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**Conference Paper**

## Global policy response to climate change

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## Environment: Dealing with Climate Change

# Global Policy Responses to Climate Change

### Summary

While fossil fuels are essential for growth in practically all economies, the resulting greenhouse gas emissions have serious adverse global effects on our climate. Dealing with this problem requires global cooperation.

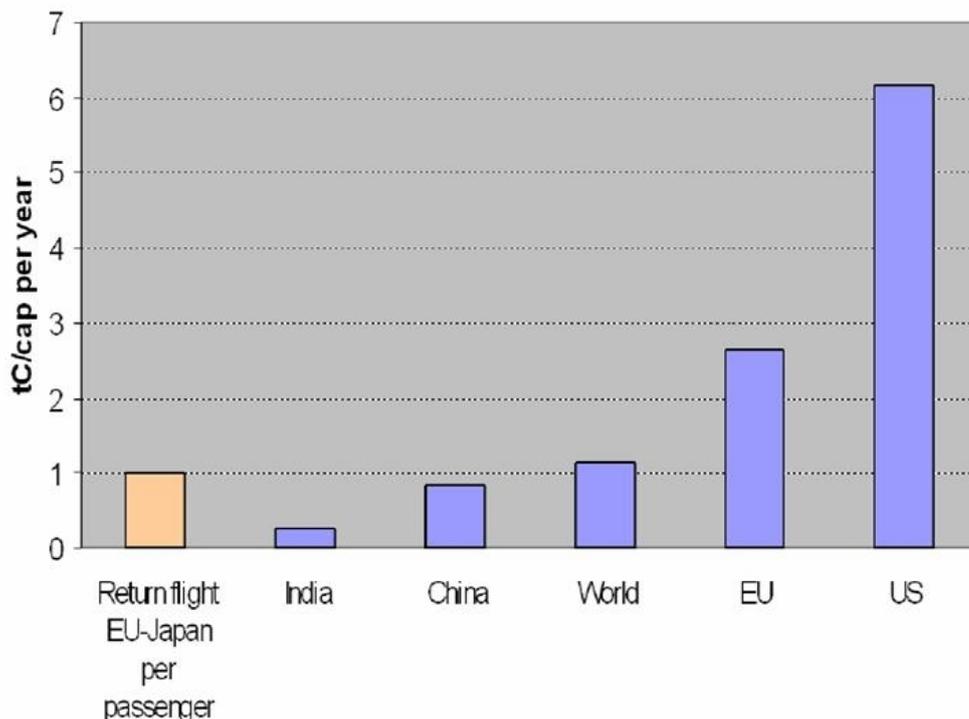
Are there preferable alternatives to the cap-and-trade system of the Kyoto Protocol? Should the coming climate negotiations be global level or include just the major emitters? How should the costs of the policy collaboration be distributed among developing and developed countries?

If global, what institutional architecture for climate negotiations is desirable? Is there a case for creating a new international institution (analogous to the IMF) to deal with climate change, or can existing institutions handle the task?

What is the role of international technology cooperation and adaptation measures to climate change?



**Average per capita emissions in 2005**





## **Proposed Solutions**

### **Expert Opinion**

The most likely starting point for a future climate regime is the Kyoto Protocol and the results of the negotiations in Bali. Other proposals for a future climate regime that have been discussed previous to the “Bali Road Map” seem to be off the negotiating table. Since mitigating global warming requires substantial cuts in global greenhouse gas emissions the decisive issue is clearly a participation that is broad in terms of emissions, not necessarily in terms of countries – and compliance. In this respect it might be more promising to start with a core group of major emitters instead of trying to find a potentially global agreement that is weak in terms of reduction commitments.

The core group would need to include the USA as well as the major GHG emitting developing countries. As it is, the USA is only willing to reduce their emissions when e.g. China and India agree on binding targets as well. The stand-point of the developing countries is that not only the industrial countries are those responsible for most of the past emissions but also that their per capita emissions are still much higher than in the developing countries. Creating incentives for the developing countries to join a climate regime is thus decisive and implies that the industrial countries have explicitly or implicitly to transfer resources to the developing countries.

Possible mechanisms that are discussed currently are a cap-and-trade system and an adaptation fund. Furthermore, the issue of technology transfer and cooperation is important in this context.

