FOR A FUTURE SUSTAINABLE, COMPETITIVE AND GREENER EU BUDGET

FOR A FUTURE SUSTAINABLE, COMPETITIVE AND GREENER EU BUDGET

INTEGRATING THE CLIMATE CHANGE OBJECTIVES OF THE EU

FINAL REPORT OF A CEPS TASK FORCE

CHAIRMAN: **ANDERS WIJKMAN**
Former MEP,
Vice Chairman of the Taellberg Foundation,
Vice President of the Club of Rome

RAPPORTEUR: **JORGE NÚÑEZ FERRER**
Associate Research Fellow, CEPS

CO- RAPPORTEURS: **CHRISTIAN EGENHOFER**
Senior Research Fellow, CEPS
ARNO BEHRENS
Research Fellow, CEPS

CENTRE FOR EUROPEAN POLICY STUDIES
BRUSSELS

The Centre for European Policy Studies (CEPS) is an independent policy research institute in Brussels. Its mission is to produce sound policy research leading to constructive solutions to the challenges facing Europe.

This report is based on discussions in the CEPS Task Force on "A Green Budget for a Sustainable Future: Adapting the EU Budget to Climate Change". The Task Force met several times between March and October 2009. A full list of members and invited guests and speakers appears in Appendix 1.

The members of the Task Force engaged in extensive debates in the course of several meetings and submitted comments on earlier drafts of this report. It reflects the general tone and direction of the discussion, but its recommendations do not necessarily reflect a full common position agreed among all members of the Task Force, nor do they necessarily represent the views of the institutions to which the members, the Chairman or the rapporteurs belong.

The report would not have been possible without the solid support of a number of individuals and organisations. The rapporteurs especially wish to thank Task Force Chairman Anders Wijkman, for his commitment to this endeavour, despite his much-occupied agenda. Gratitude is also extended to his assistant Ulrika Ekfeldt, who went to great lengths to help organise the logistics of several meetings. Appreciation is furthermore expressed to all the Task Force members and presenters for excellent feedback and documentation, which has greatly enriched the report. Finally, CEPS wishes to acknowledge the generous support of the European Climate Foundation, which has been instrumental in the launch of this Task Force.

ISBN 978-92-9079-954-2

Centre for European Policy Studies
Place du Congrès 1, B-1000 Brussels
Tel: (32.2) 229.39.11 Fax: (32.2) 219.41.51
E-mail: info@ceps.eu
Website: http://www.ceps.eu

CONTENTS

PREFACE

The EU budget was developed to assist the EU in achieving its objectives. It is admittedly small, however, and is unlikely to reach the levels of finance that are in accordance with its objectives. Nevertheless, as this report highlights, the EU's budget interventions are anything but inconsequential. Most notably, the EU budget is a visible and material representation of the EU's priorities. Yet over the years, the allocation of the budget has increasingly been criticised as an inefficient use of resources. The budget is not a good representation of the EU's political commitments, which has tarnished its image.

This report does not dwell on the weaknesses of the EU budget, but rather offers a clear way forward for integrating climate change objectives into the budget coherently and effectively. The study first takes stock of the implications of climate change for the EU. It moves on to present a related, functional series of reforms that are not only feasible, but also reinforce action on other EU objectives. Integrating climate efforts across the EU's budget would help foster more sustainable development generally – in line with the Lisbon and Gothenburg agendas.

Finally, the central quality of this report is that it is grounded on facts and on what is possible for the EU budget, given its unique characteristics. Its recommendations do not aim to revolutionise the EU budget, but they do show how the EU could revolutionise its impact.

Anders Wijkman
Chairman

EXECUTIVE SUMMARY

The discussions on the future of the EU budget are reaching an important turning point, with the European Commission supposed to publish its long-awaited, budget review document. Unfortunately, in recent years and amidst the review process, the number and kinds of challenges facing the EU have changed. Most notably, the world has been shaken by two crises – the global, financial meltdown and a worldwide food crisis – in addition to the prospects of catastrophic climate change. The reform of the EU budget has to take stock of these pressing and to large extent unprecedented global concerns. Indeed, the public consultation launched by the European Commission on the review of the EU budget placed climate change among the top priorities.

A common characteristic of all three challenges is that they call for serious policy action, substantial public resources and are linked to a significant degree of uncertainty. While the impact of the financial crisis may ebb away, efforts to manage global food requirements, mitigate the adverse effects of climate change and foster adaptation entail very complex issues and possibilities. Opinions on what actions to take diverge as wildly as do the forecasts for the long-term impacts of climate change. We have a broad sense of what is coming, but how to approach it remains unclear. Future food and climate risks give rise to complicated scenarios in a number of areas, ranging from food, trade and energy policy, to external aid and security.

For the budget review, this has introduced a whole new set of factors to consider. No longer can the discussion about the future of the budget concentrate on reforming the common agricultural policy (CAP) or targeting R&D and the cohesion policy more towards growth. The Lisbon agenda, until recently the central project of the EU, is today just one of several critical matters with which it must deal.

This report considers the impacts of climate change and the extent to which the EU budget can effectively assist in addressing them. Based on the analysis, the report recommends the following fundamental reforms to the EU budget, which are necessary for the EU to achieve its objectives on climate change, along with helping it to lead the global effort to curb greenhouse gas (GHG) emissions and adapt to the changes:

- Increase the support to R&D on energy and climate change, and more specifically expand the financial support for the Strategic Energy Technology (SET) Plan and the demonstration of new technology, in which the risks and long-term maturity of the projects precludes the possibility of exclusively private participation.
- Boost the support for trans-European and pan-European energy and transport links, with an emphasis on interconnectors and rail. The motorway tax Eurovignette should be introduced across the EU and be partially used to fund green transport links.
- Promote, through the guidance function of EU funding, the adoption of the best energy-efficiency practices, and especially
  - reinforce support for energy efficiency and renewable energy;
  - introduce best-practice conditionalities across all funding areas;
  - support the development of low carbon cities and regions in the EU to test and promote new technologies on a large scale, and take advantage of the need to renew energy grids in new member states; and
  - introduce energy-efficiency conditionalities and best practices in EU procurement rules.
- Reduce the share of the CAP in the EU budget by finding new financial mechanisms to introduce national co-financing, taking into account the national fiscal positions.
- Focus research on emission reductions and improved land management in agriculture, particularly possibilities for increasing the carbon storage capacities of land.
- Increase the EU's interventions on environmental matters, taking into consideration the need to protect ecosystems and promote resource efficiency.

- Concentrate more resources on waste management to reduce methane emissions more quickly.
- Better coordinate external action on climate change, centralising the effort and preferably funding of the EU's obligations through the external action budget.
- Extend the reach of the EU budget by expanding the use of financial mechanisms through the financial sector, most notably the European Investment Bank (EIB). In addition, a fundamental reform should be envisaged by which the European Commission is allowed to raise capital by issuing EU bonds for large projects of EU-wide interest.

In arriving at these conclusions, the report analyses the major difficulties ahead and looks at methods through which the EU budget, given its limitations, can most effectively assist the EU in reaching its emissions targets and meeting its adaptation needs. It takes into consideration the objectives of the EU, the principles that should govern its interventions and the limitations of the budget.

The EU budget was out of line with the EU's objectives and concerns well before the crises struck and climate change became a central priority. Yet the budget has the potential to play an important role in a number of areas, notably climate change. Aligning the EU budget towards transforming the energy sector, reducing other emissions, helping regions implement mitigation and adaptation policies, supporting R&D and creating green jobs is not only justifiable, it is also in line with the need to develop a sustainable, knowledge economy, i.e. the Lisbon and Gothenburg agendas.

The report shows that the EU budget has to integrate climate considerations across the entire spectrum of its actions, given the highly varied and horizontal implications of climate change. The EU budget needs to be climate 'proofed', i.e. compatible with the mitigation and adaptation requirements of the EU.

The four functions for which it is the most appropriate instrument to promote EU objectives in this area are listed below.

a. **Solidarity.** The EU budget is the best existing, financial solidarity instrument among the EU member states. The potential for climate change mitigation and the necessity of adaptation may be highest in countries with little budgetary resources. Thus, support through the EU budget may be an effective way to ensure important investments

are made where they would not have otherwise occurred. Where large transboundary benefits are expected, the EU budget can act as a mechanism to ensure an appropriate level of burden sharing among beneficiaries.

b. **Guidance.** The EU budget can be used as an incentive for attracting investment in specific areas through its leverage instruments. Where important EU priorities are unlikely to be funded locally, because the EU-wide benefits are greater than the local ones, the EU budget is a powerful tool to draw in the necessary investments. Trans-European energy and rail infrastructure, R&D or environmental actions with cross-border effects are such cases. Conditionalities for funds offered for poorer regions can be highly influential on national and regional development strategies.

c. **Loan guarantees.** The use of some of the EU budget to increase the loan guarantee funds of the EIB would represent another very effective instrument in the release of loans to the private sector for more risky venture-capital investments or large, complex, longer-term projects. Loan guarantees are already used for example by the European Investment Fund of the EIB. It has been recorded that the participation of the EIB in projects has helped to attract venture capital from other private financial institutions. The scope to expand into such instruments is large, but it will require further re-evaluation of the role of the EU budget – which is still very much based on a grant/subsidy mentality.

d. **Coordinated external action.** Generally, the use of centrally coordinated action for foreign assistance is theoretically considered more efficient than each member state running separate programmes. Funding for development actions abroad, which should be compatible with adaptation and mitigation objectives, could be better accomplished by a common EU instrument. A single voice from the EU within international institutions – backed by a single powerful instrument – would strengthen the negotiating position of the EU and help the EU to promote its visions of climate action and development. It would also increase the EU's visibility and make it more accountable. National programmes, even using common criteria, face higher risks of overlapping and running into coordination problems.

The financial limitations of the EU's budget restrict the EU's actions, and hence its role is greatly affected by national strategies. Coherence with programmes and policies in the recipient countries and regions is paramount.

One of the most important objectives of the EU is to implement its energy and climate change package and manage to achieve its objective to reduce emissions by 20% in 2020 (up to 30% in the case of similar efforts by other industrialised countries) and by 60-80% or more in 2050. The EU budget could play a crucial role through well-devised interventions.

First, the EU budget could facilitate the realisation of an integrated energy grid by supporting the completion of energy interconnections among member states through the budget for trans-European networks (TENs). This is vital for energy security, energy efficiency and the completion of a single market in energy. Given the objective of developing a large-scale, renewable energy capacity, it is also important that HVDC (high-voltage direct current) connections link member states. These allow long-distance energy transport with low levels of energy loss, and they can help counteract the fluctuations of energy intensity arising from renewable energy sources while minimising the need for backup energy production. Work in this area will also enable linkage across the EU as a whole to the best renewable energy locations – sun from the south, and wind and hydro from the north.

Another key role for the EU is in R&D. Through its budget and the SET Plan, the EU could speed up the development of new technologies. EU action can pool the knowledge of the best researchers and leading industries with joint programmes. In addition to providing funds for research, the EU budget could cater for the need to support the large-scale testing and deployment of new technologies, where the upfront investment is too high given the risk involved for private companies to undertake this in isolation. Care has to be taken to ensure adherence to the principles of additionality and proportionality. The EU should be adding to and not substituting national public or private funding, and catalysing these resources to enhance their impact. The report indicates that there are structural problems within the EU that limit R&D investments from the private sector, and that member states should investigate how to introduce the necessary positive incentives.

The cohesion policy could also play an important role. Especially in the new member states, the energy grid is out of date and requires upgrading. Through its cohesion and structural funds, the cohesion policy could promote the creation of low carbon zones and co-finance new interconnectors and smart grid systems with the involvement of national authorities and energy companies. The present assistance for green energy still consists of single projects without a coherent strategy. The EU could help build highly effective and coordinated programmes.

The creation of low carbon zones along with the transformation of energy and transport systems in poorer countries and regions will foster the creation of green jobs, as well as the development of a modern knowledge economy. It is an opportunity not to be missed. There is a need, however, to improve the strategic planning and implementation capacity in member states. Many are ill prepared to handle such complex multiannual and highly integrated developments. The level of state participation and the in-depth collaboration needed among state departments, regional bodies, the research community, private business and wider civil society is for many administrations unprecedented.

EU funds could additionally support actions to reduce methane emissions, especially by tackling those from waste and other sources from urban areas. Methane is a potent GHG and a number of known sources can be easily neutralised. This could be done in Objective 1 regions, for example, through the structural funds for waste management programmes.

Stronger environmental action is essential and the EU should have a larger environmental budget to intervene. Many mitigation and adaptation programmes reflect EU priorities and their benefits or impacts are cross-border in nature. The EU budget should be able to function as a mechanism to finance projects that have a European added value beyond the territory in which they are implemented. Examples are listed for mitigation and adaptation, as well as environmental catastrophes, such as wildfires and flooding. It is crucial to build a better pan-European response capability.

In the area of transport, the report highlights the necessity of speeding up the completion of the TEN rail and waterways systems, particularly for cargo, which demand greater budgetary intervention. Furthermore, to foster the switch to greener transport systems, it is recommended that member states introduce the Eurovignette to their motorway networks, using part of the revenues to develop greener transport systems.

The agricultural sector will likewise have to play a role, although the capacity to reduce emissions in the EU is limited. Still, through better farming practices and novel land-management, important reductions in emissions may be achieved – even contributing to a considerable level of carbon capture. In some cases, it is possible to contemplate the sector's integration into the Emissions Trading System (ETS) if it were able to sell emission credits.

Climate change will in any case hit the agricultural sector hard, especially in areas affected by drought and flooding. The present policy needs to change the support system and channel funds to real actions better linked to the actual costs of practices. The role of the insurance sector has to be reassessed. Private insurance schemes could cover more variability, while public funding could offer guarantees for extreme cases that private insurers would not cover.

On external action, the EU is underfunded in view of the increasing external challenges. For reasons of coherence and efficiency, it is recommended that climate change obligations be dealt with through a central budget. Initially, however, this element could be financed through a separate budget, as was the case for the European Development Fund in the past – especially if increases in expenditure are needed before the new Financial Perspectives, which is likely. It could later be incorporated into the EU budget or not. The external budget for climate actions could be funded by ETS revenues.

The EU budget is financially a very limited instrument and it will likely remain strained. That is why the report calls for reinforcing the leverage principle of the budget. It should not be funding any policy entirely, which is the case of the CAP. The report calls for the introduction of co-financing for agricultural support, preferably with a solidarity mechanism, whereby rates would vary depending on the fiscal capacity of member states.

Even with a smaller budget for agriculture, the limitations imposed on the budget severely constrain the EU's ability to act decisively in large projects of EU-wide interest. The funding levels for TENs and research are too low to contribute significantly to the finalisation of TENs in transport and energy or to finance the large-scale demonstration and testing of technologies.

The green stimulus packages will eventually end and some mechanisms should be in place to maintain the momentum. It is for this purpose that the EU has to explore further the expansion of the budget into financial solutions, such as loan guarantees for funds from the EIB or the European Bank for Reconstruction and Development, or even the possibility of allowing the EU to launch bonds to finance large projects of EU-wide interest.

The report explains the role the EU budget and lists the ways it can contribute to achieving the climate objectives of the EU. Along with helping to accomplish emission reductions, the actions presented would greatly foster the creation of green jobs and the development of a knowledge economy. The EU would benefit from these actions, additionally enabling it to keep a leading edge in green technology, which in the future will be in high demand globally.

A lukewarm integration of climate objectives in the budget and the continuation of a rather uninspiring set of budgetary actions will only damage the image of the EU institutions and send the wrong signal to EU citizens and international partners. It is time for a budget that confronts the multiple challenges ahead in a coherent fashion. Anything less will further erode the EU's standing and legitimacy, and ultimately its capacity to lead on the climate agenda in the EU and beyond.

1. INTRODUCTION

Climate change is inevitable and is already happening – the effects of which are expected to be generated by the stock of greenhouse gasses (GHGs) currently in the atmosphere. How high the rises in temperature will climb and the extent of the ramifications over the years will depend on actions taken today to limit further emissions. Europe is expected to suffer less than most other parts of the world, but the effects will be negative on balance and concentrated in some of its poorest regions.

The EU is a significant emitter of GHGs and has a high degree of historical responsibility for their present level in the atmosphere. As such, the EU has a duty to lead the reduction in emissions along with an obligation towards poorer countries to help them adapt to climate change and reduce their emissions. This obligation applies of course to all major emitters. The EU alone cannot make a susceptible difference, but may lead other countries by example and also benefit by developing and providing the necessary technologies.

The actual impacts of climate change are shrouded in uncertainty but the latest research points towards two worrisome conclusions. It is unlikely that the world average rise in temperature will be limited to 2°C this century, while a rise of over 3-4°C seems likely with possibly serious climatological, ecological and socio-economic implications. Even if the EU is able to adapt to the changes, it will not be immune to the potentially large disruptions this will cause across the globe. Containing climate change to avoid the risk of catastrophic effects is thus imperative for all countries; a weak agreement in Copenhagen will not benefit anybody. Even if the climatic change itself is mild or positive for some (mostly in northern Europe), the indirect security concerns could have serious consequences for all.

The aim is that the EU, and indeed all countries, undergoes an energy revolution, transforming into low carbon economies that in time avoid catastrophic climate change. Commencing such a revolution is feasible even with existing technologies, later (e.g. by around 2030–50) complemented by new ones. The financial effort needs to be started now. Even then, there is a great likelihood of catastrophic events occurring.

Some low-tech, fast actions could be implemented quickly, such as management of methane emissions from other human activities, particularly waste management. Methane is a powerful greenhouse gas and many sources could be tackled rapidly and cost effectively with today's technologies.

The EU budget is only a small component of the overall investment required; in fact, it is financially very limited to enable the EU to lead in the difficulties ahead. Yet, such funds have a very important part to play if used wisely. In agriculture, this is obvious because any adaptation and mitigation measures will have a direct effect on the budget for the common agricultural policy (CAP), but the EU budget is crucial for implementing policies in other areas. As a leverage instrument and through the strategic use of its funds, it can be a catalyst for change in the trans-European electricity grid and the completion of the single market in energy. Moreover, it can lead to a fundamental transformation of the energy and transport infrastructure in some EU member states and regions, especially those covered by infrastructural support through the cohesion policy.[1]

Also, through an imaginative use of funds, for example by expanding the scope of the existing but limited financial mechanisms of the European Investment Bank (EIB), the European Bank for Reconstruction and Development (EBRD) and other financial institutions, the EU budget has

[1] There are three funds under the cohesion policy: the cohesion fund, the European Regional Development Fund (ERDF) and the European Social Fund (ESF). The cohesion fund is for assistance to member states with an average GDP per capita below 90% of the EU average. It finances transport and environmental infrastructure at the national level. The ERDF and ESF are used to finance actions for regions under three objectives. Objective 1 is for convergence regions with a GDP per capita under 75% of the EU average. Objective 2 is assistance to other regions that face specific socio-economic difficulties and high unemployment. Objective 3 is for territorial cooperation, promoting it on a cross-border, transnational and interregional basis.

the ability to catalyse the funds and so multiply their size and influence. Many restrictions on the scope for using the EU budget are only based on bureaucratic and political operational methodologies.

This report analyses the challenges that climate change poses for the EU and how the EU budget can help address them while taking into account its features and the principles that should govern a supranational budget. To do so, the report must first study what the budget provides for today on climate change and consider how it can be improved.

Given the rapidly increasing dilemmas of climate change adaptation and mitigation, the role of the EU budget is no longer one of having some subheadings on climate change, but one of integrating this issue across all of its operations. Some specially dedicated funds for specific adaptation and mitigation purposes could be established, but their existence should not deflect from the need to make all budget operations coherent with climate objectives. The EU budget has to follow the Gothenburg agenda,[2] which was relegated to the shadows while the Lisbon agenda took centre stage. The Gothenburg agenda requires that environmental sustainability should be incorporated in all Community policies. All operations financed by the EU should require the highest environmental standards, especially concerning levels of emissions and climate protection. The EU institutions themselves should also be leading by example, introducing high standards in their own operations and procurement rules.

