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Cap and trade in America

US climate policy at a crossroads

May 5, 2008

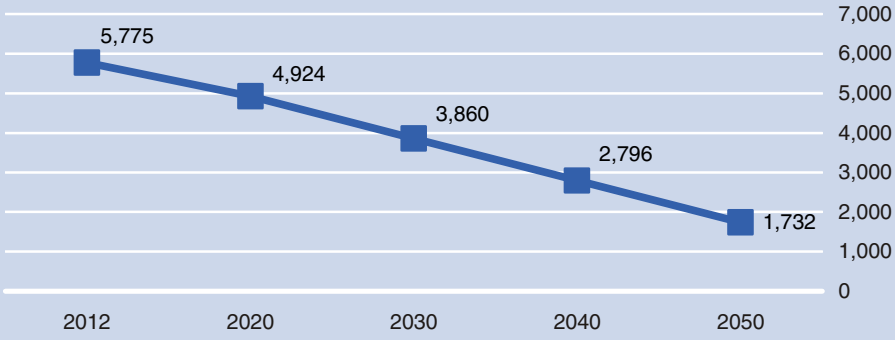
The United States – the world's No. 1 emitter of greenhouse gases for decades – are now debating a major policy shift from indirect approaches in tackling climate change to a cap-and-trade programme which would greatly reduce emissions. This will be the litmus test of US domestic politics over the next two years.

US society is increasingly ready for the big changes ahead. Public opinion is leaning more strongly towards protecting the environment against climate change; many companies have embraced constructive views; and some US cities and states have already adopted climate policies.

Pending legislation in the US Senate – the Climate Security Act – would establish a comprehensive and stringent climate policy. If enacted, US emissions would fall substantially until mid-century, power generation would shift to low-emission technologies and new technologies would emerge on a broad scale. The world's largest market for carbon trading would be established. Also, double-digit billions of dollars in public revenues from the auctioning of emission allowances would be spent on mitigation and adaptation programmes.

If the US were to take this new tack on climate policy, it would turn global climate diplomacy upside down. Pressure on emerging markets to adopt stringent climate policies would increase substantially. Prospects for convergence with the EU's climate policy would increase as well, perhaps even opening up emissions trading across the Atlantic.

The cap: US greenhouse gas emission targets*



* Proposed cap of the Lieberman-Warner Climate Security Act (S. 2191), covered sectors only, in millions of allowances for each metric ton of emission

Source: CSA (2007)

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The US and climate change

Climate change a hot topic now

Back in 1980, a US government institution produced the first comprehensive report on global environmental challenges, including climate change as a result of the increase of greenhouse gases (GHGs) in the atmosphere, to President Jimmy Carter.[1] The report summarised the available scientific evidence and suggested policies to address them. Today, 28 years later, there is still no comprehensive public policy to address climate change in the United States – still the world's major emitter of GHGs. Over the last few years, however, the politics of climate change has been changing, and new policies have been adopted at the state and local level. At the federal level, Congressional legislative activity and debate have reached a new level of ambition, and legislation on new climate and energy policies may move ahead soon.

US Senate drafts legislation

In recent months, the US Senate has worked hard on drafting a climate change bill at the Committee level. The legislation, if enacted, would establish a very comprehensive and ambitious system of quantitative constraints on future emissions based on tradable permissions of emission rights or allowances, in short: a cap-and-trade system. Legislation also deals with international aspects, in particular the trading of rights across borders and international projects to be used by emitters to "offset" domestic obligations to reduce emissions. Legislation may well pass in the next Congress. In addition, legislation setting tougher performance standards for the energy efficiency of buildings, products and processes in the economy and for the promotion of renewable energy was recently passed by Congress and signed into law by President Bush in December 2007.

This paper aims to sketch the evolution of US greenhouse gas emissions and of US domestic climate policy so far, describe the economic essentials of the major piece of draft legislation – the Lieberman-Warner "Climate Security Act" as introduced in the Senate Environment and Public Works Subcommittee on October 18, 2007 and marked up in the Committee on December 5, 2007[2] – and discuss some issues of the policy design. Discussion will also focus on its potential implications for the evolving global framework of climate change policies and for transatlantic convergence.

GHG emissions

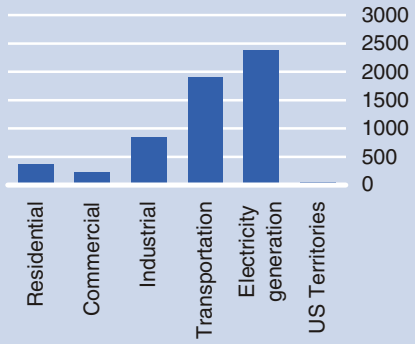
There are six greenhouse gases that are covered by the UN Framework Convention on Climate Change (UNFCCC): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Several other naturally occurring greenhouse gases include ozone, chloro- and hydrochlorocarbons and halons, which are covered under the Montreal Protocol on Substances that Deplete the Ozone Layer and are thus not covered in GHG inventories of parties (such as the US) to the UNFCCC signed in 1992. These are emissions of GHG excluding emissions/removals from land use, land-use change and forestry (LULUCF). All data and information from official sources: EPA (2007) and UNFCCC (2007). EPA reports emissions in Teragrams (1 Tg = 109 kg = 1 million metric tons (mmt)) or Gigagrams (106 kg = 1 thousand metric tons) of CO_2. This note uses the more common terms megatonne, equivalent to 1 million metric tons (mmt), or gigatonne for a thousand megatonnes.

The nature and scope of GHG emissions

In 2005, total emissions of US greenhouse gases were 7,260 million metric tons (mmt) of carbon dioxide equivalents (CO_2e). Emissions have risen by 16.3% since 1990; the US had initially committed itself in Kyoto to a 7% reduction (the average of 2008-2012 compared to the 1990 level). By comparison, the European Community reported emissions (of 15 states at the time) of 4,192 mmt of CO_2e (-1.5%), Japan of 1,360 mmt CO_2e (+6.9%). In 2005, the US was by far the largest emitter among the 38 countries reporting to the UN. Comprehensive data on major emitters such as China, India and Brazil refer only to 1994 (or years up until 1998) and are not directly comparable. China's emissions of CO_2 alone already amounted to 5,060 mmt; China is No. 2 in global emissions and, given its energy use, on its way to becoming the world's largest emitter very soon.[3]

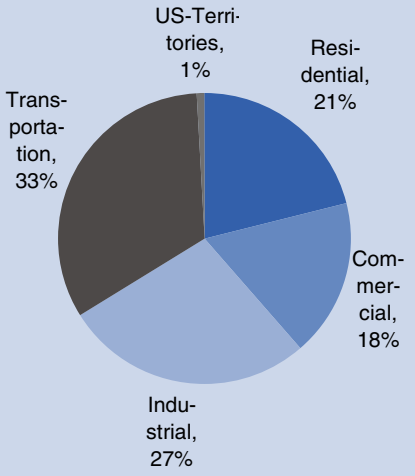
[1] US Council on Environmental Quality (1980), Speth (2005).
[2] Climate Security Act (2007).
[3] IEA (2007) and Shalizi (2007).

Emissions by end-use
2005, mmt CO_2

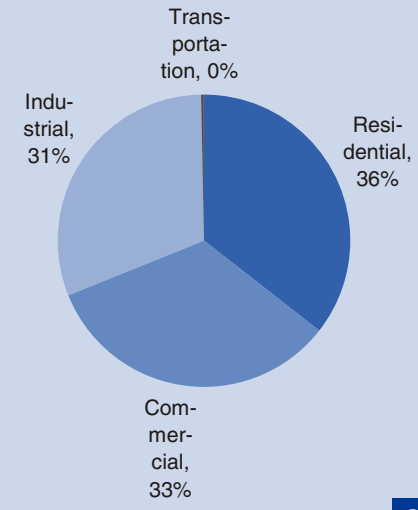


Source: EPA (2007a) 1

Carbon dioxide emissions by type of end-use, 2005



thereof electricity generation



Source: EPA (2007a) 3

Russia, however, reported 2005 data of 2,133 mmt CO_2e, ranking No. 3 globally. On a per capita basis, US emission levels are by far the highest in the world, at some 20 metric tons, whereas Russia records some twelve metric tons, Germany ten, China four and India one.

Total aggregate anthropogenic emissions of GHGs excluding impacts from land use, land-use change and forestry

Country	Emissions		Change	
	1990	2005	absolute	percentage
US	6,229	7,241	1,012	16.3%
EU	4,258	4,193	-65	-1.5%
RU	2,990	2,133	-856	-28.7%
JP	1,272	1,360	878	6.9%
DE	1,228	1,001	-227	-18.4%
CA	596	747	151	25.3%
UK	771	657	-114	-14.8%
IT	517	580	63	12.1%
AU	418	525	107	25.6%
ES	287	441	154	53.3%
UA	924	419	-505	54.7%
PL	687	399	-188	32.0%

mmt carbon dioxide equivalents

Source: UNFCCC (2007): "National greenhouse gas inventory data for the period 1990-2005", p. 17, Bali 2

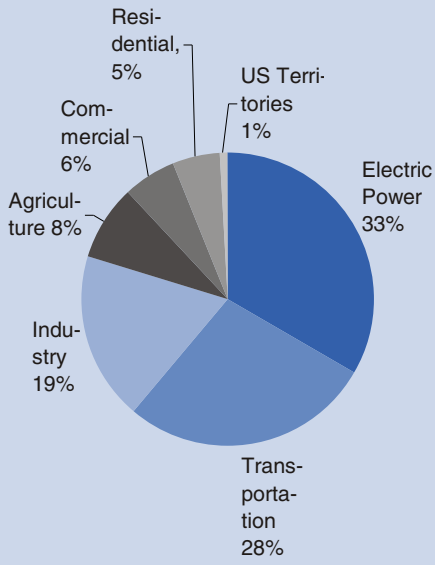
From 1990 to 2006, US GHG emissions were flat on a per capita basis, however, and related to economic activity (GHG intensity of growth) GHG emissions per real dollar of GDP fell by 24.7% in total or 1.9% per year.[4] Industrial emissions declined in particular, as had to be expected from an economy shifting increasingly to services.

In the US, the composition of emissions by gas is heavily shaped by carbon dioxide, which accounted for 84% of total emissions in 2005. Methane accounted for 7%, and nitrous oxide for 6%. 97% of CO_2 emissions again resulted from fossil fuel combustion and the non-energy use of fuels, followed by cement manufacturing, iron and steel production, natural gas systems and waste combustion. Over the period, US CO_2 emissions increased by 20%, while methane and nitrous oxide emissions decreased by roughly 12% and 3%, respectively. Emissions of all other covered gases rose by 83%. This is troublesome as many of these emissions have a very high global warming potential.

