CLIMATE CHANGE AND SUSTAINABLE ENERGY POLICIES IN EUROPE AND THE UNITED STATES

A REPORT FROM THE TRANSATLANTIC PLATFORM FOR ACTION ON THE GLOBAL ENVIRONMENT
A JOINT PROJECT BY:

Institute for European Environmental Policy

NRDC

PUBLISHED JOINTLY BY

Institute for European Environmental Policy
Quai au Foin 55
1000 Brussels
Belgium
www.ieep.eu

Natural Resources Defense Council
1200 New York Ave., NW
Washington, DC 20005
USA
www.nrdc.org

September 2008

The *Transatlantic Platform for Action on the Global Environment* (T-PAGE) is a joint project of IEEP and NRDC. The opinions expressed in this report are those of the authors and are not necessarily shared by IEEP and NRDC.

This report is also available on the T-PAGE website:
http://www.ieep.eu/projectminisites/t-page/

ACKNOWLEDGEMENTS

We would like to thank the European Commission (Directorate General for External Relations) for co-funding this project through the European Community's 2006 budget line 19.050200 'Transatlantic Dialogue at Non-Governmental Level'.

CONTENTS

1 INTRODUCTION

The New Transatlantic Agenda adopted at the 1995 EU-US summit expressed the common determination of the EU and the U.S. to:

> "work together to strengthen multilateral efforts to protect the global environment and to develop environmental policy strategies for sustainable world-wide growth. We will coordinate our negotiating positions on major global environmental issues, such as climate change ..."

Since this Agenda was adopted more than a decade ago, under a different U.S. Administration and European Commission, there have been major developments in global, EU and U.S. policies with respect to climate change and energy.

Rather than evolving in a coordinated way, EU and U.S. positions on climate change have diverged dramatically, with the EU playing a leading role in global efforts to secure the entry into force and implementation of the Kyoto Protocol, and the United States rejecting this multilateral instrument. Both the U.S. Government and the EU are, however, now committed to a new process under the UN Framework Convention on Climate Change, launched in Bali in December 2007, to explore options for long-term cooperative global action to address global warming.

Whatever global agreement may be reached at the Copenhagen climate conference in 2009 - following U.S. Presidential elections in November 2008 and European Parliament elections in June 2009 - considerable domestic efforts will be required on both sides of the Atlantic in order to achieve the substantial cuts in emissions that will be necessary to achieve the objective of stabilising greenhouse gas (GHG) concentrations in the atmosphere at a level that ecosystems and human societies can cope with. According to UN data published in 2007,[1] GHG emissions in the U.S. had risen by 16.3 % compared to 1990 levels in 2005, while in the EU the overall emission level had fallen by 1.5 % over the same time period. However, the better aggregate performance of the EU as a whole masks significant disparities between its individual Member States. Spain's emissions, for instance, have increased by 53.3 % and Portugal's by 42.8 %, while Greece, Ireland and Austria have seen higher GHG emission growth since 1990 than the U.S.. Of the 15 countries that were EU Member States at the time the Kyoto Protocol was signed, only a handful (Germany, UK, Sweden and Denmark) have achieved emission cuts which are significantly higher than the EU average.

As a result, the policy debate on the most effective and efficient measures to reduce GHG emissions and promote sustainable energy systems continues to feature prominently on the political agenda in both the U.S. and the EU. In March 2007, EU leaders made a unilateral political commitment to further cut the Union's aggregate GHG emissions in order to reach a target of -20% (compared to 1990 levels) by 2020. To deliver this commitment, the European Commission proposed an ambitious package of energy and climate measures in January 2008, which is currently under consideration in the EU Council and European Parliament. This includes measures to

[1] United Nations Framework Convention on Climate Change, 'National greenhouse gas inventory data for the period 1990–2005', FCCC/SBI/2007/30, 24 October 2007, http://unfccc.int/resource/docs/2007/sbi/eng/30.pdf

extend and strengthen the EU Emissions Trading Scheme, to increase the share of renewables in EU primary energy consumption, to introduce binding CO_2 emission standards for cars, to promote the development and application of carbon capture and storage technology and to increase energy efficiency. Since 2007, the U.S. Congress has been debating various bills proposing to introduce a nationwide cap-and-trade scheme for GHG, while an increasing number of States and cities have already adopted measures to cut their GHG emissions notwithstanding the lack of Federal legislation. Climate change and energy security are also the subject of debate in the current Presidential campaign, as both major party candidates have come forward with policy proposals to move beyond the policies of the current Administration.

Ultimately, the success of responsible public policies to tackle climate change will depend on public support and the full involvement of civil society in both Europe and America, as well as in other parts of the world which contribute significantly to global GHG emissions. As new policy proposals are currently being considered at the international level and by policymakers on both sides of the Atlantic, the Institute for European Environmental Policy (IEEP) and the Natural Resources Defense Council (NRDC), with the support of the European Commission's program to encourage "Transatlantic Civil Society Dialogues", have carried out a joint project to build bridges and stimulate dialogue and exchange of experiences between civil society organisations on both sides of the Atlantic that share a common concern for global environmental issues. Together, they have analysed public policies with respect to climate change and sustainable energy systems, with a view to identifying areas of convergence and divergence and key issues for political debate. The project has brought together experts from environmental NGOs, academia and other interested civil society organisations in the EU and U.S. to debate the most salient issues on the political agenda. In order to disseminate the main conclusions and contribute to informed public debate on climate change and sustainable energy policies, the main results of the project are made available in this report.

Marc Pallemaerts
Senior Fellow
Head, Environmental Governance Programme
Institute for European Environmental Policy
Brussels

S. Jacob Scherr
Senior Attorney
Director, International Program
Natural Resources Defense Council
Washington, DC

2 EUROPEAN POLICIES ON CLIMATE CHANGE AND ENERGY: BACKGROUND AND OVERVIEW

April 2007/ September 2008

Authors:
Jason Anderson – Head of Climate Programme, IEEP
Catherine Bowyer – Policy Analyst, IEEP
Malcolm Fergusson – Senior Fellow, IEEP
Marc Pallemaerts – Head of Environmental Governance Programme, IEEP
Carolina Valsecchi – Policy Analyst, IEEP

2.1 Climate and Energy Policy in the EU

The United Nations Framework Convention on Climate Change (UNFCCC) binds signatories to avoid 'dangerous anthropogenic interference with the climate,' but does not specify how this translates to firm goals. The European Union, through various statements by the Council, the Commission and the Parliament, has arrived at a working interpretation of seeing the world avoid global warming exceeding 2 degrees Celsius above pre-industrial levels. This goal implies far lower emissions compared to business as usual.

Europe's ambitions to see the world agree large emissions cuts for the future mean that it will need to take the leadership in achieving reductions itself. This starts with meeting its reduction commitments under the Kyoto Protocol (8% below 1990 levels for the EU-15 and for all of new Member States except Poland and Hungary, which are minus 6%).

The most recent data[2] indicate that:

- EU-27 total emissions **fell 0.3%** between 2005 and 2006;
- In 2006, EU-27 CO_2 emissions without land use, land use change, and forestry (LULUCF) were 4 258 Tg, which was 3.1% below 1990 levels;
- GHG emissions decreases between 2005 and 2006 were due mainly to reductions from households and services (-2.2%), lower industrial emissions excluding iron and steel (-4%), and lower N_2O emissions from nitric acid production (-13.1%); and
- Substantial increases in the 2005-2006 period came from public electricity and heat production (+1.1%), road transportation (+0.7%), iron and steel production (+4.6%).

In the EU-15, the report finds that:

- EU-15 total emissions **fell 0.8%** between 2005 and 2006;
- 2006 emissions were **2.2% below 1990** levels and **2.7% below the base year** (which is not always 1990);

[2] European Environment Agency, 'Annual European Community Greenhouse Gas Inventory 1990–2006 and Inventory Report 2008', EEA Technical Report No 6/2008

- In 2006, total EU-15 GHG emissions were **3.7 index points above the 2010 target path**; and
- In 2006, EU-15 CO_2 emissions without LULUCF were 3 466 Tg, which was **3.4% above 1990 levels**. Compared to 2005, CO_2 emissions **decreased by 0.6%.**

The 2005-2006 decrease in emissions was mainly due to lower emissions from households and services (-2.9%), petroleum refining (-4.5%), nitric acid (-16.3%) and adipic acid production (-43.6%). Between 2005 and 2006, substantial increases in GHG emissions took place in the public electricity and heat production sector (+0.6%), particularly in Denmark, Finland, and the UK. HFC emissions from refrigeration and air conditioning were up 2.9 million tonnes or 8.1%.

The report implies that the EU-27 as a whole is likely to meet Kyoto targets in the 2008-2012 period, though the downward pressure on emissions relies heavily on the reductions in Germany, the United Kingdom and the new Member States. In the EU-15 it is clear that several countries are challenged by their EU burden sharing targets for the first commitment period.

Despite these targets already proving a challenge, it has long been recognised that far deeper reductions are needed to avoid a 2 degrees Celsius increase in temperatures. The headline outcome of the European Council in March 2007, echoed in the Commission's proposed climate and energy package, was a commitment to a 30% reduction in emissions by 2020 if also agreed among other developed countries (with developing countries playing their part as well), with a 20% reduction if not. A 30% reduction is consistent with the conclusions of a scientific meeting held in Exeter, UK in 2005, which compiled modelling on the probability of keeping global warming under 2 degrees above pre-industrial levels, based on various assumptions about reduction effort[3]. This roughly equates to achieving a 450 ppm CO_2eq stabilisation target[4].

2.1.1 The Roles of the EU and its Member States in Climate and Energy Policy

Whenever we consider 'EU policy' in the field of climate change and energy, it is important to bear in mind that this term in fact refers to a combination of policies and measures decided and implemented by the supranational institutions of the EU and by national (and, in some cases also sub-national) institutions in 27 Member States. Climate and energy policy in the EU is a typical case of what political scientists refer to as multi-level governance and involves a complex distribution of powers and responsibilities between the EU and the Member States, which differs from that in a federal State like the United States.

The EU institutions can act only to the extent that they have been given the power (or 'competence' in EU legal jargon) to do so by the Member States in the Treaties establishing them. The relevant Treaties are the Treaty establishing the European

[3] 'Avoiding Dangerous Climate Change:' Report of the international scientific steering committee of the 'International symposium on the stabilisation of greenhouse gas concentrations.' Hadley Centre, Exeter, UK, May 2005; symposium held 1-3 February 2005.

[4] Emphasis on 'roughly,' as the link between emissions levels, stabilisation and temperature change is determined probabilistically; secondly, the impact of Europe's efforts depend on it being part of a total global effort with others taking on commitments in line with their abilities to do so.

Community (EC) and the Treaty establishing the European Atomic Energy Community (EAEC or Euratom). The European Union is an umbrella concept and institutional framework uniting all the various forms of cooperation under different Treaties between the Member States; it has also become the political identity under which the Member States act collectively on the international scene.

EU climate change policy in fact originated as part of the Union's external environmental policy in the early 1990s. One of the objectives of EU environmental policy, as laid down in Article 174(1) of the EC Treaty, is 'promoting measures at international level to deal with regional or worldwide environmental problems'. To achieve this objective, the EU can adopt internal legislation but also 'cooperate with third countries and with the competent international organisations' by concluding international agreements. When multilateral negotiations on climate change started in the UN, the EU Member States decided to participate in these negotiations as a single block on the basis of a common position. Thus the EU became one of the main actors in the global negotiations, even though, at the time the UNFCCC was signed, it had not yet adopted any internal legislation to deal with climate change. Its common position was based on political consensus between the Member States and an aggregation of their emerging national policies. Gradually, these national policies were complemented and supported by 'common and coordinated policies and measures' at the EU level, including a number of important legislative measures.

The EU institutions can adopt environmental legislation binding on all Member States without their unanimous consent; a 'qualified majority' of Member State votes is sufficient, except in two cases relevant to climate change. Under Article 175(2) unanimity is still required for any 'provisions primarily of a fiscal nature' as well as for 'measures significantly affecting a Member State's choice between different energy sources and the general structure of its energy supply'. The first exception was invoked in the 1990s to block a Commission proposal for a harmonized carbon/energy tax to be introduced throughout the EU as a climate policy measure. The second has never explicitly been invoked so far but is looming in the background in all political decision-making on climate change, especially as the impact of climate measures on energy policy is increasing.

The latter exception is related to the fact that, as the Treaties currently stand, the EU has no explicit competence in the area of energy policy, except for certain aspects of nuclear energy (including common radiation protection standards) under the antiquated Euratom Treaty. Member States remain reluctant to formally delegate part of their sovereign powers over energy policy to the EU institutions, even though they have accepted limited EU legislation on particular aspects of energy policy which can be justified under other provisions of the EC Treaty. Thus, legislation to liberalize the market for electricity and natural gas was passed in the mid-1990s using the EU's powers to establish a single market. Legislation to promote energy efficiency and renewables was adopted under the environmental provisions of the Treaty. As a result of growing concerns about energy security and climate change, a political consensus has developed between the Member States to establish a stronger role for the EU in energy policy, but this has yet to be formalized in the Treaties. A new provision granting specific competences to the EU in energy matters has been included in the 2007 Treaty of Lisbon, whose entry into force remains uncertain at this time.

After signing the Kyoto Protocol, the EU started considering the respective role of 'common and coordinated' versus national policies and measures as a means of

fulfilling its collective quantified emission reduction target of 8%. This debate involved conflicting interpretations of the so-called principle of 'subsidiarity' laid down in Article 5 of the Treaty, which provides for common action to be taken 'only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community.' Some Member States argued that national measures would be sufficient to reach their targets, while others considered a range of harmonized measures at EU level to be necessary. In June 1998, the EU Council reached political agreement on internal 'burden-sharing' - i.e. the allocation of responsibility to individual Member States for the achievement of the common Kyoto target - as well as on the need for further development of common measures. Following the earlier rejection of the Commission's carbon/energy tax proposal, attention shifted to other instruments, and in 2001 the Commission proposed a cap-and-trade system as the flagship measure of EU climate change policy.

2.1.2 EU Emission Trading Scheme

The EU Emission Trading Scheme (EU ETS) was adopted in October 2003 by Directive[5] 2003/87/EC of the European Parliament and the Council. It mandated two trading periods, in 2005-2007 and 2008-2012. The latter is concurrent with the Kyoto Protocol's first commitment period, where the ETS fits integrally into each Member State's and the EU's overall compliance with the burden sharing targets and the Protocol. The 2005-7 period was therefore seen as something of a trial run for the later period – a trial that had its share of difficulties as noted below, but one which permitted some tinkering for improvement.

The ETS applies to specific major point sources of greenhouse gases across the EU, including power stations and other combustion plants, oil refineries, coke ovens, iron and steel plants, and factories making cement, glass, lime, brick, ceramics, pulp and paper. Altogether, it covers some 11,500 installations which represent about half of total emissions of CO_2 in the EU. All these installations require a GHG emission permit issued by a competent national authority and must monitor and report their CO_2 emissions. Each installation is allocated an emission cap expressed in a number of allowances (the right to emit one metric tonne of CO_2). These caps are determined by national authorities in accordance with a pre-established National Allocation Plan (NAP), which each Member State must submit to the European Commission for approval based on a set of criteria laid down in the Directive. The first set of NAPs covered the period 2005-2007; the second the period 2008-2012.

Each year, the permit holder must surrender a number of allowances corresponding to actual emissions. If these exceed his emission cap, he will have to acquire additional allowances on the market, originating from operators anywhere in the EU who have reduced their emissions below their assigned caps. Subject to certain conditions, emission credits acquired under the Kyoto mechanisms (JI and CDM) can also be used to discharge obligations under the EU ETS. Permit holders who do not comply with their obligations will be liable to pay a fine per tonne of unlawfully emitted CO_2 (€100/tonne in the current period).

[5] A Directive, under EU law, is a legislative act which is binding on the Member States as to the result to be achieved, but leaves them some discretion in the choice of the form and method of implementation. Member States have a legal duty to transpose the Directive into binding provisions of domestic law, and ensure its practical application and enforcement.

Thus, the EU determines the overall legal framework and basic rules of the ETS, but Member States are responsible for its application to individual plants on their respective territories. They issue permits and allowances and enforce monitoring requirements. They are responsible for drawing up NAPs, but these are subject to supervision by an EU institution, the Commission, which is responsible for ensuring harmonized implementation and avoiding distortions of competition within the internal market. Member States have an obligation to report all relevant data to the Commission, which keeps track of the operation of the system through an Independent Transaction Log linked with the Member States' national registries.

Progress to date in the EU ETS has been a story of ups and downs. The system got up and running quite quickly, overcoming a number of obstacles both political and practical. It is the first of its kind in the world, and there was always recognition that there would be hiccups - particularly in the 2005-7 trading period.

But it was more than just birth pains - the process of setting allocations at national level, and the subsequent results of that process, highlight the flipside of the image of emission trading as being friendly to both environment and industry. In fact, allocation setting is a process fraught with technical difficulty and tough political choices, where industry holds an information asymmetry over regulators, and national governments can produce projections of emissions needs using opaque methodologies, designed to protect their industries.

While warnings had long been issued that allocations were too high in the first period, when verified 2005 emissions data were published in 2006, the over-allocation was made plain and shocked the market – carbon permit prices plummeted from over €15/ tonne to less that €5/tonne, and by the end of the period sank to less than €1. Permit prices for the 2008-12 period had already been trading in the previous period above €12, and through the first months of the new period rose quickly to stand in the mid €20's.

The strong price for the new period reflects the way lessons were taken from the over-allocation in the first period. To start with, having verified data in hand, it was no longer necessary to speculate about historic emissions of covered facilities. Nevertheless, in their 2008-12 National Allocation Plans, many Member States still gave generous allocations, often claiming the need to allow for strong activity growth. The Commission, however, approved all but four NAPs under the condition that total allocation levels were cut – the total cuts demanded by the Commission amounted to 10.5 % below what was requested. Perhaps most remarkable is the position of new Member States: for example, Latvia, Lithuania, Malta, and Slovakia collectively proposed caps that were fully 87% above 2005 verified emissions. The Commission cut these proposals back to a rise of 23%.

Table 1: NAP2 proposals as proposed, and as accepted, compared to NAP1 caps and 2005 emissions (in Mt CO_2)

Member State	*1st period cap*	*2005 verified emissions*	*Proposed cap 2008-2012*	*Cap allowed 2008-2012 (in relation to proposed)*	*Additional emissions in 2008-2012*	*JI/CDM limit 2008-2012 in %*
Austria	33.0	33.4	32.8	30.7 (93.6%)	0.35	10
Belgium	62.1	55.58	63.3	58.5 (92.4%)	5.0	8.4
Bulgaria	42.3	40.6	67.6	42.3 (62.6%)	n.a	12.55
Cyprus	5.7	5.1	7.12	5.48 (77%)	n.a.	10
Czech Rep.	97.6	82.5	101.9	86.8 (85.2%)	n.a.	10
Denmark	33.5	26.5	24.5	24.5 (100%)	0	17.01
Estonia	19	12.62	24.38	12.72 (52.2%)	0.31	0
Finland	45.5	33.1	39.6	37.6 (94.8%)	0.4	10
France	156.5	131.3	132.8	132.8 (100%)	5.1	13.5
Germany	499	474	482	453.1 (94%)	11.0	12
Greece	74.4	71.3	75.5	69.1 (91.5%)	n.a.	9
Hungary	31.3	26.0	30.7	26.9 (87.6%)	1.43	10
Ireland	22.3	22.4	22.6	22.3 (98.6%)	n.a.	10
Italy	223.1	225.5	209	195.8 (93.7%)	n.k.	14.99
Latvia	4.6	2.9	7.7	3.43 (44.5%)	n.a.	10
Lithuania	12.3	6.6	16.6	8.8 (53%)	0.05	20
Luxembourg	3.4	2.6	3.95	2.5 (63%)	n.a.	10
Malta	2.9	1.98	2.96	2.1 (71%)	n.a.	tbd
Netherlands	95.3	80.35	90.4	85.8 (94.9%)	4.0	10
Poland	239.1	203.1	284.6	208.5 (73.3%)	6.3	10
Portugal	38.9	36.4	35.9	34.8 (96.9%)	0.77	10
Romania	74.8	70.8	95.7	75.9 (79.3%)	n.a	10
Slovakia	30.5	25.2	41.3	30.9 (74.8%)	1.7	7
Slovenia	8.8	8.7	8.3	8.3 (100%)	n.a.	15.76
Spain	174.4	182.9	152.7	152.3 (99.7%)	6.7	ca. 20
Sweden	22.9	19.3	25.2	22.8 (90.5%)	2.0	10
UK	245.3	242.4	246.2	246.2 (100%)	9.5	8
SUM	**2298.5**	**2122.16**	**2325.34**	**2080.93 (89.5%)**	**54.61**	**-**

Source: European Commission, 2007[6]

Reaction to these cuts by the Commission has by and large been positive, particularly by carbon traders and environmentalists. Some governments, however, fought with their own industry and with the Commission over the figures. Germany's Economy Minister Michael Glos initially called the cuts "totally unacceptable", but Germany ultimately published a revised plan as demanded by the Commission.

It remains to be seen whether second period allocations will be low enough to spur innovation and emission reduction effort, which most people agree has not been the case in the first period[7]. Given what appears to be a global economic downturn currently underway, emissions may fall due to decreasing activity – or they may rise as gas prices skyrocket making coal attractive. At the moment though, the current trading price seems to indicate that real scarcity is expected and the ETS is on track to providing a solid price signal.

[6] European Commission, 2007, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1614&format=HTML&aged=1&language=EN&guiLanguage=en#fn12#fn12

[7] Not all people, however: the paper 'Over-allocation of abatement' by Danny Ellerman and Barbara Buchner (FEEM working paper 139.2006) indicates that real reductions may have partially contributed to the lower than expected verified emissions for 2005 which caused the price crash – but it simply isn't easy to distinguish effort from overallocation.

Proposals for the post-2012 ETS

In January 2008 the European Commission proposed legislation with a series of targets for the EU - to reduce greenhouse gas (GHG) emissions by 20% by 2020 (or 30 % if other industrialised countries join a post-Kyoto agreement), cut energy use by 20% below the baseline in 2020, and to increase the share of renewable energy in the overall primary energy supply to 20% by 2020. One of the essential elements in achieving the GHG reduction goals was a revised ETS proposal.

The proposed changes for the post-2012 period include:

- extending the scope of the ETS to all major industrial emitters;
- the inclusion of other greenhouse gases beside CO_2;
- allowances to be centrally allocated by the Commission (rather than through 27 national allocation plans); and
- increased auctioning.

Among these changes, centralized determination of the allocation by the Commission and auctioning of credits are the biggest shifts. Under the current proposal, the power sector would face full auctioning of permits from 2013, while auctioning in other sectors is to be phased in from 2013 with the aim of achieving full auctioning by 2020.

In addition, by 2010, the Commission is to identify sectors at risk of 'carbon leakage' (especially relocating due to competitive pressures). Based on this analysis and the state of international negotiations; in 2011 the Commission may propose measures to compensate for competitive pressures, either by increasing the free allocation of permits to identified sectors or requiring importers to buy permits to neutralise their competitive advantage. The latter is a highly controversial proposal that has already seen a formal rebuttal from the U.S. in comments made by officials during the World Economic Forum in Davos. It is, however, favoured by the French government, which holds the rotating presidency of the EU in the latter half of 2008.

The proposal is now in the hands of the European Parliament, after which it goes to the EU Council of Ministers. If it agrees with the Parliament's version, the legislation could be finalized by the end of the year. If not, the subsequent process (second reading, possible conciliation) may run the risk of pushing into the 2009 election season, which EU policymakers are currently hoping to avoid.

2.1.3 Voluntary Initiatives

The term 'voluntary initiatives' is a general way of referring to different voluntary instruments (e.g. voluntary agreements, programmes, standards, codes of conduct, guidelines, principles, statements, policies etc.) with different levels of compliance (e.g. a voluntary agreement in the Netherlands usually refers to a formal, negotiated, legally binding contract between government and industry, while in the United States is generally a non-binding voluntary programme in which companies decide individually whether and when they want to participate). Even within a country, the same term may be used in several ways. At the EU level, with a non legislative Communication (COM(2002)412) on environmental voluntary agreements (EA), the Commission (EC) outlined the necessary terms and conditions for setting out such agreements at the EU level.

So far however, only a few EA have been proposed on the European level. In addition to these, there are a number of programmes, technology platforms, codes of conduct, product labelling, environmental management certification which the EC supports in different ways. The Commission believes that voluntary agreements are particularly successful in the area of energy efficiency. Two Codes of Conduct, one for external power supplies and for digital TV services, were introduced, in which participation is voluntary and where energy efficiency guidelines are developed by the EC in close co-operation with industry. In other energy efficiency initiatives, in particular, the EC provides support to partners in the form of information resources and public recognition e.g. the European Motor Challenge Programme, which focuses on non residential users of compressed air, fan and pump systems; the GreenLight Programme, a partnership between non-residential electricity consumers and the EC to install energy-efficient lighting technologies in their facilities; the Green Building Programme, addressed to owners of non-residential buildings to realise cost-effective measures which enhance the energy efficiency of their buildings. Moreover, the EC participates as an observer in many technology platforms (under the Environmental Technology Action Plan (ETAP) framework, e.g. environmental technology platforms on hydrogen and fuel cells, photovoltaics, steel, water supply and sanitation platforms).

In the framework of the new integrated life-cycle approach to environmental product policy, the recent framework Directive on setting eco-design requirements for energy-using products (Directive 2002/35/EC) in principle gives priority over regulation to self-imposed measures by industry. Criteria for giving them preference over implementing regulatory measures are: openness of participation, added value, representativeness, quantified and staged objectives, involvement of civil society, monitoring and reporting, cost-effectiveness of administering a self-regulatory initiative, and sustainability. The implementation of this Directive has just begun, so it is too early to tell whether in practice self-regulation will prevail over binding standards.

Other voluntary schemes, supported and supervised in various degrees by the EC are: EMAS (Environmental Management Auditing System) certification for companies or services, the EU Eco-label for products and Energy Star label for office appliances (in partnership with the U.S.). For EMAS, Member States are responsible for the compliance of the operators, accrediting third parties verifiers and informing the Commission. As of 2007, 3,658 organizations and 5,380 sites in the EU were certified EMAS.

Some voluntary agreements at the EU level are considered successful by the Commission (e.g. industry self commitments on energy savings targets for washing machines, the Energy Star programme and Greenlight initiative). However, the failure of the ACEA voluntary agreement to deliver to CO_2 targets by car companies has recently come under the spotlight and, in response, the Commission has taken a tougher stance by proposing legislation setting binding targets. Generally, the debate in the EU is hot between defenders of industry self-regulation and consumers and environmental lobbyists who believe that legislation is still the best way of dealing with structural market failures. The Commission keeps a positive attitude towards this kind of instrument.

2.2 Energy Technologies

A criticism levelled at the United States over the past few years has been that, although research and development into energy technologies is quite well funded, without a carbon price or emissions limitations of some kind, there is little reason to move them from the lab to the market. Given the U.S. Government's underwhelming enthusiasm for climate policy, technology development there has come to be seen by many European observers as a form of smoke and mirrors to hide a lack of interest in tackling the climate issue.

Having positioned itself at the opposite pole to the climate scepticism of the U.S., Europe has approached the role of technology in climate policy with some caution, choosing instead to emphasize international target setting and economic instruments. But technology clearly has to play a major role in helping reach the goal of avoiding global warming beyond 2 degrees Celsius. European governments have to steer a course between laissez faire and picking winners, promoting enough of the right kind of technology with reasonable investment to get real results – no small order.

At EU level there are range of policies and programmes to promote clean technology, ranging from research (the multi-year framework programmes, of which the new 7th one is an example), to facilitating project and programmes which promote take-up (Intelligent Energy Europe) to policies (renewable energy targets). But it is at national level where the real action is – Germany and Spain's massive growth in wind energy, for example, is the result of guaranteed high tariffs paid by spreading the subsidy over the whole rate base. This is one example out of a variety of policies in place around the EU. Here, however, we focus on EU policy, in particular the result of the new set of policy documents proposed by the Commission in January 2008 (the 'Climate and Energy Package').

2.2.1 The Future of Fossil Fuel and Carbon Capture and Storage

Carbon Capture and Storage (CCS) is a greenhouse gas emissions mitigation approach consisting of capturing CO_2 from large sources (such as coal or gas fired power plants) transporting it to a storage site and injecting it into a suitable geological formation where it should remain indefinitely. Over the last few years CCS has become a much talked-about mitigation option, pressing the EU to consider how it would be regulated and commercialised.

The Second European Climate Change Programme (ECCP II), established by the Commission Communication "Winning the Battle Against Global Climate Change" of 9 February 2005 (COM(2005) 35 final) set up a Working Group on CCS. This Working Group published a report in June 2006 stressing the need for developing the policy and regulatory framework for CCS.

