

Proposal for a Post-Kyoto Framework

A World Fossil Resources Organization

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A Proposal on a World Fossil Fuel Organization
as a Post-Kyoto Regime

EXECUTIVE SUMMARY

In this paper we present a scenario for reducing global greenhouse gasses (GHG) emissions by 50% from the present level. The backcasting technique, which Robinson J.B. advocated in energy demand research, was employed for this scenario.

After examining various causes of the problems with the Kyoto Protocol and the current proposals on a Post-Kyoto regime, we have arrived at the conclusion that none of the proposals deals with the reality of financial difficulties that would arise. As a result of reduced fossil fuel consumption, fossil resources producing countries and developing countries would experience economic hardship. Neglecting these financial consequences will most likely result in a delay of agreement among these countries, whose role is critical to achieving effective GHG emissions mitigation and better control of the atmospheric temperature.

In order to minimize adverse financial effects on the parties concerned, we have worked out a scenario through the backcasting technique, which would incorporate external while observing the principles of the UNFCCC and the prerequisites referred to in the IPCC reports.

This scenario shows that improved use of fossil resources is imperative for drastic cutbacks of GHG emissions. The goal is to seek complete agreement among the countries concerned to establish an international public organization for managing such global efforts. In this paper we have addressed questions of the principles and the functions of this international managing organization.

Its principles must embrace humanity, equity, economy, common rules, penetration, efficiency and funding, and its functions must include monopolized sale of fossil resources around the world, their price control at levels justifiably high enough to their producers and to support subsidization for energy conversion with funds generated by the operation of this world organization.

Lastly, we have compared the recommended functions with those of the Kyoto regime and the Post-Kyoto proposals currently available. Our conclusion is that our proposal deserves serious attention.

KEY WORDS

Global warming, Post-Kyoto Protocol, backcasting, fund and public corporation for fossil resources

1. Introduction

In this paper we discuss the concept of a post-Kyoto Protocol regime, which will reduce global greenhouse gases (GHG) emissions to less than 50% of the current level by 2050.

First, we will address the problems with the international emissions trading system, which is the core of the Kyoto Protocol, and then we will discuss the aspects of the Kyoto Protocol as it pertains to Japan. In our view, the current measures to mitigate climate change are flawed in that they started without adequate alignment of the conflicts of interest among the countries with fossil resources, e.g. oil producing nations, developing countries with increasing dependence on fossil energy and industrialized countries with serious interest in and a strong sense of responsibilities for maintaining a healthy global environment. We will also give a critical review of the carbon tax mechanisms, which are often compared with the emissions trading systems and other post-Kyoto Protocol concepts.

From this point of view, we will attempt to first project a future in which conflicts of interest are minimized among the countries in their efforts to combat global warming. This international cooperation would enable worldwide control of combined aggregate anthropogenic carbon dioxide equivalent emissions of GHG. Next, we will construct a scenario which leads to this desired future, focusing on the external elements necessary, and working backwards from the future to the present through the backcasting technique. A world fossil resource managing organization plays a vitally important role in such a scenario.

A critical piece of this puzzle is for the world organization to acquire fossil resources from owner countries at a fair price and to create a monopoly on worldwide sales. Global carbon dioxide emissions would be controlled through these price mechanisms. With earnings from the monopoly, the organization will allocate funds

to each member country for energy conversion and adaptation to climate change, as well as management of its own administrative expenses.

The objective of this new regime is to assign a fair share of fossil resources to each economy, rather than to allocate carbon dioxide allowances, and in addition, fund energy conversion and other decarbonization endeavors in member countries. This process is expected to provide the organization with a strong centripetal force, paving the way for each country to cooperate, not argue, in improving the international energy and economic system.

Next, we discuss the external factors, economic, technological and ethical, which lay the foundation for establishing this world organization. In this discussion, we will attempt to justify our proposal by comparing it with other future systems which have already been publicized.

2. The problems with the present international emissions trading system and the current proposals for future regimes

2.1 The strengths of the current international emissions trading system

Under this system a global mandatory limit of emissions is established and each member country is given a share as its entitlement. The Kyoto Protocol allows Annex 1 Parties to trade emissions with one another on open markets toward reaching their emissions targets. Each member country takes emissions-cutting measures in the order of marginal costs. If the emissions exceed the country's quota, the country buys emissions credits at the market price as long as it is lower than its own marginal mitigation cost. On the other hand, if the price/cost relationship is reversed, the country may sell excess emissions credits. Thus, this free-market trading mechanism enables countries on both sides to enjoy their respective economic benefits. The price of credits is determined where the marginal emission abating

costs of all countries converge.

The international emissions trading system has the following theoretical advantages:

- (1) It is easier to track how much GHG reductions can be achieved around the globe.
- (2) The system contributes to minimizing the costs of global climate change mitigation.
- (3) It provides more flexibility and freedom to each country's domestic policies.

For these reasons, *inter alia*, the international emissions trading system was adopted in the Kyoto Protocol and the upper limits of GHG emissions were set for each of the developed countries and those undergoing the process of transition. Thus, the market-oriented mechanisms were introduced into the Kyoto Protocol but the real world has failed to benefit from the above-mentioned conceptual advantages since the Protocol was put into force.

Under the Kyoto regime developing countries are exempt from making GHG reduction commitments. The U.S. and Australia signed the Protocol but decided not to ratify. These exceptions make it impossible to accurately forecast aggregate global emissions. The problem will continue as long as we have countries which refuse to make mitigation commitments. Thus, the advantage referred to in (1) above has not materialized.

The advantage (2) would be realized only when each entity takes all possible mitigation measures while its marginal costs remain below the market prices of emissions credits and it buys emissions credits when the mitigation cost/credits price relationship has reversed. However, in the real world the emissions credits market may drastically fluctuate and the participants would be unable to make meaningful estimates of future market prices. Consequently, the participants could not make rational decisions about mitigation investments. If the country forecasts

high credits prices, it would go ahead and make expensive investments. Conversely, if the forecast is low, then it would opt not to invest. Thus, the targeted reduction of total emissions may not be achieved or, even if it is, global mitigation costs fail to be minimized.

