

WHO'S AFRAID OF THE KYOTO PROTOCOL?
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I would like to thank Mark Hurst for inviting me to address you today on a topic which I am sure you are less enthusiastic about than those addressed by some of the other speakers ahead of me. Before I begin I would like to share with you an anecdote from a famous British author writing at another time when coal was as expensive as today. In the opening scene of Dickens's "A Christmas Carol" Ebenezer Scrooge unbraids his clerk, Bob Cratchit, as follows: "Coal burns. Coal is momentary and coal is *costly*. There will be no more coal burned in this office today". He then tells him that in the future he has to wear more wool clothing to keep him warm rather than to burn additional expensive coal. Undoubtedly this winter some of your customers in Europe will sympathize with Scrooge's sentiment.

As I stand here today and look out across this crowded room, I am reminded of a time in February 1997 when I chaired a conference in New Orleans with the grandiose name of "World Coal Conference." These were annual meeting whose primary purpose was to have a good time at Mardi Gras. In order to expose everyone to a wider range of opinion, I had taken to inviting key note speakers from the gas industry or even environmentalists. In that year I had the American head of Greenpeace. Before he began his presentation he stood at the podium, looked at the audience and said "I hope you are all preparing your resumes because in ten years none of you will be in the coal business." Well not quite ten years have gone by and I dare say that this room is far more crowded then the conference was in New Orleans that year. Internationally traded coal volumes will set another all-time record in 2004 and prices are at levels that we haven't seen since the early 80s. Apparently, no one listened to the man from Greenpeace. Last week the German edition of the *Financial Times* on its front page carried the headlines: "Hard Coal Renaissance." Several days later the front page of the business section of *The New York Times* carried the following headline: "Fuel of the Future: Coal." Despite Kyoto, the coal industry has entered a period of strong growth.

When talking about global warming, one of the questions that the coal industry often asks is, how good is the science? The scientific findings are not entirely conclusive, but the more work that is done the more likely that it becomes that there is an element of human causation in the gradual warming of the planet that is now taking place. There are still skeptics on both sides of the Atlantic. As a non-scientist it is always hard to judge how serious the scientific controversy is. It appears when one does some reading that much of the criticism of the science of human-induced global warming has been driven from the pages of peer reviewed publications and is now found mostly in the internet. In the United States the attack on the policy consequences being drawn about global warming can be found in the publications of this conservative think tank: The Cato Institute.

Does the controversy over the scientific aspect matter? No. From a political policy point of view and from a public perception point of view it is already too late. The average person and the average politician concluded that there is a proven causal relationship between the growth in emission of manmade greenhouse gases (GHGs) into the atmosphere and the increase in global temperatures with a resulting change in weather activity. In the late 1990s, the scientific debate was dominated by the publications of the Intergovernmental Panel on Climate Change (IPCC) of the United Nations Framework Convention on Climate Change. You will have seen that before the U.S. election there were reports of a new study on the Arctic, whose publication date had been delayed until after the U.S. election. This study is now out and it constitutes the newest broad scientific analysis of climate change in the Arctic conducted by more than 300 scientists from the eight countries that have territories north of the Arctic Circle: the Arctic Climate Impact Assessment. The various scientific findings resulting from this work will dominate the debate in the next several years. In fact, the U.S. Senate has scheduled hearings on the report.

The graphics that follow come from the same report and provide some indication of the latest projections on climate change. The first shows the significant fluctuations of temperatures that have occurred in the Arctic over the past thousand years. However, in the past several decades, temperatures have climbed out well beyond that historic range. This is coincident with the increase of the use of fossil fuels and the concentration of CO₂ in the atmosphere. However, the change in temperature is far from linear. There are significant variations with cold periods occurring in the 1960s and 1970s, which do not line up well with the steady increase in atmospheric CO₂ concentration throughout that period. There are clearly therefore other factors at work.

