

EU LCPD Compliance Options: Deadline 30th June 2004



Postpone SO₂ and NO_x Controls

One of the greatest challenge facing owners of industrial and power plant boilers is the requirement to meet obligations under new environmental legislation. The EU's Large Combustion Plant Directive (2001/80/EC) sets new limits for the emission of sulphur dioxide (SO₂), nitrous oxides (NO_x) and fine dust particles for all new plant builds 50MW or larger. New limits for "existing" plants, those 50MW or larger that were licensed before 1st July 1987, will be binding from 1st January 2008. As if this was not enough, all combustion units with an installed capacity greater than 20MW will also have to contend with the EU Emission Trading Scheme (ETS) as part of its commitment to achieve its Kyoto-inspired greenhouse gas (GHG) emission reduction targets. This CO₂ emissions trading scheme will be operational from 1st January 2005.

As some of the largest emitters of CO₂, SO₂ and NO_x, existing coal-fired power stations face an uphill struggle. The simple engineering approach option would be to install the required flue gas clean up or combustion alternatives. This, however, is not the right answer in most cases. Governments and generating companies should first embrace the flexible mechanisms built into the LCPD such as the cap-and-trade option and the 20,000-hour derogation.

Complying with the LCPD

Under the cap-and-trade option, the National Emissions Reduction Plan (NERP), a Member State can define a *fixed annual tonnage* of SO₂, NO_x and dust that can be emitted by all existing installations as of 1st January 2008. The LCPD provides detailed guidelines to determine the annual allocation of emission allowances. These can be freely traded amongst participating installations to help meet their annual compliance requirements. Where compliance costs are high, the owner has the option of purchasing allowances from other parties who have lower compliance costs. In the case that the Member State does not take up the NERP option, all existing plants will have to meet an Emission Limit Value. These *emission rate limits* are site-specific and liabilities cannot be traded or exchanged.



Opt Out Deadline
30th June 2004

EU LCPD Compliance Options

National Emissions Reduction Plan

(Cap-and-Trade Option)

- ✓ Purchase Allowances
- ✓ Install Controls
- ✓ 20,000-hour Derogation

Emission Limit Value Approach *(Rate Cap)*

- ✓ Install Controls
 - ✓ 20,000-hour Derogation
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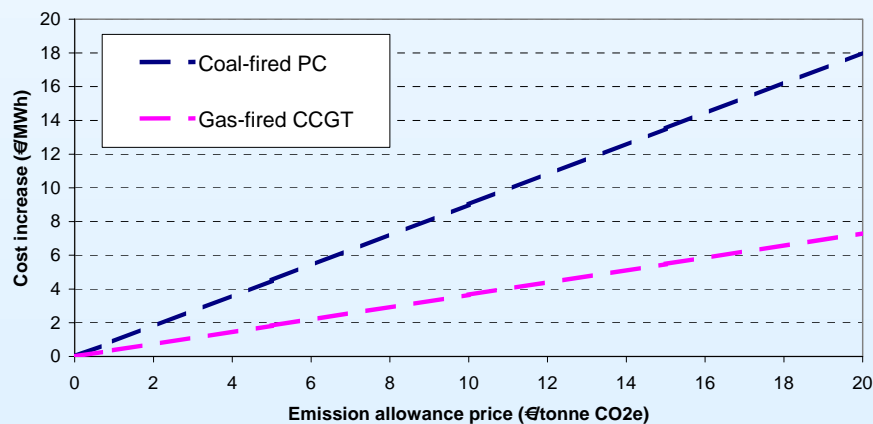
Whichever scheme each Member State selects, existing power plants can be granted a derogation from their obligation. To qualify, owners have until 30th June 2004 to inform the authorities of their intention to "opt out", whereby the plant's operating permit will be revoked after 20,000 hours of operation starting from 1st January 2008 or at the end 2015, whichever comes first. At the end of the 20,000-hour derogation for opted-out plants or from 1st January 2016 for other existing plants, all affected plants will have to meet the new build standard or face closure.

