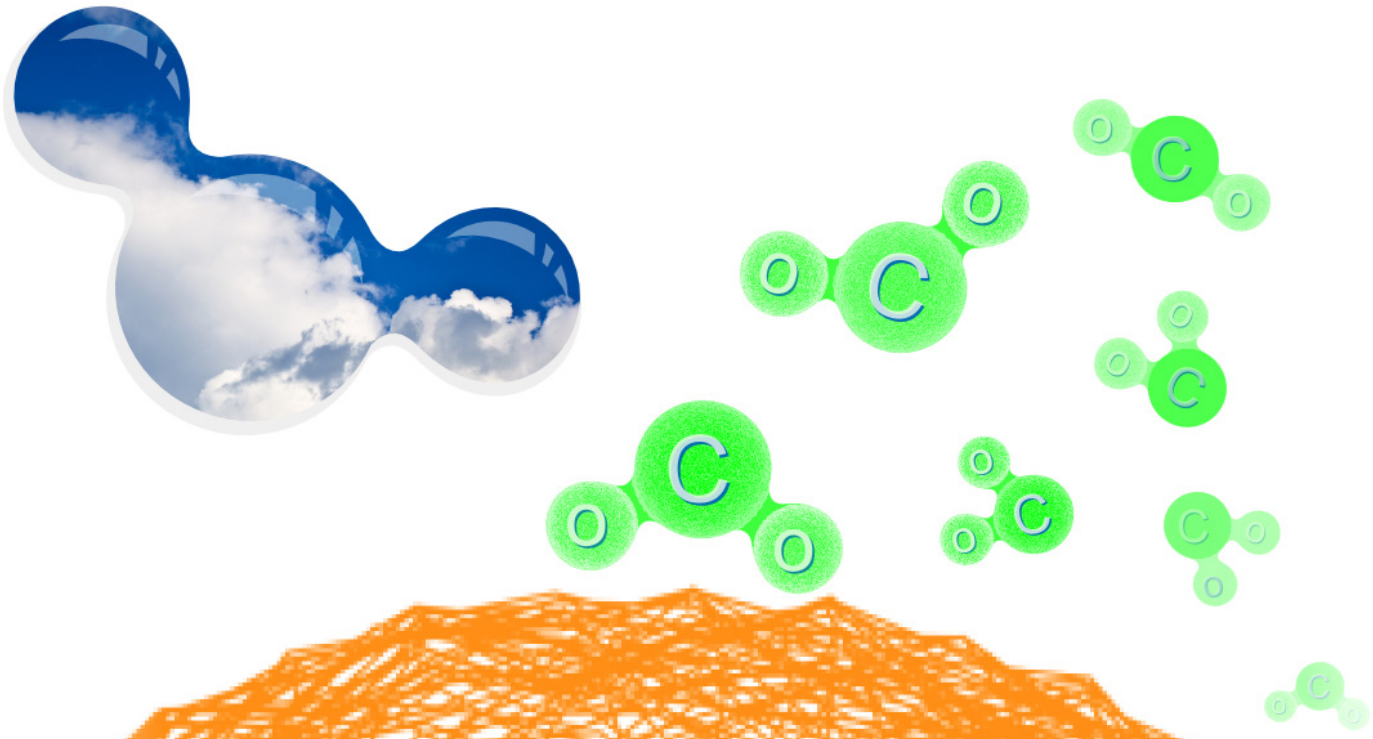
FAW/n Report

(short version)

Towards a Working Climate Regime after Copenhagen [1]

F. J. Radermacher[2]



[1] FAW/n report, Oct 2010. Translation of the German Document, "Weltklimapolitik nach Kopenhagen - Umsetzung der neuen Potentiale (Kurzfassung)". Short Version of "Towards a Working Climate Regime after Copenhagen", FAW/n report, May 2010. Translation of the FAW/n full report "Weltklimapolitik nach Kopenhagen - Umsetzung der neuen Potentiale", May 2010.

[2] Prof. Dr. Dr. F. J. Radermacher, head of the Research Institute for Applied Knowledge Processing/n (FAW/n), professor for computer sciences at the University of Ulm, president of the Global Economic Network (GEN), Vienna, president of Senat der Wirtschaft e.V., Bonn, vice president of the Ecosocial Forum of Europe, Vienna, and member to the Club of Rome

Contact: Forschungsinstitut für anwendungsorientierte Wissensverarbeitung (FAW/n),
Lise-Meitner-Str. 9, 89081 Ulm, Germany, Phone: +49 731 50 39-100, Fax +49 731 50 39-111,
Email: radermacher@faw-neu-ulm.de, http://www.faw-neu-ulm.de

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Management Summary

The present text develops a perspective for the further international climate talks as an outcome of the results of the Copenhagen conference on the basis of an FAW/n analysis. The central starting point for a proper perspective is what we call the "**Copenhagen Miracle"**, which is publicly not perceived as such. The miracle actually is that high-population newly-industrializing nations, especially China and India, have offered to **limit** their **further increase, in CO_2-emissions** below their respective increase in GDP. These nations have thus abandoned great financial claims which they could have articulated under aspects of **climate justice**. They have thus given the global community a chance to reach a sustainable climate regime by the end of 2012. The present text shows, amongst others, the following components in this regard:

- **Contractual framework for a World Climate Treaty**
- Identification of the central role of an **international reforestation program**
- **Costs and funding of an ambitious international forest regime**
- Comprehensive cap-and-trade system between the individual nations
- Optional climate neutrality for organizations, companies and private people
- Integration of international water and air traffic
- **Connection of climate regime and WTO**[1]
- **Dealing with the WBGU Budget restriction until 2050**
- Embedding the proposals into the vision of a **double-factor 10**

It is necessary to concentrate on the mentioned major questions and measures during the **pending talks**. If we do this, it may still be possible to decrease the global total CO_2 emissions from fossil energy sources to below 13 billion tons per year by 2050 and at the same time comply with the **WBGU's budget restriction** of a cumulated amount of **750 billion tons of CO_2 emissions** from fossil energy sources until 2050.

[1] World Trade Organisation

Introduction

The results of the Copenhagen Climate Conference **have mainly evoked negative comments.** Partially because there was no comprehensive consent and agreement reached in the sense of a global cap-and-trade system with binding reduction obligations for all nations until the year 2050, which would be clearly favored from a scientific point of view.

However, large newly-industrializing nations such as China and India could not been expected to join such a framework as long as the industrialized nations refuse to address **obvious justice requirements** on a large scale. Apart from significant emission reduction obligations on their part, this would have meant, amongst other things, massive financial compensation by the industrialized nations.

Although certain expectations have not been met, there is good reason to analyze the results in greater detail. What is known as the **Copenhagen Accord** outlines potentials which were not foreseeable to begin with. It is now much easier for nations to participate. This is why all large nations, especially, above all, the USA, Europe, China and India, are in the game. This improves the game theoretical possibilities to get everybody to join in, particularly when employing **WTO mechanisms**. The present text analyses the potentials of the industrialized nations in future negotiations.

1. The Copenhagen Miracle

What was the most significant result of the Copenhagen Climate Conference - what was the "**miracle**"? The "miracle" is the willingness of large, highly populated non-industrialized nations, especially China and India, to make vast compromises of a new kind unilaterally and without any financial compensation and despite the industrialized nations' much too limited concessions. This concerns the non-industrialized nations' announcement to only **underproportionally** increase their further CO_2 emissions compared to their future economic growth (in China's case approximately 55 % - 60 %, in India's case approximately 75 % of the GDP increase rates as the upper limit).

This concession will be referred to as the **Copenhagen Miracle** in the future. It stipulated an upper limit (parameterized against the GDP growth rate) for further CO_2 emission growth rates for all nations which participate in such an international climate regime. The **target** of further climate negotiations can now be the compromise of industrialized nations to generally (1) significantly reduce their emissions and (2) finance a **climate fund** and that (3) non-industrialized nations limit their emission growth rates **underproportionally compared to their GDP growth rate** on a general basis, as many nations have already declared after the Copenhagen Climate Conference.

On this basis, **a global cap-and-trade system** may be organized, parameterized against the respective GDP growth rates of the non-industrialized nations. The remaining emission growth rates of the non-industrialized nations may then be **bought out** if smartly implemented. This may potentially eliminate any further emission growth in all nations already as of 2012. The required procedure will be described subsequently. From the author's point of view, the prerequisites to establish an effective climate regime by the end of 2012 exist, if the industrialized nations use the opportunities, as created in the "Copenhagen Miracle", smartly.

2. The „Wonder of Copenhagen“

How can we proceed **strategically** in further negotiations? The intermediate input of nations such as China, but also of Brazil, Mexico and Indonesia, are an offer which the global community should transfer into an **agreement for an effective climate regime as quickly as possible**. Declarations, which partially have included the demand for compensation (for example from a climate fund) are to be systematized , legally fixated and fulfilled as to the required compensation as quickly as possible. The **entire design** of a win-win-type agreement is the core question in this regard. The respective contractual design is presented in this text and is based on a comprehensive analysis of the Forschungsinstitut für anwendungsorientierte Wissensverarbeitung (FAW/n) in Ulm [15]. The suggestion in [15] proposes that the nations of the world should be categorized in three groups with varying obligations; moreover, certain framework conditions are proposed. A 15-paragraph contractual design will be developed, various excerpts of which will be quoted in the present text.

Contracting Nations / Initial Signatories

The new World Climate Treaty shall associate to the Kyoto Protocol. Accession to the **Initial Signatories** is possible until the **end of 2012**. 2005 has been chosen as the reference year for the classification of the nations' obligations under the Contract. 2020 shall be the first targeted year. These dates conform to the reference dates chosen by many nations anyway after the Copenhagen Climate Conference as their dates for voluntary declaration. As of 2020, many of the relevant values stipulated in this Contract such as classification limits, relevant classifications, premiums, bonuses and super-bonuses as well as minimum rates to be paid into the climate investment funds shall be jointly adjusted anew. Should the participants fail to reach a joint decision, the agreements stipulated herein shall continue to be logically valid.