The result of the ACIA study is projections of dramatic increases in Arctic temperatures. There are a variety of explanations for why the impact of global warming is more extreme at the Poles than it is in the more temperate parts of the globe. The temperature increase projections are approximately double of those suggested by the IPCC for the mid latitudes in North America and Europe. This is accompanied by projected global sea level increases and these are not the result as some press reports have noted of the melting of floating pack ice, but rather are the consequence of the melting of the Greenland ice sheet. As you can see, that process is moving along quite quickly with a significant change occurring between 1992 and 2002. The ice that remains on the map on the right is in places as much as 3 km thick.

Greenhouse gasses have different global warming potentials, and therein lies a key commercial element for the coal industry. Methane has twenty-one times the global warming affect as carbon dioxide. As a consequence, reductions in methane in a world where CO₂ has a value, become economically interesting to anyone with an underground mining operation. Overall, the IPCC found that carbon dioxide accounts for about 55% of the anthropogenic greenhouse affect. Methane is second in importance with 17%.

CO₂ emissions by country line up well with total primary energy supply. The U.S. accounts for 24% of the world's CO₂ emissions, China for 13%. The second largest economy, Japan, accounts for 4.8%. Similarly the U.S. accounts for 22.4% of the total primary energy supply, again followed by China with 11.2% and Russia with 6.1%.

When CO₂ emissions are allocated by population, a totally different group of countries are the world leaders. The world average is only 3.88 tonnes per person, but on a per capita basis the leaders are OPEC countries, such as Kuwait and Qatar. The U.S. at 19.84 tonnes of CO₂ per person is still well above European averages, which are in range of 10-11 tonnes per person. These numbers are of some importance because there is considerable thought being given in the environmental community to the idea of abandoning or at least significantly altering the Kyoto structure, which imposes individual country caps. As will become clear below, this is a process that appears likely to be unsuccessful in reducing CO₂ emissions. As a consequence, some environmentalists have proposed that the post-Kyoto (post 2012) CO₂ reductions process utilize different models. One of these referred to as "convergence" would assign a CO₂ budget per capita that must be met by the end of the century. This CO₂ budget would be identical across all countries, giving every country the same per capita total of CO₂ emissions that needed to be met by the end of the century. This would include both the developed and the developing countries and would allow plenty of time for the adoption of new energy technologies. Under this scheme, CO₂ emissions would continue to rise for several more decades before declining precipitously in the later decades of the century.

The CO₂ emissions could also be looked at on the basis of units of GDP. In this case the Europeans and the U.S. are not that far apart on the virtuous end of the scale. China, with 2.75 tonnes of CO₂ per unit of GDP, is four times as great a polluter than the U.S., and the U.S. is only twice as great as the EU. One of the other alternatives to the Kyoto cap and trade approach involves targeting CO₂ reductions by unit of GDP. On a recent visit to Washington I was told that this is a model that has been under discussion and it may in fact be one that even the Bush administration might consider. Again, it would involve bringing in all of the countries, including the developing countries, into a scheme under which everyone would commit to targeting a reduction in CO₂ amounts per unit of GDP. Since in fact those numbers have been falling for all of the industrialized countries, this makes for a much easier target. It will be more difficult for countries like China and India to achieve, although experience suggest that fuel use, particularly in industry, becomes significantly more efficient as a country's economy develops. In addition, commitments to CO₂ reductions per unit of GDP will not have the negative affect on economic growth that led the Bush administration to withdraw from the Kyoto Protocol process. Many environmentalists do not like this approach because, in fact, it may not reduce overall CO₂ concentrations in the atmosphere, it will simply slow the growth.

Although Kyoto, with the signing by the Russians, becomes law on February 16th, 2005, it will have only a very limited impact on slowing CO₂ emissions into the atmosphere. The reason is that with the absence of the United States and China the big emitters are outside of the process. Since CO₂ emissions are a global issue, there is virtually nothing that Europe can do no matter how virtuous Europeans may feel with the legislation they

