UNITED NATIONS **E**

Economic and Social Council

Distr.
GENERAL

ENERGY/GE.1/2004/6
22 September 2004

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

COMMITTEE ON SUSTAINABLE ENERGY

Ad Hoc Group of Experts on Coal in Sustainable Development
Seventh session, 7-8 December 2004

THE COAL INDUSTRY: RESPONDING TO MARKETS FOR ENVIRONMENTAL ATTRIBUTES

(Prepared by John Palmisano, Energy & Environmental Capital*)

I. SUMMARY

1. The coal industry involves the extraction, transportation, and use of coal – a common and inexpensive fuel. While this fuel has powered the industrial age and now powers much of the post-industrial age, coal has many properties that produce unwanted emissions. Having stated the obvious, it is also important to state the less-than-obvious – much of the coal industry seeks to be, and is, a responsible environmental steward of conservation and is environmentally concerned.

* This paper has been prepared by John Palmisano, Chairman, Energy & Environmental Capital, 2121 K Street, N.W. Suite 830, Washington, D.C. 20037, USA, Tel: +1 202 223 2073 / E-mail: johnpalmisano@yahoo.com

2. While environmental protection is treated with respect by most of the industry, and certainly the overwhelming majority in Western countries, the industry faces new challenges. Markets have emerged for environmental attributes, and as these markets have expanded, so too have the opportunities for the coal industry to benefit. Today, the coal industry seeks to protect and expand market share, especially since scarce fuels such as oil and natural gas have greater price volatility and upward pressure on prices. To best benefit, however, from the changes in the fuel and power sectors, the coal industry must learn how to capture financial advantages out of markets of environmental commodities and from the wise use of other environmental products such as scrubber ash and coal mine/coal bed methane.

3. How can the coal industry respond to the emerging markets for environmental products and how can the industry benefit from these markets?

4. This paper concludes that in European and North American markets, the coal industry must learn how to better employ environmental markets to preserve market share and to manage the environmental consequences of associated emissions, effluent, and solid waste. Far from being reactive, the industry should be proactive in developing environmental markets and integrating environmental trading into pricing and strategic planning. The environmental markets listed below are multi-billion dollar markets and represent obvious financial benefits and public relations benefits to the industry. Today, these rewards exist for the taking by far-sighted businessmen.

II. INTRODUCTION

5. There are three general ways to manage environmental outcomes. One route is called command-and-control. This regulatory regime is characterized by directives to industry describing what kinds of technologies to be employed, how to employ them, and when. A second type of regulatory approach is market-based and relies on the pricing mechanism to allocate resources. This regime relies on environmental taxes on undesirable outcomes (“bads”) or subsidies for environmental "goods.” Whether called pollution charges or pollution taxes, the outcomes are the same – taxes are levied on certain activities or outcomes and hopefully the associated price signal will sway behaviour toward less emissions or effluent or solid waste. A third model uses quantity restrictions on environmental discharges. By limiting quantities, discharges are forced to find low cost emission control strategies or pay other emitting entities to over-control emissions if the seller’s emissions control opportunities are relatively inexpensive.

6. Heretofore, in Europe and the former Soviet Union, command-and-control and pollution charges were the tools used by regulators to control environmental discharges. In the United States, command-and-control and emission credit and emission quota trading have been the instruments of choice. Today, emission credit, emissions quota, and renewable credit trading are being adopted in Europe and North America on a wholesale basis and are creating worldwide billion-dollar markets for tradable credits and quotas.

III. WHAT ARE THE MARKETS FOR TRADABLE ENVIRONMENTAL BENEFITS?

7. Environmental benefits arise when a discharge produces pollution reductions beyond those required by law or if companies create renewable energy when laws or custom create tradable "green" benefits certified for use in offsetting a renewable energy obligation. Tradable environmental benefits can arise when there is a property right that can convey this quantified benefit.