As to (3), it is true that member countries can enjoy flexibility in adopting reduction measures but this procedure places a heavy burden on the national governments, as they must form mitigation policies by thoroughly reviewing various options and then building a consensus with citizens and industries. In a democratic country where power often shifts from one party to another, there are limits to what the ruling party can do for fear of losing power if certain unpopular measures are forced.

In 2005 the Japanese government announced an action plan to implement its commitments under the Kyoto Protocol. This plan employs a Command and Control system under which mandatory GHG reduction amounts are assigned to each sector in order to mitigate total national emissions. The problem with this plan is that there is no guarantee that the various measures listed will be implemented. It invites criticism regarding voluntary emissions reduction in industrial sector and the plan falls short of putting domestic emissions trading and a domestic carbon tax into action. Critics say that plan is merely an extension of the conventional approach which has been ineffective in achieving any drastic results.

On the other hand, if the government adopts a domestic emissions trading system, a major challenge would be whom and how much to cap. Under the upstream emissions trading proposal discussed in Japan, concrete steps to reduce downstream emissions are yet to be established. Could the country stop importation of fossil fuels if its emission allowances would be exceeded? Or can it buy as much emission credits as it needs from abroad? In addition, no consensus has been reached as yet on the introduction of a carbon tax. There are other pressing problems such as carbon leakage, that is, industrial migration from countries with a

carbon tax to those without one, the question of tax revenue appropriation and the coordination of the carbon tax with fuel taxes on petroleum, coal and gasoline. In a nutshell, the Japanese government is given a certain degree of freedom in drafting an internal policy but it has failed to come up with an effective emission mitigation program.

Thus, the theoretical benefits of the Kyoto Protocol do not effectively translate to reality.

2.2 Weaknesses of international emissions trading

The problems with international emissions trading have often been pointed out, particularly in negotiations leading to the Kyoto Protocol and the events that have emerged since that time.

(1) The most serious of them all is the difficulty in reaching international agreements on mitigation targets. The participating countries' aggregate costs depend largely upon the initial determination of their quantified emission limitations and reduction commitments. In the negotiations which resulted in the Kyoto Protocol, a good number of proposals were presented by various countries to work out fair and equitable emission targets by country. Japan, Norway, Iceland, Australia, Brazil, France and Switzerland, among others, proposed various ideas including emissions per capita, total GDP, per capita GDP, estimated population growth, etc. as a basis for determining country-by-country emissions quotas. Unfortunately, the efforts failed, as the countries were unable to agree on even the practical definition of fair and equitable.

In the end, emission reduction targets for the Kyoto Protocol had to be politically decided, and this method has unavoidably resulted in revealing many inherent defects. Developing economies flatly refused to assume any responsibilities for

cutting their emissions and their argument was eventually accepted. In order to get Russia to agree to sign the Protocol, its emission limitation and reduction commitments were set at easily manageable levels, thus providing it with “hot air”. Industrialized nations needing emissions credits can buy “hot air”. Naturally, such transactions do not contribute to net emission reductions. These anomalies are further examples of the obstacles to helping the world to achieve the ultimate objective of the UNFCCC.

- (2) Big polluters who have made little mitigation efforts would earn a sort of vested emission rights if they have reduced their emissions, thanks to the Kyoto mechanisms. On the other hand, the nations, which have painstakingly abated their emissions, would find it extremely hard to reduce more and, therefore, to implement their Kyoto Protocol commitments, much less enjoy such extra emission rights. This is a prime example of the inequity between these two groups of nations..
- (3) In pre-Kyoto Protocol days, concerns were expressed that nations would not join the international regime, if they were afraid their reduction goals would be too difficult to achieve. In fact, due to this prevailing attitude, the U.S. and Australia have practically left the Kyoto Protocol framework.
- (4) Projection of the value of emissions credits is hard to establish. Therefore, there is skepticism that emissions trading is unlikely to yield favorable results to economic activities and fossil fuel consumption. The World Bank estimates the value in 2010 at somewhere between 1 to 33 US dollars per ton of carbon dioxide under the CDM. With this much uncertainty, investors would find it risky to take emissions credits into their economic consideration.
- (5) The emissions trading system tends to cause myopic decisions and is, therefore, inadequate for development of technologies and improvement of energy-related

infrastructure.

(6) Administration of the system is complicated.

The weaknesses inherent in international emissions trading will be more pronounced as mitigation targets become higher, likely approaching 50% of the current level. It will be nearly impossible to keep all member countries within the international framework and have them to accept their respective country reduction commitments. Thus, international emissions trading cannot play a key role in a post-Kyoto regime. This, however, does not contradict the effectiveness and urgency of member countries' current responsibilities to implement their commitments under the Kyoto Protocol.

2.3 What do we learn from our experience with the Kyoto Protocol?

The Kyoto Protocol is essentially the product of ultimate political concessions by developed countries with lofty ideology and strong leadership. Nations such as Japan and the countries of the EU are to be commended for stepping forward. Projected economic benefits from emissions trading and the CDM have managed to keep uncooperative countries in the framework. (See Figure 1) Since negotiations for the 1991 climate change framework agreement began, developing countries have made concerted efforts to hold industrialized economies historically responsible for global warming and to avoid their own responsibilities to reduce GHG emissions. The idea of the CDM was then introduced as motivation to bring them on board. The benefit of "hot air" had to be given to Russia in order to get its cooperation. As a result, developed countries must bear the burden of investing in developing countries and buying emissions credits from them. Japan, as the host country of the Kyoto Protocol, had to take the initiative in accepting it for the sake of constructing the, historical, first international, framework to combat global warming in history.

In designing a post-Kyoto regime the structural weaknesses of the Kyoto Protocol must be clearly identified and a new system be developed to correct these weaknesses. The Kyoto Protocol falters because it has failed to reflect in its core the wishes of developing countries, oil producing countries and coal producing countries. A new framework must meet this challenge squarely. On the other hand, a post-Kyoto regime must also deal with industrialized economies' serious criticism of painful reduction targets to be placed upon them. Is it possible to develop new global mechanisms satisfying the demands from both sides?

This paper proposes the establishment of a world fossil fuel organization as a solution. Before going into detail on this new organization, we will review the various GHG mitigation systems publicly debated other than the international emissions trading mechanisms that we have already discussed.