This report gives a short overview of the major, direct impacts expected from climate change in Europe in chapter 2. Chapter 3 analyses the features of the EU budget and the rationale for it intervening in this area. These introductory chapters are followed by chapter 4, which presents the difficulties the EU faces and how the EU budget can assist. Chapter 5 focuses on the cohesion policy, owing to its central importance in many countries and regions. Chapter 6 gives a summary analysis of the recovery plan through the EU budget and the possible use of new financial instruments in the future. Chapter 7 presents the conclusions.

---

[2] The Gothenburg agenda (arising from the European Council of June 2001) added a 'third' environmental pillar to the Lisbon agenda, requiring the integration of environmental protection into Community policies. The other two pillars created in the Lisbon agenda (from the European Council of March 2000) involve economic and social reforms to foster growth and employment.

2. CLIMATE CHANGE IMPLICATIONS FOR THE EU

The effects of climate change on Europe have been analysed by the European Commission (2009a, 2009b and 2009d). Even with the assumption that mitigation will be substantial, temperatures in various regions are expected to increase on average by over 4°C by the end of the century. The increases are particularly serious in the Mediterranean regions in the base scenario without mitigation (Figure 1).

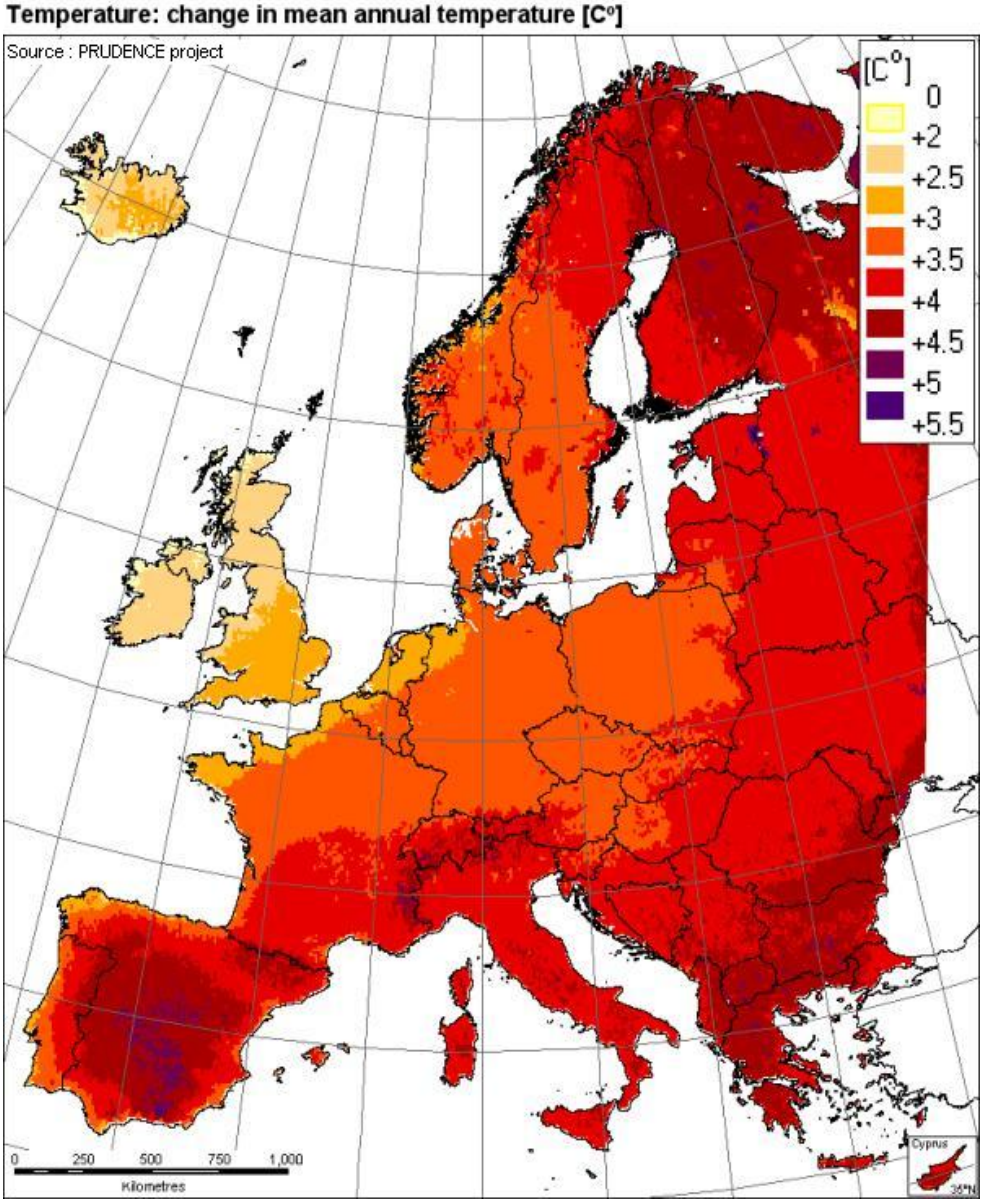
The rises in temperatures are expected to provoke more frequent coastal and river flooding and a recrudescence of droughts. Indeed, river flooding and incidences of drought in the last decade have already exceeded the averages in the past. The number of flood disasters between 1990 and 1998 surpassed the average of the entire 1950–85 period (ibid.).

Increases in temperatures of such magnitude in the Mediterranean basin are going to affect water resources and thus the environment. Desertification will speed up with considerable implications for agriculture, biodiversity and human living conditions in many regions.

With the strain on water resources worsening in several parts of the world, migration pressures and risks of conflict are likely to be exacerbated. For Europe, growing water scarcity in neighbouring Mediterranean countries could pose social and security problems owing to greater migration pressures (compounded by possibly large migrations from Asia if the monsoon is disrupted). Another expected effect is an increasing risk of wildfires in the Mediterranean basin.

The interesting aspect of the Commission's study is that the cumulative impact of climate change on European regions is highest in many of the poorest of the EU (Figure 2), compounding their difficulties in achieving a level of welfare equivalent to the EU average.

Figure 1. Change in mean annual temperature by the end of this century



Source: PESETA project (http://peseta.jrc.ec.europa.eu). The map reflects the absolute change in the mean annual temperature between the control periods 1961–90 and 2071-2100, under the IPCC SRES scenario A2. Data derived from the European Commission-funded PRUDENCE project (HadCM3 global circulation model, and HIRHAM regional climate model in 12km resolution). Map elaboration by the European Commission's Joint Research Centre/IES.

According to the Regions 2020 study of the European Commission (2009a), 170 million citizens of the EU live in the most vulnerable regions for the negative effects of climate change (based on a vulnerability index, as shown in Figure 2).[3] This index comprises the following elements:

- changes in the population affected by river flooding,
- the population in areas below 5m (with the threat of *coastal erosion*),
- potential *drought* hazards, and
- the vulnerability of *fisheries, agriculture and tourism* to changes in temperature and precipitation.

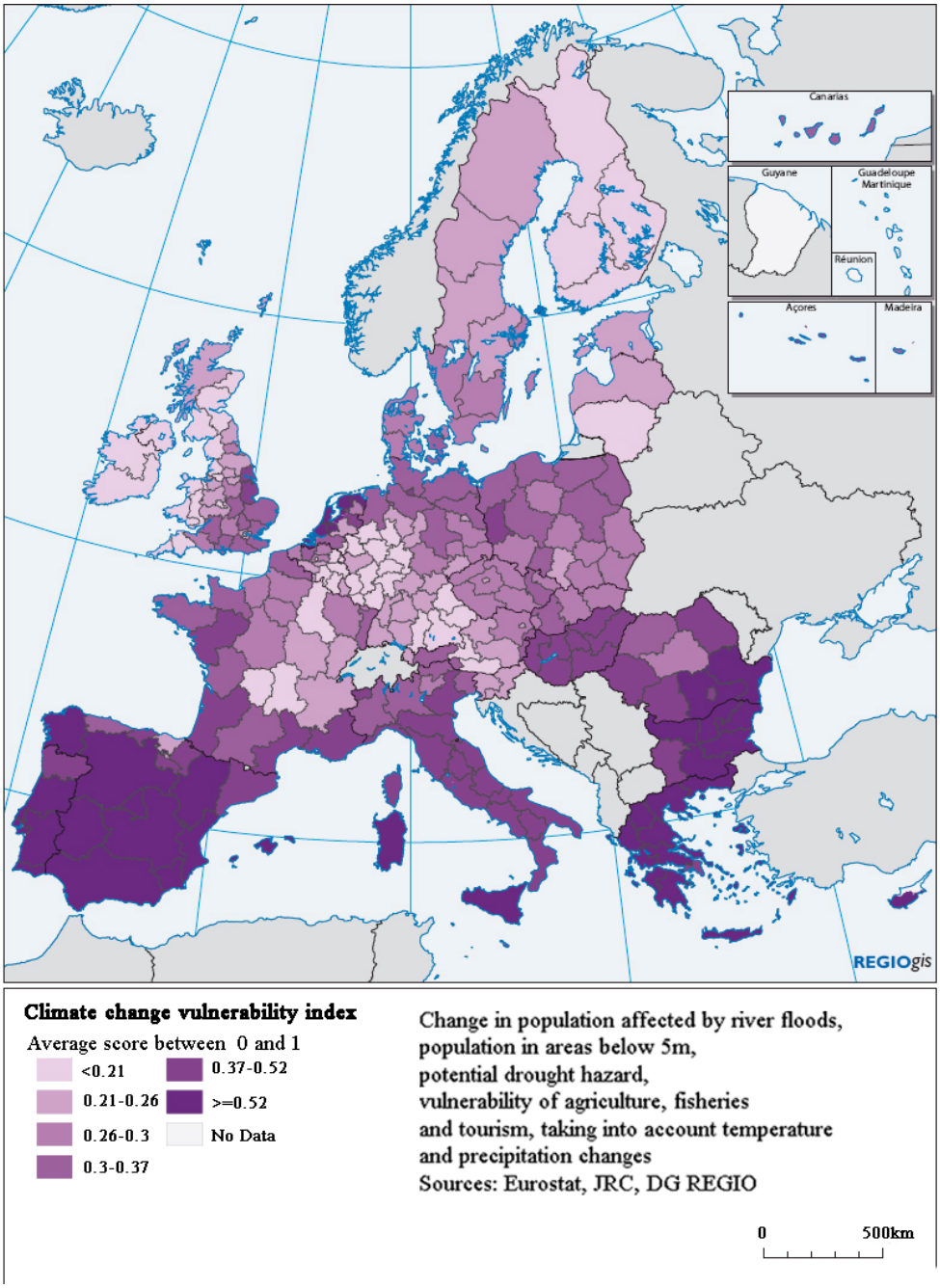
While the risks of river flooding are not expected to be concentrated in particular regions of Europe, those from droughts will accumulate in the Mediterranean, as will coastal risks in the northern Atlantic regions. Significant effects from droughts are forecasted in many important agricultural regions and disproportionately in poorer ones. For the entire Mediterranean area, the damages from climate change are expected to have major consequences for the economies of the region, with serious socio-economic repercussions.

---

[3] The list is derived from the presentation in the Task Force by Peter Berkovitz, on "The Climate Change Challenge for Cohesion Policy", 28 April 2009. According to the European Commission (2009b, p. 23),

> [t]he index is an average of normalized indicators of vulnerability of areas to drought, change in population affected by 100 year return river floods under the A2 scenario, exposure of the agriculture, fisheries and tourism sector[s] to climate change expressed by [a] proportion of these sectors in regional GVA in regions where these sectors will be negatively affected, and exposure of densely populated areas to coastal erosion expressed in coastal populations living below [the] 5m elevation. The methodology has entailed that all impacts are weighted equally, despite the fact that these impacts will incur different costs. Implicit in the calculation of the index is also that it does not account for positive effects of climate change in some regions, and does not consider how effects of climate change will be dampened by adaptation activities. In addition, indicators for some significant expected impacts have not been included due to a lack of information, e.g. effects of climate change on mountainous areas, health effects and ecological effects. Due to these shortcomings the index should not be used to compare impacts between regions, rather should be seen as a demonstration of the fact that the impacts of climate change will vary across regions.

Figure 2. Climate-change vulnerability index



Source: European Commission (2009a), p. 7.

Although the average impact on GDP is small by 2020 if changes are gradual (from 0.7 to -0.7% for all member states, taking into account the effects of climate change and the EU's recently adopted climate package, according to Berkowitz, 2009), the estimated impact on some regional economies is significant.

The magnitude of the economic consequences will depend on the sectoral composition of the regions affected. Weather-sensitive sectors will be hit by climatic changes, i.e. agriculture, fisheries, forestry, tourism and energy. In addition, climate changes will bring new health problems caused by the spread of pathogens, pests and recurring heat waves. Of course, some regions will benefit, but overall the negative effects are expected to outweigh the positive ones.

The challenges and ramifications are so large that mitigation and adaptation need to be integrated horizontally across all policies at the EU *and* national levels. For the EU budget to play a constructive role in addressing the challenges ahead, more will be required than changing some budget lines at the margin.

3. IS THERE A ROLE FOR A CENTRALISED FINANCIAL EFFORT BY THE EU?

As outlined in chapter 2, Europe will be affected by climate change directly and indirectly. The severity of the associated impacts will depend on the global efforts to curb emissions, the geographical incidence of climate effects and the sectoral composition of the economy in the affected areas. This chapter explores the extent to which the EU budget should intervene given the repercussions discussed earlier.

The role of the EU is primarily regulatory, but there are areas in which there are specific cases for EU-level financial allocations:

a) *Assistance and compensation for mitigation and adaptation operations with important transboundary costs and benefits*. This relates to the reasoning applied to a typical case of environmental damage caused by transboundary pollution, where the source of the pollution and consequences are not the same. In the case of GHG emissions (while not formally pollutants), there are strong parallels, as the source of the emissions and the location and gravity of the impacts are unrelated. Thus, there is a case for allocated funds from the EU's 'supranational' budget either to compensate the regions affected with funds extracted from the polluters (the polluter pays principle) or to assist regions that will face costs in mitigation or adaptation with the support of other regions that will benefit from their actions.

b) *Economies of scale*. At the EU level, it is possible to allocate funds more efficiently in areas where emission reduction measures and adaptation actions are most successful.

c) *Support for R&D*. Owing to its public good nature across the EU and the potentially sizeable economies of scale of coordinated action, R&D is generally considered a standard case for EU-level financial

support. The EU budget can finance the work based on excellence criteria regardless of its location. Furthermore, EU coordination of R&D activities can feed into policy-making, ensuring a coherent EU strategy and benefitting from the economies of scale generated by pooling the research of various institutes across the EU.

d) *Leverage action*. The EU budget is an important instrument for fostering climate-related objectives through its leverage action, for promoting the implementation of best practices, for R&D, for supporting the testing, deployment and use of technologies, and for the construction of infrastructure, chiefly in regions with limited resources.

e) *Cross-border and pan-European infrastructure*. The EU can provide a necessary incentive for the development of such infrastructure, where the benefits for the EU are larger compared with the benefits for the individual member state or region in which it is located. The importance of political commitments and financial assistance has been proven for the trans-European networks (TENs); of particular relevance in this respect are the electricity, gas and rail connections.

Arguing for the need of EU funds for climate action is thus relatively straightforward; fitting this into the political realities of the EU budget is not. It is also important to keep in mind that the EU is a partner in the UN-led global action through which commitments are being negotiated, and in relation to global emissions, its budget is of course not a perfect instrument. It cannot compensate for the impacts of emissions from non-EU countries, nor can it fully compensate non-EU countries for the effects of EU emissions. But for the EU, its budget is the best existing, international financial instrument available.

3.1 The present budget needs and realities

Although there is little doubt of the benefits of a common EU budget to help implement specific policies related to climate change, it is unclear whether or how much funding should be channelled through the EU budget. Consequently, and not surprisingly, the choices of the financial instruments used will be influenced by the limitations of the budget.

As the EU budget developed, equity considerations were central: income discrepancies among sectors were addressed through the CAP while disparities in average incomes among nations and regions were addressed through the cohesion policy. These sectoral and regional equity

concerns are reflected in the current EU budget, which is clearly dominated by the agricultural and cohesion policies.

Their structure, however, has been influenced by the need in the past to ensure that member states agree on two fundamental developments in the EU – the single market and monetary union. Both can be interpreted as compensation for the perceived effects of integration in member states. Their "compensatory nature" is perfectly understandable in the context of a multinational agreement, and the net balance disputes originating from these policies fit well the game-theoretic models based on political power (Kauppi and Widgren, 2005).

Still, the single market has *grosso modo* been completed while monetary union has been achieved among a large number of member states. The agricultural sector has also changed profoundly. Despite subsequent reforms of the CAP, there still seems to be a gap between the policy structure and the needs of the sector.

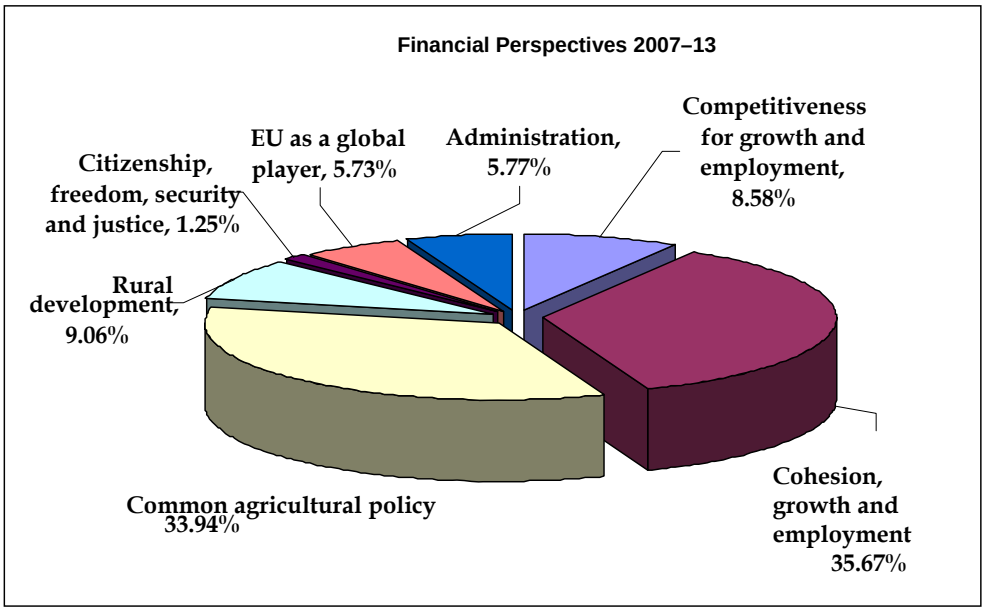
Meanwhile, the objectives of the EU have increased in number: globalisation pressures are challenging the EU's competitiveness in world markets; external developments have required member states to take joint positions *vis-à-vis* non-EU countries in areas beyond trade; and finally, climate change is pressing the EU to pool and coordinate energy resources and collaborate more closely in various fields.

Unfortunately, the CAP and cohesion policy take up 80% of the budget (Figure 3), which is limited by a rather strict ceiling of 1.24% of EU gross national income (GNI). Given the pre-allocated nature of these two policies, by either the amount of agricultural land or the GDP per capita of regions, the budget has been dominated by net balance considerations. An integration of further objectives and costs that affect the net balances is difficult, especially for funding that is not pre-allocated by region. As a result, new objectives in the budget receive little funding, or the old policies are 'retrofitted' to integrate some new concerns. The problem with these approaches is that in both cases we are often far from a 'first best' solution. For climate actions in particular, there are clear benefits from action at the EU level if the distribution of resources is focused where most efficient and is not pre-allocated.

The consequences of pre-allocated funding that is based on net balance considerations rather than on needs are expressed by the Sapir report (2003) in one sentence: [The EU budget is a] "historic relic ... inconsistent with the present and future state of EU integration" (p. 162).