The Communication from the Commission "Sustainable power generation from fossil fuels: aiming for near-zero emissions from coal after 2020" (COM(2006) 843 final), adopted on 10 January 2007, set out the EU strategy with respect to CCS. Two major tasks for deployment of CCS were identified by the Commission:

- Developing an enabling legal framework and economic incentives for CCS within the EU; and
- Encouraging a network of demonstration plants across Europe and in key third

countries.

These tasks are addressed by a Directive proposed as part of the climate and energy package in January 2008. That proposed Directive outlines establishing a legal framework for CCS, covering site selection and exploration permits, and specifies detailed criteria for the requirements on site characterisation and risk assessment. In addition, it clarifies that it is up to Member States to determine the areas to be made available for storage and the conditions for site use. Although the Commission will provide an opinion on storage permits, permitting decisions will be reviewed by a national competent authority. Impact assessment and public consultation will be ensured under Directive 85/337/EEC on Environmental Impact Assessment which will apply to CO_2 storage sites. Furthermore, the Directive covers closure and post-closure obligations, including monitoring and reporting obligations, inspections, measures in case of irregularities and/or leakage and provision of a financial security.

The legislation does not *require* CCS in the future, though this idea had been floated in earlier drafts. The only inducement to do CCS is the proposal to count the CO_2 as not emitted for the purposes of facilities covered by the EU emissions trading system. This means they would not have to purchase emissions allowances, which translates to a financial advantage equal to the prevailing carbon price.

The main battle in the Parliament over CCS has therefore not been much about what is in the Directive, but what is not – either a requirement to use CCS, or a subsidy system higher than the value of the ETS credits, or a combination of both.

2.2.2 Renewable energy

The Commission anticipates that the EU will fall short of its established 'indicative' target of 12% renewables in energy supply by 2010 (as set out in Directive 2001/77/EC), although the contribution of renewables has increased by 55% since 1997. 10% of energy supply may be more likely. Uptake of biofuels has been very uneven, with only Germany and Sweden reaching Directive 2003/30/EC's 'reference value' of 2% of all fuels in 2005. The Directive's target of 5.75% cent biofuel in 2010 is unlikely to be achieved.

In proposing a new renewable energy Directive with targets for 2020, the Commission's reaction to the likelihood of missing the 2010 targets is interesting – rather than being too difficult, they state that the 12% target was 'insufficiently ambitious to drive change.' So it proposes a mandatory target be set at 20% for renewable energy's share of energy consumption in the EU by 2020 – covering electricity, heating and cooling, and transport. The proposed target sits directly between the targets previously suggested by the Council and European Parliament of 15% and 25% respectively.

What distinguishes this 20% target from the previous 12% effort is that it is to be binding rather than indicative. Flexibility is introduced in two ways - differentiated national targets based in part on a Member State's GDP, and secondly the opportunity to trade 'guarantees of origin', allowing those over-complying to sell certificates to those needing them. Secondary targets for specific uses of renewable energy would be left to Member States to decide.

Biofuels

As part of the new overall 20% renewables target, the Commission has also proposed that a minimum binding target of 10% of overall consumption of petrol and diesel in transport by 2020 come from renewable sources, conditional on certain environmental quality considerations.

Biofuels are regarded by the Commission as a key measure not only to reduce greenhouse gases from the problematic transport sector, but at least as important, to reduce the EU's heavy dependence on imported oil, the bulk of which is for transport, and much of which comes from politically unstable parts of the world.

Thus security of supply is a key driver, and with the possibility of oil prices remaining high more or less permanently, the balance of payments is also a significant issue. The Council concurred with the binding target of 10% of all road fuels by 2020, and even higher numbers were mooted in previous Commission papers associated with the Package. This is well beyond what is either technically possible through current or envisaged levels of blended fuels, and probably also beyond Europe's capacity to supply its own needs – at least if much of that demand will continue to be supplied through first generation food crop-based production.

The 2007 report accompanying the Commission's original Communication floating the idea of the biofuels target contains a fairly realistic assessment of the extent and variability of greenhouse gas savings from European biofuels, and notes, in particular, that biofuels grown on drained wetlands would have an extremely adverse greenhouse gas balance, and that clearance of rainforest should also be avoided. On the other hand, it concludes that to produce enough biofuel to substitute 14% of road fuels would have impacts in agriculture that would be 'manageable'.

This statement appears to be based on the "Review of economic and environmental data for the biofuels report" (SEC(2006)1721), which accompanies the review. There are a number of concerns with the analysis, which is based on a land use model that is not transparent, with results which appear counterintuitive. Problems include overlooking alternative uses of some possible fuels, the soil impacts of biofuel crops, the risk of growing biofuels on High Nature Value farmland, and a variety of environmental risks which are glossed over.

The Communication envisages a future switch to second generation production processes as these become available. These permit using woody crops and cellulosic residues to create ethanol, allowing higher yields on poorer land. It argues for an incentive system that encourages 'good' biofuels and discourages 'bad' ones, but is less than specific as to how this crucial distinction will be achieved.

2.2.3 Energy Efficiency

The Green Paper on Energy Efficiency, "Doing More with Less" (COM (2005) 265) identified over 20% estimated savings potential in EU annual primary energy consumption by 2020. The potential for energy saving in the EU per sector being: households (residential) 27%; tertiary 30%; transport 26%; manufacturing industry 25%. Energy efficiency and demand side management have been recognized by the EU as one the priority means to comply with the energy security of supply and climate change agendas.

There are a number of Directives in place in various sectors promoting energy efficiency targets and standards. The energy labelling of households equipment Directive (92/75/EEC), for example, has been regarded as a great success in moving the market towards more efficient appliances. The energy performance of buildings Directive (2002/91/EC) demands Member States set minimum standards for the energy performance of new buildings; the energy end-use efficiency and energy services Directive (2006/32/EC) requires Member States to adopt a national indicative energy savings target of 9 % within 9 years (by 2016) and to provide a series of three reports on their Energy Efficiency Action Plans to outline the progress achieved in their implementation; the Directive on the promotion of cogeneration (2004/8/EC) provides harmonisation of definitions of efficient CHP, establishes a framework for a scheme for a guaranty of origin of CHP electricity, and sets the general target of having electricity production from cogeneration increased to 18%.

The Commission recently proposed an energy efficiency Action Plan (COM(2006)545), endorsed by EU leaders at the Spring Council meeting (8-9 March 2007) which pushes the above measures forward and contains over 70 proposed measures targeting buildings, transport and manufacturing. In brief:

- **Labelling and eco-design requirements:** the Commission will legislate on appliances and other energy using equipment (i.e. motors, computers, street and office lighting, televisions, air conditioning and refrigeration) with particular focus on standby loss reduction. In particular, EU leaders called for increased energy efficiency requirements on office and street lighting to be adopted by 2008 and on incandescent lamps and other forms of lighting in private households by 2009.
- **Energy efficiency in buildings**: by 2009 the Commission will propose expanding the scope of the energy performance of buildings Directive (2002/91/EC), which will include the first EU-level minimum energy requirements for new and renovated buildings.
- **Microgeneration:** in 2007 the Commission will put forward a proposal for a new regulatory framework to promote the connection of decentralised generation and minimum efficiency requirements for new electricity, heating and cooling plants capacity lower than 20 MW.
- **Fuel efficiency of cars**: the Commission has proposed legislation to ensure the EU meets its target level for average new vehicle emissions of 120g CO_2 /km by 2012, which will not be achieved through the existing ACEA voluntary agreement.
- **Energy taxes:** in a review of the EU energy tax Directive in 2008 the Commission will 'consider the costs and benefits' of using tax credits as incentives for firms to produce and consumers to buy more energy efficient products.

The Commission estimates that implementing the plan should mean that energy consumption will be 20% lower by 2020 than it would have been without intervention. Commissioner Piebalgs said reaching the target would cut consumption by 390m tonnes of oil equivalent. This should translate into savings of €100 billion a year and a reduction of CO_2 emissions of 780m tonnes; double the 2012 EU Kyoto target. The extent to which the predicted benefits materialise will depend on what measures the Commission ultimately takes forward and the response of Member States. Tax harmonisation plans for example are a particularly contentious area, as reflected in Commissioner Piebalgs' reassurances that 'this is not some back door to

unify EU taxation policy'. Resistance from key industries, such as the German car-making lobby, and changing consumer behaviour will also be potential barriers to success.

In the same spirit, the Commission announced it would table a proposal for an international agreement on energy efficiency which would bring the OECD and key developing countries (such as China, India and Brazil) together. Ideally, this would entail the banning of products failing to meet minimum standards and agreeing common approaches to saving energy.

2.2.4 Nuclear

Nuclear energy is unique in European energy policy in that there is policy competence in the area, in fact there is a whole treaty dedicated to it (Euratom). European NGOs call for the reform of the Euratom Treaty, arguing that it conflicts with energy market liberalization and environmental policy, as neither environmental liability (e.g. in case of a nuclear accident or fuel incident) nor cost internalisation are enforced for nuclear energy providers. For example, in Germany, the liability is limited to €2.5 billion, which is about 0.1% of the expected damage if a nuclear accident occurs (EEB, 2004). The nuclear industry also benefits from one-off payments from Member States and allowances for using decommissioning funds for operation. Presently, only the UK declared that it would be up to the private sector to initiate, fund, construct and operate new power plants. The latest EU R&D programme (7FP) allocates €1,947 million to research into fusion energy and €287 million for nuclear fission and radiation protection. €517 million are reserved for nuclear activities of the EU Joint Research Centre.

The divergent position of Member States toward nuclear power continues to cause controversy within the EU. Several Member States have increased their nuclear capacity since 1995, mainly through expansions of existing reactors; also, four new plants were built in the Czech Republic and Slovakia between 1998 and 2003. These augmentations were partly offset by decommissioning or capacity reductions in Slovenia, the UK, Germany, Sweden and the Netherlands. In all, the EU-25's nuclear capacity grew by 5% (6.1 GW) between 1995 and 2003; electricity production from nuclear grew by 26% between 1990 and 2003. The bulk of nuclear power production came from France, whose output in 2003 was more than 43% of the EU- 25's total, along with Germany (17%) and the UK (9%).

The Commission's policy position about nuclear energy is generally cautious given the sensitivity of the issue in the Member States. A Communication which addresses nuclear and was published as part of the energy package (COM(2006)844), focuses on those areas which are unlikely to ruffle too many feathers: safety and security. However, it also makes it clear that "nuclear energy generation has a role to play in security of supply, competitiveness and sustainability" and attempts to raise the urgency for action on maintaining nuclear capacity, noting that the average age of most plants in Europe is in the 20 to 30 year old range. There is not much time to consider new construction if the EU wishes to maintain production at current levels.

The Council of EU leaders on 8-9 March 2007 gave in to the pressure coming from France and the Czech Republic agreeing on the role of nuclear in the fight against climate change and stating that "differentiated national overall targets should be derived with due regard to a fair and adequate allocation taking account of different

national starting points and potentials, including the existing level of renewable energies and energy mix". The wording 'energy mix' is primarily coded language referring to nuclear, raising the possibility that nuclear capacity will be taken into account when considering renewables targets. On the other hand, there is opposition to nuclear from other Members of the EU: environment Ministers of Ireland, Iceland, Norway, and Austria met in Dublin on 26 March 2007 to sign a Declaration, in which they expressed their concern about atomic energy as a solution to climate change. Germany, Belgium and Sweden have commitments to phase out nuclear energy over time. Also, a recent (March 2007) *Eurobarometer* opinion survey shows that 61% of the overall EU population thinks that the share of nuclear energy should be decreased, due to concerns such as nuclear waste and the danger of accidents[8].

2.3 Conclusions

The headline outcome of the European Council in March 2007, reflected in the Commission's proposed climate and energy package in January 2008, was a commitment to a 30% reduction in emissions by 2020 if also agreed among other developed countries, with developing countries playing in accordance with their abilities. If this is not achieved through a multilateral agreement, then the EU will retain a 20% reduction target. In addition, the binding renewable energy target of 20% by 2020 and 10% biofuels in the transport sector by that year have also been proposed.

These efforts were placed in the context of a complex policy environment – energy liberalisation still ongoing; security of supply concerns and energy prices high in the minds of policymakers; geopolitical tensions around energy on Europe's borders and in the Middle East; and an ongoing complex UN negotiation around future climate targets. The EU has made strides to address internal and external climate, energy, and technology issues with its recent legislation, but challenges are evident in the discussions before the Parliament and Council. Among these probably the most evident are:

- **20% vs. 30% targets**: the EU's commitment to a 20% cut would turn to 30% in the context of an international agreement – some argue it should be 30% to begin with, as the science says this is necessary – while at the same time there is discussion around what constitutes the 'trigger' to move to 30%: signing the treaty, ratification of the treaty, etc.
- **Carbon leakage and competitiveness in the EU ETS**: industries where energy is a high proportion of their costs, and which face competition from countries outside the ETS, could run the risk of losing market share – while the proposed ETS revision addresses this issue, the details are left to further consideration at a later date. Industry wants this to be sooner, and is concerned about the terms.
- **Use of auctioning revenue**: the EU has recommended that Member States earmark proportions of their auctioning revenue for different ends – even this rather hands-off approach is seen by some Member States as too intrusive. Without direct access to the revenue, but also without the authority to say what

[8] CEC, 2008 Attitudes of European Citizens Towards the Environment, Eurobarometer Special Report 295 Wave 68.2TNS Opinion and Social, European Commission, Brussels

Member States should to with it, the EU is unable to count on the use of that revenue towards any of the energy policy goals it sets out, such as technological innovation.

- **Renewable energy targets**: some feel these are too high for their own country, with France and the UK standing out in their complaints. Arguments that CCS or nuclear might somehow either earn a lower target to begin with or count towards the targets have not been well received by others.
- **Doubts about biofuels sustainability**: biofuels have caused great anxiety since the 10% target came relatively out of the blue – many different groups have argued either that criteria to ensure sustainability are insufficient, and/or that the target is too high to be met with biofuels that are truly sustainable.

Other issues are on the table, but these are among the most discussed. Beyond that, the single greatest issue is timing – with the ambition to see these policies agreed before the end of 2008, the EU institutions are attempting to accomplish what rarely succeeds – agreement on a range of complex and controversial legislation after one reading by the Parliament. Even simpler efforts often have to be sent back for a second round, an eventuality that would likely push this package past the date of the European Parliament elections scheduled in June 2009 and the formation of a new Commission, which could mean starting the process all over again.

3 U.S. POLICIES ON CLIMATE CHANGE AND ENERGY: BACKGROUND AND OVERVIEW

April 2007 / August 2008

Principal Author:
Melanie Nakagawa – Attorney, International Program, NRDC
Contributors:
S. Jacob Scherr – Director, International Program, NRDC
George Peridas – Science Fellow, Climate Centre, NRDC
Geoff Fettus – Senior Attorney, Nuclear Program, NRDC
Jim Presswood – Energy Advocate, Energy Program, NRDC
Andrew Elligers – International Program, NRDC

3.1 Introduction

The discussion and debate in the U.S. on climate and energy issues is changing very fast. In recent years there has arisen an increased recognition by the public in the United States of climate change and the need for action. While the Federal government is only now starting to move to develop comprehensive climate change policies, there has been significant progress at the regional, state and local levels. The 110th Congress, which began January 2007, has stepped up consideration of climate change; and a number of bills establishing a cap-and-trade system for greenhouse gas emissions have been introduced.

There has also been increased consideration of energy technologies which would address climate change. In January 2007, President Bush stated, "America is on the verge of technological breakthroughs that will enable us to live our lives less dependent on oil….they will help us to confront the serious challenge of global climate change."[9] The Administration appears to be more focused on carbon capture and sequestration and nuclear power. While Federal support for renewable energy lags, there has been progress again at the regional, state, and local level where meaningful support for renewable energy is more commonly found.

3.2 Climate Policies

3.2.1 Federal vs. State

The political shift from the 109th to the 110th Congress has moved what was previously a state level discussion on climate change to a Federal level debate with a real opportunity for effective Federal action to reduce U.S. greenhouse gas emissions by enacting caps on carbon.

While internationally the U.S. remains outside key climate negotiations such as the Kyoto Protocol, this U.S. position may be changing. Although difficult to gauge

[9] President George W. Bush on January 23, 2007, cited in "Open Letter on the President's Position on Climate Change," February 7, 2007, http://www.whitehouse.gov/news/releases/2007/02/20070207-5.html.

whether the next year will usher in a new international climate treaty where the U.S. is a participant, Congress continues to spearhead calls for international participation. In 2008, the Senate discussed a resolution calling for U.S. participation in negotiations under the United Nations Framework Convention on Climate Change leading to agreements that will commit all nations which are major emitters of greenhouse gases to significant long term reductions[10].

This section examines the progress on climate policies and initiatives at a Federal, regional, and state level. At the Federal level, a priority is being placed on establishing a system of cap-and-trade. In conjunction with this effort, numerous policy tools are also being discussed to help drive the emissions reduction required under such a system. Some of these policies include promoting cleaner fuels in the transportation sector, energy efficiency, performance standards, and incentives for renewable energy which will be addressed throughout this paper.

3.2.2 Cap-and-Trade Systems

Emissions trading, or cap-and-trade systems, require a series of climate policies aimed at reducing the release of harmful gases including those that contribute to global climate change. Within a cap-and-trade system, the participants involved, such as power plants, are given a cap on their emissions. Permits, allowances, or credits are then allocated to these participants, which allow them to pollute a certain amount. In the U.S., cap-and-trade systems are favourable policy mechanisms that allow the free-market to reduce greenhouse gas emissions in a way that is flexible for those companies or power plants involved. This flexible, market-based scheme permits those participants who emit less to sell their credits and profit from those who must buy permits in order to pollute more[11].

In some cap and trade schemes **offsets**, which are emission reductions generated by projects in sectors that are not capped, can be used in place of allowances for regulatory compliance. In the U.S. debate is surfacing over the use of offsets as a supplementary compliance mechanism in some types of cap-and-trade systems. While, offsets can provide an incentive for broader emission reductions, help spur innovation, and may reduce compliance cost, there are concerns regarding how to ensure that they produce actual emission reductions. With offsets, there is a challenge in selecting the appropriate criteria and conditions for them because often the impact of offsets cannot be measured directly, but must be estimated based on hypothetical approximations. Similarly, heavy reliance on offsets could create perverse incentives for developing countries to build carbon intensive plants in order to create a market for capital flows to improve them. Given a lack of clear guidelines for how to distribute these offsets coupled with a heavy reliance on them, could allow a rich developed country, such as the U.S., to make no changes to its' domestic emissions path. In the U.S., more thought is needed on the topic of offsets, particularly in light of how to ensure actual overall emission reductions where a cap on emissions is enforced. However, the topic of cap-and-trade as it could be applied in Federal

[10] For example, the Biden-Lugar Resolution (S.Res.30) may be one mechanism to catalyze US involvement in international negotiations, if introduced and passed.

[11] "Cap-and-Trade Systems", Catalyst Volume 4 Number 1, 2005, Union of Concerned Scientists, http://www.ucsusa.org/publications/catalyst/page.jsp?itemID=27226959.

legislation is where the bulk of the Federal climate and energy dialogue is taking place.

The 110th Congress introduced six bills targeting climate reductions through a cap within its' first three months and followed up with a couple more later in 2008. The importance of these bills and the others to follow is that they lay the foundation for consensus building while also marking the starting point for where the next Congress and next U.S. President will begin, irrespective of whether a bill passed in the 110th. The introduced bills were[12]:

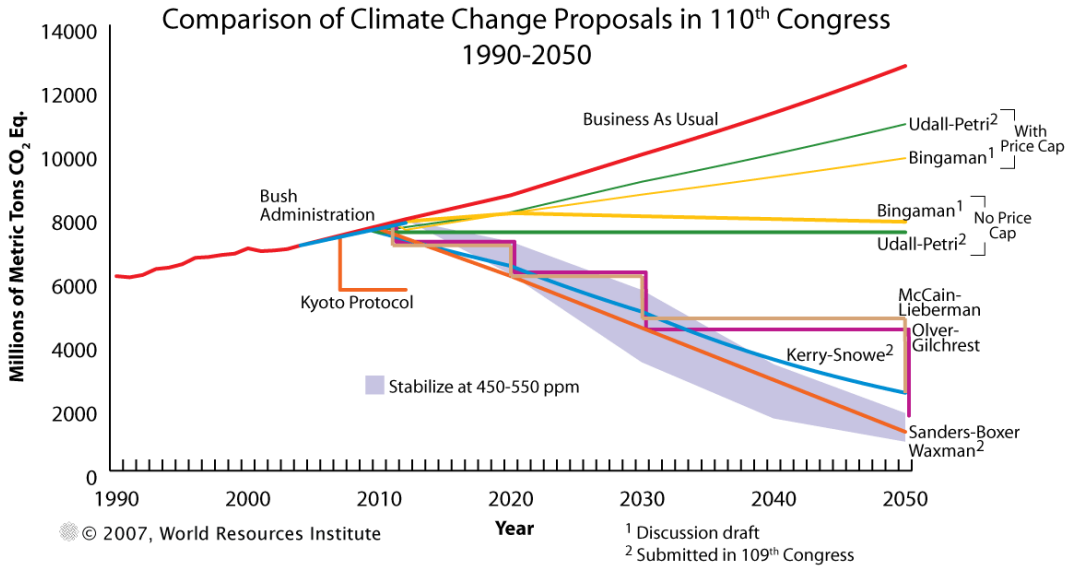
- **Global Warming Pollution Reduction Act**: Sanders-Boxer (S. 309)
  Multi-sector; Declining cap on emissions with a goal of a 14% reduction by 2020 and 83% reduction by 2050.
- **Electric Utility Cap and Trade**: Feinstein (S. 317)
  Electric sector; Declining cap on emissions with a goal of 8% reduction by 2020 and 42% reduction by 2050 (unless adjusted by EPA).
- **Climate Stewardship Act**: Olver-Gilchrest (H.R. 620)
  Multi-sector; Declining cap on emissions with a goal of a 11% reduction by 2020 and 56% reduction by 2050.
- **Climate Stewardship and Innovation Act**: Lieberman-McCain (S. 280)
  Multi-sector; Declining cap on emissions with a goal of a 13% reduction by 2020 and 50% reduction by 2050.
- **Global Warming Reduction Act**: Kerry-Snowe (S. 485)
  Multi-sector; Declining cap on emissions with a goal of a 14% reduction by 2020 and 67% reduction by 2050.
- **Safe Climate Act**: Waxman (H.R. 1590)
  Multi-sector; Declining cap on emissions with a goal of a 14% reduction by 2020 and 83% reduction by 2050.
- **Climate Security Act:** Lieberman-Warner (S. 2191)[13] and **Climate Security Act Substitute Amendment:** Boxer-Lieberman-Warner Substitute (S. 3036)[14]
  Multi-sector; Starting from 2005 levels, cuts covered sources' emissions by 4% in 2012, 19% in 2020, and 71% in 2050.

While these bills are seemingly similar, the chart below depicts the level of variation among some them in terms of the emission reductions they hope to achieve.

[12] This information can be found in the NRDC Fact Sheet on Global Warming Legislation: http://www.nrdc.org/legislation/factsheets/leg_07032601A.pdf; for more detailed analysis see NRDC's index on Global Warming: http://www.nrdc.org/globalWarming/leg/leginx.asp.

[13] NRDC Factsheet on Climate Security Act December 2007, http://www.e2.org/ext/doc/LiebermanWarnerCSA_Factsheet_Dec%202007.pdf

[14] NRDC Factsheet on Climate Security Act Substitute, May 2008, http://www.nrdc.org/legislation/factsheets/leg_07121101A.pdf



At the regional level, the **Regional Greenhouse Gas Initiative**[15] is a multi-state effort to discuss the creation of a regional cap-and-trade program among states in the Northeast and Mid-Atlantic portions of the U.S.. It is the first mandatory CO_2 emissions trading program in U.S. history. Initiated by New York Governor George E. Pataki, the program includes three phases as developed by the "RGGI Staff Working Group" and described in their action plan. The first phase, a learning phase, includes discussion of previous efforts by individual states and of the legal mechanisms required to achieve further goals. The second phase, or first development phase, covers CO_2 emissions trading for the regional power sector. As planned, the second development phase will explore offset mechanisms to reduce greenhouse gas emissions outside of the electricity sector. Current participants include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The District of Columbia, Pennsylvania, the Eastern Canadian Provinces, New Brunswick, Ontario, and Quebec act as observers.

As a supportive regional network, RGGI creates a cap-and-trade program at the regional level that does not conflict with pre-existing emissions policies at the national, state and local level. It is a cautious program without a strict standard or timetable on emissions cuts for the region as a whole. It is also a flexible program that allows new participants to join the initiative within their own timetable and allows individual states to achieve greater emission reductions with an increase in options for compliance and it supports a market for cleaner and more efficient energy technologies.

In February 2007, Governor Bill Richardson and the governors of Arizona, California, Oregon and Washington announced the **Western Regional Climate Action Initiative**[16]. Richardson and Governors Chris Gregoire, Ted Kulongoski, Janet Napolitano and Arnold Schwarzenegger signed an agreement that directs their respective states to develop a regional target for reducing greenhouse gases and a market-based program, such as a load-based cap and trade program, to reach the

[15] Regional Greenhouse Gas Initiative Website: www.rggi.org.

[16] http://governor.oregon.gov/Gov/pdf/letters/022607NGA.pdf.

target. The five states agreed to participate in a multi-state registry to track and manage greenhouse gas emissions in their region. The initiative builds on existing greenhouse reduction efforts in the individual states as well as two existing regional efforts, the West Coast Global Warming Initiative formed in 2003 by California, Oregon and Washington and the Southwest Climate Change Initiative launched in 2006 by Arizona and New Mexico.

At a state level, California is again stepping up as an environmental leader in U.S. As the 12th largest emitter of global warming pollution in the world, California was the first state to limit global warming pollution from cars in 2002. To this end, California enacted regulations requiring passenger cars and light trucks (beginning with model year 2009) to have lower emissions of CO_2 and other global warming pollutants[17]. California's regulations are expected to reduce GHG emissions from new passenger vehicles by approximately 30% by 2016, saving consumers more than $4 billion by 2020[18]. Eleven other states[19] and Canada—more than one-third of the North American car market—have followed California's lead and adopted California's standards[20]. However, this legislative effort by California, and thus under U.S. law those of the other states as well, has been halted by the U.S. Environmental Protection Agency's refusal to grant California permission to adopt motor vehicle standards that are stricter than federal requirements[21]. In response, California has filed a petition with the U.S. Ninth Circuit Court of Appeals challenging the EPA's denial[22].

While other states have pledged to curb their global warming emissions, in September 2006, California's **Global Warming Solutions Act[23]** became the first progressive and stringent action setting concrete limits on state-wide global warming pollution. California's new law requires that the state's global warming emissions be reduced to 1990 levels by 2020. The reduction will be accomplished through an enforceable state-wide cap on global warming emissions that will be phased in starting in 2012, with a goal of cutting the state's pollution 25% by 2020. This law requires all sectors to make substantial reductions. Because California currently sends $30 billion out of

---

17 AB 1493 (Pavley, 2002) directed CARB to establish motor vehicle standards to limit GHG emissions from passenger cars and light trucks. CARB unanimously approved their standards in September 2004.

18 As compared to business as usual. California Environmental Protection Agency Air Resources Board, Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, August 6, 2004, p. 39. California Air Resources Board, Addendum Presenting and Describing Revisions to: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, September 10, 2004.

19 Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Washington

20 NRDC Global Warming, "California Signs Landmark Global Warming Legislation," (Last revised November 7, 2006), http://www.nrdc.org/globalWarming/ncalifornia.asp

21 State of California, Office of the Attorney General, "California's Motor Vehicle Global Warming Regulations"

22 Id.

23 Assembly Bill No. 32, http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf

the state every year to buy fossil fuels, these pollution limits are expected to curb spending on imported energy and spur the development of clean technology.

On January 18, 2007, as a first step to achieve the reductions set out in the new law, the Governor of California signed an Executive Order establishing the world's first greenhouse gas standard for transportation fuels - the **Low Carbon Fuel Standard**[24]. The Executive Order states, a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020 because greenhouse gas emissions "pose a serious threat to the health of California's citizens and the quality of the environment." At the signing of the Order, Governor Schwarzenegger said,

> "…like the rest of the nation, California relies excessively on oil to meet its transportation needs. . . In fact, 96% of our transportation fuel is oil. And that means our transportation fuels are responsible for more than 40% of California's greenhouse gas emissions. Reducing the carbon content of transportation fuels sold in California by just 10 % means we will replace 20% of our gasoline consumption with lower-carbon fuels, more than triple the size of the state's renewable fuels market, and add seven million alternative fuel vehicles to our roads".[25]

3.2.3 Other Approaches

There are other approaches to climate and energy policy in the U.S. that are aimed at emission reductions. These include calls to action from non-traditional allies and voluntary carbon markets.