CO_2 emissions increased due to population and economic growth in general and growth in emissions from electricity generation and transportation in particular. Transportation activities account for one-third of these CO_2 emissions and stem mostly from gasoline consumption. Industry accounted for 27% of emissions, residential and commercial end-use for 21% and 18%, respectively, including the apportioned share of electricity consumption. Taken separately, electricity generation accounted for 41% of CO_2 emissions from fossil fuel combustion, half of which is based on coal (see chart 3).

[4] EIA (2007).

GHG emissions by sector



Source: EPA (2007a) 4

The sectoral composition of all GHG emissions as statistically disaggregated according to UN conventions is of importance as well. Energy consumption accounted for 85% of GHG emissions, agriculture for 7%, industrial processes for barely 5% and waste for 2%.[5] Using a more common statistical disaggregation (see chart 4), the power industry itself accounts for 33% of emissions, followed by transportation (28%), industry (19%), agriculture (8%), the commercial sector (6%), the residential sector (5%) and emissions from US territories (1%). Sinks took up almost 830 mmt of CO_2e, reducing the gross emissions by that amount, or by 11%. These emissions patterns indicate that major progress on reducing emissions requires a strong emphasis on reducing the use of fossil energy and on curbing emissions from that use.

If policies adopted since 2002 (until mid-2007) are implemented fully, total GHG emissions are projected by the Bush Administration to increase to above eight gigatonnes (8,330 mmt CO_2e) in 2020, a projected increase of 14.7% from 2005. The GHG intensity would improve further until 2020 and per capita consumption would grow by 9% only.[6] The "business-as-usual" reference simulations by the Environmental Protection Agency (EPA) show total GHGs in the US increasing to a level between ten and twelve gigatonnes in 2050.[7]

The US Department of Energy projects future emissions only of CO_2 to grow substantially until 2030, by some 36% or an average of 1.2% per year, from a level of some six gigatonnes to above eight gigatonnes in 2030, driven by an absolute increase in primary energy consumption and a shift towards a fuel mix with slightly higher average carbon content. Again, as in the recent past, electricity consumption and transportation activity are forecast to remain the key drivers of emissions growth.

US a high emitter by any measure

Summing up, the US faces an already high level of emissions by any comparative measure, which is poised to increase substantially even if current climate policies work fully. This status quo and outlook have led to a broad-based national discussion of climate policy which will now be addressed in the following.

US climate policy

The US did not ratify the Kyoto Protocol

US government policy towards climate change has undergone several changes since the first broader recognition of the policy issue in the late 1970s. During the Carter, Reagan and George H.W. Bush years, no comprehensive attempt was made to directly tackle the growth in GHG emissions. The Administration of G.H.W. Bush participated in the UN Climate Convention in 1992 which the US signed and ratified. The Clinton Administration was then involved in negotiating the Kyoto Protocol designed to put teeth to the United Nations Framework Climate Change (UNFCCC) in the mid-1990s. It signed the protocol in 1997 but never put it up to Congressional ratification as the "sense of the Senate" (the Byrd-Hagel resolution adopted during the negotiations of the protocol) was unanimously against a comprehensive national policy reducing emissions if it were costly and were to occur in the absence of similar commit-

[5] The IPCC has defined six sectors; in addition to the four mentioned above there is also Solvent and other product use and LULUCF.
[6] Department of Energy (2007).
[7] EPA (2007b). According to a recent McKinsey analysis, total US GHG emissions would increase to almost ten gigatonnes (including the absorption by land-use change [LULUCF]) in 2030, on the assumption of no major new policy, an increase in the population of 70 million and an increase in carbon-based power in electricity generation, see McKinsey&Company, The Conference Board (2007).

ments of major emitting countries in the developing or transforming world, in particular China, India, Brazil and Indonesia.[8] In Kyoto, these countries did not have to enter into binding reduction commitments. Russia committed itself in Kyoto but ratified the protocol only in 2005.

Economists in the Clinton Administration were also seriously pondering the major design features of any cap-and-trade system or of alternative strategies (a tax on carbon, performance standards and so on)[9], yet despite the policy focus of then Vice President Al Gore the Administration could not persuade Congress to adopt any far-reaching climate policy.[10] After the shift to a Republican majority in Congress in the 1994 mid-term elections and the "conservative revolution", stringent climate policy was simply not acceptable in Congress.[11]

Emissions trading was a US idea and practice

In retrospect, there is a certain irony in the history of the negotiations. In fact, it was not the Europeans who championed the use of a market-based, mandatory cap-and-trade programme to achieve reductions in GHG emissions as in already existing schemes of the US's Acid Rain Program or the use of flexible mechanisms, i.e. the international trading of emission allowances, but the Clinton Administration. Yet it was the Europeans who ultimately committed themselves to the Protocol, and later on to the very methods the US had suggested as being useful, whereas the US did not do so. In Europe, it took until 2000/01 before the European Commission finally proposed such a scheme, and it met hostility initially in broad circles of the economy.[12] However, it is in existence today.

President Bush launched different policy in 2002

The US chose a different path ten years ago. After a lack of domestic action during the Clinton years, President George W. Bush, after assuming office, reorganised climate policy in February 2002 by establishing two central processes to guide science and technology programmes within the Administration. The US has since used a variety of policy approaches and sector programmes to tackle GHG emissions. In 2002, Bush set the goal of reducing the greenhouse gas intensity of the US economy by 18% over the 10-year period from 2002 to 2012, which would amount to a 4% reduction in total emissions over the projected "business–as-usual" trend. This policy objective was considered by many experts as being largely in line with the decarbonisation trend in the US economy anyhow.[13]

[8] See Busby and Ochs (2005) on the negotiations.
[9] Frankel (2007).
[10] Gore (2006).
[11] See Schreurs (2007).
[12] Schreurs and Tieberghien (2007), p. 16, and Schafhausen (2007b).
[13] Apart from official sources see Schreurs (2007), Arimura et al. (2007), Ochs and Sprinz (2005).

Top 10 US actions under Bush Administration to reduce GHG emissions until 2006

Policy	Objective	Affected sector	Instrument	Impact by 2020[1]
Significant new alternatives program	Transition away from ozone-depleting chemicals	Industry; Private	Regulatory; Information	222.9
Renewable energy commercialisation	Develop clean, competitive power technologies	Power	Research	153.5
Energy star-labeled products	Improve energy performance in commercial buildings	Commercial	Voluntary; Outreach	148.5
Energy star for commercial market	Improve energy performance in residential buildings	Private	Voluntary, Outreach	93.5
Corp. average fuel economy	Raise fuel economy standard for minivans, SUVs and others	Automotive	Regulatory	76.7
Clean energy initiative	Remove market barriers for clean energy supply	Power	Voluntary; Education; Tech. assist.	73.3
FreedomCAR[2]	Advance high-risk research for fuel cells and hybrid cars	Automotive	Research	72.0
Distributed energy commercialisation	Remove regulatory and institutional barriers	Power	Information; Research; Education; Regulatory	57.2
Environmental stewardship initiative	Limit emissions in industrial applications	Industry	Voluntary Agreement	54.3
Industrial assessment centres	Provide recommendations to improve productivity, reduce waste & save energy	Industry	Information; Research	51.3
Total impact of top ten policy				1,003.20
Impact of all other policies[3]				557.1
Total impact of all policies under Bush administration				1,560.30

[1] Measured in mmt CO_2 equivalent

[2] In combination with Fuel Partnership and Vehicle Technologies Program

[3] Excluding not estimable impacts of other mostly voluntary agreements

Source: US Dept. Of State (2006): ch. 4, pp. 55-60 5

Many energy conservation and efficiency programmes at work

While there is no space here to describe the set of federal measures and policies in any detail (see box 5),[14] the policy approach of the Bush Administration rested mainly on R&D promotion via expenditure and tax incentives, in particular concerning energy projects for renewables and nuclear energy, carbon capture and sequestration, and other technologies.[15] The Administration also adopted voluntary programmes on energy conservation (for example, the Energy Star programme to improve the energy efficiency of appliances and buildings or lately a programme to cut fuel use and electricity use by the US government itself), various partnership programmes with the states and industry to improve technical applications, and a range of programmes addressing the use of energy in the transportation sector, of which the tightening of

CAFE standards

CAFE standards[16] is the most prominent one. The latest tightening occurred in the Energy Independence and Security Act of 2007, signed into law by President Bush on December 19, 2007. It aims at improving the fuel efficiency of automobiles by 40% to 35 miles per gallon of gasoline by 2020 and to reduce gasoline consumption by 20% in ten years. This important move in policy had long been opposed by industry and Congress and would not have gone forward if awareness of global climate problems had not

[14] See Kohl and Müller (2007), US Department of State (2006) and Auer (2005), for instance.

[15] The White House recently estimated a "climate budget" of USD 37 bn for all federal climate policies adopted since 2001.

[16] CAFE stands for Corporate Average Fuel Economy and represents a performance standard for the average fuel efficiency of automobiles of a given producer.

substantially increased in the last two years. A renewable fuel standard – which requires fuel producers to use at least 36 billion gallons of biofuel in 2022 – and aircraft fuel efficiency standards are other elements. A real reduction in methane emissions could also be achieved by a voluntary programme. Further policy measures were taken in agricultural, forest and waste management policies. However, an official analysis of the emission reduction impact within the next two decades of recent legislation since 2006 is not yet available – it will be published by the EIA in the summer of 2008 – but a full implementation of policies adopted would certainly achieve a slowdown in the growth of GHG emissions compared to the baseline. On balance, however, total federal and state-level policies on current trajectories would only curb the growth in total US GHG emissions and not lead to a reduction from current levels or even from the 1990 level. In a recent speech, however, President Bush announced a new goal: to stop the growth of US. greenhouse gas emissions by 2025. Until 2025, the growth in emissions shall be curtailed, and after 2025 they shall decline. He addressed some policy principles to achieve that goal, called for a comprehensive programme but did not mention a cap-and-trade scheme at all.[17]

New policy goals on the books now

Diplomacy in difficult waters

On the diplomatic side, the Bush Administration had a difficult time with the Europeans in particular. President Bush has been staunchly opposed to a major carbon tax or a cap-and-trade system for GHGs from the beginning. In 2001, he rejected the Kyoto approach to climate change in particular and announced a withdrawal of the US from its commitment to reduce US GHG emissions by 7% in the period 2008-2012 as compared to 1990. In 2006, President Bush launched the Asia-Pacific Partnership on Clean Development and Climate with Australia, China, India, Japan and South Korea instead. A number of bilateral partnerships with other countries are also of importance. Moreover, some significant cap-and-trade action occurred in 2007 under the Montreal protocol for hydrochloro-fluorocarbons (HCFCs).

