

# **An international registration and tracking system for greenhouse gas emissions trading**

## **Elements, possibilities, problems and issues for further discussion**

Axel Michaelowa<sup>1</sup>, Tobias Koch<sup>2</sup>

1 Hamburg Institute of International Economics, Neuer Jungfernstieg 21, 20347 Hamburg, Germany,  
Phone +49 40 42834 309, a-michaelowa@hwwa.de

2 Steinbeis-Transfer-Zentrum for Emissions Trading & Climate Protection, Burgauer Str. 44, 86156  
Augsburg, Germany, Phone, +49 821 403560; info@carboninvest.com

**Abstract:** International emissions trading under the Kyoto Protocol or an alternative international regime needs a registration system to prevent creation of fake emission permits. We suggest a two-layer system consisting of an international registry and a set of national registries. National registries have to adhere to a set of minimum standards. The international registry maintains accounts for countries and private entities. The latter would thus be ensured against expropriation. We suggest that permits should become fungible across all Kyoto Mechanisms and are allocated a serial number to allow tracking. The international registry should collect fees for adaptation and administration. It should also be charged with reallocation of emission budgets due to various causes, enforcing of eventual caps and with discounting of permits due to non-compliance. We discuss the registration process and a timetable for setup of the registries.

**Key words:** international emissions trading, climate policy, registration

## **1. Introduction**

Industrialised nations (Annex B Parties) have committed themselves in the Kyoto Protocol to the U.N. Framework Convention on Climate Change (UNFCCC) to reduce their greenhouse gas (GHG) emissions in the period 2008-2012. For this period the participating Annex B Parties were allocated an “emissions budget” containing a specific volume of emission rights called “Assigned Amount Units” (AAUs), measured in tonnes of CO<sub>2</sub> equivalents. To reduce the costs to comply with their emission targets, Annex B parties can import emission rights. The “Kyoto Mechanisms” Joint Implementation (JI), Clean Development Mechanism (CDM) and International Emissions Trading (IET) allow the creation of such emission rights known as Assigned Amount Units in the case of IET, Emission Reduction Units (ERUs) generated through JI projects and Certified Emission Reductions (CERs) created through CDM projects. Annex B Parties need to have a system for the transfer of the AAUs, ERUs and CERs and they 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. However, a transparent, efficient and credible registration system is a prerequisite for the realisation of emission reduction cost savings through the use of the Kyoto Mechanisms. In this context, the institutional responsibilities have to be clearly laid out and the links to other institutions in the Kyoto process such as the UNFCCC Secretariat or the CDM Executive Board specified. However, despite

the crucial role of registration, it has not played a relevant role in the discussions about the climate negotiations as it was perceived to be a purely “technical” subject. Nevertheless, even technical experts have not been active discussing this issue – we are not aware of any publication on this issue apart from some “non-papers” in the negotiations (New Zealand 1999, U.S. and New Zealand 1999) and some cursory mention in NGO position papers (Environmental Defense Fund 1999).

For registration there is a number of possible policy options with far-reaching implications. A fully centralised registry would be situated at the UNFCCC Secretariat and all transactions would have to be done through the central registry. Under a fully decentralised option, each party would set up its own registry conforming to international rules for registration. An intermediate option would be to have national registries supplemented by a central node at the UNFCCC Secretariat checking their activities. Another design element is the differentiation of accounts – ranging from having a single account for a party to having accounts for all kinds of different stakeholders.

A liquid and efficient emissions market can only develop when accounting rules are clarified beforehand and ensure credibility of the traded “commodity”. 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).

Within this paper we want to give suggestions on the functioning of a potential future global registration and tracking system for emission rights. We know that the still ongoing UNFCCC negotiations will have a strong influence on the future design of a global system and that not all presented features are equally necessary for successful implementation. We are also aware that current attempts to renegotiate the Kyoto regime or even supplant it by a new regime may change the background for emissions trading and project-based mechanisms. We think that any future regime will contain provisions allowing such transactions and thus the issue of registration will remain on the table. During the current negotiations Parties should keep in mind the practical need for a workable registration and tracking system and should avoid sticking too strongly to their ideologies.

