

THE ROLE OF COAL IN THE POST-2012 GREENHOUSE GAS REDUCTION AGREEMENT

International negotiations to build consensus for a post-2012 greenhouse gas (GHG) reduction agreement will have a profound bearing on the world's ability to respond simultaneously and successfully to the challenges of climate change and fulfilling future global energy and economic development needs. The negotiations are occurring against a background of widespread and rapidly increasing coal use that is being driven by the world's rising energy needs. The future use of increasing quantities of coal worldwide is inevitable if the world is to avoid a damaging energy crunch and support the development needs of poorer nations, often richly endowed with coal resources.

The mitigation of CO₂ emissions from current and higher future global energy use, together with aggressive action to promote energy efficiency, will require the deployment of all forms of currently available response including substantial investments in renewable energy and nuclear power.

The new GHG reduction agreement must focus on catalysing the development and deployment of technologies including, but not restricted to, carbon capture and storage (CCS) and best practices that reduce coal related emissions. Failure to achieve the desired reductions will jeopardise the achievement of overall GHG reduction targets and polarise the stark choice for policy makers between reducing greenhouse gas emissions and increasing the economic well-being of citizens through access to secure and affordable sources of energy.

In addition to mitigation efforts, the coal industry will need to adapt to climate change impacts on weather, water and infrastructure so as to ensure it remains a reliable source of energy. Policies to promote knowledge sharing in these fields would be a useful adjunct to any GHG reduction agreement.

The International Energy Agency's Coal Industry Advisory Board (CIAB) is supportive of efforts to reach a successful, ambitious GHG reduction agreement. The CIAB has outlined below the key elements that it believes governments must include in the new agreement if it is to successfully enable the world's use of coal to be compatible with GHG reduction objectives.

- 1. The post-2012 GHG reduction agreement must play a central role in delivering the technologies and best practices, and also the research and development, that enable deep reductions in CO₂ emissions from coal use, while maintaining adequate coal supply.***
- 2. Crediting mechanisms are needed to incentivise the deployment of high-efficiency coal-fired power plants.***
- 3. Significantly increasing investment in the development and deployment of Carbon Capture and Storage (CCS) technology should be an immediate priority and a key goal of the post-2012 climate agreement.***
- 4. CCS must be incorporated into the post-2012 low-carbon technology crediting mechanisms.***

- 5. A CCS deployment fund should be established to demonstrate commercial scale coal-fired power plants with CCS in a variety of developing countries.**
- 6. Mechanisms must be developed to allow the large number of coal fired power plants currently being built in developing countries to be constructed as 'CCS-Ready'.**
- 7. Capacity building and knowledge sharing programmes must be implemented to ensure that the operation and maintenance of plants and adaptation efforts follow international best practice, and that the implementation of CCS projects worldwide can benefit fully from the experience of early investments.**
- 8. Clarity over crediting mechanisms for biomass sequestration and linked financial benefits for forest and eco-system protection and restoration could play a major role in driving additional CO₂ sequestration while contributing significantly to poverty reduction.**

Supporting Material

- 1. The post-2012 GHG reduction agreement must play a central role in delivering the technologies and best practices, and also the research and development, that enable deep reductions in CO₂ emissions from coal use, while maintaining adequate coal supply.**

All major studies that have examined the outlook for world energy demand indicate that the world will remain dependent on the continued use of coal for many decades to come. In many key developing countries coal is essential for the provision of an affordable and reliable electricity supply that underpins economic and social development. The world's coal resource is huge – known reserves alone are large enough to last for over one hundred and twenty years at current production rates - and is located in a large number of countries. Coal provides the world with access to significant quantities of secure energy that is unmatched by any other fuel and can meet the world's growing demand.

