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**PROJECT PERFORMANCE ASSESSMENT REPORT**

**Republic of Croatia**

**ENERGY EFFICIENCY PROJECT (IBRD-71980)**

**RENEWABLE ENERGY RESOURCES PROJECT (TF-54973)**

**DISTRICT HEATING PROJECT (IBRD-48280)**

**June 27, 2013**

**IEG Public Sector Evaluation**  
*Independent Evaluation Group*

## **Currency Equivalents (annual averages)**

*Currency Unit = Croatian Kuna (HRK)*

2002	US\$1.00	HRK8.5
2003	US\$1.00	HRK7.1
2004	US\$1.00	HRK6.1
2005	US\$1.00	HRK5.7
2006	US\$1.00	HRK6.1
2007	US\$1.00	HRK5.7
2008	US\$1.00	HRK5.0
2009	US\$1.00	HRK5.5
2010	US\$1.00	HRK5.1
2011	US\$1.00	HRK5.5
2012	US\$1.00	HRK5.8 (as of December 2012)

## Abbreviations and Acronyms

EPEEF	Environmental Protection and Energy Efficiency Fund
ESCO	Energy Service Company
EU	European Union
FY	Fiscal Year
GEF	Global Environment Facility
GHG	Greenhouse Gases
HBOR	Hrvatska banka za obnovu i razvitak (Croatian Bank for Reconstruction and Development)
HEP	Hrvatska Elektroprivreda (National Power Utility)
HEP ESCO	HEP Energy Service Company (subsidiary of HEP)
HEP T	HEP Toplinarstvo (HEP District Heating Company)
IBRD	International Bank for Reconstruction and Development
IEG	Independent Evaluation Group
MoC	Ministry of Construction and Physical Planning
MoELE	Ministry of Economy, Labour and Entrepreneurship

## Fiscal Year

Government: January 1 – December 31

Director-General, Independent Evaluation	:	Ms. Caroline Heider
Director, IEG Public Sector Evaluation	:	Mr. Emmanuel Jimenez
Manager, IEG Public Sector Evaluation	:	Ms. Marie Gaarder
Task Manager	:	Mr. Ramachandra Jammi



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This report was prepared by Ramachandra Jammi, who assessed the projects in November 2012. The report was peer reviewed by Varadarajan Atur and panel reviewed by Fernando Manibog. Romayne Pereira provided administrative support.

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## Principal Ratings

### Energy Efficiency Project

	<i>ICR*</i>	<i>ICR Review*</i>	<i>PPAR</i>
Outcome	Moderately Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Risk to Development Outcome	Negligible to Low	Moderate	Negligible to Low
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory

\* The Implementation Completion and Results (ICR) report is a self-evaluation by the responsible Bank department. The ICR Review is an intermediate IEG product that seeks to independently verify the findings of the ICR.

### Renewable Energy Resources Project

	<i>ICR</i>	<i>ICR Review</i>	<i>PPAR</i>
Outcome	Moderately Unsatisfactory	Moderately Unsatisfactory	Moderately Unsatisfactory
Risk to Development Outcome	Significant	Significant	Moderate
Bank Performance	Moderately Unsatisfactory	Moderately Unsatisfactory	Moderately Unsatisfactory
Borrower Performance	Moderately Unsatisfactory	Moderately Unsatisfactory	Moderately Unsatisfactory

### District Heating Project

	<i>ICR</i>	<i>ICR Review</i>	<i>PPAR</i>
Outcome	Moderately Unsatisfactory	Moderately Unsatisfactory	Moderately Unsatisfactory
Risk to Development Outcome	Moderate	Significant	Significant
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Moderately Satisfactory	Moderately Unsatisfactory	Moderately Unsatisfactory

## Key Staff Responsible

### Energy Efficiency Project

<i>Project</i>	<i>Task Manager/Leader</i>	<i>Division Chief/ Sector Director</i>	<i>Country Director</i>
Appraisal	Peter Johansen	Peter Thompson	Anand K. Seth
Completion	Peter Johansen	Ranjit J. Lamech	Peter C. Harrold

### Renewable Energy Resources Project

<i>Project</i>	<i>Task Manager/Leader</i>	<i>Division Chief/ Sector Director</i>	<i>Country Director</i>
Appraisal	Peter Johansen	Peter Thompson	Anand K. Seth
Completion	Peter Johansen	Ranjit J. Lamech	Peter C. Harrold

### District Heating Project

<i>Project</i>	<i>Task Manager/Leader</i>	<i>Division Chief/ Sector Director</i>	<i>Country Director</i>
Appraisal	Sudipto Sarkar	Peter Thompson	Anand K. Seth
Completion	Pekka Kalevi Salminen	Ranjit J. Lamech	Peter C. Harrold

**IEG Mission: Improving World Bank Group development results through excellence in independent evaluation.**

**About this Report**

The Independent Evaluation Group assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, IEG annually assesses 20-25 percent of the Bank's lending operations through field work. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons.

To prepare a Project Performance Assessment Report (PPAR), IEG staff examine project files and other documents, visit the borrowing country to discuss the operation with the government, and other in-country stakeholders, and interview Bank staff and other donor agency staff both at headquarters and in local offices as appropriate.

Each PPAR is subject to internal IEG peer review, Panel review, and management approval. Once cleared internally, the PPAR is commented on by the responsible Bank department. The PPAR is also sent to the borrower for review. IEG incorporates both Bank and borrower comments as appropriate, and the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

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**Outcome:** The extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently. The rating has three dimensions: relevance, efficacy, and efficiency. *Relevance* includes relevance of objectives and relevance of design. Relevance of objectives is the extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). Relevance of design is the extent to which the project's design is consistent with the stated objectives. *Efficacy* is the extent to which the project's objectives were achieved, or are expected to be achieved, taking into account their relative importance. *Efficiency* is the extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. The efficiency dimension generally is not applied to adjustment operations. *Possible ratings for Outcome:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

**Risk to Development Outcome:** The risk, at the time of evaluation, that development outcomes (or expected outcomes) will not be maintained (or realized). *Possible ratings for Risk to Development Outcome:* High, Significant, Moderate, Negligible to Low, Not Evaluable.

**Bank Performance:** The extent to which services provided by the Bank ensured quality at entry of the operation and supported effective implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of supported activities after loan/credit closing, toward the achievement of development outcomes. The rating has two dimensions: quality at entry and quality of supervision. *Possible ratings for Bank Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

**Borrower Performance:** The extent to which the borrower (including the government and implementing agency or agencies) ensured quality of preparation and implementation, and complied with covenants and agreements, toward the achievement of development outcomes. The rating has two dimensions: government performance and implementing agency(ies) performance. *Possible ratings for Borrower Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.



## Preface

This Project Performance Assessment Report, prepared by the Independent Evaluation Group (IEG), evaluates three energy sector projects in Croatia: the Energy Efficiency Project (2003-2010), the Renewable Energy Resources Project (2005-2010), and the District Heating Project (2006-2010).

The three projects cover the assistance of the World Bank and the Global Environment Facility (GEF) to Croatia's energy sector since 2003. Together, the projects addressed the country's energy sector priority areas of promoting energy efficiency and developing renewable sources of energy. These issues are important for lowering energy imports, making the economy more competitive, and reducing emissions of greenhouse gases (GHG). As it moves toward full accession to the European Union in July 2013, the country is also gearing itself for EU-wide targets for energy efficiency and share of renewable sources of energy in the total energy mix.

The World Bank and GEF have several ongoing or completed projects in one or more of the energy efficiency, renewable energy and District Heating subsectors, in many countries of the Eastern Europe and Central Asia (ECA) region. Croatia is unique in that it has completed WB/GEF projects in all the three subsectors. These three projects share complementary or common issues relating to policy, regulation, institutional development, raising awareness, stimulating private investment, and developing public-private partnerships. The implementation periods of the three projects also overlapped for the most part. These factors were taken into account when selecting these projects for assessment. The findings and lessons from this assessment are also likely to be a useful input to the forthcoming IEG evaluation of the World Bank Group's contribution to electricity access in client countries.

IEG prepared this report based on an examination of the relevant Project Appraisal Documents, Implementation Completion and Results Reports, legal agreements, project files and archives, as well as other relevant reports, documents, memoranda and working papers. An IEG field mission visited Croatia during November 2012. Discussions were held with Bank staff in Washington, DC and in Zagreb, and government and other officials in Zagreb, Osijek, and other locations in the country. The mission discussed the projects' experience and the effectiveness of Bank assistance with other stakeholders including municipalities, schools, and industries. Several site visits were undertaken in several locations covering municipalities, schools, and industries.

The mission expresses its appreciation for the generous time and attention given by the Borrower and all concerned parties. A list of persons met by the mission is in Annex D.

Following IEG practice, copies of the draft report was sent to government officials and implementing agencies, and comments received from the government are attached as Annex E.



## Summary

Croatia has outperformed the rest of the former Yugoslav republics in economic performance during most of the last decade. Total energy consumption has also risen with overall economic growth, though both these have shown a downward trend since the onset of the financial crisis in 2008. As and when Croatia emerges from recession, the prospect of increasing energy consumption and import needs (Croatia imports nearly 55 percent of its total energy needs) makes energy efficiency a clear economic priority for Croatia. Even though there have been significant gains in energy efficiency during 1995-2010, particularly in the industry and transport sectors, the household sector – which now accounts for about 30 percent of final energy consumption – has lagged behind significantly in this respect.

Increasing the share of renewable energy, for which there is significant potential in the country, is a parallel priority to decreasing the dependence on imports and to decreasing greenhouse gas emissions. As Croatia moves toward full membership of the EU by July 2013, the country has to ramp up its efforts to meet the EU “20-20-20” goal by the year 2020 – to cut greenhouse-gas emissions by 20 percent, increase energy efficiency by 20 percent, and use renewable energy for 20 percent of its energy needs.

Croatia’s energy sector policies and regulatory framework have generally kept pace with the challenges presented by its energy efficiency and renewable energy agenda, and for aligning with EU policies. More recently, the New Energy Act (2012) creates the conditions for development of the energy market, competitive prices, customer protection, efficient production and energy efficiency.

Efforts to promote energy efficiency and renewable energy, and rehabilitating the District Heating sector (as a specific area for improving energy efficiency) share several common challenges relating to policy, regulation, institutional development, raising of public awareness, private investment promotion, and the development of public-private partnerships. Based on their experience with similar projects in Eastern Europe, the World Bank and GEF were in a unique position to assist Croatia in addressing the overlapping challenges across energy efficiency, renewable energy and district heating.

This Project Performance Assessment Report assesses the development effectiveness of three energy sector projects in Croatia: the Energy Efficiency Project (2003-2010), the Renewable Energy Resources Project (2005-2010), and the District Heating Project (2006-2010). The objectives of each project were:

- Energy Efficiency Project: “to increase the demand for and supply of energy efficiency projects and services in the Republic of Croatia.” The project’s global environment objective was “to overcome three barriers to energy efficiency market development and financing: (i) lack of capacity and know-how; (ii) lack of development and project financing; and (ii) lack of consumer demand.”
- Renewable Energy Resources Project: “to help develop an economically and environmentally sustainable market for renewable energy resources in Croatia.” The

project's global environment objective was "to reduce greenhouse gas emissions on a continuous basis by overcoming barriers to implementation of renewable energy."

- District Heating Project: "to promote efficient provision of District Heating services by the Project Implementing Entity."

The outcomes of the three projects, the risk to the sustainability of these outcomes, and the performance of the Bank, the government and the implementing agencies are summarized below.

### **Energy Efficiency Project**

The Energy Efficiency project was financed by the World Bank and the Global Environment Facility (GEF). The project was instrumental in establishing Croatia's first Energy Service Company (HEP ESCO, a subsidiary of the state-owned national power utility HEP), which helps clients to design and implement energy efficiency measures that are paid for through the resulting energy savings (the ESCO model). The project succeeded in raising awareness of energy efficiency issues, and the ESCO model in particular, among government institutions, industry, and the public at large, whereas these issues were not widely known or understood before. During project implementation, HEP ESCO supported several successful projects in city public lighting, schools, industrial units, and hospitals.

The objective of increasing the demand for and supply of energy efficiency projects and services in Croatia was partially achieved but the momentum slowed towards the end of the project and beyond. A wider competitive market for improving energy efficiency in the private sector has yet to be realized due to risk aversion on the part of banks, underdeveloped mechanisms for verification of energy savings, and the need for greater awareness and consumer demand for adopting the ESCO model. While a good beginning was made in several sectors including city public lighting, schools, hospitals and some industrial units, little progress was made in the residential sector where there is much potential for improving energy efficiency. The estimated savings in GHG emissions from the project were short of the targeted amounts.

The continuing financial crisis that began in 2008 resulted in less attention being paid to investments in energy efficiency, and dampened investor interest in availing the project's Partial Credit Guarantee facility, which was intended to stimulate financing of energy efficiency investments. On the positive side, Croatia's imminent accession to the EU and the prospect of EU funds becoming available have spurred the adoption of a new Energy Law and various secondary legislations, and a major effort for refurbishing public buildings, which may further stimulate the energy efficiency efforts in the country.

In designing this project, the Bank drew upon lessons from similar projects in other countries in the region, and provided for building capacity and mitigating risks in the institutional, technical and financial areas. A shortcoming was the failure to coordinate effectively with UNDP, which provided parallel financing for the Partial Credit Guarantee Facility, thus reducing its effectiveness. The Borrower showed commitment to the project objectives by acting on several aspects of the necessary policy and

regulatory framework. The implementing agency HEP ESCO displayed technical competence and diligence in promoting projects using the ESCO approach.

### **Renewable Energy Project**

The Renewable Energy project was supported solely by GEF and no IBRD funds were involved. The achievement of the global environment objective was below expectations, with the reduction in CO<sub>2</sub> emissions continuing to be far short of the target. This was because only one project – out of the 15 renewable projects that availed funding from the contingency loan fund (CLF) set up by the project – managed to reach financial closure at project completion. The expectation that the remaining projects would quickly come to financial closure and become operational has not been realized, with only two projects totaling 2 MW operational at end-2012.

At project commencement, Croatia had little expertise and an underdeveloped regulatory framework to design and implement renewable energy projects. In addressing this situation, the project design appropriately covered the elements of enacting necessary secondary legislation, strengthening institutional capacity, promoting incentive frameworks and markets, project pipeline preparation, and eventually investment financing. The results framework could have been enhanced by bringing more clarity to the linkages between the inputs, and onwards to outputs and outcomes. The necessary regulation and the modalities for the contingent loan facility were delayed, all of which contributed to a modest achievement of project objectives.

On the positive side, the project helped develop a regulatory environment for renewable energy that is compliant with EU requirements. Specific actions relate to technology-specific feed-in tariffs for renewable energy and renewable energy grid integration. A Renewable Energy Registry (RER) was created to support pre-feasibility studies, and technical assistance was offered to grid and market operators. Moreover, although renewable energy developers found the procedures for registration and processing of renewable energy project applications to be overly cumbersome during project implementation, these procedures are reported to have been greatly simplified since then.

The Croatian Bank for Reconstruction and Development (HBOR) as the implementing agency coordinated well with the Ministry of Economy Labour and Entrepreneurship (MoELE), and the Environmental Protection and Energy Efficiency Fund (EPEEF), which had an important upstream role for the technical appraisals and as a co-financier. In retrospect, however, the project design was too ambitious in the light of weak capacity in the country's renewable energy sector. Moreover, HBOR was very slow in starting up its project activities, thus resulting in a large accumulated workload during the last year of project implementation.

### **District Heating Project**

The District Heating project addressed improvements in the District Heating systems for Zagreb and Osijek cities, which were facing deteriorating infrastructure and severe financial losses through non-remunerative tariffs, and a lack of demand side management. The project was generally successful in meeting its objectives of reducing

heat and water losses in the system through replacing old pipelines. These outcomes have been broadly sustained to the present. However, the objective of achieving financial viability of the District Heating company HEP T could not be met as losses increased throughout the project period and continued to worsen beyond project completion, mainly due to insufficient increases in tariffs. The New Energy Act that was approved in November 2012 has liberalized energy pricing, including for District Heating. HEP as the parent company is now able to set District Heating tariffs subject to the approval of HERA, Croatia's Energy Regulatory Agency. This mission was informed that a significant increase in District Heating tariffs was expected, which can potentially cover HEP T's operating costs. However, tariff increases are likely to be met by consumer resistance unless accompanied by an increase in efficiency of District Heating services. Little headway has been made in demand-side management, and buildings continue to lack individual meters in housing units, obviating any incentive for rational use of heating by households.

The project design was clear and logical with technical and policy measures combining to produce desired physical and financial outcomes. The implementing agency HEP T displayed competence and diligence in carrying out the activities under the project and maintained a cooperative and productive relationship with the Bank team.

### Ratings

The Energy Efficiency Project is rated **high** for relevance of the project development objective as well as relevance of project design. Development Outcome is rated **moderately satisfactory** for disseminating the concept and practice of energy efficiency where it was little understood or practiced before, successfully creating HEP ESCO, and increasing the demand and supply of energy efficiency services and products in several targeted sectors based on the ESCO model. Risk to development outcome is rated **negligible to low** due to renewed activity for improving energy efficiency spurred by the EU directives and goals. Bank performance is rated **moderately satisfactory** and Borrower performance is rated **satisfactory**.

The Renewable Energy Resources Project is rated **high** for relevance of the project development objective, and **substantial** for project design. The Global Environmental Outcome is rated **moderately unsatisfactory** because of the low realization of CO<sub>2</sub> emissions reductions due to much fewer renewable energy projects becoming operational than expected. Risk to development outcome is rated **moderate** due to the recent favorable energy sector legislation and the impetus expected from EU accession. Borrower and Bank performance are both rated **moderately unsatisfactory**.

The District Heating Project is rated **high** for relevance of the project development objective, and **substantial** for project design. Development Outcome is rated **moderately unsatisfactory**, mainly due to the poor financial performance of HEP T, the District Heating company. Risk to development outcome is rated **significant** due to continuing concerns on the financial viability of HEP T. Bank performance is rated **satisfactory** and Borrower performance is rated **moderately unsatisfactory**.

## Lessons

**A supportive regulatory environment is crucial for overcoming risk aversion to adopting new financing instruments for energy efficiency projects, creating a level playing field for a competitive ESCO market, and to ensure sustainability of energy services.**

- The Energy Efficiency project was unable to stimulate the ESCO market beyond some sectors in the public domain due to remaining regulatory and legal constraints (as for example in the residential sector).
- In Croatia, two factors may have inhibited the emergence of a competitive regime for ESCOs: (a) HEP ESCO's special standing as a subsidiary of the national power utility HEP; and (b) the lack of standardized contract models, budgeting procedures, and public procurement rules.
- The capacity of HEP T, the District Heating Company, to provide reliable services in the long run is likely to be impacted if its financial viability is not assured through either remunerative tariffs or well-designed subsidies.

