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Coal Financing in Europe: The Banker's Dilemma

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Background and Summary Overview

The European Union (EU) faces great challenges in balancing the demand for a secure and stable supply of electricity with commitments to deep and rapid reductions in greenhouse gas emissions. The future of coal-fired power plants (CFPPs) is at the centre of these conflicts over energy security and climate change. Over recent months, Chatham House has been engaging with leading private European banking institutions to map the landscape of their current policies on investment in coal-fired power plants (CFPPs). Drawing on this research and discussions from a workshop held at Chatham House in September 2011, this paper highlights key policy questions for banks and other financial institutions. Below is a summary of conclusions:

- There is a policy inconsistency between EU and national climate protection commitments (which both require deep emissions reductions), and decisions by the utilities to build more CFPPs (which will inevitably increase emissions and atmospheric concentrations). The underlying risk and reputational issues are of increasing concern, including to investors.
- Despite a marked slowdown of investment in CFPPs in the EU, interest from utilities remains in them as a source for electricity. This particularly applies to the use of soft coal or lignite that is often mined and used locally.
- Considerable new investment is needed in the power sector in Europe to replace retiring capacity and infrastructure and to meet EU environmental legislative requirements.
- Banks are now recognizing the importance of developing specific policies on the financing of CFPPs as a means of informing their clients and the public of their views on the risks and conditions for engaging in the financing of CFPPs.
- A number of private and public sector banks have published policies, and new voluntary-sector policy guidance has been developed under the aegis of The Climate Group. The scope of these includes: the setting of current and future emissions performance standards and efficiency levels, requirements on Carbon Capture and Storage (CCS), the types of financial vehicles covered and the size and status of facilities included.
- There are a number of unresolved issues, including:
    - Uncertainties associated with CCS as its technological and economic viability remains unproven on the commercial-scale;
    - The need for clear standards for retrofitting existing coal stations that balance the efficiency improvements brought by engineering against the longer operation of outdated technology;
    - Efficiency and emissions performance standards for new construction are not linked to (and may conflict with) existing EU emissions targets, especially when the projected operational life of the facilities is taken into consideration;
    - If comparative costs of other sources of energy (e.g. gas or renewables such as wind and solar) continue to fall, the business case for CCS will be increasingly unattractive.
- The direct contribution of private banks to the financing of CFPPs is relatively small, with project financing being of increasingly limited importance. Financing is more often achieved through the issue of bonds, shares or direct company finance. For this reason, further development of finance-sector policy could valuably be broadened to include inputs from shareholders, equity investors and asset managers.
- Globally, the use of coal is increasing, especially in emerging economies. These projects are often financed by global companies and international institutions. Although the prospects for further expansion of CFPP capacity in Europe are relatively weak, how the underlying policy contradictions are ultimately resolved could shape policy behaviour globally.

1. Coal in a Climate of Change

The Cancún Climate Summit in December 2010 agreed 'that climate change is one of the greatest challenges of our time and that all Parties share a vision for long-term cooperative action'.[i] Furthermore, for the first time under the UN framework, it

> further recognize[d] that deep cuts in global greenhouse gas emissions are required according to science, and as documented in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, with a view to reducing global greenhouse gas emissions so as to hold the increase in global average temperature below 2℃ above pre-industrial levels.

In order to meet UN targets, greenhouse gas (GHG) emissions must be cut by about 80% by 2050, which will effectively require a decarbonized energy sector.

The European Union has repeatedly stated that it wants to show global leadership on climate issues and has set itself short- and medium-term targets. In the short term, it has committed itself to cutting its emissions at minimum by 20% from 1990 levels by 2020. In the longer term, a target of an 80% reduction in emissions is envisaged. This will require the virtual decarbonization of the energy sector by then and, significantly earlier, a zero-emissions electricity sector. Coal, the most polluting of the fossil fuels, currently provides 27% of the EU's electricity (of which 11% is from lignite and 16% from hard coal).

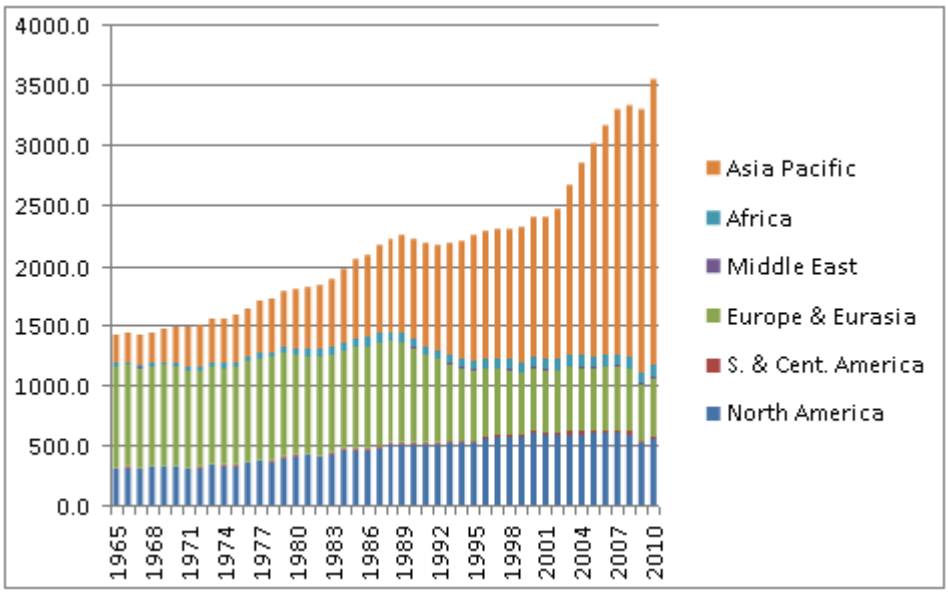
There are also considerable health benefits associated with meeting the EU's climate targets. One assessment indicates that raising the EU target on carbon emission reductions from its current 20% to 30% would prevent 5,300 cases of chronic bronchitis and 2,800 hospitalizations annually by 2020 – consummating annual health savings of up to €25 bn.[ii]

However, many of the coal power stations are due to be retired in the near term in order to meet non CO_2-related emissions performance requirements. In the light of these commitments and contributions, nowhere else in the world does the issue of building new coal-fired power plants (CFPPs) present such significant challenges. For the financiers the key issue is: can or indeed should they attempt to invest in a proven yet CO_2 intensive technology in an increasingly carbon-constrained Europe?

2. The Global Role of Coal

Despite global recognition on the need to act on climate change the use of coal is increasing. As with many other energy- and resource-consuming sectors, most of the growth is in emerging economies. In the case of coal China is truly the world leader in respect of its reserves, production and consumption. In 2010, coal consumption increased globally by 7.6%, – faster than the overall rate of increase in the energy sector as a whole– with China's growth topping 10%. Globally 60% of the increase in electricity demand over the last two decades has been met by coal, with projections that electricity demand will increase by 1.6% per year over the next decades.[iii] Therefore, without a significant change in policy direction, a climatically unsustainable volume of coal will be burned.

