

# Financial Impacts of Climate Change: Implications for the EU Budget

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## Abstract

This study focuses on the financial resources needed to fight global climate change and the implications for the EU budget. The authors apply four different methodologies to estimate global financing requirements and attempt to determine the resources that will be needed at the EU level to meet the EU's climate change objectives. The study analyses current climate change spending of the EU budget, identifies shortcomings and indicates possibilities for correcting them. It also assesses the potential of the EU emissions trading scheme (EU ETS) to raise additional resources to finance coordinated actions at the EU level aimed at fighting climate change. Finally, it provides three case studies of national public expenditure related to climate change in Germany, the United Kingdom and the United States.

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# Contents

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Executive Summary .....	1
Zusammenfassung .....	4
Note de synthèse .....	8
1. Europe in the Context of Climate Change .....	12
1.1 The Reality of Climate Change.....	12
1.2 The European Response.....	13
2. Estimating Global and EU Financing Requirements to Combat Climate Change .....	15
2.1 Global Financing Needs to Combat Climate Change .....	15
2.1.1 Recent UNFCCC Estimates .....	15
2.1.2 The Stern Review .....	16
2.1.3 UNDP Human Development Report 2007-2008.....	16
2.1.4 Vattenfall's Global Climate Impact Abatement Map.....	17
2.1.5 World Bank: An Investment Framework for Clean Energy and Development .....	17
2.1.6 Oxfam Briefing Paper: Adapting to Climate Change.....	18
2.2 Implications of Global Costs for EU Financing Needs to Combat Climate Change .....	18
3. EU Budget Interventions for Energy Policy and Climate Change .....	21
3.1 Rationale for EU expenditures on energy efficiency and climate change.....	21
3.2 Evaluating the present EU budget initiatives to tackle climate change.....	22
3.3 R&D expenditure .....	24
3.4 Cohesion policy .....	24
3.4.1 Climate change in the regulations .....	25
3.4.2 Share of cohesion policy allocated to energy efficiency and renewables.....	27
3.4.3 EU vs. national actions, what is the combined action? .....	28
3.4.4 Is the cohesion policy excessively climate unfriendly?.....	30
3.4.5 Weaknesses in programming quality and coherence.....	31
3.5 Common Agricultural Policy and Rural Development .....	31
3.5.1 Rural Development.....	32
3.5.2 Shifting priorities within the natural resources budget.....	33
3.6 External action .....	33
3.7 Conclusions on the EU budget role in combating climate change.....	33
4. Potential of the EU ETS to finance climate change actions.....	34
5. Conclusions.....	37
References.....	38
Annex 1. National Case Studies on Financial Resources Allocated to Clean Energy and Climate Change Policies .....	41
Case Study 1. Germany.....	41
Case Study 2. United Kingdom.....	43
Case Study 3. United States .....	45
List of Abbreviations .....	48



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## Executive Summary

### Estimating EU Financial Requirements for Climate Change

The financial and budgetary implications of climate change have recently been the subject of numerous studies. A common feature of these studies is the difficulty of calculating costs (and benefits) of climate change policies, which are characterised by immense complexity and great uncertainty. Such financial implications are related to average annual cost estimates, which differ greatly, ranging from 0.6% to 1.6% of total gross domestic product worldwide – or between about €230 and €614 billion annually (based on global GDP for 2006). It should be noted, however, that these figures include both public and private expenditures and that the final level of public spending is subject to political decisions.

Starting from estimations of total global costs, this paper estimates the magnitude of the European Union's share in total global costs. This share is estimated in four different ways, each using a different methodology. Two are based on the polluter-pays principle, which requires the expenses of mitigation of and adaptation to climate change to be shared according to the current level of greenhouse gas emissions. These costs are relatively simple to calculate but do not take into account historical emissions, which are considered to be essential for determining a more accurate measurement of responsibilities. Therefore, the other two methodologies are based on indices, taking into account historical greenhouse gas emissions as well as the capability of a country to contribute to the overall costs.

*The average annual global costs for mitigation of and adaptation to climate change are estimated to be between €230 and €614 billion, based on 2006 figures.*

Depending on the level of estimated global costs as well as on the methodology to assign those costs to different countries, the results show that the costs to be borne by the EU27 could range between €24 to €194 billion annually. We judge that realistic scenarios indicate annual costs of €60 billion and above, given the rationale of taking historical emissions levels and thus the historical responsibility for climate change into account. Financing needs must cover domestic mitigation and adaptation activities as well as assistance to developing countries for humanitarian needs and as a result of historical responsibilities.

*The estimated share of the EU in global costs is estimated to be at around €60 billion annually, and reaches up to €194 billion in the high-cost scenarios.*

### Budget Interventions: EU Principles

In principle cross-border pollution is most efficiently and effectively dealt with at supranational level, because national policies for abatement of pollution will tend to address those costs falling on the country's territory. Supranational action is required to ensure that all externalities

are addressed. Global action against climate change and its impacts is better dealt with in the framework of global organisations like the United Nations Framework Convention on Climate Change (UNFCCC) or other UN organisations.

On a regional level, action is best coordinated by the EU, including the allocation of financial resources. This applies also to mitigation of and adaptation to climate change. The EU budget can assist in reducing emissions and/or diminishing the burden of those member states that will suffer the most and bear the heaviest financial consequences of dealing with emissions generated elsewhere.

## Reviewing the EU Budget

It is not necessary for the EU budget to finance all the costs incurred. It might also serve as a catalyst for investments in emissions-curbing actions and technologies.

Research and development (R&D), investment in alternative and renewable energy and energy efficiency have become priority policy areas for the EU. An analysis of the EU budget, however, shows that it hardly addresses these areas, with the notable exception of R&D. Although the reduction of greenhouse gas (GHG) emissions is mentioned in the various guidelines of the budget, on many occasions it seems an insertion without much substance. Analysis of the regional operational programmes in member states benefiting from structural funds for convergence confirms that expenditures on energy efficiency and renewables are generally low and cannot be expected to offset the expected increases in emissions from planned developments, especially for transport and tourism. Programmes concentrate primarily on fostering growth with a relatively loose interpretation of the environmental sustainability of the investments.

While some member states have redirected state aids to horizontal priorities in the environment and energy-saving activities, the share of state aid for these priorities in cohesion countries is very low. A stronger emphasis on environmental investments and climate change actions is thus necessary. The review of guidelines for state aid for environmental protection does not address the issue of underspending. More weight on environmental investments could be given by requiring the integration of high standards for energy efficiency in all EU-assisted areas and creating a clear separate budget line for climate change mitigation and adaptation. The budget line should be directed at large mitigation investments with high impact for the EU as a whole. Similarly, for adaptation, the budget line should be directed to areas expected to be most severely affected.

*Countries benefiting from the cohesion policy use a very small share of EU funding on climate change expenditures. National state aids are also very low in those countries. This indicates that the EU budget should play a more active role, using earmarking, specific budget lines as well as more severe eligibility criteria for projects, requiring that these integrate GHG emissions mitigation and energy efficiency actions where relevant.*

In general, the EU budget is not well designed to efficiently address the issues faced by the EU in terms of climate change. Earmarking existing funds for climate change and creating a dedicated budget line would improve the budget's capability to deal with these issues. There should be a clear requirement for other expenditures to be 'climate proof', i.e. to include actions to avoid or reduce emissions. In addition, and to ensure the efficient allocation of funds, the EU needs to find a formula to avoid pre-allocation of funds based on political considerations rather than on efficiency criteria and needs. An approach characterised by net balance considerations would strongly influence the efficiency of the investments.

*EU budget expenditures should require that projects financed by the EU are energy efficient and foster efficiency. In addition, earmarking of existing funds for climate objectives should be considered. A budget line or specific sub-headings for investments in mitigation and adaptation is a possible option for the next Financial Framework. Allocation of support should only be based on needs and highest impact, not pre-allocated to countries or regions.*

Annex I contains case studies of climate-change related spending in Germany, the United Kingdom and the United States. The analysis is based on total or partial budgets, depending on data availability, and focuses on key priorities of expenditures.

### **How should the auctioning receipts from the EU emissions trading system be used?**

As of 2013, the EU ETS will be considerably revised. A European Commission proposal, published on 23 January 2008, foresees a reduction of the emissions cap by a linear factor each year, starting in 2013, to reach 1,720 million tonnes of CO<sub>2</sub> by the end of 2020 (or Phase 3). The proposal also foresees full auctioning of allowances for the power sector (approximately 60% of all emissions covered by the scheme). Allowances to the industrial sectors covered by the EU ETS, the remaining 40%, will continue to be given out for free, although only for as long as there is no global climate change agreement. In this case, but depending on the nature of the agreement, the allowances for the industrial sectors – partly or entirely – would also be auctioned. After the Bali Action Plan (or roadmap), there is a distinct possibility that such an agreement can be reached by the end of 2009 in Copenhagen.

The EU ETS has the potential to create considerable revenues. These are set to be retained by the member states to be invested in emissions abatement and adaptation to climate change. However, the revenues are supranational in nature and regionally arbitrary. There is a case to allocate them to coordinated actions at EU level.

Generally, auctioning receipts will go to member states' budgets, but a share of the revenues will be earmarked. According to the Commission proposal, they should be used for GHG emissions reduction policies, adaptation, climate-related R&D, renewable energies, energy efficiency measures, capture and geological storage of greenhouse gases, the Global Energy Efficiency and Renewable Energy Fund and measures to avoid deforestation and facilitate adaptation in developing countries and to address negative social impacts of climate change policy.

Independent of a global agreement, based on the Commission's EU ETS proposal, EU member states can expect average annual auctioning revenues of around €33 billion (i.e. from the power sector, which accounts for 60% of total emissions covered by the EU ETS). This assumes a CO<sub>2</sub> price of €30 per tonne, a sum that is often mentioned as likely or possible. On the hypothetical assumption of higher prices, revenues could increase to about €78 billion, in the case of a price of €70 per tonne of CO<sub>2</sub>. In case a global climate change accord is agreed, which would trigger auctioning to the industrial sector, another €22 billion would be added to the €33 billion, at a likely price of €30 per tonne, bringing the total amount to over €55 billion.

*Auctioning of emissions allowances within the framework of the EU ETS could create average annual revenues of at least €33 billion, depending on the carbon price. Revenues would go into national budgets to finance climate actions. However, as regionally arbitrary revenue, it could be used to finance actions at EU level.*

## Zusammenfassung

Die Europäische Union hat den Klimawandel als eine ihrer größten Herausforderungen erkannt und ist fest entschlossen, den durchschnittlichen globalen Temperaturanstieg auf weniger als 2°C im Vergleich zum vorindustriellen Niveau zu beschränken. Infolgedessen bekämpft die EU das Problem sowohl durch interne als auch durch externe Strategien. Die Maßnahmen zur Beschränkung und Bewältigung des Klimawandels sind jedoch mit Kosten verbunden. Die vorliegende Studie konzentriert sich daher auf die finanziellen Ressourcen und budgetären Auswirkungen der Bekämpfung des Klimawandels. Ausgehend von globalen Kostenschätzungen versucht diese Studie, jene Kosten abzuschätzen, die auf EU-Ebene anfallen werden, um die ambitionierten Klimaziele der EU zu erreichen. Die Studie analysiert die derzeitigen Ausgaben für den Klimaschutz im Rahmen des EU-Budgets, deckt Mängel auf, und weist auf Möglichkeiten hin, diesen entgegenzutreten. Außerdem bewertet die Studie das Potential des EU Emissionshandelssystems (EU ETS) zur Aufbringung zusätzlicher Finanzmittel auf EU-Ebene um den Klimawandel zu bewältigen. Annex 1 enthält darüber hinaus drei Fallstudien über Klimaschutzausgaben in Deutschland, im Vereinigten Königreich und in den USA.

### Geschätzter EU-Finanzbedarfs zur Bekämpfung des Klimawandels

Die Kosten des Klimawandels waren in jüngster Zeit Gegenstand zahlreicher Studien. Ein gemeinsames Merkmal dieser Studien ist die Schwierigkeit, die von Komplexität und großer Unsicherheit gekennzeichneten Kosten (und Nutzen) des Klimaschutzes abzuschätzen. Die geschätzten globalen Durchschnittskosten pro Jahr unterscheiden sich dementsprechend. Sie reichen von 0,6% bis 1,6% des globalen Bruttoinlandsproduktes und betragen in etwa zwischen €230 bis €614 Milliarden jährlich (auf Basis des weltweiten BIP des Jahres 2006). Es sollte beachtet werden, dass diese Zahlen sowohl öffentliche als auch private Ausgaben umfassen und dass die endgültige Höhe der öffentlichen Ausgaben Gegenstand politischer Entscheidungsprozesse ist.

Ausgehend von den globalen Kosten untersucht die Studie die Größenordnung des Anteils der Europäischen Union. Dieser Anteil wird mit Hilfe von vier verschiedenen Methodologien geschätzt. Zwei Ansätze basieren auf dem Verursacherprinzip, wonach die Ausgaben für die Beschränkung und Bewältigung des Klimawandels gemäß dem aktuellen Niveau der Treibhausgasemissionen aufgeteilt werden. Diese Kosten sind relativ einfach zu kalkulieren, berücksichtigen jedoch keine historischen Emissionen. Letztere gelten jedoch als Maßstab für eine korrekte Bewertung der Verantwortung für den Klimawandel. Aus diesem Grund basieren zwei weitere Methodologien auf Indizes, die sowohl historische Treibhausgasemissionen berücksichtigen, als auch die wirtschaftliche Fähigkeit eines Landes, zu den allgemeinen Kosten beizutragen.

*Die globalen Durchschnittskosten für die Beschränkung und Bewältigung des Klimawandels werden auf €230 bis €614 Milliarden pro Jahr geschätzt, basierend auf Zahlen aus dem Jahr 2006.*

Abhängig von der Höhe der geschätzten globalen Kosten, sowie von der Methodologie zur Verteilung dieser Kosten auf verschiedene Länder, zeigen die Ergebnisse, dass die von den EU27 zu tragenden Kosten zwischen €24 und €94 Milliarden pro Jahr betragen könnten. Wir sind der Ansicht, dass realistische Szenarien unter Berücksichtigung der historischen Verantwortung für den Klimawandel, auf jährliche Kosten von €60 Milliarden und mehr weisen. Diese Kosten decken EU-interne Maßnahmen zur Beschränkung und Bewältigung des Klimawandels ab, sowie klimarelevante Entwicklungshilfe.



*Der geschätzte Beitrag der EU zu den globalen Kosten wird auf über €60 Milliarden jährlich geschätzt und beläuft sich in kostenintensiven Szenarien auf bis zu €194 Milliarden.*

## **Budgeteingriffe: EU-Prinzipien**

Auf Grund der Tatsache, dass nationale Strategien zur Bekämpfung der Umweltverschmutzung dazu neigen nur jene Kosten zu übernehmen die auf das Hoheitsgebiet des jeweiligen Landes entfallen, sollten Probleme grenzüberschreitender Umweltverschmutzung am effizientesten und effektivsten auf überstaatlicher Ebene behandelt werden, um zu gewährleisten, dass alle externen Auswirkungen in Betracht gezogen werden. Globale Maßnahmen gegen den Klimawandel und dessen Auswirkungen sollten im Rahmen globaler Organisationen beschlossen werden. Dazu gehört insbesondere das Rahmenübereinkommen der Vereinten Nationen über Klimaänderungen (UNFCCC), sowie andere VN-Organisationen.

Auf regionaler Ebene wird die Beschränkung und Bewältigung des Klimawandels am besten von der EU koordiniert. Dazu gehört auch die Zuordnung finanzieller Ressourcen über das EU-Budget. Die EU kann dadurch jene Mitgliedsstaaten unterstützen, die finanziell am härtesten vom Klimawandel betroffen wären, bzw. schwerwiegende finanzielle Konsequenzen für Emissionen tragen müssten, die nicht im eigenen Land generiert wurden.

## **Überarbeitung des EU-Budgets**

Das EU-Budget muss nicht unbedingt alle mit dem Klimawandels assoziierten Kosten tragen, da es auch als Katalysator für Investitionen in Maßnahmen und Technologien zur Verringerung von Emissionen dienen kann.

Forschung und Entwicklung, Investitionen in erneuerbare Energiequellen und Energieeffizienz sind politische Schwerpunkte der EU beim Klimaschutz. Eine Analyse des EU-Budgets zeigt jedoch, dass diese Bereiche, mit Ausnahme von Forschung und Entwicklung, kaum behandelt werden. Obwohl die Reduktion von Treibhausgasemissionen in verschiedenen Richtlinien des Budgets erwähnt wird, mangelt es häufig an Substanz. Eine Analyse der regionalen operationellen Programme in Mitgliedsstaaten die von Struktur- und Kohäsionsfonds profitieren bestätigt, dass die Aufwendungen für Energieeffizienz und erneuerbare Energieträger im Allgemeinen niedrig sind. Man kann dementsprechend nicht erwarten, dass sie die aufgrund der Wirtschaftsentwicklung erwarteten Emissionssteigerungen – insbesondere in den Bereichen Verkehr und Tourismus – ausgleichen. Die Programme konzentrieren sich hauptsächlich auf die Förderung des Wirtschaftswachstums, wobei die ökologische Nachhaltigkeit oft in den Hintergrund gerät.

Während einige Mitgliedstaaten staatliche Beihilfen auf horizontale Umweltschutz- und Energieeinsparungsmaßnahmen umgeleitet haben, ist der Beitrag staatlicher Unterstützung für diese Prioritäten in Kohäsionsländern äußerst gering. Ein höherer Anteil umweltfreundlicher Investitionen könnte durch hohe Standards für Energieeffizienz in allen von der EU unterstützten Bereichen erreicht werden, sowie durch die Schaffung einer separate Budgetlinie für die Beschränkung und Bewältigung des Klimawandels. Diese Budgetlinie sollte sich einerseits auf hohe Investitionen zur Treibhausgasverminderung mit großen Auswirkungen auf die gesamte EU konzentrieren, sowie auf Gebiete, von denen man erwartet, dass sie am schwersten betroffen sein werden.