An international cap-and-trade system with emission rights that converge towards endowments with equal per capita emissions would give substantial leeway for emissions to the developing countries but could also lead to a substantial transfer of money from the industrial to the developing countries if they choose to sell these rights instead of emitting the Greenhouse gases themselves. As a market like mechanism the cap-and-trade system keeps the costs of climate mitigation low and at the same times provides incentives for technology transfer that allows cheaper abatement in developing countries.

Generally, it is necessary to focus not only on mitigation measures but also on adaptation (including technological advances) – which is of major concern for poor countries. An international adaptation fund that pays for adaptation measures is thus recommended to be part of a Post-Kyoto climate regime.

For the issue of technology development and transfer business will have to play a leading role since it is companies that develop, own, and diffuse new technologies world wide. So far incentives for the development and transfer of climate friendly technologies are not sufficient.

Compliance with a Post-Kyoto climate regime is a particularly complicated topic. Currently only positive incentives are available to support compliance whereas pressure can hardly be exerted within an international agreement. Trade policy measures such as border tax adjustment belong to the few instruments available. However, the consequences of using such instruments need to be carefully assessed.



## Strategy Perspectives

### ***Incentives and Institutions. A Bottom-up Climate Policy Framework***

Carlo Carraro

*Chairman of the Department of Economics and Professor of Environmental Economics, University of Venice; Director of Research, Fondazione ENI Enrico Mattei (FEEM)*

#### **1 Background**

An effective control of climate change can only be achieved by reducing GHG emissions well below the 1990 levels, i.e. the Kyoto Protocol is largely insufficient because:

- many countries are not committed to reduce emissions
- committed countries do not have ambitious targets

A post-Kyoto post-2012 strategy must focus on enhancing participation (incremental evolution) and improving policy design to lower emissions (structural evolution).

The development and diffusion of low carbon technologies will be central to providing safe, secure, sustainable and affordable energy to a growing world economy over the 21st century.

#### **2 The Incentive Problem**

Broad participation to a global cooperative initiative to reduce GHG emissions is hard to achieve because of:

- Large economic and environmental asymmetries among world regions. E.g. some countries may not suffer from climate change, others, possibly the same, pay large mitigation costs.
- Intrinsic instability of environmental negotiations. Even in the absence of asymmetries, some countries may prefer to free-ride (climate change control is a global public good, no supranational authority, myopic behaviour, etc).

As a consequence, incentives to sign an effective international agreement to control climate change are very limited. Implications:

- “Real world” incentives and institutions cannot lead to a global permit market. Markets are going to be fragmented (Victor, 2006).
- Fragmentation because of diversity of interests and institutions.
- Climate agreements based on emission reduction targets are going to be partial and multiple (Carraro, 1998)

#### **3 A Proposal for an International (Bottom-up) Policy Architecture**

A bottom-up, country-driven approach to defining national commitments should be adopted.

Instead of top-down, global negotiations on national emission targets, each country or group of countries would determine its contribution to a cooperative effort to curb GHGs and choose the partners with whom it intends to cooperate.

In a process analogous to trade negotiations, each country would put its offer of commitments on the negotiating table and invite proposals from other countries for similar commitments.



### 3.1 *Basic Ingredients of a Bottom-up Policy Architecture*

- The coordination of a variety of efforts. Countries would agree on things to do rather than on emission reduction targets.
- A variable geometry of participation. Some countries would agree on more efforts than others.
- A sufficient accountability system to ensure that commitments become connected to action.

The word "country" can be replaced by "sector".

### 3.2 *How Can This Be Achieved?*

- Limit on the number of negotiating countries (e.g. the 20 top polluters)
- Issue linkage: trade (e.g., BTA), energy security, technology cooperation, migrations, ...
- Transfers, e.g., through economic cooperation (e.g., Victor on energy infrastructure, use of ODA, ...)
- Review and scrutiny

### 3.3 *Focus on Institutions: A Bottom-up Approach Is to Be Favored*

Because:

- The underlying participation incentives inevitably leads to a fragmented climate policy regime.
- The institutions which are capable to implement an effective climate policy do not yet exist at the international level, but sometimes exist at the domestic and regional level, i.e., a club approach, in which cooperation takes place on specific dimensions where (a few) participating countries have institutions that guarantee compliance and effectiveness.