(a) Emissions Trading

(i) *Emissions Credit Trading (For the control of NOx, SOx, particulates, and hydrocarbons in local air sheds)*

8. The United States Environmental Protection Agency (US EPA) has promoted air credit trading since 1976. Today, air credit trading is encouraged under the US Clean Air Act in three ways. Under Title I (non-attainment) emission credits are required for new sources of emissions in dirty-air areas, and companies can re-arrange their emissions control obligations by over-controlling at one point while under-controlling at another, so long as net emission impacts are not increased. Finally, under Title IV (acid deposition), a quota trading system was created.

9. The US EPA began the implementation of the emissions trading programme in 1976 with the adoption of the Emissions Offset Interpretive Ruling that was incorporated into the 1977 Clean Air Act Amendments. Initially offset credit trading was viewed as an innovative strategy for balancing the conflicting goals of economic growth and air quality improvement. The basic concept promoted the reduction of emissions where the cost was cheap to offset uncontrollable emissions of new sources. The concept was subsequently extended and promoted by the US EPA's policy office as a market-based regulatory reform.

10. By encouraging policies similar to the offset policy for exiting stationary sources and by codifying the rules for creating, certifying, storing, and using extra emission reductions, EPA began a series of air pollution control reforms that evolve from offsets to bubbling, to "Controlled Trading" to emissions banking and trading to netting to emissions trading to SO_2 allowance trading. At the heart of these concepts of emissions trading is a reliance on the marketplace as an engine for fostering air quality, improving the efficiency of every environmental control dollar spent on air pollution control, and encouraging innovative pollution control technologies.

11. Emissions trading is made up of five separate but related concepts: emission reduction credits (ERCs), offsets, netting, bubbles, and emissions banking.

12. Emission Reduction Credits, or ERCs, are the common currency of emissions trading. ERCs are created when a firm is able to control emissions to a greater degree than required by law. ERCs can be created through process changes, plant retrofits, changes in production or operating hours, and/or equipment shutdowns.

13. In the United States, emission credit trading is a business worth more than US$1 billion per annum.

(ii) *Emissions Quota Trading (Regional and National Control of NOx and SOx)*

14. Title IV of the US Clean Air Act set a goal of reducing annual SO_2 emissions by 10 million tons below 1980 levels. To achieve these reductions, the law required a two-phase tightening of the restrictions placed on fossil fuel-fired power plants.

15. Phase I began in 1995 and affected 263 units at 110 mostly coal-burning electric utility plants located in 21 states. An additional 182 units joined Phase I of the programme as substitution or compensating units, bringing the total of Phase I affected units to 445. Compare this to about 10,000 facilities to be cover under the EU GHG trading programme starting in 2005

16. Phase II, which began in the year 2000, tightened the annual emissions limits imposed on these large, higher emitting plants and also set restrictions on smaller, cleaner plants fired by coal, oil, and gas, encompassing over 2,000 units in all.

17. The Acid Rain Programme is implemented through an integrated set of rules and guidance designed to accomplish three primary objectives:

- Achieve environmental benefits through reductions in SO_2 and NOx emissions,
- Facilitate active trading of emission quotas (called "allowances") and use of other compliance options to minimize compliance costs, maximize economic efficiency, and permit strong economic growth, and
- Promote pollution prevention and energy efficient strategies and technologies.

(iii) *Allowance (Quota) Trading*

18. The US acid rain programme represents a dramatic departure from traditional command and control regulatory methods that establish specific, inflexible emissions limitations with which all affected sources must comply. Instead, the Acid Rain Programme introduces an allowance trading system that harnesses the incentives of the free market to reduce pollution.

19. Under this system, affected utility units are allocated allowances based on their historic fuel consumption and a specific emissions rate. Each allowance permits a unit to emit 1 ton of SO_2 during or after a specified year. For each ton of SO_2 emitted in a given year, one allowance is retired, that is, it can no longer be used.

20. Allowances may be bought, sold, or banked. Anyone may acquire allowances and participate in the trading system. However, regardless of the number of allowances a source holds, a regulated facility may not emit at levels that would violate federal or state limits set under Title I of the Clean Air Act to protect public health.

21. In Phase II of the programme (now in effect), the Act set a permanent ceiling (or cap) of 8.95 million allowances for total annual allowance allocations to utilities. This cap firmly restricts emissions and ensures that environmental benefits will be achieved and maintained.

