INSTITUTE FOR WORLD ECONOMICS
HUNGARIAN ACADEMY OF SCIENCES

W o r k i n g P a p e r s

No. 181 July 2008

David Ellison

On the Politics of Climate Change: Is there an East–West Divide?

1014 Budapest, Orszagház u. 30.
Tel.: (36-1) 224-6760 • Fax: (36-1) 224-6761 • E-mail: vki@vki.hu

FOREWORD*

Several months ago when I started writing this paper, its principal goal was to point out some of the inequities in the European Union's 2020 Climate Change Package and attempt to explain why this happens. Since then, spearheaded by Hungary, seven of the new EU member states have filed a formal complaint with the European Commission, contesting the 2020 greenhouse gas emission targets set out in that policy proposal. Thus this paper now also serves as an explanation for why these countries might choose to do that.

* I would like to thank the participants at the 2008 Rennes ECPR Joint Sessions Workshop on "The Politics of Climate Change" and András Inotai for helpful comments. Comments Welcome. *EllisonDL@Gmail.com*

INTRODUCTION

Politics lie at the centre of the allocation process for CO_2/GHG (carbon dioxide and greenhouse gas) reduction targets and quotas in the European Union (EU). Though most presumably agree that EU allocation of CO_2/GHG reduction targets and quotas should both equalize (burden-sharing principle) and minimize the impact across individual states, the process by which state-by-state quotas are allocated is anything but transparent. Moreover, judging by the response of 8 of the 10 New Member States (NMS's) to the CO_2/GHG quotas allocated for the 2008–2012 period,[1] or by the response of most of the NMS's to the current country-level GHG emission reduction targets proposed as part of the EU's 2020 Climate Change Package introduced on January 23, 2008, the process appears potentially tilted toward the interests of the Old Member States (OMS's). The veracity of this claim aside, the relative lack of transparency in the decision-making process begs the question both of whose interests are most strongly represented in the final burden-sharing and quota allocation and why this is so.

This paper investigates both why EU member states are strongly divided over CO_2/GHG reduction targets and quota allocations as well as whose interests are most strongly represented in the current structure of EU allocations. Interest divergence is clearly most strongly felt at and below the national level of interest formation. Yet, what defines the foundation for such interest divergence remains both under-researched and controversial. Any number of factors—the relative energy mix (coal, oil, nuclear, renewable or other form), the form of carbon mitigation promotion at the national level, or relative export carbon intensity—can potentially influence the relative interests of individual countries. Comparatively little attention, however, has been paid to the core problem of variation in relative levels of economic development.

This paper analyzes those factors that best explain the division of interests across countries, with a particular focus on the division of interests resulting from comparative levels of economic development. For multiple reasons, Central and East European (CEE) NMS's are likely to view CO_2/GHG emission reduction targets and quota restrictions as real constraints on future economic growth. For one, CO_2/GHG quota allocations may impose significant constraints on future economic convergence goals. While such constraints are potentially avoidable through the mass-scale introduction of renewable energy and comparable scale energy efficiency improvements, these represent comparatively high-cost strategies (in particular in up-front costs). For comparatively less advanced countries facing significant budgetary constraints (in particular the EMU convergence criteria), these challenges are significant.

This paper first reviews the problem of supra- and international cooperation—in particular with respect to transboundary issues like climate change. For the purposes of comparison, the first section briefly outlines some of the problems at the root of conflict over climate change policy at the international level. The interests of states appear as the most significant obstacle to real progress in attempts to outline the parameters of the follow-up to the Kyoto agreement. The second section then focuses on the example of the EU and asks whether things decision-making processes have differed significantly from those at the international level. While the institutions structure of the EU is clearly more advanced than that at the international level, it is not clear that this ultimately has a deci-

[1] Several of the NMS's have filed claims against the European Commission before the European Court of Justice.

sive impact on the ability to share burdens more equitably across the member states. This point is then illustrated on the basis of three examples taken from the general framework of the EU's climate-change policy. The final section concludes.

1) Global warming and climate-change policy at the international level

The transboundary nature of global warming is inescapable. Though different regions of the world experience variation in the intensity of global warming's impact, all regions of the world have been affected. Moreover, the challenges of climate change and global warming are clearly global in character. The key question posed by climate change and global warming is whether the world's countries can agree to share the earth's atmosphere in an equitable manner. The world's most advanced economies already exploit a far greater than equitable share of the world's atmosphere based on their share of the world's population. As this fact impinges upon the ability of other countries to use the world's atmosphere, such issues are make or break issues for the future of mankind and world politics. The day has dawned where the world must decide how best and most equitably to both save and ultimately share the earth's environment.

In the political science and international relations literature, transboundary pollution is frequently seen as a force capable of overpowering the self-interested behavior of states and encouraging them to cooperate by adopting more international and universal policy goals. Taking such events as the Kyoto Protocol and the Bali discussions as examples, the evidence that states can find common terms for cooperation and agreement is at best mixed. While global warming and climate change have contributed to the assembly of nation states in single locations to discuss and negotiate environmental treaties—as witnessed in particular by the signing of formal agreements on CO_2 emission reductions (the Kyoto Protocol)—the degree of real success in reducing CO_2/GHG output is slim.

One of the principal obstacles to more far-reaching commitments on CO_2 emission reductions from individual states is the divide between more and less advanced countries and the appropriate distribution of burden-sharing across states. Conclusions from the Bali summit point to this as well. Both the US and the EU have attempted to tie an agreement on climate change to WTO tariff reductions on products with "clear environmental benefits".[2] At the same time, there has also been discussion of attempting to impose tariffs on goods with high negative environmental impacts (*e.g.* iron, steel, aluminum, cement, glass, paper).[3] Most discouraging is the impression that the advanced states repeatedly wrench advantage from agreements without more direct attention to the simple matter of reducing CO_2 emissions. The US–EU WTO proposal, for example, so far excludes biofuels such as ethanol which Brazil produces in abundance.[4] Ironically, both the US and the EU have placed considerable emphasis on the development and production of biofuels.[5]

[2] See www.cnn.com: "US, EU Push Green Trade at Bali" (Dec. 9th, 2007).

[3] See www.wsj.com: "U.S. Plans on CO_2 Percolate" (Sept. 25th, 2007).

[4] Though controversial whether biofuels—due to high CO_2 output and environmental damage inflicted by agricultural production—produce any added benefit in terms of CO_2 output (see *e.g.* Doornbosch and Steenblik, 2007), the recently signed US Energy Bill placed a heavy emphasis on biofuels production and use. Attempts to block biofuels imports from Brazil should presumably be interpreted as blatant protectionism.

[5] The US Energy Independence and Security Act passed in December 2007 mandates an increase in biofuel production from an annual 7 to 36 billion gallons of ethanol by 2022 (58 per cent is

Imposing higher tariffs on environmentally damaging goods would unevenly disadvantage the developing world. Moreover, the EU's decision to consider such tariffs in its 2020 Climate Change Package (independently of the US) triggered strong criticism from the US.[6]

What some have labeled "*nano hypocrisy*",[7] dramatically pervades the entire global warming and climate change debate with the implication that states—and first among them developed states—remain focused primarily on self-interest and secondarily—if at all—on climate change. Scapegoating the developing world has become something of a pastime for the world's more advanced countries. From pointing out China's growing CO_2 impact on the world's global warming to arguing that saving the developing world's rainforests is one of the keys to saving the planet, such arguments typically shift attention away from the two most important factors related to the current status and future increases in global warming—the developed world's overwhelming contribution (the US produces almost 5 times per capita world CO_2 output, Russia, Japan and the EU approximately 2 times) and the general inability of the developed world to reverse the co-linear paths of economic growth and rising CO_2 output.[8]

From all the emphasis and media attention focused on the rising CO_2 output from developing countries—in particular China—one might be led to think the root of all evil lies in the developing world. Sadly, both in absolute tons and on a *per capita* basis, the US—*one* of the most highly developed nations of the world—remains the world's #1 emitter of CO_2. As illustrated in *Table 1*, between 1990 and 2005, the US emitted between just over one-fifth and just under one-quarter of the world's total CO_2 output. As if these numbers were not scary enough, despite US expenditure on CO_2 related research, the US likewise remains far and away one of the highest emitters in *per capita* terms: US *per capita* CO_2 output is approximately 5 times the world average. In per capita terms, other developed nations such as Japan and the New Europe (an EU of 27 member states) emit less than half of what the US does. China, though rapidly approaching absolute US CO_2 emission levels (and reportedly surpassing them in 2006 and 2007), in per capita terms

intended to be from so-called "cellulosic" sources, *i.e.* not from corn). The EU's approach announced in January 2008 promotes a 10 per cent use of biofuels by 2020 (and favours "sustainable" sources for biofuel production).

