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A post-Kyoto climate treaty must include, they say, a ceiling on atmospheric CO₂, emissions targets for all, a global carbon market, and adaptation measures
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[Biggest carbon-burial test will hunt for leaks](#)

The world's largest CO₂ sequestration experiment is underway, with the start of drilling for a 2100-metre well in Australia
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Top UK companies do not declare all carbon emissions

- 19:28 19 February 2007
- NewScientist.com news service
- **Catherine Brahic**

A lack of mandatory standards regulating the way businesses report their greenhouse gas emissions has led to massive underestimation in the UK, according a charity-backed report.

The report, commissioned by Christian Aid, estimates that the 100 largest companies listed on the London Stock Exchange (the FTSE 100) omit about 191.42 million tonnes of carbon dioxide from the figures they report each year. According to the report, taking these "missing millions" into account would mean that worldwide activities of these companies could account for as much as 12% to 15% of global emissions - instead of the current estimate of 2.13%.

Although international standards for reporting greenhouse gas emissions exist, abiding by them remains optional unless a company is part of the European Emissions trading scheme.

Christian Aid found that only 16 of the FTSE 100 companies use internationally agreed standards. Together, these firms reported emitting 285.93 million tonnes of carbon dioxide into the atmosphere through worldwide activities over the past year. Other businesses were found to report only part of their total emissions.

"Most businesses are not obliged to reveal their emissions," a spokesperson for Christian Aid told **New Scientist**. "This makes it very hard to compare like with like." She said that, because one company declares its emissions rigorously, it may seem like it emits more than another company that does not.

Wider footprint

"Our research reveals a truly staggering quantity of unreported carbon dioxide is emitted around the world by the top 100 companies on the London Stock Exchange," said Andrew Pendleton, Christian Aid's senior climate change analyst. He admitted that "we don't even know the extent of the emissions of many of the biggest companies".

Beyond Green, a UK-based sustainable development consulting firm told **New Scientist** that the Christian Aid report "makes a clear and compelling case that we need compulsory, standardised carbon dioxide disclosure organisations and that the wider footprint of the UK's investments and consumption worldwide need to be measured".

"Only then will we be able to quantify the UK's real contribution to global greenhouse gas emissions," Green adds.

The report was published on the same day as a "final draft" of the Intergovernmental Panel on Climate Change's report on global warming was leaked. *The Guardian* reports that the summary will conclude "there is a 50% chance that widespread ice sheet loss may no longer be avoided because of greenhouse gases in the atmosphere".

Researchers, however, emphasise that the report is yet to be finalised. The second chapter of the IPCC's fourth assessment report and its summary will be officially released in April 2007. The first chapter [was released on 2 February](#).

Greenhouse gases hit new high

- 17:16 19 February 2007
- NewScientist.com news service
- **New Scientist Environment and Reuters**

Greenhouse gases widely blamed for causing global warming have climbed to record highs in the atmosphere, an Arctic researcher has revealed.

"Levels are at a new high," said Kim Holmen, research director of the Norwegian Polar Institute, which oversees the Zeppelin measuring station on the Arctic archipelago of Svalbard, about 1200 kilometres (750 miles) from the North Pole.

He said that concentrations of carbon dioxide, the main greenhouse gas, emitted largely by burning fossil fuels in power plants, factories and cars, had risen to 390 parts per million from 388 ppm a year ago.

Levels have hit peaks almost every year in recent decades and are far above 270 ppm level seen before the Industrial Revolution of the 18th century.

Holmen said the increase of 2 ppm from 2006 reflected an accelerating rise in recent years. "When I was young, scientists were talking about 1 ppm rises" every year, he said. "Since 2000, it has been a very rapid rate."

Coal fired

Holmen suggests that the growth of Asian economies, led by China, may be responsible for this steeper rise. By some estimates, China is opening coal-fired power plants at the rate of almost one per week.