The Heiligendamm G8 summit and the Major Economies Meetings

In global climate diplomacy, the US gradually changed course only during 2007 and in the face of major international pressure both in the G8 and the UN frameworks. At the G8 summit at Heiligendamm on June 7, 2007, Bush conceded the US would fully participate in the UN process to formulate by 2009 a binding agreement to follow on from the Kyoto Protocol that expires in 2012 and agreed to the phrase: “In setting a global goal for emissions reductions in the process we have agreed-together with all major emitters-to consider seriously the decisions made by the European Union, Canada and Japan which include at least a halving of global emissions by 2050”. However, the White House made clear afterwards that the US would not consider such a strong reduction feasible.[18]

After the Heiligendamm summit, President Bush invited governments of major emitting countries to two “Major Economies Meetings” designed to encourage those governments to commit themselves to more stringent GHG mitigation policies.[19] A third was held in Paris April 17-18. The US even accepted the Bali compromise of the 13th Conference of the Parties to the UNFCCC which

[17] Bush (2008).
[18] Connaughton (2008). James Connaughton is Chairman of the Council on Environmental Quality and President Bush’s top aide in the White House on global climate change.
[19] The first meeting was held on September 27-28, 2007 in Washington, DC, the second on January 30-31, 2008 in Honolulu, Hawaii and the third April 17-18, 2008 in Paris.

US looks for international agreement

entails a commitment on the part of the industrial countries to reduce emissions until 2020 in accordance with Intergovernmental Panel on Climate Change (IPCC) recommendations[20], even though President Bush publicly stated afterwards that the approach would yield risks for the US economy. However, he also stated that the US prefers sealing an agreement at the 15th Conference of the Parties in Copenhagen, Denmark, in December 2009.

The evolving US climate policy

Criticism. This mix of federal policies scattered across dozens of programmes mostly of an energy-policy nature on the one hand and misgivings about climate diplomacy on the other did not fully reflect governance desires and policy objectives on climate change as proposed by the states, communities and environmental NGOs in the US. In fact, as Schreurs and others have noted[21], federal environmental policy lost its national and international leadership roles of the 1970s and 1980s roughly by 1990 after the signing of the Montreal Protocol because domestic political conflict prevented comprehensive action both at home and in diplomacy. President Bush's climate policy has elicited much criticism of a lack of ambition. The current political situation is, however, ambiguous as Congress has shifted gear again and has tackled climate change in a comprehensive draft bill at Committee level so far. If legislation were to come about, domestic federal leadership would be resurrected and international action would probably follow suit as well.

Policy ideas of presidential candidates are similar

Presidential campaign. Also, climate change issues may still emerge as a major topic in the 2008 presidential campaign. The three senators still running, John McCain, Hillary Rodham Clinton and Barack Obama, all supported similar pieces of legislation which would set very demanding reduction targets (60-80% reduction to current levels in 2050). They all favour a cap-and-trade system and would channel a double-digit billion dollar investment subsidy into "green" energy technologies and R&D. All prefer strong improvements in energy efficiency. McCain also supports a revival of the nuclear industry. McCain's position is, however, not broadly accepted in the Republican party, which might force him to compromise on issues if elected. Obama prefers full auctioning and the use of the proceeds for large spending programmes on clean energy (USD 150 bn over ten years, doubling of R&D spending, "green" venture capital funding); he also supports tough performance targets for energy efficiency in the building sector and various programmes promoting low-carbon fuels. Clinton's policy proposals are very similar in type and ambition.

Convergence of proposals

Congress. Given the reluctance of the Administration to engage in much stronger and far-reaching commitments on mitigation, Congress has entered the stage forcefully in recent years. About two dozen legislative proposals have been introduced in Congress, in particular the Senate, so far, with weekly additions in autumn 2007.[22] There is increasing convergence of proposals, with a strong narrowing of differences compared to previous proposals of often the same senators, in particular regarding the level of ambition to

[20] The text does not contain a reference to numbers but is considered to imply a reduction by 25-40% until 2020.
[21] Schreurs (2007), see also Peterson and Rose (2006), Rabe (2004).
[22] See Arimura (2007) and MIT (2007) for surveys of these proposals and the internet sites of the Department of Energy and the Environmental Protection Agency for economic evaluations of several but not all major legislative proposals.

reduce GHG emissions by 2050, with targets running in the range of 60-80% to current, i.e. 2005, levels (not to 1990 levels). This would entail emission reductions by the US that would go a long way towards meeting IPCC recommendations of stabilising global emissions concentrations at the 450 to 550 ppm required to limit global warming to less than two degrees Celsius. There is also considerable similarity in design elements, with major differences on distributive issues (for example, on how much grandfathering of heavy polluters should initially be allowed by distributing allowances to coal mines, utilities and energy-intensive industries) and a lack of specificity in policy design on some international and national dimensions (Kyoto-compliant or not; international trade in rights or not or how much thereof; how many, and what kind of, offset provisions).

Cap-and-trade system is key element

Current US policy and all bills under consideration also entail significant spending by Congress directly, or by designated entities, on industry subsidies for technological advances in the fields of energy use and production and other climate-relevant technical dimensions. There is broad agreement that apart from cap-and-trade systems performance standards must play a role both in achieving overall policy targets and sharing the mitigation costs more broadly. This seems politically important as the price elasticity of consumption to carbon pricing may be very low in certain economic activities such as car usage.

Senate took the lead

Renewed federal activism originated not in the White House but in the **Senate**. Many influential senators on mostly the Democratic side of the political aisle have introduced pieces of comprehensive climate change legislation since the early 2000s. All of these initiatives aimed at establishing country-wide, mandatory cap-and-trade systems for all major GHGs. Long-term reduction goals and coverage of sectors differed, and initial proposals lacked specificity of rules. In 2007, a revised proposal by Senators John McCain (Rep., Arizona) and Joseph Lieberman (independent, New Jersey), who had championed the issue as early as 2003 (the Climate Stewardship Act was defeated by 55 to 43 in the Senate vote in October 2003), and later by Senators Lieberman and John Warner (Rep., Virginia) as well as another draft bill by Senators Jeff Bingaman (Dem., New Mexico) and Arlen Specter (Rep., Pennsylvania) paved the way for deliberation and decisions at the subcommittee and Environmental committee levels in the autumn. The main text under Senate deliberation these days is the bipartisan Lieberman-Warner bill S. 2191 “Climate Security Act” (CSA) introduced on October 18, 2007; several hearings were held at subcommittee level (Subcommittee on Private Sector and Consumer Solutions to Global Warming and Wildlife Protection) in October and November. The subcommittee passed the draft legislation by a vote of 4-3 on November 1. A slightly revised and strengthened version of the bill was then marked up at the Committee on Environment and Public Works on December 5, 2007 (for a full discussion of the content see below, pp. 15-25). The Democratic majority managed to unite behind the bill, whereas the Republican minority led by Sen. James M. Inhofe (Rep., Oklahoma) split on the issue, with Warner as sponsor of the bill taking the outside position. The bill might be considered at the full Senate level in the course of 2008, most probably in June. However, senior Democrats in both the House and the Senate stated that legislation will be withdrawn this year if attempts to water it down become over-

“Climate Security Act” passed at Committee level

whelming; it would then be re-introduced in both chambers after the elections.

House works on similar proposals

The **House** of Representatives has not yet produced detailed policy proposals on the issue but announced legislative proposals for spring. In the House, Speaker Nanci Pelosi, the Committee on Energy and Commerce, and the Subcommittee on Global Warming, newly established in 2006, organised a series of hearings on all broad aspects of climate change and policy in spring 2007. Also, House Energy and Commerce Committee Chairman John Dingell (Dem., Michigan) not only proposed raising a carbon tax (USD 50 per metric ton of carbon emission) but issued a series of White Papers on the design elements of a cap-and-trade system, on involving developing countries and on the role of different levels of government in policy.[23] Most importantly, the first White Paper states that the US should reduce emissions by 60-80% by 2050 and use a mandatory cap-and-trade programme as a key component to achieve this objective. Many members, and committees, of the House may well get involved in the coming weeks and months in the various details of such proposals and the potential implications for policy takers in their districts.

Many factors change societal approach to climate change

Society at large. Apart from the genuine climate policy reasons for renewed Congressional action, US climate policy has become a major political battleground also at the state and local levels, in industry and finance and in public opinion. Put in a nutshell, the main challenge created by the lack of a strong and mandatory federal framework seems to have been a strong desire by many city and state governments to adopt comprehensive GHG reduction targets, often involving cap-and-trade plans. Over the years, this decentralised approach has itself generated pressure to respond at the federal level with policy initiatives, in particular in order to avoid a fragmentation of the domestic US market. In addition, a shift in industry lobbying and policy positions from a majority of strongly critical firms – in particular from the energy, automotive and industry branches – to a majority of green firms favouring a major role of federal instead of state-level regulation and legislation in order to protect the integrity of the national market sent strong signals to Congress. Furthermore, a shift in public opinion took place. Rather than looking at climate change from a neutral or sceptical point of view, the policy problem received increasing attention. Also, public understanding has certainly been fostered by:

— the popularity of Arnold Schwarzenegger's environmental policy approach in California

— Al Gore's public campaign on climate change

— Hurricane Katrina as evidence of the risks and costs of climate change

— more volatile weather conditions in the US in general, and

— increasing evidence of, and reporting about, scientific evidence as marshalled by the Intergovernmental Panel on Climate Change established under the UN Framework Convention on Climate Change.

A growing concern in particular among conservative politicians about the price of oil and the import dependency on oil-producing countries in the Middle East played a role as well. Finally, a shift in legal decisions on environmental matters helped proponents of

[23] House (2007, 2008a, b).

California's climate policy

California has played a leading role in addressing climate change. Governor Arnold Schwarzenegger implemented Assembly Bill 32 in the fall of 2006 which established goals for the reduction of GHG emissions, increases in energy efficiency and in the supply of renewable energy sources. The full legislative programme to deliver the planned reductions in emissions shall be completed by 2011.

Overall goal:

— reduction in GHG emissions to 2000 level by 2010, to 1990 level by 2020 and to 80% below 1990 level by 2050

— establishment of a cap-and-trade programme in 2012

Transportation:

— establishment of a Low Carbon Fuel Standard to reduce fuel carbon intensity by 10%, reduce gasoline consumption by 20%, increase the use of renewable fuels and the number of advanced technology vehicles to 7 million by 2020

Electricity Sector:

— increase in the share of renewable energy supply to 20% by 2010

— increase in research and profitability of solar energy

— implementation of emissions performance standard for fossil fuels of 1,100 CO_2/MWh

— implementation of resource goal of 23,283 GWh for the time period 2004-2013

Assembly Bill 32 authorises the State Air Resource Board to develop regulations and market mechanisms to reach the goals. Governor Schwarzenegger has pointed out that a cap-and-trade system could be linked to the Emissions Trading System of the EU. Germany's foreign affairs minister, Frank-Walter Steinmeier, supports this idea as well. A possible target date for a linkage between both cap-and-trade systems could be 2012 when both the second commitment period of the ETS and the Californian cap-and-trade system ensue.

