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THE INSTITUTIONAL NEEDS OF JOINT IMPLEMENTATION PROJECTS

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ABSTRACT

In this paper, we discuss options for developing institutions for joint implementation (JI) projects. We focus on the tasks which are unique to JI projects or require additional institutional needs -- accepting the project by the host and investor countries and assessing the project's greenhouse gas (GHG) emission reduction or sequestration -- and we suggest the types of institutions that would enhance their performance. Our evaluation is based on four sets of governmental and international criteria for JI projects, the experiences of ten pilot JI projects, and the perspectives of seven collaborating authors from China, Egypt, India, Mexico, and Thailand, who interviewed relevant government and non-government staff involved in JI issue assessment in their countries.

After examining the roles for potential JI institutions, we present early findings arguing for a decentralized national JI structure, which includes: 1) national governmental panels providing host country acceptance of proposed JI projects; 2) project parties providing the assessment data on the GHG reduction or sequestration for the projects; 3) technical experts calculating these GHG flows; 4) certified verification teams checking the GHG calculations; and 5) members of an international JI Secretariat training and certifying the assessors, as well as resolving challenges to the verifications.

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SUMMARY

The Framework Convention on Climate Change (FCCC) calls for the implementation of projects to reduce net emissions of greenhouse gases (GHGs). The FCCC also suggests that signatories to the Convention may implement policies and measures jointly with other Parties (countries), with the intent that Parties may share the financing and the ensuing GHG benefits from jointly implemented projects.

However, because the FCCC does not explicitly define joint implementation (JI) or lay down criteria for JI projects, it is unclear what the appropriate roles for international or FCCC member country institutions are in present and future JI regimes. There are several vexing issues, including the governments' allocation of the authority to accept such projects and the capability of all concerned institutions to monitor, evaluate, and verify the financial and GHG benefits of JI projects.

To gain a better understanding of these institutional concerns, we asked colleagues in five developing countries to evaluate their countries' institutional capacity to handle JI projects. The five countries are China, Egypt, India, Mexico, and Thailand, which constitute a significant potential for JI projects and include at least one country from each continent. Their current postures towards JI range from an aggressive pursuit of JI projects to a wait-and-see approach, and they represent different political philosophies. These collaborating authors' papers are available in a 1995 Lawrence Berkeley National Laboratory report called "Perspectives on the Institutional Needs of Joint Implementation Projects for China, Egypt, India, Mexico, and Thailand," which is being published separately.

In this paper, we also rely on information from several pilot JI projects between US and host country institutions which have been developed over the last few years. We summarize these projects and report on their institutional make-up in order to acquaint the reader with the structure of current pilot JI projects. These projects form a backdrop against which the views

of the developing-country authors may be compared. Brief summaries of these projects are available in the appendices of this volume.

In addition, we draw on the criteria for JI projects from the US Initiative on JI and the Australian Pilot Phase JI Program and the draft criteria from the Intergovernmental Negotiating Committee and the Canadian JI Pilot Initiative. (The Netherlands and Costa Rica also have released draft criteria, however these criteria were received too late for detailed evaluation in this paper). Thus, within each section of the report, we provide information regarding these criteria, the ongoing pilot JI projects, the existing and potential institutional structures for the implementation of all JI projects, and our suggestions for the institutional mechanisms that would enhance the implementation of JI projects.

The implementation of a JI project entails tasks ranging from project feasibility studies to acceptance to eventual verification of its GHG reductions. Some tasks of a JI project are no different from those for any other investment project. Others, such as gaining host country acceptance for an eligible project, are unique to JI projects. In this paper, we have identified two unique JI tasks: 1) accepting the JI project and 2) assessing the project's GHG reduction.

Project acceptance requires that the project proposal fulfill several criteria. As the examples of the US, Netherlands, Australia, Canada, and Costa Rica attest, the current trend is toward each country developing its own criteria with some sharing of information among countries. In order to reduce the bewildering array of criteria that investors might face across different host countries, however, a common set of guidelines is needed. The Conference of Parties for the FCCC could issue such a set of guidelines which would be based on existing country-specific criteria and could be used by a country to develop its own acceptance criteria.

Acceptance institutions within the host countries could range from a senior government official specially appointed for this purpose to a panel of members of relevant ministries. No uniform formula for an acceptance institution will work across all countries, and each country

would select an appropriate institution to accept projects. It is important, however, that the acceptance panel or official have the requisite authority to trade or share GHG credits with the investor country's government on behalf of the host country's government.

The assessment task includes estimating, calculating, and verifying the GHG reduction. The performance of the task requires adequate data, analytical methods, and technical skills. Much of the project-specific data will originate from the project-level teams. However, estimating and calculating the GHG reduction will require appropriate methods and technical expertise. These tasks are best performed by technical experts who could come from private organizations, non-governmental organizations, and universities. Over time, the project parties themselves may gain the technical expertise necessary to estimate and calculate GHG reduction. The verification task requires the ability to check data sources and the methods used for calculating the GHG reduction. Thus it may require a larger team of experts working together to verify a project's performance. Furthermore, a verifier must be a trusted individual or firm whose credibility is above question.

The assessment task thus calls for information exchange, training, and verification -- activities where government intervention is appropriate and can succeed. An international institution, such as a UN JI secretariat, has an important role to play as well. It could standardize and disseminate assessment methodologies, train assessors in the use of the standardized methodologies, certify teams performing the GHG reduction verification, and resolve challenges or refer disputes to a tribunal. Development and standardization of methods should be done in concert with experts from research institutions. Assessors should be trained by sector (e.g., forest or energy), since the necessary data sources, methods, and technical skills vary greatly across sectors. The resolution of disputes will form an important function, requiring careful legal considerations which may spill over into international judiciaries.

1. INTRODUCTION

The concept of joint implementation (JI) owes its origins to projects which were started to offset carbon emissions from power plants in developed countries like the US or Sweden by planting trees in developing countries such as Guatemala or reducing the industrial emissions in transitional economies such as Poland. The intent of these projects' developers was to offset carbon emissions at a lower cost than in their own countries.

These offset projects led to the discussion and eventual inclusion of JI in the United Nations Framework Convention on Climate Change (FCCC). Since then, several countries, including the US and the Netherlands in 1993, and Canada, Australia, and Costa Rica in 1994, have established national JI initiatives. On the international level, the concepts articulated in the development of the national programs have been debated at the meetings of the Intergovernmental Negotiating Committee and the first Conference of Parties and in conferences and workshops around the world. (Table A-1 in Appendix A highlights some of the key events in the evolution of JI.)

In the future, these programs could serve as guides to the development of other national programs, for example in Russia, and will help focus the discussion in international fora such as at the Conference of Parties. Eventually, this discussion should lead to a JI regime in which both the transfer of funds and the sharing of greenhouse gas (GHG) credits are established, although the sharing of GHG credits is not a requirement for the voluntary JI pilot project phase that was initiated at the Berlin Conference of Parties in March 1995.

The purpose of this paper is to assess the roles of existing and new institutions for the establishment of a JI regime which would include the sharing of GHG credits. In addition, we point out the roles of institutions prior to the sharing of GHG credits and the eventual evolution of these institutions towards a mature JI regime. As the JI institutional regime evolves (Figure 1), a GHG crediting system would play a key role in integrating the JI institutions into a mature JI institutional regime, unlocking the full potential of JI projects.

Before discussing the institutional aspects of a JI regime, however, we will lay down some background on JI. Although the FCCC mentions JI as an allowable greenhouse gas (GHG) mitigation method, it does not specifically define JI. (Table B-1 in Appendix B contains all of the references to JI in the FCCC.) Based on these references, many authors have attempted to define JI, sparking much contention in the process. The definition of JI that we will use in this paper is from Mintzer (1994):

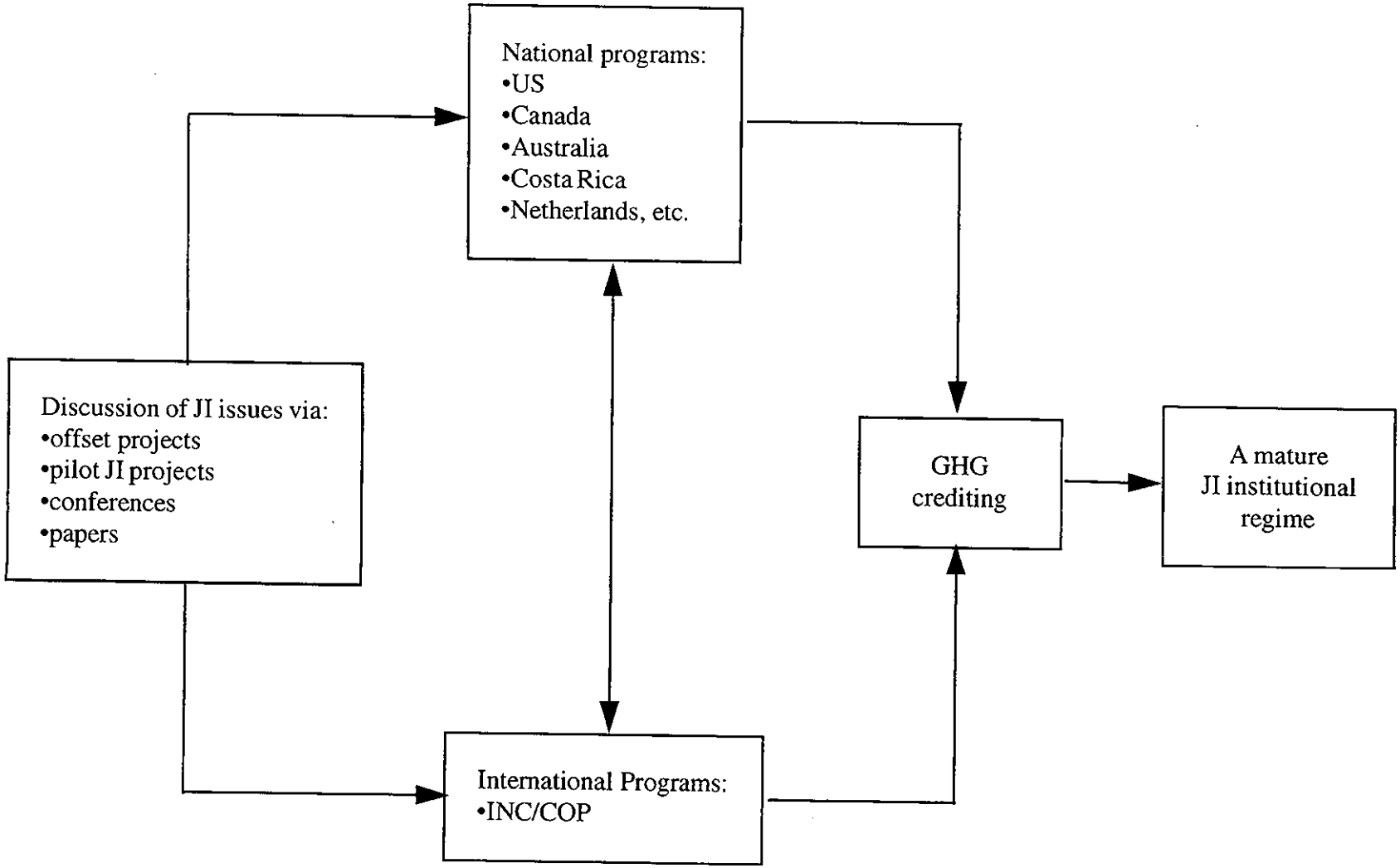
> Joint Implementation refers to the process by which the government of one country or a private enterprise in such a country invests in measures, projects, or programs in another country in order to facilitate and support efforts to reduce GHG emissions or enhance GHG sinks in the receiving country. In recognition of this contribution, the government of the investing country (or the home country of the enterprise supplying the assets to the project) receives credit for a fraction of the emissions reductions achieved in the host country. This credit applies against the obligations for emissions reductions that would otherwise fall upon the investing country under the terms of the Climate Convention. The vehicle for managing the transfer of capital or technology and accounting for the credit may be either a multilateral entity or a bilateral agreement between the parties.[1]

This definition of JI is more specific than the references to JI in the FCCC, but it still leaves the field wide-open. Potential criteria for determining what, in fact, a JI project is have been hotly debated. Four examples of criteria for JI projects are:

- the criteria from the JI Groundrules for the US Initiative on JI,[2]
- the criteria from the Australian Pilot Phase JI Program,[3]
- the draft criteria suggested by the UN Interim Secretariat of the Intergovernmental Negotiating Committee,[4] and
- the draft criteria from the Canadian JI Pilot Initiative.[5]

These four sets of criteria are available in Appendix C.