**Ensuring reliable means for verifying energy savings provides a clear basis for sharing the resulting gains between the beneficiary and the financing source, and therefore incentivizes energy efficiency efforts.**

- Underdeveloped means for monitoring and verification meant that there was an inadequate basis for sharing the gains from energy savings, thus creating a disincentive for adopting the ESCO model.
- Given the prospect of HEP increasing District Heating tariffs in the future, demand-side management should be promoted to ease the transition to higher tariffs. In particular, individual metering will need to be introduced widely so that each unit can be charged for their actual energy use.

**There is a need for the Government to coordinate its various ministries in order to provide common technical and other support services, with a view to mitigating risks for investors and consumers in renewable energy efforts.**

- While rights to state-owned land are being handed out to the private sector or for public-private partnerships in solar and wind power projects, energy resource mapping and mature project designs need to be provided as a common service by the government. In the case of biomass projects, where various ministries including forestry and water are involved, horizontal connections between ministries need to be strengthened. These arrangements were lacking during the Renewable Energy Resources project experience.

Caroline Heider  
Director-General  
Evaluation



# 1. Background and Context

1.1 The three projects covered by this report address the country's energy sector priority areas of promoting energy efficiency and developing renewable sources of energy. These areas assume renewed importance as Croatia prepares to join the EU and gears up for long term sustainable growth. In this context, improving energy efficiency and the share of renewable sources in the total energy mix is crucial for lowering energy imports, making the economy more competitive, and reducing emissions of greenhouse gases (GHG).

## **Energy Efficiency and Renewable Energy: Key Elements for Croatia's Sustainable Growth**

1.2 Croatia has led the rest of the former Yugoslav republics in economic performance during most of the last decade, with annual GDP growth rates between 4 and 6 percent during 2000-2007. While the country still enjoys the highest GDP per capita among this group of countries<sup>1</sup>, the onset of the global financial crisis has seen the economy contract by more than 10 percent since 2008.

1.3 Along with overall economic growth, the total primary energy consumption in Croatia has increased at an average annual rate of 1.6 percent during 1995-2010, though there has been a negative 3.0 percent growth since 2008 due to the economic slowdown. There have been significant gains in energy efficiency during 1995-2010, with the energy efficiency index<sup>2</sup> for the whole economy improving by 14.5 percent. The industrial sector and transport sector contributed the most to this improvement with the energy efficiency index improving by 20 percent and 19 percent respectively over the 1995-2010 period. In contrast, the improvement in energy efficiency in the household sector was much lower at 4 percent. This is significant because the household sector now accounts for nearly 30 percent of final energy consumption.

1.4 In 2010, Croatia imported nearly 55 percent of its total energy needs. As and when Croatia emerges from recession, the prospect of increasing energy consumption and import needs makes energy efficiency a clear economic priority for Croatia. Increasing the share of renewable energy, for which there is significant potential in the country, is a parallel priority to decrease the dependence on energy imports as well as to decrease greenhouse gas emissions. Also, as Croatia moves toward full membership of EU by July 2013, the country is ramping up its efforts for its commitment to the EU "20-20-20" goal by the year 2020 – to cut greenhouse-gas emissions by 20 percent, increase energy efficiency by 20 percent, and use renewable energy for 20 percent of its energy needs. These ambitious targets require significant long-term investments not easily available in a time of economic crisis in Europe. They also pose a challenge for a country that is struggling to emerge from recession.

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<sup>1</sup> Croatia's GDP per capita was US\$19,500 in 2011 (at purchasing power parity)

<sup>2</sup> ODEX is the index used in the ODYSSEE-MURE project supported by the European Commission to measure the energy efficiency progress by main sector (industry, transport, households) and for the whole economy (all final consumers). A decrease in the index indicated higher energy efficiency.

1.5 A summary of trends in energy consumption and energy efficiency is presented in Annex C.

### **Cross-cutting challenges for Energy Efficiency and Renewable Energy**

1.6 Efforts for promoting energy efficiency and renewable energy, and rehabilitating the District Heating sector (as a specific area for improving energy efficiency) share several common challenges relating to policy, regulation, institutional development, raising of public awareness, private investment promotion, and the development of public-private partnerships. Market-oriented policies for energy pricing are needed to send the right signal and incentivize investments in energy efficiency and renewable energy. Capacity building and raising awareness is crucial in situations where the benefits and modalities of adopting energy efficiency and renewable energy are not widely known or appreciated. Reliable means for monitoring and verification of savings from energy efficiency improvements are needed to instill confidence in both consumers and investors. Similarly, a clear feed-in tariff regime and technical means for integration to the grid are crucial for attracting investments for renewable energy.

### **Croatia's Energy Sector Policy and Regulatory Readiness for its Energy Efficiency and Renewable Energy Challenges**

1.7 The legal framework for the energy sector in Croatia is defined through a package of energy laws that include several pieces of primary legislation.<sup>3</sup> Croatia's energy policy is also framed by relevant international agreements to which it is a signatory, and the country's imminent accession to the EU. Important documents include the Energy Charter Treaty (1994), the United Nations Framework Convention on Climate Change; (1996); Kyoto Protocol (2007), and the EU's evolving energy legislation. In addition, the EU requires each Member State to have active policies for the promotion of energy efficiency and renewable energy although the design and implementation is mainly the responsibility of the individual member states.

1.8 The *Energy Sector Development Strategy* of the Republic of Croatia (2002) covers the period until 2030. The Strategy has the objectives of energy efficiency improvements; security of energy supply; diversification of energy sources; utilization of renewable resources; realistic energy prices, energy market and private entrepreneurship development; and environmental protection.

1.9 ***Recent Developments and Alignment with EU policies.*** Croatia has passed a new Energy Act that entered into force on 8 November 2012. The new Energy Act harmonizes Croatian energy legislation with the European directives on the internal market of electricity and natural gas<sup>4</sup>, thereby fulfilling the country's obligation to harmonize its national legislation with the EU energy legislation and the EU Third Energy Package passed in 2009. The new Energy Act creates the conditions for quality

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<sup>3</sup> Energy Act, Act on Electricity Market, Act on Gas Market, Act on Oil and Oil Products, Act on Production, Distribution and Supply of Heat and Act on Regulation of Energy Activities, Act on Energy End-Use Efficiency, Act on Physical Planning and Construction, Act on Regulation of Energy Agency.

<sup>4</sup> EU Directives 2009/72/EC and 2009/73/EC)

and safety of supply, development of the energy market, competitive prices, customer protection, efficient production and energy efficiency, as well as decrease of negative environmental effects and sustainable development in the energy sector. Additionally, the new Act transfers the authority for defining prices and tariff from the Government to the energy subjects with the approval of the regulator, the Croatian Energy Regulatory Agency (HERA), and introduces prerequisites for passing programs to implement intelligent measuring devices.

1.10 Currently almost all European Directives are transposed into Croatian legislation, including the Directive on energy performance of buildings<sup>5</sup>, and energy end-use efficiency and energy services<sup>6</sup>. That includes mandatory energy certification of buildings and energy audits of structures, and technical requirements for building materials concerning thermal protection. The National Energy Efficiency Action Plans (NEEAP) of the Republic of Croatia comply with the European Commission's directive which requires each Member State to submit to the European Commission an energy efficiency action plan.

### **World Bank/GEF contribution to Croatia's Energy Efficiency and Renewable Energy Agenda**

1.11 Since 1999, the World Bank and GEF have financed several projects in the areas of energy efficiency, renewable energy, and District Heating in many countries of the Eastern Europe and Central Asia (ECA) region (Annex B, Table 1). Based on the experience from these projects, the World Bank and GEF were in a unique position to assist Croatia with projects in those three areas that have mutually reinforcing objectives. All three projects that have been assessed here share complementary or common issues relating to policy, regulation, institutional development, the raising of public awareness, private investment promotion, and the development of public-private partnerships. The implementation periods of the three projects overlapped for the most part over the time period of 2003-2010.

1.12 ***Mainstreaming Energy Efficiency through the Energy Service Company or ESCO model.*** Croatia's Energy Efficiency project supported the formation of HEP ESCO (Hrvatska Elektroprivreda Energy Service Company) as a subsidiary of the national power utility HEP (Hrvatska Elektroprivreda). ESCOs offer energy efficiency improvement services to clients covering development and design of energy efficiency projects; installation and maintenance of the energy-efficient equipment involved; and finally, measurement, monitoring and verification of the project's energy savings. Financing for the investment can either be provided by the ESCO from its internal funds, by the customer, or by a third party funding, in which a financial institution allows a credit either to the ESCO or directly to its client; the loan is then backed by a guarantee for the projected energy or cost savings given by the ESCO.

1.13 ESCOs across the world are active in different sectors depending on the country. In industrialized countries such as the United States and Germany, the public sector is

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<sup>5</sup> 2010/31/EC

<sup>6</sup> 2006/32/EC

one of the most important ESCO clients and has often triggered the development of a national ESCO industry through projects in public buildings as well as through favorable legislation and financial support. The commercial sector is an emerging ESCO client, especially in developing countries such as Brazil or India. ESCO activity in the industrial sector often seems to be higher in developing or transition countries. The residential sector is the least active for ESCOs in most countries. This is due to the expected low profits, to legal complexities in the owner-tenant relationship as well as other factors such as difficult decision-making due to the usually high number of stakeholders.<sup>7</sup>

1.14 In general, the efforts to improve energy efficiency in several countries (as well as in Croatia) have been hindered by limited resources for financing equipment; restrictive policies and procedures that make procurement, budgeting, and new approaches more difficult; behavioral inertia of a risk-adverse public sector used to the status quo; lack of or poor access to information and institutional knowledge about energy efficiency opportunities, implementation options, certified energy-efficient equipment, and lifecycle costing; and weak governance.<sup>8</sup>

1.15 ***Overcoming barriers to development of Renewable Energy.*** The Renewable Energy Sources project addressed the barriers to increasing energy from renewable sources. In 2011, energy from renewable sources (apart from hydropower) amounted to 147 megawatts (comprising solar, wind, biomass and geothermal heating) which was about 3.6 percent of total installed capacity.<sup>9</sup> This figure is striking because the potential for renewable energy from wind, solar, geothermal, and biomass is very high in the country. Croatia also has a strong incentive because of its imminent EU membership and the EU goal of sourcing 20 percent of energy from renewable sources by 2020 as part of EU's "20-20-20" program. Croatia stands to gain from EU Structural and Cohesion Funds that will become available for this purpose upon accession, among others.

1.16 The slow progress in renewable energy in Croatia can be attributed to the combination of slow licensing of projects and lack of sufficient equity capital of developers who were not prepared to share the potential profits with an external shareholder. The permitting process for renewable energy generation facilities has been cumbersome and involves multiple clearances from different government units<sup>10</sup>, although efforts have been made recently to simplify the process considerably.<sup>11</sup>

1.17 ***Rehabilitating the District Heating network and improving its financial viability.*** The District Heating<sup>12</sup> project sought to help Croatia rehabilitate its district

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<sup>7</sup> WEC 2008.

<sup>8</sup> ESMAP 2012.

<sup>9</sup> MoELE statistics

<sup>10</sup> EBRD 2010.

<sup>11</sup> For instance, this mission was informed that paper work has been reduced by the new government from 64 to 3 documents.

<sup>12</sup> District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating. The heat is often obtained from heat-only boiler station or a cogeneration plant burning fossil fuels.

heating network, and improve its financial viability. There are 10 District Heating companies in the major cities and towns, serving about 400,000 people, about 10 percent of Croatia's total population. In comparison, the share of citizens served by District Heating is 64 percent in Latvia, 50 percent in Poland, and 17 percent in Slovenia. Croatia's District Heating services are provided by subsidiaries of HEP and by municipal companies, except in Rijeka where the District Heating company is jointly owned by the municipality and the private sector. The District Heating project covered heating services in Zagreb and Osijek which are provided by HEP Toplinarstvo (HEP T), a subsidiary of HEP. These two cities contained 82 percent of the customers in Croatia's District Heating sector.

1.18 Although District Heating in Croatia is considered a cost-effective and environmentally friendly way of delivering heat, it has experienced several shortcomings in common with most other East European countries: the piping was subject to heat and water losses; heat was not always delivered when needed; households were not charged on the basis of actual heat consumption, but on the floor area of their apartment (hence, some households ultimately subsidized other households, and all households subsidized a system prone to losses); and people could not adjust the temperature to their specific needs, receiving a set level of heating that the District Heating plant deemed appropriate for everyone. Heating tariffs have remained low making it difficult to cover operating expenses apart for necessary capital expenditures, undermining HEP T's financial viability and affecting the quality of services.

1.19 In the following chapters, each of the three projects – Energy Efficiency, Renewable Sources, and District Heating – is assessed, followed by lessons drawn from their overall experience.

## 2. Energy Efficiency Project

### Objectives, Design, and their Relevance

#### OBJECTIVES

2.1 According to the Project Appraisal Document, the Loan Agreement, and the GEF Trust Fund Agreement, the Project Development Objective was "to increase the demand for and supply of energy efficiency projects and services in the Republic of Croatia." The Global Environment Objective was "to overcome three barriers to energy efficiency market development and financing: (i) lack of capacity and know-how; (ii) lack of development and project financing; and (ii) lack of consumer demand."

#### RELEVANCE OF OBJECTIVES

2.2 ***Relevance of the project development objectives is rated High.*** The objectives of removing barriers to energy efficiency, and expanding the demand and supply for energy efficiency products and services, were highly relevant at project appraisal, and remain crucial to Croatia's economy and its environment. Improving energy efficiency is clearly

a priority for Croatia to help reduce the amount of imported energy, create new job opportunities, and reduce greenhouse gas emissions. In keeping with its imminent EU membership Croatia's 2009 Energy Strategy is aligned with the EU's "20-20-20" goal to increase energy efficiency by 20 percent, cut greenhouse-gas emissions by 20 percent by the year 2020, relative to 1990 levels, and increase the share of renewable energy to 20 percent of all energy consumed. Croatia has generally worked to align its energy policy and regulatory framework with the European's energy efficiency strategies and directives.

2.3 The project's objectives are consistent with the Bank's Country Assistance Strategy for 2005-2009, which recognized the need for improving energy efficiency and for meeting international obligations under the Kyoto Protocol to reduce greenhouse gas emissions. Increasing the sustainability of long-term development through the implementation of greenhouse gas mitigation measures is a pillar of the current Country Partnership Strategy for 2009-2012, which has been extended to 2013.

## DESIGN

2.4 The project comprised the following components:

- **Component 1: Energy Saving Investments** (estimated cost at appraisal: US\$32.45 million; cost at completion: US\$26.28 million). Under this component, investments to save energy were to be implemented by HEP ESCO (Hrvatska Elektroprivreda Energy Service Company) under Energy Services Performance Contracts with clients managing public and private buildings, public lighting, water pumping systems, small cogeneration units, and District Heating systems. The Bank's loan of US\$5 million would catalyze a total of US\$32.5 million in energy saving investments, with the balance of financing coming from local banks and the end-users themselves.
- **Component 2: HEP ESCO Project Development and Financing** (estimated cost at appraisal: US\$3.60 million; actual cost at completion: US\$3.25 million). This component financed: (i) project development by HEP ESCO for pre-contract analysis and identification of good candidate projects (US\$0.6 million from the GEF grant); and (ii) early project financing to cover bridge funding of project design services and initial investments for energy savings (US\$3.0 million).
- **Component 3: Creditworthiness Enhancement Mechanism** (estimated cost at appraisal: US\$2.00 million; actual cost at completion: US\$0.90 million). Under this component, a mechanism was to be set up at the Croatian Development Bank (HBOR) to enhance the creditworthiness of HEP ESCO, other energy service providers, and end-users. A Commercial Loan Facility (US\$0.8 million from the GEF grant) would be a first-loss reserve for HEP ESCO to mitigate end-user risks that HEP ESCO would be exposed to when it finances projects directly. A Partial Credit Guarantee program (US\$1.2 million from the GEF grant) would underwrite energy efficiency lending by commercial banks.

- **Component 4: GEF Technical Assistance** (estimated cost at appraisal: US\$1.50 million; actual cost at completion: US\$ 2.85 million). Under the GEF grant, this component would provide technical assistance – including training, information dissemination, outreach, monitoring and verification – to HEP ESCO staff and project partners, other energy efficiency businesses, HBOR (Hrvatska banka za obnovu i razvitak or the Croatian Bank for Reconstruction and Development), and nonprofit and consumer groups. HEP ESCO would also receive capacity-building assistance and transfer of management expertise from an experienced international ESCO strategic partner.

2.5 **Monitoring & Evaluation Design.** The monitoring and evaluation (M&E) framework contained a wide range of indicators to address the scope of the project objectives, and baseline values were provided where available. The task of implementing M&E was assigned to a non-profit organization and was supported by the GEF grant.

2.6 For the project development objective, the outcome indicators were HEP ESCO customer satisfaction; number of target market segments with significant energy efficiency activity; number of firms actively engaged in provision of energy efficiency services; number of local banks engaged in energy efficiency financing and lending activity; and the performance track record of commercially viable energy efficiency projects, as measured by number of incidents reported of project failure after contract signature. However, most of these indicators are in the nature of outputs rather than outcomes. Customer satisfaction as an outcome indicator can be subjective and pick up perceptions other than those related to direct savings arising from improved energy efficiency. The M&E design could have included outcome indicators that would have more directly measured or reflected improvements in energy efficiency.

2.7 For the global environmental objective, the outcome indicators covered the reduction in greenhouse gas emissions at project level; increase in availability of energy efficiency products in Croatia; total expenditures for goods in Croatian currency; price premium of energy efficiency products in Croatia relative to typical EU prices; number of added Croatian citizens accepting energy efficiency as a normal way of life; and number of target market segments with significant energy efficiency activity.

2.8 Intermediate outcome indicators were mostly financial indicators that were amenable to regular reporting and included the value of energy efficiency projects implemented by HEP ESCO; HEP ESCO net income; lending volume to HEP ESCO by local Banks; number of grant fund agreements signed; and disbursements from the Guarantee Facility Account.

2.9 **Implementation Arrangements.** Energy efficiency policy in Croatia is the responsibility of the Ministry of Economy, Labour and Entrepreneurship (MoELE) in cooperation with the Ministry of Construction and Physical Planning (MoC). The Croatian Bank for Reconstruction and Development (HBOR) and the National Power Utility (HEP) were the implementing agencies for the project. The project sought to introduce an ESCO model by working with HEP with the support of donors. Support for developing a detailed business plan was obtained from an international consulting firm specialized in the start-up of ESCO operations.