have put in place to slow the growth of global emissions. The next graph shows the absolute change in U.S. GHG emissions. By 2000, we were 908 million tonnes above the 1990 level; the recession of 2001 reduced this. The numbers for 2002 and 2003 are not yet out, but a past experience suggests a strong bounce-back from the reduction in energy during the recession and energy utilization figures tend to confirm this. Thus, at present it is safe to say the U.S. is well over 900 million tonnes above 1990. Had it signed the Kyoto Protocol its target would have been a 7% reduction from 1990 levels. As you'll see when we talk about Europe, the U.S. growth in emissions is ten times as great as the EU-15 domestic reductions in their emissions in the same time period. Thus, if one considers as well the fact that China's domestic coal production and therefore domestic consumption have increased by 200 million tonnes in each of the past two years, one quickly realizes that no matter what Europe does on this issue it is largely irrelevant to the growth in global CO₂ emissions.

As you can see, U.S. emissions grow more strongly during periods of economic growth, and during recessions they in fact decline. This is true with the rest of the world as well. One way to significantly reduce emissions is to accept very low economic growth rates. Certainly some European countries, such as Germany, have involuntarily adopted this strategy.

The latest energy forecast put out by the International Energy Agency (IEA) is the *World Energy Outlook 2004*. This modeling effort includes all implemented policy decisions, including the EU burden sharing agreement and renewables legislations in individual EU countries up to July 2004. This legislation is included in the reference scenario. The alternative scenario includes the overall impact of Kyoto (which had not yet been signed in July 2004) as well as the assumption that the EU and other countries will hit all of the renewables targets that they have set. Under both the reference and alternative scenario, global energy consumption continues to grow significantly in the next 25 years.

Global energy-related CO₂ emissions continue to climb under both the reference and the alternative scenario. In the reference scenario, which I noted contains all of the agreed policy initiatives up to July 2004, CO₂ emissions continue to climb at an annual rate of 1.7% per year. Under the reference scenario, coal usage continues to climb from 2.4 billion toe in 2002 to 3.2 billion in 2020 and 3.6 billion in 2030. Under the alternative scenario, both total energy and coal consumption climbs more gradually to 2020. Coal in that year is 2.7 billion toe. By 2030 total energy consumption increases, but coal remains at the same level as 2020. In the IEA forecast broken down for Europe, under the reference scenario shows virtually no growth in coal usage in Europe and a decline in the period 2020-2030. In the alternative scenario, coal usage in Europe declines sharply from 303 million toe in 2002 to 242 million in 2020 and 177 million in 2030.

Under the Kyoto Protocol most of the developed world accepted an 8% reduction in CO₂ emissions from the base year, which was generally 1990. There are some exceptions that were negotiated: Australia has the ability to increase 8%, Iceland 10% and Norway 1%. Canada only has to reduce by 6% and the United States by 7%.

The former centrally planned economies similarly have in general an 8% reduction, although Russia and the Ukraine have no reductions and Poland and Hungary have only 6%.

The next slide has significant policy implications. It shows the EU Burden Sharing Agreement under which the 15 old members of the EU redistributed the overall EU responsibility of an 8% reduction in CO₂ emissions and GHG emissions from the 1990 levels. The latest emissions data available is 2001. 2002 data should be available in the next several months. Although 2001 was a recession year, it shows that the 15 EU countries in their internal GHG emissions were only able to achieve 2% of the 8% reduction. This amounts to 83.4 million tonnes of CO₂e, or less than 10% of the amount of the U.S. increase in emissions during the same time period. Moreover, there is a strong likelihood that if we had 2003 data it would show an even smaller reduction. In recent days two countries, Sweden and Finland, have announced their 2003 CO₂ emissions data. Both of them show significant growth in the last two years, with Finland showing a total, according to press reports, of 20% above its 1990 level. The likely cause in the sharp increase in CO₂ emissions in Scandinavian countries in 2003 is the major reduction in hydro generation during that time period, which increased coal imports into the Scandinavian countries by approximately 7 million tonnes.

The important thing to note is that without the contribution of Germany of a reduction of 218 million tonnes, more than two and a half times as great as the overall reduction of the EU-15, the European Union would look not much better than the United States in meeting its Kyoto targets. It is not windmills, renewables and energy efficiency, which enables the EU to feel virtuous about its Kyoto commitment; it was the economic disaster that befell the people of East Germany when they are unified with the West. Almost all of the German reduction occurred in the east and it was bought at a cost of economic dislocation and social misery only partially offset by the massive transfer funds from West Germany to the East after unification, a transfer which still continues to this day.