2.4 An International Carbon Tax and other proposals

An international carbon tax has often been mentioned as a way to apply a uniform tax around the world. Assuming that each economic entity makes economically rational decisions and takes rational measures, it will exert its best endeavor to curb as much GHG emissions as possible as long as the marginal mitigation costs stay below the given carbon tax burden. As a result, total global abatement costs would become minimal. After trial and error, the carbon tax rate would eventually settle at the level where the carbon abatement goal is achieved.

The international carbon tax regime would, however, present unfair economic burdens to developing nations with many mitigation options available at low marginal costs and, therefore, would most likely invite opposition from most developing countries. For this reason, it has been suggested that a sovereign international authority be responsible for collecting part of the carbon tax and distributes it among developing countries according to certain fair principles to be established. This

would serve as a complementary remedy to the carbon tax system by alleviating the disproportionate burdens on developing countries.

A carbon tax framework with variant-rates has also been debated but the problem is that it would be difficult to determine equitable tax rates for each country, plus there is the risk of resulting carbon leakage.

In theory, international carbon tax mechanisms have many advantages such as enhanced global cost-efficiency as well as the allocation of tax revenues to large international mitigation projects. Practically speaking, however, due to the opposition by developing countries, specific solutions such as what to tax and how to collect and where the tax revenues should go have not been adequately addressed.

There are other post-Kyoto alternatives as below:

- (1) An energy-efficiency program based upon energy consumption per GDP or a carbon abatement-efficiency program based upon carbon emissions per GDP.
- (2) Sustainable Development Policies and Measures (SD-PAMs) under which each member country promises and commits itself to adopt global warming mitigation programs.
- (3) A hybrid system under which the national government issues emissions credits without limitation, should their market prices have hit the pre-determined ceiling. This allows concerned entities to buy credits at that ceiling price, freeing them from bearing the burden of additional mitigation costs.
- (4) A “Pledge and Review” system under which member countries announce action plans to combat global warming and agree to allow an international auditing body or other member countries to review their performances periodically.

This paper does not deal with the strengths and weaknesses of all post-2012

proposals in detail but where it is comparatively easy to get international consensus on a given framework, complete and overall effectiveness to curb carbon emissions is not fully warranted. Therefore, any single aspect of these options would not achieve the difficult target of reducing GHG emissions to 50% of the current level by 2050.

3. Analysis of post-2012 frameworks, by employing the backcasting technique

3.1 Analytical methodologies – Forecasting vs. Backcasting

We attempt to formulate a scenario for a new post-Kyoto regime through the backcasting analysis

Backcasting is the antithesis of forecasting. Forecasting is a technique which predicts the future based upon the information available now (e.g. the past trends). While forecasting makes econometric modeling possible, it must rely heavily upon the past trends and its effectiveness is intrinsically restricted. Therefore, uncertainties outside the scope of the past trends are unaccounted for. And even worse, forecasting is seriously flawed as it cannot break the past trends, when the likely future is undesirable and something new is wanted. As an antithesis to the forecasting technique, the backcasting technique has come into being. See Table 1 for comparison of both techniques.

Table 1 Forecasting vs. backcasting

	Forecasting	Backcasting
Underlying philosophy	● Determinism	● Teleology
Analysis objective	● Identifying specific trends deducted from the present	● Identifying solutions to important social problems

Baseline concept	<ul style="list-style-type: none"> ● Probable future 	<ul style="list-style-type: none"> ● Desired future ● Strategies leading to the desired future
Methodology	<ul style="list-style-type: none"> ● How to deal with trends ● Deduction of trends ● Econometrics modeling 	<ul style="list-style-type: none"> ● Freedom of action ● Establishing a future image ● Analysis of the routes and leading to the future image ● Deduction and induction under partial and optional
Technique	<ul style="list-style-type: none"> ● Operation ● Scenario analysis 	<ul style="list-style-type: none"> ● Inferring and scenario analysis from the present, future and external

The purpose of backcasting is to identify measures necessary to arrive at a specific desired future. Free from excessive dependence on the trends from the past to the present, backcasting identifies a desirable and plausible future state and traces the pathways and backwards to the present.

In order to arrive at an answer generally acceptable through the backcasting methodology, it is imperative that the desired future state or scenario be what many people want, the line of reasoning is correct and the routes of development and leading to the future as a result of reasoning can be naturally expressed in the form of a scenario.

The backcasting methodology was first introduced to the energy field by J. B. Robinson. Table 2 shows an example of a backcasting analysis.

Table 2 flow chart of backcasting methodology (a sample case)

<p>1. Setting the study objective</p> <p>Establish the study objective, define its scope of time and space and identify the</p>

number and the kinds of scenarios.

2. Setting a future goal

Identify a goal and as related to scenario analysis and external factors.

3. Grasp the present status of energy consumption, production, etc.

4. Identifying external factors

Identify external factors and choose only those related to scenarios.

5. Scenario analysis

Choose methodologies to construct scenarios, project future energy supply and demand at a given time in the future, analyze scenarios and examine their applicability.

6. Analysis of the meanings of the scenarios

Analyze social, economic and environmental meanings of the scenarios. Assess the scenarios from the perspective of attaining the goal, repeat the steps of 2, 4 and 5 above, if necessary, in order to establish compatibility between the future goal and the scenarios.

3.2 The objective of this paper

The Kyoto Protocol under the United Nations Framework Convention on Climate Change aims to stabilize GHG concentrations in the atmosphere at levels which would prevent dangerous anthropogenic interference with the climate system. Our vital mission is to protect it now and for the future. The objective of this paper is to establish the principles and functions of a post-Kyoto framework, which would achieve the said goal of the Kyoto Protocol.

Our study addresses all nations around the world including developed countries, countries which possess fossil resources as well as developing countries, encompassing the time frame from 2013 to 2050. The targeted limit of temperature increase by 2050 is set at 2.0 degrees under our proposal. This is because the EU countries aim at the same limit over the pre-Industrial Revolution level. In fact, the national governments in the EU started studying middle-range measures to cut GHG

emissions by as much as 60-80% by 2050.

In May 2007 Japan's Prime Minister Mr. Shinzo Abe announced a long-term proposal to mitigate global GHG emissions to 50% of the current level by 2050. His proposal was highly acclaimed by the G8 Summit that shortly followed in Germany and was in fact reflected in its joint statement. It stated to the effect that the governments would seriously study the agreement reached among the EU, Canada and Japan to cut global GHG emissions by at least 50% by 2050. From these events, we can safely say that the consensus of opinions in the world is that we must aim at global GHG emissions reductions by at least 50% by 2050.