## RELEVANCE OF DESIGN

2.10 *Relevance of project design is rated High.* The project design was intuitive and clear. The inputs to the project came from the Bank's catalytic role of providing seed financing for investments in energy savings; local banks expected to finance most of the funding required; while GEF sought to build market confidence by providing grants to identify good projects, mitigating risks, underwriting lending through guarantees, building capacity, and strengthening institutions. Together, these inputs were expected to help overcome barriers to energy efficiency market development and financing; and helping to increase the demand for and supply of energy efficiency projects and services in the country.

2.11 The start-up phase of the project was to help set up HEP ESCO as a subsidiary of the state-owned energy utility and provide technical assistance to the new entity for building capacity in project development, financing and implementation. The expectation was that the successful implementation of projects by HEP ESCO would generate interest from commercial banks and other ESCOs in the potential for energy efficiency investments, while also raising awareness among customers. HEP ESCO's target market included owners and occupants of buildings of various types such as housing cooperatives, commercial enterprises and public service facilities like schools and hospitals. The technical assistance package was designed comprehensively, by targeting the full range of relevant stakeholders, from HBOR and HEP ESCO to other ESCO partners, client businesses, nonprofit groups, and end-users.

## Implementation

### PLANNED VS. ACTUAL COSTS

2.12 Of the total project cost of US\$39.8 million estimated at appraisal, the Bank loan amounted to US\$5.0 million and the GEF grant US\$7.00 million. The balance was to be provided by the Borrower (US\$7.0 million) and local banks (US\$20.8 million). Various re-allocations were done during project implementation, notably from the Partial Credit Guarantee (PCG) program into the Energy Savings Investments component, due to the lower-than-expected demand for guarantee products. At closing, the total costs were US\$33.33 million (84 percent of the appraised estimate), with the Bank disbursing US\$5.84 million and GEF US\$6.89 million.

### IMPLEMENTATION EXPERIENCE

2.13 The project was approved on March 21, 2003, and became effective as scheduled on April 8, 2004. The project closed without any extensions on June 30, 2010.

2.14 Apart from the project being assessed here, Croatia also received support for its energy efficiency efforts from a UNDP and GEF-funded "Removing Barriers to Energy Efficiency Project" (2004-2011)<sup>13</sup> with similar project development objectives. UNDP,

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<sup>13</sup> The objective of the UNDP and GEF-funded "Removing Barriers to Energy Efficiency Project" (2004-2011) was to "reduce Croatia's greenhouse gas emissions by supporting the implementation of economically feasible energy efficiency technologies and measures in the residential and service sectors"

having immediate and working relationships with local governments, disseminated information and promoted the concept of ESCO and EPC projects, HEP ESCO utilized energy audits developed within the UNDP/GEF project, and prepared detailed feasibility studies for actual investment. Financial support for small and medium industries and energy efficiency projects was also been forthcoming from multilateral international financial institutions like the European Bank for Reconstruction and Development, European Investment Bank and KfW<sup>14</sup>.

**2.15 Safeguards.** This project was placed in Category FI (Financial Intermediary) under the Bank's environmental and social safeguard policies. This category applies when the Bank provides funds to a financial intermediary (HEP ESCO in this case) for on-lending to final borrowers at the intermediary's risk. As required for this category, the borrower prepared an Environmental and Social Management Framework that was used to screen each subproject in terms of potential environmental and social impacts. The framework document was disclosed publicly as required. HEP ESCO was responsible for screening sub-projects and ensuring that they complied with the Bank's safeguard policies and appropriate Croatian environmental law. The strong technical know-how of HEP ESCO and HBOR staff and their sound reporting systems ensured compliance with the Environment and Social Management Framework. The staff team at HEP ESCO included an environmental specialist. The project team confirmed that the project was in compliance with the Bank's safeguard policies.

**2.16 Financial Management.** The financial management systems and procedures established by HEP ESCO and HBOR were well-implemented during the project. Financial reports and external audits were submitted on time. There were no procurement concerns during project implementation. The project team confirms that there were no qualified audits.

**2.17** The project was in compliance with the two applicable financial covenants. The first related to HBOR maintaining a loss rate on non-performing loans of participating Banks not exceeding 5 percent of the outstanding guarantee liability commitment; and the second related to HEP ESCO maintaining a loss rate on beneficiaries' defaults supported by the Partial Risk Guarantee not exceeding 5 percent of the outstanding HEP ESCO receivables. In both cases the loss rate was 0 percent.

**2.18 Implementation of M&E.** The M&E effort might have been more focused and productive if fewer indicators had been prioritized. In principle, all the indicators were measurable, but considerable effort was needed to collect and update information on all these indicators. An international consultant was contracted as the project's monitoring consultant in November 2006. During their four-year M&E contract, the consultant encountered several obstacles in finding a suitable methodology to measure some

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and project immediate objectives were to overcome general institutional barriers to the promotion of energy efficiency, including the residential and service sectors. The project had a total budget of US\$13.05 million including a GEF cash contribution of US\$4.39 million and private contributions of US\$7.99 million. The major portion of the GEF contribution supported a Partial Guarantee Facility and a Project Development Facility.

<sup>14</sup> Kreditanstalt für Wiederaufbau

indicators based on the available information. Values for all indicators were provided at project completion, but the usefulness was limited for some of them due to lack of benchmark values. However, this data will form a useful baseline for future monitoring.

## **Achievement of the Objectives**

2.19 This report assesses the project development objective “to increase the demand for and supply of energy efficiency projects and services in the Republic of Croatia”, and the global environmental objective “to overcome three barriers to energy efficiency market development and financing: (i) lack of capacity and know-how; (ii) lack of development and project financing; and (iii) lack of consumer demand.”

**PROJECT DEVELOPMENT OBJECTIVE: TO INCREASE THE DEMAND FOR AND SUPPLY OF ENERGY EFFICIENCY PROJECTS AND SERVICES IN THE REPUBLIC OF CROATIA. *Rated Substantial.***

2.20 **Outputs:** Under this project, HEP created the first ESCO (HEP ESCO) in Croatia; the energy performance contracting mechanism was rolled out to several market segments; regulatory barriers were identified; and there was an increase in awareness of energy efficiency issues and the ESCO mechanism among the government, industry, services, banks, and the public at large.

2.21 At the commencement of the project (2003), awareness of energy efficiency issues was still low in Croatia. Initially, HEP ESCO focused on implementing projects under Energy Services Performance Contracts in public lighting and schools as they had direct access to these clients as a utility-owned subsidiary. After some years, HEP ESCO started to diversify its business activities to various market segments of public lighting, schools, hospitals, cogeneration, industry and commercial buildings. HEP ESCO’s marketing efforts to disseminate knowledge of energy efficiency issues and the ESCO model, coupled with its good performance track record during project implementation, are expected to have contributed to an overall growth in demand for energy efficiency services over the project implementation period. HEP ESCO was able to demonstrate the commercial and financial viability of energy efficiency investments and the ESCO contracting approach. However, for several reasons, including the effect of the global financial crisis that began in 2007 and insufficient interest from private financing sources, HEP ESCO’s momentum slowed somewhat as discussed in terms of project outcomes below.

2.22 **Outcomes:** In terms of specific outcome indicators tracked by the project, the achievements are as follows:

- Coverage of various market segments: During the project period, HEP ESCO became active in seven out of nine marketing segments that it planned to cover, namely schools, hospitals, offices, public lighting, industry, cogeneration, and commercial buildings. This can largely be ascribed to HEP ESCO’s promotional efforts and technical support; leveraging the Partial Credit Guarantee facility for additional finance for clients; and public financing for energy efficiency projects

that was made available through the EPEEF.<sup>15</sup> Two other segments, multiple residential buildings and District Heating and distribution systems that were also targeted could not be covered.

- **Number and volume of commercially viable energy efficiency projects:** During the project period, HEP ESCO implemented 31 commercial energy efficiency projects on a for-profit basis, with a total cumulative value of US\$29.5 million, which slightly exceeded the energy efficiency investments estimated at appraisal. Compared to the number of applications received, the share of projects reaching financial closure increased from 10 percent at HEP ESCO's inception to about 22 percent by project completion, which was less than the target of 50 percent. This under-performance may have been at least partly due to the impact of the financial crisis that began 2008. HEP ESCO reported that only 2 projects out of 31 were terminated compared to the ceiling of three set at appraisal. The stoppages were due to changes in management and changes in regulations for public procurement following the enactment of the Budget Law in 2010. This mission was informed that the projects undertaken by HEP ESCO during the project implementation period continue to yield expected benefits. Field visits were taken to selected projects – schools, buildings, public lighting in cities, and an industrial application for fuel efficiency – which confirmed the benefits and value-added for the clients. (Table 1).

**Table 1: Site Visits to Beneficiaries under the Energy Efficiency Project**

Beneficiary	Energy Efficiency Measures and Results based on ESCO model	Cost and Payback period	Beneficiary feedback
<b>Milivoj Medven Slaughterhouse</b>	This project provided for the use of waste heat from the cold-storage plant, which is transferred to sanitary hot water in accumulator tanks. The system was also expanded with solar collector panels. This project reduced fuel oil used to heat about 9,500 cubic meters of sanitary water by 86,600 liters/year. The resulting savings are expected to amount to 73,890 liters/year or 85 percent of the previous consumption. The reduced consumption of fuel oil resulted in a reduction in greenhouse gas emission of 192 tons/year.	Project cost: HRK 315,000 (US\$55,000) Payback period: 4 years	HEP ESCO project formulation, technical support and finance were very useful. Unlikely to have been funded by a Bank.
<b>Novigrad City</b>	Novigrad has a population of around 4,000. Two-thirds of public lighting in the city was covered by a project, for replacement with energy efficient lighting.	Project cost: HRK 2.5 million (US\$430,000) Novigrad provided 2/3 <sup>rd</sup> and HEP ESCO provided 1/3 <sup>rd</sup> of project cost. Payback period: 9 years 11 months	First town that used funds from HEP ESCO Feasibility study and technical assistance from HEP ESCO was very useful. Novigrad won an award for reducing light pollution from the "International Dark-Sky Association" ( <a href="http://www.darksky.org">www.darksky.org</a> )
<b>Rovinj city</b>	Rovinj has a population of around 14,000. 30-40 percent of the town's lighting was	Savings from reduced electricity consumption: HRK	HEP ESCO was helpful in analyzing lighting from

<sup>15</sup> Moreover, the UNDP project undertook important energy efficiency dissemination and awareness campaigns.

	replaced with energy efficiency lighting.	130,000 HRK (US\$22,500) per month	energy efficiency point of view.
<b>Solin City</b>	Solin has a population of around 20,000. 50 percent of the town's public lighting was replaced with energy-efficient lamps and about 30 percent were fitted with user-regulated lamps to help reduce light pollution.	Savings from reduced electricity consumption: HRK 30,000 per month (US\$5,200) amounting to 26 percent of original cost. Reduced carbon emissions of 120 tons/year.	HEP ESCO's assistance in analyzing lighting requirements and project preparation is acknowledged.
<b>Dugo Resa High School</b>	The school switched from District Heating to oil-based heating, and renovated doors and windows to reduce energy loss from the building. In the near future, the school intends to use renewable energy resource – boiler rooms using biomass; solar cells; solar collectors.	Project cost: HRK 1.5 million (US\$260,000) Reduced expenditure from HRK 900,000 (US\$155,000) to HRK 400,000 (US\$69,000) per Payback period: 3 years	Very satisfied with HEP ESCO's technical and financial support.
<b>Dugo Resa Elementary School</b>	This school installed energy saving lighting systems and decreased energy loss from its building through replacing the façade.	Savings: 47 percent oil for heating; 23 percent of electrical energy.	HEP ESCO's helpful role in design, public tendering, and supervision during construction stage.
<b>Elementary School, Krapinsko</b>	The school renovated its boiler room.	Project cost: HRK 120,000 approx (US\$21,000) for the boiler.	HEP ESCO's initiative and assistance is acknowledged
<b>Elementary School, Trnovec</b>	A new gas-based heating system was installed which allowed the heated area to be expanded by 2,500 sq m. with same level of expenditure on fuel as before.		HEP ESCO's initiative and assistance is acknowledged

- ESCO customer satisfaction:** Based on a survey at project completion, HEP ESCO's customer satisfaction of 90 percent was close to the 95 percent target value. The survey consisted of (i) in-depth interviews of technical and professional staff as well as end-beneficiaries for 10 representative projects selected by HEP ESCO; and (ii) a telephone survey of all projects implemented by HEP ESCO. The categories covered city officials, heads of departments for cities' communal services, production managers and company directors as well as representatives from end-beneficiaries such as headmasters of schools and high schools, hospital directors, etc. A cross-section of officials/representatives of schools, industry, and city management informed this mission that their institutions and users continue to experience the benefits from energy efficiency improvements in terms of lower energy consumption, greater comfort in buildings, and improved and cheaper lighting solutions from HEP ESCO projects. (Table 1). All the respondents expressed satisfaction with the project formulation, technical support and financial assistance organized by HEP ESCO. School staff and county officials give credit to HEP ESCO officials and consultants for raising awareness of energy efficiency issues, which are now being mainstreamed into the school curriculum, and are receiving positive feedback from students and their parents. However, these results need to be interpreted with caution since customer satisfaction can be a subjective indicator and the results can be mixed with other aspects than direct savings due to improved energy efficiency.
- Expanding opportunities for private ESCO firms and energy efficiency service providers:** HEP ESCO was also able to contribute to the development of business

opportunities for private firms. The project created a significant demonstration effect for other service providers to participate in the new energy efficiency market, including engineering firms, distributors, manufacturers, and installers. In June 2010, six months before project closing, 22 engineering consultancy firms and academic research institutions provided energy efficiency services, and more than one hundred small companies were sub-suppliers. A market survey at project completion indicated that there were a large number of organizations that provided energy efficiency services in specific market segments, of which approximately 11 worked on a commercial basis.

- Number of local banks engaged in energy efficiency lending: At project completion, three banks had signed Grant Framework Agreements (GFAs) with HBOR and were providing financing for energy efficiency; two other banks had begun to offer specific energy efficiency loans at that time. Feedback from officials indicated that there is currently little or no financing activity on the part of private banks for energy efficiency projects on the ESCO model. In addition to the general impact of the financial crisis, the main reason is that while banks are willing to lend on the basis of guarantees and collateral, they are yet to get into the mode of providing project finance.<sup>16</sup>

2.23 As of end-2012, HEP ESCO remains the only operational ESCO in the country.<sup>17</sup> Towards the end of the project, the impact of the financial crisis limited the interest of many public and private sector organizations, having a direct impact on the activities of HEP ESCO. Also, a political crisis related to widespread corruption arose in 2010, leading the public sector to avoid signing sole-source agreements with HEP ESCO as had been the case since its creation. A Ministry of Finance regulation prevents public sector entities from considering the financing obtained through HEP ESCO for the implementation of energy efficiency projects as non-budget operations. Therefore, energy efficiency projects had to compete with any other investments in the public sector, which makes them less attractive.

2.24 Overall, the initial expectation of developing a competitive ESCO market has not materialized. Feedback to this mission from various respondents in the government and industry indicating that there are new companies that are attempting to enter the market and there are many energy efficiency provider companies that do not offer guarantees.

2.25 On the positive side, the mission noted the renewed interest and activity driven by Croatia's imminent membership of EU and therefore the imperative to meet EU directives and goals for energy efficiency. The Ministry of Construction and Physical Planning (MoC) has initiated a large-scale plan for the refurbishment of public buildings. MoC officials indicated that this program has already stimulated the creation of about 20

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<sup>16</sup> Project finance is the long-term financing of infrastructure and industrial projects based upon the projected cash flows of the project rather than the balance sheets of its sponsors.

<sup>17</sup> A Budapest, Hungary-based ESCO was active during the project period. Sapphire Sustainable Development Ltd. (formerly known as EETEK Holding Plc), which along with its subsidiaries, identifies, develops, implements, and operates clean energy projects in several countries in Eastern Europe has been active in Croatia.

ESCOs in end-2012 (also see ‘risk to development outcome’). HEP officials informed this mission of their renewed support for HEP ESCO to ramp up its promotional and technical support role for energy efficiency projects, and work with EPEEF as a source of finance and technical advice for energy efficiency activities. The approval of the New Energy Law in end-2012 and several secondary/subsidiary legislation, which mainly respond to EU directives have created an improved legal and regulatory framework for energy efficiency activities.

**GLOBAL ENVIRONMENTAL OBJECTIVE:** TO OVERCOME THREE BARRIERS TO ENERGY EFFICIENCY MARKET DEVELOPMENT AND FINANCING: (I) LACK OF CAPACITY AND KNOW-HOW; (II) LACK OF DEVELOPMENT AND PROJECT FINANCING; AND (II) LACK OF CONSUMER DEMAND. *Rated Modest.*

## Outputs

2.26 *Capacity and Know-how:* Over the project period, HEP ESCO gained experience in planning and implementing energy efficiency contracts on the ESCO model, and is considered technically self-sufficient, being staffed by several professional staff with an associate degree or higher<sup>18</sup>. While building its own capacity, HEP ESCO also was instrumental in transferring skills and know-how by establishing business relationships with other major stakeholders such as engineering firms, distributors, manufacturers and installers. The project led to the development of 22 engineering/consultancy firms and academic research institutions as additional energy efficiency service providers.

2.27 HEP ESCO procured all its supplies (goods, work and installation) from domestic firms in the national currency, indicating that there was a robust distribution network of energy efficiency products. In addition, over 100 small companies were involved as sub-suppliers.

2.28 HEP ESCO’s dissemination and project support were supplemented by regional energy agencies created by EPEEF. UNDP’s concurrent energy efficiency project had established internal positions of trained energy officers at local authorities and central government bodies who demonstrated capacity for preparing energy efficiency projects for financing. Clients and officials from municipalities and country governments indicated to the IEG mission that dissemination and project supports should be provided on a continuing basis. HEP ESCO officials confirmed that this is an important part of their renewed mandate as approved by the parent HEP.

2.29 *Development and project financing:* The project had limited success with respect to the critical objective of overcoming barriers to energy efficiency financing. In the Croatian context, most banks do not really practice project finance and give much stronger weight to the balance sheets and collateral of borrowers. The project was not able to overcome the rigid collateral requirements imposed by local financiers. Banks are still not into project financing and have not warmed to the ESCO model. Commercial banks were lukewarm about providing longer-term financing for energy efficiency projects given the high transaction costs, small project size and poor creditworthiness of

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<sup>18</sup> <http://www.hep.hr/esco/en/aboutus/Employees.aspx>

municipal borrowers. The Partial Credit Guarantee (PCG) – which was intended to mitigate risks given the newness of energy efficiency concepts and market mechanisms in Croatia, failed to address the banks' concerns for energy end-user credit risks. The PCG facility did not attract increased interest from both borrowers and commercial banks, and was not effective in reducing the banks' risk aversion to energy efficiency financing. Over the course of the project, the credit enhancement facility was reallocated to the PCG program. Subsequently, after demand for PCGs also proved lower than expected (only two guarantees were signed for US\$0.9 million), the remaining grant funds were reallocated to HEP ESCO for use in projects.

