Weekly News Update

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Boulder scientists distinguish sources of CO_2 in the air

Boulder scientists have developed a method to determine whether carbon dioxide in the air came from the burning of fossil fuels, such as oil and coal, or from a natural process, such as plant or animal respiration. The results may help scientists better measure the emission rates of carbon dioxide derived from fossil fuels and help policymakers understand how any future regulation of greenhouse gases is working. The key to the new technique -- which was developed by researchers at the National Oceanic and Atmospheric Administration and the University of Colorado -- is the ability to distinguish among different types of carbon in the air. The scientists can now pick out different carbon isotopes -- versions of carbon that have different numbers of neutrons -- in the carbon dioxide. Biological sources of carbon dioxide are rich in an isotope known as carbon-14. But because carbon-14 breaks down relatively quickly, lasting just thousands of years, it's not found in the carbon dioxide emitted from burning fossil fuels, which form over millions of years.

Scientists first measured carbon-14 in the air in the 1980s, but the Boulder scientists were able to reduce the amount of air that's needed to make the measurement, and therefore, make it easier to apply the technique to smaller-sized air samples.

"This permits us to work with much smaller samples that are routinely collected around the world," said Scott Lehman, a CU senior research associate who led the study with another CU researcher, John Miller. "We typically work with 2 liters of air in small glass flasks." The old method required about 15 cubic meters of air to determine the presence of carbon-14. Now, estimates of carbon dioxide emissions are typically made using an "accounting-based approach." For example, if scientists know how much gas has been sold in the United States over a certain time period, they can calculate how much carbon dioxide is released when that gas is burned. The new carbon-14 approach allows scientists to measure what is actually in the atmosphere from all fossil fuel sources. "While the accounting-based approach is probably accurate at global scales, the uncertainties rise for smaller-scale regions," said Miller, also a scientist at NOAA's Earth System Research Laboratory in Boulder. "And as CO_2 emissions targets become more widespread, there may be a greater temptation to underreport. But we'll be able to see through that." For the new study -- published in the Journal of Geophysical Research: Atmospheres -- the researchers used air samples that were collected every two weeks by aircraft over a six-year period in the northeastern United States. Besides measuring the carbon-14 present, the researchers also measured other gases found in the sample. Because the emissions of some gases are regulated, scientists can find out how much is being released in any particular area. When they compare the total amount they know was released to the amount measured, they come up with a ratio that they can then use to figure out the total amount of carbon dioxide that was also released in the same area. Knowing the total amount of carbon dioxide that's in the air from fossil fuels can, in turn, help scientists create a baseline record of carbon dioxide that can be used in the future to evaluate methods of reducing greenhouse gases. "It's hard to regulate gases if emissions are imperfectly known," Lehman said. "We need this baseline." Measuring other gases in the samples also led to another discovery: Some gases that were outlawed in the Montreal Protocol because of their negative impact on the ozone layer are still being emitted. "That's not the kind of thing you see in bottom-up inventories," Lehman said. Lehman said the researchers' next step is to expand the testing of carbon dioxide and other gases to locations around the country. "The initial goal is to do this more thoroughly in the U.S.," he said.

US government issues rules on fracking

The US government has released rules on fracking , which mean that, from 2015, oil and gas companies will be required to capture methane and other pollutant gases that are byproducts of the process. The FT reports that this will involve pumping a mixture of water and chemicals at high pressure to crack the surface of rock formations. The guidelines, issued by the Environmental Protection Agency, represent the first federal clean air standards for fracking, the technology that has underpinned the breakneck growth of the shale oil and gas sector and holds out the hope of eventual energy independence for the US. But they grant energy companies more than two years to meet the new standards.

"[These standards are] an important step toward tapping future energy supplies without exposing American families and children to dangerous health threats in the air they breathe," said Lisa Jackson, EPA administrator. Oil and gas companies will be required to use "green completion" technologies

when fracking new wells, which the EPA said should lead to the capture of up to 95 per cent of the gas emissions vented into the atmosphere at wells where they are not yet in use. The gas could then be made available for sale or use in other industrial processes. The EPA estimates that half of all fracked oil and gas wells already comply with the new rules.

University Start-Up to Generate Power with Stored CO_2

A spin-off company from University of Minnesota is commercializing a process for generating electricity with geothermal energy from stored carbon dioxide captured at coal-fired power plants. Heat Mining Company LLC, in Rapid City, South Dakota, is based on a technology invented by Minnesota faculty Martin Saar (earth science) and Thomas Kuehn (engineering), and earth science postdoc Jimmy Randolph.

Heat Mining plans to generate electric power with heat extracted from underground, but with sequestered carbon dioxide instead of water as is normally done with geothermal power. The use of carbon dioxide (CO_2) rather than water, says the company, allows electricity to be provided from many more sites than would be possible with conventional water-based systems and does it more economically.

