

Cover Note

Project Title: Ukraine – Removing Barriers to Greenhouse Gas Emissions Mitigation through Energy Efficiency in the District Heating System

Date: 8 January 2000

	WORK PROGRAM INCLUSION	REFERENCE/NOTE:
1. Country Ownership		
<ul style="list-style-type: none"> Country Eligibility 		Cover Sheet Page 1 (UNFCCC ratified on October 29, 1996)
<ul style="list-style-type: none"> Country Drivenness 	Clear description of project' s fit within: <ul style="list-style-type: none"> National reports/communications to Conventions National or sector development plans Recommendations of appropriate regional intergovernmental meetings or agreements. 	Paragraph # 1-5, 46-47
<ul style="list-style-type: none"> Endorsement 	<ul style="list-style-type: none"> Endorsement by national operational focal point. 	OFPP' s letter of endorsement on file.
2. Program & Policy Conformity		
<ul style="list-style-type: none"> Program Designation & Conformity 	Describe how project objectives are consistent with Operational Program objectives or operational criteria.	Paragraph # 48
<ul style="list-style-type: none"> Project Design 	Describe: <ul style="list-style-type: none"> sector issues, root causes, threats, barriers, etc, affecting global environment. Project logical framework, including a consistent strategy, goals, objectives, outputs, inputs/activities, measurable performance indicators, risks and assumptions. Detailed description of goals, objectives, outputs, and related assumptions, risks and performance indicators. Brief description of proposed project activities, including an explanation how the activities would result in project outputs. Global environmental benefits of project. Incremental Cost Estimation based on the project logical framework. <ul style="list-style-type: none"> Describe project outputs (and related activities and costs) that result in 	<ul style="list-style-type: none"> Paragraph # 1, 18, 33, 40 Annex 5 Paragraphs # 9-13, Annex 5 Paragraphs # 13-14 Paragraph # 10, Annex 3 Annex 3

	WORK PROGRAM INCLUSION	REFERENCE/NOTE:
	<p>global environmental benefits</p> <ul style="list-style-type: none"> • Describe project outputs (and related activities and costs) that result in joint global and national environmental benefits. • Describe project outputs (and related activities and costs) that result in national environmental benefits. • Describe the process used to jointly estimate incremental cost with in-country project partner. • Present the incremental cost estimate. If presented as a range, then a brief explanation of challenges and constraints and how these would be addressed by the time of CEO endorsement. 	
<ul style="list-style-type: none"> • Sustainability (including financial sustainability) 	Describe proposed approach to address factors influencing sustainability, within and/or outside the project to deal with these factors.	<ul style="list-style-type: none"> • Paragraphs # 55-56
<ul style="list-style-type: none"> • Replicability 	Describe the proposed approach to replication,(for e.g., dissemination of lessons, training workshops, information exchange, national and regional forum, etc).	<ul style="list-style-type: none"> • Paragraphs # 39, 56
<ul style="list-style-type: none"> • Stakeholder Involvement 	<ul style="list-style-type: none"> • Describe how stakeholders have been involved in project development. • Describe the approach for stakeholder involvement in further project development and implementation. 	<ul style="list-style-type: none"> • Paragraph # 7 • Paragraphs # 71
<ul style="list-style-type: none"> • Monitoring & Evaluation 	<ul style="list-style-type: none"> • Describe how the project design has incorporated lessons from similar projects in the past. • Describe approach for project M&E system, based on the project logical framework, including the following elements: <ul style="list-style-type: none"> • Specification of indicators for objectives and outputs, including intermediate benchmarks, and means of measurement. • Outline organizational arrangement for implementing M&E. • Indicative total cost of M&E (maybe reflected in total project cost). 	<ul style="list-style-type: none"> • Paragraphs # 50-54 • Paragraphs # 43-45, 75; Annex 5

