Export Credit Agencies: Carbon capture and storage, coal and policy implications

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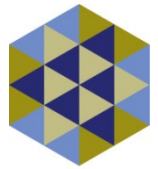
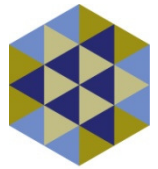
Paris, 18 November 2014

About E3G



- E3G is an influential environmental thinktank. We are an independent organisation working to accelerate the transition to sustainable development. Offices in London, Brussels, Berlin, Washington DC + presence in China, South Africa, Latin America.
- Focus on climate and energy: our work cuts across politics, diplomacy, strategy development, policy analysis and advocacy.
- Areas of relevant expertise include: Emissions Performance Standards (UK, EIB, EU), creation of UK's Green Investment Bank, International Climate Finance, Electricity Market Reform, CCS.
- Member of both ZEP (European Technology Platform for Zero Emission Fossil Fuel Power Plants) and International Environmental NGO Network on CCS.
- Chris Littlecott also Policy Research Associate with Scottish Carbon Capture and Storage, and a past UK Board Member and Vice President of European Environmental Bureau.

CCS is not just about coal



- All too often, Carbon Capture and Storage (CCS) is portrayed as just being about coal use in power generation. This is not the case.
- CCS is a category not a thing: 'CCS' refers to a family of technologies that can be applied on different sources of CO2, created by different processes, sourced from different fuels and linked to different forms of CO2 transportation and geological storage / use.
- In a carbon-constrained world, the most valuable forms of CCS will be in respect to use for 'negative emissions' to stabilise atmospheric concentrations of CO2 and to decarbonise industrial processes: iron and steel, cement, chemicals, refining etc. Many industries require CO2 during production process – can't just switch to electricity. CCS enables job retention, reduced costs and added value via industrial clusters.
- CCS on power generation is one of a number of low-carbon options. It can play a valuable role, particularly in respect to energy security and flexible capacity. But must move forward faster than current efforts.

CCS is real

- CCS widely used in relation to gas processing. CO2 used for enhanced oil recovery (CO2-EOR) since 1970s, particularly in North America.
- Challenge right now is not the technology, but creating the policy and financial frameworks required to enable a business case.
- Boundary Dam now operating as world's first commercial scale power station since September 2014, others under construction.

Source

Source

CCS in Europe

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- Irony: Europe has talked about climate action, but is lagging on CCS.
- ETS envisaged as instrument, no other deployment policies for CCS.
- 'Public acceptance' problems in some member states, particularly linked to 'figleaf' CCS for continued unabated coal and lignite.
- Economic crisis and poor decisions undermined utilities. Not in a position to deliver CCS, been slowing down efforts.
- ROAD project in Rotterdam still in receipt of EU funding – needs more support to close a financial gap and fit CCS.
- Two projects going forward in UK commercialisation programme:
  - Peterhead in Scotland, Gas, Retrofit of post-combustion to CCGT, CO2 storage in Goldeneye depleted gas field, Shell + SSE
  - Drax in Yorkshire, Coal, New Build Oxfuel unit next to UK's largest power station, CO2 storage in saline formation, Alstom + BOC, Drax
- Not much else – Europe needs a CCS strategy!

CCS in UK

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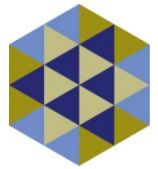
- Back in 2009-2010: UK had firm policy of ‘no new coal without CCS’ [a form of an Emissions Performance Standard (EPS) expressed via permitting requirements] plus a CCS levy legislated to fund 4 CCS projects.
- Resulted in the UK having 7 out of the initial 13 projects bidding for EU support. Later joined by another significant project.
- Showed that the combination of a financial incentive and a regulatory approach to remove high carbon alternatives could start to create a market for CCS deployment.
- Government has now formalised an EPS of 450gm/kWh. Not enough, but good to have it in place as an enforceable regulatory regime.
- But change in government led to CCS levy being withdrawn, and CCS ‘integrated’ into Electricity Market Reform on equivalent basis with Renewables and Nuclear. Policy changes killed off / delayed a number of projects – will now look at 2 in more detail.

