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Funding Scheme for Bali Action Plan

A Swiss Proposal for global solidarity in financing adaptation

"Bali Paper" updated for SB28 Bonn

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Authors
Othmar Schwank, Helen Lückge, Rolf Iten, INFRAS Zurich
in cooperation with
Samuel Mauch, Mauch Consulting, Oberlunkhofen

FOEN consultant
Thomas Stadler, Climate, Economic, Environmental Observation Division
José Romero, International Division

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CONTENT

GLOSSARY

AAU	Assigned Amount Units
AF	Adaptation Fund under the CDM mechanism according to the Kyoto Protocol
BAP	Bali Action Plan
CDM	Clean Development Mechanism under the Kyoto Protocol
CIF	Climate Investment Funds by the World Bank
CO_2e	CO_2 equivalents
DC	Developing Countries
GDP	Gross Domestic Product
GHG	Greenhouse Gas emissions
GIS	Green Investment Schemes
IC	Industrialised Countries
LDC	Least Developed Countries
MAF	Multilateral Adaptation Fund (referred to as "the fund" in the text)
NCCF	National Climate Change Fund
USD	US Dollar
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Situation

Scientific evidence confirms that climate change will continue even if mitigation policies are successfully implemented as proposed by IPCC.[1] Therefore, adaptation measures must complement mitigation, if damages are to be kept from growing to truly catastrophic levels, especially in vulnerable countries of the developing world. According to UNFCCC and World Bank estimates, the global financing needs to adapt to climate change will lie between USD 10 and 40 bn. per year. Neither the adaptation fund under the CDM of the Kyoto Protocol nor other pledged funds can provide financing of such orders of magnitude. Thus, the issue of financing the necessary measures remains unresolved.

This is why the Swiss Environment Minister Moritz Leuenberger at the twelfth Conference of the Parties of the UNFCCC in Nairobi in 2006 and later at the Bali conference in December 2007 proposed a global carbon levy to cope with the adaptation financing chasm that became more and more apparent at the time. The proposed establishment of a funding scheme shall be based on the principle of common but differentiated responsibilities and on the polluter pays principle, with a low levy on CO_2 emissions, to cope with these financing bottlenecks. The proposal presented in this paper develops this idea further and illustrates possible designs of a revenue and disbursement model. The proposal is herewith submitted for international discussion and further development. Such a discussion shall also serve in the coordination with similar and complementary proposals made by other countries such as Japan, Mexico and Norway, etc.

Objectives and principles

The overall goal is to strengthen the capability of the Parties to UNFCCC to address the challenges of financing climate change policy programmes and measures – especially for adaptation in vulnerable developing countries.

In pursuit of this goal, a global burden sharing system, based on the principle of common but differentiated responsibilities, and legally binding to all nations, is established for overcoming barriers for financing implementation of effective climate policy measures in particular for adaptation to a warming climate. The revenue for this proposal is to be raised according to the polluter pay principle through a *uniform* global levy on carbon of 2 USD/t CO_2 on all fossil fuel emissions. This leads to a burden of about 0.5 US cents/litre of liquid fuel.

1 50% reduction of year 1990/2000 global greenhouse gas (GHG) emissions by 2050

The funding scheme proposes a basic tax exemption of 1.5tCO_2e per inhabitant, to take into account the principle of common but differentiated responsibilities. This free emission allowance relieves the low-emission countries while countries with higher-emission levels make a higher contribution to the fund. Further, countries with high levels of per capita incomes contribute a larger share of the revenues of the CO_2 levy to the funding scheme than countries with lower incomes. Through these design parameters, the free emission level and the differentiated shares of payments to and revenues from the fund, the proposed funding scheme leads to a considerable net transfer of resources from rich to poor countries.

The funding scheme also reflects the polluter pays principle as all countries assume a fair share of their responsibilities for addressing climate change issues in accordance with their share of responsibility for the problem of climate. A global and uniform CO_2 based levy reflects the need to address the climate change problem on a global scale.

The economic rationale for this initiative is as follows: Following the Stern Report on the Economics of Climate Change (2006), we have to acknowledge that climate change "*is the greatest market failure the world has seen."* From an economic point of view the best theoretical solution to correct for this market failure would be to introduce an optimal carbon price[2] in order to set adequate incentives to decarbonise the economy in the long run. Today we apply a variety of strategies and efforts to implement a carbon price (tax or trading system) in different regions and a number of countries. Nevertheless, on a global scale we are far away from an optimal carbon price. Therefore this proposal targets at a second best solution: The CO_2 based levy is designed as a low level financing tax. The revenues are assigned to finance the provision of a public good, i.e. efficient pro-active mitigation and adaptation activities. Climate change related social cost shall be reduced.

Furthermore, the architecture of the revenue and disbursement models shall be designed considering the different shares of responsibility between industrialised and developing countries for the problem of climate change and in terms of different economic capacities to contribute to the solution.

Overview of proposal

The proposed funding scheme is designed to support the Bali Action Plan, including financing, governance and allocation of revenues (Figure S-1). The revenues are to be raised through a

2 Through a carbon tax or a carbon emissions trading system.

uniform global levy on CO_2. Of the total revenue collection 18.4 bn USD shall be allocated to a multilateral regime. The share of revenues which are deposited to the multilateral regime depends on the economic situation of the countries. The share of contribution from the industrialized countries to this fund is 76%. The payments from the multilateral regime are used for financing of adaptation policies and measures. The proposal is complementary to the Mexican Proposal, focussing on a global funding mechanism for technology transfer.

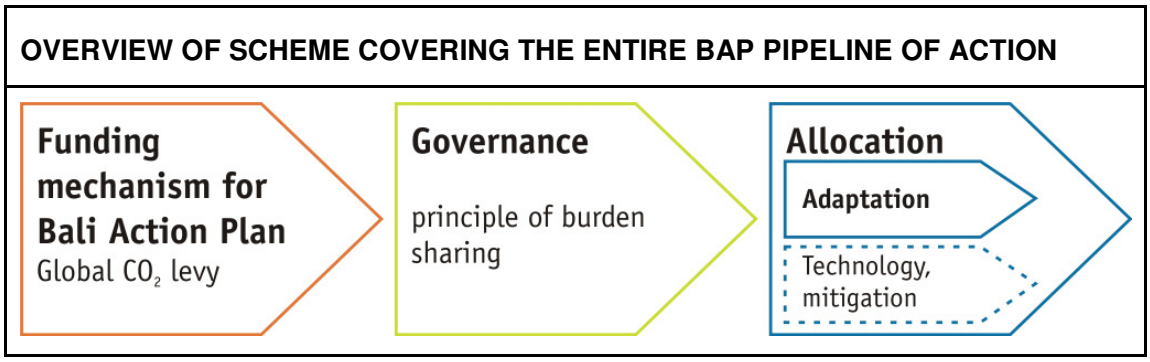

Figure S-1: BAP = Bali Action Plan.

The revenues generated under this proposal in each country are partly channelled into a National Climate Change Fund (NCCF) for financing national climate change policies according to the country's specific needs and legal frame covering adaptation, technology transfer or mitigation measures.

A share of revenues differentiated according to groups of countries formed on the basis of the per capita GDP shall flow into a global Multilateral Adaptation Fund (MAF). The MAF part of the funding is to be spent on two different themes ('Pillars'), namely[i]

› *(i) Prevention Pillar*: Climate change impact (risk) reduction through appropriate policies and measures.

› *(ii) Insurance Pillar*: Climate impact response: relief, rehabilitation, recovery.

Industrialised countries deliver a significantly larger fraction of their tax revenues to the MAF than developing countries. In contrast, developing countries keep the largest share for their national policies and deliver only a small fraction to the MAF. Medium income countries (GDP USD 15-20'000/Cap) take an intermediate position. Figure S-2 shows the financial flows and shares contributed to the MAF and the NCCFs, respectively. The proposed parameters are illustrations for the purpose of discussion only.

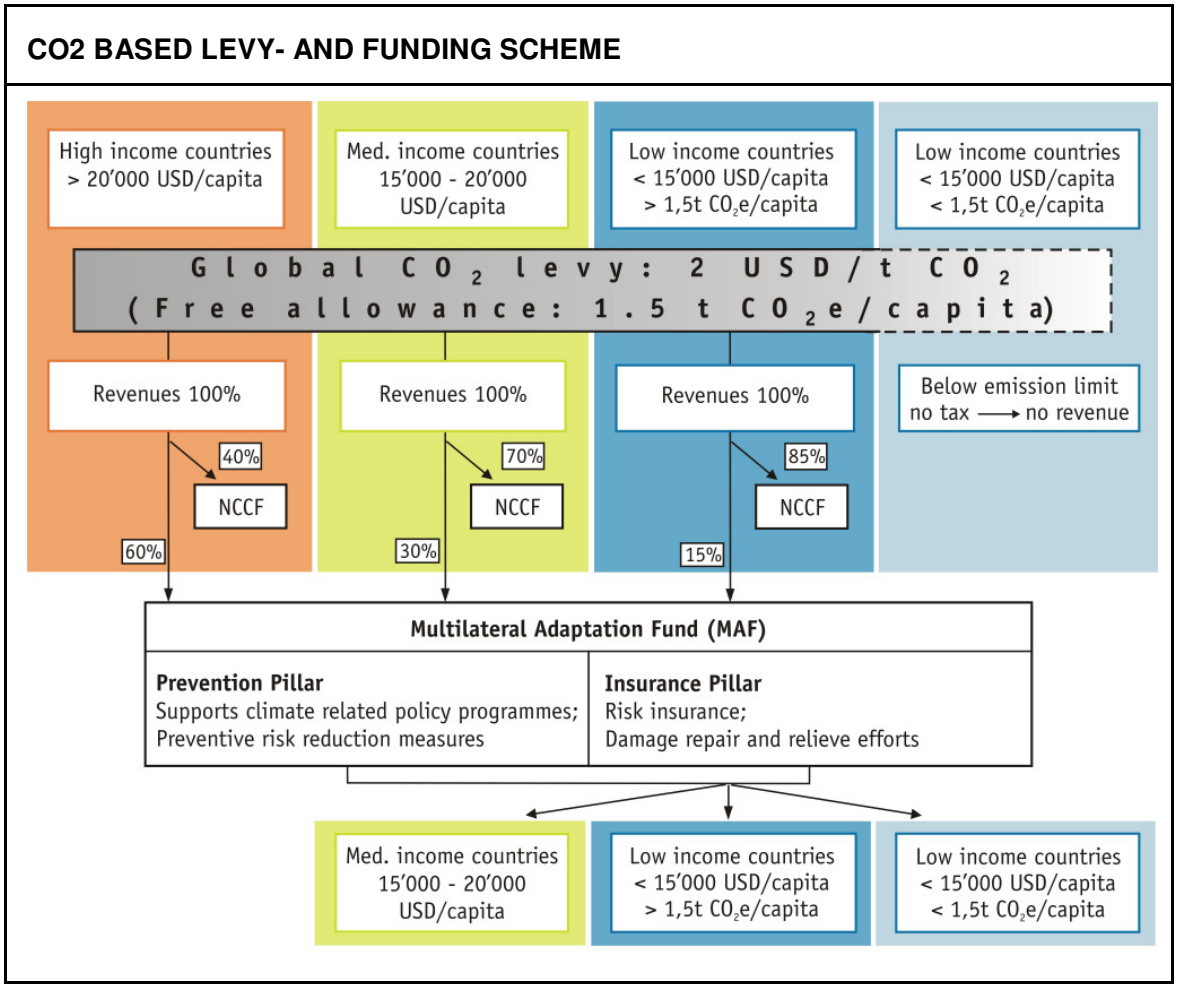

Figure S-2: This figure illustrates the leading idea of a CO_2 based levy- and funding scheme. Based on GHG emission projections and data from UNFCCC National Communications, the total revenues for funding the global MAF amount to USD 18.4 bn, of which USD 15.2 bn come from high income countries, and USD 3.2 bn come from medium/low income countries. These resources are proposed to be engaged in financing the implementation of adaptation policies and programmes in vulnerable medium and low income countries. High income countries feed their National Climate Change Funds (NCCF) with 12.2 bn USD/a, and medium and low income countries theirs with 17.8 bn USD/a. Total revenues worldwide amount to 48.5 bn USD/a (based on data of 2010).

National Climate Change Funds

Each country which decides to participate in the scheme shall autonomously operate its own NCCF. These national funds shall also operate as partner institutions to the Multilateral Adaptation Fund (MAF) and are encouraged to address the priorities of national climate change programmes and to closely coordinate with other national climate policy financing facilities depending on the national circumstances such as vulnerability to climate change and economic development. These NCCFs are seen as complementary vehicles to the project based disburse-

ment through implementing agencies as they are operating under the GEF or under the funds established under the Marrakesh Accord. NCCF funds can be used according to national priorities for adaptation as well as for mitigation measures such as improving the energy- and climate efficiency of buildings, cars, electrical equipment, or power plants and promotion of renewable energy.

Possible examples for existing national climate change funds or guidelines for designing such funds are the China CDM Fund and the Green Investment Schemes (GIS) developed between Russia and potential AAU buyers, respectively.

Multilateral Adaptation Fund (MAF)

The Multilateral Adaptation Fund is to assist low and medium income countries in financing their adaptation policies. It is proposed to become part of the financial architecture developed under the Bali Action Plan (UNFCCC 2007b). While by far the largest contributions come from industrialized countries, adaptation policies/programmes and measures in vulnerable developing and medium income countries are funded only. This reflects the special overall responsibility of the ICs for the climate change problem.

The World Bank and UNFCCC estimate the financial needs for adaptation in non-industrialised countries at 10 and 40 bn USD/year in 2030, while the financial flow under the Marrakech Accord merely provides some 0.1–0.2 bn USD/a. This illustrates the urgent need for further funding.

The MAF releases its funds of some 18.4 bn USD/a within a legally clearly defined governance framework. It shall be able to operate efficiently and complementarily to other similar facilities such as the GEF trust fund, the funds established under the Marrakech Accord, the World Bank's Climate Investment Funds or development assistance operating basically on a project by project basis.

Prevention Pillar

The MAF shall co-finance climate proof policies relevant from a climate change adaptation perspective including disaster risk reduction measures. The disbursement model operates in the form of contributions to the programme – rather than funding individual projects. It is assumed that the operations of the MAF will create the capacities and institutions for the implementation of this disbursement model. This enhances efficiency in line with the OECD Paris declaration on aid effectiveness. The supported policies can include risk responsive planning and design of settlements, infrastructures and of land use.