	WORK PROGRAM INCLUSION	REFERENCE/NOTE:
3. Financing		
<ul style="list-style-type: none"> Financing Plan 	<ul style="list-style-type: none"> Estimate total project cost Estimate contribution by financing partners. Propose type of financing instrument 	<ul style="list-style-type: none"> Paragraphs # 57-59, Annex 2, cover page
<ul style="list-style-type: none"> Implementing Agency Fees 	Propose IA fee	Fees are assumed to be the standard fees for Full Projects according to the new guidelines. This is not stated explicitly in the document.
<ul style="list-style-type: none"> Cost-effectiveness 	<ul style="list-style-type: none"> Estimate cost-effectiveness, if feasible. Describe alternate project approaches considered and discarded. 	<ul style="list-style-type: none"> Paragraphs # 15-16, 19-21, 49 Paragraphs # 21, 54
4. Institutional Coordination & Support		
<u>IA Coordination and Support</u> <ul style="list-style-type: none"> Core commitments & Linkages 	Describe how the proposed project is located within the IA' s: <ul style="list-style-type: none"> Country/regional/global/sector programs. GEF activities with potential influence on the proposed project (design and implementation). 	<ul style="list-style-type: none"> Paragraph # 5
<ul style="list-style-type: none"> Consultation, Coordination and Collaboration between IAs, and IAs and EAs, if appropriate. 	<ul style="list-style-type: none"> Describe how the proposed project relates to activities of other IAs (and 4 RDBs) in the country/region. Describe planned/agreed coordination, collaboration between IAs in project implementation. 	<ul style="list-style-type: none"> Paragraphs # 50-54
5. Response to Reviews		
Council	Respond to Council Comments at pipeline entry.	
Convention Secretariat	Respond to comments from Convention Secretariats .	
GEF Secretariat	Respond to comments from GEFSEC on draft project brief.	
Other IAs and 4 RDBs	Respond to comments from other IAs, 4RDBss on draft project brief.	
STAP	Respond to comments by STAP at work program inclusion	
Review by expert from STAP Roster	Respond to review by expert from STAP roster.	Annex 6 addresses the STAP reviewer' s comments.

PROJECT BRIEF

1. IDENTIFIERS:

PROJECT NUMBER: UKR/
PROJECT TITLE: **Ukraine: Removing Barriers to Greenhouse Gas Emissions Mitigation through Energy Efficiency in the District Heating System, Phase I**

GEF FOCAL AREA: Climate Change
GEF OPERATIONAL PROGRAM: Removal of Barriers to Energy Efficiency and Energy Conservation

PROJECT SITE: Ukraine
COUNTRY ELIGIBILITY: UNFCCC ratified on October 29, 1996
Eligible under Paragraph 9(b) of GEF Instrument

PROJECT DURATION: 70 months (divided into two implementation stages of 22 and 48 months)

GEF IMPLEMENTING AGENCY: UNDP
NATIONAL EXECUTING AGENCY: State Committee of Ukraine for Energy Conservation
NAT'L IMPLEMENTING AGENCY: Agency for Rational Energy Use and Ecology
ESTIMATED APPROVAL DATE: March 2001

2. SUMMARY: The proposed project addresses a key issue in the reduction of greenhouse gas emissions through large-scale improvements in energy efficiency in Ukraine's communal heat supply sector. These improvements will result from a four-part approach: 1) capacity building to create the basis for systematic energy efficiency activities at the local level; 2) an integrated approach of supply and demand-side improvements to achieve maximum fuel savings and emissions reduction; 3) attraction of external investment resources for an energy efficiency program in a pilot city; and, 4) project-specific replication measures including development of relevant procedures, guidelines, information materials and their dissemination, and public awareness-raising through the involvement of NGO's, in particular those concerned with environmental and energy efficiency problems. The project will involve establishing a privately-run energy service company (ESCO) as an innovative mechanism for financing energy efficiency activities in Ukraine at both municipal and regional levels. The city of Rivne was selected as the pilot city for project implementation.

3. COSTS AND FINANCING (MILLION US\$):

GEF:	Implementation Stage 1	1.840
	PDF B	0.190
	Implementation Stage 2	3.494
	GEF Subtotal	5.524
Co-financing:	Implementation Stage 1	
	Country Contribution	0.050
	Foreign Private Investor	0.030
	Foreign Banks	0.020

Implementation Stage 2

Country Contribution	3.770
EBRD	7.000
Foreign Private Investor	2.400
Foreign Banks	4.800
Local Banks	2.100

Co-financing Subtotal **20.170**

Total Project Cost 25.694

4. OPERATIONAL FOCAL POINT ENDORSEMENT:

Name: Vasyl V. Vasylchenko, Deputy Minister, Ministry for Environmental Protection and Nuclear Safety

