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Title **Final evaluation of the Project:

Integrated Approach to Wood
Waste Combustion for Heat
Production in Poland**

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EXECUTIVE SUMMARY

Description of the project

The objective of the project '*Integrated Approach to Wood Waste Combustion for Heat Production in Poland*' is to remove barriers to, and promote the efficient use of, sustainably produced wood-waste for the production of heat, thereby assisting Poland to reduce its greenhouse gas emissions.

The project sought to:

- Promote the use of wood waste, produced locally and in a sustainable way, as fuel for space heating in order to eliminate the existing solid fuel boilers powered by coal;
- Enhance the environmental and economic impact of such replacements and optimize the use of wood waste by integrating fuel conversion investments with energy efficiency improvements on the demand side;
- Provide a replicable and economically viable example of such an approach by creating a local wood waste market operated on a commercial basis by a company buying wood waste and providing thermal comfort to heat consumers;
- Provide an example of inter-municipal and public-private co-operation in managing renewable energy resources by creating an Inter-Municipal Public-Private Partnership company (IMPPP); and
- Assist in removing institutional, financial, and information/ awareness barriers to efficient use of wood waste for heat production.

Context and purpose of the evaluation

The evaluation of the '*Integrated Approach to Wood Waste Combustion for Heat Production in Poland*' was carried out between 4 and 23 September 2008 by Mr. M.W. Vis and included analyses of project documentation and interviews at UNDP Poland in Warsaw; visits to project sites; interviews with the project manager, members of the Steering Committee, one of the involved UNDP officers and other project participants.

The purpose of the evaluation is:

- To assess the project concept and design.
- To assess the implementation of the project in terms of quality and timeliness of inputs and efficiency and effectiveness of activities carried out.
- To assess and rate the achievement of outputs and outcomes as well as the impact achieved by the project and the likely sustainability of project results (including review of GHG emission reduction calculations of the project).
- The evaluation will also examine if the project had significant unexpected effects, whether of beneficial or detrimental character.

Main conclusions, recommendations and lessons learned

One of the immediate objectives *IO 1: Create an example of an inter-municipal and public-private partnership company to manage biomass energy resources at the local level in integrated and optimal manner as part of the Jordanów/Bystra-Sidzina model investment project* was not achieved.

- Considerable effort was spent on establishing the inter-municipal public private partnership (in short IMPPP). However, private partner Bio-Energia ESP finally

was willing to invest first only in the briquetting factory, and later in district heating networks, as the latter was expected to be unprofitable. The private partner withdrew from the IMPPP and finally a ‘public - public’ partnership Biomasa BSJ was established between with the municipalities of Jordanow and Bystra-Sidzina.

- The Municipality of Jordanow was not able to arrange sufficient co-financing to secure a conditionally approved EcoFund grant and therefore establishment of the district-heating network and biomass storage facility/briquetting factory became impossible.
- Finally, a pipeline of five biomass boilers was successfully implemented in the region around Krakow of which two boilers in the initially involved municipality of Jordanow.

The immediate objective IO2 was to *increase the use of wood waste produced locally and sustainably as a fuel for space heating in order to eliminate the existing solid fuel boilers powered by coal in Poland* and consists of information dissemination activities, establishment of an information centre, publication of energy guidelines and development of a marketing plan and enhancement of in country projects.

- A number of articles and leaflets were produced, seminars visited, a biomass internet service was launched, energy audit contests for schools were organised and a closing seminar was held.
- The energy guidelines were not implemented as proposed for no objective reason. This should be corrected.
- The information centre was not implemented as planned, mainly because of poor personal relations resulting from the initial phase of the project.
- The establishment of the website www.biomasa.org is seen as a useful addition to the information dissemination activities.

Parts of the evaluated issues were rated according to the GEF Project Review Criteria. The ratings are summarised in the table below.

| | HS | S | MS | U | NA |
|---|----|---|----|---|----|
| Conceptualization/design of project formulation | | X | | | |
| Implementation approach | | X | | | |
| Monitoring and evaluation | | X | | | |
| Stakeholder participation | | | X | | |
| Attainment of Outcome/Achievement of objectives | | | X | | |

Rating: HS: Highly Satisfactory; S: Satisfactory; MS: Marginally Satisfactory; U: Unsatisfactory; NA: Not applicable.

Overall, it is concluded that the project results are marginally satisfactory.

The following lessons can be learned from this project.

- The long time span between project proposal preparation (in 1998) and project implementation (in 2002) led to decreased relevance of the project outcomes - the wood waste biomass market had developed itself already - and reduced support from local communities. The delays were partly caused by the long time needed to find an executing agency and non-acceptance of the initially proposed

Implementing Agency. The PDF-A phase of this type of projects has a duration of maximally one year. It is suggested that in future this period could be limited to three or four months.

- The above-described time span between project idea and implementation phase but also the top-down approach of the project caused a passive attitude of the municipal project beneficiaries. A project design in which the project beneficiaries are actively participating, or better, project initiators, would be preferred. However, in practise the municipalities as main project beneficiaries might not have had the right capabilities to prepare such a proposal.
- If possible, removal of the project proposer as implementing agency - as befallen in this project - should be avoided, as it complicates sound implementation of the project. The new implementing agency was not the author of the project proposal, and moreover, it created poor working relations with the project proposer, who was still responsible for part of the tasks.
- The set up of the inter-municipal public private partnership proved to be a very difficult process, and although it was innovative, the IMPPP did not generate real added value to the project. Even if all parties involved had fully cooperated, the formal establishment of the IMPPP would have been very hard, due to complex Polish legislation on IMPPP introduced after project approval.
- The successful implementation of the project depended on the successful acquisition of parallel financing from funds, which was not obtained. The most obvious reason was the lack of co-financing from the municipalities. Although the general impression is that the project manager performed to the best of his abilities, non-approval of funding did not directly affect the Implementing Agency financially. In general, a project design could be better designed in such a way that the project will be cancelled as soon as it is clear that insufficient co-financing can be arranged.

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ABBREVIATIONS

| | |
|-----------------|---|
| (R) | Item that is rated according to the GEF Project Review Criteria |
| AAU | Assigned Amount Unit (emission allowance of 1 tonne of CO ₂ equivalent) |
| Academy | Faculty of Fuels and Energy of the Academy of Mining and Metallurgy in Krakow |
| CO ₂ | Carbon Dioxide (a greenhouse gas) |
| ESP | ESP Pumped Storage Power Plants S.A. |
| EU | European Union |
| FEWE | Polish Foundation for Energy Efficiency |
| GEF | Global Environmental Fund |
| GJ | Giga Joule (unit of energy) |
| IA | Implementing Agency |
| IMPPP | Inter-Municipal Public Private Partnership |
| IO | Immediate Objective |
| kW | kiloWatt (unit of energy capacity) |
| NGO | Non Governmental Organization |
| PDF-A | Initial grant for preparation of project documentation for medium/large GEF project |
| PEPF | Polish Environmental Partnership Foundation |
| RES-E | Renewable electricity |
| Tonne | Metric Tonne (1000 kg) |
| UNDP | United Nations Development Program |

1 INTRODUCTION

1.1 PURPOSE OF THE EVALUATION

The Monitoring and Evaluation (M&E) policy at the project level in UNDP/GEF has four objectives:

- i) to monitor and evaluate results and impacts;
- ii) to provide a basis for decision making on necessary amendments and improvements;
- iii) to promote accountability for resource use;
- iv) to document, provide feedback on, and disseminate lessons learned.

The purpose of this final evaluation is:

- To assess the project concept and design
- To assess the implementation of the project in terms of quality and timeliness of inputs and efficiency and effectiveness of activities carried out.
- To assess and rate the achievement of outputs and outcomes as well as the impact achieved by the project and the likely sustainability of project results (including review of GHG emission reduction calculations of the project).
- The evaluation will also examine if the project had significant unexpected effects, whether of beneficial or detrimental character.

The evaluation of the 'Integrated Approach to Wood Waste Combustion for Heat Production in Poland' was carried out between 4 and 23 September 2008 by Mr. M.W. Vis and included analyses of project documentation and interviews at UNDP Poland in Warsaw; visits to project sites; interviews with the project manager, members of the Steering Committee, one of the involved UNDP officers and other project participants.

The findings, recommendations, lessons learned, and rating on performance can be found in this evaluation report.

1.2 METHODOLOGY OF THE EVALUATION

The evaluation is based on the study of documents and interviews with key persons involved in the project, i.e. representatives of the implementing agency, UNDP project staff, the Project Coordinator and other involved municipalities, the Steering Committee, as well as other partners, stakeholders and beneficiaries.

The evaluator has analyzed the main documentation related to the project, including the project document, quarterly and annual reports as well as the final report. Also the mid-term evaluation report and the report of a 'specially managed project review' of 2004 have been used. A complete list of reviewed documents can be found in Annex E.

Based on the analysis of the above-described documents, and especially the quarterly reports of 2002-2006, a list of questions has been prepared addressing any issue needing explanation from key persons involved in the project, in particular the project manager, Mr. Ziemowit Pochitonow of Polish Environmental Partnership Foundation (PEPF).

Mr. Pochitonow was interviewed in his office in Krakow, and he also organised and joined the evaluator during two days of visits to several project beneficiaries: a nursing home for handicapped people in Lyszkowice, the Municipality and primary school of Jordanow. Moreover, the surroundings of the Municipalities of Jordanow and Bystra-Sidzina with most wood processing industries were visited, as well as the location where the wood storage facility and briquetting factory was planned.

Additionally, the following persons have been interviewed:

- Ms. Monika Lesz, - Chairperson of the Steering Committee and representative of the Ministry of Environment (Executing Agency of the project);
- Mr. Przemyslaw Czajkowski - Responsible UNDP project coordinator at the time of project implementation; and
- Mr. Jerzy Janota Bzowski - Representative of the Ecofund that was envisaged to provide a large part of the co-financing to the project.

After the mission to Poland, Prof Adam Gula has been approached. He is one of the main initiators of the projects, involved in the Polish Foundation for Energy Efficiency (FEWE) and associated with the Faculty of Fuels and Energy at the University of Mining and Metallurgy in Krakow. Both organisations performed parts of the project.

A complete list of interviewed persons can be found in Annex C.

The current UNDP project officer Ms. Aleksandra Krukar, supported the evaluation mission. She was not involved in the project during its implementation phase in 2002-2006.

Although the evaluation took place more than 1.5 years after the project finalisation, it was possible to interview sufficient key persons involved in the project to evaluate the project properly.

1.3 STRUCTURE OF THE EVALUATION

The project and its development context are described in chapter 2. The findings on the project formulation, implementation and results of the projects are elaborated on in chapter 3. The evaluated issues are described below:

1. Project formulation

- Conceptualization/Design (R)
- Country ownership/Drivenness
- Stakeholder participation in the project
- Replication approach
- Cost-effectiveness
- UNDP comparative advantage as IA of the project
- Linkages between project and other interventions within the sector
- Management arrangements

2. Implementation

- Implementation approach (R)
- Monitoring and evaluation (R)
- Stakeholder participation (R)
- Financial Planning
- Sustainability
- Execution and implementation modalities

3. Results

- Attainment of Outcomes/Achievement of objectives (R)
- Sustainability
- Contribution to upgrading skills of the national staff

In addition to a descriptive assessment, all criteria marked with (R) have been rated using the following divisions (according to GEF Project Review Criteria).

| Abbreviation | Rating |
|---------------------|-------------------------|
| HS | Highly Satisfactory |
| S | Satisfactory |
| MS | Marginally Satisfactory |
| U | Unsatisfactory |
| NA | Not applicable |

The recommendations and lessons learned can be found in chapters 4 and 5, respectively.

2.1 PROJECT START AND ITS DURATIONProject start

- On 16 March 2001, the GEF project 'Integrated Approach to Wood-Waste Combustion for Heat Production in Poland' was approved by UNDP.
- Because the proposed implementing agency withdrew and later the PEPF was selected as implementing agency, the project document was updated and signed on 21 June 2002 by UNDP, the Ministry of Environment (Executing Agency) and PEPF (Implementing agency).
- The contract for implementation of the project with PEPF was signed on 22 July 2002.

Project duration

- The project initially had a duration of 36 months, ending in June 2005.
- The project duration was extended for 12 months until June 2006 and in practice the project has been operational until December 2006.

