The Cost of Kyoto: How Can Industry Thrive in a Post-Kyoto Environment?

*By Jean-Marie Bourdaire**

It is a pleasure to be with you in Rome thanks to the IAEE and to look, together with you, at the energy and carbon trends. Will they be as flat as the Kansas horizon as Amory Lovins put it for electricity in 1984?

We, in the IEA, do not believe in such a flat perspective. Our 1998 WEO and, the challenging paper on climate change that our executive director delivered last month to the IEA Energy Ministers at our 25th Anniversary celebration, provide the vision of a strong and regular increase of both energy and energy-related carbon emissions in a business-as-usual scenario. As you can see, our new approach is based on the notion of energy-related services: inputs in power generation, electricity demand, transport and stationary fossil fuel end uses in relation to the GDP.

So far, the only factor which evidently influences the past aggregated trends is that of prices: end-user price changes have resulted in a break of linear trends and, conversely, trends have remained constant as long as end user prices have not changed. Furthermore, comparisons among countries or regions reveal a clear inverse link between the slope of a trend, i.e., the energy intensity of GDP, and the end user price. These remarks apply either to final electricity demand, to the stationary fossil fuel end uses or to transportation trends. We believe that, unless significant price changes happen for end-users, these trends will continue unabated in the future. Whether this will be true also for energy supply is uncertain, but we are a little bit more optimistic because we expect that the overall thermal efficiency of power plants will increase thanks to technology (in particular in CCGT), competition (brought by deregulation) and a better use of the lost heat (e.g., with commercial and residential co- or tri-generation units).

Overall, given that energy accounts for 85 percent of all greenhouse gas emissions in developed countries, this highlights the size of the Kyoto challenge for the energy sector.

At this stage, let me share quickly with you a few thoughts on energy-related carbon trends. Their past rigidity highlights the challenge we collectively face to abate them.

To make a long story short, given the rise of the trends, Kyoto commitments come as an enormous challenge. It is in this context that I wish to address the topic of the practical implementation of the Kyoto protocol, and how industry can survive in an after-Kyoto context.

Today, most of the details of domestic policies and measures as well as the precise aspects of the elaboration of the flexibility mechanisms are not known. So, let me be simple and blunt in summarising my views in three words "certainty, fairness and cost-effectiveness".

Certainty, because both the deregulation process and the challenge brought by Kyoto are creating enormous uncertainties which prevent industry from moving and investing as fast as it could, thus lowering their contribution to economic growth. Uncertainty has a cost because decisions made in such a context imply high hurdle rates and myopic investment decisions. A clear step-by-step timetable, well-defined tools and objectives and strong institutions will contribute to create more "certainty".

Fairness is also very important because the competitiveness of the individual industrial actors is at stake if the burden of the commitments is not equally shared either among the national or the international competitors. Fairness is a two-sided coin with on one side the imposed emission target and, on the other side, the marginal value of this constraint.

This in turn leads us to a last aspect, that of cost-effectiveness. For industrial actors, the concern is not that of the overall national cost-effectiveness. They know that policy constraints will impose compromises such as a certain amount of domestic policies and measures, the choice of regulatory instruments in preference to economic instruments because of public acceptance, or a burden sharing across sectors and energy services which is not necessarily consistent with an unique marginal "carbon value". Hence, policy compromises will rather lower their pain.

Individual industrial actors need the insurance that the marginal cost will not skyrocket because of a lack of flexibility and the insurance that the government take, be it taxes, tradeable permits or the cost of regulations will be recirculated in the economy. This is the reason why industry backs the flexibility mechanisms. They lower the cost and spread the benefits on non IEA countries.

After this global overview, let me try to be more specific. In terms of economic instruments, only few options are available to engage industry on the road towards meeting the Kyoto goals. As I have mentioned, raising energy prices would be one option; the other, equivalent in economic terms is to apply tradeable caps to industrial emission sources. Many countries are considering this latter option, sometimes in combination with taxes: Canada, Denmark, New Zealand, Norway, the United Kingdom, the United States, to name a few. Denmark has already introduced a tradeable quota system onto its power producers, starting in 2000. Private companies such as BP-Amoco and Royal-Dutch-Shell are also applying tradeable permits to reduce their corporate CO_2 emissions. As a market instrument, trading seems to win the favour of industry.

As you all know, carbon taxes cannot be designed to meet emission objectives with full certainty. And tradeable quotas face their own problem: the uncertainty on the marginal cost of reductions, even if one knows that it is minimised by the system. If tradeable quotas are to be the instrument of choice for climate change policy in the industry sector, two practical questions are, therefore, worth asking: what system could remove the uncertainty on quota prices? And what system could avoid distortion of competition among industry actors covered by different systems?