Date: 3 November 1998

5. IMPLEMENTING AGENCY CONTACT:

Susan Legro, Regional Adviser for Energy and Climate Change

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Fax: (+421-7) 59331-450

BACKGROUND

1. Ukraine is one of the least energy efficient countries in the world and has the greatest emissions level per unit of GDP among CIS countries. A recent inventory estimated that total emissions from Ukraine in 1990 were 246 million tons of carbon equivalent, placing it sixth in the world. Per capita emissions of CO₂ were 4.75 tons of carbon per year. This figure significantly exceeds the levels in most European countries and is also one of the highest in the world. Heat supply in the buildings sector accounts for approximately 25% of all fuel consumed in Ukraine, and there is a huge potential for energy efficiency improvement in this sector. This pattern explains the priority of this sector for Ukraine and the need for active cooperation with international agencies.
2. Since 1991, the Government of Ukraine has paid a great deal of attention to the development of energy sector. In 1994, the Ukrainian Parliament adopted the Concept of Fuel and Energy Complex Development until 2010. This document formed the basis of the National Energy Program of Ukraine, which was developed in 1996. The Concept and the Program determine Ukrainian energy policy and its priorities: energy conservation, use of domestic resources, development of renewable energy and targeted investments in strategic areas of the economy. In the district heating sector, the program calls for reconstruction and rehabilitation of existing district heating networks, continued development of district heating systems and combined heat and power plants, promotion of waste heat usage, and construction of new high-efficiency, heat-only boiler plants where appropriate.
3. In 1995, the Ukrainian Parliament approved the Program on Restructuring the Ukrainian Economy, which envisaged a considerable decrease in energy-intensive production processes. To fulfill the national energy conservation policy, the Ukrainian Parliament adopted the Law of Ukraine "On Energy Conservation" in 1994 and established a special national-level institution: the State Committee for Energy Conservation (SCEC). The SCEC prepared the Comprehensive National Program on Energy Conservation that was approved by the Parliament in 1996. The Comprehensive National Program defined a strategy for improving energy efficiency in the main branches of the Ukrainian economy, estimated the potential for energy conservation, and set targets for reductions in energy intensity. The program also identified efficiency activities in heat supply and consumption as a priority area.
4. In the area of climate change, Ukraine prepared a GHG inventory for the year 1990, assessed Ukraine's vulnerability to climate change and adaptation to it, and identified mitigation options for reducing greenhouse gas (GHG) emissions with support from the U.S. Country Study Program. Ukraine used this research as the basis for its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), which was prepared in 1998. The First National Communication identified improvements in energy efficiency as one of the main mitigation options for reducing GHG emissions in Ukraine.
5. In addition to reflecting national priorities in Ukraine, the proposed project also builds upon the existing goals and activities of the GEF implementing agency in Ukraine and the surrounding region. UNDP has identified the environment as one of its four priority areas for global activity. This project will also serve as an innovative approach to district heating efficiency projects, an important part of the UNDP-GEF portfolio. Finally, UNDP is assisting local governments in the

formulation and implementation of Local Agenda 21 sustainable development strategies at the county and municipal level. Energy plans are included in these strategies.

6. The proposed project addresses a key issue in the reduction of greenhouse gas emissions through large-scale improvements in energy efficiency in Ukraine's communal heat supply sector. These improvements will result from a four-part approach: 1) capacity building to create the basis for systematic energy efficiency activities at the local level; 2) an integrated approach of supply and demand-side improvements to achieve maximum fuel savings and emissions reduction; 3) attraction of external investment resources for an energy efficiency program in a pilot city; 4) project-specific replication measures including development of relevant procedures, guidelines, information materials and their dissemination, and public awareness-raising through the involvement of NGO's, in particular those concerned with environmental and energy efficiency problems.
7. The city of Rivne was selected as the pilot city for project implementation. This decision was made by the Project Steering Committee (PSC) at the end of March 2000 based on a competitive procedure whereby applications from candidate cities were evaluated against the following criteria:
 - the funding available in municipal budgets for financing energy efficiency measures - to provide for expected contribution to project preparation and implementation, which was an obligatory condition as the project was prepared and has to be implemented under joint financing by the GEF, SCEC and local counterparts;
 - the financial state of the district heating company and the local budget - to provide for the possibility of attracting external investors' funding to finance project implementation;
 - the availability of a municipal energy saving program or developed investment projects;
 - the representative nature of the heat supply system (in technical, institutional and other aspects) - to ensure that project results could be justified and approaches replicated in other Ukrainian cities.
8. There was an additional important argument in favor of the city of Rivne: Ukraine is going to receive a large financial aid from the European Union and the European Bank for Reconstruction and Development (EBRD) to complete the construction of Rivne nuclear power plant under the Chernobyl nuclear power plant shutdown program. Putting the Rivne power plant into operation will provide additional revenues to local budget and further improve its financial state, which will increase the confidence of potential investors in the viability of suggested project.