The budget policies and their allocation suffer from what many have termed 'Eurosclerosis'. Hence, important EU policies aimed at growth, external action, security and home affairs are underfunded.[4]

Figure 3. EU budget composition, Financial Perspectives for 2007–13



Source: Núñez Ferrer (2007a, p. 7) Calculations based on the Interinstitutional Agreement between the European Parliament, the Council and the Commission on budgetary discipline and sound financial management, OJ C 139/01, 14.06.2006.

Not surprisingly, on climate change, the present budget does not address the needs, as numerous studies have made clear.[5]

Some efforts are being undertaken, such as the recent shifts in the priorities of national strategies for the structural funds,[6] newly adopted changes in the investment rules of the European Regional Development

[4] A description of the underlying factors is presented in Núñez Ferrer (2007a and 2007b).

[5] See Egenhofer et al. (2008), CEE Bankwatch and Friends of the Earth (2007), Mabey et al. (2008) and Adelle et al. (2008).

[6] See European Commission (2009g).

Fund (ERDF) for energy efficiency in buildings and the funding for energy in the recovery plan.[7] But these do not sum up to solve the large weaknesses of the budget in this area.

From the standpoint of the amount of resources, for the EU to finance new climate objectives sufficiently, it must consider either allowing the budget to increase or reducing the expenditure under some present headings. Of course, both the regional and agricultural policies can be altered to contribute to cutting emissions and adapting to climate change, but this is a prerequisite in any case and it does not substitute for the need to rethink, in depth, the finances and the structure of the budget.

3.2 Limitations and potential of the EU budget

Using the EU budget not only offers opportunities, but also faces specific limitations that are unlikely to change in the coming decades, and these need to be clearly stated to better focus the discussion. Furthermore, interventions from the EU budget do not occur in an isolated context, which offers possibilities for enhancing their efficiency through better coordination and integration with national policies. The main points to be taken into account are outlined below.

1. **The EU budget does not operate in isolation.** The EU budget should be considered an additional fiscal and budgetary resource in the EU. As such, it should not be financing entire policies independent of national action. It is the sum of the national and EU actions that will determine the quality of the interventions.
2. **Coherence between EU and national actions is paramount.** Furthermore, actions at the EU level should be additional and enhance national actions.
3. **The EU budget is limited**. Even if it increases, it is unlikely to be able to fund entire policy areas efficiently.
4. **The EU budget has four natural roles it can play:**
    a. **Solidarity.** The EU budget is the best existing financial instrument for solidarity among EU member states.[8] The

[7] See European Commission (2008c).

potential to mitigate climate change and the need to adapt may be highest in countries with low budgetary resources. Support through the EU budget may be an effective way to ensure important investments are undertaken where they would not have occurred otherwise. Where large transboundary benefits are expected, the EU budget can act as a mechanism to ensure appropriate burden sharing among beneficiaries.

b. **Guidance.** The EU budget can be used as an incentive for attracting investment into specific areas through its leverage instruments. Where important EU priorities are unlikely to be funded locally, because the EU-wide benefits are greater than the local ones, EU assistance is a powerful tool to attract the necessary investments. Trans-European energy and rail infrastructure, R&D or environmental actions with cross-border impacts, are such cases. Conditionalities for funds offered for poorer regions to develop could be an effective way to influence national and regional development strategies.

c. **Loan guarantees.** The use of some of the EU budget to increase the loan guarantee funds of the EIB could represent a highly effective instrument for releasing loans to the private sector for more risky venture-capital investments or large, complex, longer-term projects. Loan guarantees are already used for example, for the European Investment Fund of the EIB. It has been recorded that participation of the EIB in projects has assisted in attracting venture capital from other private financial institutions. The scope to expand into such instruments is large, but it would require further re-evaluation of the EU budget's role, which is still very much based on a grant/subsidy mentality.

d. **Coordinated external action.** Generally, the use of centrally coordinated action for foreign assistance is theoretically considered more efficient than having each member state run

---

[8] The Emissions Trading System also incorporates solidarity through differentiation in effort sharing among member states, but it is not an EU budgetary instrument, as revenues do not accrue to the EU.

separate programmes.[9] Funding for development actions abroad, which should be compatible with adaptation and mitigation objectives, could be better served by a common EU instrument. A single voice from the EU within international institutions – backed by a single powerful instrument – would strengthen the negotiating position of the EU, helping it to promote its visions on climate action and development. It would also increase the EU's visibility and make it more accountable. National programmes, even using common criteria, face higher risks of overlapping and encountering coordination problems.

3.3 Fundamental rules of the EU budget

Increasing the budget to fight climate change is not enough; the targets for the funds are as important as the level of funding. These targets are guided by principles that are enshrined in the EU treaties, financial rules and regulations:

- *Subsidiarity.* The EU should only act when it is better suited to do so when compared with lower levels of governance.
- *Proportionality.* According to EU law, the EU may only act to exactly the extent needed to achieve its objectives and no further. Implicit in this principle, actions should be *value for money* and provide *European added value*.
- *Additionality.* This rule, which is applied to cohesion policy and rural interventions, states that EU aid should not substitute for national funding that would have been disbursed in the absence of EU intervention, nor should EU funding reduce aggregate national public spending. This rule should apply in general, unless EU member states pool all national financial resources for a policy, e.g. the CAP.

[9] This reasoning follows the theories of fiscal federalism, which analyse the best level of governance for certain policies. There are often criticisms that external aid programmes are uncoordinated and that national aid agencies are competing rather than collaborating in the same crisis areas.

4. MAJOR CHALLENGES FOR THE EU AND THE ROLE OF THE EU BUDGET

Discussions on the EU budget tend, understandably, to become entrenched in the actual policies and headings of the budget. This can be useful when discussing alterations to particular policies, but constrains change. The opposite is also true: handling the budget completely in isolation of its composition produces abstract policy recommendations with little guidance for realistic reforms. This report attempts to find a balance that allows both – discussing the functions of the budget openly and providing specific recommendations for actual policies. Doing so, however, requires the analysis to be based on a discussion of seven important areas in which EU intervention is crucial, with possibly significant budgetary implications:

- the fundamentally changing nature of energy supply and demand in the EU,
- support for R&D and technology demonstration,
- a rethinking of the role of the agricultural policy,
- reductions to emissions from transport,
- improvements to environmental sustainability and the management of ecosystems,
- support for climate actions generating EU-wide benefits, and
- help for developing countries in mitigation and adaptation efforts.

Under these headings, this chapter concentrates on objectives and links them to the structure of the EU budget. It then specifically recommends the necessary changes in the budget to achieve them, taking into account the limitations of the budget as described earlier. Some of the

recommendations are presented in chapter 5 on cohesion policy. Because of its complexity, this policy is analysed in more detail as a separate budget.

4.1 The fundamentally changing nature of energy supply and demand in the EU

Given that energy-related emissions account for about 80% of all GHG emissions in the EU (EEA, 2009), energy is the single most important item for mitigation (the 10,000 installations covered by the Emissions Trading System (ETS) by themselves produce half the CO_2 and 40% of total GHG emissions).[10] The power sector is central to the mitigation efforts. In the EU, over 50% of the electricity generated in power stations relies on fossil fuels. In transport, a shift to rail and fluvial transport and the use of biofuels, electric motors and hydrogen can reduce CO_2, but at the same time, rail and the spread of electric and hydrogen cars will increase the demands on the power sector. Moreover, the next 20 years will require some 600 GWe[11] of new power generation capacity to accommodate the growth of demand and to replace ageing plants. This equals the current installed capacity. Meanwhile, substantial financial investment is also needed for grids to replace ageing infrastructure.

The challenge for the power sector is significant. According to the model results of the International Energy Agency (IEA) (2009) on how to limit the concentration of CO_2 at 450 ppm (parts per million),[12] the effort required for the power generation sector until 2020 is considerable and higher than for other energy users. Globally, to reduce emissions from energy use from 28.8 Gt[13] to 26.4 Gt by 2030 (compared with a reference trend of 40.2 Gt by 2030), the power sector would have to reduce emissions by 3.4 Gt, thus more than offsetting the rise in emissions in other areas. For

[10] See the Questions and Answers on the Commission's proposal to revise the EU ETS in European Commission (2008d).

[11] GWe refers to gigawatt electric.

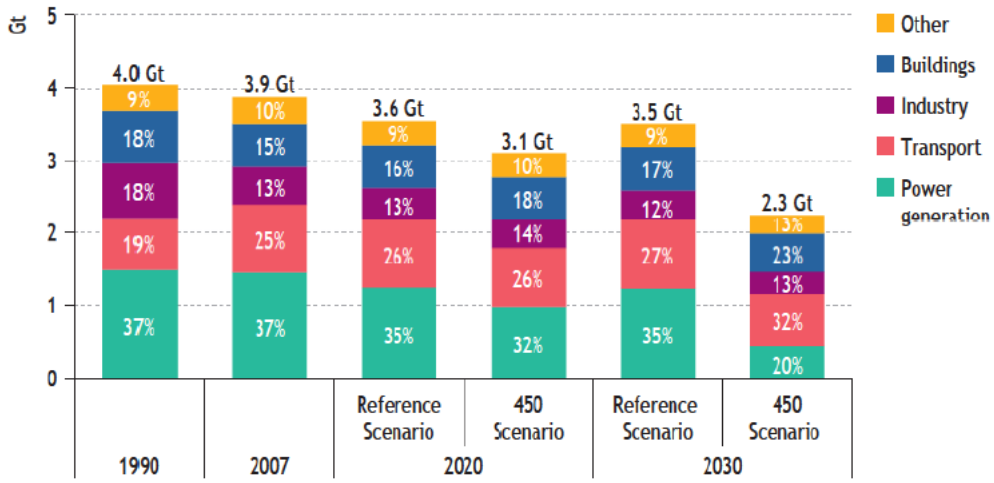
[12] Note that 450 ppm is the level at which, according to climatologists, there is a 50% chance of temperatures rising above 2°C – a level after which there is a high risk of catastrophic effects.

[13] Gt refers to gigatonne.

the OECD+,[14] the required fall is vital, and given the higher share of emissions from the power sector than in non-OECD countries, it is proportionally higher. The total emissions reduction required is 5.4 Gt from today's 13.1. To achieve this, a cut of 3.5 Gt will have to be achieved by the power generation sector (a fall of 66%), which is greater than the global, total emissions reduction.

For the EU, the required reduction in total emissions is from 3.9 Gt to 2.3 Gt, with 68% of the fall coming from power generation (see Figure 4).

Figure 4. EU energy-related CO_2 emissions



Source: IEA (2009), Figure 17.

The most important intervention of the EU has been the formal adoption of the energy and climate change package on 6 April 2009. This package intends to achieve the EU's overall, binding environmental targets, which were adopted by the EU heads of state and government at their 8-9 March 2007 summit (Council of the European Union, 2007). They committed to unilaterally reducing GHG emissions by 20% compared with 1990 levels by 2020 (and up to 30% if other developed countries commit to comparable emissions reductions) and to increase the share of renewable

[14] OECD+ represents all OECD countries plus the EU member states that are not part of the OECD.

energy in the EU's total energy consumption to 20%. While these two targets are binding, they also initially set a non-binding energy-efficiency goal of reducing primary energy consumption by 20% by 2020 compared with base projections – an objective that seems to have been dropped and subsequently substituted by a 20% increase in the energy efficiency target, which says nothing about consumption. The package adopted consists of a number of directives (see Box 1), regulating the elements set out below.

Emission targets. A binding absolute target for the reduction of emissions has been agreed, which includes a "firm independent commitment" by all the 27 EU member states to reduce their emissions unilaterally by 20% below 1990 levels by 2020. The package also establishes a more ambitious reduction target of 30% below 1990 levels by 2020 provided there is a global agreement, i.e. developed countries commit to "comparable emission reductions" and advanced developing countries agree to "contribut[e] adequately". The unilateral 20% target will be met by strengthening the EU ETS to reduce emissions by 21% below 2005 levels in the sectors covered, and cut emissions by 10% in all other non-ETS sectors, including waste, transportation and buildings, through EU-wide and member state policies. To allow flexibility for member states to meet the 10% target in the non-ETS sectors, member states can make use of their national policies, credits related to the clean development mechanism (CDM)[15] of the UNFCCC,[16] bank any excess reductions and trade among themselves.

Renewables target. A binding target of 20% of renewable energy sources in the EU's final consumption of energy by 2020 has been adopted, which includes a binding minimum 10% share of biofuels and other renewable transportation fuels in each member state's transport energy consumption by 2020.

---

[15] The CDM is a system through which emitters can obtain emission reduction credits through projects outside the EU. While theoretically, one can consider that a reduction abroad is equivalent to a domestic reduction for a global emission, in practice the projects financed have been criticised as having a very dubious emission reduction effect, sometimes even increasing emissions.

[16] UNFCCC refers to the United Nations Framework Convention on Climate Change.

Energy-efficiency goal. A non-binding energy-efficiency goal was also included at the outset, of reducing primary energy consumption by 20% by 2020 compared with projections. Yet this objective seems to have been replaced by the objective to increase energy efficiency by 20% by 2020, which is not the same thing. A draft Commission Communication on Energy Efficiency published by EurActiv[17] clearly states that the energy consumption objective will not be met. Under the best scenario, only an 11% fall can be achieved. The new objective, however, is very controversial, as it is wide open to 'rebound effects' – by which savings achieved from energy efficiency can change behaviour towards increasing consumption. Rebound effects can strongly diminish the impact of efficiency gains, by 50% worldwide according to Barker et al. (2009).

Carbon capture and storage goal. A commitment to invest in the construction of up to 12 large-scale power plants using carbon capture and storage (CCS) technology has been agreed, as well as a legal framework for CCS. A new directive has been adopted that sets up an EU-wide regulatory framework for CCS. While it remains up to member states whether they want to deploy this technology, the directive ensures harmonised conditions for the assessment of storage sites, for authorisation procedures and for the closure of such sites.

Vehicular emissions performance standard. A stringent emissions performance standard of 120g CO_2/km for all new cars by 2015 is another target. In 2012, this objective will become binding for 65% of a given manufacturer's car fleet, in 2013 for 75% and in 2014 for 80%. As of 2015, the entire fleet will be required to meet the emissions limit.

Fuel quality standards. The revised fuel-quality directive aims at improving air quality and reducing GHG emissions through environmental standards for fuel. It seeks to facilitate the blending of biofuels into petrol and diesel, which will need to meet sustainability criteria corresponding to those of the renewables directive. The directive sets a target for fuel suppliers to reduce GHG emissions from fuels by 6% over their complete lifecycle by 2020. Mixing biofuels with petrol and diesel as well as improving production technology in refineries will be the main strategies to achieve this.

---

[17] For further information about the Communication, see the EurActiv.com website link http://www.euractiv.com/pdf/Draft_COM_IS_Oct2009-1%5B1%5D.pdf).

Box 1. Directives making up the EU's energy and climate change package

The package consists of the following directives:

- Directive of 26 March 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community, PE-CONS 3737/08;
- Directive of 26 March 2009 on the promotion of the use of energy from renewable sources amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, PE-CONS 3736/08;
- Directive of 26 March 2009 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, PE-CONS 3738/08;
- Directive of 25 March 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles, PE-CONS 3741/08;
- Directive of 27 March 2009 as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC, PE-CONS 3740/1/08; and
- Directive of 26 March on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No. 1013/2006, PE-CONS 3739/08.

Still, these directives alone are not enough to ensure the industrial revolution required in the medium to long term, which must be driven by innovation and a fundamental change, not only in the way energy is produced, but also in how it is consumed. Prior to this package, the EU had already published the Strategic Energy Technology (SET) Plan (European Commission 2007a), presenting a roadmap for strengthening the research, development and demonstration of new technologies relevant for addressing climate change. This document has recently been complemented by a more detailed action plan (European Commission, 2009e).

Some aspects of the EU approach have raised concerns, including the low price of carbon in the ETS, which reduces its impact. Also, the provisions allowing the offsetting of reductions through the CDM have been questioned by the WWF,[18] which warns that they may potentially reduce actual emission cuts. Nevertheless, while the allocation of permits and the carbon price of the ETS might have been softened, the binding targets to reduce GHGs are still important and stringent for the energy sector.

Shifting away from fossil fuels poses issues that are very often misunderstood or underestimated. MacKay's (2008) book on meeting energy needs with renewables and increasing energy efficiency in the UK clearly points out that the energy consumed today is far too high to believe that renewable sources at the national level or basic energy-saving investments will do the trick. Just to put it in figures, in the EU, 29% of the electricity production is generated from coal, 4% from oil, 20% from gas and another 30% from nuclear power stations. In other words, this means that the 'non-renewable' production of electricity covers 83% of the power supply (2006 figures, Eurostat).

Longer term, limiting global warming to 2°C above pre-industrial levels – a level below which EU policy-makers believe that irreversible ecological damage may still be avoided – will require cuts in *global* emissions of at least 50% by 2050 relative to 1990 levels (European Commission, 2007b). This figure may well be far too optimistic according to climate scientists, with 70-80% being a more realistic requirement (MacKay, 2008). Those who claim that the energy solution can be found in a narrow band of technologies, in either renewables, nuclear or carbon capture, generally do not realise the complexities of the challenge ahead – technological as well as political and socio-economic. All technologies will have to play a role on a large scale. There is space for all players, but it requires fundamental developments for which the EU is essential, particularly as a regulator but in some cases as a finance provider (through the cohesion funds for poorer member states, for developing countries through the external action package and through the financial and fiscal mechanisms such as the ETS).

---

[18] See WWF (2009).

We need to match energy supply with demand while quickly decarbonising. This requires a mixed basket of technologies, taking into account that renewables face severe constraints in deployment and that it is unlikely that energy efficiency will reduce the demand for energy from the power sector. Worldwide, the *International Energy Outlook of 2009*[19] by the US Energy Information Administration (EIA) shows an average growth of electricity demand of over 2.5% a year until 2030. For the EU, an annual increase in demand of around 1% is still predicted, while potentially large shifts in transport from fossil fuels to electricity and hydrogen would require a further increase in electric power generation. Energy efficiency on the demand side is still important to cushion this growth, but efficiency and decarbonisation on the supply side will be crucial. The power sector faces a dual challenge – decarbonising while increasing power. Even if the demand side becomes more energy efficient, many of the shifts away from fossil fuels, particularly for transport, will be towards the use of electric power.

This challenge is indeed a very serious one. The average energy consumption of an EU citizen is 125 kWh/d per person (the total, mixed EU energy-consumption divided per person). Taking the example of solar power, which in theory could cover all our demand needs, we find that to cover just 50 kWh/d from photovoltaic (PV) sources in sunny Mediterranean areas (less than half of demand), would require 400 times the entire present, global, solar-panel capacity.[20] Assuming high-efficiency panels at the present cost of implementation, this could be very expensive. Of course, the costs should fall with large-scale use, and technologies such as solar towers could greatly improve the power yield. The point nonetheless is that there are clearly no simple solutions.

On the cost savings from large-scale use, the IEA,[21] for example, makes the case that renewables (except wind) experience significant capital

---

[19] See "International Electricity Analysis" in EIA (2009) (retrieved from http://www.eia.doe.gov/oiaf/ieo/pdf/electricity.pdf).

[20] This is based on MacKay's (2008) assertion that to cover the same demand in the UK, the solar panels needed would exceed the globally deployed photovoltaics by 100 times. The population of the EU is close to 10 times that of the UK, while photovoltaics produce around twice the energy in the Mediterranean regions, leading to this inaccurate but rather large estimate.

[21] See IEA (2003), p. 69.

cost savings for each doubling of capacity, such as 15-20% for PVs and 20% for solar water heaters. This justifies proactive support policies for low carbon technologies, but we need to avoid glorifying any single energy source.