2.2 PROBLEMS THAT THE PROJECT SEEKS TO ADDRESS

The project document describes the following problems that the project seeks to address. The partial deregulation of the energy sector has led to a dramatic increase in the costs of space heating. Wood waste in Poland is utilized at a rate far below its potential. Even when wood waste is used for space heating, a large portion of heat is lost at point of use in poorly insulated buildings. In the wood processing facilities, the main goal of burning wood waste is often to eliminate the waste rather than to produce useful heat. A final problem is that wood waste disposal is relatively expensive and landfills are often absent in smaller communities. A common practice in response to that lack of disposal options is to dump wood waste into rivers, ponds or along roadsides.

In order to avoid dumping of wood waste and promote its utilization in an energy efficient manner, as described in the project document, the project addresses the following barriers:

Institutional barriers

- Supply orientation of heat companies aiming to maximize sales: Heat companies are traditionally supply-oriented and aim to maximize their sales. As a rule they are not interested in (and often are opposed to) improving the thermal parameters of their customers' buildings. Consequently, given the limited potential of biomass resources in a given area, the CO₂ elimination potential that would result from fuel conversion is reduced.
- Inter-municipal co-operation needed to use biomass resources optimally: the greatest potential of wood waste use for energy production exists in joint action of several neighboring municipalities, which may enable them to optimally allocate biomass

resources. At the same time, no experience or tradition exists of inter-municipal co-operation in this area in Poland.

Financial (and market) barriers

- Competition: Aggressive marketing of gas and oil offering attractive terms of delivery and payments means that municipalities opt for these fuels rather than biomass. A comparable in-country capacity to promote biomass equipment does not exist.
- It can be difficult to finance biomass projects, because investors and developers lack knowledge about project-specific economics and available financing sources.

Information/awareness barriers

- Decision makers seldom realize that biomass can be a viable, valuable and environmentally-benign supplementary local source of energy. Consequently it attracts little attention in the process of national, regional or local energy planning.
- In addition there are no examples of stable long-term contracts for wood waste delivery.
- Lack of information on biomass technology also leads to outdated perceptions of the market. For example, heating with wood is often associated with old-fashioned technologies that were used in rural areas in the past.
- Environmental awareness of potential investors or project developers is very low.
- Consumers are not aware that demand-side management investment would not increase their heat bills, because it would reduce overall consumption. Heat suppliers, which are traditionally sales-oriented, have not spread this message.

2.3 IMMEDIATE AND DEVELOPMENT OBJECTIVES OF THE PROJECT

The development objective of the proposed project is *to reduce greenhouse gas emissions in the energy sector by reducing barriers to the market for biomass energy.*

In order to contribute to the achievement of the overall objective, the UNDP intervention will be used to achieve two immediate objectives (IO):

- IO 1: Create an example of an inter-municipal and public-private partnership company to manage biomass energy resources at the local level in integrated and optimal manner as part of the Jordanów/Bystra-Sidzina model investment project.
- IO 2: Increase the use of wood waste produced locally and sustainably as a fuel for space heating in order to eliminate the existing solid fuel boilers powered by coal in Poland.

These immediate objectives have been translated into a number of project outcomes and activities.

IO 1 should lead to the following outcomes:

- Outcome 1: Inter-Municipal Public-Private Partnership Company in Jordanów/Bystra-Sidzina area.
- Outcome 2: Long-Term Wood Waste Purchase and Heat Sale Contracts and other Actions Securing the Stable Development of the Wood Waste Market.

-
- Outcome 3: Integrated Approach to Fuel Conversion Combined with Monitoring and Assessment of the Environmental Impact.

IO 2 should lead to the following results.

- Outcome 4: Information Campaign Promoting Biomass Energy
 - Activity 4.1: Information to promote biomass energy developed and disseminated;
 - Activity 4.2: Establishment of an Information Centre;
 - Activity 4.3: Publication of biomass energy guidelines.
- Outcome 5: Development of Marketing Plan and Project Pipeline
 - Activity 5.1: Development of a Marketing Plan and Enhancement of in-country projects;
 - Activity 5.2: Development of a pipeline of projects.

2.4 MAIN STAKEHOLDERS

The most important direct beneficiaries of the project will be the local communities for which the use of the locally produced wood waste will constitute an additional source of income and who will also benefit from the improved quality of the local environment through eliminating coal combustion for heating, leading to better air quality, and eliminating dumping of wood-waste in unauthorised sites, thereby reducing soil and water pollution.

Other key stakeholders and beneficiaries for the outcomes of the project include:

- Local authorities (responsible for delivery of heat and other services to consumers)
- Government ministries, in particular
 - Ministry of Environment (responsible for Renewable Energy Policy)
 - Ministry of Economy (responsible for Energy Policy)
 - Ministry of Agriculture and Rural Development (responsible for Forestry Policy)
- Energy companies (power sector in generation, transmission, and distribution; and heat supply and distribution)
- Oil, Coal and Gas industries (competitors)
- Wood / biomass industries (using wood resources and producing and using wood-waste)
- EcoFund, established by the Ministry of Finance to manage the Polish debt for environment swap
- The National Fund for Environmental Protection and Water Management
- The Voivodeship Funds
- Civil society and NGOs
- Corporate sector (equipment suppliers, services providers)
- Heat and power consumers.

RESULTS EXPECTED

As described in the project document, the following project results are expected:

- Substitution of circa 4 MW of hard-coal based heat production capacity in the region with about 4,000 tonnes of biomass per year (wood waste); this is equivalent to approximately 1,300 tonnes per year of hard coal.
- Establishment of local wood waste market to make full and optimal use of the local wood waste potential. A local company will be created that will purchase wood waste from local wood processing industries or workshops and timber mills and will manage this resource to provide maximum energy service to final heat consumers.
- Creation of human and institutional capacity to replicate integrated fossil fuel-to-waste conversion projects by establishing and making operational an information and training centre. Increased awareness levels and receptivity of decision-makers to biomass.
- Enhance carbon dioxide emissions reduction by conversion to biomass through simultaneous application of demand-side measures allowing heat producers to serve more consumers with the same amount of wood waste.
- Develop, publish and widely distribute guidelines for the inclusion of an integrated conversion/efficiency approach into Polish municipal energy plans.
- Prepare a pipeline of five investment projects.
- Precise estimates for the amount of CO₂ reductions from the project were not given in advance of the project. However, a very conservative rough estimate for the lower limit of coals substitution of approximately 14,500 tonnes of CO₂ annually was stated.

3 FINDINGS

3.1 PROJECT FORMULATION

3.1.1 Conceptualization/Design

The logical framework of objectives, outputs, indicators and activities follows the structure of Immediate Objective (IO's) and outcomes as described in section 2.3. Furthermore, the logical framework contains a detailed structure of indicators and additionally a description of the monitoring activities. The logical framework is presented in Annex B. The project contains two immediate objectives IO 1 and IO 2 and their related activities are analyzed below.

Immediate objective 1

Immediate objective 1 (IO 1): *creation of an example of an inter-municipal and public private partnership company to manage biomass energy resources at the local level in an integrated and optimal manner* requires the performance of multiple activities:

- Outcome 1. Creation of inter-municipal public private partnership (IMPPP).
- Outcome 2. Wood waste and heat purchase contracts developed and signed.
- Outcome 3. Integrated approach to fuel-switching implemented.

General

Each of the outcomes is essential to the overall success of the project. For instance if the IMPPP cannot be established, the execution of the integrated approach to fuel-switch is endangered. With all eyes focused on a project that should demonstrate best practice, but is as complex as this, there is a significant risk that the result will not be one of best practice. This makes the project design vulnerable to failure.

Outcome 1: Creation of inter-municipal public private partnership (IMPPP)

In particular the creation of an IMPPP could be (and turned out to be) a rather complex process and proved to be a potential risk to the project. At the time of the project, the legal status of public private partnerships was not described in Polish law. Alternatives for the creation of the IMPPP were not described. It is also observed that establishment of public private partnership is an innovative element that at the time of project formulation might have been highly valued at GEF/UNDP, and could have been important for obtaining project approval.

Outcome 2: Wood waste and heat purchase contracts developed and signed

One of the supposed barriers was the absence of long-term wood-waste purchase contracts. It is questionable whether lack of these was really a barrier to the development of a biomass market in Poland.

Outcome 3: Integrated approach to fuel-switching implemented

Outcome three involves the installation of three district heat networks fuelled by three biomass boilers that supply heat to buildings that have undergone DSM measures. The commissioning of a wood storage facility was not mentioned in the logical framework,

but described in the project document under outcome 3 and therefore regarded as one of the indicators.

The performance of energy audits to buildings that will be connected to a biomass district heating network seems relevant. It can help owners of buildings to consider energy saving measures such as insulation. There is however a risk that energy audits are performed without much potential impact. The process of selecting the buildings has not been described. Ideally, energy audits should be performed only if the owner has at least the intention to perform measures described in the energy audits.

The establishment of a waste wood storage facility is foreseen in the project. However, the project design did not foresee in the processing of waste wood into chips, briquettes or pellets that can be easily fed into biomass boilers; in the course of the project this element was rightly added. The project proposal assumes establishment of three district-heating networks. The implementation of district heating networks will likely exceed the project duration of three years.

Immediate objective 2

Immediate objective 2: *increase the use of wood waste produced locally and sustainably as a fuel for space heating in order to eliminate the existing solid fuel boilers powered by coal in Poland* is envisaged to be met by the following activities:

- Organization of a number of seminars (activity 4.1);
- Establishment of an Information centre (activity 4.2);
- Publication of biomass energy guidelines (activity 4.3)
- Development of a marketing plan (activity 5.1);
- Development of pipeline of projects (activity 5.2).

Organization of seminars

Dissemination seminars can be a useful tool if the target audiences are reached effectively.

Information centre

The Information Centre will promote biomass use for energy through publications, seminars and direct consultations. The targeted audience for the Centre will be local decision makers, investors and developers. The centre will provide specific information on the environmental and economic advantages of biomass, biomass technology and sources of financing.

The idea of the information centre is relevant and could play an important part in information dissemination provided that the information centre is easily accessible and its availability is communicated to the stakeholders. Since these aspects are not worked out in the project document, they need to be elaborated on in the project's implementation phase.

Biomass energy guidelines

The biomass energy guidelines for municipal energy planners *will include basic information about biomass as an energy source, approaches to estimating resources,*

integrated planning methods, available technologies and financing tools and case studies based on the present project. (...) Bridging the information gap on biomass through the guide for energy planners will increase the competitiveness of biomass relative to gas and oil. In addition, the financial section of the guide will be designed to increase the knowledge of potential investors and developers about innovative financing sources for biomass projects.

The energy guidelines can potentially be a powerful tool to disseminate bioenergy and the knowledge and skills developed during the project to other municipalities, provided that the energy guidelines are disseminated and actually reach the target groups.

Development of a marketing plan

The development of the marketing plan is not described very well. It is not clear for whom the marketing plan should be prepared; internally or externally. If for external use, it is not clearly described how it will be communicated to others.

3.1.2 Country ownership/Driveness

The basic idea to use waste wood is very relevant to the local communities. There was a large supply of waste wood available in the project area and its utilization is relevant in the face of global environmental impacts (CO₂ emission reduction), local environmental impacts (avoiding pollution by wood waste) and local economic development purposes.

At the time of its start up, the project fitted well in the energy and environmental policies of Poland:

- Poland's strategic objective in the renewable energy sector is to increase the share of energy from renewable sources to 7.5% of total primary energy in 2010 to 14% in 2020. These targets are political objectives as agreed on at EU level.
- Based on an analysis conducted by the Ministry of Environment, and presented in "Development Strategy of Renewable Energy Sector", adopted by the Council of Ministers on 5 September 2000, and Parliament on 23 August 2001 (document number 2215), Poland's strategy will mainly focus on the utilisation of biomass resources. This is based on both current levels of use and the technical potential.
- Poland has fully participated in the global climate change deliberations and is a signatory to the Kyoto Protocol. Poland is an Annex 1 country, meaning that it has to achieve a GHG emissions target by 2008-2012 of 6 percent from its base period. The use of renewables and improved energy efficiency are seen as important elements in the climate change strategy as reflected in the third national communication to the UNFCCC.
- It is the energy sector that contributes mostly to aggregate emissions of greenhouse gases, which includes emission from fuel combustion and fugitive emission from fuels. In 1988 the energy sector accounted for 87.1% of total emissions, falling to 84.6% in 1999. The importance of the other sources is comparatively insignificant with Agriculture accounting for 7% of total emissions in 1999.
- Direct reference to greenhouse gas emissions is included in legal provisions laying down the principles for energy management and energy resource saving, as well as those supporting the increase in the use of renewable energy sources. Making use of a 'renewable obligations' approach, and based on an order of the Minister of Economy

of 15 December 2000, power distribution companies are required to gradually raise the rate of energy originated from renewable energy sources in the Polish energy balance from 2.4% in 2001 up-to 7.5% in 2010.