[6] The EU announced its plans for new climate change legislation on Jan. 23rd, 2007. Despite the EU and US WTO suggestions to introduce similar measures, US Trade Representative Susan Schwab responded to the EU position with dismay where the US sees, "climate or the environment being used as an excuse to close markets" (*Euractiv*: "Britain and US up in arms against EU carbon tax", Jan. 23rd, 2008).

[7] Michael Renner, in: "Analysis: Nano Hypocrisy" (WorldWatch Institute, Jan. 16th, 2008) ultimately argues the developed world is unable to adequately balance criticisms of the CO_2 output threat posed by the developing world with due consideration of the consumption habits of the developed world. His example pairs Tata's upcoming introduction of the Nano car in India with Western fascination with the souped up Toyota Prius. While journalists and global warming analysts alike rage at the thought of introducing the Nano in India, they should be asking what the benefits would be of introducing the Nano to Western markets. According to thumbnail calculations, the Nano would emit approximately 30 g/km in CO_2, while the Prius reportedly emits 104 g/km. The Prius does get somewhat better mileage 65.7 mpg compared to a reported 50 mpg for the Nano.

[8] Further examples of *nano-hypocrisy* are the following: instead of pointing to per capita CO_2/GHG output levels, countries instead insist on the problems of absolute levels (*e.g.* China) or energy intensity (*e.g.* CEE). While many countries in the developed world are reconsidering nuclear power as an option, states in the Middle East wishing to pursue the nuclear option are rapidly ostracized. Likewise, though countries rapidly point out the problems of de-forestation resulting from the ravaging of the rainforest, few emphasize the role developed countries could play in promoting their own re-a-forestation (despite studies suggesting this would be beneficial; see *e.g.* Saikku, Rautiainen and Kauppi, 2008). Finally, when one talks about the problems of the world's population, one looks first at China's discussion of abandoning its one family – one child policy rather than considering EU member state subsidies to promote larger families.

only emits one-fifth of US CO_2 output. India lags much further behind. While oil-rich countries such as Qatar, the United Arab Emirates, Kuwait and Brunei have substantially higher per capita GHG emissions, combined these countries represented only 0.65 per cent of world GHG output in 2000.[9]

US reliance on coal-burning power plants does much to boost these numbers. Even more sadly, the US continues to resist a leadership role when it comes to climate change and global warming—despite its obvious contribution to this problem (California fares much better). Rather than rise to the occasion, the US argues that countries such as China—despite dramatically lower per capita CO_2 output—be tied to the same rules and regulations. Equally sadly, those European countries that have assumed a leadership role by signing onto the Kyoto Protocol (despite the lack of support from the US), prefer to lead by vision rather than by example. True, the full partnership of countries like China and India would be a tremendous asset to the protocol—making it possible perhaps to pull even the US into its fold. But until the more advanced countries are able to lead by example rather than coercion, little is likely to change.

Most disturbingly, the developed world has made virtually *NO* progress in reducing its own CO_2 emissions from 1990 levels as mandated by the Kyoto Protocol. At best, a few stellar performers have made it possible for the EU as a whole to halt and mildly reduce its rate of CO_2 output growth (details of the EU case are discussed in the following section). Other signatories to the Kyoto Protocol have failed miserably. Friends of the Earth, for example, is suing the Canadian government for failure to abide by its Kyoto Protocol obligations (though Canada promised a 6 per cent reduction of 1990 levels by 2010, emissions rose by 25-35 per cent. As EU member states have had an equally difficult time abiding by their Kyoto Protocol commitments, similar actions may well be on the horizon in Europe. Though Japan committed to reducing CO_2 emissions by 6 per cent over 1990 levels, in 2005 its emissions were 7.8 per cent above 1990 levels and Japan chose to buy carbon credits from Hungary.[10] Finally, the fact that the US, China and India continue to resist signing on to the Kyoto Protocol suggests that state interests continue to dominate the debate on all fronts.

There are important and profound reasons why the less developed and rapidly growing nations (China, India and many more) hesitate to sign the Kyoto pact that have little to do with whether or not Kyoto—at least in principle—is a good idea. The root problem is that unless the advanced nations can pave the way to greater *domestic-level* CO_2 reductions, they will never be able to convince the less developed nations that comparable levels of economic development can be achieved with lower CO_2 emissions. Committing to a program that would trigger sanctions when targets are not met is incompatible with the goals of economic development and convergence and unreasonable in a context where the advanced nations are unable to illustrate the feasibility of the path they promote. The potential for such ceilings to act as future constraints on the project of economic growth and convergence is reason enough to make such countries hesitant to join the fold of Kyoto promoters. The only less developed nations in the world that have agreed to this kind of regimen are in fact the Central and East European Countries (CEEC's) who, as part of the EU accession agreement, agreed to future ceilings that may not sit well with future economic growth aspirations.

[9] These numbers are from the webpage of the World Resources Institute.

[10] See www.portfolio.hu: "EBRD to buy "carbon credits" from Hungary for Spain, Ireland – official" (Mar. 26th, 2008).

2) Global warming and climate-change policy in the EU

In the EU of course, everything was supposed to be different. Political cooperation at the supranational level was supposed to make it possible for states to share their burdens and find "community" solutions to common problems. Though possessed of an institutional structure that—at least in principle—makes it possible to identify "Community" goals and formulate common "Community" solutions, there is a long literature suggesting most EU decision-making continues to be dominated by the interests of states and intergovernmental principles.[11]

The EU's approach to climate change policy encompasses both the signing of the Kyoto Protocol in 1997 and the current 2020 Climate Change package introduced by the European Commission on January 23rd, 2008. Though the initial policy goals agreed in the Kyoto Protocol represent a significant reversal of world trends—in contrast to most other major countries of the world, the EU agreed to reduce CO_2 emissions by 8 per cent by 2012—overall EU performance in meeting these targets has to-date been lackluster. On paper, the EU will manage to meet its Kyoto requirements due to the Eastern Enlargement, not state performance.

Diverging from the general parameters of the Kyoto Protocol, EU member states chose to "more fairly" redistribute the burden of CO_2 emissions reductions across countries. Performance however bears no resemblance to initial targets (see *Table 2* for data on individual country performance).[12] As illustrated by *Figures 1 & 2*, the lion's share of successful emission reductions occurred in the CEEC's. Western EU member states managed to reduce total GHG emissions by only 2 per cent (when individually selected base years are used for this calculation) and 1.5 per cent when the originally proposed 1990 base year is used. These figures disguise the more favorable performance of a few Western countries—in particular in Denmark and Sweden and to some extent Germany and the UK. In general however, the CEE NMS's—by joining the EU—make it possible for the EU as a whole to appear to meet its Kyoto requirements. Put differently, a set of countries representing 20.8 per cent of the EU population are responsible for approximately 75 per cent of EU CO_2 emission reductions over the period 1990–2005—about 3.6 times the relative contribution of the OMS's.

How things will look in the next round up to 2020 is anybody's guess. Negotiations on the EU's 2020 Climate Change Package are in their initial stages. The conclusion of the EU's March 2007 summit called for the following features: (1) a 20 per cent reduction in GHG emissions by 2020 (30 per cent with the support of a renewed international Kyoto Protocol extending until 2020), (2) a 20 per cent increase in the share of renewable energy sources, (3) a 20 per cent reduction in energy use (potentially from increased energy efficiency) and (4) a 10 per cent increase in the share of biofuels in the general fuel mix.

Member states (in the Council of Ministers) and representatives in the European Parliament must agree on the energy and climate-change package by

[11] The current author has also contributed (in particular Ellison, 2006a). Much of the relevant competing literature is also cited in that article. See also Moravcsik (1999, 1997, 1991).

[12] A few countries were able to deviate from the 1990 base year by choosing base years in the mid- to late 1980's in which CO_2 and other GHG emissions were highest. Thus for example, Bulgaria, Hungary, Poland, Romania and Slovenia benefited significantly from this choice of base year (see also Ellison, 2006b: 21). The effect of deviation in the choice of base year is reflected in the numbers in the last column of Table 1.

March 2009 to place Europe in a strong bargaining position at global climate-change negotiations in Copenhagen in November 2009. The forthcoming decisions will set EU member states on a development path that will be difficult to alter in the years that follow. The element of potential irreversibility in these climate-change policy strategies will weigh heavily on the individual countries and European Parliamentary Representatives (MEP's) choosing from among the different options present in the EU's future climate-change strategy and additional strategies.

The notion that there is *ONE* country position driving the 2020 climate-change policy package is untenable. However, countries certainly strive to put their mark on the 2020 policy package. For one, Germany was the principal proponent of the general policy package, pushing for it during the German presidency in 2007 and achieving approval of the initial guidelines sent on to the European Commission in March 2007. The UK also appears to be playing a significant role behind the scenes. With the most fully developed country position on the policy package, in particular on the Guarantee of Origin green-certificate system being proposed (COM(2008) 19 final), the UK appears to have influenced considerable influence.[13] Moreover, individual countries repeatedly promote positions that reflect relative comparative advantages in energy production, energy security concerns or heavy investment in either energy intensive industries or services (the UK, France and other countries on the nuclear path, the CEEC's on heavy industry, the UK and Poland on carbon capture and storage (CCS), *etc.*).