## **2. Accounting rules in the Protocol**

So far, general accounting rules are scattered throughout the Protocol. Art. 3, 10-12 are the basic rules for the establishment of a registry and tracking system. They state that AAUs, 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 of emission rights for future budget periods. Article 5 states that COP/MOP has to make provisions for the establishment of national GHG inventories. Article 6.1c rules that Parties can only take part in JI projects if they comply with Art 5 and 7 and have therefore accounting systems in place. Article 7 stipulates that Parties are to report annually changes in assigned amounts and have to create national inventories. Further details of reporting duties of

the Parties ( e.g. frequency of future reporting) are to be decided by COP/MOP. Article 8 states that independent review teams that review annual reports and check compliance. Article 12.3b stipulates that CERs can be used by Annex 1 Parties for fulfilment of their obligations, while 12.8 provides the base for the "Adaptation Tax" which is to be deducted from the CER volume. Art. 17 states that reporting and accountability rules for emissions trading shall be set by COP. Article 18 gives the base for a non-compliance system which is to be decided by COP/MOP.

The widespread mentioning of accounting throughout the Kyoto Protocol makes the future accounting system for emission rights the backbone of compliance and all Kyoto Mechanisms. Therefore Parties without functioning inventory and accounting systems cannot take part in any trading activities.

### **3. Targets of a registration and tracking system**

In our view, an international registration and tracking system should be designed to fulfil the following primary targets:

- ensure transparency and credibility
- ensure information in case of non-compliance of the Party of origin of emission rights according to non-compliance procedures developed by COP/MOP.
- allow homogenisation of original AAUs, ERUs and CERs as one commodity (we call it AAUs)
- in case Parties wish so, at least at the end of the budget period, guarantee international compatibility of data
- create the base for a viable market for permits
- minimise market power

- minimise transaction costs
- collect fees to finance administration and the "adaptation fund"

The design of a registration and tracking system should 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
- 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.
- enable developing countries to take part in CDM without establishing expensive computing
- provide data to the UNFCCC to 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),
- b) a purely global registry with national sub-registries,
- c) decentralised national registers without a central node

In case a), 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 is the set-up of national inventories instead of a single global agency setting up inventories. Such a system is 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 case b), we increase the risk of highly centralised bureaucracy. However, system b) would be preferable in case of a centralised system to shift liability from the seller to the buyer (traffic-light system). The recent international discussion has moved away from the traffic-light system due to its distinct disadvantages such as setting the trigger for the yellow light. In any case, the necessity of domestic registries remains.

Case c) 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). Such a decentralised structure of stand-alone national registries extremely well implements a low cost and streamlined approach modelled on the electronic registry for SO<sub>2</sub> trading in the U.S.. However we do not think that the positive experience of the SO<sub>2</sub> trading regime could easily be transferred to an international trading system for AAUs. The limited number of actors in the U.S. SO<sub>2</sub> system was

easy to survey and monitor. The amount of SO<sub>2</sub> 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 AAU 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
- no additional national report to the UNFCCC Secretariat is necessary
- there is no need for review team 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 the UNFCCC
- it administers uniform rules for certifier involvement
- it homogenises AAU quality and avoids “junk bonds”

In case Parties will not be able to agree on central registry structures, there is of course the possibility that countries interested in trading will mutually recognise their registries via bilateral contracts. Provided enough market power, this kind of network could evolve into a standard for national registries, but could be reserved for members. In fact, a closed group of countries with a common registry system would

work like a commitment bubble, as the inner working of the system could not be transparent enough for third parties

We will thus mainly deal with case a). It is assumed that most Annex B states will set up domestic registries and are interested in exchanges of AAUs. 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 liability in the case of non-compliance central to the debate on the structure of a global registration system for AAUs. 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 AAUs has to be done in a consistent way starting with country of origin, the year of issue/certification, the project and certifier. Each year AAUs are counted from 0 and denominated in single tonnes CO<sub>2</sub> equivalent.

National codes are compulsory. Some examples:

a) a trade in original AAUs: RU-2008-00500300-000-000 (Russia, AA issued 2008, number 500300,)

b) a trade in AAUs resulting from a JI project: RU-2008-00500301-001-000 (Russia, ERU issued 2008, number 500300, JI project Saratov afforestation)

c) a trade in AAUs 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 AAUs has to be kept separate.

The first trade of ERUs and CERs has to include delivery of the project's certifier's report to the IR. National registries are responsible for compliance in case AAUs 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 trade by the national registry. If the national registry sold more futures than its amount of AAUs 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.

We further suggest the introduction of secret codes for each market participant which should be issued by the International Registry. Similar to the "digital signature standard" in Germany, transactions could be authorised by adding a secret code, which allows unique identification of the market participant.

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 AAU 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 AAUs 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 AAU allocation on decision of COP/MOP, e.g. to account for the “Iceland” exception on large projects
- Enforcing caps
- Discounting of traded AAUs 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. Suggested 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 AAUs. 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 AAUs.