§ 1 Obligations of the Participating Nations

The participating nations to the contract agree to an individual **path of obligation** to limit their CO_2 emissions from fossil resources by 2020 for the time being. Any **further emissions of** other **climate gases** shall be regulated in a separate contract in compliance with the proposal of the WBGU[i]. We will include, however, the **forest issue** into the present Contract due to its great significance (see § 2). Regarding the **international water and air traffic** procedures shall conform with § 3.

The paths of obligation as individually declared by the nations shall be **binding** to the extent that the maximum emission rights shall be lowered by means of self-declaration at anytime, but can no longer be increased (analog to the regulations for customs dimensioning under GATT/WTO). In order to become a nation to the Contract, the participating nations must fulfill specific requirements. The nations shall be divided into 3 categories: Industrialized nations (see § 5), emission-intense newly-industrializing nations (see § 6) and low-/lowest-emitting nations (see § 7).

§ 5 Obligations of industrialized nations

Industrialized nations are such nations whose GDP per capitum was at an annual minimum of US $ 9,000.00 in 2007. Bulgaria and Romania shall be included as EU countries as well. Apart from a few cases, which were rather insignificant size-wise (such as tropical tax havens and Latvia), these states have all generated average CO_2 emissions exceeding 4 tons per capitum in 2005. The other states mainly produced less than 4 tons per capitum, except for the exceptions in the classification made in chapter 21 and in the ANNEX of [15]. We can thus apply an emission amount of **4 tons of emissions per capitum in 2005** as a limit value in general. The following shall be required from industrialized countries: Industrialized nations as participants in the climate regime shall implement **annual absolute decreases** in CO_2 emissions by 2020 for the time being. Said decreases shall be individually stipulated and announced. The participating industrialized nations are additionally expected to render a (self-imposed) **annual contribution to the climate investment fund**.

The higher the average emission level of climate gases of a country, the higher an annual contribution is expected to the climate investment fund. The minimum contributed amount of an industrialized nation shall be **5 US $ per ton of emissions volume** of the respective country.

§ 6 High-Emission Newly-Industrializing Nations

Nations, whose per-capitum emission levels were between 2 tons and 4 tons at the appointed date, shall commit to a **minimum 50%-reduction of CO_2 emissions relatively to their increase in GDP**. This shall apply on an annual basis always relating to the actual GDP of the previous year. The privilege of the orientation to relative emission limits instead of an obligation to absolute reduction values shall be valid until **2020**. As of this point in time, real annual reduction will be required.

§ 7 Low- and Lowest-Emission Nations

Nations, whose per-capitum emission levels were below 2 tons at the appointed date, shall have the right to increase their emissions at maximum **parallel to their annual increase in GDP** for the time being. Further increases shall not be permissible. This shall apply on an annual basis always relating to the GDP of the previous year as a reference value. This special privilege of a permissible increase of the average CO_2 emissions oriented on the GDP increase of an individual nation shall be valid until **2020**. As of this point in time, a minimum 50% reduction relatively to the GDP increase of the previous year shall be required. Absolute annual reductions shall be required as of **2025** at the latest.

§ 8 Climate Investment Fund

A **climate investment fund** shall be established, which shall be funded in particular by the industrialized countries. The minimum contributed amount of an industrialized nation shall be **5 US $** per ton of emissions volume of the respective country (see §5). In addition, the climate investment fund (and its management) shall receive a limited amount of shares, e.g. 15% from the sales of climate certificates via the **international trading platform**, which is to be established for this purpose (see §10). The UN certificates for the binding of CO_2 by means of a labored **international reforestation program** to be allocated in a special contingent shall be funded via organizations, companies and private investors, who intend to position themselves climatically neutral (see §13). The climate investment fund shall take on a financial balancing function in this regard.

The climate investment fund shall benefit from income from the sales of certificates for the **international water and air traffic**. The planned emission rights shall be allocated by the responsible UN organization. The financial means shall go into the climate investment fund. A separate (and more price-intense) sub-regime may potentially be established for the **international air traffic**. The climate investment fund is a central element of a solution as per the Copenhagen Climate Conference. The per-capitum emissions of a country, granted reductions of emission volumes and contributions to the climate investment fund shall be regarded as a "package deal". The climate investment fund shall

be endowed accordingly. This is mainly an important responsibility of the industrialized countries as well as a significant contribution to an approximation to **climate justice** under the Copenhagen regime.

3. Motivation of partizipation of non-industrialised states

A compromise for a climate regime, as it seem possible after Copenhagen, requires, in particular, the transfer of great amounts of money to cross support of non-industrialised states. For this, the climate fond, among other, plays a major role. In the contract proposal in [15] the following recommendations are included.

§ 8 (Continuance)

The financial means in the climate investment fund serve 7 purposes: (1) **Annual honoring lowest-emitting nations**, which show an average emission level of below 1 ton. Such states are honored with the difference between "population * 1 ton" and the cumulative emission volume of the nation in the respective year. They are honored with a **super-bonus** of US $ 30 per ton. Moreover, a **bonus** of US $ 15 and a **premium** of US $ 5 are granted for every citizen thanks to collective decreasing of the 2-ton and 3-ton limit, (2) **annual honoring of low-emitting nations** relatively to the 2-ton limit via a **bonus incentive scheme** in the amount of US $ 15 per ton of emission volume, by which the cumulative emission volume of the respective nation falls below the value of "population * 2 tons" in the respective year. Furthermore a **premium** in the amount of US $ 5 per citizen thanks to collective decreasing of the 3-ton limit. (3) **Honoring of high-emission newly-industrializing nations** relatively to the 3-ton limit by means of a **premium** in the amount of US $ 5 per ton of emission volume by which the cumulative emission volume of the respective nation falls below the value of "population * 3 tons" in the respective year. (4) **Funding of special projects** related to the topic, especially in low- and lowest-emitting nations and, to a certain extent, also in high-emission newly-industrializing nations. The more fiercely high-emission newly-industrializing nations and, most of all, lowest-emitting nations oblige to relative reduction proportionally to the increase of their GDP, the more funding they shall receive from the support funds. (5) Inducing further reduction of CO_2 emissions in the sense of **capitalization** of climate rights pursuant to §12. This especially aims at the reduction of permitted percentage increases in high-emission newly-industrializing countries and low-/lowest-emitting nations against

financial funding - an issue of central significance. (6) **Financial balancing** for the (separate) UN certificate system to fund a labored **international reforestation program** as well as for the **capitalization** of still complained rights of (non-)industrialized nations to lumbering pursuant to §2. (7) Inducing further reductions with regard to **climate neutrality** pursuant to §13.

4. Capitalisation of rights to increase CO_2 emissions

Capitalize remaining rights of non-industrialized states for further growth in CO_2 emissions

Make use of the generous offer of states such as China and India to have future CO_2 emission growth below the GDP growth ("Wonder of Copenhagen"). Transform this into a global cap and trade system that is parameterized on sub-BIP growth rates. Also, as far as possible, try to capitalize the remaining rights for increases in CO_2 emissions in certain states using the climate fund.

The program developed so far is only possible because of the "Copenhagen Miracle", that is to say that it is based on the acceptance of an upper limit for further CO_2 emission increase rates for large newly-industrializing nations which lay below these nations' GDP growth rates. If we succeed with the contractual fixing as, for example, outlined in the present text, the remaining growth potentials of the respective nations may be estimated with regard to the maximum volumes and may **be purchased during negotiations for an adequate price.**

For the first time, the industrialized nations now have the opportunity the prevent further CO_2 increases in all participating nations by means of payments. This is an extremely favorable situation. The processing of such buy-outs may be organized via the **climate fund**. Estimates for the subsequently described (simplified) form amount to capitalization costs in the amount of **100-125 billion US dollars** which may be stretched over several years by using the capital market.

Since, from today's point of view, all large nations would participate in a climate regime à la Copenhagen, especially because of the opportunity to also participate to a great extent in the definition of the obligations to be adhered to, the described approach would allow for a **global cap-and-trade system** with a fix cap which would be lowered on a

yearly basis. As described later on in this text with regard to the **WTO issue**, a consistent worldwide cap may be achieved soon.

§ 10 Tradable Climate Certificates / Cap-and-Trade System

The described logic to fixed upper emission limits in an absolute or relative sense define global annual CO_2 emission volumes from fossil energy sources, which may be translated into **annually** newly issued and (potentially) useable **(UN) climate certificates**, which are tradable in between nations. The certificates feature **international designation**, so they can be identified unambiguously at any time. Illegal multiple usage shall thus be excluded. The proposed system is a **2-stage nation-based cap-and-trade system** in annual orientation and thus with the **real certificate effect** in the sense that only such emissions are feasible for which a certificate may be presented. The volumes for upper limits in relation to GDP increase are estimated at the beginning of the respective year and are subsequently adjusted in the course of the year on certain call dates. Moreover, considering the actual GDP increase values, the volumes are corrected subsequently in the following year and potential differences are balanced.

Nations may use their allocated certificates on the national level or in cooperation projects with other nations, such as technology transfers or technology partnerships (as in traditional **CDM projects**). The certificates may also be used for achieving climate neutrality for organizations, companies and private people on the national level. As an alternative to the presented forms of usage, the certificates may be sold to **other nations** or **to the climate investment fund for neutralization purposes**. The official trading platform to be used for the determination of the market price, potentially on appointed dates, shall be organized on the international level under **UN supervision**. The precise conditions remain yet to be determined. A portion of the trading income (e.g. 15%) shall mainly go into the climate investment fund (e.g. 12%) and shall otherwise serve the funding of the climate regime management as well as the operation of the platform by the UN (3%). In addition, there are significant financial means for the fund from the sales of (UN) certificates through the UN with regard to the integration of **international water and air traffic**. The type of mutual reaction with the (separate) UN certificate system for the funding of the planned labored **international reforestation program** shall be appropriately stipulated. The climate investment fund shall especially take on a financial balancing function.