Carbon dioxide concentrations peak just before spring in the northern hemisphere, when plants start soaking up the gas as they grow. Southern hemisphere seasons have less effect as there are fewer land masses and plants south of the equator.

The Zeppelin station is run in cooperation with Stockholm University and is one of the main measuring points, along with a station in Hawaii. Scientists say the concentration of CO₂ in the atmosphere is at its highest in at least 650,000 years.

90% chance

In a [report published on 2 February](#), the world's top climate scientists said they were more than 90% certain that human activities, led by burning fossil fuels, were to blame for global warming. That was up from 66% certainty in a previous report published in 2001.

The UN's Intergovernmental Panel on Climate Change said that temperature rises were set to accelerate and could increase by between 1.1°C and 6.4°C 2100, bringing floods to some regions, droughts to others, and rising sea levels.

Apart from emissions caused by burning fossil fuels, scientists say other factors could affect CO₂ levels in future. On one hand, plants may grow more in a warmer world, soaking up more CO₂. But if the soil gets warmer, dead plants and leaves may rot more in winter, releasing more carbon.

Any heating of the oceans may mean less absorption of CO₂, partly because the greater buoyancy of warmer water prevents it from mixing with deeper levels.

Bubble fusion, back with a pop

- 19 February 2007
- NewScientist.com news service

Reports that the bubble had burst for a form of cheap, table-top nuclear fusion may have been premature. Rusi Taleyarkhan, the physicist at the centre of a furore surrounding so-called bubble fusion, was last week cleared of scientific misconduct.

In 2002, Taleyarkhan, then at Oak Ridge National Laboratory in Tennessee and now at Purdue University in West Lafayette, Indiana, published a paper in *Science* claiming that bombarding a solvent with neutrons and sound waves produced tiny bubbles that triggered nuclear fusion reactions. Then in March 2006, Purdue began investigating allegations of misconduct against Taleyarkhan, amid accusations that the evidence of fusion he reported was actually caused by a radioactive isotope of californium.

However, on 7 February, Purdue absolved Taleyarkhan's group of any misconduct. The verdict follows independent verification of Taleyarkhan's results by Edward Forringer of LeTourneau University in Texas and his colleagues last November (*Transactions of the American Nuclear Society*, vol 95, p 736).

Taleyarkhan says he has been "vindicated".

From issue 2591 of New Scientist magazine, 19 February 2007, page 4

Lab-grown replacement teeth fill the gap

- 18:00 18 February 2007
- NewScientist.com news service
- Emma Young and Roxanne Khamsi

Here's something to smile about: a Japanese team has successfully grown replacement teeth and implanted them into the mouths of adult mice, suggesting that a similar technique could replace missing teeth in humans.

Takashi Tsuji at the Tokyo University of Science, Japan, and his colleagues took single-tooth mesenchymal and epithelial cells – the two cell types that develop into a tooth – from mouse embryos. They stimulated these cells to multiply before injecting them into a drop of collagen gel. Within days, the cells formed tooth buds – the early stage of normal tooth formation.

The team then transplanted these tooth buds into cavities left after they had extracted teeth from adult mice. There, they developed into teeth with a normal structure and composition. The engineered teeth also developed a healthy blood supply, and nerve connections.

Previous approaches to regenerating teeth have involved growing them in the kidneys of mice before transplanting them into the mouths of other mice (see [Tooth growing experiments bring smiles](#)).

In situ

“This study represents an important contribution to the field of tooth regeneration” because it demonstrates how teeth can be grown directly in the mouth, says Jeremy Mao, at the Columbia University College of Dental Medicine in New York, US.

But Paul Sharpe at Kings College London, UK, notes that earlier studies have shown alternative methods of regenerating teeth directly in animals' mouths.

He says Tsuji's approach is different from earlier methods because it involves culturing the cells in a collagen gel. But according to Sharpe, the advantage of using such a gel mixture remains unclear.