Insurance Pillar

This pillar aims at investing financial resources into safeguarding public goods, which in particular comprises to insure climate related risks, which are not covered by private insurance companies because premiums are not affordable for local insurance takers (low probability, high consequences risks). The focus is on vulnerable institutions, enterprises and segments of population in medium and low income countries. Insuring the rehabilitation of core infrastructure of an affected area, or compensation of lost assets of the most vulnerable groups shall have priority. Furthermore, the Insurance Pillar will develop pilot projects for weather risk insurances (e.g. for agriculture) at sub-regional levels. Also, a small amount of the budget can be used for developing the data basis required for such schemes (technical assistance).

An optimal form of private public partnership with the insurance sector must be developed, while guaranteeing the interests of affected groups in vulnerable developing countries. One possibility to be evaluated is assistance to the countries in the form of payment of special insurance premiums. This would correspond to the principles of subsidiarity and efficiency, and allow for a lean and efficient administration of the MAF.

Impacts and Implementation

Table S-1 shows an overview of the impacts in terms of financial flows between regions. The last column of table S-1 illustrates the total receipts from both the NCCF and the MAF in the different regions. The transfer of finances from industrialised to developing countries is shown in the second-to-last column, showing the positive net payments from the MAF for developing countries. This is additional to resources for technical cooperation and based on multilateral agreements.

INDICATIVE FINANCE FLOWS BETWEEN PARTICIPATING REGIONS						
	Total revenue of tax	Revenue going to MAF	Payments obtained from Prevention Pillar	Payments obtained from Insurance Pillar	Net payments to and from MAF	Net receipts from NCCF plus contributions from the MAF
United States	11551	6'930.69			-6930.7	4620
Canada	1224	734.48			-734.5	490
Australia, New Zealand	890	533.89			-533.9	356
Japan	2154	1'292.33			-1292.3	862
OECD Europe	7532	4'519.16			-4519.2	3013
Total High income group	*23351*	*14011*	*0*	*0*	*-14011*	*9340*
South Korea	907	272.07	96.3	268.0	92.2	999
Russia	3236	970.92	137.5	142.3	-691.1	2545
South Africa	962	144.34	74.2	85.3	15.1	977
Mexico	753	112.95	111.0	136.6	134.6	888
Non-OECD Europe & Eurasia	2019	302.80	293.2	319.2	309.7	2328
China	9571	1'435.68	1996.4	2800.3	3361.0	12932
Middle East	2711	406.63	212.2	181.9	-12.6	2698
Brazil	704	105.61	194.5	181.8	270.6	975
Other Central & South America	1282	192.32	281.9	260.2	349.8	1632
Non-OECD Asia	2143	321.39	1594.4	1858.8	3131.7	5274
India	315	47.19	2324.0	2045.6	4322.4	4637
Other Africa	0	0.00	1409.5	702.2	2111.7	2112
Indonesia	535	80.18	476.2	219.4	615.5	1150
Total Low and Medium income group	*25137*	*4392*	*9201*	*9201*	*14011*	*39148*
Total World	48488	18403	9201	9201	0	48488

Table S-1: Net annual financial flows of the MAF between participating regions; total receipts from MAF and NCCF (data basis year 2010). The first and last columns show the total tax revenues collected in, and the total resources flowing into a region, respectively.

A financial flow analysis as depicted in Figure S-3 shows that the average contributions of industrialised/high income countries are much higher than in medium- and low income countries although their tax rate only differs on the basis of the application of the free emission level of 1.5 t CO_2e/capita. The receipts from the MAF show the same pattern, so that the funding scheme leads to a considerable net transfer from high-income to low income countries of about 14 bn USD equivalent to 76% of the funding under the multilateral regime.

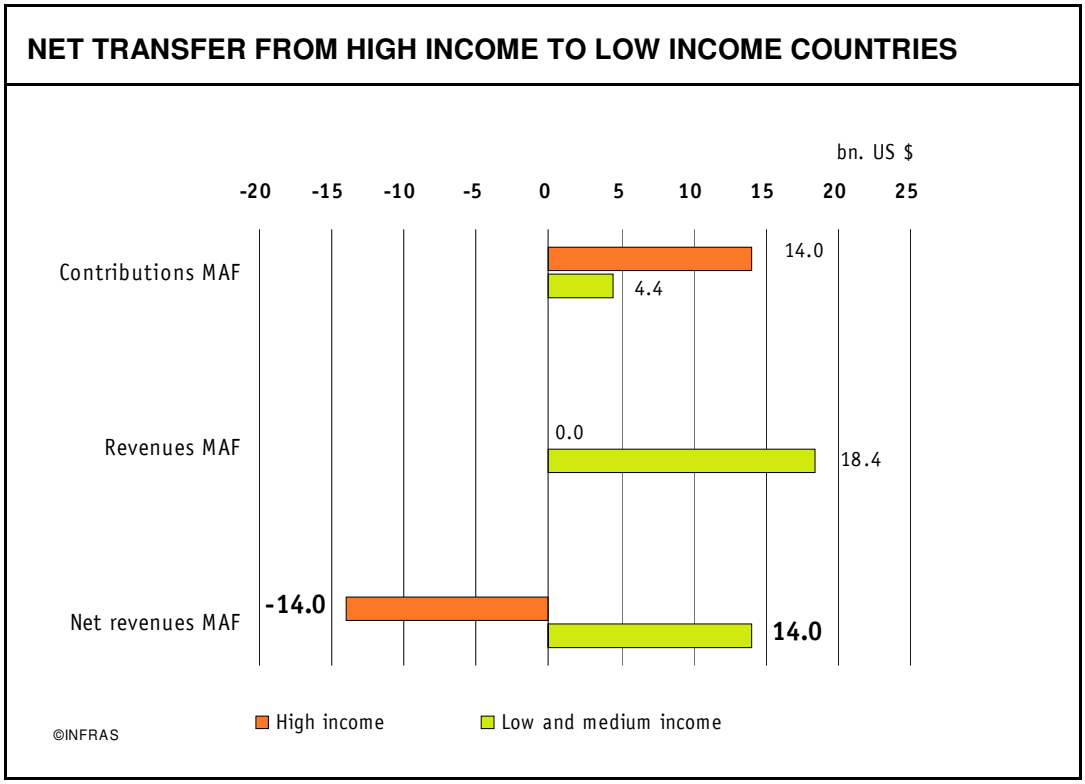

Figure S-3: How many USD per year does a country from the high income/medium income/low income group contribute to, and receive from the MAF? High income countries contribute 14 bn USD, but do not receive any funds. Medium and low income countries contribute 4.4 bn USD and receive 18.4 bn USD.

As only a low CO_2 based levy is introduced, it can be assumed that this will not have any noticeable negative effects on economic growth and GDP in industrialised countries. Also, in emerging and developing countries with low- and medium GDPs, negative economic impacts are not likely due to the tax free emission level of 1.5 t CO_2e/capita. Furthermore, the funding scheme can lead to positive economic impacts in developing (DC) and least developed countries (LDC), as adaptation measures are expected to reduce the potential GDP damages caused by climate change.

Implementation issues need to be studied carefully to meet the challenge of administrative efficiency. One issue is how to collect the CO_2 based levy. The tax free emission level of 1.5 t CO_2e/capita exempts a significant number of countries with low institutional capacity from establishing a system to collect the CO_2 levy. Furthermore, it alleviates the problem of lack of economic capacity of least developing countries (LDC) to contribute to the Multilateral Adaptation Fund. Experience in several countries suggests that an upstream approach is most feasible: Levies are charged at the points of import and production rather than at the consumer level. By applying an upstream approach only a small number of subjects needs to be levied.

Further work

This paper outlines cornerstones of a climate change financing scheme, primarily for adaptive policies in low and medium income countries. At this stage, the level of consultation and investigation is only limited. Hence this paper presents a leading idea and a tool box of instruments for refinement and discussion. Examples of open questions which do need further investigation and consultation are:

- How to best integrate the proposed scheme into the current negotiation process under the Bali Action Plan for a post 2012 international UNFCCC agreement and in particular:
  - How to best combine/delineate this proposal with other proposals such as the Mexican proposal on funding technology transfer or the Norwegian proposal on international bunker fuels?
  - How to ensure an effective governance taking into account the operation of the Kyoto-Adaptation Fund for CDM, and the World Bank Climate Investment Funds?
- How to best modify the proposed design parameters in order to attract sufficient support from other parties to justify a comprehensive assessment process. The levels of taxation are one example?
- How to best design the Insurance Pillar, especially the form of public private partnerships.

Next steps: Interested parties are invited to cooperate in a process to further develop the proposed scheme.

1. SITUATION

1.1. THE CHALLENGE

The recent Fourth Assessment Report of the IPCC establishes that anthropogenic warming and sea level rise would continue for centuries due to the timescales associated with climate processes and feedbacks even if greenhouse gas (GHG) concentrations were to be stabilized soon (IPCC 2007b). The IPCC attributes the responsibility of most of the observed increase in globally-averaged temperatures since the mid-20th century with high probability to anthropogenic GHG activities.

Effects of regional climate change on natural and human environments are emerging. Thus, adaptation along with mitigation is indispensable. Within the framework of the UNFCCC, the responsibilities to combat climate change and to adapt to its adverse effects are common but differentiated among parties. In this context, industrialised countries have to take the lead in reducing GHG emissions. Furthermore, they have to provide technical and financial means to developing countries to combat climate change.

Adaptive capacity is intimately connected to social and economic development but is unevenly distributed across and within societies. Developing countries have lower per capita emissions but will incur disproportionately damages from climate change. For example, for Africa, the recent Fourth Assessment Report of the IPCC states that towards the end of the 21st century, the cost of adaptation could amount to at least 5–10% of the Gross Domestic Product (GDP). The damages resulting from a projected sea-level rise will affect low-lying coastal areas with large populations.

There is high confidence that neither adaptation nor mitigation alone can avoid all climate change impacts. However, they can complement each other and together significantly reduce the risks of climate change. As impacts of climate change are already visible, adaptation measures need to be implemented as soon as possible. However, the issue of financing these measures is not solved.

The Bali Action Plan launched a negotiation process under UNFCCC which will run in parallel with the Kyoto negotiations with the expectation that the two tracks will converge in a comprehensive post 2012 agreement in 2009. The Bali Action Plan consists of 4 building blocks namely enhanced action on mitigation, adaptation, technology transfer and provision of financial resources for all 3 fields of action. Progress in the negotiation process on mitigation, adaptation and technology transfer will crucially depend on reaching an agreement on predictable and adequate funding of developing country parties' enhanced action.

The recent report on investment and financial flows relevant to the development of an effective and appropriate international response to climate change (UNFCCC 2007, dialogue working paper 8) indicates that the total global investment needs between now and 2030 are estimated at a level of USD 200–300 bn, or 10–15 bn USD/a. World Bank estimates even amount to USD 10–40 bn per year for financing adaptation in low and medium income countries. Currently, no mechanism can provide financing of such an order of magnitude.

The Adaptation Fund under the CDM of the Kyoto Protocol is expected to provide USD 300–450 hundred million in the period 2008–2012. This and other sources such as the World Bank Climate Investment Funds[3] will not provide the resources needed for an adequate level of funding (Müller 2008).

1.2. PROPOSAL, INTEGRATION INTO BALI ACTION PLAN

Therefore, we are left with an unfulfilled task. This is why the Swiss Environment Minister Moritz Leuenberger at the twelfth Conference of the Parties of the UNFCCC in Nairobi in 2006 and later at the Bali conference in December 2007 proposed a global carbon levy to cope with the adaptation financing chasm that became more and more apparent at that time. The proposed establishment of a funding scheme shall be based on the principle of common but differentiated responsibilities and on the polluter pays principle, with a low levy on CO_2 emissions, to cope with these financing bottlenecks. Besides the financing of preventive adaptation and mitigation measures the inclusion of an insurance mechanism to cover high risks of climate change was proposed which cannot be covered by the market of the private insurance sector.

We must adapt to the inevitable consequences of climate change, address the risks of high potential damages and reduce them. We will face high damage costs and should therefore establish a global insurance system, fair and with solidarity to all nations.

The project presents an approach for a global burden sharing system to overcome barriers for financing effective climate policy measures, domestically as well as internationally. It shall address the principle of common but differentiated responsibilities of parties. Emphasis is put on collecting tax revenues from emissions worldwide and allocating these funds for action mainly in developing countries. The establishment of the proposed funding scheme with legally defined contributions marks the transition from a development cooperation type organisation to a legally

3 The Climate Investment Funds (CIF) launched by the World Bank in response to the Gleanagles G8 summit and the Japan/UK initiative of bridging climate change funding including adaptation up to 2012 proposes 3 funds:
Clean Technology Fund (targeted size 5–10 bn USD)
Forest Investment Fund (USD 1 bn)
Adaptation Pilot Fund (USD 1 bn)

binding international agreement. Also, the proposal strengthens the necessary link between development and climate policy.

The funding scheme is designed to integrally support the Bali Action Plan, including financing, governance, and allocation of revenues (see Figure 1). Of the total revenue collection 18.4 bn USD shall be allocated to a multilateral regime. The share of revenues which is deposited to the multilateral regime depends on the economic situation of the countries. The share of contribution from the industrialized countries to this fund is 76%. The payments of the multilateral regime are used for financing of adaptation policies and measures. The disbursement of the revenue is to be partly domestic through "National Climate Change Funds" for financing national climate change policies according to the country's specific needs and legal frame covering adaptation, technology transfer or mitigation measures. This proposal however focuses mainly on the financing of adaptation.

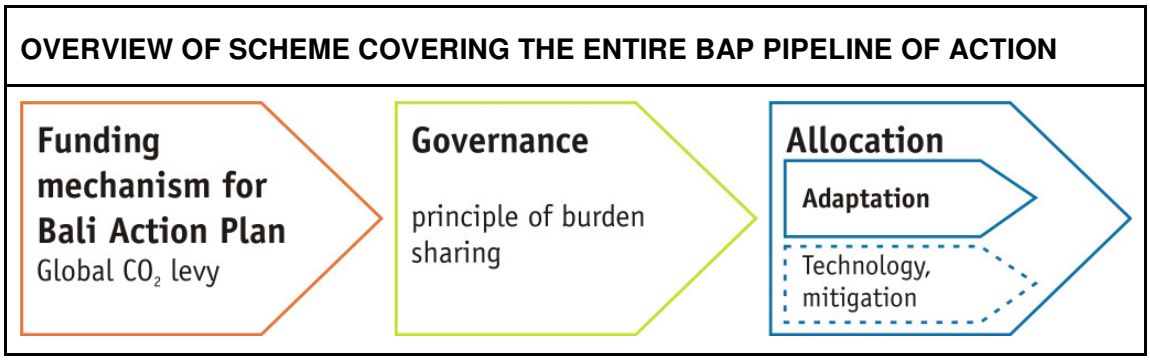

Figure 1 Link to the Bali Action Plan (BAP).