### 5.2 JI

A JI project's negotiated ERUs are converted into AAUs 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 AAUs

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

The transaction could be automatically cancelled in case a Party would start using up its compliance reserve. Faulty AAUs should be destroyed and their numbers listed on a public black list.

#### 5.4 Banking

Countries or other entities could commit themselves to reduce the availability of AAUs in the current commitment period by transferring AAUs on a banking account or do this as a form of compliance reserve. On notification of the national registry of country A, AAUs from its AAU account are transferred to the banking account of country A. The country may retransfer AAUs 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 AAUs in the national account. This surplus is transferred to the national account of the next budget period. If the COP/MOP allows, private entities can open a distinct banking account at the International Registry to protect them against expropriation by governments. The home country cannot confiscate AAUs banked on this account. The AAUs can nevertheless be discounted in case of non-compliance of the seller.

#### 5.5 Retiring

Both Parties and private entities can transfer AAUs to a central retirement account. Retired AAUs cannot be traded any more. They are counted towards compliance of the retiring Party. Private entities retiring AAUs can choose the Party towards whose compliance the retired AAUs shall count. Retired AAUs are not subject to discounting in case the country of origin is later found to be in non-compliance, because retired AAs have no influence on national registries any more.

#### 5.6 Changes in Assigned Amount Units because of decisions by COP/MOP

Discretionary changes in total AAUs 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 AAUs 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 AAUs 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 AAUs traded under the scheme. Then the IR deletes the faulty AAUs including retired ones. The selling party's national registry is finally responsible to supply sufficient valid AAUs 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 AAUs.

The registration numbers of deleted AAUs should be listed in a black list for documentation

## 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. However, this "first come, first served" system has distortionary effects on company investments in the Kyoto Mechanisms.

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

## **6. Structure of Accounts**

The registries will contain seven different kinds of accounts. Accounts for entities participating in trading would be grouped as follows: National Accounts of Annex B Parties, for Non-Annex B Parties, banking accounts for Non-Parties and full trading accounts for Non-Parties. Moreover, an aggregated Annex B Information Account, an account for transaction fees and an account for the Adaptation Fund as well as a Black List would have to be kept by the IR. All entries in these accounts should be publicly available.

### 6.1 Accounts of participants in trading

Entries in national accounts of Annex B Parties should include:

1. Initial Assigned Amounts
2. Current Assigned Amounts
3. AAUs acquired –by date, - by quantity, -by source (classification, last owner, first owner, in case of CDM project)
4. AAUs acquired in IR auction or from CDM Adaptation Fund
5. AAUs sold

6. AAUs paid as transaction fee<sup>1</sup>

7. ERUs transferred

8. AAUs banked

9. AAUs retired

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

Necessary entries in Non-Annex B Party accounts include:

- CERs produced (date, quantity, name of project, project certifier, first buyer)
- CERs paid for adaptation and administration, if applicable under a unilateral CDM
- CERs banked

Many companies and NGOs might want to secure AAUs acquired against political risk such as expropriation. They thus will not want to hold their AAUs in the national registry. Moreover, NGOs will be interested in banking and retiring AAUs. 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 AAUs 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
- AAUs acquired –by date, - by quantity, -by source (classification, last owner, first owner)
- AAUs Retired

---

<sup>1</sup> It is likely that the fee will be levied in kind. If it is paid as fixed monetary rate there is no need for this account. A monetary fee would be an incentive to trade in futures only and settle the open futures

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

Non-state entities likely prefer not to hold the acquired AAUs in a Party account and thus would like to have a distinct, “Non-Party” account. The introduction of Non-Party-Accounts at the level of the International Registry however needs a positive decision by COP/MOP. The Parties need to be aware that international companies could seek to prevent control of national governments on company AAUs. On the other hand many projects could be realised by entities from countries with bad track records concerning investor security.

A necessary condition for opening of a Non-Party-Account would be that the company shows direct involvement in a CDM or JI projects to prevent misuse of accounts. This would allow for the following cases: Multinational funds channel the capital of companies from many countries in projects spread over several countries, it is difficult to allocate AAUs of these entities to a national registry. Brokers would like to have a stock of AAUs available without waiting for separate transfer licenses from a national registry. Insurance companies would like to hold big amounts of AA for

---

only once at the end of the budget period.

insuring carbon sinks and non-compliance for their clients. These clients do not necessarily have the same nationality as the insurer. Registration of these AAUs 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 AAUs for coverage of its clients' losses due to fear of non-compliance.