A number of the details of individual 2020 policy-package proposals and their related Impact Assessments, however, were arrived at in relative obscurity. Transparency is in fact a serious problem where the definition of emissions' targets and the assessment of their impact are concerned. As just one example, the mathematical models and data used for the Commission's Impact Assessments (SEC(2008) 85) are proprietary and not readily available either to the academic research community or to policy makers and their respective staff members in the member states. This fact alone raises serious questions about the overall transparency of the consultation and negotiation process. Further, it raises serious questions about the viability of social scientific assessment of EU climate-change policy. If the academic and research apparatus behind individual member-state governments are unable to replicate the models used for making EU-wide policy proposals and assessing impact, they cannot seriously test, critique or otherwise assess the proposed policy models in a meaningful manner.

Why such methods and strategies have been chosen by the European Commission remains unexplained both to the scientific and to the political community in the member states. Such a situation must presumably be considered unacceptable and member-state governments are likely to demand resolution of this problem. Though there is little time left to make these important decisions, they should presumably be a product of "Community" policy in order for them to be supported, approved and to garner adequate legitimacy. In this regard the *PRIMES* and other models (GEM-E3, POLES and PACE, developed at the E^3M lab at the National Technical University of Athens and elsewhere)[14] and their use in the setting of burden sharing targets and impact assessments requires re-evaluation. Despite the increasing preva-

[13] In this regard, previous Commission papers on renewable strategies (see "The Support of Electricity from Renewable Energy Sources", SEC(2008) 57 and the precursor to this study COM(2005) 627) strongly favored the feed-in tariff systems employed to great success in countries like Germany and Spain.

[14] The POLES model, for example, was developed at the Institute for the Politics and Economics of Energy at the CNRS (Centre National de Recherche Scientifique) in France.

lence of laudable scientific values based on *transparency* and *reproducibility*, the calculations and formulae used are not publically available, nor is the database upon which they are calculated. Equally troubling, no competing research currently offers alternative models and predictions on viable and meaningful EU Emission Trading Scheme (ETS) and many other targets.

Hungary (and other new member states) filed a legal case against the European Commission (T-221/07) before the European Court of Justice on June 26th, 2007 regarding the firm-level CO_2 emission quotas approved for 2008–2012. The Hungarian case argues the Commission failed to consider all available and relevant information—in particular the data and information Hungary filed with the Commission in its *National Allocation Plan*—and further that the Commission contravened the principles of transparency by failing to share the data and calculations used to arrive at the quotas established for the 2008–2012 period (see *e.g.* the *Official Journal*, Aug. 25th, 2007).

Though the problem of transparency makes it difficult to divine the structure of interests behind various elements of the Commission's climate-change policy package, the remainder of this paper presents at least three ways in which powerful divisions across less and more advanced states pervade the structure of the current 2020 Climate Change Package. The following section addresses the general problem of economic growth and climate change in the EU. The second section discusses the problem of the choice of base year that arose with the current distribution of the burden for reducing GHG emissions by the year 2020. Finally, the third section discusses the strategy for reducing emissions across ETS sectors.

3) Economic growth vs. climate change

Climate change and economic growth challenges were heightened by the March 2007 European Council Summit commitment to reduce GHG emissions by 20 per cent by the year 2020. While NMS's achieved quite dramatic reductions in their levels of CO_2 output between the years 1990–2004 (due to the decline of heavy industry and many other factors),[15] most OMS's exhibit remarkably little success (see *Table 2*). Though Germany is perhaps the most successful OMS, a large share of CO_2 reductions are the result of economic change in the former East Germany. Countries such as Sweden and Denmark, the UK and to some extent Germany, on the other hand, deserve high marks for their relative ability to reduce CO_2 and GHG emissions in the face of competing concerns and a comparatively high level of economic development.[16]

The principal question for the less developed economies is whether the more advanced EU member states are able to lead by example rather than by command. By their own admission, ten EU OMS will achieve their individual Kyoto targets primarily by writing Joint Initiative (JI) and Clean Development Mechanism (CDM) investments off national-level emissions targets. Only one of the NMS (Slovenia) has chosen to take advantage of these measures in order to meet its target (EEA, 2006: 30). While the European ETS facilitates environmentally bene-

[15] The range of potential explanatory variables here is extensive. For a detailed discussion, see Ellison (2006b).

[16] The positive performance of some countries is marred by the role of nuclear power (France), or Germany's re-unification with East Germany (despite considerable progress in the introduction of renewables).

ficial investments in those countries and plants that represent the greatest potential return on investment (both in potential emission reductions and the related carbon credits) there are likewise two distinct disadvantages to this system. One is the postponing of real change in emission behaviour, in particular in the more advanced states. The second is the failure to demonstrate, by power of example, that future economic growth is compatible with reduced emissions.

Without significant GHG reductions in the more advanced states, the pursuit of *both* economic growth and CO_2/GHG emission reductions may prove incompatible. Due in particular to the starting points of individual countries, Kyoto imposed "*ceilings*" are likely to impinge upon growth and convergence interests. As evident in Table 2, the less advanced Western states (Greece, Ireland, Italy, Portugal and Spain) have continued their rapid growth in CO_2/GHG emissions on into the period 1990–2005 and show no signs of slowing down alongside comparatively rapid rates of economic growth. *Table 3* represents a rough thumbnail estimate of GHG output levels given convergence on the 2005 EU average GDP (countries already above the average EU GDP have been excluded from the table).[17] Columns I calculates the GHG output this would represent based on 2005 levels and columns III and V compare this number to the 2012 and 2020 targets. Significant growth constraints arise, suggesting the ability of the more advanced states to reduce CO_2 emissions relative to GDP presumably defines future limits to economic growth—along with EU climate policy—for both more and less advanced states.

The European Commission's 2008–2012 strategy for setting emissions targets provides a meaningful example. The Commission required NMS's to scale back their national allocation plans for the period 2008–20012 by between 12 and 55 per cent (see *Table 4*). For the OMS's, some 90 per cent of CO_2 quotas were accepted. As indicated above, eight of the ten NMS's have initiated legal challenges. Seen against the backdrop of quite substantial NMS GHG and/or CO_2 emissions reductions between 1990 and the present, these Commission imposed ceilings are difficult to understand. Moreover, given the lackluster performance of most of the OMS's reducing GHG and CO_2 emissions, many of the Commission goals often appear unattainable. Despite the objections raised by the NMS's, compared to emissions levels in 2006, the Commission's cap approvals mostly require significant reductions from the OMS's and permit increases in CO_2 emissions in the NMS's. Based on these numbers, the NMS's position on CO_2 caps is not immediately obvious.

Two basic problems, however, lurk behind the scenes. For one, CEE requests for higher CO_2 quotas are in part the result of rapid economic growth and increasing economic investment. In Hungary, for example, 2006 verified emissions did not include the future emissions of some 5 plants scheduled to come online in 2007.[18] Thus over the period 2008–2012, firms in Hungary—in order to create room for new installations—must find ways to reduce emissions. Though little *public* discussion has emerged, quota allocation decisions have an effect on future locational investment decisions and act as potential barriers to entry. In this regard, overly restrictive quotas may limit future investment and

[17] This measure is based only on the ratio of 2005 GDP to the 2005 EU average GDP used as a multiplier to estimate future emission associated with higher GDP output. This measure ignores however potential changes in the structure of production (*e.g.* increased size of service sector), reductions in energy intensity, general improvements with regard to CO_2 and GHG mitigation and other changes. A more sophisticated measure should take these additional factors into account and would reduce the estimates in columns III and V.

[18] Interview with representative from the Hungarian Ministry of the Environment and Water.

hinder convergence-related economic growth.

The second basic problem concerns the following two key questions: (1) whether the more advanced states are genuinely able to achieve real CO_2 emissions reductions, and (2) whether or not emissions' targets will act as constraints on future economic growth. While the European Commission proscribes CO_2 reduction targets through the mechanism of the ETS and national allocation plans, little is really known about the limits of potential future CO_2 reductions. As noted above, the more advanced states—apart a few notable exceptions—have not achieved significant emissions reductions.

4) The choice of base year (1990 or 2005)?

The 2020 Climate Change Package incorporates a shift from the original 1990 base year adopted in the Kyoto Protocol to a new base year, 2005. As illustrated by the basic country positions outlined in *Table 5*,[19] virtually all of the CEEC's were opposed. None of the Commission documents reviewed either discuss or justify in meaningful detail the shift to a 2005 base year. Though the 2005 base year is mentioned in the European Commission's Impact Assessment (SEC(2008) 85) and other documents, the real impact is neither revealed nor analyzed, essentially papering over the potentially large and significant impact on the cost of mitigation in the CEEC's and in those few Western countries that have already made significant progress in reducing GHG emissions.