The good news for meeting Kyoto targets is Central and Eastern Europe, including Ukraine and Russia. However, again these countries, with the exception of Ukraine and Russia, have to meet an 8% reduction, but will have no difficulty achieving that goal since reductions based on the 2001 numbers range into the mid double digit percentages. It is important to note that for Russia and Ukraine particularly and to a lesser extent for all the other countries, these reductions represent a collapse in their economies. A review of the growth in the Russian economy in the last three years indicates that the energy to GDP efficiency has not improved and therefore any great improvement in the Russian economy will bring with it significant increases in CO₂ emissions. This is less true for the countries that are the new members of the EU. These on the whole have restructured, and to a significant extent closed their old dirtier energy inefficient industries and there has been a steady improvement in the efficiency of energy consumption per GDP unit. The new Central European members of the EU represent a huge reservoir of “hot air” under the Kyoto Protocol, some of which may be allocated to industrial facilities who can then use it in the EU emission trading system. In general, despite the reductions mandated by the EU in the National Allocation Plans (NAPs) of Slovakia and the Baltic

countries in July 2004, it appears that the over-allocation in Central Europe will amount to 10-15%. This will create a large pool of additional allowances, which once the system is up and running in 2005 will be sold to facilities in the original EU-15. If Russia also develops a parallel allowance system, as been indicated by some Russian government officials in the 2008-2012 period, a very large reservoir of hot air may be available for purchase by EU member countries. This will enable everyone in Europe to feel virtuous and pat themselves on the back and feel that they have met the Kyoto targets.

The reality is significantly different. In fact, it appears that those EU countries with the strongest economic growth, such as Spain and Ireland, do not stand a chance in meeting their Kyoto targets from their indigenous efforts. They therefore will need to buy allowances from the pool created by over-allocation in the new Central European EU members as well as utilizing the Clean Development Mechanism (CDM) and Joint Implementation (JI) mechanisms allowed for in the Kyoto Protocol. There are several hundred million tonnes of CO₂e already in the pipeline in project developments under those two mechanisms in developing countries.

In fact, a huge bureaucracy is being created to manage this entire process. The question that even true believers among the environmentalists have begun to ask is: When you add in all the land use and forestation to the emission trading manipulations that appears likely to take place, is the result only a lot of sound and fury signifying nothing in terms of global CO₂ emission reductions?

The past year, however, has been very valuable from policy point of view. The Point Carbon pricing graph reflects emissions trading in Europe. At the end of 2003 and early 2004, bank analysts were projecting prices by as €25/tonne of CO₂. While Germany's draft NAP was still in the hands of the true believers of Mr. Trittin's Environmental Ministry, prices remained high. Once it became clear, however, that Germany would choose economic growth over environmental purity the market price collapsed. It has since stabilized at around €8.50-9.00/tonne CO₂. There are a number of recent predictions that the price could go even lower to €5.00 once trading commences in 2005 and some forecasts see prices below €5.00/tonne CO₂. At the current levels and at projected levels the impact on fuel switching is negligible. Where there is surplus existing capacity, such as in the UK and The Netherlands, some marginal fuel switching may occur, but in most countries the impact of current prices is not sufficient to encourage the closing of coal-fired powerplants and the construction new gas combined cycle units as their replacement.