Next, we would need to construct as many scenarios as required, if there are different levels of GHG stabilization targets or different pathways leading to the stated objectives, as seen in SERES. However, we believe we can achieve the objective with only one scenario by materializing the global monopolization of fossil resources through the World Fossil Fuels Organization. Our concept is based in principle upon the A1T scenario of SERES and no other rational scenarios can be found by the backcasting technique. We will discuss the underlying for the concept and this world organization below.

3.3 Setting a future goal and the parameters for scenario construction

The goals under our plan are 50% GHG emissions reductions and stabilization of GHG concentrations in 2050. It is possible, however, that further study on the relationship between GHG intensities and temperature rise may show the need of more stringent GHG emissions abatement requirements. Thus, we face the challenge of developing an effective framework flexible enough to cope with long-term uncertainties.

Next, we will discuss the parameters for our scenario construction. Article 2 of the

UNFCCC states that its ultimate objective is to achieve the stabilization of atmospheric GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system within a time frame sufficient to allow ecosystems to adapt to climate change, to remove threats to food production and to enable sustainable economic development. The Convention has established underlying principles for this purpose: equity, common but differentiated responsibilities, cost-efficient actions, precautionary measures to anticipate and minimize the causes of climate change, the right to promote sustainable development and cooperation to support an open international economic system.

The IPCC Third Assessment Report on Climate Change (Working Group III) has summarized these principles as cost efficiency, equity and global sustainability and socio-economic studies. Here we briefly discuss what these principles mean.

First, judging from “cost efficiency” and “support of an open international economic system”, it is assumed that capitalism prevails and a free trade system is maintained in 2050. It is further assumed that good cost efficiency contributes to the economic development of society, material and other civilizations that have long been developed remain as intact as possible, active human activities are maintained and mankind’s general quality of life remains constant.

Second, the definition of equity depends upon the nature of the framework. It is assumed that the international rules concerning the mitigation of GHG emissions apply equitably to all populations in the world and all nations perceive that the rules and the framework are fair to them.

Third, as to global sustainability and socio-economic studies, it is assumed that the incompatibility among human economic activities, the physical cyclic system of the earth and ecosystems is to be mitigated and a recycling-based society can be established by 2050.

3.4 The current regime to reduce GHG emissions

We discussed the problems with the Kyoto Protocol in Chapter 2. At the COP13 and COP/MOP3 held on the island of Bali, Indonesia, in December 2007, some improvement was seen on the conflicts of interest among the group led by the U.S., the EU countries and the developing countries. Australia, which had sided with the U.S., stepped forward toward the EU position as a result of the recent change of government. Furthermore, South Africa, Brazil, Argentine, Singapore and China, among developing countries, started showing enthusiasm to reduce their own GHG emissions.

It was agreed that the Ad Hoc Working Group (AWG) under the UNFCCC would officially start discussions on post-Kyoto Protocol according to the Bali roadmap. Regrettably, however, specific numerical targets of emissions reductions were not reflected in the roadmap.

On the other hand, the AWG under the Kyoto Protocol, which does not include the U.S., was held at the same time, and industrialized nations agreed to target 25%-40% GHG emissions reductions from the 1990 levels by 2020. This shows there still is a serious gap in stance on the issue of global warming among the EU countries, the U.S., many developing countries and countries owning natural resources. To complicate the matter further, the future positions of Russia and Japan remain to be seen. There is still a long way to go before the whole world comes to agree on an effective framework to combat global warming together.

In the meantime, crude oil prices have skyrocketed but this has not decreased fossil fuel demand. Still worse, industries started shifting back to more polluting coal.

The IPCC Working Group III Third Assessment Report discusses potential GHG mitigation capabilities by sector within certain cost parameters and recognizes that

such capabilities are not fully put into action. It lists the barriers for developing these potential GHG-mitigation pathways as follows:

1. Lack of funding by commercial financial institutions due to high risks associated with developing green financial products.
2. Absence of market prices for certain impacts (externalities) such as an environmental harm
3. Network externalities
4. Misplaced incentives
5. Vested interests
6. Lack of effective regulatory agencies
7. Lifestyles, behaviors and consumption patterns
8. Uncertainty about future energy prices, energy conservation, technological innovations, etc.

It is apparent that these barriers indeed exist and that they seriously hamper the development and diffusion of technologies.

3.5 External elements for developing scenarios

The following perspectives must be taken into account for developing a concept for a new framework and scenario analyses:

- 1. All parties act as homo-economics.** Restricting the use of fossil fuels is highly political. However, if we include political considerations in our study, neither forecasting nor backcasting methodology can meaningfully function. Therefore, this assumption as in modern economics must be introduced. This means, for instance, that every nation and every economic entity would agree to shift energy and industries or even to sell fossil resources to an international organization as long as they see an economic benefit in doing so. We will discuss assumptions regarding economic entities' behaviors, when our scenario is constructed.

2. Development of new industries dealing in new energy sources and new materials. When the price of fossil fuel becomes exorbitant, economic entities will be forced to free themselves from reliance on fossil fuels. They will then switch to new energy sources and, as a result, new industries would emerge to supply alternative energy and manufacture new materials instead of existing products derived from the use of fossil fuels. This transition would be feasible as long as the required capital is made available.

3. Growing widespread recognition of the irreversible and damaging threats posed by global warming. The entire world finally understands the serious extent of the dangers of climate change, should it be left unmitigated. There is global recognition of the need to bear mitigating costs as long as they stay below or at the level of the costs resulting from damages otherwise inflicted upon the earth. Therefore, we believe that world consensus would support the introduction of an effective yet demanding new regime to abate GHG emissions.

We will discuss these external in detail and redefine them to better suit the purposes of the new scenario when it is completed.

3.6 The principles of a new regime derived from the backcasting analysis.

The purpose of the backcasting analysis in this paper is to find a timely solution to a complex social problem. First, a desired future goal is set and then a scenario leading to it is traced backwards to the present by deduction.

We attempt to identify the principles of a new regime to take effect in the year 2050 on the basis of the desired future goal, the metrics for scenario construction and the external, which we have referred to earlier.