[19] *Tables 5* and *7* include the positions of the 17 countries who had posted position papers with the European Council's Consilium website by the time of writing. More complete country positions addressing all the major issues in the 2020 Climate Change Package are available in Ellison, Fleischer and Hugyecz (2008: Annex).

For a document that intends to measure and weigh the total impact of the 2020 Climate Change Package and ultimately justify the distribution of burden-sharing across countries, this fact is shocking. Reference is clearly made in the Impact Assessment to the need to place less of a burden on the less advanced states in order to meet the 2020 target goals: "This will require developed countries to continue to take the lead in cutting their greenhouse gas emissions and efforts by developing countries to significantly reduce their emissions before 2020" (p.16). The choice of the 2005 base year for determining required GHG emission reductions appears to obliterate these good intentions.

The choice of the 2005 base year for the second round of proposed GHG emission reductions up through 2020 sends a rude message to the majority of the NMS's and to those Western states that have likewise managed to make progress in reducing emissions. As illustrated in *Figure 3*, all of the CEEC's (except for Slovenia) and several Western countries (Sweden, Finland, the UK, France and Belgium who managed to reduce their emissions) are significantly or moderately hurt by the choice of the 2005 base year. The real winners are those countries that increased their emissions well beyond the Kyoto target but somehow managed to receive even higher 2020 targets (in particular Malta, Cyprus, Spain, Slovenia, Luxembourg, Austria, Portugal and Italy). The total gain or loss in tons of CO_2 equivalent resulting from the change in base year is calculated for individual states. To provide a sense of the magnitude, this number is then divided by each country's 1990 GHG output.

The findings seem out of keeping with the concept of burden sharing. Given that the enlargement essentially saved Western Europe from having to meet its Kyoto targets, there is considerable irony in this outcome. The Eastern enlargement provided Western states with a cheap

source for purchasing carbon credits, saving them from having to make far more considerable investments in renewables, energy efficiency and GHG reductions (in whatever form; Joint Implementation (JI)/CDM or in the domestic market). Setting low emission reduction targets for the Eastern states and over-allocating emission credits to domestic firms in Western states provided plentiful and cheap solutions to potentially costly Kyoto goals. Moreover, those countries that made the most progress on their Kyoto targets will pay the price.

This point is best represented in *Figure 4* which illustrates a very strong correlation between the change in the 2020 target based on the 2005 base year and overall change in GHG emissions between 1990 and 2005. More rigorous investigation provides further support for these findings even when important control variables (per capita GDP, energy intensity and a per capita target model; see below) are added to the regression analysis.[20] Countries that reduced emissions received higher targets (greater negative burdens) while countries that raised emissions received lower targets (or higher positive burdens). Though the CEEC's were "rewarded" for their progress—they were able to sell surplus carbon credits—this revenue stream will presumably be diminished in the second stage of the climate mitigation strategy from 2013–2020. Though the price has varied dramatically, estimates suggest that Hungary could take in anywhere from 0.8 to 1.7 billion euros by 2012 from its sale of carbon credits. Most of these revenues are spent on energy saving investments in the residential sector.[21]

With respect to the general EU Climate Change Package, it is incumbent upon the framers of this policy proposal—at the very least—to provide adequate analysis and explanation for this dramatic shift in policy orientation. Moreover, this analysis raises important questions about the potential impact of the 2020 targets on the future economic growth and convergence aspirations of the less advanced states. Since this issue is neither raised nor really discussed in the Impact Assessment, it seems unlikely its overall impact on future economic growth is adequately modelled or even measured.

At least part of this shift to the 2005 base year is driven by external considerations. In the broader international negotiations over a new Kyoto package, in particular for a broad range of less developed countries, 2005 data is considered more reliable than 1990 data.[22] However, given that the EU has the necessary institutional setting with which to make more reasonable allocations of the GHG burden across states, it makes little sense to reward past poor performers. It is possible, however, to opt for the 2005 base year and to make reasonable adjustments to individual country targets that provide for a more equitable distribution of the burden across EU member states.

5) The allocation and auctioning of credits across ETS and non-ETS sectors and states

As expressed in individual member-state positions on the 2020 Climate Change Package, several countries would like to

[20] For more detail, see Ellison (2008).

[21] See for example: "Az EBRD szén-dioxid kreditet venne Magyarországtól" (HVG, Mar. 26th, 2008) and "Nagy a tolongás Magyarország szén-dioxid-kvóttájáért" (Magyar Nemzet Online, Mar. 26th, 2008).

[22] Interview with the Hungarian Ministry of the Economy. Ministry representatives make the argument that, due to problems of measurement and data reliability in earlier years, a 1990 base year will be unacceptable in international negotiations.

see more flexibility across EU ETS and non-ETS sectors (see *Table 7*). For the CEEC's, such flexibility would be a significant asset. This is above all the case since improvements in energy efficiency are likely to bring greater returns in non-ETS sectors than in ETS sectors—in particular in CEEC's. This does not mean there are no firms that could produce significant returns on investments in energy efficiency and GHG emission reductions. But since the crucial issue in the Impact Assessment is the cost efficiency of mitigation efforts and their impact on growth, it is obviously more advantageous to make energy saving and emissions' reducing investments where they will have the biggest impact and largest marginal return.

While there is a definable logic to the current ETS system, it is questionable whether this is the best strategy for the CEEC's. For one, these countries have already made quite significant cuts in overall emissions (see Table 1). For another, in per capita terms, Central and East European emissions levels are on average well below Western levels (Ellison, 2006b). While the energy intensity of GDP in CEE remains well above Western levels, we know substantially less about how different levels of energy inefficiency are distributed across different sectors of the public and private economy. There is a substantially large and growing segment that is likely to use energy comparatively efficiently. Western investors in particular have installed new plants and physical capital in Hungary and elsewhere that, on average, are far more efficient than many other remaining segments of the economy. However, with the rapid rise of energy costs in Hungary, many domestic firms have likewise been motivated to make energy saving investments.

In the public sector, in part because of the lack of both foreign and domestic investment, there has been far less change. Studies of the potential opportunities for investments in energy efficiency in the building sector suggest that energy use per square meter is considerably higher than in Western Europe (ECOFYS, 2006). Built in a time of cheap and highly subsidized energy, few buildings in CEE approach Western energy use standards. As illustrated in *Table 6*, the non-ETS sector contributes significantly to total GHG output. Yet, only the Western states are permitted (or encouraged) to make energy saving investments in the non-ETS sector. For the CEEC's, this strategy ultimately means that all of their GHG reduction efforts will focus on ETS sectors. In light of the above discussion, this makes little sense. For Hungary, the non-ETS sector represents almost 70 per cent of GHG output. Moreover, the requirement of putting all of Hungary's efforts into reducing GHG output in ETS sectors means that all efforts are focused on a significantly small share of the economy and at potentially high cost.

The strategy of imposing a strict division between ETS and non-ETS sectors seems ill-suited to the pursuit of cost-efficient strategies for reducing GHG emissions and achieving the general 2020 Climate Change Package targets. Moreover, given the very rudimentary data presented herein, it again seems highly unlikely that the various options considered represented the best possible and most cost efficient strategies for individual countries to pursue—in particular in CEE. Even though we can expect the service sector to grow in size in CEE in coming years (assuming these countries follow similar development trajectories to those in Western Europe), this does *not* mean that great improvements in energy efficiency cannot be achieved in the non-ETS sector. Moreover, placing all the emphasis on emission reductions in the ETS sectors will likely diminish attempts to improve energy efficiency since these are not significantly rewarded through the ETS system. In fact, without substantial rewards for increased efforts, CEE

states may face disincentives to invest in energy efficiency.

As proposed by some member states (see the respective country positions in Table 7), a system of free allocation and/or auctioning across ETS and non-ETS sectors would give individual states more flexibility to promote emissions reductions wherever they are the most cost effective. Moreover, the ability to freely sell (auction) carbon credits across sectors and states could potentially provide more incentive to undertake such investments. Precisely why such rigidity across ETS and non-ETS sectors should be introduced, or why states should not be immediately able to auction carbon credits is not immediately clear from the assessment. Moreover, such "rigidity" seems likely to cause significant problems where "new installations" and the emergence of potential "growth constraints" are possible outcomes. Though the interest in documenting "verifiable" emissions' reductions is an important issue, it may be possible to solve this problem in other ways.

6) Discussion

Apart from the obvious advantage of promoting greater flexibility across ETS and non-ETS sectors, there is at least one potential policy alternative that has so far not been mentioned or discussed that might in fact create the foundation for a more equal distribution of the burden of reducing GHG emissions across states. One such alternative is to generate a measure of what *per capita* GHG output should *on average* be in order to achieve the goal of sharing the earth's environment fairly and equitably. The November 2007 IPCC report notes that GHG reductions must be in the range of 50 per cent to 85 per cent by 2050 compared to 1990 levels. One can then use these calculations to derive both a 2050 target and a comparable 2020 target for individual countries based on each state's per capita GHG emissions for 2005 and the 2020 and 2050 per capita target based on what world per capita emissions would have to be to achieve the 2007 IPCC goals.

