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INTEGRATING CLIMATE POLICIES IN THE EUROPEAN ENVIRONMENT

A Policy Report

by

Carlo Carraro* and Alessandra Goria**

This report summarises the main ideas, proposals, scientific achievements, consensus and conflicting issues that emerged at the Second EFIEA Policy Workshop, held at Fondazione Eni Enrico Mattei, Palazzo delle Stelline, Corso Magenta 63, Milan, Italy, March 4th-6th, 1999. EFIEA, the European Forum for Integrated Environmental Assessment, is a concerted action funded *by the Environment and Climate Programme of the European Commission, Directorate-General XII (contract no. ENV4-CT97-0450)*. The two main objectives of the EFIEA are: (i) to improve the scientific quality of integrated environmental assessment; (ii) to strengthen the interaction between environmental science and policy-making. In addition, the EFIEA fosters cooperation between scientists and decision makers inside the European Union, communication and cooperation outside the EU, and training of IEA techniques. The Second EFIEA Policy Workshop was devoted to improve communication and stimulate co-operation between different stakeholders, policymakers and scientists on the most relevant climate policy issues. The Authors of this report are grateful to Pier Vellinga and Richard Tol for many helpful suggestions and remarks. They are however the sole responsible for the opinions expressed in the report and for eventual misrepresentation of some participants' opinion.

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1. INTRODUCTION

If the necessity of short-term climate policies is often debated, the optimal policy to be implemented is even more controversial. Both efficiency and equity of different proposals are currently discussed, without achieving the sufficient consensus which would be necessary to adequately implement the Kyoto Protocol. One of the goals of the **European Forum on Integrated Environmental Assessment** (hereafter referred to as **EFIEA**) is to assess how integrated assessment approaches can help to identify the relevant policy questions on the one hand, and consensus answers to these questions on the other hand. The second EFIEA Policy Workshop¹ was specifically devoted to highlighting policy questions and answers related to climate issues by gathering representatives from science and economics, governments and NGOs, business and the EU Commission.

The main objective of the workshop was to analyse the costs and benefits of climate change policies from an integrated assessment perspective, addressing equity criteria in costs assessment, as well as identifying the mutual benefits and opportunities of international climate policies. The workshop focused on the analysis of climate change mitigation policies with the aim of providing an assessment of the decisions taken in Kyoto and Buenos Aires, and of identifying the critical issues to be addressed and tackled in the near future.

The two and a half day workshop was structured in three main sessions:

1. ***Costs: Fairness, Equity, Burden-Sharing***, which addressed the international, intergenerational and social equity issues emerging from the distribution of costs and long-term benefits related to climate change mitigation and adaptation policies.
2. ***Opportunities and Mutual Benefits***, which aimed at exploring the dynamics of the interaction of climate policies with different policy tools in a few relevant sectors, identifying the costs as well as the direct and secondary benefits involved in mitigation and adaptation strategies. The session mainly focused on the energy and transport sectors, including urban air policies.
3. ***Institutions and Policies after Buenos Aires***, which offered blue-prints for a climate policy, focusing on the integration of environmental policies with industrial and trade policies, as well as on the design of appropriate institutions and norms.

¹ The Second EFIEA Policy Workshop was held at the Fondazione ENI E. Mattei, March 4-6, 1999. The organising Committee was formed by Carlo Carraro (Chair), Pier Vellinga, Carlo Jaeger, Jill Jaeger, Jean Charles Hourcade,

A world wide call for papers was launched nine months before the workshop in order to collect the best and most recent research analyses on climate issues. In order to avoid a large number of scientific presentations to give time to policy discussions, scientific papers were circulated but not presented. The contents of the scientific papers were summarised by five surveys: “International Equity in Climate Change Policy”, presented by Bert Metz², “Intergenerational Equity and Discounting”, presented by Ferenc Toth³, “Energy and Climate Policies”, by Alessandro Lanza⁴, “Transport, Urban Air Policies and Climate Change Policy”, by Stef Proost⁵, and “Blue-Prints for a Climate Policy”, by Frank Convery⁶. All surveys will be published in a special issue of *Integrated Assessment*.

The workshop gathered academics, policy makers, representatives of the industry in various sectors, as well as Non-Governmental Organisations’ and environmental associations’ representatives. This report intends to provide a synthesis of the main ideas and concerns expressed in the workshop, by underlying the relevant policy questions emerged from the scientific surveys’ presentations and the debates, by identifying those issues which encountered a general consensus and those which generated conflicting views, and finally by highlighting the new policy perspectives addressed and recommended.

It is worth noticing that during the workshop, despite the presence of different, sometimes conflicting stakeholders, some general ideas were supported by all parties. For example, the link between equity and efficiency of climate agreements was clearly identified and emphasised. On the one hand, an equitable agreement induces more countries to commit to emission control, thus enhancing its effectiveness; on the other hand, a cost-effective agreement reduces the conflict on distributional issues. Another example is the importance of using the so-called Kyoto flexibility mechanisms to reduce the costs of compliance. These ideas, and the related policy perspectives, will be discussed in more detail in the last part of this report.

Martin O Connor, Ferenc Toth. The Organising Committee is very grateful to Monica Eberle and James Shaw for their very valuable help in the organisation of the workshop.

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³ PIK, Potsdam, Germany.

⁴ International Energy Agency, Paris, France.

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⁶ University College of Dublin, Ireland.

The structure of the report is as follows. The next section will present the main policy questions. Section 3 will identify a few issues on which consensus emerged during the long and lively debates that took place during the workshop. Section 4 will focus instead on the issues on which conflicting views could not be resolved and for which further research efforts and deeper interactions between science and policymaking are necessary. Finally, Section 5 proposes a few policy guidelines that reflect the main ideas debated on the last day of the workshop. Notice that the papers quoted in the following sections were all submitted for circulation and discussion at the workshop. The final section summarises the main ideas that emerged during the five sessions of the EFIEA policy workshop.

2. RELEVANT POLICY QUESTIONS

The most relevant policy questions addressed at the EFIEA workshop are grouped into a few broad classes, reflecting policy questions relating to equity, policy integration and policies by sector.

2.1 EQUITY

Equity issues were at the core of the workshop. The terms of reference of first the workshop, and then the scientific surveys and debates, identified some key equity issues for global warming policies. The following main broad policy questions were addressed:

**** Which equity dimensions should be addressed by international climate policies?***

When equity objectives are concerned, international policies involve several dimensions of equity: equity between countries, referred to as *international equity*, equity between different social groups and stakeholders, i.e. *national/social equity*, and equity between generations, mostly referred to as *intergenerational equity*. These multiple equity dimensions apply to equity on impacts, adaptation and mitigation of climate change. Current climate change policies mainly address international equity issues, which are crucial to the implementation and evolution of the UNFCCC and of the Kyoto Protocol. So far international equity in climate change mitigation has been central to the climate change debate; the international equity aspects of climate change impacts and adaptation have instead received little attention.

*** *Does equity in climate change impacts and adaptation deserve more policy attention?***

This question relates to the multiple facets of the equity problem among which the following ones emerge in the literature:

- the precautionary principle should be applied with equity issues in mind: what counts is the risk of the most vulnerable (Martin, 1997);
- climate change impacts are likely to vary considerably between countries; in hotter climates and natural resource dependent countries, the impacts are widely expected to be adverse (IPCC, 1996);
- institutional and social structures in developing countries tend to be weaker and these countries lack financial resources: present inequalities are likely to increase (Shukla, 1999);
- small islands, low lying areas, and very dry regions are exceptionally vulnerable; adaptation options vary widely and may not exist at all (Banuri *et al.*, 1996).