All of these aspects demonstrate that renewable energy, energy efficiency and greenhouse gas reductions were - and still are - high priorities for Poland and that this project was relevant to the country and to municipalities.

3.1.3 Stakeholder participation in the project

Stakeholder participation is not explicitly addressed in the project document. The following can be said about implicit stakeholder participation in the project.

- The establishment of the IMPPP (Outcome 1) will require intense participation of the involved municipalities of Jordanow and Bystra-Sidzina.
- The development of wood waste purchase contracts will require identification and participation of wood waste suppliers.
- A main weak point of the project proposal is that none of these beneficiaries were involved as partners in the project proposal and that in fact a top down approach was used. These beneficiaries are not owner of the project, yet crucial to the successful implementation of the project idea.

Parallel financing is also essential to the success of the project. Rightfully, representatives of funds like the Ecofund were active in the Steering Committee.

3.1.4 Replication approach

The establishment of an Information Centre and publication of energy guidelines as described in section 3.1.4 promote replication of the project. Moreover, the project proposes to develop a portfolio of five projects, selected according to available wood waste supply, environmental impact, costs effectiveness compared to fossil fuels and involvement and support of local administration and readiness of the wood waste supplier and buyers to enter into long-term contracts. The replication of the demonstration project however, will largely depend on external factors, especially the price development of biomass and fossil fuels, and the availability and accessibility of funds to support investments in bioenergy. It is concluded that, within its possibilities, the project design contains sufficient effort to replicate the best practice example created in the project.

3.1.5 Cost-effectiveness

The project document contains a summary of the allocation of funds, which is replicated in Table 1 below. If the project would have been implemented according to the project document, the project would have a volume of 2.69 mln. USD, of which 1.93 mln. (71%) would be spend on equipment and land. An amount of 1.55 mln. USD of land and equipment will be secured from 'other' resources, like the Ecofund, the National fund for Environmental protection and water management and other appropriate bodies.

If the project fails to attract parallel financing from other parties, the project would have a volume of 1,142,700 USD, of which 207,500 USD (18%) would be allocated to equipment, compared to a GEF contribution of 767,500 spent mainly on project management, and national subcontracts. These numbers make clear that securing

sufficient parallel financing is essential to achieve a healthy share of investment costs compared to other project costs.

Table 1 Allocation of funds table (in USD) (Annex 2. of project document)

| Component | Source of funds (in USD) | | | | |
|----------------------------------|--------------------------|----------------|------------|----------------|------------------|
| | Total | Recipients | Government | UNDP | Other |
| Project management and personnel | 286,110 | 0 | 0 | 286,110 | 0 |
| Contracts | 436,000 | 0 | 0 | 436,000 | 0 |
| Training | 2,390 | 0 | 0 | 2,390 | 0 |
| Equipment/land | 1,925,200 | 162,700 | 0 | 207,500 | 1,550,000 |
| Miscellaneous | 18,000 | 0 | 0 | 18,000 | 0 |
| PDF-A | 25,000 | 0 | 0 | 25,000 | 0 |
| Total | 2,692,700 | 162,700 | 0 | 975,000 | 1,550,000 |

The budget for (mainly national) subcontracts can be subdivided as follows:

- 249 kUSD for activities related to immediate output 1 (the IMPPP establishment, supply and demand side studies, energy audits, etc.);
- 77 kUSD for ‘soft’ dissemination activities; and
- 100 kUSD for the pipeline of projects.

This budget is considerable and should be sufficient to create high quality outputs.

The costs for project management and personnel of 286,110 USD also forms a considerable part of the GEF project budget. The budget indicates 222 man months in three years, corresponding with 6.2 fte in three years time, which seems to be too much since a large part of the activities are subcontracted.

3.1.6 UNDP comparative advantage of IA of the project

The project document does not comment on the role of UNDP as IA of the project. In the project design phase, UNDP Poland was enthusiastic about the project and promoted inclusion of the IMPPP as innovate element in the project. The role of UNDP is evaluated elsewhere in the report, for instance in section 3.2.2 on *monitoring and evaluation* during project implementation.

3.1.7 Linkages between project and other interventions within the sector

The project contributes to the development of the bio-energy sector, and the project document describes the following linkages with other interventions within the bio-energy sector.

- Funds like the Ecofund, National Fund for Environmental Protection and Water Management and the Krakow Regional Fund for Environmental Protection and Water Management are available to support, among other things, bioenergy projects. The project seeks parallel financing from these funds.
- According to the project documents the establishment of the Information Centre will partly be supported by the PHARE-TEMPUS Project “Courses on sustainable Energy for Local Administrators”.

-
- The Biomass Energy Guidelines will use parts of work developed in other projects funded by USAID, the aforementioned TEMPUS course, previous publications of the Polish Network Energie Cites, and the FEWE.

The parallel funding is essential for the successful implementation of the example project. The linkage to other projects supported by PHARE-TEMPUS project and USAID could strengthen the resulting information centre and energy guidelines, provided that the allocation of GEF funding can be justified in a transparent way.

3.1.8 Management arrangements

The following management arrangements have been made in the project document:

- The *Executing Agency* for the project will be the Department of Investments and Technology Development (DITD) of the Ministry of Environment.
- The National Director, nominated by the Ministry of Environment, will form the *Steering Committee*, responsible for monitoring, evaluation and supervision of the project implementation as a whole.
- The *Implementing Agency* will be PEPF, a non-profit organization with the task to manage the GEF funds together with the funds raised from other sources.
- The *Project Manager* will be selected through a transparent selection tender by UNDP. The project manager will select the project team that will be hired by PEPF. The roles of the diverse functions in the project team are described briefly. The subcontractors and suppliers need to report to PEPF.
- The project manager will prepare and submit to UNDP and PEPF quarterly technical and financial reports on the progress, which are forwarded to the Executing Agency.
- The project manager will report on the status of the GEF funds to the Executing Agency every 6 months. The report requires approval of the Steering Committee.
- The project will be subject to tripartite review (a review by representatives of the government and the UNDP) at least once every 12 months. The tripartite review will coincide with Steering Committee meetings.

The above-described reporting structure enables UNDP, the Executing Agency and Steering Committee to stay well informed on the progress of the project. This makes it possible to provide timely suggestions and feedback to the project manager.

3.2 IMPLEMENTATION

3.2.1 Implementation approach

The evaluation of the implementation approach contains an assessment of:

1. The use of the logical framework as a management tool during implementation and any changes made to this as a response to changing conditions;
2. Other elements that indicate adaptive management such as comprehensive and realistic work plans routinely developed that reflect adaptive management and/or; changes in management arrangements to enhance implementation.
3. The project's use/establishment of electronic information technologies to support implementation, participation and monitoring, as well as other project activities.
4. The general operational relationships between the institutions involved and others and how these relationships have contributed to effective implementation and achievement of project objectives.
5. Technical capacities associated with the project and their role in project development, management and achievements.

1 & 2. The use of the logical framework and other elements that indicate adaptive management.

During the project no formal changes were made to the logical framework and project document. In practice, however, several elements have been changed during project implementation, in most cases with approval of the Steering Committee.

The project design did not foresee in the processing of waste wood into chips, briquettes or pellets that can be easily fed into biomass boilers; in the course of the project this element was rightly added. This change makes much sense, since wood waste as such can generally not be fed into biomass boilers, and moreover, considerable less storage space is needed and transport of the biomass to end users is much easier. The surplus of pellets, chips or briquettes can be sold to interested parties outside the region.

In the course of the project a number of developments made it impossible to meet the outcomes of IO 1.

- The commercial partner Bio-Energia ESP postponed joining the IMPPP 'Biomasa BSJ', basically because they doubted the feasibility of the district heating system of Jordanow.
- The City of Jordanow was unable to secure 275 kPLN for the project due to insufficient budget resources. The conditionally approved Ecofund grant of 1,629 kPLN was subsequently withdrawn.
- The municipality of Bystra-Sidzina discontinued participation.
- The briquetting plant suffered problems with the permits and lack of interest from the municipality of Bystra-Sidzina.

In the quarterly report of April-June 2005, it was reported that PEPF had stopped with creation of inter-municipal public private partnership (IMPPP), wood waste and heat purchase contracts and the integrated approach to fuel-switching. After these dramatic

developments, the emphasis of the project was put on activity 5.2: the development of a pipeline of projects. Beside the pre-feasibility studies, as described in the logical framework, the activities additionally included the technical design, tender procedures, installation and commissioning of boilers. By implementation of these changes the remaining budget could be spend on the installation of biomass boilers. It is observed that in absence of the IMPPP, the implementation of boilers could take place in a more effective way.

In spring 2004, representatives of the Academy of Mining and Metallurgy (in short: the Academy) have proposed to allocate GEF funds to cover the costs of purchase and installation of a biomass boiler and some office equipment. A contractual agreement was prepared and signed indicating that in exchange for the boiler, the Academy would set up the Information Centre (activity 4.2). This way the Implementing Agency lost control on the implementation of this Information Centre. This deviance from the logical framework was apparently approved by the Steering Committee and appears to be rooted in the poor relationship between the Academy and the Implementing Agency.

3. The project's use/establishment of electronic information technologies to support implementation, participation and monitoring, as well as other project activities.

PEPF has established a dedicated internet service www.biomasa.org. The main objective of this website is to promote biomass as a renewable energy source by providing solid and actual information. The site is still online and operational and contains news from August 2008 for instance. According to the final report it also served as an official GEF project webpage aimed to disseminate information about the project and experience gained during project implementation. PEPF has received budget for office equipment, which was used for project management activities.

4. The general operational relationships between the institutions involved and others and their contribution to effective implementation and achievement of project objectives.

The project document proposed an implementation team of seven people, which was reduced to three during implementation, which seems more appropriate. The Mid Term Evaluation report states that *communication between the different staff members within PEPF is well organized. The level of cooperation of staff members appears to be good – this is to be expected from such a small team.* This observation will be followed, since the project team was not present anymore during the final evaluation.

The general relationships between the Implementing Agency and the municipalities of Jordanow and Bystra-Sidzina have been good. However, in the late nineties already the municipalities were informed about the upcoming project activities and not until 2002 the implementation phase started. These delays caused loss of interest of the municipalities, also because the mayors have a mandate of four years and need to show results to their communities within this period. Moreover, after election of a new mayor, many issues agreed on with the former mayor needed to be discussed again; this happened in Bystra-Sidzina.

The general operational relationships between the PEPF as implementing Agency on the one hand and FEWE, ESP and the Academy on the other hand are partly determined by the course of developments before project start up:

- A ‘Screening Evaluation Mission’ from UNDP concluded that the project proposer, FEWE Krakow did not have the necessary management capacity to implement the project. Internal disagreements between FEWE Krakow and FEWE Katowice appear to have isolated the Krakow office on project implementation issues.
- ESP was then proposed as Implementing Agency. However, this commercial partner refused to be Implementing Agency unless the Government would guarantee them a 10% ROI from the project. The Ministry of Environment naturally refused to do this. ESP therefore withdrew from the project.
- The ‘Environmental Partnership’ was then approached and accepted in 2002. Since ESP withdrew, co-financing was reduced with respect to the original project brief.
- The Implementing Agency was then faced with the situation where they had no more documentation than the Project Document, since the feasibility study carried out by ESP during the PDF-A phase of the project was claimed as the property of ESP.
- Almost a whole year of negotiations to purchase or redo the feasibility study followed. In May 2003 ESP rejoined the project as private investor as was originally envisioned.
- Representatives of FEWE Krakow and the Academy did not appreciate the introduction of PEPF as new Implementing Agency (that was never involved in the project’s design phase). The relationship between the Project Manager and the Academy remained poor and negatively affected the information dissemination part of the project.

The communication with the Steering Committee and the management of the Environmental Partnership appears to be good. The recommendations and suggestions of the Steering Committee are generally incorporated into the development of the project.

5. Technical capacities associated with the project and their role in project development, management and achievements.

According to the mid-term evaluation, PEPF staff members were appropriately experienced for their tasks and appeared motivated to achieve the objectives of the project.

There was no technical (biomass energy) expert in the PEPF project team, and for the various activities specialised companies were hired through national subcontracts, as planned in the project document. For the installation of boilers tender procedures have been prepared and carried out.