### 3.4 *Environmental Effectiveness*

In terms of incentives and institutions, a bottom-up approach is the only one with chances to succeed in curbing GHG emissions. A set of coordinated efforts with a variable participation geometry is likely to be the future of climate policy.

However, by relying only on self-interests, this approach may not succeed in achieving the large emission reductions that most scientists believe to be necessary to control climate change.

### 3.5 *Equity and Burden Sharing*

Equity concerns may not be adequately addressed through a bottom up framework. If countries agree on different sets of efforts, the costs of these efforts must be assessed and compared. A metric of efforts must be defined.

## 4 ***Summing Up. A Bottom-up Framework to Climate Policy***

- *Number of negotiating countries*

As recently proposed by the Canadian Prime Minister, 20 is probably the right number, but a slightly smaller number (12?) would also be appropriate.



- *Issues on which these countries will negotiate*

Technological cooperation, climate related trade rules, carbon taxation, carbon sinks, contribution to a global adaptation fund, forestry preservation, biofuels, development aid, energy infrastructures, are some examples.

- *Rules*

For each issue a number of countries, not necessarily the same countries, not necessarily the same number, decide to cooperate.

- *Verification*

A regular verification process of how different measures are implemented in each country or group of countries (and of their impacts and costs) is also agreed upon. Given that all measures are implemented domestically or within a bilateral or regional cooperative setting (e.g. the European Union or Mercosur), the establishment of new global or supra-national institutions would not be necessary.

- *Update*

Regular meetings can be organised to update the set of countries cooperating on each issue. Whenever the verification process identifies an insufficient effectiveness of the adopted measures or an unequal sharing of the burden of controlling climate change, new measures or a new distribution of existing measures have to be negotiated.

This framework implies that climate change is no longer an environmental problem to be dealt with specific environmental policy measures. It is a global economic problem to be dealt with global economic policy measures.

## **Submission**

Richard Evans

CEO, Rio Tinto Alcan

## **Overview**

- The existence of climate change is unequivocal and one of the most pressing challenges of our time.
- Rio Tinto recognizes that addressing the climate change challenge will require significant changes in global energy, transport, land management, industrial and community systems and infrastructure.
- Climate change is a business issue for Rio Tinto:
  - Our operations emit greenhouse gases. Also our metals and minerals value chains play a broader role in global emissions and mitigation opportunity.
  - Government climate policy, and changes in climate systems, will impact the growth potential, operability and cost structure of our business.
  - Business and industry are increasingly seen as essential to the development and implementation of climate solutions.

Our host communities, shareholders and governments expect us to be involved:

- The aluminium industry has a significant GHG footprint with about 1% of global emissions. With its 4.18 million metric tons of primary metal production in 2007, Rio Tinto Alcan is one of the largest producers of aluminium in the world.
- Rio Tinto Alcan is the global leader in efficient aluminium production technology.



## **Solutions**

1. Encourage leadership from developed economies while enabling all countries to contribute to effective management of GHG emissions:
  - Major emerging emitters such as Brazil, India and China need to be included in the solution, taking into account the demands of their emerging economies.
  - Preventing carbon leakage is essential; we must avoid the forced relocation of existing production from one country to another, without reductions in global emissions.
  - International cooperation in the development and implementation of policy and low emissions technologies.
2. Increasing the understanding of climate science and actively adapting to climate impacts.
3. Policy making should be tailored to regional, national and sub-national circumstance and should be environmentally effective, economically efficient and socially equitable:
  - Coordination of policy frameworks across jurisdictions is key for cost-efficient emission reductions.
  - Establishing a price on carbon will facilitate the establishment of broad-based market mechanisms. These will increase flexibility and reduce the cost of abating GHG emissions.
  - Emissions trading is an important abatement strategy and is preferred over carbon taxes (where revenues may be diverted away from the climate problem) or inflexible on-site reduction requirements.
  - There is concern that emissions trading will not adequately accelerate technology development and that narrowly applied local schemes could harm international competitiveness and distort local economies. With careful analysis such negative effects can be avoided.
  - A comprehensive suite of policies should include continued work in climate science, technology, emissions reduction, policy instruments, economic modeling and analysis, international engagement, education and credible planning.
4. Consider full life-cycle emissions and promote those products that bring the most benefit. We believe that aluminium has an important role to play:
  - Aluminium is a lightweight, durable alternative to heavier materials and results in significant downstream GHG savings, especially in the area of transportation.
  - Only 5% of the energy used to produce aluminium from alumina is required to recycle it and, in the long term, aluminium can be recycled indefinitely without compromising quality.
5. Improved technology can bring significant emission reductions:
  - With the appropriate policy framework, the power of innovation can be released to reduce emissions.
  - Rio Tinto Alcan's proprietary AP3X smelting technology is unsurpassed. It is the aluminium industry's leading technology in terms of energy efficiency and lowest emissions. This lead is expected to be extended in the coming years with the arrival of the next generation AP50 Technology.