*** *How does equity relate to efficiency, i.e. the achievement of emissions reduction targets at the lowest cost? Is there a trade-off between equity and efficiency objectives in climate change policies?***

There is a widespread opinion that, through emissions trading, efficiency in emissions reduction can be made independent of equity (the initial distribution of permits). In other words, a system of tradable permits may allow for the separability of equity and efficiency: equity objectives could be pursued in line with efficiency criteria, provided that the distribution of permits is equitable. Rose *et al.* (1998) note that an equitable distribution of permits will enhance efficiency: “Interestingly, this pursuit will actually promote efficiency as well. We have taken for granted the issue of the comprehensiveness of the number of parties to an agreement. If more parties can be enticed into it by appealing to their equity concerns, environmental quality will be further enhanced. If these parties have relatively lower abatement costs than the original signatories, overall economic efficiency will be improved”. Rose *et al.* (1998) note that the concept of separability between efficiency and equity applies both to a static and dynamic framework, allowing intergenerational equity issues to be addressed along with inter-temporal efficiency: “Permit trading over time promotes even higher levels of efficiency by capitalising on abatement cost differentials in different periods”.

However, are these conclusions really sound? Do they refer to a specific definition of efficiency and of equity? Can the amount of resources that a system of emission trading distributes affect other

economic variables, in addition to the environmental ones, thus affecting economic efficiency and equity? Is there a social dimension of equity which is neglected by economic analysis? If the above conclusions are correct, how can an equitable distribution of permits be achieved? Is the distribution of emission allowances implicit in the Kyoto Protocol equitable?

**** How can climate change policies be made consistent with other public policies? Are Costs-Benefits Analysis techniques applicable to the climate change problem? And what would be the most appropriate discounting procedure to compare costs and benefits over time?***

The choice of the appropriate discounting technique is crucial to weight the costs and benefits of integrated climate policies in an inter-temporal dimension. Ferenc Toth, from PIK, Germany, provided a review of the various discounting techniques that have been proposed and applied in integrated climate change models. Dealing with the effects of climate change, which imply long-time horizons, possibly irreversible changes, the threat of environmental catastrophes, leads to Toth's dilemma: "one can attempt to be consistent with economic theory and empirical observations, but in this case the derived discount rate will be in the order of 5 to 8%. As a result, even possibly significant damages from climate change turn out to be negligible when considered at their present value. The artificially low discount rate based on ethical reasoning, on the other hand, makes climate-related decisions and resource allocation inconsistent with the majority of other public decisions".

Toth concludes that three major lines of thought regarding the choice of costs-benefits techniques can be identified in the literature and in the current debate:

- a) a first view, based on the consideration that impacts and benefits related to climate change will occur very far in the future, believes that standard cost-benefit analysis (CBA) is appropriate even for policies applied to climate change. Therefore the discounting technique should not differ from other policies standards, provided they are revised on a regular basis.
- b) a second view "recognises that the technique of CBA is appropriate to address climate policy but tries to bring distant economic losses due to global warming closer to the attention of today's decision makers", using lower discount rates for the evaluation of far future impacts. Nordhaus (1997) however points out that this procedure does not help to achieve efficient abatement policies, nor to save unique environments.

- c) a third view sustains that, if the environment is highly at risk and irreversible changes are foreseen, CBA may have only a limited validity. The best strategy would be to define specific long-term environmental goals and work out the optimal cost-effective policy to reach them.

Is there a way to compare the above proposals? Is there a consensus on how to compare environmental benefits and abatement costs? How should the intertemporal discount rate be fixed when evaluating the net benefits of climate policies?

*** *Which main equity issues should be addressed by climate change mitigation policies?***

Some policy issues are often indicated as the most relevant in terms of their implications for equity: the definition of the emissions reduction quota for Annex 1 parties, the criteria for 'burden' sharing, the implementation of the sinks provision, the design of the Kyoto flexibility mechanisms, the share of proceeds for the Clean Development Mechanisms project activities, the consequences of participation in the Kyoto mechanisms for both Annex 1 and non-Annex 1 parties, the future participation of parties in mitigation.

However, are there other issues that are relevant for equity but are not sufficiently analysed? What is the link between equity issues addressed by mitigation policies and those addressed by adaptation policies?

*** *Which equity criteria could be reflected in burden sharing?***

The evaluation of costs and opportunities of alternative climate policies should fully address their implications for equity. Berk *et al.* (1999) emphasise that there is no common accepted definition of equity in climate change policies. Rose *et al.* (1997) distinguish three types of alternative equity criteria for global warming regimes:

- 1) *allocation based criteria*, defining equitable burden sharing in terms of principles for the distribution of emission rights;
- 2) *outcome based criteria*, defining equitable burden sharing in terms of the consequences of mitigation policies;
- 3) *process based criteria*, defining equitable burden sharing in terms of the process for arriving at a distribution of emissions burdens.

This distinction raised a broad fundamental question: *should equitable policies imply equitable outcomes and/or equitable procedures?* Rose *et al.* (1998) write: "Fairness in one area of the policy

may have quite different implications in another, i.e. a principle that gives all countries an equal proportion of permits in relation to their initial emissions will not result in equal percentage emissions reductions or equal percentage changes following trading”.

Ringius *et al.* (1998) propose the following equity principles to address climate change policies:

- 1) *egalitarian*: people have equal rights to use the atmosphere;
- 2) *sovereignty*: current emissions constitute a status quo right now;
- 3) *horizontal*: actors under similar (economic) conditions have similar emissions rights and burden sharing responsibilities;
- 4) *vertical*: the greater the capacity to act/ability to pay, the greater the economic burden, and
- 5) *polluter pays*: the greater the contribution to the problem, the greater the burden.

Ringius *et al.* (1998) also suggest that during the negotiations on the Kyoto Protocol the principle of horizontal equity has been dominant amongst Annex-1 countries, whereas the relationship between the developed and the developing countries, even in the broader context of the UNFCCC, can be better described by a vertical equity and polluter pays approach.

Banuri *et al.* (1996) assert that, with regard to emissions allocation criteria for burden sharing, the following *concrete proposals* exist:

- allocation based on *equal per capita entitlements*, reflecting an egalitarian approach
- allocation based on *current emissions*, reflecting a sovereignty approach
- allocation based on the *polluter pays principle*, as reflected in the Brazilian proposal presented at Kyoto, whereby the emission reduction efforts should be proportional to each party's contribution to the global temperature increase
- allocation based on a *mixed system*, rooted both in population and GDP, whereby proportional reduction efforts should lead to per capita convergence

It is therefore necessary to clarify how equity can be defined and then how equitable policies can be implemented.

* ***How should the sink provision be implemented?***

The definition and implementation of the sink provision will have major implications for equity: among Annex 1 parties due to further definitions and retro-active inclusions of additional sink categories, for developing countries depending on the inclusion of sinks in the Clean Development Mechanism.

As stressed at the EFIEA workshop by Tom Heller from Stanford University, this is an issue which is emerging as one of the most relevant and therefore deserves additional careful research. Tom Heller noticed that the USA has the highest potential for carbon sinks, and that the definition of rules with regard to the sink provision will strongly influence future political games.

**** How should the guidelines and the operational modalities of the Kyoto flexibility mechanisms be effectively designed to pursue equitable objectives?***

The design of the Kyoto flexibility mechanisms will have equity implications for any restriction imposed in the form of caps (definition of the “supplementarity” criterion), participation, types of projects, share of proceeds or fees. Banking of emissions and transaction costs for the project-based mechanisms will carry out equity implications as well. As stressed by Sujata Gupta, from the Tata Institute, India, developing countries are particularly concerned about higher future costs of emissions control after the Clean Development Mechanism phase.

**** Should country participation in emissions reduction commitments be enlarged? Which commitments and which timing would be most appropriate?***

With regard to countries participation, even if the Kyoto Protocol starts from a “no harm to developing countries” approach, based on a sense of historic responsibility and allowing for efficient reductions through global trading, increased participation of countries in emissions reduction will be necessary over time in order to be able to stabilise concentrations of greenhouse gases (IPCC, 1997, Berk *et al.*, 1999). Berk *et al.* (1999) suggest that for the evolution of the UNFCCC two options could be foreseen:

- 1) a gradual extension of the group of Annex-1 countries, taking on binding emission levels under the Convention (sometimes referred to as “graduation”) or,
- 2) defining the emission rights of all parties over a longer period.

The first regime would mean a gradual extension of differentiated commitments, as in the Kyoto Protocol, based on rules for participation and burden sharing which are part of an incremental

decision making process. This “increasing participation regime” is combined with a long-term perspective by using a global emission constraint.