Of course, the EU budget does not have the resources to handle the funding needs for deploying new energy sources, nor should this be its primary role. But the EU has to lay the foundations that will trigger the fundamental changes required to achieve a low carbon economy, and in this regard, budgetary resources can provide vital support through the guidance role they exert in leverage instruments, more specifically by

a) supporting R&D in this area and financing the demonstration of technologies;
b) assisting the development of the trans-European energy networks (TEN-E); and
c) helping poorer regions and countries to invest in clean energy systems and energy efficiency, in line with its solidarity role.

Energy security across the EU with a large renewables sector requires the completion of a proper, single energy market, with a trans-European energy grid. In closed regions, without cross-border energy flows, energy sources compete for a reduced local market and fluctuations in energy from renewables require a high level of backup in power production capacity (see Ummels, 2009, on wind power). This limits the attractiveness of the deployment of large-scale renewable energy sources. This problem can be resolved largely by linking the EU regional power structures to high-voltage direct current (HVDC) lines, which allow long distance energy transportation with little loss.

The necessity of the energy network being able to adapt to the energy fluctuations and to respond quickly also calls for a rethink of the grids. A promising proposal is the deployment of smart grids, i.e. an intelligent energy system. These optimise energy consumption by de facto controlling the use of energy of private appliances. This is not an issue for the EU budget and public funds, but rather a regulatory one – in a free energy market the ownership and control of the metering devices needs to be regulated. At the same time, the EU would need directives that ensure that the introduction of large-scale, energy-efficient technologies is not hampered by regulatory barriers. The financial side may also be important in new member states and for large-scale demonstrations.

A network of HVDCs could be a fundamental step in the realisation of the single EU energy market, and a strong element for energy security and supply stability among EU member states. It would form the basis of a real energy revolution regardless of the kinds of energy sources present and the actual level of deployment of smart grids. EU financial support to set the basic infrastructure for an EU-wide HVDC network may be necessary. Without EU intervention and some burden sharing, some member states do not have the incentives to participate in the development of interconnectivity, as the benefits are not spread equally among member states. The European Commission's (DG Competition) enquiry into the energy market (2008a) and many other energy sector studies[22] have pinpointed the difficulties of creating a genuinely integrated energy market.

The EU fund for TEN-E provides some support, but for the moment it is quite limited. It was not developed to address today's energy concerns, as the Second Energy Review clearly states (European Commission, 2008b), and we are far from a coherent development of an integrated grid. Therefore, a potential role of the EU budget is to ensure that the necessary trans-European infrastructure is fostered to realise the single energy market. The use of HVDC lines for cross-connectivity could be a principal stepping stone, as these enable maximal use of renewable resources where more efficient.

Frontrunners in the deployment of an integrated energy market with a strong renewable-energy element are the Nordic countries. These countries have developed sufficient cross-border capacity to consider this a real electricity exchange market, in which energy is traded freely in the 'Nord Pool exchange' (for a comprehensive review, see MVV Consulting, 2007).

On the smart grids, while the financing of these grids will primarily fall into the hands of private operators, major opportunities to upgrade national networks in this direction in the new member states have to be grasped. Some new member states have obsolete and highly inefficient networks. Investments made today in the energy grids could fix the

[22] See for example, Attiyas and Núñéz Ferrer (2008), Durant (2006), Egenhofer and Gialoglou (2006), Jamasb and Pollitt (2005), CPB (2006) or the national reports of the PIQUE FP7 project.

infrastructure for decades. The ETS allows exemptions from auctioning for the new member states if the associated revenues are invested in upgrades, but a fundamental upgrade requires appropriate integrated strategies that could be fostered by the EU (as discussed in chapter 5 on the cohesion policy). Mistakes will be costly. The EU is in a privileged position to offer co-financing and technical expertise to upgrade the grids to the latest specifications in line with the future needs of HVDC lines and smart energy grids.

The ability of the EU to achieve emission targets through renewable energy or still-unproven carbon capture methods is questionable. Energy efficiency thus seems a central tool for the EU to reduce emissions on both the supply and demand sides. Energy efficiency is now subject to a non-binding objective of a 20% increase in efficiency by 2020, but attainment would be more likely with the use of binding targets, especially to avoid the strong rebound effects mentioned earlier. Regulations and the carbon price levels will be determinants, additionally promoting the increasing efficiency of power generation from fossil fuels. Feed-in tariffs should also be introduced across the EU to promote the installation of renewables. On the demand side, energy efficiency is primarily a pricing and regulatory issue, such as the existence of building codes, with some national public support and EU assistance through the cohesion and rural development policies.

Fiscal incentives (positive and negative) for energy efficiency remain mainly a national competence. The EU will have some sway by using and expanding the ETS, encouraging emission reductions and so fostering energy efficiency. Some limited form of carbon taxation linked to the EU budget revenues could be considered, as proposed by the Commission in its own resources report of 2004 (European Commission, 2004).

Where the role of the EU budget is central is in increasing the energy-efficiency conditionalities for the projects it funds, in the cohesion and structural funds, or for investment in farms and the food industry. The climate 'proofing'[23] of EU-funded projects is a minimum requirement. In

[23] The term 'climate-proofing' is generally used for adaptation. Here it refers to the need to ensure that all measures integrate the best practices available, such as those concerning energy efficiency in infrastructure built with EU funds, preservation as

this respect, public procurement rules are crucial, as they have an influence on the general adoption of technologies. For instance, they are particularly important in the support for housing, as integrated into the budget. Housing in many parts of the new member states needs expansive new developments. Energy efficiency in building is a major emission reduction strategy, and a failure to use the best energy-saving building systems would amount to a large policy blunder given the low turnover rate of 1 to 1.5% p.a. in the EU. The same should of course apply to commercial buildings.

Alongside EU interventions, member states could introduce a fund to facilitate the implementation of profitable energy-saving projects in households, industry and the public sector, with the objective of identifying the most cost-effective savings in these sectors, looking at all phases from energy production to end use. The fund would provide loans for supporting, in the best way possible, the collective actions taken by each member state to meet the individual targets set out in the 2020 compromise.

Such a fund could complement other sources of finance. For example, it could be used in collaboration with the EIB and similar lending institutions or provide the capital necessary to co-finance structural fund projects to support the proactive energy savings identified. The fund should be able to include provision of advice on how to access means of financing for relevant projects. Financing from state-owned lending institutions and the greater use of structural funds are vital for guaranteeing the implementation of needed energy-saving projects during this time of restricted access to capital in private investment markets.

A similar scheme by the EU already exists for investments in the sustainable development of cities (JESSICA, the Joint European Support for Sustainable Investment in City Areas). This scheme allows structural funds to be converted into equity, loans or guarantees for investments in sustainable urban projects. The energy fund would not be part of the structural funds, but be a national element to accompany other efforts to achieve the energy efficiency objectives of the EU.

---

part of environmental actions and even concerns about long-term impacts in *ex ante* impact evaluations of infrastructure (e.g. the effect of higher temperatures on specific infrastructure).

Chapter 5, dedicated to the cohesion policy, elucidates how this important budgetary mechanism could be adapted to complement the efforts for mitigation.

Role of the EU budget in energy

- The funding and interventions to develop the TEN-E should be increased considerably, focusing on crucial nodes for a single European energy market, using HVDC technology where appropriate.
- The introduction of HVDC lines and smart grids should be fostered, especially in the new member states, whenever infrastructure is modernised. Where necessary, directives should be introduced to ensure smart grids are not hampered by inappropriate national regulations.
- Energy efficiency conditionalities should be integrated in all projects funded by the budget. EU public procurement rules should integrate them.
- The use of alternative funding instruments to reach EU energy efficiency and emission targets should be expanded.

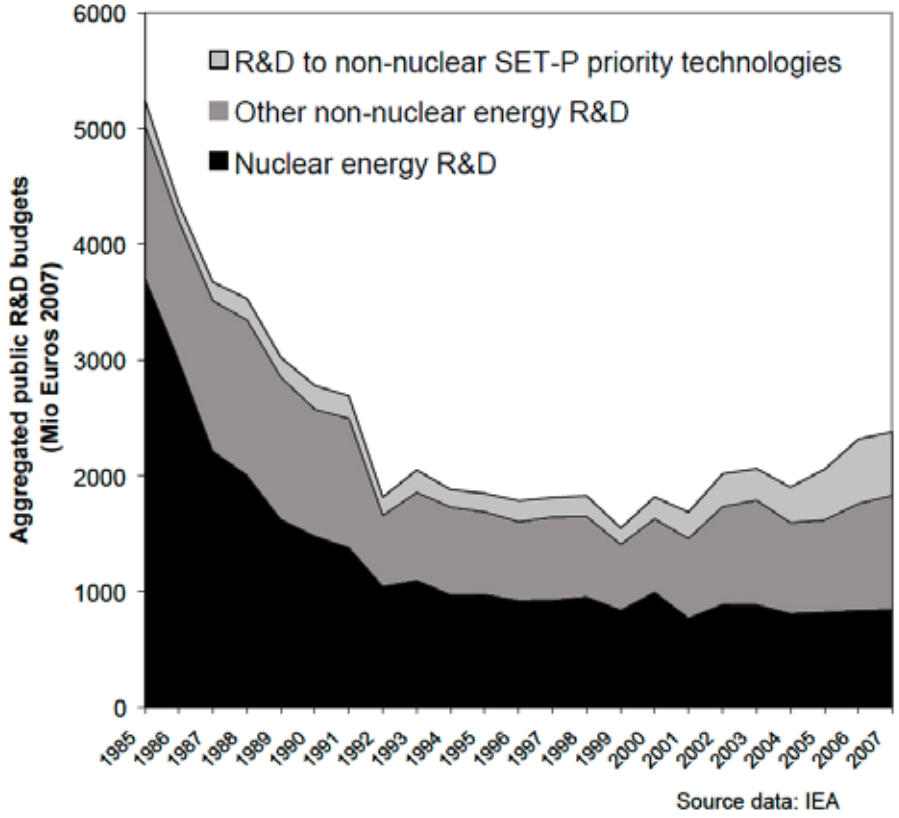
4.2 Supporting R&D and demonstration

The EU budget support for R&D is limited and its contribution to innovation is difficult to measure. For example, the EU framework programme corresponds to a mere 3% of EU R&D and thus the impact is hardly quantifiable. It seems clear that the EU has helped in increasing collaboration among research institutes across Europe, but it is less clear how the EU can contribute markedly to the development of technologies.

The level of public and private research funding on energy across the EU is a real concern. It is important to realise that the share of R&D funding in the EU in the energy sector has fallen (private and public added together) by 40% since 1990, much more than that in the US (-13%), while it has increased in Japan (+22%). At the same time, it should be pointed out that the fall has primarily been caused by a drastic reduction in research on nuclear power. Figure 5 presents the structure of R&D for energy by area according to a new JRC publication (Wiesenthal et al., 2009). Yet, what is really striking is that 80% of public and private expenditure is concentrated in only 4 countries (France, Germany, the UK and Denmark) and 98% in 8

of the 27 member states! Investment in energy research is practically inexistent in 19 of the EU member states.

Figure 5. EU public R&D research in energy



Source: IEA as reproduced in Wiesenthal et al. (2009), which formed part of the presentation by G. Evans to the Task Force on 3 April 2009.

That the share of R&D in this sector is low in the EU does not signify that the EU budget should intervene. Even so, according to fiscal federalism theories, R&D and innovation are better handled at the EU level because of potential economies of scale. Nevertheless, the EU is not a federal state and the EU budget, even after considerably increasing its resources, is unlikely to be allocated a very substantial share of the aggregate public R&D spending across the EU.

There are, however, important initiatives by the EU. One of them is the SET Plan,[24] a development plan at the EU level seeking to coordinate EU research and to channel the results towards commercial viability in the area of low carbon technologies. To a certain extent, the SET Plan is a response to the identified need to foster the necessary innovations to make medium and long-term EU objectives in energy a reality. The SET Plan is based on different technology platforms and initiatives concentrating on future technologies that should, in principle, be too risky for the private sector to invest in alone owing to the long-term, high investment requirements with uncertain success. It also finances joint public and private initiatives (collaborative business and research initiatives) in which the private sector would not invest given their transparent nature and partial loss of benefit from the open source aspects of the work. The platforms and initiatives bring together the European Commission, research institutes and corporate players in the field, to design a coordinated pan-European approach to the technological challenges ahead.

The SET Plan is divided into three periods or technology waves. The first (until 2020) focuses on technologies that should be deployable soon, while the second (until 2050) seeks to develop more complex, long-term solutions (Table 1). The third wave (after 2050) presently just entails the deployment of fusion energy if the ITER[25] and its successor demonstration plants succeed.

One of the stumbling blocks in the SET Plan is the lack of funding to support the agreed strategies decided by the groups forming the platforms and initiatives. Another problem is the selective nature of the platforms, which to a certain extent, pre-defines where the EU is going to invest. A regular review of the direction of the SET Plan to ensure it stays on the leading edge of developments in energy is necessary.

---

[24] See European Commission (2006a) and (2006b).

[25] The ITER refers to the International Thermonuclear Experimental Reactor being constructed in the south of France, financed by an international consortium including the EU (see http://www.iter.org).

Table 1. First two technology waves of the SET Plan

2010	2050
• Second-generation biofuels • Commercialisation of CCS • Larger wind turbines • Large-scale PV and concentrating solar power systems • Enable a single, smart grid • Market energy-efficiency devices • Long-term waste management	• Next generation of renewables • Breakthroughs in energy storage • Hydrogen fuel cell vehicles • Gen-IV (nuclear) • Complete ITER (fusion demonstration) • Alternative vision TEN-E and other systems • Breakthroughs in materials, nano-science, ICT, bio-science, etc.

Source: Presented by G. Evans to the Task Force on 3 April 2009.

Still, one has to tread carefully in the field of public R&D. The success of public funding of R&D in developing commercially viable products has been questioned by the OECD (2003), which saw a strong correlation between industrial R&D and growth, yet no clear relation for public R&D. This may be because public R&D tends to be directed towards basic research with longer maturity, but may also reflect some other 'performance and selection' problems. The EU should be careful how R&D support is administered. Public R&D in the EU as a share of GDP is not low compared with the US and Japan (Núñez Ferrer, 2008), but private R&D is. A detailed EIB study published by CEPS (Uppenberg, 2009), finds that, with the exception of a few sectors, EU private companies are weaker in R&D than their American or Japanese counterparts are in some important areas. The JRC publishes yearly surveys on R&D in the EU and has recently published the results for 2008 (JRC, 2009). This survey does not compare results with non-EU countries, except for expected growth rates in R&D expenditure. But it depicts the relative importance of several factors affecting decisions to engage in R&D in the EU and it should be taken into consideration, as governments should aim at introducing positive incentives to foster private R&D. Unfortunately, the information is offered

as an aggregate of the EU and not by member state. This has important implications given that the tax regime is placed at the top of decision-making by R&D-intensive industries[26] and taxes vary considerably across member states.

As low levels of private R&D across the EU seem systemic and largely owing to market and policy failures, member states should carefully review the causes at the national level. In addition, public authorities should be vigilant not only to avoid substituting private R&D funding with public funds, but also to avoid national public funding being replaced by EU financing. The principle of EU additionality should not be violated. The risk of public funding replacing private funding is a real one, as it is completely rational for private enterprises to seek to their R&D costs through public money. The collaboration between the public and private institutions through the SET Plan is very positive, but maximising the potential of the collaboration requires a distinct separation of roles between the public and the private sectors and most likely some improvements in the regulatory framework in a number of member states.

There is also a need in all member states for the public sector to be more involved in R&D processes. This means the public administration taking an active part with respect to the area of research, with officials having an open dialogue with the public and private research sectors.

While the systemic aspects need to be addressed, there are areas where the EU budget can play an influential role:

a) supporting the SET Plan by financing research in institutes across the EU, allowing for a coordinated effort and economies of scale. Efforts need to be directed at facilitating the collaboration between academic institutes and private companies in the framework programmes;

b) supporting the dissemination of results of the research undertaken, along with their demonstrating and commercialisation; and

c) financing the large-scale demonstration of technologies and their rollout, such as CCS, innovative electricity-grid technologies or other new energy systems.

---

[26] R&D-intensive industries are biotechnology, health-care equipment & services, leisure goods, pharmaceuticals, software and technology hardware & equipment.

A financial strategy for the SET Plan has been presented by the European Commission in a recent Communication (European Commission, 2009e). This document outlines the road ahead and the resources needed according to the European Commission study in the accompanying impact assessment.[27] The document estimates that for the SET group of technologies, the present investment in R&D (public and private) is €3 billion annually. In 2007, €366 million came from the FP7 and Euratom FP7 research programmes. The Communication calls for an increase in the combined resources to €8 billion a year or €50 billion over the next 10 years.

For non-nuclear energy research, 30% of the funding is from public sources and a fifth of the public funds originate from the Community. To bring total funding for R&D on energy to €8 billion, public funding has to increase. The document provides a number of policy options to reinforce research in this area without specifying what level of funding from the EU budget would be necessary. What is clear is that in general, EU funding needs considerable reinforcement to participate in a leverage exercise of this magnitude. Of course, the funds raised from the ETS will also have to play a significant role in financing R&D.

When considering how to approach R&D, it is important to take into account that there are compelling industrial and commercial reasons to promote R&D in the EU. If the EU manages to keep a lead in environmental technologies, it may also lead and capture the markets for environmental technologies in the future. It is now apparent that the US will become an important participant in global efforts and that China wishes to create its own green technologies. If the EU does not show a very strong commitment to green technologies backed by more than just words, it will miss the opportunity to lead the technological field and this global market. Despite the economic woes facing public resources, there is a good argument to shift EU and other public funding to this priority. Losing a leading position in the energy technologies of the future because of underinvestment will have a considerable impact in the competitiveness and growth of the EU economy.

[27] See European Commission (2009f).

EU budget in climate-related R&D

- Member states should tackle the foundations of low EU private investment in R&D.
- The SET Plan objectives should be regularly reviewed.
- Funding for the SET Plan should be reinforced to allow it to reach its objectives and facilitate the collaboration between research institutes and the private sector.
- The additionality of public and EU funding should be ensured. Any substitution of private funding for R&D by public funding or national public funding with EU funding must be avoided.
- Support should be given for disseminating the results of the research undertaken, along their demonstration and commercialisation.
- The large-scale demonstration of technologies and their rollout should be financed, such as CCS, innovative electricity-grid technologies or other new energy systems.

4.3 Rethinking the role of the common agricultural policy

Agriculture is a sector that will be highly exposed to climate change impacts, both negatively and positively. The negative impacts will exceed the positive ones, however. Studies show that some limited positive impacts are to be expected in northern Europe, but significant negative impacts will hit the sector in the south. The limited positive impacts in the north stem from the expected rise in precipitation and reduction in sunshine accompanying the milder winters and hotter summers. Meanwhile, the south (Mediterranean and south-eastern Europe) is expected to face recurring droughts. Adaptation to climate change is thus a central concern for the sector.

Important impacts are already starting to be felt and the years 2020–30 are forecasted to bring considerable stresses to the agricultural regions, not only in the form of water scarcity in the south, but also from a recrudescence of extreme weather events.

The direct changes and extreme weather events are not the only threats, as they may be accompanied by further indirect damage. Higher temperatures and the northern increase in humidity will facilitate the spread of diseases and change pest patterns. Soil conditions will also be affected, with higher erosion risks in many areas and soil quality often

affected negatively, especially in drought regions. The extension of risk management systems, such as private insurance schemes to cover variability with public backing for extreme events, should be explored.

Higher crop yields, volatility and risks of crop failures will require innovative forms of intervention, such as wider use of insurance schemes. Not only crops, but also livestock management will be affected. These changes may need support from the public sector, and the role of the EU budget in the agricultural sector will need to be reassessed. The European Commission's White Paper (2009b) on adaptation and the sectoral working paper for agriculture list the difficulties ahead (European Commission, 2009h).

On mitigation, agriculture has a part to play, as it is an important contributor to emissions – presently 9% of the total. Notably, since 1990 agriculture has already cut its emissions by 20%, owing to a decline in livestock, more sustainable farm practices and restructuring in the new member states. Further reductions are possible, but limited. An important area to investigate is changes in land use practices and carbon sequestration, as well as the sector's participation in energy generation from energy crops or from farm by-products.