22. This programme targets the power industry and thus, indirectly, targets the coal industry.

23. By all accounts, the programme has been a great success and based on this success, other models for quota trading are being developed in the United State, Canada, and Europe.

(iv) *Greenhouse Gas Trading (National and International Controls on CO_2 and CH_4)*

24. The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) establishes quantified emission limitations and reduction targets for greenhouse gases (GHGs) that are to be achieved by the end of the first commitment period (2008 - 2012). On average, these commitments call for a 52% reduction from 1990 emission levels. (However, these commitments vary from one Party (country) to the Convention to another.)

25. Among other things, the Protocol includes basic provisions for the monitoring, reporting, and verification of greenhouse gas emissions, and it outlines the need for effective procedures and mechanisms to address non-compliance. Also, the Kyoto Protocol allows for the use of economic-incentive mechanisms to meet national emission control targets. The so-called "flexible mechanisms," permit emission reduction targets to be met at least cost.

26. These mechanisms include Joint Implementation (JI, Art. 6); the Clean Development Mechanism (CDM, Art. 12); and International Emissions Trading (Art. 17). They also include the use of Article 4 (the "bubble") by a group of Parties to fulfil their commitments jointly.

27. Joint Implementation (JI): JI allows Annex I Parties (developed countries) to transfer and acquire "Emission Reduction Units" that are generated from project-level activities that reduce emissions by sources or that enhance removals by sinks in other Annex I countries. That is, a country or designated legal entity within a country can invest in a greenhouse gas (GHG) reduction project in another Annex I country and receive credits for the emissions reductions that the project generates. Project participants must show that the emissions reductions or removals are real, measurable, and additional to what would have occurred in the absence of the project activity.

28. Clean Development Mechanism (CDM): The CDM enables Annex I Parties or legal entities within these countries to invest in GHG emission reduction or removal projects in non-Annex I countries (i.e., developing countries), in exchange for "certified emissions reduction" units. The CDM would promote sustainable development in developing countries and help Annex I countries meet their GHG targets. Similar to JI, project participants must show that the emissions reductions or removals are real, long-term, measurable, and additional to what would have occurred in the absence of the project activity.

29. International Emissions Trading (IET): Under Article 17, Annex I Parties are able to participate in international emissions trading to meet their GHG targets. That is, countries with high costs of emissions abatement can provide funding for additional reductions in other Annex I countries that have low costs of emissions abatement, in exchange for the acquisition of assigned amount units (AAUs). AAUs are like emissions quotas or allowances and are owned by countries, or in the language of the Kyoto Protocol, Parties.

(v) *Mercury Trading*

30. Mercury is a naturally occurring element. It is found in coal at very low levels.

31. Owing to the fact that is an element, mercury cannot be created or destroyed. The same amount of mercury has existed on the planet since the Earth was formed. But human activities, such as manufacturing and energy production, have increased the amount of mercury that is currently in the atmosphere, soils, and water bodies.

32. Power plants account for about 40 per cent of the human-caused mercury air emissions in the United States. Of course, other coal-fired power plants produce mercury emissions too. Much of the mercury emitted from power plants disperses into the global background while the remainder often deposited downwind of the plant site, spreading out over many miles. Mercury that is dispersed into the global pool stays in the atmosphere for months. When it eventually settles out, it deposits far from the source over wide areas.

33. Mercury has been a concern within the environmental community for many years and mercury emissions and discharges in water have been regulated for years. Power plant emissions of mercury are at very low concentrations and have been a concern in many countries. In December 2000, the US EPA announced it would regulate mercury emissions from certain electric power plants and issued a proposed rule in December 2003 that would reduce mercury emissions from coal-based power plants by up to 70%.

34. The proposal includes two alternative control plans:

- A market-based trading programme ("cap-and-trade") similar to other programmes already in force under the Act, and
- A site-specific proposal that would set emission limits at each power plant site ("command-and-control").