*Länder, die von der Kohäsionsstrategie profitieren, nutzen nur einen sehr kleinen Anteil der EU-Finanzierung für den Klimaschutz. Auch staatliche Beihilfen sind in diesen Ländern äußerst gering. Dies deutet darauf hin, dass das EU-Budget eine aktivere Rolle spielen*

*könnte, beispielsweise mit Hilfe einer Zweckbindung von Mitteln, spezifischen Budgetlinien sowie strengeren Berechtigungskriterien für Projekte bezüglich der Verringerung von Treibhausgasen und der Steigerung der Energieeffizienz.*

Im Allgemeinen ist das EU-Budget gegenwärtig nicht geeignet, sich Klimaschutzmaßnahmen effektiv zu widmen. Eine Zweckbindung bestehender Mittel an Klimaschutzmaßnahmen und die Schaffung einer eigenen Budgetlinie würden die Möglichkeiten des Budgets verbessern, diese Themen zu behandeln. Es sollte außerdem eine klare Anforderung für andere Aufwendungen geben, diese ‚klimasicher‘ (‘climate proof’) zu machen, d.h. dass sie Maßnahmen zur Vermeidung oder Reduktion von Emissionen einschließen. Darüber hinaus muss die EU eine Formel finden, um eine Zuweisung von Mitteln auf Basis politischer Erwägungen anstelle von Effizienzkriterien und Bedürfnissen zu vermeiden. Ein durch direkte Kosten-/Nutzenüberlegungen charakterisierter Ansatz würde die Effizienz der Investitionen erheblich verbessern.

*Aufwendungen im EU-Budget sollten sich an Effizienzkriterien der Projekte orientieren. Darüber hinaus sollte eine Zweckbindung bestehender Mittel für Klimaziele in Erwägung gezogen werden. Eine Budgetlinie oder spezifische Zwischentitel für Investitionen zur Beschränkung und Bewältigung des Klimawandels sind mögliche Optionen für den nächsten Finanzrahmen. Die Zuweisung von Mitteln sollte auf Effizienzkriterien und Bedürfnissen basieren, und nicht auf Grund politischer Erwägungen im Voraus erfolgen.*

Annex I der Studie enthält Fallstudien über staatliche Klimaschutzausgaben in Deutschland, im Vereinigten Königreich und in den USA.

## **Potentielle Einnahmen aus dem EU-Emissionshandelssystem**

Mit Beginn der dritten Handelsphase ab 2013 wird das EU Emissionshandelssystem (EU ETS) erheblich geändert. Am 23. Januar 2008 wurden diesbezügliche Vorschläge der Europäischen Kommission veröffentlicht. Diese sehen eine jährliche Reduktion der Emissionsobergrenze um einen linearen Faktor vor, durch den bis 2020 ein Limit von 1.720 Millionen Tonnen CO<sub>2</sub> erreicht werden soll. Der Vorschlag sieht außerdem die Versteigerung sämtlicher Berechtigungen des Energiesektors vor (ungefähr 60% aller Emissionen die durch das System abgedeckt werden). Berechtigungen der vom ETS abgedeckten Industriesektoren – die restlichen 40% - werden weiterhin frei ausgeteilt, allerdings nur so lange es kein globales Klimaschutzabkommen gibt. In diesem Fall, jedoch abhängig von der Beschaffenheit dieses Abkommens, würden auch die Berechtigungen der Industriesektoren – teilweise oder gänzlich – versteigert. Nach dem Aktionsplan von Bali, der auf der letzten VN-Klimaschutzkonferenz im Dezember 2007 beschlossen wurde, bestehen gute Chancen, dass ein derartiges Abkommen bis Ende 2009 in Kopenhagen erzielt werden kann.

Das EU ETS hat Potential erhebliche Einnahmen zu schaffen. Es wurde festgelegt, dass diese von den Mitgliedsstaaten einbehalten werden, um sie in Emissionsbekämpfung und Anpassungen an den Klimawandel zu investieren. Allerdings sind diese Einnahmen überstaatlicher Natur und regional willkürlich. Dies ist ein Argument, sie für koordinierte Maßnahmen auf EU-Ebene zu verwenden.

Im Allgemeinen werden Versteigerungseinnahmen in die Budgets der Mitgliedsstaaten einfließen, ein Anteil der Einnahmen wird jedoch zweckgebunden. Gemäß Kommissionsvorschlag sollten die Erlöse für folgende Maßnahmen verwendet werden: Reduktion von Treibhausgasen, Anpassung, klimarelevante Forschung und Entwicklung, erneuerbare Energien, Energieeffizienzmaßnahmen, Abscheidung und geologische Speicherung von Treibhausgasen, Fonds für globale Energieeffizienz und erneuerbare Energiequellen,

Maßnahmen zur Vermeidung von Abholzung und Ermöglichung der Anpassung in Entwicklungsländern, sowie zur Behandlung negativer sozialer Auswirkungen der Klimawandelrichtlinien.

Unabhängig von einem globalen Abkommen können EU-Mitgliedsstaaten auf Basis des ETS-Vorschlags der Kommission zwischen 2013 und 2020 durchschnittliche Versteigerungseinnahmen von ungefähr €33 Milliarden pro Jahr erwarten (d.h. vom Energiesektor, der für 60% der vom ETS abgedeckten Emissionen verantwortlich ist). Dies setzt einen häufig als wahrscheinlich oder möglich bezeichneten CO<sub>2</sub>-Preis von €30 pro Tonne voraus. Im Falle eines Preises von €70 pro Tonne CO<sub>2</sub> könnten die Einnahmen auf ungefähr €78 Milliarden steigen. Sollte ein globales Klimaschutzabkommen abgeschlossen werden, das Versteigerungen auch an den Industriesektor auslösen würde, würden den €33 Milliarden weitere €22 Milliarden hinzugefügt, was bei einem wahrscheinlichen Preis von €30 pro Tonne, einen Gesamterlös von über €55 Milliarden ergibt.

*Die Versteigerung von Emissionsberechtigungen innerhalb des EU ETS könnte durchschnittliche Einnahmen von mindestens €33 Milliarden pro Jahr schaffen, abhängig vom Preis der Emissionsberechtigungen. Die Einnahmen würden in nationale Budgets zur Finanzierung geeigneter Klimaschutzmaßnahmen fließen. Die Gelder könnten jedoch als regional willkürliche Einnahmen zur Finanzierung von Maßnahmen auf EU-Ebene verwendet werden.*

## Note de synthèse

L'Union Européenne a identifié la lutte contre le changement climatique comme l'une de ses priorités et est déterminée à limiter l'augmentation de la température mondiale moyenne à moins de 2°C en comparaison avec les niveaux pré-industriels. En conséquence, l'UE devra affronter le défi dans ses politiques soit internes qu'externes, et les mesures d'atténuation et d'adaptation au changement climatique seront onéreuses. Cette étude se concentre sur les besoins de ressources financières et les implications budgétaires de la lutte contre le changement climatique. Se basant sur les prévisions des financements mondiaux estimés nécessaires, l'étude tente de déterminer le montant des ressources requises au niveau européen pour réaliser les objectifs de l'UE en ce qui concerne le changement climatique. L'étude analyse le montant du budget européen actuellement utilisé pour le changement climatique, identifie ses carences et indique de possibles options pour y remédier. Elle présente le budget de quelques-uns de ses Etats membres ainsi que celui de d'autres économies majeures. Enfin, l'étude évalue le potentiel du système d'échange de quotas d'émission de l'UE (SEQE) pour libérer des ressources supplémentaires au niveau européen.

### Estimation des ressources financières européennes nécessaires pour la lutte contre changement climatique

Les implications financières et budgétaires de la lutte contre le changement climatique ont récemment fait l'objet de nombreuses études. Une caractéristique commune de ces études est la difficulté de calculer les coûts (et les bénéfices) des différents politiques, caractérisées par leur complexité et un niveau élevé d'incertitude. Ces prévisions financières sont liées aux estimations des coûts annuels moyens, qui diffèrent fortement entre elles, allant de 0,6 % à 1,6 % du produit intérieur brut (PIB) mondial total, c-à-d d'environ €230 à €614 milliards par an (basé sur le PIB mondial de 2006). Il faut cependant remarquer que ces chiffres incluent tant les dépenses publiques que privées, et que le niveau final des dépenses publiques est soumis aux décisions politiques.

Se basant sur les besoins de financement mondiaux totaux, l'étude tente de déterminer quelle devrait être la part de l'Union Européenne dans ces financements. Cette part est estimée de quatre manières différentes, chacune utilisant une méthodologie appropriée. Deux d'entre elles se basent sur le principe du pollueur payeur, qui requiert le partage des dépenses d'atténuation et d'adaptation en fonction du niveau actuel d'émissions de gaz à effet de serre. Ces coûts sont relativement simples à calculer, mais ne tiennent pas compte des émissions historiques, ce qui est considéré comme nécessaire pour arriver à une détermination plus précise des responsabilités. En conséquence, les deux autres méthodologies se basent sur des index, tout en tenant compte des émissions de gaz à effet de serre historiques ainsi que de la capacité d'un pays à contribuer aux coûts généraux.

*Les coûts mondiaux annuels moyens nécessaires aux mesures d'atténuation et d'adaptation s'élèvent, selon les estimations, de €230 à €614 milliards, sur la base de données de 2006.*

Dépendant du niveau des coûts mondiaux estimés et de la méthodologie utilisée pour attribuer ces coûts aux différents pays, les résultats indiquent que les coûts pour l'UE27 pourraient se situer entre €24 et €194 milliards par an. Nous estimons que les scénarios réalistes indiquent des coûts annuels de €60 milliards et plus, étant donné la nécessité de tenir compte des niveaux d'émissions historiques et donc de la responsabilité historique face au changement climatique. Les financements doivent couvrir les initiatives nationales d'atténuation et d'adaptation ainsi que l'assistance aux pays en voie de développement à des fins humanitaires et en raison des responsabilités historiques.

*La part estimée de l'UE dans les coûts mondiaux s'élève à près de €60 milliards par an, et atteint jusqu'à €194 milliards dans les scénarios reprenant les coûts les plus élevés.*

## **Interventions budgétaires : principes européens**

En principe, la pollution transfrontalière est traitée avec plus d'efficacité au niveau supranational, car les politiques nationales de lutte contre la pollution ont tendance à couvrir les coûts incombant au seul territoire du pays. L'action supranationale est donc requise pour s'assurer que toutes les externalités soient abordées. De plus, l'action mondiale contre le changement climatique et ses impacts sont mieux traités dans le cadre d'organisations mondiales telles que la CCNUCC ou d'autres agences des Nations Unies.

Au niveau régional, l'action devrait préférablement être coordonnée par l'UE, y compris l'allocation des ressources financières, tant pour les mesures d'atténuation que pour celles d'adaptation. Le budget européen peut aider à la réduction des émissions et/ou à la diminution de la charge des États membres qui subiront le plus les lourdes conséquences financières des émissions non générées au niveau national.

## **Révision du budget européen**

Le budget européen ne doit pas nécessairement financer tous les coûts encourus. Il peut aussi servir de catalyseur pour des investissements dans des initiatives et des technologies de freinage des émissions.

La recherche et le développement, l'investissement dans les énergies alternatives et renouvelables, ainsi que l'efficacité énergétique sont devenus des domaines prioritaires dans la politique de l'UE. Une analyse du budget européen montre toutefois que celui-ci aborde à peine ces domaines, à l'exception notable de la recherche et du développement. Bien que la réduction des émissions de gaz à effet de serre soit mentionnée dans les diverses directives du budget, il semble qu'il s'agisse le plus souvent d'une insertion sans grande substance. Une analyse des programmes opérationnels régionaux dans les États membres bénéficiant des fonds structurels de convergence confirme que les dépenses relatives à l'efficacité énergétique et aux énergies renouvelables sont généralement faibles et ne peuvent compenser les augmentations d'émissions qui seront l'inévitable conséquence des développements planifiés, surtout dans le domaine du transport et du tourisme. Les programmes sont essentiellement axés sur la promotion de la croissance associée à une interprétation relativement vague de la durabilité environnementale des investissements.

Tandis que certains États membres ont redirigé leurs aides nationales vers des objectifs prioritaires horizontaux tels que la protection environnementale et l'économie d'énergie, la part de l'aide nationale accordée à ces domaines dans les pays dits « de cohésion » est très faible. Il est donc nécessaire de se concentrer plus intensément sur les investissements environnementaux et sur les initiatives visant le changement climatique. La révision des directives concernant l'aide nationale pour la protection de l'environnement n'aborde pas la question de la sous-utilisation des fonds. Plus de poids pourrait être accordé aux investissements environnementaux en exigeant l'intégration de normes strictes en matière d'efficacité énergétique dans tous les domaines de compétence de l'UE et en créant une ligne budgétaire clairement séparée pour les mesures d'atténuation et d'adaptation. La ligne budgétaire devrait être orientée vers des investissements de réduction d'émissions qui aient un impact significatif pour l'UE dans son ensemble. De la même manière, la ligne budgétaire devrait être orientée, pour les mesures d'adaptation au changement climatique, vers les domaines susceptibles d'être les plus gravement touchés.

*Les pays bénéficiant de la politique de cohésion utilisent une très petite partie du financement européen pour les dépenses relatives au changement climatique. Les aides nationales sont également très faibles dans ces pays. Cela indique que le budget européen devrait jouer un rôle plus actif, en utilisant l'allocation des fonds, des lignes budgétaires spécifiques ainsi que des critères d'éligibilité plus sévères pour les projets, ce qui implique que les actions relatives à la réduction des gaz à effet de serre et à l'efficacité énergétique soient appliquées là où cela s'avère pertinent.*

En général, le budget européen n'est pas correctement conçu pour traiter efficacement les questions auxquelles l'UE fait face en termes de changement climatique. Octroyer des fonds existants au changement climatique et créer une ligne budgétaire spécifique amélioreraient la capacité du budget à s'adresser à ces objectifs. D'autres dépenses devraient être clairement 'sans effet négatif sur le climat', c.-à-d. inclure des actions qui visent à éviter ou réduire les émissions. En outre, pour assurer une allocation efficace des fonds, l'UE devrait trouver une formule qui permette d'éviter une pré-allocation des fonds basée sur des considérations politiques plutôt que sur des critères d'efficacité. Une approche caractérisée par des considérations de bilan net influencerait fortement l'efficacité des investissements.

*Les dépenses budgétaires européennes devraient exiger que les projets financés par l'UE assurent l'efficacité énergétique et encouragent l'efficacité. En outre, l'allocation de fonds déjà existants aux objectifs climatiques devrait être considérée. Une ligne budgétaire ou des sous-rubriques spécifiques pour des investissements dans des mesures d'atténuation et d'adaptation constituent une option possible pour le prochain contrat-cadre financier. L'octroi d'un support devrait être basé uniquement sur les besoins réels et l'impact le plus élevé, et non pré-alloué aux pays ou aux régions.*

Le rapport présente des études de cas sur les dépenses liées au changement climatique en Allemagne, au Royaume-Uni et aux États-Unis. Les études se basent sur la même méthodologie, en évaluant le niveau général et les priorités des dépenses.

### **Comment devraient être utilisées les recettes des adjudications du système d'échange de quotas d'émissions de l'UE ?**

Dès 2013, le SEQE de l'UE sera considérablement révisé. Une proposition de la Commission Européenne a en effet été publiée le 23 janvier 2008. Elle prévoit une réduction annuelle du seuil des émissions par un facteur linéaire à partir de 2013, pour atteindre 1 720 millions de tonnes de CO<sub>2</sub> à la fin de 2020 (ou phase 3). La proposition prévoit également l'adjudication complète des droits d'émission du secteur de l'électricité (environ 60 % de toutes les émissions couvertes par le système). Les droits d'émission des secteurs industriels couverts par le SEQE, les 40 % restants, continueront d'être octroyés gratuitement, à moins qu'il n'y ait un accord mondial sur le changement climatique. Dans ce cas, dépendant de la nature de l'accord, les droits d'émission des secteurs industriels feront aussi – partiellement ou entièrement – l'objet d'adjudications. Après le plan d'action de Bali (ou feuille de route), il existe une réelle possibilité de voir un tel accord atteint fin 2009 à Copenhague.

Le SEQE de l'UE a le potentiel de créer des revenus considérables. Ceux-ci sont censés être retenus par les États membres pour être investis dans des mesures d'atténuation et d'adaptation. Cependant, les revenus sont supranationaux par nature et régionalement arbitraires. Il serait préférable de les allouer à des initiatives coordonnées au niveau européen.

D'une manière générale, les recettes des adjudications seront perçues par les budgets des États membres, mais une part des revenus sera allouée. Selon la proposition de la Commission, ceux-

ci devraient être utilisés au profit de politiques d'atténuation et d'adaptation; de projets de recherche et de développement dédiés aux énergies renouvelables, à l'efficacité énergétique, et à la capture et à l'entreposage géologique des gaz à effet de serre ; du Fonds mondial pour la promotion de l'efficacité énergétique et des énergies renouvelables ; et de mesures visant à éviter la déforestation et à faciliter l'adaptation dans les pays en voie de développement ainsi qu'à amortir les impacts sociaux négatifs de certaines politiques visant à la lutte contre le changement climatique.

D'après la proposition SEQE de la Commission, en l'absence d'un accord mondial les États membres de l'UE peuvent s'attendre à des revenus d'adjudication annuels moyens d'environ €33 milliards (c.-à-d. du secteur de l'électricité, qui représente 60 % des émissions totales couvertes par le SEQE). Cela suppose un prix du CO<sub>2</sub> de €30 la tonne, qui est un prix souvent cité comme probable. Dans l'hypothèse improbable d'un prix plus élevés, les revenus pourraient augmenter jusqu'à environ €78 milliards dans le cas d'un prix de €70 la tonne de CO<sub>2</sub>. Dans l'éventualité où un accord mondial sur le changement climatique soit conclu, les adjudications seraient étendue au secteur industriel, et €22 milliards supplémentaires seraient ajoutés aux €33 milliards, à un prix probable de €30 la tonne, portant le montant total à plus de €55 milliards.