As a first step, chapter 2 presents the underlying objectives and principles on which the funding scheme is based. The following chapter 3 presents the outline of the funding scheme with the general parameters, an overview of financial flows as well as the three pillars of the scheme – National Climate Change Funds (NCCF), an Insurance, and a Prevention-Pillar within the Multilateral Adaptation Fund (MAF). Chapter 4 shows a preliminary and illustrative quantitative structure of the scheme as basis for further discussion. This structure includes information on the CO_2 tax revenues of the scheme as well as a proposal for the allocation of revenues to the different world regions. Chapter 5 discusses implementation problems. The paper concludes with a short discussion of further steps needed.

2. OBJECTIVES AND PRINCIPLES

2.1. OBJECTIVES

The overall goal is to strengthen the capability of the Parties to UNFCCC to address the challenges of financing climate change measures – especially for adaptation in vulnerable developing countries, domestically and through international cooperation. The legal frame of reference is the UNFCCC.

In pursuit of this goal, the objectives of the proposal are:

› To establish a global burden sharing system in solidarity and fair to all nations, for overcoming barriers for financing effective climate policy measures, in particular for adapting to the unavoidable part of climate change.

› To install a fair and effective global CO_2 based levy- and funding-scheme for financing climate change adaptation measures needed. The low level tax is not designed as an economic incentive to curb CO_2 emissions, but rather to generate revenues for financing climate change measures in line with the polluter pays principle.

› To establish, with the revenues of the tax, a Multilateral Adaptation Fund component (MAF) for international financing of adaptation measures in vulnerable developing countries and – at national level – National Climate Change Funds (NCCF) to help financing the climate change policy of each country according to its own priorities.

› To leave as much room as possible for national decision making to each individual country. Accordingly, a lean but effective international governing and administration structure shall be pursued to complement national actorship where needed.

2.2. PRINCIPLES

One guiding principle for the design of the funding scheme is to balance out interests between different countries in order to find broad support for action of the whole global community with widely different economic and ecological situations, interests and responsibilities for action between countries. Furthermore, the funding scheme is based on two major principles which are presented as follows.

Common but differentiated responsibilities

› Global solidarity in financing enhanced action stipulated by the Bali Action Plan: all countries with per capita emissions above a basic need oriented threshold share responsibilities

by raising a low levy on CO_2 emissions to cope with the bottlenecks, particularly for adaptation financing.

› The free emission level of 1.5 t CO_2e/capita relieves the low-emission countries while countries with high-emission levels make a higher contribution to the fund.

› Countries with high levels of per capita incomes contribute a larger share (60%) of their tax revenues to the MAF than countries with lower incomes. The latter keep the largest share (70% and 85%, respectively) of their national revenues for adaptation and mitigation action at the national level according to their own needs and priorities.

› Through the free emission level and the differentiated shares of payments to and revenues from the fund, the funding scheme leads to a considerable net transfer of resources from rich to poor countries. 76% of total revenues of the Multilateral Adaptation Fund come from industrialized countries.

› By involving all economic sectors into the financing scheme, an adequate and predictable level of funding is achieved. The low level of the proposed levy ensures that further economic development in low-income countries is not constrained.

Polluter pays principle

› All countries assume a fair share of their common but differentiated responsibilities for addressing climate change issues in accordance with their share of responsibility for the problem of climate change (see Figure 2 for an overview of CO_2 emissions per capita).

› A global and uniform CO_2 based levy reflects the need to address the climate change problem on a global scale outside thinking in Annex I and non Annex I boxes. The contributions to the funding scheme are based on current levels of GHG emission.

› Basic tax exemption of 1.5tCO_2e per inhabitant: The GHG emission benchmark applied for calculating the technical tax rate between countries/regions includes all greenhouse gas emissions, also CO_2 emissions from LULUCF activities.

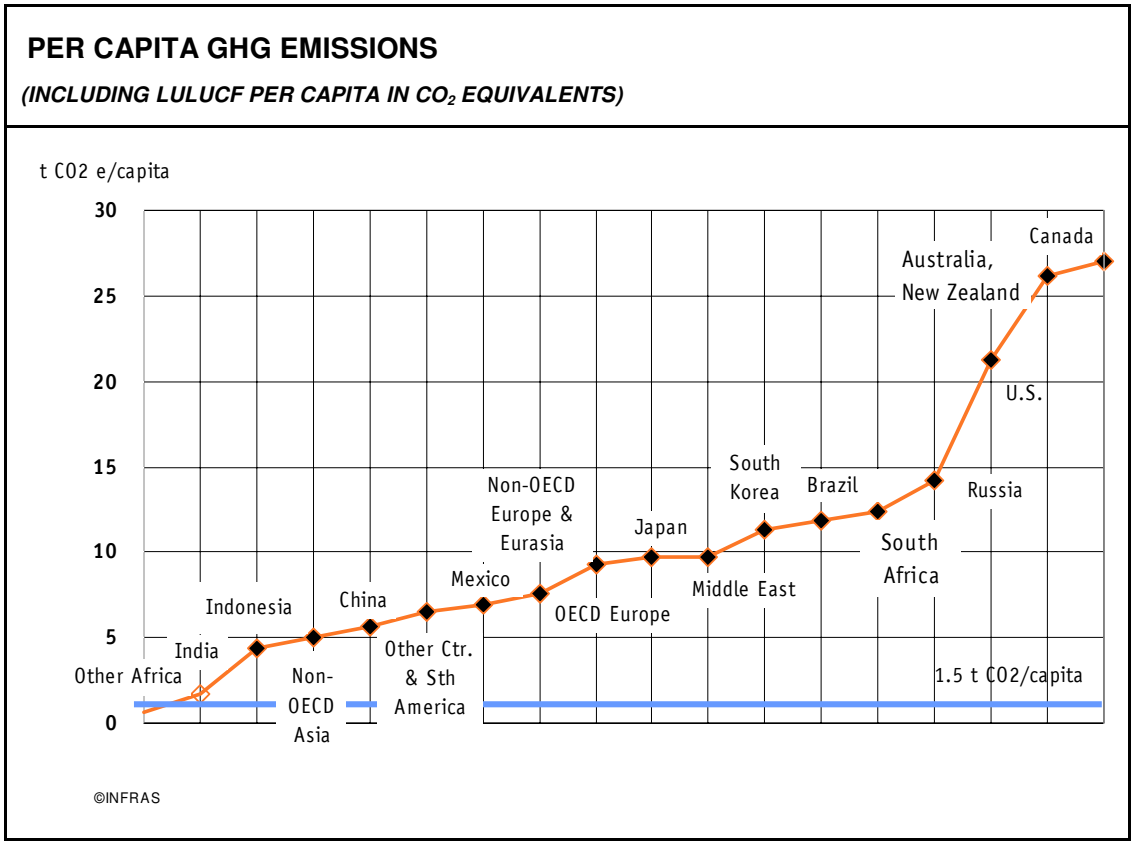

Figure 2: Source: CO_2 emissions: Energy Information Administration, other GHGs and LULUCF: UNFCCC database. The countries or groups of countries analysed are listed in a sequence of increasing per capita emissions.

Economic rationale

The economic rationale for this initiative is as follows: Following the Stern Report on the Economics of Climate Change (2006), we have to acknowledge that climate change "*is the greatest market failure the world has seen.*" From an economic point of view, the best theoretical solution for correcting this market failure would be to introduce an optimal carbon price[4] in order to set adequate incentives to decarbonise the economy in the long run. Today, we can observe a variety of strategies and efforts to implement a carbon price (tax or trading system) in different regions and a number of countries. Nevertheless, on a global scale we are far away from an optimal carbon price. Therefore, this proposal targets a second best solution: The CO_2 based levy is designed as a low level financing tax. The revenues are assigned to finance the provision of a public good, i.e. efficient pro-active mitigation and adaptation activities. Climate change related social cost shall be reduced. The third best solution, i.e. to mobilize revenues from auctioning of

4 Through a carbon tax or a carbon emissions trading system

emission entitlements under emission trading schemes was not further investigated as a global approach to implement the polluter pay principle for two reasons:

› Emission trading schemes currently cover only part of the emissions of an economy.

› The likelihood that all major emitting countries agree to introduce a cap and trade scheme under the negotiations of the Bali Road Map is low.

Thus, the underlying economic rationale gives a clear guidance on how to apply the revenues of the financing levy for mitigation and adaptation purposes:

› Mitigation: Revenues should be invested in order to correct market failures in the context of mitigation. The focus might be (1) on promotion of technology and (2) on the correction of market failures in the property and capital markets.[5]

› Adaptation: Revenues should be assigned to correct market failures related to adaptation: (1) Promoting the integration of climate change into national development policies is a key activity complementary to adaptation driven by market forces. (2) Insuring public risks such as large scale damages to public infrastructures which are not insurable by the private insurance market.

In doing so the initiative will support regional efforts to address the necessary structural change and lead to improved efficiency of the world economy.

Further underlying criteria

› **Subsidiarity:** Individual nations shall maintain the power and responsibility to cope with problems which can be solved with fairness and solidarity at their national level.

› Each country shall define its own solutions to coordinate the global taxing and funding scheme with already existing or emerging national systems.

› Supra- and international level action comes in only when problems cannot be solved by a country alone.

› **Efficiency and effectiveness:** The tax scheme shall cover CO_2 emissions from production and use of commercial fossil fuel only, according to the guidelines for the Energy Sector emission established for the preparation of greenhouse gas inventories under the UNFCCC.

5 See e.g. Stern report: …"*Second, we must promote technology: through research and development. Further, private sector investors need confidence that there will be markets for their products: that is why deployment policy also makes sense. And third we must deal with market failure; for example problems in property and capital markets inhibit investments for energy efficiency."*

- To ease implementation, the architecture of the scheme shall be compatible with other facilities and mechanisms already in place for climate change action at national and international level.
- The proposal takes a long term view with options for review and – where needed – revision at defined time intervals by the parties.
- An insurance approach is proposed for climate change damage repair measures. This is for reasons of effectiveness.
- For the Prevention Pillar it is crucial to avoid an administratively expensive and cumbersome project based approach for adaptation measures.
- The proposal is to start building an additional international institution for this scheme only when a significant number of countries have joined the scheme. Up to this date the resources collected could be redistributed through the Adaptation Fund

3. OUTLINE OF A POSSIBLE FUNDING SCHEME

3.1. PARAMETERS OF THE SCHEME

The outline of design parameters shown in Table 1 it is not intended to be seen as a ready made model. Rather, it is an illustration of one possibility for the concrete profile of the general concept, for the purpose of communicating the lead idea. Each parameter is open for discussion and negotiation among interested parties. The aim of such a negotiation process is to find an effective and efficient solution, acceptable to the parties in the sense of meeting their needs and potentials.

POSSIBLE OUTLINE OF THE FUNDING SCHEME			
Elements	**Description for category**		
	High-income countries	**Medium income countries**	**Low income countries**
Characterisation in terms of per capita income (USD/a)	> USD 20'000	Between USD 15'000 and 20'000	< USD 15'000
Countries applying the levy	Countries with per capita GHG emissions >1.5 t CO_2e		
Regime for national fund (mode of tax collection, allocation of the revenues)	Individual country solution, autonomous decision		
Tax base	CO_2 emissions from fossil fuels; incl. international bunker fuels (defined by IPCC 2000[6])		
Tax rate	2 USD/tCO_2		
Minimum free emission level per year	1.5 t CO_2e		
Percentage of revenue going to MAF	60%	30%	15%
Total revenues worldwide (2010)	USD 48.5 bn		
Total revenue to the global fund per year (Multilateral Adaptation Fund, MAF)	USD 14.0 bn	USD 4.4 bn	
Total revenue to national funds (NCCFs)	USD 9.4 bn	USD 20.7 bn	

Table 1: Outline of main parameters for a possible profile of the proposed funding scheme. It shows how the design reflects the economic differences between three different classes of countries.

Financing mechanism

The CO_2 based levy is a global instrument which – in terms of tax base and tax rate – is applied in a similar manner in all countries. Considering that carbon emissions are a global challenge irrespective of the location of the emission, the basic tax rate with USD 2 per ton CO_2 is proposed to be the same for all world regions. As it does not matter where on the globe a ton of

6 IPCC GHG inventory good practice guidance

CO_2 is emitted, this creates a level playing field with the same value of carbon emissions in all countries.

The first aspect of the principle of common but differentiated responsibilities is implemented by considering the first 1.5 t CO_2e/capita as a "basic need", which is exempted from the levy for all countries as well as by the payments which go to the MAF used solely for policies in low and medium income countries. All countries benefit from the basic need emission level of 1.5 t CO_2e/capita which is not subjected to taxation. This means that countries with very low emission levels (below 1.5 t CO_2e/capita) are waived from collecting the CO_2 based levy at all. In countries with emission levels above 1.5 t CO_2e/capita, the technical taxation rate of 2 USD/tCO_2 is calculated as an average over all emissions, taking into account the free allowance, in order to ease the collection of the tax. Hence the taxation rate is increasing for countries with per capita emissions exceeding the waived threshold, as displayed in Figure 3.