FEWE has performed 42 energy audits based on national standards, which can be used for obtaining subsidies for demand side measures. According to a representative of the Jordanow Municipality, the next five years the energy audits will remain valid. According PEPF and the project beneficiaries, these official energy audits tend to overestimate the energy demand, leading to the installation of plant capacities larger than needed. Some assumptions in the national standards should be adjusted to present reality more

accurately. Although the energy audits are carried out properly, it hardly resulted in any application for energy saving measures. Project beneficiaries did not give high priority to these measures mainly because of their costs.

3.2.2 Monitoring and evaluation

Regarding the role of the UNDP in the project the following has been observed:

- At the start of the project UNDP and the Executing Agency (Ministry of Environment) agreed that UNDP would carry out the financial administration of the project including payments to the Implementing Agency. This way the financial administration could be performed more effectively.
- Short-term difficulties were being experienced with the ATLAS budget management system introduced world-wide by UNDP leading to delays in payment to the Implementing Agency in 2004.
- During the project implementation some UNDP staff changes have occurred, but most of the time Ms. Napieralska was the responsible project officer, mainly doing the (financial) administration from UNDP side. She does not work with UNDP Poland anymore and could therefore not be interviewed.
- Mr. Przemyslaw Czajkowski was officially assigned as manager of the small GEF program, but as a senior UNDP officer he was also involved in the Wood Waste project. Besides his enrolment in the Steering Committee he could not spend much time for monitoring from UNDP side.
- In 2004, a regular mid term evaluation was carried out by Eco. Ltd. Additionally, the GEF Monitoring and Evaluation Unit had randomly selected the Wood Waste generation project for mid term evaluation.
- The current final evaluation has been carried out 1.5 years after the project's finalization. However, sufficient information could be collected, especially because of the possibility to interview the project manager and availability of quarterly reports. In Jordanow a technical manager could be interviewed; the present mayor was not involved in the project. The visit to Krakow did not foresee in a visit to the Academy, but the responsible person could be reached by email and phone later on.

Regarding the executing agency:

- Related to monitoring and evaluation the Executing Agency did not play a very active role in the project. Ms. Monika Lesz of the Ministry of Environment however played an important role as chairperson of the Steering Committee.

Regarding the steering committee:

- The Steering Committee was a main actor monitoring and evaluating the project performance.
- The communication with the Steering Committee and the management of the Environmental Partnership appeared to be good.
- The recommendations and suggestions of the Steering Committee were generally followed up by the Implementing Agency.

Regarding the Implementing Agency:

- The project manager provided regular updates of the project results to UNDP, Steering Committee and Implementing Agency.
- The quarterly reports of the project manager gave a clear and to the point overview of the status of the project.
- The final report of the project manager in general gave a clear overview of the project results. The following observations were however made:
 - The report indicates a CO₂ reduction 465 Mt CO₂. In order to avoid confusion: the Mt means Metric tonnes, not Megatonnes, so in fact an emission reduction of 465 tonnes CO₂ per year was indicated.
 - There was no reporting on activity 4.3 *Publication of biomass energy guidelines*. This activity appeared not to have been carried out.
 - Related to activity 4.1 *Development of a marketing Plan and Enhancement of in-country projects*, also no specific information was found except that the execution of a feasibility study on the biomass boilers of the schools in Jordanow was mentioned. This activity was also not carried out.
 - The final report (on page 23) states that *the EcoFund Foundation at the beginning of September announced that all applications for co-financing for years 2006 and 2007 are withheld*. According to Mr. Bzowski of EcoFund, such a stop on applications for co-finance for the years 2006 and 2007 did not take place.

Regarding essential mid-term decision making:

- In the quarterly report of January – March 2005, it was stated that 500 kUSD was still available in the GEF budget, while the establishment of an IMPPP operating a district heating network became impossible because the conditionally approved EcoFund grant was cancelled since the Municipality of Jordanow was not able to arrange sufficient co-financing. Moreover, the Municipality of Bystra Sidzina discontinued participation. At that point the Implementing Agency advised to limit activities to implementation of two briquette boilers in two schools in Jordanow.
- At that time UNDP, the Executing Agency and Steering Committee could have seriously considered to stop the project and save the remaining budget.
- During interviews, three members of the Steering Committee (Mr. Czajkowski UNDP, Ms. Lesz – Ministry of Environment, Mr. Bzowski – Ecofund) have clearly indicated that the Steering Committee did not consider cancellation of the project. The evaluator would have expected that discontinuation of the project would at least have been considered, regardless of the outcome of this consideration. Especially UNDP, who provides the GEF funding, would have been expected to have a critical role.
- According to Mr. Czajkowski the Steering Committee strongly motivated the Implementing Agency to develop and implement the pipeline of projects. UNDP suggested inclusion of the Nursing Home in Lyszkowice as a possible location for a biomass boiler since they had already successfully implemented two small biomass boilers using small GEF funds.
- It is clear that UNDP and Steering Committee actively supported continuation of the project.

3.2.3 Stakeholder participation

The evaluation of the stakeholder participation contains an assessment of:

1. The production and dissemination of information generated by the project;
2. Local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project in this arena;
3. The establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation;
4. Involvement of governmental institutions in project implementation, the extent of governmental support of the project.

1. The production and dissemination of information generated by the project

PEPF has established a dedicated internet service (www.biomasa.org). The main objective of this website is to promote biomass as a renewable energy source by providing solid and actual information. The site is still online and operational and contains news from August 2008 for instance.

A number of articles and leaflets have been published, a visualization of the wood storage facility has been prepared, conference, seminars and trade fairs have been visited and a project closing conference has been held. The more permanent Information Centre has not been implemented at all.

2. Local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project in this arena

The owners of wood waste and owners of buildings form two groups of local resource users. Local resource users have been approached in the frame of a large survey on biomass availability. They also could indicate what percentage they could offer to the wood waste storage facility. Regarding the owners of buildings, it is not clear how much they were involved in the energy audits. Municipalities are supposedly owner of many of the audited buildings. The top down approach is a main weakness of the project that is inherently part of the project design.

3. The establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation

The participation of the municipalities as project beneficiaries was very passive. For instance, the establishment and operation of the inter-municipal partnership company 'Biomasa BSJ' was only possible thanks to the continuous effort of the Project Manager. Project proposals for funding submitted by Biomasa BSJ were actually prepared by the Implementing Agency. The municipalities however had shown some commitment by putting land as asset in Biomasa BSJ.

The acquiescent attitude of the municipalities could have multiple causes: (i) high expectations were developed in the late nineties although project implementation took place only in 2003; (ii) the project idea was not really owned by the municipalities and

therefore they were not very interested in active participation; (iii) mayors need to show results before the next elections and are less interested in long term projects; (iv) municipalities have limited budgets and need to set their priorities carefully; (vii) biomass boilers and DSM measures have less appeal than for example road improvements.

4. Involvement of governmental institutions in project implementation, the extent of governmental support of the project

Lack of country ownership has resulted in delay in identifying an executing agency and an implementation unit for the government. Finally, the Ministry of Environment was willing to take the position of executing agency. Generally, the Ministry of Environment as Executing Agency did not play a very active role in the project. However, Ms. Monika Lesz of the Ministry of Environment has played an active role as chairperson of the Steering Committee.

The Ecofund was represented in the Steering Committee and applications for funding have been submitted to the Ecofund. Conditional funding for the district-heating network could not be obtained because the municipality of Jordanow could not arrange sufficient own funding for the project. Later the Voivodeship for environmental protection and water management fund in Krakow and the Municipality of Jordanow have contributed to the implementation of two boilers in Jordanow.

3.2.4 Financial Planning

The actual project expenses made during 2004-2008 are presented in the Table 2.

Table 2 Project expenses according to the UNDP administration (2004-2008) in USD

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|-----------------------------------|----------------|----------------|----------------|----------------|---------------|----------------|
| () | 48 | (22,508) | (2,249) | (3,399) | (1,049) | (29,157) |
| IO1 Pre-investment study | 8,090 | 2,325 | 1,136 | - | - | 11,552 |
| IO1 IMPPP registration | 8,645 | 3,913 | - | - | - | 12,558 |
| IO1 Securing supply | 226 | - | - | - | - | 226 |
| IO1 Securing demand | 1,820 | - | - | - | - | 1,820 |
| IO1 Supply side MGMT | 29,452 | 19,219 | - | - | - | 48,671 |
| IO1 Demand-side MGMT | 26,378 | - | - | - | - | 26,378 |
| IO2 Info Center AGH | 1,874 | 20,946 | - | - | - | 22,820 |
| IO2 Local information | 5,526 | 1,129 | - | - | - | 6,655 |
| IO2 Vortal 'Biomass' | 13,201 | 15,916 | 6,198 | - | - | 35,315 |
| IO2 Promotional activities | 121 | 3,187 | 24,673 | - | 4,130 | 32,110 |
| IO2 Development of marketing plan | 349 | | | | | 349 |
| P Pipeline of projects | 3,355 | 78,373 | 157,040 | - | 2,596 | 241,365 |
| G PM & short term consultants | 44,632 | 35,696 | 38,316 | - | 9,345 | 127,988 |
| G Administrative support | 12,418 | 32,044 | 36,807 | - | 7,381 | 88,650 |
| G Travel for Monitoring | 8,658 | 12,201 | 6,402 | - | - | 27,261 |
| G Office and Telecommunication | 14,972 | 15,341 | 25,369 | - | - | 55,682 |
| G UNDP GEF Administration | 5,685 | 9,111 | - | - | - | 14,796 |
| Total | 185,450 | 226,894 | 293,692 | (3,399) | 22,403 | 725,039 |

Unfortunately, no detailed financial information on the years 2002 and 2003 was available since this information dates from before introduction of the ATLAS administration system of UNDP. UNDP project officer Ms. Krukar, however, confirmed that the expenses in 2002 and 2003 valued 221509 USD. This means that in total 946,549 USD was spent (excl. PDF-A), this is almost the whole budget of 950,000 USD (excl. PDF-A).

Table 3 provide the aggregated expenses on main activities and is based on Table 2. A distinction is made between activities related to Immediate Output 1 (IO1: the example project), Immediate Output 2 (IO2: information dissemination), the pipeline of projects and general expenses that with the available information that could not be allocated to one of the outputs.

Table 3 Summary expensed of main activities (USD)

| | Activity | Amount (USD) |
|----------|------------------------------|---------------------|
| () | | (29157) |
| 1 | Immediate objective 1 | 101,205 |
| 2 | Immediate objective 2 | 97,249 |
| P | Pipeline of projects | 241,365 |
| G1 | PM & short term consultants | 127,988 |
| G2 | Administration, office etc. | 186,389 |
| Year 1-2 | All | 224,960 |
| PDF-A | Preparation project document | 25,000 |
| | | 975,000 |

Table 4 Planned allocation of funds table (in USD) (Annex 2. of project document)

| Component | Source of funds (in USD) | | | | |
|----------------------------------|---------------------------------|-------------------|-------------------|----------------|------------------|
| | Total | Recipients | Government | UNDP | Other |
| Project management and personnel | 286,110 | 0 | 0 | 286,110 | 0 |
| Contracts | 436,000 | 0 | 0 | 436,000 | 0 |
| <i>IO1</i> | <i>249000</i> | | | <i>249000</i> | |
| <i>IO2</i> | <i>77,000</i> | | | <i>77,000</i> | |
| <i>Pipeline</i> | <i>100,000</i> | | | <i>100,000</i> | |
| Training | 2,390 | 0 | 0 | 2,390 | 0 |
| Equipment/land | 1,925,200 | 162,700 | 0 | 207,500 | 1,550,000 |
| Miscellaneous | 18,000 | 0 | 0 | 18,000 | 0 |
| PDF-A | 25,000 | 0 | 0 | 25,000 | 0 |
| Total | 2,692,700 | 162,700 | 0 | 975,000 | 1,550,000 |

Table 4 shows the overview of the planned allocation of funds as stated in the project document. See also section 3.1.5. Although a one-to-one comparison is difficult, the general impression is that the GEF funds are spent as foreseen in the budget, except that GEF funds have been reallocated from IO1 (the district heating system plus wood storage/briquetting factory and DSM measures) to the pipeline of projects.

The funds spent on the pipeline of projects have been further detailed in Table 5. The indicative numbers are based on information provided in the final report and personal

communication with the project manager. The numbers do not exactly match those of the UNDP administration, but are rather close to it.

