argus Global Emissions

Greenhouse gas trading, policies and regulation

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Managing expectations

The UN Framework Convention on Climate Change secretariat has been careful to downplay hopes of success at its forthcoming Conference of the Parties

Do not expect big breakthroughs in forging a multinational, post-2012 climate change agreement at the Framework Convention on Climate Change's (UNFCCC) 16th Conference of Parties (Cop 16) in Cancun, Mexico. The UNFCCC secretariat has downplayed expectations in a succession of inconclusive preparatory meetings this year. This is an honest approach.

The preparatory meetings were agreed hastily after last year's fractious Cop 15 in Copenhagen. Denmark - one of the few sensible outcomes of the conference (AGE, March, p1). They were designed to take the heat out of the negotiating process, to buy some time to resolve two enormous, separate and messy negotiating texts.

The scope of the latest and last meeting in Tianjin, China, last month was the same as earlier ones - to create, in the words of UNFCCC executive secretary Christiana Figueres, "a structured set of decisions that can be agreed at Cancun" (see p8).

Figueres pointed out "the critical importance of turning dry texts into a set of keys that unlock a new level of climate action". She noted "clear progress" by governments that now have "greater clarity on what is potentially doable".

What went wrong in Copenhagen, many experts say, was that no such "keys" ever materialised. Ministers and heads of state arrived to rubber-stamp agreements. But they discovered that too

much was unresolved in the negotiating texts, despite the fact that the two major negotiating streams or ad-hoc working groups had two years to prepare them. In the end, US president Barack Obama - with an eye to the unprecedented global attention at Copenhagen - hastily created the loosest of agreements and claimed credit for showing international leadership. This was the Copenhagen Accord (AGE, January, pp9-16).

Copenhagen discord

The US and EU say this accord could and should be the basis of any agreement moving forward. But China and many developing nations prefer the Kyoto protocol, which does not require them to meet specific emissions mitigation targets. The accord could never replace the UNFCCC process. It is too vague and too broad. The UNFCCC has merely "noted" its existence.

The UNFCCC hopes progress can be made once expectations are lowered and tempers have cooled. It has sharply limited the number of non-governmental organisation representatives at Cop 16, after Copenhagen turned at times into an angry scrum of vocal protesters. And the media presence will be smaller this year. Both should help turn down the volume in Cancun. But negotiators still face what one UK politician calls "some of the most complex negotiations ever". Genuine breakthroughs should be modest rather than headline-grabbing.

Emissions markets monthly prices			
Oct 10	Bid	Offer	
EU emissions trading scheme (ETS)	(€	€/t CO₂e)	
Spot 🗸	14.91	15.01	
Vintage 2010	14.96	15.06	
Vintage 2011	15.28	15.38	
Vintage 2012	15.78	15.88	
Project-based			
CDM CER 2010	12.77	12.87	
EU ETS price indexes Midpoint		point	
Argus index 10	15.37 (27/10)		
(monthly cumulative)			
	Bid	Offer	
UK Roc		(£/MWh)	
Compliance period 6 (co-fired)	45.39	45.59	
Compliance period 6 (non-co-fired)	45.39	45.59	
Europe (SKr/MWh			
Swedish elcertificate spot	239.00	241.00	
Swedish elcertificate Mar 2009	244.00	246.00	
Swedish elcertificate Mar 2010	254.00	256.00	



'We have reawakened trust in Cancun' — Belgian environment minister Joke Schauvliege (see p3)

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EU supports Kyoto protocol commitment extension

The EU is ready to consider a second commitment under the Kyoto protocol as a means of breaking the impasse at global climate negotiations, EU environment ministers indicated after meeting in Luxembourg last month.

The EU will support extending the protocol beyond 2012 at the forthcoming UN Framework Convention on Climate Change (UNFCCC) Conference of the Parties (Cop) in Cancun, Mexico, later this month. The ministers agreed a formal set of conclusions aimed at establishing a joint EU position ahead of the Cop. The ministers agreed to keep to the EU's greenhouse gas (GHG) reduction target of 20pc by 2020, rising to 30pc by then only if other major emitters make comparable commitments — thereby keeping to its familiar negotiating position.

"We want a legally binding deal at

Cancun, but we can see that it is not likely to happen," EU climate action commissioner Connie Hedegaard said after the council meeting. "We have built all our internal regulation on the Kyoto principles, so there is no reason why we should not want a second commitment period," she said.

"We have reawakened trust in Cancun," Flemish environment minister Joke Schauvliege said. She was representing the Belgian presidency.

But Hedegaard stressed that the EU's willingness to see an extension of the Kyoto protocol comes with conditions attached. "It is crucial for us that all major economies commit to do something," Hedegaard said. The US has not ratified the protocol, while China is not obliged to reduce its GHG emissions under the agreement. "If we agreed [to an extension] unconditionally, then a lot of pressure would be taken off the other key players," Hedegaard said, citing China as an essential component of any future climate deal.

A second commitment period must address key EU concerns such as the surplus of assigned amount units, which EU ministers have said damages the environmental integrity of the protocol. And ministers agreed that the UN's clean development mechanism must be reformed as part of a wider scaling up of market mechanisms.

The Cancun Cop must deliver an ambitious set of decisions covering forestry, adaptation, technology and measurement, reporting and verification, Hedegaard said. "We want a balanced package to keep the momentum."

China's GHG efforts are 'serious'

Any hope of an international climate change framework could fragment completely unless developed nations start to match China's emission reduction efforts, says China Carbon Forum special adviser Henry Wang. Developed nations — notably the US — must make solid commitments at the UN climate change talks in Cancun, Mexico, at the end of the month to ensure that the concept of a legal agreement in 2011 remains viable (see p1).

"Inside China there is a push for improvements as well as greater emission reductions and carbon funds," Wang says. "It is high priority and important on everyone's agenda. In my meetings with the senior leaders and policy makers, they are pushing very hard," he says.

"On the other hand there is stagnation in the international negotiations. If we are not careful, after a while no-one is going to care about this global framework and everyone will just do their own thing," Wang says. The US has committed to a 17pc emission reduction by 2020 compared with 2005 in the Copenhagen Accord. China has not specified an outright emission reduction target, but has set an ambitious 40-45pc carbon intensity cut by 2020 from a 2005 baseline.

"China has been quite upfront and has offered to do a lot. It is waiting for the developed, rich countries to do their bit," Wang says. The pledges of developed nations included in the Copenhagen Accord are hedged with conditions of moving to tougher targets only if major developing economies such as China, India and Brazil show signs of emissions cuts.

International climate change discussions are undeniably complex. Global media coverage of the issue this year has softened considerably, which could have a knock on effect on momentum during the negotiations. "Nowadays there is not as much media coverage [as Copenhagen], because people just do not care. It is a shame," Wang says.

Korea talks renewables

South Korea has outlined a publicprivate sector partnership that plans to spend 40 trillion won (\$32bn) by 2015 on developing renewable energy.

Seoul will put up W7 trillion and the private sector will provide W33 trillion to develop predominantly solar, wind and fuel cell-powered ventures. The initiative will create jobs and substantial export revenues while helping to curb the country's greenhouse gas emissions, the government says. South Korea has been stepping up its promotion of renewable energy sources in recent years.

President Lee Myung-bak's administration outlined spending of W100 trillion at the end of 2008 to increase the share of renewable energy sources in the country's energy mix to 11pc by 2030. And Lee has exploited diplomatic channels, aiming to seal free trade agreements with all Asian countries to partner its clean energy technology with the natural resources of its Asian neighbours.



EU tweaks phase 3 cap

The European Commission has revised upwards its estimate for the allowance cap in the first year of phase 3 of the EU emissions trading scheme (ETS) in 2013-20. The revision takes into account the extended scope of the post-2012 EU ETS into new sectors. It has fallen more or less in line with general expectations from market analysts.

The commission has increased the 2013 allowance cap by 113mn t CO2 equivalent (CO2e) to just under 2.04bn t CO2e from the previous estimate released in July. The new cap takes into account the expansion of the EU ETS into the following sectors post-2012 — bulk organic chemicals, hydrogen, ammonia

People

Edward joins PetroChina

The former head of US bank Citigroup's carbon trading desk, Garth Edward, has taken up a new post as head of emissions trading at Chinese state-controlled oil giant PetroChina. Edward will focus on carbon market developments as well. He will be London-based, working "out of a trading floor in London, but very connected with Beijing", he says. Edward handed in his notice at Citigroup at the beginning of June, after holding the post of director of environmental products since 2008. Edward was employed previously as carbon trading manager at Shell.

CCS

Eon quits UK CCS race

German utility Eon is pulling out of the UK government's carbon capture and storage (CCS) competition, ending plans to build a new coal-fired power station at Kingsnorth in Kent, southeast England. Kingsnorth is one of two projects shortlisted for the government's competition for funding to build the UK's first commercial CCS scheme. The only bidder left in the competition is Spanish utility Iberdrola's and aluminium, N2O emissions from the production of nitric, adipic and glyocalic acid production, and perfluorocarbons from the aluminium sector.

The cap will decrease by 1.74pc/yr from 2013. This annual reduction will continue beyond 2020 and "may be subject to revision not later than 2025", the commission says.

The new cap is more or less final — assuming the EU sticks with a 20pc emission reduction target by 2020 compared with 1990 — and is only likely to be subject to some "marginal fine tuning". But the cap could change significantly should the EU opt to move to a 30pc reduction target.

Scottish Power unit, which plans to convert the Longannet power station to use CCS technology. Eon had planned to build a carbon capture unit on a new 1,600MW coal-fired station at Kingsnorth, where its existing coal-fired plant will close in 2015 under an EU environmental directive (*AGE, April 2009, p10*). Eon will now focus on developing its CCS project at Maasvlakte in the Netherlands.

UK keeps funding CCS

The UK government has announced public funds of up to £1bn (\$1.6bn) for a commercial-scale carbon capture and storage (CCS) demonstration power plant in its latest spending review. The spending review renewed the new government's promise to provide public funding for four CCS demonstration plants.

Targets

CMIA urges tighter EU target

The EU must implement its tighter 2020 emission reduction target of a 30pc cut "as soon as possible", the Carbon Markets and Investors Association (CMIA) says. The EU's emission reduction target at present is a 20pc cut from 1990. Time is a prime consideration as firms need to prepare their investment and hedging

Cez scraps lignite plant

The Czech environment ministry and state-controlled utility Cez have agreed to limit plans to modernise the country's Prunerov lignite-fired power plant, which is the biggest source of CO2 emissions in Czech Republic. Cez's proposal calls for a more rapid shutdown of some of the plant's existing units, which will result in reductions of about 9.4mn t of CO2 emissions from 2013 to 2016. The utility will phase out the 440MW Prunerov 1 plant in 2019, rather than refurbish the ageing plant as originally planned. The utility agreed to limit the operation of one of the five 210MW generators at its newer 1,050MW Prunerov 2 lignite-fired plant to just 1,500 hours a year from 2016 to 2023. And it agreed not to transfer emissions rights from discontinued or limited generators at Prunerov to the newer generators, the Czech environment ministry says. The agreement is seen as a victory of green lobbies over Cez. "It is a limitation, but we have to take it as is," a Cez spokeswoman says.

strategies. "The CMIA is concerned that further delays before moving to the 30pc pathway would give industry insufficient time to plan the large scale of investments in low-carbon technology needed in 2013-20," the association says.

Poland urges target caution

The Polish government has reiterated its objections against raising the EU's emission reduction plans beyond the current 20pc goal, citing fears that an overly ambitious goal could have a negative impact on new EU member states' economies. Poland's environment ministry voiced the government's opposition to proposals to raise the emission reduction goal to 30pc from 1990 by 2020 during a European Commission climate council meeting in Luxembourg last month. "Those proposals cannot be accepted by Poland," Polish environment minister Andrzej Kraszewski says.



CDM

Gazprom grabs Chinese CERs

Russian gas firm Gazprom's UK-registered subsidiary Gazprom Marketing and Trading has agreed to purchase a number of Chinese primary certified emission reduction (CER) credits through a transaction conducted on the China Beijing Environment Exchange. Gazprom Marketing and Trading will purchase all the CERs from a Chinese clean development mechanism wind power project in southern Fujian province. The project is expected to generate just over 125,000t CO2 equivalent of CERs by the end of 2012. Gazprom opened an office in Singapore at the end of March to expand its carbon trading operations in Asia-Pacific.

CDM EB scrutinises DOE procedures

More work is needed to define the exact parameters of the procedures relating to designated operational entities' (DOE) responsibilities as third-party certifiers of clean development mechanism (CDM) projects to "make good" on over-issuances of carbon credits, the CDM executive board (EB) concluded at its 57th meeting in Bonn, Germany, last month. The CDM EB considered "a procedure to address significant deficiencies and excess issuance of certified emission reductions [CERs]" at the meeting. DOEs are typically responsible for handling any over-issuance of CERs from a CDM project. But the degree of their obligation is still unclear. In addition, the CDM EB agreed an appeals procedure for requests regarding project registration and CER requests.

Uzbek CDM signed

A joint venture to develop two clean development mechanism (CDM) projects in Uzbekistan has been signed between UK-based green asset development firm Frontier Carbon and UK-based project developer Blue Sphere. Up to \$2.6mn will be invested in the landfill CDM projects, both of which are near the city of Samarkand. They will be developed with local project developer Albemarle Kapital and construction is expected to begin in the first quarter of next year.