1. Judging from the goal of achieving total global GHG emissions in the year 2050, these emissions must be down to 50% of the present level. We acknowledge that cost-effectiveness is critical, and we concur with the conclusion of Working Group

III of the IPCC that altering the present global lifestyles presents serious challenges. Therefore, our emission scenario must be A1T of its Special Report on Emission Scenarios (SRES). Significant GHG emissions mitigation is expected over a long period of time under Scenarios B1 and A1T. B1 describes “a convergent world with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource-efficient technologies”. However, we cannot choose this scenario because of the difficulty in drastically altering lifestyles; changing whole economic structures would cost more than energy conversion. This leaves only Scenario A1T for our analysis. Under A1 scenario the world would achieve, to quote from SRES, “very rapid economic growth, global population would peak in mid-century and decline thereafter, and new and more efficient technologies would be introduced. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income”. A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. Scenario A1T places emphasis on non-fossil energy resources. However, this scenario estimates the global aggregate of carbon dioxide emissions in 2050 at 12GtC, 1.7 times the 1990 level. Therefore, under our new scenario, energy conversion must be developed much earlier and more rapidly than A1T assumes. Thus, one of the principles for our new regime is conversion of energy resources from fossil to non-fossil.

2. From the cost-effectiveness point of view, fossil resources must be used for production activities which maximize value added in terms of GHG emissions. To implement this, prices of fossil fuels must be allowed to rise freely up to the level at which GHG emissions reach the targeted limits. This process would answer the question of internalizing external costs associated with environmental damages, as pointed out in the IPCC Third Assessment Report. Under the assumption that free markets exist, fossil fuel prices would rise simultaneously and to the same

levels around the world. Thus, it should be noted that the new framework has the ability to raise fossil fuel prices globally.

3. If fossil fuel prices were allowed to rise without any restriction in order to attain GHG emission reduction goals, they would shoot up beyond control, and it would defeat the cost-effectiveness requirement. An analytical report from Japan states that a domestic carbon tax, when coupled with tax revenue recycling, would be 10 times more effective than the carbon tax alone. Likewise, fossil fuel price increases must be accompanied by subsidized investments into energy-saving and renewable energy development. Thus, the new framework assumes the ability to subsidize energy conversion.
4. To be cost-effective, the expense of running the new framework must be minimized. The managing organization must, therefore, be as small as it can in terms of size and operating expense.
5. Working Group III of the IPCC Third Assessment Report refers to a number of models which estimate the GHG emissions mitigation costs in oil exporting member countries and regions at over 10% of their oil revenues. The financial impact on these oil exporters would become too painful when GHG emissions are reduced to less than 50% of the current level. They certainly would not consider this situation to be fair and they are unlikely to bear the burden without getting some kind of compensations. Therefore, the oil exporters would receive, *inter alia*, preferential treatment in participating in new industries as compensations for their loss of fossil fuel sales or alternatively long-term reparations for the damages.
6. For sustainability, developing economies would experience growth based upon renewable energy instead of fossil fuels. In the process of transition toward the desired goal, fossil fuel prices would have risen, strict regulations and penalties would have been enacted and incentives in the form of international subsidies extended for developing renewable energy particularly to developing countries.

7. If stringent GHG emission restrictions applied only to industrialized countries, they would not only criticize the system as unfair but also might react to move production to the cheaper countries with more relaxed carbon standards. This would make it more challenging to achieve global goals of GHG emission reductions. To avoid this counter-productive development, differences in emission control rules would have to be minimized among countries.
8. On the other hand, if universal fossil fuel prices, taxes and penalties were to apply, developing countries would denounce the system on the ground that it would force them to bear an unfair burden. To solve this problem, special rules should allow developing countries to use fossil fuels as an exception where their application is not justifiable (e.g. cooking and home heating), coupled with appropriate subsidization.
9. Industrialized countries would need to develop policies to coordinate adjustments over energy and energy-intensive industries, and appropriate subsidies would be granted for this purpose.
10. To maintain equity among countries, each country must fulfill its commitments and ensure its full lawful compliance. The managing organization must carry out systematic monitoring, reporting and examinations with the least administrative burden and at the lowest possible costs.
11. By 2050 climate change is likely to cause extreme weather events so serious as to threaten even the survival of inhabitants in many countries. It would not be fair to make the afflicted countries cope alone with their disasters. The new framework should assist them in ensuring their people's survival and guaranteeing them minimum standards of living.

Our backcasting analysis concludes, working backwards from the state of the world as depicted above, that a world organization should be established to manage global GHG emissions reductions under the above-mentioned principles. They are reclassified into a simple list as follows:

Table 3 Principle of the new framework

1.Humanitarianism	Guarantee of the survival of mankind with an acceptable minimum standards of living
2.Equity	Equitable cost-sharing in consideration of weather , status of natural resources and industries of each country
3.Cost effectiveness	Priority given to production activities deriving maximum values out of natural resources
4.Commonality	Remove or minimize the differences of applicable rules among countries
5.Penetration	Direct application of responsibilities to firms and other entities without governments' involvement
6.Administrative efficiency	Minimize the size of the organization and its administrative costs
7.Creation of funds	Subsidize energy conversion (technologies) and climate adaptation

Supply of ample funds should be given as one of the principles from the perspective of ensuring equity to developing countries and fossil fuel owner countries and also encouraging the growth of new energy industries.

The Kyoto Protocol is based upon international emissions trading as its core mechanism. Equity among countries under such a system depends upon an allocation of emissions allowances to each country. The harder the mitigation goals, the higher the hurdle to agree on country-by-country allocations. Furthermore, the definition of equity is required to be precise. A variety of new ideas for sharing the burden of emissions reductions have been aired. They are, *inter alia*, reduction of per capita emissions (e.g. the Triptych approach, contractions and convergence), carbon intensity targets (emissions reductions per GDP) and the Brazilian proposal based upon historical emissions. However, no global consensus has been formed yet on this subject.

If equity is assured by compensations for damages inflicted upon each country and supply of funds for developing new energy industries, there would be no need to wrangle over a universal definition of equity as long as the countries and the world organization can work out what may be termed political compromises regarding the compensations.

