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# Biomass Energy for Heating and Hot Water Supply in Belarus

## Developing Bioenergy JI Projects

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# Biomass Energy for Heating and Hot Water Supply in Belarus (BYE/03/G31)

## Developing Bioenergy JI Projects

**Colophon**

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# TABLE OF CONTENTS

# 1 INTRODUCTION

This document gives an introduction on the issues that are of relevance to the development of biomass-based Joint Implementation projects in Belarus.

It first sets out the background of Joint Implementation (JI) and the main operational procedures. Having established the requirements that JI project have to comply with, it subsequently looks at the commercial aspects of JI projects, and touches upon project development costs, revenues, markets, prices and risks. This is followed by a description of the experience of project developer / carbon trader BioHeat International with developing JI biomass energy projects in the Czech Republic. Finally, some observations concerning the perspective and the status of JI project development in Belarus are made.

# 2 PROJECT DEVELOPMENT UNDER JI TRACK 2

## 2.1 Background

In 1997, almost 200 countries signed the Kyoto Protocol[1]. A number of things were agreed under the Protocol, but the most important were:

1. Developed countries agreed quantitative targets on greenhouse gas (GHG) emissions[2]
2. Establishment of the "Kyoto Flexible Mechanisms" to assist developed countries meet these targets and assist developing countries achieve sustainable development

These targets are translated into emission allowances – or "rights to emit".

Developed countries, which have ratified the Kyoto Protocol and accepted their emissions reductions targets, may meet their targets through a combination of domestic climate change activities and the use of the Kyoto Mechanisms. There are three Kyoto Flexible Mechanisms:

- Joint Implementation (JI)
- Clean Development Mechanism (CDM)
- International Emissions Trading (IET)

Both JI and CDM are "project based mechanisms" collectively known as "climate change projects". They involve developing and implementing projects that reduce GHG emissions overseas, thereby generating carbon credits that can be sold on the carbon market. This means that a project that reduces GHG emissions can generate an additional income stream in the form of carbon credits.

IET involves trading in emissions reduction or carbon credits between countries. So, a country with fewer "rights to emit" than its actual emissions can purchase credits to overcome its shortfall from another Annex-I country[3]. Alternatively, a country with surplus "rights to emit" can sell them.

Climate change projects are conventional projects that can generate an additional income stream through monetising the carbon benefit. However, there are additional project requirements.

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[1] The United Nations Framework Convention on Climate Change (UNFCCC) was first discussed at the Earth Summit in Rio de Janeiro, in 1992. Parties to this Convention (countries) have met every year since then, resulting in a number of decisions, of which the Kyoto Protocol (1997) is the most important. See www.unfccc.int for more details.

[2] The GHG's covered by the Kyoto Protocol are Carbon dioxide ($CO_2$), Methane ($CH_4$), Nitrous Oxide ($N_2O$) and various fluorinated gases (HFCs, PFCs and $SF_6$).

[3] For a pragmatic explanation of the term "Annex 1 country" and many other concepts central to Kyoto Mechanisms see Annex 2.

## 2.2 Joint Implementation

Joint Implementation (JI) involves project activities undertaken in developed countries (Annex-1 countries). The carbon credits that accrue to a JI project are termed Emission Reductions Units (ERUs) and are issued by the host country government.

Emission reductions can be claimed for the first commitment period of the Kyoto Protocol 2008-2012. However, verified emission reductions of JI projects prior to 2008 may be traded under certain circumstances as Assigned Amount Units (AAUs).

**Eligible project categories and technologies**

No list of eligible project categories has been defined, however, countries are to refrain from using ERUs from nuclear energy projects to meet their commitments.

Some indicative examples of JI projects in the energy field include:

- Installations based on renewable energy sources - wind, biomass, small hydro, etc.
- Fuel switch to lower carbon intensive fuels (in electricity and heat sector, industry)
- Energy efficiency at supply side (improvement of the efficiency, for example use of improved technologies, improved transmission and distribution systems, updated district heating networks, etc.)
- Energy efficiency at the demand side (improvement of the efficiency on use of supplied energy); this includes projects in the residential and the industrial sector
- Combined heat and power (CHP) projects

No specific performance standards are fixed for project technology. However, project technologies introduced should at least have an equal or better performance standard than the existing operational technologies in the host country.

**Two tracks for JI**

JI projects will follow certain procedures under one of two tracks: Track 1 and Track 2.

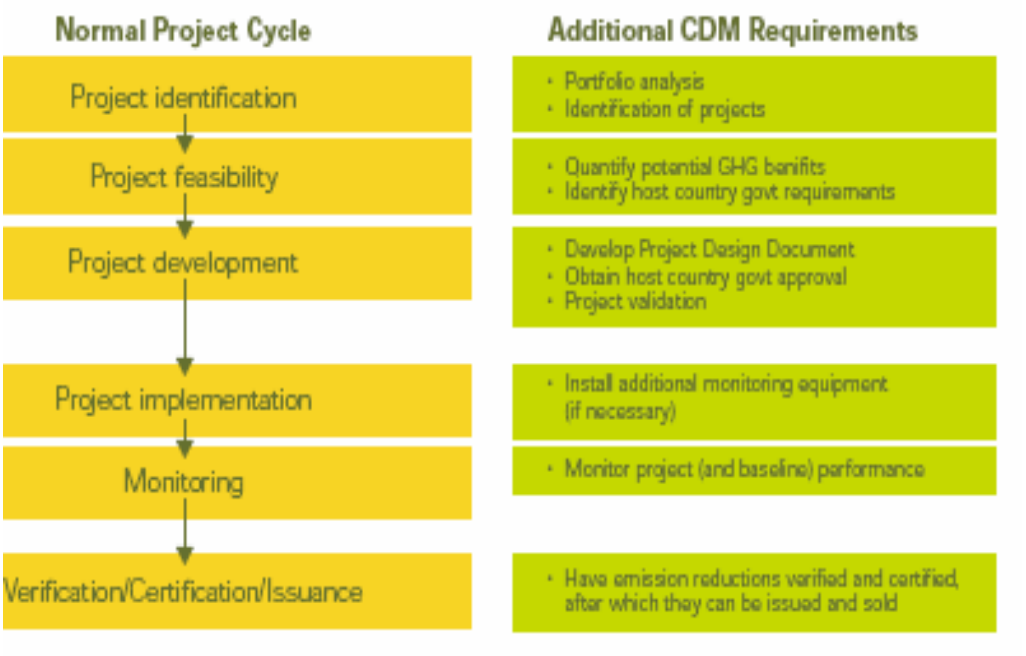
| | |
|---|---|
| **Track 1** procedures apply when the host country meets all the Kyoto Protocol eligibility requirements related to the transfer and acquisition of ERUs. In this situation, Annex I host countries are allowed to apply their own procedures for assessing and accepting projects' eligibility and additionality. | **Track 2** procedures apply when the host country does not meet the eligibility requirements for Track 1. Under Track 2, projects are assessed according to procedures administered by an international regulatory body called the JI 'Supervisory Committee'. These are likely to be similar to the procedures for CDM projects and more complex than for Track 1. |

Because at present most countries are unable to meet all the eligibility requirements for Track 1, it is most likely that JI projects will follow Track 2 procedures, which are similar to the procedures established for CDM projects.