Moroccan CDM signed

A consortium of French companies has signed a Moroccan emission reduction purchase agreement (ERPA) for 2mn t CO₂ equivalent of certified emission reduction (CER) credits. French emissions trading house Orbeo, African carbon fund Fonds Capital Carbon Maroc and European fund the Post 2012 Carbon Credit Fund signed the agreement with Moroccan utility Office National de l'Electricite. The consortium will manage the clean development mechanism registration of a 140MW power project in Tangiers and will purchase pre and post-2012 CERs. The move demonstrates growing confidence in the post-2012 CER market, following months of regulatory uncertainty.

JI

JISC proposes track merger

Tracks 1 and 2 of the joint implementation (JI) mechanism could merge under proposals unveiled by the JI supervisory committee (JISC) at a meeting in Bonn, Germany, last month. The plans are part of an effort to streamline the JI process and will be debated at UN climate talks in Cancun, Mexico, starting at the end of this month. "This is a landmark moment for the market-based approach to combating climate change. We are putting forward ambitious, but extremely practical proposals that would draw on the best features of national and international approaches to incentivising emission reduction projects," JISC chairman Benoit Leguet says. The JI mechanism has suffered from a chronic lack of funding in the past five years, and the JISC hopes that merging its two tracks will improve the financial efficiency of the mechanism. Track 1 projects are awarded approval from the host country, providing the country meets certain criteria under the Kyoto protocol. Only the JISC can approve track 2 projects.

UN approves Russian JI

The UN's joint implementation supervisory committee (JISC) has approved the first Russian joint implementation (JI) project registered under the mechanism's track 2 stream.

The project is at the Shaturskaya thermal power plant near Moscow and is one of 15 projects that received approval from the Russian government at the end of July. The project is a combined-cycle gas turbine that is expected to generate 1.1mn t CO₂ equivalent of emission reduction units (ERUs) by the end of 2012.

German utility Eon owns the power plant. The firm plans to register two further JI projects. "This is a major step forward for carbon markets. The approval of Russian JI projects will add liquidity to the market and gives companies such as Eon the confidence to invest further in carbon reduction projects in the region," Eon managing director of carbon sourcing Herve Touati says.

The project was submitted to the UN in August and then underwent a 45-day vetting process. "Track 2 has surprisingly been dubbed 'slow track'. But since the first Russian projects to emerge are going through track 2, it may be time for a name change," JISC chair Benoit Leguet says.

Activity in the JI mechanism has been stepping up recently, following the first Russian approvals this past summer in the northern hemisphere. The IntercontinentalExchange announced last week that it will start quoting ERUs this month and another carbon exchange has suggested that it plans to launch an ERU product.

The 15 Russian projects that received approval in July are eligible to generate ERUs under the JI mechanism's track 1 stream. But the decision by some to go down the track 2 route may have resulted from the possibility that the EU will ban the use of track 1 credits in the EU emissions trading scheme post-2012.



Waste solutions thrive in EU

Waste to energy (WTE) is proving an innovative solution to the EU's environmental nightmare of managing rubbish, by converting household waste into a source of heat and electricity.

WTE encompasses a basket of processes that recover energy in the form of electricity or heat from waste sources. Researchers at the US University of Maryland say 1t of municipal residue biomass could be converted into about 8GJ of energy and 640kg of CO₂ emissions by WTE processes, or buried in a landfill where its decomposition would produce methane emissions.

The EU dominates the WTE sector with a 47.4pc share of global revenues generated by WTE plants. There are about 400 WTE installations in the EU, mostly in France and Germany. They sell power generated by WTE processes to the national grids. Recent forecasts predict that the global WTE sector will increase in value to \$28.8bn by 2015 from about \$22bn this year.

Methane has about 23 times the global warming potential of CO₂ over 100 years, yet garners much less publicity. It is defined as one of the six greenhouse gases (GHGs) in the Kyoto protocol, but not covered directly by the current phase

of the EU emissions trading scheme (ETS). WTE facilities are exempt from emissions caps under the EU ETS, provided their primary purpose is the "incineration of hazardous or municipal waste" and not energy generation.

Disposal challenge

A key source of methane is biodegradable household waste, and the challenge is how to dis-

pose of the waste while minimising methane emissions. One way is to restrict its use in landfills.

The EU's 1999 Landfill Directive set out targets to cut back on household biodegradable waste entering landfills, aiming for a reduction by 75pc by 2010 from 1995 for EU member states that rely heavily on landfill, such as the UK and Poland, and a 50pc reduction for other members. The directive initially applied to new landfill sites, but pre-existing sites were brought under its remit in July last year.

The most recent data from EU statistical arm Eurostat show that municipal waste committed to landfill has fallen to about 103mn t/yr, around 73pc of 1995 levels, in the EU 27. Countries with the most dramatic reductions in landfill percentages have been investing in new methodologies to meet their waste commitments.

Incineration continues to be the most prevalent WTE mechanism by far. But this means heavy metals and particulate matter are making their way into the atmosphere, and societal pressure is increasing because of concerns about pollution and health issues.

The EU's Waste Incineration Directive in 2000 placed

stringent operating regulations on incinerators that should in theory have alleviated such concerns. But incinerators remain unpopular and are considered an eyesore. Their stark and unprepossessing functionality has led to a recent push by various celebrity architects to design a new wave of more aesthetically pleasing landmark plants in Austria and Japan.

A study conducted by the US Environmental Protection Agency (EPA) cites WTE through incineration as effectively providing net negative GHG emissions to the atmosphere. The EPA says that for every 1MW of energy generated from waste incineration, 1MW is not generated from polluting sources. Modern municipal WTE plants separate ferrous and non-ferrous materials for recycling, saving energy wasted in mining. And incineration means that methane emissions that would have been generated from landfill are avoided.

Debatable topic

Methane emissions avoidance is of debatable validity in the EU, as the Landfill Directive specifies that methane be captured from landfill. The captured methane can then be used as fuel in its own right and it forms the basis of clean development

mechanism projects in developing countries such as South Africa.

Waste to energy is much less environmentally damaging than other landfill options

Several studies have compared GHG emissions from WTE plants to landfill with methane capture and energy production. The studies give varying values for volumes of gas emitted, but the overwhelming consensus is that WTE is much less environmentally damaging

than any available landfill options.

Various national policies support WTE in EU member states. Countries with the lowest percentage of municipal waste committed to landfill often have regulatory measures to encourage incineration.

In Sweden, it has been illegal to landfill pre-sorted combustible waste since 2002. As a result, only 3pc of municipal waste enters landfill. The Netherlands has a tax break for energy produced in WTE facilities and only 1pc of its municipal waste ends up in landfill.

But many EU countries, especially in eastern Europe, have been slow to respond to the EU's waste directives and have remained absent from the WTE sector. The commission is considering setting up a dedicated enforcement agency after a relatively ineffective series of legal actions against states failing to implement EU waste law.

The commission estimates that 200mn t/yr CO2e of GHG emissions, including methane from landfill, could be abated if the waste laws were properly implemented. And Europe should see an even greater drive for alternative waste management options if the commission were to set up the suggested enforcement agency, which would be good news for WTE.



Commission's Zapfel talks sectoral

The European Commission's head of policy co-ordination for climate action, Peter Zapfel, spoke to Argus recently about the birth of new market mechanisms and lessening demand for early post-2012 auctioning in the wake of the recession, as well as sectoral crediting. Edited highlights follow:

How do you envisage a sectoral crediting approach working?

At this stage, we are focusing on the higher-level conceptual design issues. We seek some kind of enabling provision that reads like articles of the Kyoto protocol that were the foundations of joint implementation (JI) and the clean development mechanism (CDM). And we have gone beyond that.

Firstly, we have said this mechanism would operate at a sectoral level. Secondly, it should be based on a "do something" baseline or threshold against which you can start to the earn sectoral credits. So it requires some action being taken in that sector and only after that action would carbon credits start to be earned. Thirdly, we have said we seek consistent coverage of installations in the sector, hence the reference to a sectoral carbon market mechanism. *"It is*

But that does not need to go down to the smallest installation, so we have outlined several design issues. Of course such issues should only be discussed and decided after a provision has been adopted in an international agreement to develop those mechanisms.

There has been talk of the commission setting up sectoral pilot projects. Where will these projects be based and what kind of projects are they?

There has been a lot of discussion about the pros and cons of a sectoral market mechanism. Can it work in practice? How would it be designed? The international process has not resulted in an enabling provision to set up such a new mechanism. We should do some pilot activity to test such a mechanism — to move beyond the conceptual debate, to learn on the ground and further inform the decision-making and discussion process. For example, we could start a pilot with China in the steel sector. We need some well-designed pilot activities to get to the next level of the debate.

Such pilot schemes would happen in developing countries, replacing the CDM over time. The commission could be involved in this, along with others such as multi-lateral development banks. It is a learning by doing stage now. Whether it is us or others is of secondary importance.

What scope do you see for private-sector participation in building a sectoral mechanism?

The private sector is key. The carbon market was developed in Europe for the private sector to have a cost-effective way of reducing greenhouse gas emissions. In essence, our clients, so to speak, are the private sector. Several associations are active in the debate about climate change and carbon markets — they have expressed support and interest in developing sectoral mechanisms. But they have also expressed a certain caution in the sense that they seek clarification on many practical issues. I could imagine a company that is interested in furthering the debate participating in pilot activities.

The European Federation of Energy Traders has called on the commission to release a "positive list" of emission reduction credits that will definitely be usable in the EU emissions trading scheme (ETS) post-2012. How likely is this to happen?

The EU ETS directive does not foresee the creation of a "positive list" of what credits can be used. The directive takes the opposite approach. It allows the introduction of use restrictions for certain project categories, which is a kind of "negative list" approach. Such use restrictions could take many forms. They

could, for example, be a full use restriction, such as we have in our legislation for nuclear or forestry credits, or they could take the form of multiplier.
ers — you may have to hand in three or four of a certain type of credit to satisfy your compliance obligation for 1t emitted in the EU. Commissioner Connie Hedegaard decided in early August to seek the introduction of use restrictions on industrial gas CDM credits. We are

preparing for this and conducting an impact assessment to compare alternative approaches.

The commission has suggested in the past that it might not accept track 1 JI emission reduction units (ERUs) post-2012. Where do you stand on this?

The commission has not suggested formally that this might be done, only highlighted this as one of the many ways that use restrictions could be applied. It is our legal understanding that if we do not have the continuation of the Kyoto protocol, in the form of a second commitment period, there will no longer be a basis for JI credits post-2012.

Utilities seem to be worried about hedging their post-2012 carbon exposure. How confident are you that post-2012 auctioning will start next year?

I do not share the view that there are increasing worries on the side of power utilities. There is less of a demand now for early auctions than there was before the recession. In terms of what stakeholders expect, we have reached a major milestone in terms of agreeing the regulation. The next steps are clearly there and we see converging views on the volume of early auctions.

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a learning by

doing stage now.

Whether it is us or

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importance'

'Patches of sunlight' precede Cancun

The final meeting of the UN Framework Convention on Climate Change (UNFCCC) before its forthcoming 16th Conference of the Parties (Cop 16) in Cancun, Mexico, saw limited progress made in cutting the negotiating texts.

The meeting took place in Tianjin, China, on 4-9 October and governments "came closer to defining what can be achieved" at Cop 16, according to the UNFCCC. The annual conference starts at the end of November (see p1). The meeting "got us closer to a structured set of decisions that can be agreed in Cancun", UNFCCC executive secretary Christiana Figueres says. "Governments addressed what is doable and what may have to be left to later."

Cop 16 in theory could agree on a post-2012 multinational climate change agreement and second commitment period for the Kyoto protocol. Figueres began the meeting on a hopeful note, saying that "governments seem ready to discuss difficult issues. Now they must bridge differences to reach a tangible outcome in Cancun."

The UNFCCC's complex negotiations are still conducted in two separate streams, the ad-hoc working group on long-term cooperative action under the convention (AWG-LCA) and the ad-hoc working group on further commitments for Annex-1 parties under the Kyoto protocol (AWG-KP). Both are working on lengthy negotiating texts that contain many similarities, but efforts to harmonise the two have made only limited progress (AGE, September, p12).

Governments have discussed each element of a package of decisions, including a long-term shared vision, adaptation,

Soundbites from UNFCCC's Figueres

At the start of the meeting

"Governments have restored their own trust in the process, but they must ensure that the rest of the world believes in a future of ever-increasing government commitment to combat climate change."

"The agreements that can be reached in Cancun may not be exhaustive in their details, but as a balanced package they must be comprehensive in their scope and they can deliver strong results in the short term, as well as set the stage for long-term commitments."

At the end of the meeting

"I told you at the beginning of this week that governments this week had to address together what is doable in Cancun and what may have to be left until after Cancun. They have actually done that." mitigation, climate finance and capacity-building, Figueres says. These are the four main issues singled out by former executive secretary Yvo de Boer in the run-up to Cop 15 in Copenhagen, Denmark, last year. The clue to success in Cancun is about turning "small climate keys to unlock very big doors" leading to a new level of climate action, Figures says. But the political will to forge these keys in the first place continues to be in short supply.

