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Michaelowa, Axel; Koch, Tobias

Research Report

Critical issues in current climate policy: Hot air, multi-level emission trading registries and changes in emission commitments due to international conflicts

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HWWA HAMBURG

REPORT

Critical Issues in Current Climate Policy

"Hot air", multi-level emission trading registries and changes in emission commitments due to international conflicts

Axel Michaelowa

Tobias Koch

HWWA-Report

194

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Preface

Currently, international climate negotiations concentrate on design issues for the flexible instruments outlined in the Kyoto Protocol. As the 6th Conference of the Parties to the U.N. Framework Convention on Climate Change in late 2000 or early 2001 has to take decisions on these matters, it is imperative to develop solutions that combine long-term economic efficiency with long-term environmental effectiveness. Sometimes, a reconciliation of these targets is difficult and compromises have to be made.

This report discusses solutions for three critical issues which have got different degrees of attention until now but are linked inasmuch their solution will be crucial for the success of the Kyoto Protocol. The authors have come across them due to their close involvement in the negotiation process.

The first issue has been a major topic of debate - the possibility that Russia and other countries in transition may have an enormous surplus of emission permits due to their economic collapse. Unfettered trade in this surplus would artificially depress permit prices, reduce the incentive for long-term innovation and would not be linked to any efficiency improvement in the selling countries. Koch and Michaelowa discuss ways how incentives can be devised to link sales of emission permits with actions that lead to long-term emission reductions. They include an element of early action designed to prevent lock-in on an emission-intensive path of economic recovery by fostering investments whose emission reduction cannot be quantified but is nevertheless real. Early project-related Joint Implementation plays an important role in this context.

The second issue is relatively technical but a necessary condition for the functioning of a global market in emission permits. It deals with the design of a system of national registries that track trades in permits. An International Registry would be the node of this system and guarantee that no fraudulent trades enter the system. A homogenous trading unit would be created. The way how trades are processed, the information requirements and the time-related aspect of the implementation of the registry system are discussed.

Finally, the third issue seems remote but may prove challenging in the long term. International conflict will impact upon the Kyoto Protocol commitments. Wars like the one in Kosovo will lead to additional greenhouse gas emissions that have to be accounted

for. Territorial changes will lead to changes in commitments. The authors discuss the different possibilities that change commitments and make recommendations how they could be accommodated in the Kyoto framework.

Dr. Axel Michaelowa, a former staff member of HWWA Institute for Economic Research, is now working as an independent climate policy expert in Paris. Among other functions, he serves as a permanent advisor and project coordinator for HWWA on the economics of international climate policy. Tobias Koch is a specialist on Russian climate and energy policy. He is doing research with the Center for Energy Policy in Moscow and has also worked for the UN climate change secretariat on issues of emissions trading. However, the views expressed in this report are his personal ones.

Hans-Eckart Scharrer
Vice-President, HWWA

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"HOT AIR" REDUCTION FOR RUSSIA THROUGH MEASURES PRIOR TO 2008 AND NON-QUANTIFIABLE PROJECTS

Tobias Koch, Axel Michaelowa

1. Introduction

After long international negotiations, the Kyoto Protocol of 1997 was approved including legally binding emission targets for a basket of six greenhouse gases. These targets are differentiated and apply to most OECD countries and countries with economies in transition (the so-called Annex B). A novel feature is the use of a commitment period that runs from 2008 to 2012 instead of a single target year. Moreover, the Protocol allows for the use of so-called flexible mechanisms: emissions trading (Art. 17) in permits derived from the emission budgets (assigned amounts), Joint Implementation (JI) (Art. 6) and projects of the "Clean Development Mechanism" (CDM) with countries without emission targets (Art. 12). While CDM credits shall already start from 2000, JI only starts in 2008. All these instruments shall be "supplemental" to domestic measures. Supplementarity has not been defined in the Protocol, though. If average emissions in the commitment period are lower than the emission target the difference can be banked for the next commitment period. In case of higher emissions the country will be in non-compliance.

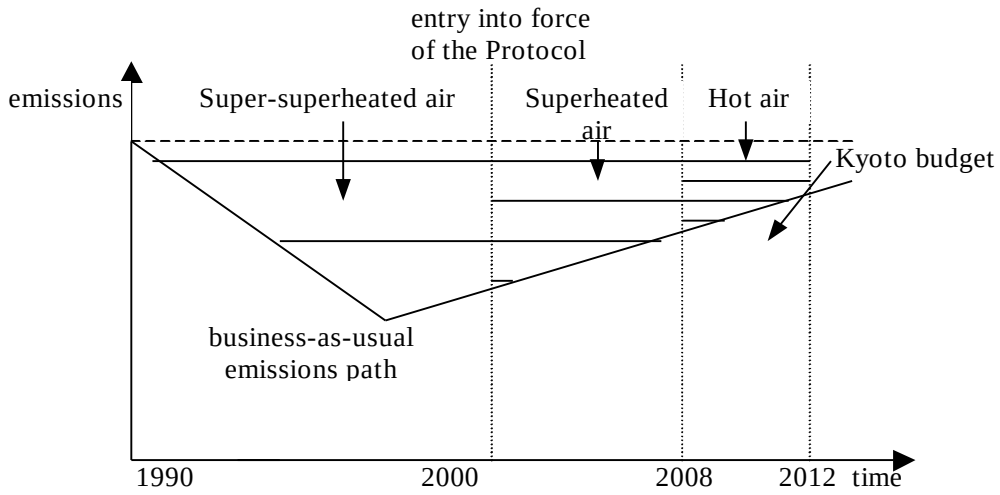
The differentiation of targets led to an intense debate during and after Kyoto where the differentiation finally achieved was criticised by many observers. One of the main issues is whether some countries got targets that actually mean they do not have to reduce emissions at all and can even sell or bank a surplus of assigned amounts. This issue was to be known as "hot air" and mainly refers to Russia. We will discuss its implications below. By no means, though, it is purely Russian problem. Australia, for example, also managed to get "hot air".

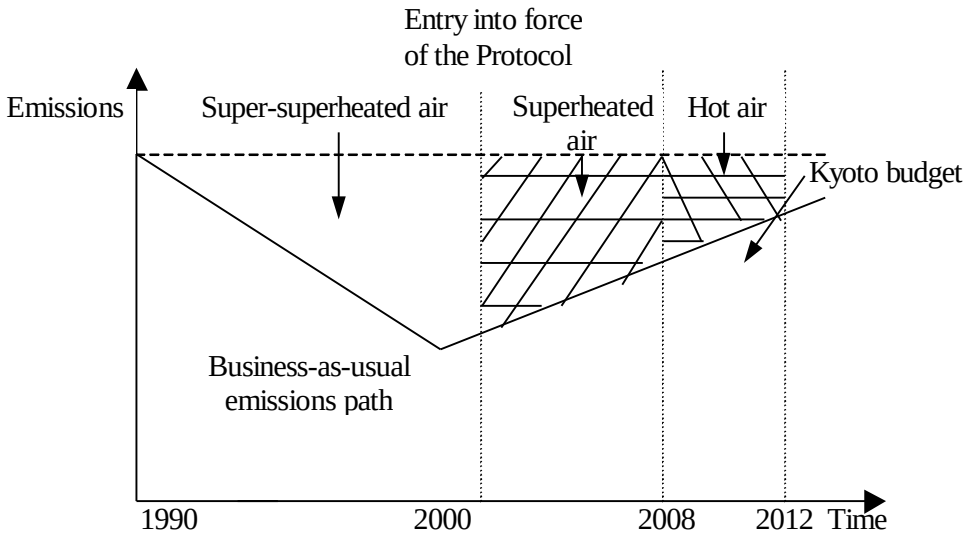
2. Origin of Russian "Hot Air"

During the negotiations leading up to Kyoto, Russia stressed that countries in transition should get a special treatment in a Protocol, including "a degree of flexibility […] taking into account their real contribution to reducing greenhouse gas emissions into the atmosphere, which has taken place since 1990 due to economic reasons" (UNFCCC

1997a, p. 43). Nevertheless, still at the seventh session of the Ad-hoc-Group for the Berlin Mandate (AGBM) in July 1997 nobody feared that this could lead to trade in fictitious emissions reduction - e.g. the Greenpeace analysis (Greenpeace 1997a) of the different country submissions does not mention the issue. Only at AGBM 8 in October the environmental NGOs recognised the problem and called it "hot air" while also being called at the time "paper credits" or "phantom emissions" (Greenpeace 1997b, Anonymous 1997a). The term "hot air" stuck. During that time several forms of fictitious emissions reduction were discussed:

Figure 1: Different Forms of Fictitious Emissions Reductions





The most far-ranging was the idea that the difference between the 1990 level and the actual level would be tradable from 1990 onwards - this was called "super-superheated air"[1]. A bit less fantastic, but still enormous would have been to trade all emissions reductions from the date of the entry into force of the Protocol, the "super-heated air"[2]. Finally, "hot air" would be the difference during the budget period 2008-2012.