The Californian initiative to implement the Low Carbon Fuel Standard has been stopped by the federal government. The Environmental Protection Agency denied California's request for a waiver from the Clean Air Act of 1970. The decision has a significant business implication, as 13 other states have adopted the Californian standard already, and another six have considered doing so. Schwarzenegger, however, announced that California would challenge the decision.*

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* Spiegel (2008) and Governor (2008).

comprehensive, mandatory climate change policies as well. However, opponents to comprehensive and ambitious legislation addressing emissions may continue to play a strong role in future.

Although there is no space in this analysis to go into those matters in any depth, a few highlights have to be presented to explain the powerful shift back towards federal environmental activism after almost two decades of slippage.

State and local action. State (and local) action is probably the most significant driver of renewed federal activism. Over the years, numerous US states have developed rather detailed policy responses to global warming. The promotion of renewable energies including the adoption of renewable energy standards, reductions in public energy consumption in particular by improving the energy efficiency of buildings and programmes to lower transport emissions are commonplace.[24] 39 states are also participating in an interstate climate registry.

Perhaps the most aggressive policy has been pursued by California (see box for details), which has adopted demanding performance standards and market-based programmes for the reduction of GHGs, driven by Governor Schwarzenegger's ambition to address climate change comprehensively. Indeed, California is very vulnerable to devastating impacts of climate change. In 2006, the legislature passed a bill requiring a reduction in emissions to a level 80% below 1990 in 2050, essentially aiming at reducing emissions from above 400 mmt CO_2e in 1990 and above 500 mmt CO_2e in 2010 back to the 1990 level in 2020 (by some 174 mmt CO_2e) to below 100 mmt CO_2e in 2050.[25] The policy includes many measures:

— California wants to set very tough emissions standards for automobiles initially planned for 2009 but currently blocked by an EPA decision; emissions from transportation accounted for 41% of total emissions in 2002;

— A tough energy efficiency standard for buildings,

— The introduction of a renewable energy portfolio standard; and

— The Million Solar Roofs Initiative.

In addition, Schwarzenegger, with governors of other West Coast states, created a regional organisation in 2007 which shall establish a cap-and-trade system for GHG emissions.

Regional initiatives. Also, two other regional initiatives have set themselves medium-range energy conservation and/or GHG reduction targets and are on their way towards implementing comprehensive schemes to get there, including a first regional cap-and-trade system to come into effect in 2009 in the Northeast which aims at emissions stabilisation between 2009 and 2015 and provides for annual reductions of 2.5% until 2019. In the Midwest, another regional system is in the process of being established.

In addition, several hundred cities are participating in the US Mayors Climate Protection Agreement which covers some 77 million citizens and provides local administrations with practical guidelines; these cities adopted Kyoto-consistent targets of reducing emissions by 7% below 1990 levels.

[24] See Auer (2005) on US energy policy and Rabe (2004), Schreurs (2007) and Peterson and Rose (2006) on state-level climate action.
[25] Whitherspoon (2007).

RGGI*

The Regional Greenhouse Gas Initiative (RGGI) was set up in December 2005 and now comprises ten states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont) and several observer states (US states and eastern Canadian provinces) which might join at a later stage.

The RGGI sets up a policy framework of a cap-and-trade system for carbon dioxide emissions which is legislated at state level and shall come into effect in 2009.

The regional cap for GHG emissions is set at 188 million short tons of CO_2 (roughly the current emission level) up until 2014 before initiating an emissions decline of 2.5% per year until 2018. There is a reduction obligation of 10% until 2019. There is an emissions cap for each participating state. This only covers utilities with an output of 25 megawatts or larger. Banking of rights is allowed. Compliance is checked every three years. In 2012, the scheme will be reviewed.

There are no prescriptions for how the allowances are to be distributed. Each state may decide how to auction or allocate the emission rights. There is, however, a common understanding that at least 25% of revenues from the auction of allowances will be allocated to "a consumer benefit or strategic energy purpose", i.e. to R&D programmes, conservation measures and so on. Several states decided to auction all allowances. Also, a large effort was undertaken to study the policy options for the auctioning of allowances.**

There are various offset provisions including afforestation and farming measures. The use of offsets depends on a 14-month grace period and on a price trigger: if the price falls below USD 7, 3.3% of emissions by a covered entity can be met by offsets at a 50% discount; at or above USD 7, 5% of emission rights can be met by offsets at equal value; if the price is higher than USD 10, global offsets can be used up until 20%.

Electricity prices are estimated to increase by 1.7-3.2% in 2015.

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* Comprehensive information is available at http://www.rggi.org

** See Holt and Shobe (2007)

Industry. There is no single industry position on climate change, given the broad and deep divergence among potential losers and winners from both climate change itself[26] and any regulatory effort to address the problem in the US. At least there is no longer any strong lobbying effort to dispute scientific evidence as assembled by the IPCC as in the past. Industry is still split between active supporters (assembled in the US Climate Action Partnership[27] including firms such as GE, Alcoa and all three major US auto manufacturers) and opponents. The supporters in USCAP are by and large in line with demanding UN recommendations and the major thrust of current legislative proposals; USCAP favours the introduction of an ambitious cap-and-trade system and hopes to benefit from structural change accelerated by tough legislation.[28] Interestingly, the car industry has made a U-turn in recent years on climate change and now supports comprehensive action in principle, even if there has been some opposition to tightening CAFE standards recently. Some manufacturing firms are obviously concerned with competitiveness issues and are pressing for exemptions, generous allocation rules or trade protection in case a cap-and-trade system is established. Some major emitters, usually utilities, are concerned with initial endowment issues in a new system. However, in the course of the legislative process, major lobbying efforts to soften the policy will certainly come about.

Finance. Financial firms have also become more involved in the debate. The development of "green" business stretches from questions of financing particular sources of energy to creating new products either to insure or to hedge against climate change[29] or to benefit from structural changes to the production system. The insurance industry has been the first mover in this field, as catastrophic risk and damages related to extreme weather events already affect business strongly and directly. In asset management, "green" investment themes play an increasing role now in the US and Europe, and in corporate finance and emissions trading, financial services firms will soon cope with the business implications of the unfolding "third industrial revolution", the transition to a low-carbon economy and the introduction of ambitious cap-and-trade programmes both in the US and the EU. Trading of emission rights is already well established in Europe, and in the US the financial industry is preparing for managing carbon trading and derivatives related to it at much higher level as well. Venture capital is flooding in from former IT entrepreneurs, too. However, full engagement of the financial industry in managing the large structural transformation can only be expected once the US has established the legal and regulatory framework of climate change policies more firmly. Without political guidance the highly complex investment issues related to renewables, coal or the nuclear industry cannot be dealt with adequately.

Public opinion. In recent years, US citizens have become much more concerned about global warming. In a couple of multi-country-surveys conducted until 2006[30], a majority of US citizens ranked concerns about global warming highly; in the Chicago poll, 43% of

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[26] Heymann (2007).
[27] See http://www.us-cap.org. Interestingly, several major US environmental organisations are on board as well.
[28] See US CAP (2007a and b).
[29] See Weistroffer (2007), Allianz Group/WWF (2006).
[30] Bremer (2007) for a summary of these surveys, and Chicago Council (2007) for a recent one.

Western Regional Climate Action Initiative (WCI)

In February 2007, the Governors of Washington, Oregon, Arizona, New Mexico and California established the Western Climate Initiative (WCI). Its approach is to collaborate in identifying, evaluating and implementing ways to reduce GHG emissions and to achieve related co-benefits. Other states, such as Utah, and two Canadian provinces have joined the initiative, while others are participating as observers. The overall goal is an aggregate GHG reduction of 15% below 2005 levels by 2020 which is split up into different goals for each region. To reach this goal, the main instrument in the states' approach to addressing climate change will be the implementation of a cap-and-trade system whose details are currently under discussion. Design principles include:

— minimising administrative costs,
— stimulating investments in low-carbon technologies,
— rewarding innovations that lead to long-term GHG reductions,
— providing incentives for early emission reductions, and
— facilitating linkage to other regional and international GHG reduction markets.

Source: http://www.westernclimateinitiative.org/

Midwestern Greenhouse Gas Accord

In November 2007 the governors of the US Midwestern states Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Ohio, South Dakota and Wisconsin signed the Midwestern Greenhouse Gas Accord, a GHG Reduction Program to follow other states' initiatives in addressing climate change. In detail, this programme focuses on implementing a market-based and multi-sector cap-and-trade system to reduce GHG emissions by

— establishing GHG reduction targets,
— joining The Climate Registry,
— developing a low-carbon fuel standard,
— increasing biofuel supply stepwise up to 50% in 2025,
— increasing renewable electricity share to 30% in 2030,
— developing economy-wide carbon capture and storage standards, and
— creating regional incentives and funding mechanisms.

Some of the undersigned will be observers but they and any other states may join as well.

respondents even agreed that costly measures to mitigate the problem are required, and another 37% favoured a low-cost response; there is a broad majority supporting US international aid for developing countries to limit their GHG emissions but also for the inclusion of environmental provisions in trade agreements (91%). US public opinion also supports public incentives for renewable energies and nuclear energy as well as tougher auto fuel efficiency standards. Energy taxes are still unpopular and questions concerning a cap-and-trade system have so far not been posed. In general, however, the "greening of America" is reflected in these popular attitudes.

Towards a cap-and-trade system: The CSA

The main piece of legislation under consideration in the US Senate these days is the Lieberman-Warner Climate Security Act. It provides for the establishment of a comprehensive, nation-wide, mandatory cap-and-trade system for GHGs regulated under the UNFCCC in 2012; the rulebook would extend through 2050. The bill would cover about 82% of US GHG emissions either at the source (coal) or "upstream" at the level of importer or distributer (fuel, natural gas) rather than at the end-of-the-pipeline emitter (as compared to 40% in the EU system) and set targets that would reduce the cap for covered emissions from some six to seven gigatonnes CO_2e at the start of the programme to 1.7 gigatonnes CO_2e in 2050. Actual emissions could in the end be higher since international credits, i.e. emission reductions somewhere else, are allowed, as in the European system. The legislation would set up an emissions monitoring and reporting system that would be run by EPA.

Coverage. The bill sets one cap for five of the six GHGs under the UNFCCC and a separate cap for HFCs used in the production of cooling equipment. The bill covers almost all GHG emissions by major sources and, by sector, in power generation, manufacturing and transportation. All facilities in the power sector and in manufacturing emitting more than 10,000 metric tons of CO_2e are covered; the same holds true for entities producing or importing fuel[31], the use of which would emit this amount or more, and for chemical production units whose emissions exceed this level. Coal facilities using more than 5,000 metric tons a year are included as well. Natural gas, gas processing plants, facilities producing gas in Alaska and entities that import gas (including liquefied natural gases or LNG) are covered, too, a change from the subcommittee version which leads to a substantial tightening of the cap. HCFC producers emitting hydrofluorocarbons (HFCs) above that level must buy allowances as well. HFC producers or importers of HFCs, of products or equipment containing HFCs, must buy allowances under a separate cap. The heating sector will be outside the framework but tackled directly with tougher standards. All covered facililties must submit EPA a number of emission allowances that accounts for all of the emissions forecast for the following year.