Some working groups were able to show progress, particularly on finance, technology and adaptation — the least contentious of the issues to be faced in Cancun. "Those patches

'The history of negotiations shows that major breakthroughs are possible up to the last moment'

of sunlight will need to grow over the coming weeks if Cancun is going to achieve real progress toward an international agreement," World Resources Institute climate and energy programme director Jennifer Morgan says.

Big push

The biggest push could come from US govern-

ment ministers, US non-governmental organisation Natural Resources Defense Council international climate policy director Jake Schmidt says. "Ministers have the power to direct their negotiators to change the dynamics, stop throwing up roadblocks and start finding ways to solve problems. They need to stop just saying no," he says.

Failure to produce a meaningful result in Cancun could throw the future of the UNFCCC process into doubt. But "the history of negotiations shows that major breakthroughs are possible up to the last moment," Morgan says.

A row of sorts broke out in Tianjin after the EU and the US separately accused some countries of backtracking on last year's Copenhagen Accord. "There has been insufficient progress in translating key elements of the Copenhagen Accord into UN texts. The lack of progress on these issues, and signs of backtracking on the accord by certain parties gives us cause for concern about the balance of the Cancun package," EU commissioner for climate action Connie Hedegaard said. "There is a vast gap between the current negotiating texts and the decisions needed to reach an agreement in Cancun," she added.

US climate envoy Todd Stern said after the meeting that China has largely ignored its Copenhagen pledge to reduce the carbon intensity of its economy by about 40pc by 2020 — a comment that riled the Chinese delegation.

Some environmentalists say China is not being given proper credit, citing the many steps it has taken recently, such as reducing the energy intensity of its economy by nearly 20pc. "In the halls in Tianjin you get the impression that nothing is happening, but all you have to do is step out of the facility and you can see first-hand that things are happening," Schmidt said.

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LPG industry promotes black carbon benefits

One of the lesser-known areas of the energy industry, the liquefied petroleum gas (LPG) sector, is strongly promoting the fuel's benefits in helping cut black carbon (BC) emissions The World LPG Association (WLPGA) and the European LPG Association (AEGPL) have commissioned reports this year from Switzerland-based environmental consultancy Atlantic Consulting on BC and LPG.

The WLPGA released its report, *Clearing the Air: Black Carbon, Climate Policy and LPG*, at the association's annual forum in Madrid, Spain, last month. It outlines what BC is and how LPG can help reduce BC emissions.

BC — more commonly known as soot — is the charcoallike residue that remains after burning fuels rich in carbon, as seen in fireplaces, and forms part of the particulate matter emitted by vehicle exhausts. Airborne BC warms the atmosphere by absorbing sunlight and radiating the energy as heat. One area of particular concern is that BC deposits can be carried airborne to the Polar regions, reducing the reflectivity of snow and ice and thereby increasing the rate of melting.

Strong benefits

LPG's clean-burning properties offer strong benefits in terms of BC emissions compared with diesel and firewood or other biomass. And LPG's BC profile is one of its major strengths as a product.

LPG is derived from oil refining and gas processing, but differs chemically from natural gas, which — as methane — is one of the six greenhouse gases included in the Kyoto protocol. The industry is relatively small, producing around 243mn t/yr compared with 3,567mn t/yr of oil equivalent (toe/ yr) of crude and 2,716mn toe/yr of natural gas. But although

What is black carbon?

• Black carbon (BC) is better known as soot. It is emitted mainly through burning, more specifically from the incomplete combustion of primarily biomass and diesel.

• BC is almost always emitted with other substances, in particles of varying size, and so is included in definitions of particulate matter (PM).

• BC is estimated to have a global warming potential 2,200 times greater than CO₂.

• Coarser PM (PM10) tends to be deposited downwind of emissions sources. Fine PM (PM2.5) can remain airborne for months.

• BC combustion sources include open biomass such as wood or charcoal (42pc) and residential biofuels (18pc). BC from industrial and power generation sources make up around 10pc of BC emissions, with transport responsible for 24pc and residential coal burning 6pc.

ultimately derived from fossil fuels, LPG is a clean fuel with a variety of uses such as a cooking and heating fuel and as a transport fuel, called autogas.

The Atlantic Consulting reports outline the scientific findings that underline LPG's benefits when it comes to cutting BC emissions in household heating and autogas. "The traditional position of LPG in terms of the environment is that it has lower CO₂ emissions than other fuels and has a low impact in terms of air pollution," the report's author, Eric Johnson, says.

BC in the atmosphere causes up to around 16pc of global warming by some scientific measurements. But it is not covered by the Kyoto protocol or the Montreal protocol. Some scientific measures put its global warming potential over 20 years at around 2,200 times that of CO₂.

"Ignoring black carbon can seriously skew policy judgments by making some fuels or technologies appear misleadingly better or worse than they really are," the report says. Eliminating BC emissions would bring about temperature reductions more rapidly than eliminating CO₂ or methane emissions, it says. One recent scientific study says the elimination of BC emissions would cool global temperatures by around 0.4°C over 10 years, while eliminating CO₂ or methane emissions would only cool global temperatures by 0.1°C over the same period.

The issue of BC should be added to the climate change policy debate, especially in relation to biofuels, which account for around a third of all energy-related BC emissions, Atlantic Consulting says. In addition, BC has a serious negative impact on human health. LPG has an important role to play as a clean or hybrid fuel, especially in the developing world as a cooking fuel alternative to wood and charcoal.

What is LPG?

• LPG is derived from crude refining or natural gas processing, although some "field grade" LPG comes directly from associated oil or gas wells. It involves two main gases — propane and butane.

• The sector produces around 243mn t/yr and consumes around 240mn t/yr.

• LPG has a variety of uses as a cooking and heating fuel, a petrochemical feedstock, a transport fuel and in niche markets such as crop-drying, barbecues and camping, and forklift trucks.

• India and Indonesia are implementing fuel-switching programmes to get millions of residents to use LPG rather than kerosine. This cuts subsidy costs as well as emissions. The world's largest markets are the US, China, Japan and India.

• LPG has a valuable role to play as a "transitional" fuel in the move away from reliance on fossil fuels.



Project developer gets cold feet

UK-based clean development mechanism (CDM) project developer Trading Emissions revealed at the start of October that it will sell most of its certified emission reduction (CER) portfolio by the end of 2012.

The move signals the project developer's lack of faith in the carbon market and comes as the European Commission prepares to release details of the quality restrictions it intends to place on CERs used in phase 3 of the EU emissions trading scheme (ETS). The commission's plans could see firms being prevented from using certain CERs for compliance in the EU ETS from 1 January 2013, regardless of whether or not the credits are derived from emission reductions that took place before this date.

This situation could partly explain Trading Emission's decision to sell most of its credits before the end of 2012, as the EU's quality restrictions could make sales after 2012 far more difficult. But the firm has made it clear that it is winding down its carbon operations because of the lack of a post-2012 climate agreement. "We are one of the most successful carbon businesses and we are shutting," the firm's investment adviser EEA Fund Management says, adding that this offers little hope for other carbon finance firms.

Controlled realisation

Trading Emissions will sell the entirety of its pre-2012 carbon portfolio — equating to just under 82pc of its carbon portfolio — before the end of 2012 in a process it describes as "a controlled realisation programme". EEA Fund Management has been charged with selling the emission reduction credits.

The firm's risk-adjusted, pre-2012 CER portfolio stands at 32.15mn t CO₂ equivalent (CO₂e). It has fallen by about 9.5mn t CO₂e compared with a year earlier as a result of lower than expected CER issuance rates. "The decline was largely as a result of [project] registration delays and the reduced supply of natural gas in Zhejiang province in China," Trading Emissions says. In comparison with its pre-2012 CER portfolio, the company's risk-adjusted, post-2012 CER portfolio is small at just 7.13mn t CO₂e.

If the commission chooses to apply CER quality restrictions from 1 January 2013, credits subject to those restrictions will be in extremely low demand after this date. Firms taking delivery of December 2012 credits will have a matter of weeks, possibly merely days, to surrender their credits for EU ETS compliance to avoid quality restrictions. The compliance deadline for 2012 emissions does not fall until the end of April 2013, but many market participants are working under the assumption that the commission will impose restrictions from the start of 2013.

Trading Emissions is not looking to sell its CERs at current market value, because "prices are still depressed", the company says. The project developer is looking for a target



price of €15/t CO₂e, saying that the market value will increase as 2012 approaches.

Trading Emissions "remains of the view that current market prices of EU allowances and CERs are materially below the physical cost of abatement and, barring further significant economic deterioration, CER prices will continue to have the potential for significant upside," the firm said in its end of year results released on 5 October.

Trading Emissions made the decision to realise its portfolio by the end of 2012 in September. The front-year CER contract is trading at just under €12.60/t CO2e.

The firm has sold or hedged 31pc of its pre-2012 CER portfolio, but has engaged in "limited commercialisation activity" since 2008, when market prices were higher. The CDM executive board's decision to review the issuance requests of HFC23 projects has "materially affected" Trading Emissions' CER portfolio, impacting two of its projects (*AGE, October, p5*).

Arbitrage opportunities

Trading Emissions "will have no concern about meeting its December 2010 obligations with current inventory, and is likely to take advantage of the arbitrage trading opportunities that exist", it says. The CER market is likely to become further backwardated as the delivery date approaches, meaning that firms with available CERs can sell the front-end of the curve and buy back later maturities to lock in a profit.

The market for CERs has changed considerably in recent years, EEA Fund Management chairman Simon Shaw says. "The ability to do large transactions in carbon has been reduced. The scale of everything has shrunk dramatically," he says. With HFC23 projects coming under fire from the UN and the European Commission, carbon credits are far from the easy pickings they once were.

Trading Emissions is sceptical about the chance of an international deal being agreed at UN climate talks starting in Cancun, Mexico, this month. But it is positive about some progress in areas such as sectoral crediting and programmatic CDM. "We remain hopeful that the bottom-up momentum will continue to deliver progress in small steps," the firm says.



Industrial gas capture under further scrutiny

Investor confidence in the clean development mechanism (CDM) has come under further pressure following accusations of "phantom" certified emission reductions (CERs). A report released by Geneva-based market watchdog CDM Watch on 18 October says nitrous oxide (N2O) capture projects — the biggest generators of CERs alongside HFC23 capture projects — have yielded a significant number of phantom CERs through carbon leakage.

Up to 13.5mn t CO₂ equivalent (CO₂e) of offset credits may have been issued after adipic acid production at plants in industrialised countries, which generate more N₂O, shifted to plants in China and South Korea, where N₂O capture could gain credits under the CDM.

CDM Watch has called on regional and national buyers to consider demand-side restrictions, and ultimately calls for the N2O credits to be excluded from trade in the EU emissions trading scheme (ETS).

Taking action through the CDM executive board (EB) has been ruled out. "We cannot depend on the CDM EB, which has a record of delaying action to improve flawed crediting methodologies," CDM Watch director Eva Filzmoser says. Of the 2,456 registered CDM projects, only four are CER-generating N₂O projects. Yet these four projects have yielded nearly 20pc of the 449.1mn t CO₂e of CERs generated since October 2005, when issuances began. Excluding the credits from the EU ETS would have an enormous impact on CER supply and project developers' portfolios, and would fuel CER price gains.

Independent international research institute Stockholm Environment Institute compiled the report. "Our findings show that these N₂O profits have evidently led to significant shifts in adipic acid production away from non-CDM plants to CDM plants, and strongly indicate that carbon leakage has occurred," senior scientist and report co-author Michael Lazarus says.

The study says N2O abatement costs for adipic acid pro-

When oxygen combines with nitrogen...

• The combustion of various fuels produces nitrogen and oxygen in combination. Nitrogen oxide (NO) is the primary name of this basic binary compound of oxygen and nitrogen.

• Nitrogen oxides are better known under the generic term NOx, which refers specifically to NO and NO2.

• Nitrous oxide (N2O) is a combustion by-product and is defined as a greenhouse gas.

• Adipic acid, which generates N₂O when produced, is a basic raw material of the petrochemical industry widely used in the production of plastics, adhesives, resins, paints, coatings and tissues. Demand for adipic acid is growing strongly in China, South Korea and India.

ducers are extremely low at 10-40c/t CO2e. Producers are then able to lock in large profit margins when they sell the credit in the EU ETS market for €13/t CO2e or more. In addition, CDM projects can take credit for 100pc of their N2O reductions, even though large sections of this industry are already voluntarily abating at least 90pc of their N2O emissions without financial reward, CDM Watch says.

Three firms have profited from the four projects that have come under scrutiny in the report. French company Rhodia operates two CDM plants in South Korea and Brazil, and has received almost 65mn t CO2e of CERs, CDM Watch says. Chinese companies PetroChina and Shemna operate two plants that have generated 13mn t CO2e and just under 7.5mn t CO2e of CERs respectively.

CDM Watch's claims over N2O projects have unnerved some market participants, after its first report in June prompted the CDM EB to review the HFC23 methodology. And the watchdog's most recent report on N2O projects may trigger a second review. "The CDM EB has done it once with HFC23, there is nothing stopping them doing it again with N2O. It is a dangerous and scary idea," one broker says. In the meantime, it appears the market is still digesting the information. "I do not think many people will have priced in any serious N2O issuance risk yet," a market analyst says. An N2O yield of 3.1mn t CO2e on 19 October suggests the UN is "not taking note of the CDM Watch concern just yet", a trader adds.