3.7 Functions of the framework deduced from the principles

It is not possible for a system with emissions trading as its base to satisfy all the principles as referred to in Table 3, not least, supply of funds. A system with an international carbon tax could hardly provide funds across national boundaries, either. Here comes the need to introduce the idea of fossil fuel monopolization as a framework to make such funding possible. An international organization with such a financial ability is tentatively called “World Fossil Resources Organization” (hereinafter “The World Organization”). It must satisfy the minimum requirements as referred to in Table 4 below:

Table 4 Basic functions of World Fossil Resources Organization

1. The World Organization negotiates with countries concerned to acquire the capabilities of fossil resources of production, refining and storing, subject to agreement on compensations.
2. The World Organization is obligated to supply fossil fuels to developing countries at equitable prices on a priority basis to the extent that they could ensure their people’s survival and maintenance of social order.
3. To manage global use of fossil fuels, the World Organization applies uniform fossil fuel prices around the world.
4. The World Organization may lend and endow funds needed for energy-saving, energy conversion and industrial transformation as well as for humanitarian causes associated with global warming.

As to Paragraph 1 above, the World Organization would either buy all producing firms or alternatively buy all fossil fuels exclusively. Company acquisitions will be considered, subject to negotiations between the World Organization and the sovereign entities. It is most likely that the World Organization would try to minimize investments for this purpose while fossil fuel owner countries would no doubt request the World Organization to buy as much of production and refining facilities as possible to maximize and stabilize their income. In case of exclusive fossil fuel purchases, the World Organization and producer governments would have periodical rounds of negotiations about quantity and price. The question of a price agreement mechanism must be addressed later.

As to Paragraph 2 above, the World Organization asserts that fossil fuels would be supplied to developing countries at the current price levels only to the extent that their people would need such low-priced fuels to maintain at least the pre-industrial standards of living (i.e. mainly for heating and cooking). Developing countries, on the other hand, would rebut that it would be unbearable for them to pay the same fossil fuel prices as industrial countries, except for such small exceptions, until they complete the energy switch. The World Organization may have to compromise on some issues for a certain period of time but overall this difference in negotiating stance between them should result in spurring a global energy switch.

For the purposes of Paragraph 3 above, the World Organization would market fossil resources at prices which include certain profits over the costs or market prices, as in the case of taxation for carbon emissions. Fossil fuel consumption could not be curbed by price increases alone in the short term, as clearly demonstrated in recent years when we saw no demand decreases despite the skyrocketing petroleum prices. However, price increases for fossil fuels are expected to encourage a steady energy shift in the medium to long range, if they are followed by investments in alternative energy development. At the initial stage fossil fuel prices would be set at levels which would just allow the World Organization to accumulate profits enough to support its intended activities. As the energy shift in member countries progresses,

the World Organization would control fossil fuel prices according to its long-term policies. If more than enough profits are gained, the World Organization would distribute the excess for humanitarian causes to relieve the people victimized as a result of global warming.

As to Paragraph 4, after the World Organization has paid the whole compensations to fossil fuel owner countries and relief funds for humanitarian causes, it would distribute the remaining revenues to each national government in a fair manner. A system must be developed to penalize industrialized countries and others if they do not spend such funds for energy conversion or other worthwhile purposes.

To ensure smooth operations of the World Organization, it is advisable to establish an International Executive Council, fully respected and trusted by member countries, to make key decisions for the World Organization. Deliberations must follow on this issue.

3.8 Redefinition of external to ensure the functionality of the framework

In Chapter 3.5 we discussed the initial definitions of external for scenarios. The backcasting technique has led to the concept of establishing a world fossil resources managing organization. In this Chapter we will again focus on the issue of external .

The first three paragraphs below describe for the World Organization to earn profits without fail and to secure needed funds:

1. High fossil fuel prices. Significantly high prices must be set and maintained.

Fossil resources are to be used as raw materials for limited applications, which have higher value added and that alternative energy resources could not meet with the current technologies. Chemical products and aviation fuel fall under this category. Therefore, even if fossil fuel prices have significantly increased, there should still be high enough demand big to support the World Organization.

2. Funding the World Organization. Funds would be provided to the World

Organization to start its operations. The IBRD, part of the World Bank, is the largest development funding institution in the world. The IBRD has extended loans, bank guarantees and grants to middle-income countries for their sustainable development. It has member countries' share capital but raises most funds on the world's financial markets. The bank allows member countries to pay for a small part of their shares initially and the rest as it may require later. We believe the IBRD with this feature would be a good fit for the World Organization.

3. Installment payments to fossil resources countries. Producer countries would accept long-term installment payments from the World Organization for the title transfer of their fossil resources. This is imperative because of the buyer's limited ability to pay and also to avoid any serious confusion in financial markets as a result of a massive influx of capital if paid in one lump sum. Practical details, especially interest rates, must be worked out. If the World Organization buys fossil fuels on an exclusive basis, the question of interest rates would not surface.

4. Alternative energy. As discussed in Chapter 3.5, development of new energy industries would be encouraged by spiral price increases of fossil fuels on one hand and the resulting World Organization's funding capabilities on the other. The growth of such new industries would be absolutely imperative to compensate for the reduced supply of fossil fuels.

5. Member countries' faith in the World Organization and their readiness to cooperate. People would be the final victims of adverse impacts brought upon by fossil fuel price increases. However, it is important that a global consensus be established on the need of every citizen's willingness to accept pains out of the battle with global warming. Furthermore, there should be worldwide recognition of the absolute need of global management of fossil resources through a world organization to be established and member countries' strong faith in its pledge toward the happiness of mankind and rational management.

3.9 Review of scenarios and analysis of their effect

Because of the limited space here, we skip discussions on this subject. Please refer to Figure 1 and Figure 2 at the end of this paper for the projected capital flows before and after the establishment of this post-Kyoto framework we propose.

4. Comparison between the World Fossil Resources Organization and other schemes

The National Institute for Environmental Studies of Japan has constructed three scenarios on future regimes to fight global warming. They are based on “carbon markets”, “government-led policies and measures” and “technology-prioritized approach”. The third scenario might not work effectively by itself in abating carbon emissions. The comparison of the remaining two scenarios with our “World Fossil Resource Managing Organization” is shown in Figure 5. It illustrates that the hurdle to clear for reaching agreement would be highest for the World Organization and that it would, therefore, take most time to materialize the scenario. However, once agreed, it would undoubtedly be the strongest force to reduce GHG emissions. There seem to be a few similarities between this framework and its alternatives other than the said two scenarios, “carbon markets” and “government-led policies”.