The cap. US emissions will be capped in 2012 at 5,775 million allowances – one allowance for each metric ton of emission – or 4% below the 2005 figure. The cap will then be lowered year-by-year at a constant rate (106 m allowances or 1.8% p.a.) such that a reduction to a level of 1,732 million allowances will be achieved in

[31] The bill covers not only petroleum-based fuels but also coal-to-liquid and gaseous fuel.

US Conference of Mayors' Climate Protection Agreement

The same day the Kyoto Protocol became law for the 141 countries that have ratified it, Seattle's Mayor Greg Nickels launched this initiative to apply the goals of the Kyoto Protocol to at least 141 American cities. By the end of 2007 more than 800 mayors had signed the agreement.

Under the Agreement, participating cities commit to take the following three actions:

— strive to meet or beat the Kyoto Protocol targets in their own communities through several actions including

— the adoption of land-use policies that reduce sprawl and create walkable urban communities,

— the promotion of various public transportation options,

— the increase of alternative energy use or

— the increase of recycling rates in city operations.

The mayors also intend to urge their state governments and the federal government to enact policies and programmes to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol, i.e. a 7% reduction from 1990 levels by 2012, and urge Congress to pass bipartisan greenhouse gas reduction legislation which would establish a national emissions trading system.

Source: http://www.usmayors.org/climateprotection/

2050. In 2050, covered emissions would be 70% below 2005 level. There is a special provision for the capture and sequestration of gases (CCS): if coal producers use CCS technology, the number of metric tons sequestered will be subtracted from their allowance requirement. All other producers receive an allowance back for every metric ton they sequester. This reduces the cost for coal producers as compared to the other players.

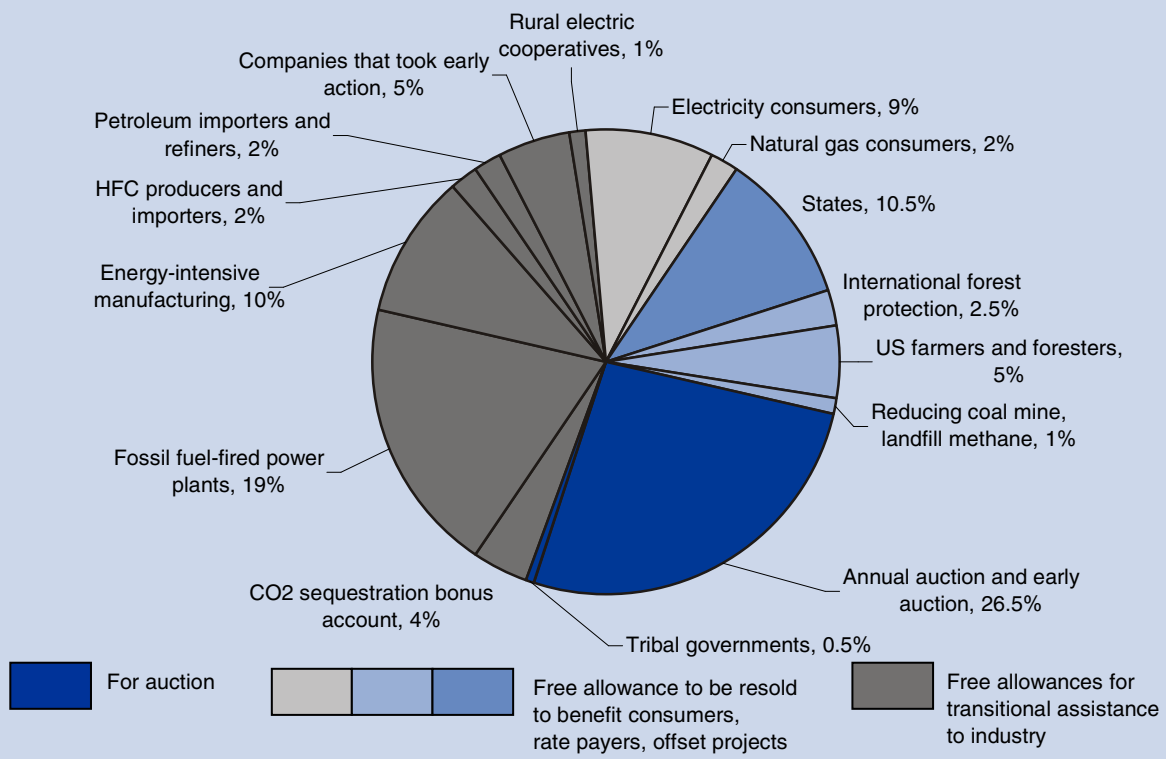
Trading of allowances. Trade in allowances would not be restricted domestically. Also, the scheme would permit the "banking" of allowances: acquired allowances above actual emissions could be used in the following years. In the reverse case, a facility could also "borrow" up to 15% of its required allowances at an annual interest rate of 10% (within a five-year limit).

Domestic and international offsets. The bill also stipulates that covered entities may satisfy up to 15% of their annual obligation with US offset measures, and up to another 15% with international offsets from countries that EPA determines to run similarly stringent GHG reduction schemes. Right now, it is considered that this provision would perhaps only apply to allowances in the EU Emissions Trading System but not to Certified Emissions Reduction Units (CERs) stemming from the Clean Development Mechanism in developing countries according to UNFCCC rules.

There are a number of projects which qualify in principle as domestic offset opportunities: agricultural and range sequestration practices; afforestation and reforestation projects; forest management, manure management and disposal, and methane capture and sequestration at nonagricultural facilities (landfills and coal mines). EPA is required to provide rules and guidance on those projects.

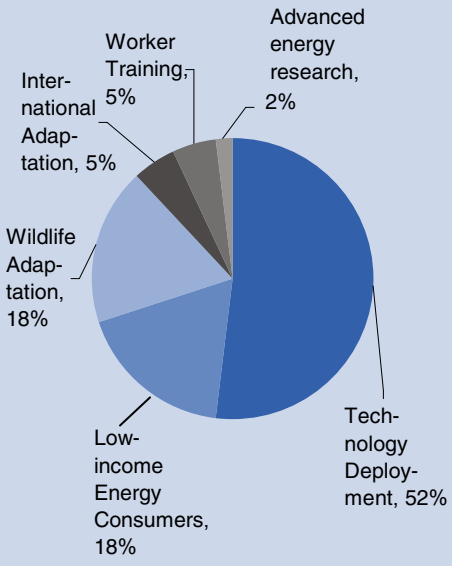
Allocation and auctioning of allowances. The bill entails a sophisticated scheme (see box) for both the free allocation and the auctioning of allowances in the initial stage and over time. Initially, 26.5% of all allowances will be auctioned. This portion will rise to 69.5% in 2031 and be held at that level until 2050. Initially, 73.5% of allowances will be allocated according to a sophisticated scheme; 43% will be afforded to regulated entities (19% to the power sector, 10% to manufacturing firms), up to 10.5% to the states, and 20% to consumers, farmers, forest programmes and others under a variety of schemes. Coal-fired power plants that adopt CCS before 2030 will receive bonus allowances for injecting carbon dioxide underground; 4% of annual allowances can be used for that purpose; and initially 4.5 bonus allowances will be afforded to a firm for each metric ton sequestered. By 2031, all emission credits for covered facilities will be auctioned. States must qualify for the allocation, however. The bill sets policy targets which must be met in order to obtain the allowances from EPA. Also, 11% of the allowances will be allocated to consumers of electricity and natural gas in order to limit the welfare loss of low- and middle-income households. However, political opinions still differ on issues such as how many allowances should be allocated to emitters free of charge and how fast the transition to auctioning should occur. Senators Barack Obama and Hillary Rodham Clinton favour full auctioning from day one of the scheme, even though Senator Clinton voted for the CSA in the Committee in order to move legislation forward.

Distribution of emission allowances



Source: CSA (2007) 6

Use of auction proceeds



Source: CSA (2007) 7

The use of auctioning proceeds. The bill establishes seven special funds at the US Treasury through which the proceeds from the auctions will be channelled to a wide range of recipients. The bill sets constant shares of spending for designated purposes: 52% of revenue shall be used for the deployment of energy technologies, 18% for programmes supporting low-income households, 18% for the adaptation for natural resources (mostly on wildlife and fish programmes), 5% for worker training, 5% for international projects and 2% for energy R&D.

A trade provision. The bill also entails a trade provision: eight years after enactment of the bill, it is determined whether other major emitters have comparable GHG reduction schemes in place or not. If no comparable action is determined, the president is authorised to require that importers of GHG-intensive manufactured products from these nations must submit emission credits of a value equivalent to the US requirement for a domestic manufacturer.

Institutional issues. The bill sets up two new institutions, the Climate Change Credit Corporation (CCCC) which shall run the auctions and the Carbon Market Efficiency Board (dubbed the "Carbon FED") which shall manage the cap-and-trade programme. The Board consists of seven members serving staggered fourteen-year terms, plus a scientific advisor. All members are appointed by the president with the advice and consent of the Senate. In the first two years, the board may lift the cap for a particular entity if the price of an emission credit exceeds a forecast of the Congressional Budget Office. From the third year on, the Board can temporarily increase the amount entities can borrow, alter the payback period or the interest rate on loans, or loosen a cap by as much as 5% while

preserving the medium-term stringency of the scheme. The CCCC would consist of five members serving staggered five-year terms chosen by the same procedure. It would run the auctions and channel the proceeds to the Treasury.

The legislation also sets up a periodic review mechanism. Every three years the National Academy of Sciences shall produce a full assessment of climate change science and US policy. By 2020, the president is directed to update US legislation in response to a full-fledged interagency report on the whole programme.

Issues for discussion

EPA and the Energy Information Agency of the Department of Energy have performed several modelling exercises for various pieces of draft legislation.[32] On March 14, EPA published its first assessment of the CSA.[33] A subsequent assessment is planned for June which would then also cover a new reference scenario for GHG emissions based on the analysis of the impact of the Energy Act of 2007 on energy markets and emissions. The preliminary assessment is instructive, however.