6. Whenever possible, priority must be given to clean, renewable energy sources:
  - Where there is not yet sufficient access to economically competitive clean energy sources, the focus should be on achieving energy efficiency and savings as part of rigorous carbon mitigation efforts.
  - Complementary policies may be required to ensure that the required technology is available so as to make meaningful emission reductions.
7. Voluntary Sectoral agreements can bring important emission reductions:
  - Properly structured, these agreements can eliminate the risk of carbon leakage within a given sector.
  - They allow major emitters from all countries to compete on a level playing field.
8. Engaging with communities and individuals to create day-to-day commitment to address climate change:
  - Significant emission reductions cannot be achieved without addressing the day-to-day actions of individuals. These, when summed together, represent important levels of emissions.
  - Climate change must resonate to ever-greater degree with the general population, which in turn will generate greater political will.

### ***Global Policy Responses to Climate Change***

John Feldmann

*Member of the Executive Board, BASF*

Any initiative in response to climate change has to be based on a few fundamental principles.

#### ***Be Effective***

It is common sense that everyone on this planet should use the scarce resources we have efficiently and sustainably. Efficient use of energy resources – both fossil as well as renewable – will have an immediate and direct economic effect, reduce the specific ecological footprint, and limit if not reduce the global ecological impact. This can only be achieved effectively if the same general principles are applied globally.

Any strategy that is not universally binding and that allows major players to opt out will not succeed in achieving sustainability goals.

#### ***Be Fair***

Do not expect others to carry the burden, and do not just look for the benefits.

Developing nations will not accept slowing down on their way to prosperity. Developed nations will not accept substantial sacrifices with regard to their quality of life, nor will they accept reducing their global economic competitiveness for the benefit of developing nations. Is this a dead end street – the end of the efforts? No, it is not: We have by no means exploited all the opportunities for ensuring more efficient use of our resources and reducing the related ecological footprint that will allow us to maintain or even improve standards of living. McKinsey's global CO<sub>2</sub> abatement cost curve shows that there is potential to reduce seven gigatons of CO<sub>2</sub> without additional cost, that is about 15% of total current CO<sub>2</sub> emissions. We believe more can be achieved. Penalty systems like emission trading must be changed so that they are fair in respect of:

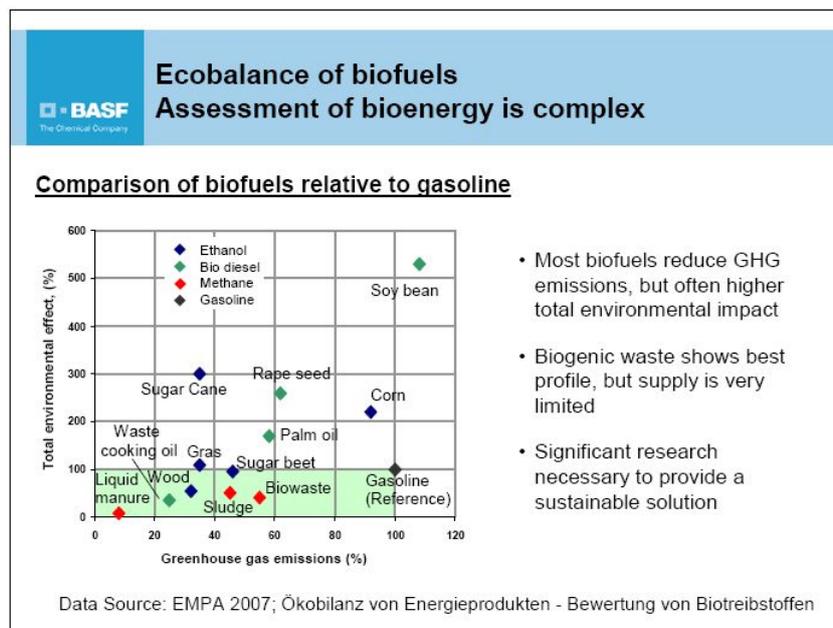


- giving a chance to further develop society,
- giving equal chances to all nations.

