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Global Emissions Trading

A Solution to the Climate Challenge?

- The economic cause of climate change is a structural market failure. Combating climate change fundamentally requires a restructuring of our fossil fuel-based energy supply structure and industrial production towards a low-carbon economy. Particularly in the context of the present economic crisis, the enormous investments required for this transformation could play a significant role in counteracting the effects of the worldwide recession.
- Global emissions trading can limit the extent of this market failure as well as ensure a stepwise reduction in emissions and at the same time supply the substantial investment capital necessary for a reorientation of the world economy and for the mitigation of expected climate damage.
- Climate change can only be limited if all major emitting countries, especially emerging economies, are included in the fight against it. Including these countries will only be possible if they receive sufficient financial incentives and are in principle granted equal per-capita emission rights.
- This implies a significant transfer of resources from industrialised countries to emerging economies and developing countries through emissions trading. However, the transfer would be smaller by orders of magnitude than the costs expected from progressively advancing climate change if no action is taken. It would also be far smaller than the gigantic flows of financial resources into oil and gas-producing countries caused by dependence on fossil energy.

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1 Petra Bierwirth: Foreword

Climate change is the major challenge facing humanity during the Twenty-First Century as demonstrated irrefutably in the reports of the Intergovernmental Panel on Climate Change (IPCC). We cannot prevent climate change from occurring, but we can limit the extent to which it occurs. In order to do so, we must act quickly and decisively on a regional, national, and international level. Numerous studies have impressed upon us one central message: Time is of the essence. We cannot afford to delay any longer, since only few years remain during which we can still decide the course for our future.

Above all, we must limit the extent of global warming to an increase of less than two degrees Celsius with respect to pre-industrial levels. In order to prevent more severe global warming, industrialised countries must reduce their greenhouse gas emissions by 80 percent by 2050. To this end, various tasks lie before us: We must substantially decrease energy consumption, expand the use of renewable energy sources, and increase energy efficiency.

A further important element of any climate protection strategy is emissions trading, which must cover energy producers and industry. These sectors produce

about 60 percent of carbon dioxide emissions. At present, only Europe has a functioning emissions trading system in place. However, within the framework of the post-Kyoto process, the establishment of a global emissions trading system is envisioned.

With its package of climate policies, the European Union has set a clear signal for international negotiations on a new climate policy regime for the period after 2012. Emissions trading is at the heart of this set of policies. From 2013, power utilities will be required to bid for 100 percent of the emissions certificates they require. In the economically less developed new EU member states of Eastern Europe, a transition period has been allotted for existing installations. But even there, certificates for the operation of power plants will have to be purchased by auction from 2020 onwards.

With this package of policies, the European Union has again taken a leadership position in climate policy matters. The European Union has taken the first important step. Now other states must follow suit.

I am convinced that emissions trading is an excellent instrument for regulating carbon dioxide emissions. It has proved itself to be an important element of any international climate protection strategy.

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2 Key points

- Global climate change caused by greenhouse gas emissions is the central challenge of this century, besides the question of security of energy supplies. This challenge can only be met if all major contributors to greenhouse gas emissions, notably emerging economies, are included in the fight against climate change.
- The economic cause of climate change is a structural market failure, which prevents the damage caused by climate change from being properly accounted for in economic processes. In order to be successful, strategies to combat the problem must begin by addressing this structural failure and must ensure that those who cause this damage are held financially accountable.
- A global emissions trading system is the appropriate instrument for such a strategy. Tax measures have little effect and are only meaningful as accompanying measures. Equally, improvements to energy efficiency alone are insufficient.
- Combating climate change fundamentally requires a restructuring of our fossil fuel-based energy supply structure and industrial production towards a low-carbon economy. Particularly in the context of the present economic crisis, the enormous investments required for this transformation could play a significant role in counteracting the effects of the worldwide recession.
- A global emissions trading system can guarantee a gradual reduction of emissions and at the same time provide the investment capital for a reorientation of the global economy and for the mitigation of climate-related damage, if it is designed as a cap-and-trade system based on the auctioning of emission rights. This is probably the most cost-effective and most efficient instrument for climate protection and can mostly prevent market distortions.
- Emerging economies can only be integrated into a global system for climate protection if they are provided with sufficient financial incentives and are generally granted equal per-capita emission rights. This implies a substantial redistribution of resources from industrialised countries to emerging economies and developing countries by way of emissions trading. However, the associated financial burden will be a fraction of that which would fall on countries if no action were taken. The redistribution of resources would also be significantly smaller than the gigantic cash flows that are directed towards oil and gas-producing countries as a result of industrialised countries' dependence on fossil fuels.

- The European Union began the establishment of the world's largest emissions trading system (EU-ETS) in 2005. This system has provided an opportunity for important experience to be gathered. It has also proved that such a system can operate on a large scale and at low cost. The problems faced by the EU-ETS up until today have generally concerned the excessive supply of emission rights, distortion of competition, and windfall profits, all of which have been broadly addressed through a recent revision of the system.
- Present experience with the EU-ETS gives reason to hope that this system would represent a good starting point for the development of a global carbon market and should be used to actively campaign for an extension of the system outside of the European Union.

3 Policy recommendations

- The Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), to be held in Copenhagen in December 2009, provides an important opportunity for setting global emission targets, establishing a worldwide emissions trading system, and deciding on the targeted financial transfer mechanisms, which are necessary for a reorientation of the world economy. The European Union and its individual member states should throw their entire weight behind these initiatives.
- A broad consensus among all parties to the UNFCCC would certainly have a significant symbolic meaning. However, an initial agreement only among the 20 largest emitters of greenhouse gases, which are responsible for 90 percent of global emissions, would be more effective for the establishment of a global trade and climate investment system than a broad-based agreement among all participant states on the lowest common denominator. Nonetheless, a system limited to the largest emitters should allow for its extension to additional states at a later date.
- To avoid distortions of competition, it is important for all states and emission sources to be incorporated into a global emission trading system within a foreseeable time horizon. Possible exceptions – permitted as a transitional solution – should also be eliminated in a step-wise manner according to a fixed plan.
- In order to optimally ensure coherence and practical implementation, a unitary global system should be preferred to a heterogeneous, fragmented sys-

tem, which would require complicated and time-consuming consultation processes among the members of the system. Such a system should be organised in the form of a World Emissions Trading Bank with an associated monitoring system, which should be located in one of the emerging economies.

- Participating states must agree on a common global support and financing structure to ensure that resources are in fact allocated towards an effective and global reorientation towards a low-carbon economy.
- A significant need exists for research and development efforts in the area of sustainable energy supply and production. In designing a trade, transfer, and support system, arrangements for appropriate financial mechanisms of sufficient size must be made to support these activities.
- Special arrangements must be made and support mechanisms created to allow the participation of developing countries and particularly least developed countries in global efforts to diminish greenhouse gas emissions. These arrangements and mechanisms should address the transfer and implementation of necessary technologies and the protection of forests in particular.

4 Climate change: The issue of the century

Worldwide climate change is largely anthropogenic in nature, i.e., caused by human activity, and can be attributed to non-controlled emissions of greenhouse gases, primarily carbon dioxide. From an economic perspective, it is »the greatest and widest-ranging market failure ever seen«,¹ since the market has failed to internalise the costs associated with the emission of greenhouse gases. This means that emissions are not accounted for in the cost calculations of market participants.

