Assessing the Constraints and Opportunities for Private-Sector Participation in Activities Implemented Jointly: Two Case Studies from the US Initiative for Joint Implementation

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Abstract

This paper assesses the constraints and opportunities for private-sector participation in Activities Implemented Jointly under the United Nations Framework Convention on Climate Change. After some initial background, the discussion turns to the United States Initiative on Joint Implementation (USIJI)—its objectives, proposal review and evaluation criteria, and a classification of project proposals by project type and stage of development. Two USIJI projects are developed as case studies. One case is an energy end use project that has gained formal acceptance and financing. The other case is an energy production project proposal that has not secured acceptance or financing. In both cases, transaction costs were substantial, and project proponents regarded gaining formal host country acceptance as the principal impediment to project development. The cases illustrate how the host country JI project approval process can become entangled in broader struggles over economic reforms. The cases also suggest that JI project proponents may have divergent perspectives on the speculative value of greenhouse gas (GHG) credits. An enforceable cap on GHG emissions in the project funders' countries, which is a prerequisite to establishing any market for the credits, is contrary to the position of energy and power suppliers who promote voluntary emissions reductions. For emissions reduction technology firms, however, establishing a value for GHG credits would help generate demand for the firms' stock in trade. Finally, the study underscores that notwithstanding transaction costs associated with JI proposal development and acceptance, financing remains the ultimate hurdle to project implementation.

Keywords: climate change, joint implementation

JEL Classification Nos.: Q28, F21

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Assessing the Constraints and Opportunities for Private-Sector Participation in Activities Implemented Jointly: Two Case Studies from the US Initiative for Joint Implementation

Mark Powell, Ron Lile, and Michael Toman*

A. INTRODUCTION

This assessment of selected Activities Implemented Jointly (AIJ) under the United Nations Framework Convention on Climate Change (FCCC) was undertaken as part of an international project approved by the Asia Pacific Economic Cooperation-Human Resources Development-Business Management Network (APEC-HRD-BMN). This assessment draws from two projects under the US Initiative for Joint Implementation (USIJI): an approved and financed district heating fuel switching/cogeneration project in the Czech Republic and a proposed coal bed methane recovery project in Poland. The complete APEC report will contain contributions from other participants in Canada, the People's Republic of China, Japan, the Philippines, and Thailand. Support for RFF's participation was provided primarily by general support from RFF and was supplemented by the University of Hawaii's APEC Studies Center.

APEC's specific objective for the overall project is to contribute to the development of business management practices in joint implementation by highlighting a set of "lessons learned" by companies which have entered into AIJ projects. A broader aim of the project is to inform international policy deliberations about the role of AIJ in implementing the FCCC leading up to the Third Conference of the Parties (COP) to be held in Kyoto, Japan in December 1997. Due to the proliferation of partial JI program reviews and evaluations being conducted in anticipation of the 3rd COP, we would also draw the reader's attention to other ongoing efforts of which we are aware, including studies by ENRON, the Center for International Environmental Law, and World Resources Institute.

B. BACKGROUND

Policy analysts have long recognized that in order to achieve a specified environmental improvement goal at the least overall cost to society, it often is necessary to provide flexibility in the allocation of responsibility for emissions reductions so that those with lower costs of abatement carry out more abatement activity. The idea of "emissions trading" grows out of this realization. With emissions trading, those emitters having lower abatement costs have a built-in incentive to expand their abatement activity since they can sell extra emissions reductions (without any net increase in overall emissions) to other emitters

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who have higher abatement costs. In practice, of course, one must also consider how the system can be monitored and enforced and other important specifics related to the design of a trading program. Overall, however, both extensive analysis and a limited but growing body of actual experience in the US suggests that emissions trading can provide substantial cost savings (see, e.g., Burtraw 1995).

Much of the assessment of emissions trading has been concerned with its application for achievement of domestic environmental goals within one country. There is no reason *in principle*, however, why the approach cannot also be applied internationally for control of emissions that transcend national boundaries (Mullins and Baron 1997; Stewart *et al.* 1996). Carbon dioxide (CO_2) and other greenhouse gases (GHGs) clearly have that characteristic. International trading of CO_2 emissions could reduce the overall cost of compliance with any specified set of internationally accepted reductions in CO_2. Even if, as is currently the case, only a subset of countries have agreed to concrete targets for reducing CO_2 emissions, those countries might be able to reduce their own emissions reductions costs by trading either with other countries with established emissions reductions targets, or by engaging in joint ventures for emissions reductions with countries that do not currently have targets. The latter types of transactions have the potential to provide tangible investment and other economic benefits to the partner country while offering lower abatement costs to those paying for the investments.

Joint ventures of the type just described are referred to as "joint implementation" (or "JI") in the parlance of the Climate Change Convention. They are recognized in the Convention as a promising approach for generating both lower-cost emissions reductions for Annex 1 countries (those who have currently assumed an obligation to reduce emissions), and the transfer of lower-emissions technology (or carbon sequestration) to countries outside Annex 1 whose emissions otherwise are likely to grow substantially in coming years as economic development proceeds. The US Government supported the concept of JI and international GHG emissions trading in Article 7 of its January 1997 Draft Protocol Framework for the Third Conference of the Parties under the Convention to be held in December 1997.