Coal is the key fuel for power generation and currently meets 40% of the world's electricity needs.¹ During the period 2000 – 2006, demand for coal rose at 4.9% per annum, which is a faster rate than for any other fuel. Furthermore, projections show that coal use will grow by over 60% from 2006 to 2030. This rising demand will be led by developing countries, which will use 97% of the projected increase to meet their increased electrification needs.² The desire of developing economies to increase the economic well-being of their citizens is understandably strong. At present 25% of the world's population, concentrated in developing countries, does not have access to electricity with a similar proportion only having access to intermittent supplies.

However, coal is the most CO₂ intensive fossil fuel and is responsible for over 40% of all energy related CO₂ emissions.³ Therefore it is clear that greenhouse gas emissions associated with the use of coal must be significantly reduced while maintaining the ability to meet future coal demand. The rapid increase in the global use of coal – particularly in developing countries - requires the new international GHG reduction agreement to play a central role in the demonstration and deployment of the technologies and best practices that can deliver the necessary CO₂ emissions reductions from its use, while ensuring that the framework for these reductions also

¹ OECD/IEA "World Energy Outlook 2008" (2008)

² OECD/IEA "World Energy Outlook 2008" (2008)

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supports adequate investment in the coal sector. Similarly the new agreement must support innovative research and development on other possible uses for carbon, such as biofuel production and biomass sequestration.

Currently, coal mining investment in developed economies is being discouraged by uncertainty over future carbon regulatory regimes and clarity is required.

2. Crediting mechanisms are needed to incentivise the deployment of high-efficiency coal-fired power plants.

Improving the efficiency of both existing and future coal-fired power plants has the potential to generate significant and cost-effective emissions reductions and must be a priority for all coal-using countries. Improving the efficiency of coal-fired power plants by 1% leads to a reduction in CO₂ emissions of 2–3%. Worldwide the average efficiency of coal-fired plants is 28%, compared to 45% for the most efficient plants. Modern, state-of-the-art coal power plants therefore have CO₂ emissions up to 40% lower than the average for all coal plants. Ensuring that all new coal-fired plants are constructed using the most efficient technologies applicable to local conditions combined with the replacement of existing, highly inefficient coal-fired plants can deliver significant global CO₂ reductions and reduce CO₂ emissions from coal by almost 25%, representing a 6% reduction in global CO₂ emissions.⁴

The construction and operation of the most efficient power plants can also drive deeper cuts in future emissions by supporting the installation of Carbon Capture and Geological Storage (CCS) at these plants. Only the most efficient plants will be considered for retrofitting with CCS because they minimise the cost penalty of the significant quantities of energy consumed in capturing, transporting and storing the plant's CO₂.

The new GHG reduction agreement must seek to maximise these supply-side emission reduction opportunities and incorporate highly efficient coal utilisation technologies in low carbon technology deployment mechanisms such as the Clean Development Mechanism, the EU Emissions Trading Scheme and any additional market-based mechanisms. These mechanisms and other incentives (such as tax relief, accelerated depreciation allowances, enhanced allowances for capital relief on innovative research and development) can help address the financial barriers to accelerating deployment of the most efficient plant and so contribute very significantly to emissions reductions.

3. Significantly increasing investment in the development and deployment of Carbon Capture and Storage (CCS) technology should be an immediate priority and a key goal of the post-2012 GHG reduction agreement.

Various studies have reinforced the importance of CCS as a cost-effective and critical component of climate change goals. The Intergovernmental Panel on Climate Change (IPCC) identified CCS as key to stabilising atmospheric greenhouse gas concentrations at lower costs. They found that CCS could contribute up to 55% of the cumulative mitigation effort by 2100 whilst reducing the costs of stabilisation by 30% or more.⁵ The International Energy Agency found that attempting to stabilise emissions without CCS will increase mitigation costs by over 70% resulting in an additional cost of US\$1.28 trillion annually by 2050.⁶

⁴ IEA "Towards a Sustainable Energy Future, IEA programme of work on climate change, clean energy and sustainable development" (2008)