**2.30 Consumer Demand:** While the project has helped to raise awareness and application of the ESCO model across Croatia in different sectors, potential consumer demand is not being realized due to continuing lack of awareness, capacity and knowhow; and lack of development & project financing. Feedback from respondents also suggests that consumer demand for ESCO services may be inhibited by some widely observed perceptions, for instance – energy efficiency interventions result in only small savings of energy; costs savings are small compared to overall operational costs; and that energy efficiency investments are non-core activities that take too much time. Despite the project's efforts to disseminate information, a large section of prospective beneficiaries still need to be exposed to knowledge about the ESCO model and the potential benefits. Similar to many other countries, public procurement remains complicated for ESCO applications. The mission was informed that HEP ESCO's efforts to work with the private sector have been inhibited by the rigidities of public procurement procedures. Also, the ESCO model was not recognized by the authorities as an individual business model. As a result, Croatian ESCOs could not invoice their services as a package and VAT (value-added tax) had to be paid for the equipment installed for the client upfront, thereby affecting profits.

## **Outcomes**

**2.31** GHG emissions reductions from the project's activities were only 30 percent of appraisal targets. The lower GHG emission reductions are explained by the lower share of realized energy savings than the levels estimated during appraisal. HEP ESCO supported projects were predominantly in the street lighting and public buildings sector, i.e., projects characterized by high-cost measures (including some reconstruction works given the poor state of some facilities). As a result, the average payback time was close to 8 years, compared 4 to 5 years that was expected based on the mix of projects forecast at appraisal. Finally, the weak demand for the Partial Credit Guarantee facility also translated into lower energy savings and environmental benefits.

## **Efficiency**

**2.32 The efficiency of the project in meeting its objectives is rated Modest.** The project's ERR at closing was re-estimated at around 10 percent, which is 8 percent lower than the appraisal estimate, and also lower than the estimated opportunity cost of capital of 12 percent. With respect to the GEF incremental cost analysis, the project's global benefits would be at a cost of US\$21.9 per ton of CO<sub>2</sub>, which is almost triple the appraisal estimate of US\$7.3 per ton of CO<sub>2</sub>. However, this cost figure actually achieved

at closing would still be reasonable compared to the estimated medium-term price of US\$25 per ton of CO<sub>2</sub> in the European Trading Scheme.

2.33 Until project completion, HEP ESCO continued to improve its operational and financial performance demonstrating commercially and financially viable energy efficiency investments, modeling its ESCO contracting approach. In addition, HEP ESCO's profit margin increased steadily between 2006 and 2008, when it reached US\$ 0.3 million (50 percent of the target).

## Ratings

### OUTCOME

2.34 ***Overall project outcome is rated Moderately Satisfactory.*** The relevance of the project's objectives to the country's declared priorities and the Bank's country assistance strategy was and remains *high*. The relevance of the project's design, with its comprehensive approach of complementing the Bank's catalytic financing with GEF's grant financing for risk mitigation and capacity-building, was *substantial*. The project's major contributions were in introducing the concept and practice of energy efficiency where it was little understood or employed before, and creating HEP ESCO which was instrumental in initiating a market for energy efficiency, and disseminating the ESCO model over several sectors. However, the momentum could not be maintained for developing and implementing a steady pipeline of ESCO projects. On balance, the achievement of the Project Development Objective is rated *substantial*. GHG emissions from successful ESCO projects were far lower than targeted and limited success was achieved in overcoming barriers to expanding capacity and know-how for ESCO development; project finance; and consumer demand. Achievement of the Global Environment objective is rated *modest*. With an economic rate of return that was lower than the appraisal estimate and the estimated opportunity cost of capital, and costs per ton of CO<sub>2</sub> removed that are triple that of appraisal estimates, efficiency is *modest*. Overall outcome is rated *moderately satisfactory*.

### RISK TO DEVELOPMENT OUTCOME

2.35 ***The risk that the achieved development outcomes will not be sustained is rated Negligible to Low.*** The project's achievements in raising the profile of energy efficiency in Croatia, introducing the ESCO concept and demonstrating its effectiveness through specific interventions in several sectors are likely to be sustained. This is underlined by the feedback provided to this mission by officials at different levels in the government, and by the field visits and discussions with beneficiaries. The decrease in momentum experienced after the financial crisis, and during political change, has now been replaced with a tangible commitment to energy efficiency by the government and HEP. Much of this renewed commitment is driven by the obligations and financial incentives linked to the imminent accession to the EU.

2.36 Over the past few years almost all European Directives involving energy efficiency have been transposed into Croatian legislation. That includes mandatory energy certification of buildings and energy audits of structures, technical requirements

for building materials concerning thermal protection, mandatory energy labeling of household appliances and products linked with energy. Banks are offering lower interest rates when investing in energy efficient equipment. According to the Energy Service Directive, monitoring and verification – a crucial feedback requirement in implementing energy efficiency schemes - is emphasized to be a bottom-up process. Croatia will receive assistance from GIZ<sup>19</sup> (German Society for International Cooperation) promoting and standardizing monitoring & verification procedures.

2.37 The Second National Energy Efficiency Action Plan was drafted in 2011 and acceptance is expected by mid-2013. Some of the proposed energy efficiency measures are already being implemented. The most ambitious program is the Refurbishment Program of Public Buildings for the period commencing in 2012-2013, under which 10,000 buildings are being taken up for improving their energy efficiency. There is strong political incentive for this program because of the potential for job creation for construction companies and others.<sup>20</sup> The program is centered in the newly formed Center for Monitoring Business Activities in the Energy Sector and Investments (CEI). For this program, MoC has simplified tendering procedures. UNDP has carried out energy audits for 1,800 buildings that feed into the refurbishment effort. At the same time, MoC is planning to promote energy renovations in other sectors as well, including residential and commercial buildings. MoC officials told this mission that this initiative has stimulated the creation of about 20 ESCOs in end-2012.

2.38 Much work still needs to be done in reducing several barriers to energy efficiency that was initially addressed by the project. While energy efficiency issues are understood more widely than at the beginning of the project, much more needs to be done in educating government officials, and prospective beneficiaries in the industry, services and residential sectors. Private finance continues to be scarce for energy efficiency investments on the ESCO model. The mission was informed that there is little or no interest in the Banks for such lending at present. The period for obtaining required permits/approvals is too long and acts as a disincentive to potential domestic and foreign project developers to invest in energy efficiency and renewable energy projects. In the residential sector there still exist key barriers apart from access to finance that prevent practically any building level investment in existing multi-apartment buildings such as a 100 percent quorum required for any building level investment decision, including energy efficiency.<sup>21</sup>

2.39 HEP remains committed to providing HEP ESCO with the necessary financial, management and human resources to meet its business plan goals. HEP and HEP ESCO officials told the mission that HEP ESCO plans to establish information centers of energy efficiency that will be located in the 20 county centers and are expected to be functional by early-2013. Through these centers, HEP staff will provide free advisory and

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<sup>19</sup> Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)

<sup>20</sup> "The implementation of energy efficiency projects will have a direct impact on Croatia's economic development, by stimulating construction and industry, which will ultimately lead to increased employment.": Ana Pavičić Kaselj, Assistant Minister for Energy, January 17, 2012. <http://www.undp.hr>

<sup>21</sup> However, new private buildings are taking up energy efficiency on their own, especially those promoted by large real estate developers.

educational services to households and organizations on opportunities for saving electrical and heat energy and how soon investments for these purposes can be recovered through savings. Lack of experience and expertise in preparation of energy efficiency/renewable energy projects is to be addressed by seminars for project developers, investors, engineers, architects and decision makers on a national/local level.

2.40 HEP ESCO plans intensive development of new projects through employing a new complement of engineers, and helping install PV panels on houses and apartment buildings, as well as all on HEP's building on a "turnkey" basis. HEP plans to install photovoltaic power plants of 10 to 30 kW integrated in HEP's buildings amounting to more than 400 kW of installed capacity to set an example to other building owners. HEP ESCO will provide assistance with verification and smart metering. HEP ESCO official told the mission that there is a lot of interest in these initiatives from prospective beneficiaries, especially industry. Other planned initiatives relate to discounts on purchase of energy-saving light bulbs.

### **BANK PERFORMANCE**

2.41 *The quality at entry for the project is rated Moderately Satisfactory.* The World Bank raised the issue of energy efficiency as early as its 1999 Country Assistance Strategy, which pointed out the need to increase the demand for energy efficiency and associated services; and to achieve financial sustainability and efficient operations for public enterprises. Although risks were generally well defined and mitigation measures seemed appropriate, the risks of joint coordination with UNDP for the PCG sub-component were not adequately foreseen. This presented significant coordination difficulties and delays in implementing the sub-component, which eventually did not significantly address the critical barrier of lack of energy efficiency financing. The Monitoring & Evaluation (M&E) indicators were also excessive as discussed under "Monitoring & Evaluation" (paras 1.68-1.75). Otherwise, adequate attention was given to the technical, financial, economic, institutional and environmental aspects of the project. Procurement, financial management and safeguards aspects were also adequately addressed. Design alternatives were considered, and the experience and lessons from Eastern European and North American energy efficiency projects were taken into account. The need to transfer management experience from a well-established ESCO was also recognized and pursued through project assistance from a strategic partner to transfer know-how at a senior level to HEP ESCO. This was important, given the project's significant innovations and associated risks in Croatia's context.

2.42 *The Bank's quality of supervision during the project is rated Moderately Satisfactory.* The bank conducted regular supervision mission, about twice a year. Aide Memoires were clear in terms of the required follow-up actions, and Implementation Status and Results Reports were candid in their assessment and realistic in their ratings. However, the Bank was slow to adjust to the realities of the energy efficiency market in Croatia. The Partial Credit Guarantee Facility sub-component was already rated moderately unsatisfactory one year after effectiveness and remained so throughout implementation. Funds from the failed sub-component were reallocated to the energy savings component only one month before the project's Closing Date. The Bank could also have attempted to update the M&E Framework during the Mid-term Review.

2.43 Overall Bank Performance is rated *Moderately Satisfactory*.

#### **BORROWER PERFORMANCE**

2.44 *The government's performance is rated Satisfactory.* The Government showed strong ownership and commitment to the project's objectives, notably by establishing the necessary energy efficiency policy as well as the necessary legal and regulatory environment. The Energy Sector Development Strategy marked energy efficiency as a cornerstone; and the Electricity Market Act included obligations for electricity suppliers to support energy efficiency measures. The Energy Efficiency Law and secondary legislation, including the Energy Efficiency Action Plan defined the ESCO business model and its market role. The EPEEF was set up to finance energy efficiency programs.

2.45 Various officials reiterated to this mission that energy efficiency is a high priority in general for Croatia. Other respondents suggested that the focus on energy efficiency issues had diminished somewhat since project completion mainly due to the cumulative impact of the financial crisis, political events and change of government in the country. However, more recent developments (2012) underline the government's commitment to energy efficiency especially in anticipation of accession to EU in July 2013. The developments include the New Energy Law and several secondary legislations included energy audits, Measurement & Verification (M&V) of Performance, and IT systems for monitoring energy savings and energy performance contracting in the public sector.

2.46 *Implementing agency performance during the project is rated Satisfactory.* HEP ESCO staff proved to be highly dedicated to the development of the ESCO concept and the establishment of a financially viable business model for ESCO operations as at project completion. HEP ESCO management made appropriate decisions on staffing requirements for the newly founded HEP subsidiary, and in hiring young and motivated staff. At project completion, and based on a comprehensive beneficiary survey, the overall level of satisfaction of HEP ESCO clients was high (90 percent on average), and they indicated that they would definitely (45.5 percent) or probably (36.4 percent) recommend HEP ESCO to a colleague or associate. HEP ESCO was awarded the prestigious European Energy Service Award in 2008, which honors achievements for the successful development of energy services in Europe. There were requests from Bosnia & Herzegovina and Slovenia to learn from HEP ESCO's experience. There were no safeguards, procurement, or fiduciary compliance issues outstanding at project completion. HEP ESCO received financial and human resource support from the parent HEP. Their relationship was cooperative, but work processes between the two were slow.

2.47 HEP ESCO's activities slowed down gradually with the onset of the financial crisis in 2007 and due to government actions impacting the public sector following the general political crisis related to widespread corruption that erupted in 2010. More recent legislative actions by the government, and other steps take in anticipation of accession to EU are likely to have a positive impact on HEP ESCO's activities.

2.48 The project revealed a number of benefits and costs of using an ESCO as a subsidiary of a utility. On the positive side, HEP ESCO benefitted from HEP's brand,

access to its customer base and the ability to raise loans on the strengths of HEP's corporate guarantee. The downsides were the need to apply HEP's human resources and compensation policies which were not well suited to a rapidly growing services company (e.g., the imposition of a hiring freeze). It is also not clear whether HEP ESCO may have discouraged the growth of other ESCOs given HEP ESCO's apparently preferential position.

2.49 Overall, Borrower performance is rated *Satisfactory*.

#### **MONITORING AND EVALUATION**

2.50 **M&E Utilization.** As discussed under M&E design and Implementation, the list of output and outcome indicators was long, and a significant amount of data collection effort was needed to do justice to all of them. It is recognized that the purpose of having several indicators was to monitor early signs of market transformation and identify any corrective actions. In view of the lack of baseline information and clarity in some indicators, the M&E results provided a general assessment of project performance, but were not very useful as a tool for decision-making at the operational level.

2.51 Overall, M&E is rated *modest*.

### **3. Renewable Energy Resources Project**

#### **Objectives, Design, and their Relevance**

##### **OBJECTIVES**

3.1 The project development objective as stated identically in the Project Appraisal Document and the GEF Trust Fund agreement was "to assist in developing an economically and environmentally sustainable market for renewable energy (RE) in Croatia." Additionally, the Project Appraisal Document states the Global Environment Objective as "to reduce greenhouse gas emissions on a continuous basis by overcoming barriers to implementation of renewable energy."

##### **RELEVANCE OF OBJECTIVES**

3.2 **Relevance of the project development objectives is rated High.** The project's objectives were, and still are, highly relevant to the development of Croatia's energy sector. The Government's Energy Sector Development Strategy prepared in 2001 called for post-war recovery and transition towards energy security through, among other measures, the promotion of energy efficiency and renewable energy resources development. The Energy Law of July 2001 provided for the development of renewable energy resources and for a minimum share of renewable energy in the total energy supply. The Bank's Country Assistance Strategy for FY2005-09 recognized the need for meeting international obligations under the Kyoto Protocol to reduce greenhouse gas emissions. The current FY2009-12 Country Partnership Strategy focuses on assisting Croatia in joining the EU, within which renewable energy development is a priority to

reduce the vulnerability of the economy to oil price shocks, increase the sustainability of long-term development, and help to mitigate climate change.

## DESIGN

3.3 The project had the following components:

- **Component 1:** Market Framework (estimated cost at appraisal: US\$2.00 million; cost at completion: US\$2.10 million). This component provided technical assistance to support the Government in designing and implementing the necessary policies and secondary legislation to increase the share of renewable energy in the country's electricity supplies. The technical assistance consisted mainly of legal and technical support, as well as capacity-building and advice to the government agencies and other entities involved in creating the regulatory framework for renewable energy, implementing the new system, and streamlining the permitting process.
- **Component 2:** Project Preparation (estimated cost at appraisal: US\$6.50 million; cost at completion: US\$4.88 million). This component provided contingent loans, as well as grants for initial project development costs and investment support. The Contingent Loan Facility (CLF) was established to provide loans to qualified project developers on a cost-sharing basis. The contingent loans would either be capitalized in the project financing, or converted into a grant if the project did not proceed to implementation. The grants were used to identify candidate projects for renewable energy investments and cover initial development costs, such as feasibility studies.

3.4 **Monitoring & Evaluation Design.** The global environment objective indicators were not clearly specified in the Project Appraisal Document. However, two appropriate global environment objective indicators were tracked at project completion: CO<sub>2</sub> emissions reductions and the share of renewable energy in the national energy supply. The “introduction of a new energy law” was an indicator at completion. Such a law had already been approved in July 2001, and the reference here, as clarified in the project’s implementation completion report, is to secondary legislation including feed-in tariffs for renewable energy development that would need to be put in place.

3.5 Other appropriate global environment objective intermediate outcome indicators could have been "introduction of secondary legislation especially feed-in tariffs, market conditioning based on incentives, and the preparation of a project pipeline. Collectively, these global environment objective indicators would have been useful in developing a strategy for scaling-up renewable energy, fine-tuning policy to address remaining barriers, prioritizing the necessary investments to mobilize financial resources and achieve the GHG reduction goals.

3.6 **Implementation Arrangements.** HBOR, the Croatian Bank for Reconstruction and Development was the implementing agency for the project while the Bank's direct counterpart was the Ministry of Economy, Labor and Entrepreneurship (MoELE). To facilitate the creation of a project pipeline, a Renewable Energy Advisory Facility

(REAF) was created under MoELE to provide information and know-how to project developers and equipment suppliers.

3.7 Other agencies and ministries involved were: EPEEF as a source of funding and project technical review inputs; the Croatian Energy Regulatory Agency (HERA) in respect of feed-in tariffs; HEP, the Croatia's Electricity Utility, which is also the transmission and distribution system operator; MoELE; the Ministry of Construction and Physical Planning (MoC); the banking community; private developers; and NGOs.

#### **RELEVANCE OF DESIGN**

3.8 *Relevance of project design is rated Substantial.* The elements of the results framework are clearly laid out. The project design included appropriate elements for reducing barriers to promoting renewable energy in the long term, as a means to reduce GHG emissions. The results framework provided for strengthening capacity, adopting enabling legislation, building suitable market conditions, preparing a pipeline of projects, and stimulating investment finance for renewable energy development. The interaction between these inputs could have been set out more clearly. For instance, the adoption of relevant legislation and a system of market incentives can set the stage for facilitating a pipeline of projects to develop and attract potential entrepreneurs and investors. The project could have spelt out more clearly, the interaction between inputs, and onwards to outputs and outcomes. Implementation

#### **PLANNED VS. ACTUAL COSTS**

3.9 The project cost at appraisal was estimated at US\$8.5 million. The Global Environmental Facility provided US\$890,000 of grants for Component I. For Component II it financed US\$2.0 million to establish the Contingent Loan Facility and provided grants of US\$1.5 million to be used for project development and project investment support, for a total of US\$3.5 million. The rest of the project cost was provided by the government. It was anticipated that the Environmental Protection and Energy Efficiency Fund (EPEEF) and the final private borrowers would also provide funds, but only one deal reached financial closure. Thus, at project closing, the total actual costs amounted to US\$7.33 million (about 86 percent of the planned cost), of which the Global Environmental Facility financed US\$4.39 million, and the government provided US\$2.94 million. Component I also included support for the Project Implementation Unit (PIU), information dissemination, and monitoring and evaluation, which was later cancelled. On October 5, 2010, an undisbursed amount of about US\$1.46 million was cancelled from the Grant.