Figure 1: Global coal consumption (Mtoe)



Source: BP Statistical Review of World Energy

3. EU Climate and Energy Objectives

At the national level, each EU member state's actions on climate change are largely determined by EU targets and measures for the energy sector. While the overall framework is set by the collective target to reduce GHG emissions by at least 20% by 2020 (with the possibility of increasing this to 30% in the event of an international agreement), the most important short-term policy measures for the electricity and coal sectors include the following:

- *Binding 20% target for the use of renewable energy by 2020:* This will require an estimated threefold increase in the use of renewable energy within the EU. Given the current status of the sectors and technologies, it is anticipated that the electricity sector will see the largest increase, with up to 30% of the EU's electricity needing to come from renewable sources over the coming decade. Achievement of this target is widely recognized to be challenging and foreshadows major and increasing government interventions in the market.

- *Large Combustion Plants Directive (LCPD) and Industrial Emissions Directive (IED):* The revision will have major implications on the demand for coal in the EU and will result in changing the role of coal-fired plants over the next decade and beyond. The requirements of the latest IED for existing facilities mean that by 2016, all major pulverized coal-fired power plants will have to greatly improve flue-gas scrubbing (>90% removal of SO_2 and >85% NOx removal) or face closure.[iv]

- *The European carbon market and the Emissions Trading Scheme:* The EU Emissions Trading Scheme (ETS) is the most ambitious example of large-scale emissions trading in the world. Following an imperfect first phase, where quotas were over-allocated, confidence has grown in Phase II with a tighter cap on emissions (2008–12). In 2010, the European market was worth about $120 bn (€85 bn). The ETS continues to grow in scale and ambition. However, the economic downturn in the EU has led to over allocation of carbon credits and a low carbon price which prevents the scheme from effectively driving technology change.

- *New energy efficiency policy:* The June 2011 directive on energy efficiency aims to bring forward new measures on energy efficiency across the whole of the energy chain, including for utilities, to encourage end-users to cut their energy consumption through efficiency

improvements. The directive has not proposed a mandatory EU target for energy efficiency, however, and it has postponed a requirement for national targets until 2014. A growing body of economic analysis showing that improvements in energy efficiency can be made at negative or marginal additional cost makes efficiency improvements a high government priority;

- *Carbon capture and storage (CCS):* There are a number of directives that affect the development and demonstration of CCS from an environmental and financial perspective. Environmentally the 2009 directive on geological storage of CO_2 sets out the regulatory framework for exploration and storage options, although not all member states have yet to implement it. The 2008 CCS directive provides for €300m in ETS allowances to be used to fund CCS demonstration projects, on top of the €1 bn in new funds available specifically allocated for CCS in the EU stimulus package in November 2008.

It should be noted that even though energy has been included as an area of joint competence for the EU since the Lisbon Treaty, the mix of types of electricity generation remains a decision for member states. This explains why there are considerable differences across the EU on the use of coal, largely (but not solely) determined by the availability of the resource. Box 1 gives example of some of the current policies in member states.

Box 1: A sample of national-level actions

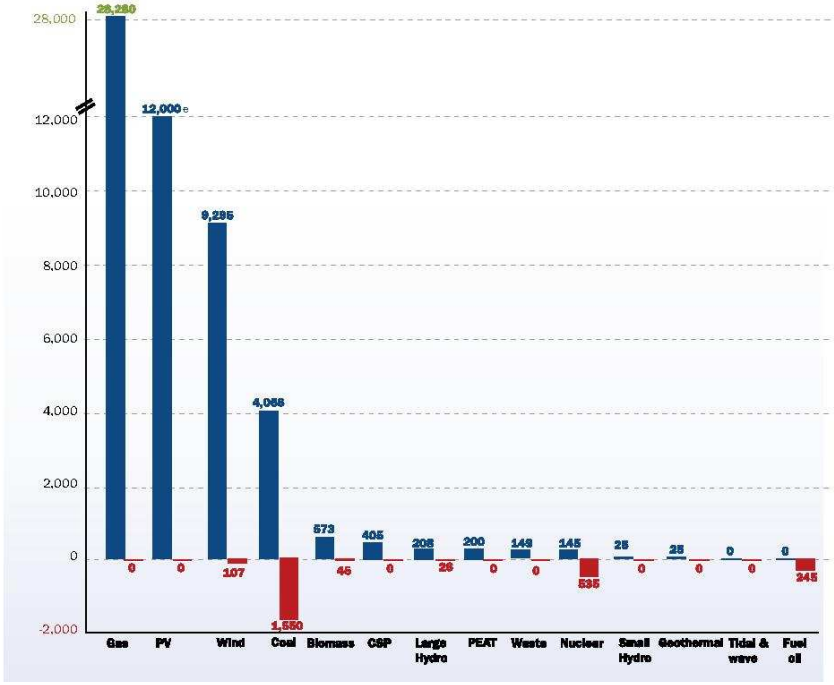
France	Under the LCPD by 2015 any plant that does not meet the emissions standards in the directive will be shut. In 2009, the government passed the Grenelle Law, which requires all new coal-fired plants to be CCS ready.[1]
Italy	In 2009, Italy implemented Law no. 99/2009, which called for the implementation of a new National Energy Strategy. It was expected to promote diversification of energy sources, and a rise in nuclear and renewables. There was strong public opposition to the use of coal (and nuclear) owing to environmental concerns. Electricity production is increasingly likely to be diversified into renewables and natural gas.[2]
Poland	In November 2009, Poland adopted the National Energy Policy up to 2030. The government has committed itself to continuing with domestic anthracite and lignite as primary fuels for electricity generation, arguing that it is cheap and guarantees national energy independence and security. Potential additions to this mix are natural gas plants, some nuclear and, increasingly, wind power. [3]
Sweden	The Swedish government sees climate and energy as being interrelated and inseparable, and has passed numerous regulations to meet EU standards. By 2020 49% of Sweden's total energy must be met by renewables. There is no clear coal policy but its role is very small and declining.[4]
United Kingdom	European legislation required coal-fired power plants to meet more stringent emission limits by 1 January 2008. Because of this, operators in the UK have recently invested about £575m in new abatement plant that reduces sulphur dioxide (SO_2) releases to air. Existing plant for which it is uneconomic to fit new abatement technology may operate until 2016 with limits on the number of hours that they can operate. Out of the current 24.9 Gigawatts (GW) of coal-fired generating capacity, 7.1 GW will therefore be closed. [5] The government has introduced a floor price for carbon that, when introduced in April 2013, will be £16 per tonne of CO_2, rising to £30 by 2020. Notes: [1] International Energy Agency (2009), 'Energy Policies of IEA Countries, France 2009 Review'. http://www.iea.org/textbase/nppdf/free/2009/france2009.pdf [2] International Energy Agency (2009), 'Energy Policies of IEA Countries, Italy 2009 Review'. http://www.iea.org/textbase/nppdf/free/2009/italy2009.pdf

	[3] Bellona (2011), 'Insuring Energy Independence A CCS Roadmap for Poland'. http://www.globalccsinstitute.com/sites/default/files/publication_20110324_ccs-roadmap-poland.pdf [4] Swedish Energy Agency (2009), 'Energy in Sweden in 2010'. http://webbshop.cm.se/System/ViewResource.aspx?p=Energimyndigheten&rl=default:/Resources/Permanent/Static/b4cea7b00212456b9bdbdbe47a009474/ET2010_47w.pdf [5] UK Environment Agency (2011), 'The future of new coal-fired power stations'. http://www.environment-agency.gov.uk/research/library/position/41191.aspx

4. Current Status of the Electricity Sector in Europe

As noted above, if EU climate objectives are to be met, the energy and electricity sectors in Europe must change dramatically through a shift in energy sources and efficiency improvements. Already progress has been made. Figure 2 highlights the extent to which this occurred in 2010 and shows some important new trends.