It is reasonable to expect that transaction costs[1] associated with an international trading scheme would be considerably higher than those in a trading system confined to a single country. If these transaction costs are high enough, they could significantly reduce the global community's ability to gain from mutually advantageous potential trades in "credits" for GHG reductions.

Transactions costs can arise from a number of sources. Some of these are inherent in the JI process itself, such as the challenge of computing business-as-usual baseline emissions and verifying reductions. Other costs go beyond the scope of JI to include broader challenges to investing in developing countries and countries in transition to market economies. These

[1] "Transaction costs" is the term used by economists to refer to the time, effort, and other resources needed to search out, negotiate, and consummate a deal.

broader challenges include lack of host country experience with market transactions, and cumbersome regulatory approval processes in host and investor countries for foreign investment. Such processes cause delay that almost inevitably reduces the realized return on investment, and they require disproportionate investments of scarce managerial resources by the investor in obtaining investment approval. Complex, nontransparent processes governing the approval and implementation of investment by both sides also can invite opportunistic rent-seeking by host country officials, or even raise the troublesome issue of corruption.[2]

There are a number of geopolitical concerns (e.g., the relative contribution of different countries to existing and future atmospheric levels of green house gases) and implementation issues (e.g., the means of computing baseline GHG emissions and of verifying reductions) with respect to JI that so far have kept the concept from being fully deployed under the Convention. Instead, a five-year pilot phase of "activities implemented jointly" (AIJ) has been initiated (starting in 1995) to learn more about the operation of JI projects, to build confidence in the approach, and to more fully develop a framework for international implementation of JI. The US contribution to the pilot phase is the US Initiative on Joint Implementation, or USIJI.

Under the pilot phase, countries whose emitters undertake AIJ can identify emissions reductions achieved but cannot claim pre-2000 emissions reductions through JI as credit against current obligations to reduce emissions. This means that in practice, incentives for private investment in JI are limited to "win-win" projects that create net economic benefits independent of greenhouse gas reductions, or projects where the investor is willing to speculate against the possibility that post-2000 emissions reductions might be creditable and thus gain market value. JI and AIJ projects must also be "additional" in the sense of not displacing any ongoing foreign assistance programs to recipient countries. As discussed below, the USIJI program may have imposed stronger additionality constraints, requiring also that emissions reductions be in excess of what would have obtained from public *and* private activities.

Within the narrower range of potential projects that qualify and command investor interest under these conditions, a key lesson to be learned from the AIJ pilots is how other factors may affect investor interests. In particular, what seem to be the primary motivations for undertaking AIJ? What factors (programmatic and otherwise) may especially encourage or hinder investor participation? In the jargon of economics, what factors raise or limit JI transaction costs? In this study, we attempted to learn more about these motivations and factors from the perspective of the US private sector by considering actual experiences in two USIJI cases. The analysis does *not* attempt to provide an exhaustive review of the USIJI program or its projects; nor does it attempt to provide a comprehensive assessment of the specific cases considered. Instead, the more modest goal is to begin identifying potentially important transaction cost influences by directly soliciting the views of actual or potential

[2] Under the US Foreign Corrupt Practices Act, bribery of foreign public officials is a criminally punishable offense. In contrast, Australia, Austria, Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, New Zealand, Portugal, and Switzerland allow the tax deductibility of bribes, considering them as a business expense (OECD 1997).

private sector partners involved with the USIJI program. Before delving into the case studies, we provide a brief overview of the USIJI program.

C. US INITIATIVE ON JOINT IMPLEMENTATION

The USIJI was established in 1993 as part of the Clinton Administration's Climate Action Plan. USIJI is a non-regulatory pilot program designed to contribute to the international knowledge base for considering approaches to joint implementation through projects demonstrating a range of alternatives to reducing, avoiding or sequestering greenhouse gas (GHG) emissions.

The main objectives of the USIJI pilot program (as described at http://www.ji.org/usiji/usiji.htm) are to:

- Encourage private-sector investment and innovation in the development and dissemination of technologies for reducing or sequestering GHG emissions.

- Encourage the rapid development and implementation of cooperative, mutually voluntary, cost-effective projects between US and foreign partners aimed at reducing or sequestering emissions of greenhouse gases, particularly projects promoting technology cooperation with and sustainable development in developing countries and economies in transition.

- Promote a broad range of projects to test and evaluate methodologies for measuring, tracking and verifying costs and benefits.
- Encourage participating countries to adopt more complete climate action programs, including national inventories, baselines, policies and measures, and appropriate specific commitments.

- Contribute to the formulation of international criteria for JI.

An interagency group chaired by the US State Department oversees USIJI. This interagency group is responsible for overall US policy development on joint implementation, decisions on amendments to program ground rules, and formulating the international strategy for promoting joint implementation. The USIJI Secretariat and the inter-agency USIJI Evaluation Panel are co-chaired by the Environmental Protection Agency (EPA) and the Department of Energy (DOE). Other USIJI participating agencies include the Agency for International Development (AID), Agriculture, Commerce, Interior and Treasury. The USIJI Secretariat is staffed by federal employees “on detail” (temporary assignment) from the participating agencies.