Climate change is directly related to the concentration of greenhouse gases (GHGs) in the atmosphere. This concentration has risen from 280 ppm to 380 ppm since the beginning of the industrial age. All states, including the United States, China, and India, have committed themselves to limiting the rise in this concentration under the United Nations Framework Convention on Climate Change (UNFCCC, 1992), in order to prevent dangerous anthropogenic interference with the climate system (Article 2 of the UNFCCC). The large majority of experts agree that the

critical maximum concentration lies at 450 ppm, while some put the critical maximum at 550 ppm. 450 ppm are thought to correspond to a rise in the global mean temperature of two degrees Celsius. According to the Fourth Report of the Intergovernmental Panel on Climate Change (IPCC) of 2007, whose alarming conclusions are amplified in more recent research findings², the increase in global greenhouse gas emissions must be reversed by 2020, if a further rise in temperatures is to be prevented.

The European Union and Germany have agreed that the greatest tolerable increase in temperatures should be an increase of two degrees Celsius, an even more stringent commitment than that called for by the IPCC. Reaching such a goal will require drastic measures, which go far beyond those called for under agreements currently in force.

5 Emission growth and its distribution

Currently global carbon dioxide emissions³ are rising by three percent (a yearly average of exactly 3.1 percent between 2000 and 2007). Western industrialised countries (Annex II countries according to the Kyoto Protocol⁴) account for nearly five percent of this growth, while Asian countries (without Japan and South Korea) account for around 68 percent of the growth in emissions, i.e., their additional emissions are almost fourteen times higher than those of Western industrialised countries according to figures for 2000 to 2007⁵.

If it were possible to reverse the growth in emissions from industrialised countries, this might be considered progress; however regarding the distribution of growth it would only have a relatively small impact on the global emissions trend. Therefore it is indispensable for any strategy aimed at decreasing global greenhouse gas emissions that Asian countries, of which China and India account for over 80 percent of emissions, be incorporated into a system for decreasing emissions.

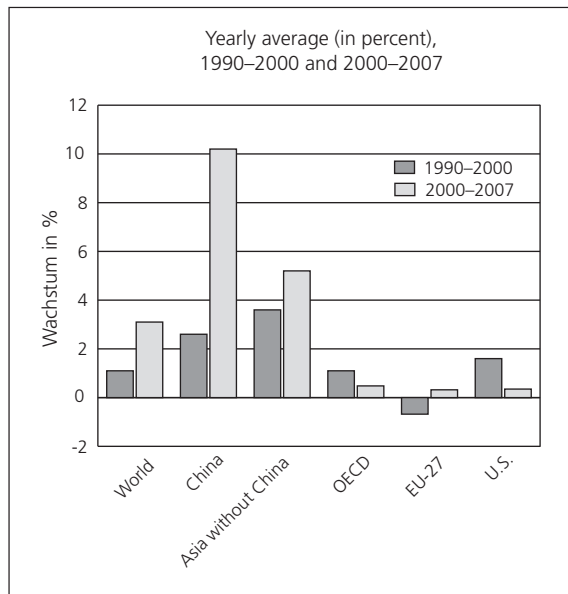
2 Tin (2008), 3.

3 Carbon dioxide emissions account for 80 percent of total greenhouse gas emissions. Since no exact figures are available on total global greenhouse gas emissions, only carbon dioxide emissions are considered here to illustrate the problem of climate change and greenhouse gas emissions.

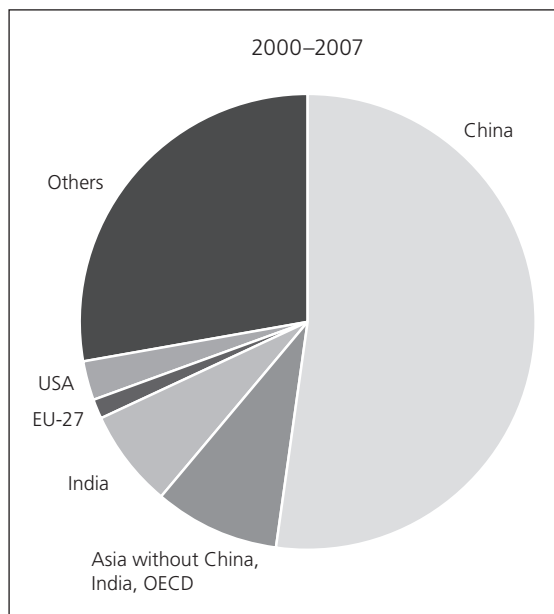
4 Under the Kyoto Protocol, Annex II countries include all OECD countries without the new member states (i.e., without South Korea, Mexico, Poland, the Czech Republic, Slovakia, and Hungary).

5 See: Ziesing (2008), 64

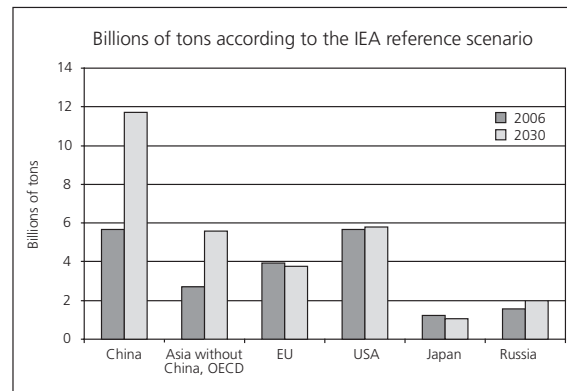
1 Stern (2006) Executive Summary, VI.

Figure 1: Growth in carbon dioxide emissions

Source: Authors' representation using figures from H.J. Ziesing, *Energiewirtschaftliche Tagesfragen*⁶

Figure 2: Distribution of growth in carbon dioxide emissions

Source: Authors' representation using figures from H.J. Ziesing, *Energiewirtschaftliche Tagesfragen*⁷

Figure 3: Future carbon dioxide emissions

Source: Authors' representation based on figures from the IEA *World Energy Outlook 2008*

The battle against climate change will thus become a central task of policy oriented towards »global governance«.

6 Which solutions are possible?

6.1 Increase in energy efficiency

Mainstream discussions on the incorporation of Asian emerging economies into a global climate policy framework proceed from the premise that these countries should not be required to demonstrate absolute emissions reductions but rather to undertake relative limitations, namely by increasing efficiency of energy consumption (i.e., reducing energy intensity). The reason that this approach has been taken is that it has seemed unfeasible up until today to bind these countries to concrete emissions limitations. As a result, the mainstream has backed away from seeking such commitments. However, relative emissions limitations do little to solve the global problem. The experience of industrialised countries shows that yearly average efficiency increases of 1.5 percent – achieved by Germany since 1990 – to a maximum of 2.5 percent per unit of GDP can be achieved over longer time periods through technological progress and the application of regulatory measures. Thus, average economic growth of the same magnitude – in Germany yearly growth in GDP was 1.4 percent between 1991 and 2006 – can be compensated in such a manner that energy consumption remains constant. This is then (misleadingly) termed »decoupling« of energy consumption from economic growth.⁸ Yet such a de-

6 See: Ziesing (2008): *Energiewirtschaftliche Tagesfragen* Heft 9 (September)

7 See: Ziesing (2008): *Energiewirtschaftliche Tagesfragen* Heft 9 (September)

8 If energy consumption in a country does not rise in spite of economic growth, this is often referred to as decoupling of energy consumption from economic growth. In fact, what is happening – as occurred in Germany during the past de-

coupling would not be possible in cases of economic growth exceeding eight to ten percent over longer periods of time (as in the case of China and India), since this would require a yearly increase in energy efficiency of over eight to ten percent. With an expected increase in energy efficiency of 2.5 percent and economic growth of eight percent in China and India, global GHG emissions growth cannot be reversed in this manner. Even if increases in efficiency have a positive impact and are therefore to be supported, a substantial part of the solution to this climate policy challenge will only be achieved through the application of additional instruments in an even larger scope. If these are to be effective, they must proceed from the structural-economic cause of emissions growth, the market failure alluded to above, and make it possible to impose the costs of damage to the climate system on those who cause this damage.