The EU has a common policy for agriculture, which means that mitigation and adaptation policies are going to be mainly decided at the EU level. The EU also has a full subsidy mechanism in place for agriculture; the challenge is to implement the necessary measures, in a well-targeted and cost effective manner. The last 20 years of successive CAP reforms clearly demonstrate that fundamental changes to the policy are a complex issue. The report on the value added of agricultural policy in the EU written by CEPS for the European Parliament (Núñéz Ferrer and Kaditi, 2007) presents the weaknesses of the present policy. Subsidies are badly targeted and highly inefficient, and are based on parameters that are not related to actual problems or their costs. A review of studies by Boulanger and Messerlin (2009) on the CAP today highlights the serious dissociation between the CAP's objectives, the modern needs of the sector and the structure of the policy.

The CAP additionally has an indirect influence over the potential of the EU budget to address any new concerns. The EU budget is small and increasing it is complicated, thus unnecessary transfers through the EU

budget are to be avoided. Tying up 40% of funds in the CAP restricts the freedom of manoeuvre of the budget,[28] not only for other objectives in the budget, but also for the agricultural policy itself, which is under pressure to reduce its size. The co-financing of direct support has often been called for. This could reduce the size of the agricultural budget substantially, giving the EU budget more flexibility in the future. Co-financing could be done in a number of ways, based on differential obligations in keeping with the solidarity principle of the EU budget. Some are discussed in Núñez Ferrer (2008).

The investments in the second pillar of the CAP, i.e. rural development, need to be in line with climate objectives. All measures need to integrate climate concerns, ensuring that investments in farms and the food industry follow best practices. Higher priority should be given to investments that reduce emissions.

Land use, for instance, will be a key element for mitigation and adaptation. Reforestation and improving farm practices will be crucial for reducing emissions, but also for adapting to changes caused by climate change. Farming in some areas is expected to be hit severely by climate change and there is a strong argument to allocate support to the hardest hit areas to adapt or even phase out production. For the increase in extreme climatic events, the EU will need to explore insurance schemes with a public–private partnership to ensure that the private sector covers an important palette of risks, with the public sector intervening in the worst cases. The role of the EU in this regard is still to be defined and it could well be that this issue is largely a national one.

From the standpoint of mitigation, new technologies could have the potential to reduce or sequestrate emissions. Changes in land use that prevent tile farming or foster increased carbon sequestration should be researched with support through the R&D budget and encouraged through incentives.

One example that is gaining interest is a process of smouldering organic matter in a low-oxygen environment. The result is called 'biochar'

---

[28] An argument often presented by defenders of the CAP is that reducing the expenditure will not mean that other headings will increase. Yet this is not a valid argument for maintaining inefficient expenditures and keeping a large share of the budget 'occupied'.

by its promoters, a substance that (due to the process of production) serves to capture carbon in the soil and results in a fertiliser. The attractiveness of biochar is that it enables capturing more emissions than those generated from farming. The application of this technology in some farming areas could potentially reduce national emissions through offsetting. Introducing the practice into the ETS market could induce farmers to participate, as it could make the practice profitable. Of course, this could be combined with other possibilities, such as the generation of biofuels, and care has to be taken that this is not excessively used by emitters to avoid reducing emissions (by making agreements with farmers to offset their emissions). Another drawback is the impact on competing uses of farm by-products, from animal feed to inputs for the second generation of biofuels.

Facing the agricultural challenge

- The CAP will need to be further reformed, but its size in the budget should also be reduced. No policy should be fully funded by the EU budget, thus co-financing should be introduced.
- The spread of private insurance schemes in the agricultural sector should be explored and promoted to cater for increased variability, with public funds operating as guarantors in cases of extreme events.
- The rural development policy should integrate climate conditionalities in its interventions and prioritise investments in actions to reduce emissions.
- Land use practices that reduce emissions or allow carbon sequestration in production should be researched and encouraged through incentives.
- Climate resilience should be integrated into policy actions.

4.4 Reducing emissions from transport

Air and road transport produce a large share of anthropogenic emissions. Energy efficiency and alternative power systems need to be researched and the EU could support the development of the required infrastructure. In particular, the completion of the rail and waterways of the trans-European networks for transport (TEN-T) has the potential to reduce CO_2 emissions.

One promising aspect for cutting emissions concerns rail links among all major European centres and especially complete cargo links by rail and

waterways. Fast rail links between major cities have been shown to reduce the use of air and road travel. The carbon footprint of each mode of transport for both freight and passengers (infrastructure costs, energy efficiency and especially GHG emissions) must be taken into account to arbitrate investment choice in one mode of transport or the other. As regards rail, the French rail company SNCF has completed a study on the carbon footprint of one of its fast-speed rail links; in this case, the link was expected to become carbon-positive after 12 years of operation.[29]

The highest potential reductions may probably lie more in shifting cargo off the roads[30] into rail and further promoting multimodal transport. It is interesting to note that according to a study for the US,[31] fuel efficiency since 1969 has doubled in cars, while fuel efficiency for trucks has remained stagnant. Therefore, cargo rail links across Europe should be considered very seriously, as the reductions in emissions, improved road safety and reductions in road congestion could be substantial.

The financial effort is very large indeed, estimated at €900 billion for the total TEN-T, of which €271 billion is for projects deemed a priority over the period 2007–20 (European Commission, 2008a). It is notable that member state (EU-15) spending in transport as percentage of GDP has fallen since 1980 from 1.5% of GDP to less than 1% today (ibid.). New member states spend 1.5% of their GDP on transport infrastructure, but these countries also obtain support from the EU budget, and even for this level of expenditure, there have been issues related to the absorption capacity of the funds. The European Commission's proposed level of EU funding for the 2007–13 budget for the TEN-T network was not approved and indeed was substantially reduced for that period. Hence, alternative solutions must be found for the challenges ahead.

---

[29] See SNCF, "1er Bilan Carbone ferroviaire global – La Ligne à Grand Vitesse Rhine-Rhône au service d'une Europe durable", SNCF, Paris, 2009.

[30] It is interesting to note that cargo transport on roads has increased substantially, while the energy efficiency of trucks has remained stable for 30 years, not showing the improvements seen in the passenger cars.

[31] See P. McKenna, "Kings of the Road", *New Scientist*, No. 2721, 17 August (retrieved from http://www.newscientist.com/article/mg20327211.100-future-trucks-cleaning-up-the-kings-of-the-road.html).

EU grant funding has its limitations. While in poorer regions of the EU the costs can be covered by as much as 85% through the cohesion funds, in other areas the only funds available are those dedicated to TEN-T, which finance 50% of the studies and 10% of the costs of priority projects, 30% of those with cross-border aspects and 10% of non-priority projects.

As mentioned earlier in the case of energy grids, TEN-T links have also suffered from sluggish responses by member states, particularly in the case of rail. The EU has responded in turn by introducing a clause stating that unreasonable delays will cause priority projects to lose the support of the EU's budget, thereby increasing the pressure on member states to complete the projects.

Given the limited funds available, in this domain the EU has started to expand the use of financial tools in a serious way and foster public–private partnerships. Here, the EU's budget now also provides for the EIB loan guarantees – the LGTT (loan guarantee instrument for TEN-T projects). This instrument has been developed jointly by the European Commission and the EIB (through the latter's European Investment Fund). Each year, the EU budget provides a given sum to the EIB as a loan guarantee. This is then used to cover part of the risks of projects and so improve their viability and attractiveness to private investors. LGTT is financed with a capital contribution of €1 billion (€500 million each from the Commission under the TEN-T budget and the EIB), which is intended to support up to €20 billion of senior loans. The amount of guarantee never exceeds more than €200 million, while the EIB is expected to offer loans for €50 billion over the next decade (EIB, 2006 and 2008).

The EIB separately offers loan guarantees through the European Investment Fund and it has created a new financial instrument, the Transport Investment Facility. This consists of loans with maturities of up to 35 years and covers up to 75% of costs.

The TEN policy has supported the contribution of public–private partnerships to implementing transport systems. The approach has been successful in spreading and potentially reducing overall costs while increasing efficiency. Yet, the introduction of user fees to recover the investments has to date been limited and ultimately the main bulk of the risks and costs have fallen on national governments, eroding the benefits of public–private partnerships. The attempt by the European Commission to introduce road charges with a Eurovignette has not been adopted across the EU, although the Commission has yet not abandoned the idea and still

presses ahead in this direction. The mechanism is described in more detail in a document on innovative financing methods (European Commission, 2003). Only some countries use this to cover road infrastructure costs.

The Eurovignette has other beneficial effects, such as encouraging people and freight to move off the road into (hopefully) rail and waterways (for cargo). Moreover, the revenues of the scheme can be reinvested in greener forms of transport.

Transport

- The support for completing the priority TEN-T projects in rail and waterways should be increased, particularly the cargo capacity.
- The possibilities of public–private partnerships should be further explored and expanded, fully using the EIB to complement EU budget support.
- A coordinated, motorway tax Eurovignette has failed to materialise. It is recommended that this is introduced, with the revenues used to complete and maintain the TEN-T.

4.5 Improving environmental sustainability and ecosystem management

Ecosystem management is increasingly recognised as an important aspect in nature conservation. In all areas of environmental management, it is becoming clear that programmes focusing on protecting specific species from manmade threats or from climatic events often fail because the functioning of their ecosystem is not understood or taken into account.

In many areas, ecosystem management is progressively seen as the only way to preserve nature successfully and its all-important function of regulating the planet's climate and habitability. Ecosystem management remains, however, a poorly recognised and funded endeavour. It is crucial that environmental protection is brought to the forefront of EU policy in a holistic fashion and that funding is reinforced. To a limited extent, Natura 2000 and some no-fish areas do integrate the idea of ecosystems, but there is a need to go further. The same applies to areas of external action for climate change, where the protection of rainforest ecosystems, for example, is essential.

It is recommended that the environmental protection of ecosystems becomes a more substantial financial element of the budget. Without an

ecosystem approach, the money spent on Natura 2000 could be wasted, as the programme is still too limited and lacks focus.

Generally, there is a need to concentrate on the sustainability of resources. Increasing resource efficiency globally is important. The EU should reinforce general obligations on resource efficiency and integrate them across all EU operations. Resource depletion and climate change are intrinsically linked, and should be a central focus of policy. An example in the right direction is the adoption of the Ecodesign Directive,[32] setting standards for energy-using products.

Environment and ecosystem management

- Environmental protection should become a prominent heading in the budget and should include a clear and strong element for ecosystem management (not including agricultural areas). This element should feature in external action as well.
- EU environmental programmes such as Natura 2000 need to introduce ecosystem sustainability among their core objectives.
- The EU should develop a more robust policy approach to resource efficiency. All EU operations domestically or abroad should aim at such efficiency.

4.6 Special support for climate actions generating EU-wide benefits

Described in chapter 3 as a natural role for the EU budget, funds from the EU level serve as a useful compensation mechanism to ensure that projects with EU-wide benefits are undertaken. Infrastructure in specific areas may generate notable benefits for other member states or regions, while the region in which it must be constructed may not benefit or may prefer a cheaper or more limited solution. This philosophy is the same as that underlying the TENs.

[32] See Directive 2005/32/EC of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC, OJ L 191/29, 22.7.2005.

In instances of cross-border, positive externalities, there is a strong case for financial support from the EU budget. Neighbouring countries can of course engage in joint initiatives, but for those with multiple interested parties, EU funding can facilitate the task. One example where this may apply is infrastructure for river flood protection. Similarly, some investments with large EU benefits may be detrimental to certain regions; in such instances, the EU budget could intervene to develop measures to mitigate the negative externalities.

Catastrophes caused by climate change are expected to become more frequent. Thus, there is a case for increasing the financial allocation for emergency support. A budget line for climate change adaptation – focusing on rapid reaction, emergency support and reconstruction – should be considered. This fund could be used as an insurance guarantee for extreme events and could cover rapid, EU-level action in the event of wildfires or flooding. Some EU forest-fire initiatives and programmes already exist, but are for the moment mainly academic background exercises (Farmer and Baquerizo, 2006). In emergencies, EU-level responses are still partially ad hoc and it is important to have more established mechanisms.

Special budget for climate change

- Specific funds should be available to fund projects related to climate change with clear EU-wide benefits.
- The EU should also have the financial capacity to maintain an emergency fund to render assistance in the event of catastrophic wildfires or flooding. The EU should be able to deploy rapid response teams for such catastrophes.

4.7 Helping developing countries with mitigation and adaptation

The EU's external challenges are phenomenal – without taking into account climate change. The potential financial responsibility of the EU for assisting non-EU countries to reduce emissions and adapt to changes will add a hefty additional cost. Despite the importance of external action for the EU's peace and prosperity, and increasingly for averting the global climate crises, the external budget of the EU remains unrealistically low. It is true that the EU's external action consists of the sum of all national budgets plus the EU's part, but it is uncoordinated. While the EU has a common strategy

and often presents itself as a single entity in negotiations, the member states play the leading role in developing countries. The fragmented actions and budget give very confusing signals to non-EU countries.

There are various concerns about the complications created by parallel, uncoordinated, member state actions for development abroad, although the European Commission does not have a good reputation from an efficiency point of view. Nevertheless, to a certain extent, the operational quality of the EU's interventions is affected by the institutional restrictions imposed by the EU member states. The EU is currently burdened by an excessive level of bureaucracy, controls and restrictions in its operations, which are often absent in similar operations by member states. There is thus a need to review fully the operations of the EU and the coordination, collaboration and reporting structures involved in the totality of the EU's external aid.

The small external budget is a serious handicap in view of the obligations the EU is likely to face in financing climate-related expenditures in developing countries. Transfers from developed to developing countries to finance mitigation and adaptation to climate change are expected to be vast.

In addition to efforts by OECD countries, developing countries themselves – and especially emerging economies – need to address the challenge of climate change in the medium term. According to the reference scenario of the IEA (2009), global energy-related CO_2 emissions may increase by about 40% between 2007 and 2030, thus putting additional pressure on the climate. The vast share of this increase comes from non-OECD countries, above all from China. Limiting global warming to 2°C above pre-industrial levels – a level below which EU policy-makers believe that irreversible ecological damages may still be avoided – will require cuts in global emissions of at least 50% by 2050 relative to 1990 levels. This would translate into reductions for industrialised countries in the magnitude of at least 80% by the same year (European Commission, 2009a).

The EU and other industrialised countries should take the lead, given their historic responsibility for having emitted most of the current GHG stock in the atmosphere, which is responsible for climate change. The EU has started to address climate change with the adoption of its energy and climate change package in April 2009, entailing member state targets of decreasing GHG emissions by 20% below 1990 levels by 2020 (and up to 30% in the case of comparable efforts by other industrialised countries).

Still, bearing in mind that the EU was only responsible for roughly 14% of global, energy-related CO_2 emissions in 2007 (IEA, 2009), and that in the reference scenario this share would decrease to around 9% by 2030 (ibid.), the EU's ability to have a direct effect on global GHG emissions is limited. It will thus require a global alliance to avoid dangerous climate change. The need for fast-growing developing countries to start reducing their emissions rapidly is well illustrated by the projection that, even if all OECD countries were to reduce their GHG emissions to zero by 2030 (which is highly unrealistic), non-OCED countries alone would exceed global emission levels in line with the 2ºC threshold (IEA, 2009).

A large and coordinated effort to face the costs of assisting developing countries in their actions to reduce emissions and adapt to change is crucial. Solid concerted action in the EU will thus be necessary, including clear signals for other countries to follow suit.

The European Commission provided a blueprint on climate finance that seeks to support an ambitious, global agreement on climate change to be sealed in Copenhagen and to unblock the deadlock in international negotiations. It estimates that the finance requirements for adaptation and mitigation actions in developing countries will reach some €100 billion per year by 2020 (European Commission 2009c and 2009d). International public finance would have to contribute between €22-50 billion per year, while the bulk should come from two other sources: domestic public and private finance (20-40%) and flows leveraged by the international carbon market (up to 40%) (European Commission 2009d). The contribution of the carbon market will be significant, especially if facilitated by a new sectoral crediting mechanism. As to the public burden, the suggestion is to share it between developed and advanced developing countries "on the basis of ability to pay and responsibility for emissions" (European Commission 2009c, p. 3). Based on these principles, the EU contribution to international public finance is estimated at between 10-30% and some €2-15 billion annually.

These figures put forward by the European Commission may be underestimated, however. Behrens (2009), for example, shows that governments of EU member states and the European Commission may realistically need to contribute between €1.6-16 billion annually for mitigation alone. Another €1-11 billion may be added to address adaptation in developing countries. The flow of such large amounts of money requires considerable absorption capacities in poor and middle-income countries.

Absorption capacity depends on the quality of controls, administrative capacity and procurement procedures.

It seems very unlikely that developing countries will be able to cope with such significant investment flows (some €200 billion annually, see Behrens, 2009) unless they can establish an appropriate legal, organisational and human resources framework to provide for an effective execution of financial flows. The focus should thus be put on the qualitative nature of low carbon investments in development countries rather than purely on quantitative figures.

In comparison with the figures presented above, the capacity of the current EU budget to participate in climate change activities in developing countries is low, given the meagre size of the external action budget. The latter is well below any level required for contributing to the EU's obligations towards the developing countries. While this can be handled by national budgets, the economies of scale of a centralised policy would be lost. It is also necessary to review existing developing programmes to adapt them and integrate climate change into their actions.

A substantial increase in the external budget before the next Financial Perspectives is not feasible, while support for developing countries may start to increase earlier. A separate budget for this purpose could be a possible solution.

External action

- The EU needs a policy supported by a budget more in line with its obligations and large enough to show a real commitment in assisting developing countries to reduce emissions and adapt to climate change. Without the developing world on board, EU emission reduction efforts will be dwarfed.
- Member states should give the EU the capacity, through a common policy, to present a strong common face along with the supporting financial means to reach concrete results in the climate negotiations in Copenhagen and beyond.
- With increasing financial flows to developing countries, absorption capacity becomes more important. The EU should not only focus on quantitative figures, but also on the qualitative nature of low carbon investments in developing countries.

5. ADAPTING POLICIES FOR COHESION TO CLIMATE OBJECTIVES

The EU's cohesion policy deserves particular attention, as it represents a substantial, transnational transfer system among member states aimed at fostering growth in lagging regions. Despite its limited size, the EU's cohesion policy has had a significant impact on the development path of recipient regions. Its effects are most apparent in the new member states, where it assists in the development of major infrastructure and more importantly influences national development strategies, as well as such aspects as national public procurement rules. The ability of the cohesion policy to have a bearing on development choices in the beneficiary areas is central to fostering actions that reduce emissions, but will progressively be called upon to help with adaptation. Many regions that fall under the cohesion policy are highly vulnerable to the repercussions of climate change, especially in southern Europe.

The Community Strategic Guidelines for the structural and cohesion funds[33] do mention the need for member states to promote investments in sustainable energy, transport and investments to contribute to the EU's Kyoto commitments.

Nevertheless, the guidelines were published in 2005, when climate change was not at the centre of policy development. The guidelines therefore do not give these actions the level of urgency or any precise obligation, as is the case for the Lisbon strategy, which benefits from earmarking and the requirement to prove the compatibility of programmes with this strategy. Likewise, no mention is made of adaptation.

[33] See European Commission (2005).

As far as actual regulations are concerned, the cohesion fund regulation[34] allows the following investments under Art. 2, para. 1(b): "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 regulations on structural funds,[35] Arts. 3, 5 and 6 include the possibility of funding actions to mitigate climate change. Table 2 presents the sections of the different cohesion-oriented EU funds where actions for CO_2 reductions are proposed.