Proposal Review and Evaluation Criteria

Each proposal submitted to USIJI receives an initial review by Secretariat staff to determine its completeness and level of detail. The Secretariat advises the proposal's partners in writing if additional information is needed to continue proposal evaluation. If the proposal is complete and has the requisite level of detail, it begins a more comprehensive, formal technical review by a minimum of two independent parties experienced in both the technology (or technologies) and country/region involved. Proposal partners are encouraged to discuss their proposals with Secretariat staff before the formal evaluation and partners also are given the opportunity to submit additional information or to clarify issues identified during the technical review. Following submission, proposal development is frequently an iterative process among the proposal's partners, Secretariat staff, and technical reviewers. Some applicants withdraw proposals from consideration during this review process. The Secretariat presents proposals that clear the technical review process to the USIJI Evaluation Panel to determine if they can be accepted into the USIJI program. Proposal participants are then formally notified of the Panel's decision.

The USIJI Secretariat and Evaluation Panel are responsible for approving or rejecting USIJI proposals based on specific criteria. These criteria are intended to ensure that approved projects support the development goals of the host country while providing GHG benefits beyond those that would occur in the absence of JI. The Evaluation Panel must find that a project proposal:

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 criteria 2 above (without the JI project); (b) as the result of the specific measures referred to criteria 2 above (with the JI project);

4. Will reduce or sequester greenhouse gas emissions beyond those referred to in criteria 3a above (without the JI project) , and if federally funded, is or will be undertaken with funds in excess of those available for such activities in the applicable fiscal year;

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.

Evaluation criterion #1 is intended to ensure compliance with the FCCC agreement that AIJ activities support the national environment and development priorities of recipient countries. Evaluation criteria 2, 3 and 4 are associated with the FCCC concept of "additionality." The stated goal of incorporating these criteria is to ensure that AIJ projects do not displace ongoing official development assistance (ODA) provided by investor countries to developing countries or countries with economies in transition from central planning to markets. (In other words, AIJ is not supposed to result in reprogramming or repackaging of foreign assistance.) Note, however, that USIJI criteria #4 may not satisfy some interpretations of additionality in light of flat or declining aggregate ODA levels. According to WRI (1996), under US Joint Implementation review procedures, beyond demonstrating public sector additionality, project developers must also make a satisfactory case that private investments are "additional." It is unclear, however, whether private sector additionality is an explicit or implicit requirement since the USIJI Project Proposal Guidelines do not address the issue.[3]

The Evaluation Panel also considers: the potential for the project to lead to changes in greenhouse gas emissions elsewhere; the potential positive and negative effects of the project in addition to its effect on greenhouse gas emissions reduced or sequestered; 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; and 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.

Classification of USIJI Project Proposals

Table A classifies and presents the status (as of May 1997) of the 64 projects submitted to USIJI during the first 4 rounds of proposal submissions. The projects are classified by

[3] The Guidelines state only that for projects receiving multilateral funding, leveraging of additional private investment is a consideration. It may be that, informally, demonstrating private sector additionality contributes the necessary weight of evidence (regarding criteria #2) for project acceptance by the US interagency Evaluation Panel. In contrast, according to WRI (1996), the Canadian Joint Implementation Initiative criteria excludes only projects that are financed entirely by the Canadian International Development Agency.

Table A. Classification of USIJI Project Proposals

Project Type	Proposal Submitted	Proposal Rejected/Withdrawn	R/W	Proposal in Development	Proposal Accepted	Round Accepted	Proposal Financed	Round Accepted
Energy End Use	Electric Powered Transport to Reduce GHG Emissions - South Africa (04-02)	Gas Pipeline - Chile (01-27)	W	Gas Pipeline Replacement - China (01-18)	District Heating in Zelenograd - Russia (01-11)	3	Fuel Switching for District Heating System - Czech Republic (01-03)	1
Energy End Use		Biomass Fuel Switching - Czech Republic (03-09)	W	Bombay Energy Efficiency - India (01-22)	Rusagas Fugitive Gas Capture - Russia (02-21)	2		
Energy End Use				Klatdna Generating Project - Czech Republic (03-03)				
Energy Production		IFREE Hydropower - Honduras (01-02)	R	Wood Energy Crops and Other Biomass to Electricity - Armenia (01-01)	Enersol Rural Solar Electrification - Honduras (01-19)	1	Plantas Eolicas S.A. Wind Facility - Costa Rica (01-05)	1
Energy Production		Indian Biomass - India (01-04) Same as (02-05)	W	Rotational Biomass for Cement Manufacturing - Costa Rica (01-06)	El Hoyo-Monte Galan Geothermal Project - Nicaragua (02-02)	2	Dona Julia Hydroelectric Project - Costa Rica (02-08)	2
Energy Production		California Electrification Project - El Salvador (01-07)	R	Coal Bed Methane Recovery - Poland (01-08)	Bio-Gen Biomass Power Generation Project - Honduras (02-07)	2	Tierras Morenas Windfarm Project - Costa Rica (02-11)	2
Energy Production		Solar Photovoltaic - Mexico (01-21)	W	Bagasse-Fired Cogeneration - India (02-05) Same as (01-04)	Aeroenergia Wind Facility Costa Rica (02-09)	2		

Table A. Classification of USIJI Project Proposals (cont'd)