6.2 Emission or energy taxes

One possibility for reducing GHG emissions in a certain economic area or even globally is to impose taxes on emissions. The more expensive emitting becomes, the stronger the incentives are for avoiding emissions. As a result, emission taxes are often taken into consideration as regulatory measures. The German Green Party and numerous environmental organisations used this approach as a starting point, pursuing the goal of incrementally increasing the price of gasoline to five German marks per litre in Germany during the 1990s. The disadvantages of such an emission tax are that it is very difficult to find an appropriate level of taxation to encourage the desired consumer behaviour. Furthermore, it cannot be expected that the goal of decreasing emissions (e.g., by 30 percent by 2020) will be reached through voluntary commitments, even if high emission taxes are imposed. A tax on energy consumption would be a feasible variant and might be easier to collect. But since such a tax would not be applied to the primary target (carbon dioxide emissions) but to a secondary factor, it would also indiscriminately fine energy sources less harmful to the climate system. The price elasticity of demand for

cedes – is a concurrence of two opposite trends – in economic growth and efficiency growth – which coincidentally are in the same order of magnitude and therefore keep growth in energy consumption at zero. During periods in which Germany achieved economic growth exceeding two percent, positive growth in energy consumption was unavoidable, since an increase in energy efficiency of more than two percent could hardly be achieved.

gasoline and heating oil is extremely low in the short and medium term, which means that large increases in price will only result in small decreases in demand regardless of the variant chosen. Thus demand remains constant and does not respond to price increases by following a downward trend, as might be expected. At best, substitution effects might occur over the long term. In addition, it is unlikely that high consumption taxes could be imposed in many countries. Neither in the United States, nor in the large emerging economies of Asia, nor in many European countries could a targeted manipulation of GHG emissions be achieved through an increase in emission taxes. Taxes are also a constant point of contention and starting point for conflicts among parties tinged by populism insofar as they impose a burden on consumers. This fact has also limited the extent to which it has been possible to apply the instrument of the »eco-tax«⁹ in Germany.

6.3 Regulatory measures

At the national level, regulatory measures are imposed to limit emissions, either by raising the price of emissions-intensive processes (e.g., through a tax on carbon dioxide) or command-and-control measures (e.g., requirements for thermal insulation or efficiency improvements). At the international level, similar regulatory measures can only be enforced by consensus. By contrast, the Kyoto Protocol provides instruments through Joint Implementation (JI) and the Clean Development Mechanism (CDM) that can be offered as additional options for fulfilling existing commitments. These instruments can make adhering to emissions limitations more economical and at the same time lead to technology transfer. By using these instruments, countries with high efficiency should be able

9 Strictly speaking, Germany does not have a tax called the »eco-tax« (Ökosteuer). The term is used in connection with the »ecological tax reform«, which aims to discourage the use of energy as a factor of production by raising the price of transportation and heating fuels and electricity through taxation in order to provide incentives for energy saving. Additionally, it is designed to alleviate the cost of labour as a production factor by decreasing contribution rates to retirement insurance, subsidising it with the additional tax income collected, in order to contribute to better conditions on the labour market. The last of five stages of the so-called eco-tax came into effect in 2003. At that point the »ecological tax reform« project was complete. In 2003 and 2004, additional modifications were undertaken, mainly targeting a reduction in subsidies. See also: http://www.bundesfinanzministerium.de/nrnn_53848/DE/BMF__Startseite/Service/Downloads/Abt_IV/061,property=publicationFile.pdf

to fulfil their commitments to reduce emissions in countries with lower efficiency by making use of lower-emission technologies. These instruments can lead to cost savings. On the other hand, they are reaching the limits of their usefulness, since each individual case of transferring commitments to another country must be examined for its compliance with the relevant rules and must be specifically authorised. The examination of cases cannot be consistently designed in such a manner that its utility in reducing global emissions can be ensured, in spite of the bureaucratic effort involved. Furthermore, Kyoto Protocol permits the use of these instruments only in order to compensate for emission reductions not achieved domestically. For this reason, these instruments cannot bring about emissions savings beyond those required of Annex I countries¹⁰ under the Kyoto Protocol but instead lead to a shift in local emissions savings to another region. An increase in efficiency in developing countries and emerging economies is not possibly simply through a transfer of know-how. Rather, immense investments are needed to translate this know-how into practical applications, for example to build high-efficiency power plants in developing countries. In order to reach these goals, resources will be needed of a scope far beyond the limited amounts that can be mobilized through JI and CDM.

The latest proposal by the EU Commission may have a greater chance for success. It would require that, within the framework of negotiations, emerging economies and developing countries assume robust development strategies, forgoing on high carbon emissions.¹¹

Certainly, though, neither the levying of taxes to influence relative prices (which can strangle growth in developing countries and emerging countries in particular) nor regulatory measures designed to increase technology transfer are adequate (or at least not sufficient) to achieve the kind of structural changes in developing countries and emerging economies that are needed to decrease or minimise their large contribution to global emissions growth.

7 Global emissions trading

Provided that all important emitters can reach a consensus on the establishment of a global emissions trading system and that adherence to agreed rules can be enforced, such a system¹² has at least six important advantages: Firstly, it encompasses a quantitative solution. This means that, in contrast to emissions taxes or efficiency regulations, a quantified and adaptable limit on global emissions (a »cap«) is specified. From this cap, restrictions on activities can be derived. Secondly, a scarce good is created, namely emissions rights, which can be distributed in such a manner that supply and demand reach an equilibrium (»trade«), thus minimising social costs. Thirdly, in an established trading system, all participants have a significant interest in keeping emissions as low as possible. Therefore a »cap-and-trade« system provides for the achievement of the climate goal and this at minimal social cost. Fourthly, in contrast to emissions taxes, trade in emission rights does not necessarily pad state budgets, as a result of which acceptance of such a system is increased.¹³ Fifthly, decentralized pricing of emissions certificates would occur, through which highly complex state regulation could be avoided. Sixthly, a unitary emission certificate price, which would emerge within the framework of a global emission trading system, would be capable of eliminating distortions in international competition and »carbon leakages«.¹⁴ All these advantages are generally recognized. The central question remains, whether global emissions trading can be established in spite of existing differences in interests. Only under the condition that all important emitters participate

12 The following considerations on a unitary, globally functioning system also apply in principle to a union of networks composed of national or regional systems. The prerequisite for this equivalency to hold is that the networks must agree on global emissions targets that correspond to a stabilization of rising temperatures. They must also be in agreement on the division of emission rights derived from these agreed levels among the different networks. Furthermore, the networks must agree on the harmonization of central functional elements such as a trading register, monitoring standards, trading periods, etc.

13 The management of the European Emissions Trading Scheme is already now organised through private sector exchanges (see Section 7.3). However, in the future, income from the auctioning of emission rights is to be allocated to government budgets. This could be better managed by having an international organisation (most likely an agency of the United Nations) apply surpluses (i.e., inter-state net payments) to low-emission energy structures. Surpluses would be allocated according to an investment formula defined under an accord on global emissions trading.