Damaged reputation

CDM EB chairman Clifford Mahlung has not elaborated on the board's position following the report, so it is not yet known how much of an effect it has had on an official level. But whether the UN acts on the allegations or not, the effect on the mechanism's reputation is undeniable. "What does it say when a UN mechanism is so susceptible and influenced by a nongovernmental watchdog's report?" another trader says. The questions being raised by CDM Watch's report "means we are now seeing even more investors leaving the project market", a trader from a large European utility says.

The board is expected to make a decision following the HFC23 review in November. CDM Watch has stressed that HFC23 plants are manipulating their production in line with CER profitability margins. Two plants reduced HFC23 generation when they were ineligible for crediting and then increased generation once they were viable once again, according to CDM Watch data. In addition, the data show that some plants only produce the exact amount of HFC23 for which they are able to claim CERs. HFC23 projects are the second-largest generator of CER credits after N2O projects. Of the 2,456 registered CDM projects, 19 are HFC23 projects that are expected to yield half of the 1bn t CO2e of CERs generated to 2012 (see p23).



Aviation's ICAO agrees new climate deal

UN body the International Civil Aviation Organisation has forged a landmark agreement on curbing CO₂ emissions. But the industry is still battling its position in the EU and its inclusion in the EU emissions trading scheme

The aviation industry has promised to try and cap its international carbon emissions from 2020 onwards, as part of an enhanced package of climate change measures agreed by the sector last month.

The package of measures designed to curb aviation's greenhouse gas (GHG) emissions was agreed at an International Civil Aviation Organisation (ICAO) general assembly in Montreal, Canada, in October. Aside from the emissions cap, delegates agreed to establish a global framework for market-based mechanisms such as emissions trading by 2013, while reaffirming a long-standing ICAO target of improving fuel efficiency by 2pc/yr to 2050. The ICAO is a UN body (see box).

The landmark agreement from the ICAO summit, which comes ahead of the forthcoming UN Conference of the Parties (Cop 16) in Cancun, Mexico, has been hailed by the industry as "historic". The measures agreed stand in marked contrast to the shipping industry's faltering efforts on cutting emissions — a separate meeting of the UN International Maritime Organisation's (IMO) Marine Environment Protection Committee in London, UK, at the end of September failed to reach agreement on mandatory fuel efficiency requirements for new ships (see p13).

Fault lines

The ICAO deal is meant to present a unified response from the industry on climate change, but major fault lines among important member countries remain unresolved. The European Commission welcomed the new deal, saying it will allow the commission to press ahead with existing plans to incorporate all flights in and out of the EU into the EU emissions trading scheme (ETS) from 2012 (*AGE, October, p9*).

The agreement crucially refrains from language that would make aviation's inclusion in the EU ETS dependent on the mutual agreement of other ICAO member countries, according to the commission. For its part, the EU has agreed to discuss with non-EU countries how emissions generated by incoming flights from these countries can be dealt with, while giving way on its proposal to see aviation agree a 10pc cut in its international carbon emissions by 2020 compared with 2005.

But the US aviation industry, which is challenging its inclusion in the EU ETS in the European Court of Justice (ECJ), says the opposite is true. "We had hoped that an agreement at the ICAO summit would obviate the need for our legal challenge," Air Transport Association of America (ATA) chief executive James May said after the ICAO deal was announced. "The Europeans' resolve to ignore international law and key aspects of the new ICAO assembly resolution only strengthens our resolve to fight in favour of them," he added, vowing to continue with the legal challenge at the ECJ.

The ATA says the EU ETS contravenes key global principles agreed at the ICAO Montreal summit that are supposed to govern the application of market-based measures to the industry. These principles include minimising market distortions, safeguarding the fair treatment of aviation relative to other sectors and ensuring that aviation emissions are accounted for only once.

Departure tax

National taxes such as the UK air passenger duty and Germany's departure tax levied in conjunction with the EU ETS contravene the principle that emissions should not be double counted, according to aviation trade body the International Air Transport Association. But the commission says the EU ETS is fully consistent with all of the principles in the ICAO agreement, allowing it to proceed with the aviation sector's inclusion in the scheme.

What is the ICAO?

• The International Civil Aviation Organisation (ICAO) is a UN agency. It has 189 member countries and describes itself as the "global forum for civil aviation".

• The ICAO's main role is to achieve its vision of "safe, secure and sustainable development of civil aviation through co-operation among its member states".

• The organisation established a number of strategic objectives for 2005-10 to implement its vision. These include:

- Enhance global civil aviation safety
- Enhance global civil aviation security
- Minimise the adverse effect of global civil aviation on the environment
- Enhance the efficiency of aviation operations
- Maintain the continuity of aviation operations
- Strengthen laws governing international civil aviation

• The ICAO's efforts to reduce GHG emissions include various measures such as promulgating standards, publishing guidance documents, encouraging technology improvements and pursuing market-based measures. The organisation says it co-operates closely with the UN Framework Convention on Climate Change.



Shipping postpones standards decisions

Governments have failed to reach an agreement on the best way to curb greenhouse gas (GHG) emissions from the shipping sector. A meeting of the International Maritime Organisation's (IMO) Marine Environment Protection Committee in London, UK, from 27 September to 1 October was unable to come to a consensus on applying energy efficiency standards to new ships. And a resolution to make industry-wide energy efficiency standards mandatory for new vessels failed to pass at the IMO gathering.

Rejected amendments

The IMO has previously drafted two key amendments to its regulations for the prevention of air pollution from ships, to make the energy efficiency design index and the ship energy efficiency management plan mandatory for new ships. But opposition from developing countries led by China, India, Brazil, South Africa and Saudi Arabia has meant these amendments have not been adopted or officially circulated.

A decision on possible market-based mechanisms for the sector — such as emissions trading, a levy on CO₂ emissions or the trading of fuel efficiency credits — was postponed until next year, when an inter-sessional meeting dedicated solely

to discussing market-based measures will be held in March. An "expert group" was tasked at the meeting to conduct a feasibility study and impact assessment of several possible market-based measures submitted by governments and observer organisations. It will continue its work to "provide an opinion on the compelling need and purpose of market-based measures as a possible mechanism to reduce GHG emissions from international shipping", according to the IMO.

The failure to agree on GHG policy for the shipping sector will fuel long-standing criticism from environmental advocates that the IMO is too slow or incapable of regulating the industry on this key issue. IMO secretary-general Efthimios Mitropoulos acknowledged after the meeting that the political aspects of how the measures should be applied, as well as whether they should be mandatory and what legal form they should take, are proving difficult.

"All of these questions have vexed the membership of the organisation," Mitropoulos told the Seoul International Maritime Forum in South Korea last month. "It has not yet been possible for them to reach consensus," he admitted, insisting that the outcome of the meeting was still "positive in the circumstances".

Africa stands 'united' as Cancun Cop nears

Diverse nations from the African continent will together push for a simplified clean development mechanism (CDM) rule book for local projects, according to Abbas Kitogo, the CDM manager of German bank KfW's Kenyan office.

Several other areas will be common ground for the diverse African countries at the United Nations Framework Convention on Climate Change's (UNFCCC) 16th Conference of the Parties (Cop 16) in Cancun, Mexico, starting at the end of this month.

"It would be a rather naive approach for Africa to come up with completely different representation in Cancun, as this will undermine the efforts already made in past negotiations that favoured Africa," Kitogo says.

The continent will be for calling for adaptation issues to be addressed "as a matter of urgency", Kitogo says. And greater progress on the elements of the Copenhagen Accord, which was agreed at the UNFCCC's Cop 15 in Copenhagen, Denmark, in December last year is much needed. Crucially, action on the fast-track financing of \$30bn up to 2012 must be taken, as well as longer-term financing for Africa from developed nations.

Africa's final common position at the pending UNFCCC talks mirrors calls made recently by China, urging stringent commitments by developed countries to reduce their emissions.

South Africa's priorities may vary slightly, considering its position as Africa's biggest emitter, the primary CDM investor on the continent and as one of the original signatories of the Copenhagen Accord. But it is expected to stand alongside its neighbours in negotiations at Cancun.

Regulatory clarity on reducing emissions from deforestation and degradation (REDD) is a priority. More than 16pc of the world's rainforests are in Africa. "Making REDD work for Africa means recognising the complexity and diversity of African forests and making UNFCCC rules and regulations to make African forests eligible for REDD projects," Kitogo says. REDD's growing international profile "means there is no way to avoid it at this stage, but to promote it," he adds.

Kitogo says negotiations in Cancun must achieve two steps in terms of REDD. Firstly, there needs to be a better understanding of how REDD will be implemented through "REDD readiness", including capacity-building in national institutions, systems on monitoring deforestation and development of local REDD policies. Secondly, agreements are needed to launch several REDD pilot projects in forested countries.

Attitudes to CDM development in Africa are improving, as "the west has found its own ways to deal with challenges in Africa", according to Kitogo. More than 140 Africa-based projects are in the CDM pipeline, most of them in South Africa.



Australia widens climate consultation

The Australian government has created two climate change round-tables as part of its effort to consult widely on its plan to establish a carbon price in the domestic economy. One group comprises members from the business sector, the other is made up of members from trade unions and various non-governmental organisations (NGOs), including environmental and local community groups.

The business round-table will discuss how the government's climate change policies intersect with other economic policies, including tax reform. The NGO round-table will provide advice to the government on the introduction of a carbon price, including issues of household assistance, growth in employment and sustainability surrounding climate change.

Deputy prime minister and treasurer Wayne Swan and minister for climate change and energy efficiency Greg Combet will co-chair the business round-table. Minister for resources and energy Martin Ferguson will be a member of the roundtable. Members of the business climate change round-table include the heads of banks, mining companies and energy firms (see table). Combet and minister for sustainability, environment and water Tony Burke will co-chair the NGO roundtable. Agriculture and forestry minister Joe Ludwig will be a member of this round-table.

"The introduction of a carbon price will reshape the business environment for all Australian companies, providing businesses with the certainty they need to begin the transition to a low-pollution economy," Swan said after announcing the round-tables in mid-October. The new business round-table

Australia funds overseas CCS projects

The Australian government-backed Global Carbon Capture and Storage Institute (GCCSI) will provide A\$18mn (\$17.5mn) for carbon capture and storage (CCS) projects. The funding is the first it has provided since being set up in April 2009.

The GCCSI will give A\$220,000 to a state governmentbacked CarbonNet venture in the Latrobe valley, Victoria, which has brown coal deposits. CarbonNet aims to capture 4mn-10mn t/yr CO2. The Victoria government pledged A\$30mn to CarbonNet in June. The Callide Oxyfuel project in Queensland, operated by state-owned generator CS Energy, will receive A\$1.83mn. The project involves retrofitting the Callide A 120MW coal-fired power station with a A\$200mn oxyfuel combustion system that stores CO2 underground.

GCCSI will give \$2.2mn to the Rotterdam CCS project in the Netherlands to fund a feasibility study to assess potential CO₂ storage sites in the North Sea. And \$2.55mn will go to a Romanian CCS demonstration project in Oltenia, which plans to capture 1.5mn t/yr of CO₂ from a unit of the Turceni power plant and store it in saline aquifers near the facility.

Business round-table membership			
Government	Representative		
Deputy prime minister	Wayne Swan		
Climate change minister	Greg Combet		
Energy and resources minister	Martin Ferguson		
Company			
AGL	Michael Fraser		
BHP Billiton	Hubrecht van Dalsen		
Origin Energy	Grant King		
Qantas	Alan Joyce		
Shell	Ann Pickard		
Woodside	Don Voelte		
National Australia Bank	Cameron Clyne		

will ensure that the views of the business community are front and centre as this economic reform progresses, he added.

The Australian government plans to set up a trading market in energy efficiency certificates by July 2012 as a precursor to introducing a domestic carbon price. And it plans to improve energy efficiency by 30pc by 2020 compared with this year.

The government has not stipulated when it will introduce carbon price legislation to parliament. Climate change minister Greg Combet says he wants a carbon price introduced before the next federal election in 2013.

An energy efficiency obligation will help shield households and businesses against price rises associated with the future introduction of a carbon price, as energy efficiency gains will reduce emissions intensity and so reduce exposure to carbon price-related costs, a report released in March by former prime minister Kevin Rudd says.

State replacement

The proposed national energy efficiency scheme will replace three existing state schemes in New South Wales, Victoria and South Australia, and be phased out as a carbon price system matures. The report proposes energy efficiency measures such as a mandatory light vehicle CO₂ standard — Australia only has voluntary fuel efficiency standards — emissions targets for federal government cars, developing interoperability standards for electric vehicles, a clear government policy on electric vehicles and a zero emissions policy for buildings.

The government will consider giving the Australian Energy Regulator and the Australian Energy Market Commission stronger regulatory oversight of the national energy efficiency scheme. And consideration will be given to new electricity pricing, such as the introduction of time pricing where appropriate, the report says. Australian government energy efficiency measures are expected to deliver more than 38mn t of emissions abatement in 2020, but there is scope to do more, according to the report.



