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UNFCCC workshop on **insurance-related actions** to address the specific needs and concerns of **developing country Parties** arising from the **adverse effects** of climate change and from the **impact of the implementation of response measures**
Bonn, May 15, 2003

Overview of insurance-related actions in the context of the impact of the implementation of response measures

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Structure of presentation

- **Adverse effects of response measures in UNFCCC negotiations**
- **Typology of potential negative impacts of climate policy measures on developing countries and quantitative estimates**
 - Greenhouse gas emissions reduction/sequestration
 - Adaptation
- **Principal options for alleviating losses and applications in other contexts**
- **Evaluation of proposals made in the context of UNFCCC negotiations (Art. 4.8 and 4.9)**
- **Recommendations**

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Adverse effects of response measures in UNFCCC negotiations

- Art. 4.8 + 4.9 UNFCCC; Art. 3.14 Kyoto Protocol
 - Annex B implement their emission targets in such a way as to minimise adverse social, environmental and economic impacts on developing countries
 - Information in annual inventory report how this is done
 - Annex B shall provide funding, insurance and transfer of technology.
 - Specific mention of LDCs
 - priority on removing subsidies on environmentally unsound and unsafe technologies

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Typology of potential negative impacts of climate policy measures

- **Effects from the impact of the implementation of response measures are unequally distributed and difficult, if not impossible to quantify**
 - Terms of trade, international capital flows, development efforts. Effects can be positive (e.g. for fuel importers)
- **Greenhouse gas emissions reduction and sequestration**
 - Reduction of demand for carbon-rich fuels
 - Increased demand for renewable energy and energy efficiency technologies
 - Timber market effects due to carbon sequestration in terrestrial vegetation

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Reduction of demand for carbon-rich fuels

- Reduction in world market prices leads to reduced export revenues.
- Wide range of parameters influences energy markets: impossible to unambiguously separate the price and quantity effect caused by mitigation
- Price and maybe even absolute production of fuels with a low carbon content (natural gas) will rise due to the demand shift
- Countries importing fossil fuels will profit from the lower prices

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Case 1: fossil fuel export

Due to the conversion of the electricity generation system from coal to wind in Annex B country Aeolia, the coal exports from developing country Carbostan to Aeolia drop from 10 million t per annum to zero. Likewise, the coal market price falls from 20 to 10 € per t. Due to long-term export contracts with the other importers, overall coal exports from Carbostan only fall from 50 to 40 million t but prices have to be adjusted. Carbostan claims a loss of 600 million € (1000 million € previous coal export revenues compared to 400 million € after Aeolia's action) due to mitigation

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Increased demand for renewable energy and energy efficiency technologies

- Lower short-term availability and higher price of such technologies for developing countries
 - PV module prices have not fallen in the last years in the highly subsidised markets of Germany and Japan
 - German wind turbine producers shun export markets due to the high demand in their home market
- Long-run positive impacts from increased renewables investment
 - Economies of scale lead to lower prices

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Case 2: renewables technologies

Due to a new 10,000 MW wind programme in Annex B country Aeolia, all Aeolian wind turbine manufacturers operate at full capacity. Thus the developing country Tempesto cannot place an order for 100 MW wind turbines with a producer in Aeolia. It thus has to switch to a turbine producer in Breezia which charges a price of 1200 € per kW installed instead of Aeolia's producers' list price of 1000 € per kW. Tempesto claims a loss of 20 million € (200,000 €/MW times 100 MW) due to Aeolia's mitigation

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Timber market effects due to carbon sequestration in terrestrial vegetation

- Increased forestry activities will lead to a decrease in timber prices in the future due to the enhanced supply
- Negative for timber exporters and positive for timber importers

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Case 3: afforestation

In 2000, the developing country Arboria approved a CDM afforestation project on 100,000 ha whose first harvest occurs in 2020. In 2020, the country Verdura logs 10,000 ha and harvests 1 million t of timber. Due to Arboria's timber supply, timber prices fall from 50 €/t to 45 €/t. Verdura claims a loss of 5 million € (5 €/t times 1 million t) due to Arboria's sequestration

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Adaptation

- Technical adaptation to meteorological extremes
 - Expenses for coastal and riparian protection
 - Stimulation of the construction industry raises prices for corresponding inputs
 - Construction is a localised industry; direct adverse impacts for other countries are limited
- Societal adaptation
 - Expenses for early warning systems and for institutions such as agricultural and forestry extension services
 - Changed management of natural resources such as irrigation and hydropower systems
 - Indirect effects on resource availability possible

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Case 4 and 5: adaptation

- In 2005, developing country Neptunia builds a seawall on 500 km of coastline. Due to the high demand for building material, export prices for 1 million t of cement to neighbouring Montania increase from 55 to 65 €/t. Montania claims a loss of 10 million € (10 €/t times 1 million t) due to Neptunia's adaptation.
- In 2005, developing country Fluvia introduces a new operation plan for its irrigation system to be able to withstand more severe droughts due to projected climate change. Due to the much lower cost of irrigation farmers expand irrigation and the amount of water discharged to neighbouring Desertum declines by 10%. Desertum argues that it has to reduce its irrigated area by 100,000 ha and claims a loss of 10 million € (100 €/ha times 100,000 ha) due to Fluvia's adaptation.