Figure 2: New installed/decommissioned generating capacity in EU, 2010 (of total 52820 MW)

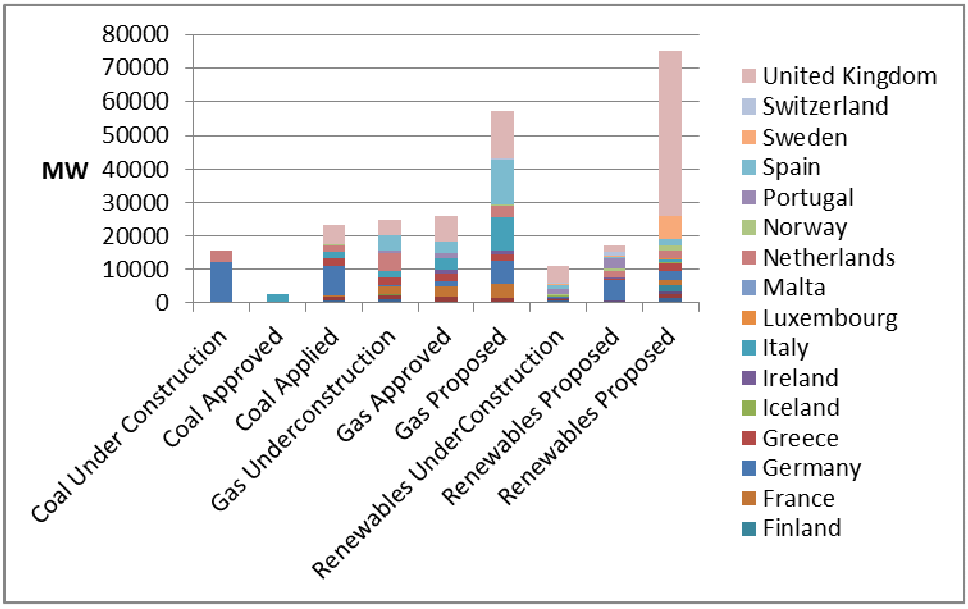


Source: European Wind Energy Association (2011), 'Wind in Power 2010 European Statistics', February.

The dominance of natural gas and renewables in newly installed capacity is expected to continue over the coming decade, in particular as policies are focused towards meeting the 2020 renewable energy target. This trend can be seen particularly in the United Kingdom, where very large offshore wind capacity is being developed. Figure 3 shows the extent of the project pipeline across Western

Europe for the major energy sources. While not all of these projects will ultimately be delivered, these figures demonstrate the intent of utilities.

Figure 3: Power generation project pipeline



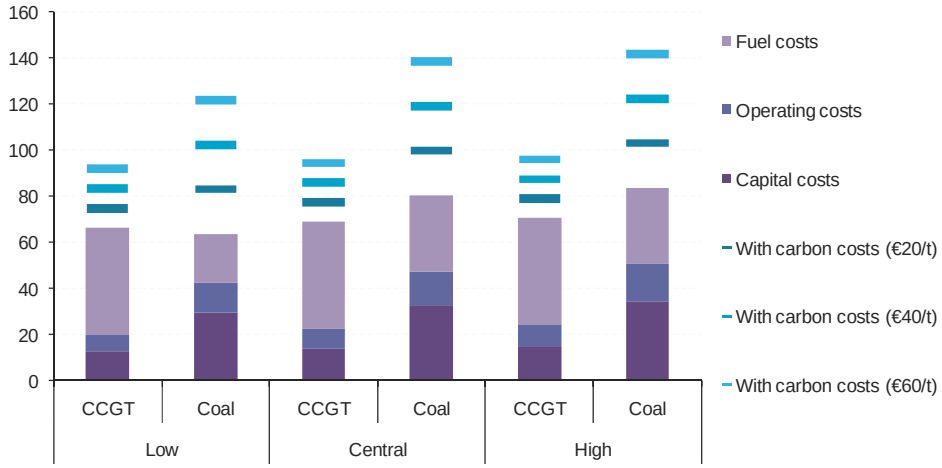
Source: Platts (2011), 'Power Plant Tracker', Power in Europe, May 15th

In the last few years there has been a move away from traditional and usually base-load power plants to the much greater deployment of renewables and natural gas. In particular in the past year there has been a considerable increase in the deployment of *solar photovoltaic (PV)*, largely driven by German domestic policies. 2010 also saw the dominance of new natural gas installations, with a 20 GW increase over 2009, reflecting supply, price and lower pollution considerations[v].

Regarding coal, 2010 marked an increase in net capacity, for only the second time since 1998. However, despite the number of coal stations now under construction (see Annex 1), and considering the EU directive which requires the closure of the most inefficient and polluting coal stations, 2010 is likely to be an anomaly rather than a trend.

One key reason for the changing fortune of coal is the economics of the current market and future projects (particularly as they relate to energy and carbon prices). The analysis below shows that even without a price on carbon, coal is struggling to be competitive with gas, under a variety of operational and construction costs (low, central and high). Therefore higher carbon prices will create a large cost differential between coal and gas. This view is largely supported by recent analysis by the OECD's Nuclear Energy Agency, which concluded that 'even with moderate carbon pricing, coal will struggle to be competitive for new investments at 2005–2010 coal prices'.[vi]

Figure 4: Cost of new build, coal vs gas – levelized cost of energy (€/MWh)



Source: Bloomberg New Energy Finance (2010). 'Emission Performance Standards'

As a result of these conditions across the EU 19 coal power stations (hard coal and lignite) are under construction in six member states (Bulgaria, the Czech Republic, Germany, Italy, the Netherlands and Poland); and even then there are suggestions that construction on some of these has been delayed or suspended (see Annex 1).

In addition to meeting the climate objectives of the EU and member states, the fuel mix of the power sector is expected to change as a result of changes in technological innovation, resource availability, commodity price and other environmental concerns. By and large, fossil fuels, which have traditionally been seen as the source of affordable, secure, and reliable power, are increasingly being seen as problematical. The spectre of a carbon price, rising fuel and operating costs, and their association with climate change and health concerns make them often seem a higher risk option in comparison with renewables.

Questions, for example, remain as to the size of the potential reserve for unconventional gas, which has seen significant development in the United States in recent years, rising in a decade from providing 1% of the consumption to 20% today. This has raised the prospects of and subsequent exploration for non-conventional gas (shale gas) within the EU. Across the Union, there are different views as to the likely viability, acceptance and availability of shale gas, with member states already taking significantly different positions. For example the extraction – or fracking – of shale gas is significantly restricted in France while being encouraged in Poland. However, regardless of the exploitation of domestic non-conventional resources, the global development is affecting global gas prices.