⁵ IPCC "Special Report on Carbon Dioxide Capture and Storage" (2005)

⁶ IEA "Energy Technology Perspectives" (2008)

Despite the acknowledged importance of CCS, current investments in the technology's development and deployment are a small fraction of the amounts needed; and much lower than the investments being made in other low-carbon technologies such as renewable energy. The new climate agreement should seek to redress this situation and play a central role in international efforts to expand the global deployment of CCS, using methods such as:

- the inclusion of CCS under low-carbon technology incentive programmes;
- promotion and recognition of national actions to further develop CCS technologies;
- removal of barriers and clarification of commercial risks that inhibit the deployment of CCS; and
- the establishment of cooperative research and development efforts to further improve global capacity to deploy CCS.

Increased investment in CCS deployment will generate CO₂ emissions reductions and improve the technology's environmental and economic performance, enabling countries to reach future emissions reduction targets at lower cost.

In addition to the investment support required for the deployment of CCS, there are significant infrastructure (pipelines and shipping for CO₂ transport), legal (permitting and access to suitable geological formations) and risk mitigation (insurance, potential liabilities of long term commercial CO₂ storage, public confidence, local acceptance of CO₂ capture and storage projects) challenges that will require active government engagement if they are to be successfully addressed.

4. CCS must be incorporated into the post-2012 low-carbon technology crediting mechanisms.

Industry has the experience and technologies to develop industrial scale CCS projects now. The cost of a CCS project is dependent on the source of the CO₂ and its distance from a suitable storage site. Relatively low-cost CCS projects can be developed where industries would, in the normal course of business, vent high concentration streams of CO₂ to the atmosphere from production facilities (i.e. natural gas processing facilities, fertiliser plants, coal gasification plants, etc) that are sited close to good storage sites. These projects can be incentivised and deployed through the carbon market.

Countries should agree to the inclusion of CCS in the Clean Development Mechanism (CDM) or its successor mechanism as a matter of priority; and establish a process to resolve outstanding issues and enable CCS projects to receive credits that can be traded internationally. The exclusion of CCS from the CDM during the first commitment period of the Kyoto Protocol has resulted in lost opportunities to deploy the technology and is incompatible with international GHG reduction objectives.

The inclusion of CCS in the post-2012 crediting mechanisms will greatly accelerate the global deployment of the technology in the fossil fuel dependent developing countries, where the need to use this technology is most urgent.

5. A CCS deployment fund should be established to demonstrate commercial scale coal-fired power plants with CCS in a variety of developing countries.

Global demand for electricity increased by nearly 25% from 2000 – 2006 and projections to 2030 show future growth trends are set to remain strong.⁷ The world's electricity generation systems are largely dependent on fossil fuels; and coal is the predominant fuel used, generating 40% of electricity while natural gas accounts for another 20%.⁸ Reducing GHG emissions while still relying on fossil fuels for electricity generation requires the large scale deployment of CCS, but CO₂ capture from electricity generating plants incurs significant costs. The first commercial-scale power plants fitted with CCS will cost between US\$80 – 120 per tCO₂ although these costs are expected to decline significantly to US\$40 – 60 per tCO₂ as the CO₂ capture technology improves and multiple plants begin to use common transportation and storage infrastructure.⁹

The construction and operating costs of these first-of-a-kind plants cannot be supported solely through the carbon markets and alternative means of bridging the financing gap are needed. The post-2012 GHG reduction agreement should establish a CCS deployment fund to finance multiple, commercial-scale, coal-fired power plants fitted with CCS in developing countries. The demonstration of power plants fitted with CCS in developing countries will have a number of important benefits, including:

- increased confidence and acceptance of the contribution of CCS to global CO₂ emissions reduction efforts;
- demonstration that fossil-fuel dependent developing countries can contribute to international climate change goals without compromising economic growth;
- achievement of early reductions in CO₂ emissions from the power sector that would otherwise be vented to atmosphere; and
- improving the performance and lowering the cost of CCS, enabling future emission reduction goals to be reached at lower cost.