Renewables

US needs infrastructure investment

The US needs to invest \$50bn-100bn in its power transmission infrastructure in the next 10 to 15 years to meet state renewable energy goals, according to a report by consultancy The Brattle Group. "Without a multi-billion investment to the order of \$50bn-100bn, our nation's transmission capabilities will be insufficient to allow for the integration of enough renewable power sources into the highvoltage grid to meet the [renewable portfolio standard (RPS)] requirements," The Brattle Group principal and utility practice leader Johannes Pfeifenberger says. Satisfying the current state RPSs will require \$50bn in transmission investment. If the US institutes a federal RPS of 20pc, that number could rise as high as \$80bn-130bn.

Quebec hydro heads south

A planned \$1.1bn high-voltage power line could bring up to 1,200MW of low-carbon hydropower from Quebec, Canada, into Regional Greenhouse Gas Initiative (RGGI) states in New England through New Hampshire. The city of Franklin in the south of New Hampshire will host the transfer station for the line, called the Northern Pass transmission project. The direct-current Northern Pass line will bring 1,000-1,200MW of electricity from existing facilities belonging to utility Hydro-Quebec into the New England grid. The new line is scheduled for completion by 2015 and will facilitate the goals of the RGGI, which caps the amount of CO2 emissions that can be released by fossil fuel-fired power generators in 10 northeast and mid-Atlantic US states, including New England. RGGI states plan to reduce their CO2 emissions by 10pc by 2018 from 2008.

US looks at wind potential

Developing offshore wind resources along its coastlines and in the Great Lakes would help the US generate 20pc of its electricity from wind by 2030, according to a report released last month

CCX winds down voluntary programme

The Chicago Climate Exchange (CCX) will end its emission reduction programme next year and create a new asset registry based on its existing protocols and rules.

The CCX's changes will not affect the Chicago Climate Futures Exchange (CCFE), which offers futures and options contracts for several environmental commodities, including sulphur dioxide (SO₂), nitrogen oxides (NOx) and the US renewable energy markets. And the CCFE serves as a clearing house, reducing the risk of bilateral transactions.

The CCX started in 2000 with a grant from the Joyce Foundation. It developed the first North American trading market for all six greenhouse gases (GHGs). It launched in 2003 with 13 charter members and American Electric Power as the sole participating US utility (*AGE*, *November 2003*, *p7*).

The exchange now has more than 400 members from a wide range of sectors. CCX members have entered voluntary but legally binding commitments

by the Department of Energy's National Renewable Energy Laboratory (NREL). This would be a significant increase from the 3.3pc of US power capacity that wind represented last year, according to the latest EIA data. NREL's least-cost optimisation model found that 54GW of added wind capacity could come from offshore wind, with significant benefits for the domestic economy. The report is called *Large-Scale Offshore Wind Power in the US: Assessment of Opportunities and Barriers.* The US leads the world in installed, land-based wind energy capacity, but it still has no offshore capacity.

EPA

EPA in GHG court tussle

Parties involved in litigation against the federal regulation of greenhouse gases (GHGs) have until early November to weigh in on whether a federal court to cut their GHG emissions. Phase 1 of the programme called for companies to reduce their emissions by 4pc between 2003 and 2006, and phase 2 increased that target to 6pc between 2007 and 2010.Members will still be required to meet their 2010 commitments, but the emission reduction programme will not be extended into phase 3.

The new CCX Offsets Registry will operate independently from the exchange. Projects logged in the new registry will be awarded vintage 2011 to 2012 offset credits, based on the exchange's existing offset protocols. Services to facilitate trading of phase 1 and phase 2 allowances, and offsets created during those years, will be available until mid-2011.

The offsets registry will be open to the public and include a transfer mechanism to complete transactions. Any direct emitter will be able to register projects, regardless of whether or not they participated in the CCX emission reduction programme.

should delay implementation of the regulations while it hears the cases. A threejudge panel of the DC Circuit Court of Appeals issued a briefing schedule in mid-October that gave the Environmental Protection Agency (EPA) until the start of November to respond to four motions to stay various GHG-related regulatory matters. Other parties, including states and environmental groups intervening in the cases, have until 1 November to file responses to the motions, while the parties that asked the court to stay the regulations have until 8 November to respond to the EPA's filing. In setting the schedule, the court rejected a request filed by Texas to expedite consideration of its 15 September motion to stay the EPA's tailoring rule for stationary source permits. The court denied the EPA's motion to strike court papers filed in support of the motions to stay by Peabody Energy, the Utility Air Regulatory Group and American Farm Bureau Federation.



EPA rules on particulates

The Environmental Protection Agency (EPA) published a final rule on 20 October that completes a trio of regulations governing particulate matter emissions from new and modified sources. The rules are designed to aid states in complying with Prevention of Significant Deterioration (PSD) programme requirements for particulate matter, which affect the permitting of new or modified sources. The first rule, the Clean Air Fine Particle Implementation Rule, was promulgated in 2007. The current rule, the PSD for Particulate Matter Less Than 2.5 Micrometers (PM2.5), and a second rule published in 2008, the PM2.5 New Source Review Implementation rule, quantify the allowable emissions increases and should help states properly measure particulate matter emissions for their permitting programmes. The latest rule repeals the grandfathering provision in the May 2008 final rule. This would affect all sources that applied before 15 July 2008 and have not yet received a final federal PSD permit.

Canada

Climate Action Reserve looks to Canada The non-profit Climate Action Reserve wants to start developing protocols over the next year to cover greenhouse gas reduction projects in Canada, reserve business development manager Max DuBuisson says. The reserve, which already has protocols covering emission reductions projects in the US and Mexico, will look at adapting its US forest protocol for use in Canada. It is likely to take a similar approach in Canada to that followed in Mexico, where it already has protocols to cover the monitoring and verification of livestock and landfill gas projects. The reserve has already issued 7.5mn Climate Reserve Tonnes (CRTs) for projects registered under its protocols and is developing protocols in the US covering soil sequestration, nutrient management and rice cultivation. Buyers have paid \$2-7/t CO2 equivalent of CRTs recently.

New York state utility emissions see long-term drop

Power plant emissions in New York state have fallen significantly in the past decade, as environmental compliance has made facilities' operations more efficient, according to a report, titled *New York State Plant Emissions*, released at the end of September by the New York Independent System Operator (ISO). The ISO monitors and controls the transmission grid in New York state.

Sulphur dioxide (SO₂) emissions have seen the most dramatic decline of the three main pollutants, falling by 82pc last year from 1999, the report says. Nitrogen oxides (NO_x) emissions were down by 62pc in the same period, while CO₂ emissions decreased by 31pc.

The start of the Regional Greenhouse Gas Initiative in 2008 made generators bear CO₂ costs and lower their emissions of the pollutant, the ISO says. The efficiency of the fleet of plants serving New York improved as a result.

New York state's CO₂ emissions rate is the ninth lowest in the US, its NOx emissions rate is 13th lowest and its SO₂ emissions rate is 12th lowest. The emission reductions have occurred despite the addition of more than 8,000MW of new generation coming on line in the state since 1999. Nearly 1,300MW of the new capacity is wind power.

The system-wide heat rate for fossilfuelled power plants in the state fell by 27pc to 9,500 Btu/kWh from 13,000 Btu/ kWh over the past decade — essentially a decline from a rate near that of an inefficient coal-fired plant to a more efficient gas-fired plant. "The 25pc decline in the heat rate means that New York's power plants are using one-quarter less fuel to produce the same amount of electricity," ISO president Stephen Whitley says.

The report does not mention the key power market issues of cheaper gas and more efficient dispatch. And upcoming retirements suggest that even with compliance, the state has too much ageing and incorrectly sited generation. ISO has about 10 unit retirements listed on its website, many of which were old, small gas-fired plants. Energy System's 80MW North East plant in Pennsylvania appears to be the next to close.

Coal

Firm trials methane capture technology

US coal producer Walter Energy will control methane emissions from its coal mines using carbon project developer Biothermica Coal Carbon technology to cut emissions intensity. Walter partnered Biothermica to develop the controls, the first of which is expected to be operational by next year. The initial project will cut emissions by 330,000 t/yr CO2 equivalent (CO2e). The pipeline of projects could reduce emissions by over 3mn t/yr CO2e. Biothermica's VAMOX technology has been operating successfully as a pilot project at Walter's No. 4 Mine in Alabama since March 2009. It controls about 35,000 t/yr CO2e, the firms say. The project captured and destroyed 25,931mn t of methane between 6 March 2009 and 5 March 2010, project verifier Ruby Canyon Engineering says.

EPA projects GHG savings

The Environmental Protection Agency (EPA) released estimates last month of the short-term greenhouse gas (GHG) reductions that could be made if its current rules go into action. US GHG emissions should fall by about 839.1mn t CO2 equivalent (CO2e) by 2015 from 2010, according to the EPA's five-year strategic plan. About 99mn t CO2e of reductions will come from the light-duty vehicle GHG rule, and 240mn t CO2e from the heavy-duty truck rule and the initial phases of the GHG tailoring rule. Programmes already in place, such as the Energy Star efficiency standards and Smartway Transportation Partnership, will account for 500.4mn t CO2e of reductions. The plan lays out the blueprint for attaining the EPA's highest priorities.



US elections add turbulence to GHG debate

The US mid-term elections involve both houses of Congress and various state governorships. They are often taken as a general vote of confidence on the incumbent administration — and promise mixed results for the prospect of US emissions policies

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A frantic wave of electioneering across the US will reach a climax on 2 November, when the electorate gets a chance to vote for members of the House of Representatives, senators and state governors. Some of the battles between Republicans and Democrats involve key political figures and issues in the US climate change debate. The elections have brought into prominence the Tea Party, a loose, grassroots affiliation of individuals with a broadly anti-state, conservative agenda that strongly opposes the policies of president Barack Obama's administration.

California: Boxer faces tough fight

A close Senate race in California could see the defeat of Democrat Barbara Boxer, the head of a key Senate committee with jurisdiction over Clean Air Act regulations and cap-and-trade legislation. Despite having served three terms in the Senate, preceded by a decade in the House of

Representatives, Boxer has enjoyed only modest single-digit leads over her challenger, Republican Carly Fiorina, in the most recent opinion polls.

National discontent with the Democrats' handling of the economy, along with the fact that Boxer has rarely enjoyed widespread support in the state, has made her vulnerable. A win by Fiorina, the former head of technology firm Hewlett-Packard, would be a major coup for Republicans looking to slow the progress of greenhouse gas (GHG) regulations.

What are the US mid-term elections?

• Mid-term elections fall halfway through the four-year office

- All 435 seats in the House of Representatives are being contested in the elections.
- The election involves 37 of the 100 seats in the Senate.

• Democrats control 59 seats in the Senate and have a major-

ity of about 77 seats in the House at present.Republicans have a good chance of taking control of the

House of Representatives in the mid-term elections.

• Elections are being held for 37 state governorships at the same time.

• The traditional re-election rate for House of Representatives members is more than 90pc. But the polls this year suggest an unusually strong level of dissatisfaction with incumbents, as well as the Obama administration. Boxer's ascension to chair of the environment committee after Democrats took control of the Senate in 2006 was seen by some supporters of GHG limits as a sign that tough new cap-and-trade legislation would soon pass Congress. She has sponsored many pieces of environmental legislation, and co-sponsored two key GHG bills. But neither bill has made it through the Senate. The Lieberman-Warner bill fell on a procedural vote, while the Kerry-Boxer bill was put aside to allow senators John Kerry and Joe Lieberman to try to develop a bill

more likely to win 60 votes. The lack of major legislative accomplishments has been one of the knocks against Boxer.

Fiorina spoke positively of cap-and-trade when she was an adviser to senator John McCain's 2008 presidential campaign. But in an effort to burnish her conservative credentials over the past year, she has shifted position. In one

TV advert she questioned why Boxer was "worried

about the weather instead of terrorism". Fiorina says the Kerry-Boxer bill would be "disastrous" for the economy.

Nevada: Reid under fire

Senate majority leader Harry Reid is in a tough election battle for the Nevada seat he has held since 1986. His Republican opponent Sharron Angle is backed by the strengthening Tea Party movement, and she has attacked Reid's support for most bills passed under Obama's watch.

Reid has supported proposals to establish a cap-andtrade programme for GHG emissions this year, but Angle is opposed and says she does not believe climate change science. Recent polls show the two in a dead heat. Nevada residents are wary of regulations to set a price on carbon emissions. The presumption that the rules would raise energy costs and cause jobs losses is strong in the state. Nevada leads the nation in unemployment levels, bankruptcy and foreclosures.

Wisconsin: Tea Party flexes its muscles

The Senate race in Wisconsin is pitting Democratic incumbent senator Russ Feingold against Tea Party favourite, Republican Ron Johnson, with the candidates taking opposing views on clean energy issues. Feingold cites overdependence on oil, global warming and high gas and heating oil prices as reasons to put a strong focus on renewable energies and secure energy independence for the US. Johnson, who has a business background, places greater emphasis on traditional energy sources and is making headlines by ques- $\Rightarrow p18$

argus

tioning the human contribution to global warming.

Wisconsin is one of several races that could affect the odds for future passage of climate legislation. It features candidates with opposing views on the issue and will determine whether Democrats retain control of the Senate next year. Obama campaigned in the state, reflecting Wisconsin's political importance. But in a tough economy, pro clean energy arguments are challenged by business groups concerned about the jobs impact of policies such as Obama's proposed national cap-and-trade programme. The state's unemployment rate is 7.9pc compared with the national rate of 9.6pc.