The **Chicago Climate Exchange (CCX)**[26] is the world's first voluntary, rules-based greenhouse gas reduction and trading system and North America's only program. CCX members who want to participate must agree to reduce their greenhouse gas emissions by a certain % below their calculated baseline each year beginning in 2003. These goals are to be accomplished through eligible emission offset projects recorded in the CCX Registry, like landfill and agricultural methane, sequestration in soils, and forest biomass. CCX members include private companies, manufacturing corporations, municipalities, and universities. Although the aim of this system is emissions reduction, critics of the CCX question whether this market will result in real reductions or if members could be in compliance without making actual reductions. Similarly, CCX is criticized for its ability to be a private enterprise for the public good where there lacks public oversight or Federal legislation providing oversight criteria or regulations found in other types of markets, e.g. the New York Stock Exchange.

---

[24] Executive Order S-01-07 by the Governor of the State of California, http://gov.ca.gov/executive-order/5172/

25 Office of the Governor, Press Release, Gov. Schwarzenegger Signs Executive Order Establishing World's First Low Carbon Standard for Transportation Fuels (January 18, 2007) http://gov.ca.gov/index.php?/press-release/5174/

[26] Chicago Climate Exchange, www.chicagoclimatex.com.

In January 2007, U.S.-based businesses and environmental groups in alliance called on the Federal government to quickly enact strong legislation to achieve significant reductions in greenhouse gas emissions. This unique cooperative effort, called the **United States Climate Action Partnership (USCAP)**, consists of 26 market leaders including Alcoa, American International Group, BP America, Caterpillar, Duke Energy, DuPont, FPL Group, General Electric, PG&E, and Shell, along with five leading non-governmental organizations -- Environmental Defense, National Wildlife Foundation, Natural Resources Defense Council, Pew Centre on Global Climate Change, and World Resources Institute[27]. USCAP has laid out principles and recommendations in a solutions-based report, A Call for Action, a blueprint for a mandatory economy-wide, market-driven approach to climate protection[28]. USCAP urges policy makers to enact a policy framework for mandatory reductions of GHG emissions from major emitting sectors, including large stationary sources and transportation, and energy use in commercial and residential buildings. The cornerstone of this approach would be a cap-and-trade program and recommends Congress to provide leadership and establish short- and mid-term emission reduction targets; a national program to accelerate technology research, development and deployment; and approaches to encourage action by other countries, including those in the developing world.

U.S. companies are increasingly aware and in some cases active in addressing greenhouse gas emission reductions. One such mechanism is the **Clean Development Mechanism (CDM)** as a way for these companies to secure a supply of carbon credits for their own compliance requirements. For example, in 2006 AES Corporation, a global power company which has generation facilities around the world announced plans to invest approximately $1 billion over three years to expand the company's alternative energy business and bring to market new projects and technologies to reduce or offset greenhouse gas emissions under the CDM. The CDM is evolving as a way for companies who are or want to be more diversified. CDM is seen as an opportunity to make returns on capital that they put in today. There is some frustration with the current CDM process given that it is highly bureaucratic and needs reforms, e.g. reforms to speed up the process, navigate through the bureaucracy, adjustments to the scope of the CDM to incorporate projects not currently eligible for CDM, such as gas flaring. The U.S., has an opportunity to make a more effective CDM, therefore companies are beginning to see merit in participating now to learn by doing as others look to develop a new mechanism or streamline the CDM.

3.3 Energy Technologies

In the U.S. there is a significant emphasis placed on technology development as a way to address climate change and reduce U.S. dependence on oil. In some areas, U.S. energy policies are overshadowed by policies that encourage the research and development of new technologies. These technologies include carbon capture and sequestration, bioenergy, and nuclear and are coupled with measures to promote investments in renewable sources and energy efficiency. Investments in renewable energy and a renewable market that would lead to real reductions in U.S. consumption of fossil fuels are happening at a regional, state, and local level with more marginal

[27] USCAP webpage, http://www.us-cap.org/about/index.asp.

[28] United States Climate Action Partnership, A Call for Action, http://www.us-cap.org/USCAPCallForAction.pdf.

efforts at the Federal level. This section highlights these technologies and the policy mechanisms which are directed at promoting them.

3.3.1 Carbon Capture and Storage (CCS)

In the U.S. there is still a strong political and economic drive for fossil fuel use and coal in particular. Therefore, systems that capture and safely dispose of carbon dioxide are emerging quickly as a feasible option for decarbonising these fuels and combating climate change. Carbon capture and sequestration (CCS) aims to sequester CO_2 in geological formations for at least hundreds or thousands of years, and can reduce the greenhouse impact from continued use of fossil fuels to the atmosphere. Several aspects of CCS are currently being explored and evaluated on international, federal, and regional levels in the U.S. with excellent results. Deployment of the technology has been slow, mainly because of economic, policy and regulatory reasons, as opposed to technological. At present, the U.S. lacks the necessary policies, incentives and mechanisms to make greenhouse gas emissions reduction a priority and spread the cost of CCS projects, ensuring that they develop at a sufficient pace to curb growing emissions. Funding for CCS is a concern. There is the potential for acceleration of CCS technology through potential funding available in the Energy Independence and Security Act of 2007 and Department of Energy's budget for research and development. There are also legislative measures being given serious consideration as CCS has become a topic of discussion as climate change legislation proposals move forward in 2007.

As part of the CCS conversation in the U.S., the issue of enhanced oil recovery (EOR) is also discussed. The U.S. is a world leader in EOR engaging in this process for decades. As a result of years of experience in EOR and the CO_2 injection involved with this technology, the U.S. has developed an extensive pipeline network to transport CO_2, a precursor technology and infrastructure development related CCS techniques.

At a Federal level, research and development efforts are coordinated and funded by DOE. One such initiative, **Carbon Sequestration Regional Partnerships (CSRP)**[29], announced in November 2002, creates a national network of public-private sector partnerships aimed at examining the political, economic, and social viability of carbon storage as a mode of mitigating CO_2 levels in different areas of the country. The selected seven regional partnerships are the West Coast Regional Carbon Sequestration Partnership, Southwest Regional Partnership for Carbon Sequestration, Big Sky Regional Carbon Sequestration Partnership, Plains CO_2 Reduction Partnership, Midwest (Illinois Basin) Geologic Sequestration Consortium; Southeast Regional Carbon Sequestration Partnership, and Midwest Regional Carbon Sequestration Partnership.

3.3.2 Biofuels

Biofuels has emerged as a popular and rapidly growing field in the U.S. with significant potential to advance U.S. environmental and energy security goals provided adequate guidelines are implemented. As a relatively new technology,

[29] Carbon Sequestration Regional Partnerships, http://www.fossil.energy.gov/programs/sequestration/partnerships/index.html

reactions and responses to the concept of biofuels are largely positive. There are a range of reasons for the support biofuels receive ranging from energy security and climate change to economic potential and the benefit to U.S. farmers. In particular, ethanol is generally considered a renewable, non-toxic and environmentally-friendly energy source so long as the appropriate guidelines and regulations are put in place.

However, some debate concerns the production process in that it may take more energy to turn crops such as soybeans, corn, and sunflowers into ethanol or biodiesel than is generated by the fuel; how much biofuels can be produced from local sources; and whether development of this industry will compromise domestic food production. Similarly, without adequate guidelines, biofuels production poses a threat to environment, public health and climate and there is concern with the efficiency and large-scale implementation of this technology.

Notwithstanding these concerns, and evidenced by Congressional actions, biofuels have received overwhelming support on the national stage. Excitement about biofuels has also emerged from the White House where President Bush's 2007 State of the Union address include a call to, "...expand the use of clean diesel vehicles and biodiesel fuel. We must continue investing in new methods of producing ethanol—using everything from wood chips to grasses, to agricultural wastes"[30].

At a Federal level, the Energy Independence and Security Act of 2007 addresses biofuels policy through the **Renewable Fuel Standard (RFS)**. The RFS requires that gasoline sold or introduced into commerce in the U.S., on an annual average basis, contain 15.2 billion gallons of fuel produced from renewable biomass, up from the current requirement of 4.7 billion gallons, and increasing to 36 billion gallons by 2022. The RFS further requires such gasoline to contain 500 million gallons of cellulosic biofuel by 2012, increasing to 16 billion gallons per year by 2022. Support for biofuels is also apparent in the 110th Congress with the introduction of bills to increase and encourage the production of fuels such as biodiesel and ethanol[31].

At a regional scale, there are partnerships like the **Governors' Ethanol Coalition**, consisting of 36 member states plus international representatives from Brazil, Quebec, Canada, Mexico, Queensland, Australia, Sweden and Thailand who share the common goal of increasing ethanol production[32]. The Coalition seeks to increase ethanol production from corn or other domestic, renewable resources using sustainable agricultural methods and encourages its use in environmentally acceptable applications[33]. In 2005, the Coalition issued "Ethanol from Biomass: America's 21st

---

[30] President George W. Bush, "State of the Union 2007", http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html.

[31] "American Fuels Act of 2007", http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:s133is.txt.pdf; "Biofuels Security Act of 2007", requires the annual production of 60 billion gallons of biodiesel and ethanol by 2030, http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:s23is.txt.pdf; similarly to encourage the growth of bioenergy, Senate Agriculture Committee Chairman Tom Harkin (D-Iowa) has expressed a desire to create $20 billion fund for farms and crops that contribute to the growth of biofuels, "Harkin Highlights Benefits of Biobased Products," http://harkin.senate.gov/currentevent/biobased.cfm (last accessed May 2007).

[32] Governors' Ethanol Coalition, http://www.ethanol-gec.org/.

[33] Governors' Ethanol Coalition Goals, http://www.ethanol-gec.org/aboutus/goals.htm.

Century Transportation Fuel"[34] which called for the creation of three national policy recommendations: a renewable fuels standard with a cellulosic component; increased ethanol research and development; and incentives for cellulosic derived ethanol production. The three recommendations were incorporated into the Energy Policy Act of 2005.

Support for biofuels is also strong among the states. A report by the **National Biodiesel Board** provides highlights of 53 pieces of biodiesel or biofuel-related legislation passed at the state level through September 30, 2006. Policy mechanisms utilized within these laws include incentives, use requirements, point of taxation clarification, authorisation of studies, state fleet use requirements, biodiesel promotion, and numerous others[35]. Presently, the policy focus in California is a low carbon fuel standard to encourage the use of alternative vehicles and non-traditional fuels.

U.S. cities are also encouraging the use of biofuels. To meet the challenging requirements of the U.S. **Mayors' Climate Protection Agreement**[36], mayors are promoting alternatives to fossil fuels. For instance, the city of Seattle is increasing its use of biofuels to address climate change[37] and Mayor Chavez of Albuquerque, New Mexico initiated the use of biodiesel in the City fleet as well as ethanol blending requirements at fuel stations[38]. Similarly, the city of Cedar Rapids Iowa is beginning to use biodiesel to fuel its buses[39].

3.3.3 Renewable Sources

Environmental groups place a strong emphasis on renewable energy as a mode of decreasing the human impact on the environment, especially with respect to climate change. Although renewable energy was once considered expensive and technologically impractical, many renewable sources like solar and wind have become cost-competitive with technical advances and increasing consumer interest. However, some forms of renewable energy generation such as tidal and wave power continues to be surrounded by some scepticism and have yet to receive as much attention as other sources. In the U.S., many criticize the Federal government for its lack of adequate resources allocated towards the development of renewable energy. As Dan Arvizu, Director of the U.S. Department of Energy's Colorado-based National Renewable Energy Laboratory, said in response to a question about

---

[34] America's 21st Century Transportation Fuel: Recommendations (April 2005), http://www.ethanol-gec.org/GEC_biomass_rept_4-12-05.pdf.

[35] "2006 State Legislation Highlights", National Biodiesel Board, http://www.biodiesel.org/resources/PR_supporting_docs/20060926_State_Legislation-Current.pdf.

[36] Office of the Mayor, Seattle, US Mayors Climate Protection Agreement, www.seattle.gov/mayor/climate.

[37] Seattle Climate Action Plan, September 2006, http://www.seattle.gov/climate/docs/SeaCAP_plan.pdf.

[38] "Alternative Fuels", City of Albuquerque, http://www.cabq.gov/sustainability/green-goals/sustainability/green-goals/alternative-fuels/alternative-fuels.

[39] "Five Seasons Transportation and Parking", US Department of Energy, http://www.eere.energy.gov/afdc/progs/new_success_ddown.cgi?38.

government purchasing to stimulate the renewable market, "A few things are happening, but at the federal level, embarrassingly few things. . ."[40].

The U.S. Federal government has attempted to facilitate the expansion of renewable energy sources through a provision in the **Energy Policy Act of 2005**, which provides revised renewable energy purchase goals. Although Federal initiatives to encourage the use of renewable sources have been infrequent, the Senate version of the 2005 Act included a **renewable portfolio standards** amendment which would insure 10% of the U.S.'s electricity from clean, renewable sources by 2020. Although the renewable portfolio standards amendment did not make it into the final version of the bill, the 110th Congress' increasing support for these standards may signal a shift towards more adequate measures to promote renewable energy at the Federal level.

Despite the current lack of support within the Federal government for promoting renewable energy generation, individual states and cities are taking action. Numerous states have created a range of modest to encouraging incentives for the use of renewable energy sources such as wind, solar and biomass. In particular, state legislation includes inducements of tax credits, loans, grants, and other mechanisms. Typical programs cover a wide range of renewable measures and technologies that are commonly grouped together in a single property tax exemption on equipment or tax credit on new installations[41]. In California, the **Energy Action Plan** prioritizes renewable energy generation in California's energy sector. In the city of Seattle, starting in 2001, Seattle adopted a resolution that committed the local public utility, City Light, to becoming a zero net greenhouse gas emitter. As a result, the utility agreed over the next ten years to invest in non-hydro renewable energy sources for electricity production[42].

3.3.4 Energy Efficiency

Energy efficiency efforts in the U.S. target a variety of sectors, notably efficiency in vehicles, transportation fuels, buildings, homes and appliances. To promote energy efficiency, these efforts are typically discussed with complementary policy measures to incentivise efficiency, such as performance standards and tax incentives.

The transportation sector in the U.S. presents a unique challenge and opportunity to integrate climate and energy issues. The call for energy security and a cap and trade system has spurred interest in vehicle standards, fuel sources, and performance standards that help end-users use less oil as a necessary measure to produce meaningful reductions in oil use and greenhouse gas emissions. One result of such interest is the 110th Congress, in the Energy Independence and Security Act of 2007, mandating Corporate Average Fuel Economy (CAFE) standards of 35 miles per

---

[40] Harvard University Gazette, February 8, 2007, http://www.news.harvard.edu/gazette/2007/02.08/09-energy.html.

[41] Further detail regarding incentives for renewable energy in specific states may be found through the Database for State Incentives for Renewable Energy, http://www.dsireusa.org/.

[42] "Low Carbon leader: Cities Oct. 2005," The Climate Group.

gallon by 2020 for total passenger and non-passenger automobile fleets for sale in the U.S.[43]

The U.S. Environmental Protection Agency and Department of Energy jointly created the **Energy Star** to promote energy efficient products and practices[44]. This national program encourages energy conservation and efficiency by providing information and helpful product ratings. The Energy Independence and Security Act of 2007 requires the federal procurement of Energy Star or Federal Energy Management Program-designated products and the update of federal green building standards with an emphasis on energy efficiency and sustainable design principles[45].

The **Energy Policy Act of 2005** contained several measures to promote energy efficiency. These included, but are not limited to: 1) new efficiency standards for residential and commercial products; 2) a permanent extension of agency authority to enter into Energy Savings Performance Contracts; 3) a requirement that federal buildings meet new advanced energy efficiency standards that the Department of Energy is directed to develop; and 4) a package of tax incentives for high efficiency buildings and products. A number of these measures are reaffirmed or further developed in the Energy Independence and Security Act of 2007[46].

At the state and city level, energy efficiency policies vary, but often include application standards, energy efficiency funds, building codes, transportation initiatives, public benefit funds, and tax incentives. A few states use an **Energy Efficiency Resource Standard (EERS)** as a market-based trading scheme used to promote more efficient generation of electricity and use of natural gas. The city of Seattle, for example, implemented measures such as increased use of waste material in industrial processes[47], improved public transportation, expanded bicycling and pedestrian infrastructure, a new commercial parking tax, and plans for combined heat/power generation plants, efforts to create green urban neighbourhoods, and improved average fuel efficiency[48],

In general, energy efficiency is largely regarded as a step in the right direction towards increasing energy security, making energy more affordable and decreasing climate change-inducing emissions. Prominent energy expert Amory Lovins considers energy efficiency as a free lunch that we are paid to eat[49].

---

[43] Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (2007), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ140.110.pdf.

[44] Energy Star, http://www.energystar.gov/.

[45] Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (2007), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ140.110.pdf.

[46] Id.

[47] "Low Carbon leader: Cities Oct. 2005," The Climate Group.

[48] "Climate Action Plan", City of Seattle, September 2006, http://www.seattle.gov/climate/docs/SeaCAP_plan.pdf

[49] Amory B. Lovins, Soft energy paths: toward a double peace, (New York: Harper & Row, 1977)

3.3.5 Nuclear

The past year ushered in a new wave of interest in nuclear energy in the U.S. as part of the global warming discussions. Today in the U.S. there are 104 operating nuclear reactors, although an order for a new nuclear reactor in the U.S. has not been filled in over three decades[50]. The existing U.S. nuclear power industry relies on heavy subsidies in a variety of forms. Any potential growth of new nuclear power in the United States will likely depend on a number of factors, including significant constraints on carbon, sustained high natural gas prices, and importantly, maintaining the existing and entrenched subsidies and obtaining a variety of new taxpayer subsidies and regulatory protections against the marketplace. The mixture of existing and new subsidies include such things as the Price-Anderson Act—federal insurance against catastrophic accidents—generous tax credits on future electricity sales from new nuclear power plants, guarantees of federal "cost sharing" during the licensing and construction phases, risk insurance for any "delays" to either the licensing or construction of a new reactor, continued nuclear energy R&D funding, and of course, federal assumption of responsibility for the disposal of spent nuclear fuel[51].

Through the **Energy Policy Act of 2005,** Congress granted approximately $10 billion in subsidies to the nuclear industry for the construction of a handful of new reactors[52]. The authorisation included a $2 billion risk insurance program for the next six nuclear reactors that are built[53]. The 2005 Act also authorized a new federal loan guarantee program for new nuclear reactors that is worth billions and included other incentives for nuclear development, like production tax credits that are also worth billions of dollars[54]. The 110th Congress is also discussing more subsidies for the nuclear energy industry in terms of U.S. energy security[55].

In February 2006, the Department of Energy announced a new program, the **Global Nuclear Energy Partnership**, to restart the plutonium reprocessing of spent nuclear fuel in the U.S. and to develop sodium-cooled fast reactors[56]. The GNEP program, ambitious and expensive by any analysis, is a matter of controversy in the United States and is certain to be the subject of legal challenges and significant debates in Congress[57]. Nuclear waste disposal remains a heated issue with the proposed

---

[50] Thomas B. Cochran, "The Future Role of Nuclear Power in the United States.", 15 April 2004, http://www.nrdc.org/nuclear/pnucpwr.asp.

[51] NRDC Nuclear Facts, Feb. 2007, http://www.nrdc.org/nuclear/plants/plants.pdf

[52] Id.

[53] Department of Energy, Press Release, "Secretary Bodman Announces $2 Billion Federal Loan Guarantee Program as Part of First Anniversary Celebration of Energy Policy Act" (August 7, 2006), http://www.energy.gov/news/3897.htm.

[54] Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109.pdf .

[55] Climate Stewardship and Innovation Act: Lieberman-McCain (S. 250); House subcommittee meetings on security measures (Energy and Commerce Oversight and Investigation Subcommittee as well as the House Armed Services Strategic Forces Subcommittee).

[56] Global Nuclear Energy Partnership, http://www.gnep.energy.gov/.

[57] Mary O'Driscoll, "Nuclear Power: GNEP rush 'doesn't make sense,' industry official says," January 10, 2007, Greenwire.

repository at Yucca Mountain, Nevada continuing in its central role for the foreseeable future. However, with DOE not having filed a license application for the site with the federal licensing agency (the Nuclear Regulatory Commission) and Nevada Senator Harry Reid (D-NV) currently the Senate Majority Leader, it is unlikely that the proposed repository will move beyond continued funding and policy debates. Even DOE has noted that 2017 is the earliest the proposed repository could be open, and that depends on the site being licensed in the first instance.

Without question, the nuclear industry and its allies have argued that nuclear power has a central role in power generation in a carbon constrained world and the debate on this matter in the United States is currently vigorous. The environmental community, its allies, and many members of Congress in the new majority have by and large, noted that building new nuclear power plants is not yet economically viable without significant government subsidies and the nuclear industry has yet to demonstrate it can further reduce the continuing security and environmental risks of the entire nuclear fuel cycle—including the misuse of nuclear materials for weapons and radioactive contamination from nuclear waste. The environmental community has pointed out that several issues plague the industry beyond its economics – from uranium mining to a weak regulatory structure to the failure to adequately site and license a final disposal site. Focusing on just one of these controversial issues – waste disposal – illuminates the issues facing the industry. Currently, there is also no operational geological repository for spent fuel anywhere in the world. Although there is a proposal for disposing of spent nuclear fuel and high-level radioactive waste at Nevada's Yucca Mountain and the U.S. Federal government has spent decades and billions of dollars trying to establish this repository, progress has been, at best, fraught with technical and political controversy. Although the government's response has been to attempt to relax the licensing criteria to ensure that the facility receives an operating license, this plan, even if successful, would not likely occur until at least another decade, if not longer. Similarly, there has been no work on a second repository even though within a few years more waste will be generated than the amount of waste for which Yucca Mountain is currently licensed.

In summary, the more significant debate (i.e., not the public relations campaign) in the U.S. regarding new nuclear generation has, thus far, focused on whether a few additional heavily subsidized new plants will be licensed, constructed, and then brought online. Currently, Internal Revenue Service guidelines for the 2005 Energy Policy Act subsidies require that nuclear utilities must file license applications by the end of 2008 to be in line for the subsidies available to pay half the costs of the application. Then, utilities must make a decision whether or not to commence construction by 2014. Given the pressing concern of climate change, debate on developing new nuclear power will certainly continue in the near future where a focus of this dialogue will likely be on the efficacy of continued and new subsidies for this mature industry.

4 EMISSION TRADING IN EUROPE

April 2008

Author:
Jason Anderson – Head, Climate Change Programme, IEEP

4.1 Introduction to the EU ETS

The centrepiece of European greenhouse gas mitigation policy is Directive 2003/87/EC. It establishes a Community-wide GHG emissions trading scheme that is intended to enable companies in the EU to reduce compliance costs. The 'European Emissions Trading Scheme' (EU ETS) officially became operational in January 2005 and applies to manufacturing industry and energy supply (around 11,500 installations in the EU's 27 Member States), which together account for around half of the EU's CO_2 emissions.

Under the EU ETS, covered facilities are issued with allowances indicating the maximum amount of CO_2 (other gases are eligible, but have to be opted in by each Member State, which has not happened yet) that can be emitted in any one year. If a company emits more CO_2 than it has allowances it can buy additional allowances on the market from companies with excess allowances, i.e. those which emitted less CO_2 than they were allowed. After each calendar year, installations must surrender a number of allowances equivalent to their verified CO_2 emissions in that year, otherwise they will have to pay a fine[58] for each tonne over-emitted, as well as making up the deficit.

There is a maximum of 5% auctioning in the first trading period and 10% in the second, at levels set by each Member State. Otherwise allowances are issued for free, using methodologies that vary by Member State, but include both grandfathering and benchmarking.

The European Commission has set out specific legislation (2216/2004/EC) for a 'standardised and secure system of registries' to track the issuance, holding, transfer and cancellation of allowances. Installations open trading accounts in national registries, which are linked to a Europe-wide transaction log, available on the web[59]. The computerised system tracks all of the transactions and any irregularities detected prevent a transaction from being completed.

[58] During the first trading period the penalty is € 40 per tonne, but from 2008 it will rise to € 100. Operators also have to obtain allowances to make up the shortfall in the following year

[59] European Commission, Community Transaction Log, http://europa.eu.int/comm/environment/ets/ (last visited 30 July 2008).

4.2 The 2005-7 and 2008-12 trading periods

The current ETS Directive is divided into two trading periods, in 2005-2007 and 2008-2012. The latter is concurrent with the Kyoto Protocol's first commitment period, where the ETS fits integrally into each Member State's and the EU's overall compliance with the burden sharing targets and the Protocol. The 2005-7 period was therefore seen as something of a trial run for the later period, and serious problems were evident.

These problems were more than just birth pains - the process of setting allocations at national level, and the subsequent results of that process, highlight the flipside of emission trading's image as being friendly to both environment and industry. In fact, allocation setting is a process fraught with technical difficulty and tough political choices, where industry holds an information asymmetry over regulators and national governments can produce projections of emissions needs using opaque methodologies, designed to protect their industries.

While warnings had long been issued that allocations were too high in the first period, when verified 2005 emissions were released in 2006, the over-allocation was made plain and shocked the market, Carbon permit prices plummeted from over €15/ tonne to less that €5/tonne, and by the end of the period sank to less than €1. Permit prices for the 2008-12 period had already been trading in the previous period above €12, and through the first months of the new period rose quickly to stand at €25 by mid April.

The strong price for the new period reflects the way lessons were taken from the over-allocation in the first period. To start with, having verified data in hand, it was no longer necessary to speculate about historic emissions of covered facilities. Nevertheless, in their 2008-12 National Allocation Plans, many Member States still gave generous allocations, often claiming the need to allow for strong activity growth. The Commission, however, approved all but four NAPs under the condition that total allocation levels were cut – the total cuts demanded by the Commission amounted to 10.5 % below what was requested. Perhaps most remarkable is the position of new Member States: for example, Latvia, Lithuania, Malta, and Slovakia collectively proposed caps that were fully 87% above 2005 verified emissions. The Commission cut these proposals back to a rise of 23%.

Table 2: NAP2 proposals as proposed, and as accepted, compared to NAP1 caps and 2005 emissions (in Mt CO_2)

Member State	*1st period cap*	*2005 verified emissions*	*Proposed cap 2008-2012*	*Cap allowed 2008-2012 (in relation to proposed)*	*Additional emissions in 2008-2012*	*JI/CDM limit 2008-2012 in %*
Austria	33.0	33.4	32.8	30.7 (93.6%)	0.35	10
Belgium	62.1	55.58	63.3	58.5 (92.4%)	5.0	8.4
Bulgaria	42.3	40.6	67.6	42.3 (62.6%)	n.a	12.55
Cyprus	5.7	5.1	7.12	5.48 (77%)	n.a.	10
Czech Rep.	97.6	82.5	101.9	86.8 (85.2%)	n.a.	10
Denmark	33.5	26.5	24.5	24.5 (100%)	0	17.01
Estonia	19	12.62	24.38	12.72 (52.2%)	0.31	0
Finland	45.5	33.1	39.6	37.6 (94.8%)	0.4	10
France	156.5	131.3	132.8	132.8 (100%)	5.1	13.5
Germany	499	474	482	453.1 (94%)	11.0	12
Greece	74.4	71.3	75.5	69.1 (91.5%)	n.a.	9
Hungary	31.3	26.0	30.7	26.9 (87.6%)	1.43	10
Ireland	22.3	22.4	22.6	22.3 (98.6%)	n.a.	10
Italy	223.1	225.5	209	195.8 (93.7%)	n.k.	14.99
Latvia	4.6	2.9	7.7	3.43 (44.5%)	n.a.	10
Lithuania	12.3	6.6	16.6	8.8 (53%)	0.05	20
Luxembourg	3.4	2.6	3.95	2.5 (63%)	n.a.	10

Malta	2.9	1.98	2.96	2.1 (71%)	n.a.	tbd
Netherlands	95.3	80.35	90.4	85.8 (94.9%)	4.0	10
Poland	239.1	203.1	284.6	208.5 (73.3%)	6.3	10
Portugal	38.9	36.4	35.9	34.8 (96.9%)	0.77	10
Romania	74.8	70.8	95.7	75.9 (79.3%)	n.a	10
Slovakia	30.5	25.2	41.3	30.9 (74.8%)	1.7	7
Slovenia	8.8	8.7	8.3	8.3 (100%)	n.a.	15.76
Spain	174.4	182.9	152.7	152.3 (99.7%)	6.7	ca. 20
Sweden	22.9	19.3	25.2	22.8 (90.5%)	2.0	10
UK	245.3	242.4	246.2	246.2 (100%)	9.5	8
SUM	**2298.5**	**2122.16**	**2325.34**	**2080.93 (89.5%)**	**54.61**	**-**

Source: European Commission, 2007[60]

Reaction to these cuts by the Commission has by and large been positive, particularly by carbon traders and environmentalists. Some governments, however, fought with their own industry and with the Commission over the figures. Germany's Economy Minister Michael Glos initially called the cuts 'totally unacceptable,' but Germany ultimately published a revised plan as demanded by the Commission.