Table 5 GEF and other co-finance used for the implementation of the pipeline of projects (USD)^{a)}

| | GEF | City of Jordanow | Voivodeship Krakow | Total |
|---------------------------|----------------------|------------------|-----------------------|----------------|
| Primary school Jordanow | 63,666 | 15,434 | 24,437 | 103,537 |
| Gymnasium Jordanow | 63,666 | 15,434 | 24,437 | 103,537 |
| Nursing home - Lyszkowice | 81,829 ^{b)} | - | - | 81,829 |
| Jurassic Park | 10,289 | - | - | 10,289 |
| Niepolomice | 26,688 | - | - | 26,688 |
| | 246,138 | 30,868 | 48,875 | 325,880 |

^{a)} The numbers were converted to USD with a rate of 3.11 PLN/USD (average 2006)

^{b)} Only hardware costs included. Costs of feasibility studies etc estimated at 46.8 USD.

About 25% of the total GEF budget was dedicated to the development of this pipeline and implementation of these projects. Because the district heating system, demand site management measures and wood storage facility/briquetting plant was not implemented, a large share of the remaining budget was spent without sustainable results.

Parallel financing

Figure 1 provides information on co-finance, using the table as provided by UNDP. The parallel financing consists of land and in-kind contributions from the Municipalities. Furthermore, the municipality of Jordanow has contributed to the boilers in the two schools. The land was put in the municipal partnership company Biomasa BSJ, but since no project was implemented, the municipalities are presently working on recovery of the land by termination of the Biomasa BSJ company.

The initially proposed co-financing levels have not been achieved. An Ecofund grant of 1.629 kPLN (approximately 524,000 USD) was conditionally approved. The Municipality of Jordanow was however not able to arrange 274 kPLN (approx. 88,000 USD) of co-financing and the grant was withdrawn.

Co-financing and Leveraged Resources

| Co-financing (Type/Source) | IA own Financing (mill US\$) | | Multi-lateral Agencies (Non-GEF) (mill US\$) | | BI-laterals Donors (mill US\$) | | Central Government (mill US\$) | | Local Government (mill US\$) | | Private Sector (mill US\$) | | NGOs (mill US\$) | | Other Sources* (mill US\$) | | Total Financing (mill US\$) | | Total Disbursement (mill US\$) | | | |
|----------------------------|------------------------------|--------|--|--------|--------------------------------|--------|--------------------------------|--------------|------------------------------|--------|----------------------------|--------|------------------|--------|----------------------------|--------------|-----------------------------|-------------|--------------------------------|-------------|-------|--|
| | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | | |
| Grant | | | | | | | | | | | | | | | | | | | | | 0.031 | |
| Credits | | | | | | | | | | | | | | | | | | | | | | |
| Loans | | | | | | | | | | | | | | | | | | | | | | |
| Equity | | | | | | | | | | | | | | | | | | | | | | |
| In-kind | | | | | | | | | 0.076 | 0.076* | | | | | | | | 0.076 | 0.076* | | | |
| Non-grant Instruments* | | | | | | | | | | | | | | | | | | | | | | |
| Other Types* | | | | | | | | 0.087 | | | | | | | 1.56 | 0.049 | 1.64 | 0.049 | 1.56 | 0.049 | | |
| TOTAL | | | | | | | | 0.163 | 0.182 | | | | | | 1.56 | 0.049 | 1.72 | 0.16 | 1.56 | 0.08 | | |

Figure 1 Co-finance and leveraged resources

- “Proposed” co-financing refers to co-financing proposed at CEO endorsement.
- Please describe “Non-grant Instruments” (such as guarantees, contingent grants, etc): Not applicable
- Please explain “Other Types of Co-financing”: Municipal assets: land for boiler house and wood storage facility brought in by municipalities.
- Please explain “Other Sources of Co-financing”: The 1,555,555 USD is budgeted for SSM and DSM hardware procurement. The Project document explains that ‘Funding will be sought from funding sources such as EkoFundusz Foundation, the National Fund for Environmental Protection and water management, the Krakow regional Fund for Environmental Protection and Water Management and other appropriate bodies’. At project stage the expected co-finance from each source was not yet further subdivided. During implementation phase about 48,875 USD (152,000 PLN) grant was received from Voivodeship Environmental Protection and Water Management in Krakow.
- * It is assumed that the Municipalities have invested their time as in kind contribution. This could however not be checked.

3.2.5 Sustainability

The sustainability of the project has been evaluated in section 3.3.2.

3.2.6 Execution and implementation modalities

UNDP

The role of UNDP was mainly monitoring and evaluation of the progress as well as the financial administration and payments to the Implementing Agency. This has already been described in section 3.2.2 on monitoring and evaluation.

Executing agency

- The selection of the Executing Agency was a long and complex process during which a number of potential governmental organizations were approached. It took such a long time because the position includes additional responsibilities without benefits, since no budgets or activities were allocated to the Executing Agency.
- After selection of the Ministry of Environment as the Executing Agency, it had a rather limited role except for the chairperson of the Steering Committee (Ms. Lesz was activity involved in monitoring project results).

Implementing Agency

- The project document proposed an implementation team of seven persons, which was reduced to three during implementation, which appeared to be more appropriate. This indicates that PEPF was looking for efficient project implementation. The Mid Term Evaluation report states that communication between the different staff members within PEPF is well organized. The level of cooperation of staff members appears to be good.
- PEPF had no technical bioenergy expert in the project team and had to rely on work done by subcontractors.
- The Mid Term Evaluation (article 54) states that *an analysis of the work done by subcontractors shows that the technical quality of the advice and consequently of the project activities is high, and the inputs of FEWE and Bio-Energia ESP appear to be technically sound (this conclusion is based only on a rapid review of project reports). Since Bio-Energia ESP is planning to invest fairly significantly and will thus want to be sure of its investment risk this reduces technical risk for the whole project.*
- The technical manager of the municipality of Jordanow indicated that the energy audits were of good quality, although overestimating the heat demand. This deviation is mainly caused by the national rules on energy audits.
- The survey on wood waste availability has resulted in a very detailed estimation of wood waste availability, which is very useful for planning of the project activities.
- The general impression is that PEPF has effectively subcontracted the right experts and consultants to perform the project activities.
- The amount of studies and money involved in subcontracts is considerable, however, this is in accordance with the project document.
- Mr. Bzowski of EcoFund remarked that the process of application for co-finance for instance for funding by the EcoFund, was fairly slow. The applications for funding through Biomasa BSJ were mainly the work of PEPF and inputs of the municipalities - the owners of Biomasa BSJ - were very limited.

3.3 RESULTS

3.3.1 Attainment of outcomes/achievement of objectives

The following table shows the attainment of outcomes and the achievement of objectives, including ratings applied conform the GEF Project Review Criteria.

| Abbreviation | Rating |
|--------------|-------------------------|
| HS | Highly Satisfactory |
| S | Satisfactory |
| MS | Marginally Satisfactory |
| U | Unsatisfactory |
| NA | Not applicable |

| Outcome in project document | Result | Mark |
|---|---|------|
| <u>Outcome 1:</u> Inter-Municipal Public-Private Partnership Company in Jordanów/Bystra-Sidzina area. | Considerable effort was spent on establishing the IMPPP. However, private partner Bio-Energia ESP finally proposed to invest first only in the briquetting factory, not in district heating networks, as the latter was perceived to be unprofitable. The Implementing Agency did not agree with this approach and the private partner withdrew from the IMPPP. Finally a 'Public - Public' partnership Biomasa BSJ was established between with the municipalities of Jordanow and Bystra-Sidzina, which operated only on paper. | MS |
| <u>Outcome 2:</u> Long-Term Wood Waste Purchase and Heat Sale Contracts and other Actions Securing the Stable Development of the Wood Waste Market. | The establishment of long-term wood waste purchase and heat sale contracts was on schedule. However, this activity became irrelevant after the district heating network and briquetting factory were cancelled. | S |
| <u>Outcome 3:</u> Integrated Approach to Fuel Conversion Combined with Monitoring and Assessment of the Environmental Impact. | The preparatory audits, feasibility studies and technical designs were in an advanced stage of development. The Municipality of Jordanow was not able to arrange sufficient co-financing to secure a conditionally approved EcoFund grant and therefore establishment of the district-heating network and biomass storage facility/briquetting factory was not achieved. | MS |
| <u>Outcome 4:</u> Information Campaign Promoting Biomass Energy | See activities 4.1, 4.2 and 4.3 | |
| <ul style="list-style-type: none"> <u>Activity 4.1:</u> Information to promote biomass energy developed and disseminated | <p>PEPF has generated a number of activities to promote and disseminate information on bioenergy:</p> <ul style="list-style-type: none"> A dedicated biomass internet service was launched (initially not described as activity). An educational service was launched as a support tool to be used during classes in gymnasiums and high schools (also initially not described as project activity and funded by National Fund for Environmental Protection and Water | S |

| | | |
|--|--|----|
| | <p>Management).</p> <ul style="list-style-type: none"> • A contest for schools has been organised in which students can carry out an energy audit. The winning schools would receive a professional energy audit. • A number of articles and leaflets have been produced. • A visualisation of the wood storage facility was prepared for promotion and demonstration purposes. • On the organisation of <i>four seminars for local decision makers, financing institutions and representatives from the neighbouring countries such as the Czech Republic, Slovakia, Ukraine and the Baltic countries</i> as stated in the project document, was not reported in the final report. Instead, a number of around twelve seminars have been visited. • A project-closing seminar was held on 8 September 2008 and attracted around 100 participants. <p>It is concluded that this activity was carried out in a satisfactory way.</p> | |
| <ul style="list-style-type: none"> • <u>Activity 4.2</u> Establishment of an Information Centre | <p>In the course of project the implementing Agency PEPF agreed with the Faculty of Fuels and Energy at the Academy of Mining and Metallurgy (in short “the Academy”) that they would receive funding for purchasing some office equipment and a biomass demonstration boiler. In exchange, the Academy would establish the information centre at their own costs. Involved UNDP officer Czaikowski indicated that during a visit to the Academy no separate Information Centre was found. Prof. Adam Gula of the Academy confirmed that the information centre did not contain a website, but indicated that people involved know about the activities of the Academy and find their way. It is concluded that no Information Centre was established and in view of the poor relationship between the Implementing Agency and the Academy it is concluded that the Academy did not result in any promotional added value to the project.</p> | U |
| <ul style="list-style-type: none"> • <u>Activity 4.3:</u> Publication of biomass energy guidelines | <p>The publication of biomass energy guidelines was not addressed in the final report. Since materials from the closing seminar could be seen as part of the inputs for publication of energy guidelines, part of the preparatory work has been done. However, editing of the work into energy guidelines and its actual publication and wide distribution did not take place. According to Mr. Czajkowski, UNDP had repeatedly requested for the publication of energy guidelines, but to no avail.</p> | U |
| <p><u>Outcome 5:</u> Development of Marketing Plan and Project Pipeline</p> | <p>See activities 5.1 and 5.2</p> | |
| <ul style="list-style-type: none"> • <u>Activity 5.1</u> Development of a Marketing Plan and Enhancement of in-country projects | <p>As already stated in section 3.1.1 on the project design, the development of a marketing plan has not been described very well. The final report did not mention activity 5.1 and after interviews it appeared that the marketing plan was not carried out at all.</p> | U |
| <ul style="list-style-type: none"> • <u>Activity 5.2:</u> Development of a pipeline of projects. | <p>After the activities on outcome 1, 2 and 3 were cancelled, the development of a pipeline of projects became the main goal of the project. Instead of only pre-feasibility studies, as proposed in the project document, the activities included the technical design and tender procedures, installation and commissioning a number of boilers</p> | HS |

| | | |
|--|--|--|
| | <p>The following boilers were installed:</p> <ul style="list-style-type: none"> • Two boilers (240 kW each) in the primary school and gymnasium are running mainly on pellets and wood chips respectively. • A boiler (230 kW) in the nursing home for handicapped people in Lyszkowice is running. However, the nursing home also installed two new coal fired boilers to supply the base heat, financed by the municipality; the pellet boiler is used during times of peak heat demand. • In Niepolomice a 60 kW biomass boiler (not visited). • A small (49 kW) boiler in the Jurassic park of Baltow (not visited). <p>Feasibility studies were performed for the following boilers:</p> <ul style="list-style-type: none"> • Biomass boiler in an ecology, heritage and renewable energy centre. • Biomass boilers for households in the city of Niepolomice. The citizens finally did not want to install the biomass boilers because they were concerned about the availability of biomass fuels and reliability of the technology. That is the reason that a demonstration project was initiated first, as described above. <p>It is concluded that the pipeline of projects was performed better than described in the project document.</p> | |
|--|--|--|

Development objective

The development objective of the proposed project is to reduce greenhouse gas emissions in the energy sector by reducing barriers to the market for biomass energy.

