Joint Implementation for International Emissions Reductions through Electricity Companies in the European Union (EU) and in the Central and Eastern European Countries ("JOINT")

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Accreditation, Verification & Monitoring of Joint Implementation

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Executive Summary

JI as a baseline and credit scheme requires the determination of the amount of tradable emissions permits for each individual project eligible under such a regime. This entails the definition of a baseline, the measurement of actual emissions, and the identification of permits that accrue to the project participants. In this context, activities like accreditation, monitoring and verification (AVM) will play a major role.

Therefore, AVM can be regarded as the necessary administrative process required to bring about JI.

Additionally, JI as a market-based instrument is aiming at the establishment of a market for these emission permits. This means, that permits generated through JI must be credible and marketable. Credibility shall be assured through the AVM procedure. Without a strict penalty system for non-compliance, the risks of violating environmental integrity, thus lowering the credibility, is not negligible. Facing a trade-off between environmental precision and AVM costs, the design of AVM must keep the balance between the efforts to assure environmental integrity to a certain degree and keeping the burden on participants willing to invest in JI projects as low as possible.

Given the current situation with many open questions concerning the regulatory framework of JI, it seems to be advisable that the design of the AVM process should be oriented towards the suggested CDM project cycle with cost-saving adjustments where appropriate and possible (small scale projects). Permits have to draw their credibility out of the verification process which has to be based on strong and detailed procedures.

A two track approach with a lowered regulatory intensity for host countries that demonstrate compliance with certain inventory and reporting requirements can only be recommended if sufficient sanctions are in place. Whereas no strong compliance regime is visible on the global level, within the JOINT context the process of accession could be used for an issue linkage in order to establish such a JI framework between the EU and the CEE countries. This would also give the opportunity for an early start of JI, prior to 2008.

A convincing framework must avoid conflicts of interest, promote accountability, keep transaction costs down, and ensure full transparency. Efficient markets with private sector capital could be promoted if the Parties:

- **Keep the project cycle short and predictable;**
- **Avoid or minimise *ex-ante*, open-ended approval processes at the pre-investment stage and instead rely on *ex post* audits with heavy penalties for malpractice to ensure environmental integrity;**
- **Create transparency and predictability through international guidelines that might contain agreed validation protocols, accreditation criteria for validating/verifying/certifying bodies.**

1 Introduction

1.1 Strategic Aspects

The Kyoto Protocol stipulates that industrialised countries and countries with economies in transition – the group of so-called Annex I countries – shall reduce their overall emissions of carbon dioxide and other five greenhouse gases (GHG) by at least 5% as compared to their 1990 emissions levels[1]. This should be achieved by the first commitment period from 2008 to 2012. In order to meet these targets cost-effectively, the protocol allows for the use of the market-based Kyoto Mechanisms at an international level. Essentially, these mechanisms should enable Annex I countries to meet part of their reduction objectives by financing GHG emission reductions abroad, where mitigation costs might be lower. The Protocol refers to the following three international forms of climate change mitigation:

- Joint Implementation (JI) between Annex I countries,
- the Clean Development Mechanism (CDM) between Annex I countries and non-Annex I countries, i.e. developing countries,
- International Emissions Trading (IET) between Annex I countries.

While IET can be classified as a *cap and trade* system, JI and the CDM are *baseline and credit* regimes (Sorrell/Skea 1999, Janssen 2000). The former starts by defining an aggregate, legally binding emission limit for a group of countries. This overall budget of emission permits is then allocated to eligible participants of the trading system. Afterwards, these permits can be traded amongst the participants. Under a *baseline and credit* regime, the tradable permits relate to emissions reductions achieved by eligible GHG mitigation projects. This means that host countries are willing to sell off parts of their Kyoto budgets in return for foreign investment in national emission reductions. These reductions are calculated by comparing the actual emissions of a project with the emissions that would have occurred in the absence of the relevant project, i.e. the reference scenario or baseline. It is assumed that *cap and trade* schemes, regarded as comprehensive by their nature, require an exten-

[1] To be precise, the emission targets apply to countries listed in Annex B of the Kyoto Protocol instead of Annex I of the Framework Convention on Climate Change. Since the list of Annex B countries is almost identical to the list of Annex I, except for Belarus and Turkey which are not listed in Annex B but in Annex I, this paper does not distinguish between these two, and refers only to Annex I.

sive regulatory involvement and effort at the beginning. In contrast, credit regimes are argued to require less initial design and inception effort, but the emissions reductions must be determined on an individual basis for each project implemented during the lifetime of the program. So, a credit system depends more or less on a project-by-project analysis, whereas a cap and trade scheme depends on an inventory analysis of the regulated entities (Sorrell/Skea 1999).

For JI as a *baseline and credit* scheme, this results in the necessity of determining the amount of tradable emissions permits for each individual project eligible under such a regime. A baseline has to be defined, the actual emissions have to be measured, and last but not least, a decision must be made as to how many of the accrued permits the project participants are entitled to. In this context, activities like accreditation, monitoring and verification (AVM) will play a major role. Therefore, AVM could be regarded as the necessary administrative process in order to start JI. The Kyoto Protocol is rather vague on this issue and leaves it to further negotiations to decide how a framework for AVM should be set up.

1.2 Objective

The overall objective of this paper is to analyse how the process of AVM should be implemented in order to achieve tradable emissions permits out of GHG mitigation projects.

According to the contract, Working Group 4 is charged with – after having defined accurate and appropriate terminology - exploring all the key issues regarding AVM, what information and other requirements are necessary, and who should be responsible for the different steps of the AVM procedure. Particularly, they work very closely with the institutional working group. A recommended framework for verification and monitoring of investments, and the GHG abatement that accrue from such investments, and the costs associated with each has to be set out.

1.3 Methodology

Since the framework should have minimal impacts on transaction costs in order to encourage industry to proceed within an easily understood, comprehensible framework that encourages JI investments while meeting relevant requirements (e.g.

UNFCCC), the analysis is based on economic theory while taking into account the outcomes of the ongoing climate negotiations. Therefore, the focus is more on the incentives associated with different set-ups than on technical details of the different steps within the AVM process.

Seven sub-tasks have been identified and agreed upon, i.e.:

- Definition of criteria for each step of the project cycle,
- Responsibilities,
- Project classification,
- JI vs. CDM,
- AVM and transaction cost,
- AVM and ISO,
- Capacity building.

The paper is organised as follows: The next section explains the scope and limits of AVM, recalling some economic basics concerning JI as well as exploring the relationship with the CDM. The third chapter contains a proposal on how AVM could be incorporated in the overall project cycle. The fourth section tackles some special issues with regard to AVM. This includes the role of transaction costs, responsibilities of the various stakeholders involved in the JI process, as well as some considerations concerning possibilities for standardisation. In section 5, the findings derived so far are confronted with the current negotiating text. Finally, there will be some conclusions.

2 Scope and Limits of AVM

AVM is part of the regulatory framework for JI and depends – to some extent – on the overall regime laid down in the Kyoto Protocol. Unfortunately, most of the overall design has yet to be defined. The stricter the compliance system the Parties are subject to, and the more accurate the data contained in the national inventories are, the less effort might be spent in calculating the emissions reductions achieved by a single project. Neither of them has been clearly defined yet. Therefore, some general rules guiding the considerations around AVM in the remainder of the paper will be derived from the following two sub-sections.

2.1 Environmental Integrity vs. Economic Efficiency

JI aims at assisting countries in meeting their emissions limitation commitments cost effectively. However, in order to make JI a useful tool to mitigate climate change, there must be substantial economic incentives for investors and hosts of JI projects. These incentives are necessary, since the investor will only go for JI projects if he gains something. This could be for two reasons:

(1) The credits gained from JI projects can (partly) offset a national regulation that the investor may face (e.g. tax relief in return for adding emission permits to the national assigned amount).

(2) The credits can be sold on an international market for emissions rights (e.g. the investors sell parts of the assigned amount from a host country to another government).