In the original proposal of emission targets for Annex I countries of December 9, Russia and the Ukraine had been allocated a target of -5%. In this proposal, all other eastern European countries had targets of -8%. This would have led to an overall Annex I reduction of over 6%. Unfortunately, the Russian delegation was bound to decisions taken by government not to accept any reduction obligation. This decision was based on over-optimistic growth expectations (an average growth rate of 4.5% until 2012) for the Russian economy combined with the assumption of continued use of outdated technology. These assumptions were already outdated at the time of the Kyoto Conference due to the East Asian financial crisis which had strong negative impacts on the Russian financial system. Moreover, the original U.S. position of a 0% target inspired the Russian negotiators. Michael Grubb even suggests that the Russian and Ukrainian targets were "a backhanded way of giving weaker targets to the U.S. and Japan" (Anonymous 1997b, p. 4). Furthermore, the Russian delegation suffered from a lack of flexibility due to the absence of senior decisionmakers. The intransigence of the Russian delegation supported by Ukraine at the decisive negotiation at 3:30 in the morning of Dec. 11 led to a chain reaction of other eastern European states renouncing their reduction targets of the previous day. Poland and Hungary moved from -8% to -6%, Croatia to -5%. The other states fortunately stuck to the -8% target (World Energy Council 1998).

In the aftermath of Kyoto, the future path of Russian climate policy, which is discussed within an interministerial working group, was hotly debated within Russian government structures. Particularly, the State Committee for the Environment and the Ministry of Fuels and Energy of the Russian Federation developed interest in taking over the initiative from the State Hydrometeorological Organisation, which is responsible for climate issues since Soviet times. The core interest of Russian climate policy shifted from pure conference diplomacy to a energy-project oriented approach. A small number of western-oriented, technologically skilled new generation of officials is currently taking over. Capacity building, primarily by U.S. agencies, led to the emergence of the first

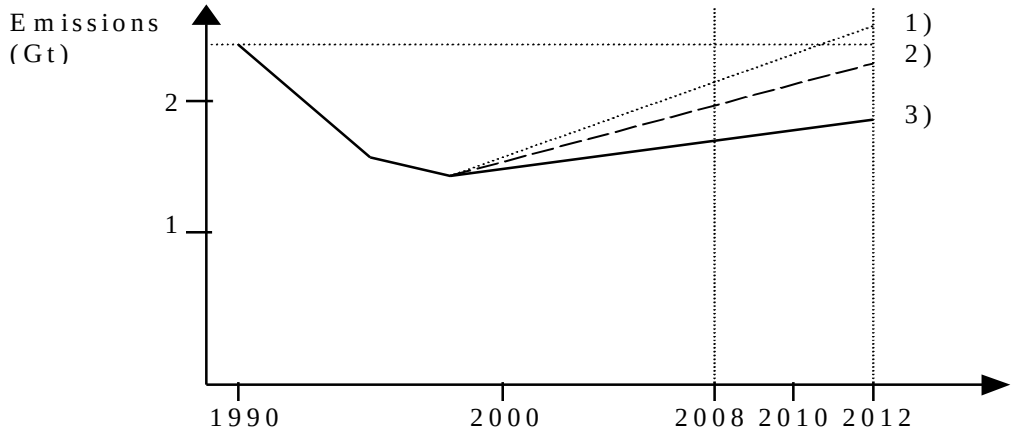
1 At the U.S.-Russia bilateral emission trading workshop in July 1998, however, the Russian draft definition called this "super-heated air" (Metalnikov 1998).

2 Metalnikov (1998) refers to this as "hot air", for the period 2000 to 2008. The commitment period is not considered at all!

group of full-time climate policy specialists, introducing economic reasoning in the process. The emergence of the new Russian climate policy was strongly promoted by the U.S. which invested a lot of funds and efforts in bilateral exchanges and conferences.

What will be the actual amount of Russian "hot air"? Figure 2 shows current emissions and a range of forecasts. The total volume of "hot air" is thus estimated between 0 and 3.2 Gt of CO_2.

Figure 2: Russia's CO_2 Emissions 1990-2010



1. Russia's own estimate 1995, IIASA high estimate 1998
2. UNFCCC in-depth review team estimate 1997
3. IIASA low estimate 1998

Sources: IEA (1998, p. 40), UNFCCC (1997b, p. 6), Russian Federation (1995, p. 47), Victor et al. (1998, p. 6).

3. Discussion to Limit "Hot Air"

After Kyoto, many interest groups and politicians have criticised Russian "hot air" (e.g. Greenpeace 1999) and tried to find ways to limit its use. The following options were suggested:

- renegotiation of Russian and Ukrainian targets. That would mean a reopening of the full negotiation of the Protocol and thus is not feasible,
- quantitative caps on emissions trading and JI as suggested by the EU,
- caps on the sale of emission permits and use of JI credits (EU Council 1998),

- caps on the acquisition of permits (UK 1998),
- allowing sale of permits only if they originate from "real" reduction (Grubb 1998),
- excluding Russia and Ukraine from trading altogether,
- excluding Russia and Ukraine from trading if no reporting and monitoring system is in place.

In our view all these options are more or less flawed and do not achieve their aim (Dutschke/Michaelowa 1998). We will discuss other possibilities that are acceptable for the Russians and for those who want to safeguard the long-term environmental integrity of the Protocol.

4. Hot Air Trade Linked to Financing of Projects with Non-Quantifiable Emission Reductions

There exists a considerable range of projects that lead to emission reductions but are not eligible for JI as emissions reductions cannot be quantified We call them "non-quantifiable projects" (NQP). NQP currently have no chance to get funding in Russia and should be allowed to be financed through sales of futures on assigned amounts (AA). They include:

- national monitoring of emissions according to best-practice standards,
- insurance fund for investors in energy efficiency (even for economically feasible projects) administered outside Russia (Aslanian et al. 1998),
- environmental education,
- capitalisation of Russian energy service companies,
- capacity building of environmental NGOs in the climate change issue, e.g. financing of a type of Russian Climate Action Network that so far does not exist,
- JI service brokers and consultants for project preparation,
- grassroots climate-related projects,
- energy audit,
- Russian database for energy efficiency products and energy-related laws and decrees (bilingual).

4.1 NQP Programme Structure

Financing of NQP could be done by sales of "hot air" emission permits. Obviously, such a procedure would need safeguards to prevent financing of dubious projects and "laundering" of "hot air". The procedure would be designed as follows:

The government annually reserves a specific number of assigned amounts that is available for financing of NQP. It issues an international tender on the Internet. There are no restrictions for offers. International investors can submit proposals specifying the amount invested and the number of assigned amounts claimed. Investors may form consortia to share project risks. The proposals will be only eligible after certification by independent, non-Russian certifiers. These certifiers have to be accredited by UNFCCC, possibly by the CDM Executive Board, as the Board has experience in accreditation. Offers have to be opened simultaneously to prevent price manipulation and published on the Internet without delay. The government has to accept all projects in an order of ascending price per assigned amount until the quota is filled. The assigned amounts will only be issued after a certification of the project using management standards, e.g. ISO 14000. These certifiers have to fulfil the same criteria as those certifying project proposals. It is important to notice that this type of certification is different from CDM or JI certification inasmuch it uses management instead of performance standards.