6. Mechanisms must be developed to allow the large number of coal fired power plants currently being built in developing countries to be constructed as 'CCS-Ready'.

In the coming decades, the increasing electrification requirements of developing countries will result in the construction of large numbers of new coal-fired power plants, with life expectancies of 40 years or more. Significant numbers of these plants will be constructed before CCS is widely deployed and wherever possible they should be constructed as "CCS-Ready" to enable CCS to be retrofitted in the future at least cost. A critical issue is defining what is meant by "CCS Ready" as no common definition is currently available.

It is suggested that "CCS-Ready" requires power plant developers to ensure that no significant barriers exist that would prevent the retrofitting of CCS in the future. At a minimum, plant operators should construct the most efficient new power plants possible, leave additional space at the power plant for the future construction of the CCS facility and undertake an evaluation of routes to transport the CO₂ to suitable geological storage sites. Early consensus amongst both developing and developed countries on an agreed meaning of "CCS Ready" should be sought.

Incorporation of "CCS Readiness" requires additional early investments that do not result in immediate emission reductions and so cannot be financed through conventional carbon markets. However, these early additional investments are needed

⁷ OECD/IEA "World Energy Outlook 2008" (2008)

⁸ OECD/IEA "World Energy Outlook 2008" (2008)

⁹ McKinsey & Company "Carbon Capture & Storage: Assessing the Economics" (2008)

to ensure that developing countries do not lock-in to a high carbon economy for many years to come. The post-2012 GHG reduction agreement should seek to identify innovative options that overcome this investment barrier and enable the incremental CCS-Ready investments to be made.

7. Capacity building and knowledge sharing programmes must be implemented to ensure that the operation and maintenance of plants and adaptation efforts follow international best practice, and that the implementation of CCS projects worldwide can benefit fully from the experience of early investments.

Reducing the emissions from coal requires that countries not only deploy low carbon technologies but that they also have the capacity and knowledge to operate and maintain the technologies, ensuring that the maximum emission reductions are achieved and maintained over time. For example, poor operation and maintenance practices mean that many power plants frequently operate at thermal efficiencies substantially lower than original design efficiencies. Implementing effective operation and maintenance practices enables plant operators to maintain high levels of efficiency and maximise CO₂ emissions reductions.

Adaptation practice to cope with impacts of weather, impacts on water and infrastructure should also follow proven best practice.

CCS specifically uses technologies and skills found in a variety of sectors including the petroleum, power and chemicals sectors. Many of these skills are particularly scarce in developing countries. It is critical that the post-2012 GHG reduction agreement facilitates the capacity building and knowledge sharing programmes that enable countries to develop the skills sets necessary to deploy CCS.

As more countries deploy and operate industrial-scale CCS plant, it is expected that significant technological improvements will result in cost reductions for future CCS projects. It is essential that those developed and developing countries that are concerned with deploying CCS maximize the opportunities to partner in the development of the technologies. The deployment of CCS in developing countries needs to occur in parallel with the deployment of the technology in developed countries if efforts to reduce greenhouse gas emissions are to be successful.

8 *Clarity over crediting mechanisms for biomass sequestration and linked financial benefits for forest and eco-system protection and restoration could play a major role in driving additional CO₂ sequestration while contributing significantly to poverty reduction*

There is an opportunity for the coal industry to contribute to reducing the net GHG contribution from coal production and coal use by offsetting emissions in recognised biomass sequestration projects – such as those with potential for biofuel production. There are further opportunities for emissions offsets in both reforestation and avoided deforestation; and implementation will provide opportunities for many developing country communities to play a role in forest and eco-system protection and restoration by placing a clear economic value on the biomass resource.

The rules and crediting mechanisms for such activities need clarification, and clear government leadership to encourage their application in the post-2012 GHG reduction agreement.