Therefore, a prerequisite for JI investment is either the existence of a national regulation that can account for the credits, or a well functioning market for tradable emission rights with clear price signals for the potential investor.[2] Given these incentives, the design of JI as a policy instrument needs to take into account at least two criteria:

- environmental integrity and

[2] One could also think of a voluntary market similar to the "Green Pricing" experiences in the power sector. However, we do not assume that a voluntary market would be sizeable enough to bring about sufficient incentives for JI investment.

- efficiency.

Environmental Integrity

Article 6 of the Protocol requires to credit only those emissions reductions that are additional to “any that would otherwise occur” which has to be confirmed by a sufficient AVM procedure. How additionality should be proven is a topic of hot debate. At least three dimensions are currently being discussed (Haites/Aslam 2000):

- Environmental additionality: according to the original text of the Protocol;
- Investment additionality: demonstrating that the value of the credits is a significant contribution to the financial viability of the project, assuming that the project would not have been implemented without the economic contribution from the credits;[3]
- Financial additionality: demonstrating that financing for projects is additional to both official development assistance and contributions to the Global Environmental Facility.

Sometimes, Parties demand the demonstration of technological additionality, i.e. that the technology used for the project is best available for the circumstances. Most of the discussions are with regard to the CDM, but they show how complex proving the additionality criterion can become if environmental integrity is taken very seriously. A detailed analysis of the different dimensions is beyond the scope of this paper. The important thing for our purposes is the fact that an additionality check will be part of the AVM procedure. Therefore, it can be assumed that the more precisely I try to credit only additional emissions reductions, the more effort I have to spend on the AVM procedure resulting in higher administrative cost.

Efficiency

Cost efficiency means that a given emissions target is achieved at the least cost possible. Quite often, only the real mitigation costs are taken into account (cost of the investment in less carbon-intensive equipment). Broadening the scope, the cost associated with the implementation and operation of the instrument should also be considered. Therefore, the implementation of a measure aiming at the reduction of

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[3] For investment additionality see e.g. Langrock/Michaelowa/Greiner (2000).

GHG emissions could be judged as cost efficient if it leads to a minimisation of mitigation *and* transaction cost.[4]

As indicated above, there seems to be a trade-off between precision and the cost induced by AVM. There are two reasons why trying to implement JI in a way that completely secures additionality (if possible) while raising the transaction costs to a level which prevents possible participants from investing in less carbon-intensive measures abroad makes no sense. Firstly, hindering Annex I countries from using the low cost option could lead to considerable welfare losses. In the short run, it could be argued that this is a desirable outcome since the Kyoto Mechanisms shall be only supplemental to domestic actions. In the long run – coming to the second reason – this argument turns out to be problematic. The higher the costs are to meet the targets in the first commitment period, the less willing a Party will be to accept stricter targets in the future.

C1: For the design of AVM this means a balance must be maintained between the efforts to assure environmental integrity up to a certain degree and keeping the burden on participants willing to invest in JI projects as low as possible.

2.2 JI vs. CDM

The range of conceivable AVM regulations can be drawn from a negotiation text on Article 6 prepared by the President of COP 6 at the end of the meeting in The Hague last year (UNFCCC 2000a). With regard to Article 6, two extremes were proposed by the Parties. Following a liberal view, it was suggested not to define international rules but to leave the entire JI review to the market or the host country. A more regulatory proposal is to apply exactly the same procedure for JI as for the CDM.

While Article 12 requires the establishment of an international process for independent certification of the emissions reductions achieved by CDM projects, Article 6 contains no guideline for certifying the reductions achieved by JI projects. In the case of CDM, the necessity of an international review process by independent experts is quite clear. Both participants, the investor as well as the host, benefit from revealing higher emissions reductions than actually achieved – they have an incentive to cheat (Michaelowa 1998). They want to get the maximum emissions reductions through

[4] See also section 4 and Stronzik (2001).

the project. The gain for the investor depends on the ratio of total project costs to credible emissions reductions. The host will only find an investor if the projects leads to a gain for the investor. This can be achieved either by overstating the baseline or by reporting less emissions during the project's lifetime.

Since JI is only allowed between Annex I countries, one could argue that both participants – the host as well as the investor country – will have legally binding targets. Therefore, it might not matter whether reductions are subject to a strict AVM process, because it is a zero-sum game. The amount of reductions stated by the participants will be subtracted from the Assigned Amount of the host country and added to the account of the investor country. Therefore, it does not matter whether the generated amount of credits reflects the actual achieved emissions reductions, as long as the penalties for non-compliance with the Kyoto targets are severe. Furthermore, the host has no incentive to cheat, since he faces opportunity costs of a reduced emissions budget. A JI project that receives credits in excess of the reductions actually achieved leaves the host with fewer surplus in the Assigned Amount to sell, or makes compliance with its commitment more difficult. However, this argument only holds if a Party is able to deliver accurate inventory data *and* faces substantial penalties for non-compliance. At the moment, it is not clear if such a strict compliance regime will be in place by the time JI starts. On an international level it is not very likely that sovereign countries would be willing to accept substantial penalties from just any supranational organisation. However, it might be possible to establish a penalty system on the EU-level that also covers JI projects of present EU-member states with accession states. Such a system would support a more liberal handling of AVM and could also follow the two track approach explained in Section 5. Concerning the accuracy of inventory data, in its Revised Guidelines for National Greenhouse Gas Inventories IPCC (1996) highlights some important causes of uncertainty associated with the determination of national emissions or removals of GHG:

- differing interpretations of source and sink category or other definitions, assumptions, units etc.,
- use of simplified representations with "averaged" values, especially emission factors and related assumptions to represent characteristics of a given population,
- uncertainty in the basic socio-economic activity data which drives the calculations,

- inherent uncertainty in the scientific understanding of the basic processes leading to emissions and removals.

The uncertainties estimated by IPCC range from about 10 % for CO_2 emissions in the energy sector at the lower bound up to more than 50 % for emissions in the area of land use and forestry at the upper bound (see Appendix 1). The high uncertainties give countries room to fit their emissions data by flattered calculations in order to make compliance with the reduction obligation easier, even if IPCC methodology is applied.

There are three further reasons in favour of a similar treatment of JI and CDM. Firstly, if one regards JI and the CDM as competitive measures, only equal treatment would ensure a level playing field between these two instruments. Secondly, if JI review is left entirely to the host, similar JI projects might be treated differently in different countries resulting – again – in market distortions. Furthermore, in case of weak sanctions host governments would have the incentive to handle the AVM procedure as lax as possible to keep transaction costs down and attract foreign investments resulting in a regulatory race to the bottom (Brockmann/Stronzik/Bergmann 1999). Third, it is still uncertain whether there will be emissions limitation commitments in place after 2012 and if so, what they will look. Therefore, assuming that JI will only last from 2008 until 2012, crediting projects under JI can be regarded as a five-year subsidy. Usually, subsidies go along with the fact that some applicants are awarded even though they do not need the extra financing, since eligibility criteria are very often open for interpretation. Due to budget limits, some genuine applicants will be displaced (crowding-out effect). In the case of JI, this results in crediting non-additional projects and crowding out some genuine, but high-cost projects, thus lowering the permit price.

C2: These reasons lead to the following conclusion. JI as a market-based instrument is aimed at the establishment of a market for emission permits. This means, permits generated through JI must be marketable. This presupposes that the permits are credible as a tradable good on a free market. Credibility shall be assured through the AVM procedure. Without a sufficient AVM procedure, JI credits will be less valuable. All in all, the risks of violating environmental integrity and so lowering the credibility do not seem to be negligible.

R1: Given the current situation with many open questions concerning the regulatory framework of JI, it seems to be advisable that the design of the AVM process should be oriented towards the suggested CDM project cycle with cost saving adjustments where appropriate and possible.

3 AVM Procedure

3.1 Project Cycle

According to the proposed CDM project cycle, five main actions for a sound AVM procedure can be identified (definitions, c. Appendix 2): accreditation, validation, monitoring, verification, and certification. Figure 1 indicates a possible arrangement of these actions within the overall JI project cycle.