The advantages of a NQP system would be the following:

- long-term spillovers that cannot be quantified today but may be very important are generated,
- no emissions monitoring is necessary,
- transaction costs are lower that in JI projects,
- investors' risks are lower as most NQP have shorter lifetimes.

The NQP system would have the risk that the government could push through pet projects. Thus full transparency and a safe bidding procedure is essential.

5. Could Early Joint Implementation Reduce "Hot Air"?

As mentioned above, JI credits are only to accrue from 2008 onwards. This is criticised by Russian decisionmakers as it would give an unfair advantage to CDM and postpone any incentives for international investors to become active in Russia until 2008. This in-

creases the likelihood that Russia might sell "hot air" futures contracts to finance government spending without any positive impacts on Russian emissions. Nevertheless, there are also voices inside government that prefer setting aside a "compliance reserve" which is not available for sale and could be banked after successful compliance for the second budget period. This is also due to the growing impression that future Russian targets might be much less favourable and would possibly hit a strongly-growing Russian economy. Eriomin (1998) clearly states that "the CO2 surpluses a temporary phenomena, they will disappear when the economy revives. An unreasonable sale can turn out a new bondage. To buy the sold surpluses back will cost much more".

Therefore, it is necessary to show possibilities for a kind of early JI other than NQP programmes. Generally, JI encounters extremely strong barriers in Russia. First, there are several difficulties in definition of baselines. Even if in the near future economic growth would pick up again, it is unlikely that there will be an autonomous increase in energy efficiency investment. Available funds would primarily go to private consumption of a highly energy intensive type such as high-powered cars, air-conditioning and poorly-isolated housing. Moreover, the following factors apply to baseline determination:

- high and erratically changing subsidies for energy consumption,
- regional energy over- and undersupply,
- lack of metering on all levels of the energy system,
- extremely high losses in distribution systems and lack of data,
- worn-out systems that lead to damages for third-parties,
- overstretching of technical lifetime of equipment.

Nevertheless, some project categories such as installation of renewable energy systems and some simple energy efficiency measures have an easy-to-determine baseline and sometimes extremely short payback periods.

Moreover, there are several heavy risks for investors:

- non-payment of fuels by utilities and energy bills by consumers,
- widespread barter instead of monetary transactions,
- exchange rate risk (volatility),
- lack of efficient financial intermediaries,
- non-transparent and unsteady government decision-making,

- unclear ownership of plants and energy systems,
- no secure property rights even if government guarantees have been given.

Further barriers for demand-side management include:

- lack of bank credit and extremely high interest rates if credit can be procured,
- public entities cannot provide guarantees by law,
- intransparent accounting practices,
- no possibility to enforce legal claims.

Due to these barriers, high and sustained JI investment in Russia is unlikely. Successful JI will need thorough preparation, local know-how and deep understanding of Russian decision-making procedures. Therefore, it is necessary to start capacity-building now, also on the side of the investors. Unfortunately due to the Russian economic crisis many Western companies which had built up thorough local know-how are currently down-scaling their operations. It is necessary to offer a clear perspective for Western companies to retain and build up new capacities for a long-term time horizon. Therefore, a mechanism of early JI has to be designed.

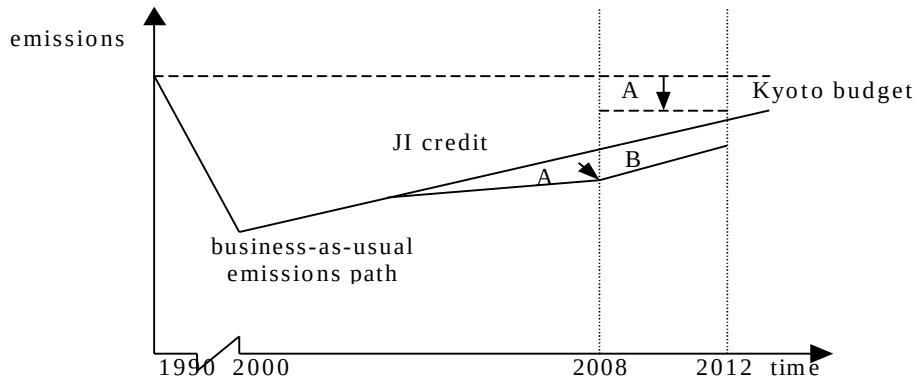
Principally, early JI would work as follows (see Figure 3): Early JI credits are given to investors in form of futures on the first budget periods where they have to be subtracted from the Russian budget. Otherwise Russia would have an incentive to maximise early JI that is not additional and thus the Annex B budget would be blown up. If JI leads to a reduction from business-as-usual by the amount A, the same amount has to be deducted from the Russian budget to avoid non-compliance.

In this case, one might think that JI reduces the amount of "hot air" by the credited emissions reduction. This was done by the Swiss delegation at the fourth Conference of the Parties in Buenos Aires which circulated a non-paper that argued for early crediting of JI exactly for this reason (Switzerland 1998). This argument holds if "hot air" is defined as the amount of allocated permits exceeding the initially forecast emissions for the budget period. However, if only domestic efforts are considered to determine the amount of "hot air" - what in our view is more appropriate -, the business-as-usual emissions path has to be adjusted due to JI activities since JI should be classified as a non-domestic effort - JI is carried out in the Russia but financed by the investor country.

With this definition in mind, a reduction in "hot air" through early JI would require A>B in Figure 3. This depends on baseline setting, induced change in the future emissions path and especially on the start of the program. Therefore, we would argue that the amount of "hot air" is likely to increase (A<B) if early JI is truly additional as the business-as-usual path is shifted downwards. Furthermore, if the program starts before the year 2003 it runs longer than the first commitment period resulting in a longer period of time where early credits can be accumulated.

Only in case of non-additional JI the amount of "hot air" - taking our definition into consideration - seems to fall but this is only due to a "laundering" of the "hot air". Non-additional JI would not be attractive as it would reduce the saleable quantity of "hot air" by the same amount and presumably entail lower transfers.

Figure 3: JI Early Crediting in Russia with "Hot Air"



Notwithstanding the design of such a program or whether the amount of "hot air" will decline or not - as long as there is a subtraction from Russia's target, the total Annex B budget remains unchanged.

Recognising the problems of the earlier approach, Switzerland further developed its proposal for the June 1999 session of the climate negotiations by stating that revenue from early JI credit sale should be reinvested in emission reduction projects.

The main problem of such an early JI system is that long-term futures are extremely insecure. Therefore, it is necessary to design additional safeguards for investors, e.g. insurance funds for JI projects that are capitalised through the NQP programme as well as improved insurance by international institutions like MIGA.

We would thus suggest an approach that minimises incentives for Russia to default on its contractual obligations. This can be achieved through investor country early JI programmes that start with small projects but progressively increase in volume. The national programme is immediately terminated in case Russia defaults on a single project.

The advantages of this approach would be the following:

- Investors have higher security as the projects are connected with the prospect of future, higher investment. Thus Russia has a high interest to prevent failure of any project.
- The know-how of investors is growing together with the size of their projects.
- Borrowing and insurance is easier and cheaper for single investors due to the lower risk that the national programme will fail.
- Know-how in the framework of national JI programmes is shared.
- Transaction costs are significantly lower due to lower negotiating needs with Russia.
- The risk of harassment and cheating by local authorities and criminal groups is lowered.

Disadvantages include:

- All projects have to be planned well in advance.
- Investors have to co-ordinate all their action with their umbrella organisations and respective governments.
- Co-ordination is a long-term issue and has to survive changes in government on both sides.

In sum, co-ordinated national early JI programmes would lower the incentives for the Russian side to default on its obligations.