#### **IMPLEMENTATION EXPERIENCE**

3.10 The project was approved on June 23, 2005, and became effective as scheduled on November 23, 2005. On March 30, 2010, the project closing date was extended by two months, from April 1, 2010 to May 31, 2010, to allow the signing of six contracts that were pending approval under the Contingent Loan Facility.

3.11 **Safeguards.** The project was classified as a Category "C" and no environmental assessment was required. The Project Implementation Plan specified the procedures for

environmental compliance of Contingent Loan Facility projects, which were followed in preparing the environmental impact studies for those projects. The project team confirms that the project was in compliance with the Bank's safeguard policies.

**3.12 Financial Management.** The Financial Management rating was satisfactory for five out of six Implementation Status and Results Reports prepared by the Bank as part of its project supervision process. The rating was Moderately Satisfactory once, in May 2009, when the financial management reports failed to include Government contributions. However, this was resolved in the first quarter of 2010, when Government contributions were included in the financial management reports and the rating was upgraded back to satisfactory. The project team confirmed that there were no qualified audits.

**3.13 M&E Implementation.** The M&E sub-component of the project provided US\$350,000 of GEF funds for information dissemination, but this was not implemented, with the project implementation unit choosing to carry out this task on its own without any outside consultant support. However, the cancellation of this M&E sub-component meant that potentially useful information that may have provided the basis for adjusting incentives and creating new market opportunities may have been missed.

### **Achievement of the Objectives**

**3.14** Only the global environment objective is assessed for this project, given that the assistance for this project came from the GEF alone and there were no IBRD/IDA funds involved.

**GLOBAL ENVIRONMENT OBJECTIVE:** TO REDUCE GREENHOUSE GAS EMISSIONS ON A CONTINUOUS BASIS BY OVERCOMING BARRIERS TO IMPLEMENTATION OF RENEWABLE ENERGY. *Rated Modest.*

**3.15 Outputs.** Between project completion in mid-2010 and end 2012, there has been little progress in the renewable energy project pipeline, apart from the Koncar wind power unit and the Udbina biomass cogeneration unit mentioned in para 2.17 below. One more wind power facility of 20MW has reached financial closure while another of 55MW capacity has obtained its location permit. Two biogas and one biomass cogeneration project have obtained location and construction permits. Four other biogas and three biomass cogeneration projects were still at an early phase of the project cycle. (Table 2). The progress that has been achieved so far, though significantly short of targets, was enabled by several institutional and policy initiatives under the project as discussed below.

**Table 2: Renewable Energy Projects Availing Contingency Loan Fund: Status as of November 2012**

Plant Capacity (MW)	CLF* Loan Amount (US\$)	Planned Contribution of Investor (US\$)	Investment (US\$ million)	Comments
<b>Biogas</b>				
1.7	150,000	156,373	8.84	Early phase of procedure
1.0	173,221	173,221	5.2	Early phase of procedure
1.0	149,340	149,340	5.2	Early phase of procedure
1.0	78,703	78,703	5.2	Early phase of procedure
1.0	150,000	258,972	5.20	Location permit obtained
1.0	157,685	157,685	5.2	Construction permit obtained
<b>Biomass, cogeneration</b>				
4.0	161,522	161,522	20.8	Early phase of procedure
1.0	105,908	147,809	5.2	Early phase of procedure
1.0	105,908	107,100	5.2	Early phase of procedure
6.5	105,908	431,273	33.8	Location permit obtained
1.0	105,908	145,009	5.2	In operation
<b>Wind</b>				
55.0	150,000	277,619	93.5	Location permit obtained
20.0	127,267	185,810	36.3	Financial closure in process
23.0	150,000	316,547	39.1	Financial closure in process
16.0	128,627	135,606	27.2	1 MW unit in operation
134.2	2,000,000	2,566,048	US\$301.1	

3.16 An important achievement was the secondary legislation that included technology-specific feed-in tariffs for renewable energy. Other actions related to renewable energy grid integration; creation of a Renewable Energy Registry (RER) to support pre-feasibility studies; provision of renewable energy information and practical guidance to project developers; technical assistance to the grid and market operators; and streamlined procedures for registration and processing of renewable energy project applications. Capacity-building and financial advice was also provided to EPEEF, commercial banks and municipal finance authorities.

3.17 By the end of 2011, the Contingent Loan Facility had leveraged a potential total renewable energy investment value of US\$150 million. This has increased around US\$300 million as of end-2012, which would be a significant achievement once it is fully realized.

3.18 The establishment of the Renewable Energy Advisory Facility (REAF) within MoELE and continuous training of the staff led to creation of the renewable energy registry (RER) and project pipeline, which contained more than 300 projects at completion. The mission was provided an updated picture of the pipeline of projects as of September 2012 in the renewable energy registry, as shown in Table 3 below. The figures show an increased interest in renewable energy projects but relatively low progress in most categories except for wind power where there is significantly more activity.

Category	Number Registered	Number Implemented
Biomass plants	93 (234 MW)	3 (6.7 MW)
Biogas plants	62 (89 MW)	8 (8.6 MW)
Geothermal plant	1 (5 MW)	0
Small hydro power plants	64 (126 MW)	2 (30 kW)
Wind power plants	111 (4,690 MW)	9 (129.8 MW)
Solar plants	292 (83 MW)	68 (2.2 MW)
Total	632 plants (>5.2 GW)	90 (177.3MW)

Source: Ministry of Economy

3.19 Many delays negatively affected the market conditioning and setting of incentive frameworks. The secondary legislation with feed-in tariffs was almost two years late (i.e., it was passed by Parliament only in July 2007 compared to the end-2005 original target) due to resistance from vested sector interests. This delay had the cascading negative effects of: (i) delaying Component II for Project Preparation, hence the Contingent Loan Facility became operational only in the latter part of 2007; (ii) the first few loans were signed only almost a year later in the second half of 2008; and (iii) most of the other contracts were signed only during the last two months of the project. Market uptake was slowed down initially by a general lack of information about the Contingent Loan Facility, complaints concerning the lending conditions, overly short implementation periods allowed, and the extensive bureaucracy. Some technical assistance activities could only be defined when gaps and barriers became more visible as measures to support renewable energy were being implemented, but the foregoing delays means that some of the enabling technical assistance was pushed out of sequence into the last year of project implementation.

3.20 **Outcomes.** Reductions in CO<sub>2</sub> emissions were the main outcome indicator tracked at project completion, and the share of renewable energy in the country's electricity production was an intermediate outcome indicator. The project has not yet made any significant difference to GHG emissions reductions or the share of renewable energy in Croatia's energy supply.

3.21 The appraisal target for CO<sub>2</sub> emissions reductions was 54,417 tons of CO<sub>2</sub> emissions/year, based on 5 projects reaching financial closure by the end of 2009, with a total design capacity of 83 MW. At project completion (mid-2010), reductions of 17,710 tons of CO<sub>2</sub> emissions/year were expected to materialize by the end of 2010 from a 23 MW wind power plant<sup>22</sup> at Glunca that had reached financial closure in 2009. This plant represented the only proposal to have reached financial closure out of 15 Contingent Loan Facility loans that had been made at project completion.

3.22 An update (Table 2) provided to this mission as of November 2012 shows that the Glunca plant is yet to be operational, and therefore its contribution to reducing CO<sub>2</sub>

<sup>22</sup> A 23 MW wind power project at Glunca developed by Tudi Elektro Centar d.o.o. The projected electric output of the installation is 50.6 GWh per year.

emissions has not materialized. However, since project completion, a 1MW unit of the Koncar wind power facility – which is part of a planned larger 16MW facility – has started production. Also, a 1MW biomass co-generation plant at Udbina is now operational. This mission carried out field visits to both these facilities and was briefed on their operations by technical and managerial staff at the site. These two facilities are the only sources of reduction of CO<sub>2</sub> emissions attributable to this project so far. The actual CO<sub>2</sub> reductions resulting from 1 MW at Koncar and 1 MW at Udbina, – with the Glunca facility not yet operational – are less than 3 percent of the appraisal targets of emissions corresponding to 84 MW.

3.23 The project contributed to overcoming barriers to investments in renewable energy through several policy actions and institutional initiatives. Overall, the project helped develop a regulatory environment for renewable energy that is compliant with EU requirements, and is expected to help support Croatia in its EU accession efforts.

## Efficiency

3.24 ***Efficiency of the project is rated Modest.*** The Project Appraisal Document provided the required GEF incremental cost analysis and a "cost-benefit analysis" by a consulting firm. However, the Project Appraisal Document discussed mainly policy questions such as the minimum share of renewable energy in total electricity production, cost recovery principles, and regulatory issues. A range of rates of return based on alternative investment scenarios across different renewable energy technologies was not provided, although the annex did provide a cash flow model for the Contingent Loan Facility and financial projections.

3.25 The *ex ante* calculations of Net Present Value and Internal Rates of Return for the 15 projects in the Contingent Loan Facility pipeline assumed low discount rates (between 4 percent and 7.5 percent for different projects), and may have been optimistic. All 15 projects were expected to be profitable, but this cannot be ascertained since 13 out of the 15 projects have yet to operational.

3.26 The project helped create a large pipeline of renewable energy and cogeneration projects that have obtained a Preliminary Energy Approval. The cost-effectiveness of this effort is reduced due to the uncertainty of financial closure despite resources spent on preparing them. Although the expected amount of renewable energy investments could potentially exceed US\$300 million if all 15 projects with Contingent Loan Facility support reach financial closure, this remains uncertain at this stage, with progress towards closure being made in only two projects in the two years after project completion.

## Ratings

### OUTCOME

3.27 ***Overall global environmental outcome is rated Moderately Unsatisfactory.*** Although the project objectives were *highly* relevant, the relevance of project design was *modest* since it sought to implement simultaneously, within an unrealistic timetable, the

several steps of enacting secondary legislation, institutional capacity strengthening; promoting incentive frameworks and markets, project pipeline preparation, and eventually investment financing of renewable energy projects. The achievement of the global environment objective was *modest*. While the project contributed to overcoming barriers to investments in renewable energy through several policy actions and institutional initiatives, the realized reduction in CO<sub>2</sub> emissions is less than 3 percent. Efficiency was *modest* given the low level of environmental benefits accruing so far relative to project costs. The achievement of the global environmental objective and the sustainability of the Contingent Loan Facility's impact depend heavily on the extent to which renewable energy project developers can secure financing for their projects. These concerns persist two years after project completion due to the lingering effects of the financial crisis,

### **RISK TO DEVELOPMENT OUTCOME**

3.28 ***The risk that the achieved development outcomes will not be sustained is rated Moderate.*** Going forward, funds for the early preparation and development phases of new renewable energy projects still remain a constraint. There is also a demand for funds for the equity contribution. Private funds are available to some extent, mainly as venture capital. HBOR is not in a position to provide non-recourse financing. EPEEF is being considered as source for providing guarantees.

3.29 The Croatian government is placing a fresh emphasis on developing renewable energy in keeping with the EU's 20-20-20 initiative. Also, renewable energy is seen as a good source of new jobs. The target for renewable energy for 2020 is set at 1200MW comprising 1020MW from wind power, 140MW from solar power, and 40MW from biomass. Wind power appears most promising followed by biomass cogeneration and biomass. The new Energy Law that was approved in late 2012 has among others, opened up the market for investments in renewable energy, and the tariff regime for electricity has been liberalized subject to the oversight of the energy market regulator.

3.30 The capacity-building resulting from the project's technical assistance has been mainstreamed, given the absorptive capacity of well-qualified and experienced staff in Croatia's relevant financial and technical institutions. Improvements in the enabling environment resulting from the secondary legislation (particularly with respect to feed-in tariffs) are likely to be irreversible. These findings are reinforced by feedback provided to this mission from both the Bank and the borrower.

3.31 However, feedback to this mission from government officials and entrepreneurs indicates several concerns in increasing the pace of renewable energy development. At the broader level, spatial planning has to be carried out in a systematic manner. Horizontal connections between ministries need to be strengthened as for example in the case of biomass projects where various ministries including those for forestry and water are involved. While rights to state-owned land are being handed out to the private sector or for public-private partnerships, there are not enough mature project designs to be offered to entrepreneurs. There is a need for developing administration capacity within the ministry for monitoring investments – some respondents felt that a dedicated unit may be needed for this. A strategy is required to meet the concerns of the numerous and

vibrant non-government organizations in the country to avoid delays in implementation. As the share of renewable energy rises, technical provision for its integration with the grid needs to move in parallel. The mission was informed that HEP is taking this up as part of its efforts to modernize existing production and transmission facilities, for which finance has been raised through a major bond issue<sup>23</sup>.

## **BANK PERFORMANCE**

3.32 *The quality at entry for the project is rated Moderately Unsatisfactory.* The project preparation efforts adequately covered the technical, financial, procurement and financial management aspects of the project. Design alternatives were considered, and lessons from earlier operations were taken into account, although the Project Appraisal Document focused mainly on citing cost-sharing grants as existing or having been tried before, without really discussing whether they worked, and if not, what lessons have been learned that were reflected in project design.

3.33 In retrospect, the design of the project's implementation timetable was too ambitious in light of the weak capacities in the country's renewable energy sub-sector when the project was conceptualized and appraised, leading to significant risk that the renewable energy investments would not materialize. The legal and regulatory environment was clearly inadequate at the time; hence it was not clear whether the pipeline of renewable energy projects could be defined, since the enabling environment had not yet been established in the first place. The Project Appraisal Document did acknowledge and provide for this risk through including Component II for Project Preparation, but the Bank under-estimated the time for these legal and regulatory barriers to be overcome, resulting in a two-year delay in starting Component II of the project. This apparent over-estimation of the government's ability to enact the necessary legal and regulatory framework is surprising given that almost three years elapsed between the Project Concept Review (May 2002) and Appraisal (February 2005).

3.34 Shortly after the GEF Grant effectiveness, it became clear that the timeframe for implementation was ambitious. The operational aspects of a contract for the Contingent Loan Facility that was signed in May 2006 between HBOR and EPEEF could not be finalized until January 2007 due to unresolved issues regarding EPEEF's role. This was yet another unfortunate delay since the GEF Project Document and the Project Implementation Plan had assigned EPEEF an important upstream role for the technical appraisals of Contingent Loan Facility projects and as a co-financier.

3.35 *The Bank's quality of supervision is rated Moderately Unsatisfactory.* The Bank maintained a consistent dialogue with the government, focusing on the pace of implementation and the need for corrective actions. However, in the face of the delay in passing the secondary legislation, the Bank was slow in adjusting the project to a new timetable, which should have been done in mid-2007 rather than a mere 2 months before the closing date of May 31, 2010. In retrospect, the midterm review should have also been carried out around mid-2007, rather than in December 2008. With the Bank's own

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<sup>23</sup> HEP successfully floated a US\$500 million (Euro 386 million) Eurobond in November 2012 ([www.powermarket.seenews.com](http://www.powermarket.seenews.com))

delays, it was no longer credible to try to restructure the project in March 2010 when a restructuring was done to extend the project's closing date by 2 months, especially since only 1 out of 15 Contingent Loan Facility projects reached financial closure by that time.

3.36 Overall Bank performance is rated *Moderately Unsatisfactory*.

### **BORROWER PERFORMANCE**

3.37 *Government's performance is rated Moderately Unsatisfactory.* The Government demonstrated its support for the project by requiring MoELE to establish a Renewable Energy and Energy Efficiency Department under its Directorate of Energy. The Government also created the Renewable Energy Advisory Facility (REAF) to promote renewable energy projects along with the Environmental Protection and Energy Efficiency Fund (EPEEF). These agencies successfully introduced a new renewable energy legislative and regulatory framework as well as the Contingent Loan Facility as a dedicated funding facility for project preparation. However, the passing of the secondary legislation was significantly delayed by about 2 years. Moreover, although the key agencies and funding/advisory facilities were created, the government allocated inadequate staff and budgetary resources, thus creating work overload and long backlogs. Consequently, several important technical assistance activities, including studies on feed-in tariff levels and the setting of a realistic renewable energy share in the energy balance, were delayed and eventually cancelled.

3.38 *Implementing agency performance during the project is rated Moderately Unsatisfactory.* The Croatian Bank for Reconstruction and Development (HBOR) was the implementing agency, under which the Project Implementation Unit (PIU) was created. Although HBOR's cooperation and coordination with MoELE and EPEEF were good, HBOR was very slow in starting up its project activities, thus resulting in a large accumulated workload during the last year of project implementation. Many technical assistance contracts were rushed through during the final eight months, which put tremendous pressure on the technical assistance recipients, particularly the market operator, system operators, and the energy regulator. In addition, very few loans were signed under the Contingent Loan Facility up until the final months before the closing date, when 15 contracts were signed. Finally, the restructuring and closing date extension request reached the Bank about one year after the recommendation was made during a previous portfolio review. The update given by HBOR officials to the mission suggests that some progress is being made since project completion in their renewable energy portfolio with one wind project in operation, one other wind projects having reached financial closure and four other renewable energy projects having obtained their location/construction permits.

3.39 Overall Borrower performance is rated *Moderately Unsatisfactory*.

3.40 **M&E Utilization.** Since the M&E system was cancelled, and more fundamentally, only one deal reached financial closure, there was no utilization of information gathered from monitoring the performance indicators. The results and measurement framework did not specify how the data from global environmental

objective performance indicators would be used and nothing appears to have been done in this regard.

3.41 Overall, M&E is rated *Negligible*.

## 4. District Heating Project

### Objectives, Design, and their Relevance

#### OBJECTIVES

4.1 According to the Loan Agreement and the Project Appraisal Document, this Project's Development Objective was "to promote efficient provision of District Heating services by the Project Implementing Entity." The project implementing entity was HEP Toplinarstvo (HEP T), which provides District Heating services in the cities of Zagreb and Osijek, and is a subsidiary of the national electricity utility HEP (Hrvatska Elektroprivreda).