Johnson, who is leading Feingold in recent polls, has come out strongly against cap-and-trade legislation to address climate change, calling it a "job-killing" and "crippling national energy tax" that would put state businesses at a competitive disadvantage and cost the average Wisconsin family as much as \$1,600/yr. He questions the science behind "man-caused climate change". "I think it is far more likely that it is just sunspot activity or something in the geologic eons of time where we have changes in the climate," he said at a campaign event in August.

By contrast, Feingold promotes "a sustainable renewable energy policy — one that reduces our dependence on fossil fuels". He calls for an "aggressive" national mandate requiring utilities to obtain 15pc of their electricity from renewable sources by 2020, with increased financial penalties for utilities that do not meet these standards. He backed increasing the federal renewable fuels mandate to 36bn USG/yr by 2022 as part of the 2007 energy bill.

Feingold has criticised Johnson's remarks about the science of climate change, and he opposed a Senate resolution to overturn federal regulation of GHGs. He co-sponsored legislation in 2005 to reduce US emissions by 80pc by 2050 compared with 1990.

The Democrats seem likely to emerge from the elections with a much smaller majority of possibly 51 or 52 seats, which would make it more difficult but not impossible to pass legislation to address climate change. But many experts expect the Republicans to win at least 40 House seats currently held by Democrats, which would give them the majority. Should this happen, any effort to pass major climate legislation through Congress would likely have to wait until after the 2012 elections. House Republicans said in a campaign document released in late September that they will oppose the cap-and-trade "energy tax" and focus on trying to increase domestic production of fossil fuels.

Gubernatorial race: California laws in doubt

Several states in the US could see a shift in energy and climate policies, depending on the outcome of the gubernatorial elections in November. Nearly 40 states are holding elections for governor this month, including 20 where the current office holder is not up for re-election.

The outcome of those races could have a significant effect on the course of energy and climate policy in the states for the next few years. Such policies could be hit hardest in states that are already on the path towards enacting cap-and-trade programmes for greenhouse gas (GHG) emissions and those that have enacted renewable energy mandates and incentives.

Nearly every state participating in the Regional Greenhouse Gas Initiative (RGGI), Western Climate Initiative (WCI) and Midwest Greenhouse Gas Reduction Accord is holding an election for governor this year.

The same is true of states that have enacted a renewable or alternative energy portfolio standard. Future action in those states could be slowed by newly elected chief executives who oppose such policy mandates or are sceptical that climate change is an issue to be concerned about. This is notably the case in California, where the outcome of the election will determine whether implementation of the state's GHG reduction law, AB 32, continues unimpeded. Major programmes to meet the law's mandate of reducing emissions to 1990 levels by 2020, such as cap-and-trade, are due to take effect in 2012.

The race pits attorney general Jerry Brown — a Democrat — against Republican Meg Whitman, former eBay chief executive. Under current Republican governor Arnold Schwarzenegger, the state has enacted AB 32, which includes the nation's first GHG standard for new cars and trucks and a renewable electricity standard (RES) of 33pc by 2020.

Brown, who served as governor in 1975-83, and Whitman are both in favour of the 33pc RES as a way to continue the growth of the state's clean technology industry. And Brown has laid out plans for 20,000MW of new renewable capacity by 2020, as well as energy efficiency standards. Both candidates oppose Proposition 23, a ballot initiative that would suspend implementation of AB 32 until the state's 12.4pc unemployment rate falls to 5.5pc or lower for four consecutive quarters (*AGE, October, p16*).

Several other states may see a shift in policy after November, notably Florida, Illinois, Maine, Massachusetts, Minnesota, New Mexico and Oregon. The Republican candidate for governor in each state questions the science of climate change or opposes requiring GHG cuts. But many voters may not notice the policy differences between the candidates. Few mention the issue of climate change at all, preferring instead to cast their support of renewables as an economic policy.

"Radical activists are trying to convince us... that cows are causing 'global warming'," Minnesota Republican candidate Tom Emmer says on his campaign website. And he has criticised one of his opponents for having "jumped on the global warming bandwagon".



Argus Global Emissions — US markets_

RGGI

• The Regional Greenhouse Gas Initiative (RGGI) market has seen prices remain relatively rangebound on low volumes ahead of the next auction on 1 December.

• The forthcoming auction will see more than 45mn allowances offered to an already oversupplied market.

• Prices ended the month up by 3¢/t CO₂ equivalent (CO₂e) compared with prices at the start of October, reaching \$1.91/t CO₂e on 26 October.

• Recent auctions have been undersubscribed. Only 75pc of current vintage allowances offered in the September auction were sold, all at the reserve price of \$1.86/t CO2e.

S02

• Sulphur dioxide (SO₂) allowance prices increased on the month in October.

• The current vintage hit a high of \$9.50/t early in the month before falling to \$8/t on 26 October, up by \$1.50/t from the start of October.

• December-delivery SO₂ trades dominated market activity, but volumes were low. There was only light trading of small amounts reported during October.

• The new SO₂ and NOx rules proposed by federal regulators in July are still not finalised. But many participants have priced the extent of the rules into the SO₂ market, putting prices of vintage 2012 and beyond at \$1/t or even lower.

NOx

• Current vintage annual nitrogen oxides (NOx) prices reached \$370/t on 26 October, up by more than 15pc from the start of the month.

• Generators are analysing their most recent emissions data. More than 75pc of sources had submitted their thirdquarter reports to the US Environmental Protection Agency (EPA) by 26 October.

• Utilities appear to be waiting until new regulations from the EPA are more certain before making major environmental investments. Atlanta-based power firm Southern chief executive David Ratcliffe has expressed hope for "a more rational approach" for phasing in new regulations. Utility Allegheny Energy chief executive Paul Evanson says the "EPA train of regulations is going to slow down".





US: SO2 allowances







\$/t

Argus Global Emissions — Markets _____



EU ETS: 2011 vintage

€/t CO2e



EU ETS vs CDM CER 2010 €/t CO2e 17 CDM CER 16 FU FTS 15 13 12 1 10 L Jul 09 Oct Jan 10 Apr Jul Oct

Generation economics, incorporating emissions (26 Oct)

EU ETS

• EU emissions trading scheme (ETS) allowance prices fell by around 3pc in October, reflecting a slight bearish trend in the wider energy complex. Rangebound trading seen in September continued throughout October.

• The December 2010 allowance contract in the over-thecounter (OTC) market fell by 48c/t CO₂ equivalent (CO₂e) from September's close to finish October at €15.16/t CO₂e.

● The December 2010 allowance contract remained rangebound in October at €15-16/t CO2e, apart from during one trading session on 21 October when prices decreased to below the €15/t CO2e key technical support level, closing at €14.86/t CO2e.

• The UK auction of 4.4mn t CO2e of EU ETS allowances on 7 October removed a number of buyers from the market and spot prices inched lower. The next UK auction of 4.4mn t CO2e will take place on 4 November.

• Netherlands-based carbon exchange Climex's auction of 2mn t CO₂e of allowances on 14 October was cancelled. The auction was rescheduled to take place on 27 October. The effect on the market was negligible, because of the small amounts of allowances to be auctioned.

● Allowances posted a four-month high of €15.85/t CO2e on 11 October. Allowances were buoyed by buying from utilities hedging their carbon exposure. The buying interest saw the December 2010 contract temporarily decoupled from movements in the wider energy complex.

• Allowances had a bearish run mid-month, posting losses for six consecutive days on 12-19 October. The bearish trend traced movements in the wider energy complex.

Month-ahead contract				
	UK month-ahead (£/MWh)	Netherlands month-ahead (\in /MWh)	Germany month-ahead (€/MWh)	
Electricity	44.70	49.58	49.54	
Natural gas + ETS	16.55	25.32	25.57	
Adjusted spark spread (49.13%)	5.76	4.43	3.88	
Coal + ETS	21.12	24.13	24.13	
Adjusted dark spread (38%)	8.35	8.03	8.00	
Coal spread minus gas spread	2.59	3.60	4.11	
Year-ahead contract				
	UK year-ahead (£/MWh)	Netherlands year-ahead (\in /MWh)	Germany year-ahead (€/MWh)	
Electricity	46.50	48.18	48.05	
Natural gas + ETS	17.20	25.91	26.20	
Adjusted spark spread (49.13%)	6.19	1.79	1.24	
Coal + ETS	21.37	24.45	24.45	
Adjusted dark spread (38%)	9.87	6.28	6.15	
Coal spread minus gas spread	3.69	4.49	4.91	



Argus Global Emissions — Markets _____







Crude oil: North Sea Dated \$/bl

Apr

Jul

Oct

Jan 10

CDM CERs

• Prices in the secondary certified emission reduction (CER) market fell by about 6pc during October, posting around double the losses reported on EU emissions trading scheme (ETS) allowances.

● Secondary CERs fell sharply throughout October as firms' frustration over post-2012 supply uncertainty meant many preferred to trade allowances. The December 2010 CER contract closed at €13.03/t CO₂ equivalent (CO₂e) at the end of October, falling by 85c/t CO₂e from 29 September.

• The premium of December 2010 EU ETS allowances to CERs widened by around 21pc on the month to €2.13/t CO2e at the end of October. The differential hit its widest intra-month point of €2.18/t CO2e on 22 October.

• A report by market watchdog CDM Watch compounded diminishing confidence in the clean development mechanism's (CDM) ability to generate sufficient CER supply pre and post-2012. The report questions the validity of N2O CDM projects and calls for all N2O credits to be excluded from trade in the EU ETS.

• N₂O CDM projects account for nearly 20pc of global CER yields. Any action by the CDM executive board (EB) would significantly dent CER supply, especially as the board is already considering supply restrictions on HFC23 projects.

• The CDM EB is expected to announce a decision on the validity of HFC23 credits by mid-November. It is still unclear whether any action will be taken on N2O projects.

● Some traders expect the December 2010 allowance-CER differential to widen to €3/t CO2e as the potential changes to the CDM rule book force firms to continue their "hands off" approach to the CER market. Other market participants expect the spread to tighten in coming weeks.





Oct

50 L Jul 09

EU ETS 2011

16.

16.2

16.0

15.8

15.6

15.4

15.2

1.2

1 0

0.8

0.6

0.4 0.2

0.0

25 Oct

















Volume (right-hand scale) mn t CO2e

4 Oct

11 Oct

18 Oct

Price (left-hand scale) €/t CO2e

27 Sep



Argus Global Emissions — Data: CDM summary_

CDM scorecard			t CO2e
Projects	No. of projects	Average CERs*	Expected total to end 2012*
Awaiting approval	>4,200	na	>2,900,000,000
Registered	2,456	388,830,154	>1,840,000,000
Requested registration	75	10,490,103	>20,000,000
*Certified emission reductions. **Assuming no renewal of crediting periods.			

Annex-1 CDM investors	
Investor	Projects
Australia	1
Austria	50
Belgium	24
Brazil	1
Canada	50
Denmark	47
Finland	33
France	62
Germany	158
Ireland	2
Italy	52
Japan	334
Liechtenstein	1
Luxembourg	19
Netherlands	328
Norway	43
Portugal	8
Spain	84
Sweden	205
Switzerland	563
UK	823

CDMs by sector and region					
Sector	Projects				
Afforestation/reforestation	17				
Agriculture	128				
Chemical industries	68				
Energy demand	28				
Energy industries (renewable/non-renewable sources)	1,864				
Fugitive emissions from fuels (solid fuel, oil and gas)	143				
Fugitive emissions from halocarbons and sulphur hexafluoride	24				
Manufacturing industries	143				
Mining/mineral and metal production	30				
Waste handling and disposal	486				
Transport	3				
Region					
Africa	48				
Asia-Pacific	1,918				
Latin America and Caribbean	480				
Other					





Approved CDMs ar	nd CERs by c	ountry t/yr CO2e
Host country	Projects	Average reductions
Albania	1	22,964
Argentina	17	4,206,791
Armenia	5	223,063
Bangladesh	2	169,259
Bhutan	2	499,522
Bolivia	4	563,991
Brazil	179	21,301,816
Cambodia	4	124,356
Cameroon	1	130,009
Chile	38	4,726,558
China	1,001	238,851,545 🛧
Colombia	24	3,222,850
Costa Rica	6	293,640
Cuba	2	465,397
Cyprus	6	125,899
Dominican Republic	2	483,726
Ecuador	14	713,266
Egypt	6	2,396,757
El Salvador	6	619,535
Ethiopia	1	29,343
Fiji	1	24,928
Georgia	2	411,897
Guatemala	11	864,760
Guyana	1	44,733
Honduras	16	312,559
India	546	43,792,846 🛧
Indonesia	48	4,326,425
Iran	1	463,122
Israel	17	1,868,684 🛧
Ivory Coast	1	71,760
Jamaica	1	52,540
Jordan	2	434,074
Kenya	2	307,191
Laos	1	3,338
Macedonia	1	54,623
Madagascar	1	44,196
Malaysia	86	5,203,091 🛧
Mali	1	188,282
Mauritania	1	188,282
Mexico	123	9,597,247
Mongolia	3	71,904
Morocco	5	287,447
Moldova	4	226,585
Nepal	2	93,883
Nicaragua	4	577,381
Nigeria	4	4,411,771 个
Pakistan	9	1,688,676
Panama	6	291,579
Papua New Guinea	1	278,904
Paraguay	1	1,523
Peru	22	2,492,026 个
Philippines	42	1,634,584 个
Qatar	1	2,499,649
Rwanda	1	23,858
Senegal	1	188,282
Singapore	1	15,205
South Korea	48	17,041,202 个
South Africa	17	2,959,270
Sri Lanka	7	201,168
Syria	2	132,927
Tanzania	1	202,271
Thailand	40	2,232,960 个
Tunisia	2	687,573
UAE	4	348,645
Uganda	2	41,774
Uruguay	3	251,213
Uzbekistan	7	1,105,386
Vietnam	34	2,153,498 个
Zambia	1	130,032
		— UNFCCC