Since mesenchymal and epithelial cells have the potential to develop into other organs and hair follicles, Tsuji hopes his method could eventually be applied more widely. “We hope to collaborate with dentists and clinicians in various fields to develop artificial organs for people,” he says.

Journal reference: *Nature Methods* (DOI: 10.1038/nmeth1012)

Leading nations find agreement on climate change

- 14:17 16 February 2007
- NewScientist.com news service
- **Catherine Brahic**

There's a climate of change on Capitol Hill. On 14 and 15 February more than 100 legislators and officials from 13 countries met within the walls of the US Senate to discuss the future of international climate policy.

At the close of the meeting they issued a statement setting out the components which they say will be essential for an international agreement on climate change when the Kyoto protocol expires in 2012.

These are:

- An agreed limit beyond which carbon dioxide emissions should not rise – somewhere between 450 and 550 parts per million in the atmosphere. In 2005, atmospheric levels were 379 ppm
- Emissions targets for all countries, according to historical responsibility and development needs. Developed countries must lead, with targets for developing country targets recognising their need for economic growth
- A global carbon market, linking the European emissions trading scheme with [others emerging across the globe](#)
- A focus on research and development, energy efficiency, and means of adapting to the unavoidable effects of climate change

The statement urges the G8 summit in June 2007 to agree on the key elements for a post-Kyoto framework. It calls for global negotiations on this framework to be launched at a UN summit on climate change in December 2007, and to conclude by 2009.

The statement carries no legal weight, but could prove significant because of who has signed it. The US – which refused to sign Kyoto – had strong representation at the forum, including leading US senators and in particular Republican presidential hopeful John McCain.

Crucially, the leading developing economies of Brazil, China, India, Mexico and South Africa were represented. These nations are not obliged to limit their greenhouse gas emissions under Kyoto. Also present were Nicholas Stern, author of an authoritative 2006 [report on the economic impacts of climate change](#), Paul Wolfowitz, president of the World Bank, and the European Union's environment commissioner, Stavros Dimas.

Ready for action

So could this be the embryonic stages of a post-Kyoto global agreement? The signs are pointing in that direction, if a number of high-level political summits scheduled for 2007 also bear fruit.

"People in all nations of the world have moved strongly in the last few months to recognise that this is a problem of great seriousness," says Stern. "There's an increased preparedness to act, both in the reducing of emissions and in adapting to a changing climate. But are they ready to act quickly enough, and will they act in a way that is collaborative across nations and regions? We'll have to find out."

First in line in a series of political summits is the G8, from 6 to 8 June 2007. Angela Merkel, the German chancellor and chair of this meeting has made climate change its priority. Furthermore, Merkel has also announced that a special G8 meeting to discuss the technical issues underlying climate change would be held in May, to pave the way for an agreement at the G8 summit.

If a framework for a new treaty on climate change is agreed by G8 leaders, it could be presented at the annual meeting of the 189 member nations of the UN Framework Convention on Climate Change, in December 2007. The UNFCCC is the body that delivered the Kyoto protocol.

Year's end

The 2006 UNFCCC summit in Nairobi failed to agree on a deadline for reaching an agreement on a post-Kyoto protocol treaty (see [Climate talks fail to set post-Kyoto timetable](#)).

The UNFCCC announced on 14 February that its annual summit will take place in Bali, Indonesia, from 3 to 14 December, together with the annual summit of the parties to the Kyoto protocol.

The Capitol Hill forum was organised by the Global Legislators for a Balanced Environment (GLOBE) and the Alliance of Communicators for Sustainable Development. It is part of the G8+5 Climate Change Dialogue which was launched in 2006 to "provide a forum for legislators, senior business leaders and other key decision makers to discuss a 2012 climate change agreement".