Outlining GHG emissions' targets based on population has a number of advantages. For one it represents what is presumably a "fair" sharing of the burden because it bases targets on an equal per capita sharing of the world's environment. For another, in contrast to the decidedly non-transparent character of current European Commission proposals on 2020 targets, it is remarkably transparent. At the same time, however, the results raise serious questions about the ability of the EU 2020 climate package to achieve genuine, effective and above all sustainable change. The emissions' targets derived from a 50 per cent reduction from 1990 levels and an equal sharing of the world's environment are already considerably more extensive than those currently proposed by the European Commission (imposing the IPCC 85 per cent reduction target and/or using estimated 2020 population figures would result in far more severe reduction targets).

As illustrated in *Figure 5*, on the basis of these targets, all of the Western OMS's would be required to make dramatic and more extensive cuts in GHG emissions by 2020 in order to meet these proposed targets (2050 targets are exactly three times the amount depicted for 2020).[23] The CEEC's would likewise

[23] Some caution is required when viewing this figure. As noted in the sources information, some of the required data, in particular on GHG emissions for 2005, is not available (*e.g.* for China and India). Thus 2005 GHG emissions are estimated based on change in CO_2 emissions from 1990–2005. This may lead to some errors, in particular for countries like India and China. The biggest discrepancy in the numbers appears to arise with India in the 1990 GHG and CO_2 data. This presumably leads to a larger than likely increase in estimated GHG emissions from 1990–

be required to make further dramatic cuts, though not as extensive cuts as in Western Europe. In sharp contrast however to the proposed Commission's 2020 GHG reduction targets, the distribution of the burden would be somewhat reversed. Moreover, weighting these figures based on past performance would likewise provide a meaningful framework for negotiation.

One downside of this model is its failure to consider a more equal sharing of the burden of emissions' reductions. However, if we impose some of the existing criteria proposed in the 2020 Climate Change Package—*e.g.* variation in the level of economic development (as a proxy for ability to finance)—Western states would be even harder hit by the resulting set of targets. In fact, with this set of targets some inverse model of burden-sharing favouring the more advanced states might possibly be required due to the large and substantial comparative costs they would face. However, in terms of maintaining an even competitive playing field in the European marketplace, such concessions would likely be unsavoury to CEE producers.

Of course, the failure to include the rest of the world in a new international Kyoto II agreement would mean that EU efforts are comparatively meaningless. Again, as illustrated in *Figure 5*, significant reductions are likewise required from the remaining large world economies—in particular the US—if there is to be any progress on the goal of combating climate change.

2005. Thus India, based at least on 2005 GHG emissions, possibly would not have to reduce emissions under these basic assumptions, but might instead have some small amount of room for increasing them.

7) Conclusion

As noted at the outset, international cooperation on issues such as global warming is complicated by the conflicting interests of states and the difficulty of establishing cooperation across states. At the international level, cooperation is complicated by the fact that the principal GHG emitters repeatedly appear to scapegoat the less advanced states while failing to make real advances or even commitments on their own part. The failure of some of the largest states—in particular the US—to participate in existing venues for international cooperation further weakens their meaning and potential success. As has been frequently noted by others the 27 Member states of the EU were only responsible for approximately 15 per cent of world CO_2 output in 2005. Thus any effort made by the EU alone is ultimately not meaningful in the longer run unless other states join.

Turning to the EU, how the current 2020 climate-change proposal will fair in the EU legislative process remains unclear. Though decisions must be made quickly, both to adequately prepare the groundwork for the next round of negotiations over Kyoto II and to stem the tide of climate change, there is a good chance current EU negotiations will run up against substantial resistance. Though the EU potentially provides a framework for fairly distributing the burden of reducing GHG emissions, the EU has been unsuccessful in doing this. To-date, most of the "burden" has been transferred to the CEE NMS's. While this fact produced little resistance for the first Kyoto round, current negotiations are likely to produce far greater resistance.

Fairness in burden-sharing presumably means the more advanced EU member

states—in particular those with higher per capita GHG emissions—should bear a significantly higher share of the burden. Moreover, the burden should presumably be based on a measure approximating both fair and sustainable usage of the world's environment in the international sense: *i.e.* an GHG emission level that is directly correlated with a state's share of the world population. At the same time, however, new targets should presumably taken into account progress already made (or the failure to make progress).

To-date, the EU experience leaves little assurance that such a fair distribution of the burden can be achieved. For one, the lack of transparency behind the choice of GHG emission targets and the choice of base year make genuine consultation and negotiation difficult. As an exercise in policy formulation and evaluation, this is an excellent example of how *not* to do things. More importantly, some of the policy proposals themselves seem ill-suited to achieving the important goals of climate mitigation. Thus, several of the policy proposals and in particular the choice of a 2005 base year seem strongly tilted toward Western interests and thus destined to jeopardize the future of the proposed 2020 Climate Change Package.

Given the overall importance of responding to the challenge of climate change, these points require immediate resolution. A first step in this regard would be to require the release of the relevant data and mathematical models to public and scientific scrutiny. A second step would be to extend the range of possible scenarios being considered in the manner suggested above. In particular, considering greater flexibility across EU ETS and non-ETS sectors would seem a crucial component to adequate analysis of the possible policy scenarios—in particular for the CEEC's. A third step would be to consider alternatives to currently proposed targets—in particular one based on per capita emissions targets set at a level that recognizes past achievements and thus might facilitate greater intra-EU cooperation.

* * * * *

BIBLIOGRAPHY

ECOFYS (2006). "Cost Effective Climate Protection in the EU Building Stock of the New EU Member States: Beyond the EU Energy Performance of Buildings Directive", ECOFYS: Cologne.

EEA (2007). *Annual European Union Greenhouse Gas Inventory 1990-2005 and Inventory Report 2007*, Technical Report No. 7/2007, Submission to the UNFCC Secretariat, May 7th, European Environment Agency.

EEA (2006). *Greenhouse Gas Emission Trends and Projections in Europe 2006*, EEA Report No. 9/2006, European Environment Agency.

Ellison, David L. (2006a). "Divide and Conquer: The EU Enlargement's Successful Conclusion?" *International Studies Review* 8(1): 150–165.

Ellison, David L. (2006b). *Weighting the Politics of the Environment in the New Europe*, Working Papers No. 169, Institute for World Economics, Hungarian Academy of Sciences, Budapest.

Ellison, David L., Tamás Fleischer and Attila Hugyecz (2008). "Report on the European Commission's Impact Assessment of the Costs Related to the 2020 Climate Change Package", manuscript (paper commissioned by the Hungarian Ministry of the Economy and Transport).

Moravcsik, Andrew (1999). "A New Statecraft? Supranational Entrepreneurs and International Coopera-

tion," *International Organization* 53(2):267-306.

~~~~~. (1997). "Taking Preferences Seriously: A Liberal Theory of International Politics," *International Organization* 51(4): 513–553.

~~~~~. (1991). "Negotiating the Single European Act: National Interests and Conventional Statecraft in the European Community," *International Organization* 45(1): 19–56.

Saikku, Laura, Aapo Rautiainen and Pekka E. Kauppi (2008). "The Sustainability Challenge of Meeting Carbon Dioxide Targets in Europe by 2020", *Energy Policy* 36(2): 730–742.