It remains to be seen whether second period allocations will be low enough to spur innovation and emission reduction effort, which most people agree has not been the case in the first period[61]. Given what appears to be a global economic downturn currently underway, emissions may fall due to decreasing activity – or they may rise as gas prices skyrocket making coal attractive. At the moment though, the current trading price seems to indicate that real scarcity is expected and the ETS is on track to providing a solid price signal.

4.3 Proposals for the Post-2012 ETS

In January 2007 the European Commission proposed a series of targets for the EU - to reduce greenhouse gas (GHG) emissions by 20% by 2020 (or 30% if other industrialised countries join a post-Kyoto agreement), cut energy use by 20% below the baseline in 2020, and to increase the share of renewable energy in the overall primary energy supply to 20% by 2020. These targets were endorsed by EU leaders in March 2007, and in January 2008 the Commission published a package of legislative proposals that convert these high-level commitments into concrete actions by Member States. One of the essential elements in achieving the GHG reduction goals was a revised ETS proposal.

The proposed changes for the post-2012 period include:

- extending the scope of the ETS to all major industrial emitters;
- the inclusion of other greenhouse gases beside CO_2;
- allowances to be centrally allocated by the Commission (rather than through 27 national allocation plans); and
- increased auctioning.

[60] European Commission, 2007, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1614&format=HTML&aged=1&language=EN&guiLanguage=en#fn12#fn12

[61] Not all people share this view, for example, a paper by Danny Ellerman and Barbara Buchner, 'Over-allocation of abatement' (FEEM working paper 139.2006) indicates that real reductions may have partially contributed to the lower than expected verified emissions for 2005 which caused the price crash – however, it is not easy to simply distinguish effort from over-allocation.

Among these changes, centralized determination of the allocation by the Commission and auctioning of credits are the biggest shifts. Under the current proposal, the power sector would face full auctioning of permits from 2013, while auctioning in other sectors is to be phased in from 2013 with the aim of achieving full auctioning by 2020.

In addition, by 2010, the Commission is to identify sectors at risk of 'carbon leakage' (especially relocating due to competitive pressures). Based on this analysis and the state of international negotiations, in 2011 the Commission may propose measures to compensate for competitive pressures, either by increasing the free allocation of permits to identified sectors or requiring importers to buy permits to neutralise their competitive advantage. The latter is a highly controversial proposal that has already seen a formal rebuttal from the U.S. in comments made by officials during the World Economic Forum in Davos. It is, however, favoured by the French government, which holds the rotating presidency of the EU in the latter half of 2008.

The proposal is now in the hands of the European Parliament – as with all legislation of this type. An MEP, Avril Doyle, has been designated the Parliament's 'rapporteur' for the report, responsible for making an initial round of suggested amendments for consideration by the Environment Committee. Her stated aim for the timing is to have her amendments ready in the beginning of June; further amendment within the committee will be suggested by the first week of July; it should be voted on in committee by the first week of September, then by the plenary in the first week of October, after which it goes to the European Council of ministers – if it agrees with the Parliament's version, the legislation could be finalized by the end of the year. If not, the subsequent process (second reading, possible conciliation) may run the risk of pushing into the 2009 election season, which they are currently hoping to avoid.

4.4 Inclusion of Transport in the EU ETS

A 2007 consultation document[62] from the Directorate General for Energy and Transport of the European Commission reports that the inclusion of all modes of transport in the EU ETS could be envisaged, as one of several policy options to internalise the external costs of transport use. However, practical arrangements would be different for each transport mode (e.g. road, rail, maritime and inland waterway transport). Currently, aviation is the only mode of transport explicitly proposed for inclusion in the ETS; however shipping is also a candidate while some have even proposed the inclusion of road transport.

4.4.1 Aviation

On 20 December 2006 the European Commission issued a proposal to include aviation in the EU Emissions Trading System from 2011. The draft was long-awaited, having been the subject of much study, including a working group of the European Climate Change Programme.

---

[62], Preparation of an Impact Assessment on the Internalisation of External Costs - Consultation Document, TREN.A2/EM/cc D(2007) 322073.

As recently as two weeks prior to publication, the proposal was reported to include important features that were ultimately dropped in the released version. Among these were a plan to auction increasing amounts of permits to the sector from one trading period to the next, starting at 10%. Further, consideration of a multiplier to account for the non-CO_2 impacts of aviation was deferred, awaiting separate rules on airline NOx emissions. Most importantly, initially only intra-EU flights will be covered at first, rather than all flights taking off from or landing at an EU, which is scheduled to start a year after, in 2012. Potentially including transatlantic flights has earned a warning of legal action from the U.S. They argue that any rules are under the authority of the International Civil Aviation Organisation (ICAO), which has reserved the right to make rules on emission limitations from airplanes (but which also allows members to consider the option of emissions trading, leading to an unclear situation as to whether this can only be 'considered' and brought before ICAO, or actually enacted as the EU proposes).

The Commission proposes to offer the industry its allowances free of charge at a rate equal to 2005 levels beginning in 2011. This is nearly double the 1990 level, which simply recognises that the growth of the sector is not to be quickly undone. Many predict that the cost of the measure will be passed through to customers so that airlines stand to make a huge profit, by applying the marginal cost of some emissions allowance across all tickets, leading to the windfall profits as seen in the electricity industry.

According to several studies, inclusion of the aviation sector is initially unlikely to do much about the sector's own emissions, or affect the price in the ETS significantly, as the allocation is likely to be high (ie at the 2005 level) and the proportion of needed reductions thus very low compared to the size of the market. Excluding the international flights for one year (or more, if it remains too controversial) makes this all the more true. The effect that is more likely is intra-industry disparities, with those companies having older airline fleets being able to take advantage of buying more efficient new planes to cut emissions, and those with more business and first class passengers able to put costs of any allocations purchases on them. Both of these facts put European budget airlines, with newer planes and single class service, at a disadvantage compared to legacy carriers like BA, Air France and Lufthansa.

The European Council of ministers has issued its common position on the Commission's proposal and the Parliament is about to begin a second reading, which means a decision should be reached relatively soon.

4.4.2 Road Transportation

A number of Member States proposed that the European Commission's post-2012 ETS review should consider whether it would be effective to include road transport in later phases of the EU ETS. The European Commission has looked at this possibility focusing on two options – inclusion of car manufacturers and inclusion of individual motorists. A third option could be including fuel producers in the EU ETS on the basis of their fuel sales. However, no move was made for inclusion in its most recent proposals.

Inclusion of road transport in EU ETS could sit alongside other forms of direct intervention to reduce road transport CO_2 emissions such as policy instruments targeted at the use of biofuels, fuel efficiency, eco-driving, etc. But the interaction with these other instruments would need to be carefully considered.

In 2007 the Commission brought forward a regulatory proposal which would set mandatory targets for new car fuel efficiency, but this measure will not cover all vehicles and it will not provide incentives to reduce fuel consumption in other ways (switching to more environmentally friendly modes of transport and minimizing fuel consumption while driving). Inclusion of road transport in EU ETS could therefore have broader CO_2 saving impacts.

Some organizations (e.g. WWF) argue against the inclusion of surface transport in the EU ETS due to (i) allocation problems and ownership of emissions; (ii) market distortions and price impacts; (iii) diversion from more effective and targeted measures that would deliver real and lasting improvements in the road transport sector's own emissions; (iv) lock in on high-carbon infrastructure and behavioural choices which will be difficult or costly to reverse later on; and (v) possible destabilisation of the EU ETS and distraction from other critical design aspects.

4.4.3 Maritime Transport

Maritime transport is a global industry and as such should ideally be dealt with at a global level. However, this appears unlikely given the lack of support for effective action among Member States of the International Maritime Organisation (IMO). The European Commission stated in 2002 that unless concrete measures were forthcoming from the IMO by 2003 then the EU would consider taking unilateral action. Commission officials have subsequently indicated that a proposal for the incorporation of shipping in the EU ETS is likely to occur.

The inclusion of the maritime transport in the EU ETS is supported by an expert report[63] published in December 2006 by the European Commission. The report suggests that inclusion in the EU ETS would be technically feasible and is likely to be more cost effective than alternative EU instruments considered. Ship operators calling at EU ports could be required to surrender allowances for the CO_2 emissions associated with their voyage. However, the evidence base is at an early stage, and considerable further work is required to assess the overall cost effectiveness of this option, and the relative impacts of different design options.

In a paper on EU maritime policy from 8 April 2008[64], the European Parliament's transport committee reinforced the call for maritime emissions to be incorporated into the ETS.

---

[63] 'Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive', December 2006.

[64] European Parliament transport committee press release 'EU maritime policy needs more ambition, says Transport Committee', 8 April 2008.

4.5 Linking Emissions Trading Systems

The review of the EU ETS considered extending arrangements for linking its scheme with other emission trading schemes that are in operation or planned in third countries. Currently the EU ETS is linked to the CDM and JI, but excludes forestry-related projects.

The EU sees its system as the potential kernel of an internationally linked ETS. The reasons probably have as much or more to do with building international agreements and solidarity on climate change policy as it does with creating a better functioning and broader market. In fact there are quite some challenges to overcome in creating a link, both in terms of design and legal instruments.

On 26 October 2007, the first ETS linking agreement was signed with Norway, Iceland and Liechtenstein, after months of legal wrangling and second thoughts by the Commission, despite the systems being nearly identical to the ETS. The EU ETS Directive has now been incorporated into the European Economic Area agreement. The next step is for national approval procedures to be fulfilled in Norway, Iceland and Liechtenstein. Switzerland may represent another possibility of linking in the near future.

A potentially significant development in the harmonisation of linking took place in October 2007: a group of EU Member States, U.S. states and Canadian provinces, together with New Zealand and Norway, met in Lisbon to give birth to the International Carbon Action Partnership (ICAP). The partnership aims to contribute to the establishment of a global cap and trade carbon market, by providing governments and public authorities that are adopting mandatory greenhouse gas emissions cap and trade systems with an international forum to share experiences and best practices.

A formal political declaration has been signed by nine EU countries (France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the UK), the European Commission, U.S. states who are part of the Regional Greenhouse Gas Initiative (RGGI), U.S. and Canadian members of the Western Climate Initiative (WCI) and New Zealand and Norway on behalf of their emission trading programmes. Leaders attending the summit included the European Commission President José Barroso and the UK Prime Minister Gordon Brown, while the Governor of California Arnold Schwarzenegger participated through video link.

ICAP will establish an expert forum, convening regularly, to discuss relevant questions on the design, compatibility and potential linkage of regional carbon markets, identifying barriers and solutions.

4.6 Further Discussion

The EU, particularly the European Commission, has been proud to set up the world's first industrial CO_2 cap and trade system. Despite criticism of first period over-allocation on the one hand, and arguments from some Member States about cuts to their second allocation on the other, there is overall a sense of pride at having put Europe in a leadership position with this policy.

Inevitably a functioning policy attracts attention for expansion, and it could well be that the ETS can be seen in light of the saying 'when all you have is a hammer everything looks like a nail.' With airline emissions rising precipitously and no action by ICAO, the ETS appears to be the chosen answer. With road transport rising precipitously and the voluntary agreement with car makers off track, ETS looks like a possible answer. Lacking a clear source of additional funding, CCS developers envision support via the ETS. It is certainly not the case that ETS is the only game in town, but having spent years failing to pass an EU carbon tax, and hard-to-address sectors continuing to defy policy, the ETS inevitably attracts attention.

European NGOs have maintained a fairly positive stance to the ETS, choosing to fight for its improvement rather than criticise it outright. U.S. NGOs, meanwhile, have fought for cap and trade as a policy with teeth standing in stark contrast to the voluntary and business-as-usual Bush initiatives. But there may well be important design differences open to a new U.S. system where the debate is already closed in Europe. Particularly with respect to the means of financing and promoting new technologies, the role of standards and obligation, and the place of taxation, it might be necessary to re-examine how emissions trading is applied

5 CAP AND TRADE IN THE UNITED STATES

April 2008

Principle Author:
Christine Erickson - International Programme, NRDC,
Contributor:
Melanie Nakagawa - Attorney, International Programme, NRDC

5.1 Introduction

Cap and trade is one of the major policy areas identified by U.S. and European participants at the first Transatlantic Platform for Action on the Global Environment (T-PAGE) conference as critical in moving both the EU and U.S. consistently toward a common understanding on the topic of climate change and energy. This paper is a follow-up and update to a paper presented at the last T-PAGE workshop on November 13, 2007[65] and it sets out to explain the environment in which cap and trade policies are currently being discussed in the U.S. The paper begins with a description of the most recent developments in policy at the federal, regional, and state levels. The paper then describes some of the voluntary and bottom-up approaches being used in the U.S. to reduce greenhouse gas (GHG) emissions, which may provide some lessons for Europe.

5.2 Cap and Trade Policy Development

5.2.1 Federal Government

The legislative environment at the federal level continues to change rapidly. In the summer of 2007, more than a dozen cap and trade proposals were introduced in Congress. In December 2007, the Lieberman-Warner bill, now called the "America's Climate Security Act", passed out of the Senate Environment and Public Works Committee and is currently scheduled to go to floor debate in June 2008. The bill establishes an economy wide cap and trade program and other measures to stabilize and then reduce global warming pollution. Specifically, the legislation provides for a 15% reduction in covered emissions by 2020 and 70% by 2050. It caps and cuts emission in three sectors—electricity, transportation, and industry which together account for about 75% of U.S. greenhouse gas emissions[66]. The bill also includes features to reduce emissions from covered sectors, principally a set of energy efficiency measures for building and key energy-using activities, and a "set-aside" of allowances from within the cap to encourage emission reductions and sequestration in

[65] For more information on the cap and trade discussions and copies of the background papers from the T-PAGE workshop on November 13, 2007 see: http://www.ieep.eu/projectminisites/t-page/climateenergy/capandtrade.php.

[66] NRDC Legislative Facts, Lieberman-Warner Climate Security Act, December 2007, http://www.nrdc.org/legislation/factsheets/leg_07121101A.pdf.

the agriculture and forestry sectors[67]. The bill would implement its cap and reductions through an allowance system and includes "cost containment" provisions that are intended to protect the integrity of the emissions cap and preserve incentives for technology innovation.

Although the legislation had widespread support in the Senate Environment and Public Works Committee, it is difficult to tell where the bill will end up. Senator Boxer (CA), the Committee's Chair, has said that the bill will be pulled if any weakening amendments are added to it on the Senate floor[68]. She and other supporters and co-sponsors of the bill have threatened to withdraw the bill and bring back stronger legislation in November 2008 with a new Congress and President. Senator Boxer, who is still pushing to increase the 70% by 2050 goal to 80%, has indicated that she does not anticipate being able to move the bill this year since several amendments designed to protect the economy and deploy low emission energy sources, like nuclear energy, are likely to pass during the floor debate. Several other co-sponsors of the bill have indicated that they are not as unwilling to compromise as Senator Boxer. Other issues cropping up in the Senate concerning the bill include the projected short-term cost and who will pay the price, how practicable the system is, the allocation of free allowances, and the role that state governments and regional initiatives will play. Thus, it is difficult to tell what the fate of America's Climate Security Act will be in June. While this bill is of critical importance to the U.S.'s effort to solidify a national cap and trade legislation, many U.S. non-governmental groups continue to press for changes in other areas to supplement what is being done in Congress.

In addition to the pending Lieberman-Warner climate bill, the federal government has also passed an energy bill aimed at reducing global warming pollution and protecting the earth's climate. The "Energy Independence and Security Act of 2007 ("The Energy Act"), was passed and signed into law in December of 2007. The new legislation includes a Renewable Fuel Standard (RFS) which requires 36 billion gallons of renewable fuels to be produced in the U.S. by 2022. According to the NRDC, the RFS will reduce global warming pollution by about 114 million metric tons per year by 2022, which is equivalent to about 1 % of U.S. emissions in 2005[69]. These reductions will be achieved by establishing lifecycle greenhouse gas reduction standards for the renewable fuels covered by the RFS. The full spectrum plan will ensure that the RFS generates climate benefits rather than climate liabilities due to emissions associated with clearing of forests or other damaging production processes.

While the Energy Act is a critical step in the movement toward more stringent federal climate and energy legislation, with narrow Democratic majorities in the House and the Senate and an Administration that heretofore has strongly opposed mandatory

---

[67] Dan Lashof, "Global Warming Pollution Reductions under the Lieberman-Warner Bill" (October 16, 2007) http://docs.nrdc.org/globalwarming/glo_07102201A.pdf.

[68] U.S. Senate Committee on Environment & Public Works, "Boxer Waves White Flag on Lieberman-Warner Climate Bill," March 12, 2008, http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecord_id=a4eaee40-802a-23ad-4260-e3d783eff011.

[69] NRDC Energy Bill Promotes Clean Biofuels, December 13, 2007, http://docs.nrdc.org/air/air_07121301A.pdf.

caps, there is a high likelihood that a cap and trade focused legislation will not be passed until after the 2008 election. However, the Lieberman-Warner bill awaiting floor debate in the Senate indicates progress toward a bipartisan compromise. Even if legislation is not passed by this Congress, the work done will provide momentum for legislation in future years. Similarly, another positive signal of progress in the U.S. on addressing climate change is legislation moving through in the energy bill to improve energy efficiency standards and promote renewable energy.

5.2.2 Regional Greenhouse Gas Initiative

At the regional level, the Regional Greenhouse Gas Initiative (RGGI) is still considered by many environmental groups as the most advanced effort in the U.S. to date to cap and reduce carbon dioxide emissions from power plants. Ten states are currently participating, including Connecticut, Delaware, Maine, Maryland, New Hampshire, New Jersey, New York, Rhode Island, Massachusetts, and Vermont. However, there is some criticism regarding the RGGI plan in that it is not stringent enough to actually reduce carbon dioxide levels for the first few years of the program[70]. It is believed that the 50.6 million metric tons cap that is set to last through 2014 will not produce the desired effect because emissions from power plants were 48.1 million metric tons last year. But notwithstanding this debate, RGGI continues to make progress.

The final model rule was issued in January 2007. There are also several observer states as well as states, such as California, which have expressed interest in joining the initiative. As per the RGGI Memorandum of Understanding, the participating states Governors have committed to complete a rulemaking based on the model rule by the end of 2008. Thus far Vermont, New York, and New Jersey have adopted rules. A review of the proposed design of the regional cap and trade mechanism follows[71].

- **Cap:** Regional carbon dioxide emission will be capped at 1990 levels by 2015, and 10% below that level by 2020. Each state will have its own emissions budget, but the cap is regional. Trading will commence in 2009 with three year commitment periods. The cap only covers carbon dioxide from power plants, not the other five Kyoto Protocol Annex A GHGs or other sources.
- **Sector Coverage:** Any fossil fuel fired power generating unit larger than 25 megawatts. Exemptions are given for plants that burn more than 50% biomass and those that provide less than 10% of electricity to the grid. The current coverage design is intended to utilise the existing monitoring devices already in place at power plants for the acid rain cap and trade program. After the initial trading period, caps could be extended beyond the electricity sector.
- **Permit Allocation:** A combination of auction and grandfathered allocation, whereby at least 25% of permits will be auctioned to raise capital for "consumer benefit support," such as energy efficiency programs. Some states have already opted for 100% auction of permits.

---

[70] Debra Kahn, "States: RGGI goals not strong enough, enviro group says," ClimateWire (03/22/08) http://www.eenews.net/climatewire/2008/03/27/4.

[71] RGGI Model Rule. http://www.rggi.org/modelrule.htm, see also: Summary of the Draft Model Rule. http://www.rggi.org/docs/summary_of_public_review_draft_mr.pdf.

- **Offsets:** RGGI will use a standards-based approach and will agree to memorandums of understanding with other states that produce offsets. Sectors eligible to produce offsets include: landfill gas, SF_6, end-use energy efficiency, afforestation, farming operations, and natural gas transmission and distribution. Offsets within RGGI states will be awarded one certified credit per ton, while offsets from other U.S. states will require two tons to receive one credit. Where applicable, offsets will only be allowed to meet 50% of a sector's emission reductions.
- **Cost Control Measures:** The model rule allows for the banking of permits, but not borrowing. The model rule also contains two safety valve provisions. If the price of carbon dioxide is greater than $7 per ton (adjusted from 2005 dollars) for more than 14 months, a greater number of offsets will be allowed in the market. If the price stays above $10 per ton (adjusted from 2005 dollars) for more than 12 months, the compliance period will be extended for an extra year.

5.2.3 California

The state of California is continuing its process of establishing a cap and trade market. In addition to the executive order issued in 2005 calling for an 80% reduction in GHG emissions by 2050, in September 2006, Governor Schwarzenegger signed into law California AB32, the "Global Warming Solutions Act." Under the law, the California Air Resources Board (CARB) has been charged with writing rules for the implementation of the legislation. In June 2007, the Market Advisory Committee of CARB issued the following draft recommendations for rule making:[72]

- **Cap:** AB32 requires emissions levels to be reduced to 1990 levels by 2020, with emissions trading starting in 2012. CARB is currently determining the emissions baseline. The Market Advisory Committee recommends a gradually declining cap with three year commitment periods.
- **Sector Coverage:** The Market Advisory Committee has developed four proposals that CARB can choose from to cap GHG emissions in the state. The first would only cover medium and large GHG-emitting facilities downstream, like the EU ETS and RGGI. For California that would only account for 39% of state-wide GHG emissions. The second proposal would also cover the transportation sector, bringing the total coverage to 72%. The third proposal would include the first two categories as well as upstream coverage of all other fossil fuels, amount to 83% of state-wide GHG emissions. A fourth proposal would provide upstream coverage for all fossil fuels.
- **Permit Allocation:** The Market Advisory Committee recommends a mix of auctioned and grandfathered permits, with the auctioned share increasing over time. CARB may lack the legal authority to auction permits, so additional legislation may be needed. The Committee recommends that revenue from permit auctions should be dedicated to clean technology R&D.
- **Offsets:** Consensus from the Market Advisory Committee advises CARB to allow offsets, as long as they are "real, additional, independently verifiable, permanent, enforceable, and transparent." The committee favours a standards-

[72] California Air Resources Board. "Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California." June 12, 2007, http://www.climatechange.ca.gov/events/2007-06-12_mac_meeting/2007-06-01_MAC_DRAFT_REPORT.PDF.

based approach rather than a case by case review, and it opposes geographic or quantitative limitations on offsets. Categories used by RGGI are favoured, and the Committee is open to CDM and JI credits being used. Voluntary offsets from the Chicago Climate Exchange would not meet these standards.

- **Cost Control Measures:** The Market Advisory Committee favours banking and opposes borrowing or a price ceiling. AB32 was written with a specific environmental objective, which excludes the possibility of a safety valve or a circuit breaker. The Market Advisory Committee suggests that government investments in energy efficiency and renewable energy will be sufficient to contain costs.

In January 2008, CARB determined the state-wide 1990 baseline and set the state-wide 2020 GHG emissions limit[73]. At that time, CARB also adopted a mandatory reporting program for significant sources. In 2009, CARB is expected to prepare and approve a scoping plan for achieving the 2020 state-wide GHG emissions limit. The scoping plan is set to take effect in January of 2012, the same time at which market-based cap and trade regulations will become effective in California.

In March 2008, CARB also issued a draft outline for California's Low-Carbon Fuel Standard program, which became law in January 2007. CARB, who has also been charged with writing the rules for this plan, revealed that they intend to apply different approaches to various fuels covered by the standard, to include gasoline, diesel, liquefied natural gas, propane, electricity, hydrogen, and sever blends of ethanol and biodiesel. The proposed rules will regulate refiners and importers at production or importation facilities for diesel and ethanol. However, for natural gas, propane, electricity, and hydrogen, the regulation will occur at the point where the fuel is transferred to the vehicle by the retail provider. The draft also outlines different baselines, regulation methods, and sliding scales for gasoline and diesel. Some criticise the proposed program for its complexity and the possibility that some fuels will be more regulated than others.

Many environmental organisations anticipate that California's initiatives will serve as a springboard for more regional and national action.

5.2.4 New York

In December 2006, New York Mayor Michael Bloomberg launched PLANYC, a ten point program for improving the sustainability of the city by 2030. In December 2007, the plan was codified and signed into legislation. One of the major points of PLANYC is a goal of reducing GHG emissions 30% below current levels by 2030. There are four wedges of the climate change plan that will produce this 30% reduction[74]:

- **Avoided Sprawl:** PLANYC aims to attract 900,000 new residents to the city who would have otherwise moved to the suburbs. To achieve the goal the city intends to add additional affordable housing stock, promote brownfield

[73] California Air Resources Board, "Timeline- California Global Warming Solutions Act of 2006" September 25, 2006, http://www.arb.ca.gov/cc/factsheets/ab32timeline.pdf.

[74] PLANYC: Climate Change, http://www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf.

development, improve urban infrastructure, and plant trees and increase the number of parks.

- **Clean Power:** To reduce emissions from New York City's electricity supply, the city intends to replace inefficient plants with current technology and expand the use of renewable energy.
- **Efficient Buildings:** PLANYC calls for policies to improve energy efficiency in existing buildings, require efficiency in new buildings, improve the city's building and energy codes, and increase awareness to promote behaviour change.
- **Transportation:** The plan calls for a reduction in vehicle use through improvements in public transit and policies like a proposed congestion pricing scheme, an improvement in vehicle efficiency through the use of hybrid vehicles for taxis and the city fleet, and a reduction in the carbon intensity of fuels.

As part of this movement, Mayor Bloomberg also signed legislation in February 2008 requiring the use of Ultra Low Sulphur Diesel Fuel by diesel powered city-owned ferries[75]. The state of New York continues to take steps towards implementing laws targeted at carbon emissions and climate change.

5.2.5 Other State Initiatives

Today, a large portion of the action happening to address cap and trade issues in the U.S. is happening at the state level. Below is a list of initiatives happening at the state level from Renewable Portfolio Standards to caps on greenhouse gas emissions.

Renewable Portfolio Standards

Legislatures in twenty-six states[76] now require their electric utilities to generate some energy from renewable sources. The features of these Renewable Portfolio Standards (RPSs) vary in terms of the amount of renewable energy required and the types of generation accepted.

Greenhouse Gas Emission Caps

Four western states are developing GHG emission caps like that in California, and two other states have proposed caps. Sixteen states also have mandatory GHG targets[77].

In February 2007, Governor Jon Corzine of New Jersey signed an executive order establishing new greenhouse gas emissions targets for the state of 1990 levels by 2020

---

[75] For more information on the ULSDF ferry legislation, visit, http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2008a%2Fpr063-08.html&cc=unused1978&rc=1194&ndi=1.

[76] U.S. Department of Energy, Energy Efficiency and Renewable Energy, Information Resources webpage, "States with Renewable Portfolio Standards," http://www.eere.energy.gov/states/maps/renewable_portfolio_states.cfm.

[77] Map of states with greenhouse gas emission targets from Pew Center on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/emissionstargets_map.cfm.

and 80% below 2006 levels by 2050[78]. The order directs the New Jersey Department of Environmental Protection to spend the next six months developing a plan for achieving the emissions targets. New Jersey will need to develop some new initiatives, but the state already has in place a number of climate and energy policies that reduce greenhouse gas emissions. For example, the state is already a member of the Northeast Regional Greenhouse Gas Initiative. New Jersey also requires its electric utilities to obtain 20% of their power from renewable sources by 2020. The state has also committed to California's vehicle greenhouse gas standards.

Both Oregon and Washington have established emissions caps for new power plants[79]. While Oregon's program requires new power plants to meet at stringent carbon dioxide emissions cap or offset excess emissions, Washington's legislation requires new fossil-fuelled plants to mitigate 20% of their projected carbon emissions. Both plans allow plants to purchase permanent carbon credits traded on a recognized trading authority of exchange, pay a third party to provide mitigation, or directly implement carbon mitigation projects.

Both New Hampshire and Massachusetts have set emissions caps for existing power plants that may be met through offsets now and through carbon trading in the future[80].

In addition to capping emissions and addressing renewable portfolio standards, state action is also taking place in the implementation of various green energy policies such as public benefit funds (approximately half of the states), state-wide net metering (twenty states), green pricing (forty four states), energy efficiency standards (nineteen states), climate action plans (twenty-nine states, eight in progress), and state-wide GHG inventories (forty-two states). Many environmental groups expect that state initiatives based on the climate and cap and trade will only continue to expand over the next few decades.

5.2.6 Voluntary and Bottom-Up Approaches

Despite the lack of a functioning GHG emissions market in the U.S., many voluntary and bottom-up approaches to GHG emissions reduction continue to emerge. Voluntary targets are inherently not enforceable nor are they independently verified. Furthermore, city level governments often lack the capacity to do some of the things they promise, particularly control urban sprawl and implement comprehensive public transport systems[81]. Nevertheless, such initiatives have accomplished some progress in a political environment that is not conducive to implementing market-based policies. Voluntary agreements and bottom-up approaches, especially when combined with a market mechanism that internalizes the price of carbon, can facilitate the transition to a low carbon economy. This is potentially one area in which Europe can learn from the U.S.