14 See: Edenhofer (2007), 8.

10 Annex I countries under the Kyoto Protocol are those industrialised countries (belonging to the Western and Eastern hemispheres) that must reduce their GHG emission by up to eight percent by 2008 to 2012 with respect to their emissions in 1990 (or, as in certain cases such as Russia, keep emissions at the same level as in 1990).

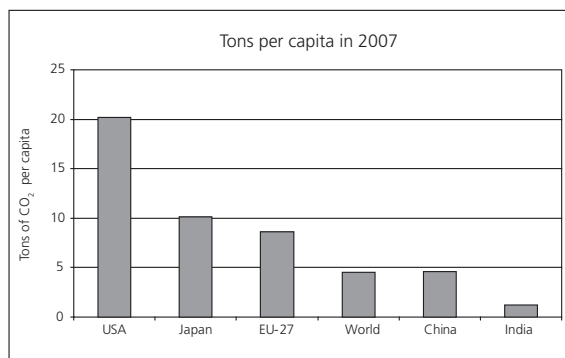
11 COM(2009) 39 final, 5.

can such a system remain functional over the long term. Otherwise serious distortions in competition will emerge that will ultimately cause the collapse of the system.

7.1 Prevailing interests

The prevailing interests of affected participants – all states that have ratified the Framework Convention on Climate Change – differ if a global emissions trading system is established from those that would exist if a system were established that would impose obligations on absolute or relative emissions limitations, in the latter case by requiring efficiency improvements. China and India have, for example, resisted submitting to a regime of emissions limitations since the beginning of the 1990s.

Figure 4: Per-capita carbon dioxide emissions



Source: Authors' representation based on figures from H.J. Ziesing, *Energiewirtschaftliche Tagesfragen*¹⁵

The reason for this is plausible. As long as these countries have per-capita emissions that are far below those of industrialised countries and even still below the world average and as long as these countries define themselves as countries that are in a process of development to catch up with industrialised countries, they will not see any rationale for emissions limitations. This implies a strategy based on the conviction that the richer the country is at the point in time that climate protection measures are implemented, the less costly these measures will be. Thus, such a country will attempt to delay the implementation of measures as long as possible in order to increase its wealth as quickly as possible to the largest extent possible beforehand. To this end, both China and India have refused to commit themselves to a binding regime within the framework of the Kyoto negotia-

tions, in spite of the major pressure exerted on them by the United States (see, for example, the Byrd-Hagel Resolution of July 1997¹⁶).

Prevailing interests would be completely different if the prospect existed for financial resources to be made available within the framework of a global emissions trading regime through which modernization could be financed. Whether this possibility will be assured for Asian emerging economies will be determined by the mechanisms according to which emission rights or the proceeds from emissions trading are distributed. However, it can be assumed that an agreement on a global emissions trading system will only be reached if such opportunities for financing exist for emerging economies and developing countries.

7.2 Possibilities for designing an emission trading system

In principal, the possibility exists to distribute emission rights, whose total amount would be determined on the basis of a climate target, at no cost to enterprises according to a specific formula or at a specific price through auctions. Afterwards these rights could be traded among buyers and sellers on an exchange. Thus a global price for GHG emissions would emerge that would be incorporated into the cost calculations of, for example, suppliers of fossil fuel-based energy. Even in the case of distribution at no cost a price will emerge through the trade in emissions certificates, provided that their total volume does not exceed an upper limit that is lower than the volume of total emitted carbon dioxide equivalents.¹⁷

¹⁶ The Byrd-Hagel Resolution passed by the US Senate a few months before the signing of the Kyoto Protocol stated that the US Senate would support no agreement that did not commit the most important developing countries such as China and India to emissions restrictions.

¹⁷ Under the Kyoto Protocol, six gases that contribute to climate change are cited. These gases are called greenhouse gases (GHGs). Among them, carbon dioxide is the most important. This gas is responsible for 80 percent of the greenhouse effect. In order to calculate the greenhouse effect caused by all GHGs, including methane and nitrous oxide, their effect must be made comparable with that of carbon dioxide. The number of molecules of a greenhouse gas that produce a greenhouse effect equivalent to that of one molecule of carbon dioxide are termed a »carbon dioxide equivalent«.

¹⁵ See: Ziesing (2008): *Energiewirtschaftliche Tagesfragen* Heft 9 (September)

Distribution at no cost

If emission rights are distributed at no cost, an endless number of possibilities exist for determining the formula by which they are allocated. The key criterion is enforceability and for that a plausible principle of allocation is needed. Two principles have gained particular importance in this context: firstly, the »grandfathering principle«, and secondly, the »principle of equal per-capita emissions«.¹⁸ The »grandfathering principle« states that emission rights are allocated according to the actual emissions of a preceding period (basis year). Thus abrupt changes and associated resistance to the introduction of the system are avoided. This principle was applied in the distribution of emission rights under the Kyoto Protocol, together with cuts of up to eight percent for some of the states/groups of states (European Union) committed to this agreement. The »principle of equal per-capita emissions« is based on the belief that every person has equal shares in the ownership of the atmosphere (equity principle). Though this principle is one on which consensus could be reached among the majority of the world's population – India and China have indicated on a frequent basis that any other principle would not be acceptable to them – the disadvantage would be that it would entail a sudden redistribution of many billions of dollars from industrialised countries on the one hand to developing countries and emerging economies on the other. In order to avoid such abrupt changes but still retain the principle of equal emission rights per capita as the basis for a system of distributing emission rights, due to its high acceptability, proposals for a combination of principles or a successive transition from one principle to the other over an extended period of time have been made. In a special expert report entitled »Thinking beyond Kyoto« (2003), the German Advisory Council on Climate Change (WBGU) has, for example, proposed a linear transition from the grandfathering principle to the principle of equal per-capita emissions according to a time axis set from the present to 2050.¹⁹ Thus it would be possible to avoid abrupt changes; however countries with high per-capita

emissions would be under a significantly greater pressure to restructure their energy supply systems than poor states with low per-capita emissions. Other hybrid systems are imaginable, for example a system under which states with high emission avoidance efficiency would be rewarded through allocation of emission rights, thereby creating an additional incentive for efficiency improvement but also for pioneering technological developments. The exact mix between both principles and the gradual transition from one to another could be the object of negotiations on a successor agreement to the Kyoto Protocol and on the creating of a global emissions trading regime.

Auctioning

A perfectly functioning market system would exist if emission rights were globally auctioned off. This would present the large advantage that lobbying and political leverage would play no role, since there would be no allocation of emission rights. Instead anyone that requires emission rights would have to purchase this right (by auction). However, the issue of politicisation would simply be transferred to the next higher level, which is to say to the distribution of income from the sale of emission rights as a scarce good. However, it might be easier to reach a consensus on the distribution formula at this level. The overriding principle could be to reach as low a world market price as possible for emission rights while respecting upper limits for global emissions. This would be achieved if available funds were applied in such a manner that the largest emission-reducing effect could be attained with the given financial resources.

Hybrid solutions

Combined solutions are conceivable not only with respect to the attribution of emission rights within the framework of a cost-free distribution of rights but also with respect to the two basic options of cost-free distribution and auctioning of emission rights. The EU-ETS, at present the most expansive and most extensively tested system, is currently based on such a hybrid solution. Perhaps this kind of solution is the most widely acceptable, especially since the volume of transactions is kept smaller than it would be in a pure auctioning system.