Climate Change - *Want to know more about global warming - the science, impacts and political debate? Visit our continually updated [special report](#).*

Biggest carbon-burial test will hunt for leaks

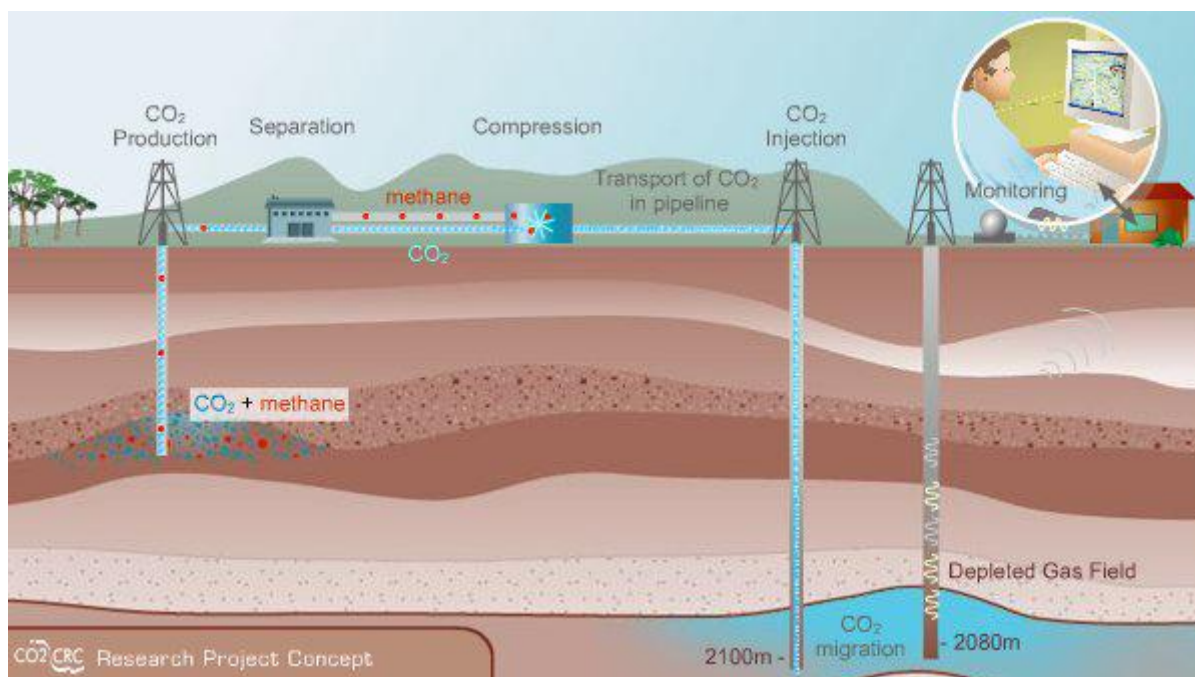
- 12:15 16 February 2007
- NewScientist.com news service
- **Rachel Nowak, Melbourne**

The largest carbon burial experiment in the world began in earnest on Thursday when the drilling of a 2100-metre well began in the Otway Basin, on the coast of southern Australia. The project promised the most comprehensive monitoring for leaks to date.

If all goes well, researchers from the Canberra-based Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) will start injecting carbon dioxide into the new well in July. They will start by extracting CO₂ from a nearby natural geological reservoir and compressing it into a "supercritical fluid" – a gas-liquid hybrid. This will be injected via the new well into a sandstone reservoir (this [animated graphic demonstrates the process](#)).

The reservoir is shaped like an upside-down saucer that is partially-filled with methane gas, and covered by a series of impermeable rock layers. Over the following six to nine months, 100,000 tonnes of supercritical CO₂ will be injected.

"We plan to demonstrate that the CO₂ will move into the reservoir as predicted," says Kevin Dodds of CO2CRC and CSIRO Petroleum in Perth. The Otway Basin Pilot Project will also be the most intensely monitored carbon burial project so far in the hopes of demonstrating that CO₂ can be safely and securely kept underground.