Step 1: Project Design

The entities carrying out the project shall make available a documentation including the following:

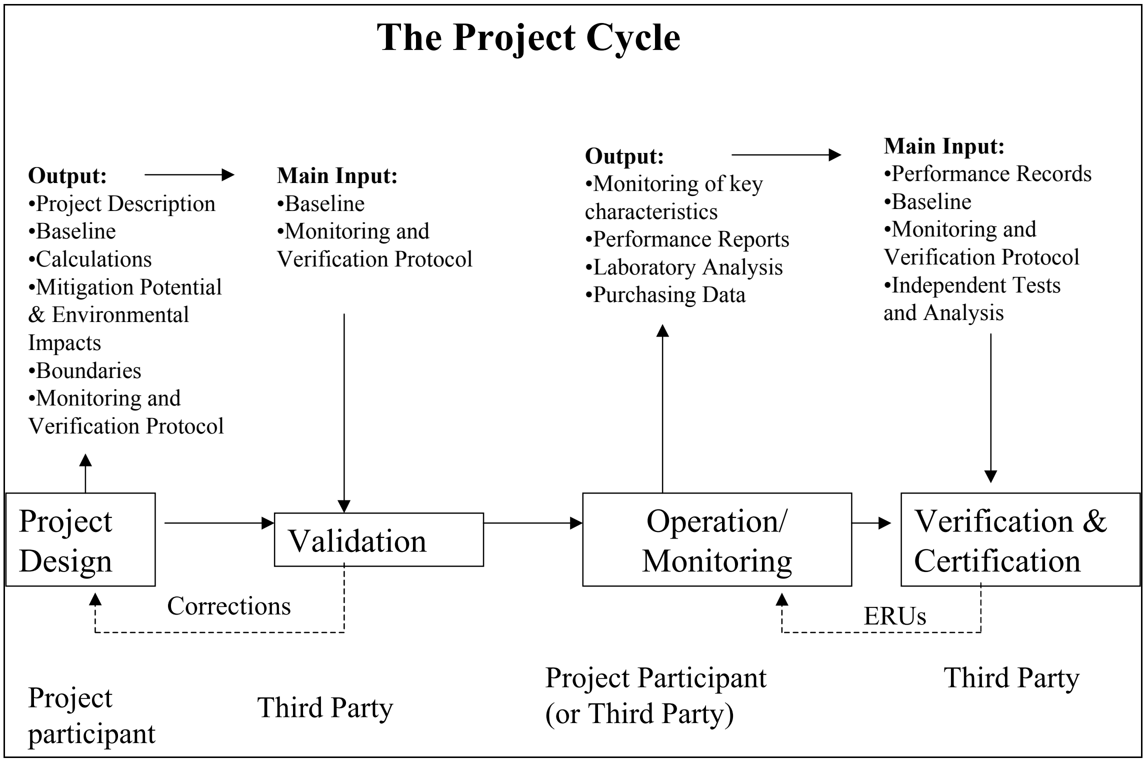
- project description,
- project objectives (if possible, in quantified terms),
- identification of project parties and their responsibility and authority regarding project planning, implementation and operation,
- agreement on credit-sharing,
- monitoring and verification protocol (MVP).

The project description shall clearly identify

- technology and methods used for emission abatement,
- baseline emissions over the project's estimated lifetime,
- emission mitigation potential over the lifetime with documentation of technical calculations,
- implementation plan including timeframe and responsibility for project activities,
- financial calculations,
- operation phase (staffing and capabilities, guarantees, ownership etc.).

The monitoring and verification protocol should give details about the project's verification procedures including when the monitoring, reporting and verifying should be performed and by whom. It shall define who the data should be reported to, what data and installations should be accessible to the verifier, and what data sensitivities exist and how to deal with them. The project developer should give reasons why the project meets the additionality criteria. This could be done by explaining why a certain baseline has been chosen.

Figure 1: The Project Cycle



Source: Norway (1999), slightly modified.

Step 2: Validation

Validation is likely to be required before a final investment decision to keep risks low. This step contains a review and assessment of the assumptions and plans relevant for successful implementation and operation of the project. The assessment will be mainly based on a document review and appropriate research by the validator. The process is expected to provide answers to the following questions such as:[5]

- Does the project meet the relevant criteria for JI (Kyoto Protocol requirements, host country criteria and legislation, investor country criteria, other criteria for social and environmental impact assessment)?

[5] A brief outline of possible project evaluation criteria can be found in Appendix 3.

- Does a proper baseline study exist? Is the baseline credible (additionality criteria)?
- Are there any significant leakage effects from the project? What are the major risks regarding the emissions reductions?
- Is the MVP appropriate for this type of project, and is it in compliance with relevant standards or best practice?

The validator will prepare the validation report, which will cover the above listed aspects.

When new technology or methods are introduced during the project's lifetime, new validations shall be performed.

R2: Therefore, this step is a kind of an "*ex-ante* certification". With regard to the importance of baselines, it seems appropriate that baselines should be issued with a "valid until" date, with reviews at appropriate regular intervals, known beforehand. Otherwise, it will be hard to attract money from the private sector if baselines are not fixed prior to the investment decision.

Step 3: Monitoring

During the operation of the project, monitoring of project activities is conducted periodically (e.g. annually) to ensure that performance is as designed. Several data collection and data analysis methods are available that vary in cost, precision and uncertainty (Vine/Sathaye 1999a and 1999b). The data collection methods include engineering calculations, surveys, modelling, end-use metering, on-site audits and inspections as well as collection of utility bill data. If measured data are not collected, then one may rely on engineering calculations and stipulated (or default) savings. There are two stipulated savings methods:

- algorithms for calculating energy savings for specific measures; and,
- a set of criteria for using best engineering practices.

The rationale for doing so is that the performance of some energy-efficiency measures is well understood and may not be cost-effective to monitor (see also discussions under section 4.3).

Data analysis methods include engineering methods, basic statistical models, and integrative methods. If the focus of the monitoring is an individual source, then some methods will not be used (e.g. basic statistical models), since they are more appropriate for a group of sources.

Step 4: Verification and Certification

A forth step is a periodic (e.g. annual) verification of the actual reductions that are achieved by the project. This would entail auditing data such as physical measurements that are done at the project site as well as auditing equipment used for this purpose. Then, emissions data are compared with the baseline established under step 2 and the computation of the resulting reductions. The verifier would also review compliance with an established framework for project monitoring. These functions are also quite similar to what has been done under established schemes, such as ISO or EMAS. Finally, the verifier would be expected to review and re-asses the basic project assumptions at regular intervals, if this were required by the international framework. A report would be issued after each verification.

The guidelines for the Prototype Carbon Fund (PCF 2000a) of the Worldbank require an initial verification prior to commissioning to ensure that the project has been constructed according to design, and that the monitoring system is in place as required by the MVP. This seems to be unnecessary in the case of JI. With annual verification, it is in the self-interest of the investor to implement the project properly. Otherwise, he faces the risk that the project will be terminated by the host government after one year, leaving him with stranded investment costs. In cases that matter (large scale projects), this risk tends to be higher than what the investor could gain from operating the project for one year. Certification is the formal step based on, and possibly in conjunction with, the verification report. Certification is a written guarantee that, within the verification period, a project has achieved the stated emissions reductions in compliance with all relevant criteria.

Whether certification should be part of the AVM procedure, again, depends on the overall framework to be set up by the Parties. For example, it is still not clear if accrued ERUs can be apportioned to private entities. In this context, fungibility of emissions reductions is a major issue, i.e. whether or not emissions reductions earned can be readily directed, or redirected, at any time to meet any Annex I country's obligations. A transfer of ERUs only between the accounts of Annex I Parties would result in a lack of fungibility. An investor would have to specify the Annex I country against whose obligations these emissions reductions would count at the time of the project registration. If not impossible, he would have to negotiate with the relevant government if he wished to transfer the permits to some other country.