First, the World Organization framework is similar to a universal carbon tax system reinforced by equitable redistribution of part of the tax revenues collected by an international agency. However, the former has a great benefit in that it would not have to deal with people’s allergy to “taxation”. This feature would be very important when substantial fossil fuel price increases must be realized. If a carbon tax were in effect, each national government would be required to impose “tax” rates so high that the people would persistently refuse to accept. Our monopolistic framework, unlike carbon taxation, could still raise the funds necessary to complement the producer countries’ general budgets and promote their energy conversion and adaptation, through the World Organization’s upward price adjustments of fossil fuels. Our framework would also be better in terms of operational flexibility in

revenue collection and international fund distribution. In addition, it would produce similar effects as “Pledge and Review”, if funds are distributed in consideration of member countries’ investment plans for energy and industrial conversion and would also yield the same advantages as “PAMs”, if cutting-edge environmental technologies are freely shared and emission mitigation projects are developed globally.

The World Organization regime is expected to promote positive investments in developing technologies and projects but when it has reached the final stage where energy conversion is completed, it would serve as a mitigation-inducing price approach. In this respect, it is close in concept to “technology-prioritized approach” which advocates the supremacy of technologies in mitigating global warming.

In the course of preparation for establishing the World Fossil Resources Organization, an emissions trading system like the one under the Kyoto Protocol could work as an interim scheme to combat climate change.

Thus, the World Organization encompasses strengths of many other post-Kyoto alternatives and is believed to be further refined by designing details of its mechanisms.

See Table 5 “Comparison of the World Fossil Resources Organization with other alternative systems”

5. Conclusion

This paper does not include any quantitative analyses. In our future studies we must assess the degrees of impacts fossil fuel price increases would bring upon, *inter alia*, industries, estimate fossil fuel demand and costs and expenses for energy shift and examine the feasibility of the framework at each development stage. We also need to address such issues as how for the member countries to share the initial financial

burden of the World Organization and how to structure the International Executive Council, as referred to in Chapter 3.7.

There have been only two cases in history of superstate management of international public property. One is deep-sea development of natural resources and the other is the allocation of satellite positions in geostationary orbits by The International Telecommunication Union. In this sense the framework of the World Fossil Resources Organization would be much harder to materialize than the current GHG emission quota system under the Kyoto Protocol. However, there already are superstate arrangements, though small in number, in other fields. It is high time for Japan and other countries to launch serious studies on the idea of monopolized world fossil resources management and to design a scheme using our model as a basis.

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Figure 1 International Capital Flows Under the Kyoto Protocol Regime