### **Be Holistic**

In our highly integrated and interlinked world, we can not agree on any measure or policy that focuses on just one effect such as reducing CO2 emissions when producing electricity or driving a car. In terms of the ecological impact of any measure, we have to look at the whole value chain, not just the isolated measure as such. In 2007, the Eidgenössische Materialprüfungsanstalt (EMPA) in Switzerland analyzed the overall ecological impact of various renewable resources as potential substitutes for gasoline – today’s major energy source for cars. They not only looked at greenhouse gas emissions, but took into consideration the total environmental impact relative to gasoline.

They concluded that effluents and by-products from the food chain could well serve as an energy source without major additional ecological impact, whereas the impact of crops specifically grown as energy sources is substantially bigger in most regions than the related impact of producing and using gasoline.



This study does not address the question of whether it is wise and ethical to utilize the scarce arable land and water resources to replace scarce fossil resources. We believe that, based on today’s technology, we would need more than 20% of global arable land to substitute 10% of the oil consumed today. And with a growing population and growing global wealth, demand for food will increase both qualitatively and quantitatively. Please note that to produce one calorie of beef to eat, you need to grow 10 calories of grain to feed the calf, and that meat consumption grows with wealth. Thus, for any measure, a comparative cradle-to-grave analysis of the overall ecological impact along the value chain has to be considered.

### **Be Realistic**

In order to create buy-in and acceptance, measures should not only be sustainable from an ecological point of view in a holistic cradle-to-grave view. Measures also need to be economically reasonable. There are a lot of opportunities with both ecological and economic justification that should be addressed first. Levies on some technologies and subsidies for



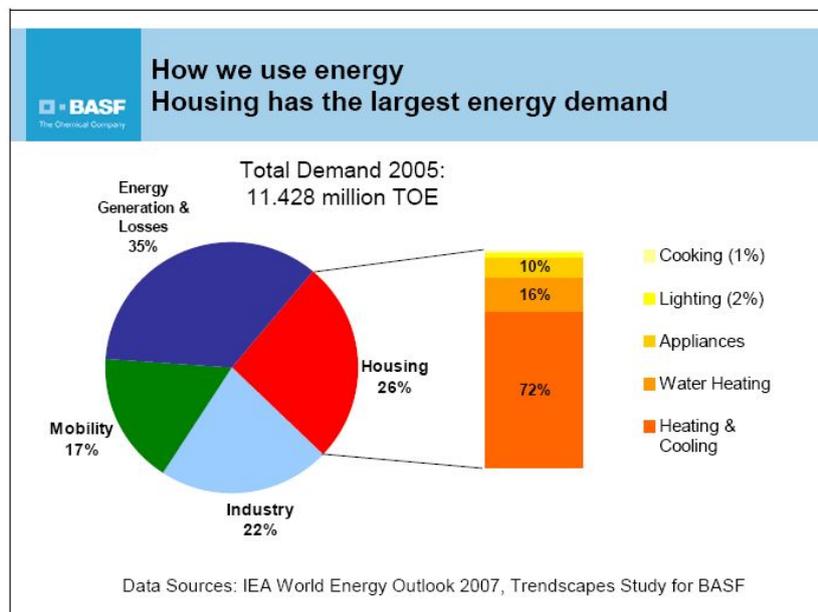
others may lead to totally wrong developments if they are not also backed by a holistic cradle-to-grave analysis of their ecological impact and a test of their economic sustainability.

Public initiatives to discourage technologies without a readily available sustainable and viable alternative should be avoided, as should incentives for technologies with no reasonable economic justification.

In view of energy security, we have to remind ourselves, that since 2007 the majority of people on this planet live in cities. In other words, future energy scenarios will have to take megacities into account as a way of living.

### ***Be Focused***

The biggest and most obvious opportunity for using our energy resources more efficiently and reducing the ecological impact of energy use is by saving energy. To achieve that we need to know where energy is used.