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Principal options for alleviating losses and applications in other contexts

- Insurance
 - Probabilities of a damaging event have to be able to be assessed in a systematic way
 - Risks must be spread across a large set of entities
 - Implementation of emission reduction measures invariably reduces prices of carbon rich fuels but the effect will be masked by a multitude of other influences
 - Rarely, there will be one distinct event. Normally many small activities will have a gradual influence over time
 - Adverse effects from adaptation action can be specified more clearly due to clear starting and end point

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Insurance contd.

- Possible definitions of loss-generating event
 - when Annex B country Aeolia's wind power capacity has reached 20 GW
 - when coal world market prices fall below 20 €/t
 - when annual coal export revenues of developing country Carbostan fall below 300 million €
 - when prices for wind turbines rise above 1200 €/kW
 - when developing country Neptunia completes 500 km of seawall
- Probability of these events can be assessed and insurance providers can calculate premia
- Contract duration low, often < 1 year

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Allocation of liability

- Greenhouse gas emitters liable for adverse effects from their emissions
- Country liable for emitters on its territory
- Enforcement ?
- Quantification if damages arise decades after emissions ?
- Availability of insurance ?
 - Emitters could be mandated to pay the premia of developing country insurance against losses from climate change and climate policy
 - AOSIS proposal on insurance pool : countries pay
 - developing countries pay, supported by Marrakech Agreement funds

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Damages covered by liability

The diagram consists of four starburst shapes arranged in a 2x2 grid. Each shape contains text describing a type of damage or cost covered by liability:

- Top-left: Damages from remaining impacts
- Top-right: Costs of emission reduction
- Bottom-left: Costs of adaptation
- Bottom-right: Losses due to emission reduction

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Financial derivatives for hedging of prices

Instrument	Characteristics	Lifetime	Applicability in climate policy context
Forward	Price fixed at future date, OTC. Physical delivery expected.	< 1 year	None
Future	Price fixed at future date, exchange. Less risky than forward due to margin payments.	< 3 years	Limited
Option	Price fixed at future date, OTC or exchange. Premium paid at beginning.	< 3 years	Limited
Swap	Exchange of specified cash flows at specific intervals (series of forwards). Tailor-made contracts	< 25 years, normally < 7 years	High; can cover multiple commitment periods
Commodity bond	Repayment linked to price. Tailor-made contracts	< 30 years	High; can cover multiple commitment periods

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- Financial derivatives cont.**
- The higher the lifetimes, the less standardised instruments become and the higher transaction costs are
 - If the market expects a quick implementation of climate policy and a high probability of fossil fuel price decrease, premia for options / interest rates for commodity loans and bonds will be high
 - Current high price level of fossil fuels due to the political insecurity in the Middle East may be a window of opportunity to negotiate contracts at attractive conditions with a duration that is as long as possible
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- Stabilisation funds**
- Revenues from the export of commodities can be collected in times of high prices and be distributed in periods of low prices
 - Failure of commodity fund schemes in the past if falling price trends persisted
 - Funds can collect export revenues and invest to raise revenues that serve as compensation of future export revenue losses
 - Fund revenue use for economic diversification instead of consumption
 - Politicians have an incentive to spend accumulated fund assets
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Oil funds

Name	Country	Start date	Value 2002 (billion €)
Government Petroleum Fund	Norway	1990	80
General Reserve Fund	Kuwait	1960	Peak 100*, currently 40
Alaska Permanent Reserve Fund	USA	1976	20
Alberta Heritage Savings Trust Fund	Canada	1976	8
Investment Fund for Macroeconomic Stabilization	Venezuela	1999	3.5
State General Reserve Fund	Oman	1980	2
Foreign Exchange Reserve Account	Iran	1999	1
National Fund	Kazakhstan	2000	1
State Oil Fund	Azerbaijan	1999	0.5

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Diversification

- Diversify away from commodities that run price and demand risks
- Many fossil fuel exporting countries have a good renewable energy resource base, especially concerning solar but also wind energy
- CDM can be harnessed to provide funding and technology for renewable energy deployment
 - CDM incentive will be the stronger, the higher the world market carbon price. It will be perfectly negatively correlated with the amount of losses due to emission reduction measures
 - Successful CDM needs institution building

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SOME SUGGESTIONS

- Many non-targeted suggestions
 - Improving efficiency in upstream and downstream activities relating to fossil fuels is counterproductive
 - Technological development of non-energy uses of fossil fuels: only if the non-energy uses do not lead to carbon emissions at the end of the lifetime of the product
 - If capture and geological sequestration of fossil fuel CO₂ can be achieved at low cost, the continuation of fossil fuel use would be possible without carbon emission and thus avoid adverse impacts for fossil fuel exporters
 - Effects of promotion of less greenhouse gas emitting energy sources (natural gas) depends on elasticities of substitution between different fossil fuels
 - Promotion of renewable energy leads to a diversification and allows leverage through the CDM

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Concluding remarks

- Differentiate across temporal levels
 - Formal insurance: limited role due to short duration of contracts and the difficulty to calculate premia.
 - Financial derivatives: short term (up to three years), can be used to guarantee prices of carbon-rich export commodities unless the market has already depressed the price.
 - Commodity bonds: medium term (up to a decade).
 - Economic diversification: long-term strategy
 - Collection of commodity revenue through funds
 - Harnessing of CDM funds
 - Geological carbon sequestration strategy

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Thank you!

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