Example China: Capitalization costs

Should China accept the stipulated obligation to reduce the CO_2 emission growth from fossil fuels at a rate of max. 50 % compared to its GDP growth rate between 2012 and 2020, as outlined in this text, and should China waive any growth rates as a part of the contract after 2020, the potential growth until 2020 **must be financially compensated** in order to reach a zero-growth limit value for China between late 2012 and 2020 (8 years). A simplified calculation reads as follows (emission volume late 2012)x 8 years x (4/100 = reduction by 50 % of 8 % for an assumed average economic growth of 8 % spread over the 8 years in view) x agreed purchasing price per saved ton of CO_2 (with assumed **25 USD per ton**). The annual GDP growth rate with compound interest effects are to be disregarded. The payoff also disregards discounting with compound interest effects. This almost evens out under similar interest and discount rates and over a limited period of 8 years. Based on China's total emissions in 2007 amounting to 6,083 billion tons of CO_2, we assume an emission volume of 7 billion tons for the end of 2012. This results in a total value of 7 billion x 8 years x 4/100 x 25 USD = **56 billion USD** for the waiver of the remaining relative emission growth rights for China of assumed 50 %.

Example India and other non-industrialized nations

For India, 15.3 billion USD are identically calculated, for the other non-industrialized nations without China and India the calculation renders 29 billion USD; altogether a good **100 billion USD**.

5. Start at Trade level 1 / integration of states producing

If an agreement is to be successful, the core question is as to by which measures the nations of the world plan to keep the annual CO_2 volume **below the contractually stipulated level.** This is a matter of core significance, also under aspects of international monitoring.

The presented thoughts mainly lead to a **global cap-and-trade system** under which all nations have a certain CO_2 emission potential at their disposal by means of self-imposed reduction obligations, emission rights trading and potential decommissioning of certifi-

cates by means of neutralizing purchases and under which they need to ensure that the CO_2 emissions in their territories do not exceed the available emission rights. (Note: international water and air traffic with currently approximately 1 billion CO_2emissions per year are not included but will be regulated per a separate UN certificate regime following the mentioned proposal).

As fossil energy carriers such as oil, coal and gas will inevitably be used at some point in time once they have been retrieved from the ground (disregarding the technical sequestration option which carries many problems) and since the thus bound CO_2 will be released into the atmosphere, the regulation of fossil energy production and the subsequent 1st trade stage with regard to such energy carriers from the nations' sides seems to be the best solution.

The following is proposed: (1) Retrieval of fossil energy carriers on the contracted nations' territories shall only be permissible to the extent to which there is a buyer who is able to provide the required certificates for the use of the energy carriers. Such certificates may be owned by the respective nation which thus allows for the retrieval of fossil energy carriers in said nation's territory. The certificates may also be owned by foreign buyers. (2) Moreover, fossil energy carrier imports into a country shall only be possible to the extent to which the import is already covered by the required certificates or to which the importing nation allocates its own emission rights for this purpose.

The described regime of **quote limitation regarding the production of fossil fuels** as a part of the implementation of the climate regime means a significant shift in the ratios on the energy markets, especially concerning oil and gas. Currently, there is an extensive global demand for fossil fuels. The producers, inter alia the OPEC nations, determine to a great extent the produced amounts of fossil fuels and their price. **The volume of transformed money is gigantic.**

The described regime creates a **demand-driven market** for fossil fuels. This will be a market, bearing in mind the planned significant demand reduction over the coming years, which will not suffer any production shortness - also not in the future. The nations control and **limit the quotas** for the production of fossil fuels through the emission rights which they have at their disposal. They do so by tying the use of fossil energies in their territories to the availability of the respective emission rights, either their own rights or owned by third parties. Many nations will thus promote the (limited) production of fossil fuels in their own territories, primarily for the use in their own countries. Maybe they will even promote exports. Imports into a nation are no problem if they are accompanied by their own emission rights. Usually, however, these rights will be available in

the importing nation and will have to be allocated for this purpose. In order to avoid the problems of quota limitations, exporting nations such as Saudi Arabia will have to purchase the respective emission rights under a global cap-and-trade system. The required cap limitation and its annual lowering, however, implies that there will be fewer and fewer rights available for purchase and less and less fossil fuel will be allowed for production.

This also means that a functioning climate regime will not lead to the generally feared **price explosion by Peak Oil**, if the climate problem is to be solved. However, it remains yet unclear whether the Nations of the world will succeed in this task.

This context carries the Problem that many nations, which produce crude oil and natural gas, may not join the climate regime. Nations which participate in the climate regime are able to prevent the import of superfluous production by nations which have not joined by means of only allowing the use of fossil fuels on their territories for which emission rights can be presented. The only problems which may arise are caused by such processes occurring between nations which have both not joined the climate regime. The economic attraction for such "**free-riders**" could be the attempt to produce cost-efficiently with **cheap energy** and without **limitations as to CO_2emissions** energy-intensive goods such as **aluminum, steel and artificial fertilizers** for the global market and then export such goods into the territories of nations who have joint the climate contract. While this may be prevented for fossil fuels by means of quota limitations and pursuant to the climate regime, as described, the export of such goods as e.g. aluminum might present an opportunity to indirectly export fossil fuels and their emissions.

It is crucial that the international community rules out such opportunities, ideally using the respective **WTO mechanisms** for otherwise the climate regime could be rendered useless. The following section will go into greater detail on this matter.

However, there may be the chance to include, for example, the OPEC nations in the contract right from the beginning. There are two possible approaches. On the one hand could the right to purchase climate certificates (i.e. for the export of fossil fuels) be limited to nations and companies in nations which participate in the climate regime. On the other hand could the remaining nations grant the traditional producers of fossil fuels their hitherto usual income to a great extent despite a decrease in the use of fossil fuels. This would open up new perspectives to such nations for the long-term usability of their precious resources, which are much too valuable for **simple energetic waste**. They would thus have the chance of long-term income, for example from using their precious raw materials in the chemistry sector or for fuel production.

However, this would be an unusual constellation under free-market aspects. For decreasing demands for volumes this would have to result in significantly higher prices. It could, however, be part of an international agreement to act differently in this case. Already today, taxes make up the largest proportion of the price for mineral oil products such as gasoline, compared to all other costs implied. The respective ratio in Germany is approximately 1:2. The price charged by gas stations is thus mainly made up of taxes. If we intend to achieve substantial changes in fuel consumption behavior by means of significantly increased prices, prices will **at least have to be doubled** due to the low price elasticity in the mobile sector. This increase may only be achieved by a significant tax increase due to the need to invest into domestic social balance and not by extremely expensive emission certificates, which will have to be bought **internationally**. In this context, it would be possible to maintain the used income level for nations which produce crude oil and natural gas to a great extent. At the same time, the increased taxes should finance **social compensation payments** in order to make the implementation of the achieved CO_2 reductions as fair as possible.

As per the proposal, the production of crude oil, natural gas and coal is to be targeted for limitations of CO_2 emissions on the first trading stage. Production shortages is mainly indicated by means of taxation and the tax payments are used in such a manner, keeping in mind social balance, that all parts of the population will be able to participate in the use of energy from fossil sources, for example in the mobile sector, as well in the future. Consequently, this also means that the price for energy-intensive products such as gasoline can not be the only regulatory for volume decrease. There must also be **established technological standards and behavior standards** such as, for example, today's stipulations for combustion engines or green buildings.

6. Prohibition of Free riding – Embedding in the framework of the WTO

Implement WTO-conform cross-border tax adjustments

Combine the described program with an agreement of participating nations to implement WTO-border tax adjustments towards countries not participating in the climate regime. This would stop free-riding, allow for the avoidance of carbon leakage, for true comate-neutrality of interested parties and further capitalize on the "Wonder of Copenhagen

As indicated before, there may be problems with the climate regime if certain nations do not participate. This shall especially apply if the nations which produce coal, crude oil and natural gas, potentially even in cooperation with other nations, concentrate on producing energy-intense products in their territories and, in mutual exchange produce them cost-efficiently (at climate's expense) and then **export** such products into the dominant part of the global economy, that is to say into the nations which participate in the climate contract. The nations participating in the climate treaty need to stand united to fight off the adherent free-riding effects. Especially **boarder tax adjustments** are a means proposed to prevent free-riding advantages. The crucial question will be as to whether this will be feasible in a manner which **conforms to WTO standards**. This is particularly the case when the concerned nations are WTO members.

We need to mention up front that the large producers of fossil fuels are usually **not WTO members**. They show only little interest to join when the condition for them is to subject the marketing of their fossil fuels to a general market regime with equality obligation. This is the reason for the long-lasting negotiations between such nations and the WTO.

Usually, however, such nations are **GATT members**. GATT demands equal treatment of all goods in the sense of all goods being treated equally under customs aspects (**Most-Favored-Nation clause**), as are all domestic products, that is to say imported products as well, once they have entered the territory of the respective nation. The issue of free-riding thus primarily affects production processes with a high energy proportion (that is to say which bear high CO_2 emission levels) in nations which **do not participate** in the climate regime but are WTO members. This will probably only be a small circle of nations. In order to avoid free-riding in this situation, **border tax adjustments** are necessary, which need to be designed as per WTO standards.

Does such a strategy have potential for success? Yes! The topic is discussed in great detail in [14]. This also includes references to the relevant literature. One crucial point for achieving WTO conformity is the final negotiation of this aspect already in the climate negotiations process with the serious intent to find a fair solution. This is exactly a part of the proposed agreement in [15]. There should be **fair solutions** for border tax adjustments in case the negotiations with some partners fail to reach positive results. There are several approaches possible. An analysis by the FAW/n recommends to limit the border tax adjustments to products with a high specific energy proportion and to require the respective importers to document their implicit emissions in a manner which can be checked and to position themselves climatically neutral, for example by purchasing **climate certificates**. As a substitute, there will be charges under border tax ad-

justments fees which will approximately even out the market costs required to achieve climate neutrality.