Figure 1 gives an overview of a conventional JI project and the potential requirements under JI Track 2 from a project developer's point of view. A conventional project development cycle (left side) is compared with the additional requirements for JI projects

(right side). Each stage is then described in more detail in relation to the specific requirements of JI projects[4].

**Figure 1: Flow chart of the JI project cycle (Track 2 example)**




## 2.3 Portfolio analysis/identification of projects

Initially a project developer should determine whether there are any opportunities for JI projects within his organisation or operations by conducting a portfolio analysis. This consists of examining existing investment plans and project development initiatives to determine whether they have the potential to reduce GHG emissions. In addition to that, the project should be eligible for carbon credits. There are many eligibility requirements, but the most important are whether or not the project reduces GHGs compared to a situation without the project, and whether or not the project is located in a country that is eligible. Annex 1 presents a Quick Scan Checklist that can be used to get an indication of whether a project might qualify as JI project.

## 2.4 Project feasibility

First of all, it is important to estimate the amount of emission reductions likely to accrue from the project. Together with expected market prices for carbon credits, this gives an idea of the extent to which additional financing through JI can contribute to the overall profitability of the project. Alternatively, the developer can estimate the price of the carbon credits that would be required to make the project profitable and compare these to

[4] JI approval procedures, under either Track, are not formally operational. JI projects are currently being implemented under interim contractual agreements between credits buyers, sellers and the host government. The buyers and sellers allocate risks and terms related to the future approval of the projects. Some buyers are following CDM procedures, which are already operational. A precise format with guidelines can be downloaded from the following website: http://CDM.unfccc.int/pac/howto/CDMProjectActivity/Reference/Documents.

current market prices. The amount of carbon credits accruing from a project is dependent on the scenario that describes what would have happened in absence of the project (the baseline), the project emissions and the size of the project.

For more complex technologies, a more in-depth study may be required. It should be noted that this would also need to be done for projects that are borderline in terms of leading to a net emissions reduction in the pre-feasibility check.

Secondly, it is important to check a project against host country requirements. Quite often, the government of the country in which the project is to be implemented has formulated additional requirements for JI projects.

## 2.5 Project development

**Project design document**

If the feasibility phase indicates that it is possible to develop the project as a JI project under Track 2, a document called the Project Design Document (PDD) needs to be produced. This PDD should contain the following information:

- General description of project activity
- Host country approval
- Baseline methodology
- Monitoring methodology and plan
- Calculations of GHG emissions by sources
- Environmental impacts
- Stakeholders comments

**Baseline and monitoring plan**

The baseline is the scenario that describes the situation that would occur in absence of the proposed project activity. Once this is known, the emission reductions attributable to the project can be determined.

This is the difference between the emissions without the project (baseline) and emissions from the project over the period for which emission reductions may be claimed. The baseline must be derived using a valid baseline approach and methodology. Because the JI Supervisory Committee has only just been established and still need to formalise JI procedures, a project developer may choose to use the currently approved methodologies for CDM projects, which are documented on the UNFCCC website.

If no approved methodologies exist for the project, a new methodology will need to be developed. The same applies to the monitoring methodology and monitoring plan.

A project developer is advised to consult specialist climate change consultants for determination of the baseline and monitoring plan.

**Environmental impact assessment**

The environmental impacts of the project will need to be determined, in accordance with the requirements of the host country. The project developer must provide documentation on the analysis of environmental impacts of the proposed project, including transboundary impacts. In the case of significant environmental impacts, an Environmental Impact Assessment (EIA) is required.

**Validation**

The final step in this stage is to submit the PDD to a validator (an Independent Entity - IE) that has been accredited by the JI Supervisory Committee (JI SC). Since the JI SC has only recently been established, buyers are adopting their own validation procedures; thus the project proponent should consult with the buyer on how to proceed.

**Stakeholder consultation**

Stakeholder consultation is essential during the development of a JI project and may have to take place at two different occasions, once during the project design phase, and once during the validation process. The requirements for the public consultation during the design phase are dependent on host country requirements. The PDD will need to be published on the Internet for a thirty day period. Comments from stakeholders are invited and need to be addressed in the final version of the PDD.

## 2.6 Project implementation

After approval, the project can be implemented and monitoring requirements, including those specified in the monitoring and reporting plan should be installed.

## 2.7 Monitoring after project implementation

Since ERUs are issued for actual project emissions, the project developer must periodically monitor the GHG reductions resulting from the implemented project, according to the monitoring methodology and plan developed for the PDD.

## 2.8 Verification, certification and issuance

The monitored GHG reductions must be periodically determined and verified by the IE. After verification, the IE provides written certification that the project activity achieved the verified GHG reductions. Following the certification, the JI host government will issue the carbon credits accordingly. They can then be sold on the carbon market.

More details concerning the development of climate change (JI and CDM) projects are given in manuals and handbooks that are issued by e.g. the Japanese Ministry of Environment, the Danish Energy Authority, the Baltic Sea Regional Energy Co-operation (BASREC), EURELECTRIC and others. A selection of guides published at the Internet is listed in the literature overview presented at the end of this document.

# 3 COMMERCIAL ASPECTS OF JI PROJECTS

## 3.1 Why participate in JI?

There are a number of reasons to participate in the development of JI projects, including:

- To improve the financial viability of GHG mitigation projects;
- To generate emission reduction credits that can be used to meet targets under the European Union (EU) emission trading Directive;
- To develop carbon accounting and management skills and understanding
- To improve or add to the public relations, through the good publicity generated by developing environmentally sound projects.

However a project that may qualify as JI activity should not be considered if the transaction costs overweigh the financial returns.

## 3.2 Costs of developing a JI Second Track Project

Project developers incur considerable costs associated with evaluating, structuring, and securing an ERU transaction.

The developer will have to undertake a JI feasibility study, which will involve evaluating whether a project meets the JI eligibility criteria and whether the project generates sufficient ERUs, and whether these ERUs can be transacted at a price per ERU that covers both the costs of transaction and improves the financial viability of the project.