4.2 The Project Appraisal Document further breaks down the project objective in terms of (a) reducing energy and water losses through rehabilitation of the networks and closure of non-economic boilers in Osijek; (b) increasing the profitability of HEP T by promoting cost recovery tariffs, assuming that the Government allowed tariffs to be adjusted as per HEP T's proposal; and (c) increasing the level of customer satisfaction by understanding their needs through surveys and implementing a voluntary demand-side management program in Zagreb and Osijek. These three sub-objectives are used as the basis for assessing the project's performance.

#### RELEVANCE OF OBJECTIVES

4.3 *Relevance of the project development objectives is rated High.* The project's objectives were relevant to the needs of the country's energy sector at project appraisal, and continue to be relevant at present. Croatia's District Heating systems face important shortcomings: the piping is subject to heat and water losses; tariffs are low and insufficient to cover even operating expenses; and due to lack of individual metering, individual housing units in apartment blocks are billed on the basis of the surface area of their apartment, reducing the incentive to use energy optimally and leading to wastage.

4.4 The Government's concern for the issues facing the District Heating sector was reflected in the Law on Production, Distribution and Supply of Thermal Energy (2005), followed by a framework for implementing a District Heating strategy in 2006. Attention to the District Heating sector also supported Croatia's efforts to meet its Kyoto Protocol commitments through energy savings. The project's objectives are consistent with the Bank's Country Assistance Strategy for FY2005-09 as well as the current Country Partnership Strategy for FY2009-12, which has been extended to FY2013. Both the documents supported Croatia's efforts to improve its District Heating sector, in the

overall context of national goals for improving energy efficiency and aligning with relevant EU directives.

## DESIGN

4.5 The project had two components:

- **Component 1: Infrastructure Rehabilitation** (estimated cost at appraisal, US\$40.61 million; actual cost, US\$41.65 million). This investment component in Zagreb and Osijek would include network rehabilitation that was identified as a priority given high energy and water losses. The Zagreb rehabilitation works would include replacement of a dual pipe trench (35 km), transmission pipes (20 km), and distribution pipes (15 km). HEP T would contribute the procurement of pipes while the Bank loan would finance the installation works and pipe parts. In Osijek, distribution pipes (15 km) that were in poor condition would be replaced. Customers who were connected to the inefficient local heat-only boilers would be connected to the main Combined Heat and Power plant. Rehabilitation of 25 heating sub-stations would also be supported. For some consumers with a heat load of 6 MW, the heat supply would be switched from steam to hot water.
- **Component 2: Consultancy Services** (estimated cost at appraisal, US\$3.60 million; actual cost, US\$1.76 million). This component, which would be fully financed by HEP T, included the development of a demand-side management program by December 31, 2006; completion of two surveys in Zagreb and Osijek to assess the needs of consumers; preparation of bidding documents; construction supervision; and preparation of annual audits for HEP T and the project.

The project objectives and components were not modified during project implementation.

4.6 **Monitoring & Evaluation Design.** The monitoring and evaluation framework was well designed. The outcomes and outputs/intermediate outcomes were clear, measurable and relevant to the project sub-objectives. The outcome indicators covered physical parameters (energy loss as a percentage of heat generated, and ratio of water added to the network volume), as well as a financial parameter (net profit/revenues). Additionally, customer satisfaction was to be measured through a survey mechanism. Outputs and intermediate outcomes covered percentage of planned rehabilitation completed, total number of domestic connections, ratio of receivables to sales (in days), ratio of payables to cash operating expenses (in days), and operating ratio. Baseline data for 2005 was collected and presented. Year-by-year intermediate target values were explicit, and the frequency of, and instruments for data collection were clearly delineated. HEP T was responsible for collecting data on monitoring indicators. The project documents provided adequate guidance on the measurement methodology for consumer satisfaction.

4.7 **Implementation Arrangements.** HEP was the borrower and HEP T was the implementing agency.

## RELEVANCE OF DESIGN

4.8 ***Relevance of project design is rated Substantial.*** The project covered District Heating systems in Zagreb and Osijek. The results framework clearly links the project's activities to its expected outputs and outcomes. The efficient provision of District Heating services would be achieved through reducing energy and water losses through rehabilitation of the network and closure of non-economic boilers; and promoting cost recovery tariffs. In terms of institutional design arrangements, the project would lend to HEP for onlending to HEP T. For this purpose, HEP T would be a separate entity responsible for heat and steam distribution activities, while HEP would continue to produce heat and steam through its combined heat and power plants. In parallel, the Government would commit to the key enabling actions (a satisfactory tariff methodology, tariff adjustments, a demand-side management program), which would be dated covenants in the Loan Agreement. In retrospect, the Bank could have asked the government to implement upfront, the reform actions needed for tariff adjustments and demand-side management (rather than covenanting these actions). This was particularly so because of the Bank's experience of the government's slow response to the legal and regulatory needs for the Renewable Energy Sources project, whose effectiveness date preceded that of the District Heating project.

## Implementation

### PLANNED VS. ACTUAL COSTS

4.9 The project's actual cost was US\$43.48 million (based on the December 2010 Euro-US\$ exchange rate), marginally higher than the planned cost of US\$44.28 million. The rehabilitation component accounted for 96 percent of the final cost, the rest being for consultancy services. The Bank financed US\$31.68 million of the final cost, slightly higher than the planned US\$29.76 million. HEP T contributed US\$11.8 million, somewhat less than the US\$14.54 planned at appraisal.

### IMPLEMENTATION EXPERIENCE

4.10 The project was approved on June 20, 2006, and became effective on March 9, 2007 as scheduled. The project closed without any extensions on June 30, 2010.

4.11 **Safeguards.** In respect of the Bank's environmental and social safeguard policies, the project was classified in Category B indicating less adverse, site-specific and mostly reversible impacts. Safeguard polices for OP 4.01 on Environmental Assessment and OP 4.12 on Involuntary Resettlement were triggered. An Environmental Management Plan was developed and environmental mitigation measures were mainstreamed as common construction good practice or integrated into technical design. HEP T implemented all the measures proposed by the City of Zagreb including protection of trees, avoiding main traffic lanes and pedestrian walks, and respecting special traffic conditions. HEP T monitored the noise compliance of the construction equipment, and no complaints were received in this regard. In respect of social safeguards, a Land Acquisition Policy Framework was prepared in the unlikely event that HEP T would have to acquire land for the proposed rehabilitation works under the

project. Ultimately, no land acquisition was required. On this basis, the project was in compliance with the Bank's environmental and social safeguard policies.

**4.12 Financial Management.** HEP T maintained a satisfactory financial management system and regularly submitted to the Bank all the required quarterly and annual financial reports. The project team confirmed that financial statements and audit reports were unqualified. The project was implemented in compliance with the Bank's procurement guidelines. Procurement aspects were supervised regularly and no matters of concern were reported. The location of the Bank procurement specialist in Zagreb greatly facilitated the resolution of procurement issues as they arose during implementation.

**4.13 M&E Implementation.** HEP T was responsible for data collection and reported regularly on physical, technical, financial, environmental and other parameters through the semi-annual Progress Reports submitted to the Bank. The data provided by HEP T to the IEG mission indicate that this data is being compiled and recorded regularly.

### **Achievement of the Objectives**

4.14 This report assesses the project objective "to promote efficient provision of District Heating services by the Project Implementing Entity" in terms of the following three sub-objectives implied by the PAD: (1) to reduce energy and water losses through rehabilitation of the network and closure of non-economic boilers in Osijek; (2) increase the profitability of HEP T by promoting cost recovery tariffs, assuming that the Government allowed tariffs to be adjusted as per HEP T's proposal; and (3) to increase the level of customer satisfaction by understanding their needs through surveys and implementing a voluntary demand-side management program in Zagreb and Osijek.

**SUB-OBJECTIVE 1: TO REDUCE ENERGY AND WATER LOSSES THROUGH REHABILITATION OF THE NETWORK AND CLOSURE OF NON-ECONOMIC BOILERS IN OSIJEK. *Rated Substantial.***

4.15 The main outcome indicators for this sub-objective were energy and water loss reductions, which were measured in terms of the percentage of heat generated and ratio of water added to the network volume respectively.

4.16 ***Outputs and intermediate outcomes.*** The above outcomes were achieved through rehabilitating 20.4 kilometers of hot water pipelines in Zagreb and 7.2 kilometers in Osijek by project completion. Additionally 2.6 kilometers of new hot water pipelines were built in Osijek. Altogether, these outputs amounted to 90 percent and 65 percent of the targets in Zagreb and Osijek respectively at project completion. The shortfall was mainly due to increased costs of pipeline replacement during project implementation. Conversion of direct to indirect substations was carried out in 17 cases in Osijek. One local boiler was closed and the consumers connected to the central heating system, while another boiler was restricted to hot water production (Table 4).

**Table 4: District Heating Project: Physical Outputs/Intermediate Outcomes  
Baseline (2005); At project Completion (2009); 2010-2011**

	Zagreb					Osijek				
	2005 Baseline	2009 Project Closing		2010	2011	2005 Baseline	2009 Project Closing		2010	2011
		Target	Actual				Target	Actual		
Planned rehabilitation/ replacement of hot water pipes completed (%)	-	100	90	-	-	-	100	65	-	-
Total number of domestic connections	96,000	98,000	99,646	102,077	102,280	10,100	10,500	10,384	10,418	10,416
District Heating Channels constructed/ replaced (meters)	-	22.0	20.4	-	-	0	15.0	9.7	-	-

Source: HEP T

4.17 The number of emergencies reported for the hot water pipelines have remained stable in Zagreb (84 and 104 in 2000 and 2011 respectively and Osijek (14 each in 2010 and 2011). However, the mission was informed that the magnitude of these emergencies was lower on the whole because they relate mainly to smaller connections (Table 5).

4.18 The mission was also informed that over the period 2010-11, 3,191 meters and 185 meters of pipeline have been added in Zagreb and Osijek, respectively. Additionally, 4,470 meters and 1,316 meters of old hot water pipelines have been replaced in Zagreb and Osijek, respectively. Direct to indirect sub-station replacement has been carried out for 34 substations during 2010-11. During 2011-12, 44 heating stations have been revitalized, benefiting several commercial customers and hospitals (Table 5).

**Table 5: District Heating Project: Outputs/Intermediate Outcomes during 2010-2011**

	Zagreb		Osijek	
	2010	2011	2010	2011
New meters of pipeline on the network (meters)	1776	1415	55	130
Replacement of old hot water pipelines (meters)	230	4,240	476	840
Number of emergencies reported for the hot water pipeline	84	104	14	14
Reconstructing heating stations of the direct type to indirect type	13	21	-	-

Source: HEP T

4.19 **Outcomes.** Energy loss reductions reported at project completion (end-2009 figures) favorably exceeded their targets in both Zagreb and Osijek. This mission verified that, as of 2011, these reduced energy loss levels have been maintained in Osijek, but Zagreb's energy losses have risen to some extent. Specifically, energy losses for Zagreb's network were 12.20 percent in 2005, fell to 9.45 percent in 2009, and increased to 11.00 percent in 2011. For Osijek, these numbers were 11.00 percent in 2005, falling

to 6.80 percent in 2009, and after rising in 2010, have settled back to 7.00 percent in 2011. (Table 6).

4.20 Water losses were reduced significantly in both Zagreb and Osijek at project completion, again exceeding expectations. Since then, Zagreb's network has made further significant reductions in water losses, while Osijek has maintained them close to project completion levels. The mission was informed that, for Zagreb, water losses were reduced from 26.50 percent in 2005 to 22.63 percent in 2009 and further to 12.15 percent in 2011. In Osijek, the water losses reduced significantly from 11.5 percent in 2005 to 5.91 percent in 2009, but rose somewhat to 6.87 percent by 2011. (Table 6).

**Table 6: District Heating Project: Outcome Indicators Baseline (2005); At project Completion (2009); 2010-2011**

	Zagreb					Osijek				
	2005 Baseline	2009 Project Closing		2010	2011	2005 Baseline	2009 Project Closing		2010	2011
		Target	Actual				Target	Actual		
Energy loss (% of heat generated)	12.20	10.2	9.45	11.70	11.00	11.00	10.00	6.80	9.80	7.00
Ratio of water added to the network volume	26.50	23.0	22.63	13.03	12.15	11.5	9.00	5.91	7.00	6.87

**SUB-OBJECTIVE 2:** TO INCREASE THE PROFITABILITY OF HEP T BY PROMOTING COST RECOVERY TARIFFS, ASSUMING THAT THE GOVERNMENT ALLOWED TARIFFS TO BE ADJUSTED AS PER HEP T'S PROPOSAL. *Rated Negligible.*

4.21 This sub-objective was not achieved, mainly because HEP T's sales tariffs, which have been subject to Government approval, did not keep up adequately with the increase in operating expenses, especially energy prices. Purchases of heat and steam from HEP are the single largest component (about 75 percent) of HEP T's annual operating expenses. With the increases in international energy prices, HEP T's per unit purchase cost of heat and steam from HEP increased by a cumulative 43 percent between 2005 to 2008, and have increased even more sharply since then. Tariffs did not increase till 2009, when the Government permitted a 16 percent increase in the average tariff, but they have remained at similar levels till end-2012. The mission was informed that, at the current level of tariffs and operating expenses, an even greater loss than in 2011 is likely in 2012. Despite increases in District Heating allowed by the central government, local municipalities retained the authority to specify prices for their area, and this has put further pressure on HEP T and HEP. This mission was informed that the new Energy Law passed in 2012 allows HEP/HEP T to set prices, subject to the approval of the energy regulator HERA (Croatia Energy Regulatory Agency). The local governments will no longer be able to modify these tariffs. This new development is discussed under "risk to development outcome". (Table 7)

**Table 7: District Heating Project: Financial Outcome/Intermediate Outcome Indicators Baseline (2005); At project Completion (2009); 2010-2011**

	Zagreb					Osijek				
Outcome Indicators										
	2005 Baseline	2009 Project Closing		2010	2011	2005 Baseline	2009 Project Closing		2010	2011
		Target	Actual				Target	Actual		
Net profit/revenues (%)	-11.3	0.5	-17.8	-24.9	-57.2	-11.3	0.5	-24.9	-15.4	-29.4
Customer satisfaction (%)	-	90	85	-	-	-	90	89	-	-
Intermediate Outcome Indicators										
Ratio of receivables to sales (days)	102	78	138	143	148	102	78	115	108	98
Ratio of payables to cash operating expense (days)	259	122	234	223	223	259	122	241	212	228
Operating ratio	1.11	0.98	1.18	1.27	1.58	1.11	0.98	1.20	1.20	1.44

Source: HEP T

4.22 Net profit for HEP T in Zagreb decreased from a baseline value of -11.3 percent in 2005 to -17.8 percent in 2009 and further to -57.2 percent in 2011. For Osijek, the net profit decreased from -11.3 percent in 2005 to -24.9 percent in 2009 and further to -29.4 percent in 2011. Other financial indicators missed their targets by a wide margin, and either worsened or improved marginally between 2005 baselines and 2009. The ratio of receivables to sales (days) increased from 102 to 138 in Zagreb and 102 to 115 in Osijek against a target of 78 days for both cities. The ratio of payables to cash operation expense (days) decreased marginally from 259 to 234 in Zagreb and 259 to 241 in Osijek against a target of 122 days for both cities. The operating ratio<sup>24</sup> worsened from 1.11 to 1.18 in Zagreb and from 1.11 to 1.20 in Osijek, against a target of 0.98 in both cities. The mission was informed that all three indicators remain at similar or worse levels at end-2011. In particular, operating ratio for Zagreb and Osijek has deteriorated to 1.58 and 1.44 respectively (Table 7).

4.23 The persistence of tariffs that are less than cost-recovery levels has resulted in an increase in HEP T's annual losses from HRK 63 million in 2005 to HRK 194 million in 2008, before declining to HRK 113 million in 2009.

**SUB-OBJECTIVE 3:** TO INCREASE THE LEVEL OF CUSTOMER SATISFACTION BY UNDERSTANDING THEIR NEEDS THROUGH SURVEYS AND IMPLEMENTING A VOLUNTARY DSM PROGRAM IN ZAGREB AND OSIJEK. *Rated Modest.*

4.24 Overall customer satisfaction levels in both Osijek and Zagreb as measured at project completion were close to the targeted levels of 90 percent (Zagreb 85 percent and Osijek 89 percent). These results were based on two customer satisfactions surveys that were conducted by HEP T in Zagreb and Osijek, first in June-July, 2007 and the second

<sup>24</sup> operating expenses as a percentage of revenue

in April-May, 2010. The number of respondents for each survey was approximately 1,000 in Zagreb and 500 in Osijek. Among other concerns, the surveys measured consumers' satisfaction with provision of heating and warm water service; implementation of strategies considering service issues; and willingness of households to pay increased price with purpose to improve heating and hot water service quality. Both surveys were preceded by a test pilot survey covering 20 respondents to test the comprehensibility of the survey's instruments and the appropriate duration of interview itself. The mission was informed that no further surveys of customer satisfaction have been carried out since 2010 (Table 8).

**Table 8: District Heating Project: Outputs/Intermediate Outcomes for Customer Satisfaction Baseline (2005); At project Completion (2009); 2010-2011**

	Zagreb					Osijek				
	2005 Baseline	2009 Project Closing		2010	2011	2005 Baseline	2009 Project Closing		2010	2011
		Target	Actual				Target	Actual		
Customer satisfaction (%)	-	90	85	-	-	-	90	89	-	-
Total number of domestic connections	96,000	98,000	99,646	102,077	102,280	10,100	10,500	10,384	10,418	10,416

Source: HEP T

4.25 The Government chose voluntary implementation of demand-side management measures in apartment buildings and approved in 2009 the revisions to the laws and regulations defining the roles, responsibilities, and requirements for different parties in implementing such measures. At project completion it was clear that tenants were not provided the financial incentives to make decisions to invest in demand-side management measures because the heat tariffs continued to be low and savings of even 20 percent of annual heat consumption were not adequate to pay back the investments.

4.26 In Zagreb, 3,646 domestic connections were added compared to a target of 2,000. While in Osijek 384 materialized against a target of 500. Since project completion and until end-2011, Zagreb added 2,634 more connections (raising the number of connections from 99,646 to 102,280 and Osijek added a marginal number of 32 connections (from 10,384 to 10,416) over the same period.

## Efficiency

4.27 *Efficiency is rated Substantial.* The projected economic rate of return for the project at appraisal was 17 percent. At project completion, and using the same methodology as at appraisal, the economic rate of return was higher at 24 percent. The difference was mainly due to energy savings that were larger than anticipated and economic energy prices that were also higher than appraisal estimates, particularly in 2008. The project was completed within the scheduled implementation period and close to the estimated costs while implementing most of the planned activities.