Figure 1: The Evolution of an Effective JI Institutional Regime



The key aspects of these criteria are that:

- a JI project "must be undertaken or accepted by the Governments concerned;"[6]
- it "should bring about real and measurable results, determined against reasonable baselines;"[7]
- it must contain "adequate provisions for external verification of the greenhouse gas emissions reduced or sequestered by the project;"[8]
- and the benefits from the project "may be shared between the Parties involved."[9]

Although there has been much debate about JI criteria, little has been written on the institutional needs of JI projects. Wexler et al. (1994) is one paper that discusses the institutional needs in depth.[10] Wexler et al. discuss the wide range of theoretically possible institutional regimes for JI projects. They organize their discussion around some of the tasks of a JI project and evaluate the possible institutions by how well they promote easy entry into the JI marketplace; minimize transaction costs; facilitate the employment of environmentally-sound technology; ensure confidence among participants through the fulfillment of financial obligations and achievement of project goals; and ensure credibility in the international arena through effective monitoring and verification.[11]

Although Wexler et al. are quite thorough in their analysis, their discussion of institutions remains theoretical. Our paper moves beyond theoretical discussions to practical considerations of what institutions actually exist in host and investor countries, what JI tasks they are capable of fulfilling, and how these institutions can be adapted or other institutions created in order to fill the gaps for a feasible, reliable, and flexible JI institutional regime, using the word "institutions" loosely to mean international, governmental, non-governmental, and private institutions as well as the JI project parties themselves.

1.1. Typical Tasks in a JI Project

Like Wexler et al., we focus our discussion by analyzing JI projects by task. JI can encompass a wide range of projects involving forestry, energy demand and supply, agriculture, methane recovery, transportation, etc.. But it is possible to write about "a typical JI project" because all of these projects involve some or all of the following tasks listed in Table 1.

Table 1: Typical Tasks in a JI Project

Developing the project	• Bringing together the project investors and hosts; • Preparing the pre-feasibility and/or feasibility study; • Estimating the GHG reduction; • Accepting the project; and • Negotiating the contracts.
Managing the project	• Training project staff in various aspects of the project; • Implementing the project; • Managing the project finances; and • Preparing the reports.
Assessing the project	• Monitoring and evaluating the project; • Calculating the GHG reduction; and • Verifying the GHG reduction.

Of these tasks, four are unique to JI projects or have additional institutional needs compared to traditional development projects (in chronological order):

- estimating the GHG reduction;
- accepting the project;
- calculating the GHG reduction; and
- verifying the GHG reduction.

From an institutional perspective, these tasks fall into two categories: acceptance and assessment, since accepting the project is mainly the function of a national government, but estimating, calculating, and verifying the GHG reduction mainly involves technical institutions. Thus, we will discuss these two categories separately, addressing for each the related criteria, the pilot JI projects' experiences, and the host country perspectives.

1.2. Information and Data Sources

This paper was written in collaboration with seven energy and forestry experts from China, Egypt, India, Mexico, and Thailand. These seven authors surveyed the JI situation in their countries and wrote country-specific papers on the existing institutions and the institutions which would need to

be created in their countries to implement JI projects. These papers are available in " Perspectives on the Institutional Needs of Joint Implementation Projects for China, Egypt, India, Mexico, and Thailand," which is being published separately as a Lawrence Berkeley National Laboratory report. In this paper, we cite these works to describe the situation regarding JI in their countries.

The views expressed in this report are those of the authors, based on the information they gathered from various ministries and other institutions in each country. The authors have participated in national and international JI workshops and conferences and discussed JI with representatives from the ministries of environment, forests, and energy in their countries. Nevertheless, the views expressed cannot represent a consensus, since a common voice on JI has not emerged within each country or across countries.

In addition, we base our analysis on summaries of ongoing pilot JI projects. We consider a project a pilot JI project if it involves the reduction or sequestration of one or more GHGs, if part of its development included considerations of potential JI criteria, and if the project managers consider it to be a pilot JI project. A list of twenty-nine pilot JI projects which involve US institutions is available in Appendix D. (For simplicity, in this paper we use the word "project" to refer to both actual projects and project proposals.)

Of these twenty-nine pilot JI projects, we chose ten to summarize and analyze in this paper, based on the availability of detailed project information and the appropriateness of the project as a model for future JI projects. Table 2 describes these projects and lists the major host and investor country participants. (One-page summaries of the projects are available in Appendix E.) We will discuss the institutions involved in these ten pilot JI projects in more detail in the following sections on "Accepting the Project" and "Assessing the GHG Reduction."

Table 2: Major Host and Investor Country Actors for the Ten Pilot JI Projects

	Name	Project Type	Major Host and Investor Country Actors
Projects:	The High Efficiency Lighting Pilot Project in Mexico (ILUMEX)	Demand-side management	Federal Electricity Commission (CFE) (Mexico) *Global Environment Facility (International) *Kingdom of Norway
	The Bynov Heating Plant Project in the Czech Republic	Fuel switching and efficiency improvements	Bynov Heating Plant in Decin (the Czech Republic) *City of Decin (the Czech Republic) *Wisconsin Electric Power Company (US) *Commonwealth Edison (US) *Northern Indiana Public Service Company (US) Center for Clean Air Policy (US)
	The EPA-led Russia-US Forestry and Climate Change Project -- Saratov Afforestation Project (RUSAFOR-SAP)	Afforestation and reforestation	Russian Federal Forest Service International Forestry Institutes in Moscow and Volgograd (Russia) Saratov Forest Management District (Russia) Russian Ministry of Ecology Institute for Market Economy (Russia) *US Environmental Protection Agency *Environmental Defense Fund (US) Oregon State University (US)
	The NEES/Innoprise Reduced Impact Logging Project in Malaysia	Forestry management practices	Rakyat Berjaya SND. BHD. (Malaysia) *New England Power Company (US)
	The CARE/AES Guatemala Agroforestry Project	Afforestation and forest conservation	*Guatemalan Directorate General of Forests *US Peace Corps *AES Thames (US) *CARE (US) *US Agency for International Development
	The Mbaracayu Conservation Project in Paraguay	Forest conservation	Moises Bertoni Foundation (Paraguay) *AES Barbers Point (US) *The Nature Conservancy (US) *US Agency for International Development
	The OXFAM American Amazon Project	Forest conservation	Coordinating Body of Indigenous Peoples Organization of the Amazon Basin (nine South American countries) *AES Shady Point (US) *OXFAM (US)

Project Proposals:	The San Lorenzo Watershed Protection Project in Costa Rica	Watershed protection and afforestation	*Consorcio Nacional de Empresas de Electrificacion de Costa Rica (CONELECTRICAS) (Costa Rica) *National Rural Electric Cooperative Association (NRECA) (US)
	The Biomass Cogeneration Project in India	Fuel switching and cogeneration	Six sugar mills in three states in India *Tata Energy Research Institute (India) Econergy International Corporation (US) *Lockheed Environmental Systems and Technologies Co. (US) *Duke Engineering and Services, Inc. (US) *Niagara Mohawk Power Corporation (US) *TransAlta Utilities Corporation (Canada)
	The Wood Energy Crops and Other Biomass to Electricity Project in Armenia	Fuel switching	Ministry of Energy and Fuel (Armenia) *Armenian Engineers and Scientists of America, Inc. (US) *Martin Marietta Energy Systems, Inc. (US) *Joint Institute for Energy and Environment (US) *US Agency for International Development *International Applied Engineering, Inc. (US)

*Project investors.

2. ACCEPTING THE PROJECT

2.1. Introduction

There seems to be little debate about the criteria for the acceptance of JI projects. All four sets of criteria, i.e., the Intergovernmental Negotiating Committee, the US Initiative on JI, the Canadian JI Pilot Initiative, and the Australian Pilot Phase JI Program's criteria, specifically state that a JI project must be accepted by the host country's government.

However, there is much debate about what "accepted" actually means, particularly since, according to our definition, in a JI project "the government of the investing country ... receives credit for a fraction of the emissions reductions achieved in the host country."[12] Most of this debate about acceptance revolves around three main questions:

- Who is authorized to accept the project?
- What procedures are necessary for the project to be accepted?
- What criteria determine whether the project is accepted?

We will address the first two questions together and then the third, based on the pilot JI projects' experiences and the host country perspectives.

2.2. Institutions and Procedures for Acceptance

The descriptions of the US Initiative on JI, the Canadian JI Pilot Initiative, and the Australian Pilot Phase JI Program all specify who is authorized to accept JI projects and they give some details about the necessary procedure. For example, the US Initiative on JI's Evaluation Panel is made up of eight members from the Environmental Protection Agency, the Agency for International Development, and the Departments of Energy, Agriculture, Commerce, State, the Interior, and the Treasury.[13] This Evaluation Panel is responsible for:

- "advising and assisting prospective US and foreign participants on the technical parameters (including with respect to baselines, measuring and tracking) of projects submitted for inclusion in the USIJI;
- accepting project submissions from eligible US participants and their foreign partners;
- reviewing and evaluating project submissions, including baseline projects;
- approving or rejecting project submissions for inclusion in the USIJI, based on criteria contained in Section V;
- providing written reasons for its decisions; ...
- certifying emissions reduced or sequestered estimated to result from projects;
- developing operational modalities for the implementation of the Program; and
- preparing an annual report of its activities, including a summary of approved projects."[14]

2.2.1. Pilot JI Projects' Experiences

In countries without JI programs, however, it is not always clear who is authorized to accept projects and via what procedure. For example, the Bynov Heating Plant Project in the Czech Republic has an "official" governmental acceptance letter which includes a GHG reduction crediting agreement. According to Janet Gille at the Center for Clean Air Policy, the three US utilities that are each contributing $200,000 (about 40 percent the project funding) to the Bynov Heating Plant Project have a letter of agreement signed by the Mayor of Decin stating that they "get 40 percent of the carbon reduction credits ... and that the credits would last for 20 years."[15] However, the project also has another "official" governmental acceptance letter from the Czech government which does not include a GHG crediting agreement.

This apparent contradiction occurs because the Municipal Government of the City of Decin is one of the project participants and thus, the crediting agreement with the Mayor of

Decin is essentially an agreement between the project parties. But, so far, the project does not have a federal-level GHG crediting agreement, because there is no bilateral JI agreement between the US and the Czech Republic. However, the project developers believe that when a bilateral JI agreement is negotiated, it will be fairly easy for the project parties to get a federal-level GHG crediting agreement because they already have the project-party crediting agreement.[16] Thus, for this and other projects, the host country's acceptance involves both the question of who is authorized to accept a project, including the GHG crediting agreement, as well as the question of what acceptance procedures are necessary.

2.2.2. Host Country Perspectives

Since none of the collaborating authors' countries currently have a mechanism for accepting JI projects, we asked the seven collaborating authors to speculate about possible acceptance panels and procedures in their countries. De Buen and Masera (1995) envision an acceptance procedure for Mexico with several steps. First, the project parties would prepare a preliminary agreement which would contain an analysis of the technical and economic feasibility of the project, an estimation of the GHG reduction, a description of the monitoring methodology which will be used to calculate the GHG reduction, and a description of the GHG allocation of credits. This preliminary agreement need not contain a firm commitment.

The project parties would present a formal request that includes the preliminary agreement to a government panel composed of members from the foreign affairs ministry, the energy ministry, and the environmental protection ministry. This government panel would analyze the request, considering criteria such as the feasibility of the project, the size of the project, and the commitment of national emission credits. If the project is accepted, it would be registered within the host country as an official JI project.

Zhou and Li (1995) present a rather different acceptance procedure for JI projects in China. They do not believe that any JI project could occur between Chinese and foreign parties without the involvement of the Chinese government. In fact, they believe that the

Chinese government, either central or local, will become one of the parties for all the JI projects in China. In this context, they propose the following acceptance procedure.

First, the Chinese government and the investor country government(s) or international organizations would reach a bilateral or multilateral agreement on criteria which would determine the scope of the technical or financial support from the non-Chinese investors. Then the Chinese government would collect JI project proposals from different sectors, including projects prepared by foreign parties. These project proposals would be evaluated for whether they fit the agreed upon criteria, whether they were consistent with the national goal of sustainable development, and whether they were consistent with the Chinese government's Agenda 21, which contains a list of top investment priorities for future environmental and economic development. The selected project proposals would next be formally approved by a government agency authorized by the State Council, such as the State Planning Commission, the State Economic and Trade Commission, the State Science and Technology Commission, or the National Environmental Protection Agency. Then the project proposals would be forwarded to the non-Chinese investors for discussion.

Currently, no government agency has been assigned the responsibility for evaluating and accepting JI projects in China, but Zhou and Li believe that the State Planning Commission would be the best organization for this, since it is a high-level decision-making agency under the State Council which is in charge of policy aggregation for social and economic development.

Ravindranath (1995) suggests that in India the local benefits must be the driving force for JI projects. Thus, the projects must be conceived and proposed by local communities, non-governmental organizations, educational institutions, and entrepreneurs. He believes that the Ministry of the Environment and Forests should create a committee of climate change experts, economists, representatives from non-governmental organizations, and representatives from the Ministry. This committee should assist local organizations in preparing acceptable JI projects. He also suggests that this committee's work might be easier if a UN agency like

UNEP prepared an extensive list of 20 - 30 projects that are generally acceptable. The committee could then screen the UNEP list, adding or deleting projects. As a result, each potential host country could have a list of acceptable JI projects which potential investors could pick from.