---

[78] Pew Center on Global Climate Change, "Governor Establishes New Emissions Targets for New Jersey" http://www.pewclimate.org/node/4040.

[79] Id.

[80] Id.

[81] See, for example: Rusk, David, *Cities Without Suburbs* (1995) and Orfield, Myron, *American Metropolitics: The New Suburban Reality* (2002).

One example, the U.S. Mayors' Climate Protection Agreement, led by Seattle Mayor Greg Nickels, commits mayors to "strive to meet or exceed the Kyoto Protocol targets" of a 7% reduction in GHG emissions by 2012[82]. To date, it has since been endorsed by the U.S. Conference of Mayors and has been signed by 710 Mayors representing more than 66 million Americans[83].

In addition, the Western Governors' Association, an independent, non-profit organization representing the governors of 19 states and three U.S.-Flag islands in the Pacific, has played a major role in identifying and addressing key policy and governance issues in the area of climate change. The Association has urged Congress to act quickly to approve federal tax incentives under the Energy Independence and Security Act[84]. The Western Governors' have also adopted a Clean and Diversified Energy Initiative (CDEi), which addresses climate change on three fronts: promoting widespread adoption of energy efficiency measures, promoting aggressive market penetration of renewable energy, and promoting that a portion of new Tier 1 coal generating plants use advanced technologies with carbon capture and sequestration[85].

5.3 Conclusion

Even with the progress the U.S. has made in terms of federal and state initiatives to curb the effects of climate change through cap and trade regimes, there remains a significant gap between that which has been accomplished and that which needs still needs to get done. Political considerations continue to stand in the way of cap and trade legislation at every level and the policies that emerge from the political process may not include some of the more ambitious proposals, or they may include some of the cost control measures that undermine the objective of GHG reductions. In the meantime, it is expected that voluntary and bottom-up efforts will continue to expand, along with the implementation of federal and state standards. The political momentum behind such efforts continue to build, and when effective cap and trade policies are implemented the U.S. will have a powerful combination of top-down and bottom-up policies.

---

[82] "Endorsing the US Mayors Climate Protection Agreement." http://www.seattle.gov/mayor/climate/PDF/Resolution_FinalLanguage_06-13-05.pdf.

[83] US Mayors Climate Protection Agreement. http://www.seattle.gov/mayor/climate/default.htm#what.

[84] Western Governors' Association, Press Release, "Western Governors call for Swift, Decisive Action on Energy Independence and Security Act," http://www.westgov.org/wga/press/energy12-6-07.htm.

[85] Western Governors' Association, "Clean and Diversified Energy Index" http://www.westgov.org/wga/initiatives/cdeac/index.htm.

6 PUBLIC PERCEPTIONS OF ENVIRONMENTAL, CLIMATE CHANGE AND ENERGY ISSUES IN THE EU AND U.S.

April 2008

Authors:
Camilla Adelle – Policy Analyst, IEEP
Sirini Withana – Policy Analyst, IEEP

6.1 Introduction

Government responses to climate change on both sides of the Atlantic have been very different. The European Union (EU) and its Member States have been strong political supporters and promoters of the Kyoto Protocol and are keen to depict themselves as the world's leader in climate change policy. On the other hand, the U.S. is the world's largest emitter of greenhouse gases; however the Bush administration did not submit the Kyoto Protocol to the Senate for ratification, a necessary step for the Protocol to be binding in the U.S. Therefore, the non-binding status of the Protocol in the U.S. and the current Administration's continuing refusal to commit to binding emission reduction targets, keeps the U.S. as an outlier in the international process. 'Differences in public opinion are often used to explain, if not justify, differences at the governmental level'[86] and public policy decisions that do not take into account public opinions will inevitably prove problematic. Climate policies require a certain degree of 'buy-in' or public acceptance in order to be successfully implemented and should be in line with public perceptions of the risk of climate change in order to be supported by the electorate[87].

Consequently public perceptions of environmental issues in general and climate change in particular have long been of interest to researchers and policy makers. In the EU, for example, *Eurobarometer* (a regular public opinion survey conducted across the EU on behalf of the European Commission) has published a number of surveys of citizens' views in this area periodically since 1992. In the U.S., several polls including the Gallup Poll, Harris Poll, and the Pew Surveys include questions related to the environment and global warming. In addition, numerous academic studies, public consultations and consultants' reports on both sides of the Atlantic have explored public perceptions of specific climate change mitigation technologies such as bioenergy and Carbon Capture and Storage (CCS) and compared changes in public opinion over time. It is therefore possible, and potentially illuminating, to consider whether the different approaches being taken by the U.S. and EU in their climate and energy policies reflect a broader difference in public concern for these environmental issues as well as a differing level of support for environmental policy.

---

[86] Reiner, D.,M. et al (2006), 'American Exceptionalism? Similarities and Differences in National Attitudes Toward Energy Policy and Global Warming', Environment Science and Technology, 40(7), 2093-2098.

[87] Lorenzoni, I., and Pidgeon, N. (2006) Public Views on Climate Change: European and USA Perspectives. *Climate Change* 77, 73-95

This paper, therefore, examines the public opinions of the EU and U.S. public towards the environment, and climate change in particular, and explores how they vary across time and space within each of these jurisdictions. First, the public perceptions of citizens across the EU Member States will be explored and in the second part of the paper, U.S. public perceptions of these issues will be investigated. In both cases the views on the environment in general, as well as climate change in particular, will be assessed. The implications of these views on policy making in each jurisdiction will then be assessed. In the final and concluding section of this paper, the similarities and differences in EU and U.S. public perceptions will be discussed in general as well as in light of the different governmental approaches taken. It is important to note the limitations of survey data and the difficulty in directly comparing different surveys, given their varying approaches to questioning, articulation of questions, timeframes and geographic scope. However, this analysis of certain public surveys in the EU and U.S. allows us to identify certain trends in public opinion over time and to make some tentative comparisons.

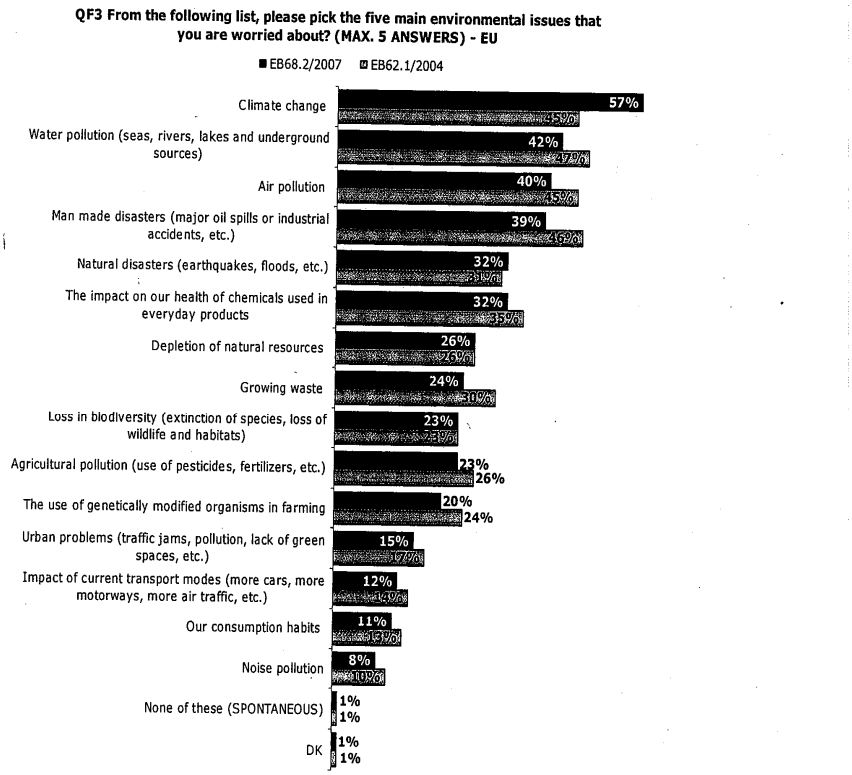
6.2 EU Public Perceptions

6.2.1 Public Opinions of Environment and Climate Change

The environment is an important issue for the European public. The most recent *Eurobarometer* survey of public opinions on the environment commissioned by the Environment Directorate General (DG) within the European Commission and conducted at the end of 2007; showed that an overwhelming 95% of European citizens felt that it was important to protect the environment[88]. The top six environmental issues Europeans were most concerned about were climate change (identified by 57% of respondents), water pollution (42%) and air pollution (40%), man-made disasters such as major oil spills or industrial accidents (39%), the impact on health of the use of chemicals in everyday products (32%), and natural disasters such as earthquakes and floods (32%) (see Figure 1).

[88] CEC (2008) Attitudes of European Citizens Towards the Environment, Eurobarometer Special Report 295 Wave 68.2TNS Opinion and Social, European Commission, Brussels

Figure 1: The Top Environmental Concerns of EU Citizen's identified in Eurobarometer Surveys in 2007 and 2004



Source: CEC 2008

Opinion with regards to the environment and climate change was not, however, uniform across all Member States. For instance, the *Eurobarometer* survey showed that there appears to be a geographical split between the new and old Member States over what is commonly understood as the 'environment'. In the 15 old Member States 21% of respondents associated the environment with more contemporary environmental problems such as climate change, compared to only 9% of the respondents in the 12 new Member States. For these respondents in the new Member States the environment was more commonly associated with more traditional conceptions of the environment such as 'green and pleasant landscapes' (21%) and 'protecting nature' (18%) (compared with 21% and 11% respectively in the old EU 15)[89].

In addition, the concern of the European public about the environment appears to be increasingly focused on climate change. In a similar survey in 2004 climate change was identified by only 45% of the respondents as a top environmental issue (compared with 57% of respondents in the most recent survey) and of less concern than water pollution and man made disasters. Thus, while at first the uncertainty and complexity surrounding climate change was reported to hamper efforts to raise its

[89] CEC (2008) Attitudes of European Citizens Towards the Environment, Eurobarometer Special Report 295 Wave 68.2TNS Opinion and Social, European Commission, Brussels

profile both with the public and politicians[90], it is evident that in Europe this picture is now changing. In particular, the survey showed that the level of concern about climate change is highest in the Southern Member States with people in Spain, Cyprus, Malta and Greece the most worried. The results of a *Eurobarometer* survey on 'Europeans' attitudes towards climate change' published in 2008[91] indicated that two thirds of European citizens considered climate change to be one of the most serious problems facing the world, second only to the problem of poverty. However, this ranking was not uniform across Member States. Respondents from traditionally climate-sceptic Member States such as the Czech Republic rated the importance of climate change much lower (45%) while those from certain Mediterranean countries (Greece, Cyprus) rated the problem much higher (above 90%) .

6.2.2 Public Awareness and Understanding of Environment and Climate Change

The public's perception of environmental issues is of course affected by the extent to which they feel informed about these issues. Low levels of knowledge and understanding will be insufficient to ensure informed public opinion[92]. There has been an apparent rise in the global debate on environmental issues such as climate change in the media in recent years. This has culminated in the 2007 Nobel Peace Prize being awarded to advocates for change in this area namely the Intergovernmental Panel on Climate Change (IPCC) and the environmental activist Al Gore, 'for efforts to build up and disseminate greater knowledge about man-made climate change'. Despite this Europeans do not appear to feel more informed on these issues than in the past surveys. The most recent *Eurobarometer* survey showed that a small majority of Europeans felt informed about the causes and consequences of climate change (56%). However, only 9% felt *very well* informed whereas 41 % felt that they were badly informed. However, it is clear that respondents in the old EU 15 Member States felt significantly better informed than respondents in the 12 new Member States (with the exception of Slovenia). This lack of knowledge is confirmed by the fact that 30 % of those surveyed think that CO_2 emissions only have a marginal impact on climate change while 15 % do not know whether CO_2 emissions have any impact at all[93].

More specifically, a *Eurobarometer* survey published in 2003 focusing on 'Energy: Issues, Options and Technologies' found that there were mixed levels of understanding about the way in which energy was used and which energy sources were used[94]. The survey demonstrated a clearer perception of rising energy use in the EU and of the possibilities for energy savings. However, while the majority of respondents in this survey agreed that fossil fuels were a major contributor to global warming, almost half believed nuclear power was also a contributor.

---

[90] Lowe, T, et al (2005) Does Tomorrow Ever Come? Disaster Narrative and Public Perceptions of Climate Change. Tyndall Centre for Climate Change Research. Working Paper 72

[91] CEC (2008), 'Europeans' attitudes towards climate change', Special Eurobarometer Report 300 Wave 69.2 – TNS Opinion & Social, European Commission, Brussels, September 2008

[92] McGowan, F., and Sauter, R. (2005) Public Opinion on Energy Research: A Desk Study for Research Councils. Sussex Energy Group, SPRU.

[93] CEC (2008), 'Europeans' attitudes towards climate change', Special Eurobarometer Report 300 Wave 69.2 – TNS Opinion & Social, European Commission, Brussels, September 2008

[94] CEC (2003) Energy: Issues, options and technologies. Eurobarometer Special Report 169, Wave 57.European Commission. Brussels

In addition, various studies show that there can be confusion in the public understanding of the term 'renewable energy'. In particular, a study conducted by the UK government revealed that the public seemed more familiar with discussing particular renewable energy sources such as wind, solar etc than the abstract term. Of these sources, there was a higher knowledge of solar, hydro and wind compared to biomass. However, the knowledge about renewables was greater if respondents lived nearby a renewable energy project[95].

6.2.3 Public Opinions of Climate Technologies

There appears to be a correlation between knowledge of a specific technology and a positive opinion/ general approval of it[96]. This is leading to an apparent contradiction that even though concern for climate change is rising in the EU, adverse public perceptions are still seen as a key barrier to the development of some 'climate friendly' technologies in certain areas of the Union.

For example, awareness of bioenergy is very low (2% in a study in Ireland and 8% in one in the Netherlands)[97]. A study in the UK found that while 85% of respondents wanted to increase renewables only 16% supported biomass with nearly 5% opposed, the vast majority just did not know about it. Therefore, while local people accept the need for renewables, they often do not accept the need to build the necessary facilities locally. However the situation in some Member States is more optimistic. Bioenergy is well established in Sweden where public perception is not an issue due to the longstanding use of waste from the paper and pulp industry to produce energy.

Similarly, the majority of the general public have limited knowledge of the relatively new (and still developing) technology of Carbon Capture and Storage (CCS) and so either have no opinion on this technology or are somewhat sceptical[98]. However, it appears that once (even limited) information is provided on the role of CCS in reducing CO_2 emissions to the atmosphere, opinion tends to shift towards slight support for the concept. This is particularly true if CCS is seen as one part of a wider strategy for achieving significant cuts in CO_2 emissions or as a temporary/bridging role until long-term alternatives are developed. As a stand alone option, there is

---

[95] TNS Plc (2003), Attitudes and Knowledge of Renewable Energy amongst the General Public, Report of Findings prepared for Central Office of Information on behalf of Department of Trade and Industry, Scottish Executive, National Assembly for Wales, Department of Enterprise, Trade and Investment, JN9419 and JN9385. Taylor Nelson

[96] Id

[97] Thornely, P. and Prins, W. (2008) Public Perceptions and Bioenergy: Some remarks in preparation of the workshop scheduled for the Themalnet meeting in Vicenza, October 2008, http://www.thermalnet.co.uk/docs/Barriers%20Precisfinal.pdf

[98] Shackley, S. et al (2004) The Public Perceptions of Carbon Capture and Storage. Tyndall Centre for Climate Change Research. Working Paper 44

evidence that the public feel that CCS might delay more far-reaching and necessary long-term changes in society's use of energy[99].

In some Member States a significant sector of the public reject wind turbines in their local area. A study for the UK government in 2003 found that about one fifth of the British general public were against wind farms in their local area, mainly on esthetic grounds, while 28% would strongly approve it[100]. This opposition has in general led to problems with local planning procedures in the UK and to the government considering expensive plans to site large scale wind farms off shore. This negative perception of wind turbines is not, however, the case in all Member States and for instance Germany and Portugal have numerous wind turbines situated on land and even close to recognised areas of natural beauty. There is some evidence in the UK that wind farms can receive a more positive consideration in remote areas, where they also offer direct local benefits such as jobs, and also after respondents have actually seen a wind farm[101].

By comparison to other low carbon technologies, the levels of support for nuclear power have been relatively low in many Member States such as Germany and the UK which have been phasing out nuclear power stations or at least have not built new ones for some years. An opinion poll in the UK conducted by Ipsos MORI, however, shows a significant increase in support for new built nuclear power stations in the UK in recent years[102]. In 2001 they report that only 20% of the UK population supported the building of new nuclear power stations to replace those being phased out compared to around 60% who were opposed. By mid 2007 they report that this had changed to 35% support and 29% opposition[103].

The apparent redemption of nuclear power in the minds of some UK citizens may be due to links being made between nuclear energy and climate change mitigation in the recent UK political agenda and media coverage. A study by Poortinga et al[104] demonstrates that people interpret nuclear energy in a rather more ambivalent or even

---

99 Shackley, S. et al (2004) The Public Perceptions of Carbon Capture and Storage. Tyndall Centre for Climate Change Research. Working Paper 44; ICF International (2007) Analysis and Interpretation of Responses from the Carbon Capture and Storage Internet Consultation. European Commission. Brussels

100 TNS Plc (2003), Attitudes and Knowledge of Renewable Energy amongst the General Public, Report of Findings prepared for Central Office of Information on behalf of Department of Trade and Industry, Scottish Executive, National Assembly for Wales, Department of Enterprise, Trade and Investment, JN9419 and JN9385. Taylor Nelson

101 Id.

102 Ipsos MORI (2007) The Role of Public Perception in Creating a Nuclear Future. Presentation by Robert Knight. June 2007

103 Id. However, a review of public opinion surveys in the UK showed that opinion on the future nuclear construction varied considerably according to different polls and surveys - McGowan and Sauter (2005) Public Opinion on Energy Research: A Desk Study for Research Councils. Sussex Energy Group, SPRU.

104 Poortinga, W., Pidgeon, N. and Lorenzoni, I. (2006) Public Perceptions of Nuclear Power, Climate Change and Energy Options in Britain: Summary Findings of a Survey Conducted during October and November 2005. Understanding Risk Working Paper 06-02. Centre for Environmental Risk, UEA

positive way when it is positioned alongside climate change. However, few of their participants actively and wholeheartedly supported climate change mitigation through new nuclear build as an acceptable policy position[105]. In contrast, the attitude to nuclear power is apparently much higher in France where its use is much more wide spread. A 2001 Ipsos poll found that 70% of the French population had a 'good opinion' of nuclear energy in France and 63% wanted their country to remain a nuclear leader[106].

6.2.4 Public Perceptions of Environmental Policy

The public's views and values on the environment have important implications for policy. It would be difficult for policies to be made and implemented which did not hold the general support of the public. However, neither should governments be discouraged from showing leadership for steering society towards long term solutions to environmental problems. Indeed, it is apparent from the recent *Eurobarometer* surveys that the European public is supportive of EU leadership to help tackle environmental issues, especially since, although they feel willing to act individually, they are apparently yet unable to do so.

This *Eurobarometer* survey showed that while 86% of EU citizens saw themselves as having a role to play in protecting the environment as individuals, their green attitudes did not always translate into concrete actions[107]. On average the survey revealed that a European citizen had done only 2.6 things for environmental reasons in the past month. A large number (59%) had separated their waste, followed by nearly half (47%) who indicated that they had cut down their energy consumption and over a third (37%) who had cut down their water consumption. All of these choices were considered to be linked to the citizens' everyday life and somewhat 'passive'[108]. More 'active' choices which could be more directly linked to environmental concerns were even rarer. For example, while 75% of respondents said that they were ready to buy environmentally friendly products even if they were more expensive, only 17% had actively done so in the last month. The recent *Eurobarometer* survey on climate change revealed that 61% of Europeans surveyed claim to have taken some form of personal action to combat climate change. The most common activities undertaken include those which require the least personal and financial commitment, such as waste separation and reducing energy and water consumption. Activities requiring more personal and financial commitment such as purchasing a more environmentally friendly car, avoiding short-haul air travel, and switching energy suppliers were much less popular[109].

The *Eurobarometer* survey of public opinions on the environment revealed that EU citizens felt that the best way to tackle climate change and energy-related issues was

---

[105] Id.

[106] Embassy of France in the U.S. (2001) Nuclear Notes from France: Summer 2001. http://www.ambafrance-us.org/intheus/nuclear/n2f2/summer2001.asp 15/04/08.

[107] CEC (2008) Attitudes of European Citizens Towards the Environment, Eurobarometer Special Report 295 Wave 68.2TNS Opinion and Social, European Commission, Brussels

[108] Id.

[109] CEC (2008), 'Europeans' attitudes towards climate change', Special Eurobarometer Report 300 Wave 69.2 – TNS Opinion & Social, European Commission, Brussels, September 2008

at an EU level. Two-thirds (67%) of European citizens preferred environmental decisions to be made jointly within the EU. Environmental policy actions at the EU level were widely encouraged in every country and 82% of respondents agreed that European environmental legislation was necessary and 80% believed that the EU should assist non-EU countries to improve their environmental standards[110]. Furthermore, when presented with the EU's climate and energy targets for 2020 (to reduce GHG emissions by 20%; the related 30% international target for reducing GHG emissions; and increasing the share of renewables in the EU's total energy supply to 20%) the majority of respondents to the *Eurobarometer* survey on climate change considered the targets to be 'about right' or 'too modest'. However, given the results of the survey regarding public knowledge on climate change, these judgments are based on limited understanding of how the targets will be met and their domestic implications[111].

Further to this, the European Commission claimed that the survey also showed that Europeans do not see environmental legislation as a threat to the EU's competitiveness agenda. Nearly two thirds of Europeans in the survey felt that protecting the environment was more of an incentive to innovate (63%) than an obstacle to economic performance (16%). In addition, two thirds (64%) of respondents felt that protecting the environment should be given priority over economic competitiveness. Indeed, 78% of respondents would have accepted increased EU funding for environmental protection even if it came at the expense of other areas. However, *which* other policy areas should be subordinate to environmental protection was not specified[112]. Other studies have found that the importance of climate change was in fact secondary in relation to other personal and social issues such as health, family, safety and finances[113]. Therefore, it is possible that the responses to *Eurobarometer*'s question may have been different if the question had been phrased differently and/or hard choices had had to be made.

6.3 U.S. Public Perceptions

The American public has become increasingly aware of the threat of global warming as a consequence of the extreme weather patterns they have experienced in recent years as well as more frequent domestic media coverage of the issue. This increased concern is reflected in the more prominent role environmental issues are playing in the ongoing election campaign. However, this increased public awareness has yet to

---

[110] CEC (2008) Attitudes of European Citizens Towards the Environment, Eurobarometer Special Report 295 Wave 68.2TNS Opinion and Social, European Commission, Brussels

[111] CEC (2008), 'Europeans' attitudes towards climate change', Special Eurobarometer Report 300 Wave 69.2 – TNS Opinion & Social, European Commission, Brussels, September 2008

[112] CEC (2008) Attitudes of European Citizens Towards the Environment, Eurobarometer Special Report 295 Wave 68.2TNS Opinion and Social, European Commission, Brussels

[113] Lorenzoni, I., and Pidgeon, N. (2006) Public Views on Climate Change: European and USA Perspectives. *Climate Change* 77, 73-95.

be reflected in official government policies at the Federal level which continue to lag behind and frustrate international efforts to tackle climate change.

6.3.1 Public Opinions of Environment and Climate Change

There has been a significant increase in public concern about global warming in the U.S. A comparison of the results of two surveys, carried out in 2003 and 2006, indicates that the percentage of the American public that ranked global warming as the top environmental priority tripled between 2003 and 2006[114]. A *New York Times / CBS News Poll*, conducted in April 2007[115], indicates that over 90% of the 1052 people surveyed considered global warming to be a serious or very serious problem. 52$ of those surveyed state that global warming should be one of the highest priorities for government leaders, while 78% of those polled maintained that action to counter the effects should be taken immediately. Americans are typically portrayed as being economically focussed, however, when asked about the trade-off between stimulating the economy and protecting the environment, 52% of respondents said that the environment should take precedence (compared to 36% which supported the economy). A recent Gallup poll conducted in March 2008 indicates that Americans continue to favour protection of the environment even at the risk of reducing economic growth – a finding which is particularly pertinent given the impending recession in the U.S. and global economy[116].

These results were reflected in another poll undertaken in the same time period by the *Washington Post, ABC News* and Stanford University[117] which surveyed a nationwide sample of 1002 adults. Global warming / greenhouse effect / climate change is considered by 33% of the sample to be the single biggest environmental problem being faced by the world; this is double the number who ranked it as the top environmental problem in the same poll carried out in 2006. The next biggest environmental problem is considered to be air pollution (by 13% of the sample in both 2006 and 2007). 52% of the sample said that global warming was important to them personally, with 18% saying that it was extremely important to them.

While the U.S. public's concern over global warming has risen to the top of the list of environmental issues, it is still not considered a major national priority. A 2006

---

[114] MIT LFEE, 2007, 'A Survey of Public Attitudes towards Climate Change and Climate Change Mitigation Technologies in the United States: Analyses of 2006 Results' April 2007, Massachusetts Institute of Technology, Laboratory for Energy and the Environment, MA

[115] New York Times, (2007), New York Times / CBS News POLL, April 20-27 2007, http://graphics8.nytimes.com/packages/pdf/national/20070424_poll.pdf.

[116] Gallup, 2008, Gallup Poll – Environment, 6-9 March 2008, http://www.gallup.com/poll/105715/Half-Public-Favors-Environment-Over-Growth.aspx

[117] Washington Post, (2007), Washington Post – ABC News – Stanford University Poll: Environment Trends, Friday April 20, 2007, http://www.washingtonpost.com/wpsrv/nation/polls/postpoll_environment_042007.html.

survey sponsored by MIT[118] indicated that the main concerns of the American public continue to be terrorism, foreign policy, health care and the economy. Comparing results to a similar survey carried out in 2003, concern about the environment grew slightly but continued to rank in the middle range of all the national issues listed[119]. The most recent survey undertaken by the Pew Research Centre in February 2008 among a sample of 1,508 adults[120], indicates that developing new sources of energy was considered by the majority (54%) of those surveyed to be a more important priority for the country than protecting the environment. Thus while there has been a growing concern for environmental issues, this continues to be over-shadowed by other issues considered to be of higher national importance.

6.3.2 Public Awareness and Understanding of Environment and Climate Change

The American public is typically more sceptical of the science behind climate change. In the 2007 *Washington Post* poll, 56% of the sample believed that there is still a lot of disagreement among scientists on the issue of whether or not global warming is happening. This public doubt over the scientific consensus behind global warming, which in general terms has been declining, is contrasted by growing evidence of the effects of climate change. In the 2007 *New York Times* poll, 75% of those surveyed recognise that weather patterns over the past few years have been 'stranger than usual', of this group 43% recognised that this peculiarity was due to global warming, with only 11% saying it was part of the natural cycle. Furthermore, 41% of those surveyed felt that the rise in world temperatures is being caused 'mostly by things people do'. Regarding their knowledge of global warming, 51% of the sample felt they knew a 'moderate' amount about the issue, with 37% admitting they knew little/nothing about it.

In the 2007 *New York Times* poll, 89% of the sample had heard or read of the term global warming (42% has heard a lot about it, while 47% had heard something about it), with 21% of the sample agreeing that the release of greenhouse gases is the most important factor causing global warming (while 62% thought greenhouse gas emissions were one among many factors). Given the popularity of Al Gore's documentary 'An inconvenient truth' in other parts of the world, and the international recognition of his efforts through the joint awarding of the Nobel Peace Prize in 2007, 82% of those surveyed had not seen this movie.

In analysing public understanding and knowledge of CO_2 sources and sinks, the two MIT surveys provided a list of technologies and natural resources and asked about the CO_2 emissions / reductions of each. In both 2003 and 2006, the public seemed to understand that automobiles, coal burning power plants and factories were significant sources of CO_2 , while they were more unsure of the impacts of nuclear power plants and oceans.

---

[118] MIT LFEE, 2007, 'A Survey of Public Attitudes towards Climate Change and Climate Change Mitigation Technologies in the United States: Analyses of 2006 Results' April 2007, Massachusetts Institute of Technology, Laboratory for Energy and the Environment, MA

[119] Id.