Big impact on emissions

Impact on emissions. Total US emissions are projected to be approximately 40% lower than in the "business-as-usual" reference case in 2030 and 56% lower in 2050 and would then be roughly 25% below 1990 levels. Total US emissions would decrease to four to five gigatonnes, covered emissions minus offsets to slightly above three gigatonnes. The bill would also reduce emissions outside of the US as US entities would purchase emission credits (EPA estimates a reduction abroad of 601 million metric tons of CO_2e in 2030). The lion's share of abatement over the period would stem from the transition to low-emitting technologies in power generation mostly by 2035. International credits and domestic offset measures mostly in agriculture and forestry would contribute the second largest effect, but both would decline in importance over time because the absolute limits would decrease in a linear fashion. After 2030, abatement in the transportation sector would pick up finally.

Impact on prices and output modest

Carbon prices, output and consumer welfare. The CSA bill is considerably more stringent and comprehensive than many previous bills. The allowance price (measured in 2005 US dollars per metric ton of CO_2e) at the start of the programme would be in the range of USD 30-40/t CO_2e, but then increase quite rapidly over the years, according to EPA perhaps to USD 61-83/t CO_2e in 2030 and to USD 159-220/t CO_2e by 2050.[34] The price ranges would probably be lower due to the Energy Act of 2007, which has not been modelled yet.[35]

There are a number of important assumptions on which the analysis is built:

— nuclear power is supposed to increase output by 150% until 2050,

— CCS technology is thought to be available and deployed from 2015 on, gradually replacing coal without CCS,

[32] See EIA (2008a, 2007 a-d), EPA (2007b, c, 2008a, b), MIT (2007).
[33] EPA (2008a).
[34] The ranges represent different outcomes from the two models used in the analysis.
[35] EPA indicates that another scenario it used might come closer to reality as it assumes an earlier adoption of low-emission technologies. In that case, allowance prices would start at USD 22-35/t CO_2e in 2015 and increase to USD 121-193/t CO_2e in 2050, see EPA (2008a), slide 27.

— other countries engage in significant reductions of emissions as well: Annex I group countries of the Kyoto Protocol reduce emissions to 50% below 1990 levels in 2050, with the exception of Russia, and non-Annex I countries of the Kyoto Protocol are assumed to establish ambitious GHG reduction programmes by 2025 which lead them back to 2000 emission levels in 2050.

EPA has drafted ten scenarios taking into account different pathways of international action and of technological developments which all would have a big impact on carbon pricing, output and welfare. In the standard scenario described above, output is projected to be between 0.9% and 3.8% lower in 2030 (2.4% and 6.9% in 2050) than in the reference scenario which assumes an increase in GDP of roughly 2 ⅔% p.a. between 2010 and 2050. Households would forgo consumption in the range of 0.9-1.4% in 2030 and 2.1-3.3% in 2050. Scenarios that stress problems in the adoption of CCS, new nuclear power generation and biomass generation obviously lead to stronger impacts on prices, output and welfare.

The power sector matters most

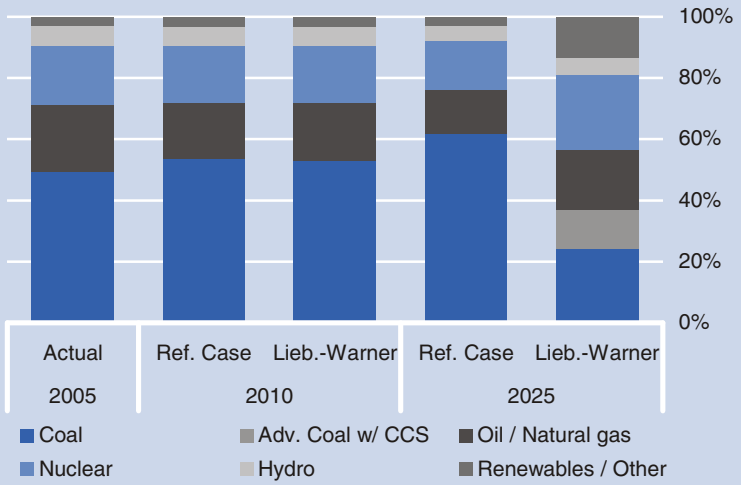
The biggest impact in all models occurs in the electricity sector, in which prices are projected to increase 44% in 2030 in case of a full auction (and by a lower degree if allowances are freely allocated to utilities, as it is provided for in the CSA).

More interestingly, however, is the fact that not the level and stringency of the cap per se is determining price, output and welfare effects but the interaction of the cap with flexibility and offset provisions. This effect is much larger than the availability of abatement technologies. The price effect of the cap-and-trade system depends crucially on a few factors:

Flexibility provisions are crucial

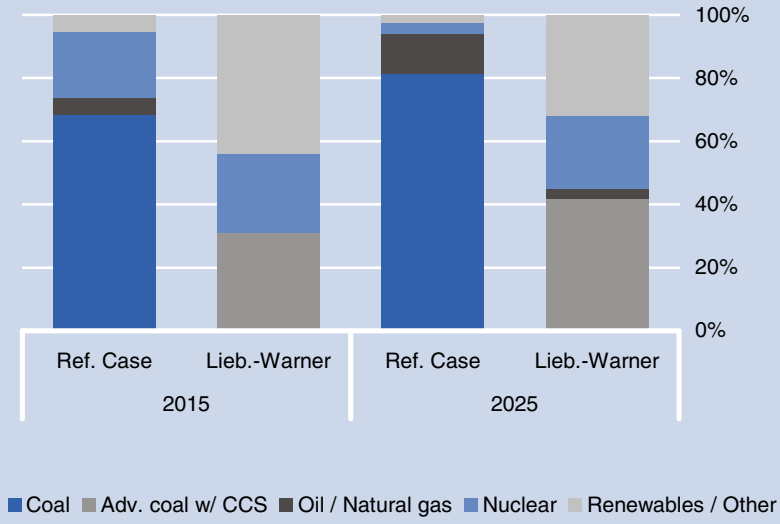
First, the flexibility provisions of the legislation itself matter, in particular the amount of offsets allowed either domestically or internationally. The CSA authorises up to 30% of offset activities in any given year, which eases the price impact considerably. The main impact stems not predominantly from domestic offset programmes which would be mostly in agriculture and forestry and continue to be used over the whole period in an increasing fashion but from international projects which would initially be much cheaper than emission reductions at home. Over time, offsets would become more expensive, and domestic supply would crowd out demand for international credits. EPA estimates that abatement from offsets and international credits would be 46% in 2015, 27% in 2030 and still 15% in 2050. The declining contribution reflects the fact that the amount of offsets decreases and the quantity of abatement increases over time. EPA modelling also shows that allowing for unlimited offsets would cut the long-run equilibrium carbon price by almost three-fourths while ruling out offsets would double the carbon price in the long run. In comparison to the EU ETS, the CSA provisions are somewhat more generous than the European Commission proposals for EU policy for the post-Kyoto commitment period beginning in 2013 as of January 2008 (see below).

Electricity generation mix
Share of electricity generation



Source: EPA (2008a) 8

New generation capacity
Share of new generation capacity



Source: EPA (2008a) 9

Availability of CCS critical

Second, the impact depends on the speed at which carbon capture and storage technology becomes technically feasible, politically acceptable and commercially attractive in the coal industry.[36] Retrofitting existing coal facilities is generally seen as not commercially promising, and both carbon capture and sequestration in fields most likely not close to production itself raise costs considerably. EPA considers that some existing coal power plants can be adapted to CCS technology and that much new coal capacity with CCS will be built from about 2015 on as the allowance price itself and the bonus allowance provision would set a strong incentive. Commercial viability seems to be attainable in 2025. This would then lead to almost full replacement of traditional coal power generation by 2035. Advanced coal power generation with CCS

[36] Auer (2007).

would account for the largest share of new generation capacity, followed by biomass and – trailing at some distance – nuclear generation. By implication, operating traditional coal-fired power plants will become an increasingly expensive option during the next ten to fifteen years and cease to be commercially viable due to high variable costs linked with carbon pricing not much more than a decade after the scheme is introduced. It should be noted here that regional effects might differ strongly, depending on whether CCS becomes an option on political and geological grounds. However, if CCS does not become technically available or politically accepted at all or in time, allowance prices will increase substantially, and GDP effects will almost double. In Europe and Australia, CCS projects are being pursued as well, but today nobody can reliably forecast whether and how fast they can be implemented. Politically, however, the issue of the speed of the transition period for the coal industry to turn itself into a cleaner operation may become a hot potato and lead to changes to the design of the cap and the allowance allocation in Congress.

Nuclear can make a difference

Third, the supply response of the nuclear industry matters as well. An expansion of nuclear electricity generation would ease the price effect, but by no means as much as CCS. Whether a strong expansion of nuclear power capacity is likely to occur is heavily debated: electricity and allowance prices are probably not the key drivers of investment decisions in the US nuclear industry compared with political acceptance, the waste disposal problem, capital expenditure issues and financing, insurance and other issues. Even though a cap-and-trade scheme raises the commercial attractiveness of nuclear power generation, a strong supply response might fail to come about. One has to remain a sceptic on this account.

Biomass uptake critical

Fourth, the supply response of the renewables industry has a strong impact as well. The projected uptake in biomass power generation (a sixfold increase by 2025) is based on the strong regulatory and financial support it receives from both the bill and the energy bill of 2007, state actions and programmes, and other incentives. However, it is not yet certain that biomass can really supply such a large share of power generation in the US. In addition, solar and wind power generation may pick up some share of the output as well, as the US solar industry is technically very advanced, and both solar and wind power may gain in importance as the technologies are sufficiently established and do work well. In addition, state-level programmes supporting these technologies are in place already.

Carbon price uncertainty. A key design element in any cap-and-trade system is the issue of price predictability and volatility. The US looked thoroughly in that regard at the dismal experience of the EU ETS in its first experimentation phase before 2008. A cap-and-trade system should deliver a steady decline in the cap of emissions and a correspondingly predictable increase in the price of carbon over the decades. Rather low price uncertainty is beneficial for investment planning in particular for power installations with high capital expenditure and very long operation periods. A high expected price provides a strong incentive to invest in new capital equipment which reduces emissions or to engage in R&D to obtain those technologies.

The demand for energy and the emissions associated with it, however, may fluctuate pretty strongly in the short run due to output variations, weather conditions (heating demand) and other factors. The CSA allows for borrowing and banking of allowances which

should help to manage short-run fluctuations in demand and prices, which is generally welcome. It also entrusts the Carbon Board with the indirect management of the short-run allowance price.