An important reference in this regard is a remarkable most recent statement on principles by WTO general secretary **Pascal Lamy** [8]:

> *Let's talk about the pending global conference on climate in Copenhagen. At this conference, the nations intend to close a new contract on global warming. Will such a contract encumber global trading?*
>
> *Lamy: "I have always said environment ranges first, trade comes second. Should there be no agreement, some nations intend to introduce tax adjustment at their borders.*
>
> *This means higher import duties for products from nations which are not serious about climate protection. Is there a protectionist avalanche about to be triggered if the nations fail to agree on precise plans as to climate protection in Copenhagen?*
>
> *Lamy: The question remains: Is this good or bad for the environment? This is the most important assessment.*

Please bear the following in mind: The obligation format seems to make it so easy for most nations to join in - and that's the beauty of a climate contract à la Copenhagen. This may also be the decisive **game oriented advantage** of the Copenhagen approach. Many significant nations and/or trading blocs (also in view of the decisions made in the WTO and in view of the **WTO arbitral jurisdiction**), especially the **USA, Japan, China and the EU** have thus become contractual partners. And if the contract is well designed, as implied before, activities by non-participants, which are hazardous to the climate, will be significantly encumbered anyway. This will motivate further nations to join. This has created good pre-conditions for a goal-oriented negotiations process to **ensure WTO conformity of border tax adjustments**. Free-riding will be deprived of its economic sense if this attempt succeeds. This will immediately render optimum chances to establish a climate regime which is globally valid and excludes any kind of free-riding and **carbon leakage**, that is to say that all nations of the world want to enjoy the advantages to participate and will probably do so if the WTO side is consequently oriented today.

7. The 2°C aim and the WBGU budget restriction

The international community targets what is known as 2°C objective albeit there is no binding stipulation under international law yet. This objective means that the global temperature shall not rise by more than 2°C compared to the pre-industrial era.

Based on the analysis of the German Advisory Council on Global Change (WBGU) this means a maximum of altogether **750 billion tons** of permissible emissions into the atmosphere for CO_2 emissions from fossil fuels for the period between 2010 and 2050 [23]. In this case we would achieve the 2°C target with a 2/3 probability. If we desire a 75% probability for achieving the mentioned target, the amount of the total emissions must be limited to 600 billion tons.

This target, however, is barely feasible today since the international community already ranges at an **annual 31 billion tons of CO_2 emission from fossil fuels** (including international water and air traffic). The balancing of the budget is the core challenge. The 2nd demand, the demand to reduce the total emissions from fossil fuels to approximately 10 - 12 billon tons per year by 2050 (that is the amount buffered by the terrestrial vegetation and the oceans) is not an easy task either but still the part which is easier to manage.

Why is it so difficult to meet the budget restrictions? Because this target is only achievable under elemental calculatory aspects if the emissions are **reduced drastically** to begin with. Later on the reduction may be conducted more gradually. However, if the emissions are reduced slowly to begin with, so many emissions will add up already in the first years that it will be impossible to keep the 750-billion-ton limit towards the end. Based on the current emission level, and calculated further as of 2012 for 20 years at the current rate, our emissions will amount already then to more than 660 billion tons of CO_2 – and how are we supposed to fulfill the budget calculation until 2050 at this rate?

Various analyses in [15] show that in 2025 emissions should be reduced to 18 or 19 billion tons of CO_2 to be realistic. This would require an annual reduction of 1 billion ton until 2025 calculated from today.

The 1-Billion-Ton Request

Between 2013 and 2025, the global CO_2 emissions from fossil fuels are to be reduced by an annual 1 billion tons.
(In order to fully appreciate the magnitude of this task, the fast growing global population needs to be considered.)

CO_2 reduction required between 2013 and 2025 without reforestation program

The way until 2025 (and further on until 2050) must be seen in a differentiated way for different parts of the world. The necessity of a differentiated approach results from the fact that the economic development and the development of living standards in different nations shall also be much differentiated in 2050. Subsequently, a potential **scenario to fulfill budget balancing**, which is compatible with the target of 18 billion tons of global CO_2 emissions from fossil fuels in 2025, will be described in four charts.

The **allocation** of existing emission volumes among the nations and/or the four in this case separately considered greater parts of the world (the USA as an industrialized nation, industrialized nations excluding the USA, China as a non-industrialized nation and the remaining non-industrialized nations) is of special significance, which is yet to be negotiated.

(1) The non-industrialized nations excluding China bear little reduction potential due to the already low emission volumes. Only where there is high consumption there is potential for great reductions, not where there is little consumption anyway.

(2) China bears great potential for reduction volumes in the long run. Nevertheless, we need to consider the following, especially with regard to the period until 2025: China produces for the entire world. There is still a great amount of poverty among the Chinese population. China features a still-growing population. The potentials for emission increase planned for China shall be "bought out" by means of capitalization in the present proposal, the potentials in the reforestation sector shall be limited by means of activities under the proposed **global forest regime** and the **labored international reforestation program**, which is exclusively oriented towards **climate neutrality concerns,** not towards allowing for additional economic processes. Apart from that, there may be additional potentials in the re-

forestation sector. However, this is a sensitive subject and must be negotiated separately by the global community.

(3) The great emission volumes are located in the industrialized nations, primarily in the USA. This is why there need to be significant reductions. In this regard, the allotted settlement structure **in the USA and the expected increase in population**, which is significantly larger in this region than it is in Europe, needs to be considered among other factors**.**

2007 Initial Situation	Population (in thousands)	Emissions (in 1000 t)	CO_2-Per Capita	CO_2-Efficiency
World	**6.674.666**	**28.298.458**	**4,24**	**0,52**
Industrial Countries	1.302.266	15.436.023	11,85	0,36
USA	312.731	5.853.501	18,72	0,42
Industrial Countries without USA	989.534	9.582.523	9,68	0,33
Non-industrial Countries	5.372.400	12.862.435	2,39	1,06
China	1.313.649	6.083.231	4,63	1,68
Non-industrial Countries without China	4.058.752	6.779.204	1,67	0,80

Population and CO_2-Emissions – Initial Situation 2007

Scenario 2007 – 2025	Population (in thousands	Emissions (in 1000 t)	CO_2-Pro Capita	Reduction per Capita Emissions 2007 – 2025	Reduction Total Emissions 2007 – 2025
World	**8.000.000**	**18.000.000**	**2,25**	**46,93%**	**36,39%**
Industrial Countries	1.400.000	7.500.000	5,36	54,77%	51,41%
USA	450.000	3.500.000	7,78	58,44%	40,21%
Industrial Countries without USA	950.000	4.000.000	4,21	56,51%	58,26%
Non-industrial Countries	6.600.000	10.500.000	1,59	33,47%	18,37%
China	1.400.000	4.000.000	2,86	38,23%	34,25%
Non-industrial Countries without China	5.200.000	6.500.000	1,25	25,15%	4,12%

Scenario 2007-2025: Trend of Population and CO_2-Emissions

Scenario 2025– 2050	Population (in thousands	Emissions (in 1000 t)	CO_2-Pro Capita	Reduction per Capita Emissions 2025 – 2050	Reduction Total Emissions 2025 – 2050
World	**10.000.000**	**13.000.000**	**1,30**	**42,22%**	**27,78%**
Industrial Countries	1.500.000	4.500.000	3,00	44,03%	40,00%
USA	500.000	2.000.000	4,00	48,59%	42,86%
Industrial Countries without USA	1.000.000	2.500.000	2,50	40,62%	37,50%
Non-industrial Countries	8.500.000	8.500.000	1,00	37,11%	19,05%
China	1.500.000	3.000.000	2,00	30,07%	25,00%
Non-industrial Countries	7.000.000	5.500.000	0,79	36,80%	15,38%

without China					

Scenario 2025 – 2050: Trend of Population and CO_2-Emissions

Scenario 2007 – 2050	Population (in thousands	Emissions (in 1000 t)	CO_2-Pro Capita	Reduction per Capita Emissions 2007 – 2050	Reduction Total Emissions 2007 – 2050
Welt	**10.000.000**	**13.000.000**	**1,30**	**69,34%**	**54,06%**
Industrial Countries	1.500.000	4.500.000	3,00	74,68%	70,85%
USA	500.000	2.000.000	4,00	78,63%	65,83%
Industrial Countries without USA	1.000.000	2.500.000	2,50	74,17%	73,91%
Non-industrial Countries	8.500.000	8.500.000	1,00	58,16%	33,92%
China	1.500.000	3.000.000	2,00	56,80%	50,68%
Non-industrial Countries without China	7.000.000	5.500.000	0,79	52,69%	18,87%

Scenario 2007 – 2050: Trend of Population and CO_2-Emissions

Conclusion: Infeasibility

A standard analysis has shown that the global CO_2 emission reductions for the period between 2007 and 2025 from fossil fuels, which are required in order to meet the WBGU's budget restrictions, that is to say an annual 1 billion tons, **cannot be reached**. This especially applies for the industrialized nations, who need to **reduce** their CO_2 emissions **by more than 50%** in as short a time period as 13 years. Without a significant loss in economic performance and wealth, this is not imaginable and it is thus not a political option.

Conclusion regarding the infeasibility of the WBGU restriction under a realistic climate regime (without any "wild card")

The climatic disaster could not be avoided based on the results rendered in chapter 7 if there weren't any other options to even out the situation. Now, it is time to pull the "wild cards", which exist luckily enough. The most important "wild card" shall be described throughout the next chapter: A labored **international reforestation program**. The subsequent text shall show on this basis that an **ambitions global climate regime** in combination with a **labored international reforestation program** still allows for adherence with the 2° C target.