PROJECT OBJECTIVES AND APPROACH

9. The project objective is to reduce overall fossil fuel consumption and associated GHG emissions by removing barriers to supply and demand side energy efficiency improvements in district heating systems in the main cities of Ukraine. GEF participation will reduce major existing barriers in one pilot city and provide for the replication of defined approaches and measures in other main cities of Ukraine.
10. The projected average annual reduction of GHG emissions in the pilot city is about 131,000 tons of CO₂ equivalent (including CO₂ itself, CH₄ and N₂O), and almost 2 million tons of CO₂ equivalent over the project life cycle. Estimated total replication potential for communal heat supply sector in other cities makes up about 64 million tons of CO₂ equivalent.

11. This global environmental objective is to be achieved through the removal of the following main existing barriers to energy efficiency improvement: 1) difficulties in arranging financing for efficiency projects; 2) institutional constraints; 3) lack of capacity and experience in preparing, implementing and managing energy efficiency projects; 4) high transaction costs for relatively small energy efficiency projects; 5) lack of information about existing opportunities for energy efficiency.
12. This project will involve two key components: (i) setting up an innovative financial mechanism in the pilot city for implementing energy efficiency activities on a sustainable basis with the capability for self-replication in other Ukrainian cities; and (ii) related capacity building and barrier removal activities including installation and commissioning of energy efficiency measures, shifting to consumption-based billing system, and introduction of regulatory changes to motivate energy saving, including adjustment of subsidies allocation system.
13. The privately-run ESCO is intended to conduct energy efficiency activities at the municipal and regional level. It presents an innovative and very promising mechanism to finance large-scale energy efficiency activities in Ukraine. This approach fits well with the component of the GEF mission requiring the organization to develop strategies and projects whose designs may be more innovative or experimental than those of traditional development projects. In order to maximize the resources available for replicating the project, proportional returns on GEF funds for the pilot phase of the project and the city-wide investment will be placed back into the ESCO as equity for subsequent projects in the municipal sector in Ukraine undertaken by the ESCO as long as resources remain over the course of the project period.

13.a The project team selected this approach after considering a number of options. Extensive consultations with stakeholders resulted in the conclusion that an energy efficiency program in the city of Rivne (and in other cities like it) could not be financed by a direct loan granted to the city by a Western commercial bank. Not only would there be a long and cumbersome application procedure, but certain banks (such as the EBRD) would require a sovereign guarantee, which would not be granted by the Government of Ukraine. While an ESCO was seen to address several major issues, a public ESCO business would encounter the same types of delays as UkrEsco (see “Lesson Learned section below), so the team focused on private sector alternatives. It found that EBRD was already working on a similar scheme to promote municipal ESCOs in Central and Eastern Europe. In addition, Ukraine was also scheduled to become the focus of a TACIS program to support public-private partnerships in municipal investment projects, the Municipal Infrastructure Investment Support Programme (MISP).

13.b The ESCO approach also complements existing strategies of major investors. For example, the EBRD has expressed that the project is in line with its current strategy, and it has expressed interest in the project during meetings throughout 2000 in the Ukraine Country Office and in January 2001 at its headquarters in London. Furthermore, the project team has met with several other private investors (representing both energy companies and investment funds) who have also expressed interest in an equity position in the Rivne ESCO.

PROJECT DESCRIPTION

14. The project consists of four components described below: 1) establishing an energy service company (ESCO) as a mechanism for financing energy efficiency activities in the city of Rivne; 2) phased implementation of a municipal energy saving program, including a pilot project on a typical segment of the municipal district heating system and its users; 3) project replication measures; and 4) monitoring and evaluation.

Activity 1. Setting up of an ESCO in the city of Rivne.