However, the bill does not include a "safety valve" for the whole period limiting the price increase to a pre-announced ceiling nor does it set a price floor for maintaining the signal for investment. Again, the benefits of such an approach would be high in the early years of a programme and decline over time, as emitters can plan on renewing their capital stock given sufficient adjustment time.[37] A "safety valve" was proposed in the Bingaman-Specter bill and dubbed the Technology Accelerator Payment. The TAP shall essentially set an upper limit for the carbon price sufficiently high to still achieve scarcity and long-term predictability but take short-term volatility to the upside out of the market. Specifically, the bill sets the price at USD 12 initially, increasing by the sum of 5% and the inflation rate p.a. This could result in a price of USD 25 in 2030 (and USD 65 in 2050). This approach was first proposed by the National Commission on Energy Policy in its report in 2004[38], the price recommendation for the safety valve being USD 7 per metric ton of CO_2-equivalent reductions. As the EIA analysis has shown, the inclusion of such a provision would most likely lead to excess emissions endangering the environmental integrity of the bill.[39] Moreover, given the more stringent approach of the CSA, the safety valve price would have to be set at a much higher level. The issue is of considerable political importance for businesses and utilities. Furthermore, as the CBO correctly notes, price uncertainty should be limited to the downside as well; otherwise, investment in low-emitting technologies may fail to pay off or remain commercially profitable in the medium run.

"Safety valve" too complex

The whole approach is thought to build elements of price certainty into the cap-and-trade programme to maximise efficiency of long-term investment and R&D and to mimic the functioning of a carbon tax.[40] However, it would come at a price itself as well. First, market-based pricing would not be allowed to work fully. Second, the logic of a quantitative restraint on emissions at volatile prices is juxta-posed with the logic of price certainty based on volatile quantities. On environmental grounds, the Senate Environment and Public Works Committee rejected the approach. This is to be welcomed.

Emissions from transportation. The CSA bill laudably includes practical and comprehensive coverage of all fuels used in trans-portation because it creates broader opportunities for GHG reductions under the cap. Initially, the effect on fuel prices will be minimal. In the long run, however, prices may rise sufficiently to constrain growth in travel demand across all modes to some extent. EPA estimates that, by 2030, the price of gasoline will increase by 21% due to carbon pricing. Both residential and commercial transportation are of great importance, as the US population is expected to increase, become wealthier and increase the demand for transportation, and thus pose a risk of raising emissions.

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[37] Kopp and Pizer (2007), p. 12.

[38] National Commission (2004, 2007). The original proposal of the safety valve considered a price of seven dollars per metric ton. The proposal was updated in 2007 to ten dollars per metric ton initially, which would increase by 5% above inflation per year.

[39] EIA (2008).

[40] On the pros and cons of quantitative, i.e. cap-and-trade, and price, i.e. tax, approaches to emissions see CBO (2008) and Kopp and Pizer (2007).

Price effects of carbon emission costs

Commodity	Cost of carbon content by 2030
Metric ton CO_2	USD 60.62
Metric ton of carbon	USD 222.20
	of producer price
Barrel of oil	47%
Gallon of gasoline	21%
Short ton of coal	360%
Short ton of coal w/CCS	36%
tcf[1] of natural gas	57%

[1] trillion cubic feet

Source: EPA 2008a 10

In general, large improvements in the fuel efficiency of vehicles (cars in particular, but also light-duty vehicles, trucks, aeroplanes, ships and others) can only be achieved by setting more demanding performance standards such as CAFE, which have been tightened recently (see above). Also, California's fuel efficiency standards could work this way. Finally, the emissions from the use of fuels can be targeted by standards; again, the 2007 energy bill includes a renewable fuel standard which would reduce emissions from a given level of demand. The CSA also includes a standard which would reduce the emissions of transport fuels 5% by 2015 and 10% by 2020 by replacing oil with fuels such as ethanol that have lower net emissions of carbon dioxide. The whole topic of biofuels may, given its political salience in the Midwestern states, still be dealt with extensively in legislation.

The use of auctioning proceeds. In order to limit the overall cost to society of a stringent climate protection programme, auction revenues should in general be directed to the public budget in a manner that taxes on capital and labour can be reduced or other spending be financed without debt. On public policy grounds, one can also argue that public promotion of climate-related R&D helps to bring about a desired level of innovation yielding social benefits which private firms would not be able to capture fully. Almost all proposals under consideration in Congress, including the CSA, however, intend to use the vast majority of revenues for specific programmes. For each of those programmes, good arguments have to be found. In fact, transition assistance and income support for workers and low-income consumers as well as adaptation programmes for natural resources and international assistance would cope with inefficiencies and equity concerns on reasonable public policy grounds.

Degressive approach to R&D subsidies required

The bulk of proceeds, however, shall be used to finance energy research and deployment. The CSA stipulates that 52% of proceeds from auctions shall be devoted to the Energy Technology Deployment Program. In effect, it creates a double-digit billion USD programme subsidising low-carbon power generation technologies, advanced bio-fuels, CCS systems, electric and plug-in hybrid electric vehicles and high-efficiency consumer products. Almost all of these technologies are already heavily incentivised by the cap-and-trade programme itself and by other federal and state-level policies. EPA estimates that the value of auctioned allowances would be in the range of USD 47-64 billion p.a. at the start of the programme and increase to USD 192-265 billion p.a. in 2050 in the standard scenario. While it is understandable that lawmakers place such a strong emphasis on subsidies for the "third industrial revolution", the case for doing so may he highest in the R&D phases perhaps in the first decade of the cap-and-trade scheme and become increasingly problematic as a distorting industrial policy over the decades. A more flexible and degressive scheme shifting a larger share of proceeds to the general budget over time may be more efficient and reduce overall costs of abatement.[41]

Competitiveness. There are two separate concerns about the competitiveness of US firms facing internalised costs of global warming. The one effect is the issue of "leakage", i.e. the shifting of US production (and emissions) offshore. In EPA's standard analysis of the CSA, this problem would not occur since other countries

[41] On the general point see Kopp and Pizer (2007), pp. 8-9.

would adopt significant climate change policies as well. If emerging markets were not to adopt such policies, leakage could become a problem over time.

Competitiveness issues are very political

The second issue is the straight competitiveness of certain branches of energy-intensive manufacturing. There are some industries producing tradables whose production is GHG-intensive and for which cheap reduction technologies are not yet available such as cement, aluminium, iron and steel, glass, pulp and paper and parts of the chemical industry. Whether including them fully in a cap-and-trade scheme would effectively reduce their competitiveness, lead to rising export prices and falling volumes, and to higher imports, is a difficult empirical matter for which neither firms nor public policy have reliable data or methodologies ready at hand. A few studies show that the impact of carbon pricing is both modest and limited to a very few industrial activities in which energy costs play a large role, technical substitution in the short and medium run is difficult and demand is strongly price-elastic. This holds true for the iron and steel industry in particular and for a few very niche industries. Regional electricity mix effects may play a role as well; industries relying on coal-fired electricity may fare worse than others, for example.

Trade provisions not the right way

CSA tackles this problem in a twofold way: first, these industries initially receive free allowances as part of the transition assistance which will decrease to zero in 2030. For a long period, this provision should prevent both strong additional import competition due to price disadvantages of US producers and "leakage", i.e. the relocation of production units to other countries without stringent climate protection policies. In addition, the CSA also contains a trade provision – based on lobbying by American Electric Power, a large utility from the South, and the International Brotherhood of Electrical Workers, a union – that US importers of GHG-intensive goods will have to buy GHG emission allowances if the president determines that the country of origin does not have comparable climate policies. Whether such a provision would set the right political incentives for other countries and for domestic manufacturers, could be performed technically (determining the carbon content of imported goods is tricky), require full-scale or partial purchases of allowances (in case of free allocation to US producers) and be in compliance with the obligations of the US under the WTO is the subject of a lot of discussion.[42] EPA even assumes that US exports of energy-intensive manufacturing goods to emerging markets will increase over time as those countries engage in significant climate policies by the mid-2020s at the latest, rising more strongly, in fact, than to other industrial countries running similar cap-and-trade schemes. Also, existing trade provisions protecting industries and workers from surges in imports may fully suffice for addressing the problem. In the end, on economic grounds, such a provision as entailed in the CSA is problematic and should be avoided, but politically it will remain attractive. The implicit threat to cut off market access to major exporters to the US producing in emerging markets – many of which would be US multinationals – or to force them to buy allowances according to what would certainly be a highly complex and opaque scheme may induce emerging markets to get serious about climate policies soon.

[42] See Bremer (2008), Herrnstadt et al. (2007) and Morgenstern (2007) for a comprehensive discussion of those concerns in both the EU and the US, and Jordan-Korte and Mildner (2008) and Hufbauer (2008) on the CSA in particular.

Note that a similar discussion is taking place in the EU as well; if the EU and the US were to use such provisions, the leverage on the rest of the world would obviously be huge.

International linkages.[43] Linking cap-and-trade systems of different countries is a fundamental design element of the Kyoto agreement. It is also a theoretically plausible concept – designed to establish a global market for carbon emissions – if all major emitters adopt similarly stringent domestic policies. Trading in allowances will equilibrate the marginal price of allowance prices. However, linking systems is a practical challenge if key design elements differ across nations. As the CBO[44] has summarised the debate, the degree of ambition in policy and core design elements must be similar in order to avoid unintended consequences.

Transatlantic trading likely

Despite the comparable medium-term stringency of the EU plan for the reformed ETS and the CSA approach, allowance prices in the EU and the US may differ considerably. This would generate a large potential for transatlantic trade in allowances. In addition, trade may be driven by exchange rates. EPA projects the price of international credits to increase from roughly USD 10 to 50 over the 2015-2050 period, whereas the price of domestic offsets might fall slightly from USD 30-40 initially to some USD 30. Market estimates of the EU ETS carbon price in 2012 are much higher, converted at current exchange rates. However, it remains to be seen which prices in the end will emerge in the two markets. If US purchases of credits from Europe are commercially attractive, this might even have indirect implications for the demand in Europe for Certified Emissions Reductions and Emission Reduction Units stemming from projects in developing countries according to the UN rules governing the Clean Development Mechanism and Joint Implementation under the Kyoto Protocol.[45] If EU purchases of US credits are attractive, the market for offset projects in the US may be affected. The potentially complex interactions between US and EU carbon markets and the implications for prices of international credits are not yet fully understood and deserve more attention in future.

However, before the conclusion of the UN negotiation process on a successor agreement to the Kyoto Protocol, the international part must remain an open issue. If the UN process were to lead to a global agreement succeeding the Kyoto Protocol and if the US were to participate in it, there would probably be a sufficient international legal framework for establishing trade across jurisdictions. However, any new international treaty would require Senate ratification by a two-thirds majority, which may not come about. Therefore, it might be useful to design US legislation in a way that would allow international linkages in the absence of ratification of a new international legal framework. The CSA establishes unilateral international offset rules that 15% of a given year's compliance obligation of a covered entity can be satisfied by international credits, i.e. a purchase of an emission allowance from a foreign GHG trading market that EPA certifies as having comparable design features as the US system. This would perhaps apply to credits in the EU ETS market. CSA does not directly allow the use of CERs and ERUs. It remains to be

[43] This point of the legislation is perhaps the most complex one, and the legislation essentially avoids a resolution of the matter. A full discussion is beyond the scope of this paper, see CBO (2008) for a good and short summary of the problems of linkage and Edenhofer et al. (2007), ECCP (2007) and Aldy and Stavins (2007) for a comprehensive discussion.