Project Type	Proposal Submitted	Proposal Rejected/Withdrawn	R/W	Proposal in Development	Proposal Accepted	Round Accepted	Proposal Financed	Round Accepted
Energy Production		Coal to gas - Eastern/Central Europe (01-28)	W	Compania Nacional de Fuerza y Luz SA (Hydroelectric project) - Costa Rica (02-14)	The Bel/Maya Biomass Power Generation Project - Belize (03-01)	3		
Energy Production		Photovoltaic - Sri Lanka (03-10)	W		The Bio-Gen Biomass Power Generation Project Phase II, Sava Site - Honduras (03-02)	3		
Land use	Forest Reserve Initiative - Brazil (04-01)	Hanoi Landfill Methane Recovery - Vietnam (01-10)	R	Ecuador (01-17) - (R)	Project CARFIX: Stabilize Existing and Expand Forest Cover - Costa Rica (01-09)	1	RUSAFOR Saratov Afforestation Project - Russia (01-24)	1
Land use	Forest Reserve Trust Sequestration Project (04-03)	Reduce Impact Logging - Solomon Islands (01-12)	R	Reduced Impact Logging - Malaysia (01-26)	Klinki Forestry Project, Costa Rica (01-23)	2	ECOLAND: Esquinas National Park - Costa Rica (01-29)	1
Land use	Community Silviculture in Sierra Norte, Oaxaca - Mexico (02-03) (W)	Preservation of the Sovi Basin - Fiji (01-13)	W	Lak Conservation Area Sustainable Forestry Project - Papau New Guinea (02-01)	Scolel Té--Sustainable Land Management and Carbon Sequestration, Chiapas, Mexico (02-04)	3	Rio Bravo Conservation and Forest Management - Belize (01-30)	1
Land use	Pilot Afforestation Project in Sierra Gorde, Queretana - Mexico (04-05)	COPEC Afforestation - Thailand (01-14)	R	Monteverde Biological Corridor Carbon Sequestration (Forest management) - Costa Rica (02-10)	Reforestation in Vologda - Russia (02-06)	3	Project Salicornia: Carbon Sequestration and Halophyte-based Industries in Sonora - Mexico (03-04)	3

Table A. Classification of USIJI Project Proposals (cont'd)

Project Type	Proposal Submitted	Proposal Rejected/Withdrawn	R/W	Proposal in Development	Proposal Accepted	Round Accepted	Proposal Financed	Round Accepted
Land use	Consolidation of Costa Rican National Parks & Biological Reserves as Carbon Deposit - Costa Rica (04-06)	Carbon Farming - Fiji (01-15)	R	Rural Enterprise Dev - India (02-15)	Biodiversifix: Forest Restoration Project - Costa Rica (02-12/02-13)	2	The Noel Kempff M. Climate Action Project - Bolivia (03-05)	3
Land use		Guandera & Bilsa reserve - Ecuador (01-16)	W	Colina Blanca International SA (Rainmaker Project/Forest preservation) - Costa Rica (02-18)	Forest Conservation - Bilsa Reserve - Ecuador (02-16)	3		
Land use		Hydrobasin Forest Protection - Costa Rica (01-25)	R	Reforestation of the Mountains of Zambales - Philippines (02-19), Same as Philippines (01-20) - (R)	Reforestation of Chiriqui Province - Panama (03-06)	3		
Land use		Canal Watershed - Panama (02-17)	W	Reforestation of the Mountains of the Northwest Province - Cameroon (02-20)	Reduced Impact Logging - Indonesia (03-08)	3		
Land use		Restoration - El Salvador (03-07)	W					

project type and stage of development. The projects are divided into 3 types: energy end use (i.e., efficiency), energy production (i.e., "climate friendly" energy generation), and land use (i.e., carbon sequestration). The projects are further sorted among 5 development stages: proposal submitted, proposal withdrawn/rejected, proposal in development, proposal accepted, and proposal financed. This table is not intended to be an exhaustive list of potential JI projects from US investors. There are, for example, undoubtedly many more proposals in exploratory stage of development which have not yet been formally submitted to USIJI. There are also a number of JI-like projects in which the partners have elected not to go through the official USIJI process. (For example, Honeywell has conducted a number of AID-DOE sponsored district heating projects in Eastern Europe that are not USIJI projects.)

The table does permit, however, some observations about potential JI projects and the USIJI process. Through 3 rounds of proposals reviews, the USIJI Evaluation Panel approved approximately 40% of the proposals submitted (25 out of 59 proposals). Roughly 30% of the proposals submitted (17 out of 59) have been rejected or withdrawn. A handful of proposals (9) originally entered during the first round of submissions remain under development. These observations emphasize that during the pilot phase, the USIJI project development and review process has been lengthy and discouraging for some applicants. Through 4 rounds of proposal submissions, a majority of the JI proposals have been for carbon sequestration projects. This is not surprising given the relatively lower capital intensity of "green" projects versus energy projects. However, the majority constituted by sequestration projects is slim (35 out of 64), perhaps reflecting the technology export potential associated with energy projects. Finally, approximately one third of the proposals accepted as USIJI projects (9 out of 25) have been fully financed. This underscores that notwithstanding transaction costs associated with JI proposal development and acceptance, financing remains the ultimate hurdle to project implementation.