Under current technology, the new build standard requires the installation of flue gas desulphurisation (for >90% removal of SO₂) and selective catalytic reduction (for >85% removal of NO_x). At estimated investment costs of €100-€150/kW each, these retrofit costs should not be ignored. If one assumes a combined cost of about €250/kW to fully equip an existing plant to the new build standard, a fully dispatched power plant would need to see an increase in revenues of at least €37.5/kW per year to recover the additional investment cost alone. This translates into an increase in all-in costs of €5.0/MWh for a baseloaded coal-fired plant or an increase of €8.6/MWh if the plant were dispatched at only 50%.

Kyoto targets to drive coal plant operation

As part of the commitment to achieve its Kyoto-inspired greenhouse gas (GHG) emission reduction targets, the EU25 will be implementing a CO₂ emissions trading scheme (ETS) from 1st January 2005¹. And it is the scarcity value of CO₂ allowances, EU Allowances (EUAs), rather than SO₂ or NO_x constraints that will really drive the operational profile for a coal-fired plant. With a thermal efficiency of 36%, a typical pulverised coal-fired plant will produce slightly more than 0.9tCO₂/MWh. This is more than twice the rate of a gas-fired CCGT, which at 50% efficiency will emit about 0.4tCO₂/MWh. The impact on the marginal operating costs is shown in Figure 1.

Figure 1: Additive impact of EUAs on PC and CCGT marginal operating costs



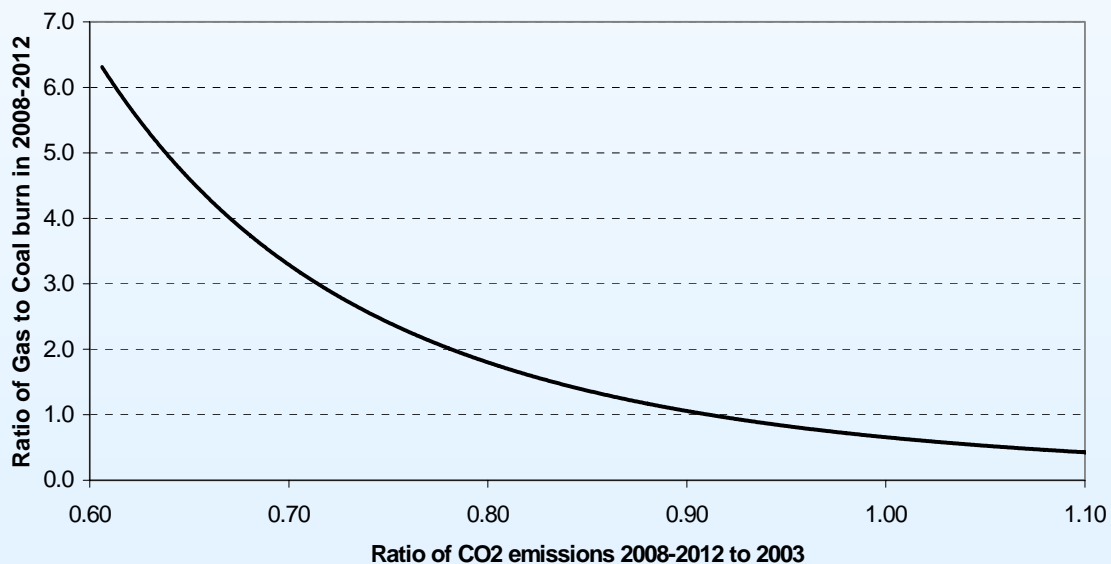
Source: ICF Consulting.

¹ The target for the EU 25 is to achieve a CO₂ emission reduction of 8% from 1990 levels by 2008-2012.

If one imagines an equilibrium where the generation, and hence CO₂ emissions, from PC and CCGT plant are in line with EU25 Kyoto targets, then for any given level of electricity demand, carbon-free generation from hydro, nuclear and/or renewables sources, or inflow of credits from CDM and JI², any unmet electrical demand will have to come from fossil-fired plants. The tighter the CO₂ cap, the greater the scarcity value of carbon and the greater the share of generation from gas-fired plants needed to meet the target. Even with an allowance value of only €10/tCO₂, the marginal costs increase of a coal-fired plant would be nearly €10/MWh, nearly twice as large as that required to cover SO₂ and NO_x investments.