Gelil (1995) does not describe an acceptance procedure for Egypt, but he does suggest that three governmental agencies -- the Egyptian Environmental Affairs Agency, the Organization for Energy Conservation and Planning, and the Egyptian New and Renewable Energy Authority -- are capable of assessing the compatibility of potential JI projects with national priorities.

2.3. Criteria for Acceptance

Because there are already a number of papers published which recommend criteria for the acceptance of JI projects, we do not feel that it is necessary to make recommendations on criteria. However, we will discuss briefly two eligibility restrictions which the official criteria from the US and Australia and the proposed criteria from the UN and Canada mention:

- the project funding sources must be additional to traditional development project funding sources, and
- the project must be consistent with the host country's national priorities.

2.3.1. Pilot JI Projects' Experiences

The intent of the first eligibility restriction is that the funding for JI projects should not come from traditional development projects packaged under a new name, i.e., the funding for JI projects should come from new sources. On the whole, the ten pilot JI projects we studied did have some funding from new sources which might not be available to traditional development projects. However, it is not clear that all of the funding for the projects came

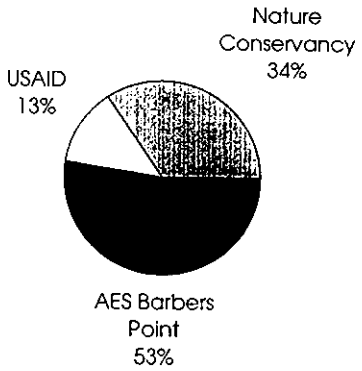
from sources motivated by JI. Figure 2 demonstrates the proportions of funds from different investors for four projects.

The most traditional funding sources are those for the High Efficiency Lighting Pilot Project in Mexico (ILUMEX), since the funding was provided through a grant from the Global Environment Facility for $10.0 million to the Mexican Federal Electricity Commission (CFE), a World Bank loan to CFE for $10.0 million, and a grant from Norway to CFE for $3.0 million. It seems unlikely that most host countries would consider this funding "additional." However, ILUMEX does not have to prove "additionality," because it was not initiated as a JI pilot project. Instead, it was initiated as a GHG offset project, with the primary goal of demonstrating "the technical and financial feasibility of reducing emissions of GHG ... through the widespread installation of high efficiency lighting."[17]

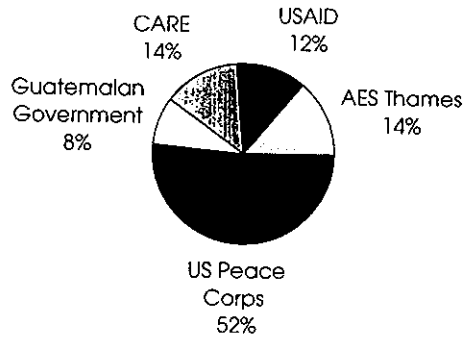
On the other hand, the "additionality" of the funding for the CARE/AES Guatemala Agroforestry Project is open to interpretation. Of the project's $14.5 million in both cash costs and in-kind contributions, the US Peace Corps contributed 52 percent (in labor value of the volunteers), CARE contributed 14 percent, the US utility, Applied Energy Services, Thames, contributed 14 percent, US Agency for International Development contributed 12 percent (in food aid), and the Guatemala government contributed 8 percent (in forest extension agents and seeds).[18] So, 64 percent of the project is funded by investor country government funds, 28 percent comes from private sector funds, and 8 percent comes from host country governmental funds.

Figure 2: Diversity of Funders for Pilot JI Projects

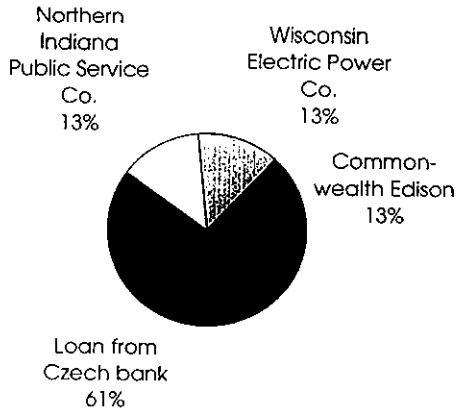
The Mbaracayu Conservation Project in Paraguay: $3.8 million



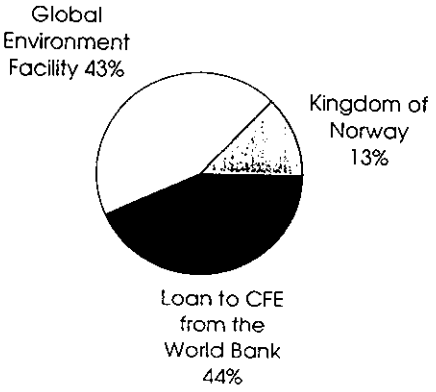
The CARE Guatemala Agroforestry Project: $14.5 million



The Bynov Heating Plant Project in the Czech Republic: $1.5 million



The High Efficiency Lighting Pilot Project in Mexico: $23.0 million



Because Guatemala does not yet have a set of acceptance criteria, it is unclear what definition of "additionality," including what definition of "traditional funding," they would adopt. The US Initiative on JI's criteria implicitly define a project with "additional funding" as one that "if federally funded, is or will be undertaken with funds in excess of those available for such activities in fiscal year 1993."[19] Canada's draft criteria for the JI Pilot Initiative suggest that projects be "in response to, or in reasonable anticipation of, the Joint Implementation Pilot Initiative,"[20] and Australia's Pilot Phase JI Program requires that "funding for projects should be additional to Overseas Development Assistance."[21] Thus it is not immediately clear, according to these criteria, what percentage of the funding for the CARE/AES Guatemala Agroforestry Project would be considered "additional." This issue of certain percentages of a project's funding being "additional" will be discussed further in the "Assessing the GHG Reduction" section.

2.3.2. Host Country Perspectives

When we asked the seven collaborating authors to describe projects that they thought their countries would be particularly likely to accept or refuse, they tended to emphasize the second eligibility restriction, i.e., that the project must be consistent with the host country's national priorities. Their views are based on their knowledge of host country institutions and the information they gathered from conversations with relevant governmental agencies.

Gelil (1995) believes that the government of Egypt would likely favor any JI projects that promote the use of natural gas in all sectors, since these would mesh with the national energy policy to use the recently developed gas reserves to replace petroleum products in domestic consumption. In addition, because Egypt's fossil fuel and hydropower resources are extremely limited, the government would favor energy conservation, energy efficiency, and renewable energy JI projects.

Ravindranath (1995) speculates that due to growing shortages in forest products and energy, the Indian government would actively support JI projects aimed at augmenting the energy supply and biomass production, such as solar, wind, and biomass renewable energy projects and afforestation or tree plantation projects.

Zhou and Li (1995) believe that the Chinese government will prefer JI projects which are of high priority for economic development, but which have had difficulty finding funding from domestic and/or foreign sources. They also believe that, in the short term, many energy-efficiency retrofitting projects will be suggested for JI, such as industrial boiler renovations; high-efficiency industrial boiler manufacturing; cement production process improvements; steel production renovations; and small-scale ammonia plant renovations.

Intarapravich (1995) speculates that the Thai government's main criteria for accepting a JI project is likely to be whether the project conforms to the country's development priorities. Also, she believes that the government would prefer JI projects that do not incur costs to the government and do not require obligations beyond those that Thailand has committed to under the Framework Convention on Climate Change. As a specific example of JI projects that are likely to be acceptable, she suggests reforestation projects, particularly in degraded conservation forest areas.

2.4. Conclusions

JI acceptance panels, which set procedural rules and criteria for the acceptance of JI projects, have been established in four developed countries. The procedural rules for accepting JI projects are different in each country based on its socioeconomic and political structure. Similar panels should be formed in other investor and host countries. Our collaborating authors suggest that panels in their countries should represent the interests of the ministries of environment, energy, forests, and foreign affairs. The panels can consist of a single official or several from the relevant ministries. The panels' most critical function will be to negotiate GHG sharing agreements with other countries. It is thus essential that the panel have the

commensurate authority, which has thus far been lacking in officials claiming to negotiate carbon sharing on the behalf of the country's government. While each country's acceptance criteria will be different, from a developing country perspective, the most important criteria is that the JI project be consistent with the country's national development goals, priorities, and plans.

3. ASSESSING THE GHG REDUCTION

3.1. Introduction

Assessing the GHG reduction is one of the most difficult aspects of JI projects. The official criteria from the US and Australia and the proposed criteria from the UN and Canada suggest that JI projects should:

- be "in response to, or in reasonable anticipation of, the Joint Implementation [Initiative];"[22]
- "bring about real and measurable results;"[23]
- provide "data and methodological information sufficient to establish a baseline of current and future greenhouse gas emissions: a) in the absence of the [JI project]; and b) as the result of the [JI project];"[24] and,
- contain "adequate provisions for external verification of the greenhouse gas emissions reduced or sequestered by the project."[25]

These are no small set of demands. We classify these criteria as three separate tasks of JI project assessment:

- estimating the GHG reduction,
- calculating the GHG reduction, and
- verifying the GHG reduction.

(For simplicity, we use the phrase "GHG reduction" to mean "GHG reduction or carbon sequestration.")

The task of estimating the GHG reduction occurs during the project preparation stage. It is a necessary step in order to attract potential investors and gain the approval of the relevant acceptance panels. The task of calculating the GHG reduction occurs during or after project

implementation. It is a part of monitoring the progress of project implementation. Its objective is to calculate the GHG reduction of the project and to quantify the number of GHG credits, if any, that should be transferred between the host and investor countries. The third task, verifying the GHG reduction, may occur once or several times during and after the project implementation. Its objective is to establish whether the calculated GHG reduction actually occurred. Although we differentiate these three different tasks based on their objectives, timing, and, as will be discussed below, required reliability, we discuss all three tasks in this single assessment section because of the potential overlap and interactions between the institutions which might perform these tasks.

In this section, we will briefly discuss some of the potential types of institutions to perform these tasks and some of the issues surrounding these tasks, including reliability, baselines, additionality, and leakages. Then, we will discuss some pilot JI project experiences and host country perspectives. Finally, in the last section we will discuss possible assessment institutions or teams, which include project-level teams, technical consultants, verification teams, and an international JI Secretariat.

3.1.1. Estimating the GHG Reduction

The reliability of a GHG estimation will be important to both the potential investors and the government panels which will accept a project. Under a GHG crediting system, a JI project's estimate of the GHG reduction will be a key determinant of whether investors will be willing to invest in the project, since the investors will be attempting to buy GHG credits at the lowest feasible cost per unit of GHG reduction. But even if, as is currently the case, there is no GHG crediting system, investors will still tend to favor projects with lower unit costs in order to get the most out of their investment. Thus, the investors will need reliable GHG reduction estimates in order to choose between potential projects.

Likewise, a host country acceptance panel needs reliable GHG reduction estimates in order to match JI projects with its national priorities. For instance, a host country acceptance

panel might only be willing to accept a JI project with a per unit cost below a certain threshold. Or, a host country acceptance panel might be willing to divide the GHG reduction credits from a project equally with the investor country if the GHG reduction is estimated at 500,000 tons of carbon, but if the final GHG reduction calculation shows that the carbon reduction was actually 1,000,000 tons of carbon, the host country acceptance panel might be reluctant to follow through with sharing the credits equally. Thus the reliability of the estimation is key to both the potential investors and the host acceptance panels.

3.1.2. Calculating the GHG Reduction

Although the required reliability of the estimate is a matter for negotiation between the investor and host country project parties and acceptance panels, we feel that the required reliability of the calculation should be substantiated by the verification team and not be up for negotiation. Thus, it is likely that the calculation methodologies for most projects will be significantly more complex than the estimation methodologies.

Most of the complexities in the calculation result from the problems involved in establishing baselines, including proving additionality and tracking leakages. According to the criteria from the US Initiative on JI, the project calculations should establish baselines of current and future GHG emissions in the absence of and as a result of the JI project.[26] Often, with the right equipment and methodologies, it is feasible to measure the current GHG emissions at a project site. However, predicting the future emissions, and especially, determining what the emissions at the project site might have been if the project had not been implemented is not so straightforward.

Leakages add another complication to establishing baselines. A leakage occurs when the GHG reduction at the project site results in an increase in GHG emissions elsewhere. For example, if a part of a forest is protected from encroachment by villagers searching for firewood, those villagers may in turn gather firewood more extensively from a nearby unprotected part of the forest. Thus the pressure on the forest might be merely shifted rather

than relieved. However, such leakages can be quite difficult to track if they involve a vast area or are the result of unexpected consequences from the JI project, unless there are both project-specific and national baselines.