The expected (initially supposed to be conservative and rough) CO₂ emission reduction as a result of the project was 14,500 tonnes CO₂-eq per year. The final report states that 465 tonnes of CO₂ reduction was realized, which was found to be a realistic estimate of the emission reductions achieved by the project. This is lower than expected at the project start up phase. However, although the development objective is to reduce greenhouse gas emissions, the project was set up as a demonstration project, not as a plain emission reduction project.

Conclusion

The core of the project, establishment of an exemplary bio-energy project with integrated demand and supply measures installed, managed by an Inter-Municipal Public Private Partnership was not achieved. This was partly compensated by the implementation of a pipeline of projects. The information dissemination activities were supposed to be based on the example project. Since the exemplary project was displaced by a number of more scattered individual projects, information dissemination lost part of its relevance. A number of articles and leaflets were produced, seminars visited, a biomass internet service was launched, energy audit contests for schools were organized and a closing seminar was held. However, part of the information dissemination activities were not carried out as planned, partly because the project document was not clear or outdated (marketing plan), partly because the project manager just did not implement part of the project (energy guidelines), and partly because personal relations between parties were not good (Information Centre at Faculty of Fuels and Energy). *Overall, it is concluded that the project results are marginally satisfactory.*

3.3.2 Sustainability

The project has come to an end 18 months ago, which gives opportunity to assess the sustainability of the project. The sustainability of the exemplary projects and the promotion activities has been assessed.

A number of exemplary projects have been installed:

- The two boilers (240 kW each) in the primary school and gymnasium are running mainly on pellets and wood chips respectively.
- The boiler (230 kW) in the nursing home for handicapped people in Lyszkowice is running. However, two new coal fired boilers supply the base heat; the pellet boiler is used during times of peak heat demand.
- In Niepolomice a 60 kW biomass boiler is installed and running (not visited).
- A small (49 kW) boiler is installed in the Jurassic park of Baltow and running (not visited).

The project resulted in a number of up and running projects.

In relation to sustainability of the promotion activities:

- All the boilers can be visited on demand, but this is not specially promoted.
- The www.biomasa.org website is still up-to-date and online.
- The information centre was never established
- The inter-municipal company 'Biomasa BSJ' will be terminated, as the involved municipalities wish to regain access to the land that they brought in. The efforts to establish an IMPPP were in vain.

It is concluded that the project has produced sustainable results, which can be regarded relatively modest in relation to the effort and means that have been put into the project.

3.3.3 Contribution to upgrading skills of the national staff

The following contributions to upgrading skills of national staff were identified:

- Implementing Agency PEPF has a rather broad range of activities, of which many outside of the field of bio-energy. Related to bio-energy issues, PEPF relied mainly on external expertise to perform the project. However, the performance of the project led to increased knowledge and skills of the involved personnel, especially the project manager.
- The subcontracts were carried out by organisations like FEWE (energy audits), Lemtech Konsulting Ltd (biomass availability in private forests), Malopolska Energy and Environment Agency (biomass potential of energy crops), MABUD design company (design wood storage facility). All these organisations had opportunity to sharpen and increase their expertise and skills by performing assignments subcontracted by the Implementing Agency.
- The (foreign) biomass boiler equipment suppliers and installers could work on implementation of biomass boilers and supplementary equipment.
- The project beneficiaries, owner of the installed boilers, gain experience with operation of biomass boilers and can share this experience with interested parties.

3.4

RATINGS ACCORDING TO GEF PROJECT REVIEW CRITERIA

A number of evaluated issues have been rated according to the GEF Project Review Criteria. The ratings are summarised in the table below.

| | HS | S | MS | U | NA |
|---|----|---|----|---|----|
| Conceptualization/design of project formulation | | X | | | |
| Implementation approach | | X | | | |
| Monitoring and evaluation | | X | | | |
| Stakeholder participation | | | X | | |
| Attainment of Outcome/Achievement of objectives | | | X | | |

The item *attainment of the Outcomes/Achievement of objectives* results from the following ratings of the results of the different outcomes and activities.

| Outcome in project document | Mark |
|---|-----------|
| <u>Outcome 1:</u> Inter-Municipal Public-Private Partnership Company in Jordanów/Bystra-Sidzina area. | MS |
| <u>Outcome 2:</u> Long-Term Wood Waste Purchase and Heat Sale Contracts and other Actions Securing the Stable Development of the Wood Waste Market. | S |
| <u>Outcome 3:</u> Integrated Approach to Fuel Conversion Combined with Monitoring and Assessment of the Environmental Impact. | MS |
| <u>Outcome 4:</u> Information Campaign Promoting Biomass Energy. | |
| <u>Activity 4.1:</u> Information to promote biomass energy developed and disseminated. | S |
| <u>Activity 4.2:</u> Establishment of an Information Centre. | U |
| <u>Activity 4.3:</u> Publication of biomass energy guidelines. | U |
| <u>Outcome 5:</u> Development of Marketing Plan and Project Pipeline. | |
| <u>Activity 5.1:</u> Development of a Marketing Plan and Enhancement of in-country projects. | U |
| <u>Activity 5.2:</u> Development of a pipeline of projects. | HS |
| Final rating results | MS |

| Abbreviation | Rating |
|--------------|-------------------------|
| HS | Highly Satisfactory |
| S | Satisfactory |
| MS | Marginally Satisfactory |
| U | Unsatisfactory |
| NA | Not applicable |

4 RECOMMENDATIONS

4.1 CORRECTIVE ACTIONS

The publication of energy guidelines is still pending. It is suggested that the Project Manager should finish task 4.3 as promised and agreed on with UNDP.

No further corrective actions are suggested because the project has been finished already 1.5 years ago, and moreover, UNDP Poland is in the process of finishing its activities as UNDP country office.

4.2 ACTIONS TO FOLLOW UP

The website www.biomasa.org is a useful information portal developed in the course of the project. The project manager as well as the Polish Biomass Chamber of Commerce and the publisher of the Polish edition of the Bioenergy International magazine are encouraged to keep this website online and use the website as a portal to promote the project results; for instance the performance of the implemented projects, to promote the opportunity to visit those projects and to keep it up-to-date with recent developments in the field of bioenergy in general. The role of UNDP in this follow up activity is expected to be limited.

According to PEPF and the project beneficiaries, the official energy audits tend to overestimate the energy demand, leading to the installation of plant capacities larger than necessary. Some assumptions in the national standards should be adjusted to better present reality.

4.3 PROPOSALS FOR FUTURE DIRECTIONS

The development of the bio-energy market in Poland, like in most EU countries, depends on market factors, especially the price development of biomass and fossil fuels, but also on the availability and accessibility of funds to support investments in bioenergy.

UNDP will finish its activities in Poland on short term, and stimulation of bioenergy will depend on national, EU and Kyoto-type measures. The following suggestions for the further development of the wood waste for energy market in Poland are made.

Poland's renewable energy targets and incentives

- Currently and in the near future bio-energy is expected to play an important role in the achievement of renewable energy and renewable energy targets of 7.5% in 2010.
- The Polish renewable energy policy includes:
 - Tradable Certificates of Origin introduced by the April 2005 amendment of the Law on Energy (1997).
 - The Obligation for Power Purchase from Renewable Sources (2000, amended in 2003) involves a requirement on energy suppliers to provide a certain minimum share of RES-E (3.1% in 2005, 3.6% in 2006, 4.8% in 2007 and 7.5% in 2010). Failure to comply with this legislation leads

-
- in theory – to the enforcement of a penalty. In 2005, these were not sufficiently enforced.
- An excise tax exemption on RES-E was introduced in 2002.
 - Steady but modest progress is being made with regard to the renewable electricity targets. Due to increased quota obligations, higher certificate prices and faster growth of RES-E are expected from 2007 onwards. Next to hydropower, solid biomass has also penetrated the market and is expected to be responsible to provide the main contribution to additional renewable electricity production capacity to meet the renewable electricity targets.
 - Bioenergy for heating, like demonstrated in the Wood Waste Combustion project, is relevant for achieving the general renewable energy targets. Growth in the use of biomass for heating has however been modest in recent years (1% growth per year between 1997 and 2004).

Biomass for heat production is highly relevant in the achievement of the renewable energy targets of Poland and should be actively promoted.

Poland's participation in Kyoto mechanisms

- Under the Kyoto Protocol, Poland has a considerable amount of emission allowances (AAUs), which can be traded with countries with shortage of allowances. The income from AAUs can be allocated to emission reduction projects through a Green Investment Scheme (GIS). Further development of the bioenergy sector could be realized partly by using these funds. A Green Investment Scheme is currently in preparation.
- For achievement of emission reductions, biomass use for heat production is generally much more effective than its use for electricity production, while stimulation measures are generally directed to renewable electricity only.

Part of the Green Investment Scheme funds should be used to support the development of the biomass heat sector in Poland.

EU policy and support

- EU member states are supposed to provide a detailed Biomass Energy Plan to the EU See: http://www.bapdriver.org/doku.php/best_practice.
- The new EU Cohesion Policy 2007 – 2013 places particular emphasis on sustainable approaches to the use of energy, including energy from renewable sources. Support for power generation from renewables will be obtainable under Priority X of the Infrastructure and Environment Operational Programme, “Environmentally Friendly Energy Infrastructure”, as well as under regional operational programmes. This support is complemented by renewables support under the Rural Areas Development Programme.
- Polish partners can participate in EU calls, for instance in the Seventh Framework Programme (FP7). Although some project beneficiaries of the Wood Waste Combustion project complained about the complexity of EU funding applications and praised UNDP/GEF for having straightforward procedures, the EU funding will be a main source of support in the future.

It is recommended that project developers are actively supported in the preparation of applications toward EU funding, and that channels are developed to make support for biomass heating systems easy available to smaller communities.

The following lessons can be learned from this project.

- The long time span between project proposal preparation (in 1998) and project implementation (in 2002) led to decreased relevance of the project outcomes - the wood waste biomass market had developed itself already - and reduced support from local communities. The delays were partly caused by the long time needed to find an executing agency and non-acceptance of the initially proposed implementing agency. The PDF-A phase of this type of projects has a duration of at most one year. It is suggested that in future this period could be limited to three or four months.
- The above-described time span between project idea and implementation phase but also the top-down approach of the project caused a passive attitude of the municipal project beneficiaries. The best would be a project design in which the project beneficiaries are actively participating, or preferably, are project initiators. However, in practice the municipalities as main project beneficiaries might not have had the right capabilities to prepare such a proposal.
- Projects that require strong involvement of municipalities should take into account the perspective of these municipalities:
 - Mayors need to show results before the next elections and are less interested in long term projects;
 - Municipalities have limited budgets and need to set their priorities carefully;
 - Biomass boilers and DSM measures have little allure (less than for example road improvements).
- If possible, removal of the project proposer as implementing agency - as befallen in this project - should be avoided, as it complicates sound implementation of the project. The new implementing agency was not the author of the project document, and moreover, it created poor working relations with the project proposer, who was still responsible for part of the tasks.
- The set-up of the inter-municipal public private partnership proved to be a very difficult process, and although innovative, the IMPPP did not generate real added value to the project. Even if all parties involved had fully cooperated, the formal establishment of the IMPPP would have been very hard, due to complex Polish legislation on IMPPP introduced after project approval.
- The successful implementation of the project depended on the successful acquisition of parallel financing from funds, which was not obtained. The most obvious reason was the lack of co-financing from the municipalities. Although the general impression is that the project manager performed to the best of his abilities, non-approval of funding did not directly affect the Implementing Agency financially. In general, a project should be designed in such a way that the project will be cancelled as soon as it becomes clear that insufficient co-financing can be arranged.

ANNEX

A. TERMS OF REFERENCE

Terms of Reference for Final Evaluation of the Project

Project Title: Integrated Approach to Wood Waste Combustion for Heat Production in Poland

Project Number: POL/01/G35/A/1G/99

INTRODUCTION

The Monitoring and Evaluation (M&E) policy at the project level in UNDP/GEF has four objectives:

- i) to monitor and evaluate results and impacts;
- ii) to provide a basis for decision making on necessary amendments and improvements;
- iii) to promote accountability for resource use;
- iv) to document, provide feedback on, and disseminate lessons learned.