8. Dealing with further sources of CO_2-emissions

The German Advisory Council for Global Environmental Changes (WBGU) reports in [23] as to further sources of CO_2 emission which are to be considered in the climate sector. There are some contractual proposals in this regard. A crucial issue here is the **treatment of forests**. Forests bind a great amount of CO_2. Moreover, forests feature a great many further positive potentials which ensure sustainability. The topic includes a "wild card" and is thus explicitly included in the FAW/n analysis [15] as well as in the present text. It is a **core question**.

No further deforestation without equivalent afforestation

Today some 16 million ha of forest are destroyed every year without corresponding afforestation. This amounts to a loss of some 8.5 billion trees a year which are able to bind some 6.4 billion tons of CO_2, in steady state, permanently.

Currently we globally face **vast delumbering** each year without any reforestation. This creates an additional 6 billion tons of CO_2 emissions. This corresponds to an annual loss of **16 million hectares** of woods. Such predatory exploitation must by all means be stopped immediately. This is why we propose to include a **prohibition of delumbering without equivalent reforestation in terms of quantity and quality** into the future global climate regime. This is not an easy task and requires adequate compensation by the industrialized nations, for many nations will claim the right to further delumbering without compensation obligation.

For this case, the following is proposed: **(1) As of 2013 (included), the industrialized nations shall rescind this right, (2) the non-industrialized nations shall maintain this right for another 10 years**. Until then, delumbering will be permitted to its current extent without any compensation (approximately 8 million hectares of compensation-free delumbering).

Industrialized states should compensate non-industrialized states for partizipation in a stop of deforestation

Cost for this compensation is estimated as 20 billion US $ a year over the next 10 years.

Enforced by **capitalization**, for example via the climate fund or offers for climate neutrality, the objective shall be to cease using these potentials as early as of 2013. The

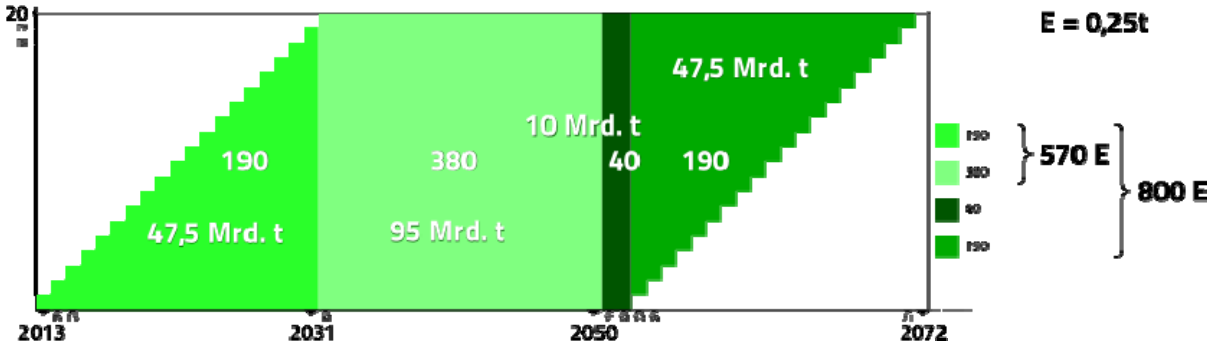
amount of the required payments has been estimated in [15] under the following prerequisites: Payments over 10 years for 8 million hectares each, which are not to be delumbered, honoring of a 25-year absorption period for CO_2, a price of 100 US dollars per hectare (assuming a minimum absorption of 10 tons of CO_2 per hectare and year and at a price of 10 US dollars per ton). This results in an annual capitalization value between 2013 and 2022 of 8 million hectares x 10 tons/hectare x 25 years x 10 USD/ton = **20 billion USD**. This amount is to be financed every year between 2013 and 2022 by the nations of the world. The contribution shall be raised especially by organizations, companies and private people, who intend to position themselves **climatically neutral**. The respective mechanisms will be described subsequently.

9. A laboured reforestation program as a key

Initiate a major global afforestation program

This would be an important contribution to global development, to the implementation of the UN Millennium Development Goals (MDGs), to an increased use of renewable energy and to the implementation of a Global Marshall Plan.

The previous explanations show that the 2°C target may only be achieved without any loss in wealth and with further economic growth, if a reliable wild card is dealt. The required wild card could be worldwide **massive reforestations**. Reforestation is an obvious form of sequestration and includes much less insecurities than technological sequestrations such as coal-based power plants. FAW/n estimates [15] lead to the idea to reforest **5 million km²**, high-quality reforestation, considering all relevant socio-ecological standards, using training curves and employing renewable energies for the supply of the energy required for the reforestation process etc. This is a program of the **Global Marshall Plan** type [13]. We propose an implementation in 20 individual steps over a period of 20 years between 2012 and 2032. This shall be implemented in approx. 50 southern nations each year. This is an average of 5,000 km^2 per nation and year. This is much, but it is feasible.



Process of the reforestation program

Bind 200 billion tons CO_2 permanently in trees, with the program proposed and win crucial time to reach the 2°C target

The time gained by binding 200 billion tons of CO_2 can be used to implement a workable climate regime, compatible with sustainability and further economic growth.

With a **cycle period** of 40 years for a steady state of reforested woods (this period is probably flexible), this will render a total absorption of **200 billion tons** of CO_2 for the viewed period at a minimum absorption of 10 tons of CO_2 per hectare and year. Commencing in 2013, the amount of absorbed CO_2 will grow until 2032. This will result in a steady state until 2052, by 2072, the forests will be replaced (use and immediate reforestation). Until 2050, approximately **150 billion tons of CO_2** will be absorbed. The forest can be cultivated in the steady state, this means that the absorption of 200 billion tons of CO_2 will be maintained. Amongst other advantages, an enormous recourse of **renewable raw material** is gained. Viewed solely under aspects of energy value, this amounts to the equivalent of 1.8 billion tons of used coal per year. This amounts approximately to the current annual volume of used coal in all non-industrialized nations together, 1.4 million tons in China alone. The proposed global reforestation program could thus double today's power generation of non-industrialized nations from coal in a climatically neutral manner. The global reforestation program has the character of a **Global Marshall Plan**. Its volume ranges, depending on the price per absorbed ton of CO_2 (10 - 20 USD) in the steady state at **50 - 100 USD per year**. It creates jobs, promotes biodiversity, protects nature, promotes innovations and improves people's living conditions. It is an extremely sensible program. At the same time, it provides the international community with time to still meet the 2°C target.

§ 2 International Forest Regime

The nations of the world agree on an **international forest regime**, oriented towards massive binding of CO_2 emissions. As soon as possible (target date is 2013) shall a decrease in forest area or a reduction of forest quality be forbidden. Lumbering in one place shall be compensated on the national or international level by reforestation to the same extent and quality or more at the expense of the individual nation. Potential compensation-free lumbering quotas for (non)industrialized countries, which may be negotiated in the future, shall be **capitalized** as soon as possible (analog to the capitalization of increase quotas for CO_2 emissions).

On the target basis to be agreed upon, but also independently from such a base line (if a joint decision cannot be reached), the nations of the world shall agree on a **labored international reforestation program** over a period of 20 years between 2013 and 2032, which is to increase the forest stand by 500 million hectares in the long run. On average, an annual 25 million hectares shall be planted. Considering a minimum cycle time of 40 years for periodic renovation of the reforested areas, a minimum of **200 billion tons** of CO_2 will be absorbed as a one-time effect and bound permanently in steady state. Said reforestation program shall be financed through UN climate certificates in compliance with §10, with a specially marked type of certificate being intended in order to avoid unmonitored commingling of the international climate regime and the international reforestation program. Primarily organizations, companies and private investors, who intend to position themselves **climatically neutral,** shall be the **financial sources** for the program. The same shall apply for the planned efforts for the **capitalization** of existing rights to compensation-free lumbering. Should the financial means from the planned financing structure prove to be insufficient, the United Nations shall cover for the difference through the climate investment fund, which will take on a financial balancing function (see §8).

150 billion tons of absorbed CO_2 consequently involve that the international community may not only emit 750 billion tons of CO_2 until 2050 but rather 900 billion tons. The required reduction speed may thus be slowed down significantly. [15] proposes to save (only) **half a billion tons of CO_2** per year rather than 1 billion tons which is still very ambitious.

Hard Cap Line 2012 - 2050

The **hard cap line** of the climate regime ranges from 31 billion tons in 2012 based on an **annual reduction by half a billion tons** to 12 billion tons in 2050. The nations of the world should agree on this program. Cross-financing measures are to be planned for in an appropriate manner.

If this program is implemented, there will be **no** room for **neutralization intentions** by organizations, companies and private people under a stricter climate regime. There are, however, such possibilities under the labored international reforestation program and with regard to the previously required capitalization of claimed temporary delumbering rights without compensation obligations by (non-)industrialized nations. Should the reduction to the described **hard cap line** fail to succeed under the global agreement on climate, further volumes of CO_2 emissions from fossil fuels are to be withdrawn from actual use via **offers for neutralization** to organizations, companies and private people as far as possible, if need be via the acquisition via the climate fund as a replacement.