[120] Pew Research Centre, 2008, 'Public Sends Mixed Signals on Energy Policy: Ethanol Research Loses Ground, Continued Division on ANWR', The Pew Research Centre for the People and the Press, Thursday, March 6, 2008, http://people-press.org/reports/display.php3?ReportID=400

Thus while there has been an increased recognition of the problem of global warming, and the fact that human activities are in part responsible for this increase in temperatures, there appears to be little understanding of the underlying carbon cycle and detailed knowledge of global warming appears limited.

6.3.3 Public Opinions of Climate Technologies

The two MIT surveys also attempted to analyse changes in the public's awareness of the technologies available to address global warming from 2003 to 2006 and included questions on whether or not participants had heard or read about certain environmental and energy technologies. While the majority of those surveyed in both 2003 and 2006 had at least heard of hybrid/efficient cars, renewable energy technologies and more efficient appliances, hardly any had heard of carbon capture and storage or carbon sequestration, while very few had heard of bioenergy/biomass. The results of the survey also indicated that respondents were unclear of the environmental problem carbon capture and storage aimed to address.

In the 2007 *New York Times* poll, 48% of those surveyed considered using coal to generate electricity 'mostly a bad idea' compared to 43% that considered it to be 'mostly a good idea'. The use of renewable energy sources to generate electricity was considered to be 'mostly a good idea' by 87% of the sample, while only 9% thought the use of renewable energy sources was 'mostly a bad idea' agreeing with the statement that they are costly and unreliable. There was 70% support for the use of ethanol as a substitute for foreign oil, and 58% of the sample thought the use of nuclear power to generate electricity was a 'bad idea' given the associated risk and the issue of waste disposal. The 2008 Pew survey indicates that the public remains divided over the issue of nuclear power, with 44% favouring government policies that support nuclear power and 48% against it. 57% of those surveyed also support increased federal funding for ethanol research, a fall of 10% from 2006.

Despite increasing awareness of the issue of global warming, public knowledge of the most appropriate technologies to address the issue remains limited.

6.3.4 Public Perceptions of Environmental Policy

The above analysis of opinion polls indicates that the American public is increasingly more concerned with global warming, which is reflected in a significant increase in public support for action to address climate change. In the 2006 MIT survey, the majority of those surveyed felt that the scientific evidence available warrants action, representing a significant increase in support since 2003. The two surveys also revealed that the public's willingness to pay to 'solve' global warming increased by 50% between 2003 and 2006. However, a question included in the 2006 survey to assess the public's willingness to pay a revenue-neutral carbon tax, was supported by a third of the sample and opposed by another third, with more respondents strongly opposing the proposal than those that strongly supported it.

In the 2007 *New York Times* poll, 63% of those polled agreed with the statement that 'protecting the environment is so important that requirements and standards cannot be too high and continuing environmental improvements must be made regardless of costs'. With 64% stating that they would be willing to pay higher taxes on fuels to

fund research into renewable energy sources and 75% stating they would be willing to pay more for their electricity if it was generated from renewable sources, and thereby would help to reduce global warming. However, when asked whether they had purchased specific products that were good for the environment, although being more costly, only 6% of the sample answered that they had purchased a hybrid / fuel efficient car, 18% had purchased environmentally-friendly household products while 45% had done nothing. 57% said that they did not car pool to work while 61% stated that they did not take public transport. Furthermore, 92% of the sample stated that they do not use renewable energy in their homes. While the vast majority of the sample (92%) supported requirements for car manufacturers to produce more energy efficient cars; 58% were opposed to the introduction of a federal tax on gasoline to reduce energy consumption. Interestingly, 64% supported a federal tax on gasoline for the purposes of reducing U.S. dependence on foreign oil. This reveals the reluctance among the public to make 'costly' changes to their personal lifestyle despite an increased recognition of the problem of climate change.

The 2007 *Washington Post* survey reiterated the reluctant attitude to pay for environmental goods, with 79% of the sample opposing higher taxes on electricity to encourage reduced consumption, and 67% opposing higher taxes on gasoline to reduce car use or encourage purchases of more efficient vehicles. The sample tended to marginally prefer tax breaks (44%) to government legislation (42%) to encourage the production of more fuel efficient cars. The sample also tended to favour tax breaks for encouraging the development of energy-efficient appliances and buildings. 62% of the sample favoured the introduction of government legislation to reduce the greenhouse gases that power plants are allowed to emit. 94% of those surveyed said that they would be willing to make personal lifestyle changes to help improve the environment, and interestingly the majority maintained that they have already undertaken measures to reduce energy consumption, recycle, and reduce water use in their homes. The majority of those surveyed also said they would support the introduction of legislation to encourage such behaviour at the local level.

The 2008 Pew survey, indicated broad public support for government legislation that required better auto fuel efficiency standards (90%); increased federal funding to develop alternative energy sources such as wind, solar and hydrogen technology (81%) and mass transit (public transport) including subway, rail and bus systems (72%). The survey indicated that the majority of the public also opposed increases in fuel taxes that would to encourage fuel conservation and stimulate changes in behaviour such as car pooling.

When asked which level of government should be responsible for setting environmental protection mechanisms, half of the sample surveyed in the 2007 *New York Times* poll responded that it should be the federal government while 40% advocated action at the regional level to state government. Thus there is slight preference towards action to tackle climate change to be taken at the federal level. While supporting federal action to promote renewables, improve public transport, encourage the production of fuel-efficient cars and limit emissions from power plants, the majority of people surveyed are opposed to the introduction of taxes on electricity or gasoline, even though such measures would help to reduce global warming. There is an indication of an increasing willingness among the American public to make lifestyle changes in certain areas; as is evident in the number of people already reducing their energy / water consumption and recycling in their homes, while there is

greater reluctance to take on 'costly' measures in other areas, such as reducing personal car use.

The U.S. public has shown a significant dissatisfaction with the way its current leaders are handling the issue of climate change. The 2007 *New York Times* poll indicated that 56% of those polled disapprove of the way that President Bush is handling the environment. This dissatisfaction is mirrored in the *Washington Post* poll in which over half of the sample surveyed trusted the Democrats in Congress to handle issues related to the environment and global warming better than George Bush. 70% of those surveyed also thought the federal government should do more than it is currently doing to reduce global warming, with 49% maintaining that it should do 'much more'.

An analysis of over forty public opinion surveys from 1989 – 2002 by Thomas Brewer[121] revealed that the majority of the U.S. public supports the participation of the U.S. in the Kyoto Protocol and disapproves of the administration's withdrawal from the process in 2001. Similarly Brewer finds that the majority of the public supports mandatory emissions reductions for industry and tough government action to reduce global warming. He also undertakes a very interesting comparison of U.S. public perceptions with the opinions of U.S. leaders based on a survey sponsored by the Chicago Council on Foreign Relations and the German Marshall Fund which indicated that while almost half of the public surveyed considered global warming to be a significant threat to the interests of the U.S. in the next ten years, less than a third of U.S. leaders surveyed felt the same way. This significant gap between perceptions of U.S. leaders and the public is evident in the public's dissatisfaction with the approach of the U.S. administration as outlined above.

The results of the polls analysed indicate that the public generally disagrees with the approach being taken by the current administration. The U.S. public appears to support increased government action to help reduce global warming, encourages its participation in the Kyoto Protocol process, and is in favour of mandatory domestic emissions reductions. There appears to be a significant divergence in opinion between the general public and its perceptions of the risk of global warming and the perceptions of current U.S. leaders. The 2007 *New York Times* survey indicates that 35% of those polled said they would not vote for a candidate that did not share their views on the environment. It will be interesting to see whether or not this increased concern with environmental issues will be reflected in the results of the upcoming presidential elections.

6.4 Conclusions

Comparing the public perceptions of environmental issues and climate change on either side of the Atlantic is tempting but nevertheless fraught with difficulties. As briefly discussed above, not only do the survey approaches, articulation of questions and time frames vary between studies, but there are significant differences in geographical scope. Although perceptions are no doubt not uniform across the States

[121] Brewer, T.L., (2003), 'U.S. Public Opinion on Climate Change Issues: Evidence for 1989 – 2002', 18 June 2003, paper prepared for conferences on climate change issues at the Georgetown University McDonough School of Business in Washington DC in 2002 and 2003.

in the U.S., studies discussed in this paper mainly refer to the U.S. population as a whole. In contrast, only *Eurobarometer* studies conducted on behalf of the European Commission have so far given a picture of public perceptions across all EU Member States. Indeed from these studies it is clear that public opinion and understanding of environmental issues varies significantly between different EU Member States. Many of the other studies conducted in the EU in fact focus on only one Member State and much of the academic findings described in this paper focus on the UK alone. It is therefore difficult, though not impossible, to make generalisations on an EU public position with which to contrast to that of the U.S. However, there are a few obvious points of comparison which do appear from the surveys discussed in this paper.

Considering the difference in the governmental responses in the EU and the U.S., there are more apparent similarities between the public perception of environmental issues and climate change than might be expected. First, it is apparent that there has been a recent increase in concern about climate change in both the EU and U.S. and in both jurisdictions climate change is considered the most important environmental concern, with pollution as the next most significant issue. There was also in general support for renewable energies and mixed attitudes towards nuclear power. Interestingly, there is also an apparent discrepancy in both the U.S. and EU between the high importance placed on environmental protection, including the apparent willingness to pay for this choice at a policy level, and individual behaviour. Few of the surveyed citizens in either the U.S. or EU had backed up their positive attitude towards the environment with recent environmentally friendly purchases or choices in their everyday lives such as cutting down on their car use or the use renewable energies in their own homes. Furthermore, there remains a limited understanding of the underlying causes of climate change and the technologies available to address it among both the EU and U.S. public. This lack of understanding could limit the policy options available to decision-makers and may become a barrier to implementing appropriate solutions that address the issue.

There are, of course, also differences between the common public perceptions in the U.S. and EU. In particular, there appears to be a significant degree of scepticism of the science of climate change in the U.S. with 57% of respondents in one survey believing that there was still a lot of disagreement among scientists on the issue of whether or not global warming is happening. While, there is no directly comparable question in the EU surveys with which to compare this result, it is hard to believe that, in some Member States at least, a similar degree of scepticism would have been found in the last few years. It is also apparent that energy security may be more important in the U.S. than in the EU and this is given greater priority than environmental protection by a significant number of Americans. This attitude is also reflected in the high degree of support that is still found in the U.S. for electricity generated by coal fired power stations.

In terms of public perceptions of environmental policy, there appears to be a high degree of support for action to protect the environment and to tackle climate change at the State and Regional level in the U.S. and at the EU level in Europe. This is particularly interesting since, as stated in the introduction, the governmental approaches to climate change have been so different. The reasons for this disjuncture between apparent public support and governmental policy in the U.S. are most probably multiple and complex and cannot be discussed within the context of this paper. However, they may relate to the relative importance of other policy areas -

such as terrorism, or the traditionally relatively low levels of government intervention, as well as a reliance on energy intensive lifestyle patterns and infrastructure issues. However, the recent emphasis given to environmental issues in the ongoing selection of presidential candidates may well indicate a greater alignment between public perceptions and governmental action in the U.S. in the near future.

In the EU in contrast, it is conceivable that action on climate change at an EU level may even be ahead and indeed leading public opinion on the issue. The recent publicity of the (carefully worded) *Eurobarometer* survey showing public support for action on climate change may have served as a way of legitimising not just EU action in this area but also potentially the EU project as a whole. As McGowan and Sauter warn us:

> *"it is not unreasonable to assume that many of these polls are commissioned as much to shape the public agenda as they are to gather information on public attitude. Most of the organisations involved in polling have specific causes or interests which they are seeking to promote or defend"*[122].

With this warning in mind, it is interesting to note that the Commission claimed that the findings of the survey lend support to the expanding EU environmental *acquis* in general, as well as to recent proposals to tackle climate change in particular. This apparent widespread support for tackling environmental issues at an EU level has important implications not only for environmental policy making but also for the 'EU Project' as a whole. Tackling issues which are important to EU citizens such as environmental issues and climate change, clearly illustrates the EU 'added value' and could help to boost the EU's ratings with European public.

.

[122] McGowan, F., and Sauter, R. (2005) Public Opinion on Energy Research: A Desk Study for Research Councils. Sussex Energy Group, SPRU, p.28

7 BIOFUELS FOR TRANSPORT

April 2008

Authors:
Catherine Bowyer – Senior Policy Analyst, IEEP
Malcolm Fergusson – Senior Fellow, IEEP
Christine Erickson – International Program, NRDC
Melanie Nakagawa – Attorney, NRDC

7.1 Introduction

Biofuels offer the potential for environmental benefit or environmental catastrophe. They have enormous potential for climate change mitigation, energy security, and economic development. Additionally, high concentration biofuel blends can produce fewer air pollutants than gasoline. If developed in unsustainable ways, however, biofuels can be a driver for land-use change, loss of carbon stores via deforestation and ploughing up grasslands, biodiversity loss via agriculture intensification and expansion, and water and air pollution. The policies used to promote biofuels will determine which of these contradictory paths is followed.

Growth in the production biofuels will occur regardless of whether the environmental community supports it. While the potential reductions in carbon emissions is one driver, pressures in terms of the security of energy supply are seeing ambitious targets for biofuels uptake being put forward in both Europe and the U.S. The International Energy Agency projects a growth rate for the production of biofuels of between 7% and 9% per annum until to 2030, increasing the use of biofuels for road-transport fuel from 1% to between 4% and 7% globally[123]. The amount of land used to cultivate feedstock for ethanol is projected to more than double or even triple by 2030. Consumption of biofuels will be concentrated in the U.S. and Europe. The U.S. is already the largest biofuels producer and consumer by volume, having recently surpassed Brazil. It is expected to maintain the highest growth rate, although will be closely followed by Europe[124].

While biofuels are a significant element of climate change policy packages in both the EU and the U.S., perspectives on biofuels differ across the Atlantic. There is an acceptance in the U.S. that biofuels production in inevitable, while in Europe there is still much more of a debate. Biofuels remain an expensive way of reducing greenhouse gas emissions, but they remain one of only a handful of options available to curb the ever burgeoning emissions from the transport sector (the other key measure being to force carmaker's to reduce CO_2 emissions from the fleet by increasing efficiency of fuel use)[125].

---

[123] IEA. "World Energy Outlook 2006: Fact Sheet – Biofuels," http://www.iea.org/textbase/weo/fact_sheets/fs_biofuels.pdf.

[124] Ibid.

[125] European Commission, Communication from the Commission – Biomass Action Plan, COM(2005)628, 7.12.2005 – Page 6

This paper is intended to introduce the current situation in terms of both policy and the market for biofuels in the EU and U.S. We then examine the key issues of interest for civil society in terms of the development of biofuels. There is obviously the fundamental question of whether biofuels should be supported at all, however, given the rapid expansion of the market it is important to consider:

- how sustainability requirements can be applied effectively;
- how GHG savings might be ensured;
- what the land-use impacts of biofuel expansion might be and conflicts with other demands for biomass in terms of energy and food; and
- how, when and whether to support the push for second generation/advanced biofuels.

7.2 European Policy Approaches

7.2.1 Nature of the market

The EU is reliant on other countries for a huge proportion of its energy; approximately 48% of all energy is imported[126]. The level of dependency upon imported fuels varies according to fuel type, but importantly many of Europe's existing oil fields are expected to be exhausted in the medium term; remaining reserves are relatively limited and expected to be more problematic to exploit. Meanwhile, energy consumption within the transport sector is growing exponentially, having increased by 22% between 1990 and 2000[127]. Currently the transport sector is almost completely dependent on oil as its primary fuel source.

Aviation is the fastest expanding transport sector, however, road vehicles account for a predominant 72% of transport's energy use (see figure 1). Between 1990 and 2001, greenhouse gas emissions from Europe's transport sector increased by a comparable 21%[128]. This masks, however, very large disparities in emission increases between Member States. Over this period Ireland's emissions increased by 124% and Portugal's by 81%; meanwhile Finland's emissions only increased by 1%. Carbon dioxide accounts for 97% of the greenhouse gas emissions from the Europe's transport. In turn, road transport is by far the largest contributor to CO_2 emissions, responsible for 92% in 2001. Emissions from the transport sector are expected to continue to grow, projected to be 39% above 1990 levels by 2010[128].

---

[126] European Environment Agency, Indicator Fact sheet, TERM 2003 01 EEA-17 — Transport final energy consumption by mode, Feb 2004, http://themes.eea.europa.eu/Sectors_and_activities/transport/indicators/consequences/TERM01%2C2003/TERM_2003_01_EEA17.pdf.

[127] Id.

[128] Id.

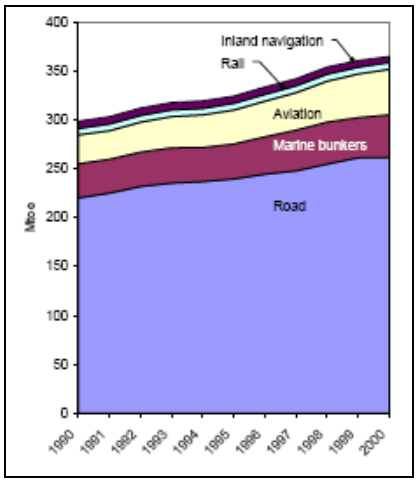


Figure 1 – Energy Use split by transport sector for the EU 15 plus Norway and Iceland (EEA 17). This demonstrates the increase in consumption between 1990 and 2000. It also demonstrates the dominance of road transport in terms of emissions and the growth still being experienced in this sector**.**

Unlike the U.S., Europe is making use of significant quantities of biodiesel as well as bioethanol. The EU is the world's biggest producer (although not all feedstocks for production come from within the EU) and user of biodiesel; 2 million tonnes were manufactured in 2004. Germany is by far the most prolific producer, followed by France and Italy. According to the European Commission, however, the EU has greater capacity to produce bioethanol than biodiesel[129]. Currently bioethanol generation is concentrated in Spain, France and Sweden,[130] however, overall EU production is far behind that of the major producers, i.e. Brazil and the U.S. Production of ethanol in Europe is less than a quarter of that in Brazil or the U.S.

The renewable transport fuel Directive[131] sets out reference values, essentially indicative targets for the uptake of biofuels in Europe, of 2% by 2005 and 5.75% by 2010. Figure 5 illustrates the actual uptake of biofuels in reporting Member States by 2005; clearly the 2005 indicative target was missed in the majority of countries with only Germany and Sweden having significant biofuel market shares.

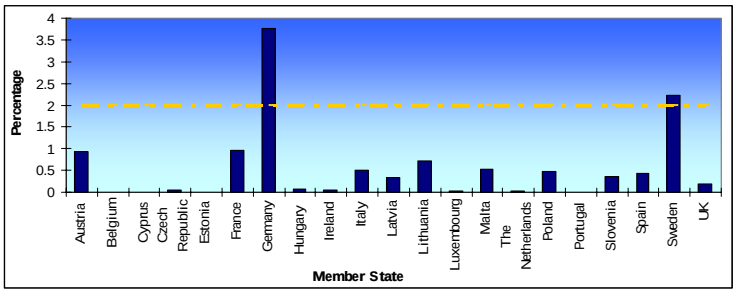


Figure 2 – Use of biofuels in Member States as a percentage of total fuel used in 2005. Dotted line marks the biofuels Directive reference value for 2005 ie the indicative target to fuel uptake[132].

[129] European Commission, Communication from the Commission – Biomass Action Plan, COM(2005)628, 7.12.2005, 11.

[130] EurObservER 2005.

[131] Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport, 15.5.2003 http://ec.europa.eu/energy/res/legislation/doc/biofuels/en_final.pdf

[132] European Commission, Communication from the Commission to the Council and the European Parliament, Biofuels Progress Report, COM(2006) 845, 10.1.2007

7.2.2 EU and Member State Policy Approaches

EU Approaches to Promoting Development

Directive 2003/30/EC for the promotion and use of biofuels or renewable fuels for transport[131] (known as the Biofuels Directive) requires Member States to ensure that a 'minimum proportion' of biofuels is put on the market. In order to do this Member States must set national indicative targets. 'Reference values' for these targets are set in the Directive at 2% at the end of 2005, rising to 5.75% in. However these values are not legally binding, and the 2005 goal has already been missed.

The biofuels Directive did not have an easy birth. When the measure was first proposed by the European Commission it caught many by surprise. Despite previous requests for action on alternative transport fuels, from the Heads of the EU Governments, many thought the Commission's Directorate General on Transport was uninterested in this issue. There were significant objections raised to the original proposal text with the Commission accused of only involving a small group of vested interests in the proposal's development. Environmental groups reacted to the proposals with a mix of caution and dismay, concerned that the balance of biofuels' environmental costs and benefits had not been properly considered. The proposals were subsequently watered down and refined during codecision[133] where mandatory targets for biofuel uptake were converted to the much weaker system of reference values. Importantly, clauses were also added to counter concerns over biofuels' environmental impacts; as a result Member States have to take into consideration the 'overall climate and environmental balance' of different biofuels and are permitted to preferentially promote those with the 'most cost-effective environmental balance.'[134] There is, however, no consideration or guidance setting out how this should be done.

Future Biofuels Legislation

Since the adoption of the Biofuel Directive pressure, particularly in terms of the security of energy supply, has mounted. The use of biofuels, and more generally biomass for energy, has increasingly been seen as a way of securing Europe's energy future, ensuring diversity in terms of energy sources and at the same time reducing carbon intensity. At the end of 2005, the Commission published an action plan on the use of biomass for energy[135]; this was closely followed by an EU strategy for biofuels in mid 2006[136]. These discussion documents set the scene for more robust legislation encouraging the use of biofuels in the transport sector and importantly the proper consideration of sustainability and climate impacts within this.

---

[133] The approval process where by the European Parliament and Council of the European Union (upon which all Member States are represented by their Ministers of State) negotiate the final content of a legislative measure amending the European Commission's original proposed text.

[134] Article 3 of Directive 2003/30/EC.

[135] European Commission, Communication from the Commission – Biomass Action Plan, COM(2005)628, 7.12.2005.

[136] European Commission, Communication from the Commission: An EU Strategy for Biofuels, COM(2006)34, 8.2.2006.

On the 10 January 2007, the European Commission published (what has been termed) 'The Energy Package', which includes future targets and measures across the sphere of EU energy policy[137]. Importantly, it contained plans to adopt new, mandatory and much more ambitious targets for the uptake of biofuels e.g. 10% of all road fuels by 2020. This is well beyond what is either technically possible through current or envisaged levels of blended fuels, and probably also beyond Europe's capacity to supply its own needs. Member States have agreed to this ambitious and mandatory target, but have stated their support is subject to second generation fuels coming on stream and the adoption of measures to ensure the sustainability of the biofuels used. A legislative proposal formally setting the new biofuels target, alongside equally ambitious requirements for renewable energy, is expected to be adopted in early 2008. Formal requirements for the sustainability of fuels used in Europe are expected to be put forward in this measure.

Somewhat surprisingly, barely a week after the Energy Package was launched, the European Commission adopted a proposal to amend the EU's fuel quality Directive[138]. Historically this has been a very technical measure concerned only with fuel quality parameters, but controversially the Commission's Environment Directorate used its review to radically extend the Directive's scope by inserting two new clauses relating to biofuels. The most important of these, mirroring developments in California although more restricted in scope, seeks to ensure the progressive decarbonisation of transport fuels. Under current proposals (the exact requirements may be amended as the measure is approved in codecision) as of 1 January 2011 Member States must ensure the progressive reduction of life cycle greenhouse gas emissions from transport, by 1% per year between 2011 and 2020 such that by 2020 it will be 90% of the level reported in 2010. It is estimated that this measure should save 100Mt of CO_2 equivalent per year by 2020.

By inserting GHG requirements into the fuel quality Directive the Commission has been accused of pre-empting the debate under the energy package and complicating the future regulation of biofuels. Certainly the proposed 10% reduction target appears to imply an even more demanding target for biofuels than that proposed in the Energy Package. To understand how these two parallel measures came to be launched at the same time, one must be aware of the political background to their development. The Commission's Environment Directorate General has, for a long time, had concerns about measures promoting biofuels use. The development of these measures has primarily been driven by the Directorates General for Agriculture and for Energy and Transport. There have been concerns that sustainability standards, when they emerge, may not be as robust as deemed necessary by environmental groups. This measure attempts to provide a security mechanism to ensure that the unfettered expansion of the biofuels sector is at least subject to the need to continually improve performance in terms of GHG emissions, albeit only after 2010. Additionally, it would potentially forestall the introduction into Europe of new synthetic fuels with very high life-cycle carbon emissions, such as those sourced from coal, oil shale or tar sands.

---

[137] European Commission, Energy for a Changing World, http://ec.europa.eu/energy/energy_policy/documents_en.htm.

[138] European Commission, Proposal for a Directive of the European Parliament and of the Council amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and the introduction of a mechanism to monitor and reduce greenhouse gas emissions from the use of road transport fuels and amending Council Directive 1999/32/EC, as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC, COM(2007)18, 31.1.2007.

This measure was much delayed by political infighting within the Commission, and upon its adoption was welcomed by Green NGOs and Members of the European Parliament. The oil industry is thought to be opposed to such curbs on conventional fuels (though quite willing to see carbon targets for biofuels), but Europia (the European umbrella body for the downstream oil industry) did not react immediately except to criticise the decreasing level of policy coherence in biofuel policy. It is understood that some oil companies may be less opposed to the idea than the others. Meanwhile, the proposal appears to have survived a motion by Member States to block the inclusion of GHG limits. The UK initially tried to develop a blocking minority in the Council, but appears now to have altered its position, so the prospects for the inclusion of this clause in some form are now greatly increased.

Funding Energy Crop Development and Adoption of Biofuels

Historically there has been financial support for growing energy crops in Europe, albeit to a much more limited extent than for food production. Set-aside measures in Europe require farmers to exclude a certain proportion of farmland from specific arable production. In return they receive a payment from Europe intended to prevent over production and generation of the notorious 'food mountains'. While food crops can not be grown on set-aside land energy crops can without the farmer foregoing set-aside payment. The cultivation particularly of rapeseed for biodiesel commonly occurs on set-aside land (although by no means all). Additionally, the EU provides a limited amount of subsidy supporting the production of energy crops in the EU. The funding structure for agriculture in the Europe and importantly energy crops looks set to dramatically change however. The level of set-aside has recently been reduced to zero, and the 'Health Check' scheduled for 2008 and 2009 on the EU's Common Agricultural Policy (CAP) looks set to get rid of set-aside and alter the approach to funding energy crops.

There are other sources of funding helping to support the development of the biofuels industry in Europe. 2007 saw the commencement of a new funding period (which extends until 2013). Under this the Commission has specifically asked Member States to consider funding of biofuel and biomass development. This could be in the form of part-funding the construction of processing plant all the way down the supply chain to helping educate farms about the growing of energy crops. Key mechanisms for the funding of biofuels projects include under the new Rural Development Fund[139] and the broader measure on Competitiveness and Innovation in the EU,[140] which focuses on the development of new technologies.

7.2.3 Member State Approaches to Promoting Biofuel Development

The level of ambition in terms of developing and adopting biofuels for transport varies dramatically across European nations. Historically Germany, France and

---

[139] Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development, 21.10.2005, http://eur-lex.europa.eu/LexUriServ/site/en/oj/2005/l_277/l_27720051021en00010040.pdf.

[140] Decision No 1639/2006/EC of the European Parliament and of the Council of 24 October 2006 establishing a Competitiveness and Innovation Framework Programme (2007 to 2013) http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_310/l_31020061109en00150040.pdf

Sweden have been the main users. The former two have been particular protagonists calling for the support of biofuel development in Europe. Member States have, however, all struggled to adopt effective policies that would support the integration of biofuels into main stream fuel supplies. For example, much of the biodiesel usage was from the use of high blends for particular vehicle niches rather than low level blending across the economy. This picture is, however, changing; as it must do if Europe stands any chance of meeting the ambitious 2020 target. This would require much broader adoption across the whole vehicle fleet at lower levels of blend.

In response to this, and pressure to better consider second generation methods and sustainability of fuels, Europe is currently witnessing a shift in the nature of policy support for biofuels. Historically tax incentives and exemptions, albeit in a variety of different permutations, were most popular. These were intended to make biofuels, which are still more expensive than fossil oil, competitive by relying on market pressures to bring about their broader use. As the market and policy has developed, however, there has been a rapid shift towards the use of obligations. These oblige fuel companies to blend a certain proportion of biofuels into petrol and diesel supplies. Each has an obligation to achieve a certain level of blending and faces financial penalties if they fail to do so.

Obligations are now the favoured format for national policy, as they drive the potentially rapid transformation of the entire fuel market. It is considered that they allow targets to be achieved more cost effectively than tax exemptions and allow difficulties with tax exemptions, e.g. what should they be applied to and how should quantities be controlled, to be overcome. Additionally, obligations suit the political mood as Europe's governments become less willing to provide tax exemptions generally due to spending and other political pressures. Finally, and positively for the environment, obligations are believed to allow more scope for the favourable treatment of second generation fuels and fuels meeting sustainability standards.[141] The UK's obligatory system, termed the Renewable Transport Fuel Obligation (RTFO), is one of the most well established. It looks likely that the Commission will support the use of obligations in their 2008 proposals.