At the outset, the incentives to use EU funding appropriately in this field were too weak. This was reflected in the programming documents, which were mainly oriented towards growth and fund absorption. Road infrastructure is, for example, one of the fastest ways to use EU funding. It is also clearly a major priority for most convergence regions, particularly the new member states, which actually runs counter to the need to reduce emissions. Roads are quicker and cheaper to build than fast rail links and cargo rail. The TEN-T for rail tends to trail far behind its road counterparts; some links have never been started. Energy efficiency was not at the heart of the development strategy in the new member states, despite these countries being highly energy inefficient per unit of output.

[34] More specifically, see Council Regulation (EC) No. 1084/2006 of 11 July 2006 establishing a Cohesion Fund and repealing Regulation (EC) No. 1164/94, OJ L 210/79, 31.7.2006.

[35] See 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, OJ L 210/25, 31.7.2006.

Table 2. Funding options for CO_2 reductions in the EU budget

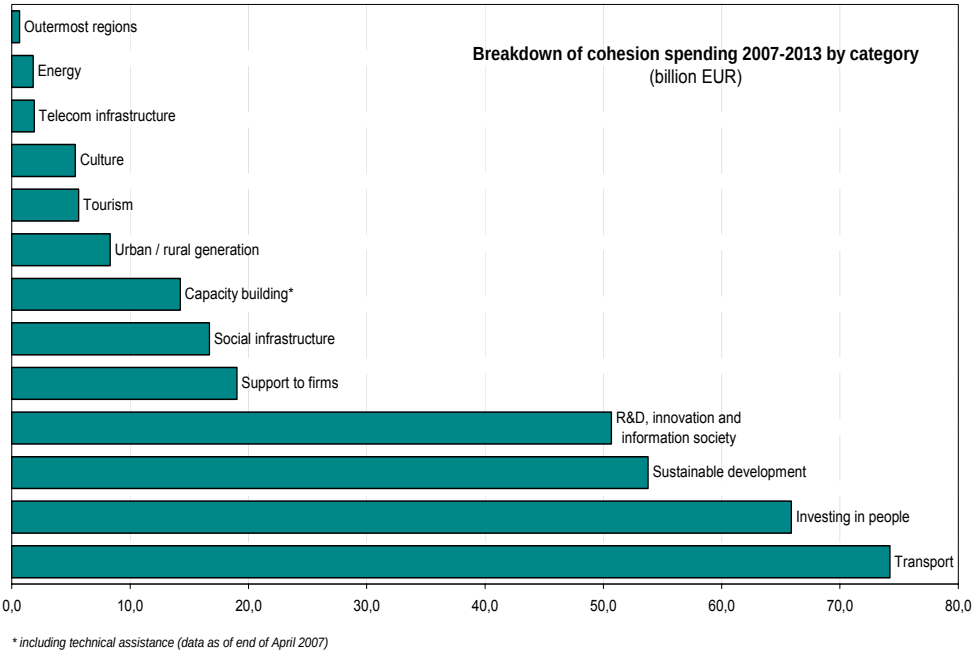
	Cost item	Funding options			
		ERDF [1]	ESF [2]	Cohesion fund	EAFRD [3]
Framework for management and administration	Administration costs (funding of regulatory authorities)	–	–	–	–
	Developing public procurement criteria for energy efficiency	–	(3.2b(i))	–	–
	Establishment of energy agencies	–	–	–	–
	Capacity building for public administrations	–	(3.2b(i)) (3.2b(ii))	–	–
	Capacity building for businesses	(4.1) (4.7) (6.2d)	(3.2b(ii))	–	–
	Strengthening related regulatory authorities	–	(3.2b(i)) (3.2b(ii))	–	–
	Studies and plans	(4.3) (5.2b)	(3.2b(i))	–	–
	Research	(4.1)	–	–	–
Operation and monitoring	Operation of participation systems (esp. for the resolution of conflicts)	–	(3.2b(ii))	–	–
	Operation of awareness and information systems	(4.2)	–	–	–
	Support to business for the uptake of energy-saving solutions	(4.1) (4.3) (5.1a) (5.1b) (5.2b)	–	(2.3)	(28) [4]
	Support to households to adopt energy-saving solutions	–	–	–	–
	Support for the development of relevant skills and techniques	(4.1) (5.1a) (5.1b)	(3.1a(i)	–	–
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)	–	–	–

[1] European Regional Development Fund
[2] European Social Fund
[3] European Agricultural Fund for Rural Development
[4] While possible, no direct mention of energy efficiency is made, only the general modernisation of technology.

Source: WWF (2005), p. 32, Table 18.

The planned distribution of funds over the period is presented in Figure 6. The share of investments in the environment or climate change-oriented expenditure is difficult to subtract from the figures. Studies on the matter seem, in some cases, to contradict one another owing to the interpretation of what constitutes an investment in climate change protection. According to the figures presented by the European Commission (Berkowitz, 2009), the funds directly related to climate change (renewable energy, energy efficiency, mitigation and adaptation to climate change, air quality and risk prevention) represent 4.7% of the cohesion policy funding. A further 9.2% is indirectly related to climate change (railways, mobile rail assets, cycle tracks, intelligent transport systems and clean urban transport). Around 90% of the combined 13.9% is spent through the convergence funds. Table 3 presents the distribution of this 13.9% of the funds by area of action.

Figure 6. Breakdown of cohesion spending 2007–13



Source: Presentation by P. Berkowitz (2009).

Table 3. Distribution of climate change-related funds by area

Investment type	Area of action	€	%
Direct	Air quality	1,020,376,565	2.1
Direct	Climate change	304,727,396	0.6
Direct	Energy efficiency	4,192,277,448	8.8
Direct	Renewable energy	4,785,767,205	10.0
Direct	Risk prevention	5,828,968,710	12.2
Indirect	Cycle tracks	634,419,290	1.3
Indirect	Intelligent systems and clean urban transport	7,257,185,855	15.2
Indirect	Rail	23,878,214,407	49.8
Total		**47,901,936,876**	**100.0**

Source: Presentation by P. Berkowitz (2009).

Climate change and energy efficiency nevertheless began to take centre stage in EU policy shortly after the start of the programming period. The political importance of emission reductions, the EU target reductions of 20-30% in 2020 and the introduction of the ETS are having an effect in changing the development objectives of countries, but these changes have to be patched into the existing structural fund strategies, which will likely result in more inefficient and less effective outcomes.

The efforts are considered insufficient in a number of reports, particularly for energy efficiency and renewable energy. Concern has been raised by two studies[36] that have analysed the level of allocated expenditures for the new member states for the programming period 2007–13. But according to European Commission figures, their performance is not worse than that of many of the 'old' member states. Table 4 shows the shares of funds allocated to energy efficiency and renewables in the convergence regions[37] of the EU.

[36] See WWF and German Federal Ministry of Environment, Nature Conservation and Nuclear Safety (2007) and CEE Bankwatch Network and Friends of the Earth (2007).

[37] Convergence regions are those with a per-capita average GDP under 75% of the EU average, i.e. under Objective 1 of the structural funds.

Table 4. EU funds allocated to energy efficiency and renewables in convergence regions within the member states

Member state	% share of funds	Member state	% share of funds
Bulgaria	2.9	Lithuania	6
Czech Republic	4.5	Malta	4
Germany	1.5	Poland	1.8
Spain	0.7	Portugal	1.1
Estonia	2.1	Romania	2.3
Greece	1.8	Slovak Republic	1.5
Hungary	1.5	Slovenia	3.9
Italy	6.6	UK	3.7
Latvia	2.8	–	–

Source: DG for Regional Policy.

Looking at the EU budget interventions is a very biased way to observe the commitment of member states to climate change actions. EU interventions have not been designed primarily to target climate change, and national actions are more important in this field. National schemes based on other forms of intervention, through subsidies, regulation or fiscal incentives, play the leading role. For instance, Germany is a leader in the renewable energy sector and cannot be accused of neglect, even if scarcely any EU funds are directed at this priority. Countries are also adapting their actions during the programming period, which means that over time there should be some movement in the line of shifting investments towards climate change compared with the original operational programmes.

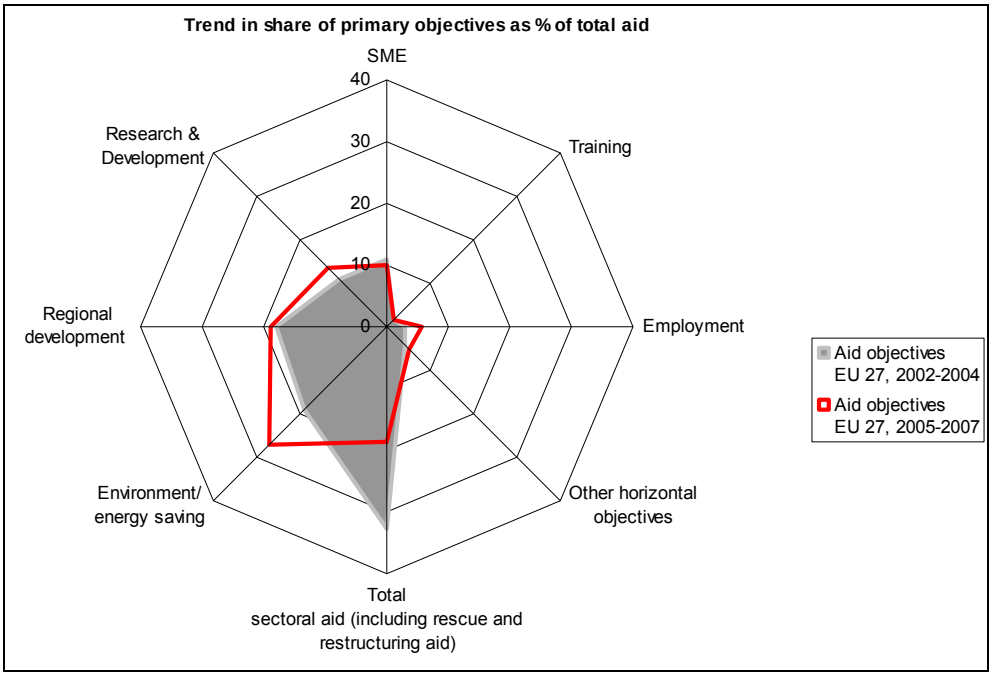
Indeed, there is an indication that state aid directed towards the environment and energy saving (energy efficiency and renewables) in many EU member states has increased considerably. This can be discerned by looking at the direction of state aid in the member states (public support excluding Community funds and instruments) using DG Competition's state aid scoreboard.[38] Figure 7 shows that the EU-27[39] has strongly shifted

[38] The European Commission's DG Competition scoreboards exclude state aid to agriculture, fisheries and railways.

[39] The data exclude Bulgaria and Romania, which were not EU member states in the period covered.

the emphasis of state aid from sectoral support to horizontal priorities and environmental issues, and energy saving in particular. This has been quite recent, with a remarkable shift from priorities visible in the periods 2003–04 and 2005–07.

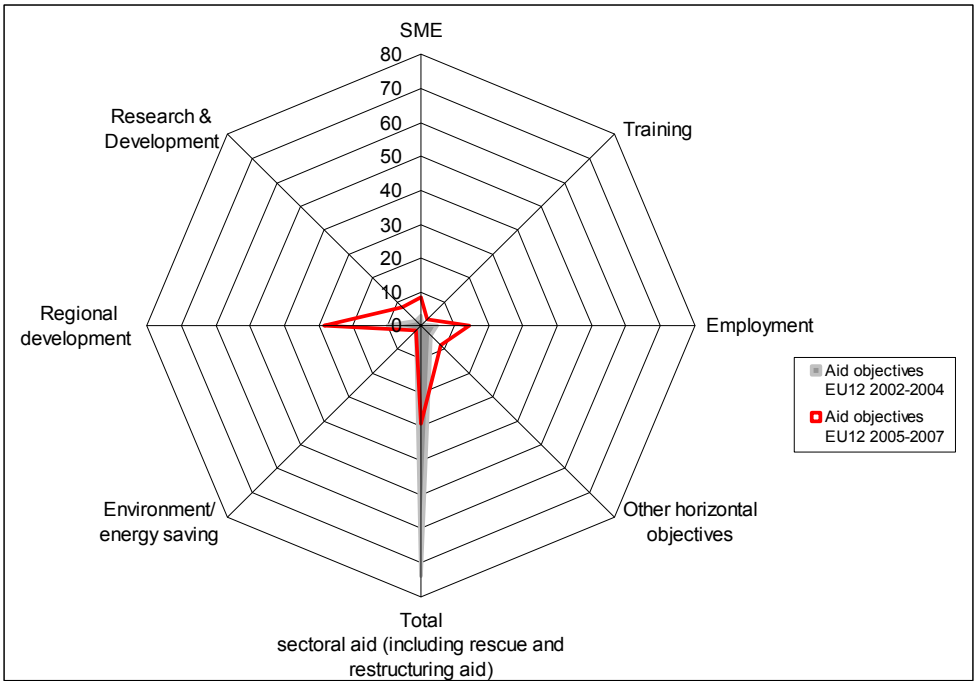
Figure 7. Share of state aid for horizontal priorities in the environment and energy sectors (EU-27)



Source: The European Commission's state aid scoreboard (retrieved from http://ec.europa.eu/comm/competition/state_aid/studies_reports/stat_tables.html).

Yet, this shift has not been equal in all EU countries: the same shift has not occurred in the new member states (Figure 8) or the remaining 'old' cohesion countries (Greece, Spain and Portugal). While a reduction in sectoral aid has generally occurred with a shift in the emphasis towards horizontal issues, environmental and energy-saving investments have not increased markedly.

Figure 8. Share of state aid for horizontal priorities in the environment and energy sectors, new member states (EU-12)

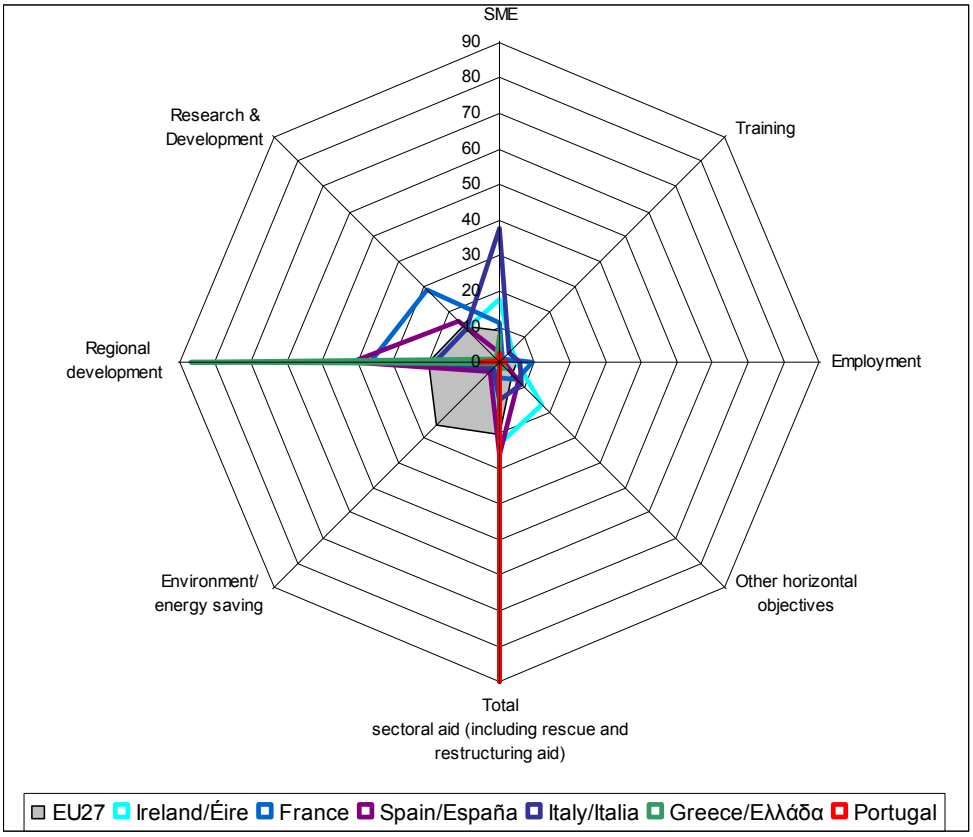


Source: The European Commission's state aid scoreboard (retrieved from http://ec.europa.eu/comm/competition/state_aid/studies_reports/stat_tables.html).

Still, and to be fair, the non-cohesion countries (France, Italy and Ireland) do not seem to have increased the share of investment in the environment and energy either (as shown in this segment of Figure 9). It is interesting to note the large differences in the state aid structures, especially Portugal's nearly exclusive sectoral support and Greece's nearly exclusive regional support, underscoring the wide divergences among member state needs or policy priorities.

Even taking into account that energy efficiency and a reduction of GHG emissions can be achieved through support in other aid categories (urban transport, regional aid, rail network expansion or communal heating-system improvements), climate concerns are not well integrated in national development plans.

Figure 9. State aid priorities in 2007 in France, Greece, Italy, Ireland, Spain and Portugal, compared with the EU average

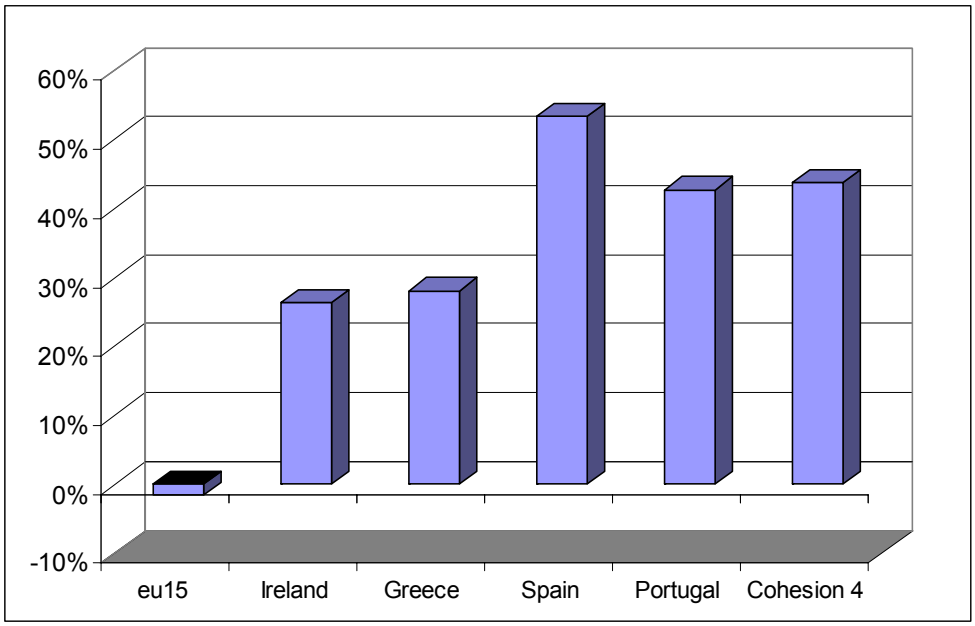


Source: The European Commission's state aid scoreboard (retrieved from http://ec.europa.eu/comm/competition/state_aid/studies_reports/stat_tables.html).

Another strong criticism by EU budget studies is that large investments are for activities that will foster CO_2 emissions, well over any reductions likely to be achieved. Transport absorbs the highest share of the EU funds in the new member states, at between 20 and 30% of the funds. Of those funds, 53% is allocated to road transport. The planning for public transport is still deficient in the structural fund strategies of most new member states and climate concerns are not central to the planning process. There is also a serious worry that EU funding in the past has encouraged a significant increase in emissions (Figure 10), most notably in the road sector. These countries have seen a large increase in emissions between

1990 and 2005, compared with a total reduction of emissions by the EU-15 as a whole of 1.5%. The priorities of new member states for the EU funds are similar to those of the EU-15 cohesion countries in past programming periods. Of course, these increases start from a low base, but demonstrate the speed of the change and how quickly emission allowances in the new member states can be eroded.

Figure 10. Change in GHG emissions in the cohesion countries, 1990–2005



Sources: Eurostat database, published in Egenhofer et al. (2008).