Description:

15. The ESCO in the city of Rivne is suggested as a joint-stock company with majority participation of a private (western) investor having relevant experience, and minority shares of local authorities (municipality and regional government), the district heating company, and EBRD. Proceeding from the estimated size of municipal energy saving program [1], the equity base of the ESCO should be about \$4 million; the following share capital structure is suggested: private investor - \$2.4 million (60%), district heating company - \$0.4 million (10%), municipality - \$0.4 million (10%), regional government - \$0.4 million (10%), EBRD - \$0.4 million (10%).
16. For implementation of the municipal energy saving program, the ESCO under its own guarantees will involve debt financing with the following planned structure: EBRD - \$6.6 million, western banks - \$4.8 million, Ukrainian banks - \$2.1 million. Local contribution to investment program (in addition to participation in the ESCO equity) will be \$2.5 million, with \$1.2 million provided by the municipality and \$1.3 million - by the district heating company. Before the project document is completed, there will be agreements in place for cofinancing by the municipality, private investors and/or the EBRD. Also, any GEF guarantee facility proposed will be fully specified, including conditions and contingencies.
17. The ESCO will perform energy audits and install energy efficiency measures at district heating company facilities (boiler plants, transmission/distribution networks, substations) and buildings (first of all, public and residential). The ESCO activities may be expanded to include district heating systems in smaller cities in the Rivne region, as well as other energy efficiency projects in the region. The ESCO will operate on a commercial basis under energy performance contracts (EPC) with its clients (district heating companies and building owners).

Barriers:

18. The establishment of an ESCO in Rivne will mitigate several important barriers currently hindering the improvement of supply and demand side energy efficiency in the district heating system: 1) lack of substantial internal funding and difficult access to attractive external financing for up-front investment costs; 2) institutional constraints, that is, undeveloped or absent organizational structures that would specialize in energy efficiency activities; 3) insufficient knowledge and information about energy efficiency opportunities and lack of experience in preparation and implementation of energy efficiency projects; 4) high transaction costs for large number of relatively low-cost energy efficiency projects and measures; 5) large number of building owners (four different budgets in public sector and dissociation of the majority of residential housing owners), which increases both transaction costs and difficulties in arranging financing; 6) current housing allowance system without a cap on subsidized consumption, which reduces incentives to energy saving by subsidized households.

Rationale:

19. An ESCO presents the most efficient way to provide for systematic energy efficiency activities in the city. This is because an ESCO is oriented for operation with numerous clients of various types, possesses necessary expertise for projects preparation and implementation, is quick and flexible in making decisions about financing the projects and is intrinsically interested in multiplying energy efficiency activities through expansion of its customer base. An ESCO suggests win-win solutions for its clients by using EPC mechanisms. An ESCO reduces transaction costs and can tackle a large number of similar and relatively small-scale projects that could not be financed separately using traditional approach. So the ESCO approach facilitates the access to external financial sources for the owners of smaller projects. EPCs offer the ESCO clients attractive long-term financing otherwise almost inaccessible in current Ukraine. Further, experience with international joint ventures shows that foreign investors look at the strength of the local partner as a primary criteria for investment decisions.
20. The Rivne municipality, Rivne District Heating Company, and the regional administration strongly support the idea of establishing the ESCO to expand energy efficiency activities in the city. The reasons for this are: large budgetary expenditures on the energy bills of institutional buildings and on residential subsidies, high energy intensity of delivered heat, resulting in high heat tariffs etc. It should be noted that compared to other Ukrainian cities, Rivne has made significant progress in reforming its municipal energy sector. Cross-subsidies in heat energy tariffs for different consumer categories have been eliminated, direct billing of all district heating system customers has been introduced, the payment collection rate has increased to the point where it is now one of the highest in Ukraine, and energy saving has been identified as a priority both by the municipality and by the district heating company. Local authorities are willing to go further in reforming energy sector when establishing the ESCO in order to increase the confidence of private investors. For example, they will guarantee full payments in cash on heat bills of budgetary institutions, make full payments of existing residential subsidies to the heat supplier, and fix the level of tariffs for the investment amortization period.
21. Suggested ESCO scheme is presented in Annex 1. Majority shareholding by private investors will guarantee that the ESCO operation is free from political considerations and will pursue its commercial goals leading to improvement of energy efficiency in the city. This would provide sufficient confidence to attract debt financing from development and commercial banks. Participation of the municipality and district heating company will ensure the necessary market for the ESCO in the city, and participation of the regional government will provide for further expansion of the ESCO activity in the region.
22. It should be emphasized that this financial mechanism is very innovative for Ukraine and the CIS countries in general. The major challenge will be to attract private investors who have not previously been supportive of Ukrainian projects before. However, taking into account improving financial situation in Rivne, firm stand of the municipality and commitments it is ready to make, it can be realistically expected that investors will come. Incentives for investors include attractive rates of return, market penetration and expansion, lack of significant competition at this moment, and risk mitigation measures proposed by the project. In this respect, GEF involvement is particularly important as it will help to reduce the risks and leverage significant private financing for the project.