The second regime would be a major shift away from the Kyoto Protocol approach and have a long-term perspective with respect to the distribution of rights and their evolution over time: an example would be the so-called “contraction and convergence” scenario of the Global Commons Institute, which defines emission permits on the basis of a convergence of per capita emissions under a contracting global emissions profile.

The equity impacts of the two regimes for the world regions should be addressed, and the socio-economic implications in terms of costs and opportunities of alternative policy scenarios should be explored.

* ***Which other crucial elements underlie the policy debate on equity?***

The surveys and the subsequent debates identified some additional variables affecting equity that need to be assessed by climate research and addressed by policymaking:

- the patterns of GHGs emissions, in terms of their temporal, geographical and sectoral distribution. These patterns are needed to address their impact on present and future generations, to assess the nature of current and future emissions by source and sector, as well as in terms of their geographical concentration, and to address their distributional impact both at the national and international level.
- the inclusion of the different greenhouse gases, the methods to weight the contributions of the different gases to overall emissions (Gottinger, 1999), emission sources and sinks
- the inventory methodology (consumption versus production based inventories)
- the relationship between equity and technology, identifying which forces among which social groups may enhance technological change.
- the choice of indicators (Berk *et al.*, 1999)
- the role of nuclear energy with respect to intergenerational equity issues: it was claimed that policies should address the social legitimacy of nuclear waste for present and future generations.

Does existing research address the above issues? Is there enough information on the role played by the above variables for policymakers to undertake reliable actions?

*** *How could weaker countries be empowered to correct or compensate for inequities in the contractual power of climate change policy negotiators?***

Joyeeta Gupta, from IVM, Amsterdam, claimed that developing countries' representatives are in a weaker position to negotiate with respect to developed countries' negotiators; appropriate mechanisms should be developed to empower them to address the potential net benefits of climate policies for the South. Adequate incentives should be directed for instance towards the design and implementation of national and regional climate policies in the South. One other suggestion was to get China and India, as leading G-77 representatives, involved in the G-7 meetings. Another one is the creation of an international arbitrator for climate conflicts. Which institutions are most appropriate to give countries a balanced and therefore equitable bargaining power in climate negotiations?

2.2 SECTORAL POLICIES

2.2.1 TRANSPORT POLICIES

The scientific survey on "Policies in the Transport Sector" by Stef Proost highlighted that in the EU the transport sector represents approximately 25% of all CO₂ emissions; the majority of emissions comes from the use of fossil fuels for road transport, i.e. cars and trucks. Emissions in the transport sector in Europe have been growing extremely fast, faster than GDP growth, and are expected to grow further. This makes transport a priority in climate change policies. The relevant policy questions addressed at the workshop are:

*** *Which instruments would be most appropriate to meet climate change policy goals in the transport sector?***

Stef Proost (1999) notes that at present the *fuel efficiency standard* for new cars is the only policy decision which has been taken to reduce CO₂ emissions from cars in the EU. He also suggests that "the emphasis of current European policies on fuel efficiency of cars (via standards, eco-bonus, etc.) is wrong. This is not a cost-effective policy. The main reason is that the fuel efficiency of present cars has already been designed in function of the present excise on fuels that represent a disguised

CO2 tax of 300% or more”. Does this imply that further efficiency gains cannot be achieved by increasing energy taxation? Or should energy prices be further increased?

Moreover, energy taxation (or other instruments) should also be used to internalise the external costs generated in the transport sector, such as air pollution, accidents, noise, and congestion. As regards air pollution, for instance, major externalities generate from the diesel, which has a strong impact on health. Policy measures should be balanced taking such considerations into account. In reality transport pricing appears to be highly inefficient, where inefficiencies are dominated by external congestion costs. Addressing correctly external costs, with measures which may generate additional CO2 emissions reductions, is a challenge for policymaking. Is this type of policy politically and economically feasible? What could impacts on income distribution be?

**** How could transport policies be integrated with other sectoral policies to meet climate change policy objectives?***

Stef Proost (1999) underlines that “in certain urban areas air quality problems can be addressed by a combination of local and global emission measures; due to the strict emission standards that are in place now for the transport sector, a cost-effective solution could require important efforts from other emissions sources”. This may require the integration of policy instruments and measures from different sectors towards a common policy goal. For instance, transport policies could be integrated with land-use planning policies, and integrated policies should address which patterns of land-use planning would enhance energy efficiency towards climate change mitigation. Transport policies could also enhance fuel switching, from traditional fossil fuels to clean fuels, such as NLG and bio-gas.

2.2.2 ENERGY POLICIES

The following relevant policy questions were raised:

* *Which key elements should be taken into account in the design of future energy policies?*

Alessandro Lanza (1999) highlights three key features which are likely to shape energy policies in Europe: the increasing concern about the environment, the ongoing process of market diversification and deregulation, and the increasing role of non-Annex 1 parties.

The increasing concern about the environment is reflected by the focus of policymaking on greenhouse gases emissions and concentrations, and on the economic and modelling analysis, which accounts for emission trading and the other Kyoto flexibility mechanisms. The process of market diversification and deregulation is characterised by the fact that:

- a) oil is no longer the dominant fuel, and grid-based energy sources are increasing,
- b) in developing countries there is a substitution between non-commercial energy source (i.e. bio-mass) with commercial bio-mass and other energy sources,
- c) public ownership and state monopolies in the electricity and gas sectors are being privatised, opening up to competitive markets.

The increasing role of non-OECD, i.e. non-Annex 1 parties, is testified by the world energy balance projections contained in the 1998 World Energy Outlook: by the year 2020 the present group of OECD countries will use 42% of the world energy, compared to a 55% share in 1995.

Which other elements should be taken into account when designing future energy policies? How can climate-unrelated energy policies help to address climate problems?

**** What does the achievement of the Kyoto targets imply in terms of energy investments and infrastructures? Are the additional emissions reductions needed to reach the Kyoto targets feasible from an economic, energy and political perspective? Are financial transfers to economies in transition or developing economies, implied by the Kyoto mechanisms, realistic given the present situation?***

In Lanza (1999) great emphasis is given to the issue of financial transfers implicit in the implementation of the Kyoto Protocol through the flexibility mechanisms, and more generally to the problems of financial needs arising from the large investments necessary to control GHGs emissions. Are these transfers politically and economically feasible? Will they induce a “credit crunch”? How do they affect income redistribution world-wide? Can these environmentally related financial transfers be linked to financial aid to economies in transition and developing countries?

2.3 POLICY INTEGRATION

**** Is policy integration a powerful tool to achieve climate change policy objectives? Which types of policy integration are more necessary? How should transport and energy policies be integrated with environmental, economic and fiscal policies?***

Alessandro Lanza from IEA, Paris, suggests that policy integration avoids sending contradictory signals to the economy, induces win-win policy options, and creates a self-reinforcing environment across policy measures. Environmental policies could be integrated with energy policies, welfare and labour market policies (Marsiliani *et al.*, 1998), technology transfer and co-operation (J. Janssen, 1998), policies to achieve side-effects and co-benefits of greenhouse gases emissions control (Markandya *et al.*, 1998), transport and land-use planning policies (S. Proost, 1999). Energy and environmental policies could be harmonised with fiscal policies, and ‘double dividend’ opportunities could be exploited whenever they exist (Cf. Bosello, Carraro and Galeotti, 1999; Marsiliani, 1999). It was emphasised by several participants that fiscal policies should aim at enhancing energy efficiency: if any form of taxation on energy were imposed, the money raised should be used towards energy efficiency and fuel switching. It was suggested that the contribution of other fiscal policy instruments towards energy efficiency both in a static and a dynamic horizon should be further investigated.

How can these policy integrations be actually implemented? Are there political obstacles or economic costs of integration? Do countries need new institutions? Do they lack a long-term perspective when designing their optimal policy-mix?

3. CONSENSUS ISSUES

As said in the introduction, climate policies are often the subject of deep controversy and even during the workshop conflicting views were hotly debated. Nonetheless, there are a few issues on which, at the end of the debate, consensus could be found among the different participants.