Heat Mining calls its process CO_2 plume geothermal (CPG) technology and says it's an attractive solution for conventional power plants based on fossil fuels. In this technology, the CO_2 is permanently stored underground, rather than emitted into the atmosphere, where it contributes to greenhouse gases. The geothermal power facility can produce baseload power or provide peak-load power and thus also serve as a type of high-efficiency back-up power source for intermittently available wind or solar power.

China leading global efforts on clean coal

China is come a step closer to capturing and storing its carbon emissions with the launch of the GreenGen coal gasification plant in Tianjin, according to a report in Nature.

Carbon capture and storage was highlighted by the leaders of the G8 group of nations in 2008, when they called for the development of 20 large-scale projects demonstrating carbon capture technologies by 2010. But with the exception of a few initiatives in Australia, Europe and the United States, many plans been delayed or cancelled.

As a result, even though the state-owned Huaneng Group's GreenGen project is more than a year behind schedule, its progress means that China is leading global efforts to exploit coal resources without releasing carbon dioxide.

The first phase of the US$1.5 billion project is a 250-megawatt power plant that will convert coal into a mixture of carbon monoxide and hydrogen to produce electricity. Separating carbon dioxide from the waste outputs of such plants is easier than in conventional plants. It is due to be fired up during the northern hemisphere Spring.

CO_2 capture and storage can help Ukraine ensure its independent energy future

The Bellona Foundation and its local partner in Ukraine Centre for CSR Development have started creating a CCS ROADMAP FOR UKRAINE.

"We are excited about the prospects of studying the options for CCS deployment in the Ukraine", says Paal Frisvold, chairman of Bellona Europe.

Carbon capture and storage (CCS) is the new tool for combating global warming. CCS refers to technology attempting to prevent release of large quantities of CO_2 into the atmosphere from fossil fuel use in power generation and other industries. Storage of CO_2 takes place deep underground in special geological formations where the CO_2 remains safely deposited.

WRI launches new CCS regulatory matrix

WRI has recently launched a new online tool that compares Carbon Capture and Storage (CCS) regulations, standards, and best practice guidelines.

Industry has been exploring CCS as an option to reduce greenhouse gas emissions from power plants for several years, but so far it remains at a demonstration level. To reach the next stage of deployment, it must be tried at scale on different types of power or other industrial plants, and in different geographic regions using suitable geologic reservoirs. Currently, there are 74 projects in process, of which only eight are operational, according to the Global CCS Institute. With a lack of strong carbon policies, along with a range of other issues outlined below, CCS has lost momentum in recent years and demonstration projects are proving hard to see through.

Queensland's Callide Power Plant Now Firing With Retrofitted CCS Technology, an Industrial Info News Alert

A 700-megawatt (MW) coal-fired power plant in Queensland, Australia, is now firing with retrofitted carbon capture and storage (CCS) technology. CS Energy Limited (Brisbane, Australia), a state-owned company and leading generator of electricity, has modified one of the six steam boilers at its Callide Power Plant to use the oxy-fuel method of CCS. Work on the Callide A4 unit began in 2008, and now the exhaust gases from the 30-megawatt (MW) boiler are captured and burned in an atmosphere of pure oxygen. As a result, the output consists almost entirely of carbon dioxide (CO_2), allowing for easier CO_2 capture. Air Liquide (PINK:AIQUY) was selected to supply and build the 660-tonne-per-day oxygen plant and the CO_2 capture plant.

Senate Panel Keeps Carbon Capture & Sequestration Bill Alive

The Senate Environmental Quality Committee advanced legislation aimed at establishing a regulatory system for carbon capture and sequestration plants in California by a 6-0 vote April 16. As a condition of approval, however, bill author Sen. Michael Rubio (D-East Bakersfield) agreed to substantively amend SB 1139 in the coming month.

"I'm not sure we can expect a good result from regulation," said panel chair Sen. Joe Simitian (D-Palo Alto), unless the bill outlines goals for what the rules should achieve.

Public Administration Select Committee Report – 'Strategic thinking in Government: Without National Strategy, can viable Government strategy emerge?'

The recommendation from the Public Administration Select Committee is that Government produces an annual National Strategy that considers long term ambitions as opposed to the current short-term 'patch-and-mend' approach as it has been termed in the papers.

Some key points are:

"We do not consider that the process of strategic thinking in Government currently reflects a virtuous circle of emergent strategy. We have little confidence that Government policies are informed by a clear, coherent strategic approach, itself informed by a coherent assessment of the public's aspirations and their perceptions of the national interest"
"Policy decisions are made for short-term reasons, little reflecting the longer-term interest of the nation. This has led to mistakes which are becoming evident in such areas such as …energy (electricity generation and renewables) and climate change…"

"We invite the government to publish an annual 'Statement of National Strategy' in Parliament which reflects the interests of all parts of the UK and the devolved policy agendas. This would be a snapshot of how National Strategy has developed providing an opportunity for reassessment and debate about how tax and spending decisions support the Government's national strategic aims. If published in late spring or early summer, this would mark the start of the new spending round."