23. The initial GEF contribution will promote private initiative and facilitate the establishment of an ESCO in the pilot city. After that, the ESCO will operate on a sustainable basis as a self-financing commercial entity. Being commercially viable, this scheme can be easily and quickly replicated in other Ukrainian cities, thus ensuring achievement of global environmental objectives set by the project.

Activities:

24. *a) Preparing and distributing to possible investors/financiers project description materials and requests for participation.* External investors that will be contacted for possible participation in the ESCO equity include: investment funds (REEF, FINNFUND, DEXIA-FONDELEC, COGEN, AIG), companies with proven experience in ESCO business (Honeywell, Siemens etc.), banks (EBRD, NIB (NEFCO fund), IFC). Local participants are as follows: Rivne District Heating Company, the municipality, the regional government, and Ukrainian banks.
25. *b) Developing and formulating necessary commitments to be made by the local stakeholders for attracting the investors.* Measures to be taken at municipality/district heating company or regional level will be elaborated in detail and formulated as commitments of local project stakeholders. These measures will include guarantees of full payments in cash on heat bills of budgetary institutions, full payments of existing residential subsidies to heat supplier, fixing the level tariffs for the investment amortization period, modification of existing housing allowance system to provide incentives for saving energy in subsidized households, further measures to improve the payment collection rate, etc.
26. *c) Developing necessary project documents and providing relevant inputs for loan/equity approval process to EBRD and other banks/ equity investors.* The pre-feasibility study developed during the PDF Block B phase will be finalized and updated according to specific requirements of investors. Necessary materials for initial and final review of the project by the EBRD and other banks will be prepared and submitted.
27. *d) Preparing supporting materials for ESCO operation.* A model energy performance contract will be drafted in accordance with Ukrainian legislation. The model energy performance contract and the subsequent city-wide contract will be structured so that returns from the projects are proportional to the involvement of GEF investments and equity contributions are recovered for use as equity in future municipal efficiency projects. Also, necessary legal and fiscal issues regarding ESCO operation in the country will be elaborated (options for repayment guarantees, currency exchange and transfer procedures, arbitration of disputes etc.). GEF support in developing these materials will reduce initial costs for potential external investors and therefore increase their willingness to participate. Besides, in this case these materials will not be a private property of the investors and can be freely distributed, which will facilitate project replication in other cities. The ESCO documents will also address the contingent nature of the GEF funds to be used for energy-saving investment projects and mechanisms to recover these funds for subsequent municipal efficiency projects for use over the course of the project period.

28. *e) Conducting negotiations and selecting investors/financiers.* This will include initial negotiations to select a shortlist of possible investors/financiers, analysis of submitted business plans and final selection of participants. For preparing and conducting negotiations, assistance of western financial consultants will be involved. As an output, agreement in principle on the structure of ESCO equity and debt financing will be concluded.
29. *f) Developing founding documents and registering the company.* Necessary legal documentation (company's charter and foundation agreement) will be prepared and signed.

Timing: Months 1 – 9 (February 2001 to November 2001)

Costs: \$740,000 (GEF contribution \$640,000)

Activity 2. Phased implementation of municipal energy saving program with pilot project on a typical fragment of Rivne city district heating system and its users.