Structuring costs are associated with developing the PDD, contracting an Independent Entity, etc. There are also costs associated with transacting ERUs such as marketing of credits, contract negotiations, etc.

Table 1 below indicates the approximate costs for the JI evaluation, structuring and transacting activities that have to be undertaken to develop a JI project. It is important to distinguish between upfront pre-operational costs (payable before the project is operational and generating revenue) and implementation/operational costs which will be paid once the project is operational and generating revenue. Upfront costs include feasibility studies; producing the Project Design Document (PDD), verification of PDD, and credit marketing materials; and marketing activities. The implementation/operational costs include verification, payments to brokers (if utilised), and administration charges to the JI Supervisory Committee[5].

[5] Once the Supervisory Committee is operational, an administrative charge is likely to be a levy in the form of a small percentage of credits generated per annum (likely to be no more than 1-2%). The question of who will bear the cost of such a fee will be subject to negotiation between the project participants (i.e. host government, investor government, carbon purchaser and project owner/developer).

**Table 1: Estimated Additional Costs Associated with JI Projects**

| Conventional Project Activities | JI Project Cycle Activities | Estimate of JI Cycle Costs (€) |
|---|---|---|
| **Pre-operational Activities** | | |
| Project Design and Feasibility assessment | Additionality and baseline assessment, emissions quantification, monitoring feasibility, and financial analysis. Information for Project Design Document | 20,000 – 50,000[1] |
| Project planning and Design activities | Monitoring Plan | 5,000 – 40,000[2] |
| Approval activities: e.g. obtaining Government permits | Determination – approval of PDD by Independent Entity | 5,000 -25,000[3] |
| Finalise project design, procurement, and contracting | Marketing of Credits | Internal costs or if external brokers used payment likely to be due when payments received from buyer – see below |
| | **Total Up-front Costs:** | **40,000-115,000** |
| **Construction/Implementation Activities** | | |
| Construction, operation, sales, maintenance and administration activities | Verification by Independent Entity | 5,000 - 15,000 per verification |
| | Transaction activities – transfer of carbon credits | If brokers are utilised success fee in region of 1-15% of ERU value |
| | Possible fee to cover the costs of the JI Supervisory Committee | No decision taken on possible fee |
| | Risk Mitigation - optional | 1-3% of credit revenue yearly. Mitigates loss of incremental value as a result of project risk. Buyer may take this risk |

Source: JI Project Manual, Danish Energy Authority, 2003

1: Depends on complexity of project.

2: Depends on complexity of the project and sources of greenhouse gases.

3: Depends on complexity of project, and location of the project.

## 3.3 Characteristics of ERU revenues

The ERU revenues can be generated only for the period 2008-2012, which is a limiting factor of JI. This has several implications on the impact that associated revenues have on a project's financial viability and bankability, which include:

- The usual method of payment – pay-on-delivery – is less attractive for projects implemented now because the revenues cannot impact on the repayment of debt in the crucial first few years of a projects operation.
- Revenue will be discounted.
- Buyers generally prefer large projects that generate >100,000 tonnes of CO2-euivalents per annum because the crediting period is short.

The project developer should be aware of any claims on ERUs by the host government.

## 3.4 Markets

The market for ERUs can currently be divided into two main markets:

- The Kyoto compliance market
- The Non-Kyoto compliance market

In the **Kyoto compliance market**, ERUs traded will be able to contribute to achieving the formal targets agreed in the Kyoto Protocol. The most significant buyers of ERUs at present are institutional buyers, like the World Bank (through its Prototype Carbon Fund, www.prototypecarbonfund.org)), and the Dutch Government (through its ERUPT programme, www.carboncredits.nl). They are willing to take (part of) the risk that the resulting credits are not Kyoto compliant, and price their offer process accordingly. Countries including Sweden, Finland, Denmark, Italy, Austria, Spain, Portugal and Japan have also entered this market as buyers.

Recently, more private buyers are entering the market, mainly to speculate on price development, and to hedge against expected future Kyoto commitments. The introduction of the EU Emissions Trading Scheme significantly increased the market for project-based credits, as it will be possible to use ERUs for compliance purposes.

**EU Emissions Trading Scheme (EU ETS)**
The EU ETS began in January 2005. This scheme requires Member States to grant GHG emissions permits to companies in relevant sectors. Through a regulation called the "linking directive", companies will be able to buy credits from JI projects to help them meet their targets. It is very likely that companies under the EU ETS will use credits from JI projects from 2008.

The **Non-Kyoto compliance market** involves the buying and selling of credits that are not eligible for use in meeting national Kyoto Protocol targets. Typical reasons for participating in this market are:

- Meeting voluntary agreements/targets
- Hedging against expected future commitments
- Trading (speculation on price development of carbon credits)

The carbon buyers on this market are mainly private buyers (traders, utilities, etc).

**Early and late crediting**
Verified emission reductions of JI projects prior to 2008 and past 2012 can be traded under certain circumstances as Assigned Amount Units (AAUs), making use of the provisions in Article 17 of the Kyoto Protocol. These are often termed "Green AAUs". It should be noted that in order to transfer AAUs, the Parties involved have to meet all the eligibility criteria for participating in Emissions Trading, which are the same as the eligibility criteria for participation in JI First Track projects. Host countries are most likely to be interested in early crediting if they anticipate that they will have large surplus of AAUs, and if the project is of particular interest to them.

## 3.5 Prices

The current carbon market is far from a liquid market, and there is no transparent pricing mechanism for carbon credits. It is not clear at present that the market price reflects the cost of making the emissions reductions.

Kyoto compliant credits are usually more expensive than credits for the non-Kyoto compliance market. There are two reasons for this. Firstly, only Kyoto compliant credits can be used towards the national Kyoto emission reduction targets, and secondly, because of the international significance of the credits the project developer or credit owner needs to fulfil a number of requirements with regard to their validation, monitoring and verification.

Prices of ERUs in the carbon market so far have ranged widely. The Prototype Carbon Fund prices range between US$3.5 and US$5 per tonne $CO_2$, while the ERUPT tenders prices have ranged between €5 and €9 per tonne $CO_2$. Prices depend strongly on the segment of the market, and on the structure of the transaction. They reflect the distribution of risks between buyer and seller (see below). Typical prices on the non-Kyoto market range from 1 to 3 €/t $CO_2$-eqv.