About one-third of the energy globally produced is lost during storage and transport. This is clearly where we should be focusing our efforts in science and technology. Private housing accounts for 26% of the energy produced today, 72% of that amount is for heating and cooling. There is an enormous potential to reduce energy consumption, greenhouse gas emissions and other ecological impact by properly insulating houses in an economically reasonable way. However, subsidies on energy in some countries and rent law inducing an investor-beneficiary-dilemma in others, e.g., in Germany, prevent economically and ecologically efficient measures. By the way, lighting accounts for just 0.5% of the energy produced. Campaigns to switch off lights or use energy-saving light bulbs are a demonstration of good will, but are relatively insignificant when it comes to saving energy.

### ***Be Pragmatic and Do the Obvious***

By properly renovating houses, Germany alone could save substantial amounts of fossil resources used for heating and cooling houses (and plenty of money, too). In this way, Germany could reduce emissions equivalent to 35% of its Kyoto commitment and create jobs by renovating more than 20 million apartments – all in an economically reasonable way (if rent law allowed for it). Whereas industry, particularly in Western Europe, has done a lot to be a global leader in energy efficiency, there is still a high potential in other parts of the



world. Exchange of know-how and technology will be crucial, but it will be imperative that we don't take measures to discourage technologies in some parts of the world that may be extremely useful elsewhere.

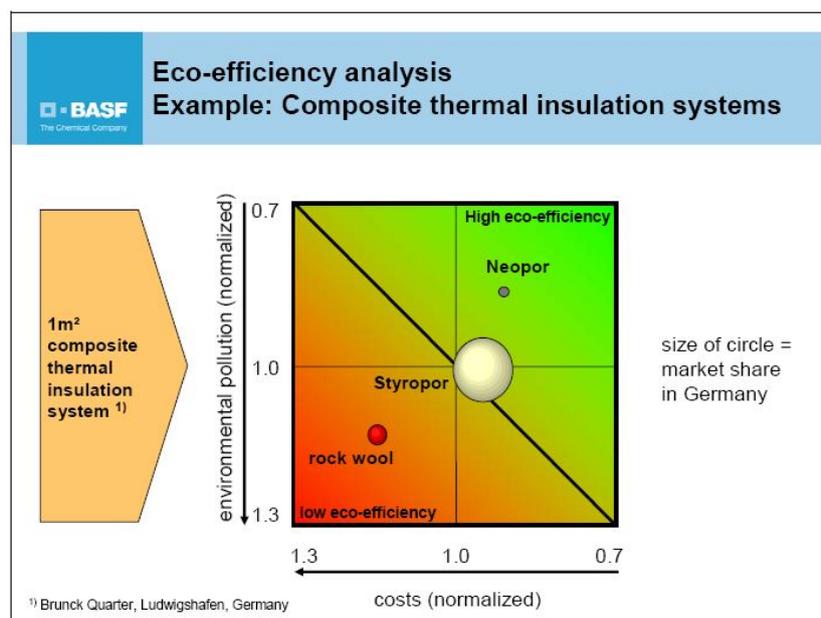
Furthermore, we need to make sure, that the global technology leaders in energy efficiency are not discouraged to continue with their efforts with misguided regulations, for example on emission trading. We must avoid production shifts from countries or regions with strict climate policies to regions with lower standards, leading to "carbon leakage" instead of climate protection. Further huge potential exists with regard to mobility. In today's cars, on average only 10% to 20% of the fuel burnt is effectively used to move the car forward. Improving engine efficiency, reducing the overall weight of cars, and looking for concepts for transport energy that are viable in the long term are the relevant approaches.

### **Be Eco-efficient**

Strategic instruments to evaluate fields for further activities have to adopt a holistic approach that considers both the costs as well as the environmental burden and takes the entire lifecycle into account.

To do this, BASF has developed an eco-efficiency analysis tool: economic and ecological advantages and disadvantages of products and processes are jointly assessed and compared from cradle to grave. The environmental impact is described using six categories: Raw materials consumption, energy consumption, land use, emissions to air, water and ground (wastes) and disposal methods, toxicity potential and risk potential. The total environmental impact of a product or process is determined by combining these individual pieces of data. With regard to the economic dimension, the calculation includes all the costs incurred during manufacturing and use of a product. The eco-efficiency analysis also takes into account the consumption behavior of end users, as well as various recycling and disposal options.

This economic analysis together with the overall environmental impact is then used to compare the eco-efficiency profiles of different products or processes. Higher eco-efficiency means greater benefits with respect to costs and the environmental burden.