3.1 EQUITY

** Equitable outcomes are as important as equitable procedures.*

Integrated policies should aim at both equitable outcomes and equitable procedures. At present in climate change policies it would be unrealistic to expect to find an agreement on equitable procedures, whereas it may be possible to reach an agreement on equitable outcomes. To provide an example, with regard to emissions trading equitable procedures could refer to the criteria according to which emissions permits are initially allocated, and to the process by which the policy decisions are made; equitable outcomes would instead refer to the post-trading welfare outcome. An equitable post-trading outcome should involve both developed and developing regions, and could be set in terms of a global emission constraint, or in terms of per capita emissions ‘entitlements’.

The criteria for the initial allocation of marketable emissions permits were highly debated. Berk *et al.* (1999) for instance find that participation and burden sharing rules for emissions reduction based on indicators of a region’s absolute contribution to climate change act to the disadvantage of large regions/countries, while disregarding differences in levels of economic development. Rose *et al.* (1999) note that principles that allocate to all countries an equal proportion of permits in relation to their initial emissions will not necessarily result in equal levels of post-trading emission reductions

post-trading, thus highlighting a possible trade-off between equitable procedures and equitable outcomes.

Manfred Bergmann, from the European Commission, DGXII, stressed how hard it is to agree on equity procedures because of political reasons, but he expressed a positive view on the possibility of reaching agreements on equitable outcomes, helping developing countries to identify winning strategies and to undertake commitments. Generally, the need for a long-term focus on equitable objectives, inclusive of both Annex I and non-Annex I countries, was stressed by most participants.

Frances MacGuire, from Friends of the Earth, U.K., claimed that the Kyoto Protocol does not establish equitable procedures and is not so equitable from a real world point of view. Tom Heller noticed that in Buenos Aires equity issues were raised in two ways: a) it was questioned if trade could occur before the overall distribution of entitlements was decided, b) it emerged that equity issues should be discussed with regard to the individual Kyoto mechanisms. It was agreed that making the Kyoto mechanisms operational and equitable cannot be a long-term policy objective: it should be a priority of short-term forward-looking climate policies. Consensus was expressed on the fact that ‘per capita allocation’ of emissions “entitlements” will be the most equitable solution to pursue international climate change policy objectives.

**** Emissions permits should be auctioned rather than grandfathered.***

Peter Bohm (1999) makes a strong case for auctioning permits rather than grandfathering, i.e. free quota allocation, supporting his argument mainly because of revenue recycling options: “Auctioning the whole volume of permits provides government revenue that allows a reduction of pre-existing distortionary taxes, a so-called double-dividend ... the auction price reflects this environmental concern and emerges as a corrective rather than distortionary levy”. Frank Convery (1999) notes that “grandfathering allows benefiting firms to (a) remain in business for some non-economic reason, (b) have more funds for risky investments, and (c) have cheaper access to bank loans and capital markets...giving away permits for free to existing firms can be expected to slow down productivity growth. Thus, the fear that countries using grandfathering will have a competitive edge is unlikely to be valid, at least in the medium term. And any advantage will be further undermined by revenue recycling, and neutrality towards new firms, which imply that auctioning of permits provides other important efficiency benefits”

On the above remarks and conclusions there was a widespread consensus at the workshop. It was also proposed to look at the recent proposal by Resources for the Future (hereafter RFF) which provides an interesting step in the right direction, since it proposes a model of domestic trading with auctioning of emissions permits and a cap on prices, where equity is served by a recycling mechanism. The three key features of the RFF proposal are summarised by its broad coverage, its modest target, and its equitable burden sharing. Concerns were expressed however about the fact that the recycling process may re-propose the “carbon-tax loop”

**** Further research on the equity dimension of climate change impacts is necessary.***

Little research has in fact been carried out on the equity dimension of impacts; instead, research has focused on mitigation policies, addressing the equity implications of mitigation mainly through the debate on procedures and criteria for emissions allocation and trading. Bill Hare, from Greenpeace International, emphasised the need to carefully evaluate climate change impacts, particularly impacts on human life, in order to address equitable targets.

3.2 OPERATIONAL MODALITIES

With regard to the implementation of the Kyoto Protocol, general consensus was found around the following key issues:

**** Despite their high variability, all estimates show that the Kyoto flexibility mechanisms significantly reduce the costs of compliance.***

J. Shrogren noted that it is estimated that any agreement without the cost flexibility provided by trading will at least double the USA costs, where flexibility can be measured as the ability to reduce carbon at the lowest cost, either domestically and internationally, including the so-called “when and where” flexibility; the key is to distribute emissions internationally so as to minimise the costs of climate policy. A. Manne and R. Richel’s (1999) model indicates that “losses in 2010 are two and one-half times higher with the constraint on the purchase of carbon emission rights; international co-operation through trade is essential if we are to reduce mitigation costs”.

These are just a couple of examples of the many models that reach the same conclusion: emission trading can reduce overall mitigation costs without reducing the effectiveness of the climate policy (see also Rose *et al.* 1998, Bosello and Roson, 1999, Hourcade *et al.* 1999). As noticed by Carlo Carraro, from University of Venice and FEEM, the same conclusion can also be achieved independently of the specific climate model which is adopted. Tulkens *et al.* (1999) show that the application of simple economic principles is sufficient to achieve the conclusion that:

- flexibility mechanisms reduce total compliance costs;
- the largest cost reduction is achieved when no constraint is imposed on the trading system;
- there exists a system of transfers such that this cost reduction benefits all countries.

*** *Quota or permit trading markets can be made to work effectively.***

P. Bohm (1999) makes the point that carbon trading involves a homogenous good with no transport, implying that transaction costs per unit of trade will be small: therefore designing a market system should not be impossible. The units traded could be units of emissions reductions or units of national emissions quotas that can be used once during a five year commitment period, or banked for a subsequent period, using an international emissions exchange which never closes". Frank Convery from UCL, Dublin, noted that "trading rules should be designed and defined to be effective and ensure competitive markets ... it would seem to be necessary to make all transactions subject to a *transparency requirement* where the prices are made commonly known to all traders ... anonymity makes market transactions more efficient".

*** *Monitoring and enforcement should be feasible.***

Monitoring of national emissions levels will be crucial to the implementation of mitigation policies. P. Bohm (1999) writes that "it is in the interest of every fossil fuel exporting country to avoid underestimates of its export volume, and of every importing country to avoid over-estimates of its import volume". Appropriate institutions should be put in place to initiate the monitoring process. At the same time special measures may be required for monitoring imports from non-signatory countries: measures such as sample unannounced inspections of fossil-fuel transports could be implemented.

**** Without strict pre-conditions, early crediting is likely to be ineffectual and to undermine the achievement of targets.***

Frank Convery noted that “the Kyoto Protocol sets legally binding emission targets for industrialised countries, without accounting for reductions carried out prior to 2008, the beginning of the first commitment period”. Only the Clean Development Mechanism allows for a still undefined pre-commitment crediting. However “an early credit Bill was introduced in the US Senate in October 1998 which allows crediting for future domestic emissions reductions, but also for past actions identified under par 1605 of the Energy Policy Act of 1992 – where companies can voluntarily report mitigation activities which will then be registered; no verification process exists and in some cases the same reductions are reported by different entities (double counting)- as well as for projects under the USA initiative on Joint Implementation”. Credits could be used to offset future emissions control obligations.

In the literature however this proposal has generated unanimous criticism: A. Michaelowa and M. Stronzik concluded that “the following safeguards are necessary but not sufficient to guarantee an advantageous system for early crediting: strict baseline; incentives for innovation; incentives for rigid sectors to install climate-friendly capital replacement”. Resources for the Future suggests that “the early credit Bill proposal risks distributing too many credits for questionable early reductions. The only way to reduce this risk is to thoroughly examine each project and evaluate the true reductions incurred: a cumbersome and potentially expensive administrative process. Further, the proposal still connects the incentive for early action to the future worth of emissions rights under an uncertain permit scheme, a speculative value that may fail to motivate sufficient activity”.

**** There is scope for experimental domestic trading markets.***

Resources for the Future provides a complete proposal for a USA credible early action in climate policy from the research modelling side. On the other end, Michael Wriglesworth, from BP-Amoco U.K., illustrated BP-Amoco action, which offers an interesting operative example from the industry side, having launched a domestic emissions trading scheme in 1998. Both schemes are introduced in more detail below in the section on ‘new policy perspectives and recommendations’.