The policy and market response to the events at the Fukushima nuclear power plant in Japan in March 2011 are not yet fully known. However, in some European states a public and policy response is already visible. In Germany, agreement was reached within the government in June 2011, and subsequently approved by the parliament, that its oldest reactors would not reopen and that all of the remaining reactors would be closed by 2022. In Italy, a referendum was held in June on a number of issues including the reintroduction of nuclear power. However, in other countries, nuclear plans are, so far, being developed without significant changes, notwithstanding questions about the final economic costs and disposal options.

Finally, a fundamental question will be how to integrate renewables into the existing electricity grid and management systems. Today's grids were built on the concept of the majority of the power coming from large centralized power stations. However, future EU plans rely on increased contributions from variable, dispersed and decentralized renewable sources. Fully integrating these to maximize their utilization requires a redesign of grid infrastructure, grid management and

payment systems. The future electricity system is also expected to be influenced by a greater emphasis and reliance on energy efficiency and energy saving, greater synchronization between demand and supply, through the use of smart grids and appliances, and the electrification of the heating and cooling and transport sectors.

5. Private-sector Coal-financing Policy Developments in Europe

Research by Chatham House reveals that European banks are already beginning to respond to the issues arising from investment in CFPPs in various ways (see Table 1). Significantly, some have already developed coal-specific policies, while others have adopted sector standards on climate and carbon that require consideration of investments in CFPPs. Awareness by the banking sector of the growing question marks and risks associated with investments in CFPPs can be seen at a number of levels.

At the level of individual institutions, a number of private banks have developed or are in the process of developing policies and/or guidelines for lending on coal-related projects or portfolios. These include: HSBC (2011),[vii] WestLB (2010),[viii] Société Générale (2011)[ix] and BNP Paribas (2011).[x] Further developments are anticipated with a further revision of the WestLB policy envisaged later in 2011.

Groups of banks have collectively developed and adhered to general guidance on climate and/or carbon (e.g. the Climate Principles, the Carbon Principles). While these do not focus specifically on coal, they express concerns about the implications of fossil fuels for climate change and are engaged in considering and reducing the carbon intensity of investments in the electricity sector.

The Climate Group, an independent non-for-profit body, has been working with a group of private-sector financial institutions (signatories of the Climate Principles), utilities, engineering companies and business groups to explore the need for specific policy guidance in relation to CFPPs. The output of this has been a guidance note on the financing of coal fired power stations, the summary of which can be seen in Box 2.[xi]

Box 2: The Climate Group guidance note: financing new coal-fired power plants

Deployment of the best available technologies for coal-fired power plants could raise generation efficiency from today's global average of 34% to over 50%.

Financial institutions can help accelerate the uptake of the best available CFPP technologies by adopting policies that stipulate minimum standards from emissions intensity levels that become progressively tougher between now and 2050.

Improved generation efficiency and co-firing are necessary, but in the longer term are inadequate to limit dangerous climate change. CCS is the only technology with the potential to make the CFPP emissions cuts necessary. Fully integrated commercial-scale CFPP with CCS remains to be demonstrated and is unviable for private-sector finance at current operating costs and carbon prices, but it is important that CFPPs built now are made 'CCS ready'.

6. Defining the Elements of a Coal-financing Policy for European Banks

The developments described above raise the question of what the further spread and evolution of policies and practices in relation to the financing of CFPPs in Europe might be. Looking at existing policies, and given the increased understanding of the banking sector of the importance of climate change and the risks facing the industry in relation to the investment decisions made, it might be asked whether the banking sector should be evolving towards a new sector-wide approach that specifically addresses CFPPs and, if so, what this might look like.

Table 1 illustrates some of the considerations that are involved in a range of policy options that might be held in relation to investment in CFPPs, including having no policy, having an industry standard and having an institution-specific policy. In each case the pluses and minuses have been considered.

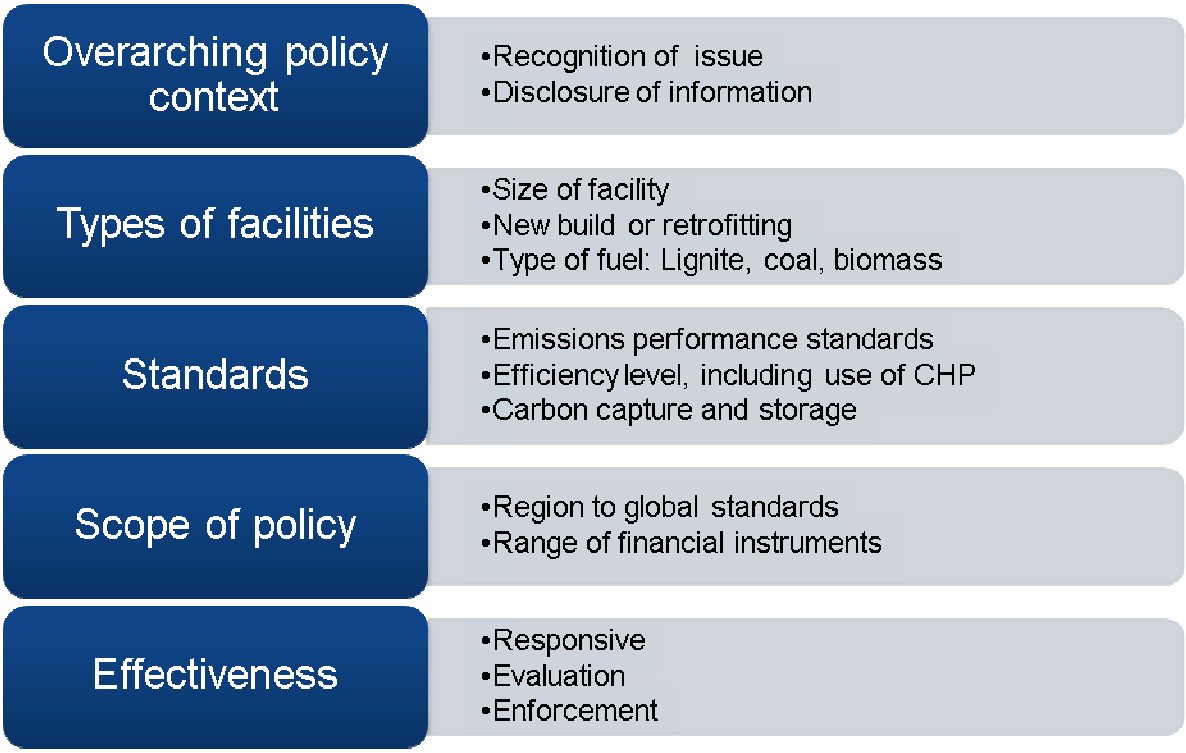
Table 1: Consideration of range of policy approaches

Approach	Considerations
No specific policy on energy generation technologies	**Pluses** – Consistency: all investments subjected to existing house risk and reputation analysis; no need for additional standards and instruments; no reason to give coal special treatment. No added costs. **Minuses** – Risks under-estimating rapid changes in regulatory, social, technology environments specific to coal, with related reputational damage. Prevents transparency on carbon footprint of investments, etc.
Adoption of industry standards/principles on climate/carbon	**Pluses** – Creates conformity across sector and enables benchmarking. Responds to concerns over climate changes. Increases transparency. **Minuses** – Risks under-estimating rapid changes in regulatory, social, technology environments specific to coal, with related reputational damage. Prevents transparency on carbon footprint of investments, etc. May reduce the introduction of direct CFPP policies in lending institutions.
Policy on CFPPs	**Pluses** – Analysis of the risks in regulatory, social and technology environments specific to coal, enabling quantification and avoidance strategies. Enables transparency on carbon footprint of investments. Creates certainty for project staff and clients of financial institutions. Puts in place a review policy to assess the short- and long-term viability of projects. Creates policy certainty. **Minuses** – High project assessment costs and longer processing time. Loss of credibility if policy not enforced. Does not necessarily affect all financial vehicles in institutions. Needs to be continually reviewed in the light of technological, environmental or development considerations.