UK: Don Valley Power Project



- 2Co Energy project (ex BP Rio Tinto joint venture 'Hydrogen Energy').
- ~800MW pre-combustion coal project, proposed with aim of developing CO2-EOR in North Sea.
- Received €180m EU EEPR funding – used to develop pipeline route and CO2 storage option now being used by White Rose project.
- Was top ranked in initial NER300 process, but not selected under UK competition – scale of investment seen as too big for UK programme.
- Technology: Shell gasifer, GE turbine.
- EPC: Samsung – a fully wrapped, fixed-price, turn-key, bankable deal.
- **+ ECA support: Over £1bn funding via Kexim and K-sure.**

- Project currently in negotiations to sell to Sargas, as 2Co concentrating on CO2-EOR opportunities in USA. Still has €50m of EEPR funding, and prospect of UK Contract for Difference support.

UK: Captain Clean Energy Project

- Summit Power project. ~570MW pre-combustion coal project, co-located with the INEOS Grangemouth oil refinery and petrochemicals facilities.
- Would use existing gas pipeline to create CO2 spine through Scotland, enabling CCS for majority of industrial emitters. CO2 Storage in Captain sandstone (linked to Goldeneye field) and potential for CO2-EOR.
- Technology: Siemens gasifier and turbines.
- At July 2014 meeting with UK Secretary of State Ed Davey in Beijing:
  - HQC affirmed it would lead EPC for CCEP
  - PetroChina (HQC's parent) affirmed its support of CCEP & CO2-EOR
  - **Ex-Im Bank of China affirmed it intends to provide CCEP project debt**
  - Rothschild's Beijing managing director affirmed ability to raise equity
  - PetroChina's refining arm (co-owns Petro Ineos) supported CCEP
  - Potential inbound Chinese capital noted as approximately £3 billion

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- Awaiting access to Contract for Difference to enable investment.

USA: Texas Clean Energy Project

- Summit Power project. ~445MW pre-combustion coal project, located in West Texas for access to CO2-EOR opportunities and existing CO2 pipeline infrastructure.
- Power Purchase agreement with local utility for 200MW power output.
- Poly-generation project: sulphuric acid and urea production from CO2.
- Technology: Siemens gasifier and turbines. Linde acid gas removal.
- Received $450m in US Federal Government support, plus tax credits.
- EPC supplier: China Huanqiu Contracting & Engineering Corp. (HQC)
- **Project finance: Chexim will lend to 85% of EPC contract value.**
- Strategic cooperation between Summit Power and Clean Energy Research Institute (CERI) GreenGen project in China, as part of US-China Strategic and Economic Dialogue.
- TCEP currently finalising update to FEED study, aim to conclude contracts and groundbreaking in April 2015.

USA: Petra Nova, Texas

- Petra Nova: under construction – 240MW post-combustion retrofit to existing plant. JV of NRG Energy & JX Nippon Oil & Gas Exploration.
  - Using Mitsubishi Heavy Industries (MHI) proven capture technology: used at 10 natural gas power plants worldwide, and Alabama pilot project on coal.
  - Financed by a grant of $167 million from the Department of Energy Clean Coal Power Initiative, loans of $250 million from **Japan Bank for International Cooperation** and Mizuho Bank Ltd., and equity contributions from NRG and JX Nippon of about $300 million (including stake in oil field).

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USA: Kemper County, Mississippi

- Kemper County: 582MW IGCC under construction (and had cost overruns). Received US stimulus support, revenues from CO2-EOR and rate payers. Designed with 65% CO2 capture to match emissions rate of natural gas. Uses Southern Company's own gasification technology developed with US DOE, on lignite fuel. Southern actively promoting technology internationally – an opportunity for US Ex-Im support!

Source

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Other USA CCS experience

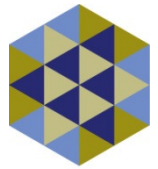
- Hydrogen Energy California: in planning. Plans to use MHI gasification technology for poly-gen plant also producing fertiliser, from Petcoke feedstock. CO2 to be used for EOR. California EPS regulatory driver.
- CCS project on Biomass now operational = negative emissions.
- Extensive CO2 storage mapping through regional partnerships.
- Increasing interest in combination of natural gas + CCS + CO2-EOR.