6. Conclusions

Sale of Russian "hot air" is a major potential loophole in the Kyoto Protocol. The methods to get rid of "hot air" suggested so far are not convincing. We suggest an approach that - while not strictly quantifiable - would limit the volume of "hot air" through linking sales of assigned amounts to financing of projects that are likely to lead to substantial emission reductions in the medium and long term. It is crucial to avoid an emis-

sion path where Russia first sells all its "hot air" but will not be able to meet more stringent emission targets in subsequent commitment periods. In this case, Russia could exit from the Protocol during the second or third budget period where new targets would constrain growth expectations. This is due to the total lack of environmental consciousness in the Russian population which leads to an extremely low importance of environmental issues. Thus environmental pressure groups that might press for compliance with Protocol rules and argue against exit are non-existent (Victor et al. 1998, p. 9). Therefore, long-term incentives have to be provided to keep Russia in the climate regime including awareness-building in Russia. A well-designed early JI programme could also help to bring about the transformation of the Russian emission path and thus lower the risk of exit.

The successful solution of the Russian "hot air" problem will be crucial not only to prevent Russia from leaving the Protocol but also to give developing countries the right incentives to join Annex B. In the current situation, it has to be feared that developing countries will only accept targets with a huge "hot air" (in this context often called "tropical air") component. Our proposals might also alleviate this problem.

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AN INTERNATIONAL REGISTRATION AND TRACKING SYSTEM FOR GREENHOUSE GAS EMISSION TRADE

Elements, Possibilities, Problems and Issues for Further Discussion

Axel Michaelowa, Tobias Koch

1. Introduction

The Kyoto Protocol allows Annex 1 countries to reduce the costs to comply with their targets[3] with the help of the "Flexible Mechanisms" Joint Implementation (JI), Clean Development Mechanism (CDM) and International Emissions Trading (IET). The transfer of Assigned Amounts (AAs) by IET, Emission Reduction Units (ERUs) from JI projects and Certified Emission Reductions (CERs) created through CDM projects are to be registered to adjust emission budgets of parties. The Kyoto Protocol does not provide sufficiently detailed rules how this registration process is to be done. An emissions market can only develop when accounting rules are clarified beforehand. This is a necessary condition for the establishment of trading services. Before costly software and computing equipment is acquired, the basic set of rules must be clear to avoid costly changes and market insecurity. Therefore, it is necessary to start an early discussion of rules and procedures for a registry system to pave the way for a quick decision by the first meeting of Parties to the Protocol (COP/MOP 1).

2. Accounting Rules in the Protocol

So far, general accounting rules are scattered throughout the Protocol. Article 5 states that COP/MOP has to agree on rules for accounting and guidelines for national inventories. It elaborates guidelines for national reports. Article 7 stipulates that Parties are to report annually changes in assigned amounts and have to create national inventories. Article 8 states that independent review teams that review annual reports and check compliance.

3 These targets are expressed as an amount of emissions during a five-year time period (2008-2012) which is commonly called emission budget.

Art. 3, 10-12 are the basic rules for the establishment of a registry and tracking system. They state that AAs, ERUs and CERs transferred to a party shall be added to its budget and subtracted from the budget of the transferring party. That clearly envisages a double-entry bookkeeping. Art. 3, 13 allows banking. Art. 17 states that reporting and accountability rules for emissions trading shall be set by COP.

3. Targets of a Registration and Tracking System

An international registration and tracking system would be designed to fulfil the following primary targets:

- ensure transparency,
- ensure information to allocate consequences of non-compliance,
- allow homogenisation of original AAs, ERUs and CERs as one commodity (we call it AAs),
- guarantee international compatibility of data,
- create the base for a viable market for permits,
- minimise market power,
- minimise transaction costs,
- finance administration costs.

The design of a registration and tracking system would have the following sub-targets to reach the primary targets

- allow full participation of private entities,
- guarantee real-time availability of data about each transaction (with prices) via Internet,
- avoid purely political deals (summit diplomacy),
- allow tracking of the full chain of transaction from the first to the last buyer,
- allow in-depth review through adequate data storage,
- avoid fake certifying on a national level by integrating certifiers in the registration process,
- allow third parties a continually updated forecast of compliance status of all countries,
- help to establish analytical services that will provide ratings and market assessment

- enable developing countries to take part in CDM without establishing expensive computing,
- enforce potential trading caps,
- provide the public and the UNFCCC with latest statistical data.

4. Design of a Registration and Tracking System with an International Registry

Fulfilling the targets and sub-targets would lead to the establishment of a double-entry bookkeeping on a national and international level. We would consider the following options for a global structure:

- a) national registries with a global node, which we call International Registry (IR), or
- b) a purely global registry with national sub-registries.

The detailed design of a third option, decentralised national registers without a central node, is not discussed in this paper. It was originally developed by New Zealand (1999) and is now strongly promoted by the Umbrella group of countries (U.S. and other "free market" countries). We see many pitfalls of such a system and outline them in paragraph 14 below.

In the first case, compatibility of the national registries has to be assured. It would entail higher costs due to the double structure, but would fit into a concept of sovereign nations that has been embraced by the Convention and the Protocol. A precedent would be the set-up of national inventories instead of a single global agency setting up inventories. such a system would be useful if compliance issues are dealt with ex-post. An open issue would be whether the IR would be informed in real time or only at intervals, e.g. annually.

In the second case, we increase the risk of highly centralised bureaucracy. It would be preferable in case of a centralised system to shift liability from the seller to the buyer (traffic-light system). The necessity of domestic registries remains.

This discussion paper will mainly deal with version a). It is assumed that most Annex B states will set up domestic registries and are interested in exchanges of AAs. The question of caps on trading is taken in to consideration, as well as the possibility for non-Annex B nations to participate in flexible mechanisms. We consider the question of lia-

bility in the case of non-compliance central to the debate on the structure of a global registration system for AAs.

An additional element of both systems would be the introduction of a fee (around 0.2%) per transaction to cover administration costs.

4.1 Minimum Standards for National Registries

The allocation of serial numbers to AAs has to be done in a consistent way starting with country of origin, the year of issue/certification, the project and certifier. Each year AAs are counted from 0 and denominated in single tons CO2 equivalent. National codes are compulsory. Some examples:

a) a trade in original AAs: RU-2008-00500300-000-000 (Russia, AA issued 2008, number 500300),
b) a trade in AAs resulting from a JI project: RU-2008-00500301-001-000 (Russia, ERU issued 2008, number 500300, JI project Saratov afforestation),
c) a trade in AAs resulting from a CDM project: PRC-2001-3030303-020-003 (China, CER issued 2001, number 3030303, CDM project Wuhan boiler conversion, certifier Lloyds Register).

Uniform reporting files for all transactions have to be kept and processed for entering in the IR. In the case of CERs, certifiers reports have to be filed. Standardised deadlines for data transmission to the IR are to be kept. Transactions are irrevocable, i.e. a national registry is responsible for any flawed transaction.

Domestic accounting of futures trades and trades in AAs has to be kept separate.

In case trades are resulting from the direct conversion of JI ERUs and CDM CERs in AAs the project's certifier´s report has to be attached to the whole trade and delivered to the IR. National registries are responsible for compliance in case AAs they are holding are discounted due to non-compliance of the country of origin. Minimum standard equipment for data transaction and code transfer to the IR has to exist.

If national registries wish to register and publish sales of futures they are free to do so to improve transparency. However the IR cannot register futures. Claims resulting from futures sales will be considered by the IR only if they are submitted as a normal AA tra-

de by the national registry. If the national registry sold more futures than its amount of AAs above its budget held in the account at the IR, the transactions cease when the AA are reaching the budget in the national account. The same applies if the COP suspends the right of this nation to trade because compliance looks unlikely.

Many developing countries taking part in CDM measures might not need and not be able to establish extensive domestic registries. For occasional creations of CERs the IR might allow Non-Annex B parties to send data in written form or by simple e-mail. The certifier could then send its code electronically or on paper to register the trade. CDM trades are not so sensitive that they will need online processing and could be covered by a department of the IR. These activities could be cross-subsidised through the fee in AA trades between Annex B countries.

4.2. Basic Functions of the International Registry

The International Registry keeps accounts of all countries participating in trading. A necessary condition for opening of an account would be the accreditation of the respective domestic registry. This could be waived for countries occasionally selling CERs (see above). Besides countries, private entities such as companies or NGOs wishing to bank or retire AAs could also open an account. Accounts would be closed, merged or divided in case of disappearance, merger or disintegration of Parties.