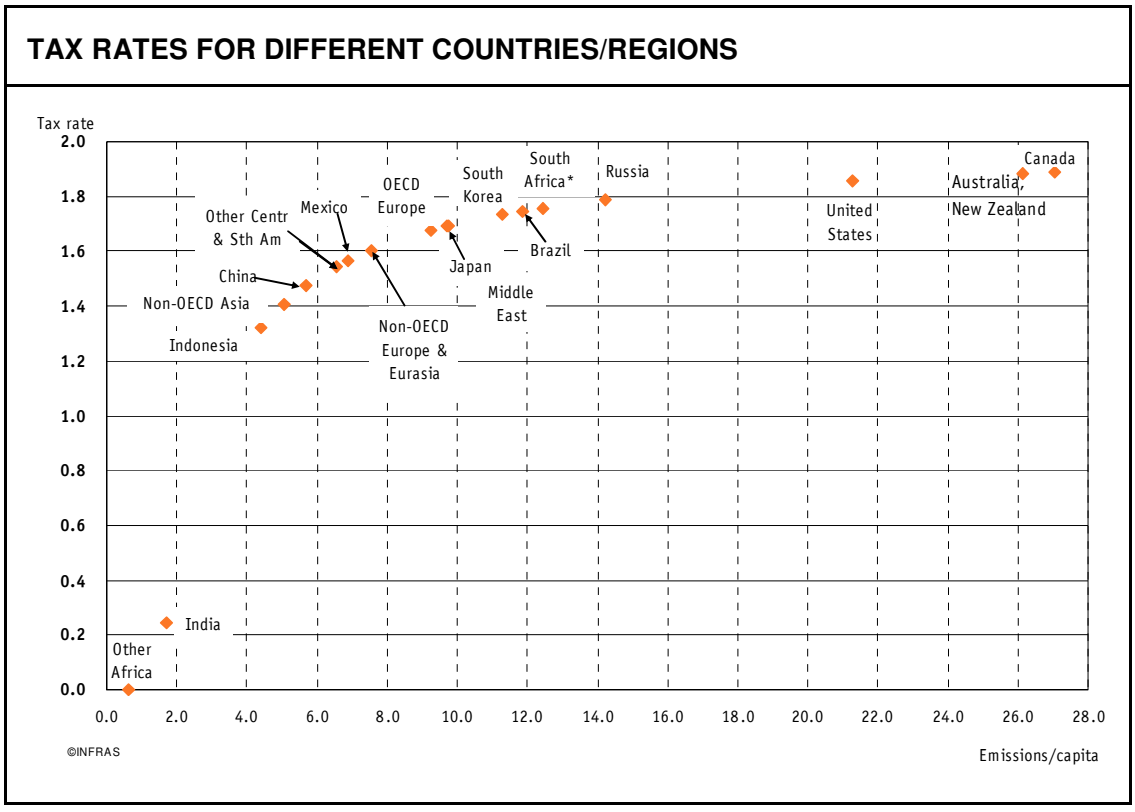

Figure 3: Tax rates based on 2 USD/t CO_2, considering per capita emissions of all GHG and the exempted basic needs level of 1.5 t CO_2e/cap.

In order to create a fair mechanism taking into account the different characteristics of countries and the different emission sources, total per capita greenhouse gas emissions (including LU-

LUCF) were considered. If the tax rate were to be calculated on the basis of energy-based CO_2 emissions only, the system would treat countries with high emissions from carbon sinks too favourably and would set counterproductive incentives. The calculation of the country specific tax rates is illustrated in Annex I.

Payments to the Multilateral Adaptation Fund

The second aspect of the principle of common but differentiated responsibilities is implemented with the payment structure. The part of the national revenues which flows into the MAF is determined by the current level of economic development[7]. Countries with high incomes (above 20'000 USD/capita) pay 60% of their revenues to the fund. Medium income countries (between 15'000 and 20'000 USD/capita) pay 30% of their revenues to the fund while countries with an income level below 15'000 USD/capita pay only 15%. This payment structure reflects the polluter pays principle, because the richest countries make the largest contributions to the multilateral fund, while medium and low-income countries can keep most of their revenues for their National Climate Change Fund.

The purpose of the NCCF and the MAF shall be complementary to the Adaptation Fund established with the 2% proceeds rule under the Kyoto Protocol.[8] In line with the principles of solidarity and effectiveness, international bunker fuels for sea and air transport shall be included in the scheme.

3.2. FINANCIAL FLOWS

The general structure of the financial flows is illustrated in figure 3. Based on the assumed parameters of the funding scheme, the total revenues for funding the MAF amount to USD 18.4 bn, of which USD 14.0 bn come from countries with a per capita income above 20'000 USD/year, and USD 4.4 bn come from medium and low income countries (below 20'000 USD/year). This revenue of the MAF flows back to medium and low income countries, half of it for financing adaptation measures, the other half in form of insurance payments. The NCCFs are fed with 9.4 bn USD/a in high income countries and 20.7 bn USD/a in low and medium income countries. Total revenues worldwide amount to 48.5 bn USD/a (based on data of 2010).

7 This working paper is based on purchasing power parity corrected data for the GDP as provided by the Energy Information Administration.

8 The current CDM pipeline is equivalent to 2.3 bn CER, assuming between 2008 and 2012 a deal flow of 500–600 mio CER/year at a price of 10–15 USD/CER would generate a resource flow to the adaptation fund of 100 to 180 million USD per year. The CDM Adaptation Fund operates in project mode. It shall contribute to create skills and capacities in the recipient countries to absorb the resources from the disbursement model proposed in this paper.

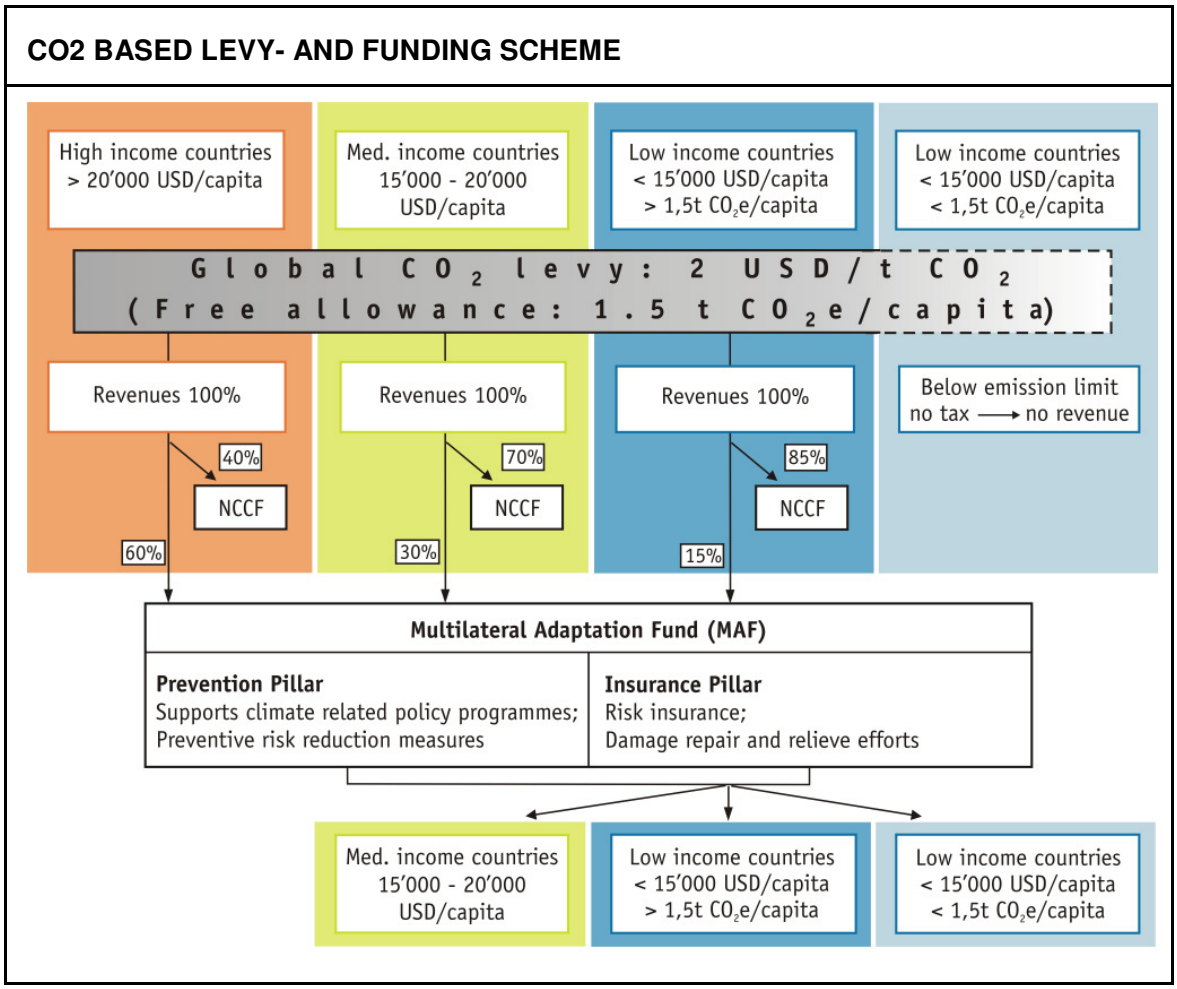

Figure 4: Financial flows of the proposed Funding Scheme. This figure illustrates the leading idea of the proposed revenue and disbursement model. Based on GHG emission projections and data from UNFCCC National Communications the total revenues for funding the global MAF amount to 18.4 bn USD, of which 14.0 bn come from high income countries, and 4.4 bn come from medium/low income countries. The figures are illustrative and to be seen as an input to further discussion and consideration for further elaboration within the frame of the Bali Action Plan.

3.3. PROPOSED ELEMENTS OF THE DISBURSEMENT MODEL

3.3.1. GENERAL OUTLINE OF OPTIONS

Providing a predictable and adequate basis for adaptation funding is crucial for the negotiations under the Bali Action Plan. The Adaptation Fund (AF) and the proposed CIF Adaptation Pilot Fund do not meet this requirement even under optimistic assumptions regarding the development of the international carbon market. Therefore, complementary finance and governance

architecture are indispensable. The proposal for such architecture encompasses three different pillars (see figure 1 and table 2):

- The National Climate Change Funds (NCCF),
- The Insurance Pillar of the Multilateral Adaptation Fund (MAF),
- The Prevention Pillar of the Multilateral Adaptation Fund (MAF).

The revenues from these three pillars will be channelled into two funds: the NCCF on the one hand, and the MAF with its two pillars on the other hand. There is an option to engage the resources generated within the frame of the financing architecture of an emerging "Copenhagen consensus", which could also comprise funding of technology transfer.

In this section the 3 pillars of the funding scheme are summarized. Table 2 gives an overview of the different elements. The following sub-chapters give more specific information on the three different pillars and illustrate how these could be designed to create synergies within the overall funding scheme.

THE THREE PILLARS OF THE FUNDING SCHEME			
	NCCF: **National Climate Change Funds**	**MAF:** **Multilateral Adaptation Fund**	
		Insurance Pillar	**Prevention Pillar**
Type of measures	Mitigation and adaptation	Insurance against climate change damages (extreme events)	Risk reduction and adaptation
Share of national CO_2 tax revenues	40% in high income countries 70% in medium income countries 85% in low income countries	30% of tax revenue from high income countries 15% of tax revenue from medium income countries 7.5% of tax revenue from low income country	
Governance of revenue allocation	As per national legislation	"Multilateral Climate Change Adaptation Fund"[9].	
Effective allocation of revenues	"OECD/IPCC type" of good practice guidance from "Multilateral Climate Change Adaptation Fund"	Funding of regional insurance coverage for damages of non-insurable risks caused by extreme weather events (storms, floods, droughts) to infrastructure/productive capital assets etc. Mandated insurance takes care of claims in case of damage (low and medium income countries)	Financing contribution to national climate change funds according to per capita and damage potential: fixed share (low and medium income countries)
Regulation needs	Compliance with lean set of criteria for countries to become eligible for funding from global fund	Clear insurance policy defining eligible extreme events and insured damages (legal basis for claims)	Agreements between global and national funds on use of global contribution for disaster risk reduction and adaptation

Table 2: Main characteristics of the three pillars of the proposed funding scheme: The National Climate Change Funds (NCCF) and the two pillars of the Multilateral Adaptation Fund (MAF): the Prevention Pillar for funding risk reduction and adaptation measures and the Insurance Pillar for damage repair.

9 Design according to the model of the "Multilateral Fund" of the Montreal Protocol. Executive Committee with equal representation (7 representatives) from developed and developing countries

3.3.2. NATIONAL CLIMATE CHANGE FUNDS (NCCF)

Each country will autonomously operate its own NCCF. Countries are encouraged to address the priorities of national climate change programmes and to closely coordinate with other national climate policy financing facilities, depending on the national circumstances such as vulnerability to climate change and economic development. The NCCFs of the proposed scheme are seen complementary to the project based implementation mechanisms established under the Marrakesh Accord. Reporting ensures transparency on the financial flows.

In contrast to the MAF resources allocated to medium and low income countries for adaptation purposes and insurance payments, NCCF resources are allocated according to the priorities of the individual party. Besides measures for adaptation and disaster risk reduction parties can use NCCF funds for mitigation measures as well.[10] The scheme can also finance capacity building and raising public awareness, depending on the national needs and priorities. Adaptation could comprise the full range of sectoral measures from agriculture, forestry and fisheries, to water resource management and supply, health, coastal management and infrastructure.

When defining guidelines for the design and implementation of the NCCF, relevant lessons on institutional architecture learned from other existing funds should be considered. Examples are the funds established under the Green Investment Schemes (GIS)[11] or the China CDM Fund[12].

The proposed resources from the Multilateral Adaptation Fund (MAF) supporting preventive climate change adaptation action and disaster risk reduction programmes of National Climate Change Funds shall have the form of financing contributions in line with the OECD Paris declaration on aid effectiveness. Hence, the MAF is **not** operating in a project by project mode. Each medium or low income country wishing to participate in the adaptation funding scheme will enter into an agreement with the MAF which specifies the adaptation programme of action supported under the Prevention Pillar. This agreement will also specify the implementation modalities of operations under the Insurance Pillar as well as the coordination efforts undertaken between the Insurance Pillar and the national adaptation and disaster risk reduction programme implemented party through its NCCF. National policies should play an important role in ensuring that the use of adaptation resources allocated for adaptation purposes, both private and public, is optimized. In particular there is a need for:

10 Mitigation could comprise measures such as improving the energy and climate efficiency of buildings, transport infrastructure/cars, electrical equipment, or power plants as well as promoting renewable energy.

11 The idea of the GIS was developed between Russia and potential AAU buyers to guarantee that the revenue from selling "hot air" is linked to global or local environmental benefits (Kokorin 2003, Gorina 2006).

12 The China CDM Fund promotes an innovative financial mechanism to support implementation of climate change activities at the national level as outlined in the National Climate Change Programme of June 2007.

› Domestic policies that provide incentives for private sector investors to adapt new physical assets to the potential impacts of climate change,
› National policies that integrate climate change adaptation in key line ministries such as Agriculture/Forestry/Fisheries, Water Resources, Health, Energy/Transportation/ Telecommunication, Urban Planning/Housing and last but not least Finance,
› Provincial and local government adaptation policies in key sectors,
› Capacity building and public awareness to support disaster risk reduction measures such as land use planning providing incentives for people moving out of flood-prone areas.

The contributions from the MAF shall accordingly support the adaptation priorities specified in the national climate change policies and the operation guidelines for the National Climate Change Funds.