## Ratings

### OUTCOME

4.28 ***Overall project outcome is rated Moderately Unsatisfactory.*** The relevance of the project objective remains *high* given the continuing need for improving the physical and financial performance of the District Heating systems in Zagreb and Osijek. The results chain was simple, clear and appropriate. However, the approach of covenanting reform actions relating to tariff adjustments and demand-side management (rather than asking Government to implement them up-front) proved to be a significant shortcoming. Relevance of design is therefore rated *substantial*. The first objective of reducing energy and water losses was achieved to a *substantial* extent. Financial performance of HEP T deteriorated during the project period and till end-2012, mainly due to the persistence of low tariffs, making the achievement of the second objective *negligible*. Under the third objective customer satisfaction was favorable as measure at project completion, but there has been little progress in promoting demand-side management, making the overall achievement of this objective *modest*. Efficiency is rated *substantial* given the favorable economic rates of return (which benefited from the higher than expect value of energy savings due to the prevailing high energy prices); and from the project being completed as scheduled and approximately at the planned cost. Overall outcome is rated *moderately unsatisfactory*.

### RISK TO DEVELOPMENT OUTCOME

4.29 ***The risk that the achieved development outcomes will not be sustained is rated Significant.*** HEP T's management and staff are experienced and motivated, and the project's physical investments have improved the state of the network and added to the company's technical efficiency. These gains are considered sustainable. However, on the financial front, significant risks have remained beyond project completion. The financial impact of HEP T's negative profitability is absorbed by building arrears with HEP, but there are little or no resources for continued rehabilitation and upgrading of the District Heating network. The government has not allowed tariffs to keep pace with increasing operating costs, the bulk of which are energy costs that are subject to international prices. The belated tariff increase in 2009 was insufficient. Moreover, local authorities have exercised their right to modify heating tariffs in their areas and the resulting lower tariffs have further hurt HEP T's bottom line.

4.30 In December 2012, the Croatian Parliament passed the New Energy Law which liberalizes energy markets in general, and gives HEP the ability to revise District Heating tariffs subject to regulation by the regulatory agency HERA. There will be no flexibility for local governments influence these tariffs. Feedback from officials indicates that if prices are raised by 36 percent as a first step as is being proposed, about 50 percent of the revenue gap can be covered. This will also set the stage for HEP and HEP T in reaching an agreement for a progressive settlement of HEP T's accumulated arrears. Officials indicated to the IEG mission that along with an increase in heating tariffs, there will be pressure on HEP T to improve its performance for which HEP T appears to be technically prepared.

4.31 The use of Heat Cost Allocators, which provides a strong incentive for efficient use of heat, remains voluntary. While buildings have a choice, they do not yet give high priority to energy efficiency issues. Some new buildings are expanding District Heating to buildings with their own heating systems (and will replace existing boilers).

4.32 HEP T officials informed the mission that the program of revitalization of heating stations for direct to indirect type will be completed by 2017. This is being financed from internal resources in Zagreb. Osijek will be taken up next, where all the heating stations are of the direct type. About 75 percent of the network in the city has to be revitalized, which will be taken up at the rate of 20 km per year. HEP is financing these tasks out of its own funds, and is also trying to cooperate with HEP ESCO to put it under the overall umbrella of energy efficiency, so as to tap funds that may be available for that purpose.

### **BANK PERFORMANCE**

4.33 *The quality at entry for the project is rated Satisfactory.* The technical viability of the proposed investments and their readiness for implementation were adequately assessed. Benefit-cost analyses were also conducted to establish the satisfactory economic and financial rates of return for the investments in both Zagreb and Osijek. A sector-wide approach covering all District Heating companies in Croatia was initially considered but was not pursued because of the uncertain viability of some smaller companies and the likely complexity of project implementation. Lending directly to HEP T was also not pursued because HEP T was not yet profitable and statutorily was not allowed to take on debt, whereas its parent company HEP was permitted to assume debt and already had experience in working with the Bank on two other ongoing projects. In retrospect, the approach of covenanting reform actions (rather than asking Government to implement them up-front) was a significant shortcoming, especially since warning signals were already being given by the Government's long delays (eventually two years) in delivering the enabling regulatory framework for the Renewable Energy Project that was approved by the Board a year earlier.

4.34 *The Bank's quality of supervision during the project is rated Satisfactory.* Sufficient budgetary and staff resources were allocated to project supervision. Close supervision and monitoring was made possible by a highly decentralized Bank team. The objective of improving HEP T's profitability proved to be a key issue, and the task team as well as the Bank's country and sector management consistently drew the Government's attention to the need for timely and adequate tariff increases that would enable HEP T to offset increases in international energy costs. The Bank did consider suspension of disbursements given the Government's failure to raise tariffs as covenanted in the Guarantee Agreement, but the project team with support from Country and Sector management decided against it since the physical investments were proceeding well, HEP T was providing adequate counterpart financing, and suspension of disbursements would adversely affect the pace of project implementation.

4.35 Government and implementing agency officials provided positive feedback on their engagement with the Bank to this mission. The officials appreciated the variety of expertise made available by the Bank team, and also a sense of assurance that the project

tasks would be supported until completion. They would welcome re-engagement with the Bank, not merely for the financial support but for the professionally enhancing experience that it provides.

4.36 Overall Bank performance is rated *Satisfactory*.

#### **BORROWER PERFORMANCE**

4.37 *The Government's performance is rated Moderately Unsatisfactory.* The Government showed commitment during project preparation. It also took early and positive steps to improve implementation readiness. By the time of effectiveness: (i) the fiduciary arrangements were in place; (ii) HEP and HEP T staff to implement the project had been identified; (iii) HEP T had already started the procurement for the works contract; (iv) disclosure requirements had been met; (v) the results assessment was completed; and (vi) an Environmental Management Plan and a Land Acquisition Framework were in place. Government officials worked closely and cooperated fully with the Bank's project team. However, during implementation, the Government failed to raise HEP T's tariffs to reach the agreed cost recovery levels, which resulted in the continuous worsening of HEP T's financial situation. As a result of the Government's inaction, the financial viability of HEP T as a self-sustaining entity is at risk. As discussed in para 3.24 above, recent developments following the New Energy Law passed in end-2012 hold promise for tariffs moving towards cost recovery levels but the effect of these yet to be seen.

4.38 *Implementing agency performance during the project is rated Satisfactory.* HEP T as the project implementing agency demonstrated technical and professional competence in implementing the project. It had officials designated specifically to plan and execute the investments, and its adequately staffed and qualified counterpart team was well organized, motivated, and quick in learning Bank procedures. There were no concerns in project management, procurement, or financial management, except for a delay in 2008 in pipeline installation. HEP T prepared bidding documents of good quality, addressed issues in a timely manner in consultation with the Bank team, made counterpart funds available when needed, and reported on progress regularly. HEP T mainstreamed environmental mitigation measures with construction good practice or integrated them into design.

4.39 Overall Borrower performance is rated *Moderately Unsatisfactory*.

4.40 **M&E Utilization.** In cases where there were risks of delays in achieving targeted levels for certain indicators, HEP T alerted the Bank team and discussed the underlying reasons and sought measures to minimize or avoid the delays. Considerable discussion revolved around the monitoring of HEP T's precarious financial situation and the urgent need for adequate tariff adjustments. HEP T officials informed the IEG mission that the data is used routinely for monitoring progress and as a feedback mechanism for taking corrective measures.

4.41 Overall, M&E is rated *High*.

## 5. Lessons

### Lessons

**5.1 A supportive regulatory environment is crucial for overcoming risk aversion to adopting new financing instruments for energy efficiency projects; creating a level playing field for a competitive ESCO market; and to ensure sustainability of energy services.**

- The Energy Efficiency project was unable to stimulate the ESCO market beyond some sectors in the public domain due to remaining regulatory and legal constraints (as for example in the residential sector).
- In Croatia, two factors may have inhibited the emergence of a competitive regime for ESCOs: (a) HEP ESCO's special standing as a subsidiary of the national power utility HEP; and (b) the lack of standardized contract models, budgeting procedures, and public procurement rules.
- The capacity of HEP T, the District Heating Company, to provide reliable services in the long run is likely to be impacted if its financial viability is not assured through either remunerative tariffs or well-designed subsidies.

**5.2 Ensuring reliable means for verifying energy savings provides a clear basis for sharing the resulting gains between the beneficiary and the financing source, and therefore incentivizes energy efficiency efforts.**

- Underdeveloped means for monitoring and verification meant that there was an inadequate basis for sharing the gains from energy savings, thus creating a disincentive for adopting the ESCO model.
- Given the prospect of HEP increasing District Heating tariffs in the future, demand-side management should be promoted to ease the transition to higher tariffs. In particular, individual metering will need to be introduced widely so that each unit can be charged for their actual energy use.

**5.3 There is a need for the Government to coordinate its various ministries in order to provide common technical and other support services, with a view to mitigating risks for investors and consumers in renewable energy efforts.**

- While rights to state-owned land are being handed out to the private sector or for public-private partnerships in solar and wind power projects, energy resource mapping and mature project designs need to be provided as a common service by the government. In the case of biomass projects, where various ministries including forestry and water are involved, horizontal connections between ministries need to be strengthened. These arrangements were lacking during the Renewable Energy Resources project experience.

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## Annex A. Basic Data Sheet

### ENERGY EFFICIENCY PROJECT (IBRD-71980)

#### Key Project Data (amounts in US\$ million)

	<i>Appraisal estimate</i>	<i>Actual or current estimate</i>	<i>Actual as % of appraisal estimate</i>
Total project costs	39.80	33.33	84%
Loan amount	12.00	12.73	106%
Cofinancing	-	-	-
Cancellation	-	-	-

#### Cumulative Estimated and Actual Disbursements

	<i>FY03</i>	<i>FY04</i>	<i>FY05</i>	<i>FY06</i>	<i>FY07</i>	<i>FY08</i>	<i>FY09</i>	<i>FY10</i>	<i>FY11</i>
Appraisal estimate (US\$M)	2.02	4.65	8.22	10.34	11.55	12.00	12.00	12.00	12.00
Actual (US\$M)	0	0.05	0.9	1.86	2.75	5.33	9.75	11.23	12.73
Actual as % of appraisal	0	1	11	18	24	44	81	94	106
Date of last disbursement: September 7, 2010									

#### Project Dates

	<i>Original</i>	<i>Actual</i>
Appraisal	03/21/2003	03/21/2003
Board approval	10/07/2003	10/07/2003
Signing	11/10/2003	11/10/2003
Effectiveness	04/08/2004	04/08/2004
Closing date	06/30/2010	06/30/2010

**Staff Cost**

<i>Stage of Project Cycle</i>	<i>Staff Cost (Bank Budget Only)</i> US\$ '000s (including travel and consultant costs)
<b>Lending</b>	
FY03	2.10
<b>Total:</b>	<b>2.10</b>
<b>Supervision</b>	
FY04	19.84
FY05	12.57
FY06	39.20
FY07	83.57
FY08	55.86
FY09	51.62
FY10	34.30
FY11	17.59
<b>Total:</b>	<b>316.94</b>

**Task Team Members**

<b>Names</b>	<b>Title</b>	<b>Unit</b>	<b>Responsibility/Specialty</b>
<b>Lending</b>			
Rachid Benmessoud	Team Leader	ECSEG	Team Lead
Yves Duvivier	Team Member	ECSEG	Financial Analyst
Peter Law	Team Member	ECSEG	Infrastructure Specialist
Irina Kichigina	Sr. Counsel	LEGEG	Lawyer
Elzbieta Sieminska	Procurement Specialist	ECSCS	Procurement
John Cowan	ESCO Management Specialist	ECSIE	ESCO Specialist
Hirant Heart	Financial Management Specialist	ECSPF	Financial Management
Rory O'Donoghue	Financial Analyst Consultant	ECSIE	Financial Analyst
<b>Supervision/ICR</b>			
Peter Johansen	Team Leader	ECSSD	Team Lead
Angelica A. Fernandes	Procurement Analyst	ECSC2	Procurement
Claudia I. Vasquez Suarez	Consultant	ECSSD	Energy Economist
Iwona Warzecha	Sr. Fin. Management Specialist	ECSC3	Financial Management
Nicholay Chistyakov	Disbursement Officer	LOAG1	Disbursement
Michael Gascoyne	Sr. Resource Management Officer	CFRPA	Resource Management
Mirela Mart	Consultant	ECSPS	Financial Management
Elzbieta Sieminska	Procurement Specialist	ECSC3	Procurement
Ranjan Ganguli	Financial Management Specialist	ECSC3	Financial Management
Natasza Vetma	Operations Officer	ECSS3	Env. Safeguards
Stjepan Gabric	Senior Operations Officer	ECSS6	
Roman Palac	Operations Analyst	ECSIE	
John Cowan	ESCO Management Specialist	ECSIE	ESCO Specialist
Xiaoping Wang	Sr. Energy Specialist	LCSEG	Energy Specialist
Hana Huzjak	Program Assistant	ECCHR	
Rozena Serrano	Program Assistant	ECSSD	
Bogdanka Krtinic	Program Assistant	ECCHR	

**RENEWABLE ENERGY RESOURCES PROJECT (TF-54973)****Key Project Data (amounts in US\$ million)**

	<i>Appraisal estimate</i>	<i>Actual or current estimate</i>	<i>Actual as % of appraisal estimate</i>
Total project costs	8.85	7.33	83%
Loan amount	5.89	4.39	75%
Cofinancing	-	-	-
Cancellation	-	1.50	-

**Cumulative Estimated and Actual Disbursements**

	<i>FY06</i>	<i>FY07</i>	<i>FY08</i>	<i>FY09</i>	<i>FY10</i>	<i>FY11</i>	<i>FY12</i>	<i>FY13</i>
Appraisal estimate (US\$M)	1.50	3.00	4.50	5.40	5.50	5.50	5.50	5.89
Actual (US\$M)	0.00	0.55	0.55	1.45	3.43	4.39	4.39	4.39
Actual as % of appraisal	0	18	12	27	62	80	80	75

Date of last disbursement: September 7, 2010

**Project Dates**

	<i>Original</i>	<i>Actual</i>
Appraisal	02/21/2005	02/21/2005
Negotiations	05/09/2005	05/09/2005
Board approval	06/23/2005	06/23/2005
Signing	11/23/2005	11/23/2005
Effectiveness	11/24/2005	11/23/2005
Closing date	04/01/2010	05/31/2010

**Staff Cost**

<i>Stage of Project Cycle</i>	<i>Staff Cost (Bank Budget Only)</i> US\$ '000s (including travel and consultant costs)
<b>Lending</b>	
FY01	53.62
FY02	59.00
FY03	23.46
FY04	24.46
FY05	49.82
FY06	61.94
<b>Total:</b>	<b>272.30</b>
<b>Supervision</b>	
FY07	50.77
FY08	58.83
FY09	50.81
FY10	22.45
FY11	22.45
<b>Total:</b>	<b>227.52</b>

**Task Team Members**

<b>Names</b>	<b>Title</b>	<b>Unit</b>	<b>Responsibility/Specialty</b>
<b>Lending</b>			
Rashid Benmessaoud	Senior Energy Specialist	SACPK	Task Team Leader
Grederick Renner	Consultant	-	Renewable Energy Expert
<b>Supervision</b>			
Peter Johansen	Senior Energy Specialist	ECSS2	Task Team Leader
Angelica A. Fernandes	Consultant	ECSS2	Procurement
Stjepan Gabric	Senior Operations Officer	ECSS6	
Hana Huzjak	Operations Analyst	ECSS6	
Lamija Marijanovic	Financial Management Specialist	ECSC3	Financial Management
Mirela Mart	Consultant	ECSPS	Environmental Safeguards
Natasa Vetma	Operations Officer	ECSS3	
Iwona Warzecha	Sr. Financial Management Specialist	ECSC3	Financial Management

**DISTRICT HEATING PROJECT (IBRD-48280)****Key Project Data (amounts in US\$ million)**

	<i>Appraisal estimate</i>	<i>Actual or current estimate</i>	<i>Actual as % of appraisal estimate</i>
Total project costs	44.28	43.48	98%
Loan amount	29.80	31.68	106%
Cofinancing	-	-	-
Cancellation	-	-	-

**Cumulative Estimated and Actual Disbursements**

	<i>FY07</i>	<i>FY08</i>	<i>FY09</i>	<i>FY10</i>	<i>FY11</i>
Appraisal estimate (US\$M)	7.45	14.90	22.35	29.80	29.80
Actual (US\$M)	5.43	10.58	15.77	31.68	31.68
Actual as % of appraisal	73%	71%	71%	107%	107%

Date of final disbursement: October 19, 2010

**Project Dates**

	<i>Original</i>	<i>Actual</i>
Appraisal	04/06/2006	04/06/2006
Board approval	06/20/2006	06/20/2006
Signing	09/11/2006	09/11/2006
Effectiveness	03/09/2007	03/09/2007
Closing date	06/30/2010	06/30/2010

**Staff Cost**

<i>Stage of Project Cycle</i>	<i>Staff Cost (Bank Budget Only)</i> US\$ '000s (including travel and consultant costs)
<b>Lending</b>	
FY05	23.10
FY06	184.29
<b>Total:</b>	<b>207.39</b>
<b>Supervision</b>	
FY07	85.16
FY08	81.27
FY09	89.26
FY10	85.91
FY11	24.78
<b>Total:</b>	<b>573.78</b>

**Task Team Members**

<b>Names</b>	<b>Title</b>	<b>Unit</b>
<b>Lending</b>		
Ljiljana Boranic	Team Assistant	ECCHR
Ruxandra Maria Floroiu	Environmental Engineer	ECSS3
Stjepan Gabric	Senior Operations Officer	ECSS6
Irina L. Kichigina	Chief Counsel	LEGEM
Mirela Mart	Consultant	ECSPS
Kishore Nadkarni	Consultant	EASCS
Norval Stanley Peabody	Consultant	EASIS
Pekka Kalevi Salminen	Sr. Energy Specialist	ECSS2
Sudipto Sarkar	Sector Leader	EASIN
Yukari Tsuchiya	Temporary	ECSSD
Antonia G. Viyachka	Procurement Specialist	ECSC2
<b>Supervision</b>		
Ljiljana Bornic	Team Assistant	ECCHR
Ruxandra Maria Floroiu	Environmental Engr.	ECSS3
Stjepan Gabric	Senior Operations Officer	ECSS6
Hana Huzjak	Operations Analyst	ECSS6
Bogdanka Krtinic	Team Assistant	ECCHR
Lamija Marijanovic	Financial Management Specialist.	ECSC3
Mirela Mart	Consultant	ECSPS
Kishore Nadkarni	Consultant	EASCS
Norval Stanley Peabody	Consultant	EASIS
Poonam Rohatgi	Program Assistant	SASDO
Pekka Kalevi Salminen	Sr, Energy Specialist.	ECSS2
Rozena Serrano	Program Assistant	ECSSD
Ljiljana Tarade	Operations Analyst	ECCHR
Natasa Vetma	Operations Officer	ECSS3
Antonia G. Viyachka	Procurement Specialist	ECSC2