7.2.4 Ensuring Sustainability

The sustainability of biofuels is a hotly-debated topic in Europe, with the terms of debate comparable but subtly different from that in the U.S.. There are increasing concerns over the impact that the rapid expansion in Europe's biofuel sector will have. Both direct and indirect impacts, particularly upon biodiversity and water resources, both within and outside the EU, are a concern. Additionally, if biofuels are to be seen as a technology for the reduction of GHGs there is a need to be able to measure the reductions they deliver and ensure that these are maximised. Europe has been at the forefront of the movement pushing for the adoption of standards to ensure that biofuels are in fact the sustainable solution that they have the potential to be.

The proposals to amend the fuel quality Directive (discussed in section 7.2.2) are an attempt to ensure the reduction in GHGs from the whole transport fuel sector. Additionally, broader sustainability standards for biofuels are expected to be put forward in the 2008 proposals. Meanwhile, Member States have been very active in

[141] Biomass Action Plan, note 8.

developing their own approaches to sustainability requirements with efforts well advanced in the UK, the Netherlands, and Germany. This independent thinking is important not just as it helps to further the debate, but also it is expected that the Commission will propose a framework under which Member State governments will be responsible for ensuring the sustainability of biofuels used nationally. While EU measures can require the development of such systems and have oversight over whether they are effectively implemented, the important decisions as to which biofuels are acceptable will be made nationally.

Schemes under development in Europe would probably not ban unsustainable biofuels from the market place i.e. biofuels could still be sold that do not meet the standards. It will, however, probably become necessary to meet certain standards in order for biofuels to qualify towards targets, obligations or tax breaks. This is intended to minimise the use of the worst biofuels in Europe without contravening WTO rules, while hopefully adding value to the most sustainable fuels on the world market. At present such a system should act to influence the market because the latter is primarily policy driven ie the market is developing so rapidly not of its own accord but in order to meet an artificial demand generated by said targets, tax breaks and obligations. If the biofuels market were ever to begin to operate on its own account ie beyond the policy requirements, then this system would be far less effective and other measures might be needed.

The systems currently being favoured by the European Commission, in the UK and other Member States, is one where overarching principles are set out that biofuels should comply with (see box 1). In order to demonstrate compliance with these conditions there is not one specific standard or certification approach, but instead a 'meta-standard' approach. This reflects the fact that biofuels are heterogeneous and as such there is no one measure that demonstrates sustainability, or indeed a single available standard applicable to all aspects of the sustainability principles. This is because of the different nature of feedstocks, growing conditions, production processes, end products etc. A variety of standards will, therefore, be approved that are deemed to demonstrate compliance with the core principles set out (termed qualifying standards under the UK proposals). Under each standard there would likely be a complex of methods and approaches approved to prove compliance depending on location etc. This essentially similar to the meta standards approach proposed by WWF and Ecofys[142] (see section 7.4.1).

Box 1 - Examples of proposed sustainability principles around which standards and certification efforts are being built in Europe	
Principles set out in UK consultation on carbon and sustainability reporting[143]	Principles set out in European Commission consultation on sustainability of biofuels[144]

[142] Dehue, Bart et al. "Towards a Harmonised Sustainable Biomass Certification Scheme." Ecofys, June 2007. http://assets.panda.org/downloads/harmonised_sustainable_biomass_scheme.pdf

[143] Department for Transport, Carbon and sustainability reporting within the renewable transport fuel obligation, Consultation document, http://www.dft.gov.uk/consultations/closed/rtforeporting/.

[144] Energy and Transport Directorate-General, European Commission, Biofuel issues in the new legislation on the promotion of renewable energy, Public consultation exercise, April – May 2007, http://ec.europa.eu/energy/res/consultation/doc/2007_06_04_biofuels/2007_06_04_public_consultation_biofuels_en.pdf.

Environmental principles	
Principle 1	Biomass production will not destroy or damage large above or below ground carbon stocks
Principle 2	Biomass production will not lead to the destruction or damage of high biodiversity areas
Principle 3	Biomass production does not lead to soil degradation
Principle 4	Biomass production does not lead to the contamination or depletion of water sources
Principle 5	Biomass production does not lead to air pollution
Social principles	
Principle 6	Biomass production does not adversely affect workers rights and labour conditions
Principle 7	Biomass production does not adversely affect land rights and community relations

1. achieving a minimum level of greenhouse gas savings;
2. avoiding major reduction in carbon stocks through land use change; and
3. avoiding major biodiversity loss from land use change.

The UK's proposed scheme for ensuring sustainability under the RTFO is currently the most advanced in the world. The UK Government recently ran a public consultation requesting comments on their proposed approach[145]. It was well received by the majority of stakeholders. There was a general feeling that the scheme was well thought through, having been developed via a series of working groups composed of environmental and industry representatives under the auspices of the Low Carbon Vehicle Partnership[146]. The UK system will require detailed reporting on the biofuels used to comply with the RTFO. Reports need to be submitted by fuel companies setting out details of the batches of biofuels being used in the UK, and where gaps in knowledge exist. In order to receive a credit under the RTFO they will also have to report on a monthly and annual basis. There are then ambitious, although currently indicative, targets set that will mean the fuel industry must rapidly ramp up the GHG reductions and the proportion of fuels achieving appropriate sustainability standards (see box 2). Additionally, there will be targets for the reporting of sustainability and carbon requirements. The system will be overseen by a new government agency known as the 'Renewable Fuels Agency'.

Box 2 – Provisional targets under the UK's carbon and sustainability reporting system

Under this system indicative targets are set requiring fuel companies to source feedstocks with the following characteristics:

- A certain percentage of feedstocks must be in compliance with qualifying standards, ie standards deemed and approved by the UK government as delivering the principles of sustainability
- Deliver a certain percentage of greenhouse gas savings
- Provide data on the sustainability characteristics of fuels, not that this can be that they comply with specific qualifying standards or other standards.

Annual supplier target	2008-2009	2009-2010	2010-2011
Percentage of feedstock meeting a Qualifying Standard[1]	-	50%	80%
Annual GHG saving of fuel supplied	40%	50%	60%
Data reporting of sustainability characteristics[2]	35%	65%	80%

The EU more widely looks set to follow a model similar to that put forward in the UK. According to their most recent Communication on this subject, biofuels complying with the principles of sustainability set out for the EU (see box 1) would

[145] Dft Consultation[144] and IEEP response link, http://www.dft.gov.uk/consultations/closed/rtforeporting/consultation.

[146] Low CVP information, http://www.lowcvp.org.uk/.

count towards the achievement of the EU target. The Commission is looking to put in place an EU wide system of obligations for the mixing of ethanol and biodiesel into conventional fuel supplies. The meta-standards approach allows the EU requirements to interact and make use of ongoing international initiatives. Despite this, however, many groups in Europe – particularly industry groups – are pushing for one international approach to the sustainability of biofuels due to the potential complexities of numerous standards and methods being in place.

7.2.5 Moving to Second Generation Biofuels

Many in Europe are calling for a rapid transition from first to second generation biofuels. These advanced fuels offer much greater potential carbon savings and importantly a much higher ratio of useful energy to land area. This means that greater amounts of more climate-friendly fuels can be produced on the same area of land. This would address two of the greatest concerns in terms of the expanding use of fuels, ie the limited GHG savings some offer and the potential impact of land use change upon biodiversity. In Europe there is support for a shift to second generation fuels, however, it remains unclear how and when this might be achieved. Increasingly, it is also being highlighted that these are still not 'wonder fuels' or without their own set of potential environmental impacts and complexities. There are a variety of estimates as to when second generation fuels will be market ready and what fuel will offer the greatest potential benefits.

Within Europe there are a variety of demonstration projects that have been set up to develop second generation fuels. There are three pilot lignocellulosic processing plants. These are in Sweden, Spain and Denmark. Other technologies to covert biomass to liquid fuel include Fischer Tropsch biodiesel and bio-DME. Demonstration plants are in operation in Germany and Sweden working to develop these fuels.[147]

In terms of European policy, there are numerous statements highlighting the need to support second generation fuels but few concrete examples of how this might be done as yet. For example the European Commission's high level group of transport experts 'Cars21', identified second generation biofuels as particularly promising and recommended that their development should be given substantial support. They specifically called for R&D into second generation and for the establishment of market places and supply chains. This reflects concerns that, as the market for first generation fuels expands and such fuels become important commodities, the system will become 'locked in' to their use. This could make transition to potentially more beneficial second generation fuels even more problematic.

In relation to second generation key questions, however, remain. These include:

- how and when can market transformation be achieved;
- what are the potential environmental implications of a shift;
- what support is appropriate;
- who needs to take action; and
- when do actions need to be taken in order to best facilitate the establishment of an effective market?

[147] Biomass Action Plan, supra note 8.

7.2.6 Driving the Development of Biofuels

'*The EU is supporting biofuels with the objective of reducing greenhouse gas emissions, boosting the decarbonisation of transport fuels, diversifying fuel supply sources and developing long term replacements for fossil oil. The development of biofuel production is expected to offer new opportunities to diversify income and employment in rural areas'*[148]*.*

Action to promote the use of biofuels in Europe has stemmed from a combination of the following drivers: to reduce Europe's emissions of greenhouse gases; to ensure security in terms of oil supply; and to support rural development and Europe's farmers. As the biofuels debate has evolved, however, the relative importance of these drivers has shifted. Measures to support the use of biofuels in Europe originally emerged at a time when concerns about energy security were less acute. Measures were adopted before the most recent war in Iraq, when the Middle East was more stable, and prior to Russia's attempts to cut off the gas supplies to its European neighbours.

In the early 2000s climate change was on Europe's political agenda. While it was seen as a challenge, the Kyoto commitment period still felt a long way off and the debate was nowhere near as high profile or pervasive as today. Meanwhile, concerns were growing for Europe's farmers. With downturns in food prices, pressures to scale back subsidies and a general malaise in rural areas there was a concern that Europe's countryside might become depressed and destitute. The first measures on biofuels in Europe where, therefore, primarily driven by the desire to support Europe's agricultural businesses. This was promoted primarily by the farm lobby and agribusinesses, and the proposal for the original biofuels Directive[149] was considered by Member States as primarily an agricultural measure, being debated not by energy or environment Ministers but by those for Agriculture.

Subsequently the emphasis has obviously changed. While the farm lobby has remained strong, biofuels have increasingly been seen as an option for supporting security of supply and for addressing the ever burgeoning greenhouse gas emissions of the transport sector. Support for the development of biofuels has, however, primarily still been driven by the agricultural lobbies, the emerging biofuels sectoral interests and perhaps nervous politicians. Biofuels are still not wholeheartedly embraced by environmental groups who have acute concerns about some environmental impacts. Fuel and car companies, although initially reluctant about the uptake of biofuels, now appear to be increasingly supportive; not least because reducing GHG emissions via biofuels removes some of the pressure to address other more problematic and fundamental challenges ie to increase the efficiency of vehicle engines or to alter personal mobility preferences.

---

[148] European Commission, Communication from the Commission: An EU Strategy for Biofuels, COM(2006)34, 8.2.2006.

[149] European Commission, Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of biofuels for transport, COM(2001)547, http://eur-lex.europa.eu/LexUriServ/site/en/com/2001/com2001_0547en01.pdf.

7.3 U.S. Policy Approaches

7.3.1 Nature of the market

The transport sector produces a larger share of U.S. GHG emissions and a much greater volume per capita than in Europe. America's cars, trucks, and buses account for 27% of U.S. global warming emissions[150] and transport as a sector (excluding international bunker fuels) accounted for approximately 31% of all U.S. CO_2 in 2005[151]. Overall, total U.S. emissions of GHGs have risen by 16.3 % from 1990 to 2005, transport sector emissions rose from 1467.0 Tg CO_2 Eq to 1,897.9 over the same period. Over 60% of the transport emissions resulted from personal vehicle use, the remainder being from other transportation activities, including the combustion of diesel fuel in heavy-duty vehicles and jet fuel in aircraft.

The U.S. consumes 25% of the world's total oil production, but has only 3% of known reserves[152]. Reduction in the use of automobiles cannot occur in the short term, thus other solutions are needed to reduce the GHG emissions from the transport sector. Biofuels are part of the answer, but they cannot be seen as just a technological fix. Improving efficiency and reducing demand are other essential components of cutting emissions on both sides of the Atlantic. Under a scenario produced by the Natural Resources Defense Council (NRDC), when biofuels are combined with improved fuel efficiency and a reduction in driving from smart growth policies, demand for oil could be reduced from 30 million barrels per day in 2050 to less than 10 million barrels per day[153].

While the primary biofuel in Europe is biodiesel, ethanol is the biofuel of choice in the U.S. In 2006 more than 4.8 billion gallons of ethanol were produced in the U.S. (primarily corn based), compared with 250 million gallons of biodiesel (primarily from soy)[154]. On many counts U.S. produced biodiesel is superior to U.S. produced ethanol: it produces more GHG savings, feedstock production is more environmentally benign, and biodiesel yields more energy than ethanol.[155] However, the use of soybeans as a feedstock, the U.S.'s primary source for biodiesel, yields much less fuel on a per acreage basis. Due to constraints on land and a limited ability

---

[150] Greene, Nathanael et al. "Growing Energy: How Biofuels Can Help End America's Oil Dependence." Natural Resources Defense Council, December 2004, http://www.nrdc.org/air/energy/biofuels/biofuels.pdf.

[151] ES-2 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 –2005, US Environmental Protection Agency, http://www.epa.gov/climatechange/emissions/downloads06/07ES.pdf

[152] Greene, Nathanael et al. "Growing Energy: How Biofuels Can Help End America's Oil Dependence." Natural Resources Defense Council, December 2004, http://www.nrdc.org/air/energy/biofuels/biofuels.pdf.

[153] Greene, Nathanael et al. "Growing Energy: How Biofuels Can Help End America's Oil Dependence." Natural Resources Defense Council, December 2004, http://www.nrdc.org/air/energy/biofuels/biofuels.pdf.

[154] Carriquiry, Miguel. "U.S. Biodiesel Production: Recent Developments and Prospects." Iowa State University Center for Agricultural and Rural Development., http://www.card.iastate.edu/iowa_ag_review/spring_07/article4.aspx.

[155] Hill, Jason et al. "Environmental, economic and energetic costs and benefits of biodiesel and ethanol biofuels." Proceedings of the National Academy of Sciences: July 25, 2006, Vol. 103 no. 30.

to grow high yield biodiesel feedstock crops in the U.S., biodiesel has limited market potential compared to ethanol.

7.3.2 Policy for Promoting Biofuels

A range of market-based policy options are available for prompting an increase in the production and consumption of biofuels. While Renewable Fuels Standards (RFS) have received a great deal of attention, a wide range of policies have been adopted to promote biofuels at the federal and state levels. Aside from standards, the federal and state governments have subsidised the production of biofuels through government purchases of biofuels, research, development, and demonstration funds, and tax incentives. However, policy implementation has been ad hoc and uncoordinated, resulting in a diversity of policies around the country.

Total subsidies for biofuels in the U.S. are estimated to be in the range of $5.1-$6.8 billion annually for ethanol, and $.4-$.5 billion for biodiesel; though those numbers may be regarded as at the high end of a range[156]. The scale of these subsidies and their opportunity cost begs the question of how well tailored the current subsidy regime is to the stated objectives for biofuels, particularly climate change mitigation. One estimate places the current expense of biofuels subsidies at more than $500 per metric ton of carbon dioxide equivalent reduced from gasoline use[157].

7.3.3 Federal Government

Tax incentives for ethanol production along with research and development funding for alternative fuels have been included in federal legislation since the 1970s. The federal government has also encouraged the development of flex-fuel vehicles since the passage of the 1988 Alternative Motor Fuels Act. That legislation still provides automakers a credit for up to 1.2 miles per gallon off their Corporate Average Fuel Economy obligation for manufacture of flex-fuel vehicles.

The current era of large scale subsidies for biofuels began with the 2002 farm bill. The bill developed a biofuels procurement program for federal government purchases of biofuels, authorised grants for research and development, and developed education programs to inform farmers and consumers about biofuels[158]. Cellulosic ethanol was included in the bill, which called for a per gallon payment for the production of cellulosic ethanol of up to 1 billion gallons. While funds were authorised, appropriations for the biofuels programs over the past five years have been minimal. Additionally, the cellulosic ethanol program was never established by the U.S. Department of Agriculture[159].

---

[156] Koplow, Doug. "Biofuels – At what Cost? Government support for ethanol and biodiesel in the United States." Global Subsidies Initiative of the International Institute for Sustainable Development, October 2006, http://www.globalsubsidies.org/IMG/pdf/biofuels_subsidies_us.pdf.

[157] Id.

[158] US Department of Agriculture. Farm Bill 2002 website, Title IX summary, http://www.usda.gov/farmbill2002/energy_fb.html.

[159] Governors' Ethanol Coalition. "2007 Farm Bill Recommendations," April 2007, http://www.ethanol-gec.org/information/Farm_Billl_Recom.pdf.

The Energy Policy Act of 2005 included many more provisions for biofuels than the 2002 farm bill, and authorised programs have been funded through appropriations. The legislation included a package of RFS policies, research, development, and demonstration funding, and tax incentives for the development and deployment of biofuels. It is the leading source of federal policy on biofuels.

- *Renewable Fuels Standard (RFS):* The current guiding policy for biofuels in the Energy Policy Act of 2005 is a RFS. This standard serves as a production mandate rather than a consumption mandate, as is the case in the EU. Production mandates are useful at stimulating commercialisation of technologies, but they can provide perverse incentives for locking in existing technologies. It can be argued that has been the case for corn-based ethanol thus far. The RFS in the Energy Policy Act of 2005 phases in a requirement that refineries increase the volume of ethanol produced per annum from 4 billion gallons to 7.5 billion gallons by 2012. To promote the market deployment of advanced biofuels, the RFS counts each gallon of cellulosic ethanol as equivalent to 2.5 gallons of the RFS volume. However, this mandate is largely irrelevant as the 7.5 billion target is expected to be surpassed by 2009.[160] A targeted mandate for advanced biofuels is a requirement in the RFS for 250 millions gallons of cellulosic ethanol to be produced per annum by 2012.
- *Research, Development, and Demonstration:* RD&D programs authorised under the Energy Policy Act of 2005 total more than $3.25 billion between 2006 and 2015, though there are usually large differences between authorisations and appropriations in a given year.[161] The legislation also provides incentives specifically for the development of cellulosic biofuels, authorising appropriations of $250 million with a production goal of 1 billion gallons of production by 2015.[162] These funds are intended to support initial research into new biofuels technologies, improved cost competitiveness of biofuels, demonstration projects, and loan guarantees for market deployment. Implementing agencies include the Department of Energy, Environmental Protection Agency, and Department of Agriculture.
- *Tax incentives:* A tax credit of 10 cents per gallon can be claimed by produces of biodiesel for up to 15 million gallons and by ethanol producers for up to 60 million gallons. Fuelling stations can claim a tax credit for up to 30% of the cost of installing re-fuelling equipment for biofuels blends above E85 and B20[163].

---

[160] World Resources Institute. "Submission by the World Resources Institute to: Senate Energy and Natural Resources Committee Transportation Biofuels Conference," February 1, 2007. http://pdf.wri.org/wripershing_senate_enr_biofuels2.pdf.

[161] Governor's Ethanol Coalition. "Ethanol Provisions of the Energy Policy Act of 2005," http://www.ethanol-gec.org/information/Ethanol-Provisions-EPACT-9-26-05.pdf.

[162] Federal Network for Sustainability. "Energy Policy Act of 2005: Summary of Biofuels and Alternative Fuels provisions," http://www.federalsustainability.org/initiatives/biodiesel/Summary%20of%202005%20Energy%20Policy%20Act.pdf.

[163] U.S. Department of Energy. "The Energy Policy Act of 2005: What the Energy Bill Means to You," http://www.energy.gov/taxbreaks.htm.

Congress is currently in the process of re-authorising energy and farm policy. Biofuels are playing a prominent role in the discussion in both legislative areas. The Senate has already passed legislation increasing the RFS to 36 billion gallons of biofuels by 2022, 21 billion gallons of which must come from cellulosic feedstock crops.

In addition to domestic production of biofuels, significant potential exists for the importing of biofuels, particularly Latin America. In March of 2007 the U.S. and Brazilian governments agreed to cooperate in their efforts to expand biofuels production and develop new technologies. A $0.54 per gallon tariff on imported ethanol continues to prevent large scale importing of foreign biofuels. There is little political traction to reduce that tariff.

7.3.4 State Governments

At the state level, the most common policy used for biofuels promotion has been a renewable fuels standard. Seven states have adopted RFS policies for all motor fuels sold in-state, while three others have adopted RFS policies for the state-owned vehicle fleet. These measures have only recently been developed; eight of the states have adopted RFS policies since 2006 and another seventeen states are considering RFS proposals. The design of the policies varies significantly from state to state[164]. The standards adopted at state level all, however, refer specifically to the use of bioethanol or biodiesel failing to leave the way open to meet requirements using second generation/advanced fuels.

- *Requirements:* Hawaii requires that at least 85% of gasoline sold be at least E10; Iowa requires that 25% of all gasoline sold contain some renewable sources (either E10 or E85); Minnesota requires that total gasoline sales must contain 20% ethanol and total diesel sales contain 2% biodiesel; Missouri and Montana require that total gasoline sales must contain 10% ethanol by volume; and Louisiana and Washington state require that total gasoline sales must contain 2% ethanol by volume and total diesel sales must contain 2% biodiesel by volume. For states that have adopted RFS policies for state-owned vehicles, Colorado requires all vehicles to be fuelled with B20; Maryland requires half of its fleet to use a biodiesel blend of at least B5; and Ohio has adopted annual minimums of consumption (based in gallons) for ethanol and biodiesel.
- *Compliance Dates:* The compliance date for a given state does not necessarily match the stringency of its RFS; for instance Hawaii, Missouri, and Washington State all have a compliance date of 2008. Other compliance dates range from 2008 to 2020.
- *Market Trigger:* Two states have adopted a threshold for in-state production of biofuels before the state requirement goes into effect. The Louisiana RFS will not go into effect until 2015 or until in-state production reaches 50 million gallons per year of ethanol and 10 million gallons per year of biodiesel. Montana's market trigger is the production of 40 million gallons per year of ethanol. In contrast Louisiana has adopted a price cap, requiring that the

[164] Brown, E. et al. "Understanding the Informing the Policy Environment: State-Level Renewable Fuels Standards," National Renewable Energy Laboratory, January 2007, http://www.nrel.gov/docs/fy07osti/41075.pdf.

wholesale price of ethanol must be less than gasoline before the policy takes effect.

Other state policies for the promotion of biofuels include tax credits for biofuels production, tax cuts for the sale of gasoline-biofuel blends, grants for the development of biofuels infrastructure, and funding for public education campaigns[165].

7.3.5 Ensuring Sustainability

California was the first government in the world to implement a low carbon fuels standard. In January 2007, Governor Schwarzenegger announced an executive order committing California to a 10% reduction in the carbon intensity of vehicles by 2020[166]. Such a standard has the advantage over a RFS in that it promotes the use low GHG biofuels and provides an incentive to develop advanced/second generation fuels. The California Air Resources Board is currently writing rules for the order and establishing methodologies for determining "well to wheel" emissions. Twelve other states have now adopted California's low carbon fuels standard, including Florida, Vermont, New York, New Jersey, Massachusetts, Connecticut, Maine, Rhode Island, Pennsylvania, Maryland, Washington and Oregon.

According to figures from the U.S. EPA ethanol produced from corn has the potential to reduce GHG emissions for every gallon of gasoline by up to 60%, but meeting this potential depends on how ethanol plants are developed. If not properly orchestrated utilising GHG-reduction measures, ethanol can actually have greater lifecycle emissions than gasoline. Currently, the EPA estimated that use of ethanol in the U.S. reduces GHG emissions by 21% for each gallon of gasoline it replaces, on average[167]. It is hoped greenhouse gas performance standards would help to illuminate the most inefficient conversion processes. Other proposed policy solutions includes linking subsidies and renewable fuels standards to the use of sustainable farming practices. More broadly there are concerns that the use of particularly low blend biofuels can negatively impact on air quality increasing the production of low level ozone by elevating levels of precursors i.e. nitrogen oxides and volatile organic compounds.

While there is public support for the expansion in the use of biofuels in the U.S. there are still concerns regarding the impact of this upon biodiverse habitats etc. The production of feedstock contributes significantly to a biofuel's environmental footprint. Farming impacts include: use of chemicals and fertilizers, waste management, soil erosion and exhaustion, water quality impacts, and biodiversity loss from monocrop agriculture. The farming of corn in particular is associated with significant localised environmental impacts. The promotion of sustainable farming practices goes beyond biofuels, so recommendations for reducing farming impacts are neither new nor limited to biofuels feedstock crops. Solutions to the challenges faced by the expansion of biofuel production within the U.S. include the following.

---

[165] National Biodiesel Board. "2006 State Legislation Highlights," http://www.biodiesel.org/resources/PR_supporting_docs/20060926_State_Legislation-Current.pdf.

[166] State of California, Office of the Governor. "Gov. Schwarzenegger Issues Directive to Establish World's First Low Carbon Standard for Transportation Fuels," January 9, 2007, http://gov.ca.gov/index.php?/press-release/5074/.

[167] US Environmental Protection Agency. "Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuels Use," April 2007, http://www.epa.gov/otaq/renewablefuels/420f07035.pdf.

- The federal government controls a large amount of rural land in the U.S., particularly land that is used for farming. Wild and ecologically sensitive lands controlled through federal agencies, like the Bureau of Land Management, can be kept off limits from feedstock production.
- The federal government also operates the Conservation Reserve Program, which subsidises farmers who take sensitive land out of production to reduce soil erosion. Under current law it may be possible for farmers to escape their commitments without penalty when the price of corn is greater than the subsidy. That loophole can be rectified in farm legislation.
- Incentives for sustainable agriculture have been written into federal and state agriculture subsidies, but appropriations for conservation programs usually fall short of their authorizations. The biofuels boom provides an opportunity to refocus attention on conservation programs. With the price of biofuels feedstock crops rising due to demand, subsidies can be shifted entirely from commodity payments to "green payments" that encourage sustainable farming practices, including conservation tillage, soil erosion controls, limited use of fertilizers susceptible to runoff, and reduction and recycling of farm waste.[168]
- A certification scheme measuring and reporting the environmental impacts of biofuels production can be used for consumer education and regulation of feedstock farming practices.
- Conversion of land to monocrop agriculture for biofuels feedstock farming has the potential to harm biodiversity, especially if native plants are replaced or conservation land is farmed. Limited data is available on these impacts, but federal and state wildlife agencies can monitor them.

U.S. environmental interests have also been active in terms of promoting the development of international systems of voluntary standards for the production of biofuels. Having learned from the experience of promoting sustainable forestry in the developing world, many NGOs are proposing that a system of best practices be adopted for biofuels through the use of a sustainability certification scheme. Similar to the Forest Stewardship Council, a comparable organisation for biofuels could promote sustainability by working directly with producers and by certifying sustainable biofuels for consumption in the U.S. Efforts in terms of promoting international standards are focused very much on developing nations and the use of biofuels in these countries or those that might be imported into the U.S. in future.

7.3.6 Driving the Development of Biofuels

The current political climate in the U.S. is extremely conducive for the political support of biofuels, specifically corn-based ethanol. In the debate over federal energy and agriculture legislation, biofuels provisions are one of the least controversial areas of policy. The dynamics producing support for biofuels include:

- *Strong agriculture lobby in the U.S.* While agriculture represents a small share of U.S. GDP and employment, agricultural sector production is relatively uniformly distributed among political constituencies across the country. Some of the political constituencies that wield a large amount of clout in the U.S. political system are also dominated by the agricultural sector, such as Iowa;

[168] Marshall, Liz. "Thirst for Corn: What 2007 Plantings Could Mean for the Environment," World Resources Institute, June 2007.

the first state to hold a nominating caucus for the U.S. Presidential primary process. The agrarian ideal of the family farmer continues to be a popular political image, even when large agribusiness runs the industry and provides large donations to candidates.