The purpose of any specific sector investment policy should be twofold: first to guide internal development and decisions within an institution on the types of projects and finance which are to be encouraged and supported; and, second, to demonstrate externally the views and values of the institution on the risks and opportunities of particular financial activities These twin purposes require a discussion of the overriding risks and rationale of the policy, while also giving guidance on technical aspects of the fast-moving technologies and the scope of the financial vehicles to which the policy should apply.

A model CFPP should contain a number of different aspects that justify the need for a policy, as well as give details on the facilities and the standards that are required and the scope of the policy. A complete policy would also include evaluation mechanisms. Figure 5 details the individual requirements of a coal policy. The existing policies of banks are then assessed against these.

Figure 5: Contents of coal-financing policies



Overarching climate policy

Recognition of the issue: In framing a policy on investments in CFPPs it is important to recognize two basic 'lifetime' issues. The first is atmospheric physics. CO_2 emissions have a cumulative effect on atmospheric concentrations. It is estimated that CO_2 has an atmospheric lifetime of up to 100 years. From a climate policy and climate protection perspective, this makes reductions in near-term emissions more attractive than later reductions. The second lifetime issue concerns plant. Most CFPP infrastructure investments are made on the assumption that they will operate for at least 50 years. Building on this, any policy on investments in CFPPs and related infrastructure would need to take those considerations into account as well. Some policies, such as HSBC's, note the need for reducing emissions: 'If serious impacts from climate change are to be avoided, energy demand needs to be reduced and energy supply made more efficient[xii]'.

Disclosure of information: Investors are increasingly seeking more information on climate and carbon risk policies and data. This can be seen not only in the development of investor initiatives (e.g. the Carbon Disclosure Project, the Institutional Investors Group on Climate Change) but also in the rise of shareholder questions on carbon measurement and management. The development and uptake of several international standards on CO_2 emission reporting (including by ISO and the World Resources Institute/World Business Council for Sustainable Development) as well as Global Reporting Initiative (GRI) indicators underline the trend. Investors are using this information to make better-informed assessments of the quality of corporate management, of business plans, and of alternative investments.

In this context, a common set of principles and policies on investment in CFPPs could be helpful in relation to measurement and disclosure requirements. Considerations could include:

- *Transparency*: Increased regulatory, investor, stock exchange and rating agency pressure for greater transparency on CO_2 emissions and related risk-assessment governance (e.g. environmental and social governance requirements).

- *Accounting*: The need for accurate, comparable and consistent carbon accounting in the context of emissions trading.
- *Disclosure*: The maturation of greenhouse gas emissions and related sustainability reporting standards and tools, and related issues of the consistency between internal and external policies and practices.
- *Consistency*: On how policies relate to external standards (e.g. Climate Principles, Principles for Responsible Investment, Global Compact, Equator Principles, etc.) and to other environmental and cross-sector policies within the institution.

Types of facilities

Any future coal policy would also need to address issues arising in relation to the types of facilities covered. Relevant considerations could include:

- *Size of facility*: Should there be a minimum/maximum size to which any future policy might apply? HSBC's policy suggests that a threshold to which the lending criteria should apply is over 500 MW. This would apply to all coal stations currently under construction in the EU. The engineering justification for this threshold is that the more advanced, e.g. super-critical, power plants are not manufactured below this size and therefore there would be unfair discrimination against systems requiring smaller additional capacity.
- *New build or retrofit:* With uncertainty over the energy market and fuel prices and EU legislation requiring retrofitting of many coal stations if they are to operate post-2016, there is a large potential market for upgrading and/or retrofitting existing plants. Despite the engineering improvements of retrofitting they do not come close to the efficiency of new build and therefore a balance needs to be struck between improving efficiency levels and extending the operating live of an existing facility. The suggestion of WestLB is that it should only fund retrofitting when 'the relative improvement in the efficiency of the expanded/optimised part of the plant is at least 30 per cent'. BNP Paribas, for its part, has stated that 'the resulting energy efficiency is either (1) brought to a level at least equal to the level required for a greenfield CFPP project or (2) is increased by at least 10% from the initial level'.
- *Fuel type:* There are a number of different types of coal; the two main variants used in power stations are bituminous coal (often referred to as coal or anthracite coal) and lignite (also referred to as brown coal). Lignite is used almost exclusively for localized power generation and tends to have higher moisture and lower energy content than hard coal. The CO_2 emissions per unit of energy vary between different coals, with lignite producing more carbon emissions than bituminous coal, making it even less attractive from a climate protection perspective.

  In this context, increasing consideration is being given to requirements for co-firing (i.e. using a mix of other fuels). In the Netherlands proposals are being developed to make mandatory the co-firing of biomass in all CFPPs, which will not only reduce the net CO_2 emissions but also other gases' emissions such as NOX or SOX and particulates. Although, as of early July 2011, specific percentages for the level of biomass to be used have not been put forward, it is likely to be in the 10–20% range. Such requirements would have to come with specific biomass environmental and sustainability standards.

  Increasing the share of biomass in co-firing to 30% is possible in existing power stations, thus offering a near-term, low-cost, flexible, part-solution to emission reductions.[xiii] Beyond this, retrofitting and newly designed plant will be necessary to achieve greater biomass fuelling. It should also be noted that given the lower energy density (and therefore larger volumes of fuel that need to be transported) of biomass, it is a much more localized fuel source and its cost, and therefore economic viability, are determined by local market forces.

Standards or technology required

Another set of issues for inclusion in a policy on CFPPs relates to standards.

Emissions performance standards (EPS): EPS set specific limits for the quantity of CO_2 emissions per unit of electricity generated. In the United States, an EPS on CO_2 emissions was introduced in California in 2007 and then adopted by other states (Illinois, Montana, Washington, Oregon and New Mexico). In August 2011 the Canadian government proposed new standards that would apply from 2015 requiring all new fossil fuel capacity and older units that have reached the end of their economic life (thus addressing life extensions) not to emit more than 375 g C02/kWh.[xiv] In the EU, an EPS was initially excluded from the framework established by the EU Directive on geological storage of CO_2 as it was considered premature because of the demonstration state of the technology.[xv] However, the EU CCS Directive requires that, by 2015, the European Commission conducts a review, assessing, among other things, 'whether it is needed and practicable to establish a mandatory requirement for emission performance standards for new electricity-generating large combustion installations' if key aspects of the CCS chain are considered to be 'sufficiently demonstrated' (Art. 38).[xvi] In the United Kingdom, the White Paper on Electricity Market Reform published in July 2011 proposed an EPS requiring emissions not to exceed equivalent to 450g CO_2/kWh (at base load) for all new fossil fuel plants. The EPS will be subject to review every three years.