**** Sufficient arguments exist with respect to using discounting procedures in the evaluation of climate change policy options.***

The discount rate is at the heart of any inter-temporal decision and plays a central role in models of economic growth: in integrated climate-economic models the choice of the appropriate discount rate is crucial. Various discounting techniques are however available and the optimal discounting choice is under debate.

3.3 SECTORAL POLICIES

**** An effective transport policy in Europe is crucially necessary, which would imply new policy reforms.***

General agreement was expressed on the fact that so far European transport policies have been a failure. De Pretto, from the International Road Transport Union, Switzerland, stated the need for a transport policy in Europe. From the panel debate, it emerged that *in the short run it will be relevant to ameliorate access to infrastructures*, and that *efficiency in the transport sector should be improved across transport modes*: Gert-Jan Koopman, from the European Commission, stressed the pressing need for a railway reform in Europe, and for shifting away from a modal transportation system towards an inter-modal system, improving efficiency across transport modes. Inter-modal systems should be made available and accessible. Further consensus among panelists and participants to the workshop was reached on the *need to integrate transport policies with other sectoral policies* in order to achieve climate change policy objectives. It was agreed that a correct and socially efficient transport pricing should be a complement to a mix of policies.

**** Energy policies should provide incentives to supply side actions on renewables.***

This view did not generate any conflicts at the workshop. It was noted that in Europe there is a great scope for cost-effective measures on renewable energy sources. Kevin Leydon, from the European Commission, DG XVII, stressed the obligation to increase energy from renewables in Europe, doubling it by 2010 mainly through the use of biomass.

**** Too little attention has been devoted to sinks; sinks provisions should be developed to evaluate sinks as sources of carbon sequestration as well as sources of energy.***

However carbon sinks should be dealt with carefully: Frank Convery noted that “countries can claim carbon sequestered from 1995 as a contribution to meeting their targets, and some countries which have a comparative advantage in forest plantation growth, e.g. New Zealand, Ireland, the USA, will be able to avail of this option”. J. Shogren called carbon sinks a *wild card* “It may cost as little as \$25 to sequester a tonne of carbon in the US but both the base line and operational (sequestration rates etc.) data are poor”.

*** *Climate change policies should address not only the technology side, but also the behavioural side.***

As stressed by Kevin Leydon, technology improvements alone will not be able to drive parties to reach their emissions reduction targets. In specific sectors, consensus on enhancing a “joint responsibility” approach was expressed. Philip Daubeney, from the Electricity Association, U.K., suggested that efforts should be made in order to induce consumers to buy “cleaner” energy at higher prices, stressing that the electricity industry has a major role to play, not only as a source of the climate change problem, but even as a source of possible solutions.

3.4 POLICY INTEGRATION

*** *Energy and environmental/ economic policies need to be closely integrated.***

It was underlined that policy integration may also lead to effective synergies across institutions. As explicitly addressed by Kevin Leydon, policy integration should be achieved across various sectors, including energy, transport and agriculture. It was agreed that policy integration may help to achieve climate change targets at lower costs. At the same time, the achievement of climate goals may help to lower the impacts of economic activities on other environmental problems.

With regard to institutional integration, the consideration that the integration of environmental and competitiveness regulatory authorities may achieve synergies, in the form of lower costs or increased benefits, seemed acceptable. Frank Convery noted that “market failures derive from the ability to exercise market power (competitiveness issues) and ability to impose environmental externalities (environmental issues)”. M. Acutt and C. Elliot, who presented a paper modelling the

effects of a change of regulatory regime from the current system of separate simultaneous regulation by the two regulators to a co-operative regulatory regime, concluded that "...a potential welfare improvement is available as a result of a move to regulator co-operation. Under the co-operative regime, whilst welfare is reduced as a result of less investment in cleaner technology by firms, welfare is simultaneously increased as industry output and consumer surplus plus profit will be greater than under non co-operation."

3.5 RESEARCH, POLICY AND MARKET STRATEGIES

With regard to research, policy and market strategies there was agreement on the fact that:

**** Research should make it possible to assess the effectiveness of various policy instrument combinations, both in terms of their environmental effectiveness and macro-economic impact.***

Frank Convery quoted the SPOT3 model for Belgium, which indicates that a Kyoto compliance carbon trading scheme could be implemented with minimum recessive effects on the economy, incorporating the interactions of energy economy and environment for the Belgian economy. This approach should be pursued on a wider scale. In particular, research should focus on the analysis of the mechanisms driving technological change in the different sectors of the economy. It was agreed that *technological change represents the weakest area in energy and economic modelling* and deserves special attention.

**** One of the major problems in the design of international climate change policies is the long term involvement of developing countries; there was general consensus on the consideration that the overall UNFCCC process will not succeed unless effective globalisation mechanisms are found.***

Priyadarshi Shukla from the Indian Institute of Management made the point that "the whole venture will fail unless the South is productively engaged, and this will involve radical thinking". A. Manne and R. Richels (1999) make the same point: "The Kyoto forever scenario will fail to stabilise global emissions and concentrations". Hence, the participation of developing countries is needed.

*** *Kyoto was a win-win option for Annex 1 countries.***

At Kyoto Annex 1 players were winners in the game. The USA obtained the insertion of the option of International Emissions Trading in the Kyoto Protocol, giving up their opposition to the EU bubble. The EU was thus able to develop a framework that other countries could join. Eastern European countries became signatories thanks to hot air, i.e. loose stabilisation targets with an allocation which exceeds their likely emissions in 2008-2012 under the BAU scenario. If hot air hadn't been provided, Russia and Ukraine would not have played the game and everyone would have lost. P. Bohm (1999) writes: "First, Russia and the Ukraine may not have accepted a reduction of their quotas to equal their most likely BAU levels, especially not given the time-pressed conclusion of the Kyoto negotiations. Instead, the risk would seem to have been significant that, confronted by such a quota offer, one or both of these countries would have dropped out of the agreement. And other Annex 1 countries would realise that their commitments then would have become more costly and therefore may have negotiated larger quotas themselves", with an increased risk of carbon leakage.

*** *Efforts should also be made domestically.***

There was general agreement on the need for domestic policies in addition to the use of global flexibility mechanisms, and on the fact that *technology efficiency and its improvement should be a major issue and concern*. The USA in particular should make domestic efforts to enhance technology efficiency. It was proposed that climate change policy targets and measures should allow de-coupling of green-house gases emissions from GDP growth.

*** *Risk management strategies should be incorporated in the climate change policy framework.***

Josef Janssen from the University of St. Gallen underlined the need for instruments to manage risks related to project-based mechanisms. These instruments may include integrated existing insurance institutions, such as the MIGA (Multilateral Investment Guarantee Agency), and mechanisms for projects' portfolio diversification, with a wide range of project types and host countries. Tom Heller suggested that, to promote national and international equity, this process may be guaranteed by a multilateral arrangement with very little overall regulation, in the form of an open multiple market, careful to avoid the formation of cartel prices.

*** *Dialogue between actors such as fuel producers, governments, NGOs, as well as consumers should be enhanced.***

The workshop showed that, despite the large amount of information which is circulating around the world on climate issues, little dialogue is taking place among different parties. Both at the research and policy level it is necessary to develop more careful comparisons of results and proposals. Alain Heilbrunn, from the Energy Policy Action Group (EUROPIA), suggested the need for ‘more and better science’, and greater acceptance by the general public, to promote the acceptance of the Kyoto Protocol. Michael Wriglesworth, representing the oil and chemical industry, also expressed the need for more dialogue and communication.

4. CONFLICTING ISSUES

The lively debate that took place during the three days of the workshop highlighted that there is consensus on some issues, at least the ones described above, but that many issues remain controversial. Environmentalists, policymakers and industrialists have different views on crucial aspects of the climate debate and in particular on the priorities to be given to different policy goals. Here is a summary of the conflicting issues that emerged during the panel debates and the discussions.