*L'adjudication des droits d'émission dans le cadre du SEQE de l'UE pourrait produire des revenus annuels moyens d'au moins €33 milliards, dépendant du prix du CO<sub>2</sub>. Les revenus seraient attribués aux budgets nationaux pour financer des initiatives climatiques. Cependant, ils pourraient être utilisés, à titre de revenus régionalement arbitraires, pour financer des actions au niveau européen.*

# FINANCIAL IMPACTS OF CLIMATE CHANGE: IMPLICATIONS FOR THE EU BUDGET

CEPS Working Document No. 300/August 2008

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## 1. Europe in the Context of Climate Change

### 1.1 The Reality of Climate Change

In the final part of its Fourth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) recently reported that “warming of the climate system is unequivocal” and that the observed increase in global average temperatures of 0.74°C between 1906 and 2005 is “very likely due to the observed increase in anthropogenic greenhouse gas (GHG) concentrations”.<sup>1</sup> The Bali Action Plan, agreed during the climate negotiations in Bali, Indonesia in December 2007, makes reference to this Fourth Assessment Report, especially to the warning that “delay in reducing emissions significantly constrains opportunities to achieve lower stabilisation levels and increases the risk of more severe climate change impacts”.<sup>2</sup>

The European Council on 8-9 March 2007 confirmed the need for developed countries to collectively reduce emissions by 60-80% by 2050 compared to 1990 and the need for more advanced developing countries to “adequately” contribute. At Bali, developing countries signed up to “measurable, reportable and verifiable *actions*”. In return, developed countries have committed to provide support to developing countries, a principle that is laid out both under the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the hitherto key international agreements governing climate change.

It is widely acknowledged that developing countries will be among those most vulnerable to climate change,<sup>3</sup> not only because of their geographic location but also because of their limited capacity to cope with such change. However, Europe is and will increasingly be affected by climate change impacts.<sup>4</sup> Observed average temperature increases of about 1°C over the last century in Europe are higher than the global average and the impacts differ greatly in different parts of Europe. The most vulnerable areas in Europe are Southern Europe and the entire Mediterranean Basin, the Alps, coastal zones, densely populated floodplains and the Arctic region, with the highest rates of projected warming on Earth. In Southern Europe, for example,

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<sup>1</sup> Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007: Synthesis Report*, 2007.

<sup>2</sup> UNFCCC, Bali Action Plan, Decision 1/CP.13, December 2007.

<sup>3</sup> See, for example, UNDP, Human Development Report 2007/2008, 2007; Nicholas Stern, *Stern Review on the Economics of Climate Change*, UK Treasury, 2006; Working Group on Climate Change and Development, *Up in smoke? Asia and the Pacific – The threat from climate change to human development and the environment*, fifth report from the Working Group on Climate Change and Development, Oxfam, 2007.

<sup>4</sup> For specific impacts on the European electricity sector, see, for example, G. Eskeland, E. Jochem, H. Neufeldt, T. Traber, N. Rive and A. Behrens, *The Future of European Electricity – Choices before 2020*, CEPS/ADAM Policy Brief No. 164, Centre for European Policy Studies, Brussels, 2008 ([www.ceps.eu](http://www.ceps.eu)).



climate change is expected to exacerbate vulnerability to reduced water availability, hydropower potential, summer tourism and crop productivity. Similarly, health risks related to heat waves and the frequency of wildfires will increase.<sup>5</sup> The Alps, on the other hand, could be faced with continuing glacier retreat, reduced snow cover and winter tourism, and extensive species loss. A rise in the sea level and increased risk of storms will mainly affect coastal zones, while floodplains will increasingly experience intense rainfall and flash floods.<sup>6</sup> In some regions, however, climate change may initially have positive effects. In Scandinavia and Russia, for example, temperature increases may lead to higher agricultural yields, lower winter mortality, lower heating requirements and a possible boost to tourism. However, these regions will be characterised by some of the highest rates of warming, which in the long run may lead to damages in infrastructure, human health, local livelihoods and biodiversity.<sup>7</sup>

Changing climatic conditions will directly impact various economic sectors. Among the most affected will be agriculture, forestry, beach and skiing tourism and health. But even financial services and insurance sectors as well as processing industries may be indirectly affected through damage to buildings, transport and industrial infrastructure.<sup>8</sup>

## 1.2 The European Response

The share of the EU in global GHG emissions, currently at about 11%, is relatively small and declining to 8% in 2050 or even below. Politically, however, the EU has been one of the most vocal advocates for combating global climate change and has led international global efforts towards a global climate change agreement. At the Spring 2007 European Council during the German Presidency, European Heads of State and Government committed to a low-carbon energy future<sup>9</sup> and agreed on an integrated climate and energy policy.<sup>10</sup> Based on the so-called “Energy and Climate Change Package”<sup>11</sup> tabled by the Commission in January 2007, the Council agreed on:

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<sup>5</sup> Data from an impact study on the 2003 heat wave on the European population suggest 70,000 additional deaths during the summer of 2003, including over 20,000 additional deaths before the month of August (Inserm, CANICULE project, 2007).

<sup>6</sup> IPCC, *op. cit.* and European Commission, Green Paper on Adapting to climate change in Europe – options for EU action, COM(2007) 354, 2007.

<sup>7</sup> Stern Review, *op. cit.*

<sup>8</sup> COM(2007) 354, *op. cit.*

<sup>9</sup> For more information on European energy policy, see A. Behrens and C. Egenhofer, *Energy Policy for Europe – Identifying the European Added-Value*, Report of a CEPS Task Force, Centre for European Policy Studies, Brussels, 2008 (available for free downloading at [www.ceps.eu](http://www.ceps.eu)).

<sup>10</sup> Presidency Conclusions of the Brussels European Council on 8-9 March 2007. Council Document 7224/1/07 REV 1.

<sup>11</sup> European Commission, Communication, An Energy Policy for Europe, COM(2007) 1; European Commission, Communication, Limiting global climate change to 2 degrees Celcius, COM(2007) 2; European Commission, Communication, Biofuels progress report, COM(2006) 845; European Commission, Communication, Renewable energy road map, COM(2006) 848; European Commission, Communication, Report on progress in renewable electricity, COM(2006) 849; European Commission, Communication, Prospect for internal gas and electricity market, COM(2006) 841; European Commission, Communication, Priority interconnection plan, COM(2006) 846; European Commission, Communication, Strategic energy technology plan, COM(2006) 847; European Commission, Communication, Sustainable power generation from fossil fuels: Aiming for near-zero emissions from coal after 2020, COM(2006) 843; and European Commission, Communication, Nuclear illustrative programme, COM(2006) 844.

- a binding absolute emissions-reduction commitment of 30% by 2020 compared to 1990 levels conditional on a global agreement,<sup>12</sup> and a “firm independent commitment” to achieve at least a 20% reduction by 2020. At the same time, the EU advocated that industrialised countries should reduce their emissions collectively by 60-80% by 2050 compared to 1990. The European Parliament in a recent resolution on climate change has insisted that the EU should commit unilaterally to 30%.<sup>13</sup>
- a binding target of 20% of renewable energy in total energy consumption by 2020;
- a binding minimum target of 10% biofuels for all transport fuels by 2020;
- a 20% reduction of primary energy consumption by 2020 compared to projections; and
- the development of a European Strategic Energy Technology Plan (SET Plan).

In addition, the European Council endorsed the carbon dioxide capture and sequestration (CCS) policy, which outlined the subsequent draft Directive published by the European Commission on 23 January 2008. The intention was to bring forward a legal and policy framework for carbon capture and geological storage, as well as an incentive framework, support programmes and external elements such as technology cooperation with key countries.

In the follow-up to the Spring 2007 Council, the European Commission has tabled various proposals to implement the European Council decisions. A European Strategic Energy Technology Plan (SET Plan)<sup>14</sup> was published in November 2007 focusing on specific technologies that may help to achieve the 2020 commitments. On 23 January 2008, the Commission presented a whole package of proposals,<sup>15</sup> containing an update of the EU Emissions Trading System (ETS),<sup>16</sup> binding national targets for the reduction of GHG emissions outside the EU ETS until 2020,<sup>17</sup> binding national targets for increasing the share of renewable energy sources in final energy consumption in 2020,<sup>18</sup> proposals on biofuels including environmental sustainability criteria,<sup>19</sup> new rules to stimulate CCS,<sup>20</sup> as well as new state aid

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<sup>12</sup> Provided that other developed countries commit themselves to “comparable” reductions and economically more advanced countries to contributing “adequately” according to responsibility and capabilities.

<sup>13</sup> European Parliament, European Parliament resolution on climate change, Resolution P6\_TA(2007)0038, 14 February 2007.

<sup>14</sup> European Commission, “Towards a low carbon future – A European Strategic Energy Technology Plan”, COM(2007) 723.

<sup>15</sup> See also European Commission, “20 20 by 2020 – Europe’s climate change opportunity”, COM(2008) 30.

<sup>16</sup> European Commission, “Proposals for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system”, COM(2008) 16.

<sup>17</sup> European Commission, “Proposals for a Decision of the European Parliament and of 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”, COM(2008) 17.

<sup>18</sup> European Commission, “Proposals for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable resources”, COM(2008) 19.

<sup>19</sup> Included in the proposal on renewable energy resources.

<sup>20</sup> European Commission, “Supporting Early Demonstration of Sustainable Power Generation from Fossil Fuels”, COM(2008) 13 and European Commission, “Proposals for a Directive of the European Parliament and of the Council on the geological storage of carbon dioxide and amending Council Directives 85/337/EEC, 96/61/EC, Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC and Regulation (EC) No 1013/2006”, COM(2008) 18.

rules. The adoption of the package by member states is foreseen for the end of 2008, at the earliest.

Priorities for international cooperation have been formulated in the Action Plan that is annexed to the European Council Presidency Conclusion of 8-9 March 2007. Priorities in regard to developing countries are: bilateral energy dialogues with China, India, Brazil and other emerging economies, focusing on the reduction of GHG emissions, energy efficiency, renewables and low-emission energy technologies – notably CCS; enhancing energy relationships with Algeria, Egypt and other oil-producing countries in the Mashreq/Maghreb region; a special dialogue with African countries on energy and the use of Community instruments to enhance decentralised renewable energies in particular, and generally energy accessibility and sustainability in this region, as well as energy infrastructure of common interest; and promoting access to energy in the context of the UN Commission on Sustainable Development (UNCSD).

At the same time, the EU continues to play a key role in the development of emerging carbon markets, both in running the world's largest GHG allowance market in the form of the European Emissions Trading Scheme and in generating the significant demand for CDM (Clean Development Mechanism) and JI (Joint Implementation) credits.

## **2. Estimating Global and EU Financing Requirements to Combat Climate Change**

### **2.1 Global Financing Needs to Combat Climate Change**

This section gives an overview of estimated costs related to fighting climate change. It summarises the main findings from various international reports. Even though these studies are rather heterogeneous in their selection of reduction targets, base years and time horizons, the numbers presented give an overall indication of the estimated magnitude of costs associated with global adaptation and mitigation efforts in response to climate change.

Estimates range from annual costs in the magnitude of 0.6% to 1.6% of global GDP, with the Stern Review suggesting 1%.

#### *2.1.1 Recent UNFCCC Estimates<sup>21</sup>*

In 2007, the UNFCCC published an analysis of existing and potential investment and capital flows regarding the international response to climate change.<sup>22</sup> It concludes that an additional €199-306 billion (\$248-381 billion) from private and public sources would be required in the year 2030 to return global GHG emissions to the level of 2004. While this sum is substantial in terms of current funding under the UNFCCC and the Kyoto Protocol, it represents only 0.3-0.5% of estimated global GDP and 1.1-1.7% of estimated global investment in the year 2030. It includes about €161-169 billion (\$200-210 billion) required for mitigation, with funds mainly flowing into the transport sector, buildings, industry and agriculture. Annual investment in the fossil fuel supply sector, on the other hand, is reduced by €47 billion (\$59 billion) in 2030. However, this does not imply declining output but rather reduced growth in this sector. In addition to mitigation, adaptation will require another €39-137 billion (\$49-171 billion). The

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<sup>21</sup> Data originally quoted in 2005 USD were converted into euro using the average 2005 USD/EUR exchange rate (1.2441). Source: Eurostat.

<sup>22</sup> UNFCCC, Report on the analysis of existing and potential investment and financial flows relevant to the development of an effective and appropriate international response to climate change, 2007.

large margin of the estimate is due to infrastructure adaptation cost estimates, which range from €6 to €104 billion (\$8-130 billion).

In the same report, investment and financial flows directed to developing countries are estimated to amount to an additional €61-62 billion (\$ 76-77 billion) for mitigation and at least another €23-54 billion (\$28-67 billion) for adaptation in the year 2030. The most costly sectors for mitigation efforts will be transport, forestry, and industry. Funds for adaptation will mainly be focused on infrastructure, water supply, and agriculture, forestry and fisheries. The magnitude of these financial transfers may be explained by the fact that developing countries will be especially vulnerable to the impacts of climate change while offering most of the cost-effective opportunities for reducing emissions.

The additional investment needs stated in the report refer to both private- and public-sector investments. However, the role of private investors is stressed as they contribute 86% to investments and financial flows.

### 2.1.2 *The Stern Review*

The principal conclusion drawn from the cost analysis of the Stern Review<sup>23</sup> is that “mitigation – taking strong action to reduce emissions – must be viewed as an investment, a cost incurred now and in the coming few decades to avoid the risks of very severe consequences in the future”. The report thus highlights the benefits of early action in view of projected future costs of climate change.<sup>24</sup>

The estimated costs of stabilisation at 500-550 parts per million (ppm) of carbon dioxide equivalent (CO<sub>2</sub>e)<sup>25</sup> are estimated to be around 1% of global GDP by 2050. Given that economic output in OECD countries is projected to rise in real terms by over 200% by 2050, and in developing countries by 400% or more, the Stern Review concludes that the projected costs of stabilisation are not trivial, but “also not high enough seriously to compromise the world’s future standard of living”. It should be noted, however, that GHG-intensive countries and sectors may face higher costs.

### 2.1.3 *UNDP Human Development Report 2007-2008*

The UNDP Human Development Report 2007-2008 uses a similar emissions reduction trajectory as the European Council of 8-9 March 2007, i.e. reductions of GHG emissions by industrialised countries of at least 80% by 2050 as compared to 1990, and 30% by 2020. Developing countries’ emissions would need to peak around 2020, with cuts of 20% by 2050. Industrial and developing countries’ efforts together would amount to a global reduction of GHG emissions of 50% by 2050, a reduction level deemed necessary to avoid “dangerous”

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<sup>23</sup> Stern Review, op. cit.

<sup>24</sup> At global warming of 2-3°C, the costs of climate change could be equivalent to 0-3% loss in global GDP (as compared to GDP levels without climate change) in the year 2050. With 5-6°C warming, on the other hand, cost estimates increase to a 5-10% loss in GDP. In the worst-case scenario, global consumption per head would fall by around 20%.

<sup>25</sup> Referring to the concentration of greenhouse gases in the atmosphere, measured in parts per million of CO<sub>2</sub> equivalent (ppm CO<sub>2</sub>e). Current concentrations of CO<sub>2</sub> are at 379 ppm (IPCC, op. cit.). A stabilisation of atmospheric greenhouse gas concentrations at 500-550 ppm CO<sub>2</sub>e is in line with the EU’s objective to limit global average temperature increases to less than 2°C compared to pre-industrial levels (see Commission Communication, “Limiting global climate change to 2 degrees Celsius”, op. cit.). However, at a concentration of 550 ppm, the probability of breaching the 2°C-threshold is still as high as 80%.

climate change.<sup>26</sup> Modelling work carried out for the report suggests that the annual costs of achieving this objective would be about 1.6% of global GDP between 2007 and 2030, a considerably higher estimate than suggested other by studies.

#### 2.1.4 *Vattenfall's Global Climate Impact Abatement Map*

Research presented by the Swedish energy company Vattenfall in January 2007,<sup>27</sup> suggests that limiting the concentration of greenhouse gases to 450 ppm by 2030 may cost only around 0.6% of global GDP if all low-cost opportunities are addressed. The study emphasises the role of measures with negative costs, i.e. where investments are more than compensated for by a decrease in the cost of energy. Such measures mainly relate to increasing energy efficiency and fuel efficiency in the buildings and transport sector.

On a global scale, the study suggests that around 27 Gt CO<sub>2</sub>e could be saved annually at costs below €40 per tonne. About 70% of this potential is not dependent on the development on new technology. Vattenfall estimates that negative cost-abatement potentials could contribute 35-45% to total abatement potentials in industrialised countries. Developing countries (excluding China) are estimated to account for more than 40% of the climate-protection potential. The industrial and power sectors represent less than 45% of the global 2030 potential.

#### 2.1.5 *World Bank: An Investment Framework for Clean Energy and Development*<sup>28</sup>

An April 2006 paper published by the World Bank notes that cost estimates associated with climate change vary widely, ranging from less than €8 billion (\$10 billion) to over €61 billion (\$200 billion) per year, depending on the stabilisation target, the pathway to stabilisation and the underlying pathways of developing countries.<sup>29</sup> Costs of about €48 billion (\$60 billion) per year are considered a central estimate for stabilising at 550 ppm CO<sub>2</sub>e. The World Bank notes that no clean carbon technology package is currently “financially viable at scale without some combination of internalising environmental externalities into the price of energy, providing incentives for implementation and further cost-cutting research and development”. The problem of financial viability is exacerbated by subsidies provided for fossil fuels and current planning approaches that are not favourable to clean carbon technologies. However, decarbonisation of the power sector is essential for significantly reducing greenhouse gas emissions, with a considerable increase in fossil fuel technologies and increased use of advanced fossil-fuel technologies (e.g. coal- and gas-fired plants with CCS) and non-fossil fuel technologies (e.g. hydropower, wind and possibly nuclear). In another World Bank report published in September 2006, the global incremental, upfront capital costs of decarbonising the power sector are estimated to reach up to €32 billion (\$40 billion) per year between 2006 and 2050, of which about 50% to 80% will need to be borne by non-OECD countries (up to €24 billion).<sup>30</sup>

As regards incremental annual costs to adapt to projected climate change in developing countries, the estimates given by the World Bank in April 2006 lie between €8 billion and €32

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<sup>26</sup> “Dangerous” climate change is defined by an increase of global average temperature of more than 2°C compared to pre-industrial levels.