There is one answer to the first question, and that is to cap the price of quotas with a penalty: companies could either meet their emission objective, or emit above that level and pay the penalty. No company should be ready to pay a price that is higher than the penalty. Of course, this principle only works if paying the penalty would cancel the extra-emissions. This is, in my view, the important point: penalty should act as a compliance incentive and not as another constraint.

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Summing up the BIEE 1999 Conference on: *A New Era for Energy? Price Signals, Industry Structure and Environment*

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This was the third BIEE conference in 'academic' vein and was a resounding success, with attendance of over 140. The Oxford setting was ideal, and compared to the previous two BIEE conferences held at Warwick, debate was sharper and sometimes had more political edge.

But the wider intellectual agenda was also different, and not just because the conference title had changed. The main reason for this changed agenda was that in the period of almost two years since the previous conference, world energy issues have moved on in at least two important ways:

- Mergers and takeovers have become a much more prominent feature of the world's energy industries, and companies in oil and gas as well as electric utilities are rapidly becoming much larger than ever before. Traditional issues about the effectiveness of competition, and the regulation of market power have assumed renewed importance;
- Environmental regulation has at last become a serious issue for many governments and energy companies. The environment has steadily moved up the international policy agenda since the late 1970s but only in late 1997 was the Kyoto Protocol agreed, carrying with it for the first time the prospect of legally binding commitments to reductions in carbon dioxide emissions. Some large energy companies now take serious account of environmental issues in their own planning, either defensively or (increasingly) as market opportunities.

It is always useful to start from first principles–for economists, Adam Smith. Smith's contribution was much wider than to analyse so brilliantly the advantages of markets and the division of labour: he was also deeply worried by the tendency of unregulated capitalism to lead to cartels and monopoly, and was a powerful advocate of the enforcement of market rules by public agents. The unhampered pursuit of profit, far from automatically leading to vigorous competition, often leads to high concentrations of market power, at least in those (common) situations where there are no diminishing returns to size or scale. So while *competitive* markets are necessary and desirable, we should not confuse them with *free* markets.

This is especially relevant for energy businesses, where company size is often large and political interest is intense for a variety of reasons. Politics cannot be abolished from energy markets, and economic analysis that simply complains of the 'irrationality' of politics is unlikely to help much. As Smith would have put it, we need political economy as much as economics.

The three themes of the conference were energy prices or signals, market structures and the environment. In slightly (but not wholly) facetious vein, and simplifying grossly, the following classification of the approach of the conference papers seems to make sense:

- in the case of prices, the dominant discipline is economics, the subject of study is markets, the preferred policy prescription is deregulation, and there was, in the conference papers, a general air of approval;
- for market structure, the dominant discipline is political economy, the subject is the interaction between markets and policy, and the policy prescription is *re*-regulation. The general tone was one of regrettable necessity;
- for environment, the discipline is political science, the subject is politics and the policy prescription is simply regulation.

In the environment case this was something of a surprise. Few papers were framed in terms of environmental economics, and when the environment came up, it mostly appeared not as a subject of analysis but rather as, at best, a constraint and, at worst, a serious nuisance. This suggests that the vast amount of recent years' work on environmental economics is yet to be taken seriously be many energy economists: the environment is seen as important politically and probably ethically, but not economically.

The linked issues of market structure, takeovers, integration and competition were intellectually dominant at the conference, and provoked much debate. Small may be beautiful, it seemed, but big may be necessary. But the idea of 'bigness' needs disaggregating. In the energy world, the dominant concept has historically been the engineering economics idea of economies of scale, where scale referred to the size of individual production units (turbine generators, oil platforms). It is now widely agreed that we are free from the tyranny of these economies of scale and smaller scale technology can compete profitably against large.

However a second kind of bigness remains vital–the economies of mass production. These have definitely *not* become redundant, and one of the main hopes for the new small-scale technologies like renewables is that the numbers of units needed (often hundreds or even thousands) will allow economies of mass production to work more effectively than for the older larger-scale technologies where batch production was the best that could be managed.

There was of course a third kind of 'bigness', directly connected to market structure–company size. If technologies were getting smaller in scale, and if being a small firm allowed flexible and rapid responses, why did companies keep getting larger and more integrated, horizontally and vertically?