Transport is one of the most sensitive areas in relation to climate actions. The largest investments of the cohesion policy are in transport and road transport is the easiest to implement. Investments in green transport have nonetheless become prominent in the programmes, and according to the planned programmes of member states, 36% will be dedicated to green transport.[40] The increasing prioritisation of rail is clear, with nearly 30% of

[40] Green transport here includes cycle tracks, intelligent transport systems, railways, mobile rail assets, clean urban transport and the 'blue' transport: waterways, multimodal transport and ports (8.7% of funds).

the funds pre-allocated to rail; whether these rail projects are realised, however, remains to be seen.

For the new member states, the share of EU funds allocated to climate issues is particularly important, owing to the limited capacity of national budgets and the extensive need to improve energy efficiency.

Another new and interesting measure of the structural funds is the possibility to use EU funds for housing in the new member states.[41] This would allow funding for energy efficiency in housing and promote use of renewable energy sources. Yet, the measure does not spell this out specifically, and hence represents a missed opportunity given that 40% of all CO_2 emissions in the EU originate from the building sector,[42] of which 77% stem from the residential side.[43] That notwithstanding, in March 2009, the European Parliament voted to expand the scope of investments in the housing sector by explicitly including a measure for energy efficiency in housing in the structural funds for all member states. The EU will support investments in energy efficiency, including retrofitting existing housing.

Despite the somewhat increased presence of positive news on the priorities of the cohesion funds, the 2007–13 programming period still treats climate change as a fringe issue, as it was not at the centre of programme development. It is possible that the new member states were too complacent in the programmes and in other national plans. They all had a significant level of 'slack' in their Kyoto commitments. The EU also absorbed their slack and allowed the new member states an increase of 20% in GHG emissions. This slack is being absorbed very rapidly and the performance of the old cohesion countries as presented above shows that a

---

[41] "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" (p. 1, para. (5) of Regulation (EC) No. 1080/2006 of 5 July 2006 on the European Regional Development Fund and repealing Regulation (EC) No. 1783/1999, OJ L 210/12, 31.7.2006).

[42] This figure is derived from Directive 2002/91/EC of 16 December 2002 on the energy performance of buildings, OJ L 1/65, 4.1.2003, pp. 65–71.

[43] This figure, by CECODHAS (European Liaison Committee for Social Housing), is for the year 2002.

20% increase in emissions can be reached quickly. As of 2012, new and old member states alike will face the challenge of transforming into a low carbon economy.

Another area where the EU funds should focus resources is the reduction of methane emissions through appropriate waste management and by tackling urban sources that even create ozone in certain areas. Here action can be swift with current knowledge and have an impact on reducing the GHG accumulation in the atmosphere.

5.1 Strategy

A lack of concern over emissions is not the only reason for the absence of real commitment in the programmes. A serious problem has been the capability of the administrations to integrate a national strategy efficiently. The quality and implementation of the strategy is crucial to the performance of the funds (see Leonardi, 1995 and Núñez Ferrer, 2007a and 2007b).

The development of a coherent national strategy is complex and requires highly skilled specialists and strong political backing. Many EU countries continue to lack the capacity to develop good strategies and implement them. There is a need to use all available avenues, such as twinning projects to transfer the necessary knowledge in these fields. This has been recognised and the European Commission is reinforcing mechanisms to transfer best practice. In addition, there is a need to extend the awareness of the options for integrating climate change concerns horizontally in structural actions. Also, to date there is no clear, consistent methodology for estimating the impact of the GHGs of EU programmes. This needs to be developed to make meaningful programmes with quantifiable results to mitigate their emissions.

What can be inferred from the different reports on the issue is that there is still, for the cohesion policy, a lack of coherence in the approach to climate change. For energy, for example, the CEETA (2005) analysis detected that in a number of actions on renewable energy, there was a lack of connection with energy efficiency, i.e. new, renewable energy systems may supply energy-inefficient houses or industries. This finding is important for cohesion policy: if projects are not energy efficient, the benefits of increasing renewable energy will be partly eroded.

Generally, the problem of the cohesion policy, as in general for other items and member states' budgets, is that climate change is a highly

horizontal problem. Reducing emissions and adapting to climate change are not tackled by adding a measure or two into the areas of intervention; they require a systemic change and integration across all areas. To achieve this, it is necessary that the linkages among different actions are understood and form part of coherent local and national strategies. The deployment of renewable energy systems and energy efficient systems requires the introduction of better-integrated grids. The want of a coherent, horizontal climate policy at multiple governance levels is particularly striking for cities.[44] Although 74% of the EU population lives in urban areas, responsible for 75% of emissions,[45] the consistent and strategic integration of cities into the climate debate remains absent and city authorities often lack the necessary empowerment to act. The urban aspects of climate change should have a much clearer presence in the cohesion policy and all urban initiatives in the EU budget. The population density of cities allows for projects with substantial economies of scale and quick efficiency gains.

5.2 Opportunities in new member states

New member states that have an ageing energy infrastructure offer a perfect opportunity for the introduction of smart grids, where renewable energies and private consumer–suppliers play an increasing role (consumers with their own energy sources such as solar panels, who can sell excess energy). But such an approach requires a clear national strategy. EU funds, national funds, private operators and legislators need to coordinate a multiyear, large-scale, solid strategy. Structural programmes remain an amalgamation of loose measures, with renewable energy or energy efficiency support offered as single independent measures unrelated to an overall, coherent energy infrastructure. Hence, support through the cohesion policy for the development of low carbon cities or entire regions should be encouraged.

---

[44] The topic of cities and climate change is currently being examined by another CEPS Task Force, which is due to publish its results in late 2009 (see http://www.ceps.be/taskforce/eu-and-global-climate-change-policy-and-increasing-role-cities).

[45] See the Eurostat *Statistics in Focus* article by B. Feldmann, "The Urban Audit — Measuring the quality of life in European cities", *Statistics in Focus*, No. 82/2008.

One promising way ahead could be the running of large-scale pilot programmes for low carbon zones in cities and regions of the new member states. This would assist the modernisation of these regions and the creation of green jobs. Apart from infrastructure, support through the European Social Fund (ESF) for acquiring the necessary skills associated with a low carbon programme would lead to the development of more sustainable regions and indeed a knowledge economy – in line with the growth and jobs objectives of the EU.

It is therefore recommended that the cohesion policy integrate a significant energy production and efficiency component, with a link to concrete national actions. Such move should also tie in with the EU's objectives for a single market in energy, and thus include a strong cross-border energy component.

Cohesion policy

- Energy and energy efficiency need to be incorporated throughout regional and national strategies for intervention.
- The polluter pays principle should be fully integrated.
- The strategic component of the programmes should be strengthened, particularly with the aim of contributing to a better-integrated energy system. New member states offer an opportunity for substituting ageing infrastructure with new, smart grid technologies, which can only be implemented under a coherent national strategy.
- Offers to reinforce assistance for strategic development should be made and the transfer of best practices expanded.
- There is a need for a clear methodology for accounting for the GHG impacts of EU programmes.
- The role of urban areas in mitigation and adaptation should be enhanced, ensuring consistency with national actions.
- The creation of low carbon zones through cohesion policy assistance should be considered.

6. RECOVERY PLANS, THEIR FOLLOW-UP AND OTHER FINANCIAL MECHANISMS

The economic recovery plans, and in particular the EU's recovery plan, is a matter of substantive dispute with respect to climate change. Many countries around the world have released historically unheard-of levels of public funds into the economy to save the banking sector from total collapse and to cushion the global economic slowdown. These recovery plans try to ensure that loan mechanisms to the private sector continue to prevent a significant contraction of the private sector and therefore a contraction of demand.

At the same time, such stimulus packages can also be devised to redirect economic activities, and this idea has been somewhat successfully sold to policy-makers by many non-governmental organisations, which saw a unique opportunity to direct funding away from environmentally unfriendly activities towards the development of low carbon economies. Failure in redirecting the funding also constitutes a very clear danger for the development of a low carbon economy. Fuel prices have fallen with demand, making renewables less attractive again, while the downturn has initially reduced the growth of renewables and clean technologies by 90%. To avoid a lock-in of the green sectors, these have to be given an advantage during this downturn, allowing them to take a leading place in the market in a future upturn. Furthermore, once the recovery plans subside, there is a need to ensure that the stimulus created does not flatten out. In this respect, follow-up is important.

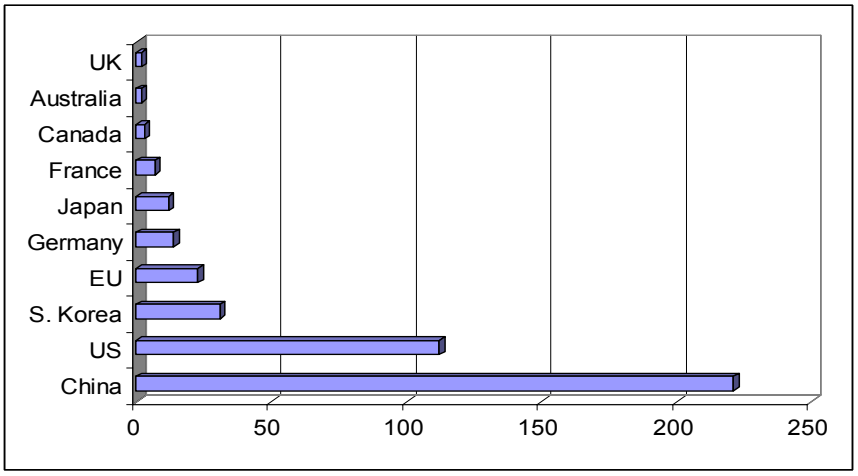
The aim of directing recovery packages towards green technology development is to mobilise funding in such a way as to establish a large green energy base sufficient to start nothing other than an energy revolution. Unstable oil prices, increasing energy security concerns and the growing awareness that our energy consumption is going to affect our lives

in one generation and for millennia to come (in many cases negatively) is providing a window of opportunity for a wave of behavioural change through clear policy commitments. The WWF, EG3, the Institute for European Environmental Policy and the Green Alliance have led the work on the recovery packages.[46]

6.1 International comparison of stimulus packages

According to figures provided by Mabey (2009), the current global stimulus packages amount to roughly $1.8 trillion for the period 2008–10 (3.25% of GDP). Höhne et al. (2009) present a detailed scoreboard. Of this amount, a (generously) estimated 23% ($436 billion) is allocated to low carbon infrastructure and investments of which infrastructure is the bulk, with only 8% remaining in other investments ($140 billion), which is slightly over half the investments planned in road infrastructure. Given that a return oil prices of $140 per barrel would cost the US, the EU and Japan $800 billion a year, there is some rationale to focus more on low carbon investments. Interestingly, it is China that has the largest share of its stimulus package concentrated on low carbon development (Figure 11).

Figure 11. International comparison of green stimulus packages



Source: HSBC estimates.

[46] See Höhne et al. (2009), Mabey (2009), Withana and Baldock (2009) and Hewett (2009).

Despite the EU's advanced thinking in the area of climate change and the environment, it shows little actual engagement in practice with the green stimulus packages. These have been considered rather incoherent and unfocused in the analysis performed by Withana and Baldock (2009).

6.2 The EU's stimulus package

In 2008, the EU launched the European Economic Recovery Plan, setting out a package of measures to be implemented at the EU and national levels. The plan proposed an impulse of 1.5% of EU GDP (€200 billion), to be invested in specific smart activities, green technologies and climate change as part of the smart investments. Approximately €170 billion was to come from member states, accompanied by €30 billion from the EU, obtained by liberating unspent margins and rearranging priorities, including the wider use of pre-financing from the European social funds and the cohesion funds (de facto not new money) and the use of lending instruments. From the entire package, the shares for the environment are as follows:

- The EIB has increased its lending by €6 billion for 2009 and a similar figure for 2010 for climate, energy and green infrastructure investments.
- The EBRD is to contribute €0.5 billion to new member states, partially for energy efficiency.
- Three new, clean technology initiatives have been launched, entailing €5 billion for green cars, €1 billion for energy-efficient buildings and €1.2 billion for greener industries (the "Factories of the Future" initiative).
- The Commission put forward a €5 billion set of measures, of which over €2 billion is for gas (€1.44 billion) and electricity interconnection (€910 million), €15 million is for small island projects, €565 million is for offshore wind projects and just over €1 billion is for CCS.

This package has raised all manner of concerns and criticisms. Its legality has been questioned by member states and the Council. But some also criticise it for being too shortsighted.

Compared with the size of national stimulus packages, the EU budget's €5 billion (which is the 'real additional' money from the EU budget) looks feeble, but this is because of the lack of financial freedom in the EU budget. The amount is made up of unused money from budgetary headings. This package was not only very difficult to bring about, it has

also provoked some very negative reactions. On a share basis, the Commission's is the greener of all the stimulus packages (around 50% depending on the interpretation) with regard to low-carbon energy investments, but it is considered financially wasteful by some commentators, as it primarily benefits large energy providers that are highly profitable by factors far greater than the size of the package. The additionality created by the funds is therefore questionable.

While this criticism is an issue of dispute, the EU budget should generally experiment more with non-grant forms of intervention and more specifically with loan guarantees for financial institutions such as the EIB. This is happening for the cohesion policy and the TENs, but only to a limited extent. One area where the recovery package could have had a strong impact is in the fostering of smart grids through urban initiatives. The challenges in this area are daunting and energy efficiency in urban areas is a key to driving down emissions speedily.

In any case, the real problem of the recovery plans is that they are by nature short term. To maintain the momentum of the plans, the operations started with these funds must be solidly established, or some different public mechanisms should be put in place to see them carried out. Here the role of financial institutions such as the EIB may be crucial. Yet, the green aspect of any additional financial support for the economy should be geared better towards making the economy itself greener.

6.3 The role of lending institutions

When funds are limited, the use of EU budget resources as loan guarantees for the EIB in specific areas are deemed much more effective in mobilising investment. This is the case for TEN-T investments and the same reasoning could apply to the energy sector. The €5 billion recovery funding from the EU budget could likewise have been used as loan guarantees, mobilising loans to a level reaching up to 20 times the loan guarantee amount (with funds from the EIB offering another guarantee part). The quality of the projects is enhanced, as loans increase the responsibility of loan recipients to ensure that it can be repaid. This is also good and more sustainable way to stimulate the economy.

To maintain the momentum of the recovery packages and to continue fostering a sustainable, low carbon economy, the EIB could augment its provision of loans to the energy sector and activities that create green jobs. The European Commission and member states should explore the

possibilities for increasing the loan guarantees of the EIB in the area of energy and target, for example, the development of low carbon cities.

The EIB has been substantially increasing its interventions in the energy sector, reaching a planned €9.5 billion for this year. It has funds for clean transport and is planning the launch of another large new fund, the 2020 European Fund for Energy, Climate Change and Infrastructure (the 'Marguerite fund') to finance equity and quasi-equity projects in these areas and support the internal energy market, the integration of renewables and enhanced internal security of supply (EIB, 2009).

Nevertheless, despite the important role the EIB could be playing, it is crucial to ensure the additionality of EIB actions. Funds should not be crowding out the private financial sector, but concentrate on interventions where the risks are too high or the maturity of projects too long to attract private funding.

Another aspect for the EIB is to expand its loans to developing countries through instruments such as concessional loans. This effort should focus on development programmes that also integrate climate change actions either to reduce emissions or build resilience to climate change in the future.

Finally, a very interesting and useful proposal with wide-ranging, positive implications is the creation of a bond scheme issued directly by the European Commission for capital investments, such as the large trans-national projects of common EU interest, e.g. the Galileo programme. This has been proposed by a much-discussed CEPS publication by Iozzo et al. (2008).

Recovery plans, their follow-up and other financial instruments

- The green aspects of stimulus packages need more focus and the continuation of the efforts begun should be ensured.
- The wider use of EIB instruments should be fostered. With an increase in the loan guarantees, the EIB could release much larger amounts of funds for projects across the EU and beyond. Loan performance and efficiency tends to be greater than is the case with grants. Yet care should be taken that loans do not crowd out private finance, but instead attract it.
- The introduction of EU bonds for large capital investments of EU-wide interest should be considered.

7. CONCLUSIONS

This report establishes that the EU budget has a role to play in combating climate change, from reducing emissions to adapting to the impacts. With climate change a top priority among the concerns expressed in the public consultation by the European Commission in September 2007, there is a strong, legitimate reason to integrate it extensively across the EU's operations.

The budget is by nature very limited in size, but can play a vital role in cross-border infrastructure, solidarity among member states and EU-level coordinated action, and act as an effective leverage tool for fostering attainment of the EU's climate objectives. A positive aspect of focusing actions to create a low carbon economy is that it promotes the Lisbon objectives, by facilitating the creation of green jobs and boosting the rate of innovation. In so doing, it also develops further the knowledge economy and the EU's competitiveness in key technologies of the future.

The report highlights that to have a strong, renewable energy sector in the EU and increase energy efficiency, it is crucial to complete the single market in energy by linking the national grids to a single pan-European grid. It also shows that in the future, for increased use of renewable energy from different sources and for handling greater energy fluctuations, the EU will need to develop its HVDC connections. For this effort, the EU budget can provide substantial assistance through the TEN-E budget and the cohesion policy, ensuring the necessary interconnectivity. Support is very limited, however, and needs more resources. New financial instruments linked to the EIB and other financial institutions, or the creation of EU bonds for critical infrastructure in the EU should be investigated.

The EU budget furthermore has an important role to play in R&D, in funding and coordinating research across the EU, ensuring economies of scale and promoting the spread and adoption of technologies. The EU's

SET Plan is a useful structure for the future to streamline research and forge partnerships of industry and academia; however, it too requires a higher level of resources. In addition, the R&D budget should invest in longer-term untested technologies and help finance large-scale demonstrations, such as those for CCS. Allocations for the co-financing of demonstrations of innovative 'smart grids' should be considered. In this context, the EU cohesion policy could focus some of its resources on replacing obsolete grids in new member states with smart grids. The new member states could become showcases of these technologies, while achieving higher growth and increasing employment through such investment and modernisation.

The report simultaneously warns that increasing public funds alone is not enough. The low levels of private R&D in the EU are caused primarily by systemic problems. Member states need to review the factors that affect private R&D in their countries and undertake any necessary reforms.

The EU budget should continue to assist and increase its support for the TEN-T rail and waterway networks, particularly those for cargo transport. Member states should introduce the Eurovignette for their roads, to help fund the maintenance of the TENs and promote green transport. The Eurovignette would also encourage the use of alternative transport.

It is recommended that the EU budget increases its support for large catastrophic events – flooding, droughts and forest fires have been growing in severity over the years and their frequency is expected to rise. A coordinated action mechanism and a special budget line could be created. This budget line could additionally cover large adaptation infrastructure, with benefits beyond the countries in which such infrastructure is located, for example, flood protection systems.

The external action budget of the EU is very small, and does not have the capacity to contribute in any major way to obligations to non-EU countries in the area of climate change. Although it is possible for member states to run their own schemes, this approach may cause coordination and coherence problems. A coordinated effort by the EU would be appropriate, which could be financed from the EU budget or a separate and substantial budget.

One of the main limitations of the budget is its size. It is too small to cover adequately all of the EU's ambitious objectives. Furthermore, most of the budget is taken up by two policies, the CAP and the cohesion policy. While the importance of the cohesion policy is understandable with the

wide income disparities existing today, the EU budget share of the CAP is not. Even if the EU budget has a role to play in helping the agricultural sector to adapt to changes, this needs to be done by more efficient mechanisms than the present direct payments. The direct support system is inefficient, and it suffers from an accumulation of objectives. Targeting needs to be increased. The EU budget should not in any case be used to finance the entire cost of any policy. Unless the EU budget is increased substantially, it should limit itself to leveraging operations and co-financing policies. The CAP should thus be co-financed, with rates being based on the fiscal capacity of the member states for example, which would be in line with the solidarity principle of the budget.