<sup>27</sup> Vattenfall, *Global Climate Impact Abatement Map*, 2007 (available at [www.vattenfall.com/climate](http://www.vattenfall.com/climate)).

<sup>28</sup> Data originally quoted in 2005 USD were converted into euro using the average 2005 USD/EUR exchange rate (1.2441). Source: Eurostat.

<sup>29</sup> World Bank, “Clean Energy and Development: Towards an Investment Framework”, Development Committee, 5 April 2006.

<sup>30</sup> World Bank, “An Investment Framework for Clean Energy and Development: A Progress Report”, Development Committee, 5 September 2006.

billion (\$10-40 billion). The main issue is climate proofing future development investments, about a third of which will need to be financed by the public sector. However, in its September 2006 report, the World Bank stresses that “it is not possible to make an accurate direct calculation of the additional costs associated with adaptation”, because they partly depend on the effectiveness of mitigation efforts. Furthermore, the experience in mainstreaming adaptation into development projects is limited. Associated incremental cost estimates range from 5% to 20%, including “additional project preparation costs to assess climate risks, costs associated with instigating new activities more appropriate to the changing climate, and some direct costs in modified infrastructure”.

### 2.1.6 Oxfam Briefing Paper: Adapting to Climate Change<sup>31</sup>

In response to the estimates made by the World Bank regarding costs for developing countries of adapting to climate change (\$10-40 billion, see above), Oxfam conducted a similar analysis,<sup>32</sup> expanding the basis of estimation. The study notes that the World Bank estimates only account for integrating adaptation into ongoing planning, policies and practices, and climate-proofing ongoing infrastructural investments. It thus leaves aside costs for “macro actors” of climate-proofing existing stock of natural and physical capital where no new investment had been planned, or the costs of financing new investments needed specifically because of climate change. Similarly, the World Bank does not consider costs faced by “community-level actors” (households, communities, local NGOs) for the vast majority of their adaptation needs.

Taking these and other factors into consideration, Oxfam concludes that the costs of adapting to climate change in developing countries is likely to be at least €40 billion (\$50 billion), “and will be far more if greenhouse gas emissions are not cut fast enough”.

## 2.2 Implications of Global Costs for EU Financing Needs to Combat Climate Change

Given the estimated global costs to combat climate change, it is useful to determine the share of total costs the EU might have to shoulder. In the context of the last package of energy and climate change proposals tabled on 23 January 2008, the Commission estimated total costs for implementation of the European climate change and energy policies to be less than 0.5% of the EU’s GDP per year. This would amount to approximately €60 billion annually until 2020. Drawing on the global studies presented above, we focus on four different methodologies to estimate the EU’s share in global costs. The first two approaches are purely based on the Polluter-Pays Principle (PPP), according to which “the polluter should bear the expense of carrying out [...] measures decided by public authorities to ensure that the environment is in an acceptable state”.<sup>33</sup> In the case of climate change, this principle would require those countries with the highest greenhouse gas emissions to contribute most to alleviate negative effects associated with climate change. In a first step, we hence propose to establish the EU’s share of contribution to global costs according to its current share in global greenhouse gas emissions. In the year 2004, the global economy emitted about 49 billion tonnes of greenhouse gases

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<sup>31</sup> Data originally quoted in 2005 USD were converted into euro using the average 2005 USD/EUR exchange rate (1.2441). Source: Eurostat.

<sup>32</sup> Oxfam, “Adapting to climate change – What’s needed in poor countries, and who should pay”, Oxfam Briefing Paper 104, May 2007.

<sup>33</sup> OECD, “Recommendation of the Council on guiding principles concerning international economic aspects of environmental policies”, Council Document No. C(72)128, 1972 .

(measured in CO<sub>2</sub> equivalent).<sup>34</sup> The EU27's share was about 5.2 billion tonnes<sup>35</sup> or 10.6%. It could thus be argued that, given its current level of greenhouse gas emissions and without taking into account historical responsibilities related to past emissions, the EU should bear about 11% of global costs to combat climate change.

In a similar approach, global emissions are allocated to industrialised and developing countries using the politically agreed categorisation of the United Nations Framework Convention on Climate Change by differentiating between so-called 'Annex I parties'<sup>36</sup> and so-called 'Non-Annex I parties'.<sup>37</sup> Some Annex I parties are required to provide financial resources to enable developing countries to undertake emissions reduction activities under the Convention and to help them adapt to adverse effects of climate change. Following this logic, the financial ability of industrialised countries and the demands of numerous political actors, we assume for simplicity that all costs may have to be borne by all Annex I parties. A second estimate of EU financial requirements can thus be derived from the EU's share in absolute GHG emissions of Annex I parties. With total greenhouse gas emissions of 18.2 billion tonnes in this category of countries and the EU27 contributing to this amount with 5.2 billion tonnes in 2004, the EU could be required to come up with about 28.6% of global costs to fight climate change and its impacts around the world.

Responsibilities based on emissions are relatively simple to calculate. However, they do not take into account the level of historical emissions, which is considered to be necessary to determine a more accurate measurement of responsibilities. The other two methodologies are based on indices, taking into account historical greenhouse gas emissions as well as the capability of a country to contribute to the overall costs.

One is based on the Adaptation Financing Index (AFI) recently developed by Oxfam.<sup>38</sup> This index estimates the share a country should contribute to financing climate change adaptation in developing countries based on their historical responsibility for climate change and their capability to help. The responsibility of a country is determined by its historical CO<sub>2</sub> emissions between 1992 and 2003, the capability by its score on the UNDP Human Development Index (HDI)<sup>39</sup> in 2004. A country is only considered "capable" if its HDI score exceeded 0.9 (countries below that threshold are not taken into consideration for calculation of the AFI). In the Adaptation Financing Index, responsibility and capability are given equal weight. While originally the index only accounted for the costs adaptation, it is equally useful as an indicator for allocating total costs. According to the index, only 17 EU member states are considered both responsible and capable. It is suggested that these countries bear 31.6% of the global costs.

A similar index has been brought forward by Christian Aid.<sup>40</sup> It acknowledges one of the foundations of the UNFCCC that combating climate change requires an international response based on the participation of all countries in accordance with their "common but differentiated

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<sup>34</sup> IPCC, op. cit.

<sup>35</sup> UNFCCC greenhouse gas inventory data.

<sup>36</sup> Industrialised countries that were members of the OECD in 1992, plus countries with economies in transition (EIT Parties), including the Russian Federation, the Baltic States and several Central and Eastern European countries.

<sup>37</sup> Mostly developing countries, including China, India, Brazil, etc.

<sup>38</sup> "Adapting to climate change – What's needed in poor countries, and who should pay", op. cit.

<sup>39</sup> The HDI is the normalised measure of life expectancy, literacy, education, standard of living and GDP per capita for countries worldwide, on a scale of 0 to 1.

<sup>40</sup> Christian Aid, *Truly inconvenient – Tackling poverty and climate change at once*, 2007.

responsibility”<sup>41</sup> The global costs of mitigation and adaptation are shared by applying a Responsibility and Capability Index (RCI), which is based on cumulative per capita emissions data (1990-2005) as a proxy for responsibility, and national wealth and wealth disparity data as a proxy for capability. According to the RCI, the EU27 has a share of burden of 26.6%. The RCI allocates no burden to Least Developed Countries, but (contrary to the AFI) takes into account emerging middle-income economies (e.g. China, Russia, Brazil) with 21.1% of total costs.

The following table summarises the above results and compares the EU27 relative share of global financial requirements with those of the US, Japan and Russia.

*Table 1. Estimated shares of EU27 and other countries in global climate costs, in %*

	PPP Global	PPP Annex-I	AFI	RCI
EU27	10.6	28.6	31.6	26.6
US	14.7	39.6	43.7	34.3
Japan	2.9	7.7	12.9	8.1
Russian Federation	4.3	11.5	n.a.	2.3

*Note:* Figures in this table represent percentages of global costs related to climate change to be shouldered by the EU27 and the other main global players. PPP refers to the polluter-pays principle, according to which the share of a country is calculated on the basis of its share in global emissions (PPP Global) or its share in emissions of Annex-I parties only (PPP Annex-I). The Adaptation Financing Index (AFI) and the Responsibility and Capability Index (RCI) take into account historical greenhouse gas emissions as well as the capability of a country to contribute financially.

Table 1 shows that dividing the costs only over Annex-I countries or according to the AFI results in the EU bearing a higher percentage of costs than in the other cases, where countries with lower levels of income are also held accountable for financing mitigation of and adaptation to climate change.

Having derived the EU’s share in these estimates, we can show how much funding the EU may have to raise, based on estimates of global costs that we have presented above. The absolute estimated amount of money required in the EU thus depends not only on the estimated global costs, but also on the methodology to assign the costs to different countries. The lowest estimate of the above studies was brought forward by Vattenfall, with costs of around 0.6% of total gross world product. The UNDP in its Human Development Report 2007/2008 presented the highest estimate with 1.6% of global GDP. The Stern Review’s 1% may be considered as a middle estimate between the two. Table 2 shows estimated EU annual costs for different scenarios (i.e. Vattenfall, Stern Review, and UNDP) and for different global cost allocation methods. The numbers are based on the 2006 global GDP of around €38.4 trillion (\$48.2 trillion).<sup>42</sup>

<sup>41</sup> See also the United Nations Framework Convention on Climate Change (UNFCCC), United Nations, 1992.

<sup>42</sup> Using World Bank figures. Values in USD exchanged into EUR with the average 2006 USD/EUR exchange rate of 1.2556 (Source: Eurostat).



Table 2. Estimated funding required to fulfil EU27 share in global climate costs, in € billion

	Vattenfall (0.6%)	Stern Review (1%)	UNDP (1.6%)
PPP Global	24.4	40.7	65.2
PPP Annex-I	65.9	109.9	175.8
AFI	72.9	121.4	194.3
RCI	61.3	102.2	163.5

Note: Figures in this table represent average annual costs (in €) to be shouldered by the EU27. The large variation can be explained with different global cost estimates (given in % of world GDP in the year 2006) as well as different methodologies to assign a share of the global costs to the EU27. PPP refers to the polluter-pays principle, according to which the share of a country is calculated on the basis of its share in global emissions (PPP Global) or its share in emissions of Annex-I parties only (PPP Annex-I). The Adaptation Financing Index (AFI) and the Responsibility and Capability Index (RCI) take into account historical greenhouse gas emissions as well as the capability of a country to contribute financially.

The costs to be borne by the EU27 could range between €24 and €194 billion annually. More realistically, they may be expected to be above €60 billion per year, due to the limited likelihood of a global burden-sharing according to current emissions.

### 3. EU Budget Interventions for Energy Policy and Climate Change

#### 3.1 Rationale for EU expenditures on energy efficiency and climate change

According to the theories of fiscal federalism, policies to address cross-border pollution, such as GHG emissions, are better implemented at supranational level. This is due to the fact that national policies for pollution abatement tend to address only those sources of pollution that create costs for a country's own territory and will fail to address pollution, such as GHGs, which has global consequences. In the case of GHGs, the benefits of individual action are too low to expect countries to take actions in isolation, without global commitments. To ensure that all externalities are addressed, supranational action is thus required. This is not only valid for several expenditures in research, abatement and adaptation, but for the introduction of fiscal mechanisms such as environmental taxation.

Studies<sup>43</sup> explain why expenditure policies for cross-border environmental pollution are better implemented at EU level (better still at global level). Greenhouse gases are clear cross-border pollutants, as were the CFC ozone layer-depleting gases, and should be tackled to a large extent at supranational level. Table 3 explores whether there is a rationale for devoting an important element in the EU budget to the task of tackling abatement and adaptation, in the context of key EU principles.

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<sup>43</sup> See J. Núñez Ferrer, *The EU Budget – The UK rebate and the CAP – Phasing them both out?*, CEPS Task Force Report, Centre for European Policy Studies, Brussels, 2007, p. 108; and J. Núñez Ferrer, *EU budget and policy reforms in order to promote economic growth*, ITPS Working Document R2007:015, Swedish Institute for Growth Policy Studies, 2007.

*Table 3. Why and when are investments for climate change better served at EU level?*

EU Principle	Rationale
European public good	Sustainability of the environment is not only a European but a global public good. Reducing the impacts of greenhouse gas emissions will help preserve the environment, even improve it, if those actions also create effective global environmental management rules, e.g. better forestry management.
Subsidiarity	Actions to address cross-border pollution (i.e. emissions) are better addressed at supranational level to ensure that policies integrate the overall costs of externalities of pollution, regardless of the source or impact locations. Funding for research should be allocated to the best European centres of excellence in this area and thus should be handled at EU level. A share of the investments for abatement or adaptation should be distributed supranationally to ensure that the investments are allocated where the results are highest. Using co-financed actions can provide the incentives to prioritise certain actions at national level and assist areas with scarce financial resources to implement successful strategies. This requires, however, that allocation of funding is based on needs and excellence alone and not influenced bureaucratically and politically.
Proportionality*	By better targeting needs and exploiting available economies of scale of coordinated action, funding can achieve the budgetary principle of proportionality even better than independent actions by member states.
Additionality	By pooling resources and investing where impacts are the highest, the additionality principle is easy to achieve. Member states should ensure that EU funding is not substituting national funding, i.e. national funding should not decrease.
Value for money	For R&D and Trans-European Networks (TENs), the possibilities to build up economies of scale are substantial. The allocation of funds to those areas and investments creating the best mitigation and adaptation results should generate a higher value for money.
European added value	A successful reduction of greenhouse gas emissions and a well organised strategy for adaptation can create a substantial European value added.

\* To act in direct proportion to what is required to achieve its objectives.

There is undoubtedly an important potential role of the EU and the EU's budget to address the challenges of climate change. Presently the EU already commits a share of its budget to investments related to climate change. These investments are presented and briefly evaluated in the following sections.

### **3.2 Evaluating the present EU budget initiatives to tackle climate change**

The EU has launched a large number of initiatives for climate change. The EU has integrated the need to tackle climate change in its integrated guidelines for growth and jobs,<sup>44</sup> which are reflected in other documents, including in EU expenditure policies.

The main flagship initiatives are the EU emissions trading scheme (ETS), The 7<sup>th</sup> Framework Programme for Research and Development, the EU Energy Initiative,<sup>45</sup> the Environmental

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<sup>44</sup> European Council, Integrated Guidelines for Growth and Jobs (2005-2008), document adopted by the Council in April 2005.

Technology Action Plan,<sup>46</sup> the European Strategic Energy Technology Plan (SET plan),<sup>47</sup> and the Energy Policy for Europe.<sup>48</sup> The latter two set ambitious targets and draw a strategy to transform EU commitments into reality.

In addition, the EU is proposing to impose limits on the emissions of the transport sector. For industrial policy, the EU proposes to foster the European comparative advantage in the industrial sector to respond to the needs for green technologies and the reduction in emissions. In the international sphere the EU has taken a leading role in promoting climate change initiatives.

Most of the initiatives, however, have to be implemented and funded by member states. EU initiatives have been limited mainly to the regulatory sphere. The EU presently has no ability to use environmental fiscal instruments at EU level. Lately the EU has stepped up initiatives to increase EU funding in this area and coordinate the efforts of member states.

A recent initiative calling for a strong EU effort is the SET plan which highlights the structures required to implement the European energy initiative, but falls short of presenting the possible financial dimension and the method to cover the burden.

Some limited funding is available, in particular for R&D, the Trans-European Networks and through the cohesion and agricultural policies, but the EU budget does not contain a precise role and integrated strategy in the effort to curb climate change is unclear. Various documents by the EU have requested the integration of climate change initiatives in the different financial headings, but neither the level of actual funding nor the concrete role of the budget has been clarified.

In fact, the present budgetary allocation of EU funds has been dominated by other concerns. The budget still very much allocates funds based on the previous financial priorities under new headings. In fact, the 2004 Commission document on the priorities of the EU budget for the present Financial Perspective addresses investments for climate change mitigation and adaptation rather vaguely. The main focus is on energy security and connectivity. For cohesion policy, energy is mentioned as a subject, but growth and employment are the main issues with no clear mention of a serious integration of climate change concerns. A fast shift in thinking is visible and the Community Strategic Guidelines for the structural and cohesion funds<sup>49</sup> do seem to make an effort to reinforce the need for investments in energy efficiency and renewables, but the text is still rather non-committal in this sense.

Instead, the focus on climate change is an ex-post exercise, where member states are allowed to use existing funds for climate change-related expenditures. However, with the recently launched SET plan, the new energy initiatives and expected redressing reviews of policies, the budgetary

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<sup>45</sup> EU Energy Initiative for Poverty Eradication and Sustainable Development (EUEI) launched at the World Summit on Sustainable Development (WSSD) in September 2002.

<sup>46</sup> European Commission, Communication, Stimulating Technologies for Sustainable Development: An Environmental Technology Action Plan for the European Union”, COM(2004) 38.

<sup>47</sup> European Commission, Communication, “Towards a European Strategic Energy Technology Plan” (SET-Plan), COM(2006) 847.

<sup>48</sup> European Commission, Communication, “An Energy Policy for Europe”, COM(2007) 1.

<sup>49</sup> European Commission, Communication, “Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013”, COM(2005) 0299, Brussels, 05.07.2005.

needs in this area will likely become clearer. Also for national actions such as state aids, the European Commission has proposed a reform to facilitate national actions on climate change.<sup>50</sup>

This section will present how the EU budget is presently integrating climate change into its objectives and measures. Some measure of the present level of funding will be given, but as important as the level of funding is the actual coherence and quality of strategies and implementation.