## **GES – Comments<sup>1</sup>**

Thomas Sterner

*Professor of Environmental Economics, Gothenburg; President, EAERE*

### **Summary**

Are there preferable alternatives to the cap-and-trade system of the Kyoto Protocol? A system of taxes or fees is potentially preferable. Price type systems can be designed to have many advantages. The choice between these two systems is very complex and it would probably be foolish to disregard the tax alternative too early.

Should the coming climate negotiations be global level or include just the major emitters?

*It is vital to include large emitters. It may be preferable to start with a coalition of large emitters if such a coalition can be formed faster than global negotiations.*

How should the costs of the policy collaboration be distributed among developing and developed countries?

*It is clear that this will be one of the major items of negotiation. My own view is that richer countries must clearly bear a larger share of the costs.*

If global, what institutional architecture for climate negotiations is desirable? Is there a case for creating a new international institution (analogous to the IMF) to deal with climate change, or can existing institutions handle the task?

Yes I think there is a strong case for this. We create institutions for many smaller tasks and climate change is both a major challenge and a long-lasting one. It is thus thoroughly appropriate to create new and powerful institutions to deal with climate issues.

What is the role of international technology cooperation and adaptation measures to climate change?

Technology cooperation is vital for several reasons. Directly and indirectly since the availability of technology will facilitate other aspects of the negotiations concerning carbon emission reductions. Technology cooperation has also the potential for creating more “positive” energy into negotiations than simply discussing abatement.

### **Solutions**

The core group would need to include the USA as well as the major GHG emitting developing countries. As it is, the USA is only willing to reduce their emissions when e.g. China and India agree on binding targets as well. This is definitely reasonable.

The stand-point of the developing countries is that not only the industrial countries are those responsible for most of the past emissions but also that their per capita emissions are still much higher than in the developing countries. This is however also very reasonable.

Creating incentives for the developing countries to join a climate regime is thus decisive and implies that the industrial countries have explicitly or implicitly to transfer resources to the developing countries. Possible mechanisms that are discussed currently are a cap-and-trade system and an adaptation fund. Furthermore, the issue of technology transfer and cooperation is important in this context.

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<sup>1</sup> No comment means that I agree with the summary.



I agree with this and the following paragraph on the reasonableness of the Contract and Converge approach. This approach is I believe not well understood nor accepted by many parties and I believe it would be useful to popularize and spread these ideas to a broader audience in order to learn about the social acceptability of this kind of proposal.

Adaptation measures will of course to a large extent occur spontaneously. It is however useful to make them explicit and visible so that a discussion can be initiated about the their size relative to abatement and technology costs and the incidence of these costs between different groups of countries. The idea of an international adaptation fund is far from simple but definitely worth pursuing.

The term “technology transfer” is misleadingly intuitive and simple. In fact there is no such thing. Technologies are typically sold as services or embedded in capital goods that are also subject to regular market transactions. A requirement to make new technologies “available” to anyone (for instance poor countries) can have serious perverse incentives since it might lead to reduced research (in a situation where R&D is already insufficient). It is better to recognize that what needs to be transferred is simply money! This can be done by cap and trade systems or tax systems and by other means. Technology can then buy

For the issue of technology development and transfer business will have to play a leading role since it is companies that develop, own, and diffuse new technologies world wide. **So far incentives for the development and transfer of climate friendly technologies are not sufficient.**

I think we need to be careful here: Incentives for development of technology are insufficient – precisely because there is a market failure when it comes to property rights. Companies that develop new technologies cannot be certain that they can appropriate the full benefits – precisely because they may be obliged to “transfer” the technology cheaply to others or that the technology may be copied by others. Therefore we need to separate the issues of incentives for R&D and the issue of transfer since they are quite antagonistic issues.

Compliance with a Post-Kyoto climate regime is a particularly complicated topic. Currently only positive incentives are available to support compliance whereas pressure can hardly be exerted within an international agreement. Trade policy measures such as border tax adjustment belong to the few instruments available. However, the consequences of using such instruments need to be carefully assessed.

I think there is some reason for cautious optimism here. The day that the USA, EU, China, India and Japan + maybe a few others agree to a tough climate policy then this coalition will be so powerful that it will find appropriate ways to make sure that countries outside will be stopped from abusing the incentives to counteract the climate policy – for instance by using cheap coal to produce and export metals or plastics ...