35. The US EPA is scheduled to finalize the proposed mercury rule by March 2005 based on one of these two control plans.

36. Of course industry prefers a trading-based mercury control programme and the US EPA has supported such a programme. As demonstrated by the US EPA's proven Acid Rain Programme, a well-constructed cap-and-trade programme can reduce emissions faster and at far lower cost than a less flexible command-and-control reduction programme. Trading reduces compliance costs by allowing sources that can reduce emissions more cheaply to transfer allowances or credits to other sources facing higher costs. A trading programme provides incentives for the largest sources to reduce emissions the most, often through the development of innovative control technologies that are more effective. Conversely, the risks to smaller sources are mitigated.

37. A trading-based mercury control programme will involve great costs and great commercial opportunities for far-sighted business people.

(vi) *Specifics on Mercury Trading (A New Trading Programme on the Horizon)*

38. The US EPA proposed that the owner or operator of an affected unit must hold allowances (quotas) for all the affected Utility Units (the regulated unit) at a facility at least equal to the total mercury emissions for those units during the year. Compliance with the requirement to hold allowances will thus be determined on a facility-wide basis. New units will be covered under the Mercury cap of the trading programme and will be required to hold allowances.

39. The model mercury allowance trading rule applies to coal-fired combustion units serving a generator of more than 25 MW that produces electricity for sale. A unit that co-generates steam and supplies more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale shall be considered an Utility Unit.

40. The US EPA's proposal establishes the total number of tons for the mercury Budget Trading Programme within a specific state. The proposed rule sets the state's unit level allocations and adds up those allocations to develop a state level budget.

41. To control costs, the US EPA is proposing a safety valve provision that sets a maximum cost for mercury emissions reductions. This provision addresses some of the uncertainty associated with the cost of mercury control. Under the safety valve mechanism, the price of allowances is capped, meaning that if the allowance price exceeds the ''safety-valve,'' sources may borrow allowances from following years to have access to more allowances available at that price. The EPA proposes a price of US$2,187.50 for a mercury allowance (covering one ounce). This price will be annually adjusted for inflation. In addition, the US EPA will deduct corresponding allowances from future facility allowance accounts. The purpose of this provision is to minimize unanticipated market volatility and provide more market information that industry can rely upon for compliance decisions.

(vii) *Particulates*

42. Particulate matter, dust, is controlled in North America, Europe, and CIS countries. It is controlled, to one degree or another, almost everywhere. Particulates can cause both health and ecological effects.

43. While health effects due to particulate inhalation are obvious, the opacity (visibility) impacts of fine particulates are subtle.

44. There are trading programmes in the United States that include particulate matter and its precursors. Specifically, in May 2004 the United States proposed moving forward with a regional haze rule that allows states the option of implementing an emissions trading programme or other alternative measure instead of requiring BART (Best Available Retrofit Technology).

45. The US EPA believes that the trading option provides the opportunity for achieving better environmental results at a lower cost than under a source-by-source BART requirement. A trading programme must include participation by BART sources, but may also include sources that are not subject to BART.

46. In the earlier proposed rule in the year 2001, the US EPA provided an overview of the steps involved in developing a trading programme. The US EPA focused this discussion on emission cap and trade programmes that they believed would be the most common type of economic incentive programme. This programme would require three basic steps for cap and trade programmes:

- Developing emission budgets;
- Allocating emission allowances to individual sources; and
- Developing a system for tracking individual source emissions and allowances.

47. The proposal noted that an emissions budget generally represents a total emissions amount for a single pollutant such as SO_2.

48. Once an emissions budget or "cap" is set, the next step in an emission trading programme alternative to BART is to issue allowances to individual sources, consistent with the cap. Once the allowances are established, it is also necessary to have in place a tracking system to ensure that the allowances are met.

49. With regard to the geographic area covered by a trading programme for BART, the regional haze rule could be expanded to other western states when they submit programmes for meeting Federal haze-limiting regulations.

50. In the May 2004 proposal, the US EPA re-stated its belief that the trading programme alternative provided by the regional haze rule can serve to reduce the administrative burden of the programme while providing greater long-term environmental benefits.