C3: Unless full fungibility of credits is allowed, investors will be unable to place permits in the highest value Annex I regime year by year, and reallocate them as needed, thus attracting less private sector capital for JI projects. In addition, the advantages many investors seek by pooling their capital in funds to spread risk and lower transaction costs will be largely eliminated as investors will be unable to allocate and reallocate their share of projects' emissions reductions to the Assigned Amounts of their preferred Annex I country.[6]

3.2 Responsibilities[7]

Table 1 illustrates a possible distribution of responsibilities over the various steps of AVM. Small x indicate that the role is optional, based on national decisions. While monitoring can be done by the project participants themselves (or consultants), validation, verification/certification will be done by established auditing and certification companies. The validator should be a third and independent party, normally an internationally experienced and respected environmental auditing company. The company must be fully independent from all other aspects of the project and not have assisted in its design or any project components in order to avoid any conflicts of interest. The company must possess the necessary technical and economic skills to assess the project, formulate an opinion on the quality of its design and feasibility, and raise related concerns with the project participants. The same criteria apply to the verifier/certifier.

R3: Since things already validated under step 2 will be checked again during step 4, the third party dealing with verification/certification should be different from the one dealing with validation, otherwise, conflicts of interest might arise.

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[6] Both possibilities were contained in two different negotiation texts prepared before CPP 6. Following a text on Registries of the chairman on the Flexible Mechanisms, it seems permissible that ERUs can also be earned by private entities (UNFCCC 2000b). In contrast, the negotiation text on Mechanisms seems to allow only for the transfers among Parties (UNFCCC 2000c). Since ERUs are an international tradable commodity and more or less well defined through the Kyoto Protocol, certification might be unnecessary. In the other case, the flaw of limited fungibility might be overcome by certification, thus creating a private market for emission rights, separate from the market for Annex I countries.

[7] The reasons for the proposed distribution of responsibilities are explained in more detail in the working paper of the JOINT Working Group 5. This paper highlights a few of these issues.

The validator as well as the verifier/certifier should be subject to accreditation by an international (or national) authority. This would ensure integrity and quality of the overall process. However, there should be at least some international guidelines in order to achieve standardisation to a certain extent, or countries might have the incentive for setting up lax criteria with the intention of providing their national companies with a competitive advantage. This would lead to the previously mentioned *race to the bottom*.

On the other hand, the design of these international minimum standards could be used by certain Parties to prevent companies from other countries that lack the relevant capability from entering the market. Therefore, capacity building – especially in the less-developed countries – should be actively supported. Some guidance concerning conceivable accreditation criteria is provided by the Emission Reduction Procurement Tender (Eru-PT), recently launched by the Dutch government (Eru-PT 2000).

Table 1: Distribution of Responsibilities

ENTITY ACTIVITY	Project Consortium	Designated National Authorities	Accredited Validation / Certification Agencies	UNFCCC appeal body	International authority designated by COP/MOP	National or international NGO
1. Establishment of the ***Project Consortium***.	X					
2. ***Pre-screening*** of the project idea.		X				x
3. Development of ***complete JI proposal***.	X					
4. ***Validation*** of the proposal.			X			
5. ***Examination*** of the proposal for approval or rejection.		X				x
5a. Review of rejected projects.				X		
5b. Optional re-examination of the project.		X				x
6. ***Project realisation***.	X					
7. ***Project operation***.	X					
7a. ***Periodic reporting*** according to M&V protocol.	X					
7b. **Verification** with optional ***certification of ERUs*** (not same org. as validated project).			X			
7c. ***Issuing of ERUs***.		X				

7d. Occasional ***audit*** of project					X	x
8. ***Review of project additionality and baseline*** at regular, predetermined intervals.		X	(X)			x

3.3 Capacity Building

As explained in Section 2.1, JI can be regarded as a measure to foster investments in environmentally sound technology. The Intergovernmental Panel on Climate Change (IPCC 2000) has identified a lot of barriers to the transfer: lack of information; insufficient human capabilities; political and economic barriers such as lack of capital, high transaction costs, lack of full cost pricing and trade and policy barriers; lack of understanding of local needs; business limitations, such as risk aversion in financial institution; and institutional limitations such as insufficient legal protection and inadequate environmental codes and standards. One major dimension of making the technology transfer more effective is capacity building.[8] In general, IPCC has identified three areas of capacity building:

- Human capacity: Technology transfer demands a wide range of technical, business, management and regulatory skills. The availability of these skills locally might enhance the flow of international capital, helping to promote technology transfer.
- Organisational capacity: It is important to recognise the need for participatory approaches to strengthen the networks in which diverse organisations contribute to technology transfer as proposed in the previous section.
- Information assessment: Information access and assessment are essential to technology transfer. Pertaining to JI, this could be reflected by the implementation of a sound AVM procedure. Within the context of information assessment, the roles of governments and private actors are changing. Private information networks proliferate through specialised consulting and evaluation services over the internet.

IPCC calls for a country-based identification, analysis and prioritisation of barriers. In the central and eastern European countries this was done by an OECD/IEA (2000)

[8] The other two dimensions are enabling the environment and mechanisms for technology transfer.

project for the Annex I Expert Group on the UNFCCC which analysed the capacity needs related to identifying, approving and accepting JI projects. The needs that have been identified by different countries vary, in part because of large variations in process/institutions that are carrying out similar tasks, and because of the differing levels of experience gained during the AIJ pilot phase. For example, some countries have nominated a focal point for JI that can be contacted by potential project hosts and by potential project investors (Czech Republic, Estonia, Latvia, Poland, Slovakia, Slovenia), while others have only a temporary focal point (Lithuania, Romania). The procedure for approving and accepting JI projects also varies between countries. Some have publicly listed criteria or preferences in certain project categories (Bulgaria, Czech Republic, Poland, Romania, Slovakia) and some are planning to do so (Latvia, Slovenia). Some countries have also indicated areas in which they do not wish to have any JI projects (Bulgaria and Latvia: transport sector). All in all, the main insights are:

- Capacity needs fall into two categories: administrative (e.g. ability to identify and approve projects), and technical (e.g. relating to project baselines). The former benefits from AIJ experience (although different countries have this experience to different extents), but technical capacity needs are consistently highlighted as an area that needs improvement.
- The approval process is at an early stage of development in some countries. Some countries have identified priorities for JI projects, although approval/acceptance procedures appear to be the same for all project types. Two countries have identified transport as a no-go area for JI projects.
- Lack of a process for accepting JI projects is common. However, project approval/acceptance would be likely to be more rapid if the process were documented (and available to potential investors). Moreover, if the criteria were known against which potential projects were compared, it would help increase the transparency and would probably reduce the time/cost of the approval/acceptance procedure.
- The idea of "credit sharing" between host and donors appears to be becoming more widespread. However, it is likely that many host countries will wish to keep a flexible (and possibly confidential) approach on credit sharing because of competitiveness concerns.

C4: As already explained in section 2.2, strong government and legal institutions are absolutely essential for the successful and fair operation of market mechanisms that are based on property rights for a “commodity” that requires expertise to monitor or estimate, as in the case of JI. Therefore, the capacity to calculate, negotiate and set baselines must be available in the host country. The identified lack of capacity highlights the importance of international collaboration as a way to build capacity and common understanding both on methodological or analytical techniques and on institutions and processes that work well to overcome these barriers. Collaboration at the expert level may be sufficient without inter-governmental agreements that may result in unnecessary and counter-productive requirements.

4 AVM and Transaction Costs

As explained in section 2.1, transaction costs play a major role for achieving cost efficiency. Transaction costs are the costs incurred by participants in an exchange, in order to initiate and complete transactions. Such costs occur to some degree in all real-world transactions, and thus affect all existing markets. All participants may incur transaction costs, including both buyers (investors) and sellers (hosts). Not only are out-of-pocket expenditures necessitated, but so are the opportunity costs – i.e. lost time (delay) and resources (money, managerial attention) – that could have been devoted to the next best opportunity for that participant.