Forecasting the price of credits (a function of balancing demand and supply) is difficult because of the uncertain regulatory framework as well as the unpredictable role that major players in the market will adopt. According to a study by PointCarbon, in which carbon prices under different scenarios for international emissions trading in the Kyoto period 2008-2012 are examined, in the 'most likely' scenario, the updated estimate of carbon prices in 2010 is US$9.9/ $CO_2$-eqv. with low ($25^{th}$ percentile) and high ($75^{th}$ percentile) estimates of 5.0 and US$13.7/ $CO_2$-eqv. respectively.

Up-to-date information on the price of carbon credits can be obtained from potential buyers, brokers and traders.

## 3.6 Risks

Risks as perceived by the carbon buyers will influence the price they will be willing to pay for carbon credits. This risk will be low if a project is offering verified and registered credits on the spot market, but risk will play a significant role in any form of contract that involves a commitment by a buyer at present in return for a future delivery of credits.

**Market risks**

A project's carbon revenues are largely a function of the credit price, project activity level (i.e. emission reduction volumes) and the credit-worthiness of the project proponent. The fact that the carbon market is relatively immature means that it can be difficult for project proponents to forecast the cash flow or economic value of the credit stream, or for carbon buyers to decide when is the best time to buy.

The credit price will be quite sensitive to policy development in key countries, and also to fluctuations in fossil fuel prices, since the price of fossil fuels is an important determining factor for emissions reduction costs. If Russia decides to sell its surplus assigned amount

(AAUs), commonly referred to as 'hot air', into the market at significant volumes, this could have a negative impact on the value of Kyoto project credits.

**Regulatory risk**

There are major regulatory risks associated with Kyoto project development and with early purchase of credits. An important risk concerns the issue of host country approval, which is a pre-requisite for developing Kyoto projects. Many of the host governments have not formally established either their policy in relation to Kyoto projects or legally appointed agencies with authority to provide the approval needed. This places a burden on project developers to obtain approval in such an institutional and policy vacuum. Bilateral agreements between the host and investor governments can, if properly formulated, mitigate such risks.

**Project related risks**

The price a project will be able to obtain for its carbon credit greatly depends on the perceived risk related to the project itself and its location. Project risks can be categorised into country risk and operational risk.

Country risk refers to the risk of political and economical instability, of violence, infrastructural disruptions and so forth. In general, this is related to risks that cause physical or financial damage to the project under 'force majeure', thereby reducing the project's capacity to deliver carbon credits as specified in a contract with the buyer.

Operational risk refers to a variety of factors, the most important are the following: credit rating of the project developer and his sources of finance, the availability of infrastructure and technology, capacity of staff, number of stakeholders and the control the project has over them, market stability for a project's other products and operational hazards, such as, for example, fire and pests for forestry plantations.

**Risk mitigation**

Risks mitigation can be done through a variety of internal and external mechanisms to the project. **Internal methods** include, among others:

- Introduction of good practice management systems
- Self-insurance reserves or keeping a portion of the project's benefits (financial or in-kind) as a reserve to ensure for any shortfalls.
- Diversification of sources of funding

**External risk mitigation methods** include:

- Financial insurance
- Combining guarantees among various parties
- Carbon credit guarantees, a developer can promise to return some or all of the money back, in case that policy disallows trading of that particular sort of credit.
- Hedging techniques aim to combine assets with options, forwards and futures (derivatives) to create a payoff profile that minimises risk or maximises the return payoff.
- Cross-project insurance, through direct arrangements in which projects would guarantee each other.

# 4 JI PROJECT EXPERIENCE IN THE CZECH REPUBLIC

**Background**

In the Central and Eastern European (CEE) region, which includes Belarus, there is a huge potential in the district heating sector to reduce $CO_2$ emissions by switching from fossil to biomass fuel. Such fuel-switch projects qualify for JI co-financing but individually they are too small to attract the interest of $CO_2$-credit buyers who prefer contracting projects generating at least 100,000 tonnes of $CO_2$-equivalents or more in order to minimise unit transaction costs.

**The flexible biomass energy portfolio for Czech Republic**

To utilise the JI potential of small-scale projects while keeping unit transaction costs down project developer and carbon trader BioHeat International applies a flexible portfolio concept. The concept involves assembling a set of bio-energy projects of the same or similar type into a bundle characterised by the following features:

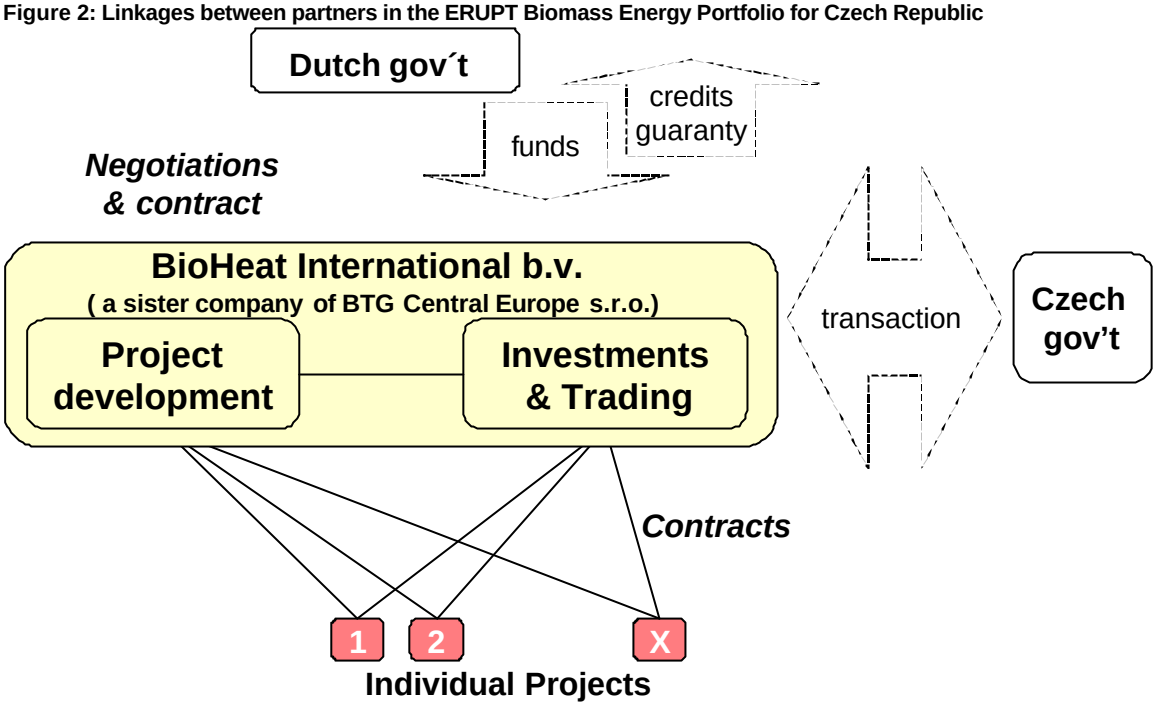
- Use of standardised baselines and emission reduction calculations
- Flexibility allowing failing projects to be replaced by new projects, thus reducing the risk of a total failure
- Gradual implementation allowing the set of projects to be implemented over a period of several years
- Involvement of a "bundling facility" – a financing intermediary between the credit buyer and the individual projects