D. CASE STUDIES

Selection Criteria and Interview Process

The two case studies were selected according to the following criteria.[4] First, we decided to select one energy end use project and one energy production project in order to focus the study on one sector of JI activities and to complement the existing and ongoing case studies of carbon sequestration projects.[5] Second, under the hypothesis that different factors would be viewed as constraining or promoting the progress of potential JI projects at different stages of project development, we selected one case that had gained approval and financing and another

[4] The case study selection process is intended to be coordinated with other participants in the APEC project to obtain a series of cases varying by investor country, project type, and stage of development.

[5] During a recent meeting convened by USIJI to help coordinate the activities of a number of domestic groups working on various aspects of JI program evaluation, a representative from the Center for International Environmental Law reported that the Center intended to conduct case studies of carbon sequestration protects.

proposal that had remained in development for an extended period. The proposals for both the Coal Bed Methane Recovery Project in Poland and the Fuel Switching/Cogeneration Project in the Czech Republic were originally entered in the first round of USIJI submissions in 1994. Coincidentally, both projects are located in the "Black Triangle" region of central Europe (the borders regions among Czechoslovakia, Poland and East Germany), so called for its severe air pollution resulting from coal, steel, and other heavy industries. The USIJI Evaluation Panel approved the project in the Czech Republic during its first review (announced in February 1995). The project subsequently secured full financing. The USIJI recognizes the proposed project in Poland as "in development," but the US private sector proponent may withdraw.

For each case study selected, a key private sector partner was identified for a telephone interview. For the coal bed methane recovery project in Poland, John Tait of Aquatech Services, Inc., Fair Oaks, CA was interviewed. Aquatech is an environmental technology development firm. For the fuel switching/cogeneration project in the Czech Republic, Mary Bittle Koenick of the Center for Clean Air Policy, Washington, DC was interviewed. The Center is a not-for-profit, nongovernmental organization that supports JI process development and, in effect, acted as a broker for three US utilities involved in the Czech project. The interviews consisted of three parts. The first line of inquiry addressed the motivations of the private sector organizations to participate in the JI project. The second set of questions asked respondents to identify the factors that impeded or facilitated progress in each phase of project development. The first two parts of the interview began with open-ended questions followed by structured probing questions and were conducted "for the record." The final part of the interview was not for attribution. Here, we asked for the respondent's personal judgments regarding the greatest bottleneck in project development and their recommendations to encourage greater private sector participation in JI activities. In addition to the interviews, the two case studies elaborated below also draw from files made available by the USIJI Secretariat and available literature.

Coal Bed Methane Recovery in Poland

Overview: Originally, this proposal was to build, own, operate, and transfer a wastewater treatment plant for the Morcinek Mine, located in Kaczyce, Upper Silesia (in southern Poland). Currently, brine from the mine is discharged directly into surface waters. The treatment facility consists of evaporators and a reverse osmosis plant, which combine to remove salts from the mining effluent, and is powered by methane gas recovered from a coal bed. Coal bed gas is a significant mining safety hazard, but it may not be present in sufficient quality or quantity to financially justify collection and off-site distribution via pipeline. Currently, methane removed from Polish coal mines is simply vented to the atmosphere. However, methane is also a potent greenhouse gas; each pound of methane emitted from coal mining is about 20 times more effective at trapping radiation in the atmosphere than a pound of carbon dioxide (OTA 1991). Coal bed methane recovery technologies therefore provide opportunities to convert a waste product with significant global warming potential to productive use, either on-site or locally. Like coal gasification and clean coal technology, however, coal bed methane recovery is an alternative technology that still receives US

Department of Energy subsides for research, development, demonstration, and commercial application projects (e.g., under Sec. 1306 of the 1992 Energy Policy Act (EPAct)).

Aquatech Services, Inc. of Fair Oaks, CA developed the methane recovery/brine treatment technology and is the USIJI project proponent. Small-scale field tests of the desalinization technology were initiated at the Morcinek Mine in October 1994 using methane generated at the mine's demethanization station. The demonstration was supported by grants from the US Department of Energy and Environmental Protection Agency ($625,000) and the Polish public sector (Debt for Environment Swap (ECOFUND)/National Fund for Environmental Protection and Water Management (NFOSiGW) - $500,000). The Polish private sector partner for the USIJI project proposal is Exbud-Metan Ltd., which has a $37,200 investment. MIMET, S.A., a Polish industrial construction firm, provided in-country labor to support the demonstration project (Center for Clean Air Policy 1996). The estimated cost of the demonstration project was $1.7 million.[6] Aquatech budgeted a commercial-scale treatment plant for the Morcinek Mine at $7.5 million. Over its projected 25-year lifespan, Aquatech estimated that the project would reduce net GHG emissions by the equivalent of more than 450 thousand tons of CO_2.[7]

Motivation: According to John Tait, Aquatech's motivations for the proposed project are entry into new markets for its technology and job creation in California.[8] Aquatech entered into the USIJI process at the urging of Department of Energy staff who believed that conducting the transaction as an AIJ project would help secure approval from Polish authorities.[9] Initially, Aquatech solicited funding from USIJI for the demonstration phase of the project, mistakenly thinking that USIJI was a potential source of financing.