Debate sometimes confused two quite distinct but often conflated ideas: competition and competitiveness. Competition is a property of a market system as a whole, and it is difficult to see many situations where greater concentration and integration lead to higher degrees of competition systemically. Competitive*ness*, on the other hand, is a property of the individual firm, and firms often feel that getting bigger will help them become more competitive, or successful in the market. But whether this leads to more *competition* is doubtful, though ironically much of the recent frenetic merger activity has been a defensive response to markets becoming more competitive in formal structure (for instance, the European electricity market). Several papers at the conference, from orthodox and more radical perspectives, raised serious questions about integration and increased degrees of market power: others made a spirited defence, from a market competition perspective, of the new larger companies.

Technology also featured in many more papers than at Warwick. The apparent contradiction between smaller scale technologies and larger companies was remarked above. But other papers also stressed technology in a variety of contexts: cutting costs in the North Sea oil business; responding to climate change imperatives; forecasting energy demand; and in the impact of liberalising electricity markets. All this reflected a concern with longer-term allocation issues, rather than the details of immediate re-structuring which had absorbed attention at earlier conferences.

Two last issues can be mentioned briefly. First, a number of papers seemed to sound the death-knell for the economic theory of depletion, which (crudely) argues that when natural resources are fixed, their price will rise at the real rate if interest as depletion proceeds. What the conference papers attacked was not the logic of this position but its assumptions: a mixture of technical progress in extraction and a constant stream of new resource discoveries appeared to be holding the depletion effect at bay indefinitely.

Finally, the biggest intellectual challenge of all was to find ways of reconciling the two great agendas affecting the world's energy industries: liberalisation and environmental protection. Pursued separately, these two agendas could easily prove contradictory (liberalisation encourages fossil fuels over hydro and nuclear: action against climate change is pre-disposed against fossil fuels). Several papers bravely tried to show these two agendas might be reconciled, and the challenge now is to take such analysis much further. This could just prove to be the theme of the next BIEE academic conference.■

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Global Warming Debate *(continued from page 25)*

indeed all of us, to become effective, need to function like *World War II radio operators striving to filter valuable intelligence out of the static and daily propaganda flood.* They need to learn how to process this huge data flow, assess it, deflect most of it, filter out some of the noise, store it in their back brain cells, retrieve it as needed, and compare it to new inputs from new sources as these occur. Without this capability individuals will become easy marks for the commercial, environmental, educational and political shysters that are endemic in our society.■

Notes and References

[1] The seminar was held on 9-25-98 and sponsored by The Houston Forum, with program support from The Gordon and Mary Cain Foundation. This event drew an eclectic and heterogeneous audience of about 300, including 40 to 50 high school students and their teachers.

[2] Westbrook, Gerald T., "Global Warming Forum on Science Behind the World's Hottest Environmental Issue," *eco•logic*, Number 46, Spring 1999.

[3] Wigley, T., *The Kyoto Protocol: CO_2, CH_4, and climate implications*, Geophysical Research Letters, 25, 2285-2288, July 1 1998.

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What could be an acceptable penalty level? Denmark is using 6 dollars per tonne of CO_2, that is, about 22 dollars per tonne of carbon. An IEA study on the impact of a 100-dollar carbon tax on energy-intensive industry shows the overall impact to be moderate, with variations across countries and industry, of course. Hence a "penalty" of say 20 dollars per tonne of carbon, the value chosen by the World Bank for their backcasting study and for their "carbon fund", would probably not have disruptive effects on industry and yet be effective given that, for instance, such a level is sufficient to make nuclear competitive against coal on average in IEA countries.

Finally, industries are also much concerned about their total as well as marginal cost of reductions versus the cost applied to their competitors. This has led some parties to the Climate Change Convention to call for applying the same allocation rules for emission trading across countries and industry. For instance, governments could all decide to grand-father emissions to industry, that is to distribute permits for free or to systematically auction them … Surely, there will be pressure by industry for grandfathered emissions, but I want to point out the fact that this is only the beginning of a discussion that aims to assure that the constraint on greenhouse gas emissions will not introduce blatant distortions in international competition.

To conclude, let me reiterate the obvious: for the energy industry, the Kyoto target is an immediate issue, given both the leadtime and lifetime of investments in the sector. It is also clear that the energy industry is likely to face considerable costs to meet these targets. In order to help industry move fast on this issue, governments need to deliver clear signals. I personally believe that a combination of tradeable quotas and a price signal, i.e., a modest penalty for non-compliance, may be best way forward. No doubt, governments and industry face an immense task to implement such a system, but they should realise that alternatives are few if they wish to address climate change seriously.■

Note: IEA Executive Director's paper on "Energy and Climate Change: the Challenge" can be obtained at http://www.iea.org/new/minist.htm