(viii) *Renewable Credit Trading*

51. Renewable credits trading systems can be used for several purposes, for example to enable public support schemes for renewable energy, such as renewable obligation schemes or renewable portfolio standards, or to support voluntary demand for electricity products generated from renewable energy sources.

52. A tradable renewable energy certificate represents all of the benefits associated with the generation of electricity from renewable sources, apart from the physical electricity. In a certificate system, a renewable energy credit is issued at the point of generation for each unit of electricity produced. The renewable energy sourced electricity generators therefore have two products to sell. They have the electricity commodity and they have the associated renewable energy credits. These commodities can be traded separately.

53. Renewable sources of energy can take away market opportunities for coal while creating opportunities for renewable sources of energy such as coal bed methane.

IV. COAL BED METHANE AND COAL MINE METHANE (CBM/CMM)

54. Methane is liberated from underground coal mines either in advance of mining, during mining activities, or after mining has occurred. The liberated methane exits the mine through drainage systems or mine ventilation systems. In the case of abandoned underground mines, the liberated methane exits through vents or drainage systems. (See, Coal-Related Greenhouse Gas Management Issues, May 2003, National Coal Council, United States.)

55. When liberated in advance of mining, methane is drained through vertical boreholes drilled into the coal seam much as in conventional natural gas production. This type of CMM recovery often occurs years ahead of the mining activity.

56. CMM that is drained in advance of mining is also considered to be coal-bed methane, or CBM. This methane is often of very high quality, and acceptable for injection into natural gas pipelines. Horizontal boreholes are sometimes used for degasification in advance of, but near the time of, mining. This process often produces high quality gas that can be recovered. However, its recovery is frequently impractical and much of this gas is emitted through boreholes to the surface or with the ventilation air.

57. After coal is extracted in a long wall type of underground mine, the methane can be released into the mine to mix with the ventilation air or it can be drained through vertical wells. This CMM can be of pipeline quality; however, it is often contaminated with air and must be processed prior to being injected into the pipeline.

58. Ventilation air is another source of methane emissions from underground coal mines. Air is drawn through underground mines, to provide a breathable atmosphere and to dilute the liberated methane to concentrations usually below 1 per cent for safety reasons. The ventilation air mixes with liberated methane and the mixture is exhausted into the atmosphere.

59. Technological advances and commercial downstream market developments have spurred an increase in CMM/CBM recovery and use. Such projects are well-established and continue to grow in the United States and other developed countries. However, implementing projects in developing countries and in economies in transition has proven more challenging. (For a detailed listing of the international and risk issues, visit the US EPA Coalbed Methane Outreach Programme (CMOP) website at: http://www.epa.gov/cmop/intl/workshopsummary.html.)

60. Barriers to the broad adoption of CMM/CBM capture include:

- Cultural differences,
- Legal and regulatory issues,
- Tax issues,
- Financial issues,
- Technological issues, and
- Infrastructure issues

(a) Cultural

61. Linguistic differences, different business practices, varying social structures, etc. can be significant impediments to project development. One cultural barrier is the primary purpose behind development -- the goal of the investor is to make money, while the host country partner might have multiple goals. The in-country participant often sees the project in a more holistic light with social benefits as well as economic benefits. Investors should understand this when considering projects in these countries.

(b) Legal/Regulatory

62. Investors want clear legal standards for production sharing agreements and gas ownership; drilling rights; transfer of the exploration license to production; a dispute resolution mechanism; payment, and recourse and remedies in the event of non-payment and breach of contract.

(c) Tax Issues

63. Tax issues are related to legal and regulatory concerns, since taxes are levied by or under the authority of government bodies and are usually codified in a statute or rule. However, tax administration presents its own set of barriers in addition to those stated previously. The confusion created by the vague and inconsistent application of tax laws can lead to over taxation that, in turn, leads directly to reductions in the return on investment.

(d) Financial

64. Major financial issues include a desire for transactions to occur in hard currency, a demonstration of in-country capital, and fixed gas prices for a predictable revenue stream.

- Currency risk is a normal commercial concern;
- Local championship shows that the project has support and those persons or organizations within the country are willing to accept some of the risk;
- Energy prices, including gas prices, fluctuate, and are sometimes subsidized.