A disadvantage would be that transaction costs are higher because AAUs 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 AAUs in these accounts would need to be transferred to the accounts of Parties where they should be used for compliance or banked. AAUs 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.

## 6.2 IR accounts

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
- AAUs banked by Annex B countries for next budget period
- AAUs banked by Annex B countries for other budget periods
- AAUs retired by Annex B countries

The IR finances itself by levying a proportional in-kind fee (see Footnote 1 above) on all transactions which will be listed in a special account. It will auction those AAUs regularly. The registry will receive income only after auctioning the AAUs 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.

The CDM adaptation and administration tax should be levied proportionally on initial transactions of CERs. The CERs received will be kept in another account and auctioned regularly. The Black list would register faulty AAUs that are excluded from further trading and usage. The IR keeps a permanently updated list of trades (“Trade Book”) including:

- The date of registration of the trade
- The parties involved
- The volume traded
- The serial numbers of the AAUs
- price per AA

## **7 The registration process and physical setup of the registry**

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 AAUs, 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 AAUs 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 AAUs enter International Registry's database/
12. AAUs are transferred from country A's account to country B's account. CERs and ERUs now become AAUs.
13. National accounts are adjusted
14. International statistics are adjusted

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.

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.

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

## **8 Timetable for implementation of the IR**

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

2003 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 like to take part in the CDM. Official trading between parties can take place using CER, only. Trade in AAUs is only possible in the form of forwards, which are not registered by the IR. 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. The full

electronic database is put into operation as soon as the number of trades makes the system necessary.

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

Settlement of futures contracts starts. All kinds of trades become possible. The IR starts annual auctions of AAUs accruing from the transaction and CDM administration and adaptation fee. Trade caps and compliance reserve regulations will be enforced

2012 31.12. Accounts are preliminarily closed for first budget period

2013 2<sup>nd</sup> 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.

AAUs 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 AAUs. Afterwards, banked AAUs will be added to new AAUs.

## 9 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 AAUs 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 overshoot its budget by 10% of its AAUs. It has banked or transferred 20% of its AAUs to other countries. In this case all its transferred or banked AAUs will be discounted by 50% of their value.

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

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

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

- a) The current owner of the AAUs will suffer discounting, and probably use insurance coverage to buy other AAUs 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 AAUs as a replacement for the discounted AAUs 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.

## **10 Conclusions**

The Kyoto Protocol includes some rules for accounting of international emissions trading but a lot of detailed rules have to be developed to allow smooth trading. Even in a context where a new international regime supersedes the Kyoto Protocol, emissions trading will remain important and thus recommendations given here will retain their relevance. A major precondition for trading is the establishment of an efficient and transparent registration and tracking system to ensure credibility and allow trading in homogeneous units (Assigned Amount Units) from all Kyoto Mechanisms. This system has to allow participation of private entities. There are many different possibilities to define a registry system with different levels of centralisation and differentiation of accounts. We feel that overly decentralised systems may lead to a lack of coordination and could create loopholes for fraudulent behaviour. We thus suggest a two-tiered registration system with an International Registry for coordination and a set of national registries. This model is more credible than a model of decentralised national registries. The two-tier system can only work if the national registries use defined minimum standards and if the Assigned Amount Units traded are made distinguishable through allocation of a unique serial number. The International Registry should maintain accounts for countries and private entities. The latter is important because it protects private entities against expropriation by

national governments. The International Registry should discount trades in case of non-compliance of a participant, enforce caps, maintain a Black List of fraudulent Assigned Amount Units and collect an adaptation and administration fee in kind. The Assigned Amounts collected in this way should be auctioned annually. The Registry must be secured against interference.

## **11 References**

Environmental Defense Fund 1999. Eight rules for accountability and compliance under the Kyoto Protocol, New York

Michaelowa, A. and Koch, T. 1999. Armed conflict, border changes and the Kyoto Protocol, in: Critical issues in climate policy, HWWA Report No. 194, Hamburg, 39-47

New Zealand 1999. National registries for emissions trading under the Kyoto Protocol, in: UNFCCC: Principles, modalities, rules and guidelines for the mechanisms under Articles 6,12 and 17 of the Kyoto protocol, FCCC/SB/1999/MISC.3, Bonn, 35-43

U.S. and New Zealand presentation at 10<sup>th</sup> SBSTA 1999. Greenhouse Gas Registry: Accounting for Changes in Assigned Amount, Bonn