4.1 Types of Transaction Costs and their Role in Markets

According to Dudek/Wiener (1996) six types of transaction costs can be distinguished:

- *Search costs* are the costs of finding interested partners to the transaction.
- Once the participants have identified each other, *negotiation costs* come into play which involve the costs for coming to an agreement. Negotiating terms may take time, and comprise visits to the site of a project, and hiring lawyers to draft contracts. This type of cost may also occur within each participant body, as boards of directors, union members, or other internal constituencies must agree to the terms of the transaction.
- *Approval costs* arise when the negotiated exchange must be approved by a government agency. The regulatory approval process can delay the completion of

the transaction, and can impose modifications on the deal the participants have otherwise found desirable.

- *Monitoring costs* are the efforts the participants must make to observe the transaction as it occurs, and to verify adherence to the terms of the transaction.
- *Enforcement costs* are the expenses acquired by the insistence on compliance once divergences are detected.
- Finally, the risk of failure of the transaction (for various reasons from engineering failures of equipment to government disapproval) may lead the participants to incur *insurance costs*. They are likewise reflected in a risk premium paid in the transaction itself (e.g. a depressed purchase price as a compensating differential for accepting project risk). They may also involve the costs of diversifying against the risk of failure by investing in a portfolio of projects with uncorrelated risks.

The most obvious impact of transaction costs is that they raise the costs for each participant of the prospective exchange, discouraging some transactions from occurring. Where the transaction costs exceed the benefits to a participant induced by engaging in the transaction, that person will not participate. It does not matter who (seller or buyer) bears the costs; since transaction costs rise, the wedge between purchasers' cost and sellers' gain widens, and the equilibrium quantity of market activity declines. Thus, whatever good or service is at issue, rules or institutions that lower transaction costs will tend to expend trade towards the full social value that participants would gain from trade (i.e. to increase efficiency).

4.2 Estimated Costs for AVM

With regard to JI, high transaction costs result in a lower trading volume. The cost differentials between abatement activities abroad and at home decrease. High transaction costs tend to drive domestic investment levels upwards compared to a zero-cost case. The level of transaction costs is influenced by the complexity and transparency of the AVM process. The more complex and the less transparent an AVM procedure is designed, the higher the resulting transaction costs are. If complex computations have to be executed and a huge amount of data collected in order to show that a project meets the additionality criterion, the potential investor faces high approval costs. In contrast, any rules improving transparency (international guidelines) will help to reduce uncertainties, and thus lower project risks resulting in lower insurance costs.

PCF experience suggests that the total costs for CDM-like procedures will be in the range of US$ 200,000 to 400,000, not including any additional fees levied by an Executive Board or the Parties as planned in the case of the CDM (c. Table 2).

Table 2: Estimated costs for an AVM procedure (CDM-like)

Activity	**Effort (person weeks)**	**Cost (US$)**
Contract (legal fees)		n.a.
Baseline Study	3-4	20,000
MVP	4-5	40,000
Validation	4	20,000-40,000
Total front-end cost		**100,000-200,000**
Verification/certification		100,000-200,000
Total amount		**200,000-400,000**

Source: PCF (2000a:7f.)

According to personal communication with other experts in the field of AVM, the lower bound seems to be more reasonable. The PCF provides no information about the size of the projects. Rentz et al. (1998) estimate transaction costs from projects in the electricity sector concluding that they are proportional to the overall investment, in the range of 10 to 30% of the equipment cost.[9]

Table 3: Project size and transaction costs (% of equipment cost)

Size (million $)	Energy efficiency (number of projects)	Renewable energy (number of projects)
0-2	4.7 (3)	4.2 (1)
2-4	1.9 (9) *Estonia 4.8 (4), Latvia 3.4 (4)*	3.9 (5)
4-6	2.8 (3)	3.0 (3)
6-8	1.8 (2)	2.0 (7)
8-10	-	1.6 (10)
>10	-	1.3 (2)
Average	**3.6 (17)**	**2.3 (28)**

Source: Michaelowa/Stronzik (2001)

The Swedish AIJ programme in the Baltic states is the only AIJ programme that consistently reports transaction costs in a standardised form. Four categories of transaction costs are distinguished: technical assistance, follow up, reporting and administration. Table 3 shows the results of a rough calculation of existing data. It should be mentioned that potential gains from emission reductions have not been considered yet. Therefore, an implicit assumption of this calculation is that all projects generate the same percentage of credits.

C5: At least, the results indicate that transaction costs have a relatively greater impact on small projects than on larger ones.

The previous considerations are only preliminary results with some general insights in the role of transaction costs caused by AVM for the functioning of an international market for emissions reductions. Further research would be required if a better understanding of this change in incentives were desired.

4.3 Project Classification and Partial Crediting

The question still to be answered is how to assure environmental integrity while keeping transaction costs at the lowest level possible. One way to address this question might be project classification. At least two criteria for categorising projects are brought to mind:

- project size,
- technology used.

Project size

Using the project size as a classification criterion in order to distinguish between different projects can be directly gathered from the considerations in the previous section. The impact of transaction costs seems to be much stronger on small projects than on larger ones.

R4: The PCF suggests that for projects less than US$ 2 million in emissions reductions financing, and about US$ 8-10 million in total financing, a CDM-like procedure for AVM should not be applied. This is due to the fact that transaction costs associated with the strict requirements similar to those for the CDM would be too significant, and thus make small projects less attractive. For most of the projects under the AIJ pilot phase, the carbon finance component would be worth less than US$ 2 million, assuming a 5 years credit period and a permit price of US$ 20. Most non-grid connected renewable energy projects would not reach the threshold level of investment. These small projects would not be able to bear the burden of transaction costs, and would thus be ruled out.

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[9] For a detailed breakdown into different cost categories see Appendix 4.

Technology used

According to Chomitz (1998), projects with different technologies should be tackled differently because each technology has its own requirements concerning AVM. A proposed categorisation is shown in Table 4.

Table 4: Technology-based project classification [10]

Project type	*Factors affecting spontaneous adoption of new technology*
Fuel-switching projects, especially away from coal	value of fuel saving and air pollution reductions; maintenance cost of old plant
New generator choices: low or high efficiency?	valuation of fuel savings and air pollution reduction; maintenance of fuel subsidies or price controls on electricity
Demand side management: installation of energy-saving equipment	valuation of energy savings
Install coal processing and washing improvements	price differential for processed coal
Methane capture from landfills for electric generation	Standards for landfill construction: *Landfills with minimal standards:* installation of methane capture has costs greater than the benefits; therefore project is additional and abates methane *Landfill with high standard:* much infrastructure needed for power generation is already in place, power generated from methane more than defrays investment costs, therefore, project is not additional
Adopt reduced impact vs. standard logging techniques	Do loggers save money or satisfy regulatory requirements with low impact techniques ? How strictly will the government enforce logging regulations?

Source: Chomitz (1998: 6).

The reason for project classification is to reduce the regulatory burden on some types of project where a strict procedure is not required.

C6: Possible areas of more relaxed rules are:

- additionality,
- leakage and spill-over,
- environmental and social impacts.

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10 Another proposal of technology-based project classification can be found in Appendix 5.

For JI projects implemented under the Kyoto Protocol, the emission reductions from each project activity must be additional to any that would otherwise occur (Art. 6.1b). Determining additionality requires a baseline for calculation of GHG emissions, i.e., a description of what would happen if the project were not implemented. Both issues are inextricably linked. Concerning AVM, this issue becomes relevant if future changes in GHG emissions differ from past levels, due to growth, technological changes, input and product prices, policy or regulatory shifts, social and population pressure, market barriers, and other exogenous factors. Consequently, the calculation of the baseline needs to account for likely changes in relevant regulations and laws as well as for changes in key variables (Michaelowa 1998). Since not all changes can be covered in advance, the baseline should be re-estimated regularly. Leakage and spill-over occur because the project boundary, within which a project's benefits and cost are calculated, may not be able to encompass all potential indirect effects, e.g. a shift of existing load to other sources. Positive indirect effects are referred to as spill-over, while negative effects are referred to as leakage. Finally, the Kyoto Protocol encourages developed countries, in fulfilling their obligations, to minimise negative social, environmental and economic impacts (Art. 2.3 and Art. 3.14).