### 3.3 R&D expenditure

The 7<sup>th</sup> Framework Programme (FP7) running for the duration of the Financial Perspectives 2007-2013 has a budget of around €50 billion. Of these funds, €8.5 billion have been allocated to the environment, energy and transport research. These funds are without doubt the only EU budget element that can be clearly identified with the fight against climate change. The use of the funds will partially depend on the quality of the project selection and the performance of the implementation of the SET plan.

In addition to the 7<sup>th</sup> Framework Programme for research, the EU has an energy efficiency programme within the Competitiveness and Innovation Framework Programme (CIP) called ‘Intelligent Energy’, which finances know-how exchanges in the field of energy efficiency and renewable energy. For 2008, €73 million have been allocated to this priority in the preliminary draft budget for 2008.<sup>51</sup>

The main risk in the use of the R&D funds is the intense pressure to distribute funding based on political pressures rather than excellence, especially for very large projects. The disputes on the distribution of task for the Galileo programme show to what extent member states demand a portion of the budget pre-allocated, regardless of the impacts on efficiency. In addition, Framework Programmes are still the result of political negotiations in the Council and bureaucratic preferences of the EU, with the selection procedures highly influenced by the European Commission. Consequently, there is a risk that the technology initiatives and the financial allocation are also driven by political pressures, giving preference to certain technologies rather than others.

As a response, some studies<sup>52</sup> suggest the establishment of a ‘European Science Agency’ to foster scientific excellence and manage the allocation of R&D funding. Such an agency exists in the US (National Science Foundation), but a similar institution has also been established in Ireland with the Science Foundation Ireland (SFI).

### 3.4 Cohesion policy

For the period 2000-06, an evaluation by the ESPON project<sup>53</sup> concluded that environmental and spatial effects of the cohesion policy were not well addressed. The Structural Funds were

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<sup>50</sup> European Commission, “Proposals for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable resources”, COM(2008) 19, 2008.

<sup>51</sup> European Commission, Statements of Estimates of the Commission for 2008, Document I, Expenditure analysis by multiannual financial framework headings, 2007.

<sup>52</sup> D. Gros and S. Micossi, *A Better Budget for the European Union – More Value for Money, More Money for Value*, CEPS Policy Brief No. 66, Centre for European Policy Studies, Brussels, 2005 (www.ceps.eu).

<sup>53</sup> Centro de Estudos em Economia da Energia, dos Transportes e do Ambiente (Research Centre for Energy, Transport and Environment Economics) (CEEETA), *Territorial trends of energy services and*

not sufficiently responsive to issues of GHG emissions or needs for adaptation to climate change. Given the rather limited discussion on reforming the fundamental structure and logic of the cohesion policy, climate change seems still to be largely an exercise in wording, rather than an efficiently integrated part of the approach.

### 3.4.1 *Climate change in the regulations*

The Community Strategic Guidelines for the structural and cohesion funds<sup>54</sup> mention the need for member states to promote investments in sustainable energy and transport and investments that contribute to the EU's Kyoto Protocol commitments.

The guidelines prioritise investment in reducing energy dependency by improving energy efficiency and participating in the Trans-European Networks. The priority also mentions the need to support renewable sources of energy and alternative technologies.

The Cohesion Fund regulation<sup>55</sup> allows for the investment under Article 2 paragraph 1 b) in “energy efficiency and renewable energy and, in the transport sector outside the trans-European networks, rail, river and sea transport, intermodal transport systems and their interoperability, management of road, sea and air traffic, clean urban transport and public transport.”

In the regulation for the structural funds,<sup>56</sup> Articles 3, 5 and 6 include the possibility of funding actions to mitigate climate change. Article 5 concentrates on cross-border connections, which should increase the efficiency of energy production. Table 4 summarises the sections of the different cohesion-oriented EU funds that propose actions for CO<sub>2</sub> reductions.

It is difficult to assess how the member states will allocate funding to climate change actions. The main concern of convergence regions is to increase the rate of growth and thus green investments are not a priority, if not clearly connected to growth enhancing activities. Road infrastructure is clearly a major priority for most convergence regions and in particular the new member states, which in fact runs counter to the need to reduce emissions. On the other hand, economies of the new member states are highly energy intensive, and energy efficiency needs to become a priority in their development. The relationship between increases in energy efficiency while simultaneously meeting growing energy demand will be very important. New investments in infrastructure in the new member states should take the opportunity to directly use the latest technologies to foster energy efficiency.

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*networks and territorial impact of EU energy policy*, ESPON Report 2.1.4, (European Spatial Planning Observation Network funded by the European Commission), 2005.

<sup>54</sup> European Commission, Communication, Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013, COM(2005) 0299, Brussels, 5 July 2005.

<sup>55</sup> Council Regulation (EC) No 1084/2006 of 11 July 2006 establishing a Cohesion Fund and repealing Regulation (EC) No 1164/94.

<sup>56</sup> Council Regulation (EC) No 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999.

Table 4. Funding options for CO<sub>2</sub> reductions in the EU budget

	Cost item	Funding options			
		ERDF	ESF	Cohesion Fund	EAFRD
Framework for management and administration	Administration costs (funding of regulatory authorities)				
	Developing a system of public procurement criteria for energy efficiency		(3.2bi)		
	Establishment of energy agencies				
	Capacity building for public administrations		(3.2bi) (3.2bii)		
	Capacity building for businesses	(4.1) (4.7) (6.2d)	(3.2bii)		
	Strengthening of related regulatory authorities		(3.2bi) (3.2bii)		
	Studies and plans	(4.3) (5.2b)	(3.2bi)		
	Research	(4.1)			
Operation and monitoring	Operation of participation systems (especially for the resolution of conflicts)		(3.2bii)		
	Operation of awareness and information systems	(4.2)			
	Support to business for up taking energy-saving solutions	(4.1) (4.3) (5.1a) (5.1b) (5.2b)		(2.3)	(28)*
	Support to households to adopt energy-saving solutions				
	Support for the development of relevant skills and techniques	(4.1) (5.1a) (5.1b)	(3.1ai)		
Infrastructure	Development of renewable energy sources	(4.7) (5.2b)		(2.3)	
	Development of co-production infrastructures	(4.7) (5.2b)		(2.3)	
	Improvement of networks	(4.7) (5.2b)			
	Refurbishment, improvement or establishment of district heating systems	(4.7) (5.2b)			

\* Possible but no direct mention of energy efficiency is made, only the general modernisation of technology.

Source: WWF, *EU Funding for Environment, A handbook for the 2007-13 programming period*, WWF, April 2005, p. 32, Table 18.

The new member states also have the possibility of using EU funds for housing,<sup>57</sup> which would allow, even if not spelled out specifically, funding of energy-efficient housing projects and promote those using renewable energy sources, such as photovoltaic panels. Some 40% of all

<sup>57</sup> “Within the framework of an integrated urban development operation, it is considered necessary to support limited actions to renovate housing in areas experiencing or threatened by physical deterioration and social exclusion in the Member States that acceded to the European Union on or after 1 May 2004, whereas, Regulation” (EC) No 1080/2006 of 5 July 2006 on the European Regional Development Fund and repealing Regulation (EC) No 1783/1999.

CO<sub>2</sub> emissions in the EU originate from the building sector,<sup>58</sup> 77% of which originate in the residential sector.<sup>59</sup> The opportunity offered in the new member states for replacing the decaying housing stock with energy-efficient buildings is particularly important, but unfortunately energy efficiency is not mentioned in the regulation. Given the needs in housing renovation in the new member states, this could be an area where important impacts can be achieved, if new member states incorporate the energy-efficiency concerns into housing project requirements. Funds are limited to 3% of the ERDF funding, which may discourage energy-efficient projects due to material costs, which would be a great missed opportunity.

There are calls for the funds to be available also in the old EU15 for housing. The rationale for such a move should be assessed, as this specific article addresses a particularly grave problem in the former centrally planned economies, which is not present in the EU15. An argument can be made for having energy efficiency for housing financed by the cohesion policy also for the EU15, but that would require a different article, as it is questionable whether the EU should be subsidising the construction of housing in general.

However, would assisting the housing sector to adopt energy-efficient systems be in line with the rules of subsidiarity, additionality and proportionality for the budget? In the EU15, national public incentive schemes and grants for improvement of energy efficiency and renewable energy use in housing can be (and often are) made available, and more stringent regulation on energy efficiency in new housing can be (or already is) introduced. The recent proposal for a directive<sup>60</sup> on the promotion of the use of energy from renewable sources should also facilitate further the promotion of renewable energy systems for housing. According to the rule of subsidiarity, the EU clearly has a role to play to finance action in poorer countries, where national budgets are limited and other incentive schemes are hampered due to low financial capacity in the private sector. In wealthier member states, the use of EU funds is not necessarily better than leaving it to national interventions, which are driven by national emissions commitments. This issue may need to be approached, as it is important that the EU budget creates additional reductions, rather than just implicitly substituting national actions.

### 3.4.2 *Share of cohesion policy allocated to energy efficiency and renewables*

It is difficult to determine what share of the cohesion policy is allocated to issues related to climate change or even how much it should allocate. Studies on the matter<sup>61</sup> seem to contradict each other due to the interpretation of what constitutes an investment in climate protection.

Presently the main thrust in the EU for reducing emissions is on increasing the use of renewable sources of energy and improving energy efficiency. Two studies<sup>62</sup> have analysed the level of allocated expenditures for the new member states for the programming period 2007-13, and both conclude that the allocated funding is too low, generally around 2%. It is very low in

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<sup>58</sup> Figures from the Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings, OJ L 1, 4.1.2003, p. 65–71.

<sup>59</sup> Figure by CECODHAS for the year 2002.

<sup>60</sup> European Commission, “Proposals for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable resources”, COM(2008) 19, 2008.

<sup>61</sup> For positive studies, see Energy 4 Cohesion consortium (<http://www.e4c.org/>) and for more sceptical assessments, see WWF, “How green is the future of EU cohesion policy? A score-card analysis of the Regional Funds Programming 2007-2013”, May 2007 (<http://assets.panda.org/downloads/scorecard.pdf>); and CEE Bankwatch Network and Friends of the Earth, “EU cash in climate clash – How the EU funding plans are shaping up to fuel climate change”, 2007 ([www.foeeurope.org/publications/2007/EU\\_cash\\_climate\\_clash.pdf](http://www.foeeurope.org/publications/2007/EU_cash_climate_clash.pdf) – accessed 5 January 2008).

<sup>62</sup> See the 2<sup>nd</sup> and 3<sup>rd</sup> studies cited in the preceding footnote.

Poland and Hungary (1%) and higher in Lithuania with 5.4%, although the bulk of funding in Lithuania is spent on biomass and a small fraction on energy efficiency. A strong criticism is that large sums are invested in activities that will foster CO<sub>2</sub> emissions, well beyond the impacts of the emission reduction actions.

In this report we have expanded the analysis to other operational programmes for convergence regions. Table 5 lists the share of EU funds (ERDF, ESF, CF) allocated to energy efficiency and renewable energy<sup>63</sup> in these areas (excluding the outermost regions of France, the Isles of Scilly for the UK and the phasing-in area of Hainaut in Belgium).

*Table 5. EU funds allocated to energy efficiency and renewables in convergence regions*

Old members	% Share of funds*	New members	% Share of funds*
Spain	1,0%	Bulgaria	2,9%
Greece	1,5%	Czech Republic	3,0%
Italy	3,7%	Estonia	2,2%
Portugal	0,8%	Latvia	2,9%
Germany	1,5%	Lithuania	5,4%
UK	3,3%	Hungary	1,1%
		Malta	2,1%
		Poland	1,4%
		Romania	2,2%
		Slovak Republic	2,1%
		Slovenia	3,8%

\* Average of Operational Programmes for the convergence regions.

Sources: Own calculations and Bankwatch Network and FOE, op. cit.

Regarding Table 5, it should be noted that EU budget interventions are not the only approach to reduce emissions in the energy sector. National schemes based on other grants or fiscal incentives play an important role. Germany is a leader in the renewable energy sector and cannot be accused of neglect even if scarcely any EU funds are directed to this priority, as national state aid is very high. State aid directed to the environment and energy saving (energy efficiency and renewables) in many EU15 member states has increased considerably. However, in the new member states, as well as in the old cohesion countries, the share of state aid directed to the environment and energy saving has been very low, often negligible.<sup>64</sup>

### 3.4.3 EU vs. national actions, what is the combined action?

This can be implied looking at the allocation of state aid in the member states (public support excluding Community funds and instruments). Figures 1 and 2 exclude state aid to agriculture, fisheries and railways. Based on DG Competition's state aid scoreboard, Figure 1 shows that the EU 25 has strongly shifted the emphasis of state aids from sectoral support to horizontal priorities and in particular environmental issues and energy saving. This has been quite recent, with a remarkable shift from priorities between 2000 to 2003 and between 2004 to 2006. However, the same shift cannot be observed in cohesion countries<sup>65</sup> (see Figure 2). While sectoral aid has been reduced due to shifting the emphasis to horizontal issues, the environment and energy-saving investments have not increased markedly.

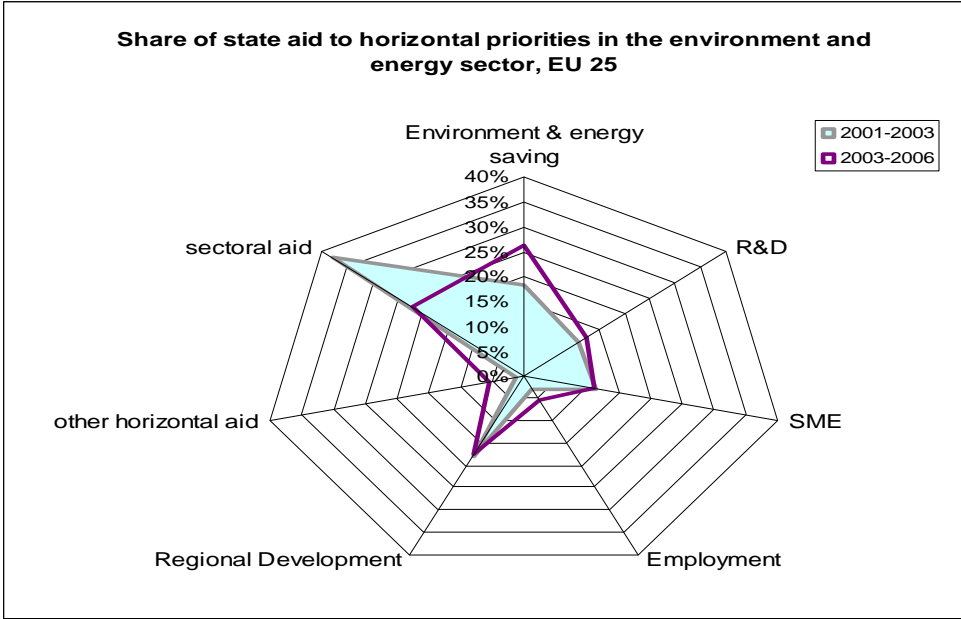
<sup>63</sup> Category codes 39-43 for structural fund assistance, from the European Commission's implementing regulation for the Structural and Cohesion Funds 2007-2013, L 371/1, 8 December 2006.

<sup>64</sup> Based on State aid declarations to DG Competition.

<sup>65</sup> The new member states except Cyprus and the remaining 'old' three (Greece, Spain and Portugal)

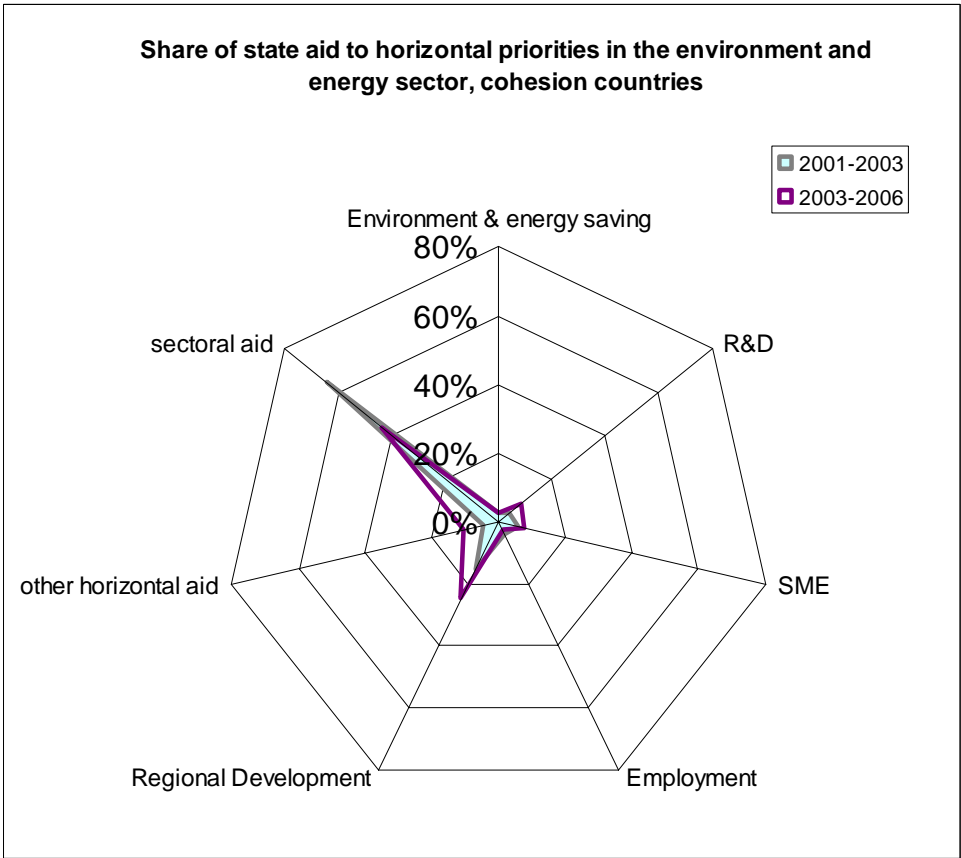


Figure 1.



Based on data of the European Commission’s state aid scoreboard  
[http://ec.europa.eu/comm/competition/state\\_aid/studies\\_reports/stat\\_tables.html](http://ec.europa.eu/comm/competition/state_aid/studies_reports/stat_tables.html)

Figure 2.