Figure 2 shows the extent of the swing away from coal to gas that is required for EU25 power sector to achieve a CO₂ emission reduction between 2003 and the second phase of EU ETS (2008-2012). In the case that CO₂ emissions from the power sector were to remain flat, this chart shows that the ratio of gas to coal burn would have to double from 1:3 to 2:3 in less than a decade. This implies an increase in gas burn of more than 65% and a reduction in coal burn of more than 10%. If the power sector were required to engineer a reduction in CO₂ emissions of just 10% compared to 2003 levels, perhaps a more realistic scenario, gas burn would have to double and coal burn fall by 30%.

Figure 2: Trade-off between gas and coal burn and CO₂ emissions reductions by EU25 power sector



Source: ICF Consulting, March 2004.

² Under the Kyoto Protocol, Joint Implementation (JI) and the Clean Development Mechanism (CDM) will allow industrialised countries to achieve part of their emission reduction commitments by conducting emission-reducing projects abroad and counting the reductions achieved toward their own commitments. JI will allow for projects in other industrialised countries with Kyoto targets, while CDM will take place in countries without targets, i.e. developing countries.

Whilst uncertainty prevails about the price of CO₂ allowances, the conclusion is clear: given today's technology, carbon constraints will force a significant reduction in the output of a PC plant. For those plants operating at significantly lower load factors, it will simply not make commercial sense to invest in flue gas clean up equipment. The market will probably not provide sufficient reward for the necessary outlay. Thus, for those coal-fired units hit with a large drop in load factor, embarking on a clean up programme early is a high-risk option³.

Hence value in delaying

The solution is therefore to select a compliance option that delays the inevitable investment for as long as possible. The NERP approach permits this by allowing the participating installation to purchase allowances to cover their SO₂ and NO_x liabilities. The derogation permits this by allowing the participating installation a further 20,000 hours before having to bite the bullet.

The a priori case in favour of flexibility is strong. This is confirmed by our analysis using our Integrated Planning Model (IPM®), a tool also favoured by the US Environmental Protection Agency. As the price of CO₂ rises, the market for clean up equipment falls and the use of derogations rises. Our work with a variety of clients confirms the view that the longer-term viability of coal is not dependent on LCPD compliance but on compliance with CO₂ reduction requirements. To meet CO₂, SO₂ and NO_x challenges in the most cost-effective manner, we would urge plant owners to assess the combined impact of three major pollutants on their portfolios. This is the only way to avoid making unnecessary investments and the best way to protect shareholder value.

About ICF Consulting

ICF Consulting is a leading management, technology, and policy consulting firm. Drawing upon extensive industry knowledge, distinguished professionals, and innovative analytics, the firm develops solutions to complex energy, environment, emergency management, community development, and transportation issues. ICF Consulting's approach to these issues is strengthened by its expertise in information technology, organisational improvement, program management, and communications. Since 1969, ICF Consulting has been serving major corporations, government at all levels, and multinational institutions. More than 1,000 employees serve clients in the Americas, Europe, Asia Pacific and Africa.

Mr. Kim Keats Martinez is a Managing Consultant in the London office. Client list includes major project developers, financiers and fuel suppliers in Europe and Asia. Other contributions include articles, conference and workshops presentations, and he is also a corporate partner of the Cambridge-MIT Institute Electricity Project.

Kim Keats Martinez
Phone: +44.20.7554.8743
Email: kkeats@icfconsulting.com

ICF Consulting
3- Floor, Hamilton House
Mabledon Place
Bloomsbury London
WC1H 9BB England

³ Following the introduction of the Acid Rain Programme in the 1990s, many American power companies invested in flue gas desulphurisation equipment. Traded prices of SO₂, however, have never been high enough to justify such action commercially.