For the cohesion policy, it is recommended that climate objectives are fully integrated, not only having measures incorporate best practices for emission reductions, but also by taking the opportunity to experiment with low carbon zones. Some new member states have energy grids that need updating. This situation represents a unique opportunity to test new energy systems and smart grids on a large scale. The direct and indirect effects on the economic development of the regions affected would be substantial and fall in line with the need to create jobs, increase human capital and move towards a knowledge economy. This is an opportunity not to miss. It is also a good case for public–private partnerships, whereby the cohesion policy could be complemented by the interventions of the EIB and the private sector.

Important for the cohesion policy operations is the quality of strategic planning, and the imperative of integrating it into the EU procurement rules and climate conditionalities.

The large recovery plans and particularly those of the EU have directed some of their efforts towards green technologies, but the recovery plans are limited in time. For the EU, reinforcing the lending power of the EIB in this area can provide a useful follow-up. The EIB is very well placed to allocate lending for climate actions, with guarantees by member states. Alongside the EIB, the EU could offer bonds aimed at financing large infrastructure of EU-wide importance.

Finally yet importantly for the effectiveness of the EU budget is the aspect of policy coherence. The EU budget can only have a significant impact if national policies are consistent with EU objectives and complement EU interventions. In this regard, there is a need to review closely the functioning and coordination of public funding across the EU.

GLOSSARY OF ABBREVIATIONS

CCS	Carbon capture and storage
CDM	Clean development mechanism
CO_2	Carbon dioxide
CSGs	Community Strategic Guidelines
EAFRD	European Agricultural Fund for Rural Development
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
ERDF	European Regional Development Fund
ESF	European Social Fund
ETS	Emissions Trading System
GHG	Greenhouse gas
GNI	Gross national income
Gt	Gigatonne
GWe	Gigawatt electric
HVDC	High-voltage direct current
ICT	Information and communications technology
IEA	International Energy Agency
ITER	International Thermonuclear Experimental Reactor
JRC	Joint Research Centre
kWh	Kilowatt hour
LGTT	Loan guarantee instrument for trans-European transport network projects

OECD	Organisation for Economic Cooperation and Development
ppm	Parts per million
PV	Photovoltaic
R&D	Research and development
TENs	Trans-European networks
TEN-E	Trans-European networks for energy
TEN-T	Trans-European networks for transport
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wide Fund for Nature

BIBLIOGRAPHY

Atiyas, I. and J. Núñez Ferrer (2008), "Energy", in S. Ülgen (ed.), *Second generation structural reforms: De-regulation and competition in infrastructure industries – The evolution of the Turkish telecommunications, energy and transport sectors in light of EU harmonisation*, Centre for Economics and Foreign Policy Studies and CEPS, Istanbul and Brussels, November.

Adelle, C., D. Baldock and M. Pallemaerts (2008), *Turning the EU Budget into an Instrument to Support the Fight against Climate Change*, SIEPS Paper No. 2008:4, Swedish Institute for European Policy Studies, Stockholm.

Barker, T., A. Dagoumas and J. Rubin (2009), "The macroeconomic rebound effect and the world economy", *Energy Efficiency*, Vol. 2, No. 4, pp. 411–427.

Behrens, A. (2009), "Financial Impacts of Climate Change Mitigation: Global Resource Requirements and Proposals for International Burden Sharing", *Carbon and Climate Law Review*, Vol. 3, No. 2, pp. 179-187.

Behrens, A. and C. Egenhofer (2008), *Energy Policy for Europe – Identifying the European Value Added*, CEPS Task Force Report, CEPS, Brussels.

Berkowitz, P. (2009), "The Climate Change Challenge for Cohesion Policy", presentation to the CEPS Task Force on "A Green Budget for a Sustainable Future: Adapting the EU Budget to Climate Change", Brussels, 28 April.

Boulanger, P. and P.A. Messerlin (2009), *Long-term Challenges Facing European Agriculture: The need for new public and private policies*, GMF Policy Brief, German Marshall Fund of the United States, Washington, D.C., October.

CEE Bankwatch Network and Friends of the Earth (2007), *EU cash in climate clash – How the EU funding plans are shaping up to fuel climate change*, CEE Bankwatch Network and Friends of the Earth, Prague and Brussels, April (retrieved from http://www.foeeurope.org/publications/2007/EU_cash_climate_clash.pdf).

Centraal Planbureau (CPB, Netherlands Bureau for Economic Analysis) (2006), *Liberalisation of European energy markets: Challenges and policy options*, CPB Document No. 138, CPB, The Hague.

Centro de Estudos em Economia da Energia, dos Transportes e do Ambiente (CEETA) (2005), *Territorial trends of energy services and networks and territorial impact of EU energy policy*, Report for the European Spatial Planning Observation Network (EPSON) Project 2.1.4, CEEETA, Lisbon.

Council of the European Union (2009), "Council adopts climate-energy legislative package", Press Release 8434/09 (Presse 77), Brussels, 6 April.

––––––––– (2007), Presidency Conclusions of the Brussels European Council of 8-9 March, 7224/1/07 REV 1 CONCL 1, Brussels, 2 May.

Cox, D. and D. Gagliardi (2009), *The public/private nexus of R&D*, IPTS Working Paper on Corporate R&D and Innovation, No. 06/2009, Joint Research Centre, European Commission, Brussels.

Durant, G. (2006), *Gas and electricity in Europe: The elusive common interest*, ECP Policy Brief, CEPS, Brussels.

Egenhofer, C. and K. Gialoglou (2004), *Rethinking the EU Regulatory Strategy for the Internal Market*, CEPS Task Force Report No. 52, CEPS, Brussels, December.

Egenhofer, C., A. Behrens and J. Núñez Ferrer (2008), *Does the EU have sufficient resources to meet its objectives on energy and climate change?*, Study for the Policy Department on Budgetary Affairs of the European Parliament, Brussels, 6 March.

Energy Information Administration (EIA) (2009), "International Electricity Analysis", *International Energy Outlook 2009*, EIA, Washington, D.C., 27 May (retrieved from http://www.eia.doe.gov/oiaf/ieo/pdf/electricity.pdf).

European Commission (2003), Communication on Developing the trans-European Transport Network: Innovative Funding Solutions, Interoperability of Electronic Toll Collection Systems, Proposal for a

Directive of the European Parliament and the Council on the widespread introduction and interoperability of electronic toll systems in the Community, COM(2003) 132 final, Brussels, 23 April.

––––––––– (2004), *Financing the European Union – Report on the operation of the own resources system,* Vols. I and II, COM(2004) 505 final, Luxembourg: Office for Official Publications of the European Communities.

––––––––– (2005), Communication on Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013, COM(2005) 0299, Brussels, 5 July.

––––––––– (2006a), Communication, Towards a European Strategic Energy Technology Plan, COM(2006) 847, Brussels, 10 January.

––––––––– (2006b), Communication on Bringing the eCall Back on Track – Action Plan (3rd eSafety Communication), COM(2006) 723, Brussels, 23 November.

––––––––– (2007a), Communication on a European strategic energy technology plan (SET-Plan) – Towards a low carbon future, COM(2007) 723, Brussels, 22 November.

––––––––– (2007b), Communication on a Renewable Energy Road Map, Renewable energies in the 21st century: Building a more sustainable future, COM(2006) 848 final, Brussels, 10 January.

––––––––– (2008a), "Key issues on the implementation of TEN-T priority projects", Document prepared for the Informal Transport Council of 6 May, Brussels.

––––––––– (2008b), Communication on a Second Strategic Energy Review: An EU energy security and solidarity action plan, COM(2008) 0781 final, Brussels, 13 November.

––––––––– (2008c), Communication on a European Economic Recovery Plan, COM(2008) 800 final, Brussels, 26 November.

––––––––– (2008d), Questions and Answers on the Commission's proposal to revise the EU Emissions Trading System, MEMO/08/35, Brussels, 23 January.

––––––––– (2009a), *Regions 2020 – The climate change challenge for European regions, Background document to the Commission Staff Working Document SEC(2008) 2868 Final*, Brussels, March.

––––––––– (2009b), White Paper, Adapting to Climate Change: Towards a European Framework for Action, COM(2009) 147 final, Brussels, 1 April.

––––––––– (2009c), Communication on Stepping up International Climate Finance: A European Blueprint for the Copenhagen Deal, COM(2009) 475/3, Brussels, September.

––––––––– (2009d), *Stepping up international climate finance: A European blueprint for the Copenhagen deal*, Commission Staff Working Document accompanying the Communication on Stepping up International Climate Finance: A European Blueprint for the Copenhagen Deal, SEC(2009) 1172/2, Brussels, September.

––––––––– (2009e), Communication on Investing in the Development of Low Carbon Technologies (SET-Plan), COM(2009) 519 final, Brussels, 7 October.

––––––––– (2009f), *Impact Assessment*, Commission Staff Working Document accompanying the Communication on Investing in the Development of Low Carbon Technologies (SET-Plan), SEC(2009) 1297, Brussels, 7 October.

––––––––– (2009g), "Cohesion Policy backs 'green economy' for growth and long-term jobs in Europe", Press release IP/09/369, Brussels, 9 March.

––––––––– (2009h), *Adapting to Climate Change: The challenge for European Agriculture and Rural Areas*, Commission Staff Working Document accompanying the White Paper on Adapting to Climate Change: Towards a European Framework for Action, COM(2009) 147 final, SEC(2009) 417, Brussels.

European Environment Agency (EEA) (2008), *Energy and Environment Report 2008*, EEA Report No. 6/2008, EEA, Copenhagen.

European Investment Bank (EIB) (2006), *EIB financing of the Trans-European Networks*, EIB, Luxembourg, September.

––––––––– (2008), "The Loan Guarantee Instrument for Trans-European Transport Network Projects", Fact Sheet 2008-005-EN, EIB, Luxembourg, 11 October.

––––––––– (2009), "EIB support for EU energy objectives", Briefing Note No. 07 for the Annual Press Conference 2009, EIB, Luxembourg, March.

Farmer, M. and C.A. Baquerizo (2006), *Climate change and natural disasters: Assessment of EU measures to tackle forest fires, in particular the contribution made by Forest Focus*, Policy Brief for the EP Environment Committee, IP/A/ENVI/FWC/2005-35, Institute for European Environmental Policy and Instituto para la Politica Ambiental Europea, London and Madrid.

Hewett, C. (ed.) (2009), *From crisis to recovery: New economic policies for a low carbon future*, Green Alliance, London.

Höhne, N., J. Burck, K. Eisbrenner, L. van der Straeten and D. Phylipsen (2009), *Economic/climate recovery scorecards: How climate friendly are the economic recovery packages?*, WWF/EG3 report prepared by ECOFYS and Germanwatch, London and Berlin, April.

International Energy Agency (IEA) (2003), *Renewables for Power Generation*, OECD/IEA, Paris.

––––––––– (2009), *How the energy sector can deliver on a climate agreement in Copenhagen: Special early excerpt of the World Energy Outlook 2009 for the Bangkok UNFCCC meeting*, OECD/IEA, Paris, October.

Iozzo, A., S. Micossi and M.T. Salvemini (2008), *A new budget for the European Union?*, CEPS Policy Brief No. 159, CEPS, Brussels, May.

Jamasb, T. and M. Pollitt (2005), *Deregulation and R&D in Network Industries: The Case of the Electricity Industry*, Cambridge Working Papers in Economics No. 0533, Faculty of Economics, University of Cambridge.

Joint Research Centre (JRC) (2009), *Monitoring Industrial Research: The 2008 Survey on R&D Investment Business Trends*, JRC51800, JRC, European Commission, Luxembourg: Office for Official Publications of the European Communities.

Kauppi, H. and W. Widgrén (2005), *Voting Rules and Budget Allocation in an Enlarged EU*, Centre for Economic and Policy Research (CEPR) Discussion Paper No. 5134, CEPR, London.

Leonardi, R. (1995), *Convergence, Cohesion and Integration in the European Union*, New York: St Martin's Press.

London Economics (2007), *Structure and Performance of Six European Wholesale Electricity Markets in 2003, 2004 and 2005*, Report for the European Commission, Directorate-General for Competition, London Economics (in association with Global Energy Decisions), London.

Mabey, N. (2009), *Delivering a Sustainable Low Carbon Recovery. Proposals for the G20 London Summit,* E3G, London, March, pp. 5-6.

Mabey, N., J. Morgan and J. Scott (2008), *A European Budget for the Future*, Paper submitted to European Parliament workshop: "Does the EU have sufficient resources to meet its objectives on energy policy and climate change?", E3G, London, December.

MacKay, D. (2008), *Sustainable Energy – Without the hot air*, Version 3.5.2., 3 November, Cambridge: UIT Cambridge (retrieved from http://www.inference.phy.cam.ac.uk/sustainable/book/tex/sewtha.pdf).

Marris, E. (2006), "Black is the New Green", *Nature*, Vol. 442, No. 10, pp. 624-626.

MVV Consulting (2007), *Implementation of TEN-E Projects (2004-2006), Evaluation and Analysis*, Final Report, Vol. I Report, MVV Consulting, Mannheim, November.

Núñez Ferrer, J. (2007a), *The EU Budget: The UK Rebate and the CAP – Phasing them both out?*, CEPS Task Force Report, CEPS, Brussels, p. 108.

––––––––– (2007b), *EU budget and policy reforms in order to promote economic growth*, ITPS Working Document R. 2007:015, Swedish Institute for Growth Policy Studies, Östersund.

––––––––– (2008), *Can Reforming own Resources Foster Policy Quality?*, SIEPS Working Document 2008:03, Swedish Institute for European Policy Studies, Stockholm.

Núñez Ferrer, J. and E. Kaditi (2007), *The EU added value of agricultural expenditure – From market to multifunctionality – Gathering criticism and success stories of the CAP*, Report for the Policy Department on Budgetary Affairs, European Parliament, CEPS, Brussels, December.

OECD (2003), *The Sources of Economic Growth in OECD Countries*, OECD, Paris.

Pond, R. (2006), *Liberalisation, privatisation and regulation in the UK electricity sector,* PIQUE (Privatisation of Public Services and the Impact on Quality, Employment and Productivity) Report, Working Lives Research Institute, London Metropolitan University.

Sapir, A. (2003), *An Agenda for a Growing Europe, Making the EU Economic System Deliver*, Report of an Independent High-Level Study Group established on the initiative of the President of the European Commission, European Commission, Brussels.

SNCF (2009), "1er Bilan Carbone ferroviaire global – La Ligne à Grand Vitesse Rhine-Rhône au service d'une Europe durable", SNCF, Paris.

Ummels, B. (2009), "Power System Operation with Large-Scale Wind Power in Liberalised Environments", PhD Thesis, University of Delft.

Uppenberg, K. (2009), *R&D in Europe: Expenditures across Sectors, Regions and Firm Sizes*, CEPS and the European Investment Bank, Brussels and Luxembourg.

Van der Geest, W. and J. Núñez Ferrer (2009), *Appropriate Financial Instruments for Public Private Partnership to boost Asia's Crossborder Infrastructural Development*, Asian Development Bank Institute – Flagship Project paper, forthcoming.

Wiesenthal, T., G. Leduc, H.G. Schwarz and K. Haegeman (2009), *R&D Investment in the Priority Technologies of the Strategic Energy Technology Plan*, JRC Reference Reports, Joint Research Centre, European Commission, Luxembourg: Office for Official Publications of the European Communities.

Withana, S. and D. Baldock (2009), *Roads to Recovery?*, Background paper for the WWF/Institute for European Environmental Policy Roundtable on Economic Recovery Plans, Institute for European Environmental Policy, Brussels, 16 March.

WWF-World Wide Fund for Nature (WWF) (2005), *EU Funding for Environment: A handbook for the 2007–13 programming period*, WWF-European Policy Office, Brussels.

––––––––– (2009), *Climate change in the 2009 EU Spring Council*, WWF position paper, WWF-European Policy Office, Brussels (retrieved from http://www.climnet.org/Position%20papers/WWF%20position%20paper%20EU%20Copenhagen%20Com_FINAL2.pdf).

WWF-World Wide Fund for Nature (WWF) and German Federal Ministry of Environment, Nature Conservation and Nuclear Safety (2007), *How green is the future of EU cohesion policy? – A score-card analysis of the Regional Funds Programming 2007-2013*, WWF-European Policy Office, Brussels, May (retrieved from http://assets.panda.org/downloads/scorecard.pdf).

APPENDIX 1.
MEMBERS OF THE CEPS TASK FORCE AND INVITED GUESTS AND SPEAKERS

Chairman: Anders Wijkman
Former MEP,
Vice Chairman of the Taellberg Foundation,
Vice President of the Club of Rome

Rapporteur: Jorge Núñez Ferrer
Associate Research Fellow, CEPS

Co-Rapporteurs: Arno Behrens
Research Fellow
CEPS

Christian Egenhofer
Senior Research Fellow
CEPS

Torsten Andersen
Adviser - European Affairs,
Confederation of Danish Industry – DI

Arno Behrens
Research Fellow, CEPS

Elena Bonfiglioli
EMEA Director for Corporate Citizenship and Community Affairs, Microsoft

Stephen Boucher
Programme Director, EU Climate Policies
European Climate Foundation

Ceyda Bursali
Regulatory Strategy and Economic Analysis Line Manager Avea, Turkey

Michael Coyle
Former European Commission Official

Ceylan Demir
Regulatory Strategy and Interoperator Relations Department Manager, Avea, Turkey

Christian Egenhofer
Senior Research Fellow, CEPS

Martin Hallet
Head of Sector,
European Commission

Dirk Hendricks
Director, EU Liaison Office
World Future Council

Agnes Kelemen
Policy Analyst, DG REGIO
European Commission

Mustafa Koc
Regulatory Strategy and Economic Analysis Specialist, Avea, Turkey

Snezana Knezevic
Counsellor
Mission of Serbia to the EU

Martyna Kurcz
Director, EU Regulatory Affairs
ALSTOM Power

Astrid Ladefoged
Policy Officer, DG Environment
European Commission

Ebba Lindegren
Director Business Development
Saab Aerotech

Chris Littlecot
Senior Policy Adviser
Climate Alliance

Domenico Maggi
European Affairs
ENEL

Rolph Moehler
Former Deputy General for Agriculture, European Commission

Norman Pearson
Officer, Cheshire County Council
Brussels

Jean Paul-Peers
Vice President – Energy Policy
Siemens AG

Ray Pinto
Senior Government Affairs Manager, Microsoft

Brook Riley
Policy Officer
World Future Council

Elena Scaroni
European Affairs, Enel

Jesse Scott
Brussels Programme Leader, E3G
Third Generation Environmentalism

Michael Wriglesworth
Senior Advisor on Climate Change
CEPS

Roberto Zangrandi
Director, ENEL

Marta Zielinska
Expert, Office of the Committee for European Integration, Poland

INVITED GUESTS AND SPEAKERS

Avril Doyle
Member of the European Parliament, EPP-ED

Göran Färm
Member of the European Parliament, S&D

Satu Hassi
Member of the European Parliament,Greens/European Free Alliance

Vittorio Prodi
Member of the European Parliament, S&D

Philippe Cattoir
Principal Administrator
DG BUDGET, European Commission

Jacques Delsalle
Socio-Economic Analyst - Impact Assessment, DG Environment

Claude Turmes
Member of the European Parliament, Greens/European Free Alliance

David Baldock
Executive Director, IEEP, London

Nick Mabey
Founding Director, Chief Executive
E3G, London

Paul Hodson
Deputy Head of Unit
DG TREN, European Commission

Giuliano Monizza
Vice President of the Executive Committee of T&D Europe and Chairman of the T&D Energy Policy & Energy Efficiency Commission

Glyn Evans
Head of Unit, DG RTD
European Commission

Hilkka Summa
Head of Unit, DG AGRI
European Commission

Mike Parr
Director Business and Politics
Biochar-Europe

Jason Anderson
Head of European Climate and Energy Policy, WWF

Cris Littlecot
Senior Policy Adviser
Green Alliance

Mark Johnston
Coordinator "Power Plant CO2 standards", WWF

Peter Berkowitz
Head of Unit, DG REGIO
European Commission