- *Framing of biofuels as energy security.* The rhetoric of energy independence has become very popular issue in U.S. elections of late. With concerns about U.S. foreign entanglements and the rising price of energy, Americans are very inclined to support measures that will reduce foreign oil imports. So far this rhetoric has been used to support biofuels, more ominously this agenda is also being used to support an increase in the extraction of fossil fuels and production of coal-to-liquids.
- *Potential economic development for rural communities.* Most Midwestern states, the biggest agricultural producers in the country, have experienced years of slow economic growth and population decline. Supporters of rural development have seized on the potential for economic opportunities presented by biofuels processing as a way to stimulate rural economies[169].
- *Large stock of available farmland and corn production.* A combination of a low population density (less than a third of the EU), highly productive farm land, and advanced farming practices makes the U.S. a prime candidate for expanding biofuels feedstock production. Furthermore, corn is a largest crop grown in the U.S. in terms of acreage. The planting of corn grew by 15% in 2007 to more than 90 million acres, growth primarily driven by ethanol production[170].
- *Public support.* The production of biofuels consistently receives high levels of popular support. A January 2007 poll shows 55% of American respondents want the government to increase funding for research and development of alternative fuels, and 40% of respondents believe ethanol will eventually replace the use of hydrocarbons[171].
- *Reliance on technological fixes.* Much has been written about the American tendency to rely on technological fixes to solve environmental problems, and support for biofuels fits that rule. The implicit message about biofuels is that they offer as a way for Americans can continue their driving habits while improving energy security and mitigating climate change.

7.4 The Challenges

7.4.1 Ensuring Sustainability

Systems for ensuring sustainability of biofuels are evolving rapidly and are a key topic of debate among environmental groups. It is now widely agreed that some system must be put in place to ensure that biofuels used in the EU and U.S. do not have large and adverse impacts on the environment, both at home and abroad. Horror

---

[169] For example, the Renewable Fuels Association, a biofuels trade group, highlights the economic development opportunities in this piece of advertising. "Tales from the Heartland: The American Ethanol Scrapbook," http://www.ethanolrfa.org/objects/pdf/scrapbook/RFA_Scrapbook_2007.pdf.

[170] National Agricultural Statistics Service, U.S. Department of Agriculture. "2007 Prospective Plantings," March 30, 2007, http://usda.mannlib.cornell.edu/usda/current/ProsPlan/ProsPlan-03-30-2007.pdf.

[171] Zogby International. "UPI/Zogby Poll: Ethanol Most Likely Alternative to Fossil Fuel." January 23, 2007, http://www.zogby.com/news/ReadNews.dbm?ID=1241.

stories about the destruction of ancient forests, important grasslands and the loss of emblematic species (for example the orangutan) are serious concerns in their own right, but also have the potential to destroy the reputation of biofuels whether or not they are well-founded. It is also essential that significant carbon savings are ensured.

Developing systems for ensuring biofuel sustainability is, however, complex. This is because:

- supply chains are long and complex making fuels difficult to track;
- fuels and their raw materials are traded purely as commodities based on price at the present;
- biofuels can be produced all over the world from different feedstocks under hugely different conditions meaning there is no one standard for fuel that can be termed sustainable;
- both fuels and raw materials can be traded and imported;
- there is no clear system of governance that can control biofuel production across the many regions of the world, and it would be very difficult to establish one;
- to produce large quantities of biofuels unavoidably requires a large land take, with potential indirect impacts upon land use due to displacement;
- many biofuels are currently produced from food crops, causing prices of staple foods to rise or fluctuate, thereby threatening the diets of the world's poor;
- the regulation of biofuels overlaps with that of the agricultural sector more broadly, notoriously a politically sensitive issue;
- the quantities of biofuels and feedstocks traded and used is expanding rapidly[172]; and
- attempts to protect markets from the importing of 'bad biofuels' run up against complex, uncertain, and untested WTO rules.

A multiplicity of schemes are currently being developed to try to overcome these issues; different interest groups are supporting varying approaches from voluntary standards based on FSC requirements to more formalised regulatory approaches (primarily being developed in Europe). Schemes for covering broad sustainability issues from the protection of high nature conservation areas to ensuring the rights of plantation workers are being developed in parallel, coupled with specific attempts to decarbonise fuel use – led by California in the U.S. and set out in the revision of the fuel quality Directive for Europe. The challenge for all schemes, however, is the same: how can compliance be ensured and verified, giving confidence that the worst biofuels are not entering the market place?

As biofuels standards are developed in different regions, for different feedstock crops, and for different processing methods, synchronising standards and certification schemes becomes a significant challenge. To enable the development of standards to meet the heterogeneous needs of biofuels, many are looking towards a meta-standards approach; as set out in work by Ecofys for WWF[173]. Certainly, the leading schemes in Europe appear to be adopting this model. Instead of applying one standard to all

[172] United Nations Conference on Trade and Development, Challenges and opportunities for developing countries in producing biofuels**,** 27 November 2006, UNCTAD/DITC/COM**/**2006/15, http://www.unctad.org/en/docs/ditccom200615_en.pdf.

[173] Dehue, Bart et al. "Towards a Harmonised Sustainable Biomass Certification Scheme." Ecofys, June 2007. http://assets.panda.org/downloads/harmonised_sustainable_biomass_scheme.pdf

biofuel production, a meta-standard approach would adopt multiple, already existing qualifying standards; a system of standards to meet standards, or standards within standards.

Meta-standards are a pragmatic solution to the multi-dimensional biofuels market. They allow flexibility to develop new standards and for countries to apply different standards according to their needs. They do, however, raise some issues of accountability and comparability. For meta-standards to work there is a need for:

- clearly defined principles that can produce a working definition of sustainably produced biofuel, upon which decisions as to what qualifying standards are appropriate can be based;
- procedures for benchmarking criteria for different qualifying standards to allow their comparison; and
- approved systems for auditing/verification that requirements under the standards are being met and ways of benchmarking/comparing audit approaches which may be different across schemes.

Ideally these conditions should be set at an international level, but no institution has the competence or resources to take control of this. In reality these steps are being adopted in Europe already; the UK has already set out approved systems in all three areas outlined above as part of measures to support the RTFO system. The EU and other Member States are also in the process of doing this. There is, therefore, a danger that biofuels will qualify differently in terms of sustainability according to country, potentially delivering different levels of stringency within Europe and across the globe. This in the longer term could fragment the market for 'sustainable' fuels or lead to an erosion of standards.

The meta-standards approach by no means solves all the problems, however, and there are difficulties that emerge from the use of this flexible approach. Some examples are set out below. While these problems should not prohibit the use of meta-standards their application must be well thought through and monitored to ensure that impacts are understood and minimised.

- The meta-standards based systems will only ever be as strong as the sustainability schemes that they rely upon. While Governments will have control over approving which schemes they deem to demonstrate sustainability, they will have limited oversight over the schemes themselves, which will most likely be run independently.
- The system will not provide one recognisable standard with which, for example, the public or organisations can associate the sustainability of biofuels. Explaining what is potentially a complex system to a sceptical public may be difficult.
- The meta-standards approach should discourage the worst fuels, but it is not a system that will actively promote best practice as currently being formulated in Europe for example. In order to do this it needs to have a very strong administrator capable of continually reviewing the standards that are deemed acceptable and being able to wield power or influence over those developing subsidiary standards to force them to continually improve their systems and the ambition of their schemes.
- Buy-in from the commodities traders and fuel companies is essential. Meta-standards work well with a system that obliges fuel companies to blend

biofuels. This means that essentially responsibility for sourcing sustainable biofuels is left down to the individual companies, and they will necessarily have ownership of the reputation problems if they are found to be using unsustainable sources. However the oil companies are unlikely to want to involve themselves directly in the making or shipping of biofuels, so both in terms of ensuring appropriate fuels are on the market and that adequate quantities of appropriate fuels are entering the market place, a more active role for commodities traders becomes essential. Currently they buy, sell and manage production levels in their sector purely via price signals, but in future they will need to become involved in sustainability certification as well.

- There are serious issues to be addressed in monitoring the supply chains and demonstrating compliance in a rigorous but un-bureaucratic way. Supply chains are often long and difficult to track, especially as raw materials and biofuels are traded on open commodity markets where they may change hands many times.
- Meta-standards will still not allow broader, indirect land use change issues to be addressed, and this remains a serious concern.

Meta-standards are a potential solution, and one of the few put forward that might ensure the sustainability of this complex market. But, how can this system be made to work effectively, and what role can NGOs and environmental groups play?

7.4.2 Interactions: Bioenergy, Food and Land Use Change

The indirect impacts of the rapid development of the biofuels sector are as great a concern, in terms of sustainability, as those directly attributable to growing the feedstocks. Biofuels could have potentially huge impacts upon current land use patterns, the production of food and its pricing, and the development of other solid biomass solutions. Expanding the biofuels sector essentially increases the pressure on land as a resource. In practice there is very little unused land in the world, and demands on it are growing as global populations increase; while land may be out of direct cultivation for agriculture it is often being used to provide other less tangible benefits ie providing valuable habitats or local amenities.

The development of biofuels will impact on land use patterns not only in the locality where they are grown but across the entire globe through knock-on effects. The worst outcome will be increased pressure for land leading to the destruction of important assets, both in terms of biodiversity and carbon storage. This is not only caused by direct destruction of a habitat to produce feedstocks, but importantly increased land pressure may mean that biofuels cultivation displaces other land uses. In turn these may be taken up elsewhere by converting biodiverse areas into farmland. More broadly the same crops may be being produced as a biofuel feedstock and simultaneously for other uses eg palm oil is used for food, soap production etc. While the biofuel feedstocks might be qualifying as being sustainability produced, their production might displace the same crop for other uses into other areas that are less suitable. This may result in a situation where sustainable crops are used for biofuels but unsustainable forms of the same crop will simultaneously be sold on other markets where there are less stringent requirements. In this way the rainforest may still be destroyed by palm plantation developments – not specifically those providing palm oil for biofuels, but displaced crops previously grown where the biofuels now are.

Importantly, the systems for ensuring sustainability currently being put forward, for example meta-standards, would not be capable of taking into account this sort of indirect land use shifts. Indeed it is difficult to see how any form of certification focused on a particular piece of land or batch of materials could capture such knock-on effects adequately. Mechanisms for overseeing land use change across the globe do not currently exist and there is a lack of workable solutions being put forward to solve this problem. Therefore, the question remains how can land use change be monitored and addressed?

If the use of biofuels is to massively expand a huge area of land will be needed to support this industry. If biofuels become a valuable commodity the production of feedstocks may replace the cultivation of other crops. Additionally, the current generation of biofuel feedstocks are also often food crops. Increased demand will most likely drive up prices of specific energy crops, but also of other food crops due to increased competition for land resources, or to competing uses for a particular crop. Alternatively, it may push production of a particular food crop into other countries which can produce it more cheaply. The production of biofuels within Europe and the U.S. has the potential to affect crop production patterns globally.

Food-fuel competition is a particular concern in the U.S. due to the reliance on ethanol produced from corn. Corn is used throughout the U.S. food industry, so rising prices of corn from ethanol production raise prices throughout the market.[174] Increased costs for food producers will either be passed on to consumers, or substitutes for corn will be used if they are cost competitive. U.S. corn is also traded in international markets, so price increases there have ripple effects overseas. Due to increasing costs, the Mexican government recently instituted price controls on corn, a staple for many Mexicans. The primary concern over rising food prices is their impact on the poor, a concern raised in particular by environmental justice groups.

Potential conflict with developing solid biomass energy systems is also a concern, particularly in Europe. The EU is looking to double the contributions of biomass to heat and electricity production, at the same time as ramping up biofuel use. While transport biofuels have the highest employment intensity and the greatest security of supply benefits, biomass in electricity has the greatest greenhouse gas benefits and biomass in heating is the cheapest[175]. Also, it is difficult to persuade farmers to grow biomass for any purpose if grain prices are also being driven to highly profitable levels as described above. Expanding all sectors simultaneously presents potential conflicts in terms of land use but also potentially increases pressure to bring new land into production.

---

[174] Corn is used throughout the U.S. agricultural and food processing industries. In almost every meal Americans eat corn is somehow involved. See, for example, Fussell, Betty. *The Story of Corn*. New Mexico: University of New Mexico Press, 2004.

[175] European Commission, Communication from the Commission – Biomass Action Plan, COM(2005)628, 7.12.2005 – page 7

7.4.3 The Challenge of Second Generation

A transition to advanced/second generation biofuels is a potential solution to some of the problems posed by current biofuels production. It should, however, be noted that the dilemma as to how the worst fuel solutions can be discouraged and the best encouraged will remain. The rapid adoption of second generation fuels is widely supported due to their advantages over first generation fuels, set out below.

1. They can significantly increase the carbon dioxide savings of switching from gasoline: processing measures are more energy efficient, feedstock crops can produce much more energy per acre, potentially fewer fossil fuel-based fertilizers are required to grow them and the feedstock crops can help sequester carbon in the soil.
2. The localised environmental impacts are potentially much less severe. Native plants can often be used as feedstock, which creates the potential for less runoff, greater soil health, less biodiversity loss, and less pesticide and fertilizer use.
3. Feedstock crops are not used as food, produce more energy per acre and they can be grown on more marginal land, reducing the potential impact on food prices from first generation biofuels. One scenario shows that advanced biofuels could produce 75% of total gasoline used in the U.S., requiring 100 million acres of farmland out of the 450 million acres currently used for cropland and 580 million acres used for grassland pasture and range[176].

Minimising the environmental impacts and maximising climate change mitigation from second generation/advanced biofuels will depend on choosing the right feedstock and using the best farming practices. One feedstock that offers great potential for development in the U.S. is switchgrass, a native grass to much of the U.S. Midwest. Compared with corn and soy, switchgrass produces between one-half and one-eighth the nitrogen runoff, between 74 and 121 times less soil erosion, an increase in soil carbon levels rather than a decrease, and provides habitat for between two and five times as many species of birds[177].

Despite a number of potential benefits, second generation fuels are not the perfect solution they might appear from many policy statements. They have their own set of potential shortcomings. While they may produce high energy yields per unit of land, they will still potentially increase land pressure (although to a lesser extent). In order to achieve carbon savings they must still be produced without destroying major carbon stores contained in forest areas, permanent grasslands etc. Feedstocks can, in theory, be grown with less local environmental impacts, but productivity may still be enhanced by use of pesticides and fertilisers, meaning that some controls over cultivation will be needed.

In Europe particularly many farmers are already nervous about committing to the cultivation of pure energy crops, as their options in terms of sale are more limited than

---

[176] Dale, Bruce. "Impacts of Cellulosic Ethanol on the Farm Economy." Unpublished paper presented to the Aspen Institute, 2006. http://www.aspeninstitute.org/atf/cf/%7BDEB6F227-659B-4EC8-8F84-8DF23CA704F5%7D/EEEethanol3.pdf

[177] Greene, Nathanael et al. "Growing Energy: How Biofuels Can Help End America's Oil Dependence." Natural Resources Defense Council, December 2004. http://www.nrdc.org/air/energy/biofuels/biofuels.pdf

for food crops. This may inhibit the development of supply chains. The development of second generation fuels will still require the planting of large swathes of new crops, the designation of areas to do this in etc. Importantly, second generation/advanced fuels are not yet market ready, nor are they likely to be until 2015 at the earliest.

Given the potential of second generation/advanced fuels what can NGOs do now to guide decisions being made about investment in them? What needs to be in place to ensure their swift adoption once the technology is market ready? What requirements and regulatory systems will need to be in place to ensure that, unlike for first generation, the development of the best fuels is favoured from the start and that we are locked into the best performing technologies and options?

7.5 Conclusions

The U.S. and EU are both currently at a crossroads in terms of their biofuels policy. Both have committed to significantly scaling up production and consumption by 2020, but are challenged by increasing production while preserving natural capital. Assuming biofuels are a chosen route for reducing greenhouse gas emissions from the transport sector, there is much the environmental community can do to minimise the environmental impacts of biofuels and maximise the climate change mitigation benefits.

While controversy may still remain in the environmental community as to whether biofuels are a good solution, they are already on the market and the expansion of their use looks set to go ahead. Cooperation and policy dialogue will be critical for promoting effective policies on both sides of the Atlantic, especially to avoid repeating mistakes. Moreover, collaboration will be essential to the development of effective biofuels standards and certification programs.

8 SUMMARY OF DEBATE AND MAIN CONCLUSIONS

Transatlantic Civil Society Conference on Climate Change
24 - 25 April 2008
Washington, DC

Representatives of civil society organisations from the EU and U.S. gathered in Washington, DC, on 24-25 April 2008 to exchange views and experience on the development and implementation of policies to mitigate climate change on both sides of the Atlantic, and discuss common strategies and approaches to advancing those policies and further building public support for them. Participants represented a variety of environmental non-governmental organisations (NGOs), environmental advisory councils, academic and other research institutions and think tanks and trade unions from some ten Member States of the European Union as well as the United States, working on different aspects of climate change and sustainable energy policies. Some representatives of public authorities at the Federal and State level in the U.S. and at the local, national and EU level in Europe also attended the conference and contributed to the debate as keynote speakers and experts.

The conference was organised jointly by NRDC and IEEP as part of the Transatlantic Platform for Action on the Global Environment (T-PAGE), a project co-funded by the European Commission within the framework of a programme to promote transatlantic dialogues at the non-governmental level. It was held at a time when climate change issues feature high on the political agenda on both sides of the Atlantic, as the U.S. Congress is debating several legislative proposals to introduce a federal cap and trade scheme for greenhouse gas (GHG) emissions, while the European Parliament and EU Council are considering a package of climate and energy legislation proposed in January by the European Commission. Political attention is also focused on the multilateral negotiations on a post-2012 global climate change regime which were launched by the Bali Action Plan of the United Nations Framework Convention on Climate Change. The T-PAGE conference discussed domestic policies in the U.S. and EU as a necessary contribution to those global efforts within the framework of the UN.

There is a growing consensus that in order to keep the level of greenhouse gases in the atmosphere within safe limits, GHG emissions will need to be reduced substantially in the years ahead. Developed countries must expect to collectively reduce their emissions by 20-30% by 2020 and by 80% by 2050.

At present, the EU Emissions Trading Scheme (ETS), which has been operational since 2005 and entered its second phase of operation on 1 January 2008, is the cornerstone of the EU's climate change mitigation policy. However, its effectiveness in curbing GHG emissions and its further development are currently the subject of considerable political debate in Europe, as the EU institutions are considering a set of legislative proposals to extend its scope and strengthen its provisions. At the same time, similar cap-and-trade systems are being developed by several State governments in the United States and legislation to introduce a nationwide cap-and-trade scheme is under consideration by the U.S. Congress. A crucial vote is expected to take place in the U.S. Senate in June. The T-PAGE conference considered the EU experience and discussed lessons that could be learnt in designing an effective cap-and-trade system in the United States. European participants highlighted several problems that had

arisen in the early stages of the EU ETS (such as inadequate baselines and over-allocation) and drew U.S. participants' attention to the need to avoid replicating the same mistakes in establishing cap and trade policies in the United States.

A broad consensus was reached among U.S. and EU civil society representatives on the following issues, based on two days of discussion and debate:

I. GHG emissions from the transport sector must be addressed as a priority in overall climate policy.

Participants agreed that cap-and-trade systems should not be viewed as a panacea and that a broader mix of policy tools would be required on both sides of the Atlantic to seriously address the challenge of climate change. In particular, the conference stressed the urgent need to reduce transport emissions, such as those from automobiles, trucks, shipping, and aircraft, which are not covered by existing cap-and-trade systems. Impacts from transport include not only greenhouse gas emissions but also other air pollutants, congestion, noise, and safety. Therefore, an integrated approach to transport policy is needed so that greenhouse gas emissions mitigation policies do not inadvertently cause a rise in other impacts and should in fact be designed to address other transport impacts as far as possible.

Participants agreed that complementary and comprehensive strategies are needed to achieve the following objectives:

- Reduce the basic demand for travel with special attention towards public transport options and expanded transport modalities (especially new rail systems and advanced bus networks);
- Encourage travel by more sustainable modes of transport that are less carbon intensive and prioritise these modes in infrastructure investment plans;
- Accelerate the transition to vehicles not powered by fossil fuels;
- Increase the efficiency of vehicles that are still powered by fossil fuels, through technologies such as plug-in hybrid vehicles; and
- Reduce the carbon intensity of fuels, through measures such as low carbon fuel standards.

No single policy measure will achieve everything and policies are needed both on the transport supply and demand sides. Vehicle fuel efficiency standards will be needed in combination with price signals for consumers to encourage efficient purchasing and travel behaviour. Market-based instruments such as emissions trading systems or taxes can help set these price signals in the road transport sector, however transport economists generally recommend road charging schemes with prices dependent on time-of-day, location and vehicle replacing fixed transport charges. Many participants agreed that cap-and-trade is unlikely to have significant impact on transport emissions unless the price of emission allowances will reach much higher levels than expected in other sectors. Some participants highlighted that there is a price paradox for carbon allowances—a trading price high enough to force real technological change can be considered politically unacceptable, whereas a politically acceptable price may not be high enough to force real change. If an emissions trading scheme were implemented, many participants considered that either an upstream system or a personal trading scheme would be the best options. Freight transport should not be neglected, as emissions from this sector continue to grow.

In all modes, transport demand is relatively insensitive to prices, but in modes subject to strong competition economic incentives can be efficient: e.g. passenger car taxation differentiated according to fuel consumption or CO_2 emission, fuel taxation differentiation, carbon taxes, and kilometre charging in road pricing schemes. With all transport policies, good transparent consumer information is important to inform transport users of the options they have and the consequences of their choices.

In the longer term ambitious targets for transport greenhouse gas emissions reduction are needed. Governments need to invest now in advanced technologies, such as electric vehicles, advanced alternative fuels etc. More ambitious climate change mitigation policies will necessitate a change in transport demand by changing lifestyles, spatial planning, and consumption patterns. Transport policies need to be in the public long-term interest and effective and should be communicated as such to the public.

II. Biofuels

The debate throughout the conference on the topic of biofuels began with a recognition that U.S. policy has mainly been driven by a combination of energy security and support to farmers, with little concern for climate change, whereas EU policy has mainly been driven by climate change and support to farmers, with less concern for energy security. Recent awareness of the seriousness of climate change as well as future oil supply problems offers an opportunity to move ahead on a common strategy that recognises the two concerns as equally important and mutually reinforcing, without disregarding equally significant concerns about food security and the overall sustainability of agricultural systems. Therefore, the following points demonstrate some of the key issues of debate among our participants.

- **It is essential that biofuels should be approached through a combination of perspectives which include climate change, efficiency, resource availability and scarcity, food security, and sustainability.**

Reducing the carbon intensity of fossil fuels is in principle desirable. But the present rush to biofuels is in danger of taking over too much land throughout the world for suboptimal fuel crops. This is causing pressures on land needed for food production and other important uses, additional stress on biodiversity, and locking production into biofuels crops that are not even the most effective use of biomass for mitigating climate change.

While participants agreed that we need to move beyond first generation and towards second generation biofuels, specifically from waste products (not food) and cellulosic materials, second generation biofuels are also not the silver bullet answer. There is no justification at this point in time to take the virtues of second generation biofuels for granted. A few concerns and drawbacks with these types of biofuels were highlighted, including high costs, availability of waste materials, potential GMO issues, the considerable lead time required for full commercialization, and the need to make them viable at large-scale production levels. However, it is important to distinguish between current biofuels and the next generation of biofuels: i.e. a moratorium on biofuels does not mean that research funds should be diverted away from a search for cellulosic and other advanced biofuels.

The need to approach biofuels from multiple perspectives led to much debate about whether we even should keep a future where combustion engines are in the transportation mix.

- **No more plants for first generation biofuels should be built in Europe and North America before the potential future impact on food prices has been clarified.**

Since so many conditions and assumptions behind the adoption of present biofuel targets have changed in the last couple of years (and virtually all in a negative direction) further investment in first generation biofuel plants should be kept on hold. A three or four years moratorium would not prohibit present medium term goals to be achieved if an in depth analysis delivers green light, but significant damage, economic or food scarcity for the world's poor, appears to be a too serious risk to be ignored.

- **Biofuels need to be compared to conventional fuels and other envisioned energy carriers for transportation (e.g. electricity, hydrogen) with respect to land use efficiency and greenhouse gas emissions on a full life-cycle basis, including emissions from the destruction of sinks, land-clearing, and refining. Similarly, there should be a focus on sustainability of global agricultural systems, rather than just on bioenergy crops.**

Participants agreed that generally expansion in biofuel production has been decided based on insufficient impact assessments. Also, the merits of improved fuel efficiency, particularly its economic impact through its modifying effect on oil price developments, have largely been ignored. Other alternative fuels, such as biogas, compressed natural gas (CNG) or electricity have suffered from lack of strong political constituencies or lobbying even though they hold stronger promises than several farm-based liquid biofuels and are without the impact on food prices.

- **Society must evaluate strategies based on their broad potential to support sustainable development including a full life cycle analysis of greenhouse gas emissions and net energy savings. This implies a need to critically evaluate biofuels initiatives adopted as agricultural policy with inadequate consideration of environmental and food impacts.**

For the next several decades at least, fossil fuel powered vehicles will inevitably retain a major share of the market so it is essential that all new vehicles achieve much improved efficiency standards as soon as possible. Regulatory standards should be tightened and resistance from vehicle manufacturers faced down. This would help avoid a bifurcated agricultural sector, which will not necessarily solve sustainability challenges, such as land use change, etc.

Sustainability criteria could be useful but will not automatically solve all problems about biofuel development. A broader strategic reassessment is required. It was generally agreed that such criteria could play a useful part in analysing and ranking the merits of different applications in relation to some features of different biofuel crops in different locations, e.g. their relative effectiveness in reducing carbon emissions (provided the frame of reference was drawn sufficiently wide). But there were some doubts whether any such criteria applied on a case-by-case basis could

capture the broader impacts of large scale changes in land use that may arise from major expansion of biofuel production in the world (e.g. significant diversion of land use from food production to biofuels production). Meanwhile it would be unwise to continue to drive excessively rapid expansion of potentially unsustainable biofuel applications with over-ambitious quantitative targets and over-generous or distorting financial incentives.

The Washington meeting concluded that there ought to be a moratorium on the expansion of biofuels production in Europe and North America until the broader transport strategies have been established, and until there is greater certainty regarding the optimum use of biomass for climate change mitigation purposes that can be developed without damaging essential food production and conservation goals.

List of Participants at T-PAGE Conference on Climate Change, 24 April 2008, Washington DC

United States

Angela Anderson – Pew Environment Group
Phil Aroneann – 350
Peter Ashcroft – Environmental Defense Fund
Barbara Bramble - National Wildlife Federation
Daniel Brindis – WCC
Geoffrey Brown – Pew Environment Group
Manfredi Caltagirone - International Bioenergy Initiative, United Nations Foundation
David Doniger – Natural Resources Defense Council
David Driesen - Syracuse University
Anthony Eggert - California Air Resources Board
Peter Fontahe - Cozen O'Conner
Dan Froats – TNC
Jana Gastellum - United Nations Foundation
Dan Howells – Pew Environment Group
Arne Jungjohann - Heinrich Böll Foundation
H.M Max Kleeman - Sustainable AG
Laura Ledwith – CF
Deron Lovaas - Natural Resources Defense Council
Kristin Luber – German Marshall Fund
Dominic Marcellino – Environmental Defense Fund
Kate McMahon - Friends of the Earth
Melanie Nakagawa - Natural Resources Defense Council
Dan Rizza – Center for Clean Air Policy
Erike Rosenthal – Center for International Environmental Law
Nicole Ruth - Wexler & Walker
Noah M. Sachs - Robert R. Merhige, Jr. Center for Environmental Studies, University of Richmond, Virginia
Miranda Scheurs - University of Maryland
S. Jacob Scherr - Natural Resources Defense Council
Jessica Schifano – Center for International Environmental Law

Katherine Silverthorne – Climate Action Network U.S.
Carolyne Spackman – American University
David Turnball – Climate Action Network U.S.
Jerome Weingart - Jerome Weingart and Associates
David Wirth - Boston College School of Law

Europe

Jason Anderson – Institute for European Environmental Policy, Brussels
Henriette Bersee – Royal Netherlands Embassy, Washington, DC
Willy De Backer - Global Footprint Network Europe, Brussels
Judit Balint - The Regional Environmental Centre for Central and Eastern Europe, Budapest
Jørgen Henningsen - European Policy Centre, Brussels
Dr. Christoph Holtwisch - Deputy Mayor of the municipality of Vreden and Lecturer at the University of Hagen and the Fraunhofer Institute UMSICHT, Germany
Sanjeev Kumar - WWF European Policy Office, Brussels
Nick Mabey - E3G, London
Leonardo Massai - T.M.C. Asser Instituut, The Hague
Derek Osborn - European Economic and Social Committee, Brussels
Dr Marc Pallemaerts - Institute for European Environmental Policy, Brussels
Dr Lisa Ryan – Comhar -Sustainable Development Council, Dublin
Ana Belén Sánchez - ISTAS (Union Institute of Work, Environment and Health), Madrid
Dr Stephan Singer - WWF European Policy Office, Brussels
Johannes Urpelainen - Finnish climate change expert (PhD candidate in Political Science at the University of Michigan)
Tinne Van der Straeten - Member of the House of Representatives, Belgian Federal Parliament
Louise van Schaik - Netherlands Institute of International Relations 'Clingendael', The Hague
Ron Wit - Dutch Society for Nature and Environment, Utrecht
Tomas Wyns - Climate Action Network Europe, Brussels