The IR would also have the following tasks:

- Changing accounts due to reasons such as transfers due to territorial splits, disputes and armed conflicts.
- Additional AA allocation on decision of COP/MOP, e.g. to account for the "Iceland" exception on large projects.
- Enforcing caps.
- Discounting of traded AA because of non-compliance.
- Discounting or cancellation of trades because of fraud.
- Collection of fees for own financial needs.
- Collection of fees for the CDM adaptation fund.

5. Types of Account Transactions

5.1 CDM

Emission reductions from a CDM project are certified by an accredited certifier who sends the respective codes to the IR and thus become CERs. The host country now can transfer the CERs from its own (Non-Annex B country) to the account of an Annex B country. This transaction transforms the CERs into AAs. The IR deducts the adaptation tax and checks the code. The certifier´s report is stored in the database with all serial numbers of the CERs. The host country´s account can be used to bank unused CERs. If a country enters Annex B, its banked CERs would be added to its AAs.

5.2 JI

A JI project´s negotiated ERUs are converted into AAs that are subtracted from the account of the host country and added to the account of the investing country. The Uniform Reporting Format (URF) document is stored in the database with all serial numbers of the ERU.

5.3 Trading in AAs

AAs are subtracted from the account of country A and added to the account of country B. AAs can voluntarily also be certified in case a buyer wants to make sure that he does not buy "hot air".

5.4 Banking

Countries or other entities could commit themselves to reduce the availability of AA in the current commitment period by transferring AA on a banking account. On notification of the national registry of country A, AAs from its AA account are transferred to the banking account of country A. The country may retransfer AA held in the banking account to the retirement account to prevent non-compliance. Banking automatically occurs if at the end of a budget period there is a surplus of AAs in the national account. This surplus is transferred to the national account of the next budget period. Private entities can open a distinct banking account to protect them against expropriation by governments. The home country cannot confiscate AAs banked on this account. The AAs can nevertheless be discounted in case of non-compliance of the seller.

5.5 Retiring

Both Parties and private entities can transfer AAs to a central retirement account. Retired AAs cannot be traded any more. They are counted towards compliance of the retiring Party. Private entities retiring AAs can choose the Party towards whose compliance the retired AAs shall count. Retired AAs are not subject to discounting in case the country of origin is in non-compliance.

5.6 Changes in Assigned Amounts because of decisions by COP/MOP

Discretionary changes in AA can occur due to the following reasons:

- border changes, disintegration or merger of Parties, international conflicts (see Michaelowa/Koch 1999),
- large scale refugee movements that lead to transfers on order of the COP/MOP (see Michaelowa/Koch 1999),
- Additional quota allocation on decision of COP/MOP
  The COP/MOP could decide to grant a Party additional AAs e.g.
  - if a small country starts a large-scale industrial project which strongly influences its GHG output (the "Iceland" exception)
  - because of a large catastrophe a country receives additional AA for reconstruction.

5.7 Discounting or Cancellation of Trades because of Fraud or Non-Compliance

A transaction is cancelled if

- the IR discovers irregularities in the national accounts,
- the national registry asks for transactions which either lead to likely non-compliance or lack the necessary uniform reporting document.

The involved parties are to be consulted by the IR. If a deliberate fraud scheme was discovered e.g. fake certifications which also involve past transactions the IR is to notify all buyers and current holders of the AAs traded under the scheme. Then the IR deletes the faulty AAs including retired ones. The selling party´s national registry is finally responsible to supply sufficient valid AAs to replace the deleted ones. For this services additional fees could be charged to the party liable for the fraud.

In case a legally responsible commercial body does not exist the national registry of the liable party is responsible for the coverage of all costs involving the adjustment of the IR´s bookkeeping and the replacement of the Aas.

Deleted AAs are to be listed in a black list to avoid further cheating.

5.8 Enforcement of Caps

Caps on trading can be automatically enforced by the IR if they are implemented using a cut-off time even if they cover all flexible mechanisms as a whole. After the last trade within the cap, the national account will be closed for further transactions of that type. If a part of the transaction is still within the cap, this part of the transaction will be executed.

Rules for preventing "hot air" sales could envisage letting the country only sell AAs that are certified to be derived from real reduction. In a sense, these AAs would be similar to CERs.

6. Structure of Accounts

All entries in accounts described below should be publicly available.

6.1 National Accounts of Annex B Countries

Necessary entries in national accounts of Annex B countries include:

1. Initial Assigned Amounts
2. Current Assigned Amounts
3. AAs acquired -by date, - by quantity, -by source (classification, last owner, first owner, in case of CDM project)
4. AAs acquired in IR auction or from CDM Adaptation Fund
5. AAs sold
6. AAs paid as transaction fee
7. ERU transferred
8. AA Banked
9. AA Retired

It would be recommended to include statistical information e.g. AA held by year, compliance in past budget periods, progress to compliance in the current budget period.

6.2 National Accounts for Non-Annex B Countries

Necessary entries in Non-Annex B accounts include:
CERs produced (date, quantity, name of project, project certifier, first buyer)
CERs paid for adaptation and administration
CERs banked

6.3 Banking Accounts for Non-Parties

Many companies and NGOs might want to secure AAs acquired against political risk such as expropriation. They thus will not want to hold their AA s in the national registry. Moreover, NGOs will be interested in banking and retiring AAs. Thus any such entity should be allowed to open a banking account. Also entities of countries without or with incomplete national registries and which would like to hold AA need to have a possibility to participate in the market. The costs of opening an international Non-Party account should be borne by the entity.

Necessary entries include:
Current Assigned Amounts
AAs acquired -by date, - by quantity, -by source (classification, last owner, first owner)
AAs Retired

6.4 Full Trading Accounts for Non-Parties

Many supra- and multinational entities plan to start funds to collect investor capital and channel it into CDM and JI projects:

- UN organisations e.g. GEF
- International development banks e.g. EBRD
- Multinational business associations e.g. E7
- Multinational companies e.g. Daimler-Chrysler
- International exchanges e.g. Chicago Board of Trade
- International NGOs e.g. Climate Network Europe

They should be allowed to open full trading accounts such as Annex B countries. A necessary condition would be that they show direct involvement in a CDM or JI projects to prevent misuse of accounts.

Advantages of this approach would be:

- As multinational funds channel the capital of companies from many countries in projects spread over several countries, it is difficult to allocate AAs of these entities to a national registry.
- Brokers would like to have a stock of AAs available without waiting for separate transfer licenses from a national registry.
- Insurance companies would like to hold big amounts of AA for insuring carbon sinks and non-compliance for their clients. These clients do not necessary have the same nationality as the insurer. Registration of these AAs for insurance coverage in a national registry could lead to the wrong assumption that a country is in compliance. Also a domestic registry could prevent an insurer to transfer its AAs for coverage of its clients´ losses due to fear of non-compliance.

A disadvantage would be that transaction costs are higher because AAs pass at least twice to the IR. Moreover, non-compliance could be triggered due to AA holdings in trading accounts that are not allocated to Parties. This could be solved by automatic closure of trading accounts at the end of each budget period. All AAs in these accounts would need to be transferred to the accounts of Parties where they should be used for compliance or banked. AAs not transferred or banked could be treated as automatically retired. In this way in case of discounting a national registry would be responsible.

Non-Party accounts must always have a positive balance to safeguard environmental integrity. Entities wishing to open a trading account should be screened by the Secretariat.

6.5 Aggregated Annex B Information Account

All national accounts of Annex B countries would be grouped together in an umbrella Annex B account for information purposes only. The numbers published would be the following:
Initial AA of Annex B countries (for the whole budget period).
Current AA of Annex B countries.

Acquired CERs from Non-Annex B countries.
Acquired AA from IR auctions.
AAs banked by Annex B countries for next budget period.
AAs banked by Annex B countries for other budget periods.
AAs retired by Annex B countries.

6.6 Account for Transaction Fees

The IR finances itself by levying a proportional fee in AAs. It will auction those AAs regularly.

6.7 Account for the Adaptation Fund

The CDM adaptation and administration tax should be levied proportionally on initial transactions of CERs. The CERs received will be auctioned regularly.

6.8 Black List

Faulty AAs are registered and excluded from further trading and usage.