The portfolio concept was first applied in the Czech Republic where BioHeat International put together a portfolio of fuel-switch projects concerning the replacement, renewal, extension or new construction of municipal or industrial heating systems, where biomass (wood and straw) boilers replace coal or gas fired boilers. Under the name "Biomass Energy Portfolio for Czech Republic" the portfolio, which originally included 28 projects, was submitted to the Dutch Emission Reduction Unit Procurement Tender (ERUPT). This bid was successful and after negotiations emission reductions up to 522,320 tonnes of $CO_2$-equivalents from the portfolio were sold to the Dutch government.

BioHeat International handles the financial transactions between the Dutch government and the individual projects included in the portfolio (see Figure 2). The total investments cost of the 14 projects that were finally included in the portfolio amount to 27 million EUR. The income from selling carbon credits accounts for 10-20% of the investment cost of individual projects and for a substantial part is paid to the project owners (mainly municipalities) in advance. Income from selling carbon credits helps municipalities to find the much needed funding to complement investment subsidies available from the Czech State.

The portfolio character brings the advantage of maximising the chance of realising emission reductions in the commitment period.

**Figure 2: Linkages between partners in the ERUPT Biomass Energy Portfolio for Czech Republic**




**Individual projects**

Most of the projects concern the installation of biomass-fuelled heat boilers. They were commissioned between November 2001 and January 2005. All of the projects of this portfolio are of the same general design. They include a biomass boiler and some include also a steam turbine for cogeneration and/or a new heat distribution system. An automated control system is a standard component. The technologies employed are commercially proven and as such do not represent any developmental uncertainty. Technology is procured from different suppliers, mainly from the Czech Republic, Austria and Denmark.

Capacities of the projects in the portfolio range from 0.6 $MW_{th}$ to 9 $MW_{th}$. Their total thermal capacity is 65 $MW_{th}$. Emission reduction of individual fuel-switch projects are typically less than 10,000 t of $CO_2$-equivalents per year. The total emissions reduction over the 2008-2012 compliance period of the 14 projects combined is 562,000 t of $CO_2$-equivalents, on par with some of the largest international carbon projects.

**Emission reduction**

The baseline scenario is that heat production will continue using fossil fuel fired individual stoves and/or central boilers. The business-as-usual (BAU) scenario does not foresee much change in the fuel mix (mainly coal). It is certainly not expected that the Czech government will ban the use of coal during the 2008-2012 JI project period.

In the baseline situation, biomass will be dumped, resulting in methane ($CH_4$) emissions caused by the fermentation of the biomass. Dumping organic materials is a common practice in the Czech Republic. Despite the fact that the country's legislation is gradually becoming as stringent as that of other EU Member States, certain environmental detrimental practices are likely to remain unchanged until the country has made sufficient economic progress. BioHeat International assumes that biomass residues will continue to

be dumped until enough biomass boilers are installed to consume all of these residues. Installation of such biomass combustion capacity will not happen without substantial investment support.

**Table 2: Individual projects included in the ERUPT Biomass Energy Portfolio for Czech Republic**

| Name/site | Thermal/ electrical cap (MW) | Manufacturer/ country | Fuel | t $CO_2$ eqv. contracted | Heat only or CHP | Date of installation |
|---|---|---|---|---|---|---|
| Bystrice | 9 | Urbas/AT | Wood | 101,105 | heat only | Nov-01 |
| Driten | 2 | Imaveco/CZ | Wood | 14,690 | heat only | Nov-02 |
| Horni Plana | 0.5 | Tractant Fabri/ CZ | Wood | 7,445 | heat only | Mar-03 |
| Nova Cerekev | 2 | Kohlbach/AT | Wood | 34,910 | heat only | Nov-02 |
| Rostin | 5.5 | Danstoker/DK | Straw | 41,965 | heat only | Mar-02 |
| Stitna nad Vlari | 0.72 | Hamont/AT | Wood | 9,680 | heat only | Aug-02 |
| Velky Karlov | 1.46 | Tractant Fabri/ CZ | Straw | 7,210 | heat only | Jan-01 |
| Zlutice | 7.9 | Verner/CZ | W+S | 88,190 | heat only | Apr-02 |
| Trebicska t. | 7/1 | Nuclea (Tedom)/CZ | Wood | 75,000 | CHP | Jan-05 |
| Iromez Phelhrimov | 6/1 | Kohlbach/AT | Wood | 75,000 | CHP | Jan-05 |
| Zruc nad Sazavou | 4.3 | Nuclea (Tedom)/ CZ | W+S | 38,550 | heat only | Dec-03 |
| Zlate Hory | 5 | Danstoker/DK | wood | 37,205 | heat only | Mar-03 |
| Slavicin | 1.6 | Kohlbach/AT | Wood | 11,520 | heat only | Feb-03 |
| Bouzov | 2.4 | Verner/CZ | Wood | 19,635 | heat only | Sep-02 |

Baseline emissions are estimated to be 522,320 tons of $CO_2$-equivalents in the period 2008-2012, of which 60% is realised by the burning of coal and 40% by the fermentation of the biomass. As the $CO_2$ released from the burning of biomass equals the amount of $CO_2$ taken up by the biomass during growing, project emissions are zero. The resulting emission reductions are thus 522,320 tons of $CO_2$-equivalents.

**Replication elsewhere in CEE**

There are a number of challenges to surmount before carbon-financed biomass projects are viable on any scale in the Central and Eastern European region. First, it is important that the material being used for energetic purposes has been managed in a sustainable manner. In the forestry sector, for example, many CEE countries such as Belarus are only just starting to apply for Forest Stewardship Council (FSC) certification to guarantee that their forest management practices follow ecological, social and economical norms. Western Europe has certified 50% of its forests for sustainable management practices. Proof of sustainable forest management practices is required under Joint Implementation. Without proper accreditation, there is an increased risk that a project using wood energy will not meet JI standards.

A larger problem for biomass power or cogeneration projects is a lack of feed-in tariffs to national power grids in CEE countries. Markets such as Germany and Austria have feed-in tariffs in place that stimulate the market for grid-connected distributed power generation. Poland has a quota obligation system whereby power sellers and producers have to guarantee they are producing a certain percentage of the power from renewables, and this percentage is growing each year. In case of non-compliance they face financial

penalties. However, such support mechanisms for electricity from renewable sources (including bioelectricity) are non-existing in Belarus.