In addition, some projects may involve international leakages. For instance, in 1989 when all commercial logging in Thailand was banned, the logging shifted to neighboring countries such as Burma, Laos, and Cambodia, as well as to Brazil. Thus, leakage boundaries might need to contain not only the local area, but neighboring countries or even the entire source (in this case, the supply of logs). But obviously leakages in such a vast area would be very hard to track and enforce. So international agreements, which include international baselines, may be necessary to prevent large-scale leakages.

Additionality can also complicate baselines. As mentioned above, Canada's draft criteria for the JI Pilot Initiative suggest that projects be "in response to, or in reasonable anticipation of, the Joint Implementation Pilot Initiative,"[27] and Australia's Pilot Phase JI Program requires that "funding for projects should be additional to Overseas Development Assistance."[28] However, satisfying the additionality criteria requires determining whether the project would have been funded even if it were unrelated to JI. For projects developed before the negotiations of the Framework Convention on Climate Change, the additionality criteria is straight-forward, but for projects currently being developed, additionality may be harder to prove. And yet, without additionality, JI runs the risk of merely draining potential development aid from other non-JI projects, rather than providing a new source of funding for GHG mitigation projects.

3.1.3. Verifying the GHG Reduction

Because of the complexities in establishing the baselines in order to perform the GHG reduction calculation, it is not surprising that both the US Initiative on JI's criteria and Canada's JI Pilot Initiative's draft criteria require "adequate provisions" for the verification of the GHG reduction.[29] If the host country acceptance panel has not agreed to share a JI

project's GHG reduction credits with the investor country, verifying whether the GHG reduction actually occurred is mainly useful for evaluating the projects, in particular to determine the most cost-effective means of mitigating GHGs and for internal record-keeping within the investor and host countries.

But if a host country acceptance panel has, in fact, agreed to share part of the GHG reduction credits with an investor country, then reliable verification is key to having a credible JI regime. The investor countries have an incentive to inflate the GHG reduction calculations to show a higher return on their investment. And host countries have an incentive to inflate the GHG reduction calculations for current projects as a way of attracting future JI projects. But since inflated GHG reduction calculations will hurt the credibility of all JI projects, effective verification is essential for a credible JI regime.

3.2. Pilot JI Projects' Experiences

3.2.1. Estimating the GHG Reduction

There is a trade-off between cheap estimates and reliable estimates. For instance, in order to keep the estimation cost down, some of the projects we did not include in this study choose to use a simple estimation formula, such as a single tree sequesters 14 pounds of carbon per year. Therefore, if 250,000 trees are planted and the project lasts 20 years, the sequestration estimate is 34,400 tons of carbon.[30] A similar formula could be developed for nearly all JI projects, be they in energy efficiency, transportation, forestry, or other sectors.

This sort of formulaic estimation is low-cost and requires little site-specific analysis, and it is likely that all JI projects will have participants with enough expertise to perform this sort of estimation. However, potential investors and many host country JI project acceptance panels probably will not accept such a simplistic and inaccurate estimation approach. The pilot JI projects we chose to study used moderately to fairly complex GHG reduction estimation methodologies. Table 3 presents the GHG reduction estimates as provided by the pilot JI

project materials. (Because these GHG reduction estimates provided by the project developers have not been independently verified, the estimates of the cost per ton of carbon reduced might not be comparable between projects).

Table 3: Project Estimates of the GHG Reductions

Project	*Total Cost of Project	*Estimated Tons of Carbon Reduced	*Cost per Estimated Ton of Carbon Reduced	Our Assessment of the Estimation Methodology
The High Efficiency Lighting Pilot Project in Mexico (ILUMEX)[31]	$23,000,000	192,000	$120	fairly complex
The Bynov Heating Plant Project in the Czech Republic[32]	$1,500,000	69,800	$22	fairly complex
The NEES/Innoprise Reduced Impact Logging Project in Malaysia[33]	$650,000	55,000 - 80,000	$8 - 12	fairly complex
The San Lorenzo Watershed Protection Project in Costa Rica[34]	$4,200,000	650,000	$6.50	less complex
The Wood Energy Crops and Other Biomass to Electricity Project in Armenia[35]	$1,600,000 (attributable to JI)	510,000 (attributable to JI)	$3.00	less complex
The CARE/AES Guatemala Agroforestry Project[36]	$14,500,000	16,000,000	$0.90	fairly complex
The Mbaracayu Conservation Project in Paraguay[37]	$3,800,000	16,000,000	$0.24	less complex
The OXFAM American Amazon Project[38]	$3,400,000	70,000,000	$0.05	less complex
The EPA-led Russia-US Forestry and Climate Change Project -- Saratov Afforestation Project (RUSAFOR-SAP)	n.a.	n.a.	n.a.	fairly complex
The Biomass Cogeneration Project in India	n.a.	n.a.	n.a.	n.a.

n.a. = not available.

* As reported by the project developers as of August 1994.

However, because projects without secure funding may be cautious about spending heavily on the estimation without the guarantee of a pay-off in project funding, many projects may use an iterative estimation approach. For example, in the initial phase of what became the CARE/AES Guatemala Agroforestry Project, the CARE proposal was one of eight that the World Resources Institute (WRI) panel reviewed for AES. This original CARE proposal contained a moderately complicated carbon reduction estimate based on site-specific assumptions about trees planted; tree survival rates; stemwood, branch, and root growth rates; projected fire protection; carbon content of wood; organic content of soils, etc. The CARE project-level team performed this estimation and the WRI review panel selected the proposal using CARE's carbon estimates. Then, after a site visit, WRI, acting as technical consultants, helped CARE to revise the carbon estimate using modified parameter estimates,[39] and once funding was secure, WRI and CARE continued to refine the modeling methodology and input parameters in order to improve the earlier estimates.[40]

On the other hand, the High Efficiency Lighting Pilot Project in Mexico (ILUMEX) project, which had fairly secure funding, used a complex estimation methodology and outside technical consultants from the start.[41] The goal of the project is to support the replacement of approximately 1.7 million incandescent light bulbs with compact fluorescent light bulbs (CFLs) in the cities of Guadalajara and Monterey, Mexico. The fluorescent light bulbs will be produced according to specifications designed for these two cities. The major host country actor is the Federal Electricity Commission (CFE) and the major investor country actors are the Global Environment Facility, the World Bank, and the Kingdom of Norway.

In order to estimate the GHG reduction, the CFE project-level team relied on three teams of outside technical consultants: UITESA of Spain performed an air quality study and the International Institute for Energy Conservation and Lawrence Berkeley National Laboratory estimated the GHG emissions for the feasibility study.[42] Based on these figures, CFE simulated the operation of their power plants and estimated that the annual carbon reduction due to the ILUMEX project would be 32,000 tons of carbon.[43]

3.2.2. Calculating the GHG Reduction

However, compared to the complexity of the estimation, the GHG reduction calculations for ILUMEX will be substantially more complex and require additional technical consultants. According to De Buen (1995), who has been an active participant in the ILUMEX project since its inception, in order to perform the calculation, the carbon reduction calculation team will need additional data on:

- the sales of the CFLs;
- the wattage of the lamps replaced and installed;
- the energy consumption of the customers that use the CFLs;
- the time of use of the energy-efficient lamps; and
- the power mix at the site and at the time of use.

In order to gather these data, the project-level team and the technical consultants will perform:

- a baseline sales survey;
- two surveys on sales of lamps;
- two surveys on participant satisfaction;
- two surveys on hours of use;
- a mid-term project implementation review;
- an end of project review; and
- a final project evaluation of participants' satisfaction with the CFLs.

One saving in the calculation cost and complexity is that ILUMEX does not have to prove additionality, because it was not initiated as a JI project.

However, the project participants of the Wood Energy Crops and Other Biomass to Electricity Project in Armenia call their project a JI project. So, additionality is a concern for them, particularly because:

> the idea for this project emerged with partial consideration of [the US Initiative on Joint Implementation (USIJI)] objectives, but the main objective is the urgent development of domestic energy supply in Armenia. To the extent that USIJI is considered ... the role of energy crops was enhanced. [The project managers'] best judgment is ... that generating capacity (fossil fuel displacement) was increased by about 16 percent.[44]

Thus, in their calculations, the project-level GHG reduction calculation team plans to attribute only 16 percent of the carbon reduction from the project to JI.

However, the Wood Energy Crops and Other Biomass to Electricity project-level team faces additional problems in calculating reliable baselines for the carbon reduction, because currently the three power plants affected by the project are working well under full capacity due to the unavailability of fossil fuels. Therefore, they plan to calculate the full carbon reduction for the project when fossil fuel is in abundant supply, but when fossil fuel is in extremely short supply, they will assume that the biomass only displaces the fossil fuel supplies available.[45] They anticipate that the fossil fuel shortages will only last two years and end before the conversion of the facilities is completed, but if the fossil fuel shortages do in fact continue for longer than two years, their carbon reduction calculations will be greatly complicated, and the project-level team could require additional expertise.

3.2.3. Verifying the GHG Reduction

In order to verify these complicated carbon reduction calculations, the project managers of the Wood Energy Crops and Other Biomass to Electricity Project in Armenia anticipate that:

> an outside team of two people from qualified environmental monitoring backgrounds will annually visit Armenia to inspect and direct monitoring. A

> decision will be made after three visits as to what type and frequency of verification will be warranted ... The project manager and technical contact will see to this certification and make sure it is acceptable to the US Initiative on Joint Implementation.[46]

Although these project managers specifically state that the verification team must be an "outside team," the NEES/Innoprise Reduced Impact Logging Project in Malaysia does not require such independence. According to Tom Sullivan, a system forester at New England Power Service who is involved in the project, verification of the project will come from two sources: peer review of the articles published about the project and the Environmental Audit Committee.[47]

The Environmental Audit Committee is "comprised of three organizations/individuals. The Rainforest Alliance is the auditor chosen by the New England Power Company, the Forest Research Institute of Malaysia was chosen by Rakyat Berjaya SND. BHD., and ... a professor at the University of Florida was chosen as the joint auditor." However, the Environmental Audit Committee is not entirely independent of the project assessment process, because the members of the committee from the Forest Research Institute of Malaysia and the University of Florida will also be involved in the GHG reduction calculation.[48]

However, the US Initiative on JI's criteria require "adequate provisions for external verification" of the GHG reduction,[49] and, likewise, the Canadian JI Pilot Initiative's draft criteria require "third-party verification."[50] (Neither the Intergovernmental Negotiating Committee draft criteria or the Australian Pilot Phase JI Program criteria mention verification of the GHG reduction.) Thus, under the first two sets of criteria, the Wood Energy Crops and Other Biomass to Electricity Project in Armenia's verification team would qualify, but the NEES/Innoprise Reduced Impact Logging Project in Malaysia's verification team would not.

3.3. Host Country Perspectives

As these pilot JI project experiences show, the potential assessment institutions could involve a wide range of participants. Similarly, the collaborating authors' suggestions for GHG reduction estimation and calculation teams cover a wide range of possible institutions from fairly decentralized (the authors from India and Mexico) to quite centralized (the authors from China). However, there is general consensus that, for verification, some sort of UN-related team would be acceptable to most of the countries.

3.3.1. India

Ravindranath (1995) suggests a fairly decentralized assessment system, which involves a project-level team, technical consultants, and a verification team. He proposes that the project-level team be composed of experts from local educational institutions, research institutes, or non-governmental organizations; local beneficiaries of the project, such as village representatives; and one of the technical consultants. This project-level team would:

- conduct regular assessments of the project using the methodology developed by the technical consultants;
- report the assessment findings to the technical consultants; and
- maintain contact with the local people, local government, and local non-governmental organizations.

He proposes that the technical consultants be largely dominated by those who are not involved in implementation: technical experts; members of national and international non-governmental organizations; professional consultants; researchers from universities and research institutes; and representatives of the major host and investor country actors, with the members of the team jointly selected by the investor country major actors and the host government. These technical consultants would:

- prepare the assessment methodologies for the project-level team;
- train the project-level team in monitoring and evaluation;
- monitor and evaluate the work of the project-level team; and,
- report the findings to the verification team, local government, and UN agencies.

In addition, Ravindranath suggests two options for the verification team: a joint team of experts from the investor and host countries which verifies the GHG reduction for a particular project or a UNDP or UNEP team acceptable to most signatory governments which verifies the GHG reduction for all JI projects worldwide. He recommends the UNEP or UNDP verification team, because he feels that host countries are more likely to be willing to give such a team the power to refuse to certify the exchange of GHG credits if the GHG commitments have not been met. This verification team would:

- set broad guidelines for assessment methodologies;
- perform external reviews of the project's GHG reduction calculations; and
- certify the exchange of GHG credits, if agreed on by the project parties and the host country acceptance team.

Ravindranath emphasizes the importance of preparing and standardizing detailed methodologies, because in India so far, projects have not been seriously assessed for global benefits. No methodology is currently in use and very few people are aware of the Intergovernmental Panel on Climate Change or the Organization for Economic Cooperation and Development's methods. Training is necessary to develop the ability to undertake the local and global assessments of GHG flows. Although there are numerous experts with the technical expertise available within India, they are dispersed throughout different institutions and are not fully engaged in climate change research.