Table 1
World CO_2 Output in Perspective, 1990–2005

Regional Share of World CO2 Output (%)																	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2005/1990
US	23.4	23.3	23.8	24.0	24.2	24.1	24.3	24.1	24.4	24.3	24.5	23.8	23.5	22.5	21.8	21.1	-9.6
Russia	n.a.	n.a.	8.9	8.0	7.5	7.3	6.6	6.5	6.8	6.8	6.6	6.5	6.6	6.5	6.2	5.5	-38.2
China	10.5	11.0	11.4	12.0	12.9	12.9	12.8	13.4	13.0	12.6	12.3	12.7	13.8	15.5	17.5	18.9	80.2
India	2.7	2.9	3.1	3.2	3.4	3.9	3.6	3.8	3.9	4.1	4.2	4.2	4.1	4.0	4.2	4.1	54.0
Japan	4.7	4.8	4.9	4.8	5.0	4.9	4.9	5.0	4.8	4.9	5.0	4.9	4.8	4.8	4.6	4.4	-7.5
EU27		19.2	19.0	18.7	18.3	18.2	18.3	18.0	17.9	17.4	17.2	17.4	16.8	16.5	15.8	15.2	-21.0
Share of World CO_2 Output			71.1	70.7	71.3	71.3	70.5	70.6	70.8	70.1	69.8	69.6	69.6	69.8	70.1	69.2	
Regional per capita CO2 Output Relative to World per capita Output																	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2005/1990
US	4.9	4.9	5.0	5.1	5.1	5.1	5.2	5.1	5.2	5.2	5.3	5.1	5.1	4.9	4.7	4.6	-6.2%
Russia		3.4	3.2	2.9	2.8	2.8	2.6	2.6	2.7	2.8	2.7	2.7	2.8	2.8	2.8	2.5	-23.4%
China	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.9	0.9	94.2%
India	0.17	0.18	0.19	0.19	0.20	0.24	0.22	0.23	0.24	0.25	0.25	0.25	0.24	0.24	0.24	0.24	47.5%
Japan	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.4	2.4	2.4	2.3	2.2	10.1%
EU27		2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	-7.8%
Ratio of US (EU15) per capita Income to Regional per capita Income																	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
US/Russia	2.8	2.9	3.4	3.8	4.4	4.7	5.0	5.0	5.5	5.3	4.9	4.7	4.5	4.2	4.0	3.9	
US/China	17.4	15.9	14.4	12.9	11.9	11.0	10.3	9.9	9.5	9.2	8.8	8.1	7.6	7.0	6.6	6.2	
US/India	17.1	17.0	16.8	16.5	16.1	15.4	15.0	15.1	14.9	14.6	14.6	14.1	13.9	13.2	12.8	12.1	
US/EU10	2.6	2.8	3.0	3.1	3.1	3.0	3.0	3.0	3.0	3.0	2.9	2.8	2.7	2.7	2.6	2.7	
EU15/EU10	2.0	2.2	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.1	

Source: CO_2 output data is from the US Department of Energy's Energy Information Agency (EIA). Population figures and per capita income data are from the World Development Indicators online database.

Table 2
Change in CO_2 and GHG Output

	CO2			GHG		Kyoto
	1990/1980	2005/1990	2005/1980	2005/1990	2005/BY	Target (2012)
Bulgaria	-19.2	-31.2	-44.4	-40.0	-47.2	-8.0
Czech Republic		-62.7		-25.8		-8.0
Estonia		-26.1		-50.9		-8.0
Hungary	-20.0	-9.3	-27.5	-18.2	-30.7	-8.0
Latvia		-33.6		-58.9		-8.0
Lithuania		-38.6		-54.1		-6.0
Poland	-21.8	-13.9	-32.7	-17.8	-32.0	-6.0
Romania	2.5	-42.9	-41.5	-38.2	-45.6	-8.0
Slovakia		-12.6		-33.6		-8.0
Slovenia		33.7		10.0	0.4	-8.0
Austria	-4.7	43.0	36.3	18.0		-13.0
Belgium	-9.3	9.5	-0.7	-1.3		-7.5
Denmark	-15.8	-9.9	-24.2	-7.0		-21.0
Finland	-5.7	-1.5	-7.1	-2.5		0.0
France	-24.0	13.3	-13.9	-1.6		0.0
Germany	-6.9	-13.9	-19.8	-18.4		-21.0
Greece	47.3	28.2	88.8	26.6		25.0
Ireland	15.7	71.0	97.8	26.3		13.0
Italy	12.7	12.9	27.3	12.1		-6.5
Luxembourg	-8.9	17.1	6.6	0.4		-28.0
Netherlands	7.6	30.7	40.7	-0.4		-6.0
Portugal	85.6	48.6	175.8	42.8		27.0
Spain	15.0	64.5	89.1	53.3		15.0
Sweden	-38.2	9.3	-32.5	-7.3		4.0
UK	-1.6	-3.6	-5.1	-14.8		-12.5
Cyprus	70.9	76.6	201.7	63.7		0.0
Malta	74.3	27.4	122.1	54.5		0.0
EU 15	-3.4	18.0	14.1	-1.5		8
EU 27		6.5		-8.0	-10.7	

Sources: Own calculation base on CO_2 from Eurostat's online database and reported UNFCC GHG data.

Table 3
2012 and 2020 Growth Constraints?

Business as Usual Estimates (Million tons)		2012 Targets		2020 Targets	
	Estimated BAU GHG Output (at 2005 avg EU GDP)	Kyoto Target GHG Output (2012)	Percent over Kyoto Targe (%)	2020 Target (ETS+non-ETS, option 4)	Percent over 2020 Target (%)
Bulgaria	225.047	97.433	131	77.261	191
Romania	487.851	211.428	131	175.277	178
Poland	866.101	502.680	72	421.892	105
Latvia	24.241	16.320	49	12.587	93
Lithuania	47.223	32.912	43	25.329	86
Slovakia	90.731	60.120	51	50.353	80
Estonia	37.989	30.152	26	21.586	76
Hungary	138.610	103.081	34	82.825	67
Portugal	129.328	74.078	75	78.917	64
Greece	177.456	137.082	29	117.652	51
Czech Rep.	213.787	171.530	25	145.040	47
Slovenia	26.976	18.678	44	19.536	38
Italy	623.751	471.752	32	468.419	33
Spain	486.630	276.287	76	370.319	31

Source: Own calculations. EU average per capita GDP from Eurostat online database. Individual country Kyoto targets are available in EEA (2007). 2020 targets are based on "option 4" in the Impact Assessment (SEC(2008) 85: p.58-9). The formula for estimating BAU GHG output is: $(pcGDP_{EU\text{-}avg}/pcGDP_{2005})^{*}GHG_{2005}$ = est. GHG output.

Table 4
Comparison of 2006 Verified Emissions with Proposed and Approved Emission Caps Imposed by the European Commission for 2008–2012

Country	Verified CO_2 Emissions 2006 (Million Tons)	Proposed Cap 2008–2012	Approved Cap 2008–2012	Percent Difference Between 2006 Verified Emissions and 2008–2012 Approved Cap	Percent Difference Between Proposed and Approved 2008–2012 Caps (%)
Cyprus	5.30	7.1	5.48	3.4	-23.0
Czech Republic	83.60	101.9	86.80	3.8	-14.8
Estonia	12.40	24.6	12.70	2.4	-48.4
Hungary	25.40	30.8	26.90	5.9	-12.7
Latvia	2.90	7.7	3.43	18.3	-55.5
Lithuania	6.70	16.6	8.80	31.3	-47.0
Malta	1.98	3.0	2.10	6.1	-29.1
Poland	215.00	284.6	208.50	-3.0	-26.7
Slovakia	27.20	41.3	30.90	13.6	-25.2
Slovenia	8.84	8.3	8.30	-6.1	0.0
Bulgaria		67.6	42.30		
Romania		95.7	75.90		
Austria	32.40	32.8	30.70	-5.2	-6.4
Belgium	60.00	63.3	58.50	-2.5	-7.6
Denmark	34.20	24.5	22.00	-35.7	-10.2
Finland	45.00	39.6	37.60	-16.4	-5.1
France	128.80	132.8	132.80	3.1	0.0
Germany	488.00	482.0	453.10	-7.2	-6.0
Greece	70.00	75.5	69.10	-1.3	-8.5
Ireland	21.70	22.6	22.30	2.8	-1.3
Italy	227.00	209.0	195.80	-13.7	-6.3
Luxembourg	2.70	4.0	2.70	0.0	-31.6
Netherlands	87.10	90.4	85.80	-1.5	-5.1
Portugal	33.10	37.9	34.30	3.6	-9.5
Spain	185.90	152.7	152.30	-18.1	-0.3
Sweden	21.90	25.2	22.80	4.1	-9.5
UK	284.96	246.2	246.20	-13.6	0.0

Source: Own calculations based on annual verified emissions data and targets from the European Commission.

Table 5
2020 Climate Change Package
Country Positions: General Comments

	General	Additional Comment
Belgium	support but want more flexibility and fairer burden-sharing (no detail provided)	need cooperation/participation from other developed countries
Britain	Support	higher levels of free allocation, prevent leakage
Cyprus	emphasize special national circumstances	concern about RES target
Estonia	1990 as base year for GHG's	clear rules on electricity import (prevent leakage)
Finland	Support	
France	Support	
Germany	emphasize manufacturing competitiveness, proper account of past performance, fair burden-sharing	step up efforts on energy efficiency
Greece	Support	
Hungary	Principal emphasis on 1990 base year	
Italy	energy efficiency should be given more weight and not left up to states	RES and GHG targets should be revised in light of national potential in non EU ETS sectors with due weight to energy efficiency, no or inadequate cost-benefit analysis
Lithuania	should consider progress since 1990 base year	states must also ensure energy security, economic viability, competitiveness and social welfare, emphasize national circumstances: closure of nuclear power plant, 70 per cent rise in GHG emissions related to power, 250 per cent rise in energy prices (with more expected)
Poland	heavy emphasis on competitiveness	concerned about potential leakage
Portugal	Support	
Romania	strong objection to 2005 base (instead of 1990 or original base year), not compensated for 1989-2005 reductions	must include 3rd countries (leakage)
Slovakia	1990 base year	high relative costs for NMS, concern about potential leakage due to domestic GDP importance of energy intensive sectors
Spain	Support	subsidiarity should be observed, especially concerning national level RES support mechanisms
Sweden	Support	

Source: See the individual country position papers responding to the Climate-Energy Legislative Package and posted on the web registry of the European Council: http://register.consilium.europa.eu/.