Factors Influencing Project Development: The coal bed methane recovery project proposal was submitted to USIJI in 1994 and officially remains "in development." Tait reports, however, that Aquatech's private investors have questioned the project outlays and that the firm

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[6] Estimated demonstration project cost based on information provided in Center for Clean Air Policy (1996) and by John Tait of Aquatech Services.

[7] http://www.wbcsd.climatechange.com/tasdform/226e.html.

[8] Poland ranked #7 among the world's coal producing countries as of 1992 (Humphreys 1994), and the country's European Community (EC) neighbors on the Baltic may seek to make Poland's entry into the EC contingent on taking steps to reduce industrial pollution--such as mining effluent--that is transported to the sea. As of early 1994, only one coalmine in Poland was equipped to desalinate mining water, according to Bates *et al*. (1994).

[9] Although the monopolistic Hard Coal Corporation was abolished in 1990, the Polish coal sector is dominated by state owned enterprises and overseen by the State Hard Coal Agency (Bates *et al*. 1994). After elimination of industry subsidies, many mines incurred heavy losses, and the government later restructured the industry by closing some mines and combining the rest into 6 coal companies and 1 holding company (several individual mines continue to operate independently). Despite these measures, the industry as a whole remains unprofitable in the absence of aggressive cost-reduction measures. Privatization is scheduled to begin in earnest in 1999 with the sale of the country's two most efficient mines (Budryk and Bogdanka) (TRADEX 1997; http://www.jurock.com/tradex/poland.html).

is considering exploring other emerging markets for its technology. According to Tait, the primary impediments to project development have been acquiring host country approval for the JI project and concerns about the security of rights for Aquatech's proprietary technology.

According to Aquatech, the Polish mining authorities as well as the Polish Ministry of the Environment have endorsed the proposal.[10] Under USIJI procedures, however, formal host country approval requires acceptance by the host country's Foreign Affairs Ministry or a body with authority delegated by the Ministry to review and approve proposed AIJ activities. The Polish Government has agreed on criteria for JI projects and opened a JI Secretariat to review project for approval (USIJI 1996a). Aquatech has been unsuccessful in securing the endorsement of the Polish Ministry of Industry and Trade, which shares responsibility for reviewing JI project proposals with the Ministry of Environment. Tait feels that USIJI involvement has not facilitated securing host country approval for the project. Part of the problem, according to Tait, is that personnel inexperienced in international commerce staff USIJI. According to Evans (1995), the Polish Government also has not been very open in developing its joint implementation policy, which has led some Polish environmental groups to criticize the process.

Aquatech was also concerned about preserving its proprietary rights over the treatment technology. Tait's anxiety grew when the Polish government sold the Morcinek Mine where the technology was tested to a Czech concern. Polish officials told Aquatech that they wanted the technology installed at two or three other mines. Due to site-specific geological differences, however, this would require testing and calibrating the technology at the new mines. Consequently, Aquatech would need to secure more up-front development costs.

According to files made available by USIJI Secretariat, Aquatech's proposal is also recognized as being "in development" due to "other considerations." Specifically, the Aquatech proposal lacks identified funding for the second phase of demonstration. The principal reason that Aquatech's proposal remains classified as "in development," according to USIJI staff, is the lack of host country acceptance. USIJI reportedly has some discretion to place proposals in the "in development" category due to "other considerations." Although full or even partial project funding is not typically a criterion for acceptance, the Secretariat felt that funding "was an issue" in Aquatech's case. (The paucity of proposals accepted by the USIJI Evaluation Panel that have secured financing confirms that funding is not generally a prerequisite. See Table A.)

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[10] Polish mining authorities may be motivated to endorse the project because mines discharging brine are subject to pollution taxes--known as fines and fees (http://www.wbcsd.climatechange.com/tasdform/226e.html.). According to Bates *et al*. (1994), pollution taxes had little effect on Polish state owned enterprises with soft budget constraints, but the enterprises are becoming more sensitive to the fines and fees as commercialization proceeds. According to files made available by the USIJI Secretariat, Aquatech's proposal did not adequately document additionality when it was originally submitted in 1994 but this criterion was quickly satisfied.

According to Tait, uncertainty about the future value (if any) of credits for GHG emission reductions is a major impediment to securing project funding. Strikes by Polish miners also have dampened the interest of Western investors in the Polish coal mining industry, says Tait. (In 1992, Polish miners struck *en masse* to demand higher wages and to protest a government plan to close unprofitable mines.) While the value of GHG credits is a factor unique to joint implementation activities, the influence of labor unrest and insecure intellectual property rights are generic to business transactions in many countries.

Estimated Development and Transaction Costs: According to Tait, Aquatech has invested approximately $500 thousand in demonstration project development and transaction costs.[11]

Fuel Switching/Cogeneration in the Czech Republic

Overview: This project, commissioned in September 1996, will implement fuel-switching, cogeneration, and efficiency improvements to upgrade the Bynov District Heating Plant, located in the City of Decin, Czech Republic. Decin is a heavily industrialized city in northern Bohemia with a population of approximately 55,000. The project will convert the Bynov Plant from burning soft coal (lignite) to burning natural gas. (Natural gas contains approximately 50 percent less carbon per unit energy than hard or bituminous coal (OTA 1991).) A cogeneration facility will use heat otherwise wasted to produce steam and electricity, and improvements in the distribution network will make the system more energy efficient.