In March 2011, Vattenfall-Nuon committed to limit the CO_2 emissions for the new coal-fired power plant at Eemshaven in the Netherlands to the level of a modern gas plant. In doing this, it became the first major European utility to accept a binding EPS of 360g CO_2/kWh on a coal plant.[xvii]

HSBC has said that it will not support individual units that exceed 850g CO_2/kWh in developing countries and 550g CO_2/kWh in developed countries. With existing technologies, this may require acceptable CCS plans (firm and achievable plans are in place to capture, transport and permanently store CO_2 from the plant from the start of operation, typically reducing intensity to less than 150g CO_2/kWh) or material benefits from combined heat and power or biomass. BNP Paribas has adopted similar figures to HSBC's – 550g CO_2/kWh for developed countries, but 660g CO_2/kWh for developing countries.

Efficiency level: This is another mechanism for measuring the relative contribution of coal-fired power stations to emissions control. The principal technology for generating electricity from coal is currently pulverized coal combustion (PCC), which accounts for more than 97% of the world's coal-fired capacity.[xviii] The average global efficiency of PCC plant has been broadly static at around 34%. More recent technologies such as super-critical (SC) and ultra-super-critical (USC) coal-fired plants have the potential to boost efficiencies up to 47%, with advances in materials permitting incremental net efficiency gains thereafter. Another technology option beginning its resurgence is the integrated gasification combined cycle (IGCC) plant, with emerging designs claiming efficiencies of over 50%. The use of soft coal or lignite reduces the efficiency of power station, as the fuel has a lower calorific value. By way of comparison, however, the best modern gas turbine technologies are already capable of thermal efficiencies of 60%, making them more attractive than coal from both economic and climate perspectives. Annex 1 shows the efficiency level of most of the coal stations under construction in the EU, with lignite fuel stations ranging from 36% to 43% efficiency and hard coal from 45% to 47%. Interestingly, the Maritza Iztok power plant in Bulgaria, which has an efficiency level of 36%, was deemed 'state of the art' by the European Bank for Reconstruction and Development (EBRD), which financed the project in 2005. This highlights the pace at which the technology is changing.

A number of bank coal policies, including those of BNP Paribas, WestLB and Société Générale, propose efficiency standards as criteria for funding and require that these must be at least 43% in developed countries and 38% in other countries.

Carbon capture and storage: CCS attracts support from a range of governments across Europe simultaneously looking to replace retiring base load capacity and meet emission reduction targets. This support extends so far as to permit new-build coal plant provided they are built 'capture ready'. This is an intuitively simple either/or definition, but holds within it significant gradations of so-called

readiness. Perhaps the most formal definition, as drawn up in a 2007 IEA GHG report,[xix] stipulates the need for developers to identify all barriers to implementation, including:

- A study of options for CO_2 capture retrofit and potential pre-investments;
- Inclusion of sufficient space and access for additional facilities that would be required; and
- Identification of reasonable route(s) to storage of CO_2.

Currently, however, definitions and legal requirements for 'capture ready' plant within the EU are unclear.[xx] There is a real risk that 'capture ready' policy could encourage investment in new CFPPs that will never be abated, either because of technology problems (e.g. CCS technologies fail to work) or because of economic miscalculations (e.g. CCS technologies are unaffordable or unattractive). In such cases, the 'capture ready' approach will fail both to prevent further carbon lock-in, and to hedge against the risk of future stranded assets.

In the light of this, effective CCS readiness would need to address all possible impacts of a retrofit on plant operation, including potential effects on core plant components such as turbine design and boiler operation. Furthermore, integration with the system of technologies downstream from the point of capture is an essential but often overlooked constituent of what should be termed a 'CCS-ready' plant. The route of transport to adequate storage lies outside the plant site, at an undefined place and point in the future. It is essential that means to complete the whole system – whether the technological, organizational, financial or regulatory elements – be put in place as early as the initial 'capture ready' investment.

In their policies, WestLB, Société Générale and BNP Paribas make reference to 'capture ready' requirements:

- *WestLB*: 'A due diligence must be conducted by WestLB or the syndicate of lenders and include third party expert reports (legal, technical, etc.) to ensure that future regulations (environmental, etc.) can be adhered to by the project on an economic basis, including, but not limited to:
    - Required additional equipment, including any technology to capture greenhouse gases for the most part and to avoid the emission into the atmosphere;
    - Other required measures to maintain all permits and remain compliant with relevant laws and regulations.'[1]
- *Société Générale*: 'In countries where a regulatory framework has been or is being developed for Carbon Capture and Storage, demonstration by the client that the power plant(s) is compliant with local regulations and can be considered as "CCS ready", according to the International Energy Agency definition.'
- *BNP Paribas*: 'An evaluation of the CFPP project and host country will be carried out to determine whether the criteria defining CCS Ready are being met, including the technical feasibility, the availability of physical space, realistic pipelines and storage options, adequate cost assessments and public engagement considering health, safety and environmental issues'.

Without commercial-scale experience of CCS, any lending policy can only rely on projects being 'capture ready'. However that definition can be expanded to require it to be mandatory once the technology is proven and to require financing to be set aside during construction or operation, similar to decommissioning funds for the nuclear industry, to ensure CCS can occur.

It is important to note that each of the added processes involved with CCS over conventional firing requires additional energy input, thus increasing the throughput of fuel. It is hoped that current

[1] The requirement for the economic analysis is intended by WestLB to provide finance only for projects that would be economically feasible in a carbon-constrained world.

developments in CCS technology will limit the overall 'energy penalty' (the amount of additional energy need to operate the CCS equipment) to around 10– 20% abated plant. Yet this still represents an appreciable increase in fuel expenditure and works against improving energy security; already a concern of countries with a high dependence on fuel imports.

Finally, there are significant outstanding financial questions surrounding CCS. These range from uncertainties about plant and operational cost, the availability of finance, legal and other risks arising from use (or non-use), through to the costs of transportation and storage. Insurance issues have also been mentioned as a consideration in this context.

Scope of policy

Regional to global standards: The role of coal within the energy and electricity mix of countries varies significantly, as do the efficiency standards of the existing power stations. Therefore regional differences have been introduced into the technology standards required.

As already noted, HSBC has different emissions-based policies for developing and developed countries, while Société Générale and WestLB have proposed a 43% thermal efficiency standard for high-income countries and 38% in other parts of the world. While there are regional differences, the thermal efficiency standards and improvements are driven by economic advantages and therefore more recent technology is sometimes being applied in many emerging economies, with rapid scale-up of industrialization facilities that represent the global 'state of the art' – for example, China is building IGCC and ultra-supercritical coal power stations (i.e. with efficiencies just under 50%). Furthermore, setting global standards will accelerate technology diffusion, enhance innovation and help reduce carbon leakage and carbon market inequalities, all of which are essential for meeting global climate objectives.