Argus Global Emissions — *CDM/JI*_____

CDM CER issuance by country t CO2									
China	229,408,499	Guatemala	895,030	Papua New Guinea	215,424				
India	79,929,621	Thailand	815,224	Jamaica	211,223				
South Korea	56,821,812	Ecuador	809,142	Cuba	166,744				
Brazil	43,188,286	Jordan	800,573	Могоссо	135,439				
Mexico	6 898 962	Colombia	769,965	Philippines	95,428				
Chilo	4 029 799	Malaysia	723,916	Costa Rica	45,787				
- Crime	4,930,700	Nicaragua	577,757	Uruguay	40,613				
Eygpt	4,710,603	Israel	502,821	Fiji	35,550				
Vietnam	4,487,743	Peru	472,867	Tanzania	13,587				
Argentina	4,343,578	El Salvador	416,517	Laos	2,168				
Pakistan	1,968,404	Honduras	412,046	Bhutan	474				
South Africa	1,794,261	Indonesia	346,164	Mongolia	48				
Bolivia	933,719	Sri Lanka	226,647	Total	448,155,430				

JI projects: Track 1 and 2

	Tra	ck 1	Trac	:k 2		Track 1 and 2		
Host country	Projects	ERUs '000 t/yr CO2e	Projects	ERUs 2000 t/yr CO2e	Projects	ERUs 2000 t/yr CO2e	ERU issuances '000t CO2e	
FSU								
Russia	0	0	105	53,848	105	53,848	0	
Ukraine	19	5,593	36	11,456	55	17,049	6469	
East Europe								
Bulgaria	21	2,056	12	1,146	33	3,202	287	
Czech Republic	43	1,160	1	33	44	1,193	261	
Hungary	10	1,643	2	142	12	1,785	717	
Poland	14	2,311	7	799	21	3,110	0	
Romania	8	547	5	1,938	13	2,485	0	
Slovakia	0	0	1	13	1	13	0	
Baltic states								
Estonia	9	352	4	189	13	541	0	
Lithuania	0	0	13	1,900	13	1,900	1697	
West Europe								
France	13	3,435	0	0	13	3,435	432	
Germany	9	4,234	1	57	10	4,291	0	
Spain	3	164	0		3	164	0	
Sweden	0		2	451	2	451	0	
Other Annex B								
New Zealand	6	544	0	0	6	544	839	
							— UNEP, Argus	

JI tra	ck 2: Approved	projects					
JISC ref.	Туре	Key developer	Place/name	Investor	Host country	Reduction t/yr CO2e	Crediting period
1	Manufacturing	JSC Podilsky Cement	Kamyanets Podilsky	CRH Finance	Ukraine	755,851	01/09-12/12
25	Wind	Veju Spektras	Kretinga	SIAE Kvotas	Lithuania	46,231	01/08-12/12
34	Wind	Achema Hidrostatys	Kretinga	TGF	Lithuania	27,794	01/07-12/12
35	GHG capture	AF Zasyadko	Donetsk	Marubeni, various	Ukraine	2,148,004	03/04-12/12
46	Wind	Vejo Elektra	Kretingos	TGF	Lithuania	22,515	09/08-12/12
49	Landfill	Ekoresursai	Lapes Landfill	TGF	Lithuania	33,431	09/07-12/12
50	Landfill	Gafsa-Skhid	Crimea	Carbon Capital Markets	Ukraine	312,230	01/08-12/12
63	Hydro	Vez Svoge	Various	EBRD	Bulgaria	65,894	07/08-12/12
64	N2O	AB Achema	Jonalaukis	BASF	Lithuania	578,569	07/08-12/12
77	Coal mine methane	Eco-Alliance	Makeyevka	Carbon TF	Ukraine	173,263	01/08-12/17
78	Coal mine methane	Eco-Alliance	Suyevka	Carbon TF	Ukraine	175,503	01/08-12/17
79	Coal-bed methane	Eco-Alliance	Kirovskoye	Carbon TF	Ukraine	313,610	01/08-12/17
89	N2O	AB Achema	Jonalaukio		Lithuania	946,508	01/08-12/12
104	Energy efficiency	Energomashspetsstal	Kramatorsk	Global Carbon	Ukraine	215,586	01/08-12/12
105	Coal mine methane	Krasnoarmeykskaya	Donetsk	Carbon TF	Ukraine	1,614,131	01/08-12/17
144	Manufacturing	JSC Volvyn Cement	Rivne oblast	Dyckerhoff, Global Carbon	Germany, Netherlands	406,962	12/08-12/12
147	Coal mine methane	Coal Mine Association	Donetsk Oblast	Carbon TF	Ukraine	146,658	01/08-12/12
163	Wind	Energogrupe	Taurages District	Ecocom	Switzerland	27,948	01/09-12/12
178	Wind	Vejo gusis, UAB	Liepynes village	Ecocom BG	Netherlands	12,539	01/10-12/13
187	Gas capture	Horlivka Coke Plant	City of Horlivka	Global Carbon	Netherlands	58,316	01/10-12/12
194	Energy efficiency	OSJC	Kryvyi Rih city	Global Carbon	Netherlands	138,520	01/08-12/12
195	Energy efficiency	OJSC	Shatura, east of Moscow	Eon Energy Sourcing	Germany	490,837	09/10-12/12
214	Gas capture	Anthracite	Donetsk region, town of Snizhne	Global Carbon BV	Ukraine	90,788	01/08-12/12
							- UNFCCC









Argus Global Emissions — Data: CDM CERs_____





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Key large Asia-Pacific HFC23 CERs issued (>10mn t C02e per project)										
Date of first CER issuance	Туре	Developer or key investor	Place/name	Host country	Investor country	Reduction t CO2e	CDM EB ref.	CER credit date		
16/01/06	HFC23	SRF	Rajasthan	India	Germany, UK	16,508,471	115	07/04-03/09		
10/04/06	HFC23	Gujarat Chemicals	Gujarat	India	Japan, UK, Neths	25,448,392	1	10/05-08/09		
22/11/06	HFC23	Zheijiang Juhua	Quizhou	China	Japan	17,385,174	193	08/06-07/09		
24/11/06	NOx	Rhodia	Onsan	South Korea	Japan, France	43,456,643 🛧	99	09/06-04/10		
02/04/07	HFC23	Changsu 3F	Changsu	China	Italy, Netherlands	20,028,751	306	12/06-03/09		
03/05/07	HFC23	Jiangsu Meilan	Jiangsu	China	Spain, Netherlands	23,911,290	11	12/06-08/09		
01/06/07	HFC23	Shandong Dongyue	Shandong	China	Japan, UK	26,004,533	232	01/07-08/09		
17/08/07	HFC23	Zhejiang Dongyang	Dongyang	China	Italy	10,969,186	549	11/06-07/09		
20/08/07	HFC23	Limin Chemical	Linhai	China	Italy	12,611,391	550	01/07-07/09		
18/06/08	HFC23	Zhejiang Juhua	Zhejiang	China	UK	12,810,695	868	04/07-10/09		
28/07/08	NOx	Goldman Sachs	Liaoning	China	Canada, Switz	22,220,494 🛧	1238	03/08-11/09		



JI progress: Key large track 2 submissions, Russia and Ukraine								
JISC ref.	Туре	Key developer	Place/name	Investor	Investor	Reduction	Crediting period*	Status**
Projects und	er JISC determination				country	1/91 0020		
Russia (>20	10,000 t/yr CO2e ERUs)							
3	Methane avoidance	Bryanskoblgas	Bryansk	AddGlobe	US	897,048	01/07-12/12	D
5	Biomass	Arkhangelsk Pulp & Paper	Novodvinsk	Camco	UK	204,290	01/08-12/12	D
12	Hydro	Irkutskenergo	Bratsk	Climate Change Mgmnt	Sweden	879,783	01/08-12/12	D
14	Methane avoidance	Kurskgaz	Kursk	Core Carbon	Denmark	240,000	01/08-12/17	D
15	Methane avoidance	Tulaoblgaz	Tula	Core Carbon	Denmark	791,000	01/08-12/17	D
17	Methane avoidance	Stavropolkraygas	Stavropol	AddGlobe	US	5,000,000	01/08-12/12	D
19	Methane avoidance	Belgorodoblgaz	Belgorad	Core Carbon	Denmark	974,200	01/08-12/17	D
20	Methane avoidance	Oreloblgaz	Orel	Core Carbon	Denmark	364,000	01/08-12/17	D
38	Manufacturing	Ural Steel	Novotroitsk	Camco	UK	632,946	01/08-12/12	D
42	Landfill gas	Ekotechprom	Moscow	Ecocom	Austria	428,726	01/08-12/12	D
43	Landfill gas	Ekotechprom	Moscow	Ecocom	Austria	371,028	01/08-12/12	D
58	Methane avoidance	Rogazifikastiya	Rostov	Apuapack Point	UK	771,392	01/08-12/12	D
59	Methane avoidance	Rogazifikastiya	Volograd	Apuapack Point	UK	731,267	01/08-12/12	D
62	Landfill gas	Poligon Timochovo	Timochovo	ECOCOM	Austria	595,767	01/08-12/12	D
66	Fuel switch	Energy Saving Agency	Kirov	TGF, various	Denmark	367,579	01/08-12/12	D
68	Fuel switch	Savinsky Cement	Savinsky	Camco	UK	224,605	01/08-12/12	D
70	Methane avoidance	Rosgazifikastiya	Tomskaya	Core Carbon	Denmark	459,333	08/06-12/17	D
74	N2O	Kuibyshevazot	Togliatti	Core Carbon	Denmark	589,000	01/08-12/27	D
82	Methane avoidance	Rosgazifikastiya	Tver	Backstreet	UK	323,306	01/08-12/12	D
83	Methane avoidance	Rosgazifikastiya	Ryazan	Apaupack Point	UK	559,365	01/08-12/12	D
87	N2O	PhosAgro	Cherepovets	Core Carbon	Denmark	548,293	01/08-12/12	D
108	Gas recovery	OJSC NK-Rosneft	Gubkinskiy	Int Reconstruction	Denmark	2,407,153	10/10-12/12	D
109	HFC23 & SF6	KCKK Polimer	Kirovo-Chepetsk	Camco	UK	1,048,146	01/08-12/12	D
111	PFC	Rusal Krasnoyasrk	Krasnoyarsk	Carbon Trade	Various	209,656	01/08-12/12	D
115	HFC23 and SF6	JSC Halogen	Perm Krai	Camco	UK	528,921	01/08-12/12	D
120	N2O	Mineral Fertiliser Plant	Kirov	Marubeni	Japan	552,420	01/08-12/12	D
121	Methane avoidance	OJSC Rosgazifikatsiya	Smolensk	Core Carbon	UK	325,083	01/08-12/17	D
122	Methane avoidance	OJSC Rosgazifikatsiya	Orenburg	Core Carbon	UK	1,150,290	01/08-12/17	D
123	Methane avoidance	OJSC Rosgazifikatsiya	Bashkortostan	Core Carbon	UK	2,113,835	01/08-12/17	D
124	N ₂ O	MCC Eurochem	Stavropol	Carbon Climate	Austria	2,235,864	01/09-01/12	D
125	N2O	MCC Eurochem	Tula	Carbon Climate	Austria	528,914	01/09-01/12	D
126	Methane avoidance	SUEK-Kuzbass	Leninsk-Kuznetsky	Carbon-IF	Netherlands	4,464,512	01/08-01/17	D
128	Energy efficiency	South Ural Mt Processing	Orenburg	Camco	UK	260,056	01/09-01/12	D
130	Methane avoidance	Novaya Energetika	Kamerowo	Carbon-IF	Netherlands	662,055	01/08-01/17	D
132	Gas recovery	JSC Salavathetteorgsintez	Bashkortosan	na	na	267,727	01/09-01/12	D
145	Landfill gas	Academy Utility Services	latarstan	C6 Capital	UK	200,013	01/09-12/12	D
156	N2O	JSC Minudobreniya	Voronezh	Core Carbon	UK	882,321	01/08-12/12	D
157	Hydro	Eurosibenergo	Angara and Yenisei		Sweden	400,000	01/09-12/15	D
159	N2U	0.350	Perm Krai	Core Carbon Group	UK	1,943,453	01/09-12/27	D
160	Gastiaring	JSC	W Siberia	na	na	229,320	04/09-03/19	D
167	Hydro	JSC Chimprom	Alagir	na Climata Cha Can	na	328,036	09/08-08/15	D
167	HFC23	Chimprom	Chaluahiaalu	Climate Cng Cap	UK	197,389	01/09-01/12	D
108		JSC	Vamal Napata	Danish EA	Denmark	210,501	01/09-01/12	D
105			Nishaekemek	Mitsubishi	Japan	824,445	08/09-12/12	D
180	Energy eniciency		Kreeneder	Camco	UK	298,080	01/08-12/12	D
100	Gas capture		Svordlovak	Compo		470,991	01/08-12/12	
190	Side initia	0.150	Kelempe	Clabel Carbon	Nothorlanda	470,001	01/10-12/12	D
192	Fuer switch		Svordlovek	Giobal Carbon	INC	321,209	01/10-12/12	
195	Energy efficiency		Shatura	Ean Enorm	Gormany	400 927	01/10-12/12	D
195	Energy efficiency	JSC	Leningrad	Fortum	Finland	368.265	01/10-12/12	
190	Energy efficiency	0.ISC	Sukhov-Log	Global Carbon	Netherlando	165 160	01/10 12/12	D
201	Steel firing	0.00	Lirale Fod District	Carbon Trade	Luxembourg	1 521 900	01/10-12/12	D
201	Steel firing	JSC	Sverdlovek	Climate Chae Marret	Sweden	502 027	01/00-12/12	D
202	Waste heat	0.150	Stavropol	Similar Onge Wighthi	Sweden	502 /12	01/11_10/10	
207	Hydro	JSC	Leningrad	Fortum	Finland	150 356	01/09-12/12	D
215	Gasturbine	OJSC	Yaiva	Fon	Germany	656.021	01/11-12/12	ם
216	Gasturbine	OJSC	Surgut	Eon	Germany	1 306 950	01/11-12/12	
222	Energy efficiency	OJSC	Slantsevskiv	Global Carbon	Netherlande	283 277	01/10-12/12	
			Liancovorty			200,211	31/10-12/12	J