A mix of tools is used to ensure effective project M&E. These might be applied continuously throughout the lifetime of the project - e.g. periodic monitoring of indicators - or as specific time-bound exercises such as mid-term reviews, audit reports and final evaluations.

In accordance with UNDP/GEF M&E policies and procedures, all regular and medium-sized projects supported by the GEF should undergo a final evaluation upon completion of implementation. A final evaluation of a GEF-funded project (or previous phase) is required before a concept proposal for additional funding (or subsequent phases of the same project) can be considered for inclusion in a GEF work program. However, a final evaluation is not an appraisal of the follow-up phase.

Final evaluations are intended to assess the relevance, performance and success of the project. They look at early signs of potential impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. It will also identify/document lessons learned and make recommendations that might improve design and implementation of other UNDP/GEF projects.

Brief project description

The project sought to foster the development of markets for wood waste-based (biomass) energy production as a renewable substitute for fossil fuels. The project focus was on the creation of an Inter-Municipal Public-Private Partnership Company in the partner municipalities of Jordanow and Bystra-Sidzina in south Poland. The project sought to demonstrate how an integrated approach, combining fuel conversion with demand side energy efficiency can be replicated on a wider scale in Poland. The

project was proposed by the Polish Foundation for Energy Efficiency (FEWE), a non-profit organization established to support activities that promote rational use of energy and to protect the natural environment and initially developed in co-operation with Pumped Storage Power Plants company.

OBJECTIVES OF THE EVALUATION

The evaluation should assess:

Project formulation:

- The evaluator will assess the project concept and design. He/she should review:
- The problems addressed by the project and the project strategy, encompassing an assessment of the appropriateness of the objectives, outputs, activities and inputs as compared to cost-effective alternatives;
- The extent to which the project idea had its origin within national, sectoral and development plans and focuses on national environment and development interests;
- Information dissemination, consultation and stakeholder participation in design stages;
- The ways in which lessons and experience from the project were or are replicable or scaled up in the design and implementation of other projects.

Implementation

The evaluation will assess the implementation of the project in terms of quality and timeliness of inputs and efficiency and effectiveness of activities carried out. He/she should review:

- Implementation Approach, including an analyses of the project's logical framework, adaptation to changing conditions and overall project management;
- The quality and timeliness of monitoring and evaluation of the project;
- Stakeholder participation in the project, specially – information dissemination, NGOs and local resources users in the implementation, the establishment of partnerships and relationships developed by the project with local, national and international entities and involvement of governmental institutions;
- Financial Planning, including an assessment of the actual project cost by objectives, outputs, activities, the cost-effectiveness of achievements, financial management and co-financing;
- Sustainability – extent to which the benefits of the project will continue, within or outside the project area, after project closure;
- Execution and implementation modalities.

Project outputs, outcomes and impact

The evaluation will assess and rate the achievement of outputs and outcomes as well as the impact achieved by the project and the likely sustainability of project results (including review of GHG emissions reductions calculations from the project¹). The

¹ Monitoring methodology according to the "Manual for calculating GHG benefits of GEF projects"

evaluation will also examine if the project had significant unexpected effects, whether of beneficial or detrimental character.

EVALUATION PRODUCT

The evaluator will produce an evaluation report with findings, recommendations, lessons learned, and rating on performance. The report (in English) should include:

Executive summary

- Brief description of project
- Context and purpose of the evaluation
- Main conclusions, recommendations and lessons learned

Introduction

- Purpose of the evaluation
- Key issues addressed
- Methodology of the evaluation
- Structure of the evaluation

The project(s) and its development context

- Project start and its duration
- Problems that the project seek to address
- Immediate and development objectives of the project
- Main stakeholders
- Results expected

Findings and Conclusions

In addition to a descriptive assessment, all **criteria marked with (R) should be rated** using the following divisions (according to GEF Project Review Criteria):

| Abbreviation | Rating |
|---------------------|-------------------------|
| HS | Highly Satisfactory |
| S | Satisfactory |
| MS | Marginally Satisfactory |
| U | Unsatisfactory |
| NA | Not applicable |

- Project formulation
 - a. Conceptualization/Design (R) – it should assess the approach used in design and an appreciation of the appropriateness of problem conceptualization and whether the selected intervention strategy addressed the root causes and principal threats in the project area. It should also include an assessment of the logical framework and whether the different project components and activities proposed to achieve the objective are appropriate, viable and responded to contextual institutional, legal and regulatory settings of the project. It should also assess the indicators defined for guiding implementation and measurement of achievement and whether lessons from other relevant projects (e.g., same focal area) are incorporated into project design;

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- b. Country ownership/Driveness – must assess the extent to which the project idea had its origin within national, sectoral and development plans and focuses on national environment and development interests
 - c. Stakeholder participation in the project (R), specially – information dissemination, NGOs and local resources users in the implementation, the establishment of partnerships and relationships developed by the project with local, national and international entities and involvement of governmental institutions
 - d. Replication approach – it would be crucial to determine the ways in which lessons and experiences coming out of the project were/are to be replicated or scaled up in the design and implementation of other projects
 - e. Cost-effectiveness
 - f. UNDP comparative advantage as IA of the project;
 - g. Linkages between project and other interventions within the sector
 - h. Management arrangements
- Implementation
 - a. Implementation approach (R) – it should include assessment of:
 1. The use of the logical framework as a management tool during implementation and any changes made to this as a response to changing conditions;
 2. Other elements that indicate adaptive management such as comprehensive and realistic work plans routinely developed that reflect adaptive management and/or; changes in management arrangements to enhance implementation.
 3. The project's use/establishment of electronic information technologies to support implementation, participation and monitoring, as well as other project activities.
 4. The general operational relationships between the institutions involved and others and how these relationships have contributed to effective implementation and achievement of project objectives.
 5. Technical capacities associated with the project and their role in project development, management and achievements.
 - b. Monitoring and evaluation (R) – especially their quality and timeliness;
 - c. Stakeholder participation (R) – it should include:
 1. The production and dissemination of information generated by the project;
 2. Local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project in this arena;
 3. The establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation;
 4. Involvement of governmental institutions in project implementation, the extent of governmental support of the project.

-
- d. Financial Planning, including an assessment of the actual project cost by objectives, outputs, activities, the cost-effectiveness of achievements, financial management and co-financing and Leveraged Resources (see Table 1 attached)
 - e. Sustainability – the extent to which the benefits of the project will continue, within or outside the project domain, after it has come to an end;
 - f. Execution and implementation modalities – it should consider the effectiveness of the UNDP counterpart and Project Co-ordination Unit participation in selection, recruitment, assignment of experts, consultants and national counterpart staff members and in the definition of tasks and responsibilities
- Results
 - a. Attainment of Outcomes/Achievement of objectives (R);
 - b. Sustainability – appreciation of the extent to which the benefits of the project will continue, within or outside the project area, after project closure;
 - c. Contribution to upgrading skills of the national staff

Recommendations

- a. Corrective actions for the design, implementation; monitoring and evaluation of the project;
- b. Actions to follow up or reinforce initial benefits from the project;
- c. Proposals for future directions.

Lessons learned

- Best and worst practices in producing outputs so far, linking them to outcomes and using partnerships strategically

Annexes

- TOR
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Questionnaire used and summary of results
- Co-financing and Leveraged Resources (see Table 1 attached)
- Manual for calculating GHG benefits of GEF projects

EVALUATION METHODOLOGY

The evaluation will be based on the study of documents and interviews with the key persons involved in the project, i.e. representatives of the implementing agency, UNDP project staff, the Project Coordinator and other involved municipalities, the Steering Committee, as well as other partners, stakeholders and beneficiaries. The evaluator will be provided with basic documentation related to the project, including the project document, summary records of Steering Committee and project reports.

The evaluation will be carried out by the International Consultant with support from local project staff. The consultant shall have prior experience in evaluating similar

projects. The evaluator selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities. Former cooperation with GEF is an advantage.

The International Consultant will be responsible for preparing and submitting the evaluation report to UNDP and for leading discussions with counterparts on the introduction of any recommendations.

IMPLEMENTATION ARRANGEMENTS

UNDP will provide the necessary substantive and administrative support. UNDP and the Project Coordinator will provide access to project documents. Upon arrival in Poland the evaluator will be briefed by the respective UNDP Programme Officer. The UNDP Project Coordinator and the Implementing Agency will plan the mission, organize interviews with selected individuals/institutions, as well as provide interpretation and translation when necessary.

The evaluation mission will be conducted in May, with the following steps:

- Desk review - gathering of data, review of documentation (project document, project revisions, reports, and other relevant project documentation);
- Organization of the mission - conducted by the Implementing Agency (scheduling of meetings as agreed with the International Consultant, confirming facilities and logistical arrangements) with the assistance of UNDP;
- Mission to Poland - will be conducted by the International Consultant. Debriefing meetings for the International Expert with UNDP representatives shall be organized on the first and last day of the mission.
- Preparation of the report - the initial findings of the evaluation should be presented as a debriefing to UNDP Poland and the Project Coordinator on the final day of the mission.

TIME FRAME

The evaluation mission will take place in May 2008. The first draft of the evaluation report shall be submitted by 31 May to allow for comments from UNDP and the Project Director. Upon receipt of these comments, the International Consultant shall submit the final report by 15 June.

The work will require a total of 14 days, comprised of a 7 days visit to Poland and 7 days for preparation and drafting of the report.

B. LOGICAL FRAMEWORK

ANNEX 1. LOGICAL FRAMEWORK OF OBJECTIVES, OUTPUTS, INDICATORS AND ACTIVITIES

| Immediate Objective | Output | Indicators | Activities |
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| <p>IO.1. Creation of an Example of an IM PPP Company to Manage Biomass Energy Resources at the Local Level</p> | <p>1. Creation of inter-Municipal Public Private Partnership Company</p> <p>2. Wood Waste Purchase and Heat Purchase contracts</p> | <p>Long Term Financial & Management Plan and Public Relations Policy of the Inter-Municipal PPP Company designed</p> <p>The Company registered in court according to Polish law</p> <p>IMPPP Personnel trained in the new technology</p> <p>WWP and HP contracts negotiated and signed</p> | <p>1.1 Pre-feasibility study</p> <p>1.2 Feasibility study</p> <p>1.3 Concept Design</p> <p>1.4 Environmental Impact Assessment</p> <p>1.5 Financial Package</p> <p>1.6 Public Participation</p> <p>1.7 Bidding procedure</p> <p>1.8 Permits</p> <p>1.9 Training and Technology Introduction</p> <p>1.10 Establishment of Inter-Municipal Public Private Partnership Company</p> <p>2.1 Wood-Waste Purchase (WWP) Contracts</p> <p>2.2 Heat Purchase (HP) Contracts</p> |

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| <p>IO.1 ctd. Creation of an Example of an IM PPP Company to Manage Biomass Energy Resources at the Local Level</p> | <p>3. Implementation of an Integrated Approach to Fuel Switching</p> | <p>Detailed heat energy audits of 40 buildings completed and the recommended DSM measures completed</p> <p>3 district heat networks (in Jordanow, Bystra and Sidzina) built and</p> <p>3 Wood-Waste boilers installed, commissioned and started: ca. 4.0, 0.6 and 0.7 MW, respectively</p> <p>Impact of thermal renovation in 10 selected buildings measured over one heating season and reported</p> | <p>3.1 Detailed Energy Audits</p> <p>3.2 Detailed Engineering</p> <p>3.3 Hardware Procurement - Supply Side</p> <p>3.4 Installation of hardware - Supply Side</p> <p>3.4 Hardware procurement - Demand Side</p> <p>3.5 Installation of hardware - Demand Side</p> <p>3.6 Measurement of impact</p> <p>3.7 Engineering supervision</p> <p>3.8 Project financial management</p> <p>3.9 Commissioning and start-up</p> |
| <p>IO2. Increasing the Use of Wood Waste Produced Locally and in a Sustainable Way for Space Heating</p> | <p>4. Information and dissemination</p> | <p>Initial seminar in month 5-6 of the Project</p> <p>4 dissemination seminars: 2 in each heating season 2002/3 and 2003/4</p> <p>Round-up seminar in month 36 of the Project</p> <p>Information Centre at UMM Krakow equipped and operational</p> <p>The Biomass Energy Guidelines published in 3000 copies</p> | <p>4.1 Dissemination seminars</p> <p>4.2 Information Centre and Green Energy Guidelines</p> |