6.9 Trade book

The IR keeps a permanently updated list of trades including:

- The date of registration of the trade.
- The parties involved.
- The volume traded.
- The serial numbers of the AAs.
- Price per AA.

7. Timetable for Implementation of the IR

The registry system should be set in discrete steps linked to the Kyoto Protocol process:

2001 COP/MOP1 might decide to start CDM

The transactions are restricted to simple selling of CERs that are acquired by Annex B parties. Thus it is necessary to have the accounts of Non-Annex B parties and Annex B parties in place that wish to participate in trading. Non-Party banking accounts can be opened at request. The principal structure of the electronic database has to be in place. Real-time publication of accounts has to be done via the Internet. To facilitate market transparency, CER trades must be announced at least two weeks in advance.

2005 Demonstrate Progress

The full electronic database with all features starts working. This provides for integration of futures trades, if Parties wish. Such a solution would alleviate problems that might occur if all trading would begin in 2008 only. Otherwise, only CER transfers are registered.

2008 Start of JI and ET between Annex B countries with Banking and Retiring

Settlement of futures contracts starts unless allowed earlier. In the former case, transactions are performed by the IR in the order the national registries have announced them. National registries have to publish futures sales and transfers immediately after they have occurred listing the exact year and amount of AAs to be transferred - sometimes years before the first budget period. All kinds of trades become possible. The IR starts annual auctions of AAs accruing from the transaction and CDM administration and adaptation fee.

2010 Progress will be monitored

Possibility to introduce green, yellow, red light warnings.

2012 31.12. Accounts are preliminarily closed for first budget period

2013 2nd Budget Period begins

2014 Final account settling for first budget period

Despite online bookkeeping, a true-up period for settlements is necessary as inventory data only become available by 2014. After a first settling non-compliance must be established.

AAs originating from non-complying countries are discounted. To avoid a chain-reaction of non-compliance, those countries, which would fall into non-compliance as a result of the discounting, have to get the possibility to make up the resulting shortfall through acquisition of additional AAs. Afterwards, banked AAs will be added to new AAs.

8. AA Data Base

Every AA traded, whether being original or resulting from a CER or ERU, must be identifiable by a unique serial number that allows to sort out issues of non-compliance. As described in the case of national registries, it has to consist of a code for the country of origin, the year of issue/certification, the project and certifier.

Besides the serial number, the following data are attached to the AA:

- URF report of the CDM or JI project.
- Certifier´s report for CDM, JI or non-quantifiable projects to reduce "hot air".
- Complete list of previous and current owners.
- Date of retirement.
- Faulty AAs are listed on a public black list and excluded from trade and usage.

9. The Registration Process

The registration process includes the following steps:

1. Certification (in case of CERs).
2. Entry in National Registry of country A (in case of CERs and ERUs).
3. The National Registry of host or selling country A applies for transfer of AAs, CERs or ERUs to investor/buyer country B.
4. The investor/buyer country B agrees.
5. Certification codes are transferred by certifiers to the IR.
6. The National registry of host/selling country A allocates a serial number and transfers it together with a secret access code (and URF report if it is a CER or ERU) to the IR.
7. The IR checks the access codes of both countries.
8. The IR checks whether the AA, CER or ERU numbers are listed in the Black List.

9. A percentage of transferred AAs is subtracted by the IR and placed in the account for transaction fees. In case of CERs an additional adaptation fee is subtracted and transferred to the adaptation account.
10. The date of the transfer is entered in the "Trade Book".
11. The serial numbers of AAs enter International Registry´s database.
12. AAs are transferred from country A´s account to country B´s account. CERs and ERUs now become AAs.
13. National accounts are adjusted.
14. International statistics are adjusted.

10. Discounting Process

When after the end of the budget period national inventory data become available and the true-up period is over, the registry can assess the non-compliance of a country. This could be done in a form that either all AAs transferred lose their value entirely or they are discounted by a certain percentage proportional to the degree of non-compliance. Examples follow:

a) A country has overshot its budget by 10% of its AA. It has banked or transferred 20% of its AA to other countries. In this case all its transferred or banked AAs will be discounted by 50% of their value.

Retired AAs can not be discounted because they left the registry.

b) A country has overshot its budget by 10% of its AA and transferred 20% of its AA to other countries. Environmental NGO bought another 10% and retired them. In this case only the AAs transferred to other countries´ AA account will be discounted by 50% of their value.

Who will be hit by the discounting? There are three possibilities:

a) The current owner of the AAs will suffer discounting, and probably use insurance coverage to buy other AAs to make up the shortfall. The national registry must guarantee compliance.
b) All former and current owners share responsibility and share the losses equally.

c) The first buyer´s national registry guarantees e.g. must provide insurance coverage for all later owners. In case it can not provide AA as a replacement for the discounted AA of the last / current holder, the first buyers country is deemed to be in non-compliance and eventually a new chain of discounting is started.

To avoid chains of non-compliance it would be better to use only case a). All cases show that the national registry of the buyer must have the right to reject trades, because it is finally responsible for compliance.

11. Financial Questions

The IR will incur costs for personnel, telecommunication and computer hardware and other equipment. These costs and capacity building at National Registries in developing countries will be covered by the following fees:

- general fee on international transactions,
- fee on CER conversion for Adaptation Fund,
- fee for processing discounts in case of non-compliance,
- opening fee for banking and trading accounts for Non-Parties (non-profit NGOs are exempt).

All fees should be paid in kind as a percentage on the AA transferred. The IR would transfer these AAs on a special account. They will be auctioned annually. The registry will receive income only after auctioning the AAs and thus incur a price risk. Nevertheless, in-kind fees are preferable to monetary fees as the latter depend on the contract value, which could easily be fudged.

12. Security Issues

As trading is likely to involve high volumes and values precautionary measures have to be taken to guarantee availability and security of transactions. Experience shows that UN organisations are becoming more and more a target of terrorists attacks - even the climate negotiations in June 1999 were target of multiple bomb threats. It is nearly sure that the IR will be under attack by hackers with different motivations as well as physical threats because of the high publicity terrorists could secure at such a prominent location.

12.1 Hackers

Ecologically motivated computer experts could try to sabotage the IR through infection with viruses. A more subtle form of sabotage could be to overwhelm the data security, lock in and perform fake trades. Mistakes in the IR could be used to compromise emission trading in general.

Criminally motivated computer experts could perform fake transactions to manipulate accounts. Because of the nature of the IR any kind of fake transaction would be discovered and would not have any positive effect for a party. Criminal manipulations could only have short time effects, e.g. manipulating the price of emission futures by a party.

Thus, the IR must have a firewall as defence against hacker attacks. All procedures of data input and transfer must be protected by the latest available data security soft- and hardware. Because no computer system can be made foolproof, the IR must elaborate defensive procedures in the case manipulated transactions took place and the involved national registries are not responsible. National registries should be provided with code keys for communication with the IR. If manipulation is done using the original codes and communication structures of national registries, the national registry where the security leak occurred is responsible for any damages.

The IR´s staff itself could be tempted to manipulate accounts because of material reasons. This could be partly prevented that also the IR staff must authorise and identify itself by a personal access code for making any input to the IR.

12.2 Physical Threats

Politically motivated interruption of the work of the registry can happen due to

- Occupation of the premises for political statements.
- Destruction of the computing centre for political statements.
- Disturbance of communication for political statements.

Thus, two sets of fully secure mainframe computers are needed. Geographically dispersed backup systems - e.g. New York - Bonn - would be preferable. The remaining computing centres must be able to take over any time automatically the legally important re-

gistration of trades by time! A help desk must be 24 hours available because of world-wide interest.

13. Advantages of a Centralised Approach to the "Pure" Decentralised Registry Network

The decentralised structure of stand-alone national registries currently promoted by New Zealand extremely well implements a low cost and streamlined approach modelled on the electronic registry for SO2 trading in the U.S.. However we do not think that the positive experience of the SO2 trading regime could easily be transferred to an international trading system for AA. The limited number of actors in the U.S. SO2 system was easy to survey and monitor. The amount of SO2 emission certificates was limited and predictable. In case of legal disputes a well-organised and powerful law enforcement system was in place. In a international System for AA transfers involving over 150 different countries and legal systems, a central clearinghouse is necessary to avoid possible problems:

- manipulation on country level,
- lowering risk of lost data,
- legal insecurity in case of fraud because many countries are involved.