Based on data of the European Commission’s state aid scoreboard  
[http://ec.europa.eu/comm/competition/state\\_aid/studies\\_reports/stat\\_tables.html](http://ec.europa.eu/comm/competition/state_aid/studies_reports/stat_tables.html)

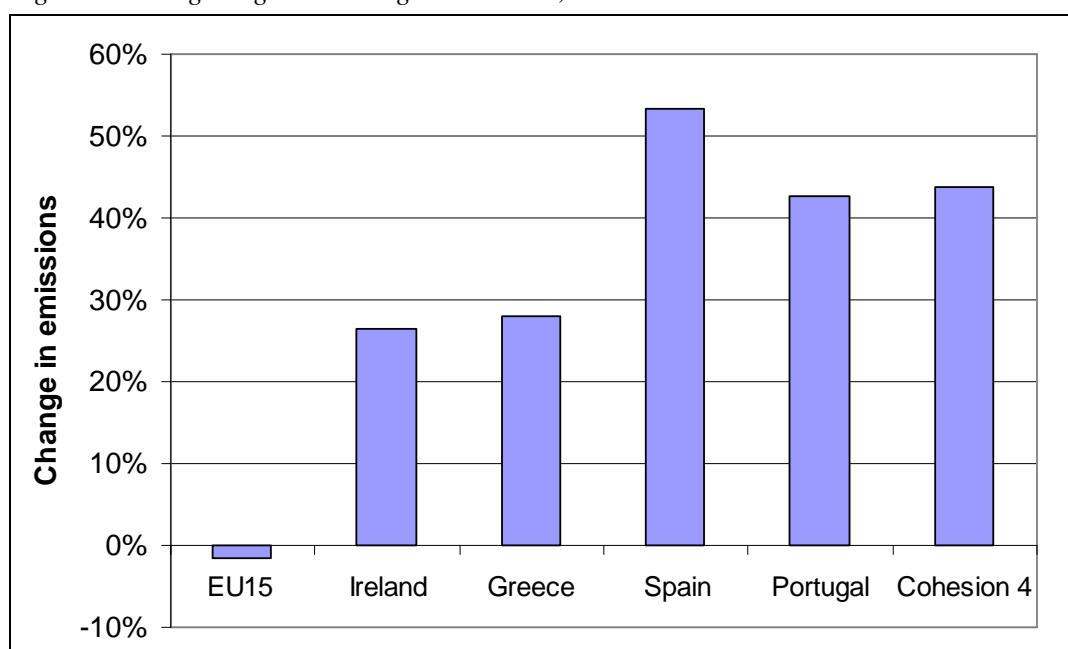
Due to the limited capacity of national budgets and the remaining large needs to improve energy efficiency, the share of the allocation in the new member states does indicate a relative weakness. Even when taking into account that energy efficiency and reduction of greenhouse gas emissions can be achieved through the support in other aid categories (urban transport, regional aid, rail network expansion or communal heating system improvements), climate concerns are not well integrated in the development plans.

#### 3.4.4 *Is the cohesion policy excessively climate unfriendly?*

There is also a serious concern that EU funding is encouraging a considerable increase in emissions (Figure 3). Transport absorbs the highest share of the EU funds in the new member states, between 20 and 30% of the funds. Of those, 53% are allocated to road transport. The planning for public transport is still inadequate in the structural fund strategies in most of the new member states.

In fact, the priorities of the EU funds are still similar to those of the cohesion countries in the past. These countries have seen a large increase in emissions between 1990 and 2005, compared to a total reduction of emissions by the EU15 of 1.5%. Just for purposes of illustration, if emissions had been limited to an increase of 10%, the EU15 would have reduced emissions by another 4% compared to 1990, equivalent to 170 million tonnes of GHGs.

Figure 3. *Change in greenhouse gas emissions, 1990-2005*



Data Source: Eurostat.

It is generally accepted that reductions in greenhouse gas emissions cannot be expected in countries trying to catch up with the rest of the EU, but this does not mean that their development plans should not integrate serious and coherent considerations of emissions in the design of the programmes. Unfortunately, almost all of these countries have ample slack in their commitments, due to a base year in the Kyoto Protocol before the collapse of the old heavy industries, which sends a signal that the problem does not need to be seriously integrated. It is nevertheless telling that while these new members have an allowance of around 20% of emissions increases, all EU15 cohesion countries increased their emissions beyond that limit. Perhaps this could be a signal that having a slack is not a panacea nor an excuse for inaction. In

any case, this slack will cease to exist as of the 2012 period when the Kyoto Protocol commitments expire, and follow-up commitments will be based on legally binding EU GHG emissions targets, which will not allow 'over-allocation'.

#### *3.4.5 Weaknesses in programming quality and coherence*

Another problem in the planning process for the use of the EU funds is the administrative capacity to efficiently integrate such strategies. A proper development strategy requires the coordination of highly skilled specialists in the process of planning, monitoring and evaluation. Many countries and in particular most cohesion countries lack capacity in general and thus also in respect to action on climate change. There is a need to use all available avenues, such as twinning projects to transfer the necessary knowledge in those fields. In addition, there is a need to build up awareness of the options for integrating climate change concerns horizontally into the structural actions.

What can be concluded from the different reports is that there is a lack of coherence in the approach to climate change. For energy, the ESPON analysis detected that while a number of actions on energy efficiency were taking place, there was, for example, a lack of connection between strategies in renewable energy and energy efficiency, i.e. new renewable energy systems may supply energy to energy inefficient houses or industries. This is important for cohesion funds, if projects creating energy consuming activities are not energy efficient, the benefits will be partly eroded.

### **3.5 Common Agricultural Policy and Rural Development**

The role of the Common Agricultural Policy (CAP) in climate change is not well defined. The Agricultural Commissioner Mariann Fischer Boel has announced repeatedly that the Health Check for the policy in 2008 will take climate change actions into account. At present the main action by the CAP has been to support the production of energy crops for the production of bio-energy crops with a €45 per hectare premium introduced in the 2003 CAP reform. This is the flagship policy to encourage reaching the target of the use a 10% share in biofuels in the transport sector.

While production of biofuels from crops has increased strongly, the effect of the support has disrupted food markets and is creating mounting concern over the effects on the environment, for example deforestation to increase production area.<sup>66</sup> Deforestation is one of the major contributors to an increase in CO<sub>2</sub> in the atmosphere. The demand for biofuels in Europe and elsewhere is potentially causing severe environmental impacts. Clearing of rainforests for the production of biofuels, for example, causes increases the CO<sub>2</sub> more than the savings from replacing the fossil fuels with them. The global costs for a reduction estimated at 1% of the EU's GHG emissions<sup>67</sup> are high. As an energy security policy it is also rather ineffective, as the potential to reduce imports is estimated to be only 3%.<sup>68</sup>

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<sup>66</sup> For an analysis, see A. Behrens (2008), "Biofuels or Bicycles", CEPS Commentary, 20 February 2008 ([www.ceps.eu](http://www.ceps.eu)).

<sup>67</sup> F. Jacquet, L. Bamière, J-C Bureau, L. Guindé, H. Guyomard and D. Treguer (2007), "Recent Developments and Prospects for the Production of Biofuels in the EU: Can they really be 'part of the Solution'?", paper presented at the Farm Foundation Workshop on Biofuels, Feed and Food Tradeoff, Saint Louis, Missouri.

<sup>68</sup> European Commission, Communication, "An EU Strategy for Biofuels", COM(2006) 34, Brussels 8.2.2006, SEC (2006) 142.

The policy was seen as a response to income concerns in the farming sector, while addressing a valid environmental problem, but seems to have little impact beyond presenting another form of income support for farmers, or some new economic activities in rural areas. The enquiry into biofuels by the UK's Select Committee on Environmental Audit of the House of Commons is rather damning over crop biofuel support: "Transport biofuels have received disproportionate attention and funding in comparison to other policies which could reduce greenhouse gas emissions at lower environmental risk and lower cost. The focus on biofuels is an example of silo policymaking..."<sup>69</sup>

As a policy to reduce GHG emissions, mounting evidence shows that there are better alternatives in other areas. As a consequence, the enthusiasm for this technology has partially faded and support to biodiesel production should fall, while support into research on the second generation of biofuels from organic matter not competing with food production or wood industry products should increase.

In the future, the CAP will most likely take some action to incorporate climate concerns in the cross-compliance conditionalities for support, but in general the role of the policy is still unclear. Rather than subsidising biofuels, the CAP should reduce support that promotes emissions or reduces forest areas, or actively reduce subsidies to farming and promoting afforestation. The complex interconnections between agricultural subsidies and climate change due to the enormous effects on land use and thus CO<sub>2</sub> absorption are explained by Lingard.<sup>70</sup> Just adding cross-compliance obligations is a sub-optimal approach, as investing in other areas than direct payments can potentially reap higher returns, not only for reductions in GHGs, but for the environment in general.

### 3.5.1 Rural Development

The rural development policy<sup>71</sup> mentions the need for mitigating emissions in the assistance for forestry measures. Afforestation support is portrayed as the main rural development tool for combating climate change: "Areas apt for afforestation for environmental reasons such as protection against erosion or extension of forest resources contributing to climate change mitigation, shall be eligible for payments provided for in Article 36(b)(i) and (iii)." (Article 50, paragraph 6). In 2003, around 8% of the rural development funds were allocated to forestry.<sup>72</sup> However, no direct mention of energy efficiency and emissions reductions is found on any measure for farm businesses or food processing industries.

What can be said from the Common Agricultural Policy is that the budget structure in general fails to address the needs of the sector,<sup>73</sup> and the bio-fuel subsidies seem also to be highly controversial as regards their benefits. There is ample scope to reform the policy, most likely freeing resources to reallocate to needs at EU level, including climate change.

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<sup>69</sup> UK House of Commons (2008), "Are biofuels sustainable?", Environmental Audit Committee, First Report of Session 2007-08.

<sup>70</sup> J. Lingard (2001), "The Role of Agricultural Subsidies in Environmental Change", *Encyclopedia of Global Environmental Change*, Vol. 3, Chichester: John Wiley, pp. 168-171.

<sup>71</sup> Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

<sup>72</sup> European Commission, "EU rural development monitoring data – Synthesis report for 2001-2003", SEC(2006) 508, 2006.

<sup>73</sup> J. Núñez Ferrer and E.A. Kaditi, *The EU added value of agricultural expenditure – from market to multifunctionality – gathering criticism and success stories of the CAP*, report for the European Parliament, Contract No IP/D/BUDG/CONT/FWF/2006-072/lot 3/C1/SC 3, 2008.

For rural development, more could be allocated to programmes for the generation of biomass for energy, while other measures for support, such as for the farm investments and the food industry, should require the integration of GHG emissions concerns in the projects. Business expansions, for example, should be required to ensure that the most efficient technologies are used in reducing emissions.

### *3.5.2 Shifting priorities within the natural resources budget*

The CAP, rural development and environment budgetary headings are all under expenditures for “Preservation and management of natural resources”, 79% of which are market-related expenditure and direct payments of the CAP. It is important to start improving the targeting of the CAP and to avoid a relabelling of existing payments to some climate cross-compliance tool. A new sub-heading under the “preservation and management of natural resources” dedicated to expenditures on actions on natural resources could be created. This heading would include actions either to adaptation in agriculture or protection of natural areas from climate change, or to generating inputs in the energy sector, such as biofuels from crops or other natural resources, such as forests. This would ensure some earmarking of funds and a better targeting and an overview of the role of subsidies in agriculture in this area.

## **3.6 External action**

Adaptation and mitigation assistance to developing countries by developed countries will have to be considerable. The role of the EU budget in the financial effort is unclear.

Interventions from the EU budget in this area are modest. The EU has launched a Global Energy Efficiency and Renewable Energies Fund (GEEREF) starting in 2007 to assist developing countries to introduce renewable energy and improve energy efficiency. The budget is initially very modest (€80 million) and is part of the Development Cooperation Instrument (DCI).

In addition to this assistance, the Energy Initiative (see section 3.2) also allows cooperation with developing countries, and some funds are available for ACP (African, Caribbean and Pacific) countries for energy. In total €220 million are available from the EU budget for assistance in developing countries in the energy area.

The budget line for the European Union as a global partner does not yet reflect the importance of climate change, and in particular adaptation. While some programmes may well exist within sub-headings, there is no visible budget line dedicated to this area. Even the Instrument for Pre-accession (IPA) lacks a clear component dedicated to energy efficiency, renewables or adaptation.

There is a need to reflect on the possible adjustments for the process of the budget review to increase the external action on climate change, as well as rethinking the EU’s role for the budget beyond 2013. The EU has the potential to lead the development of environmental technology and should also have the budget to allow this technology to be transferred to other countries.

## **3.7 Conclusions on the EU budget role in combating climate change**

The present EU budget does not sufficiently and coherently integrate climate change into its actions, despite the EU having a very important role in reducing CO<sub>2</sub> emissions. The budget neither has an integrated approach nor a clear budget line on this issue. Investments in actions to combat climate change are possible but not compulsory, and neither is there an earmarking of funds, such as for the Lisbon strategy in the cohesion policy.

The overall budget for climate change is rather modest, while figures suggest that EU funding is necessary to motivate countries to invest in energy efficiency and renewable sources of energy, in particular in the cohesion countries.

There is potential to have much higher resources for climate change actions within the present budget size, by reforming policies such as the CAP, earmarking funds, creating special headings and integrating climate change into existing policies, i.e. by requiring that projects applying for EU assistance integrate energy efficiency and emissions reductions in the plans, and even consider the adaptation needs for the future. In addition, the current EU budget is well below its overall ceiling on own resources of 1.24% of GNI for all 27 member states, allowing for considerable increases without changing the ceiling.

The EU budget for external actions has to increase. It is important that the EU assists developing countries to adopt low-emissions technologies and energy-efficiency actions. In addition the EU is committed to assist countries to adapt to climate change, which will become a serious concern. A larger budgetary commitment is also necessary if the benefits of developing the EU's lead in environmental technologies can be transferred abroad due to the financial assistance the EU provides to developing countries. There is a strong potential benefit for Europe's industries in this area from a strong assistance by the EU.

It is difficult to assess what the EU budget should spend for climate change-related policies. As estimated in section 2, the share of the global annual costs for the EU should be around €60 billion a year. This figure integrates costs for both the private and public sectors; they also include the EU's internal costs and may sometimes be undertaken through tax subsidies rather than financial assistance from a public budget. The size of the EU budget in this global effort is unclear, and there is a need to clarify what national budgets are spending, and to make sure that EU action is coherent with national actions.

One of the concerns is that external assistance could be higher than half of the yearly costs. It is important to understand how the EU and the member states will coordinate their aid budgets to cover the financial needs for action in developing countries.

#### **4. Potential of the EU ETS to finance climate change actions**

The EU budget resources mechanism could assist in raising the necessary financial needs and simultaneously contribute to create incentives to introduce environmentally friendly technologies. While member states may have their own individual tax systems in this direction, the EU has no fiscal instrument at its disposal. The European Commission's 2004 report on the Own Resources<sup>74</sup> presented two options of taxes<sup>75</sup> to reduce CO<sub>2</sub> emissions and foster more energy efficiency. Those will need to be addressed again for a future own resources mechanism.

The European Union Emissions Trading System (EU ETS) could become an important part of the EU's resources to finance climate change actions. The EU ETS has the potential to create considerable revenues. These are currently set to be retained by the member states in order to be invested in emissions abatement and adaptation to climate change. However, it is interesting to note that the revenue of the ETS fulfils the most important criteria for it to become a

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<sup>74</sup> European Commission, *Financing the European Union, Commission report on the operation of the own resources system*, Vols. I and II, COM(2004) 505 final, Office for Official Publications of the European Communities, Luxembourg, 2004.

<sup>75</sup> Taxes on motor fuel for road transport or taxes on aviation fuel.

supranational revenue for the EU. It fully fulfils the rare criteria of regional arbitrariness.<sup>76</sup> There is a case to allocate the funds to coordinated actions at EU level, as long as they are earmarked for GHG emissions reductions.<sup>77</sup>

As of 2013, the EU ETS will be considerably revised. A European Commission proposal was published on 23 January 2008, which foresees a reduction of the emissions cap by a linear factor each year, starting in 2013, to reach 1,720 million tonnes of CO<sub>2</sub> in the year 2020<sup>78</sup> (which is the last year of Phase 3). The proposal also foresees full auctioning of allowances for the power sector – approximately 60% of all emissions covered by the scheme. EU ETS allowances to the industrial sectors, constituting the remaining 40%, will continue to be given out for free, although only for as long as there is no global climate change agreement. In this case, but depending on the nature of the agreement, the allowances for the industrial sectors – partly or entirely – would also be auctioned. After the Bali Action Plan (or roadmap), there is a distinct possibility that such an agreement can be reached by the end of 2009 in Copenhagen.<sup>79</sup>

Generally, auctioning receipts will go to member states' budgets, but a share of the revenues will be earmarked. According to the Commission proposal, they should be used for greenhouse gas reduction policies, adaptation, climate-related research and development, renewable energies, energy efficiency measures, capture and geological storage of greenhouse gases, the Global Energy Efficiency and Renewable Energy Fund and measures to avoid deforestation and facilitate adaptation in developing countries and to address negative social impacts of climate change policy.

Figure 4 gives an overview of the development of CO<sub>2</sub> emissions of sectors currently covered by the EU ETS. The current Commission proposal for Phase III (2013 to 2020) foresees an annual linear reduction of 1.74% to determine the cap of slightly more than 1.7 billion tonnes for the year 2020. The cap for trading phase I (2005-07) was set at around 2.2 billion tonnes of CO<sub>2</sub> and for phase II (2008-12) at slightly less than 2.1 billion tonnes of CO<sub>2</sub>. For phase IV (2021-2028) and beyond, the Commission proposes to continue applying the 1.74% annual reduction.