3.3.2. Mexico

De Buen and Masera (1995) agree with Ravindranath's assessment team structure, except that they suggest somewhat different members for the teams. They suggest that private consultants and experts from universities and/or non-governmental organizations should comprise the project-level team. However, they note that long-term monitoring should be performed only by universities, since in the long-run neither the consultants, nor the non-governmental organizations, nor even the government agencies may exist because they are volatile due to economic and political reasons.

For the technical consultants, they suggest the same host country multi-ministry council which they recommended for project acceptance, i.e., a council comprised of representatives from the foreign ministry, the energy ministry, and the ministry in charge of environmental protection. However, they imply a more hands-off approach than Ravindranath suggests in that they see the role of the multi-ministry council as accepting and registering the project; managing the funds for monitoring; periodically assessing project evolution; and analyzing the reports presented by those surveying the evaluation of different types of projects.

For verification, de Buen and Masera believe that the Mexican government would accept any internationally certified external verifying institution, as long as there is an international body that could give that certification. In that context, the verification could be performed by any type of institution, e.g., private consultants, non-governmental organizations, universities, and/or international agencies, except for investor country governmental institutions.

3.3.3. Thailand

Intarapravich (1995) recommends only a single estimation and calculation team, which is essentially a combination of Ravindranath's two teams. For example, she suggests for a forestry project a team composed of representatives from the Royal Forestry Department;

technical experts from academic institutions, such as the Faculty of Forestry at Kasetsart University; and/or representatives from the Office of Environmental Policy and Planning. Also, depending on the project, the investor may want to employ a specialist on the team, and perhaps, for project credibility and acceptability, additional involvement might be necessary either at the national level, such as from the investor's government, or at the international level, such as from a multilateral organization.

For verification, Intarapravich suggests that a team of experts from multilateral organizations under the auspices of the UN would likely be accepted by the Thai government. However, if the JI concept is officially accepted, she notes that a separate institutional structure for external verification may be needed.

3.3.4. Egypt

Like Intarapravich, Gelil (1995) suggests a single team for the estimation and calculation of the GHG reduction. He gives the example of a team for a solar energy project composed of representatives from the project-level team; members from the Organization for Energy Conservation and Planning (a non-governmental organization); and members from the Egyptian New and Renewable Energy Authority and the Egyptian Environmental Affairs Agency (governmental agencies).

Gelil feels that the last three institutions and some others in Egypt are more than capable of assessing JI projects. However, a mechanism needs to be developed to enhance cooperation between these existing institutions in order for them to be able to jointly assess JI projects. Thus, he feels that, while there is no need to create new institutions, there is a definite need to develop an institutional structure among these existing institutions that would allow for the joint assessment of JI projects. Also, he too emphasizes that there is a great need for agreed upon assessment methodologies, particularly for establishing baselines.

He notes that in Egypt, the role currently played by most non-governmental organizations in the development, implementation, and analysis of energy and environmental policies is very limited and that their capacity is very weak. He does say, though, that their role is developing and, in the near future, it is expected to grow and their capacity is expected to improve. So, he speculates that there is potentially nothing to prevent them from participating in a JI project in the future.

Like Intarapravich, Gelil believes that in Egypt external verification would be acceptable if carried out under the flag of the UN. But he believes that involving local experts would enhance the process of external verification, though it is preferable that the local experts be independent of the JI project.

3.3.5. China

Zhou and Li (1995) essentially agree with Intarapravich and Gelil's institutional structure, except they favor a more centralized set of members for the assessment teams. They believe that although China is moving from a central planning system to a market system, the government still plays a key role in economic development. Without support from the government, any important economic activity probably will not progress smoothly in the long-run.

Thus governmental agencies should be selected to take the responsibility for the project assessment. A high-level governmental agency, such as the State Planning Commission, could coordinate the JI activities and be responsible for JI policy. And various lower-level agencies could perform the technical aspects of assessment, including monitoring the short- and long-term results and calculating the emissions of the GHGs. For example, the Energy Research Institute of the State Planning Commission could be responsible for energy-related projects, the Chinese Academy of Agricultural Sciences could oversee agricultural activities, and the Chinese Academy of Environmental Sciences could supervise environmental control projects.

Though these agencies are likely to delegate some assessment functions to other institutions, such as other governmental agencies, research institutes, and universities, Zhou and Li believe that it is unlikely that non-governmental organizations will play much of a role. In fact, only a very few non-governmental organizations currently exist in China. They feel that because JI projects are tied to agreements between governments, non-governmental organizations and private organizations at most can only contribute some technical assistance, rather than play a central role. Also, they believe that the Chinese government would not permit an international organization to play a main role in a domestic activity.

However, Zhou and Li do believe that the Chinese government would have no problem accepting the external verification of JI projects, if the external review were limited in scope. Like the other authors, they also recommend a UN verification agency, and they see the external review program in the ozone-depleting substances phase-out program under the Montreal Protocol as a precedent for the GHG verification program. They emphasize, however, that the verification agency should consist of both international and domestic experts, and that the mechanism and methodology of verification should be discussed and agreed upon by the involved parties and approved by the host country government.

3.4. Conclusions

The review of the pilot project experiences and host country perspectives suggests seven subtasks associated with estimating, calculating, and verifying the GHG reduction. The first four sub-tasks are directly associated with the data and methodologies for the assessment of GHG reduction:

- gathering the project-specific data and information necessary to perform the GHG reduction estimation and calculation;
- developing standard assessment methodologies for JI projects;
- disseminating the standardized assessment methodologies; and

- training interested parties in the use of the standardized assessment methodologies.

The last three sub-tasks deal with the verification task, which will become a crucial element once the sharing of GHG credits is accepted:

- certifying the team performing the GHG reduction verification;
- verifying the GHG calculation, and if necessary, performing an audit; and
- resolving challenges to the GHG reduction verification or referring the project parties to a tribunal;

Which institutions might best perform these tasks? Our review of the pilot JI projects suggests that project developers and project parties, who are most closely associated with the project and thus have access to the data and information, already play the role of providing data and information for their particular project to the acceptance agencies. The GHG estimation and calculation tasks, on the other hand, are being performed by both technical consultants and the project-level team. Currently, there are no standard methodologies for estimating and calculating the projects' GHG reductions, so projects vary in their use of methods. Standardized methodologies are desirable since they would significantly simplify the task of assessing the GHG reduction of a project.

Since the pilot JI projects are just being launched, the verification of projects' GHG reductions is still in the initial stages. Some project developers have created verification teams made up of independent verifiers. Others, however, have included in their verification teams technical consultants who helped in the estimation and calculation of the GHG reduction.

The surveys conducted by our collaborating authors suggest that independent verification teams should be set up. The verification teams could either be composed of members from host and investor countries or be from an international agency such as the UN. For the estimation and calculation tasks, the authors suggested teams made up of technical

consultants, university staff, non-governmental organizations, and members of governmental agencies.

4. INSTITUTIONS FOR IMPLEMENTING JI PROJECTS IN A MATURE JI REGIME

Much of the above discussion of the pilot JI projects and host country perspectives concerns institutions which are developing or need to be developed for an effective JI regime. In this section, drawing on the above assessment, we envision an institutional structure which might function in a mature JI regime. This institutional structure includes host and investor country acceptance panels and a GHG reduction assessment team, which includes a project-level team, technical consultants, a verification team, and an international JI secretariat. Although the acceptance, estimation, and calculation tasks are important in the current pilot JI regime, the verification task is not essential, unless a project includes agreements for GHG crediting. However, eventually, in a mature JI regime, all four tasks will become equally important. The roles for each of the institutions are discussed below.

4.1. The Host and Investor Country Acceptance Panels

The pilot JI projects' experiences demonstrate the confusion that can result from not having an authorized host country acceptance panel. Thus, each individual host country should create a host country governmental panel which accepts all JI projects for the country. The panel could be composed of members of a single existing governmental agency, members from several governmental agencies, or members of governmental, non-governmental, and private institutions. This panel must have the authority to accept JI projects on the behalf of the country's government.

The role of the acceptance panel and the criteria it uses to accept projects need not be the same across countries. Indeed, Zhou and Li's proposed role for an acceptance panel in China is quite different from de Buen and Masera's for Mexico. On the other hand, if each country were to write its own set of criteria, potential investors could face a bewildering array of acceptance regulations. One way to overcome this would be for the Conference of Parties to agree on a uniform set of guidelines that describe a generic acceptance panel that has the

authority to accept JI projects according to clear criteria. Each individual host country could then base their acceptance regulations on the guidelines, and clearly delineate how, if at all, their acceptance panel and criteria differ from the one described in the guidelines.

Investor countries may wish to create acceptance panel for the sake of internal record-keeping. For example, the US Initiative on JI has a mechanism for "accepting project submissions from eligible US participants and their foreign partners," in order to, among other things, "encourage the rapid development and implementation of cooperative, mutually voluntary, cost-effective [JI] projects between US and foreign partners."[51] But we want to emphasize that the acceptance of the host country is essential for the exchange of credits between a host and investor country.

4.2. The Assessment Institutions

As was discussed in the previous section, the reviews of pilot project experiences and host country perspectives propose the following subtasks associated with estimating, calculating, and verifying the GHG reduction:

- gathering the project-specific data and information necessary to perform the GHG reduction estimation and calculation;
- developing standard assessment methodologies for JI projects;
- disseminating the standardized assessment methodologies;
- training interested parties in the use of the standardized assessment methodologies;
- certifying the team performing the GHG reduction verification;
- verifying the GHG calculation, and if necessary, performing an audit; and
- resolving challenges to the GHG reduction verification or referring the project parties to a tribunal.

While there are many ways these tasks could be performed, based on the pilot JI project experiences and the host country perspectives we conclude that an institutional structure similar to the one Ravindranath (1995) suggests would be appropriate for reliable GHG assessment. This institutional structure includes a project-level team, technical consultants, a verification team, and an international JI Secretariat. The project-level team and technical consultants will be intimately involved with the project, and the verification team and international JI Secretariat will be independent of the specific project.

4.2.1. The Project-Level Team

The best candidates for people to gather the project-specific information necessary for the GHG reduction estimation or calculation are the people who are intimately involved in the project. Thus, the members of the project-level team could include project parties involved in the development and/or the day-to-day implementation of the project and any other members agreed on by the project parties, including members from international, governmental, non-governmental, and private institutions.

4.2.2. The Technical Consultants

The analysis of the project-specific information may require a different set of skills than the gathering of the information. In particular, as the examples from the pilot projects show, establishing baselines for a project which accurately account for additionality and leakages can be quite complex, especially if the analysis involves developing new or adapting established assessment methodologies. The major host and investor country project parties might not have the technical expertise necessary to perform the analysis. So the technical consultants should include members of host country and investor country research institutions, governmental agencies, non-governmental organizations, universities, etc. who have the necessary experience and/or technical expertise for the analysis, i.e., "technically proficient analysts."

The distinction between the project-level team and the technical consultants may blur somewhat. Clearly, the authors of the host country perspectives papers recommend that one

or two teams perform the GHG reduction estimation and calculation, depending partly on whether they think the project parties would have the capacity to perform the assessment without the aid of technical consultants. If the project parties do have the needed skills, there seems to be no reason to restrict them to the project-level team. In fact, having members who belong to both teams could help improve communication between the two teams. And it seems likely that the technical consultants would train some of the members of the project-level team in how to use the assessment methodologies.

4.2.3. The Verification Team

The verification team should not have members in common with the project-level team and the technical consultants, since, as discussed above, the key phrase used to describe the verification team seems to be "external" or "third-party." Thus we suggest that the verification team be composed of technically proficient analysts who have not been members of the project-level team or the team of technical consultants.

This verification team could be responsible for reviewing the GHG calculation submitted by the project-level team and the technical consultants, and if necessary, performing an audit. An audit could entail merely a more in-depth review of the calculations or it could involve a site visit. During an audit, the verification team should elicit the help of the project-level team and the technical consultants.

We want to emphasize that it is not the purpose of this verification team to evaluate the acceptability of the project. It is up to the host and investor countries to decide what their definition of a JI project is. Basically, if the project involves a GHG reduction and the two countries accept the project as a JI project, as far as the verification team is concerned, the project is a JI project and should be evaluated as such. The verification team should only be responsible for deciding whether to accept the GHG reduction calculation or not.

Because verification has the potential to be contentious, it should be possible for third parties, as well as the host and investor country parties, to challenge the verification results, in order to encourage watch-dogging between countries. Recourse in the event of disagreement about the results of a verification could include resolution by the initial verification team, introduction of a second verification team, development of new calculation methodologies, or recourse to a tribunal, depending on the project and the nature of the disagreement.