Since one of the primary goals of the CDM is sustainable development, it is quite clear that the above mentioned issues must be addressed by an AVM-process. For JI, the situation is different, and the question arises whether these issues have to be or should be covered through AVM. The same arguments could be brought forward as in Section 2. Furthermore, there is a trade-off between precision and transaction costs. AVM costs will depend on what information is needed, what information and resources are already available, project type, the size of the project area, the monitoring methods to be used and frequency of monitoring. In some cases an issue could be more relevant than in others.

R5: Large-scale projects, e.g., will more likely have an indirect effect than smaller ones. Therefore, possible spill-over and leakage should be covered, as JI still has to fulfil the additionality criteria.

Partial crediting

Vine/Sathaye (1999a and 1999b) propose to provide the participants with the option to choose the level of accuracy of monitoring in order to keep transaction costs low.

According to them, the less accurate the monitoring is, the less credits are granted. At a first glance, this seems to be promising. But Chomitz (1996: 26f.) has clearly shown that such partial crediting has a perverse effect. This strategy is successful in reducing the number of non-additional credits. However, it has the disadvantage of pricing some genuine, but higher-cost suppliers of ERUs out of the market. Moreover, the result is a kind of adverse selection: the proportion of realised credits that are not additional increases.

R6: Partial crediting as a tool to lower transaction costs can not be recommended.

4.4 Standardisation

Another option to lower transaction costs is the use of standardisation. As the Kyoto debate progresses further towards establishing the framework and rules for the flexible mechanisms, it seems logical that there will be some involvement from ISO, the body responsible for international standardisation. There is clearly a number of ways in which ISO could be incorporated into the JI project cycle, particularly the ISO 14000 standards (environmental management systems standards). The ISO 14000 set of environmental standards requires the identification of all environmental aspects of an organisational business activity.

R7: The ISO standards are used in the management of organisations objectives and targets, establishing monitoring and measurement frameworks (to test the progress of an organisation against the objectives that had been laid out). ISO 14000 is therefore currently applied to organisations, and in the context of Joint Implementation, this would need to be adapted to project activity. For example, the assessment of assumptions and forecasts, one of the key activities in the validation step, is not included in existing guidelines and standards for environmental or financial auditing and certification.

Requirements for ISO under Eru-PT and the PCF

In the first instance, it has been made clear by Eru-PT that anybody with the responsibility for the validation and verification of projects “shall be accredited for the certification of environmental management systems based on ISO 14001” and that the “validation/verification body shall document and implement a management system in accordance with ISO/IEC Guide 66" (Eru-PT 2000). This is also the approach that the PCF is likely to take. They are currently in talks on this issue.

Current Work Undertaken by the ISO Technical Committee 207

The ISO Technical Committee 207 Climate Change Task Force has been looking at the application of the ISO 14000 series of standards concerning global climate change; the Committee is currently drafting a report on the application of ISO 14000 to the Kyoto protocol. The main areas where the standard could be of use have been summarised by the Committee as the following (ISO 2000):

- The development of national policies and measures that apply to existing and internationally recognised voluntary standards already being used by a wide range of organisations. (ISO 14031);
- The establishment of GHG inventories required to formulate GHG baselines and benchmark future quantifiable emission reductions. (ISO 14001);
- The development of monitoring, measurement, verification and reporting systems of GHG emission reductions. (ISO 14001);
- The development of GHG performance and condition indicators (within the environmental performance and condition indicators standard ISO 14031);
- Internal and external audit and verification programmes, including accreditation guidance and frameworks, and the use of existing national and international accreditation infrastructure. (ISO 14010);
- The development of capacity building programmes that strengthen developing country capacity in the application of standards/accreditation frameworks in managing climate change projects/issues.

Depending on the outcome of the COP 6 negotiations, the above applications may or may not be relevant for Joint Implementation. It is clear, however, that the environmental management standards could play an important role in the management of the JI process.

Two Track Approach to Projects

One critical question with regard to this issue is whether or not JI will follow the same rules as the CDM. If, indeed, JI does not follow the rules that are set out for the CDM – in particular not requiring a certification of credits – then there will be only limited need to incorporate ISO into the JI process. There is still the issue of the two track approach that was discussed in Lyon, which would essentially require the certification of ERUs obtained from countries that are not in compliance with Articles 5 and 7 of the Kyoto Protocol. The two track approach relates to the transfer of ERUs in terms of which Parties complying with a set of identified preconditions may follow a more simplified procedure for transfer. In response to the uncertainty of this debate the PCF has opted to use a rigorous validation/verification and certification of both JI and CDM projects in order to both manage risks and offer a high quality of emission reduction. It is this rigorous approach required for the CDM, that will need an internationally recognised procedure for certification.

Project Cycle

The whole of the project cycle may be covered by the Environmental Management Standard ISO 14001, but more specifically for a JI project, the following steps have been identified in this report:

- project design,
- validation,
- implementation/monitoring,
- verification and certification.

For the first of these two steps, the key components will be the baseline establishment and also the Monitoring and Verification Protocol as described earlier in the report. The Monitoring and Verification Protocol will be a requirement for any project under JI and the CDM. It will need to be based on a certain set of guidelines or standards and the PCF is recommending that since these are project-specific protocols that should be based upon UNFCCC standards when they exist, these standards could indeed be developed by, or in conjunction with, the ISO environmental standards (PCF 2000b). The ISO 14000 set of standards has developed internationally harmonised criteria for auditor certification. This may or may not prove to be useful in the case of JI, again, depending on the outcome of COP 6. However, even if the CDM approach is not adopted for all JI projects, it is still likely that an approach will be adopted similar to the two track approach discussed in Lyon. The implication is that there will still be JI projects that will need to undergo the process of certification, and harmonisation of certification criteria will need to be developed for these projects as well as those from CDM. It is still unclear how far the standardisation of procedures and methodologies needs to be taken for JI; there will certainly need to be third party validation and verification, and these bodies will need to be accredited under an internationally recognised standard. It has already been suggested by the Eru-PT scheme and the PCF that this should be based on the ISO 14000 set of standards. The ISO 14000 standards are set out for organisational environmental management. Thus, these standards would have to be developed in order for them to focus on a project or JI aspect of a project.

C7: There are a number of specific procedures that may require international standardisation: baseline methodologies, monitoring and verification protocols, and the harmonisation of certification criteria (if required). There is certainly scope for these to be developed within the ISO 14000 framework as well as for the reporting systems that apply specifically to GHG emissions to be expanded upon.

With regard to the emissions trading scheme currently being developed in the U.K., verifiers will gain accreditation against the requirements of ISO Guide 65 and EA 6/01 with some additional requirements for the verification process (DETR 2001).

4.5 Multi-project Verification

Det Norske Veritas (DNV) has proposed multi-project verification for small-scale projects in order to reduce transaction costs (DNV 2000). In the opinion of DNV, project implementers will not have to wait for sector benchmarks or baselines to start initiatives. Instead, existing projects can be pooled and verified. This implies the following prerequisites:

- The projects should be of similar technological type and design;
- The projects should be located in the same (or very similar) region(s);
- The baselines for projects should be similar, if not the same;
- The number of projects should be large so that the sampling population is statistically significant; and
- There should be similar monitoring and reporting of project indicators.

The Swedish National Energy Administration commissioned Det Norske Veritas to perform a pilot multi-project verification of Swedish Activities Implemented Jointly projects in Estonia, Latvia and Lithuania. The CO_2 emissions reductions from 27 fuel switch projects were verified as a case study. According to DNV, transaction costs can be substantially reduced. For the Swedish AIJ case, costs decreased by roughly 70 %.