3.3.3. MULTILATERAL ADAPTATION FUND: PREVENTION PILLAR

The overall objective of the Prevention Pillar of the Multilateral Adaptation Fund is to provide incentives and support for the integration of adaptation policies as an integral part of national and sectoral plans. Achieving a broadly accepted governance and distribution model requires further iterative rounds of consultations. One reason is that the global cost of adaptation to climate change is difficult to estimate. Firstly, because climate change adaptation measures will be widespread and heterogeneous, and secondly due to limited scientific knowledge on climate change impact at the regional and sub-regional level. More analysis of the cost of adaptation at the sectoral and regional level will be required to design and fine tune an effective international response to the adverse effects of the impacts of climate change. What can be stated with certainty is: adaptation in developing countries will require significantly higher resources than the approximately USD 0.1–0.2 bn per year which are projected to flow annually under the Marrakech Accord Funds in the period 2008–2012 (UNFCCC 2007). Responding to current underfunding of adaptation, the G8 countries in cooperation with the World Bank plan to launch a Climate Investment Fund in June 2008. Japan, hosting the G8 summit, will present a proposal for bridging adaptation funding up to 2012.

According to World Bank estimates, the financial needs for adaptation in non-industrialised countries lie between USD 10 and 40 bn per year. These costs however only include investments at the macro-level. Investments at the local scale are not included (World Bank 2006, Oxfam 2007).

3.3.4. MULTILATERAL ADAPTATION FUND: INSURANCE PILLAR

Resources of this pillar are earmarked for an insurance scheme at a sub-regional basis due to climate change. The **objective** of the Insurance Pillar is preserving/restoring public goods in case of severe weather events related to climate change. The insurance shall compensate damages – otherwise non-insurable – of extreme, climate change related weather events (storms, floods and droughts) to infrastructure and productive capital assets in medium and low income countries. A regional differentiation allows a customised approach for the different world regions considering their specific climate change risks. Furthermore, the Insurance Pillar will develop pilot projects for weather risk insurances (e.g. for agriculture) at sub-regional level by linking regional authorities, micro insurance initiatives and private insurers to design common solutions. Also, a small amount of the Insurance Pillar budget will be used for developing the data basis required for such schemes (technical assistance).

The Insurance Pillar is based on the following **principles**:

- The fund shall operate complementary and with visible advantages compared to existing programmes such as the GEF trust fund, the funds established under the Marrakech Accord or development assistance. These advantages stem from the fact that the MAF insurance scheme releases funds within a legally clearly defined framework. Competition with other donor funding and fiscal priorities of Annex I countries do not come into play (Bals et al. 2006).
- An optimal form of private public partnership with the insurance sector is to be developed, while guaranteeing the interests of affected groups in vulnerable developing countries.
- The resources of the Insurance Pillar are reserved for the adjustment of market failures such as:
  - Extremely high damage potential for one single “low probability-high-risk” event, e.g. due to extreme weather events exceeding assets of any existing insurance pool,
  - Insufficient purchasing power to pay for insurance premiums of businesses and households in DCs and LDCs as a barrier to the development of an efficient insurance market,
  - High transaction costs of micro structure of risks and damages as a barrier to the development of an insurance market.
- The problem of moral hazard shall be overcome in the Insurance Pillar.
  - The sub-regional risk pooling will check free rider mentality to a certain extent. The payments from the Insurance Pillar shall actively encourage implementation of disaster risk reduction measures, because otherwise the insurance cover would decrease.

The largest share of revenues from the Insurance Pillar will flow into covering **low probability-high damage risks** of climate change. These are damages to core infrastructure (mostly public property) or compensation of lost assets/life of the most vulnerable groups of the population (refunding of disaster relief and rehabilitation action by Partner Government). Low probability risks include for example a one hundred year flood becoming a thirty year flood[13]. In order to ensure an effective use of revenues the Insurance Pillar would indirectly support affected groups in DCs and LDCs in paying their insurance premiums (insurance contracts either between MAF and private sector firms, between groups or a sub-region and MAF, or between groups or sub-regions and private a sector firm).

The insurance cover should be specified at the regional level and should be managed via public/private partnerships in which vertical risk sharing can be considered: While the private sector covers risks up to a certain limit, the public sector covers the climate-induced risks which exceed the possible risks that the private insurance sector is willing to take over. The threshold above which the risks exceed the private insurance coverage at the micro level needs to be clearly defined. In this process cooperation with the private sector is proposed.

A further refinement of the proposal could involve options for tendering insurance contracts at a regional/sub-regional level, based on agreements between the MAF and the regional parties. The insurance itself would be run by the overall operator of the system (public private partnership). Actors from the private sector could be commissioned to manage the Insurance Pillar at the regional/sub-regional level. A close cooperation between the MAF and the private sector will be necessary in order to profit from the private sector's experience in risk analysis and the concrete handling of insurance claims. Good governance principles and the knowledge of the private sector will contribute to mitigate the moral hazard problem. A public private partnership is also recommended by the biggest reinsurance companies as per their Climate Adaptation Development Programme (Swiss Re) and Climate Insurance Initiative (Munich Re).

Sub-regional "micro weather risks" are comparatively small damages (e.g. to small businesses or poor households in DCs and LDCs) due to weather anomalies which are increasing in frequency and scale due to climate change. These risks are currently difficult to cover by the private insurance sector as both the spending capacity for risk premiums and the knowledge about the risks are too low. A share of the revenue from the Insurance Pillar should be used for capacity building to develop (private) insurance markets in DCs and LDCs for evolving "micro weather" risks due to climate change and for developing the necessary data basis

13 Events likely to occur on an annual - 10 yearly bases shall be addressed through the prevention pillar or through micro level insurances.

4. ALLOCATION OF REVENUES

4.1. CALCULATION OF REVENUES

Based on a uniform global levy of 2 USD per ton CO_2 and the free allowance, revenues are calculated on the basis of projected CO_2 emissions for 2010.[14] Because up to 2010 and beyond, verified and reliable emissions data will only be available for energy sector based CO_2 emissions, the levy is only applied to CO_2 emissions from the burning of fossil fuels, for the time being. In order to implement the polluter pays principle, each country's part of its tax revenues to the MAF is determined by the country's GDP level:

› High income countries with a gross domestic product (GDP) above 20'000 USD/cap per year contribute the largest share to the MAF, namely 60% of their tax revenues.

› Medium income countries with a GDP level between 15'000 and 20'000 USD/cap per year pay 40% of their revenues to the MAF and keep 60% for financing their NCCFs.

› Low income countries with a GDP below USD 15'000 pay only 15% to the Multilateral Fund, and keep 85% for their NCCF[15]. The resulting country specific data is shown in table 3.

14 See Annex I for the calculation of technical tax rates per country/group of countries.

15 The GDP data available from the Energy Information Administration is expressed in purchasing power parity. For a further specification of the funding scheme, it needs to be checked if other data is available reflecting real cash flows. Considering the current re-evaluation of currencies, it also needs to be discussed if the scheme shall build on US Dollar as leading currency or much more on Euro.

REVENUE OF THE MAF AND NCCFS IN 2010							
	CO2 emissions in 2010	Technical tax rate	Revenue (in Mio.)	Contribution to MAF in % of revenue	Contribution to MAF (in Mio.)	Contribution to NCCF in %	Contribution to NCCF (in Mio.)
United States	6214.0	1.86	11551.2	60	6930.7	40	4620.5
Canada	648.0	1.89	1224.1	60	734.5	40	489.7
Mexico	481.0	1.57	753.0	15	113.0	85	640.1
OECD Europe	4493.0	1.68	7531.9	60	4519.2	40	3012.8
Japan	1274.0	1.69	2153.9	60	1292.3	40	861.6
South Korea	523.0	1.73	906.9	30	272.1	70	634.8
Australia, New Zealand	472.0	1.89	889.8	60	533.9	40	355.9
Russia	1809.0	1.79	3236.4	30	970.9	70	2265.5
China	6497.0	1.47	9571.2	15	1435.7	85	8135.5
India	1283.0	0.25	314.6	15	47.2	85	267.4
Indonesia	405.3	1.32	534.5	15	80.2	85	454.4
Non-OECD Asia	1524.7	1.41	2142.6	15	321.4	85	1821.2
Middle East	1602.0	1.69	2710.9	15	406.6	85	2304.2
South Africa	547.2	1.76	962.3	15	144.3	85	817.9
Other Africa	592.8	0.00	0.0	15	0.0	85	0.0
Brazil	403.0	1.75	704.1	15	105.6	85	598.5
Other Central & South America	831.0	1.54	1282.1	15	192.3	85	1089.8
Non-OECD Europe & Eurasia	1260.0	1.60	2018.6	15	302.8	85	1715.8
Total World	**30860.0**		**48488.2**		**18402.6**		**30085.6**

Table 3: Revenue of the National Climate Change Funds and the Multilateral Adaptation Fund per world region and differentiated for Annex I/non-Annex I countries.

The table above shows that the **Multilateral Adaptation Fund will generate revenues of USD 18.4 bn**. The **National Climate Change Funds will have total revenues of about USD 30 bn**.

4.2. ALLOCATION OF REVENUES OF THE MAF

The revenues of the MAF flow back to medium and low income countries via the prevention and Insurance Pillar as described above. High income countries do not receive any payments from the MAF. Both, the Prevention and the Insurance Pillar each, have funds available of about USD 9.2 bn per year. For both pillars these resources would mark a starting point: hurricane Katrina alone has led to damages of over USD 40 bn. With further economic growth in develop-

ing and newly industrialised countries, levels of potential economic damage are likely to rise. Post 2020 adjustments would need to be assessed in due time. Thanks to the close interaction foreseen between the Prevention and the Insurance Pillar, future climate exposure to such extensive damage risks should be reduced.

It is assumed that the proposed funding architecture enters into force with the ratification of a post 2012 international climate agreement. While financing of the Prevention Pillar can start directly with the coming into force of the agreement, financing of the Insurance Pillar needs to include an agreement for a transition period until the fund has accumulated enough reserves to cover climate related damages (e.g. based on a reinsurance arrangement with the private sector).

4.2.1. USE OF REVENUES – INSURANCE PILLAR

In order to illustrate the country specific allocations of funds from the Insurance Pillar and the total financial flows, a rough estimation for payments from the Insurance Pillar is based on the following assumptions:

- Two thirds of the insurance payments are allocated on the basis of projected GDP losses. Countries with high projected GDP losses are highly vulnerable to climate change and will thus obtain payments from the insurance.
- One third of the insurance payments is allocated on the basis of the population, because highly populated areas are more vulnerable, thus obtain higher payments.

Table 4 provides an estimation for the payments from the Insurance Pillar if they are based on the above-mentioned assumptions.

ALLOCATION OF REVENUES OF THE MAF FROM THE INSURANCE PILLAR ACCORDING TO A MIXED GDP/PER-CAPITA APPROACH									
	GDP in 2010	Projected climate change damages in %	Projected climate change damages (in bn. USD)	% of absolute damages	GDP-based contribution from Insurance Pillar (in bn. USD)	Population in 2010	% of population in non-industrialized countries	Per-capita based contribution from Insurance Pillar (in bn. USD)	Total contribution from Insurance Pillar (in bn. USD)
United States	12790	1.4	179.1			310			
Canada	1189	1.4	16.6			34			
Australia, New Zealand	799	3.7	29.6			25			
Japan	3789	5.8	219.8			128			
OECD Europe	12890	1	128.9			543			
South Korea	963	5.8	55.9	3.9%	0.24	49	0.8%	0.03	**0.3**
Russia	2624	0.6	15.7	1.1%	0.07	140	2.4%	0.07	**0.1**
South Africa	677	2	13.5	1.0%	0.06	50	0.9%	0.03	**0.1**
Mexico	1266	1.4	17.7	1.3%	0.08	113	1.9%	0.06	**0.1**
Non-OECD Europe & Eurasia	2147	2.3	49.4	3.5%	0.21	199	3.4%	0.11	**0.3**
China	12994	3.7	480.8	34.0%	2.08	1355	23.4%	0.72	**2.8**
Middle East	1951	0.8	15.6	1.1%	0.07	216	3.7%	0.11	**0.2**
Brazil	1778	1	17.8	1.3%	0.08	198	3.4%	0.10	**0.2**
Other Central & South America	2502	1	25.0	1.8%	0.11	287	4.9%	0.15	**0.3**
Non-OECD Asia	5687	5.8	329.8	23.3%	1.43	812	14.0%	0.43	**1.9**
India	5649	5.8	327.6	23.2%	1.42	1183	20.4%	0.63	**2.0**
Other Africa	2265	2	45.3	3.2%	0.20	957	16.5%	0.51	**0.7**
Indonesia	363	5.8	21.1	1.5%	0.09	242	4.2%	0.13	**0.2**
Total World	72323		1989			6531			
"Low income" group	40866		1415	1.00	6.13	5801	1.00	3.07	**9.20**

Table 4: Source: Energy Information Administration (2007). Assumptions: 2/3 of the payments of the insurance are determined through GDP losses, 1/3 are determined on a per-capita basis.

4.2.2. USE OF REVENUES – PREVENTION PILLAR

The global resources of the MAF channelled to the Prevention Pillar shall be earmarked for disaster risk prevention and adaptation measures. This proposal suggests allocating the resources of the Prevention Pillar on the basis of two indicators: an indicator reflecting the size of population and an indicator reflecting the relative vulnerability of the local economy to climate change.

An allocation based on climate change induced GDP damages alone would lead to a rather uneven distribution of revenues: countries with a low GDP, but highly affected by climate change in their subsistence economy would receive only low levels of funding under the Prevention Pillar though primary production and health needs substantive investment to adapt. Thus, the two-indicator approach is selected.

Countrywide quantitative vulnerability parameters are not available on a short to medium term basis. The information provided in the IPCC AR4 (IPCC 2007a and 2007b) should allow the generation of a simplified set of indicators. For illustration, the vulnerability indicator is based on the potential GDP losses derived by the integrated assessment model WIAGEM[16] and could lead to a vulnerability scale such as illustrated below:

› Low vulnerability: between 0.5 and 1.9% of GDP is lost due to climate change; vulnerability factor = 1,
› Medium vulnerability: between 2 and 4% of GDP is lost; vulnerability factor = 1.5,
› High vulnerability: loss of GDP is higher than 4%; vulnerability factor = 2.

Table 5 shows the approach and results for allocating the revenues of the Prevention Pillar.

16 Information on climate change damages is taken from latest results with the model WIAGEM (Kemfert 2002 and 2007) as cited in Thalmann (2007).)