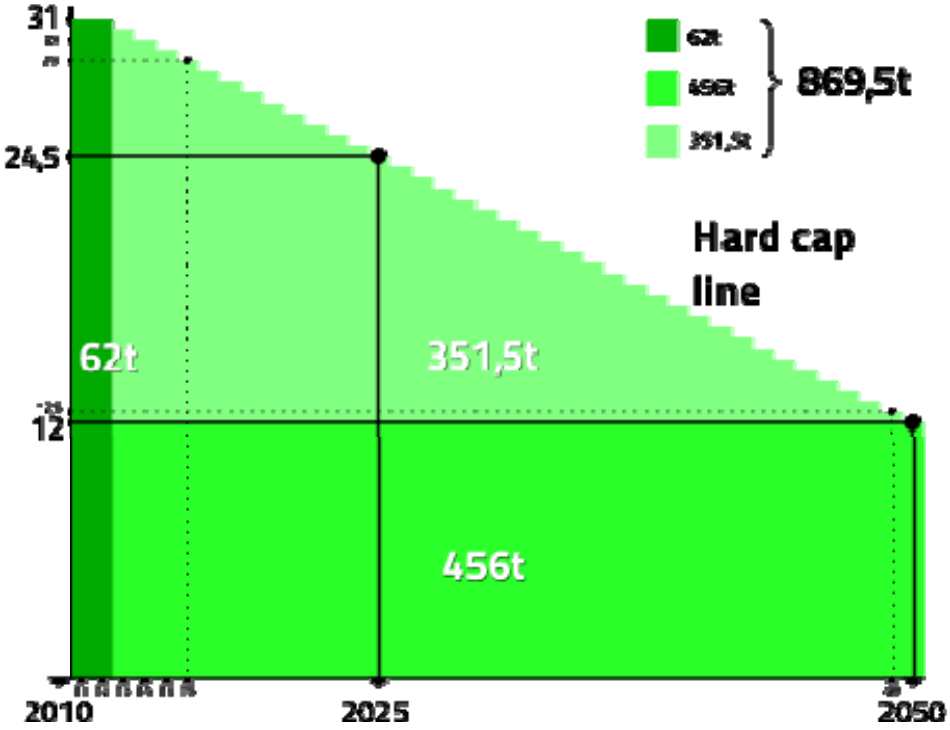
With now to 2025, this requires a reduction of 31 to 25 billion tons, no longer of 31 billions to 18 billion tons. Also this reduction has to be distributed to the different parts of the world accordingly.

Implementable CO_2 Reduction Program (Climate Regime in the Closer Sense)

Based on a level of 31 billion tons of CO_2 emissions from fossil fuels (incl. international water and air traffic) in 2011 and 2012, the CO_2 emission volume shall be linearly decreased every year by half a billion tons per year as of 2013 (including) until 2050 (**hard cap line**).

The target value for 2050 lies at 12 billion tons. The target value for 2025 is thus 24.5 billion tons. The total emissions from 2011 (included) until 2050 amount to 869.5 billion tons. If we reduce the total volume by the additively absorbed 142.5 billion tons from the international reforestation program, we reach a total volume of 727 billion tons. The **WBGU's budget restriction** is thus met.

Feasible CO_2 reduction program in combination with a global forest regime



Worldwide Global CO_2 emissions under a hard cap line

The charts above shall be adjusted subsequently to the new situation of a combination of climate regime in the closer sense with one-time effects from the labored reforestation program. As of 2013, a (mere) half billion ton of CO_2 per year will be saved in a linear manner, as displayed in the charts. In 2025, this will not amount to 18 billion tons but rather to **24.5 billion tons** of CO_2 emissions from fossil fuels, a maximum value accepted under the closer climate regime.

Implement a working climate regime that reduces CO_2 emissions from fossil energy sources worldwide by 0.5 billion tons each year

until 2050

Starting from 31 billion tons in 2012, this would lead to 12 billion tons in 2050, which would be compatible with long-term climate stability.

The required reductions are distributed across the 4 considered groups of nations accordingly. In general, this results in a plus-minus-zero situation for the non-industrialized nations excluding China as per the subsequent suggestion.

2007 Initial Situation	Population (in thousands)	Emissions (in 1000 t)	CO_2-Per Capita	CO_2-Efficiency
World	**6.674.666**	**28.298.458**	**4,24**	**0,52**
Industrial Countries	1.302.266	15.436.023	11,85	0,36
USA	312.731	5.853.501	18,72	0,42
Industrial Countries without USA	989.534	9.582.523	9,68	0,33
Non-industrial Countries	5.372.400	12.862.435	2,39	1,06
China	1.313.649	6.083.231	4,63	1,68
Non-industrial Countries without China	4.058.752	6.779.204	1,67	0,80

Population and CO_2-Emissions – Initial Situation 2007

Scenario 2007 – 2025	Population (in thousands)	Emissions (in 1000 t)	CO_2-Pro Capita	Reduction per Capita Emissions 2007 – 2025	Reduction Total Emissi-ons 2007 – 2025
World	**8.000.000**	**24.500.000**	**3,06**	**27,77%**	**13,42%**
Industrial Countries	1.400.000	12.400.000	8,86	25,26%	19,67%
USA	450.000	4.800.000	10,67	43,02%	18,00%
Industrial Countries without USA	950.000	7.600.000	8,00	17,36%	20,69%
Non-industrial Countries	6.600.000	12.100.000	1,83	23,29%	5,93%
China	1.400.000	5.400.000	3,86	16,69%	11,23%
Non-industrial Countries without China	5.200.000	6.700.000	1,29	22,85%	1,17%

Scenario 2007-2025: Trend of Population and CO_2-Emissions

Scenario 2025 – 2050	Population (in thousands)	Emissions (in 1000 t)	CO_2-Pro Capita	Reduction per Capita Emissions 2007 – 2025	Reduction Total Emissi-ons 2007 – 2025
World	**10.000.000**	**13.000.000**	**1,30**	**57,55%**	**46,94%**
Industrial Countries	1.500.000	4.500.000	3,00	65,00%	62,50%
USA	500.000	2.000.000	4,00	64,00%	60,00%
Industrial Countries without USA	1.000.000	2.500.000	2,50	66,07%	64,29%
Non-industrial Countries	8.500.000	8.500.000	1,00	47,20%	32,00%
China	1.500.000	3.000.000	2,00	49,09%	45,45%
Non-industrial Countries without China	7.000.000	5.500.000	0,79	41,31%	21,43%

Scenario 2025 – 2050: Trend of Population and CO_2-Emissions

Scenario 2007 – 2050	Population (in thousands)	Emissions (in 1000 t)	CO_2-Pro Capita	Reduction per Capita Emissi-ons 2007 – 2025	Reduction Total Emis-sions 2007 – 2025
World	**10.000.000**	**13.000.000**	**1,30**	**69,34%**	**54,06%**
Industrial Countries	1.500.000	4.500.000	3,00	74,68%	70,85%
USA	500.000	2.000.000	4,00	78,63%	65,83%
Industrial Countries without USA	1.000.000	2.500.000	2,50	74,17%	73,91%
Non-industrial Countries	8.500.000	8.500.000	1,00	58,16%	33,92%
China	1.500.000	3.000.000	2,00	56,80%	50,68%

Non-industrial Countries without China	7.000.000	5.500.000	0,79	52,69%	18,87%

Scenario 2007 – 2050: Trend of Population and CO_2-Emissions

Is such a program actually feasible? What are the consequences for the year 2025 and the subsequent years? The answer is a positive one [15]. The required reductions shall be conducted with visual judgement. The remodeling of the industrialized society and a new way of development and construction must be **learned and practiced** at first. Year after year until 2025 and especially as of 2025, the reduction speed must increase (relatively). The 0.5 billion tons of savings in CO_2 emissions each year relate to an annually decreasing base value. This, however, seems feasible if appropriate and already detectible **innovations in technology and governance** are implemented harmonically.

Central starting points of this approach affect the use of energy, especially of the currently used energy volumes of different kinds and especially the required **negative growth in the use of fossil fuels**. The latter under the aspects of the CO_2 intensity of various fossil fuels. The global power demand, its current dimensions and the respective forecast form one starting point. In view of the analyses and numbers available today [9, 10], this is a dimension which seems quite feasible. The author considers the **life-span extension of nuclear power plants in Germany** with stringent security standards and partial use of the gained windfall profits to be quite helpful in this regard. The Baden-Württemberg Council on Sustainable Development (NBBW) [11] recommends a similar strategy as a part of a **double-strategic** orientation, targeting the global nature of the climate issue [12].

The implementation of the corresponding hard cap line, combined with the climate regime, may be the negotiations' target of a new global climate treaty. By the end of 2012, or supplementary in later negotiations, it is to be negotiated that the respective nations' reductions stipulated by self-obligation by the nations of the world shall be met. The money to purchase the respective volumes for **purposes of climate neutrality** is to be negotiated as an alternative. The money shall be taken either from the climate fund or shall be taken from the then activated private sector. This takes us to the next topic, the topic of **climate neutrality**.

10. Climate neutrality

There is a growing demand to position the own activities **climatically neutrally** by organizations, companies and private people. Many DAX-noted companies have their employees travel in a climatically neutral manner as a principle. This reduces spendings in terms of bureaucracy and improves the internal climate balance which such companies aim to rectify under **aspects of corporate social responsibility** anyway and which is annually published. The **Deutsche Bahn AG** and **Deutsche Lufthansa AG** offer such opportunities as a standard. There is also the possibility to position one's personal lifestyle, hosted conferences, travels etc. climatically neutral via service providers in the internet - at reasonable costs. Calculating the fuel costs for a **premium automobile per year**, even if used extensively, and neutralizing the induced emissions with regard to costs, say, based on a price of 20 USD per ton of CO_2, we encounter avoidance costs of under 1,000 USD per year. Raising such means in order to implement the globally required changes, may make much sense, especially if this is a part of an efficient global climate regime and excludes phenomena such as **carbon leakage**, that is to say if savings in one part of the world are not bought by increased emissions in another part of the world.

In a purely abstract manner is **climate neutrality** also feasible in a world heading for a climate disaster of climatically neutral lifestyle would be defined once an individual takes more CO_2 from the atmosphere than it emits into the atmosphere. Such extraction may be a consequence, for example, of planting trees, as done in a large scale project by the "Plant for the Earth" initiative of the Global Marshall Plan Foundation (www.globalmarshallplan.org). However, we need to ensure that it is a long-term extraction. Such a long-term guarantee, however, creates difficulties. The possibility to extract CO_2 permanently from the atmosphere via trees is limited by the number of trees which may possibly be planted in addition and then permanently kept. If financially well-situated people use this potential in order to position themselves climatically neutral and it is not part of a global and permanent solution to the climate issue, one may argue that they may not even be allowed to actually use this potential since they thus deprive others or the international community of said potential at some time in the future.