- Common themes:
  - Government funding helps kick start projects
  - Positive financial revenues via CO2-EOR enable business case
  - Increasing regulatory pressure via US EPA proposals. Companies seeking to anticipate emissions standards.

CCS and ECAs

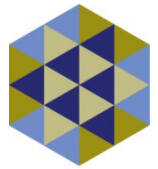
- Real CCS projects exist, with active ECA involvement – mainly from Asia to date.
- High Value projects, multiple partners, opportunities to grow market.
- But deployment of power sector CCS depends on policy drivers and financial incentives, and the exclusion of high-carbon alternatives.
- NRG Energy in 2009 delegation visit to Europe: *We want to build clean power plants including both nuclear and CCS, but as a merchant power company we can't do that if our competitors are building cheaper, dirtier power plants. So we support an EPS to give us a level playing field.*

CCS & Equipment Manufacturers



- Major technology providers all have CCS offers – sometimes several different options.
- But a real spread of public positions on CCS among European companies. Most companies silent. Many burned by lack of progress.
- Alstom willing to put own money where mouth is and back development of White Rose project, following concerted investment in pilot projects.
- Siemens willing to sell technology but been unhelpful on CCS policy matters within Europe. Followed utility approach closely, opposed policies that would drive CCS deployment.

The ‘domestic market’ problem



- E3G is sympathetic to claims that equipment suppliers are suffering due to lack of European demand for power plant technology – we want them to be able to deploy multiple technologies at scale.
- But we don’t agree that the solution to this is to make it easier to construct unabated coal power plants internationally. It appears that manufacturers are seeking easier access to overseas markets due to lack of domestic demand.
- Yet the biggest barrier to a sustainable market for power plant technology is the absence of a CCS deployment effort across OECD members. These countries must take the lead in pulling through CCS to deployment.
- Equipment suppliers would be better off arguing for a phase out of existing subcritical coal units in OECD countries, with incentives put in place to enable CCS to replace (some of) that capacity. This would create a visible and growing market for CCS technology.

Policy Implications

- E3G welcomes fact that CCS is able to access repayment terms up to 18 years under existing ECA rules – this should continue.
- This level of treatment must be reserved for low-carbon options. It would not be acceptable to offer this to unabated coal technologies.
- A static comparison of plant efficiencies misses the cumulative lifetime impacts of investment in new power plants. New metrics required?
- It is not enough to be 'more efficient' – it is now necessary that plants are able to abate CO2 emissions. An ultra-supercritical plant in the wrong location with no CO2 storage is a candidate for asset stranding.
  - OECD countries should require CCS already: "no new coal without CCS". A case could be made for lower income countries to be able to add CCS at a later date once costs have decreased.
  - **But this would require a much stricter definition of 'CCS-readiness' to ensure realistic implementation and pre-investment in CO2 storage and transportation solutions.** (And would also likely need policy hooks to ensure retrofit.)

Conclusions

- ECAs have a legitimate interest in promoting national technological and manufacturing expertise internationally.
- Normally, ECA support can play a helpful role in enabling companies to enter overseas markets, thereby fostering competition and innovation.
- **But the current context is not 'normal': we have a climate crisis.**
- Internationally, we need to build and expand new markets for clean technology options that help to foster deployment, enable cost reduction (via infrastructure economies of scale) and support supply chain growth.
- OECD members have a responsibility to be pathfinders on this – both domestically and internationally. With Paris COP21 a year away, OECD members should be seeking to take aligned actions to build a CCS market at sufficient scale to drive deployment and enable competition. **This will necessarily require action against unabated coal.**
- US-China cooperation (including on CCS) can be a first step on the way.

Many thanks

Contact: chris.littlecott@e3g.org

E3G on CCS: http://www.e3g.org/showcase/carbon-capture-and-storage

Note:

International Environmental NGO network on CCS: http://www.engonetwork.org/

Created in 2011, the ENGO Network on CCS comprises organizations coming together around the safe and effective deployment of CCS as a timely mitigation tool for combating climate change.

Our shared goals agreed in 2011 included: **Work to phase out the construction of new unabated, conventional coal-fired power stations as soon as possible, with CCS playing a part of the solution. In developed countries, no new, conventional coal-fired generation should be constructed without CCS.**