Continued overleaf.

House of Commons
Public Administration Select Committee
Strategic thinking in Government: without
National Strategy, can viable Government strategy emerge?
Twenty Fourth Report of Session 2010–12
Volume I: Report, together with formal minutes, oral and written evidence Additional written evidence is contained in Volume II, available on the Committee website
http://www.publications.parliament.uk/pa/cm201012/cmselect/cmpubadm/1625/1625.pdf

Leaders gather to discuss Saskatchewan's carbon capture future

Leaders from government, industry and academia are gathering today in Regina to discuss the future economic potential of Carbon Capture and Storage in Saskatchewan. The meeting, hosted by the International Performance Assessment Centre for Geologic Storage of CO_2 (IPAC-CO2) and the Integrated CO_2 Network (ICO2N), aims to forge a thoughtful vision for potential CCS infrastructure and economic development in the province.

"Carbon Capture and Storage (CCS) is a crucial technology for developing Canada's vast fossil fuel resources sustainably and ensuring a vibrant economy for years to come," says Robert Craig, Director of Strategy and Technology for ICO_2N. "There is recognition that Canada is a world leader in CCS technology. Planning for the future will only help to secure our position as an innovator."

UK allocates up to £60m to support development of CCS in emerging markets

Climate Change Minister Greg Barker today announced the allocation of up to £60m ($96m) to support the development of Carbon Capture and Storage (CCS) technology in emerging markets.

The Carbon Capture, Use and Storage (CCUS) Action Group recommended that $200m is allocated internationally to accelerate the deployment of CCS in the near term, (the £60m is the UK's contribution towards this).

Research highlights key challenges for the Government`s new CCS strategy

Government plans to develop carbon capture and storage (CCS) technologies to reduce carbon emissions received a cautious welcome today. A new report concluded that most of the uncertainties facing these technologies can - in principle - be resolved.

Carbon capture and storage: realising the potential? is the culmination of a two-year project funded by the UK Energy Research Centre (UKERC). The report assesses the technical, economic, financial and social uncertainties facing CCS technologies, and analyses the role they could play in achieving UK energy policy goals. Its publication today follows the announcement earlier this month of a new long-term strategy for CCS by the Department of Energy and Climate Change, including the re-launch of the UK's £1 billion competition to develop commercial scale CCS projects.

Carbon capture and storage system operating in Australia

Air Liquide was chosen to supply and build a carbon capture and storage (CCS) system at a 700 MW coal-fired power plant in Queensland, Australia.

Australia's state owned electricity generator, CS Energy Limited, has modified one of the six steam boilers at its Callide Power Plant to use the oxy-fuel method of CCS. Work at the plant began at the A4 unit in 2008 and now the exhaust gases from the 30 MW boiler are being captured and burned in an atmosphere of pure oxygen. As a result, the output consists almost entirely of carbon dioxide for capture.

UK's David Cameron sees North Sea as green energy hub

Britain's North Sea has the potential to lead the world in offshore wind and carbon capture and storage technology, British Prime Minister David Cameron said as over

20 companies signed a deal to turn the region into a major renewable energy hub.

Major utilities such as Britain's Scottish Power and Norway's Statoil, manufacturers ranging from Siemens to Gamesa and supply chain companies are supporting a plan to develop the offshore wind potential of the North Sea, provisionally named Norstec.

Further details about the operations of the network will be revealed at an offshore wind conference in London in June.

"This [will] make the North Sea again a source of investment ... [It] has the potential to lead the world in offshore wind and carbon capture and storage," Cameron told ministers from 23 countries attending a two-day clean energy summit in London yesterday. The Crown Estate, which manages Queen Elizabeth's property holdings, also said it would explore whether offshore wind test sites can be set up in even deeper water, which could open up the energy potential of more of the North Sea.

Alberta's carbon capture efforts set back

The three major companies involved in a project aimed at reducing Alberta's carbon footprint have dropped out, striking a major blow to the province's efforts to combat fierce international criticism over oil sands emissions.

The project, dubbed Pioneer and tied to TransAlta's Keephills 3 coal-fired power plant, would have accounted for about 20 per cent of Alberta's total carbon dioxide emissions reduction target by 2015.

Pioneer's failure highlights the ineffectiveness of carbon pricing in Alberta, as well as problems with regulations tied to power plants. It also comes as a hit to the province's public relations campaign, which leans heavily on its $2-billion CCS technology fund and provincial carbon tax as evidence it is committed to cleaning up the environment.