However, if we succeed in implementing a strict global climate regime and in combining it with a labored international reforestation program, we will solve the climate issue and we will solve it in a manner which actually only temporarily requires the reforestation program as an add-on. In this way, no one would be deprived of any potential. If all this is done under **UN supervision** and considering all relevant ecological and social stan-

dards, such measures are also acceptable under **eco-social aspects**. In this case, the project would bear, as already mentioned, all characteristics of a **Global Marshall Plan [13**]. In this case, people who have the required money at their disposal will co-finance a solution for everyone. They buy time for everyone so that we have the chance to establish a sensible global climate regime altogether. This global sensible system also means that there will be no carbon leakage issues as they exist today with the EU's climate regime, for example. Even today, the EU partially outsources climate-burdening production processes which, in addition, also release certificates for purchase. This would be prevented under the described global regime.

Finance the global afforestation program with estimated cost of 70 billion US $ a year via climate neutrality by offering the chance for true climate neutrality to organizations, companies and private persons

This means true climate neutrality without any carbon leakage and offers a great opportunity in the context of e.g. Corporate Social Responsibility-(CSR)-programs of companies.

It is interesting that **climate neutrality intentions thus become a financing vehicle for a labored international reforestation program**, from which especially the nations in the southern hemisphere benefit. It will be a program of the Global Marshall Plan kind. It involves a volume of approximately 70 billion USD per year. In addition there are the payments for the decommissioning of remaining compensation-free delumbering rights of non-industrialized nations for 8 million hectares per year over 10 years. Furthermore, the nations of the world may not agree on the annual half million tons of savings by means of allocated self-obligations for reduction in their stringent climate regime which are required in order to meet the 2°C target. Further financial means will then be required in order to purchase the respective volumes and to **decommission** them under the global cap-and-trade system. Apart from the climate fund, there may be another feasible, once again extended, neutrality program. This extension would also create good opportunities to have those people cover the costs who are financially able to cover them: affected organizations, companies and private people.

§ 13 Climate Certificates and Climate Neutrality

UN climate certificates can potentially be used for goals of **climate neutrality** to an extent to be determined by the contractual partners. The certificates are bought by companies in order to position themselves **climatically neutral** in view of possible economic activities. For the nations which export crude oil, natural gas and coal the precondition for potential market action can thus be created. Exporting companies based in nations which do not participate in the climate regime may find this the best way to be allowed

to export into participating states without tax border adjustments to be paid. Such certificates, oriented towards the facilitation of high-energy consuming economic activity must originate from the area of the stricter climate regime. If at all, offers may be made only in a limited amount.

For other organizations, companies or private people actual **climate neutrality** is the main issue, be it for reasons of Corporate Social Responsibility, care about the climate due to their customers' request or due to purely ethical reasons without intending any economic activity to be facilitated at all. Such organizations, companies or private people purchase the required amount of certificates in order **to take them off the market**. The international community will plan for this possibility only to the extent to which the negotiations fail to limit the total emissions to the proposed **hard cap line**. An alternative is the labored **international reforestation program**, extended by the requirements to a **capitalization** for complained compensation-free **lumbering rights**, asked for by (non-)industrialized nations. By 2050 and later, there is an enormous potential to additionally absorb 200 billion tons of CO_2 and to keep it bound permanently. (Note: The average annual financial volume will reach 43 - 80 billion US $ by 2050 to be ideally completely financed via climate neutrality goals.)

Certificates of all kinds no longer available on the market shall be noted in a **retirement register** as already practiced on the EU level today. The opportunities to position oneself climatically neutral could **gain great significance** in the future. Such opportunities allow for any organization, company and private person to actively, additively and with final results contribute to environmental protection by means of minimum funds as well as through large funds. The integration of **international water and air traffic** also falls into this context. A corresponding extension of the certificate number is proposed, which is adjusted accordingly over the years. Administration shall be carried out through the responsible UN climate organization, the benefits go into the climate investment fund and, potentially, a special subregime of special emission rights (characterized by higher certificate prices) may be established for the **international air traffic**.

11. A double factor 10

The view of the future as described in the present text does not only include the aim to avoid any loss of wealth but also the objective of a substantial further growth in the sense of a **double factor 10**[17]. This means an objective of **increasing the global**

economic performance tenfold over a period of 70 year while at the same time **increasing the eco-efficiency tenfold** so that the tenfold volume of wealth is achieved with identical resource spending and identical environmental burdening as today. This is about balanced living conditions for, after all, **10 billion people** on a high level of wealth and at the same time compatible with sustainable development. Such a future development would result in a **reduction of the global population**, as of 2050, which is an important component for **sustainability**.

Apart from technological innovations, all this requires, most of all, **innovations in global governance**. Prices must tell the truth, ecological effects must be internalized in the economic system, a global social balance is to be organized. This results in new price relations and consequently in a clearly dematerialized way of living which considers **sufficiency aspects** in a more systematic manner than it is done today. Resource consumption will become more expensive, human services less expensive in relation. A climate treaty as described in the present text and a labored international reforestation program are part of this framework.

Questions as to efficiency under the context of a double-factor 10

In the course of a **double-factor 10**, **efficiency gains** mainly support further **substantial economic growth** as a prerequisite for global development, the overcoming of poverty, the creation of balance, the promotion of political consent and the funding of gigantic technical innovation processes and the reconstruction of the material-industrial basis of human civilization. The enormous potentials for technical innovations in the North must quickly become effective in the south as well. The economic growth processes there shall thus happen in a **dematerialized way to the greatest extent possible** regarding climate effects (and also in other ways). Financing will be greatly facilitated by the mechanism proposed in this text and by the resulting options for trading of CO_2-certificates and climate neutrality.

Questions as to efficiency in the context of a double-factor 10

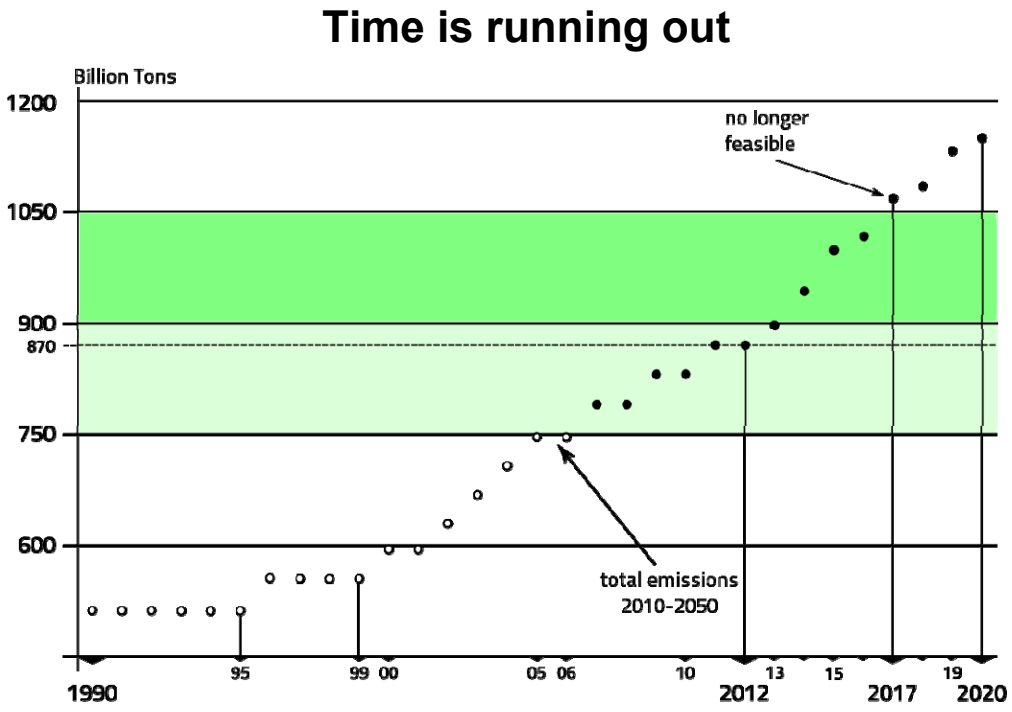
The double factor 10 aims at a wealthy balanced world. The required technological changes seem to be feasible and some are already on the horizon today. An example is the progress in the **semi-conductor industry** as a core topic for a new **energetic future** [1]. This context also includes topics such as DESERTEC [1], solar chimney power plants [21] and SuperGeoPower [22].

The actual problems are not to be found in the technological sector but in the sector of **global governance**. The opinion presented in this text excludes the achieving of the double factor 10 based on very expensive power sources. We rather need **inexpensive power supplies** in order to organize wealth for 10 billion people. However, this energy needs to be generated in an environmentally compatible and climatically neutral manner. This is an issue of **vast technological innovations** in this sector. The promotion of vast technological innovations is a core topic. This can only be reached if high ROI rates are no longer only obtainable via activity on the capital market. We need to move away from financial and casino capitalism towards strengthening of the real economy and basically towards a **global eco-social market economy** in order to create such innovations which in turn are the pre-requisite for a double factor 10 [3, 4, 6, 7, 18, 19, 20].

12. The remaining time window is extremely small

One important result of the present analysis is the fact that a solution to the climate issue in the sense of the 2°C target without any **wealth loss** and **under maintenance of further growth potentials** is already today only possible if we establish a **labored international reforestation program** which is to be financed mainly by he industrialized nations and/or organizations, companies and private people. It is interesting to see how global hardships create identical interests in the northern and southern hemisphere. A program of the likes of a Global Marshall Plan will be financed by organizations, companies and private people in the northern hemisphere as a substitute via the climate fund, actually to position themselves in a climatically neutral manner and to solve the climate problem. It is thus actually in the interest of the money providers, that is to say they are actually **motivated by intelligent egoism**. This is why people in the north finance such projects in the southern hemisphere. It is a lucky coincidence.