## Annex B. Other Tables

<b>Id</b>	<b>Project name</b>	<b>Country</b>	<b>Closing Date</b>	<b>Project Cost (US\$ million)</b>
P056192	Local Development Pilot	Bosnia and Herzegovina	31-May-2005	15
P008417	Municipal Infrastructure Rehabilitation	Georgia	30-Jun-2000	18
P008479	Energy Environment	Hungary	31-Dec-2001	100
P008519	Power & District Heating Rehabilitation	Kyrgyz Republic	31-Dec-2007	20
P055733	Power and District Heating Supplemental	Kyrgyz Republic	N/A	15
P044748	Social Infrastructure Retrofitting	Republic of Belarus	31-Dec-2010	23
P008314	District Heating	Republic of Bulgaria	30-Jun-2008	34
P095389	District Heating	Republic of Croatia	30-Jun-2010	30
P079978	Energy Efficiency	Republic of Croatia	30-Jun-2010	5
P008400	District Heating Rehabilitation	Republic of Estonia	31-Dec-1999	38
P097635	Lignite Power Technical Assistance	Republic of Kosovo	31-Dec-2011	9
P008530	Riga District Heating	Republic of Latvia	30-Jun-2005	36
P008526	Jelgava District Heating Rehabilitation	Republic of Latvia	30-Jun-2000	14
P070112	Education Improvement	Republic of Lithuania	30-Sep-2006	25
P035802	Municipal Development	Republic of Lithuania	30-Jun-2005	20
P063656	Vilnius District Heating	Republic of Lithuania	15-Jun-2005	17
P036011	Klaipeda Geothermal Demonstration	Republic of Lithuania	31-Dec-2002	6
P035163	Energy Efficiency/Housing Pilot	Republic of Lithuania	30-Jun-2001	10
P040558	Energy 2	Republic of Moldova	30-Apr-2012	35
P065059	Krakov Energy Efficiency	Republic of Poland	31-Dec-2008	15
P037339	Podhale Geothermal District Heating & Env.	Republic of Poland	31-Dec-2004	38
P008614	Katowice Heat Supply & Conservation	Republic of Poland	31-Oct-2000	45
P008576	Heat Supply Restructuring & Conservation	Republic of Poland	30-Jun-2000	340
P008853	Environment	Republic of Slovenia	30-Jun-2001	23.9
P038551	Municipal Heating	Russian Federation	30-Jun-2008	85
P036973	Enterprise Housing Divestiture	Russian Federation	31-Dec-2003	300
P008803	Energy Efficiency	Russian Federation	31-Jan-2003	107
P042720	St. Petersburg Center City Rehabilitation	Russian Federation	30-Apr-2002	31
P044832	Kiev District Heating Improvement	Ukraine	30-Jun-2007	200
P055738	Sevastopol Heat Supply Improvement	Ukraine	30-Jun-2006	28
P055739	Kiev Public Buildings Energy Efficiency	Ukraine	30-Jun-2005	18

## Annex C. Croatia: Trends in the Energy Sector and Energy Efficiency

### Energy Sector trends

The total primary energy consumption in Croatia including the transport sector has increased at an average annual rate of 1.6 percent during 1995-2010, though there has been a negative 3.0 percent growth since 2008 due to the economic slowdown. Among the sources of energy, over the entire 1995-2010 period, coal and coke showed the fastest growth at 9.2 percent per year, increasing its share in total energy consumption from 2.7 percent to 8.0 percent. More recently, since 2008, very rapid annual growth has been recorded in wind power (87 percent) and in other renewable energy sources including solar, geothermal, biodiesel, landfill gas, and biogas (30 percent) but all these renewable sources together still account for less than 0.3 percent of total primary energy consumption. (Table 1).

**Table 9: Croatia: Energy Sources in Total Primary Energy Consumption**

Energy source	Annual Growth (%)		Share of Consumption (%)	
	1995-2010	2008-2010	1995	2010
Oil	0.2	-8.6	53.3	43.4
Natural gas	2.1	0.6	28.3	30.7
Hydroelectricity	3.2	25.8	6.6	8.4
Coal and coke	9.2	-1.6	2.7	8.0
Electricity (net imports)	2.1	-14.9	4.4	4.8
Total Biomass	1.3	8.2	4.7	4.6
Wind electricity		86.7	-	0.14
Other Renewables		29.5	-	0.14
<b>TOTAL PRIMARY CONSUMPTION</b>	<b>1.6</b>	<b>-3.0</b>	<b>100</b>	<b>100</b>

Source: Energy Institute Hrvoje Pozar. 2012.

Final energy consumption in Croatia during the period 1995-2010 increased at an average annual rate of 2.2 percent, though there has been a net decrease of 2.1 percent during 2008-2010 due to the economic slowdown. During 1995-2010 for the tertiary sector, households, and industry, the average annual rate of growth in final energy consumption was 3.9 percent, 2.1 percent and 0.4 percent respectively. Significantly, during the 2008-2010 period, final energy consumption for the tertiary sector and the household sector rose at 3.0 percent and 2.8 percent respectively, though all other sectors showed a slowdown, especially in the case of industry (-9.8 percent). In terms of sector shares in final energy consumption between 1995 and 2010, the household sector held almost steady at around 30 percent, while the tertiary sector increased slightly from 9.3 percent to 11.9 percent, and the industry sector decreased significantly from 28.9 percent to 21.9 percent. (Table 2)

**Table 10: Croatia: Sector-wise Final Energy Consumption**

Sector	Annual Growth (%)		Share of Consumption (%)	
	1995-2010	2008-2010	1995	2010
Transport	3.8	-2.1	26.0	32.6
Residential	2.1	2.8	30.2	29.7
Industry	0.4	-9.8	28.9	21.9
Tertiary & Others	3.9	3.0	9.3	11.9
Agriculture	-0.2	-1.5	5.6	3.9
ALL	2.2	-2.1	100.0	100.0

Source: Energy Institute Hrvoje Pozar. 2012.

Croatia imports a large share of its energy needs. In 2010, the country imported energy equivalent to 223 PetaJoules (or 5.33 million tons oil equivalent or mtoe), about 55 percent of its total energy needs of 405 PetaJoules (or 9.67 mtoe). Given the long-term trends in the growth of energy consumption and the prospect of increasing import needs, improving energy efficiency is clearly an economic priority for Croatia. Also, as a future member of EU, Croatia has pledged to fulfill EU's "20-20-20" commitment by the year 2020 – to cut greenhouse-gas emissions by 20 percent, increase energy efficiency by 20 percent, and use renewable energy for 20 percent of its energy needs. These ambitious targets – to be achieved by 2020 – require significant long-term investments not easily available in a time of economic crisis in Europe. They also pose a challenge for a country that is struggling to emerge from recession.

Between 1995 and 2010, the total CO<sub>2</sub> emissions from final energy consumption in Croatia increased by 31 percent. The highest increase was in transport (77 percent) followed by households, services and agriculture (23 percent). On the other hand, CO<sub>2</sub> emissions from industry decreased by 6 percent over the 1995-2010 period.<sup>25</sup>

The National Energy Efficiency Action Plans (NEEAP) of the Republic of Croatia comply with the European Commission's directive which requires each Member State to submit to the European Commission an energy efficiency action plan. The first NEEAP provides a package of measures for the most important final energy demand sectors: residential households, services, industry and transport. These measures are planned in order to achieve the indicative targets for 2010 and 2016, and to comply with the requirements regarding the exemplary role of the public sector. The expected energy savings of the measures envisaged in this Action Plan for each of the four major sectors of final energy consumption are summarized in Table 3 below.

The 2nd NEEAP for Croatia has been prepared and is expected to be approved by mid-2013. This plan has a dual significance: as an implementing document presenting a comprehensive energy efficiency policy for the next three-year period; and as a report with a detailed presentation of the activities undertaken in the previous period and the assessment of actual energy savings compared to the targets set in the 1st NEEAP.

<sup>25</sup> <http://www.eea.europa.eu/>

**Table 11: Croatia: National indicative targets for Energy Savings in 2016 (PJ or PetaJoules)**

National indicative targets for Energy Savings			19.77			
National intermediate indicative target in 2010 (PJ)			6.53			
Sector division of target	Sector target (GWh)		Achieved energy savings in 2010 (PJ)		Estimated energy savings in 2016 (PJ)	
	2010	2016	Total (TD*)	From measures (BU*)	Total (TD)	From measures (BU+MAED*)
Residential	2.24	6.72	4.43	1.53	12.64	9.58
Services	1.25	3.76	0.33	1.32	4.50	3.85
Industry	1.12	3.36	1.21	0.60	4.93	1.99
Transport	1.98	5.93	0.46	0.08	16.60	3.22
Total:	6.59	19.77	6.43	3.53	38.66	18.64
(%) compared to ESD* reference consumption	3%	9%	2.9%	1.6%	17.6%	8.5%

\* BU: Business as usual; TD: Top-Down approach; MAED: Model for Analysis of Energy Demand  
ESD: Energy Supply and Demand

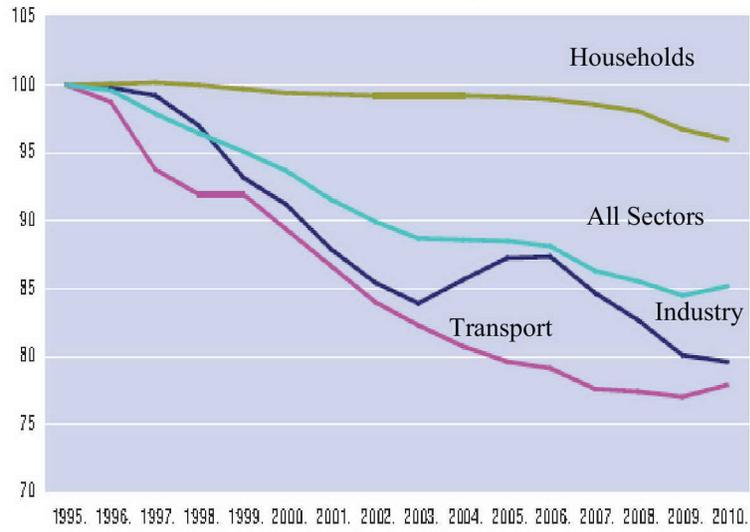
Source: Ministry of Economy, Labor and Entrepreneurship

## Trends in Energy Efficiency

Energy efficiency has shown an overall improvement in Croatia during 1995-2010, with the energy efficiency index ODEX<sup>26</sup> for the whole economy improving by 14.5 percent, which is close to the EU average of 16.5 percent (in the period 1995-2009). The industrial sector and transport sector contributed the most to this improvement with the energy efficiency index improving by 20 percent and 19 percent respectively over the 1995-2010 periods. In contrast, improvement in energy efficiency in the household sector was much lower at 4 percent in 2010 compared to 1995 (Figure 1). Overall, residential, commercial and public buildings present the largest energy savings potential in the country, followed by industry and transport, all with several benefits. For households, greater energy efficiency helps to save on monthly expenses and improves quality of life; for municipalities, energy efficiency reduces the cost of transport, utilities, waste management, and the heating and cooling of public buildings; for industry, energy efficiency helps reduce costs and makes enterprises more competitive, provides opportunities to replace old equipment and modernize production, and meets demands of export markets. In the household sector, as opposed to the transport sector, the technological solutions needed for a lower carbon society are already available and in use in the developed and developing world.

<sup>26</sup> ODEX is the index used in the ODYSSEE-MURE project supported by the European Commission to measure the energy efficiency progress by main sector (industry, transport, households) and for the whole economy (all final consumers). A decrease in the index indicated higher energy efficiency.

**Figure 1:** Croatia: Energy Efficiency Index ODEX:  
**All sectors between 1995 and 2010**  
(Index Base=100)



Source: Energy Institute Hrvoje Pozar

## Annex D. List of Persons Met

### Government of Croatia

#### Ministry of the Economy, Government of Croatia

*Ms. Kristina Celic*, Director, Sector for Energy

*Mr. Igor Raguzin*, Head, Renewable Energy and Energy Efficiency

*Mr. Marijan Hohnjec*, ex- Ministry of Economy Staff

#### Ministry of Construction and Physical Planning

*Ms. Ana Pavicic-Kaselj*, Minister

*Ms. Tea Kelsiver*, Advisor within the Minister's Office

*Mr. Damir Hajar*, Advisor within the Minister's Office

#### Croatian Energy Regulatory Agency (Hrvatska Energetska Regulatorna Agencija HERA)

*Mr. Tomislav Jurekovic*, President of the Board of Commissioners

*Mr. Mico Klepo*, Director, Thermal Energy Division

*Mr. Dalibor Pudic*, Member of the Board of Commissioners

#### Environmental Protection and Energy Efficiency Fund

*Ms. Irena Dubravec*, Head of Department for Promotion, Implementation and Analysis of Rational Energy Management

*Ms. Marija Sculac Domac*, Head of Service for Energy Efficiency and Use of Renewable Energy Sources

### Hrvatska Elektroprivreda d.d. (HEP)

*Mr. Zlatko Koracevic*, President of the Management Board

*Mr. Ivan Matasic*, Member of the Management Board for Financial affairs

#### HEP Energy Services Company (ESCO)

*Ms. Vlasta Zanki*, Director

*Ms. Jasmina Fanjek*

#### HEP Toplinarstvo (District Heating) Zagreb

*Mr. Robert Krklec*, Manager

*Mr. Robert Vuk*, Director

*Mr. Zdravko Zajec*, Assistant Director

#### HEP Toplinarstvo (District Heating) Osijek

*Mr. Ivica Mihaljevic*, General Manager

*Mr. Zlatko Markovic*, Assistant Director, Production

*Ms. Lea Fadljevic*, Head, Finance

### Croatian Bank for Reconstruction and Development (Hrvatska banka za obnovu i razvitak HBOR)

*Mr. Josip Pavkovic*, Head and Infrastructure and Environmental Protection Unit/Industry Department/Credit Division

*Mr. Hrvoje Sucic*, Project Manager, Renewable Energy Resources Project; [hrvoje.Sucic@hbor.hr](mailto:hrvoje.Sucic@hbor.hr)

## **SITE VISITS**

### Novigrad City Administration

*Ms. Sandra Rugani Kukuljan*

*Ms. Vanja Gorički*

### Solin City Administration

*Mr. Miroslav Miskovic*

### Rovinj City Administration

*Mr. Ando Saina*

### Lika Energo Eko, (Biomass co-generation project), Udbina

*Mr. Zeljko Lovrak*, Director

### Koncar, Power Plant and Electric Traction Engineering Inc (Wind Power Facility), Dugo Polje (Split)

*Ms. Alenka Dejdar*, Project Manager

### Elementary and Secondary Schools, Dugo Resa, Karlovac County

*Mr. Zeljko Sancic*, Head, County Office of Education

*Ms. Sanja Ferkula*, Principal, Elementary School

*Mr. Nikola Mriljak*, Principal, Secondary School  
*Ms. Marija Medic* and *Ms. Draxenka Sila Ljubenko*,  
County Office Representatives

Elementary School, Ljudevit Gaj, Krapinsko

*Ms. Ljubica Ljubicic*, Principal

Elementary School, Trnovec, Varazdinska

*Ms. Radmila Sacic*, Principal

### Milivoj Medveden Meat Industry, Krasic

*Mr. Milivoj Medveden*, Director

*Mr. Krunoslav Sokolic*, Food Safety Manager

## **World Bank**

### World Bank, Washington DC

*Peter Johansen*, Senior Energy Specialist, Task Team Leader, Energy Efficiency and Renewable Energy Resources Project

*Pekka Kalevi Salminen*, Senior Energy Specialist, Task Team Leader of District Heating Project

### World Bank, Croatia Office, Zagreb

*Hongjoo Hahm*, Country Manager

*Natasa Vetma*, Senior Operations Officer

## Annex E. Borrower Comments

From: Sučić Hrvoje <hsucic@hbor.hr>  
To: "rjammi@worldbank.org" <rjammi@worldbank.org>, [mgaarder@worldbank.org](mailto:mgaarder@worldbank.org)  
<mgaarder@worldbank.org>  
Cc: "lboranic@worldbank.org" <lboranic@worldbank.org>, Tanković Harun <htankovic@hbor.hr>, Kolić Marijana <mkolic@hbor.hr>, Ključariček Nikola <nkljucaricek@hbor.hr>, Szabo Tibor <tszabo@hbor.hr>  
Date: 06/26/2013 10:29 AM  
Subject: FW: CROATIA: Energy Efficiency, Renewable Energy Resources, and District Heating -Draft Project Performance Assessment Report

Dear Ms. Gaarder, Mr. Jammi

Thank You very much for sending the Draft of the PPAR. Regarding the Energy Efficiency Project (IBRD-71980) and Renewable Energy Resource Project (TF-54973) the results of this evaluation report are largely the same, in the implementation and performance part, as in the previous Implementation Completion and Results Reports on year 2010 (ICRs).

For RER Project, concerning objectives of the project: “to help develop an economically and environmentally sustainable market for RES in Croatia” and “to reduce greenhouse gas emissions on a continuous basis by overcoming barriers to implementation of renewably energy”; we can say that there has been some progress in relation to the year 2010. Renewable Energy projects were being developed and more and more projects are operational. This is also identified and recognized in PPA evaluation report so the risk that the achieved development outcomes will not be sustained is now rated **Moderate** instead **Significant**.

In this moment, mid-2013, Croatia has about 210 MW of renewables in operation and about 200 MW in construction. It is still not close to the “20-20-20” goal (1600 MW of renewables) but progress in relation to year 2010 is significant. We would like to think that this is also partly the result of RER Project.

Regarding RER Project, from 15 projects financing by CLF, 3 of them are operational: Končar wind – 16 MW, Eko (Oštra stina) wind – 20 MW (will be these days) and Lika Energo Eko biomass cogeneration – 1 MW. This is 37 MW in total and it is also certain progress in relation to year 2010 and year 2012 contributing to RER Project outcome.

Sincerely,

**Hrvoje Sučić**

Voditelj projekta

Projekt obnovljivih izvora energije

**HBOR**

Hrvatska banka za obnovu i razvitak

Strossmayerov trg 9

10000 Zagreb, Hrvatska

' +385 1 4597 8447 +385 1 4591 725\* [hsucic@hbor.hr](mailto:hsucic@hbor.hr) , [www.hbor.hr](http://www.hbor.hr)