CO₂ from a nearby natural geological reservoir will be compressed it into a "supercritical fluid" before being pumped down the well – see link in story for animated version of this graphic (Image: CO2CRC)

Green light

"We're not going to [use carbon burial] unless my Dad and yours believe that it's going to work," says geologist of Susan Hovorka, at the University of Texas at Austin, US. "We need to lay our cards face up, and let the public know what is going on down there. Otway should be a good opportunity to do this." Hovorka leads a team running the Frio Brine carbon burial experiment in Texas, and was a member of the team that reviewed the Otway Basin Project for the International Energy Agency.

Carbon burial – or geosequestration – is one of several techniques being developed to reduce the amount of CO₂ released into the atmosphere when coal, oil, or gas are burned (see also [\\$25 million prize for](#)

[greenhouse gas removal](#)). The gas, which causes global warming, would be captured from power plants and then stored underground.

The idea received a significant legal boost on 10 February when an international law came into force allowing the greenhouse gas to be buried beneath the sea floor (see [Green light for carbon burial](#)).

Flushing out

Currently, there are several commercial carbon burial projects around the world. The biggest, in the [North Sea's Sleipner gas field](#), stores one million tons of CO₂ each year in an underground sandstone formation.

Sleipner saves Norwegian oil company Statoil carbon taxes, and cuts Norway's annual output of greenhouse gases. But the aim of most commercial projects is to use CO₂ to push out more oil, rather than to find a way of reducing greenhouse gas emissions, and monitoring for leakage is minimal.

In contrast, the Otway Basin experiment involves intensive monitoring of levels of CO₂ in soil, water and air. The project includes adding tracers to the injected CO₂ to enable researchers to identify whether the detected gas is from vegetation, natural underground sources or from the CO₂ store, says David Etheridge, an atmospheric scientist at CSIRO in Aspendale near Melbourne, Australia.

Clean fresh air

The location of the Otway Basin Project is an advantage because air measurements can be made while prevailing winds bring clean air from the Southern Ocean, uncontaminated by industrial or natural sources of CO₂.

"There is no CO₂ source out there. It's a lot different to what you have in Texas with CO₂ sources all around from off-shore oil and drilling, shipping and cities," says Hovorka.

Carbon burial is mostly needed for coal-fired power stations, which account for about a quarter of global CO₂ emissions, but obstacles beyond remain to be overcome. These include reducing the cost of the technologies that capture CO₂ from power stations, and testing a variety of geological sites for their suitability for carbon burial.

Peter Cook, CO2CRC chief executive, adds: "We need a policy and pricing environment that will encourage people to use the technology."

MySpace-style websites perfect for disaster survival

- 19:00 15 February 2007
- NewScientist.com news service
- Celeste Biever

Dialling emergency services when a major disaster strikes is a typical first response. Now US computer scientists are recommending useful follow-up: logging on to a social networking site, such as MySpace, to share information and survival tips.

A bird flu outbreak among humans or a major earthquake will leave emergency call centres quickly overwhelmed, say Ben Shneiderman and Jennifer Preece at the University of Maryland, US. They came up with the idea of creating a web-based emergency alternative, along similar lines to social networking sites MySpace, Wikipedia and YouTube.

Citizens would use PCs or cellphones to access the site and receive vital updates from the authorities while also sharing information with one another.

This kind of "many-to-many" information exchange, which might include sharing photos and video clips, could be at least as valuable as an emergency call centre or a radio or TV-based alert system.

"The web is a very effective way of disseminating information," Shneiderman notes. "There seems to be a remarkable effort from people to provide information and develop relationships in the electronic environment."

Emerging emergencies

Shneiderman has applied for a grant to build a web-based emergency social network for his university campus. The idea is for participants to register beforehand and access the site should disaster strike.

"The current success stories from social networks are so provocative that it is worth giving it a try," says Shneiderman. "We have an opportunity to engage these emerging technologies for social benefit."

A number of web-based emergency systems already exist, like the Department of Homeland Security's Information Network in the US and the Emergency Response Grid in Europe.

Tough sell?

Shneiderman says these existing systems focus primarily on sharing information, support and communication between professionals. "There is a great deal to be done on the side of the resident," he says.