US participants in the USIJI project include three electric utilities that provided a $600,000 zero interest loan to finance the fuel-switching component of the project and the Center for Clean Air Policy. The utilities are the Wisconsin Electric Power Company, Commonwealth Edison Company, and NIPSCO Development Company, Inc.--an affiliate of Northern Indiana Public Service Company. As indicated above, the Center for Clean Air Policy brokered the transaction for the utilities. The City of Decin is the host country participant in the USIJI project. USIJI estimates that over the 25-year lifespan of the project, GHG emissions will be reduced by the equivalent of more than 600 thousand tons of CO_2 as a result of the fuel-switching and new cogeneration facility (USIJI 1996b).

Motivation: According to Mary Bittle Koenick of the Center for Clean Air Policy, the primary factors motivating the three US utilities to participate in the USIJI process were the desire to publicly demonstrate that they were proactive in the climate change debate and to show that flexible, market-based alternatives to command and control regulatory measures are

[11] The information provided in Center for Clean Air Policy (1996) states that Aquatech's contribution to the demonstration project was approximately $200 thousand; however, the source of one-third of the estimated total demonstration project costs were not identified at that time by Aquatech. Based on the information provided by Tait, it appears that Aquatech scaled-back somewhat on the demonstration project (originally estimated at $2 million) and made an additional $300 thousand investment.

workable in the context of GHG emissions reductions. Koenick reports that another motivating factor for the utilities was the prospect of overseas investment. (As discussed below, however, an initial stock purchase agreement was derailed when the scope of the project expanded.)

Factors Influencing Project Development: According to Koenick, the major impediment during the pre-proposal stage was securing host country acceptance. Originally, the three US utilities only had a letter of agreement signed by the Mayor of Decin. Watt and Sathaye (1995, citing Janet Gille of the Center for Clean Air Policy) report that the agreement with the Mayor of Decin stated that the utilities would get 40 percent of the carbon reduction credits from the fuel-switching and that the credits would last for 20 years. (Recall that in a joint implementation-trading scheme, the project proponent from the investor country receives credit for some portion of the GHG emission reductions, which are expressed in terms of carbon or CO_2 equivalents. In the event that a mandatory cap is placed on a nation's GHG emissions and is allocated among firms within the country, a firm holding GHG credits could count them toward emissions reductions needed to meet its obligation.)

Later, the Czech Environmental Ministry also provided an endorsement. However, this "official" letter of host country acceptance did not include a GHG crediting agreement. Since the City of Decin was one of the project participants, the crediting agreement with the Mayor of Decin was essentially an agreement between the project parties. There was no bilateral GHG crediting agreement between the US and the Czech Republic (Watt and Sathaye 1995).

There was also confusion within the Czech government, according to Koenick, about whether the Environmental Ministry had the authority to provide host country acceptance for JI projects. During project implementation, the Czech government created an interagency AIJ commission, and the Foreign Affairs Ministry delegated project approval authority to that body. According to Evans (1995), the Environmental Ministry would like to control the JI project approval process to ensure that the Czech Republic meets its obligations under the FCCC. Fuel-switching projects such as the Bynov heating plant conversion also help to ameliorate conventional forms of local and regional air pollution (i.e., the switch from coal to natural gas reduces particulate matter and sulfur oxide emissions). Other Ministries, however, have different concerns. For example, converting a large number of power plants from coal to gas may have fiscal implications for the Czech government because it could significantly increase the state subsidies allocated for natural gas (Evans 1995). Furthermore, plans to convert plants from coal to gas threaten flagging, but still influential coal mining interests in the Czech Republic. (Czechoslovakia ranked #9 among the world's coal producing countries as of 1992 (Humphreys 1994). Nevertheless, some Czech enterprises are now importing coal from Poland because it is cheaper than Czech coal. At the same time, Czech mines are closing down (OECD 1996).)

The creation of the Czech AIJ commission effectively meant that the USIJI project had lost host country approval. In December 1996, the USIJI Evaluation Panel changed the status of the project back to the "in development" category, approximately two years after the Panel initially approved the project, and after the project had already been commissioned.

(We can only speculate about why the Evaluation Panel initially approved the project without more authoritative host country acceptance, but the desire to show early progress may have been a consideration.) In any event, the US partners had to go back the new Czech AIJ commission for re-approval. Contributing to the confusion was a "chicken or the egg quandary." The Czech JI project criteria requires acceptance from the government of the proposers' country of origin. The USIJI procedures require the same from host countries for acceptance (unclassified cable from the State Department in Wash., DC to the US Embassy in Prague, dated December 18, 1996).

The highest hurdle in securing project approval, according to Koenick, was securing host country acceptance. Satisfying the USIJI requirement to establish the baseline GHG emissions and the reductions resulting from the project was also a formidable task. It was particularly challenging since the project was considered for approval during the first round when the USIJI technical protocols were being developed and test-run. Koenick states that the lack of transparency in the USIJI project review process resulted in added development costs. Furthermore, Koenick believes that the efforts of the US Government, although helpful in obtaining host country acceptance for the project, added little to the project development process.