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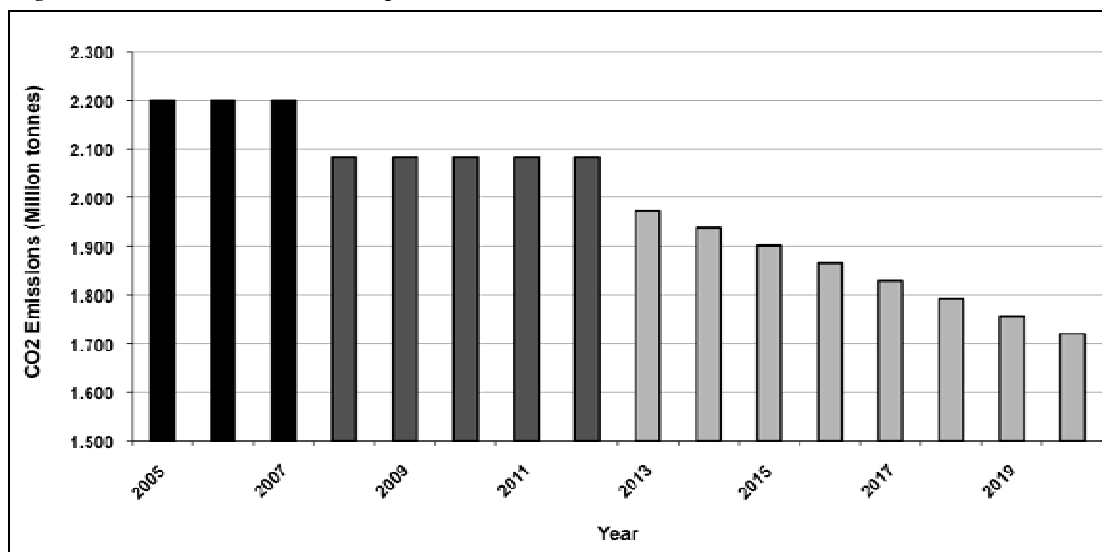
<sup>76</sup> Regional arbitrariness in the EU refers to the impossibility of reasonably attributing the base of the tax to a particular member state, as in the examples of custom tariffs and taxes for cross-border pollution.

<sup>77</sup> The allocation of resources for action at EU level is not synonymous to making the funds part of the EU budget Own Resources. These funds should be allocated to fighting climate change and this is not guaranteed if they are integrated into the general budget.

<sup>78</sup> According to the Commission, these figures will need to be adjusted for three reasons. First, in line with the extensions of the scope in Phase II. Second, following the proposal of the Commission to extend the scope of the ETS as from the third trading period. Third, the figures do not take into account the inclusion of aviation, nor emissions from Norway, Iceland and Liechtenstein.

<sup>79</sup> See also C. Egenhofer (ed.), *Beyond Bali: Strategic Issues for the post-2012 Climate Change Regime*, CEPS Paperbacks, Centre for European Policy Studies, Brussels, 2008 ([www.ceps.eu](http://www.ceps.eu)).

Figure 4. EU ETS Emissions Caps in Phases I, II and III



Note: Emission caps applying in EU ETS trading phase I (2005-2007), phase II (2008-2012) and those proposed for phase III (2013-2020).

Based on the Commission's proposal, the average annual emissions cap for the years 2013 until 2020 would amount to around 1.8 billion tonnes of CO<sub>2</sub>. Given that, without a global climate change agreement, 60% of total allowances would be auctioned (i.e. all allowances of the power sector), we should assume that EU member states will auction some 1.1 billion allowances. Assuming a CO<sub>2</sub> price of €30 per tonne, a price that is often mentioned as likely or possible, EU member states as a whole will receive some €33 billion of revenues annually from the EU ETS. On the hypothetical assumption of higher prices, revenues could increase to about €78 billion, in the case of a price of €70 per tonne of CO<sub>2</sub>. In case a global climate change accord is agreed, which could trigger auctioning to the industrial sectors – depending on the nature of an agreement – up to another €22 billion of auctioning revenues would be added to the €33 billion, at a likely price of €30 per tonne, bringing the total amount to over €55 billion. After the Bali Action Plan (or roadmap), there is a distinct possibility that such an agreement can be reached by the end of 2009 in Copenhagen.

Tables 6 and 7 present possible auctioning revenues from the EU ETS. Table 6 for Phase III (2013-2020) and Table 7 for Phase IV (2021-2028).

Table 6. Possible auctioning revenues from the EU ETS, Phase III (2013-2020)

Assumed price* per tonne of CO <sub>2</sub>	Average annual auctioning revenue without global agreement**	Average annual auctioning with global agreement***
€30	€33.2 billion	€55.4 billion
€50	€55.4 billion	€92.4 billion
€70	€77.6 billion	€129.3 billion

\* €30 is a price that is often quoted.

\*\* Column 2 assumes that only allowances to the power sector are auctioned, i.e. 60% of all emissions allowances.

\*\*\* Column 3 assumes that all allowances are auctioned

For the fourth phase (from 2021 to 2028), the European Commission proposal foresees a further annual reduction of the total number of allowances by 1.74%, bringing average annual CO<sub>2</sub> allowances under the EU ETS to 1.6 billion tonnes. While the total number of allowances decreases, we should expect a higher allowance price, e.g. going up from €30 to €50 per tonne



of CO<sub>2</sub>. We should also expect a higher overall auctioning share. Assuming a €50 average annual price per tonne of CO<sub>2</sub>, revenues are expected to amount to €64 billion annually between 2021 and 2028, given that allowances to the power sector are fully auctioned and that 50% of those are to the industrial sectors. In case all allowances under the EU ETS should be auctioned at €50 in Phase IV, average annual revenues could increase to around €80 billion.

*Table 7. Possible auctioning revenues from the EU ETS, Phase IV (2021-2028)*

Assumed price* per tonne of CO <sub>2</sub>	Average annual auctioning revenue 80% auctioning**	Average annual auctioning full auctioning***
€30	€38.2 billion	€47.8 billion
€50	€63.7 billion	€79.6 billion
€70	€89.2 billion	€111.5 billion

\* €50 may be a more realistic price than €30 in Phase IV.

\*\* Column 2 assumes that 100% of allowances to the power sector are auctioned and 50% to the industry sector, i.e. 80% of all emissions allowances.

\*\*\* Column 3 assumes that all allowances are auctioned.

## 5. Conclusions

We have shown that cross-border pollution, such as the increasing concentration of greenhouse gases in the atmosphere, is best addressed at the supranational level. Based on the principles of the EU (aiming at European public goods, subsidiarity, proportionality, additionality, value for money and EU value added), there is a strong case for an important element in the EU budget to support the mitigation of and adaptation to climate change. The present EU budget, however, allocates only a modest amount to climate change, and there is neither an integrated approach, nor a clear budget line on the issue. To increase resources for climate change actions within the present budget size, we suggested reforming policies such as the CAP, earmarking funds, creating special headings and mainstreaming climate change into existing policies, i.e. by requiring projects applying for EU assistance to integrate energy efficiency and emissions reductions in their proposals, and possibly even giving consideration to future adaptation needs. Due to the fact that the current EU budget is well below the overall ceiling on own resources of 1.24% of EU27 GNI, considerable additional funds could be made available by increasing the overall budget without changing the ceiling.

Similarly, the EU will need to increase assistance to developing countries and the support to their adaptation efforts. However, the EU budget for external action should also extend support to the transfer of low-carbon technologies, which will benefit mitigation in developing countries as well as Europe's industries in this sector.

Taking into account historical responsibilities for climate change, the EU may be required to contribute at least €60 billion annually to global climate change mitigation and adaptation efforts. This amount includes public and private spending, as well as domestic and external action. The amount to be covered by the EU budget will need to be determined politically, depending on private sector and member states' financial efforts. There are significant potential revenue streams that could be used for this purpose and the EU ETS could play an important role in providing resources to the EU to address its energy and climate change objectives.

While potential revenues of the EU ETS are currently set to be retained by member states, they fulfil the most important criteria (e.g. regional arbitrariness) to become supranational revenues for the EU. Some estimated €33 billion of average annual revenues (possibly even €55 billion in the case of full auctioning of emissions allowances) could thus be allocated to coordinated actions at EU level between 2013 and 2020, and probably even more thereafter.

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## Annex 1. National Case Studies on Financial Resources Allocated to Clean Energy and Climate Change Policies

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This annex contains three case studies regarding financial resources allocated to clean energy and climate change policies in Germany, the United Kingdom and the United States. They permit an overview of the general level and focus of public spending. However, the data presented are not suitable for a comparison between the various countries for the following reasons. First, the total/partial amount spent on climate change is not consistent for all countries due to varying degrees of integrity and aggregation. The same applies to the various spending categories. Second, the sums presented may be distorted due to the fact that the same kind of spending may be allocated to different categories. Third, tax breaks are not always included in climate change spending due to their nature as forgone revenue.

### Case Study 1. Germany<sup>80</sup>

German federal spending on clean energy and climate change policies has considerably increased from 2005 to the year 2006, and has remained more or less stable thereafter.<sup>81</sup> As shown in Figure A1, total spending in the year 2008 will reach about €2.2 billion – almost three times the amount spent in 2005. Taking into account an additional €400 million of revenues expected from the auctioning of EU allowances from the EU ETS, the German federal government expects to dispose of €2.6 billion for climate policies in the year 2008. The following references to total federal climate change expenditure do not include such revenues from emissions trading.

The increase from 2005 to 2006 can be explained by the introduction of various programmes related to climate proofing of the existing building stock. The so-called ‘Programme to reduce CO<sub>2</sub> emissions from buildings’ was introduced in 2006. With an annual volume of €1 billion, this programme represents about 45% of total climate expenditures in Germany in the year 2008. It will provide about €4 billion to energy conservation measures for buildings between 2006 and 2009 and has been extended at its present level until 2011. Together with other programmes, the German government in 2008 will spend a total of €1.5 billion on the climate proofing of buildings, or almost two thirds of total climate change expenditures (see Figure A2). Other programmes in this area mainly include tax breaks and financial support for measures implemented on federal government-owned buildings.

Other than on buildings, the 2008 German federal budget allocates about €490 million to climate and energy research (including on renewable energy sources and technology) and about €236 million to the promotion of renewable energy sources (excluding relevant research).

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<sup>80</sup> Sources: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Federal Ministry of Transport, Building and Urban Affairs, 13 August 2007. Please note that financial data for fiscal years 2005 to 2007 refer to budgeted expenditures. Data for 2008 refer to the government proposal.

<sup>81</sup> Please note that these figures refer to the federal budget only and do not including public spending of the Länder.

Figure A1

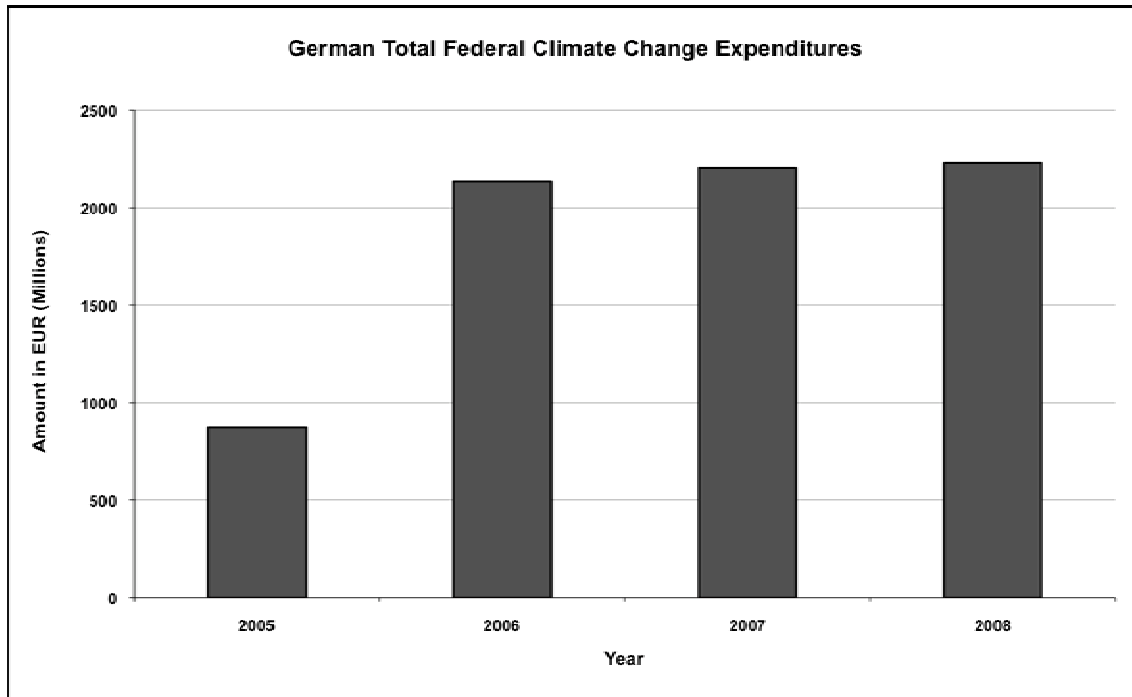
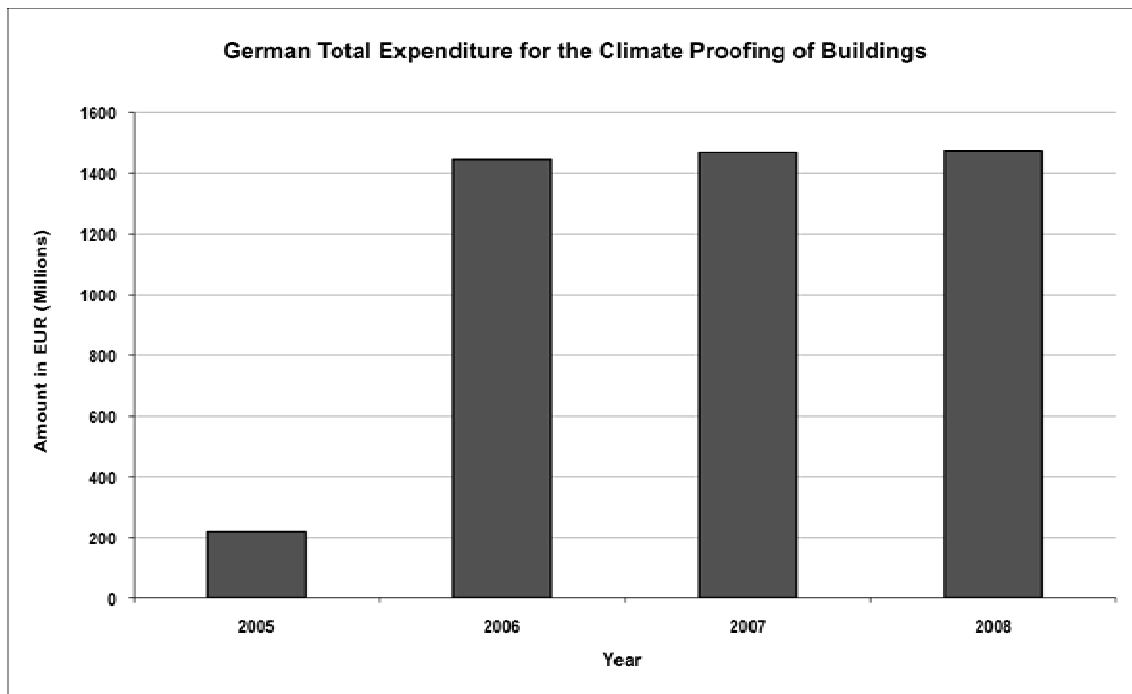


Figure A2

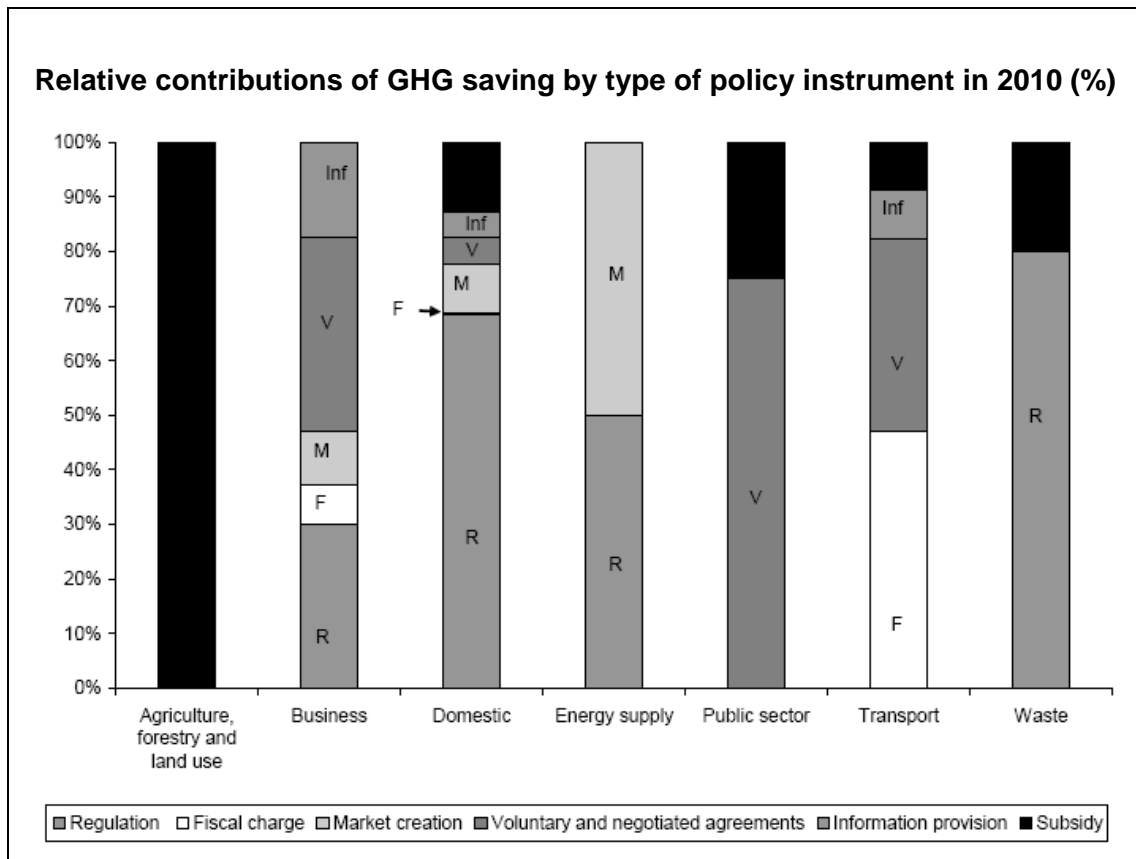


### Case Study 2. United Kingdom

The UK considers climate change as a priority for action. The main tools the UK uses to reduce climate emissions are fiscal incentives rather than direct subsidies. As illustrated in Figure A3, GHG savings have to a large extent been achieved without direct public expenditures.