18 In Germany, for example, a third approach has found application in the form of a benchmark-based system with threshold values for fuels and technologies, which also allows technological progress to be taken into account.

19 See: Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (2003), 3.

This combination of two principles is termed »contraction and convergence« (C&C) in the literature, which describes a reduction in global emissions and an equalisation of per-capita emission rights.

7.3 The European Emissions Trading System (EU-ETS)

7.3.1 Structure and functioning of the EU-ETS

The European Emissions Trading System encompasses more than 11 500 facilities in the energy production and industrial sectors and covers around 50 percent of total carbon dioxide emissions in the European Union.²⁰ Since its establishment in January 2005, it has developed into the largest market in the world for carbon dioxide certificates. It is the central element of European climate policy for the limitation and reduction of environmentally harmful greenhouse gases from industrial production. Its establishment in 2005 was preceded by an intensive process of discussion whose results culminated in a draft directive of the European Parliament and the Council of the European Union in October 2001.²¹ Though the EU-ETS was originally devised separately from international climate policy under the aegis of the UN Framework Convention on Climate Change and the associated 1997 Kyoto Protocol,²² trade in emission certificates became central to the European Climate Change Programme (ECCP) in satisfying the commitments undertaken under the Kyoto Protocol. The then 15 EU member states²³ committed themselves under the Protocol to reducing their levels of carbon dioxide emissions between 2008 and 2012 by eight percent with respect to the base value of 1990. In 2008, the European Union defined a 20 percent reduction in emissions by 2020 as a further target, which can be increased by another 10 percent, should an international agreement (»Kyoto 2«) be concluded.²⁴

On the basis of the emission trading directive 2003/87/EG that entered into force in October 2003, EU member states are required to submit National Allocation Plans (NAPs) to the European Commission at the beginning of the emissions trading periods 2005–2007 and 2008–2012. These Plans govern the implementation of emissions trading at the national level and define how states will fix the total amount of greenhouse gas emissions according to their Kyoto commitments set under EU burden-sharing arrangements. In NAP I (2005–2007) and NAP II (2008–2012),

states specified a precise distribution of emission rights to operators of affected installations and defined how many GHGs each particular entity is allowed to emit during a determined period. In the NAP I period, all emission rights were distributed at no cost to enterprises. The original basis of the allocation mechanism was average historical emission levels. In NAP II, emission rights are allocated based on benchmarks, derived from technological standards. Member states are responsible for ensuring adherence to target values given under their NAPs and monitoring of actual emissions. The European Commission functions as the ultimate supervisory body with respect to the NAP process and verifies the conformity of the NAPs with the Kyoto commitments entered into by member states. If installations covered by the EU-ETS emit more carbon dioxide than the amount allocated to them or obtained through auctions, they must purchase additional emission rights on the emissions trading market. Conversely, unused certificates can be sold at the prevailing market rate until the expiration of the relevant emissions trading period.

While the first trading period from 2005–2007 (NAP I) was deliberately conceived of as a »learning phase«²⁵ and was intended to also serve in gathering reliable data on the actual emission levels of industrial installations, the second trading period corresponds to the commitment period laid out under the Kyoto Protocol. For the period from 2005–2007, an upper limit was introduced only for the emission of carbon dioxide. Emissions of other GHGs were not included in the ETS. From 2008, member states have the option not to simply restrict trading to the activities of electric and thermal power plants and other selected industries²⁶ but also to include other installations and GHGs.

For the second trading period from 2008–2012, the total amount of carbon dioxide emission rights was reduced by an average of 6.5 percent compared to 2005 after an evaluation and authorisation of all NAPs by the European Commission. Thus, from 2008 onwards, emission certificates are available »only« for 2.03 billion tons of carbon dioxide per year during this trading period, compared to an upper limit of around 2.25 billion tons of carbon dioxide per year during the first trading period.²⁷ In contrast to the first trading period, four percent of certificates will prospectively

20 See: Commission of the European Communities (2008a).

21 COM(2001) 581 final.

22 When the Kyoto Protocol entered into force on 16 February 2005, the EU-ETS had already been operational for two months.

23 Even though the EU-27 group does not pursue a common Kyoto target, the targets also apply (with some exceptions) to new EU member states.

24 See: COM(2008) 30 final.

25 COM (2006) 725 final.

26 Mineral oil refineries, production and processing of ferrous metals, mineral industry, and industrial plants for the production of pulp and paper or board, see: Annex I of EC Directive 2003/87/EC.

27 See: Summary information provided by the Commission (2007).

already be auctioned off across Europe during the NAP II period.²⁸ Missing emission rights can be partly obtained through credits from project-related measures within the framework of the CDM or JI system of the Kyoto Protocol. Member states themselves fix the permissible level of credits to be allocated from CDM or JI projects and are responsible for the organisation and execution of auctions. Proceeds from the auctioning of certificates flow into the budgets of member states. Emission rights are primarily traded electronically under the EU-ETS and are exclusively registered electronically. On which marketplaces and in which manner trade occurs is not regulated. However, it must be organised according to the rules of the EU domestic market, so that discrimination is precluded. There are a number of marketplaces for emission rights, e.g. the European Energy Exchange (EEX) in Leipzig or the European Climate Exchange (ECX) in London. Certificates can also be traded directly among companies or through a broker.

The respective national register and European Commission are informed about every transaction. In Germany, the German Emissions Trading Authority is the national agency responsible for assuring the accounting of transfers, distribution, balances, returns, removal, and acquisition of emission credits. The attribution of credits from CDM and JI projects from 2008 onwards, during the second trading period, requires the approval of the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), if it affects the allocation of emission certificates in the NAP.

7.3.2 First results

During the first four years since its launch, a mandatory system has been established, encompassing all 27 member states of the European Union as well as Norway, Iceland, and Liechtenstein, including the necessary infrastructure for trading and monitoring. In addition, much experience has been accumulated and modifications have been developed, which have partially already found application in the current second trading period and to a larger extent during the third trading period beginning in 2013. The system has proved that carbon trading is possible on a large scale and in an efficient manner. This provides grounds for the hope that a global system including all important emitters could also be practicable. Nonetheless, over the course of the period during which the EU-ETS has existed, a number of difficulties have arisen,

which should be addressed through the modifications now implemented by the European Commission and European Parliament for the third trading period from 2013 onward:

Excess supply of emission rights to industrial installations

The overly generous allocation of emission rights under the NAPs – certainly a consequence of successful lobbying by industry representatives and energy producers – has resulted in nearly all member states providing operators of industrial installations with emission certificates at no cost – and in total providing certificates for four percent more emissions than were actually produced.²⁹

As a result of the excess supply of emission rights to industrial facilities, the pricing mechanism was circumvented and market forces were prevented from functioning. This expressed itself in the observed pricing of emissions certificates.³⁰ Though the price of emission rights per ton of carbon dioxide rose to over 30 Euros shortly after the introduction of the EU-ETS, a rapid and stepwise collapse in prices occurred as it became gradually apparent that operators of industrial installations would emit far less carbon dioxide than the amount for which they had been allocated certificates.

