

GRANT FOR MINI-HYDRO POWER PROJECT

(GEF-MSP GRANT NO. TFO 23447)

COMPLETION REPORT

NOVEMBER 2004

## Table of Contents

Summary

Basic Information

Project Impact Analysis

Summary of Main Lesson Learned

Financial Management Status

## Summary

The objectives of the project were to reduce greenhouse gas emissions in Macedonia by substituting power produced by small hydropower plants for power produced from thermal generation. The second objective was to encourage the development of independent power plants especially mini-hydropower plants. This was to be done by constructing mini hydropower plants with a total capacity of about 1200 kW on the water supply systems of the towns of Kavadarci and Debar in Macedonia.

As a result of this project, these mini hydropower plants have been constructed at slightly less than the estimated cost and are running at a higher than estimated operating rates-producing more electricity than anticipated. The power they produce is replacing power which would otherwise have come almost entirely from Macedonia's thermal plants , especially the Bitola Plant. There is considerable interest by private firms in new independent power plants and several are in the planning stage.

The construction of these mini-hydropower plants was carried out in spite of the disruptions caused to the country and project by the large wave of refugees which entered Macedonia as a result of the Kosovo Conflict and the severe civil unrest which occurred later in the country. The two towns are in different parts of the country with different ethnic populations but in spite of this the PIU continued to function and the towns continued to cooperate for the common good. When the export credits for these plants are paid off in 5 to 8 years, the plants will produce a steady stream of income for many years which income can be used to fund town services such as schools, roads etc. The project received special recognition at the Johannesburg Summit on Sustainable Development where it was featured in a large advertising display.

## Basic Information

Date of Completion Report : November 2004

Title of GEF Medium Sized Project: Mini-Hydro Power Project

GEF Allocation: \$750,000

Period of Project Implementation: April 2000- June 2004

Grant Recipient: Republic of Macedonia

World Bank Manager/Task Team: James Moose, Dejan Ostojic, Peter Johansen

Macedonian Task Manger/Task Team: Predrag Popovski - head of PIU, Nikola Cerepnalkovski - State Counselor for Energy, Jordan Milkov - manager and Todor Lalkov - deputy manager of Komunalec – Kavadarci; Stefan Cadamov - ESM, Bardul Krcista - manager and Luan Cilku - deputy Manager of Komunalec - Debar.

Goals and Objectives: (include any changes in the objectives)

The goal and objectives of the project were not changed during project implementation.

The major objective of the project was to help meet Macedonia's demand for electricity while reducing air pollution. In particular the global objective was to reduce Macedonia's emissions of carbon dioxide by substituting electricity generated by mini-hydropower plants for electricity generated from lignite-fired power plants.

A secondary objective was to promote the development of small hydropower plants by independent power producers. This project was to serve as a pilot. In particular, The project would test the new power purchase contract and connection arrangements for small hydropower plants agreed by the Government with ESM in order to encourage development of small hydropower plants.

Financial Information

The grant was an integral part of the financing of the mini-hydropower plants in the towns of Kavadarci (4 units) and Debar (1 unit). Most of the financing for this project was provided by an export credit from the Republic of Slovenia and funds provided by the towns themselves. However the grant provided an essential component without which the project would not have gone ahead.

The cost of the project was somewhat less than estimated due primarily to: 1) the diligent work of the procurement groups in the two towns (the towns provided or borrowed most of the funds) and 2) the relatively advantageous contracts signed with the Slovenes, The table below shows the estimated cost of the project compared to the actual cost of the project.

Table 1. Estimated Capital Costs of the Project and Actual Costs ( \$)

| <b>Category</b>  | <b>Estimated</b> | <b>Actual</b>    |
|------------------|------------------|------------------|
| Kavadarci Plants | 2,492,000        | 2,239,000        |
| Debar Plant      | 440,000          | 372,000          |
| PIU/Consultants  | 160,000          | 101,000          |
| <b>Total</b>     | <b>3,092,000</b> | <b>2,712,000</b> |

As a result of the reduced cost of the project, financing was also somewhat different than anticipated. This is shown in table 2 below.

Table 2. Estimated Financing Plan for Capital Investments and Actual Results

| Category         | Kavadarci |           | Debar     |         | PIU       |         |
|------------------|-----------|-----------|-----------|---------|-----------|---------|
|                  | Estimated | Actual    | Estimated | Actual  | Estimated | Actual  |
| GEF Grant        | 601,000   | 579,000   | 115,000   | 90,000  | 34,000    | 81,000  |
| Export Credit    | 1,327,000 | 1,150,000 | 200,000   | 147,000 | 0         | 0       |
| Town Equity      | 564,000   | 510,000   | 125,000   | 135,000 | 0         | 0       |
| Government       |           |           |           |         | 26,000    | 20,000  |
| Bilateral Grants |           |           |           |         | 100,000   | 0       |
| Total            | 2,492,000 | 2,239,000 | 440,000   | 372,000 | 160,000   | 101,000 |

The Grant underwent one reallocation. This was primarily to shift the unallocated funds from unallocated to works. The additional works purchased were primarily a set of circuit breakers and a disconnect switch to increase the utilization factor on the Kavadarci Plants.