Two ways to reduce some of the potential contention surrounding a verification is for the verification teams to make available the GHG reduction calculation methodologies which they have found convincing, so that other assessment teams can imitate them. Also, instead of an all-or-nothing verification system, verification teams could adopt a multi-tiered approach to GHG crediting similar to the way the US Environmental Protection Agency's (EPA) Acid Rain Program did for SO_2. The EPA's Acid Rain Program was established by Title IV of the Clean Air Act Amendments of 1990. According to the EPA:

> The Acid Rain Program achieves a 50-percent reduction in sulfur dioxide (SO_2) emissions from electric power plants using a flexible, market-based approach to environmental management. As a part of this approach, EPA issues utilities limited authorizations to emit SO_2 in the form of 'allowances,' each of which is equal to one ton of SO_2. At the end of each calendar year, a utility must hold allowances in an amount equal to or greater than its annual SO_2 emissions. To meet this goal, allowances may be bought, sold, or transferred between utilities and other interested parties.[52]

As a part of this program, the EPA established the Conservation and Renewable Energy Reserve. This reserve "is a pool of 300,000 allowances set aside to award to utilities that meet SO_2 standards through efficiency or renewable energy (such as biomass, solar, geothermal, or wind). Reserve allowances can be used for compliance, sold, or banked for future use."[53] Only certain utilities can currently apply for these allowances, and the scope of the program is still fairly small. But the Conservation Reserve verification system is rather ingenious.

The verification system uses credit scaling in order "to make monitoring attractive. By monitoring, a utility can obtain credit for a greater fraction of the [SO_2] savings and for a longer period." In contrast, if a utility calculates the SO_2 savings based on a standard formula or a few site inspections, the allowable savings that the utility can request is much lower. This scaling of allowable savings "reflects decreased certainty that savings persist when they are not monitored by the utility."[54]

This sort of credit scaling could easily be applied to JI projects. For example, if, during the first few years, an afforestation project's GHG reduction calculation team does extensive monitoring of the project, the verification team might accept the calculation team's calculated GHG reduction completely, without auditing. If, as the years go by, the calculation team does less monitoring or resorts to spot checks, the verification team might choose to accept only a percentage of the calculation team's calculated GHG reduction. And, if the calculation team stops monitoring the project all together and bases their calculations on formulaic forecasting, the verification team might accept none or only a very small percentage of the calculated GHG reduction. This crediting mechanism would give the project parties incentive to ensure that long-term monitoring of projects continues. And it gives the project parties the ability to weigh the cost of thorough project monitoring against the benefits of higher GHG reduction credits.

4.2.4. International JI Secretariat

This assessment structure with a project-level team, technical consultants, and a verification team is essentially the institutional structure that Ravindranath and the other collaborating authors were advocating, except that it leaves two of the responsibilities that they mentioned unaddressed: disseminating assessment methodologies and certifying the technically proficient analysts. These aspects of assessment seem to us to be global aspects, in that a project from Mexico could benefit from a standardized assessment methodology developed by a project in Thailand and the certified technically proficient analysts could come from any

country. Thus we advocate the establishment of an international JI Secretariat with these responsibilities. Table 4 shows the division of the subtasks between the four assessment teams.

Table 4: Roles for the GHG Reduction Assessment Team

	Project-Level Team	Technical Consultants	Verification Team	International JI Secretariat
Gather the project-specific data and information necessary to perform the GHG reduction estimation and calculation	√	√		
Develop standard assessment methodologies for JI projects		√		
Disseminate the standardized assessment methodologies				√
Train interested parties in the use of the standardized assessment methodologies		√		√
Certify the team performing the GHG reduction verification				√
Verify the GHG calculation, and if necessary, perform an audit			√	
Resolve challenges to the GHG reduction verification or refer the project parties to a tribunal			√	√

As the Global Environmental Facility's experiences with incremental costs demonstrate, at the start of a new institutional regime, new concepts and methodologies emerge which require a significant amount of training. This is particularly true with JI, because currently there are no standardized assessment methodologies, so the managers of pilot JI projects must invent the assessment methodologies as they develop the projects. Thus, we envision that one of the key roles of the international JI Secretariat will be to train the technically proficient analysts in how to develop, adapt, apply, and verify GHG reduction methodologies. Because of the complexities involved in the assessment methodologies for even a single sector, training and certifying these analysts should be sector-specific, so that there would be, for example, a "JI Secretariat Certified Assessor in Forestry."

We suggest that the international JI Secretariat be made up of a small number of representatives from FCCC member countries, preferably with 50 percent representation each from developing and developed countries, and that much of the work of the Secretariat be done by technically proficient analysts working as outside consultants. We advocate an international JI Secretariat instead of an international JI Agency, because a secretariat can start small and grow as the need develops; its overhead is lower, since it doesn't require new buildings or an extensive staff; and its structure can be flexible enough to gradually mature as the concept of JI develops.

Of course, establishing an international JI Secretariat, and then developing and implementing the certification process will take time. So, it is unlikely that during the pilot phase of JI there will be many sector-specific certified assessors. However, as the institutional structure matures, the verification team should include at least one assessor who is certified in the field of the project. Of course, if the verification team has a member who is a certified assessor, it gives the project parties strong incentive to have at least one technical consultant who is a certified assessor, because that member could develop or adapt the GHG methodologies for the project in a way that is likely to be accepted by the certified assessor on the verification team. So, we also suggest that the technical consultants include at least one assessor who is certified in the field of the project. Table 5 summarizes the membership of the proposed institutions.

Table 5: Membership of the Proposed Institutions

Institution	Members
Host and Investor Country Acceptance Panels	• Members of a single existing governmental agency, members from several governmental agencies, and/or members of non-governmental and private institutions
Project-Level Team	• Project parties involved in the development and/or the day-to-day implementation of the project. • Any other members agreed upon by the project parties.
Technical Consultants	• Technically proficient analysts.[1] • Preferably the technical consultants *should* include at least one assessor who is certified in the field of the project.[2]
Verification Team	• Technically proficient analysts.[1] • The verification team *must* include at least one assessor who is certified in the field of the project.[2] • The members of the verification team *may not* have been members of the project-level team or the technical consultants.
International JI Secretariat	• Representatives from participating FCCC member countries, preferably with 50 percent representation from each developing and developed countries. • Technically proficient analysts as outside consultants.[1]

[1] By "technically proficient analysts," we mean members of host country and investor country research institutions, governmental agencies, non-governmental organizations, universities, etc. who have the necessary experience and/or technical expertise for the assessment analysis.

[2] By "an assessor who is certified in the field of the project," we mean a technically proficient analysts who has been trained and certified by the international JI Secretariat in assessment methodologies for the field of the project, e.g., forestry, energy efficiency, etc.

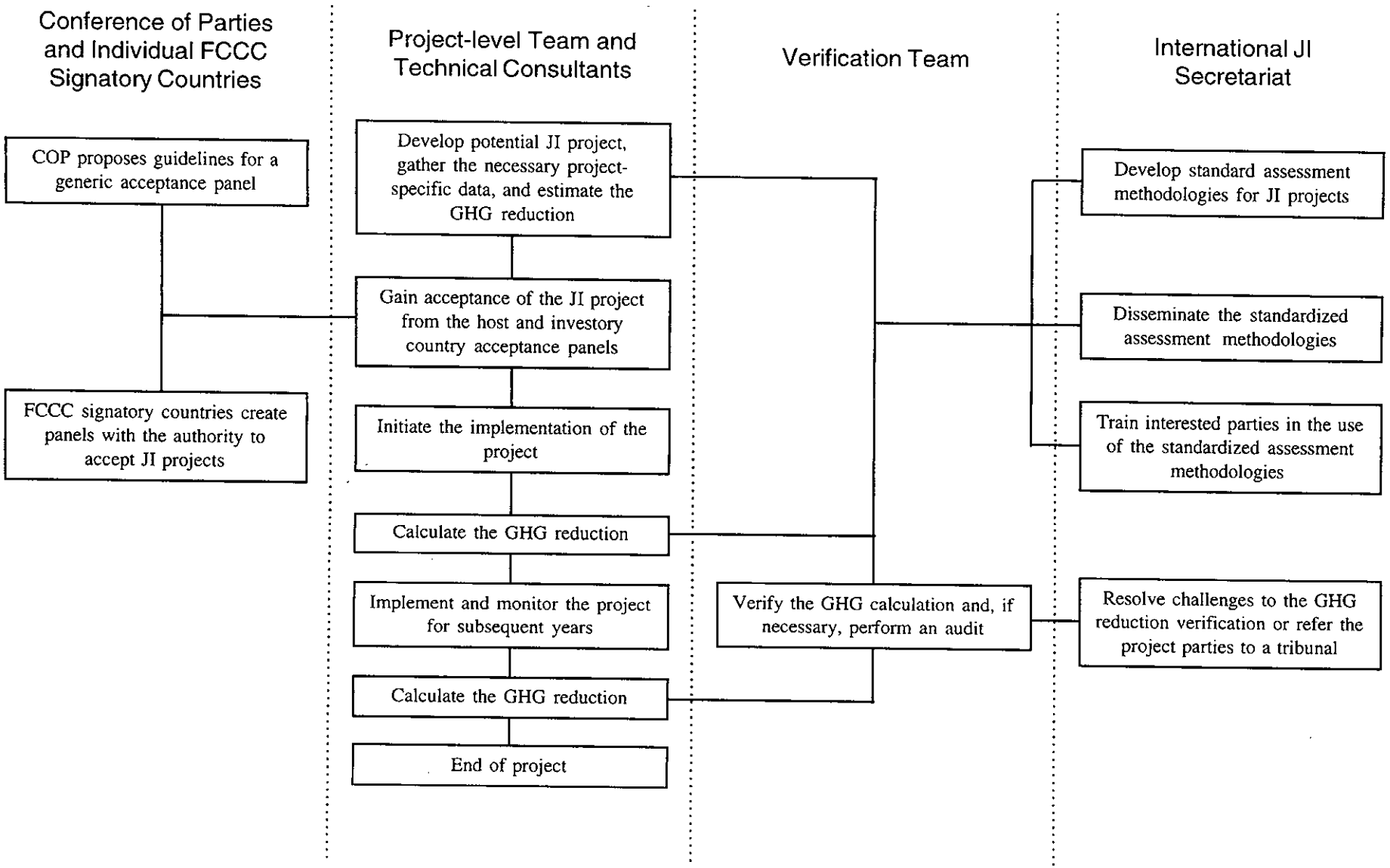
4.3. Conclusions

The implementation of a JI project entails several tasks from project feasibility studies to acceptance to eventual verification of the project's GHG reduction. Some tasks of a JI project are no different than those for any other investment project. Others, such as verifying the GHG reduction, are unique to JI projects. In this paper, we have discussed the following two unique JI tasks: accepting the project and assessing the GHG reduction, which includes estimating, calculating, and verifying the GHG reduction.

These tasks could be performed by many different types of institutions, from a centralized international organization which does all the tasks in-house to a decentralized set of governmental agencies, private institutions, non-governmental agencies, and technical teams. In examining the roles for potential JI institutions, we have largely favored a decentralized structure for the tasks, with important roles in information exchange, training, and methods development for national and international governmental organizations. Figure 3 lays out the our recommendations for the relationships between these proposed institutions.

In order to encourage the formation of these institutions, we envision several actions for host and investor country governments. First, as signatories to the Framework Convention on Climate Change, they can encourage the Conference of Parties to establish an international JI Secretariat with the responsibilities discussed above. In addition, host and investor country governments can create acceptance panels, and, as Gelil (1995) recommends, facilitate cooperation between existing institutions in order to encourage them to form inter-institutional assessment teams. Finally, they can support efforts to develop assessment methodologies, disseminate these assessment materials, and train potential members of the assessment teams in the use of these materials.

Figure 3: Summary Flowchart of JI-Specific Tasks in a Mature JI Institutional Regime



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APPENDIX A: THE EVOLUTION OF JI

Table A-1: Key Events in the Evolution of JI[55]

Date	Event
June 1992	The UN Framework Convention on Climate Change is signed by over 150 countries at the United Nations Conference on Environment and Development in Rio de Janeiro.[56] JI is mentioned in the FCCC, but not explicitly defined.
October 1993	The US government announces the US Initiative on JI (USIJI).
December 1993	The Netherlands' government announces "in its Second National Environmental Policy Plan to start pilot projects to gather experience with JI."[57]
January 1994	The Interim Secretariat of the Intergovernmental Negotiating Committee for the FCCC releases "Matters Relating to Commitments: Criteria for Joint Implementation."[58]
Spring 1994	The Canadian government releases a draft version of its regulations for the JI Pilot Initiative which is part of Canada's National Action Program on Climate Change.[59]
Spring - Summer 1994	The Australian government releases the criteria for the Australian Pilot Phase JI Program.[60]
June 1994	The International Conference on JI, held near Groningen, The Netherlands.
September 1994	President Figueras of Costa Rica and US Vice-President Gore sign a bilateral JI agreement.
November 1994	Thirty project proposals are submitted to USIJI for approval from a wide range of organizations, project types, and countries.[61]
December 1994	African Conference on Policy Options and Responses to Climate Change, including workshops with JI discussions in Nairobi, Kenya.
December 1994	Workshop on Designing Joint Project Mechanisms to Promote Benefits for Developing Countries in Rio de Janeiro, Brazil.
January 1995	The International Conference on JI in the Context of the FCCC in New Delhi, India.
January - February 1995	The South-East Asia Regional Workshop on the International Prospects for JI, Bangkok, Thailand.
February 1995	Seven projects are given USIJI approval.
March - April 1995	The first Conference of Parties to the FCCC in Berlin, Germany initiates a voluntary JI pilot phase.