Multi-project verification seems to be a promising approach to remove part of the barriers to the implementation of small-scale projects. The crucial aspect for the employment of this procedure is to have a sufficient number of similar projects in place.

5 Working Group 4 in the Light of the Climate Negotiations

Before drawing the overall conclusions, the recommendations derived so far are checked against the current negotiating text on Article 6. This is done on the basis of a short summary of the relevant provisions in the consolidated negotiating text proposed by the President of COP 6 (UNFCCC 2001a).

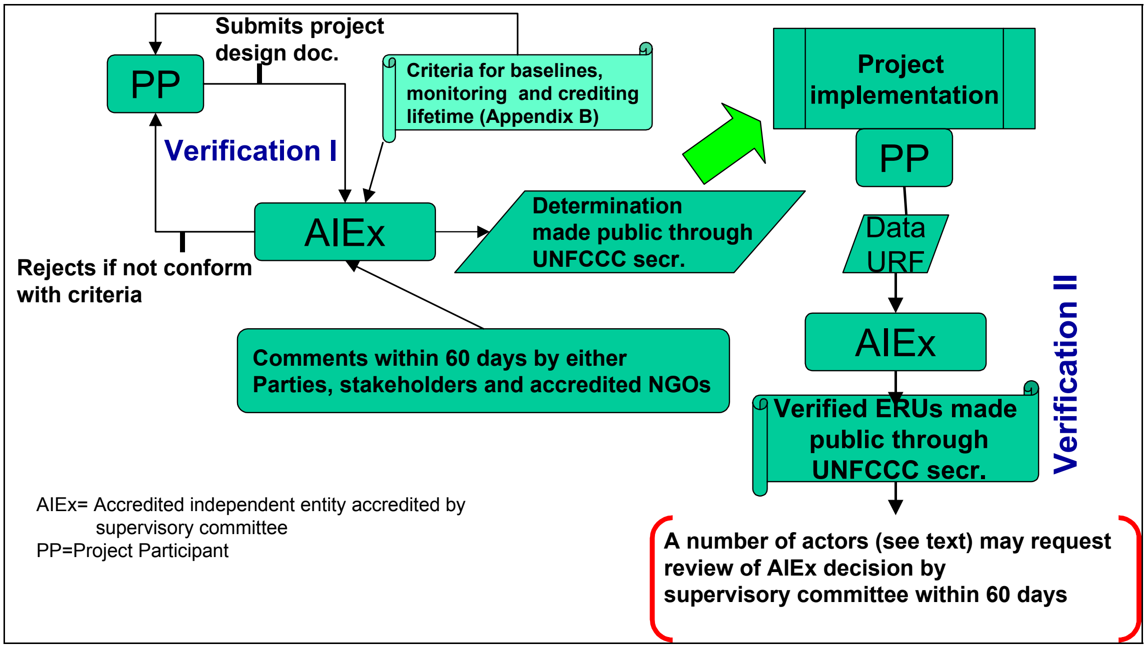
5.1 The Negotiating Text on Article 6

Trying to satisfy the different views concerning the relationship of JI and CDM explained in Section 2.2, the consolidated text contains a two track approach. This approach proceeds from the link between Article 6 and Articles 5 and 7 of the Protocol – in particular Articles 5.1, 5.2, 7.1 and 7.4. The regulatory intensity of JI can be lowered on the basis of demonstrated compliance by a Party with its inventory and reporting requirements and registries. According to this approach, the verification of reductions of emissions and removals is conducted either by the Parties involved themselves (track one) or through independent verification procedures (track two).

Track One (Paragraph 18)

Track one, that is the verification of project emission reductions by the same Party that hosts the project, is allowed a certain number of months, most likely a number within 16 and 24, after this Party has submitted a report to the secretariat documenting that it is in compliance with the commitments under Articles 5 and 7 and the provisions concerning national registries, unless within this time frame the Compliance Committee finds otherwise.

Figure 2: Verification procedure under track two



Source: Netto (2001), adjusted to the most recent negotiating text (UNFCCC 2001a).

Track Two (Paragraph 19)

Where a host Party does not meet the eligibility requirements, the emission reductions must be verified by independent entities accredited by a JI supervisory committees with accreditation functions. The accreditation of independent entities is to be performed pursuant to procedures still to be elaborated, but likely to resemble those envisaged for the accreditation of operational entities under the CDM. The verification procedure under track two is shown in Figure 2 and is quite similar to the one proposed in this paper. Host Parties that meet the eligibility requirements may – at any time they wish – elect to use the verification procedure under track two.

5.2 Comparison with Working Group 4 Findings

The question whether or under what circumstances the CDM project cycle should be applied to JI is one of the so-called "crunch issues" in a paper most recently published by the President of COP 6 (UNFCCC 2001b), i.e. issues with the strongest disagreement among Parties. Not only this is a debate on the international level, but also within the JOINT team. Both, the Working Group 4 (WG 4) and Working Group 5 (WG 5) recommend a JI framework standardised as much as possible. The design of a JI project cycle, however, seems to be the basic difference between these two. Whereas WG 4 is favouring a project cycle very similar to a procedure designed for

CDM, WG 5 states that it would not be fortunate to subject both JI and CDM to identical project cycle requirements.

The CDM project cycle needs to apply strict validation and certification procedures to make sure that tradable permits linked to emission reductions from a CDM project are credible. It can be argued that under JI it could be left to the host country to ensure credibility of emission reductions since it is the host that is selling the permits out of its Kyoto budget. In that case, however, it has to be ensured that the host countries are credible with respect to compiling and reporting their greenhouse gas inventories in order to ensure environmental integrity. This suggests the existence of a trade-off between the credibility of host countries and the credibility of the project cycle.

C8: The credibility of JI countries can be ensured by jointly agreed sanctions for non-compliance with e.g. Kyoto targets and reporting standards. If such sanctions are not in place, permits have to draw their credibility out of the certification process which has to be based on strong and detailed procedures, similar to a CDM procedure.

Instead of sanctions the WG 5 paper introduces the Project Consortium Agreement (PCA) as a means to ensure credibility of the project partners. Given the credibility of the partners, WG 5 argues that host country governments are the best judge e.g. of project additionality and, thus, no specific procedures on additionality have to be agreed upon internationally. During the JOINT project, we have figured out that no objective criteria exist to judge whether a project is really additional or not. The additionality check will be a subjective judgement based on the conditions prevalent in the host country. Therefore, the recommendation brought forward in WG 5 is sensible.

If governments involved in the JI process are not serious with their GHG inventory, permits lose market value with the approach sketched by WG 5. A stricter project cycle, as supported by WG 4, might ensure the market value of permits. However, increasing transaction costs in that case might reduce the number of JI projects and thus the potential efficiency gains.

R8: Within the scope of the JOINT project, a way out of this dilemma could be the establishment of a European Union JI framework for intra-EU+CEEC projects. Within such a framework credibility of governments concerning GHG inventories and compliance can be ensured by sanctions. As all CEE partners involved in the JOINT project will apply for the accession to the EU, one could think of an issue linkage as such that accession will only be approved if CEE countries will have a strict GHG inventory in place. Host countries that have subscribed to that framework could proceed in their JI activities according the WG 5 procedure. Host countries that do not fulfil reporting criteria etc. have to apply the more CDM-like procedure outlined in this paper.

With such a framework in place, The EU and the Accession States could start an early JI phase with real monetary credits allocated to GHG reductions by JI projects based on the contractual arrangements of the EU countries within the EU Bubble. This proposal seems to be completely in accordance with the current negotiating text.

R9: But, it should be stressed that for a two track regime a strict compliance regime is absolutely required. Without this precondition, such a scheme can not be recommended. Moreover, it is unclear how this rule could be applied. E.g., if a host country is in compliance from 2008 to 2010 and in non-compliance from 2011 to 2012, the JI projects started before 2010 will certainly not have collected the data to withstand a retrospective certification from 2011 onwards.