4.1 EQUITY

As far as equity is concerned, conflicts emerged about:

*** *The possibility of establishing equitable procedures in climate change policies.***

Even if agreements on equitable outcomes could be reached, scepticism was raised about the possibility of agreement on equitable procedures, due to the very different economic and political interests of UNFCCC parties. With regard to carbon sinks, for instance, Tom Heller noted that “the USA contribute to the climate change process as the biggest terrestrial sink: equity issues is something the world doesn’t want to look into”. With regard to intergenerational equity objectives it was argued that, if present technology does not allow us to reach the Kyoto targets, it should be possible to accept that future generations will have less than we do. Hence, whereas on the one hand

equity was considered to be an important step toward a successful stabilisation of carbon emissions, on the other hand there was no consensus on the possibility of achieving equity. As already stated, pessimistic views were raised about this issue, thus suggesting that an excessive focus on equity would be detrimental to effective protection of the environment.

* ***The real meaning of long-term convergence.***

Assuming convergence as a long-term equitable objective, which convergence should countries aim at? Per capita income convergence? It was emphasised that income convergence between the North and the South is not likely to occur in the next hundred years. Furthermore: would convergence in income also imply convergence in structural patterns? Should countries aim at convergence by sector? What would be the linkage with sectoral technological change? Again, the claim was that an excessive attention given to convergence issues would delay the implementation of effective climate policies. But the opposite view was that without convergence no climate policy can be effective.

* ***The possibility of identifying win-win options for developing countries.***

Northern and Southern positions appear to be quite divided. Paul Metz, from the European Business Council for a Sustainable Energy Future, was optimistic about the possibility of identifying win-win options in developing countries. However no consensus was found on the acceptability of “meaningful participation” of non-Annex 1 countries in the climate change process. Frances MacGuire claimed that there is too much pressure from Annex 1 countries on developing countries with regard to “meaningful participation”. Priyadarshi Shukla noted that “meaningful participation” sounds highly inequitable given that India’s per capita emissions are 5% of those in the USA. Sujata Gupta emphasised that setting quantitative targets as “meaningful participation” would not be enough, and recognised the need and the scope for energy efficiency improvements, particularly in non-Annex 1 countries.

* ***The relevance of the social equity dimension in the context of the UNFCCC.***

Michael Grubb from RIIA, London, stressed the relevance of both international and national/social equity in the context of the UNFCCC, finding some opposing views; two developing countries’ representatives, Sujata Gupta and Priyadarshi Shukla, claimed that social equity is a relevant concept, but that it should not be addressed in the UNFCCC: rather, national policies sovereignty and non-interference principles should be addressed. In general, full agreement was not reached on the proposal of using climate change policies and instruments to address social equity, for instance

through the creation of labour market opportunities in emerging energy markets, or through revenue recycling mechanisms.

* ***The possibility of attaining both equity and efficiency objectives, accepting the separability of equity and efficiency.***

Northern and Southern interpretations do exist with regard to the Coase⁷ theorem. Some participants argued that equity should be dealt with through an initial world-wide allocation of emission rights, and then markets will guarantee the achievement of equity. Whatever the initial allocation, efficiency would be attained. Others suggested that equity is a preliminary condition for any action and therefore only if the burden of reducing emissions is equitably shared can emission abatement take place.

It was also noted that conflict on the equity of a climate agreement may lead to paradoxical situations. For example, it is clear that a generalised emission trading system constitutes a Pareto improvement (all countries are going to gain, including developing countries), but nonetheless it is opposed by developing countries on the ground that it would favour developed countries more than anyone else (Cf. Bosello and Roson, 1999).

* ***How options for mitigation should be implemented across countries.***

It was stressed that mitigation should be evaluated at its price, rather than at its costs. Costs are certainly lower in developing countries but there should be some reward. Fair competition would imply a surplus to suppliers of cheap mitigation. But this view obviously reduces the efficiency of global emission trading systems and no consensus could be found on it.

* ***Who should share the burden.***

Should it be the politicians, the producers, or the consumers? It was proposed that, rather than concentrating on “burden sharing”, the focus of climate change policies should shift to both costs and opportunities, from “costs sharing” to “commitment sharing”. NGOs claimed that it would be unrealistic to expect people to act: rather, industry should act.

Andrew Warren, from the Association for the Conservation of Energy, UK, stressed the critical role of energy suppliers in taking action. Kenneth Ruffing, from the UN Division for Sustainable

Development, illustrating the case of China, claimed that energy efficiency efforts from the industry side occur outside international climate change commitments, and questioned how much the present scenario could be changed by new instruments. Delia Villagrasa, from Climate Network Europe, Belgium, questioned the transport and energy industry interest in international policies and measures, and she claimed that industry should move ahead, influencing behaviour and demand. With regard to transport, for instance, car companies should make cars attractive because of their energy efficiency, in the attempt to impact on the emotional and psychological component of demand. Frances MacGuire questioned the ability of consumers to pay for “cleaner” energy, rather than their willingness to do so, raising equity considerations. Again the position of environmentalists and industrialists were quite different.

4.2 OPERATIONAL MODALITIES

Conflicts on operational modalities focused on the definition of the “the use of the flexibility mechanism, and on the nature of the restrictions to be imposed on global trading.

** There was no agreement on the nature of the ceiling or on how much of the emissions reduction quota should be traded.*

Article 17 of the Kyoto Protocol calls for emissions trading to be only “supplemental to domestic actions for the purpose of meeting quantified emissions limitation and reduction commitments under Article 3”. To make it operational, it has been suggested that quantitative constraints on imports of emissions reduction be introduced. Frank Convery, as well as many other participants in the workshop, stated that “to the extent that constraints are placed on carbon trade, the costs of compliance will be increased the negative effects would spill over also to the countries likely to export carbon credits, since the volume of their sales and the price they get will be lower because of lower demand induced by higher costs of mitigation measures taken at home by the EU and the USA. All countries lose, and emissions reduction commitments in subsequent periods will be made more expensive and therefore less likely to be significant. Since the gains from trade experienced by

⁷ Coase[1960]: The Coase theorem states that if trade of the externality can occur, then bargaining will lead to an efficient outcome no matter how property rights are allocated.

Russia and Ukraine will be reduced, it will also reduce the prospects for trade gains from potential entrants from the developing countries in the future”.

P. Bohm (1999) asserts that “this can be expected to increase marginal costs or shadow prices of emissions reductions in the importing countries”, and “forcing countries to produce more of the emissions reduction quantity commodity at home than it wants to is like forcing cold Nordic countries to grow some minimum share of bananas before it is allowed to import bananas from countries that have a comparative advantage in banana production. Complementarity will not only make present Annex B countries less likely to accept more stringent future commitments, it will also make it harder to get new countries to join the set of Annex B countries. Finally, in the more immediate time frame, the success of the Kyoto protocol stands and falls with the US ratifying it”, which will require maximum flexibility.

There were however arguments in favour of a ceiling, mainly justified by the fact that restrictions on trading could be an effective stimulus for technical innovation and dynamic efficiency, which in the long run would make future targets more affordable. Jean Charles Hourcade, from CIRED, France, who supports this view, proposed a minimum level of emission reduction from domestic actions. A similar proposal came from Stephan Schleicher, from the Austrian Climate Council, even if a well-defined quantification of the ceiling was not offered.

Priyadarshi Shukla claimed that the North and the South are quite divided on this issue. He said that perhaps less developed countries would like to see a better defined complementarity clause, to make Annex-1 countries commitment more credible. In fact, although the global flexibility mechanisms may allow room for reducing mitigation costs and achieving a global policy goal, the “hot air” issue has provided a bad example. Arguments in favour of a ceiling were also supported by environmental associations. Bill Hare, given the environmental consequences of the whole ‘hot air’ issue, and the need for technological development, made a stringent case for having a cap.

*** *The relevance of the hot air issue was debated.***

Frank Convery suggested that “there is too much hot air about hot air”, pointing out that hot air was a pre-requisite to secure an agreement in Kyoto. Others, in particular NGOs and environmental

associations representatives, see hot air as a threat, in terms of the future credibility of the agreement itself, and as a disincentive for non-Annex 1 parties to join the agreement with long-term commitments. Bill Hare stressed that the hot air issue has strong equity and environmental implications, increasing emission levels which otherwise would not have been reached. Political, economic and environmental arguments were expressed and confronted without achieving a consensus.