In much of the CEE, the lack of easy access to the grid is complicated by the large monopolies that control the national electricity networks. The political situation across the CEE region also affects the viability of biomass projects.

Finally, biomass also faces fuel competition based on location and access to raw materials. In Eastern Europe, many are switching to natural gas along the big pipelines. Further, those sitting on coal mines are looking into clean coal. In addition, the CEE faces competition from attractive biomass investments in Kyoto-type (JI or CDM) projects elsewhere in the world, in particular in Brazil, China and India.

# 5 JI PROJECT DEVELOPMENT IN BELARUS

In August 2005 the Republic of Belarus signed the Kyoto Protocol. The Government is generally supportive of the JI concept and is particularly interested in effective investments in the power and heat generation sectors of the Belarusian economy, and in energy efficiency improvement technologies. Therefore, immediately after signing the Protocol, Belarus has started developing its JI policy.

The draft JI policy envisages Belarus selling part of its surplus assigned amount units (AAUs), commonly referred to as 'hot air', into the market. The value of such sales is estimated at 500-1000 Million Euro. The sales would give Belarus the possibility (i) to attract additional resources for introduction of new advanced technologies into energy and other sectors, (ii) to continue modernisation of its economy with the result of GHG emission reduction, and (iii) to produce and collect ERUs for the further target period. The Government has not drafted a strategy for the sales of these credits yet.

The immediate actions of the Government are to establish JI infrastructure and to initiate preliminary selection of possible JI projects.

**Establishing the JI infrastructure**

The JI infrastructure is not fully in place yet. Belarus has only just established a designated national authority that is responsible for JI activity, and that will probably also serve as a JI Secretariat. Selection of an appropriate national greenhouse gas registry system is underway. Furthermore, the country still has to formally register its Assigned Amount (the amount of greenhouse gas emissions that Belarus may emit in the 2008-2012 commitment period) and emission targets. Such formal registration is anticipated soon, after the second meeting of the COP/MOP later in 2006. Because of the modest progress realising the full set of eligibility requirements Belarus will unlikely be staying on Track 1 during the first commitment period, and thus opt for Track 2 instead.

**Selection of possible JI projects**

Under the TACIS funded project "*Technical Assistance to Ukraine and Belarus with Respect to Their Global Climate Change Commitments*" (www.climate-by.com) a preliminary long-list of 14 potential JI projects was compiled. The long-list was later reduced to a short list of 5 projects using the following selection criteria:

| Objective quantitative criteria | Subjective (expert) criteria |
|---|---|
| • Annual average emission reduction and overall project emission reduction;<br>• Net present value (NPV);<br>• Internal rate of return (IRR); with and without ERUs<br>• Specific emission reduction cost;<br>• Payback period. | • JI criteria<br>• Technical feasibility<br>• Financial feasibility<br>• Socio-economic and ecological criteria<br>• Institutional and educational criteria. |

Applying these selection criteria and their relative weights, the 14 potential JI projects were ranked, and four projects were selected for further elaboration into Project Identification Notes (PINs). Projects selected included (in descending order of ranking on the expert criteria ranking):

- Combined heat power mini-plants and hot-water boilers fired with biomass
- Energy saving "smart" buildings in rural areas
- Short rotation willow coppices for biomass fuel production
- Biogas installation

The four PINs have been completed and their elaboration into full-fledged draft Project Design Documents (PDDs) is foreseen for March 2006. The PINs and PDDs will be discussed with potential investors. It is estimated that the initial projects will require a total investment of about 80 million US dollars and may generate about 350 thousand tons of $CO_2$ per year. It is projected that the generated ERUs converted into investment credits will cover about 20-30% of total capital cost. The remainder of the required finance is envisaged to be covered by a project owner. The TACIS project team is currently searching for potential investors.

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## A. SCREENING JI PROJECT IDEAS

To give project developers an indication of whether project ideas might qualify as JI projects the following two-part JI Quick Scan Checklist can be applied to screen project ideas[6]. Part One of the checklist deals with criteria, which should lead to straightforward yes or no answers. If the assessment is positive the project developer can move on to Part Two, which involves assessing more technical aspects of the baseline assessment and the quantification of emission reductions.

**Checklist Part 1 – Government Approval, Additionality, & Monitoring**

If the answers to the questions below are Yes or likely to be Yes then move to Part Two of the JI Quick Scan Checklist to develop rough baseline and quantify emission reductions. If the answers are positive ensure you can justify your answer using supporting evidence from the policy, technical, economic, and financial context.

- Is the national government supportive of JI projects, and will it provide approval for your project type?
- Would your project activity create emission reductions that are additional to those that would have otherwise occurred?
- Is it possible to monitor and verify that the project generates emission reductions? For example for on-grid projects do you have access to verifiable records of the amounts of electricity exported to the grid, for off-grid projects do you have access to verifiable records of the amount of fuel displaced by the project?

**Checklist Part 2 – Baseline & Emission Quantification for Energy Supply Projects**

- Estimate the projects GHG emissions, expressed as tonnes of $CO_2$ per MWh or GJ
- Construct a Rough Baseline Scenario that analyses what would have occurred in the absence of the project. For **grid-connected projects** the baseline could be the continued use of grid electricity, or additional electricity supplied e.g. by a new coal fired plant. If continued use of the grid is the likely option then an estimate of the current grid mix is needed. This will be in terms of fuel or technology that are likely to be affected by the project, e.g. 10% diesel, 10% oil, 10% coal, 65% gas and 5% renewables. Calculate an average grid CEF (carbon emissions factor) using the emission factors tabulated in Table 3 and Table 4 below. To calculate the baseline emissions in tonnes of $CO_2$ per annum multiply the average grid CEF by the MW hour or GJ to be produced by the project. A baseline for an electricity grid should reflect the marginal electricity supply over time. For **off-grid projects** the baseline can be determined by finding out who will use the energy produced by the project. Then estimate what sources of energy these consumers are currently using. If it is electricity from the grid, the method presented above can be used. If it is other sources of off-grid energy this is likely to be diesel, oil, coal, gas or renewable energy. If the current energy use is likely to be renewables then the project will not generate emission reductions, and the proponent should abandon any JI consideration. If the energy used is provided by fossil fuel sources, then determine the relevant CEF (carbon emissions factor) per MW hour or GJ fuel using the

[6] The checklist was sourced from the BASREC Handbook on Joint Implementation.

emission factors tabulated in Table 3 and Table 4 below. Calculate baseline emissions by multiplying the quantity of fuel or MW hours consumed by the appropriate CEF.