[44] CBO (2008).

[45] I am particularly indebted to George Kramer for alerting me to this point.

seen how this international provision would be determined in practice by EPA.[46]

Towards transatlantic convergence?

The new US approach to climate policy is matched by the evolution of climate policy in the European Union.[47] In Europe, public awareness and acceptance of climate change and of the need to adopt strong climate policies evolved earlier and more strongly than in the US. By the early 1990s, the case for the necessity of tough climate policies was well established in public opinion and in most governments. A few governments committed themselves to GHG reduction targets as early as 1989/90 (the Netherlands, Germany and Denmark being frontrunners). Despite the more favourable political conditions and the earlier start in the EU, EU climate policy has evolved only slowly. As a consequence, the EU will have a hard time meeting its Kyoto commitments of reducing GHG emissions by 8% below 1990 level (15 old EU member states; 6-8% for new member states)[48], and several member states have experienced strongly rising emissions since 1990 which violate their commitments.

EU takes second start at climate policy

In reaction to this unconvincing start, the EU adopted much more ambitious climate policy goals in 2007, in particular a 20% reduction in GHG emissions below 1990 level by 2020.[49] If a successor agreement to the Kyoto Protocol is reached, the EU will even be ready to reduce emissions by 30%. In January 2008, the European Commission proposed policy measures to meet these goals which shall be passed as legislation by spring 2009 at the latest.[50] The long-term objective is to reduce emissions by 60-80% to 1990 level by 2050.

The cornerstone of EU climate policy, the mandatory cap-and-trade programme – the EU ETS – started January 1, 2005 and covers some 11,500 installations accounting for some 40% of total GHG emissions of the 27 member states. During the 2005-2007 first trading period, there was an over-allocation of allowances due to several design flaws.[51] This came at the expense of environmental effectiveness. However, the experience has been widely discussed by now, and strong lessons have been learned. New policy proposals have been on the table since January this year.

Second trading period more likely to be beneficial

In 2007 already, the EU reduced its overall cap for the covered sector from roughly 2.2 gigatonnes of CO_2 in the first trading period by 6.5% below 2005 emissions for the second trading period (2008-2012), which is still based on national allocation plans (NAPs) subject to Community decision-making. The design of NAPs was considerably improved, and scarcity of allocation is likely to occur. The 2008-2012 period is likely to be the first phase of an environmentally effective cap-and-trade policy in the EU.

The proposed EU-wide cap (instead of national allocation plans) for the covered sectors for the post-Kyoto period starting in 2013 shall

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[46] See Edenhofer et al. (2007) and IEA (2007b) on the issues that need to be resolved.

[47] There is a vast amount of material on this topic, for a summary see, for example, Kulessa (2007), Egenhofer (2007) and Heymann (2007).

[48] More specifically, the EU committed to an 8% reduction relative to 1990 emission levels of CO_2, methane and nitrous oxide and of 1995 emission levels for HFCs, PFCs, and SF6 by the averaged level of emissions in 2008-12.

[49] The two other key elements are increasing in the share of renewable energy in primary energy use and increasing energy efficiency, both by 20% by 2020.

[50] European Commission (2008a, b), European Council (2008).

[51] Heymann (2007), Schafhausen (2007a, b), European Commission (2008a, b).

be set at the average of national allowances in the first period which will then be reduced in linear fashion by 1.74% annually from 2013 to 2020 starting at 1,974 million allowances and ending at 1,720 million allowances in that final year. The reduction shall be continued at the same speed until 2028 as well. The proposal for the period 2013-2020 entails a policy target divided into two sub-targets, one for the sectors not covered by the ETS of 10% to below 2005 levels and one for the ETS of 21% below 2005.

The plan also entails the transition to a full auctioning of allowances softened by a transition path of allocating allowances for energy-intensive industries. Harmonised rules for national spending of auction revenues are proposed as well. The Commission proposal also envisages continued use of international credits from projects already established or finalised by 2013 under the Kyoto Protocol until 2020.[52] In case of an international successor agreement, it shall be allowed that additional reduction obligations can be met by increasing use of international credits. EU governments are currently discussing these proposals and considering additional design elements such as the inclusion of other greenhouse gases and emissions from currently uncovered sources.

EU more ambitious in narrower framework

As compared to the CSA in the US, the revised EU approach to climate change may become pretty similar, but there are still noticeable differences. The level of policy ambition in terms of reducing overall GHG emissions in the long run is higher in the EU than in the US. If the US were to cut emissions by 60-80% to 1990 levels by 2050, the respective CSA provisions would have to be tightened considerably further. Also, of course, the EU policy is quite firmly rooted in politics whereas the US is still struggling with the topic. The starkest contrast, perhaps, is the coverage of gases and emissions. The EU ETS currently covers only roughly 40% of EU emissions, instead of above 80% in case of the CSA, and it covers only carbon dioxide rather than all six GHGs. In the EU, however, PFCs and nitrous oxides shall be covered beginning in 2013. It does not cover emissions from transportation as the CSA does but the inclusion of air traffic and other sectors and modes of transportation is part of the proposal. For the non-ETS sector, there are EU commitments for quantitative reductions as well.

Prospects of convergence are real

Similar rules and prospects of convergence exist as well. The use of domestic and international offsets ("flexible mechanisms" of the Kyoto Protocol in the EU case) is allowed in both systems but the EU has not yet decided on a strong quantitative limit in all circumstances. Also, the banking of allowances is an element in both systems. Furthermore, the transition to full auctioning of allowances is planned in both systems. Regarding this point, the EU foresees a faster transition to full auctioning. Unfortunately, however, the Commission does not consider projects concerning changing land-use and forestry (LULUCF) acceptable, which the CSA now does.

New legal framework require

Currently, it is not legally possible to link the EU ETS with regional systems in the US but the proposal for a revised ETS directive includes new provisions which would fix this problem. If the US were to pass legislation on cap-and-trade but not sign and ratify a successor agreement to Kyoto, a new problem would emerge and require legal adjustment to allow trading to take place. All in all, it is

[52] As in the US, since 2008 there have been quantitative limits for the use of credits. In the German case the limit is 20% or 90 m of 453 m emission allowances subject to the ETS, for instance.

quite likely that US and EU climate policies, in particular the core element of cap-and-trade programmes, will converge over time in their principle design elements.

Implications of US developments

The developments in the US climate debate will likely lead to comprehensive political action at the federal level. Even though the timing of Congressional action is not yet certain, it seems likely that Congress will pass legislation in future. The three politicians now running for the presidency all support climate policies similar to the CSA. A new president may then sign legislation in 2009, perhaps even ahead of the Copenhagen UNFCCC meeting scheduled for December 2009. At any rate, Senator Barbara Boxer (D-Calif.), Chairman of the Senate Committee on Environment and Public Works, has stated that she prefers legislation ahead of the conference.

Politics may work out

Obviously, establishing such a complex and comprehensive climate policy as proposed in the CSA is a great challenge, in terms of both policymaking and implementation. Both House and Senate concerns over sector-specific or regional implications of the legislation may still lead to debate and perhaps new elements to redress any shortcomings. The final result is hard to forecast now. However, it seems plausible that the overall level of environmental ambition will not be altered fundamentally but that less stringent rules for special reasons may have to be balanced by more stringent rules in other areas.

Diplomacy would be strengthened

With domestic legislation now or soon establishing a strong US role in tackling GHG emissions in a very long-term policy framework, the US government may also alter its diplomatic approach to climate change and bring full pressure on “major emitters” to commit themselves to more comprehensive domestic climate policies. The outcome of the Copenhagen conference may have a bearing on the international provisions of US legislation, either directly – if not passed by then – or indirectly. If several or many major emitters strengthened their climate policies, EPA might take a different judgement on international trading in credits and accept trading with several jurisdictions. This in turn could lower the costs to the US.

In any case, global climate policies in several strands (bilateral, regional and global) would be altered fundamentally if the US were to become a strong and credible player leading by example. The whole pattern of alliance-building in diplomacy now still based on an EU-US conflict would give way to more cooperative approaches centred on building incentives for countries such as China, India, Brazil and Indonesia to also cope with those challenges earlier and more comprehensively than so far.

US green markets likely to blossom

US “green markets” would be the main beneficiaries of tough legislation anyhow. There are several good reasons suggesting why the US may assume a leading role in the development of “green technologies” in the decades to come:

— a large domestic market with appropriate regulatory incentive structures for developing and commercialising those technologies,

— a comparably tough and stringent climate policy providing long-term price and investment certainty (as compared to the medium-term planning framework of the EU),

— a comparably simple institutional set-up in policy with a dominant role of Congress and the Administration, including a few government agencies, in particular if potentially conflicting policy designs at the federal and the state levels were to be avoided,

— an evolving shift in public opinion in favour of green policies,

— a large dose of industrial policy as part of the R&D programme included in the CSA,

— world-class R&D institutions and universities which will invent new technologies,

— a large pool of venture capital available to get new energy technologies started in the first place,

— growing influence of asset management in demand for “green and clean” themes and issues,

— sufficient incentives for the power sector to make CCS a success and use “clean coal” in domestic power generation to a substantial extent

— a policy framework lending substantial support to decreasing dependency on oil and gas imports from unstable regions of the globe on grounds of national security.

Additional benefits in foreign policy

However, if the factors mentioned above were to hold true for the United States – and not in all dimensions for the European Union or other major emitters – they would produce several benefits beyond protecting the climate from GHG emissions which are not included in official modelling. US exports of green technologies would grow substantially once the technologies are fully developed for deployment. US foreign policy would be able to adopt more flexible positions on the Middle East, the Caucasian region and Russia than Europe or Asia could afford. US capital markets would dominate “green investment” and generate jobs in the US. US climate diplomacy would probably use bilateral means with some major emitter countries to tackle GHG emissions in those regions as well, helping to bring about change in emerging markets. And US citizens’ attitudes towards the political system could improve as well.

Risks of failure real as well

Of course, harsh adjustments in the power sector, unexpected difficulties in developing technologies now seemingly on the horizon or problems of accepting new solutions politically could thwart the newly emerging US climate policy ambitions. The stakes are obviously high. If the US fails to pursue stringent climate policies at home, the prospects of convincing other major emitters would be severely clouded as well. The EU, for all its laudable effort to address climate challenges comprehensively, cannot carry the leadership role alone in the long run. Given the severe risk of catastrophic climate change as evidenced by the existence of several tipping points, some of which are hard to prevent even in a best-case scenario of global climate policy[53], global expectations concerning US climate policy will remain high and keep growing. The rest of the world should better not bet on failure.

Do not bet on failure

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[53] Lenton et al. (2008).

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