B. J. Fogg at Stanford University in Palo Alto, California, US, describes the idea as "super-interesting" but says it could be necessary to employ moderators – or "credibility filters" – to ensure information is pertinent.

Fogg adds that it may be more practical to make use existing social networking sites, such as MySpace or Facebook, rather than requiring people to register with a new site altogether. "To get people to do a new social network is going to be a tough sell," he believes.

Journal reference: *Science* (vol 315, p 944)

Expert Guide

[Instant Expert: Climate Change](#)

Climate change is with us. A decade ago, it was conjecture. Now the future is unfolding before our eyes. Canada's [Inuit](#) see it in disappearing [Arctic ice](#) and [permafrost](#). The shantytown dwellers of Latin America and Southern Asia see it in lethal storms and floods. [Europeans](#) see it in [disappearing glaciers](#), [forest fires](#) and [fatal heat waves](#).

Scientists see it in [tree rings](#), [ancient coral](#) and bubbles trapped in [ice cores](#). These reveal that the world has not been as warm as it is now for a millennium or more. The three [warmest years](#) on record have all occurred since 1998; 19 of the warmest 20 since 1980. And Earth has probably never warmed as fast as in the past 30 years - a period when natural influences on global temperatures, such as [solar cycles](#) and [volcanoes](#) should have cooled us down. Studies of the [thermal inertia](#) of the oceans suggest that there is more warming in the pipeline.

Climatologists reporting for the UN [Intergovernmental Panel on Climate Change](#) (IPCC) say we are seeing global warming [caused by human activities](#) and there are [growing fears](#) of feedbacks that will [accelerate](#) this warming.



[Sun's fickle heart may leave us cold](#)

The Sun's brightness rises and falls on timescales of around 100,000 years - in time with Earth's ice ages

News - 25 January 2007

- [First claim for CO₂ prize](#) 

Entrepreneur Richard Branson's offer of \$25 million for a cost-effective technology to remove carbon dioxide from the atmosphere has got people moving (News - 17 February 2007)

- [Carbon cut will mean cleaner cars](#)

European cars will have to be cleaner after 2012 under stringent new carbon dioxide emission standards (News - 10 February 2007)

First claim for CO₂ prize

- 17 February 2007
- Magazine issue 2591

There's nothing like a prize to get people going. Entrepreneur Richard Branson's offer last week of \$25 million for a cost-effective technology to remove carbon dioxide from the atmosphere already has its first claimant. Hotfooting it from Australia, Ian Jones of the Ocean Technology Group at the University of Sydney is headed for London to make his pitch.

Jones's claim to the prize is his "ocean nourishment" project, which is a land-based fertiliser factory attached to a marine pipeline. It will make urea and feed it into the ocean to boost the growth of photosynthetic plankton. The growing plankton will absorb CO₂ from the water, ultimately drawing it out of the atmosphere. The CO₂ generated in manufacturing urea will be more than offset by that assimilated by the plankton. "Eventually the plankton are either eaten by fish or fall to the ocean floor," Jones says.

Jones unveiled his ideas in ...

Carbon cut will mean cleaner cars

- 10 February 2007
- From New Scientist Print Edition.

THE French and Italians are renowned for making stylish ones, the Germans reliable ones, the British for not producing many at all any more. But wherever in Europe they are built, cars will have to be cleaner after 2012 under stringent carbon dioxide emission standards that the European Commission was due to agree on Wednesday.

New cars may emit no more than 130 grams of the greenhouse gas per kilometre. That is 10 grams more than the cap proposed by environment commissioner Stavros Dimas but tougher than the 140 g/km limit that car makers have volunteered to meet by 2009. Average EU car emissions were 162 g/km in 2005.

The new rules come just a week after the commission proposed fuel quality standards that would cut CO₂ emissions by the oil industry by 10 per cent by 2020.

From issue 2590 of New Scientist magazine, 10 February 2007, page 5