The primary factor facilitating project development during the financing stage was having the three US utilities on board from the outset, according to Koenick. A change in design and expansion of the scope of the project, however, presented an additional hurdle during the financing stage. The project traces its origins to 1994, when the Czech Privatization Ministry began efforts to privatize the Decin District Heating Enterprise and turn it into a joint stock company, to be called Termo, which would own and manage the Bynov district heating system and plant. Originally, the total investment of $600,000 supplied by the US utilities was intended to provide the capital necessary to finance the $1.5 million fuel-switch. The hard currency investment, however, attracted other investors, giving the City of Decin leverage to increase the scope of the project to include the cogeneration facility and efficiency improvements. Ultimately, the total estimated project cost grew to $8 million (USIJI 1996b). At this point, says Koenick, there was concern among all of the parties about financing the project. The city, however, finally secured additional funding from local banks, the Czech State Environment Fund, and the Government of Denmark, which matched the US utility investment. Since the City was the recipient of the financing, it was required to maintain ownership of the Bynov plant instead of transferring the assets to the Termo Company. This precluded a stock purchase agreement originally negotiated with the US utilities to acquire equity in Termo (USIJI 1996b).

Koenick reports that the expanded number of players involved in the project and the need to rework the language of the agreement between the utilities and the City of Decin were the major impediments during implementation of the project. According to (USIJI 1996b), the utilities ultimately provided a no-interest loan to the City in return for 100% of the GHG reductions resulting from the fuel-switching. (The Center for Clean Air Policy (n.d.) reports that this represents the equivalent of 5,991 tons of CO_2 emissions reductions achieved annually by the plant. The national Czech electric utility, CEZ, reportedly retains more than

20,000 tons of CO_2 reductions achieved annually by the cogeneration facility.) Koenick notes that the negotiations required numerous iterations among the parties' lawyers to ensure that the investors could recover their principal and to cover contingencies, should the Czech government change its mind about apportioning the GHG credits. There was some concern about the utilities incurring a financial loss--it could not get underwriters' insurance because the GHG credits were not an asset. The level of exposure was minimal, however, considering that it was spread across the three US utilities.

A major complicating influence throughout project development, according to Koenick, was the privatization process in the Czech Republic.[12] Market reforms in countries with economies in transition affect all foreign investment, however, and are not unique to JI transactions.

Estimated Transaction Costs: Koenick estimates the total transaction costs incurred by the US partners involved in the Decin project at $600,000--equivalent to their total direct project financing.

E. CONCLUSIONS

The host country JI project approval process can become entangled in broader struggles over economic reforms.

As we noted in the Background section, a perusal of the broad literature on foreign investment reveals a number of general challenges to joint implementation. These include the possible lack of market experience in host countries, weak economic and other institutions, and complex JI approval processes that can create financial insecurity and may invite dishonesty. General progress in economic and legal reforms may be the best antidote to these problems.

A layered and sequential project review process may increase opportunities for inconsistent or opportunistic behavior by host country decisionmakers, and limit the effectiveness of US programs.

Turning next to the two cases we reviewed, proponents in both cases regarded gaining host country approval as the principal impediment to project development. The host country Environmental Ministries responsible for matters relating to the Framework Convention endorsed both projects due at least in part, no doubt, to concomitant local environmental benefits. Resistance came from other Ministries and the interests they represent. Due to the representation of multiple Ministries on JI evaluation panels, the host country project approval process became entangled in broader bureaucratic and political struggles over sectoral and macroeconomic

[12] For its speed, scope, and openness, the Czech mass privatization program is considered the model for economies struggling with public-sector reforms. The privatization of Czech State enterprises, however, has resulted in a pattern of ownership in the Czech economy that is heavily concentrated in the hands of a few large, formerly state-owned financial institutions (Desai 1996).

reforms. As is the case in many countries, the US included, different levels and agencies of government often fail to "speak with one voice."

Project proponents felt that the USIJI program added little to or even detracted from the project development process. The USIJI evaluation process was not always transparent, and the program's capacity to support JI transactions was limited. In some cases, USIJI's efforts to inform host country officials about joint implementation--including host country rights and responsibilities--may have complicated matters for project proponents seeking closure. In fairness, however, it should be understood that USIJI is a pilot initiative and is not solely or explicitly intended to be a vehicle for promoting US environmental technology exports. It is also clear that the projects were considerably impeded by underdeveloped host-country institutions and by host-country political/bureaucratic dynamics that were unpredictable or poorly understood by JI project proponents.

Establishing a market value for greenhouse gas credits runs counter to the electric utilities' position of promoting voluntary emissions reductions but would generate demand for GHG-reducing technology vendors.

Project financing is another major challenge. Significantly, however, the project proponents have divergent perspectives regarding the speculative value for GHG credits.[13] An enforceable cap on GHG emissions in the project funders' countries, which is a prerequisite to establishing any significant market for the credits, is contrary to the US electric utilities' position of promoting voluntary emissions reductions. In the case of the Decin project, the credits' lack of financial value only prevented the proponents from securing underwriters insurance on a relatively small exposure to financial risk. For a technology vendor such as Aquatech, however, establishing a value for the GHG credits is viewed as a development that would help generate demand for the firm's stock in trade.

[13] The first recorded carbon dioxin emissions trade recently occurred between the Government of Costa Rica and the Chicago-based Centre Financial Products, Ltd. (*Environment Reporter*, May 30, 1997, pp. 188-189).

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