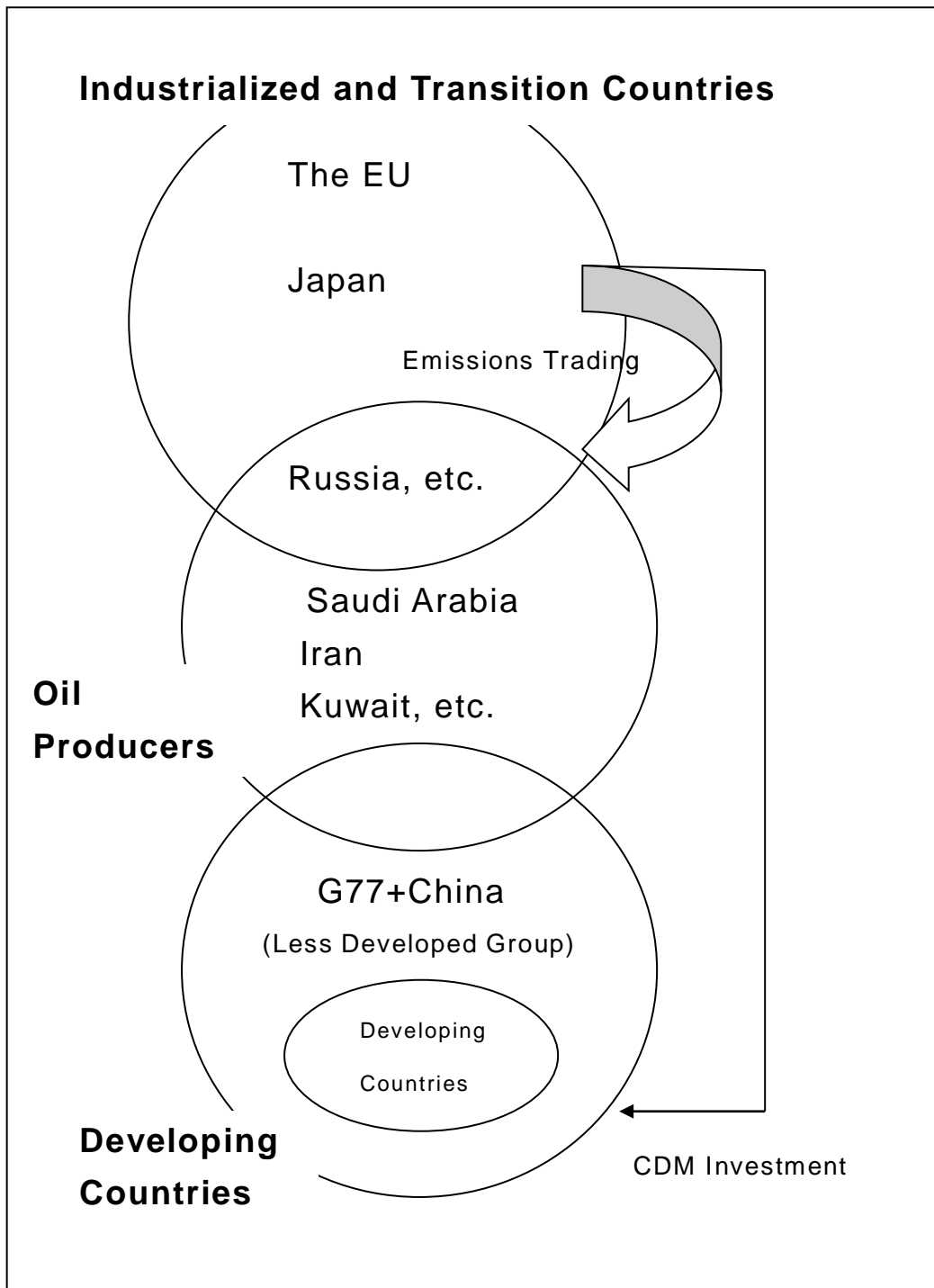
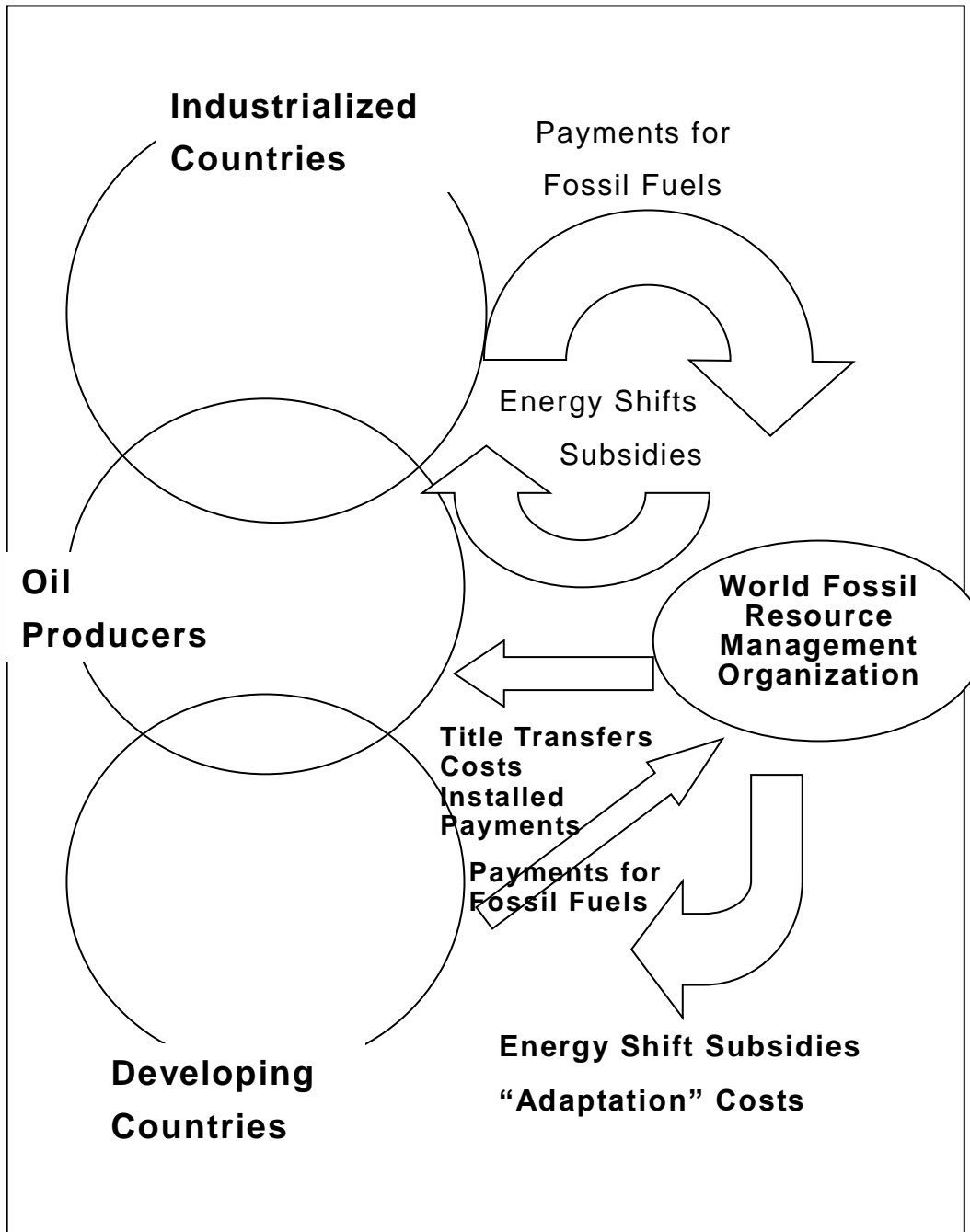


Figure 2 International Capital Flows under the World Fossil Resource Managing Organization Regime



**Table 5 Comparison of the World Fossil Resources Organization
with other alternative systems**

Scenario	Carbon Markets	Government-led Policies	World Fossil Resources Organization
Middle-term goals	Yes	No	Yes
Key mechanism	Reduction goals by country and international emissions trading	Coordinated policies and agreed measures	Fossil fuel prices and subsidies for fuel shifts, etc.
Key organization	UNFCCC	Uniform agreement among many nations	UNFCCC and World Fossil Resources Organization
Incentives for participation	Emissions trading and CDM	Nil	Subsidies for energy shifts and adaptation
Possibility to achieve goals	Medium	Small	Great
Initial costs	Administrative expenses	Nil	Member countries' agreement to share financial responsibilities
Funds for adaptation	Industrialized countries to bear	Nil	Earnings through monopoly
Strengths	<ul style="list-style-type: none"> - Easy to estimate reductions - No initial costs - Equity is maintained 	<ul style="list-style-type: none"> - Easy to monitor performances by country - Equity is maintained among sectors in each country 	<ul style="list-style-type: none"> - Common rules to all countries - Subsidies for energy conversion and adaptation and adaptation - Penetration to individual

			<p>firms</p> <ul style="list-style-type: none"> - No carbon leakage - Simple organizations - Can run together with emissions trading
Weaknesses	<ul style="list-style-type: none"> - Little incentives for participation and extra incentives such as hot air are needed - Weak incentives to developing countries and producer countries for participation - Hard to determine country-by-country emissions quotas - No influence on non-participating countries - Complex organizations 	<ul style="list-style-type: none"> - Questionable capabilities to combat climate warming - Some countries may increase emissions outside the agreement - Questionable if this is most cost effective - Complex organizations 	<ul style="list-style-type: none"> - Heavy burden on fossil fuel consumer countries - Time-consuming to reach international agreement on cost sharing - Imperative for all fossil resources owner countries to participate - Operation from financial markets imperative