While in 2002 and 2003 there had been much talk of the next phase of Kyoto leading to big reduction targets of 40-60% from 1990 levels by 2050, the sobering reality of how difficult it is to meet even existing commitments in Europe will bring a good dose of reality to the discussion of the post-Kyoto CO₂ reduction regime. Regardless of their statements, most politicians in Europe are more interested in economic growth than they are in CO₂ emission reductions. As usual in political circles there is no admission that it is either/or, the public can have everything it wants. The reality, however, is that if European countries with their aging populations are to meet their onerous social and

pension costs, they will need to increase economic growth. This can't be done at the same time as crippling caps are put on CO₂ emissions. The global warming debate will not go away and there will be some type of post-Kyoto legislation. It is, however, clear that setting challenging targets that may result in significant economic hardship is probably out of the question. Although warmer summers and rising sea levels are of some concern, the real impact from global warming is not expected during the lifetime of the current generation. Today's voters have priorities such as employment, pension and health care, which if given a choice they would probably not be willing to sacrifice in return for less CO₂ in the atmosphere at the end of this century. In addition, the sample of the numbers provided above make clear that any future CO₂ reduction plan must include the United States as well as the large developing countries such as India and China. Otherwise, Europe would be digging an economic hole for itself to no consequence since reductions in the past decade in Europe have easily been offset by one year's growth in China.

Now to briefly turn to a second element of my speech, which deals with how one can benefit as a business from the commercialization of GHGs. The flexible mechanisms of the Kyoto Protocol, CDM and JI, have created project-specific efforts to reduce GHGs in developing countries and in the former centrally planned economies (JI). These projects create emission credits, which beginning 2005 can be utilized within the EU emission trading scheme. The pie charts represent different technologies that in the past several years have been utilized in the creation of such credits. As one can see, most of these projects were initially focused in Latin America and in more recent years they have been focused in Asia. The buyers have generally been the Japanese and the Dutch, as well as Canada. This global market in emission reductions has grown significantly, exceeding \$300 million in 2003 and likely to reach \$400 million in 2004.

Prices for emission reductions measured in tonnes of CO_{2e} vary. The major variables include the country risk, the project risk and the technology risk. Where the buyer takes the liability, prices are relatively low. Higher prices are available if the seller takes the liability. The difference between these two types of contracts is that where the seller takes the liability in the more expensive form of contract there are even instances of the seller assuring the buyer of the availability of an emission reduction even if the project for one reason or another fails. This would involve the seller entering into the market and buying alternative emission reductions.

For coal companies, projects involving methane are of considerable interest. In the United States at working mines in the past ten years, methane emissions into the atmosphere have been reduced by 85%. All of this has been done without any legislative encouragement, such as the preferential electricity price that exists in Germany for electricity produced from mine methane. In the United States in general, different technologies have been pursued; these focusing primarily on the upgrading of mine methane to pipeline quality gas and the sale of that gas into the national gas transmission pipeline system. What still remains to be dealt with is ventilation air methane (VAM). An EPA study shows that in tonnes of CO₂ equivalent this amounts on a global basis to 237 million tonnes in the year 2000. This total is expected to increase, particularly as a

consequence of mining in China and Ukraine, to 308 million tonnes CO₂e by 2020. New technologies are now being commercialized, which allow the oxidation of the methane of VAM down to amounts to portions as low as 0.1%. The heat generated through the oxidation process is then converted to steam to drive a turban, resulting in the production of electricity as well as waste heat.

An analysis by the EPA shows that it is economically far better to place a value in emission reductions that can be traced back to the reduction on VAM from the mine than it is to adopt the practice, which occurs in some European countries of forcing companies to buy above-market priced electricity produced from such projects. For example, what the EPA study shows is to get a 30 million tonne CO₂e reduction in VAM, the electricity price would have to exceed \$0.13, a multiple of the current wholesale market in the United States. However, if CO₂ emissions were a tradable commodity, the value of a tonne of CO₂e need be less than \$3.50 to achieve the same result, with significantly less resulting economic dislocation. On other words, from the point of view of coal mines, the flexibility mechanisms found in Kyoto may be quite beneficial and may result in additional income streams. The resulting credits can be sold in the market or they can be sold together with the coal. There are already some proposals floating among the London trading community for the sale of coal combined with emission reduction credits.

The final graph shows conceptually how an individual mine methane reduction project methodology is developed and how the carbon credits are generated.

I hope that this has provided you with some overview of the Kyoto process as well as giving you an insight into ways in which the flexibility mechanisms of Kyoto can create new business opportunities for the coal industry.

Thank you.