APPENDIX B: REFERENCES TO JI IN THE FCCC

Table B-1: References to JI in the Framework Convention on Climate Change[62]

Article	Reference
Article 3.3	"Efforts to address climate change may be carried out cooperatively by interested Parties."
Article 4.1(c)	All Parties shall "promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices, and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors ..."
Article 4.1(d)	All Parties shall "promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol ..."
Article 4.2(a)	Each of the developed country Parties and other Parties included in annex I "shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs ... These Parties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention and, in particular, that of this subparagraph;"
Article 4.2(b)	The annex I countries shall communicate ... "detailed information on its policies and measures referred to in subparagraph (a) above, ... with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol."
Article 4.2(d)	"The Conference of the Parties, at its first session, shall also take decisions regarding criteria for joint implementation as indicated in subparagraph (a) above."

APPENDIX C: CRITERIA

Table C-1: The Proposed JI Criteria from the UN Interim Secretariat of the Intergovernmental Negotiating Committee for the FCCC[63]

1. Joint implementation refers only to joint action to implement policies and measures, and in no way modifies the commitments of each Party.
2. Joint implementation is distinct from the provision of assistance to other Parties.
3. Joint implementation is a voluntary activity under the responsibility of two or more Parties; such activity must be undertaken or accepted by the Governments concerned.
4. Joint implementation would be undertaken in conjunction with domestic action.
5. Joint implementation should be beneficial to all Parties involved, and be consistent with their national priorities for sustainable development.
6. Joint implementation activities should bring about real and measurable results, determined against reasonable baselines.
7. The impacts of joint implementation activities would have to be assessed with respect to their economic and social, as well as environmental, effects.
8. Joint implementation activities should, where appropriate, be accompanied by measures to ensure their long-term environmental benefits.
9. Joint implementation activities could address any greenhouse gas or any combination of gases.
10. Parties should give priority to joint implementation activities resulting in emissions limitations.
11. The benefits of joint implementation activities may be shared between the Parties involved.
12. Each of the Parties involved in a joint implementation activity would have to communicate relevant information thereon to the COP.

Table C-2: The JI Criteria from the Groundrules for the US Initiative on JI[64]

A. To be included in the USIJI, the Evaluation Panel must find that a project submission:

1. is acceptable to the government of the host country;
2. involves specific measures to reduce or sequester greenhouse gas emissions initiated as the result of the US Initiative on Joint Implementation, or in reasonable anticipation thereof;
3. provides data and methodological information sufficient to establish a baseline of current and future greenhouse gas emissions: a) in the absence of the specific measures referred to in A.(2) of this section; and b) as the result of the specific measures referred to in A.(2) of this section;
4. will reduce or sequester greenhouse gas emissions beyond those referred to in A.(3)(a) of this section, and if federally funded, is or will be undertaken with funds in excess of those available for such activities in fiscal year 1993;
5. contains adequate provisions for tracking the greenhouse gas emissions reduced or sequestered resulting from the project, and on a periodic basis, for modifying such estimates and for comparing actual results with those originally projected;
6. contains adequate provisions for external verification of the greenhouse gas emissions reduced or sequestered by the project;
7. identifies any associated non-greenhouse gas environmental impacts/benefits;
8. provides adequate assurance that greenhouse gas emissions reduced or sequestered over time will not be lost or reversed, and
9. provides for annual reports to the Evaluation Panel on the emissions reduced or sequestered, and on the share of such emissions attributed to each of the participants, domestic and foreign, pursuant to the terms of voluntary agreements among project participants.

B. In determining whether to include projects under the USIJI, the Evaluation Panel shall also consider:

1. the potential for the project to lead to changes in greenhouse gas emissions elsewhere;
2. the potential positive and negative effects of the project apart from its effect on greenhouse gas emissions reduced or sequestered;
3. whether the US participants are emitters of greenhouse gases within the United States and, if so, whether they are taking measures to reduce or sequester such emissions;
4. whether efforts are underway within the host country to ratify or accede to the United Nations Framework Convention on Climate Change, to develop a national inventory and/or baseline of greenhouse gas emissions by sources and removals by sinks, and whether the host country is taking measures to reduce its emissions and enhance its sinks and reservoirs of greenhouse gases.

Table C-3: The Draft JI Criteria from Canada's JI Pilot Initiative[65]

To be included under the Pilot Initiative, Canadian applicants must demonstrate to the Evaluation Committee that the proposed project:

1. will contribute to net reductions in global emissions of greenhouse gases in a manner that can be measured and verified on a clear, scientifically valid basis;
2. has the support of the government of the host country;
3. is being made in response to, or in reasonable anticipation of, the Pilot Initiative;
4. estimates current and future greenhouse gas emissions or carbon being sequestered both in the absence and as a result of the proposed project using generally accepted methodologies;
5. contains adequate provisions for monitoring project results and periodically verifying actual results with those estimated in the original submission;
6. contains adequate provisions for third-party verification of project results; and,
7. provides adequate assurances that net reductions in greenhouse gas emissions will not be lost or reversed over time.

Table C-4: The JI Criteria from the Australian Pilot Phase JI Program[66]

To be accepted as part of the Australian Pilot Phase Joint Implementation Program, project proposals will need to meet the following criteria. It should be noted that projects can be set alone or form a part of a larger commercial project. In regards to the latter situation, only the part of the project which meets the following criteria will form part of the pilot program.

1. Project proposals need to take account of the economic and social as well as environmental costs and benefits associated with the project;
2. Projects should lead to real and verifiable emissions reductions, determined against reasonable baselines: (a) estimates should be based on reliable and standardized accounting methodologies taking into account both direct and indirect effects; and (b) a reasonable estimate should be made of the reductions likely to be achieved from year to year. The estimates will have to be assessed periodically against original projects, and adjusted accordingly.
3. Funding for projects should be additional to Overseas Development Assistance as financial assistance under the Convention.
4. Projects should involve specific measures to reduce net greenhouse gas emissions as a result of the Australian Pilot Phase Joint Implementation Program.
5. A high degree of transparency and openness should exist at every stage, especially in regard to agreements reached, reporting, and assessment.
6. The national government of the host country must accept the project as a joint implementation project that is consistent with its national priorities.
7. Projects must be consistent with the principles of sustainable development.

Table C-5: The JI Criteria from the Costa Rican Office for Joint Implementation (CROJI)[67]

All proposals submitted to the Costa Rican Office for Joint Implementation (CROJI) should contain sufficient supporting data and analyses to allow for a full evaluation by the Costa Rican Joint Implementation Evaluation Panel according to the criteria listed below. Fulfillment of all criteria is the prerequisite for official project acceptance by the Costa Rican Government, although relatively poor performance on one criterion may be out weighed by excellent performance in another.

The criteria are meant to fulfill the following objectives:

1. Minimize red tape: As few criteria as possible, and highest possible level of consistency with existing sets of criteria in established, national programs.
2. Follow from experience: Address issues experienced by CROJI in the first round of US Initiative on Joint Implementation, as well as in the Costa Rican Government's general efforts to facilitate the development of new JI projects.
3. Meet current international standards: Criteria should meet current pilot phase standards set by the first Conference of the Parties to the UN Framework Convention on Climate Change.
4. Represent Costa Rica's particular interests: Criteria should address Costa Rican development priorities, as distinct from the considerations of the home country or of other developing countries.

Project Criteria

I. Basic Project Considerations and Domestic Priorities

A. Legal Compatibility: Is the project consistent with applicable Costa Rican laws and regulations?

B. Home Country (Investor Country) Acceptance: Is the project acceptable to the home country (investor) government or does the project proponent intend to apply for such acceptance?

C. National Sustainable Development Priorities: Is the project compatible with and supportive of Costa Rican national environment and development priorities and strategies, including:

- Biodiversity conservation, reforestation and forest preservation, sustainable land use, watershed protection, air and water pollution reduction, reduction of fossil fuel consumption, increased utilization of renewable resources and enhanced energy efficiency?
- Support for Costa Rica's efforts to fulfill its obligations under international environmental agreements, including the Conventions on Climate Change, Biological Diversity, and Agenda 21?
- Enhancement of income opportunities and quality of life for rural peoples and members of certain vulnerable groups including cultural minorities?
- A minimized or acceptably low level of adverse consequences of the project through site selection, scale adjustment, timing, attentuation, and mitigating measures?
- Local capacity-building such as the transfer and adaptation of know-how and high-quality technologies?

D. Local or Community Support and Participation: Will the local community support and participate in and/or benefit from the project?

II. Environmental Feasibility

A. Offset Additionally: Will the project bring about real, measurable and long-term environmental benefits related to the mitigation of climate change that would not have occurred in the absence of such activities? The proposal should include a defensible reference or baseline case for emission or sequestration processes in the absence of the project.

B. Monitoring: Does the project have a monitoring plan that includes the participation of organizations capable of successfully monitoring the project? The monitoring plan should include actual measurements of the project's emission or sequestration in order to establish a high degree of certainty that the predicted benefits were achieved by the project.

C. Verification: Will the project allow for the verification of the project's progress through inspection by qualified non-participating organizations?

D. Durability or Quality of Offset: Does the project have a high likelihood that the greenhouse gas offset will be maintained over the life of the project? The proposal should include:

1. Workplan for Project Start-Up: What is the timeline for starting or completing significant phases or stages of the project, including but not limited to: prefeasibility studies, feasibility studies, development and beginning of operations, and completion of advanced stages of the project?
2. Long-term Project Management Plan

E. Greenhouse Gas Benefits: What methodologies were used to calculate greenhouse gas emissions, emission reduction or avoidance, and carbon sequestration, and what are the key uncertainties affecting these estimates?

III. Financial Feasibility

A. Financial Additionally: Is the financing of the project additional to the financial obligations of Annex II Parties to the United Nations Framework Convention on Climate Change within the framework of the financial mechanism as well as to current official development assistance (ODA) flows?

B. Cost Estimates: Does the project include an accounting of all the costs of operation of the project, including organizations or entities other than official project participants that may contribute to the project's operations?

IV. Technical and Institutional Feasibility

A. Institute Infrastructure and Governmental Role: Does the domestic Costa Rican institutional framework (political, administrative, scientific) exist to adequately implement and administer the project, as necessary?

B. Reliability and Credibility of the Project Participants: What is the prior experience and track record of the project partner(s) and intermediaries? Is each partner's role in the project's development and implementation made explicit in the proposal? Proponents are encouraged to submit descriptions or independent appraisals of previous joint implementation or similar projects.

APPENDIX D: THE TWENTY-NINE PILOT JI PROJECTS AND PROPOSALS

Table D-1: The Ten Pilot JI Projects and Proposals Discussed in this Paper

Project or Proposal Name	Major Host and Investor Country Actors (Project Investors are starred)
The High Efficiency Lighting Pilot Project in Mexico (ILUMEX)	*Federal Electricity Commission (CFE) (Mexico) *Global Environment Facility (International) *Kingdom of Norway
**The EPA-led Russia-US Forestry and Climate Change Project -- Saratov Afforestation Project (RUSAFOR-SAP)	Russian Federal Forest Service International Forestry Institutes in Moscow and Volgograd (Russia) Saratov Forest Management District (Russia) Russian Ministry of Ecology Institute for Market Economy (Russia) *US Environmental Protection Agency *Environmental Defense Fund (US) Oregon State University (US)
The NEES/Innoprise Reduced Impact Logging Project in Malaysia	Rakyat Berjaya SND. BHD. (Malaysia) *New England Power Company (US)
The CARE/AES Guatemala Agroforestry Project	*Guatemalan Directorate General of Forests *US Peace Corps *AES Thames (US) *CARE (US) *US Agency for International Development
The Mbaracayu Conservation Project in Paraguay	Moises Bertoni Foundation (Paraguay) *AES Barbers Point (US) *The Nature Conservancy (US) *US Agency for International Development
The OXFAM American Amazon Project	Coordinating Body of Indigenous Peoples Organization of the Amazon Basin (nine South American countries) *AES Shady Point (US) *OXFAM (US)
The San Lorenzo Watershed Protection Project in Costa Rica	*Consorcio Nacional de Empresas de Electrificacion de Costa Rica (CONELECTRICAS) (Costa Rica) *National Rural Electric Cooperative Association (NRECA) (US)
**The Bynov Heating Plant Project in the Czech Republic	Bynov Heating Plant in Decin (the Czech Republic) *City of Decin (the Czech Republic) *Wisconsin Electric Power Company (US) *Commonwealth Edison (US) *Northern Indiana Public Service Company (US) Center for Clean Air Policy (US)

The Biomass Cogeneration Project in India	Six sugar mills in three states in India *Tata Energy Research Institute (India) Econergy International Corporation (US) *Lockheed Environmental Systems and Technologies Co. (US) *Duke Engineering and Services, Inc. (US) *Niagara Mohawk Power Corporation (US) *TransAlta Utilities Corporation (Canada)
The Wood Energy Crops and Other Biomass to Electricity Project in Armenia	Ministry of Energy and Fuel (Armenia) *Armenian Engineers and Scientists of America, Inc. (US) *Martin Marietta Energy Systems, Inc. (US) *Joint Institute for Energy and Environment (US) *US Agency for International Development *International Applied Engineering, Inc. (US)

* Project investors.