REDISTRIBUTION OF THE MAF FROM THE PREVENTION PILLAR BASED ON A PER CAPITA/VULNERABILITY APPROACH						
	World Popula-tion 2010	Climate change damages in %	Vulnerability factor (based on GDP losses)	Weighted Population	% of weighted population	Contribution from MAF (in bn USD)
United States	310	1.4				
Canada	34	1.4				
Australia, New Zealand	25	3.7				
Japan	128	5.8				
OECD Europe	543	1.0				
South Korea	49	5.8	2	98.0	1.05	0.10
Russia	140	0.6	1	140.0	1.49	0.14
South Africa	50	2.0	1.5	75.5	0.81	0.07
Mexico	113	1.4	1	113.0	1.21	0.11
Non-OECD Europe & Eura-sia	199	2.3	1.5	298.5	3.19	0.29
China	1355	3.7	1.5	2032.5	21.70	2.00
Middle East	216	0.8	1	216.0	2.31	0.21
Brazil	198	1.0	1	198.0	2.11	0.19
Other Central & South America	287	1.0	1	287.0	3.06	0.28
Non-OECD Asia	812	5.8	2	1623.2	17.33	1.59
India	1183	5.8	2	2366.0	25.26	2.32
Other Africa	957	2.0	1.5	1435.0	15.32	1.41
Indonesia	242	5.8	2	484.8	5.18	0.48
Total World	6841					
"Low income" group	5801			9368	100.00	9.20

Table 5: Source for world population: Energy Information Administration (2007), own calculations.

If this approach is further developed, the vulnerability factor might need to include other factors besides GDP losses, especially factors which cannot be monetised (e.g. the loss of human lives).

4.3. DISBURSEMENT UNDER THE FUNDING SCHEME

For illustrating the distributional impacts of the funding scheme, Table 6 provides an overview of the net financial flows between the participating regions. The last column illustrates the total receipts from both the NCCF and the MAF by region. The transfer of finances from industrial-ised to developing countries is shown in the second-to-last column (net payments from the MAF to developing countries).

INDICATIVE FINANCE FLOWS BETWEEN PARTICIPATING REGIONS						
	Total revenue of tax	Revenue going to MAF	Payments obtained from Prevention Pillar	Payments obtained from Insurance Pillar	Net payments to and from MAF	Net receipts from NCCF plus contributions from the MAF
United States	11551	6'930.69			-6930.7	4620
Canada	1224	734.48			-734.5	490
Australia, New Zealand	890	533.89			-533.9	356
Japan	2154	1'292.33			-1292.3	862
OECD Europe	7532	4'519.16			-4519.2	3013
Total High income group	*23351*	*14011*	*0*	*0*	*-14011*	*9340*
South Korea	907	272.07	96.3	268.0	92.2	999
Russia	3236	970.92	137.5	142.3	-691.1	2545
South Africa	962	144.34	74.2	85.3	15.1	977
Mexico	753	112.95	111.0	136.6	134.6	888
Non-OECD Europe & Eurasia	2019	302.80	293.2	319.2	309.7	2328
China	9571	1'435.68	1996.4	2800.3	3361.0	12932
Middle East	2711	406.63	212.2	181.9	-12.6	2698
Brazil	704	105.61	194.5	181.8	270.6	975
Other Central & South America	1282	192.32	281.9	260.2	349.8	1632
Non-OECD Asia	2143	321.39	1594.4	1858.8	3131.7	5274
India	315	47.19	2324.0	2045.6	4322.4	4637
Other Africa	0	0.00	1409.5	702.2	2111.7	2112
Indonesia	535	80.18	476.2	219.4	615.5	1150
Total Low and Medium income group	*25137*	*4392*	*9201*	*9201*	*14011*	*39148*
Total World	48488	18403	9201	9201	0	48488

Table 6: Overview of financial flows between participating regions as induced by the funding scheme. Column 5 shows the MAF related net receipts (+) to, or the net payments of (-) each region, while column 6 shows the resources available to each region for its climate proof policies due to the global funding scheme (MAF and NCCFs). Source: Energy Information Administration (2007), own calculations. Data basis is the year 2010.

Figure 5 illustrates the contributions (USD per capita) from high income and medium/low income countries to the different pillars of the fund, as well as the transfers received from the funds. The net finance flows need to be seen as indicative and might look considerably different if a further differentiation of countries within the regions is considered: e.g. in the Middle East region, low income countries with low level of oil production and associated emissions (like Syria or Lebanon) would receive disbursements exceeding their contributions, while the medium

to high income countries in the region with high emissions and incomes from petroleum and gas industry would be net contributors.

The scheme delivers a significant north-south resource transfer: 76% of the revenues of the MAF come from industrialized countries. This transfer reflects the common but differentiated shares of responsibility for the climate change problem. Due to the low taxation level across all sectors, the scheme establishes a moderate additional financial burden for high or medium income countries (2 USD/t CO_2 corresponds to some 0.5 US cents/litre of gasoline).

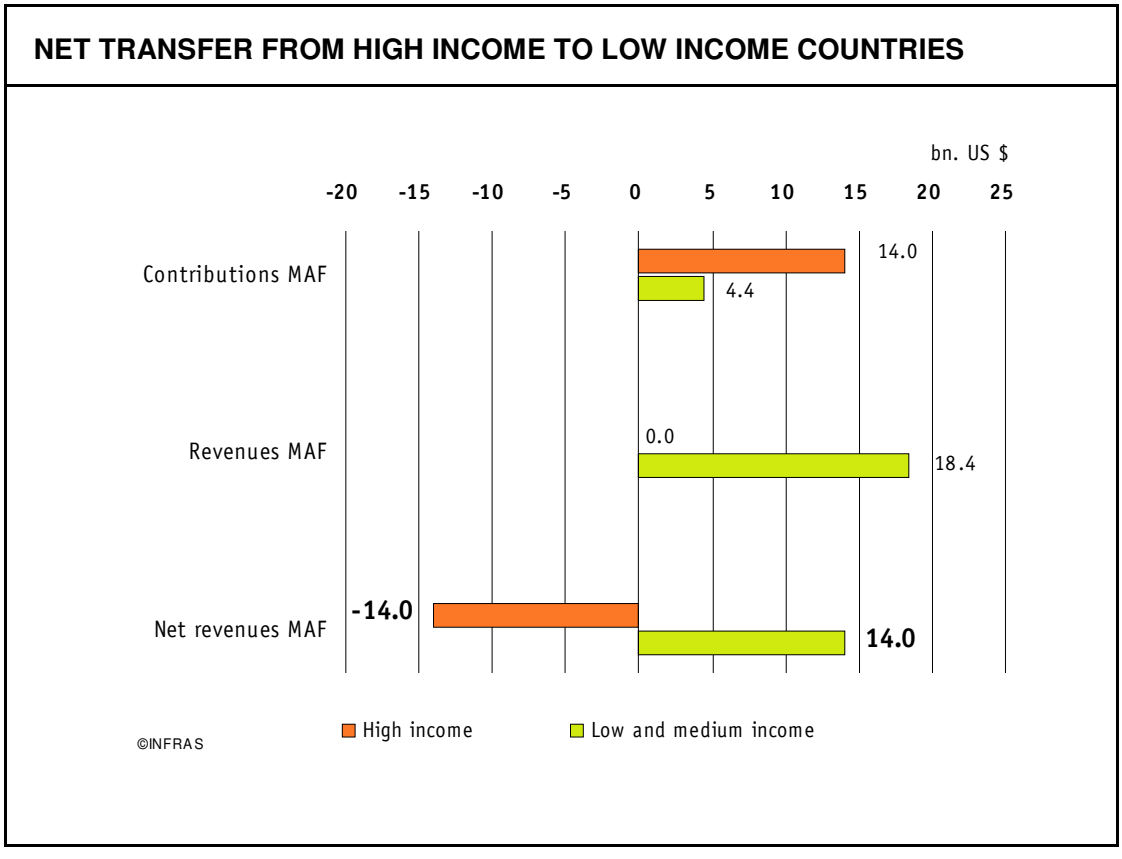

Figure 5: How many USD per year does a country from the high income/medium income/low income group contribute to, and receive from the MAF? High income countries contribute 14 bn USD, but do not receive any funds. Medium and low income countries contribute 4.4 bn USD and receive 18.4 bn USD.

A preliminary impact assessment considering economic and distributional impacts is included in Annex II of this proposal.

5. IMPLEMENTATION AND GOVERNANCE

When implementing the funding scheme, several specific implementation questions arise. These include both, institutional-organisational as well as legal aspects, and need to be answered in order to ensure an effective functioning of the funding scheme. This chapter depicts some crucial implementation questions and identifies questions for further investigation and discussion.

Collection of the CO_2 based levy

The collection of the fossil fuel based CO_2 based levy is not conceived as a centralized globally uniform scheme but shall be defined by each party at the national level, building on its taxation systems already in place. Industrialised countries already charging energy or CO_2 with the help of market-based instruments may directly link the new levy to existing mechanisms in order to reduce administrative costs. According to the initial national communications submitted by 135 DC and LDCs, almost all these parties levy customs and duties on imported fossil fuels. LDCs in particular may wish to introduce a CO_2 based levy in a step by step approach taking advantage of reforms of their fuel taxation systems, minimizing adverse economic impacts and taking into consideration regionally coordinated approaches to minimize additional regulations in cross boarder trade.

Development of the institutional architecture of the MAF

The Bali Action Plan targets the establishment of a robust financial architecture for addressing climate change related funding needs of developing countries. This architecture is likely to comprise a technology transfer and an adaptation component. This paper assumes that both components would enter into force with the ratification of the Copenhagen Agreement. To ease the start up of the proposed global funding scheme, the newly industrialized countries as well as the developing countries intending to benefit from the proposed support in adaptation funding could be granted a start up period of 5 years to establish the respective legislation after an international agreement according to the Bali Action Plan shall have entered into force. During this period, the revenues from industrialized countries, which have already introduced a carbon tax for addressing the cost of climate change adaptation, could be redistributed through the governance structure of the Adaptation Fund.

Integration of international bunker fuels

The proposed integration of international bunker fuels into the Multilateral Adaptation Fund is justified by the polluter pays principle. It may, however, raise distributional issues. The emissions of bunker fuels are not allocated on the basis of the territoriality principle but on the basis of the sales point of the fuel. Transportation hubs such as international airports or ports thus will generate sizable revenue from the CO_2 based levy[17]. Alternative solutions for the allocation of the emissions and related tax revenues shall be discussed jointly with other interested parties during the additional design process. The Norwegian proposal on carbon tax from marine bunker fuels might be one approach to consider.

Risks and possible adverse incentives

Mechanisms based on the insurance principle always bear the risk of moral hazard which can lead to a "lean-back" attitude, preventing countries from taking action. Due to its two-pillar mechanism, the global adaptation funding scheme could reduce the risk of moral hazard as the MAF ensures that preventive adaptation measures and insurance protection to cover curative measures go hand in hand.

Minimal requirements for legal arrangements and regulation

A sound but simple legal arrangement will be vital for motivating Parties to participate in the scheme. The implementation modalities may foresee a grace period of up to-5 years during which taxation of CO_2 emissions could be voluntary, when a country has crossed the critical threshold of 1.5 t CO_2e/cap. This leaves some flexibility to the countries to prepare the legislation at parliamentary level, along with other fiscal reforms. Although the NCCFs are governed solely by the national law of each party, according to the subsidiarity principle, the legal arrangement should include guidelines or best-practice measures for the use of revenue from the NCCFs.

Institutional development, role of the private sector

Possibilities on how to best involve actors of the private sector into the funding scheme, especially with respect to the management of the Insurance Pillar, shall be subject to further investi-

17 For important international aviation hubs at the Gulf in West Asia or City states such as Singapore to significant revenue for the National Climate Change Fund from international air transportation. Considering that only 10% of the revenue is channelled to the Multilateral Fund, there the resource gain for the NCCF could be seen as an incentive to introduce the tax also in important non Annex I countries. This would maintain a level playing field for the air transportation industry.

gation and multilateral discussion. The Insurance Pillar shall use the experience of the private insurance sector to the extent possible, especially for risk analysis and the broad pooling of risks. At the same time, the legitimate interests of the affected developing population must be ensured.

6. ADDITIONAL WORK

This paper outlines cornerstones of a global climate change programme financing scheme with a clear focus on adaptation within a multilateral funding mechanism. At this stage the level consultation and investigation about this proposal has been limited. Hence this paper presents a leading idea and a tool box of instruments for refinement and discussion with other interested parties.

Open issues and questions which do need further investigation are

- How to best integrate the proposed scheme into the current negotiation process under the Bali Action Plan for a post 2012 international UNFCCC agreement. in particular:
  - How to best combine/delineate this proposal with other proposals such as the Mexican proposal on funding technology transfer or the Norwegian proposal on international bunker fuels.
  - How to ensure an effective governance taking into account the operation of the Adaptation Fund and the World Bank Climate Investment Funds.
- How to best further develop the leading idea and the relevant design parameters of the scheme in order to attract sufficient support from other parties to justify a comprehensive assessment process? For example, the proposed level of taxation is indicative, to allow for such an additional consultation process.
- A core challenge will be the design of the Insurance and the Prevention Pillar of the Multilateral Adaptation Fund. Related key issues are: On the basis of which indicators shall the basis for the allocation of the resources of the MAF to beneficiaries be formed? The IPCC (2007b) Assessment Report does not quantify current/future economic impact or vulnerability of different regions in a single indicator, though it compiles the available relevant information.
- Issues related to implementation modalities on how the CO_2 based levy can best be levied, depending on the institutional and legal framework of each party.

Next steps

Interested Parties are invited to cooperate in a process to further develop and consolidate the proposed scheme.

ANNEX I CALCULATION OF TECHNICAL TAX RATES

For the determination of emission levels, total greenhouse gas emissions (including LULUCF) per capita have been considered. As GHG emissions per capita including LULUCF for a base year 2000 or later (base year of the initial national communications for non Annex I counties are 1990 or 1994) have not yet been compiled for all countries and for the groups considered for the MAF, an approximation had to be done as a first step for estimating the quantitative implications of the proposed scheme:

› For the individual countries considered in this paper, the most recent data on CO_2 emissions, other GHG emissions and LULUCF available have been taken from the UNFCCC database. The difference between CO_2 emissions only and emissions of all GHG emissions including LULUCF has been calculated as a relative expansion factor applied to the energy sector based CO_2 emissions. This expansion factor has been applied to CO_2 projections for 2010 from the Energy Information Administration which serves as basis for the quantity structure.

› For the group of countries, the expansion factor has been identified based on a representative sample of countries from this group (see Table 14 in Annex III). The resulting expansion factor is seen as first approximation to assess the quantitative implication of the scheme. The framework of figures needs to be updated and the data sources firmly specified if the proposed scheme would be considered to become part of the negotiation process.