- To arrive at an estimate of the tonnes of $CO_2$ reduced per annum by the project subtract the project emissions above from the baseline above.

| Fuel | Technology | Carbon intensity in t $CO_2$/MWh |
|---|---|---|
| Natural Gas | Simple Gas Turbine | 0.644 |
| | Combined Cycle | 0.406 |
| Diesel Oil | Combined Cycle | 0.650 |
| | Gas Turbine | 0.895 |
| | Steam Turbine | 0.735 |
| | Combustion Turbine | 0.854 |
| Coal | Conventional Steam | 0.987 |

**Table 3: Default emission factors for fossil fuel technology, sourced from the Environmental Manual for Power Development (EM).**

| | Energy carrier | ktonne $CO_2$/TJ |
|---|---|---|
| **Solid Fossil** | | |
| **Primary fuels** | Anthracite | 0.0983 |
| | Coking Coal | 0.0946 |
| | Other bituminous coal | 0.0946 |
| | Sub-bituminous coal | 0.0961 |
| | Lignite | 0.1012 |
| | Oil Shale | 0.1067 |
| | Peat | 0.1060 |
| **Secondary fuel/ products** | Coke oven/Gas coke | 0.1082 |
| | Coke Oven Gas | 0.0477 |
| | Blast furnace gas | 0.2420 |
| | Patent fuel and BKB | 0.0946 |
| **Liquid fossil** | | |
| **Primary fuels** | Crude oil | 0.0733 |
| | Orimulsion | 0.0807 |
| | Liquefied natural gas | 0.0631 |
| **Secondary fuel/ products** | Gasoline | 0.0693 |
| | Jet kerosine | 0.0715 |
| | Other kerosine | 0.0719 |
| | Shale oil | 0.0733 |
| | Gas/diesel oil | 0.0741 |
| | Residual fuel oil | 0.0774 |
| | LPG | 0.0631 |
| | Ethane | 0.0616 |
| | Naphtha | 0.0733 |
| | Bitumen | 0.0807 |
| | Lubricants | 0.0807 |
| | Petroleum coke | 0.1008 |
| | Refinery feedstocks | 0.0807 |
| | Refinery gas | 0.0667 |
| | Other oil | 0.0733 |
| **Gaseous fossil** | | |
| | Natural gas | 0.0561 |
| | Methane | 0.0551 |

**Table 4: CO2 emission factors for fuels in kt of CO2/TJ, based on IPCC 1996 revised guidelines.**

## B. GLOSSARY

Short pragmatic definitions and abbreviations of concepts central to Joint Implementation

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|---|---|
| AA | Assigned Amount – the amount of GHG emissions that an Annex B country under the Kyoto Protocol may emit in the Commitment Period 2008-2012. |
| AAU | Assigned Amount Unit – tradable units of the Assigned Amount of an Annex B country expressed as one metric ton of CO2 equivalent. |
| Additionality | The requirements that project emission reductions have to be additional to what otherwise would have occurred in absence of the project. |
| AIJ | Activities Implemented Jointly – At the first meeting of the Conference of the Parties the Parties introduced a pilot phase for jointly developing climate change mitigation projects. These projects are referred to as Activities Implemented Jointly (AIJ). AIJ activities cannot earn credits for the emission reductions achieved by the project. |
| Annex I countries | These are the industrialised countries and economies in transition listed in Annex I of the UNFCCC. Their responsibilities under the Convention are various, and include a non-binding commitment to reducing their GHG emissions relative to 1990 levels by the year 2000. |
| Annex B countries | These are the emissions-capped industrialised countries and economies in transition listed in Annex B of the Kyoto Protocol. Legally-binding emission reduction obligations for Annex B countries range from an 8% decrease (e.g., EC) to 10% increase (Iceland) of 1990 levels by the first commitment period of the Protocol, 2008 – 2012 |
| Annex I or Annex B? | In practice, the term Annex-I used in the Convention and Annex B used in the Protocol are used almost interchangeably for countries that have to reduce their emissions. However, strictly speaking, it is the Annex I countries that can invest in JI/CDM projects as well as host JI projects, and non-Annex I countries, which can host CDM projects. This even though it is the Annex B countries, which have the emission reduction obligations under the Protocol. Note that Belarus and Turkey are listed in Annex I but not Annex B; and that Croatia, Liechtenstein, Monaco and Slovenia are listed in Annex B but not Annex I. |
| Baseline | The baseline for a JI project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A (of the Kyoto Protocol) within the project boundary. |
| Baseline Approach | A baseline approach is the basis for a baseline methodology. There are no requirements on the use of specific approaches in JI-projects. |
| Baseline Methodology | A methodology is an application of a baseline approach to an individual project activity, reflecting aspects such as sector and region. No methodology is excluded a priori so project participants have the opportunity to propose a methodology. |

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| BAT | Best Available Technology. The definition of what is considered the BAT will differ from country and/or region and sector. |
| Carbon Offset | Term used in a variety of contexts, most commonly either to mean the output of carbon sequestration projects in the forestry sector, or more generally to refer to the output of any climate change mitigation project. |
| Clean Development Mechanism (CDM) | Article 12 of the Kyoto Protocol defines the clean development mechanism. It is a project based mechanism between Annex-I and non-Annex I countries, where the project is implemented in the non-Annex I country. |
| CER | Certified Emission Reductions; the terminology for emission reductions generated under the rules of the CDM. |
| Commitment period | Period for which the parties included in Annex B of the Kyoto Protocol have agreed that their aggregate GHG emissions do not exceed their assigned amounts, equal to the period 2008-2012. |
| COP | Conference of the Parties to the United Nations Framework Convention on Climate Change. |
| Crediting period | The fixed and approved period over which emission reductions units from a JI project can be generated. |
| Determination | The process of independent evaluation of a project activity by an Independent Entity against the requirements of JI (under the CDM this process is referred to as validation). |
| EIA | Environmental Impact Assessment, an assessment of the impact that the project will have on the environment. |
| ERUs | Emission Reduction Units; the terminology for emission reductions generated under Joint Implementation. |
| ERUPT | The Emission Reduction Unit Procurement Tender for JI projects administered by the government of the Netherlands. |
| Emission Reduction Purchasing Agreement (ERPA) | Agreement between buyer and seller of emission reductions in which the conditions of the sale of carbon credits are defined. |
| Emissions trading | Mechanism introduced by Article 17 of the Kyoto Protocol, allowing the trade of emission allowances (AAUs) between Annex I countries. |
| EB | Executive Board for the CDM. Board that supervises the CDM under authority of the COP/MOP. |
| EU Emission Trading Scheme (EU ETS) | Unofficial name of the EU Emission trading scheme established according to the EU Directive on Emission Trading |
| GHG | Greenhouse gas; a gas that contributes to climate change. The greenhouse gases included in the Kyoto protocol are: carbon dioxide ($CO_2$), Methane ($CH_4$), Nitrous Oxide ($N_2O$), Hydrofluorcarbons (HFCs), Perfluorcarbons (PFCs) and Sulphurhexafluoride ($SF_6$). |
| Host country/ Host party | Country in which a JI project activity is physically located and implemented. |