A low point was reached in the price of a traded ton of carbon dioxide in December 2007 at only 0.02 Euros.³¹ Through a tightening of supply in carbon dioxide emission rights in the second trading period by the European Commission, market forces were allowed to take hold and the price of certificates rose again considerably. At the electrical power exchange EEX in Leipzig, the EEX Carbon Index (Carbix) rose to over 20 Euros per ton of carbon dioxide in January 2008 and had stabilized at an average price of around 25 Euros per ton in June 2008.³² This trend in prices should provide the German federal budget with

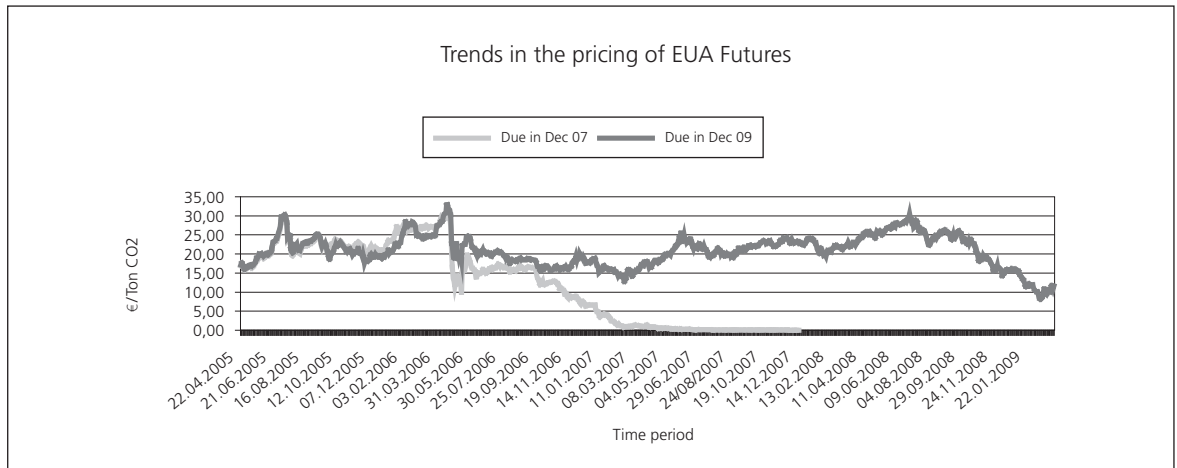
29 A similar power struggle over the free distribution of emission certificates and the question of their allocation to individual operators of industrial installations is currently taking place in the United States in the context of a legislative initiative for the introduction of an emissions trading system. See: *New York Times* (2008).

30 Stable development of prices was further impeded by erroneous data provided on emissions figures from preceding years, see: Worldwatch Institute (2008) 97.

31 For an overview of trends in the price of carbon dioxide per traded ton, see: <http://www.eex.com/en/Marktinformation/Emissionsrechte> or European Climate Exchange (ECX) (2009)

32 See: <http://www.eex.com/en/Marktinformation/Emissionsrechte/>.

28 See: Commission of the European Communities (2008b).

Figure 5: Trends in the pricing of EU-ETS certificate futures (EUA)

Source: Authors' representation based on figures from the European Climate Exchange (ECX) (2009)³³

approximately one billion Euros in additional revenue by the end of 2008.³⁴ The decline in prices during the second half of 2008 and the beginning of 2009 can be attributed to the international economic crisis, though a slight upward trend can be observed for futures with a final settlement date of December 2009.

Distortions in competition within the ETS

Apart from excess supply of emission rights, differing implementation of individual NAPs in terms of allocation, attribution, and verification among different member states led to distortions in competition within the European Union. Enterprises that had already invested in climate-friendly technologies prior to the launch of the EU-ETS were also disadvantaged.

Anticipated global distortions in competition

In addition to distortions in competition within the European Union, it is expected that higher costs would lead to diminished competitiveness in comparison to those countries not incorporated into the system. Concerns exist that, in addition to jobs and production capacities being relocated, GHG reduction could be negatively impacted, since production less harmful to the climate could be substituted through production with lower climate protection standards. This effect, known as »carbon leakage«, could take place in particular in very energy-intensive sectors, for

instance in the cement or aluminium industries, or in sectors that are particularly susceptible to international competition.

Windfall profits

Distribution of emission rights at no cost has resulted in extensive windfall profits for enterprises, particularly those in the energy sector, since they passed the market price of certificates – taken as opportunity cost – on to consumers, in spite of the fact that the certificates had been allocated at no cost.

Insufficiently long trading periods

Even if trading periods were conceived of as »learning phases«, at three and five years, they were designed too short to provide a reliable foundation for sustained, strategic decisions among enterprises and to allow a sufficiently secure planning horizon. In addition, their duration was fixed and, as a consequence, any unused pollution rights expired at the end of the trading period, which negatively impacted pricing.

Overly generous provisions for crediting of JI/CDM measures

Within the framework of the Clean Development Mechanism and Joint Implementation instruments, possibilities were created for obtaining credits for carbon dioxide-reducing projects. Creating such opportunities turned out to be a further weak point in the EU-ETS, since it undermined the Kyoto principle of

³³ See: European Climate Exchange (ECX) (2009)

³⁴ *Handelsblatt* 03.06.2008 »Emissionshandel dürfte Bund bis Jahresende über 1 Mrd. Euro einbringen«

giving priority to domestic reductions in emissions.³⁵ As a review of nine National Allocation Plans for the second trading period reveals, up to 88 percent of EU emissions could be saved through CDM and JI measures through 2012.³⁶ Both the Kyoto Protocol and declarations of the European Union explicitly demand that climate protection efforts be initially and particularly promoted on the domestic level.

7.3.3 The future of the ETS after 2012 – The third phase

In January 2008, the European Commission presented its proposals for the restructuring of emissions trading after 2013³⁷ and thus responded to the weak points in the EU-ETS described above. These proposals were discussed intensively during the course of 2008 and were ratified by the European Parliament with the support of a large majority in a form considerably reduced in certain aspects – a result of the current economic crisis – as one of six directives belonging to the EU climate package. The most significant changes envisioned include the following:

1. An EU-wide upper limit on industrial emissions of greenhouse gases will be introduced, and reduction commitments will no longer be defined on a national level through National Allocation Plans. The establishment of NAPs will thus become redundant.
2. With respect to 2005 levels, emissions are to be reduced by 21 percent until 2020 on the basis of a constant reduction factor. This reduction factor will continue to be used even after the expiration of this period.³⁸ Additional greenhouse gases until

now excluded from the emissions trading system are to be reduced by 10 percent with respect to 2005 levels. These targets are valid subject to the conclusion of stricter international agreements and can thus be modified accordingly.

3. In principle, emission rights are to be auctioned off in the future. In view of the current economic crisis, longer, staggered transition periods were decided that are also adapted sectorally. Starting from four percent to be auctioned at present, 70 percent of emission rights are to be auctioned in 2020 and 100 percent from 2027. Emission rights for the electrical power production sector are already to be auctioned in their entirety from 2013, though with exceptions for countries with low per-capita income, a high proportion of older installations, and a large share of fossil fuels in electrical power production.
4. Until the introduction of complete auctioning, unified standards are to be applied during an interim period for the no-cost distribution of emission rights in participating states in order to minimise distortions of competition. One tenth of emission rights to be auctioned will be redistributed and transferred to newly participating states for reasons of solidarity.
5. In order to avoid carbon leakage and competitive disadvantages that might affect energy-intensive sectors of production, these sectors can obtain emission rights for free or can receive special compensation through member states. This approach will be reviewed insofar as an international agreement is reached that would prevent carbon leakage.
6. The EU-ETS will be expanded to further sectors, for instance petrochemicals, aluminium and ammonia production as well as air transport, and two additional GHGs (nitrous oxide and perfluorocarbons) will be included.
7. Crediting of JI/CDM measures will be limited to 50 percent of the emissions reduction to be achieved during the period from 2008 to 2020, the trading period is to be extended to eight years with the possibility of carrying over unused certificates into the next period. 50 percent of receipts from auctioning of emission certificates are to be used for climate protection investments, and small installations can be excluded from the system, insofar as comparable emission-reducing measures have been taken.