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| | <p>5. Marketing and Project Pipeline</p> | <p>Marketing plan forged and submitted for consideration and use to the ministry of environment and other interested national and regional institutions</p> <p>Pre-feasibility studies for 5 Integrated Fuel Conversion Projects completed</p> | <p>5.1 Marketing plan</p> <p>5.2 Pipeline of projects</p> |
| <p>Monitoring</p> | <p>6. Monitoring</p> | <p>7 Steering Committee Meetings</p> <p>11 Quarterly Reports</p> <p>3 Tripartite reviews</p> <p>3 Audits</p> <p>Terminal Report</p> | <p>6.1 Steering Committee Meetings</p> <p>6.2 Quarterly Reports by Project Manager</p> <p>6.3 Tripartite reviews</p> <p>6.4 Terminal Report</p> |

C. LIST OF PERSONS INTERVIEWED

| Name | Organisation | Function / Role in project |
|--------------------------|---|---|
| Ms. Monika Lesz | Ministry of Environment | Chairperson Steering Committee Representative of Executing Agency |
| Mr. Ziernowit Pochitonow | Polish Environmental Partnership Foundation (PEPF) | Project manager Representative of the Implementing Agency |
| Ms. Barbara Zieba | Nursing home Lyszkowice | Responsible for a.o. heating system Project beneficiary |
| Mr. Kazimierz Hebda | Municipality of Jordanow | He is new mayor, has not been involved in project. |
| Mr. Jan Gringras | Municipality of Jordanow | Responsible for public procurement and technical issues. In function during implementation of the projects. |
| Prof. Adam Gula | Faculty of Fuels and Energy AGH-University of Science and Technology | Project initiator and proposer, responsible for Information Centre. |
| Mr. Jerzy Janota Bzowski | EcoFund | Vice president EcoFund, member Steering Committee |
| Ms. Aleksandra Krukar | UNDP Poland | UNDP/GEF Programme Assistant (since 01.2008) |
| Mr. Przemek Czajkowski | GEF/SGP UNDP | Former UNDP project manager of this project |
| Ms. Anna Darska | UNDP | UNDP Poland Head of Office |

D. SUMMARY OF FIELD VISITS

Visit nursing home for handicapped people – Lyszkowice

9 September 2008

The nursing home in Lyszkowice has three boilers, two coal fired boilers and one GEF financed biomass boiler. Because the nursing home arranged the biomass boiler, they could get funding from the municipalities for the coal fired boilers. The hot water demand at this place is very high (300 liter/person/day in winter time) and because this is a peak demand, storage tanks are placed behind the boiler, the stored energy can be used for both hot water and space heating. The system operates well. Because of the high price of pellets (760 PLN/tonne wood pellets versus 620 PLN/tonne coal) and considering the differences in energy density, combustion of coal is preferred; the pellet boiler operates only in case of high energy demand. As an indication: in 2007 62 tonnes of wood pellets were bought and coal consumption was 132 tonnes.

The energy manager of the nursing home appreciated GEF (and small scale GEF) because of the cooperative approach and limited amount of bureaucracy. She regrets that UNDP Poland will close and GEF stopped. Although Poland as an EU country would not need support from a developing agency like UNDP, at the same time no similar alternative is available to the GEF, and the procurement of EU funds was found to be extremely complex. Also the Ecofund would/did not subsidize the project as the CO₂ savings per invested PLN is not very big in small projects like this.

Another issue is that the standardized energy audits that work with parameters like reference temperature of minus 20°C outside and 22°C inside, lead to implementation of oversized boilers.

Besides the boiler implementation other demand side measures have also been implemented, like insulation of 120 meter of piping. Insulation of buildings is on the list, but funding is lacking.

Visit Municipality of Jordanow

Date: 10 September 2008

Location: Jordanow City

Interviewed persons: Mr. Kazimierz Hebda (mayor) and Mr. Jan Gringras (responsible for public procurement and technical affairs)

Energy audits

The energy audits handed over to the Municipality of Jordanow are still useful since not too many infrastructural changes have been implemented or are to be expected. The audits have an official status and could be used for say the next five years. Energy audits tend to overestimate the energy needs. Besides the implementation of the two boilers at the primary school and gymnasium, the energy audits hardly resulted in further implementation of demand side management measures. Insulation of the building of the municipality is difficult because of its status as historical building; only some insulation

of roofs has been implemented. The main problem is lack of financing to implement these measures.

Biomass boiler primary school

The pellet boiler at the primary school was visited after the meeting with the mayor. Two pellet boilers of each 120 kW were implemented, including feeding systems etc. The boilers are used for space heating. Most of the time only one boiler is running, because the energy audit overestimated the heat demand. However, they feel comfortable to have some capacity left in this mountainous area. The wood pellets are regarded as an expensive fuel. The present coal price is 400 PLN plus 22% VAT, while pellets cost 700 PLN/tonne. The storage space is limited to say 10-12 tonnes of pellets. For this reason the lower pellet price for quantities of over 20 tonnes cannot be obtained. Switching to wood chips is technically possible but at this particular location there is no space for storage of wood chips. The director of the school is very content with the system that is operating well.

Boiler at gymnasium

At the gymnasium the same boilers were installed as at the primary school and was therefore not visited. At this site more storage space is available and therefore mainly wood chips and shavings are used as a fuel. Pellets are only used at times of high heating demand because of their higher energy density.

Biomasa BSJ company

The involved municipalities Bystra-Sidzina and Jarđanow are in the process of ending the Biomasa BSJ company so they can recollect the areas that were put in this municipal partnership as assets.

Visit area with wood waste producers

Date: 10 September 2008

Location: Bystra and Sidzina Municipality

Interviewed person: Mr. Ziemowit Pochitonow (PEPF, implementing agency)

In the area of Bystra and Sidzina many small wood processing industries are active. In the late nineties, when the project was proposed, there was a serious problem with illegally dumped wood waste. Present day, most sawdust is collected and sold mainly to the wood pellet and plywood industry. Most piles of fresh sawdust appear near the road, apparently waiting to be collected by these industries. Occasionally some sawdust/woodwaste can be found, but this is minimal compared to the situation in the nineties or even 2004 during mid term evaluation. It is concluded that the emerging market for wood waste has solved the problem.

Visit site for wood storage and briquetting plant

The projected site for the wood storage and briquetting facility was visited. Mr. Pochintonow showed where an extra piping system for fire protection to the nearby river needed to be installed, and explained that the road was implemented differently than on the official papers, complicating the implementation of the project. Also the road was shown that was subject to dispute with neighbors.

Visit Ecofund

Date: 11 September 2008

Location: Warszawa, at Ecofund headquarters

Interviewed person: Mr. Jerzy Janota Bzowski, Vice president Ecofund

Mr. Bzowski found the project idea very good and relevant. Clearly there was a problem with wood waste in the region that could be solved by the proposed project. The path from idea to implementation was however too long and should ideally take place in the period in which one mayor is in charge. The project idea with both supply and demand management measures fits well in the philosophy of the Ecofund. However, applications for co-financing to the Ecofund took too much time and Mr. Bzowski was not convinced that the participating Municipalities were sufficiently enthusiastic; they were clearly not the project owners and most work was done by third parties, like PEPF.

At a certain point the Municipal Partnership Biomasa BSJ did not succeed and because the Municipality of Jordanow was not able to find sufficient co-finance. Should the project have stopped at that time? The idea was to show to local communities that wood waste can be used for energy generation. Promotional aspects could also be generated from a smaller number of projects, which was in the end the general idea of the project.

Contrary to what is suggested in the Final Report, the funds for applications in 2006 and 2007 were not exhausted. Only this year (2008) more projects were eligible than could be funded. In general the Ecofund works with a threshold score that must be met on points like CO₂ savings per amount of invested capital. Most probably the case of the nursing home did not meet all eligibility criteria, and the application for Ecofund co-finance was probably not sent to Ecofund.

Meeting responsible project manager UNDP during project implementation

Date: 11 September 2008

Location: Warszawa, at UNDP

Interviewed person: Mr. Przemek Czajkowski

Mr. Czajkowski was involved in the project as UNDP project manager and member of the Steering Committee. He was manager of GEF Small Grants Programme and already working with UNDP at the time the project was in preparation stage.

Background of the project

Implementation of biomass projects in Poland was not easy in the nineties. Fossil fuel suppliers were not happy with biomass as competitive fuel and in some cases used their influence to block projects, for instance by looking for obstructing permits for biomass boilers (using the lack of formal regulation for biomass boilers), using their influence on municipal level or by introduction programs for natural gas. Also quite aggressive marketing of for instance heat pumps has been observed, trying to convince potential clients to buy equipment without proper feasibility calculations made beforehand. This background makes it clear that bioenergy could use some support by demonstration and promotion. Also the problem of illegally dumped wood waste was clear. Prof Adam Gula

of FEWE was the owner of this idea that originated from October 1996, according to Mr. Czajkowski. The project proposal was finalized in 1999. At that time the local municipalities were already visited and made enthusiastic for the idea.

Before signing the contracts

The proposed partner (Pumped Storage Power Plants, S.A.) withdrew from its position as implementing agency as they had different expectations from the project due to miscommunications between the parties in the project consortium. The executing agency (ministry of Environment) had to look for another implementing agency and Polish Environmental Partnership Foundation (PEPF) was selected.

Main issues during the project

- The time between first project idea (1996) to actual implementation (2002) is much too long. Subsequently the PDF-A phase of the project, in which documentation for the medium scale project can be prepared, can take up to one year, which is much too long. According to Mr. Czajkowski the PDF-A phase should be limited to maximally a few months.
- The long time span between project idea and actual implementation makes that the project loses relevance. Moreover it frustrates the municipalities that had high expectation on short-term results and their support for the project diminishes.
- Generally speaking the municipalities as project beneficiaries were not very active. A ‘parachute approach’ was used and ideas were presented to them but not owned by them.
- Mayors of municipalities have a mandate of four years. If a project does not lead to tangible results within these four years, the municipalities will lose interest.
- Part of internal political issues within municipalities will not be visible to the outsider.

Output 1: Inter-municipal public private partnership

At the time of the project proposal the establishment of a public private partnership was an innovative idea that fitted very well in UNDP’s vision at that time. It definitely helped the project to be approved. Looking back, the establishment of this partnership took too much time, effort and money. Moreover, a Polish law was established on public private partnerships that made the formal establishment of a public private partnership very complex.

Output 4, Activity 4.2 Establishment of an information centre

Mr. Czajkowski has visited the Academy of mining and metallurgy in Krakow and observed the straw boiler and lecture hall. The information centre that would be established in exchange for the boiler was not well visible.

Activity 4.3 Publication of biomass energy guidelines

After delays it was agreed upon with the steering committee that the biomass energy guidelines would be published in the first quarter of 2008.

Activity 5.1 Development of marketing plan and enhancement in in-country projects

The project manager found this a very vague formulation, and the evaluator agrees with that. Mr. Czajkowski suggests that it could also be seen as part of the energy guidelines.

E. LIST OF DOCUMENTS REVIEWED

Ballard-Tremeer, G. (2004). Mid term evaluation of the UNDP-GEF project "Integrated approach to wood waste combustion for heat production in Poland", May 2004, Eco Ltd.

Pochitonow, Z. (2007). Final report August 2002 - December 2006, Integrated approach to wood waste combustion for heat production in Poland, report finished March 2007. Krakow, Polish Environmental Partnership Foundation for UNDP.

Pochitonow, Z (2003). Inception report, Integrated approach to wood waste combustion for heat production in Poland, 28 Feb 2008, PEPF, Polish Environmental Partnership Foundation.

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UNDP (2004-2008). Combined Delivery Report by Activity With Encumbrance. [financial figures from UNDP ATLAS administration system].

FEWE (1999). Project Document, Polish Foundation for Energy Efficiency, Krakow.

PEPF (2000/2001). Project Document, Polish Foundation for Energy Efficiency, Krakow. (Any reference to the project document in the main text is made to this final version of the project document).

UNDP (2008). Specially Managed Project Reviews 2004, Questionnaire, GEF Monitoring and Evaluation Unit, [Mid term evaluation].

Contract No. 2/2002-07-19 for the implementation of the Project "Integrated approach to wood waste combustion for heat production in Poland", within the Global Environmental Facility implemented by the United Nations Development Program.

EU (2007) Poland- Renewable Energy Fact Sheet, January 2007.

Other sources of information like email communications were briefly analyzed.