*** *Different views were expressed with regard to having a buyer or a seller's liability system.***

It was argued that a buyer liability system may be a more sound system. Bill Hare underlined that a compliance regime should work after the first commitment period, stressing that liability clauses could make the system more efficient. Since not all selling parties have a robust legal system, he proposed that a buyer, or a mixed buyer-seller liability scheme, would be preferable. P. Bohm (1999) instead suggests that, in an ideal system of international emissions exchange "the seller will be involved with a neutral international exchange- once the questions of sanctions has been settled, holds the seller responsible for its sales of emissions reduction".

4.3 SECTORAL POLICIES

*** *The view that CO₂ emissions reduction from the transport sector is the most relevant issue to be addressed was challenged.***

Stef Proost suggested that the major problem in the transport sector is to address external costs such as congestion and accidents. A carbon tax should not be used to achieve higher efficiency in the transport sector, although revenues could be used as an instrument to support relevant energy policies. Other instruments, such as road pricing, or land use planning, could be used to achieve the climate policy goal. This view was challenged by several speakers. In particular Jean Charles Hourcade expressed his view in favour of a carbon tax, noting that without a carbon tax there would be no way to achieve effective policies in the transport sector: road-pricing or permits for land-use would not be feasible instruments to be implemented. A carbon tax would instead have the advantage of being simple, and of generating revenues which could be used to implement energy efficiency policies.

**** It was highly controversial whether transport should make a real contribution to reach the Kyoto objectives.***

It was claimed that in Europe there is little marginal efficiency gain in the transport sector. Transport is a sector where significant emissions reduction cannot be achieved cost-effectively. Other views proposed that tradable permits or quotas be targeted at those sectors where there is likely to be most growth in carbon emissions if they are not constrained, such as the transport sector, to enhance their effectiveness. Focusing on the transport sector, Johan Albrecht, from the University of Gent, comments that “current designs and proposals for tradable CO₂ emission systems do not provide incentives to stimulate cross-sectoral energy efficiency investments. Manufacturers should be ‘rewarded’ for their products that make it possible for consumers to save energy during

Supporting the need for measures to control emissions in the transport sector, it was argued that in urban areas the transport sector has been the most important source of emissions for traditional pollutants (CO, VOC, NO₂, PM), representing the most important source of emissions not only in quantitative terms, but also in terms of harmfulness: in fact transport emissions, affecting mostly urban air quality, have much greater impact on local health than other emission sources. The emphasis on CO₂ fuel efficiency standards in transports could be shifted towards the use of clean fuels, switching from CO₂ fuels to NLG or bio-gas.

**** Conflicting views on the possible future role of land use planning.***

Despite the view that land-use planning would not be an effective instrument in attaining climate change policy targets, Carlo Jaeger, from the University of Darmstadt, argued that land use planning will have to emerge as a relevant policy objective in the next 20-30 years because of the alarming growth of ‘mega’ cities in the developing world. Per Sorup, from the Institute for Perspective Technologies (IPTs), suggested that land-use planners and policy makers should be more involved in the climate change debate. Richard Tol from IVM, Amsterdam, stressed that changing transport patterns is a long term issue; he questioned how consistent signals on the effectiveness of such a policy over a long time period could be obtained now and how measures on transport policies taken today could be valid in the far future. An interesting view was proposed by Virginia Sonntag-O’Brien, from the International Council for Local Environmental Initiatives, Germany. She suggested that land use planning policies should be targeted at intervening on the city structure, since cities were conceived for no-mobility, and instead they have become a place for automobiles;

policies should aim to reduce demand for mobility, to create special structures, such as pedestrian departments, and generally to shift from the automobile car industry to a ‘mobility service’ industry. Marc Darras, from Gaz de France, stressed the need for land-use planning in particular with regard to job organisation and location.

4.4 RESEARCH, POLICY AND MARKET STRATEGIES

**** There is disagreement between experts on the significance of short- versus longer-term action.***

A. Manne and R. Richels (1999) argue that: “rather than requiring sharp near term reductions, it appears that a more sensible strategy would be to make the transition at the point of capital stock turnover- eliminate the need for premature retirement of existing plants” On the other hand, many participants argued in favour of early action to send the right signals to investors. Among the environmentalists it was claimed that environmental irreversibilities make it impossible to delay action. The issue of the optimal timing of climate policy is still very controversial and little support is provided by models where uncertainty and technical change are unsatisfactorily modelled.

**** There is a lack of clarity or convergence on the origins of technological advance.***

Jason Shogren noted that “engineers argue that the origins of technological advance are firmly rooted in non-price responses; but for economists it is the search for profits that can create R&D breakthrough that reduce the costs of backstop technologies”. Furthermore, Vijay Vaitheeswaran, Environment and Energy Correspondent for *The Economist*, expressed some doubts on whether the technology option for climate change mitigation could be played if oil prices have continuously fallen, and a decreasing trend is forecast. Again the issue of technological innovation, of the availability of low cost climate-friendly technological options, and of the right policy to favour innovation and diffusion is very controversial and consensus could not be found.

**** No consensus could be found on adopting a unique discounting procedure and on how to use Cost-Benefit Analysis (CBA) to address climate change policies.***

Reyer Gerlagh, from IVM, Amsterdam, underlined that in most dynastic integrated assessment models (IAMs) the debate on the proper level of discount rates in view of sustainability is based on

an assumed relation between a 'pure time preference' economic growth and the interest rate. Quantitative results highly depend on future discounting. "Consequently, dynastic IAMs cannot be used to provide policy makers with quantitative figures about the desirable emission reduction levels and the supporting prices. Instead, economists should inform policy makers as to which instruments can be used to bring forth both efficient and sustainable resource useUsing the overlapping generations model (OLG) reveals that there need not be such fixed relations between economic growth and the interest rate. In fact various factors determine the change in the interest rate over time, including the expected demographic change in the next century, and most importantly, including social security policies and potential sustainability policies".

Chris Hope, from Cambridge University, argued that specific objectives should be defined, and that discount rates could then be targeted towards those specific objectives in the long term. Note that these views are in contrast with the practice adopted by most empirical analysis of climate change policies and were not supported by Ferenc Toth in his survey paper and by other participants in the workshop.

Kenneth Ruffing, from the UN Division for Sustainable Development, suggested that, given the net benefits of climate change mitigation options, Cost Benefit Analysis (CBA) should be used to identify the least cost options. However, CBA should be considered as an important source of information, but not as the sole base of social decision making. In fact it was argued that identifying the magnitude of mitigation costs is not the ultimate relevant question. The real issue should be how to mitigate, and *mitigation options should be compared to adaptation costs*.

**** No agreement could be found on the possibility of having a sound reference scenario for developing countries in the light of their future involvement in long-term climate change mitigation commitments.***

Furthermore, scepticism was manifested on the possibility to get developing countries involved in the climate change policy process with a long-run commitment. It was questioned *how any voluntary target from developing countries could be credible*.

5. CONCLUSIONS: NEW POLICY PERSPECTIVES AND RECOMMENDATIONS

The previous sections provided a summary of the main issues debated at the EFIEA policy workshop on climate policies. In this concluding section, we attempt to summarise a few policy guidelines that were proposed. We call them “perspectives” because they are not normative recommendations but rather positive scenarios that suggest how climate policies could be implemented.

5.1 PERSPECTIVES ON EQUITY

- Practical and effective solutions in climate change policies balance equity, efficiency, and political feasibility criteria.
- Policies focus on equitable procedures as well as on equitable outcomes. Long-term policies aim at defining a global cap, which will induce efficiency, identifying at the same time who would bear the costs and benefits of mitigation, and addressing equitable procedures.
- Before any agreement on a global cap, there is however the need to get developing countries on board: get them involved in the whole climate change debate, and make climate change policies part of their national policies. To achieve this goal equity and efficiency issues need to be carefully integrated. Increased equity would help increasing the number participating countries, thus enhancing the efficiency of the agreement. Increased efficiency would reduce each country’s cost of controlling emissions, thus facilitating the adoption of transfer and co-operation policies that increase equity as well as the number of participating countries.
- Policymakers fully evaluate the socio-economic implications of climate change impacts (damage to the environment, and human life) and adaptation, particularly addressing their equity aspects, confronting the costs and benefits of alternative policies. A better

understanding of the linkage between technology (efficiency) and equity is therefore a prerequisite for policy actions.