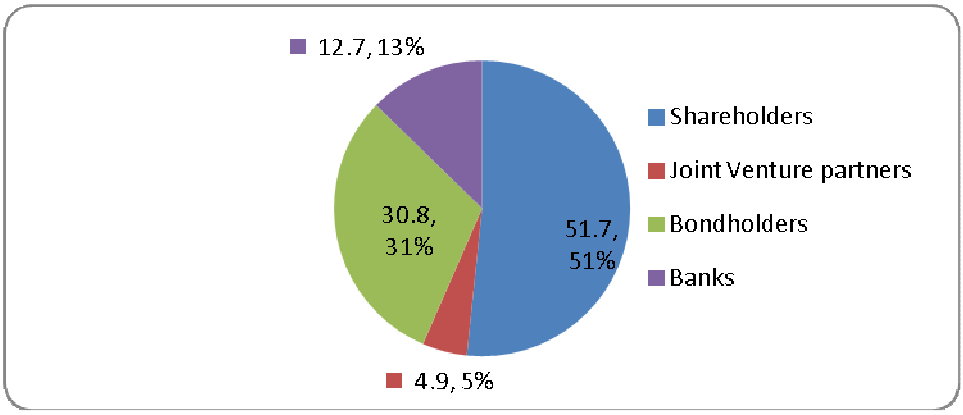
Range of financial instruments: There are a number of separate but connected issues relating to the range of financial issues that a particular policy should affect.

Engineering standards and emissions control requirements are significantly easier to establish, monitor and enforce for financial institutions when they relate directly to project finance rather than in other areas such as bonds, shares, utility financing or guarantees.

The short-term financial and reputational risk for lending institutions is most acute with regard to direct project finance. Investors can be surprisingly unaware of the split in their portfolio by geography, technology, sector or size of stock. In general the closer the engagement in a project, the higher the risk, i.e. investment in a power plant carries greater potential risk (caused by the construction of a new coal power stations) than investment in the wider utility. However, it is also true that longer-term investments, such as those held by asset managers, have a greater potential exposure to the consequences of climate change. These varying risk levels highlight the need for comprehensive due diligence and suggest that coal investment is likely to diminish in Europe given the current status of technology against which no investment risk reduction strategy can adequately hedge.

Project finance in general represents only a small part of the engagement of most financial institutions in the coal sector and therefore a wide enforcement of the policy should be encouraged across the full range of a bank's activities and for other financial institutions, such as asset managers. Figure 6 shows the financial stakeholders of coal-fired power stations in the EU. Importantly, it shows the dominance of shareholders (of which two-thirds are privately owned) and the relatively small role of banks.

Figure 6: The financiers of coal power plants in the EU



Source: Profundo 2010[xxi]

The different approaches taken in the policies in this regard are outlined below.

- *Société Générale*: 'These guidelines apply to all the banking and financial service.'
- *WestLB*: 'The Sector-Specific Regulations as outlined below must be fulfilled/ complied with for all significant business activities in high income economies related to coal-fired power generation in which the use of funds made available is fully or partly known to WestLB.'
- *HSBC*: 'The financial services covered by the policy include all lending and other forms of financial assistance, debt and equity capital markets activities, projects finance and advisory work.'
- *BNP Paribas*: 'This policy applies to all business lines, branches, subsidiaries and joint ventures of which BNP Paribas has the operational control. When BNP Paribas establishes new joint ventures in which it has a minority stake, it strives to include its standards as part of the joint venture agreement … this policy applies to all financial activities provided by BNP Paribas (lending, debt and equity capital markets, guarantees and advisory work) and to all entities managing proprietary assets and third-party assets, with the exception of index linked products'. However, BNP Paribas also states that its 'entities managing third-party assets will progressively implement all the relevant requirements of this policy. A transition is indeed necessary due to the fact that existing and potential investors have to be informed of the existence and implications of this policy.'

Effectiveness

For any policy to be effective it needs to have in place adequate monitoring and enforcement measures, but it must also be continually reviewed so that the standards and benchmarking remain appropriate.

Implementation: New policies require implementation explanations and processes. For example, Société Générale has suggested for its new policy that in the first year of implementation procedures are put in place to ensure the full integration of the new requirements.

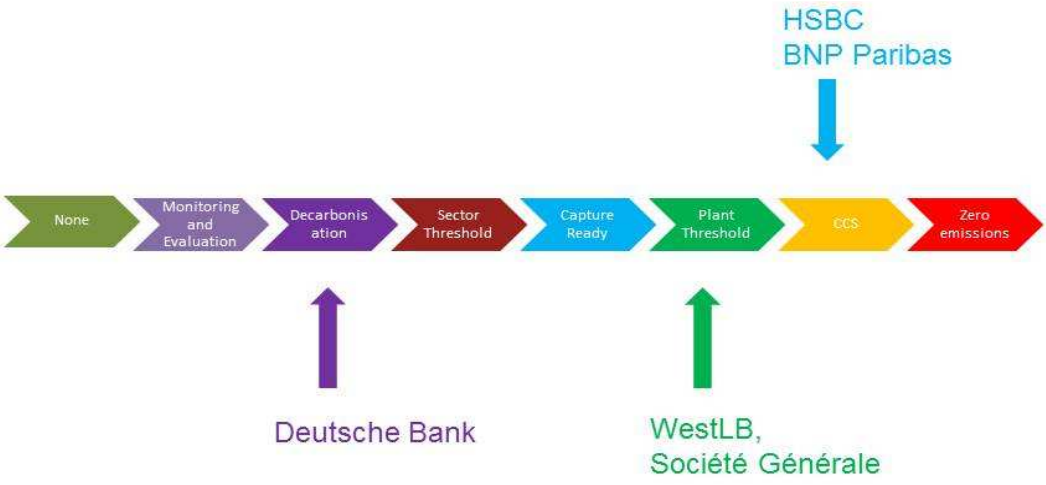
Enforcement: Mechanisms should be put in place to ensure the policies are adhered to. However, these are internal processes and policies are not a contractual commitment. In general bank policies require that projects comply with national and international laws as well as with their existing regulations and processes.

Review: Bank policies cannot be static and must be responsive to a number of changing factors, including greater understanding of the complexities of the impacts of increased concentration of CO_2 on the global climate; the development of new technologies and practices; and the improved diffusion rates of best available technologies, especially in developing countries and emerging economies. Ideally policies should also create a direction of travel for standards and new technologies that result in clear emissions reduction timetables, as have been seen, for example, in the Climate Group Guidance Note, which suggests higher standards for 2020 and effectively the use of coal only with CCS by 2031.

Société Générale has stated that 'this policy may evolve in time, according to legislative or regulatory evolutions and as a result of the discussions between the Bank and its various stakeholders'. For its part, BNP Paribas has said that it 'will review the policy regularly and in the light of the prevailing circumstance it may update it'.

Figure 7 shows a possible spectrum of policy options, ranging from no action on coal-fired power stations to zero emissions that might be considered. On the basis of our research we have then included those institutions that have declared policies.