Table 6
Share of Non-ETS Sectors in Total CO_2 Emissions,
Non-ETS 2020 Targets and Services as a Share of GDP
(%)

	Size of Services Sector (Share of GDP in 2005)	Non-ETS Share of Total CO2 Output (2005)	Non-ETS 2020 Target
Denmark	74.0	58.6	-20
Ireland	60.0	67.9	-20
Luxembourg	82.7	79.6	-20
Sweden	70.5	71.1	-17
Austria	67.8	64.2	-16
Finland	66.7	52.2	-16
Netherlands	74.0	62.1	-16
United Kingdom	73.7	63.1	-16
Belgium	74.2	61.5	-15
France	76.3	76.3	-14
Germany	69.8	52.6	-14
Italy	70.2	61.1	-13
Spain	67.3	58.3	-10
Cyprus	na.	49.0	-5
Greece	73.1	48.8	-4
Portugal	71.7	57.4	1
Slovenia	62.4	57.0	4
Malta	na	41.0	5
Czech Republic	59.3	43.4	9
Hungary	65.1	67.5	10
Estonia	66.9	39.7	11
Slovakia	66.7	47.3	13
Poland	64.0	49.3	14
Lithuania	61.5	70.7	15
Latvia	73.3	73.4	17
Romania	50.7	53.9	19
Bulgaria	58.0	42.0	20

Source: Service sector data from the World Development Indicators online database, remaining data based on data presented in the Impact Assessment. I thank Varsányi Kornél for providing foundational data.

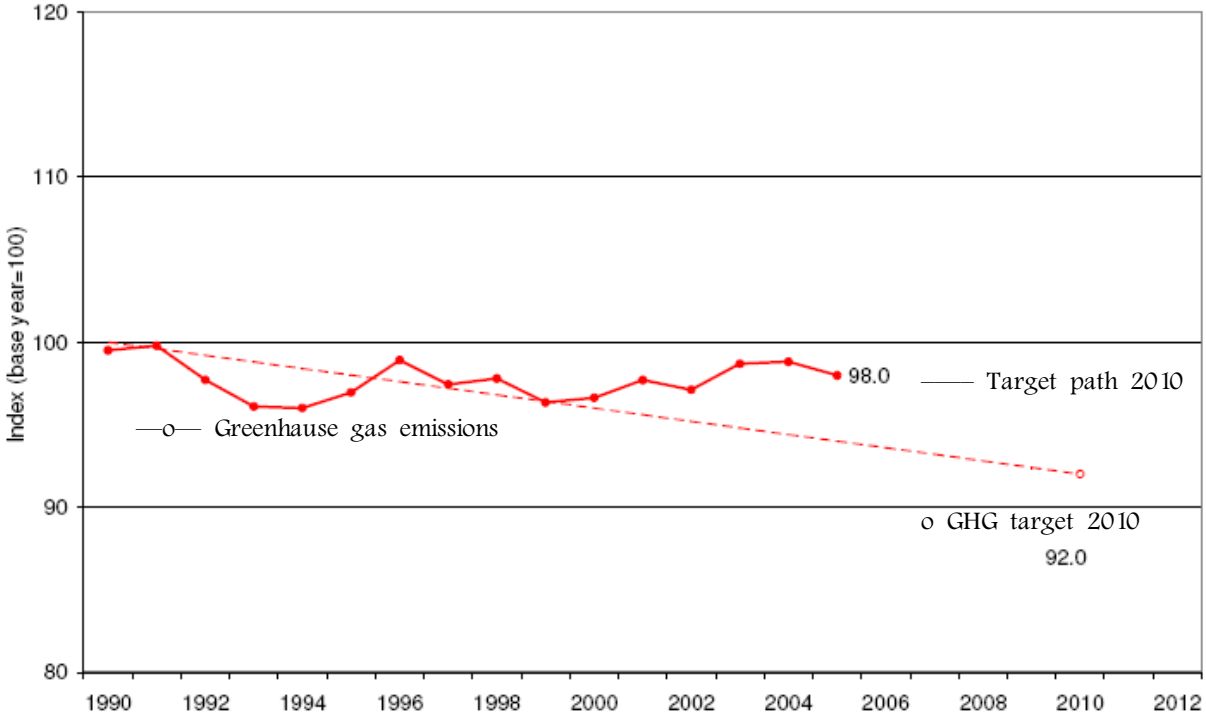
Table 7
Country Positions: EU ETS

	Division between ETS Sectors and Not	EU or State-level Cap	Additional Comment
Belgium			
Britain	economy-wide targets (not based only on ETS sectors)	EU-wide	
Cyprus			
Estonia	no strict division, emission reductions easier in non-ETS sectors		exclusion of SME's under 10 ktons (if adopt measures to reduce emissions)
Finland			
France			
Germany			
Greece			
Hungary	favours more flexibility at the national level to allocate carbon quotas across ETS and non-ETS sectors		
Italy		must determine now (not in 2011) what special arrangements will be granted to energy intensive industries to prevent leakage	address energy efficiency here, see risk of leakage even with international agreement
Lithuania			
Poland	favours no strict division, more flexibility (potential in non ETS sectors)		
Portugal			
Romania			adopt EU-wide sectoral standards for energy intensive industries
Slovakia			
Spain			
Sweden			

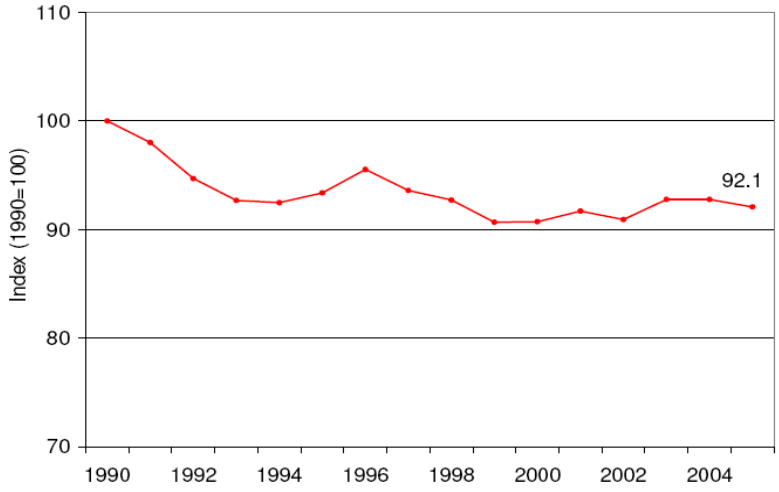
Source: Same as above (Table 5).