(e) Technological

65. Barriers exist for transferring technology to developing countries and for transfer of technologies out of developing countries. There are many reasons for technological barriers including:

- Laws restricting the use of foreign equipment,
- Equipment certification by the developing country,
- Lack of capital to purchase the equipment,
- Inadequate infrastructure to transport the equipment to its destination or support it once it is there, and
- Lack of appropriate training.

(f) Infrastructure/Immature Markets

66. In many developing countries, the physical infrastructure is inadequate to support CMM/CBM projects in the same capacity that exists for CMM/CBM projects in developed countries.

67. While all of these risks are real, the financial, health and safety, and environmental rewards from the development of CMM/CBM projects are huge and that is what motivates the United Nations, World Bank, US EPA and other stakeholders to encourage more CMM/CBM activities in more countries.

V. METHANE TO MARKETS PARTNERSHIP

68. The Methane to Markets Partnership announced in July 2004 is an action-oriented international partnership that will reduce global methane emissions to enhance economic growth, promote energy security, improve the environment, and reduce greenhouse gases. The initiative will focus on cost-effective, near-term methane recovery and use as a clean energy source. It will be executed internationally through collaboration between developed countries, developing countries, and countries with economies in transition – together with strong participation from the private sector.

69. The Methane to Markets Partnership targets three major methane sources: landfills, natural gas and oil systems, and underground coalmines. Cooperative research into methane science issues and cost-effective activities to reduce agricultural emissions over the longer-term will also be undertaken. Other benefits include improving mine safety, reducing waste, and improving local air quality.

70. The Methane to Markets Partnership is a new addition to the series of international technology partnerships advanced by the Bush Administration on hydrogen, carbon sequestration, fusion and advanced nuclear power technologies. These initiatives will help develop and deploy the transformational energy technologies that will significantly cut projected emissions and the GHG intensity of the global economy in the context of sustained economic growth.

71. The Partnership has the potential to deliver by 2015 annual reductions in methane emissions of up to 50 million metric tons of carbon equivalent or recovery of 500 billion cubic feet (Bcf) of natural gas. These measurable results, if achieved, could lead to stabilized or even declining levels of global atmospheric concentrations of methane.

72. Participating countries will soon develop a charter that outlines the purpose, organization and action plan for the Methane to Markets Partnership. The principal national commitments for partners could include:

- Building on existing, reliable inventory systems to identify and monitor methane emissions;
- Identifying cost-effective opportunities for capturing methane emissions for energy production;

- Undertaking collaborative projects aimed at these specific opportunities;
- Supporting the development of voluntary consensus standards;
- Identifying barriers and improving the legal, regulatory, financial, and institutional conditions to create effective energy markets that will attract private sector investment in methane recovery and utilization projects; and
- Developing an action plan for reducing methane emissions and a process for evaluating its implementation.

73. In addition, developed country partners would assist developing countries and countries and economies in transition in expanding methane recovery projects through cooperative technical assistance, technology deployment, and market conditioning.

74. This initiative seems not be crafted as a research initiative, but as an initiative that lead to real project, real financial results, and real environmental improvements.

VI. CONCLUSIONS

75. The coal industry should look at environmental markets as part of its business, whether in the United States or the Russian Federation or anywhere. The business opportunities relate to the trading of emissions or renewable credits and the capture and use of CMM or CBM.

76. Project development is nothing new for the coal industry and trading of coal is a fundamental of the business. Successful coal traders understand the natural gas and oil business besides understanding technologies and transportation issues. Trading of energy related commodities is no mystery and coal traders are in abundance. However, while natural gas traders have participated in emissions trading markets, the coal industry, in general, has not. While power companies have been engaged in finding uses for ash, this has not been a business captured by the coal industry. While the capture and use of CMM and CBM is a natural add-on for the coal industry and provides both strong revenues and true sustainable energy outcomes, the industry has not aggressively embraced this new business.

77. The coal industry has evolved over the years and is still evolving; capturing environmental benefits will be part of that evolution and can also contribute much to its sustainability.

VII. REFERENCES

78. References and citations are available from the author on request.