A truly International Registry could also help to implement a number of beneficial features impossible to be created by a set of decentralised registries:

- national registries can be individually designed, e.g. using the national language,
- the system can grow on demand and abilities of national registries,
- no additional report to the UNFCCC Secretariat is necessary,
- there is no need for review teams visits to over 150 countries,
- it is possible to have international accounts for non-state entities,
- it can be a source of income for the administration of FCCC,
- it administers uniform rules for certifier involvement,
- it homogenises of AA quality and avoids "junk bonds".

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ARMED CONFLICT, BORDER CHANGES AND THE KYOTO PROTOCOL

Axel Michaelowa, Tobias Koch

1. Introduction

The risk of anthropogenic climate change caused by the emissions of greenhouse gases has led to increasing international efforts to reduce emissions. The Kyoto Protocol (UNFCCC 1997) negotiated at the third Conference of the Parties to the U.N. Framework Convention on Climate Change in 1997 for the first time negotiated legally binding emission targets for the industrialized countries and countries in transition (Annex B of the Protocol). Despite of the long-term nature of its emission targets that apply to the "budget period" 2008-1012 it is almost totally silent about the impacts of long-term political crises that might lead to armed conflict and border changes. We have to expect that conflicts arise that will have repercussions on country commitments under the Protocol. The current Kosovo crisis vividly illustrates the potential consequences of warfare on emissions and related commitments.

So far the only issue touching this subject has been an internal U.S. discussion about exemption for all activities of their military forces. Several politicians and security policy think tanks argued in favour of such an exemption as otherwise the preparedness of the U.S. military would suffer. At Kyoto this led to a Decision (2/CP.3), but not an inclusion in the Protocol as often erroneously stated, e.g. by the Center for Security Policy (1998). The Decision states that emissions of "multilateral operations pursuant to the charter of the United Nations" are exempt from calculation of national emission budgets. It adds, though, that emissions of other operations have to be reported by either one or several of the Parties involved. Therefore, after Kyoto, in the U.S. pressure increased for exemption of all military operations and manoeuvers (see e.g. Owens 1998). Its proponents managed to get a unanimous amendment to the 1998 Defense Authorization Bill of the House of Representatives that "no provision of the Kyoto Protocol will restrict the procurement, training, operation or maintenance of the U.S. Armed Forces".

A blanket exemption for the U.S. military which is the single largest public greenhouse gas emitter in the U.S. as its share of federal government energy use amounts to 42%

(National Center for Policy Analysis 1998) would set a dangerous precedent as other emitters would try to get a similar exemption.

In the seven years since the signing of the U.N. Framework Convention on Climate Change border changes already had a serious impact on climate policy. German reunification led to a huge drop in emissions in former East Germany. The dissolution of the Soviet Union and the ensuing economic collapse caused an enormous slump in emissions. Lack of base-year emissions data for each of the newly independent states caused problems in setting up inventories and emission forecasts. The division of Czechoslovakia led to the necessity of accession to the Convention for both new entities.

Armed conflict between Parties of the Convention will become more relevant as soon as Annex I will expand. Already the Gulf War of 1991 demonstrated the enormous potential of modern warfare to lead to high additional emissions. The Kuwait oil fires led to additional CO2 emissions of 478 million tons CO2 (CDIAC 1998) and even regional climate disturbances, including negative impacts on third parties not involved in the conflict. The use of means of mass destruction could have such enormous impacts in this respect that we are unable to assess them in this paper.

In this context, it would be very helpful if further research would be done on human carbon storage through buildings and other products of human culture such as infrastructure and long-lived household goods. This has not yet been included in carbon inventories. Nobody has ever tried to quantify the magnitude of this storage and quantification of possible destructive military activity has not yet been undertaken (firebombing, destruction of oil and gas resources, destruction of forests and other sinks).

Besides direct carbon release, an influx or exodus of large parts of the population would have great impacts on energy consumption and thus also greenhouse gas emissions of the involved countries. In a world of emission limitation targets the winner - loser relations have to be regulated to prevent innocent suffering and economic hardships.

The Kyoto Protocol envisages a global market for greenhouse gas emission permits. Similar to commodity markets, crises in the main producer or buyer countries of these permits will have a great influence on market prices. Thus, it is necessary to elaborate a set of rules for this market that allows management of international crises, which can easily lead to over- or undersupply of permits. Predictability is as the more crucial as

this market will not base on a tangible commodity but on an artificial one created through international agreements and futures.

2. Typology of Cases that Lead to Changes in Borders and Military Operations

2.1 Cases

We can distinguish 14 cases of border changes and armed conflicts that have repercussions on the rules of the Kyoto Protocol. Current examples are added in brackets:

1. Countries A and B merge (West and East Germany in 1990).
2. Country A transfers territory to country B (UK cedes Hong Kong to China in 1997).
3. Country A splits into countries B and C (Czechoslovakia into Czech and Slovak Republics 1993).
4. Country B secedes from country A (Eritrea from Ethiopia 1993).
5. Country A continuously occupies territory of country B (Israeli occupation of the West Bank when it formally was part of Jordan).
6. Country A has military bases in country B (U.S. in Germany).
7. Country A dissolves into anarchy (Somalia) or vanishes (if sea-level-rise continues e.g. Maldives).
8. Country A and country B are in armed conflict with uncertainties about territory and high war-related emissions (Iraq occupies Kuwait and burns oil reserves in 1990/91).
9. Country A participates in an international peacekeeping operation with U.N. approval (U.S. in Gulf War 1991).
10. Country A intervenes in Country B without U.N. approval (U.S. intervention in Grenada 1982).
11. Country A participates in a humanitarian operation with U.N. approval (U.S. in Somalia 1991).
12. Country A participates in a humanitarian operation without U.N. approval (U.S. in Bangladesh 1991).
13. Country B suffers from externalities of military operations of country A, especially from an influx of refugees (influx of refugees from former Yugoslavia into Germany after 1992).
14. Terrorist attacks with large scale devastation (threatened nuclear waste spill by Chechen rebels in Moscow 1995).

2.2 Treatment of these Cases under the Kyoto Protocol

The Kyoto Protocol in Art. 2,2 exempts international aviation and marine bunker fuels from national commitments. Thus part of the emissions of cases 6 and 9-12 would be exempt, i.e. those related to air and sea operations. All other cases are not covered. Therefore, Kyoto rules leave many open questions.

3. Possible Rules for Treatment of the Cases under the Kyoto Protocol

We suggest rules for allocation of the emissions in each of the cases listed above. We assume that the climate policy regime has a long-term existence with future targets and that voting rules of the Conference of the Parties change from the current pure veto principle to some kind of majority voting. Moreover, there exist incentives for Parties to the Protocol to remain in the regime and more countries will join Annex B. Emissions trading will have been accepted with compulsory national registries to track trades. Furthermore, the U.N. will try to broaden its competencies to define an aggressor. The suggested rules are as follows:

1) The new country will be treated like a bubble under Art. 4 of the Kyoto Protocol encompassing the former countries A and B. Consequences of trades in emission permits from national budgets (assigned amounts) done by countries A and B will be honored by the new country. Trades between A and B naturally cancel.
2) Countries A and B have to negotiate the transfer of part of the budget and allocation of consequences of trades and accruing/outgoing JI/CDM credits bilaterally. If data for the base year 1990 are not available, countries A and B will also have to negotiate the allocation of the base-year inventory. If negotiations fail, countries A and B are treated as bubble.
3) Countries B and C have to negotiate division of former country A's budget, consequences of emission trades and accruing/outgoing JI/CDM credits as well as the base-year inventory bilaterally. If negotiations fail, countries B and C are treated as bubble.
4) The new country B negotiates accession to the Protocol. The division of former country A's budget has to be negotiated similarly to case 3. If negotiations fail, countries A and B are treated as bubble.
5) There exists a number of possible solutions:

a) Country B can renounce to the emissions of the occupied territory without renouncing to its national sovereignty. The emissions are transferred to the budget of the occupier A;

b) Country B can renounce to the emissions but credit ongoing CDM/JI projects which had been started by itself before the occupation. This obviously applies only if projects are still running and certified which might be difficult in such circumstances;

c) Country B does not want to renounce to the emissions for sovereignty reasons but renounces to the emissions increases from the start of occupation. Other implicit division will be arbitrary as it is impossible to distinguish between effects of occupation and business-as-usual;

d) Occupier A initiates JI/CDM projects in the occupied territory. Then the U.N. has to decide whether to accept these projects or refuse them generally. It is obvious that the occupier will not voluntarily give the credit to government of the country whose territories are occupied.