** Project accepted by the United States Inititative on Joint Implementation in February 1995.

Table D-2: The Nineteen Pilot JI Projects and Proposals Not Discussed in this Paper[68]

Project or Proposal Name	Major Investor and Host Country Actors
*The Rio Brave Conservation and Forest Management Project in Belize	Belizian Program for Belize Wisconsin Electric Power Company (US) Nature Conservancy (US)
*The CARFIX Project in Costa Rica	FUNDECOR (Costa Rica) Costa Rican Ministry of Natural Resourses, Energy, and Mines Wachovia Timberland Investment Management (US)
*The Plantas Eolicas S.A. Wind Facility Project in Costa Rica	Plantas Eolicas, S.A. (Costa Rica) Charter Oak Energy, Inc. (US) KENETCH Windpower, Inc. (US) Merrill International, Ltd. (US)
*The ECOLAND Project in Costa Rica	National Fish and Wildlife Foundation (Costa Rica) COMBOS (Costa Rica) Costa Rican Ministry of Natural Resources, Energy, and Mines Tenaska Washington Partners, Ltd. (US) Trexler and Associates (US) Council of the OSA Conservation Area (US) Rainforests of the Austrians (Austria)
*The Rural Solar Electrification Project in Honduras	COMARCA (Honduras) AHDEJUMAR (Honduras) Enersol Associates, Inc. (USA)
The Krkonose Project in the Czech Republic	FACE Foundation (Netherlands) Krkonose National Park (Czech Republic)
The Profafor Project in Ecuador	FACE Foundation (Netherlands) INEFAN (Czech Republic)
The Energy Saving Project in Hungary	The Netherlands' Ministry VROM Hungarian Ministry for the Environment NOVEM EGI
The Compressed Natural Gas Fuel Engine Project in Hungary	The Netherlands' Ministry VROM Hungarian Ministry for the Environment RABA Ikarus TNO
The Landfill Project in the Russian Federation	The Netherlands' Ministry VROM Russian Federal Service for Hydromet. and Environmental Monitoring Grontmij Geopolis
The Horticulture Project in the Russian Federation	The Netherlands' Ministry VROM Russian Federal Service for Hydromet. and Environmental Monitoring RITZA Organization

Dairy Feed Supplementation Program in Gujarat, India	US Environmental Projection Agency Appropriate Technology International (US)
Afforestation Project in Sabah, Malaysia	Forest Absorbing Carbon Dioxide Emissions Foundation (FACE Foundation) (Netherlands) Innoprise (Malaysia)
Coal to Gas Conversion Project in Poland	Poland Norway Global Environmental Facility (International)
Forestry Project in Ecuador	Global Environmental Facility (International) Durini Group
The Zambales Mountains Reforestation Project in the Philippines	Trees for the Future (US)
Afforestation Projects in Slovakia, Hungary, Ukraine,and Romania	American Forests (US)
Energy System Improvements Project in Pakistan	American Electric Power (AEP) (US)
Energy System Improvements Project in Venezuela	American Electric Power (AEP) (US)

* Project accepted by the United States Inititative on Joint Implementation in February 1995.

APPENDIX E: SUMMARIES OF THE TEN PILOT JI PROJECTS OR PROPOSALS AS OF AUGUST 1994

Table E-1: The High Efficiency Lighting Pilot Project in Mexico (ILUMEX)[69]

Project Type:	Demand-side management
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Mexico
Project Description:	This project will support the replacement of approximately 1.7 million incandescent light bulbs with fluorescent light bulbs in the cities of Guadalajara and Monterey, Mexico. The fluorescent light bulbs will be produced according to specifications designed for these two cities.
Project Duration:	June 1994 - June 1998
Major Host Country Actors:	Federal Electricity Commission (CFE)
Major Investor Country Actors:	Global Environment Facility at the World Bank (GEF) Kingdom of Norway
Total Cost of Project:	$23.0 million
Total Greenhouse Gas Reduction Claimed:	192,000 tons of carbon
Cost per Unit of Greenhouse Gas Reduction Claimed:	$120 per ton of carbon reduced

Table E-2: The NEES/Innoprise Reduced Impact Logging Project in Malaysia[70]

Project Type:	Forestry management practices
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Malaysia
Project Description:	The project will apply reduced impact logging techniques to 1,400 hectares of forest in Malaysia which would otherwise have been harvested using traditional logging techniques.
Project Duration:	August 1992 - July 1995 (may be extended)
Major Host Country Actors:	Rakyat Berjaya SDN. BHD. (RBJ)
Major Investor Country Actors:	New England Power Company (NEP)
Total Cost of Project:	$650,000
Total Greenhouse Gas Reduction Claimed:	55,000 - 80,000 tons of carbon
Cost per Unit of Greenhouse Gas Reduction Claimed:	$8 - 12 per ton of carbon

Table E-3: The EPA-led Russia-US Forestry and Climate Change Project -- Saratov Afforestation Project (RUSAFOR-SAP)[71]

Project Type:	Afforestation and reforestation
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Russia
Project Description:	"The biological, operational and institutional opportunities to manage a Russian boreal forest as a carbon sink will be evaluated in the Saratov oblast (region), which is located approximately 700 km southeast of Moscow ... Initially it is planned to create 500 ha of forest plantations in the Saratov region ... The objective of the project is to provide an operational and technical framework for the realization and joint implementation of carbon offset credit forestry projects in Russia."
Project Duration:	Three years: Fall 1993 - 1996
Major Host Country Actors:	Russian Federal Forest Service International Forestry Institutes in Moscow and Volgograd Saratov Forest Management District Russian Ministry of Ecology Institute for Market Economy
Major Investor Country Actors:	US Environmental Protection Agency Oregon State University Environmental Defense Fund
Total Cost of Project:	n.a.
Total Greenhouse Gas Reduction Claimed:	n.a.
Cost per Unit of Greenhouse Gas Reduction Claimed:	n.a.

Table E-4: The CARE/AES Guatemala Agroforestry Project[72]

Project Type:	Afforestation and forest conservation
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Guatemala
Project Description:	The project "aims to involve 40,000 Guatemala farm families in self-sustaining agroforestry, forest fire brigades, soil conservation, and wood lot planting programs. The programs will support the planting of 40 to 50 million mixed species trees by the year 2000."
Project Duration:	10 years[73]
Major Host Country Actors:	Guatemalan Forest Service
Major Investor Country Actors:	CARE AES Thames US Agency for International Development US Peace Corps
Total Cost of Project:	$14.5 million (including both cash costs and in-kind contributions of each participating organization for labor and related goods)
Total Greenhouse Gas Reduction Claimed:	16 million tons of carbon[74]
Cost per Unit of Greenhouse Gas Reduction Claimed:	$0.90 per ton of carbon

Table E-5: The Mbaracayu Conservation Project in Paraguay[75]

Project Type:	Forest conservation
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Paraguay
Project Description:	The project "will protect an area of forest roughly 2.5 times the size of Washington, D.C. from commercial logging and conversion to agriculture ... The first activities of the project involved the establishment of a nature preserve and will be followed by support for sustainable-use activities."[76]
Project Duration:	n.a.
Major Host Country Actors:	Moises Bertoni Foundation The Ache Tribe
Major Investor Country Actors:	AES Barbers Point The Nature Conservancy
Total Cost of Project:	$3.8 million[77]
Total Greenhouse Gas Reduction Claimed:	16 million short tons of carbon[78]
Cost per Unit of Greenhouse Gas Reduction Claimed:	$0.24 per ton of carbon

Table E-6: The Oxfam American Amazon Project[79]

Project Type:	Forest conservation
Greenhouse Gases Addressed:	Carbon dioxide
Host Countries:	Peru, Ecuador, and Bolivia
Project Description:	The project will support "indigenous groups from Peru, Ecuador, and Bolivia to gain control over their lands and to develop sustainable resource extraction plans for the forest."[80]
Project Duration:	10 years
Major Host Country Actors:	Coordinating Body of Indigenous People's Organizations of the Amazon Basin (COICA)
Major Investor Country Actors:	AES Shady Point OXFAM America
Total Cost of Project:	$3.4 million
Total Greenhouse Gas Reduction Claimed:	70 million tons of carbon
Cost per Unit of Greenhouse Gas Reduction Claimed:	$0.05 per ton of carbon

Table E-7: The San Lorenzo Watershed Protection Project in Costa Rica[81]

Project Type:	Watershed protection and afforestation
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Costa Rica
Project Description:	The project will purchase the private land in the San Lorenzo watershed, an area of some 5,550 hectares, and establish a permanent program to foster its rehabilitation and protection.
Project Duration:	Initially, fifteen years.
Major Host Country Actors:	Consorcio Nacional de Empresas de Electrificacion de Costa Rica (CONELECTRICAS)
Major Investor Country Actors:	National Rural Electric Cooperative Association (NRECA)
Total Cost of Project:	$4.2 million
Total Greenhouse Gas Reduction Claimed:	650,000 tons of carbon
Cost per Unit of Greenhouse Gas Reduction Claimed:	$6.50 per ton of carbon

Table E-8: The Biomass Cogeneration Project in India[82]

Project Type:	Fuel switching and cogeneration
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	India
Project Description:	"The project will develop a bagasse-fired cogeneration facility at a sugar mill in India, utilizing cane trash and/or short-rotation woody crops as off-season fuels. The project entails replacing existing low-pressure boilers with high-pressure boilers, and installing cogeneration equipment at the sugar mill, as well as integrating cane trash collection and short-rotation woody crops into sugar cane cultivation."
Project Duration:	n.a.
Major Host Country Actors:	Simbhaoli Sugar Mill, Ltd. Willard India, Ltd. Tata Energy Research Institute
Major Investor Country Actors:	Econergy International Corporation Utility Biomass Energy Commercialization Association
Total Cost of Project:	n.a.
Total Greenhouse Gas Reduction Claimed:	n.a.
Cost per Unit of Greenhouse Gas Reduction Claimed:	n.a.

Table E-9: The Bynov Heating Plant Project in the Czech Republic[83]

Project Type:	Fuel switching and efficiency improvements
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Czech Republic
Project Description:	The project includes "switching a heavily polluting district heating plant in the City of Decin, in the Northern Bohemia region, from brown coal to natural gas and improving the efficiency of the distribution network."
Project Duration:	n.a.
Major Host Country Actors:	Bynov Heating Plant in Decin City of Decin
Major Investor Country Actors:	Center for Clean Air Policy Wisconsin Electric Power Company Commonwealth Edison Northern Indiana Public Service Company
Total Cost of Project:	$1.5 million
Total Greenhouse Gas Reduction Claimed:	69,800 tons of carbon
Cost per Unit of Greenhouse Gas Reduction Claimed:	$21.50 per ton of carbon

Table E-10: The Wood Energy Crops and Other Biomass to Electricity Project in Armenia[84]

Project Type:	Fuel switching
Greenhouse Gases Addressed:	Carbon dioxide
Host Country:	Republic of Armenia
Project Description:	The project will generate 85 MW of electricity from the combustion of a mixture of biomass residues and dedicated energy crops at three locations in Armenia. There are two components to this project: 1) the tree planting and biomass supply management for energy use affecting nearly 100,000 hectares and 2) the conversion of power combustion equipment for biomass fuel use, alone or in combination with fossil fuel, principally displacing oil and natural gas with renewable biomass for generating power.
Project Duration:	30 years
Major Host Country Actors:	Armenian Ministry of Energy and Fuel ARMENERGOARD Armenian National Academy of Sciences
Major Investor Country Actors:	Armenian Engineers and Scientists of America, Inc. Martin Marietta Energy Systems, Inc. Joint Institute for Energy and Environment US Agency for International Development International Applied Engineering, Inc.
Total Cost of Project:	$1.6 million (attributable to JI)[85]
Total Greenhouse Gas Reduction Claimed:	514,320 tons of carbon (attributable to JI)
Cost per Unit of Greenhouse Gas Reduction Claimed:	$3.11 per ton of carbon[86]

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