› The proposed scheme underscores the importance of national communications. It is suggested that national communications/GHG inventories of countries with a per capita emission exceeding 1.5 t CO2e would have to be prepared at shorter intervals then required under the present regime 17/CP8.

The following table shows the expansion factor which has been derived on the basis of the UNFCCC database as well as the resulting greenhouse gas emissions including LULUCF. Information on CO_2 emissions is included in Annex III.

GREENHOUSE GAS EMISSIONS INCLUDING LULUCF			
(in Mio. tons)	**CO_2 2010**	**Expansion factor (1+x) CO_2 to all GHG incl. LULUCF**	**All GHG including LU-LUCF 2010**
United States	6214	6%	6590.7
Canada	648	42%	919.8
Mexico	481	62%	780.2
OECD Europe	4493	12%	5033.5
Japan	1274	0%	1274.0
South Korea	523	6%	552.7
Australia, New Zealand	472	38%	653.3
Russia	1809	10%	1991.0
China	6497	19%	7716.0
India	1283	58%	2022.5
Indonesia	405	163%	1067.8
Non-OECD Asia	1525	169%	4093.9
Middle East	1602	31%	2105.1
South Africa	547	14%	625.6
Other Africa	593	0%	592.8
Brazil[18]	403	483%	2348.8
Other Central & South America	831	127%	1883.5
Non-OECD Europe & Eurasia	1260	19%	1500.3
Total World	30860		**41751**

Table 7: Estimation of GHG emissions for 2010 based on EIA 2007 and www.unfccc.int.

Based on population projections for 2010 by the EIA, the absolute CO_2 equivalents have been broken down into CO_2 equivalent emissions per capita. The calculation of the technical tax rates is illustrated in the following table. The table shows the free allowance (i.e free emission level per capita) which has been set at 1.5 t CO_2 e/capita. The general tax rate has been set at 2 USD per ton CO_2 equivalents for all countries. As it is not possible to only tax the emissions above 1.5 t CO_2e/capita, a technical tax is calculated including the free allowance. Considering this free allowance, the technical tax rates grow with rising emissions and converge to the level of 2 USD. The table shows the (groups) of countries ranking from low-emission to high-emission countries.

18 For Brazil, the expansion factor seems rather high. This might be due to the fact that the last available data on emissions from LULUCF for Brazil in the UNFCCC database are from 1995. Since that date, Brazil has however taken first steps to preserve carbon sinks so that the provision of more current data would result in a lower expansion factor.

CALCULATION OF TECHNICAL TAX RATES					
	CO_2e/ capita (in t)	free allowance	t CO_2e/capita incl. free allowance	Overall tax rate	Technical tax rate
Other Africa	0.6	1.5	0.00	2	0.00
India	1.7	1.5	0.21	2	0.25
Indonesia	4.4	1.5	2.90	2	1.32
Non-OECD Asia	5.0	1.5	3.54	2	1.41
China	5.7	1.5	4.19	2	1.47
Other Central & South America	6.6	1.5	5.06	2	1.54
Mexico	6.9	1.5	5.40	2	1.57
Non-OECD Europe & Eurasia	7.5	1.5	6.04	2	1.60
OECD Europe	9.3	1.5	7.77	2	1.68
Japan	9.7	1.5	8.20	2	1.69
Middle East	9.7	1.5	8.25	2	1.69
South Korea	11.3	1.5	9.78	2	1.73
Brazil	11.9	1.5	10.36	2	1.75
South Africa	12.4	1.5	10.92	2	1.76
Russia	14.2	1.5	12.72	2	1.79
United States	21.3	1.5	19.76	2	1.86
Australia, New Zealand	26.1	1.5	24.63	2	1.89
Canada	27.1	1.5	25.55	2	1.89

Table 8: Technical tax rates by country/region based on total GHG emission per capita 2010 and the tax free allowance of 1.5 t CO_2e/cap.

ANNEX II PRELIMINARY ASSESSMENT OF IMPACTS

The following impact assessment is preliminary only. More detailed analysis and assessment is needed. On a global scale, it needs to be assessed whether the funding scheme leads to clearly undesirable economic or distributional impacts. Especially, it is important to assess to what extent the overall impacts are in line with the principles of the funding scheme and if any of the principles are undermined.

Overall impacts of the funding scheme

› **Impacts on economic growth:** As only a low CO_2 based levy is introduced, experience suggests that the levy will not have significant negative effects on economic growth and GDP in industrialised countries. Also, in emerging economies and DCs negative economic impacts are unlikely thanks to the tax exempt emission level of 1.5 t CO_2/capita and the transfer of financial resources from the MAF. Much more, the funding scheme can lead to positive economic impacts in DCs and LDCs, as adaptation measures can reduce the potential GDP damages caused by climate change.

› **Global solidarity:** In spite of the low level of the levy, the fund will raise resources which are about 50 times higher than the transfers under current funding mechanisms (GEF; LDC funds). This marks a first significant step toward a common approach to fund climate change related adaptation needs and to finance climate change related damages. On the basis of a preliminary assessment, both the principles of global solidarity and subsidiarity are met and existing climate change activities are not at risk.

› **Distributional impacts:** During the future design and discussion process of this Swiss proposal an important issue to analyse in more depth is the question of the distributional and social impacts, and their desirability or undesirability. The impacts on the poor segments of the population are of particular interest and importance.

› **Impacts on competitiveness, steering effects:** As the CO_2 tax will be introduced with the same rate of USD 2 per ton of CO_2 on a global scale for all countries with emissions of more than 1.5t CO_2/cap, no distortion of international competition is to be expected. The free allowance of 1.5tCO_2/cap does not provoke any impacts on competitiveness: Furthermore the low level of the CO_2 based levy is designed to have only a financing function and no steering effects because the changes in prices of goods and services are insignificant. Accordingly, the levy does not produce any significant incentives leading to steering effects and structural changes in the economy.

› **Minor changes in Fuel prices only:** The low level of the CO_2 based levy leads to small increases in fuel prices only. Using an emission factor of petrol of 2.3 kg CO_2/litre, a levy of USD 2 per tonne CO_2 leads to a burden of about 0.5 US cents/litre of liquid fuel in industrialized countries with the highest per capita emissions. In lower income countries the tax level would only be in the order of USD 0.3-1.6 per tonne CO_2 corresponding to a fuel price increase of about 0.1-0.4 US cents/litre (see Table 9).

As fuel and electricity prices in developing countries are often regulated it will be difficult to adjust prices by just such nominal amounts. However, the price adjustments could become politically more sensitive than the economic impact would suggest.

EFFECTS OF THE CO_2 BASED LEVY ON LOCAL DIESEL PRICES

	Diesel price/litre in local currency	Diesel price/litre in USD	Tax rate USD/t CO_2	Increased diesel price/litre in USD (including CO_2 levy)	Increased diesel price/litre local currency (including CO_2 levyt)
South Africa	8.10 rand per litre	1.072	1.76	1.077	8.146
Germany	1.163 Euro per litre	1.815	1.68	1.820	1.166
China	5.28 Yuan per litre	0.757	1.47	0.761	5.322
India	36.08 Rs per litre	0.894	0.25	0.894	36.116
USA	1.1 USD per litre	1.110	1.86	1.115	1.115

Table 9: Influence of carbon tax on local diesel prices. http://www.moneyhouse.ch/rechner.htm Exchange rates from 30.04.2008.

Revenues flowing through national climate change funds (NCCF)

The impact of the part of the revenue which is used at the national level[19] is determined by national legislation. The disbursement modalities of the Multilateral Fund may suggest a clause which commits recipient countries to use the largest part of the revenue for mitigation or adaptation measures within their national territory. This leads to the following impacts:

› If the tax flow is not re-distributed to private households and firms, their income decreases and the welfare level is reduced somewhat, according to their level of fossil fuel consumption.

› The adaptation policies financed through the NCCF can lower damages due to climate change and thus are expected to increase welfare levels.

› The second effect can (partly) compensate the direct welfare loss of the levy.

19 40% of revenues in high-income countries, 60% of the revenues in medium income countries, 85% in low income countries.

Revenues flowing through the Multilateral Adaptation Fund: Insurance Pillar

50% of the MAF is earmarked for insuring public goods in case of severe events due to climate change. The allocation of the resources depends on the occurrence of unforeseen climate change events and cannot be predicted in advance. However, it is highly probable that countries with high vulnerability and high projected GDP damages have a higher risk of severe events and resulting payments from the Insurance Pillar. Furthermore, the population density shall partly determine the probability of payments from the Insurance Pillar as climate change damages in highly populated areas will exceed the damages in areas with low population densities (see Table 4).

Revenues flowing through the Multilateral Adaptation Fund: Prevention Pillar

50% of the MAF are used for financing climate proof development policies and prevention measures, i.e. for disaster risk reduction and adaptation in developing and medium income countries. Different options for the allocation of this global contribution shall be further investigated while working out the proposed funding mechanism in more detail. The depicted approach in chapter 4.2.2 avoids GDP as an indicator and allocates the resources on a per-capita basis, modified by a vulnerability factor (see Table 5).

The distribution on the per-capita/vulnerability approach redistributes the revenue of the Prevention Pillar equitable between the regions. The net financial flows between world regions would lead to positive net flows for most medium and low income countries (except Russia and the Middle East region), giving them a clear incentive to participate in the funding scheme.

ANNEX III BACKGROUND DATA

ENERGY-RELATED CO2 EMISSIONS BY REGION, REFERENCE CASE, 1990-2030						
(in Mio. tons)	**1990**	**2003**	**2004**	**2010**	**2020**	**2030**
United States	4989	5800	5923	6214	6944	7950
Canada	474	589	584	648	694	750
Mexico	300	385	385	481	592	699
OECD Europe	4092	4321	4381	4493	4579	4684
Japan	1015	1244	1262	1274	1294	1306
South Korea	238	475	497	523	614	691
Australia, New Zealand	291	410	424	472	516	573
Russia	2334	1602	1685	1809	2018	2185
China	2241	3898	4707	6497	8795	11239
India	578	1040	1111	1283	1720	2156
Indonesia**	169	324	335	405	546	660
Non-OECD Asia	638	1218	1258	1525	2054	2481
Middle East	705	1211	1289	1602	1976	2306
South Africa*	312	430	438	547	683	794
Other Africa	337	465	481	593	740	1
Brazil	220	317	334	403	500	597
Other Central & South America	453	664	693	831	1062	1254
Non-OECD Europe & Eurasia	1860	1115	1135	1260	1527	2554
Total World	**21246**	**25508**	**26922**	**30860**	**36854**	**42880**

Table 10 Source: Energy Information Administration: International Energy Outlook 2007, Reference Case.

* South Africa: Specific projections are not included in the IEO. It is assumed that South Africa maintains the current share of CO_2-emissions of total Africa (South Africa 2004: 438.1 Mio t, Africa: 919 Mio. t, share of South Africa: 48%.

** Indonesia: Specific projections are not included in the IEO. It is assumed that Indonesia maintains the current share of CO_2-Emissions of non-OECD Asia (Indonesia 2004: 341.6, Non-OECD Asia: 1593, share Indonesia: 21.4%.

CO2 EMISSIONS OF LEAST DEVELOPED COUNTRIES (IN THOUSAND TONS)			
Country	CO2 emis-sions (in 1000)	Country	CO2 emissions (in 1000)
Afghanistan	1'096	Madagascar	1'202
Angola	5'163	Malawi	725
Bangladesh	14'487	Maldives	304
Benin	744	Mali	480
Bhutan	392	Mauritania	2'950
Burkina Faso	971	Mozambique	1'110
Burundi	224	Myanmar	8'493
Cambodia	513	Nepal	2'026
Cape Verde	121	Niger	1'107
Central African Republic	242	Rwanda	495
Chad	110	Samoa	132
Comoros	66	Sao Tomé and Principe	77
Democratic Republic of Congo	2'334	Senegal	3'133
Djibouti	366	Sierra Leone	465
Equatorial Guinea	612	Solomon Islands	161
Eritrea	0	Somalia	15
Ethiopia	7'894	Sudan	3'620
Gambia	216	Timor-Leste	0
Guinea	1'092	Togo	802
Guinea-Bissau	231	Tuvalu	5
Haiti	1'389	Uganda	1'070
Kiribati	22	Tanzania	2'466
Lao People's Democratic Rep.	352	Vanuatu	62
Lesotho	636	Yemen	16'162
Liberia	333	Zambia	2'455
		Total LDC	89'123

Table 11: Source: United Nations, http://www.cyberschoolbus.un.org/infonation/index.asp?theme=env.