6) The allocation of emissions of A's military bases overseas has to be differentiated:

a) bases established for military deployment to enforce U.N. resolutions (U.S. bases in Korea): their emissions will be exempt under Decision 2/CP.3, Art. 5;

b) other bases: the deploying country A has to negotiate with host country B which country will account for the emissions. If no agreement can be reached (which would e.g. presumably be the case for the U.S. base in Guantanamo, Cuba), the emissions should have to be borne by the deploying country A.

7) After dissolution of country A's government the registry for emissions trading no longer exists and monitoring trade is no longer possible. Emission permits from JI/CDM projects and assigned amounts that have been certified and sold before the registry dissolved are still valid. If country A again has a functioning registry before the end of the budget period, the emission reductions from JI/CDM projects that accrued during the period of anarchy must be reviewed by certifiers. Sequestration which has been reversed during the anarchic period cannot be credited at all. Measures resulting in emission reduction will become creditable for the time they have been certified.

   If the country's land area has vanished completely all certified emission reductions should be still valid except for land-based sequestration.

8) Armed conflict gives rise to different issues:

a) Fuel use for military purposes (production, transport, delivery) obviously is part of national emissions. A peace settlement, nevertheless might allocate the emissions to other parties to the conflict (e.g. the aggressor).

b) Allocation of large-scale emissions resulting from damages inflicted by enemy parties (burning of cities, oilfields etc.) have to be negotiated in peace settlements. It would be preferable to allocate such emissions to the agressor's budget. This is not necessarily linked to monetary payment of damages.

c) A changing degree of occupation during the war has to be considered. Theoretically, one would have to calculate the extent of occupation during the full budget period. If this issue is not covered by the peace settlement, a U.N. settlement could treat all participating countries as a bubble for the duration of occupation and allocate the shares of bubble after ceasing of armed conflict. No problem arises if conflict parties assume obligations from occupied territory. That would e.g. be the case if the occupier accepts that occupation is only temporary and due to military strategy.

d) As long as inventories are not updated due to military conflict, no new credits from JI in country A and B accrue to an investor country due to Art. 6, 1 c) in contrast to CDM where no such rule exists. In the latter case, though, certification has to be done which might be difficult during an armed conflict. Nevertheless, no rule says that credits which were certified and registered before hostilities broke out and inventories degraded lose their value. But in case of destroyed sinks the credits have to be discounted to the degree of destruction.

e) A new category of "hot air" (i.e. emission reductions that are not due to climate policy but purely accidental) would arise due to involuntary emission reduction following the conflict-related breakdown of economy and/or loss of population. Would that "bloody hot air" be tradeable? One could envisage a differentiation between an aggressor and its victims where part of "bloody hot air" could be traded by a victim to speed reconstruction.

9) and 11)

Emissions are generally exempt by Decision 2/CP.3, Art. 5. Questions of recognition of this status could be highly controversial, especially because of claims from the US that all its military actions could be called "in persuit of UN charta". This question should be discussed separately to avoid additional problems with ratification of the Kyoto Protocol. Different models for eligibility for "Decision 2/CP.3, Art4" are to be developed and discussed.

10) and 12)

participating countries have to negotiate distribution of operation-related emissions (2/CP.3, Art. 5). If the operation obviously fulfils objectives "in pursuit of the U.N. charter", could be treated like 9 and 11 as long as the U.N. Security Council does not condemn the operation.

13) If responsibility for aggression can be clearly established by U.N. authority, the additional emissions on country B's territory will be deducted from the budget of the aggressor. An Annex B country accepting a huge influx of refugees should get additional assigned amounts subtracted from the budgets of the countries of origin or additionally provided by decision of the UNFCCC. This is justified due to the fact that otherwise country B would have to reduce its emissions more strongly that under business-as-usual. The country could choose to get for each refugee either
   - the per capita emission of the country of origin of the refugees
   - its average domestic per capita emission.
14) If it can be shown that the terrorists are acting on behalf of an Annex B country, the additional emissions resulting from the attack should be deducted from this country's budget.

Table 1: Additional annual budget allocation (kt C, %) due to refugee movements

Country	Net[1] refugees hosted in 1997	Allocation based on 1996 per capita emissions of country of origin	Allocation based on 1996 per capita emissions of host country
Australia*	18,000	n.a.	81 (0.1%)
Austria*	11,400	n.a.	24 (0.1%)
Belgium*	14,100	n.a.	47 (0.2%)
Bulgaria*	2,400	n.a.	4
Canada*	48,800	n.a.	208 (0.2%)
Croatia	-233,200	-265 (-6.2%)	-234 (-5.4%)
Denmark*	13,000	n.a.	49 (0.4%)
Finland*	1,600	n.a.	5
France	118,300	38	212 (0.2%)
Germany*	277,000	n.a.	835 (0.4%)
Greece	4,000	3	8
Hungary*	3,400	3	5
Ireland*	4,300	n.a.	12
Italy	59,000	55	118 (0.1%)
Netherlands*	64,200	n.a.	210 (2.7%)
Norway*	3,100	n.a.	6
Romania	-4,000	-20	-19
Russia	233,900	203 (0.03%)	655 (0.1%)
Slovenia	1,800	-4	4
Spain*	3,300	n.a.	5
Sweden	181,200	131 (0.7%)	330 (2.2%)
Switzerland	46,500	21 (0.2%)	77 (0.6%)
Ukraine	4,100	1	9
UK*	58,100	n.a.	157 (0.1%)
U.S.*	491,000	n.a.	2686 (0.2%)
Yugoslavia	471,300	197	294

1 If a country both hosts refugees and is a source of refugees, the balance is calculated.
* Not covered by UNHCR.

Source: own calculations from IEA (1998), UNHCR (1998), USCR (1998).

In case the additional allocation could not be deducted from the aggressor's budget (e.g. if the aggressor is a Non-Annex B country) the global Kyoto budget would be increased. Nevertheless, such a solution would enhance the willingness to accept refugees.

If Non-Annex B countries accept refugees from an Annex B country, they are free to sell any assigned amounts deducted from the budget of the Annex B country where the refugees originated. Non-Annex B countries do not receive tradable permits if the refugees originated from another Non-Annex B country. This is not unequal due to the lack of an emission budget constraint through the refugee influx which would lead to additional negative economic impacts.

4. Conclusions

There exists a lot of possibilities for armed conflict and border changes that so far have not been taken into account in the rules of the Kyoto Protocol. We have suggested a set of rules to cover these possibilities. Generally the problem exists that an aggressor that would be subject to the suggested rules can well quit the Kyoto Protocol and the Framework Convention on Climate Change. Furthermore after losing a war, the aggressor can cease to exist due to splits or lack of successor in interest. In the latter case, a newly-created entity occupying the territory of the former aggressor has to negotiate accession to the Protocol (and to its Annexes).

Concerning military policy, the Kyoto emission targets are an additional incentive for new multilateral conventional disarmament. If the military does not get an exemption for its emissions, it should start to enhance its energy efficiency. This could lead to higher performance of conventional weapons due to increased range and lower dependence on supply lines. Training could be made less energy intensive by using advanced simulation technology.

Ultimately, a strengthened Kyoto Protocol could be instrumental in reducing the growth of international conflict potential due to climate change. The impacts of unchecked climate change are likely to enhance international tensions and refugee movements. Those countries that so far are reluctant to ratify the Protocol should consider these lon-term issues. By ratifying and implementing the Protocol's provisions they could gain much security and avoid unneccessary military expenses.

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