Figures 1 & 2
Total Mitigation Across the EU15 and the EU27

EU15

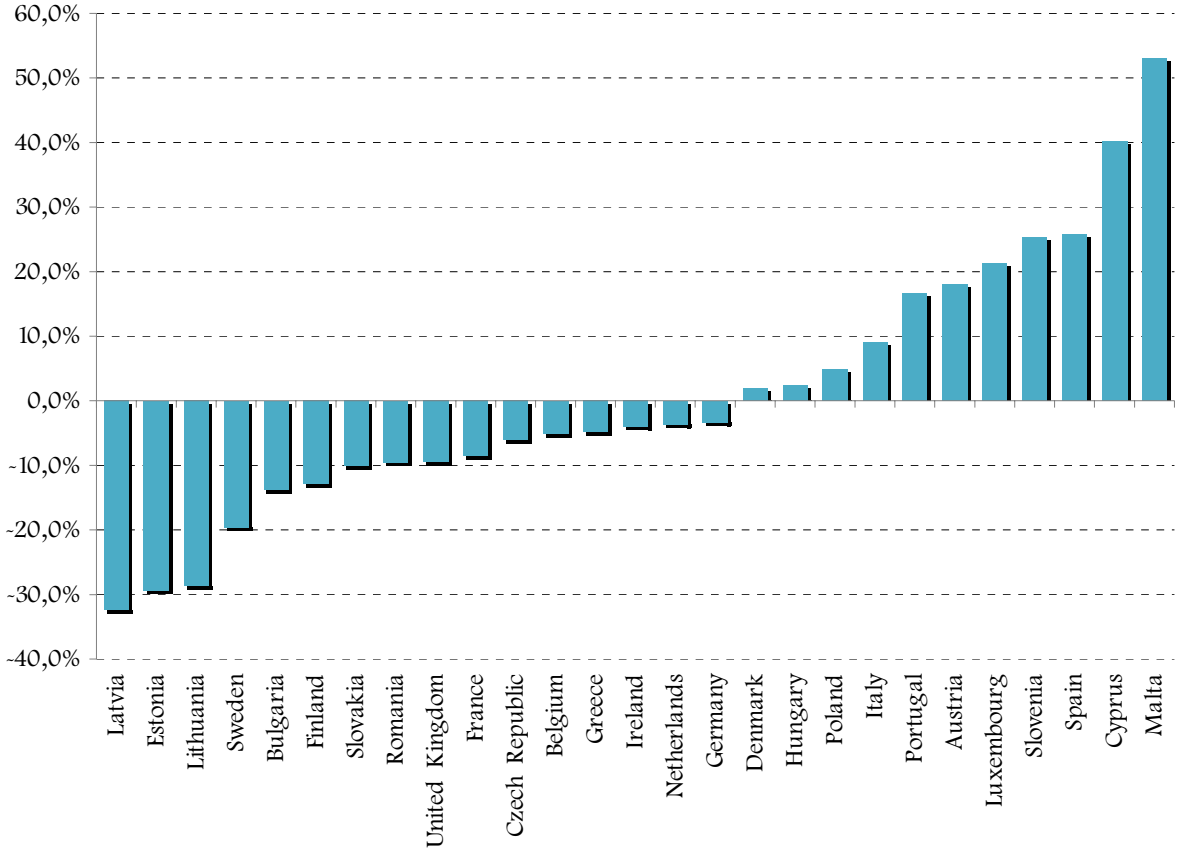


EU27



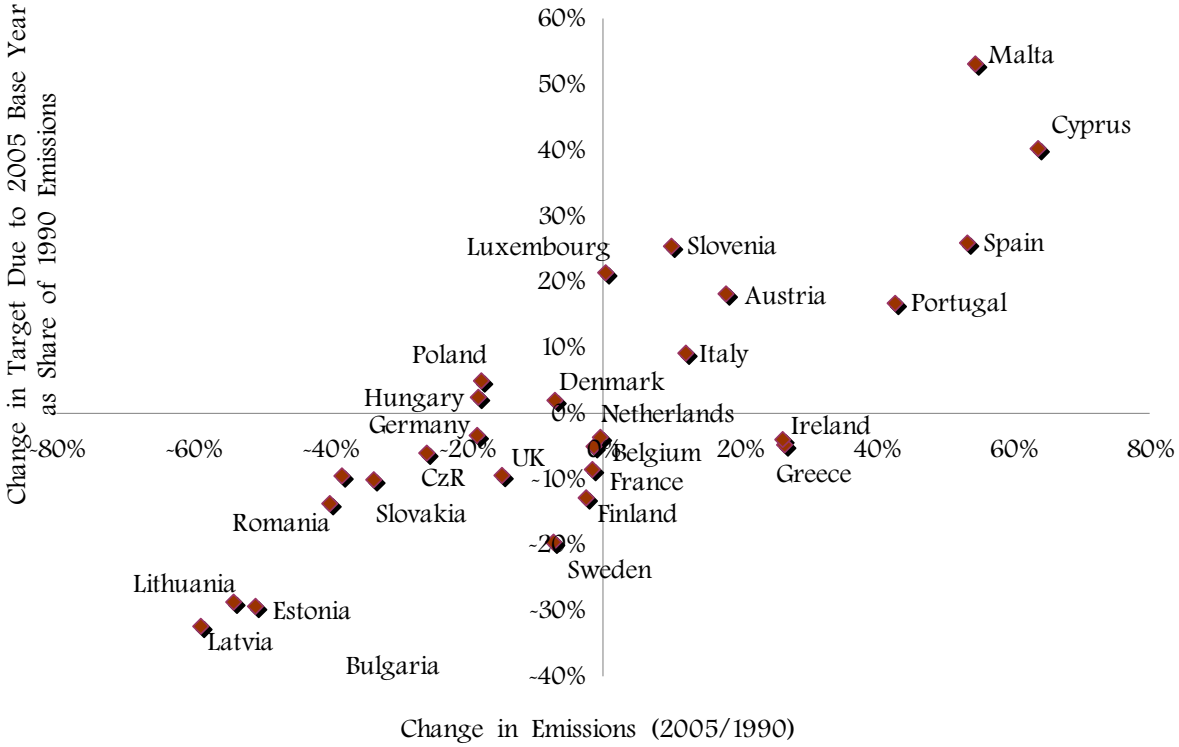
Source: Graphs taken from the European Environment Agency UNFCC reports (EEA, 2007: 10–11).

Figure 3
Change in Total 2020 Target Burden with 2005 Base Year
(Gain/Loss divided by 1990 GHG Output, Option 4)



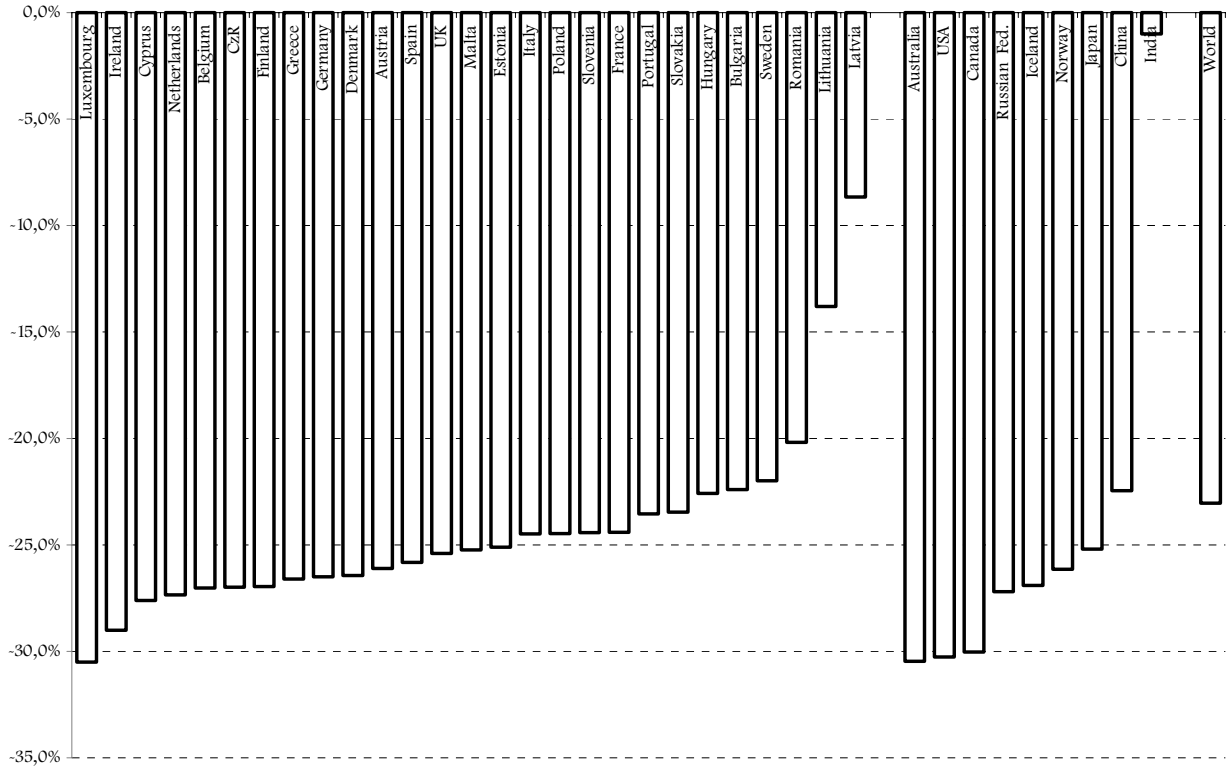
Source: Own calculations based on UNFCC reported GHG emissions data (UNFCC registry), 2012 Kyoto Targets for EU Member States (EEA, 2007) and the 2020 targets reported in the Impact Assessment. I thank Varsányi Kornél for providing foundational data.

Figure 4
Change in Target Due to Base Year Compared to Change in Emissions



Source: Change in emissioncs data from Table 2 and change in target data from Figure 3.

Figure 5
Required Effective GHG Reductions by 2020 from 2005
Assumes IPCC 50% Reduction Target from 1990 Levels & 2005 Population
Assumes Equal Per-capita Sharing of World Environment Across Countries



Source: Own calculations. Total world GHG emissions data is from the World Resources Institute (WRI) online data. Total world GHG emissions are estimated by summing all country level WRI data for 1990 and then estimating total world GHG emissions by adding the missing share to this total. Target per capita emissions are derived by dividing 1990 world emissions by the 2005 world population data and then multiplying this number by 0.5 (the IPCC 50 per cent reduction target). 2005 GHG emissions (due to the lack of adequate 2005 data) are estimated based on the amount of change in CO_2 data between 1990 and 2005. The numbers appearing in the graph above represent the GHG emissions reductions necessary to achieve the required level of per capita emissions by 2020 based on 2005 GHG emissions and the additional assumption that countries would continue to achieve regular annual emission reductions up to 2050.