35 For more information on the so-called supplementarity principle under the Kyoto Protocol, see: Hans-Jochen Luhmann; Sterk (2008), 107–125.

36 Worldwatch Institute (2008), 97.

37 The following passages are based on information from the official website of the European Commission, accessible at: http://ec.europa.eu/environment/climat/emission/ets_post_2012_en.htm.

38 This long-term emissions reduction pathway could also lead to an unintended negative effect on emissions reducing trade: The greater the extent to which required emission reductions are exceeded in a particular sector or region, the larger the number of emissions certificates will tend to be that are put on the market, with the consequence that the price of certificates will come under pressure. This will allow those enterprises that have invested little in emissions reductions to continue to invest little in emissions reductions, since they are able to cheaply buy certificates to cover their emissions, thus reducing the reduction efficiency of the system. This effect can be countered through a reduction in the amount of tradable emissions.

7.3.4 The EU-ETS – A local solution or cornerstone of a global system?

As outlined above, important experience has been gathered since the introduction of the European Emissions Trading System in 2005. This experience can be applied in decision-making regarding the design of further emission trading systems with a view to the original goal of the ETS, to reduce greenhouse gas emissions reliably and cost-effectively through quantitative restrictions. Article 25 of the Emissions Trading Directive explicitly permits the linking of EU emissions trading system to emissions trading systems in third countries. Cooperation with the European Union in establishing a transborder trade in emission rights for enterprises is therefore a possibility for other industrialised countries. As a result of the decision by the European Union to equate the value of an emission certificate traded through the ETS with an emission right issued within the framework of CDM projects, it is possible to trade these in principle different certificates³⁹ in a common system on a one-to-one basis. On this basis, a first international mechanism has been established that appears to be in a position to serve as a starting point for both integration with other emerging national and regional emissions trading systems or for a future global emissions trading system. Therefore the ETS in its current form need not remain a local solution limited to Europe.

7.4 Effects of global emissions trading

In order to establish a global emissions trading system and achieve an effective reduction in GHG emissions that such a system would permit, the forging of an international consensus among all important GHG-producing countries is an important prerequisite. Independently of how the system is concretely designed (whether based on grandfathering, per-capita emissions, a hybrid system or auctions), reaching a global consensus is only conceivable on the basis of a significant net transfer from industrialised countries with high per-capita emissions to developing countries and emerging economies. This transfer must be used in such a way as to lead to a restructuring of energy systems, so that climate policy requirements can be met. This means that, on the one hand, an increase in the price of fossil fuel energy sources relative to

non-fossil fuel energy sources must occur. On the other hand, it must be ensured that new technologies are made available on a large scale and that the enormous investments required for their application are made in order to enable and indeed push towards efficiency increases and a shift in the energy mix towards non-fossil fuel energy sources.

Accordingly, the modernization of energy consumption must be part of any agreement on global emissions trade. The impetus towards innovation that should be expected through a change in price and cost structures should be actively reinforced. To this end, it is necessary to undertake: targeted support for research; further development of necessary technologies; effective implementation strategies and implementation concepts – even in and especially in developing countries and emerging economies. For industrialised countries as net contributors, it is important that the financial transfer not be unbounded. An upper limit must be set.

For developing countries and emerging economies, this model provides an opportunity to modernize their energy sector, which is necessary in any case for development. In addition, this solution provides them with the possibility to contribute constructively to the fight against climate change, without hampering their development process. For industrialised countries, the advantage also lies in the solving of a problem, which if left unsolved, will result in at least five times higher economic costs than if it were solved, according to the 2006 report by Nicholas Stern, former chief economist of the World Bank.⁴⁰ To this extent, a net transfer can be accepted, without net contributors being the losers, especially since part of the resources transferred can be expected to be recovered in the form of work and purchasing orders. What can be certain is that China and India will participate in a responsible manner in the fight against climate change if they are given incentives to do so by way of technology and financial transfers. Should these be absent, these countries will – understandably – fall back on the following argument: Industrialised countries have caused this problem and are therefore responsible for solving it. Industrialised countries have not only exhausted the carrying capacity of the atmosphere but have also disproportionately consumed oil and natural gas as scarce resources to fuel their industrial development. Therefore China and India only have costly reserves and even more costly alternatives at their disposal, which constitutes a significant disadvantage in relation to their possibilities for developing their economies.

³⁹ Certificates traded within the EU-ETS are called »European Allowance Units« (EAUs), while emission certificates from CDM projects are termed »Certified Emission Reductions« (CERs).

⁴⁰ See: Stern (2006).

To illustrate the magnitude of such a transfer, the following calculation should be considered: Nicholas Stern argues that the prevention of the most significant economic costs resulting from climate change requires measures that are in the range of one percent of global GDP. If no additional measures are taken beyond those currently under consideration, this will lead to a decline in global gross domestic product of at least five percent. Current global GDP is currently approximately 45 trillion dollars per year, the gross domestic product of all G8 countries around 29 trillion dollars, EU countries 13.5 trillion dollars, Japan 5 trillion dollars, and US 13 trillion dollars. The difference between the cost of doing nothing (five percent of world GDP) and the cost of acting (one percent of world GDP), distributed according to GDP, represents a loss of 1.8 trillion dollars for the world, 1.160 trillion dollars for all G8 countries, 540 billion dollars for the European Union, 200 billion dollars for Japan, and 520 billion dollars for the United States. Assuming that G8 countries would apply one twentieth of this amount, i.e., 0.2 percent of their gross domestic product, for controlling damage through global emissions trading, it would represent an amount of 58 billion dollars that would be available each year for net transfers. This sum should suffice to spark the interest of developing countries and emerging economies in global emissions trading. The actual net transfer from G8 countries could be lower if only because these resources could at least partly offset against resources for development assistance. In the case of a proportional distribution, the total transfer for the European Union would represent an outflow of 22 billion dollars (approximately 14 billion Euros) and for Japan of eight billion dollars.

This net transfer of resources that should be expected to occur to emerging economies and developing countries should be seen in particular in comparison to the enormous transfer that is currently taking place from OECD countries into oil-producing countries, which has contributed little to date towards solving the climate problem. In comparison to the 1990s when the average oil price was at 17 dollars per barrel, the net outflow from countries in the European Union to oil-producing extra-European countries currently totals 181 billion dollars per year, assuming a price per barrel of 50 dollars.⁴¹ For Japan, this net

transfer totals 61 billion dollars. An emissions trading system, which would foster a shift from fossil fuel energy sources to non-fossil fuel ones, would partially contribute in the mid-term towards reducing this financial burden.

A transfer of resources within the framework of an emissions trading system from the North to the South would naturally strengthen the negotiating position of industrialised countries insofar as they would be able to permit only those countries as participants into the trading system that would submit to the monitoring associated with this system as well as to its rules. This would simultaneously increase the efficiency of the system and its positive impact in fighting climate change.