The UK is known for having an integrated approach to climate issues horizontally across sectors, which makes it difficult to speak about a specific budget for climate change. However, actions are important and the UK is a pioneer in launching a Climate Change Bill in 2007 describing a national strategy. The government budget for 2008 includes a large array of measures, particularly numerous fiscal incentives, to promote energy efficiency and renewable energy.

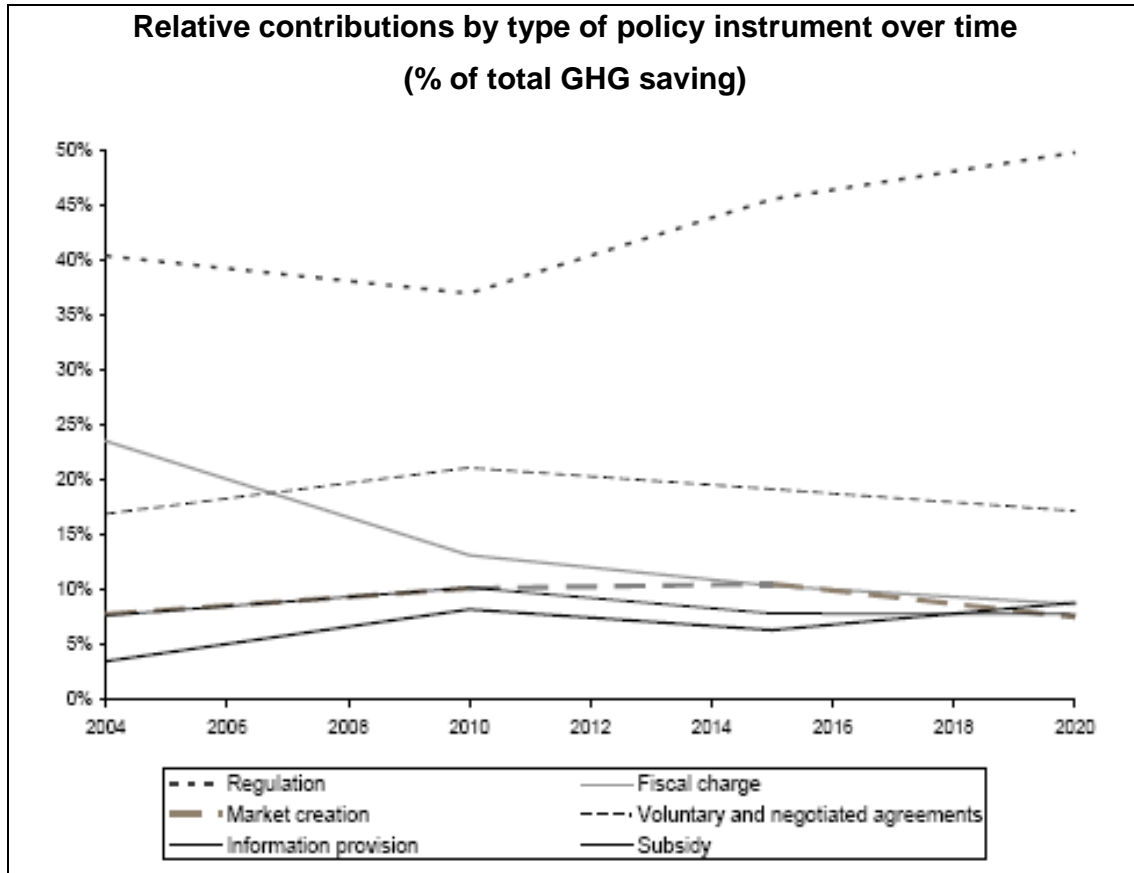
Figure A3



Source: Defra (2006), Synthesis of Climate Change Policy Evaluations, p. 19.

The UK has estimated the contribution of the different policies to GHG emissions reductions. Regulation is by far the most important policy instrument to curb emissions and will increase in importance until 2020. Voluntary and negotiated agreements also play an important role. Fiscal charges and subsidies only play a minor role, with the former decreasing drastically in importance until 2010 and in a less pronounced manner until 2020. Figure A4 clearly shows that the primary impact on GHG emissions is not from public finances. The impact of research and development has not been included in this analysis.

Figure A4



Source: UK Department for Environment, Food and Rural Affairs (Defra), *Synthesis of Climate Change Policy Evaluations*, 2006, p. 20.

Public expenditure on climate change is difficult to estimate as different departments are cooperating on climate change. The UK recently created an Office for Climate Change (OCC), to coordinate action across departments. As for public expenditures in the area, except for agricultural direct support, the main UK budget clearly dedicated to financing climate change is under the control of DEFRA (Department for Environment, Food and Rural Affairs). DEFRA's spending on climate change programmes has increased substantially between the fiscal years 2002-03 and 2006-07 (see Figure A5). In 2006-07, total spending on climate change mitigation and adaptation programmes reached €1.6 billion (£1.1 billion).<sup>82</sup> Total mitigation programmes amounted to €792 million (£542 million), with funds of €476 million (£326 million) committed to one programme alone called 'Warm Front'. This programme is the UK government's flagship programme tackling fuel poverty in England through provision of a range of heating and insulation measures for the vulnerable in the private sector. The second largest mitigation programme in 2006-07, funded with €115 million (£78.4 million), aims at helping the business and public sectors to reduce their carbon emissions and to develop new low carbon technologies through sponsorship of the Carbon Trust. The Business Resources Efficiency Waste (BREW) programme received €89 million (£60.8 million) from DEFRA with the aim to provide advice and support to businesses on how to minimise their waste and improve their resource efficiency.

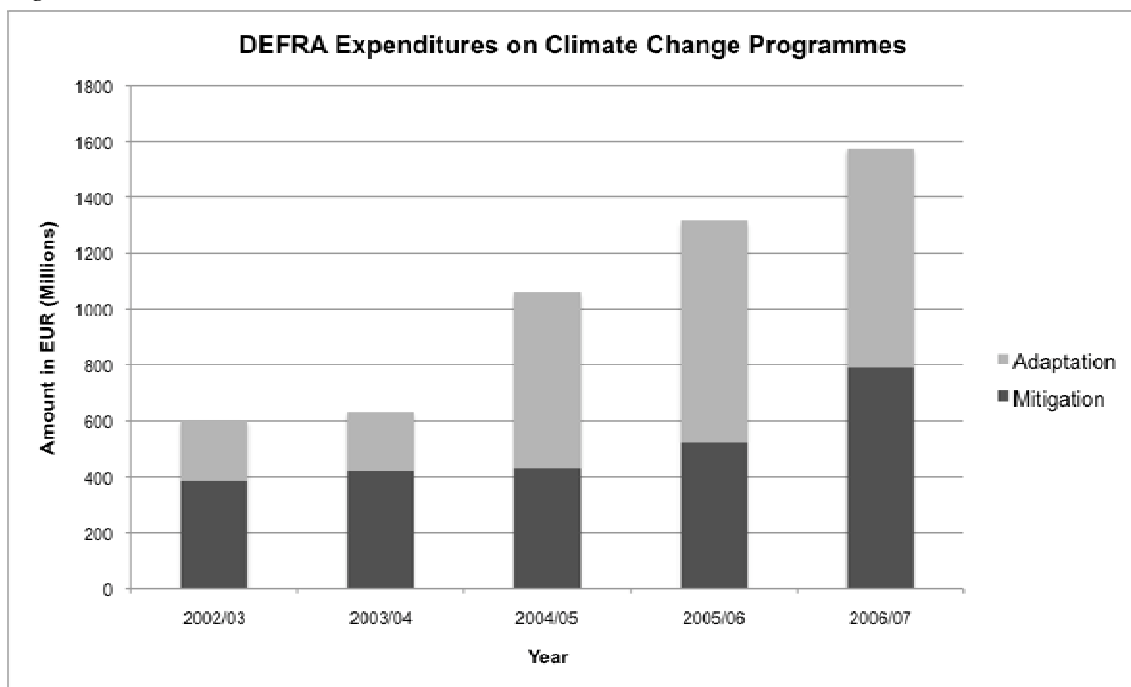
<sup>82</sup> Amounts in GBP were exchanged into EUR using the average GBP/EUR exchange rate of the year 2007 (0.68434). Source: Eurostat.



Other programmes worth mentioning include a pilot scheme for the UK Emissions Trading Scheme and sponsorship of the Energy Saving Trust.

As regards climate change adaptation programmes, DEFRA spent a total of €781 million (£535 million) in the financial year 2006-07. The single most important programme related to adaptation is concerned with flood and coastal erosion risk management. The programme received €738 million (£505 million) from DEFRA and aims to provide funding to Operating Authorities (Environment Agency, local associations and Internal Drainage Board) to manage the risk from flooding and coastal erosion so as to further sustainable development. It should be noted, however, that only a certain non-identifiable share of this programme is directed at adaptation alone.

Figure A5



Source: UK Department for Environment, Food and Rural Affairs (Defra) *Spending on climate change mitigation and adaptation programmes in each financial year from 2002/03 - 2006/07, 2008.*

### Case Study 3. United States<sup>83</sup>

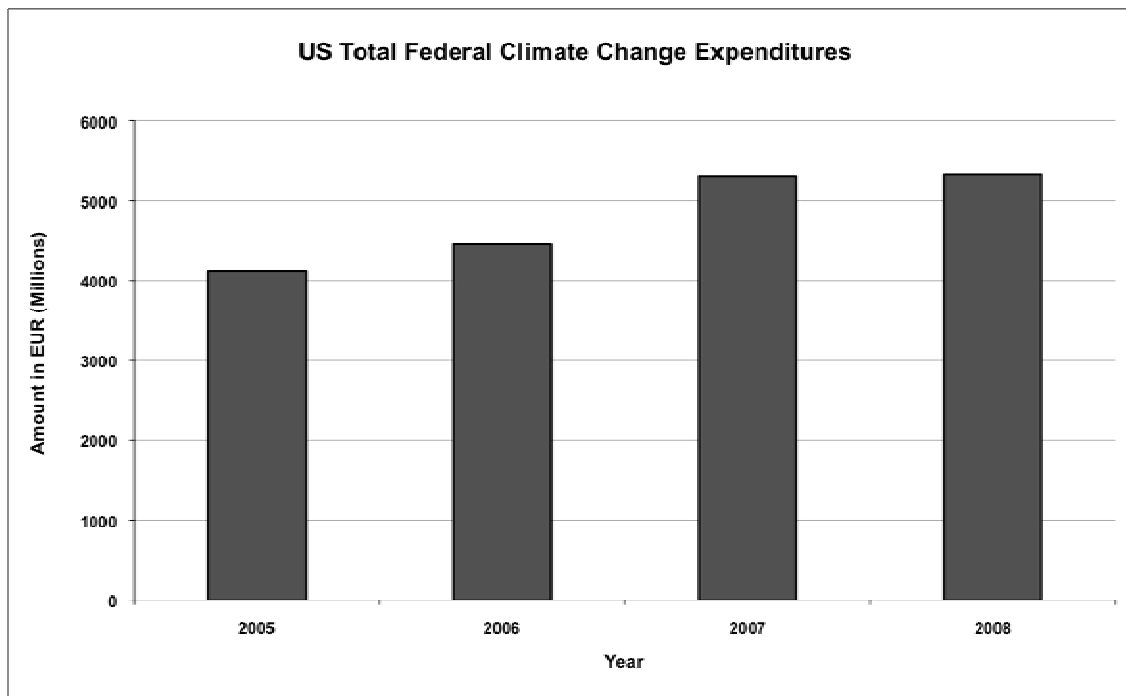
The US federal government's spending on climate change has increased by about €1 billion since 2005 to reach a proposed amount of €5.3 billion in 2008 (\$7.2 billion) (see Figure A6).<sup>84</sup> The increases between 2005 and 2007 can be attributed to a stark expansion of tax provisions, which are included in the budget as forgone tax revenues on the basis of tax legislation that grants certain tax preferences to producers and consumers. Within these two years they increased almost five times and made up almost a quarter of the total climate change budget in

<sup>83</sup> Based on Federal Climate Change Expenditures: Report to Congress, prepared by the Office of Management and Budget in the Executive Office of the President, and transmitted to the Committees on Appropriation of the Senate and House of Representatives on 3 May 2007 (see also [www.whitehouse.gov/omb](http://www.whitehouse.gov/omb)).

<sup>84</sup> Amounts in USD were exchanged into EUR using the average USD/EUR exchange rate of May 2007 (1.3511). Source: Eurostat.

2007 (up from 7% in 2005). For 2008, tax breaks were proposed to be cut to €1 billion, or 19% of the total climate change budget.

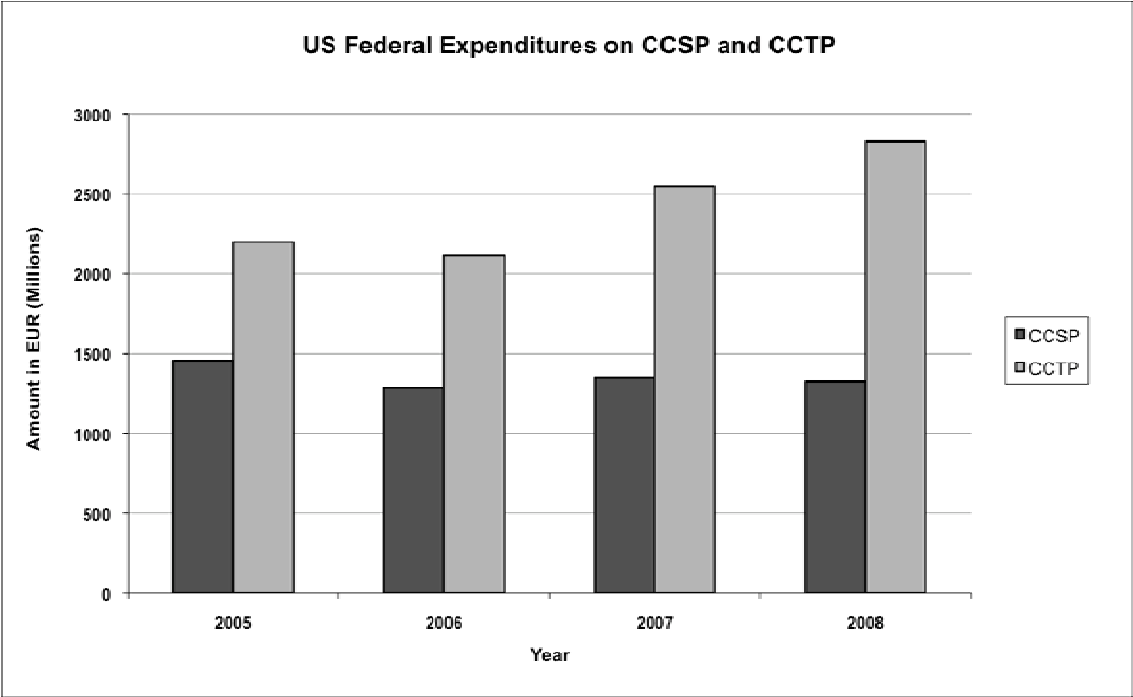
Figure A6



More than half of the 2008 US climate change budget is committed to the Climate Change Technology Program (CCTP), a multi-agency research and development coordination activity aimed at supporting climate change-related technology research, development, demonstration, and deployment. Between 2005 and 2008, the funding for this programme has increased from €2.2 to €2.8 billion. Less emphasis is placed on the Climate Change Science Program (CCSP), which integrates US federal research on climate and global change. In 2008, this programme is projected to receive €1.3 billion, €100 million less than in 2005 (see Figure A7).

The external dimension of the US climate change budget only plays a minor role with climate change-related international assistance amounting to about €153 million in 2008 (\$207 million).

Figure A7



## List of Abbreviations

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AFI	Adaptation Financing Index
CAP	Common Agricultural Policy
CCS	Carbon Dioxide Capture and Sequestration
CCSP	Climate Change Science Program
CCTP	Climate Change Technology Program
CDM	Clean Development Mechanism
CEPS	Centre for European Policy Studies
CF	Cohesion Fund
CFC	Chlorofluorocarbon
CIP	Competitiveness and innovation Framework Programme
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	CO <sub>2</sub> -equivalents
DCI	Development Cooperation Instrument
DEFRA	Department for Environment, Food and Rural Affairs (UK)
ERDF	European Regional Development Fund
ESF	European Social Fund
EU	European Union
EU ETS	European Union Emissions Trading System
EUR	Euro (€)
FP7	Seventh Framework Programme for Research and Development
GBP	Pound Sterling (£)
GDP	Gross Domestic Product
GEEREF	Global Energy Efficiency and Renewable Energies Fund
GHG	Greenhouse gas
HDI	Human Development Index
IPA	Instrument for Pre-accession
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
JRC	Joint Research Centre
NGO	Non-governmental organisation
OCC	Office for Climate Change
OECD	Organisation for Economic Cooperation and Development
ppm	parts per million
PPP	Polluter-Pays Principle
R&D	Research and Development
RCI	Responsibility and Capability Index
TEN	Trans-European Networks
SET-Plan	European Strategic Energy Technology Plan
SFI	Science Foundation Ireland
SME	Small and medium enterprises
UN	United Nations
UNCSD	United Nations Commission on Sustainable Development
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	US-Dollar (\$)