Figure 7: Range of policy options



7. Conclusion

This paper describes the context of current discussions on the deployment of new coal-fired power stations in Europe and aims to identify some key issues that should be discussed by the private sector when considering funding new CFPPs. Given all the technical and resource uncertainties in the sector, the state of the international climate regime and the perilous state of Europe's economy, careful analysis of lending to the electricity sector is particularly important, both to reduce financial risks and to give clear signals of intent.

More and more financial institutions have realized the need for policies on coal financing in order to enable them to assess the risks and to communicate this to their clients, shareholders and the wider world. This process should be welcomed as it is a recognition that all actors associated with the energy sector, and not just the mining companies and utilities, need to adjust their activities to avoid the most serious impacts of climate change.

While these policies must be mindful of the current market and financial conditions as well as country specificities, the guiding principle must be to repower the energy sector in order to achieve the.two degree global temperature target agreed at Cancún. Given the longevity of CFPPs and the emissions reduction timetables required to avoid dangerous climate change many of the current policy conditions are inadequate.

However, the implementation of policies by private banks is not a static event but the start of the process of continual renewal both of the banks' policies and in the setting and reviewing of standards for the banking sector as a whole. It should be seen as a catalyst for the process of review and change by the financial sector as whole. Developing such a set of policies will help create a level playing field between investors and investments and demonstrate the environmental leadership of the financial community.

Annex 1: Coal and Lignite Power Stations under Construction in the EU

(as of September 2011)

* Construction suspended/delayed

Name	Completion date	Size (MW)	Fuel type	Efficiency level %
Bulgaria				
Maritza Iztok	2015	670	Lignite	36
Czech Republic				
Ledvice	2012	660	Lignite	
Germany				
Neurath, Rheinland-Pfalz	2011	2x1050	Lignite	43
Walsum, Duisburg*	2011	750	Coal	45
Boxberg	2012	675	Lignite	44
Lunen, Strummhafen	2013	810	Coal	
Westfalen, Hamm-Uentrop*	2013	2x800	Coal	46
Dattein 4, * Nord-Rhein-Westfalen	2013	1 100	Coal	46
Rheinhafen, Karlsruhe	2012	912	Coal	46
Wilhelmshaven	2012	800	Coal	45+
Moorburg, Hamburg *	2012	2x2012 electric; 650 thermal[2]	Coal	60 (CHP)
Mannheim	2013	911 electric; 500 thermal	Coal	46
Italy				
Vado Ligure	?	460	Coal	
Netherlands				
Maasvlakte, Rotterdam*	2013	1100	Coal	46
Eemshaven	2013	1600	Coal	47
Magnum	2012	1200	Coal	
Maasvlakte, Rotterdam*	2013	724	Coal	45
Poland				
Bielsko-Biala	2013	1600	Coal	
Betchatow	2011	833	Lignite	42

[2] Heat output

Annex 2: Coal Policies of International Financial Institutions

Bank	Policy
World Bank	'About 72% of South Africa's and 70% of India's electricity comes from coal-fired power stations, as does 49% of the electricity generated in the US. But the world knows that burning coal, as well as other fossil fuels, produces about 70% of the planet's greenhouse gas emissions. Here is the challenge: given these numbers, experts agree that the world cannot, at present, provide affordable access to electricity to 1.4 billion people without relying to some extent on coal. But investing in coal alone for electricity –when considered in light of population growth projections – would push human-caused climate change deeply into a catastrophic zone. That's why we have strict criteria for financing of coal projects, limiting our financing to cases in which a country has no other options to respond to urgent demands for electricity, and providing several other conditions have been met and the process reviewed by an external advisory committee.'[xxii]
EBRD	'In terms of emerging "clean coal technologies", while it is too early for these to be financed in the Bank's region at present (because the technology is still in the development phase), the Bank will continue to monitor progress in this area.'[xxiii]
Asian Development Bank	'To meet the electricity needs of the region, large capacity additions will be required for which coal-based generation will grow. ADB will encourage Developing Member Countries to adopt available cleaner technologies, such as fluidized bed combustion, supercritical and ultra-supercritical boilers, and flue gas desulfurization. As new technologies – such as integrated gasification combined cycle and carbon capture and storage (or sequestration) – are shown to be technically feasible and economically viable, ADB will support their deployment in DMCs to increase their financial viability. ADB will also assist DMCs in collaborating with developed countries on long-term technology transfer agreements for new and better technologies under development. It will selectively support coal-based power projects if cleaner technologies are adopted and adequate mitigation equipment and measures are incorporated into the project design. Some DMCs with smaller size grids that depend on oil-based power supply or imports from neighbouring countries may need to install coal-based power plants using subcritical boiler technology. Such diversification will improve power system reliability and energy security, and may be the least-cost option. In the interest of economical and developmental needs, ADB will support such base-load power plants, if found to be justified after due diligence. Assistance will also be extended to retrofit existing power plants that need to improve efficiency.'[xxiv]
African Development Bank	'For coal-fired plants, the Bank will collaborate with other multilateral development banks to develop and implement consistent guidelines.'
European Investment Bank	The Bank has therefore recently adopted a more selective approach to financing carbon-intensive electricity generation so that the Bank will only finance commercial coal/lignite power stations that use the best available technology and are carbon capture ready. In addition new coal/lignite power stations should replace existing carbon intensive plants and involve a decrease of at least 20% in the carbon

	intensity of power generation. Retrofitting projects for existing coal/lignite power stations must be relatively small investments, and not delay plant replacement in the medium term; in the meantime, they should substantially reduce pollution, including via increased energy efficiency.'[xxv]
Inter- American Development Bank	'In the case of coal-fired power plants, the IDB will only finance projects that use among the best available technology to reduce their emissions of greenhouse gases (GHG) and other pollutants. These technologies are ultimately more efficient in converting coal to energy, so that over the life of a plant they yield both economic and environmental benefits. Specifically, the IDB will not finance what are known as 'sub-critical pulverized coal' power plants, due to the lower efficiency of this technology and its resulting higher CO_2 emissions. The new guidelines also rule out Bank financing for plants using a technology known as "circulating fluidized bed combustion," unless these plants meet a threshold of at least 36 percent net efficiency in converting fuel to energy. The Bank chose to adopt specific emission thresholds – instead of a more general parameter – in order to provide clarity and offer transparent criteria to governments and investors who seek IDB financing. According to Ferretti, these thresholds are likely to be raised as new technology becomes available that enables all kinds of power plants to operate with lower climate impacts.'[xxvi]

About the Author

Antony Froggatt is Senior Research Fellow (Climate Change) at Chatham House. Antony specialises in climate change, European energy policy and nuclear power issues. He has worked at length on EU energy policy issues for European Governments, the European Commission and Parliament and commercial bodies. Recent publications include: *Sustainable Energy Security: Strategic risks and opportunities for business*, joint author, Chatham House/Lloyds, June 2010 *Competing Energy Sources: Generating Change*, The World Today (Nov 2008), *The International Climate Change Agenda: Opportunities for the G8*, Chatham House Briefing Paper (May 2008) and *Changing Climates: Interdependencies on Energy and Climate Security for China and Europe*, joint author, Chatham House, (Nov 2007).

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