One may pose the question as to since when such projects are necessary. One may create models for the past and the future. The below graphic has been taken from a supplementary analysis [16] to [15] for the Eco-Social Forum for Europe.



Total CO_2-emissions from fossile sources
2010 - 2050

The graph indicates the **enormous influence of the time factor** in this process. It is interesting and maybe even surprising to read that the logical approach in the analysis conveyed here did not require a labored reforestation program until 2007 in order to achieve the 2°C target without any loss in wealth and with high growth potentials.

With a straight forward process the climate problem in the sense of compliance with the 2°C target could have been solved **without an international reforestation program** until 2007 (with 29 billion tons of emissions from fossil fuels at that time) along the cap line of an approximated reduction of half a million tons of CO_2 emissions from fossil fuels per year - if only we had started early enough.

The crucial point is that we would have been working on emission cutbacks as early as between 2008 and 2012 for a complete 4-year period. Savings: 2 billion tons per year while we currently face an emission increase of 2 billion tons over the same amount of time. This is a 4-billion-ton difference. If we start to discharge said 4 billion tons as of 2013 and thus continue to carry an additional 4 billion tons of emissions along for a long period of time, the process will be prolonged by 8 years and result in an additional volume of 160 billion tons of CO_2 emissions by multiplying the 4 billion tons per year with

40 years. This is already more CO_2 than the labored international reforestation program will have absorbed by 2050.

It also means that 2013, one year after the Kyoto Protocol has expired, provides the last chance to buy the time required to achieve the 2°C target by means of the described global reforestation program on 5 million km^2. If we continue to wait, more reforestation will be required; however, it remains unclear whether this is actually feasible at all.

Assuming the reforestation volume might be double once again, which is quite unrealistic an effort, to 10 million km^2 and assuming the reforestation process could be slightly accelerated still, that would only buy us time until 2017. **This means that there is very little time left for us to act**. Instead of reducing our emission volumes by half a billion tons per year until 2017, we increase it by 1 billions tons every other year rather then lowering that value. By 2017, this will amount to a 4.5-billion-ton increase in CO_2 emissions per year; by 2050 it will be significantly more than an additional 150 billion tons of emissions.

This shows that the available time frame is **incredibly short**. We are currently gambling our last chances to still meet the 2°C target. The price of winning only single years in time is gigantic with regard to the required reforestation volumes. We will soon have reached a point of no return concerning this problem, even if wild cards are dealt. We can only hope for the nations of the world to finally recognize the signs and reach a solution by the end of 2012, preferably by a follow-up treaty to the Kyoto Protocol, in parallel to a regulation of the global finance system scheduled for the end of 2012 and in parallel to Rio+20. **2012 will thus be a landmark year**.

Abstract/Orientation for pending climate negotiations

The global conditions are extremely difficult. Especially the situation in the energy and climate sector presents us with great challenges. The Global Climate Conference in Copenhagen has caused frustration with many. The present text shows that the situation may be difficult but not hopeless and that the Copenhagen progress has potential for great opportunities to reach a **sustainable climate regime** in the short term. The core result of the Copenhagen Climate Conference is the willingness of large highly populated newly industrializing nations such as China and India to subject themselves voluntarily and basically without any compensation to significant **relative reduction** obligations concerning their CO_2 emissions. These are CO_2 emission reductions relative to the GDP growth rate and thus indirectly linked to the obligation to significantly **increase efficiency**. This means that the used CO_2 volumes per value added unit should actually decrease.

The present text has shown that the industrialized nations should use the provided chance and should do so ideally by means of a **legal fixing** of the offers, thereby differentiating between industrialized nations, medium-emission newly industrializing nations and low-emission newly industrializing nations. The nations of the world need to reach a sustainable agreement quickly. The permissible growth potentials for emissions by newly industrializing nations should subsequently be purchased. The costs seem quite affordable at a one-time 100 - 125 billion USD. Especially a **Copenhagen climate fund** plays a more important role in honoring the efforts of non-industrialized nations.

Funding:

(1) Capitalization of remaining available potentials for emission increase of (non-) industrialized nations between 2013 and 2025 (annuity of approximately 11 billion USD per annum)

(2) Climate fund (100 - 125 billion USD per year between 2021 and 2050)

(3) Capitalization of compensation-free forest delumbering rights of (non-) industrialized nations between 2013 and 2023 (20 billion USD per annum)

(4) International reforestation program between 2012 and 2072, reached in 20 individual annual steps, total volume of 2,000 - 4,000 USD

(5) Funding of items (1) and (2) via the nations, indirectly via producers and/or consumers

(6) Funding of items (3) and (4) via climate neutrality intentions of organizations, companies and private people

The described initial situation bears great potential by including especially the USA and China WTO instruments such as **border tax adjustments** can than be used to prevent any free-riding. Using the right strategy, an efficient global cap-and-trade system could be established as of 2012. It would have to be combined with a **consequent international forest regime** which includes the fact, after the non-industrialized nations have been paid off, that soon there will be no more delumbering without adequate compensation.

Copenhagen has opened up great potentials for a rational future. The negotiating parties now need to intelligently pose their questions. The present document provides some ideas. [15] presents the **core of a climate treaty in 15 paragraphs** as per this logic. Time is short, the situation not hopeless, though.

Today's conditions only allow for achieving the 2°C target with growth perspectives (double factor 10) and without any loss in wealth if we deal a wild card which buys us time. For this purpose, the present text develops the idea of an international forest regime which includes a **labored international reforestation program** for 5 million km^2 apart from a stop to compensation-free delumbering. This would permanently bind 200 billion tons of CO_2 and buy us the required time to solve the climate problem as well as allow for further wealth growth worldwide under an implementable climate regime. This is about the reforestation of 5 million km^2. It seems possible to arrange for funding through the private sector via organizations, companies and private people, who intend to position themselves **climatically neutral**. The respective program would have the character of a Global Marshall Plan. It is a part of a more comprehensive growth philosophy which is compatible with sustainability in the sense of a **double factor 10**.

Orientation for Pending Climate Negotiations

For November 2010, the next important global conference on climate is planned in **Mexico**. What needs to be considered for the negotiations in view of the deliberations in the present text?

We need to distinguish between **three levels**:

(1) Primary Negotiation Target

The success of the Copenhagen Climate Conference is to be secured right now. The Copenhagen Climate Conference has opened up a great chance for the international community. The covenants granted by many nations in the meantime are to be developed even further; it is to be arranged and to be **transferred into a binding contract under international law.** A portion of the covenants granted is linked to such steps, by the way. The industrialized nations must make their reduction obligations more stringent; they must fill the climate fund, **financially honor great offerings by important threshold nations**, create options for climate neutrality for organizations, companies and citizens and generally improve cooperation. The **contract proposal in** [15], included in parts in this text, provides many orientation points for rules and campaigns in terms of the primary negotiation target.

(2) Accompanying Questions

At the same time at which the primary negotiation target is pursued, we need to address the crucial accompanying questions right from the beginning. This mainly affects the establishment of a **global forest regime**. Without such a regime and without a labored **international reforestation program**, the 2° C target is no longer feasible. Furthermore, we need to consider the integration of international water and air traffic, the interconnection with **questions of international trade** and with **WTO border tax adjustment regimes**, the facilitating of **actual climate neutrality** for organizations, companies and private people, the reaching of consents with the nations which export crude oil, natural gas and coal, the creation of palliative contracts as per WBGU logics and, especially important, as a part of the forest regime, the capitalization of remaining available delumbering rights from (non-)industrialized nations over 10 years for an estimated **20 billion USD per annum. In addition, after a successful stipulation of the climate contract in the more narrow sense, there is the capitalization** of any remaining potentials for emission increase of (non-) industrialized nations (an estimated one-time cost factor of **100 – 125 billion USD** for the industrialized nations). The mentioned steps should ideally be completed by the end of 2012. With regard to the forest regime and the labored international reforestation program, certain delays may be acceptable.

(3) Subsequent Negotiations

After the negotiation complexes (1) and (2) have been completed, the nations of the world must stipulate detailed reduction paths for the climate regime as quickly as possible if the **WBGU's budget restriction** is to be adhered to. The nations of the world shall

keep the cumulative CO_2 emissions from fossil fuels below 750 billion tons between 2010 and 2050 (even better below 600 billion tons). In combination with the use of the **one-time chance** of an international reforestation program, both targets are feasible. For this purpose, a global climate regime must be agreed upon which, commencing with an emission volume of 31 billion tons in 2012, shall **reduce** global CO_2 emissions from fossil fuels by an amount of **half a billion tons** year after year between 2013 and 2050. The respective emission volume for 2025 will then range at 24.5 billion tons, the emission volume for 2050 at 12 billion tons.

The climate program is to be interconnected appropriately with the proposed **labored international reforestation program** and to be translated into reduction paths for the individual parts of the world. Corner stones for a realistic path were described. It shows that this program can actually be implemented. The required technology exists. In combination with an adequate global governance structure, such technology allows for a solution to the climate issue.

Double-Factor 10 as a Perspective

Under holistic aspects it is important that the stipulated targets are still feasible, not by means of "**killer savings**" and at the cost of a decrease in wealth and economic outcome but rather in the greater sense of a **double-factor 10** as described in the text. One prerequisite for this is the full tapping of existing innovation potentials in technology, organization and cooperation by means of the described immense progress and innovation in **global governance**. Both forms of innovation are feasible and support each other, however, only if they are appropriately synchronized in relation to one another. The target is still within reach, sustainability and guaranteeing the future in a **world of balance** form an implementable perspective with great efficiency.

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[i] *translator's remark: WBGU is the German Advisory Council on Global Change*