Even if the new US Administration represents a paradigm shift in current climate and environmental policy, the establishment of a global system will in all likelihood encounter political resistance on the domestic level. Though in contrast to the Kyoto Protocol, global emissions trading fulfils both requirements of the US Congress for participation in a multilateral system (Byrd-Hagel Resolution, 25 July 1997), namely the inclusion of major developing countries in a multilateral system and the implementation of the chosen approach in as economical (market economy-oriented) manner possible. In 2001, the Bush Administration took the Byrd-Hagel Resolution as an opportunity to reject the Kyoto Protocol signed by its predecessor.⁴² Yet in spite of all changes that can be anticipated from the new Administration, it can be expected that the United States will have qualms about any kind of transfer of gross domestic product to its superpower rival China. However, if the major blocs (European Union, China, India, and other large emerging economies) could come to an agreement, the United States under the new Administration could not as easily disengage itself from the solution as it did with the non-ratification of the Kyoto Protocol. After all the United States are a contracting party of the Framework Convention on Climate Change (1992)⁴³ under which all states committed to solving the climate issue. Furthermore, a global emission trading system would meet the requirements laid out under the Byrd-Hagel Resolution, and thus the concerns raised in connection with the Kyoto Protocol would be dispelled. However, the Framework Convention also binds the Europeans, who like to see themselves as models in climate matters, to taking an approach that actually leads to the

rel) and an associated expansion in the transfer of resources to oil-producing countries should be expected.

⁴² See: Bush (2001).

⁴³ United Nations Framework Convention on Climate Change, New York 1992

⁴¹ As of early 2009, the price of oil has declined to below 50 dollars per barrel due to the economic downturn resulting from the current economic crisis. However, this low price should be expected to persist no longer than the duration of the financial and economic crisis. After the crisis has been overcome, a rise in the price of oil to levels experienced in July 2008 (when the price of oil reached 148 dollars per bar-

goal of solving the climate issue being met. It is hard to imagine that this goal would be reached without global emissions trading.

7.5 Main principles for organising global emissions trading

Setting up worldwide emissions trading must be a central element of negotiations now beginning on a successor agreement to the Kyoto Protocol. Within the framework of these negotiations it must firstly be clarified on which basis global emission pathways will be fixed until a target year (e.g., 2050). The Fourth Assessment Report of the IPCC provides an appropriate point of orientation for this purpose. Secondly, it must be determined whether emission rights will be auctioned off or distributed for free.⁴⁴ In the former case, the question arises regarding the formula according to which proceeds from auctions will be distributed, while in the latter case, the method for allocating emission rights must be determined. Using this as a transition from the grandfathering principle to the principle of equal emissions per capita should be an object of negotiations, so that certain upper limits for net transfers (for example, those figures given in the example calculations above) are not exceeded. Moreover, in a structural regard, it must be clarified for what purposes net revenue from emissions trading may be used. Logically, a large part of this revenue must be reserved for GHG-saving investments and research and development expenditures. The low-carbon development strategies proposed by the European Union could represent an appropriate framework in this context.

The greatest challenge for negotiations towards a global trading system is likely to concern the distribution formula for emission rights, which should be attractive enough to encourage emerging economies to consistently participate in the system but only burden net contributors to a manageable extent. In case of an agreement on the auctioning procedure, a consensus has to be found about the distribution of the proceeds. In this case a further advantage would be that the distribution of proceeds could be coupled with further investments for modernization. These invest-

ments could further accelerate the transition towards a low-carbon world energy supply structure.

After a distribution mechanism has been determined, an institution active in all participating countries must be established, which would be responsible for monitoring greenhouse gas emissions, transfer payments and ideally for the central auctioning of certificates. We propose the foundation of a »World Emissions Trading Bank« (WETB) for such an institution. The WETB should sensibly have its headquarters in Asia, for example in Singapore, to increase the acceptability of the system to Asian countries. This Bank must necessarily have national branches in participating countries to be able to assume responsibility for the monitoring of trends in GHG emissions as well as for the use of transfer payments. To avoid having international transfer payments reach excessively large sums, these should be limited to net transfers in annual accounts. The national branches should also keep an account of revenue and expenditures under an auctioning system but only disburse or collect as international transfers the difference between revenue and expenditures.

Only states that dispose of an internationally supervised monitoring system established on the basis of common criteria can become members of the global emissions trading system, as is the case under the EU-ETS. States for whom doubts exist whether they are sufficiently organised according to the rule of law to be able to supervise actual GHG emissions and the use of figures according to common criteria may not become participants in the system.

Should doubts be too great about whether many states among the developing countries will be able to assure reliable monitoring of emissions within the foreseeable future, it would be worth considering whether the approach of the US Administration, to give precedence to establishing a climate protection system with the top 20 GHG emitters and not immediately with nearly 200 states, should be prioritized at the launch of the system. After all, the top 20 emitters are responsible for 90 percent of GHG emissions. The administrative effort to incorporate the remaining states that are not significant emitters would be a considerable burden during the start-up phase and could make the establishment of the system much more difficult. A structure of this sort would have to be open for expansion, allowing participation by all states that want to participate in the system and fulfil the necessary prerequisites in terms of rule of law, so that the emergence of a two-class system can be avoided.

The advantage of a global emissions trading system in comparison to approaches such as that of the CDM

⁴⁴ In many aspects organising a global emissions trading system is similar to organising the monetary and fiscal policy toolkit of an economic area. The fundamental principles such as transparency, quantitative regulation, and broad independence of the central bank (here: the WETB) are also of importance in organising a global carbon market. Even exchange rates between subsystems connected amongst each other are conceivable (see: Edenhofer [2007], 21).

is that it harnesses the enormous potential for investments into more efficient and less carbon-intensive energy production and energy consumption present in the emerging economies of Asia and Latin America, which represent the largest share in expected growth in emissions. Such a system would create an incentive for emerging economies to use it to attract financial resources. In industrialised countries it would simultaneously create a significant motivation to accelerate the reduction in the use of carbon in energy production, since low-carbon energy production would become more competitive.

The incomparable advantage of a system established within such a framework would be that the indispensable participation of major developing countries and emerging economies in solving the global issue of climate change could be obtained using carrots and not sticks (Byrd-Hagel Resolution). (Using sticks would – not unjustifiably – lead developing countries to reflexively push the blame on industria-

lised countries.) Global emissions trading therefore can lead us out of the dead end in which it has become apparent that we have found ourselves since the negotiations on the UN Framework Convention on Climate Change (Rio de Janeiro, 1992). Additionally, it minimises global costs of climate protection policy according to economic criteria and permits distortions of competition to be avoided among participating countries. Achieving climate policy effectiveness and economic efficiency, in particular through minimising the extent of transaction costs and avoiding distortions of competition, will require that a great deal of care is taken in the concrete design of the system. However, there is no real alternative to such a globally based system if global growth in greenhouse gas emissions is to be led towards the necessary reduction pathway. The initial question whether emissions trading is the solution to the challenge posed by climate change can thus be answered: It can be – at least to a very large extent.

8 List of abbreviations

C&C	Contraction and Convergence
Carbix	EEX Carbon Index
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
EAU	European Allowance Units
ECCP	European Climate Change Programme
EU-ETS	European Emissions Trading Scheme
EEX	European Energy Exchange
EXAA	Energy Exchange Austria
FCCC	Framework Convention on Climate Change
GDP	Gross domestic product
GHG	Greenhouse gas
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
Jl	Joint Implementation
NAP	National Allocation Plans
ppm	Parts per million
WBGU	Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen/ German Advisory Council on Climate Change
WETB	World Emissions Trading Bank
UNFCCC	United Nations Framework Convention on Climate Change

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