WORLD POPULATION BY REGION, REFERENCE CASE, 1990-2030						
(in Mio.)	**1990**	**2003**	**2004**	**2010**	**2020**	**2030**
United States	254	291	294	310	337	365
Canada	28	32	32	34	36	39
Mexico	84	104	106	113	125	133
OECD Europe	497	530	532	543	555	562
Japan	124	128	128	128	127	123
South Korea	43	47	48	49	49	49
Australia, New Zealand	20	24	24	25	28	30
Russia	148	145	144	140	133	125
China	1155	1299	1307	1355	1424	1446
India	849	1070	1087	1183	1332	1449
Indonesia**	171	218	217	242	276	307
Non-OECD Asia	572	728	745	812	926	1028
Middle East	137	187	191	216	260	301
South Africa*	31.8	43	44	50	61.4	73
Other Africa	604	826	843	957	1167	1390
Brazil	149	181	184	198	219	236
Other Central & South America	210	260	264	287	323	354
Non-OECD Europe & Eurasia	201	199	198	199	199	193
Total World	5278	6312	6388	6841	7577	8203

Table 12: Source: Energy Information Administration (2007).
* South Africa: Specific projections are not included in the IEO. It is assumed that South Africa maintains ist current share of population of total Africa (South Africa 2004: 44.5 Mio, Africa: 887 Mio., share of South Africa: 5%
** Indonesia 2004: 217 Mio., non-OECD Asia: 962 mio., share of Indonesia: 23

GROSS DOMESTIC PRODUCT, GDP, IN BN USD								
(in bn USD)	**1990**	**2003**	**2004**	**2010**	**2030**	**Growth rates 2003-2030**	**Growth rates 2030-2050**	**2050**
United States	7113	10301	10704	12790	22494	2.79	2.79	38570
Canada	684	973	1005	1189	1829	2.24	2.24	2821
Mexico	680	975	1016	1266	2560	3.48	3.48	5041
OECD Europe	8067	10850	11132	12890	19913	2.18	2.18	30509
Japan	2862	3289	3363	3789	4476	1.06	1.06	5468
South Korea	331	683	715	963	1764	3.40	3.40	3401
Australia, New Zealand	429	658	682	799	1433	2.79	2.79	2463
Russia	2241	1780	1907	2624	4954	3.60	1.80	6844
China	2002	7013	7722	12994	39594	6.24	3.12	70632
India	1703	3434	3727	5649	15607	5.44	2.72	25954
Indonesia **	137.46	247.5	256.99	363	855.54	4.56	2.28	1352
Non-OECD Asia	2153.54	3877.5	4136.01	5687	13403.46	4.45	2.23	20384
Middle East	820	1364	1453	1951	4230	4.04	2.02	6161
South Africa*	333.5	472.88	497.03	676.66	1703.84	4.67	2.33	2692
Other Africa	1116.5	1583.12	1663.97	2265.34	5704.16	4.67	2.33	9012
Brazil	1022	1378	1446	1778	3429	3.24	1.62	4657
Other Central & South America	1169	1733	1852	2502	5440	4.07	2.04	7927
Non-OECD Europe & Eurasia	1358	1302	1426	2147	4923	4.70	2.35	7486
Total World	34222	51914	54704	72323	154313	3.92		251373

Table 13: Source: International Energy Administration (2007); Assumptions: Non-industrialised countries have a higher growth rate until 2030 (as projected by IEO) but converge to growth rates of industrialised countries between 2030 and 2050. Thus, growth rates of 2002-2030 are reduced by 50% for the period 2030-2050.
* South Africa: Specific projections are not included in the IEO. It is assumed that South Africa maintains the current share of GDP of total Africa (South Africa 2004: 491.4 Bio. USD, Africa: 2161 Bio. USD, share of South Africa: 23%
** Indonesia: same methodology: Indonesia maintains the current share of GDP of non-OECD Asia (Indonesia: 257 bn USD, non-OECD asia: 4393 bn USD; share of Indonesia: 6%

GHG DATA PER COUNTRY/REGION (IN 1000 TONS), 2004

Country	Represents Region	CO2	Other GHG	Total GHG (without LU-LUCF)	LULUCF	Total GHG (with LU-LUCF)		Increase CO2 --> GHG	Increase CO2 --> all GHG (with LULUCF)
United States	United States	6'064'328.64	1'177'153.48	7'241'482.12	-809'547.38	6'431'934.74		19%	6%
Canada	Canada	583'427.80	163'921.93	747'349.73	80'765.69	828'115.42		28%	42%
Mexico	Mexico	393'532.45	154'966.72	548'499.17	89'854.00	638'353.17		39%	62%
EU 27	OECD Europe	4'287'578.95	914'865.90	5'202'444.85	-421'224.95	4'781'219.90		21%	12%
Island	OECD Europe non EU27	45'746.89	22'912.42	68'659.31	-194.59	68'464.72		50%	50%
Norwegian	OECD Europe non EU27	43'855.23	11'036.36	54'891.59	-25'504.90	29'386.69		25%	-33%
Switzerland	OECD Europe non EU27	45'965.97	7'669.83	53'635.80	-248.59	53'387.21		17%	16%
Turkey	OECD Europe non EU27	241'884.43	51'925.41	293'809.84	0.00	293'809.84		21%	21%
OECD Europe	Total	4'665'031.47		5'673'441.39		5'226'268.36		22%	12%
Russia	Russia	1'698'063.97	388'344.57	2'086'408.54	-217'511.59	1'868'896.95		23%	10%
Ukraine	Other non-OECD Europe and Eurasia	315'631.42	97'749.55	413'380.97	-61'179.38	352'201.59		31%	12%
Armenia	Other non-OECD Europe and Eurasia	22'013.08	3'299.13	25'312.21	-617.00	24'695.21		15%	12%
Mongolia	Other non-OECD Europe and Eurasia	9'061.10	6'868.60	15'929.70	-333.00	15'596.70		76%	72%
Uzbekistan	Other non-OECD Europe and Eurasia	102'157.00	51'731.00	153'888.00	-399.00	153'489.00		51%	50%
Kazakhstan	Other non-OECD Europe and Eurasia	168'804.10	41'408.37	210'212.47	-7'441.30	202'771.17		25%	20%
Kirgizia	Other non-OECD Europe and Eurasia	11'697.53	3'354.08	15'051.61	-968.28	14'083.33		29%	20%
Tadzhikistan	Other non-OECD Europe and Eurasia	1'867.40	2'417.00	4'284.40	-1'486.80	2'797.60		129%	50%
Turkmenistan	Other non-OECD Europe and Eurasia	31'859.07	20'450.47	52'309.54	-380.60	51'928.94		64%	63%
Albania	Other non-OECD Europe and Eurasia	3'101.66	2'432.21	5'533.87	1'525.46	7'059.33		78%	128%
Belarus	Other non-OECD Europe and Eurasia	54'919.64	19'388.60	74'308.24	-23'711.57	50'596.67		35%	-8%
Romania	Other non-OECD Europe and Eurasia	116'746.88	43'312.54	160'059.42	-35'768.14	124'291.28		37%	6%
Bulgaria	Other non-OECD Europe and Eurasia	53'263.51	15'836.38	69'099.89	-8'174.40	60'925.49		30%	14%
Macedonia	Other non-OECD Europe and Eurasia	10'184.35	4'885.92	15'070.27	-2'275.61	12'794.66		48%	26%
Other non-OECD Europe and Eurasia	Total	901'306.74		1'214'440.59		1'073'230.97		35%	19%

China	China	3'073'470.00	984'147.00	4'057'617.00	-407'479.00	3'650'138.00		32%	19%
India	India	779'348.00	434'800.00	1'214'148.00	14'392.14	1'228'540.14		56%	58%
Indonesia	Indonesia	189'146.31	145'044.90	334'191.21	164'118.32	498'309.53		77%	163%
South Korea	South Korea	480'983.00	61'910.90	542'893.90	-34'642.00	508'251.90		13%	6%
Japan	Japan	1'287'604.93	69'384.49	1'356'989.42	-102'411.53	1'254'577.89		5%	-3%
Vietnam	Other non-OECD Asia	25'382.82	59'071.24	84'454.06	19'388.40	103'842.46		233%	309%
Thailand	Other non-OECD Asia	141453.2	82'536.93	223990.13	61'853.82	285843.95		58%	102%
Cambodia	Other non-OECD Asia	1321.93	11'440.66	12762.59	-17'907.69	-5145.1		865%	-489%
Singapore	Other non-OECD Asia	26800.18	58.90	26859.08	0.00	26859.08		0%	0%
Malaysia	Other non-OECD Asia	89706	46'974.77	136680.77	-61'077.96	75602.81		52%	-16%
Bangladesh	Other non-OECD Asia	16459.73	29'466.42	45926.15	7'837.97	53764.12		179%	227%
Maldives	Other non-OECD Asia	129	23.98	152.98	0.00	152.98		19%	19%
Pakistan	Other non-OECD Asia	88411.4	72'177.80	160589.2	6'527.10	167116.3		82%	89%
Sri Lanka	Other non-OECD Asia	5644	23'484.00	29128	379'079.00	408207		416%	7133%
Philippines	Other non-OECD Asia	57932	42'934.61	100866.61	-126.49	100740.12		74%	74%
Other non-OECD Asia	Total	453'240.26	368'169.31	821'409.57	395'574.15	1'216'983.72		81%	169%
Iran	Middle East	310'645.33	74'787.97	385'433.30	31'578.22	417'011.52		24%	34%
VAE	Middle East	63'690.00	66'746.50	130'436.50	-4'227.00	126'209.50		105%	98%
Lebanon	Middle East	13'602.76	2'099.57	15'702.33	206.25	15'908.58		15%	17%
Egypt	Middle East	84'235.00	32'504.56	116'739.56	-9'900.00	106'839.56		39%	27%
Armenia	Middle East	22'013.08	3'299.13	25'312.21	-617.00	24'695.21		15%	12%
Bahrain	Middle East	16'483.00	3'115.96	19'598.96	0.00	19'598.96		19%	19%
Georgia	Middle East	8'239.00	4'651.00	12'890.00	1'154.86	14'044.86		56%	70%
Israel	Middle East	52'233.00	10'843.39	63'076.39	-374.00	62'702.39		21%	20%
Yemen	Middle East	10'514.96	7'355.15	17'870.11	-9'670.18	8'199.93		70%	-22%
Jordan	Middle East	13'389.43	8'554.01	21'943.44	-3'573.88	18'369.56		64%	37%
Saudi-Arabia	Middle East	138'265.50	27'003.47	165'268.97	-15'240.00	150'028.97		20%	9%
Middle East	Total	733'311.06		974'271.77		963'609.04		33%	31%

South Africa	South Africa	315'957.23	63'879.93	379'837.16	-18'625.96	361'211.20		20%	14%
Algeria	Other Africa	63'705.00	28'053.00	91'758.00	8'586.00	100'344.00		44%	58%
Congo	Other Africa	673.70	700.99	1'374.69	-69'860.68	-68'485.99		104%	-10266%
Mali	Other Africa	954.61	7'711.60	8'666.21	-9'748.06	-1'081.85		808%	-213%
Botswana	Other Africa	3'014.50	6'277.24	9'291.74	-38'733.60	-29'441.86		208%	-1077%
Burkina Faso	Other Africa	902.00	5'066.24	5'968.24	-1'388.70	4'579.54		562%	408%
Burundi	Other Africa	143.18	1'852.26	1'995.44	-2'998.42	-1'002.98		1294%	-801%
Cameroon	Other Africa	2'769.52	162'955.50	165'725.02	22'186.37	187'911.39		5884%	6685%
Central African Republic	Other Africa	212.00	37'525.00	37'737.00	-139'315.00	-101'578.00		17700%	-48014%
Chad	Other Africa	309.65	7'711.45	8'021.10	-46'198.12	-38'177.02		2490%	-12429%
Ethiopia	Other Africa	2'862.00	44'883.00	47'745.00	-9'876.00	37'869.00		1568%	1223%
Gabon	Other Africa	4'407.74	2'116.59	6'524.33	-500'875.69	-494'351.36		48%	-11316%
Ghana	Other Africa	3'801.03	9'034.80	12'835.83	-20'298.67	-7'462.84		238%	-296%
Kenya	Other Africa	5'511.96	15'954.27	21'466.23	-28'000.22	-6'533.99		289%	-219%
Lesotho	Other Africa	635.98	1'184.31	1'820.29	1'260.57	3'080.86		186%	384%
Malawi	Other Africa	719.26	6'351.08	7'070.34	17'515.54	24'585.88		883%	3318%
Morocco	Other Africa	28'364.00	16'030.00	44'394.00	-4'511.00	39'883.00		57%	41%
Mozambique	Other Africa	1'585.59	6'638.30	8'223.89	7'745.38	15'969.27		419%	907%
Nigeria	Other Africa	114'815.82	127'810.58	242'626.40	105'009.98	347'636.38		111%	203%
Rwanda	Other Africa	312.47	2'068.60	2'381.07	-7'009.78	-4'628.71		662%	-1581%
Senegal	Other Africa	4'163.90	5'409.09	9'572.99	-6'001.66	3'571.33		130%	-14%
Sudan	Other Africa	4'500.00	49'694.00	54'194.00	17'776.00	71'970.00		1104%	1499%
Togo	Other Africa	1'404.80	4'872.51	6'277.31	28'129.30	34'406.61		347%	2349%
Tunisia	Other Africa	17'096.50	8'044.26	25'140.76	-1'772.70	23'368.06		47%	37%
Uganda	Other Africa	730.25	40'816.92	41'547.17	8'252.69	49'799.86		5589%	6720%
Zimbabwe	Other Africa	17'088.48	10'505.74	27'594.22	-62'239.45	-34'645.23		61%	-303%
Other Africa	Total	280'683.94		889'951.27		157'585.35		217%	-44%

Brazil	Brazil	253'372.20	405'276.78	658'648.98	818'080.00	1'476'728.98		160%	483%
Barbados	Other Central and South America	2'198.32	1'858.12	4'056.44	0.00	4'056.44		85%	85%
Dominican Republic	Other Central and South America	15'003.05	5'438.75	20'441.80	-6'504.22	13'937.58		36%	-7%
Argentina	Other Central and South America	131'369.00	148'314.70	279'683.70	-47'312.70	232'371.00		113%	77%
Chile	Other Central and South America	37'097.10	17'789.77	54'886.87	-9'195.31	45'691.56		48%	23%
Columbia	Other Central and South America	60'917.30	76'558.34	137'475.64	14'602.84	152'078.48		126%	150%
Bolivia	Other Central and South America	7'782.84	13'679.35	21'462.19	28'478.02	49'940.21		176%	542%
Ecuador	Other Central and South America	20'027.80	10'746.68	30'774.48	46'947.41	77'721.89		54%	288%
Paraguay	Other Central and South America	3'801.73	136'654.40	140'456.13	19'504.26	159'960.39		3595%	4108%
Peru	Other Central and South America	30'656.73	26'926.14	57'582.87	41'217.97	98'800.84		88%	222%
Uruguay	Other Central and South America	5'518.20	24'214.81	29'733.01	-12'546.65	17'186.36		439%	211%
Venezuela	Other Central and South America	114'126.00	78'066.24	192'192.24	-14'290.80	177'901.44		68%	56%
Guyana	Other Central and South America	4'085.25	-1'018.95	3'066.30	-30'866.00	-27'799.70		-25%	-780%
Guatemala	Other Central and South America	4'245.06	10'497.12	14'742.18	-39'545.82	-24'803.64		247%	-684%
Nicaragua	Other Central and South America	2'728.38	4'923.46	7'651.84	-13'056.66	-5'404.82		180%	-298%
Panama	Other Central and South America	4'314.91	6'377.17	10'692.08	23'711.71	34'403.79		148%	697%
Other Central and South America	Total	443'871.67		1'004'897.77		1'006'041.82		126%	127%
Australia	Oceania	381445.69	142'144.40	523590.09	-239.80	523350.29		37%	37%
New Zealand	Oceania	34050.16	41'068.16	75118.32	-23'380.86	51737.46		121%	52%
Oceania	Total	415495.85		598708.41		575087.75		44%	38%

Table 14 Source: UNFCCC database

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[i] The authors are using the terms 'preventive adaptation' and 'curative adaptation', but for reasons of terminological non-proliferation and comparability with the disaster management language I prefer to use 'adaptation' *tout court* or 'impact reduction' for the former, and 'impact response' for the latter.