## Project Impact Analysis

### Project Impacts

The objectives of the project were met although the main objective (expanding generation from renewable energy) was achieved more clearly than the secondary objective of promoting development of small hydropower plants. The table below summarizes the situation.

Table 3. Achievement of Grant Objectives

| Grant Objective  | Summary of Results   |
|--|--|
| Help meet Macedonia's demand for electricity by substitution of power from small hydropower plants for power from lignite fired plants | This objective was overachieved. The performance indicators were 1.2 MW of hydro capacity producing 8.8 GWh per year. Instead 1.3 MW of capacity were installed (at a lower cost) producing an estimated 10.2 GWh per year - due to more hours of operation as well as more capacity.  |
| Promote the development of small hydropower plants by independent power producers.   | A number of towns in Macedonia and elsewhere in the Balkans have sent delegations to view the plants. Folders of potential projects in Macedonia were prepared by the PIU. Several proposals for new small hydropower plants have been advanced by developers. The Bank is preparing a sustainable energy project which would, inter alia, help facilitate the |

|                                       |
|---------------------------------------|
| financing of these proposed projects. |
|---------------------------------------|

In addition to the impacts of the project related to the grant objectives, the project had two important and beneficial impacts that were not objectives.

First, although the project is an environmental project, not aimed at poverty alleviation, it will provide considerable assistance towards poverty alleviation for the inhabitants of Kavadarci and Debar. After the Slovene Export Credits are repaid, the towns will have revenue from electricity sales of around \$370,000 per year, with minimal costs. This revenue can be used for schools, roads, other municipal services or even building further hydropower plants if sites are available. Thus the longer term yearly revenue from the project is equal to about 50% of the amount of the grant.

Second, the project encouraged continuing communication and cooperation between the two ethnic communities in Macedonia during a very divisive and tense period.

#### Project Sustainability

The project is very sustainable. Typically hydropower plants have very long lives and these plants should be operating for many years. The cash that they generate would be far more than is needed to maintain them. Once the export credits are paid off they will be generating significant cash flow for the towns that own them. This cash could be used not only for schools and other social purposes but also for funding other mini-hydropower plants where sites exist.

#### Replicability

The project is fully replicable. It could be replicated most easily in situations where a town is supplied by water from a source located at a substantially higher altitude than the town. Then the flow of water to the town can be used to generate electricity and the existing water supply pipe can be used as the penstock. However, in a more general sense it could be replicated anywhere there is an economic site for a small hydropower plant.

#### Stakeholder Involvement

This project was run by the stakeholders. A PIU was created which reported to the State Counselor for Energy in the Ministry of Economy. There was an advisory group for the PIU with members from Debar, Kavadarci and the Ministry. Then each city had a special implementation team headed by the head of the city utility.

This approach worked very well because; 1) the concept for the project was Macedonian; and 2) since the towns provided or borrowed most of the funds for the project they had a strong incentive to make it a success; 3) the Bank team avoided micro- managing project implementation.

## Monitoring and Evaluation

All Bank Energy Missions to Macedonia met with the PIU and in many cases they also went to Kavadarci and Debar (when the security situation permitted) to review construction. The Missions found it to be quite important to visit the sites in order to understand fully the issues.

## Special Project Circumstances.

As mentioned in the summary, the project occurred during a period of turbulence in Macedonia caused first by the wave of Kosovo war refugees during the Kosovo War and second by severe civil unrest and tension between the Albanian and Macedonian ethnic groups in the country. The two towns were in different ethnic areas but in spite of the turbulence they worked together with the PIU to get the project done.

The project was selected for special recognition at the Johannesburg Summit on Sustainable Development in 2002. It was featured on a large billboard and there was a presentation about it. Below is the billboard.



## Institutional Capacity/Partner Assessments

The institutional capacity of both the PIU and the town utilities was good. It was their idea and they knew how it should be implemented. The head of the PIU, a Professor at the University in Skopje, is quite experienced in this field and could provide useful advice in addition to his administrative function.

## **Summary of Main Lessons Learned**

The main lessons learned are the following:

- The complete and undivided support of the implementing agencies greatly facilitates a project. In this project we had such support, because the project was their idea and most of the money going into it was theirs or they had borrowed it,

- Let the stakeholders implement the project to the extent possible. Micro-management from Washington is likely to slow the project and add costs.
- Keep moving ahead with the project even though you may be slowed by outside events.

## **Financial Management Status**

The use of grant funds by the PIU was audited by Deloitte and Touche for 2001 and 2002. The auditors provided an unqualified opinion. The 2003 and 2004 audit is under way.

The entire project was not audited as a whole since it includes substantial outlays by the towns out of their own funds or borrowed funds. The towns of course are audited by their own auditors.