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| Investor country | Country purchasing, or receiving as a return on investments, ERUs that accrue from a JI project, or sanctions such purchases by legal entities. |
| Independent Entity | Legal entity that has been accredited by the JI Supervisory Committee to perform the determination of JI project eligibility and/or the verification of ERUs generated by JI projects. |
| JI | Joint Implementation; Mechanism established under Article 6 of the Kyoto Protocol. JI allows for the acquisition and transfer of ERUs between two Annex I countries in the period 2008-2012, arising from climate change mitigation projects. |
| Kyoto Protocol | Protocol under the UNFCCC. International legal instrument on climate change containing emission reduction commitments for Annex B countries. See www.unfccc.int |
| Leakage | The change of anthropogenic emissions by sources of greenhouse gases (GHG) which occurs outside the project boundary, and which is measurable and attributable to the JI project activity. |
| Marrakech Accords | An agreement by the COP adopted by the COP at its seventh session (COP-7). The agreement elaborates on the rules and guidelines of the Kyoto Protocol, including JI. |
| MOP | Meeting of the Parties once the Kyoto Protocol has entered into force. |
| Monitoring plan | Plan describing how monitoring of emission reductions will be undertaken. Frms a part of the Project Design Document (PDD). |
| Non Annex I | Developing countries with no emission reduction commitments under the Kyoto Protocol for the first commitment period 2008-2012. |
| Operational Entity | A legal entity that has been accredited by the CDM Executive Board to perform validation, verification and certification functions for CDM projects. Accredited Operational Entities are referred to as Designated Operational Entities. |
| Party | Party to the UNFCCC and/or the Kyoto Protocol, which are the countries that ratified the UNFCCC and/or the Kyoto Protocol once these respectively have entered into force. |
| PCF | Prototype Carbon Fund administered by the World Bank. |
| PDD | Project Design Document, which refers to the documents to be submitted to an Independent Entity to determine JI project eligibility. |
| Project activity | A project activity is a measure, operation or an action that aims at reducing greenhouse gases (GHG) emissions. |
| Project boundary | The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the project activity. |
| Project participants | In accordance with the use of the term project participant in the Marrakech Accords a project participant is either a Party involved or a private and/or public entity authorized by a Party to participate, under the Party's responsibility, in JI-project activities. |
| RMU | Removal Unit – a carbon unit relating to credits generated from sequestration activities, where one unit is equal to one metric of CO2 equivalent. RMUs are only related to Annex I parties. They cannot be taken over to a subsequent commitment period. |

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|---|---|
| Secretariat | The Secretariat of the UNFCCC, located in Bonn, Germany. |
| Stakeholders | Stakeholders mean the public, including individuals, groups or communities affected, or likely to be affected, by the proposed JI project activity or actions leading to the implementation of such an activity. |
| Supervisory Committee (JISC) | Committee that will supervise JI under authority of the COP/MOP. The Committee will be created after the KP has entered into force. It will make further recommendations on modalities and procedures for JI. |
| UNFCCC or Convention | United Nations Framework Convention on Climate Change. |
| Verification | The periodic independent review and ex post determination by the Independent Entity of the monitored GHG emission reductions that have occurred as a result of the JI project activity during a given time period. |

## C. SCOPE OF AN EMISSION REDUCTION PURCHASE AGREEMENT

An Emission Reduction Purchase Agreement (ERPA) will set out the terms and conditions of payment between the seller and buyer. The contracting of an ERU transaction in an ERPA is designed to minimise the risk that the buyer, or the seller, does not meet his obligations under the contract. In the early stages of the ERU market, buyers are almost all large, financially stable organisations, while the sellers range significantly in size and financial strength. Therefore, the contracts are mostly designed to protect the buyer from the risk that the seller does not perform contract requirements. Some of the key issues that should be covered in an ERPA include the following:

- Compliance with international and domestic legal requirements
- Allocation of rights to credits. It is crucial that it is clear that all entities who potentially might have a claim on the credits, such as equipment suppliers, electricity/heat purchaser or host government, agree on the allocation of emission reductions, and on which project participant has the right to act as the seller of credits.
- Allocation of risks and guarantees
- Definition of what exactly is being sold/bought. This could be emission reductions that may or may not become ERUs. There is obviously a major difference between the two.
- Sale and purchase conditions. Description of the vintage and number of ERUs to be delivered by the seller to the buyer. This should also cover any rights to credits beyond the scope of the contract, i.e., due to the risk of non-delivery the project proponent may only want to guarantee delivery of 80% of the credits the project is expected to generate. The buyer may want the rights to the additional 20% of emission reductions.
- Delivery. This concerns the capacity to deliver and the imposition of delivery obligations. This will involve agreement on delivery dates or trigger events. It should also cover the issue of when ownership will accrue to the buyer – after verification or certification. Delivery issues will also concern shortfalls in, or non-delivery of, the quantity of emission reductions agreed, and will cover the issues of financial penalties, or repayments of upfront costs, etc.
- Evidence of Validity of Emission Reductions. The contract should outline what documentation is required, who will deliver it to whom and when. This could include: PDD, verification reports, and issuance and transfer of ERUs by the host Government
- Price and Terms of Payment. The contract will define the price, and how inflation and taxation will be accounted for. The contract will also define whether the payments will be upfront, paid on delivery, or as an option. It should also cover the issue of penalties for late payments, and the method of payment.
- Liabilities and Indemnities. Decisions need to be made on any limitations on liabilities and whether indemnities are required.
- Default, Termination and Remedies. The issue of defaults, such as the failure by seller to deliver emission reductions should be specified, and the consequences of defaults (termination or remedies) defined.

- Confidentiality. The contractual parties need to define which information is confidential.
- Arbitration and Dispute Resolution. The contract should outline procedures for dispute resolution.
- Taxes, Levies and Charges. This should stipulate who has to pay any taxes, levies, and charges. For JI this is likely to include an administration fee requested by the Supervisory Committee, although no decision has been made on this yet.