One further point with regard to the negotiating text should be highlighted. No distinction is made between validation and verification. It is not clear whether these two steps shall be carried out by two different entities or by only one. PWC (2000) estimates that transaction costs increase by around 15-20% once a second entity becomes involved. The verifying body will need to devote additional time to become familiar with the project issues, prior to conducting the verification work. Documentation will need to be reviewed again and working relationships to be established. Additional time is required for the selection of this body. However, this has only a minor impact on large scale projects. In relation to the total capital expenditures, for a new CCGT plant with 400 MW capacity the costs only increase from 0,2% to 0,3%.

C9: The question whether the viability of a project is affected by transaction costs is more a matter of project size than number of involved independent entities. If two entities are involved, for a 100 kW PV project the transaction costs amount to around 88 % of total capital expenditures. Therefore, we strongly recommend that validation and verification are carried out by two different entities.

6 Concluding Remarks and Policy Recommendations

The purpose of AVM is to assure the credibility and quality of emissions reductions. This requires the application of an agreed framework, and should ideally be an international standard that can assure international investors and other interested parties that credited emissions reductions fully satisfy all modalities of the Kyoto Protocol and other criteria and requirements, in particular that they are real and additional. A convincing framework must avoid conflicts of interest, promote accountability, keep transaction costs down, and ensure full transparency.

Thus, the challenge to the Parties is to efficiently regulate the market. Environmental integrity must be assured while maintaining market integrity. Efficient markets with private sector capital could be promoted if the Parties:

- Keep the project cycle short and predictable;
- Avoid or minimise *ex-ante*, open-ended approval processes at the pre-investment stage, and instead rely on *ex post* audits with heavy penalties for malpractice to ensure environmental integrity; and
- Create transparency and predictability through international guidelines which might contain agreed validation protocols and accreditation criteria for validating/verifying/certifying bodies.

In the absence of high penalties for non-compliance, the AVM procedure should be oriented towards the suggested CDM project cycle. Permits have to draw their credibility out of the verification process which has to be based on strong and detailed procedures.

A two track approach with a lowered regulatory intensity for host countries that fulfil certain eligibility requirements, in particular demonstrate compliance with inventory and reporting requirements, can only be recommended if sufficient sanctions are in place. Whereas no strong compliance regime is visible on the global level, within the JOINT context the process of accession could be used for an issue linkage in order to establish such a JI framework between the EU and the CEE countries. This would also give the opportunity for an early start of JI, prior to 2008.

Appendix 1: Uncertainties due to Emission Factors and Activity Data

Uncertainties due to emission factor and activity data				
1	2	3	4	5
Gas	**Source category**	**Emission factor**	**Activity data**	**Overall uncertainty**
CO_2	Energy	7%	7&	10%
CO_2	Industrial Processes	7%	7%	10%
CO_2	Land Use Change and Forestry	33%	50%	60%
CH_4	Biomass Burning	50%	50%	100%
CH_4	Oil and Natural Gas Activities	55%	20%	60%
CH_4	Coal Mining and Handling Activities	55%	20%	60%
CH_4	Rice Cultivation	3/4	1/4	1
CH_4	Waste	2/3	1/3	1
CH_4	Animals	25%	10%	25%
CH_4	Animal waste	20%	10%	20%
N_2O	Industrial Processes	35%	35%	50%
N_2O	Agricultural Soils			2 orders of magnitude
N_2O	Biomass Burning			100%
Note : Individual uncertainties that appear to be greater than +/- 60% are not shown. Instead judgement as to the relative importance of emission factor and activity data uncertainties are shown as fractions which sum to one.				

Source: IPCC (1996).

Appendix 2: Definitions

Throughout this paper, the following definitions are used[11]:

Accreditation

The recognition by a responsible authority that an impartial body is competent to undertake defined activities.

Validation

Assessment of the project design against certain criteria. A successful validation (meeting the pre-set criteria) is the prerequisite for getting a project approved as JI.

Monitoring

Monitoring refers to the measurement of GHG emissions and other defined parameters that occur as a result of the project. Therefore, it is the systematic surveillance of the project's performance by measuring and recording performance related indicators. Monitoring does not involve the calculation of GHG reductions, nor does it involve comparisons with previous baseline measurements. The objectives of monitoring are to inform interested parties about project performance, to adjust project development, to identify measures that can improve project quality, to make the project more cost effective, to improve planning and measuring processes, and to be part of a learning process for all participants.

Verification

Confirmation by examination and provision of objective evidence that results have been achieved or that specific requirements have been fulfilled. Verification can occur without certification.

Certification

The authoritative act by which an independent accredited body documents that a process or procedure is compliant with pre-set standards or criteria. In particular, it refers to certifying whether the measured GHG reductions actually occurred. Certification is expected to be the outcome of a verification process. The value-added function of certification is in the transfer of liability/responsibility to the certifier.

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[11] The elaboration of definitions is based on a review of several papers (Jones 2000, Norway 1999, Chow 2000, Vine/Sathaye 1999a and 1999b, PCF 2000b).

Appendix 3: Brief Outline of Project Evaluation Criteria

1 The character of the proposed project

(a) renewables

(b) CHP

(c) biomass

2 Originality, importance of a project

The project must be highly original, introduce new aspects, important from the view of society, promote economical development, and tackle the issue of unemployment (1-10).

3 Prospects of the project

Is it modern, prospective, what is the standard of applied technologies, is its usefulness doubtful for some reason.

4 Contribution of the project to its field and it's applicability

5 The quality of the proposal preparation, aims of the project

Problems and approaches well defined, aims realistic,....

6 The proposed concept and methods

Are they clear, well worked out, adequate, maybe missing or not clearly defined?

7 Time schedule

Adequate and realistic, unrealistic, not given, or not precisely given?

8 Applicant and his co-workers – their publication activity

Their affiliation, their publications, their current research,...

9 The team size

Conditions for work on the project at the applicant institution/firm

10 Financial requirements

Adequate, substantiated (Y/N)

11 Commentary-summary

12 Final evaluation

Appendix 4: Transaction Costs of a Large Power Station Foreign Investment

Type of cost	Value (% of equipment cost)
Feasibility study	
Internal project development	1-2
Legal fees	0.5-1.5
Approval fees	0.2-0.6
Legal consulting	0.1-0.5
Fuel supply consulting	0.1-0.5
Tax consulting	0.1-0.3
Financing	
Internal project development	1-2
External consultant (engineering)	3-8
Financial advisors (fees+travel)	1.2-3.4 (of capital acquired)
Bank fees	2-3 (of capital acquired)
Legal fees	1-3 (of capital acquired)
Construction	
Insurance	1-1.5
External consultant (engineering)	1-1.5
External consultant (financial)	0.5-1 (of capital acquired)
Internal project management	0.5-1
Training	0-3
Sum	**10-30**

Source: Rentz et al. (1998: 71f.)

Appendix 5: Project Classification

Project Type	
Measures utilising or replacing existing electric power or heat generation / transmission	• Fuel Change • Improvement of efficiency • Renewal of the facility (same output) • Reduction of loss of electric transmission or district heating network
Construction of new electric generating facility	• Replacement of a plant with another one at a higher power and / or utilisation factor • Construction of new electric generating plant grid-connected • Construction of new power plants serving isolated villages (no grid connection) • Co-generation Plants
Grid interconnection	• Grid connection of isolated villages replacing local electric plant (e.g. diesel generators) • Electrification through grid connection of non-electrified isolated villages
Use of untapped energy for heat production	• Geothermal • Flue gas heat recovery
Reduction of GHG leakage	• Reduction of leakage of gas transmission and distribution systems • Reduction of equipment leakage (e.g. SF6, HFC)
Measures on electrical end-uses	• Improvement of efficiency
Measures on thermal end-uses	• Reduction of heat demand (passive measures/process improvement) • Replacing thermal end use with more efficient electrotechnologies

Source: Enel (2000)

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