5.2 PERSPECTIVES ON POLICY INTEGRATION

- Policy integration takes into account the linkages of environmental policy with energy policies, technology development and diffusion and technological co-operation. Within the EU, policy integration occurs across-sectors: transport, agriculture and energy. In particular, the integration of transport policies with other sectoral policies is promoted, for instance making land use planning an important element of transport policies.
- Policies also provide further incentives for cross-sectoral energy efficiency investments; in this regard there is a strong need for a more innovative policy approach, which contemplates investment in new technologies.
- Integrated climate policies evaluate and investigate the implications of liberalisation in the energy market for national policies, addressing its environmental and socio-economic impact. This view was strongly supported by Delia Villagrasa, who expressed her concern about the environmental impact of liberalisation.
- With regard to the socio-economic impact of climate policies, Willy Buschak, representative of the European Trade Union Confederation (ETUC), Brussels, proposed that, since jobs will be lost in the energy sector, climate change policies should be used to generate employment. He stated that 'climate change mitigation is an option provided job opportunities are generated'.
- Policy integration implies action across groups and policy targets: policies are directed to mould both producers' and consumers' behaviour, on both the supply and the demand sides.

Consider, as an example of policy integration, the many suggestions that were provided in the debate on transport and climate policies. Participants in the panel and in the subsequent discussions outlined several improvements of transport policies in the EU, e.g.:

- a) the need to control air transport emissions;
- b) the need to shift the automobile car industry to a ‘mobility service’ industry;
- c) the need to make the transport pricing reform into a package. In fact there is a pressing need for a railway reform, and for moving away from a modal transport system towards an inter-modal system.
- d) the need to correct the biases and inefficiencies of transport policies. Policies in fact always tend to hit at the margin car producers, and they are never aimed to hit the stock of cars, thus affecting users. Policies will generate inefficiencies as long as they only hit small groups. In this regard, it was recommended that city mayors should sit at the round tables of policy makers;
- e) the need to avoid contradictory targets that generate inefficiencies. For instance transport policies tend to fulfil safety criteria as opposed to environmental friendliness criteria (heavier cars are more polluting).

Research priorities on transport were also identified:

- a) good transport forecasts for the EU;
- b) a study of the potential for emission reductions in air transport: air transport fuel is not taxed and there is no reason to maintain this inefficiency;
- c) evaluation of the costs of fuel efficiency standards;
- d) study the potential for shifts between different types of trucks (small and large), and between road, rail and shipping;

5.3 STRATEGIC ISSUES

- An effective climate policy cannot neglect the fact that its outcome crucially depends on the actions and interactions of several players.

For example, the abatement decision of a group of countries, e.g. Annex 1, can be costly and ineffective if offset by emission expansions in other countries. This is the well known carbon leakage issue, which arises because of the free-riding strategic incentives that characterise the climate problem.

- Carbon leakage is not adequately addressed in the Kyoto Protocol, and future policies should make an effort to develop measures to counteract it.

Frank Convery stressed that “carbon leakage occurs whereby firstly carbon intensive products become more expensive in signatory countries and imports increase from non signatory countries, and secondly firms using carbon emitting technologies in carbon signatory countries move to non-signatory countries. The Kyoto Protocol does not contain any policies or measures to counteract carbon leakage”. Claude Culem, from the Energy Policy European Chemical Industry Council (CEFIC), Brussels, expressed serious concern from the chemical industry side towards carbon leakage in that developing countries have no commitments to limit their emissions.

M. Hoel (1999) makes the general point that actions taken by a particular country (or group of countries) will in general affect equilibrium prices of internationally traded goods. This in turn may affect the production and consumption decisions of other countries, and thus emissions from these countries. “Given the Kyoto agreement, it is only leakage to developing (non-Annex B) countries that is of importance. Moreover, it is shown that differentiation of a carbon tax is not justified by a concern for CO₂ emissions in developing countries. It is more cost effective to induce these countries to limit their emissions through appropriate transfers. Ignoring the optimal tariff argument, an approximation of the optimal policy is thus to have a uniform carbon tax and no tariffs. Carbon leakage should be taken care of by industrialised countries giving the developing countries transfers conditional on the developing countries implementing climate policies”.

- Interactions between producers and between producers and consumers at the domestic level should be taken into account by climate policies

The RFF proposal for the USA could be adopted as an interesting example of a domestic trading permit scheme. The RFF proposal does provide for the auctioning of carbon quotas, with carbon fuel energy producers and importers required to buy the carbon quota equivalent of their output or imports respectively, with a ceiling price of \$25 per tonne of carbon, the permits to last 2 years, and the revenues to be returned to households in compensation for higher fuel prices.

- Strategic interactions and preferences for a better environment can be exploited by firms for business purposes.

BP-AMOCO indeed represents a very interesting example of ‘far-seeing’ climate policy from the industry side; BP-Amoco has in fact adopted a very innovative policy, setting its own reduction target: 22 million tonnes reduction by the year 2010, which is equivalent to a 5% reduction with respect to its 1990 baseline. In order to meet this challenge, BP-Amoco intends to develop a strategy that will result in the greatest GHG emission reduction at the lowest cost over a specific timeframe.

The implementation of this strategy will require a process of identification of the emissions, by source and type, of measurement and verification of the emissions, of identification of greenhouse gases reduction opportunities across the business. Reduction policies aim at enhancing efficiency, promoting new technology, and preventing flaring and venting. Part of this process is the implementation of a pilot trading system, which was launched in late 1998. Several business units are involved in the scheme; the pilot group has a reduction target of 3% below the 1995 baseline by the year 2003; basic emission rights have been allocated for 5 annual periods from 1999, with requirements to be met each year; a bank acts as a broker and registers trade across business units; banking, forward sales and purchases are allowed, but no borrowing can take place; trading occurs in CO₂ equivalent units.

The BP-Amoco experiment could serve as a pivotal scheme for industry, with the aim to understand how to deliver commitments at the minimum cost. The identification of opportunities across

business could also help industry and governments to develop integrated and more effective climate policies.

- Industry has important and serious contributions to make to mitigate climate change.

As stressed by Manfred Bergmann, Paul Metz, Stefano Micossi, and other participants, voluntary commitments and voluntary agreements seem to be the best option by which industry can improve energy efficiency and identify business opportunities from climate change mitigation options. There are very encouraging perspectives particularly from the chemical and oil industry. J. Rogier, from the European Solid Fuel Association, expressed confidence in the instruments proposed at Kyoto, and particularly in the Clean Development Mechanism, which would help China and India to reduce their emissions. However, Stefano Micossi, former General Director of DGIII, European Commission, expressed doubts on the capability of European and National public administrations to efficiently manage voluntary agreements on climate change and the CDM in particular.

5.4 SOME FINAL REMARKS ON CLIMATE POLICY

- The likelihood of the ratification of the Kyoto Protocol is still uncertain. Policies should be directed to induce the USA to ratify the Protocol.

Among several other participants, Nigel Haigh, from the Institute for European Environmental Policies, U.K., expressed the growing concern about the likelihood of ratification. If the USA drops out, the climate change process initiated in Kyoto will fail. It was recommended that future policies should be more realistic than they have been so far.

- The political dimension of climate policies is as important as their environmental and economic dimensions.

Stefano Micossi, former General Director of DGXIII, explicitly expressed the need for political realism: the Kyoto targets, albeit insufficient from an environmental viewpoint, are likely to be too costly to be achieved, political negotiation procedures at the EU level are too complex, and the EU commitment is too ambitious. Richard Tol claimed that, talking about EU climate change policies,

no reference has been made to the EMU. Climate change mitigation options may induce some inflationary pressure within the EMU and this issue cannot be disregarded by policy makers. Albeit controversial, this is an example of the degree of integration of climate policy with all other economic policies.

- Future policy proposals will have to be concrete with regard to costs, definition of the flexibility mechanisms, and technology advances.
- The institutional development of the Kyoto Protocol requires that more attention be devoted to its environmental effectiveness: there is a strong need for clear and objective environmental targets.

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