Argus Global Emissions — JI ERUs



JISC ref.	Туре	Key developer	Place/name	Investor	Investor country	Reduction t/yr CO2e	Crediting period*	Status**
Russia (>1	50,000 t/yr CO2e ERUs) (cont.)							
223	Energy efficiency	OJSC	Mordovia	Global Carbon	Netherlands	446,015	01/08-12/12	C
227	Energy efficiency	OJSC	Magnitogorsk	Global Carbon	Netherlands	221,633	01/08-12/12	D
230	Steel firing	JSC	Komsomolsk	Global Carbon	Netherlands	1,221,729	01/12-12/20	C
232	Steel firing	OJSC	Magnitogorsk	Carbon Trade	Netherlands	276,239	01/13-12/20	Ľ
233	Energy efficiency	OJSC	Lipetsk	Global Carbon		613,172	01/08-12/12	C
234	Steel firing	OJSC	Tula	Global Carbon	Netherlands	264,387	01/10-12/12	
Ukraine (>	100,000 t/yr CO2e ERUs)							
7	Energy efficiency	Donetskteplocomunenergo	Donetsk	na	na	130,000	01/07-12/12	D
45	Manufacturing	Alchevsk Iron & Steel	Alchevsk	EBRD	Netherlands	934,213	01/08-12/12	D
50	Landfill	Gafsa-Skhid	Crimea	Carbon Capital Mkt	UK	312,230	01/08-12/12	D
53	Wind	Nova-Eco	Crimea	Swedish EA, TGF	Sweden	738,831	01/08-12/12	D
65	Waste gas	Ekoenergiya	Alchevsk	Sumitomo	Japan	1,557,386	01/08-12/12	C
75	Energy efficiency	Mittal Steel	Kryviy Rih	EBRD	Netherlands	636,771	01/08-12/12	D
80	Coal-bed methane	Eco-Alliance	Molodogvardeysk	Carbon TF	Netherlands	353,527	01/08-12/17	D
131	N2O	Rivneazot	Rivne	Core Carbon	UK	514,710	01/08-01/27	C
140	Energy distribution	Institute of Engineering	Crimea	E Energy	Netherlands	116,334	01/05-12/24	C
144	Manufacturing	JSC Volvyn	Rivne	Dyckerhoff	Germ/Neths	377,457	01/10-12/12	D
146	Oxygen compressor	JSC Zaporizhstal	Zaporizhzhya	na	na	128,436	01/08-12/12	D
150	Energy efficiency	Institute of Engineering	Kharkiv	E Energy	Netherlands	248,378	01/05-12/24	C
172	Methane	Gafsa	Lviv	Carbon Capital Mkt	UK	115,875	04/09-12-12	D
188	Energy efficiency	JSC Yugcement	Olshankoye	Global Carbon	Netherlands	115,071	01/08-12/12	D
194	Energy efficiency	OSJC	Kryvyi Rih	Global Carbon	Netherlands	138,520	01/08-12/12	D
198	Energy efficiency	Skhidenergo	Zugres	Global Carbon	Netherlands	187,056	01/09-12/12	D
204	Methane capture	OJSC	Molodogvardiysk	ING	Netherlands	245,692	01/09-12/18	D
211	Energy efficiency	ZaporozhCox Plant	Zaporizhya	Global Carbon	Netherlands	518,520	01/12-12/20	D
217	N ₂ O capture	OJSC	Cherkaska			509,194	01/12-12/12	C
225	Energy efficieny	OJSC	Donetsk	ING	Netherlands	338,890	01/08-12/12	C
226	Steel	Electrostal	Donetsk	Global Carbon	Netherlands	358,976	01/08-12/12	C
228	Energy efficiency	JSC Azovastal	Donetsk	Global Carbon	Netherlands	1,272,253	01/04-12/07	E
231	Energy efficiency	CJSC	Donetsk	Global Carbon	Netherlands	280,646	01/08-12/12	D







Apr

Jul

Oct

Oct

Jan 10



Apr

Jul

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Oct

Jan 10







Argus Global Emissions — EU_

EU ETS: Verified emissions 2005-09* mn t CO2e									
Country	2009**	2008**	2007	2006	2005	2009 allocations			
Austria	27.3	32.0	31.8	32.4	33.4	31.9			
Belgium	46.3	55.5	52.8	54.8	55.4	56.8			
Bulgaria†	-	-	39.2	-	-	-			
Cyprus	-	-	5.4	5.3	5.1	4.8			
Czech Republic	22.0	24.1	87.8	83.6	82.5	85.9			
Denmark	25.5	26.5	29.4	34.2	26.1	23.9			
Estonia	10.3	13.5	15.3	12.1	12.6	11.9			
Finland	34.3	36.2	42.5	44.6	33.1	37.1			
France	100.3	122.1	126.6	123.3	131.1	128.7			
Germany	428.2	472.6	487.1	477.6	473.7	392.3			
Greece	63.7	69.9	72.7	70.0	71.0	63.2			
Hungary	22.3	26.0	26.8	25.8	25.7	23.9			
Ireland	17.2	20.4	21.2	21.7	22.4	20.0			
Italy	181.5	216.7	226.4	227.1	215.4	204.0			
Latvia	2.4	2.7	2.8	2.9	2.9	3.5			
Liechtenstein	0	-	-	-	-	-			
Lithuania	3.2	3.4	6.0	6.5	6.6	7.6			
Luxembourg	2.2	2.1	2.6	2.7	2.6	2.5			
Malta	-	-	2.0	-	-	2.1			
Netherlands	81.0	82.9	79.9	76.7	80.4	83.8			
Norway	-	19.3	-	-	-	8.0			
Poland	181.1	191.1	209.6	208.6	184.9	201.0			
Portugal	-	29.9	31.2	33.1	36.4	30.5			
Romania†	42.5	55.1	69.6	-	-	73.7			
Slovakia	7.9	8.9	24.5	25.5	25.2	32.5			
Slovenia	8.1	8.9	9.0	8.8	8.7	8.2			
Spain	136.8	163.2	186.6	179.0	181.1	151.0			
Sweden	17.5	20.0	19.0	19.9	19.3	21.1			
UK	231.8	264.9	256.6	251.1	242.4	217.0			
Total	1,693.7	1,904.7	2,164.7	2,027.3	1,978.0	1,926.8			

*Some countries do not strictly average their phase 1 allowances over three years and have correspondingly greater 2006 allocations †Bulgaria and Romania joined the EU in January 2007 **Data is incomplete.

EU 27 GHG emissions by source mn t CO2e 2006 2003 2004 2005 2007 GHG source Energy 4,109 4,106 4,066 4,068 3,999 Industrial processes 401 412 420 417 430 Solvents 13 13 12 13 12 Agriculture 474 473 466 463 462 LULUCF -450 -436 -439 -440 -407 Waste 154 149 146 144 141 Other 0 0 0 0 0 Total (with LULUCF) 4,700 4,717 4,671 4,665 4,638 Total (without LULUCF) 5,150 5,153 5,111 5,104 5,045 — EEA

EU 15 emissions by GHG mn t CO2e									
GHG	2003	2004	2005	2006	2007				
CO2 (incl LULUCF)	3,156	3,190	3,156	3,158	3,126				
CO2 (excl LULUCF)	3,477	3,488	3,459	3,452	3,391				
CH4	331	320	314	309	305				
N2O	313	314	309	295	292				
HFCs	50	50	53	54	57				
PFCs	7	5	4	4	3				
SF6	9	9	9	9	9				
Total (with LULUCF CO2)	3,866	3,888	3,828	3,828	3,793				
Total (without LULUCF CO2)	4,187	4,187	4,122	4,122	4,058				
Total (without LULUCF)	4,180	4,180	4,116	4,116	4,050				
					— EEA				



— European Commission



Annex-1 GHG emi	ssions (excl. LUL	UCF)				mn t CO2e
	1990	2000	2005	2006	2007	±% 2007/base year
Australia	416.2	494.8	524.6	534.5	541.2	30.0
Austria	79.1	81.1	93.3	91.5	88.0	11.3
Belarus*	129.1	69.8	75.6	81.3	80.0	-38.0
Belgium	143.2	147.5	143.8	136.6	131.3	-8.3
Bulgaria*‡	133.7	67.2	70.0	71.9	75.8	-43.3
Canada	591.7	720.9	746.9	718.2	747.0	26.2
Croatia*	31.4	25.8	30.5	30.8	32.4	3.2
Czech Republic*	194.7	149.0	145.6	149.1	150.8	-22.5
Denmark	70.4	69.7	65.5	72.5	68.1	-3.3
Estonia*	41.9	19.2	20.9	19.2	22.0	-47.5
European Community ^	4,232.9	4,107.6	4,141.3	4,115.9	4,052.0	-4.3
Finland	70.9	70.0	69.2	79.9	78.3	10.6
France	565.5	564.1	558.4	546,4	535.8	-5.3
Germany	1,215.2	1,008.1	968.8	980.0	956.1	-21.3
Greece	105.5	131.8	137.6	128.1	131.9	24.9
Hungary*‡	116.4	77.3	80.2	78.8	75.9	-34.8
Iceland	3.4	3.7	3.7	4.2	4.5	31.8
Ireland	55.4	69.1	69.9	69.7	69.2	25.0
Italy	516.3	551.6	579.5	562.9	552.8	7.1
Japan	1,269.6	1,347.6	1,359.9	1,342.1	1,374.3	8.2
Latvia*	26.7	10.1	10.9	11.6	12.1	-54.7
Liechtenstein	0.2	0.3	0.3	0.3	0.2	6.1
Lithuania*	49.1	19.4	22.7	22.8	24.7	-49.6
Luxembourg	13.1	9.5	12.7	13.3	12.9	-1.6
Monaco	0.1	0.1	0.1	0.1	0.1	-9.3
Netherlands	211.9	214.4	212.1	208.5	207.5	-2.1
New Zealand	61.9	70.3	77.2	77.6	75.6	22.1
Norway	49.7	53.5	54.2	53.5	55.1	10.8
Poland*‡	569.5	405.1	399.0	399.3	398.9	-30.0
Portugal	59.3	82.3	85.5	84.7	81.8	38.1
Romania*‡	276.1	138.6	153.7	153.8	152.3	-44.8
Russian Federation*	3,319.3	2,030.4	2,117.8	2,185.9	2,192.8	-33.9
Slovakia*	73.2	47.4	47.9	48.9	47.0	-35.9
Slovenia*‡	20.3	18.8	20.4	20.5	20.7	1.9
Spain	288.1	384.4	440.6	433.1	442.3	53.5
Sweden	71.9	68.3	67.0	66.8	65.4	-9.1
Switzerland	52.7	51.7	53.6	53.2	51.3	-2.7
Turkey†	170.1	280.0	296.6	332.7	372.6	119.1
Ukraine*	926.0	394.6	418.9	436.7	436.0	-52.9
UK	774.1	677.1	656.1	651.4	640.3	-17.3
US	6,084.5	6,965.2	7,082.2	7,006.0	7,107.2	16.8

Note: Negative values mean removals, positive values mean emissions. *A party undergoing the process of transition to a market economy (an EIT party). †Decision 26/CP7 invited parties to recognise the special circumstances of Turkey, which place Turkey in a situation different from that of other parties included in Annex-1 to the convention. ‡ Data for the base year defined by decisions 9/CP2 and 11/CP4 (Bulgaria (1988), Hungary (average of 1985-87), Poland (1988), Romania (1989) and Slovenia (1986)) are used for this party instead of 1990 data. ^ Emission estimates of the European Community are reported separately from those of its member states. — UNFCCC

