

CCS: why the high hopes cannot be fulfilled

Jeffrey Michel

The only way to stimulate investment in industry while staying in line with CO₂ reduction targets is to end coal plant construction in favour of renewable energies, argues independent energy consultant Jeffrey Michel. Carbon capture and storage (CCS) is just not going to deliver the goods. It is too costly and too risky.

Photo: carbon dioxide sequestered in basalt (PNNL)

Newly constructed coal powered plants in the EU could still be operating in 2050, even though an 80 percent CO₂ reduction has been targeted for that time referred to 1990. Rather than phasing out fossil fuels, however, the European Commission is resolved to “decarbonise” power stations and heavy industry using carbon capture and storage (CCS).

This technology is regarded essential for limiting global warming to 2°C if coal dependency is not abandoned. Yet the decarbonisation objective must be implemented worldwide, since Europe is responsible for only 11% of all CO₂ emissions.

Estimates of the International Energy Agency (IEA) indicate that equipping 3,400 power plants and industrial facilities with CCS could provide 19% of the total CO₂ avoidance required by 2050. This option is actually available only until 2030, however, since the maximum two-degree 1,000 billion tonne CO₂ budget calculated by the Zürich Technical Institute (ETH) for 2000 – 2050 would be exceeded by that time on the current emissions trajectory. The necessary pace of implementation translates to a new CCS power plant or factory built every two days over the next 18 years. Adequate geological and logistical prerequisites for CO₂ storage remain highly questionable at the scale required.

This perspective also neglects over 1,100 coal power plants counted by the World Resources Institute that are currently being designed or built without CO₂ capture. Three quarters of the projects are located in China and India, where the absence of economic justification precludes CCS implementation.

No rationale

In a report presented in April 2013 to the “Clean Energy Ministerial” (governments representing 80% of global CO₂ emissions), the IEA has conceded that there are now only 13 large-scale CCS demonstration projects worldwide, and not one commercial plant with carbon dioxide separation.

The prospects for CCS are impeded in North America by inexpensive natural gas with inherently low CO₂ emissions. In Europe, renewable energies are narrowing profit margins for coal generation. CCS is additionally burdened by high equipment costs and incalculable risks. The CO₂ forced into deep sandstone formations must overcome the fluid resistance of native brine formations. Wide-area subterranean pressurization may cause earth tremors or extrude saltwater through geological faults into overlying freshwater aquifers.

The Swedish state power corporation Vattenfall forecast in 2001 that an “avoidance cost for a whole system” of “about 30 €/ton of CO₂” could ultimately be achieved. CCS investments were to be offset by the EU Emissions Trading Scheme (ETS), affirmed by Directive 2009/29/EC to be “a predictable path” for controlling emissions. However, the IEA has since estimated CCS costs of 50 – 65 \$US/tCO₂ by 2030 for coal combustion and up to \$90 for gas-fired power plants. By contrast, ETS prices are languishing below €5/tCO₂. The European Commission concluded on March 27, 2013, that at “current ETS prices well below €40/tCO₂, and without any other legal constraint or incentive, there is no rationale for economic operators to invest in CCS”.

More cost-effective

The Earth's atmosphere will thus remain a no-charge CO₂ repository unless alternative decarbonisation strategies can be implemented. Yet carbon taxes imposed for this purpose would restrict the development of EU energy-intensive industries, many of which are proving more cost-effective in North America due to abundant shale gas and oil.

On October 10, 2012, the Commission responded to this challenge by announcing "a number of priority actions to stimulate investments in new technologies" for bringing industry back to Europe. However, the only way to promote this objective in line with CO₂ reduction targets will be to discontinue coal plant construction in favor of renewable energies. Continuing on a CCS path would raise the cost of doing business in the EU and obstruct the progress of sustainable global decarbonisation.

Jeffrey Michel (jeffrey.michel@gmx.net) is an independent energy consultant based in Hamburg, Germany. Michel, a graduate from MIT in the US, has recently written an extensive report on the problems facing CCS for the Air Pollution & Climate Secretariat in Sweden, called [Lost Hopes for CCS](#). He is also currently conducting seminars on fracking in Hamburg, where ExxonMobil has been granted a preliminary permit to explore for shale gas.

*In March of this year, the European Commission launched a consultative communication on the future of Carbon Capture and Storage (CCS) under the title *Clean Coal Technologies*. We will have more on this shortly by our Brussels correspondent *Sorja van Renssen*.*