Description:

30. Full-scale implementation of the project will be preceded by a pilot (demonstration) phase. Physical size of the demonstration fragment was determined in the pre-feasibility study during PDF Block B phase [1]. Organizationally, the pilot phase will include shifting to consumption-based billing in all demonstration buildings to provide incentives for end users to regulate their heat consumption. The pilot project will also involve capacity building and policy related activities will be conducted to facilitate the shift to consumption-based billing system, and introduce regulatory changes to motivate energy saving.
31. Implementation of measures to improve energy efficiency in boiler plants, heat transportation system (pipelines and substations) and buildings (first of all, public and residential). Suggested measures include [1]:
- for boiler plants - replacement and retrofitting of boilers, installation of meters and controls, improvement of water treatment, installation of variable speed drives on fans, ventilators and pumps, installation of automated dispatch system etc.;
 - for heat transportation system - upgrading of local heat substations; partial decentralization of hot water supply, replacement of transmission and distribution pipes with pre-insulated ones;
 - for buildings - installation of heat consumption meters and controls, apartment-level hot water metering, insulation of pipes, installation of radiator reflectors etc.

Annex 4 contains a summary list of measures and their estimated economic benefits.

32. The project team will also conduct capacity development activities in order to facilitate the shift to consumption-based billing systems, introduction of regulatory changes to motivate energy saving, adjustment of subsidy allocations, and other regulatory changes. The project experts will accomplish this through a series of training sessions, individual outreach to decision-makers, focused consultations, and collection and adaptation of policies that have worked successfully in other cities in Ukraine and in other NIS countries. A complete capacity development plan for the municipality will be included in the project document as a part of the project's information dissemination strategy, and the plan will be designed so that its components can be utilized in other municipalities.

33. The cost of the entire municipal program is estimated at approximately \$24 million. It will be financed using ESCO's equity resources (\$4 million provided by private investor, district heating company, municipality, regional administration and EBRD as described in the previous section), GEF funding (\$4 million), debt financing (EBRD - \$6.6 million, Western banks - \$4.8 million, Ukrainian banks - \$2.1 million), and a local financial contribution in addition to the ESCO equity (municipality - \$1.2 million, district heating company - \$1.3 million).

Barriers:

34. The major barrier to implementing large-scale energy efficiency improvements in Ukrainian heat supply sector is insufficient internal funding and difficulties in accessing external financial sources, particularly private sector resources. The investment environment in Ukraine has been considered as too risky by most private investors. The situation has recently improved noticeably at the local level, where much depends on local initiative. However, substantial growth in foreign direct investment has been hindered by the absence of visible examples of commercially viable mechanisms operating in the energy efficiency area. Long-term contracts of 6-7 years are usually needed for efficiency improvement activities, and they are therefore more difficult to arrange with potential investors.

Rationale:

35. A significant environmental impact in terms of GHG emissions reduction can be achieved only as the result of large-scale energy efficiency activities that require substantial external financial resources, including private sector resources. The Rivne municipality is already doing a great deal to attract external investors and is willing to take further necessary commitments reducing the risks under suggested municipal energy efficiency program. The support of GEF will both foster these commitments as a necessary pre-requisite and reduce private investors' risks associated with longer-term energy efficiency investments.
36. GEF support will cover majority of costs at the pilot implementation phase. Objectives of this phase are: 1) streamline technical aspects of concurrent supply and demand side efficiency improvements, verify cost performance of efficiency measures and thus reduce implementation risk of the program; 2) test and refine the energy performance contract mechanism and other ESCO procedures; 3) show fulfillment of commitments by project participants; 4) verify management and implementation capabilities; 5) identify important issues that should be included into the planning of full-scale implementation. Funding for the activities related to the pilot project is meant to demonstrate energy performance contracting (EPC). Indeed, recent research commissioned by the GEF Secretariat has indicated that a lack of experience with EPC can create problems for ESCOs. The pilot project is, in effect, a piloting of a contractual mechanism and this could not be tested without the procurements conducted under that activity.
37. The private investor running the ESCO will be selected based on its high level of expertise in the field of energy efficiency, which will enable it to assume most technical and implementation risks associated with the program. The investor will also provide necessary guarantees to attract debt financing. So, GEF participation will increase the confidence of investors/financiers and will help leverage very significant financing for a large-scale municipal energy efficiency program.

Activities:

38. I. Pilot implementation phase.

- a) performing energy audits and concluding EPCs with clients;
- b) procurement of equipment, materials and services;
- c) installation and commissioning of energy efficiency measures;
- d) development of necessary billing software and shift to consumption-based billing system;
- e) introduction of regulatory changes to motivate energy saving, including adjustment of subsidies allocation system;
- f) supervision of fulfillment of participants' commitments, ESCO operation, repayments etc.

39. II. Full-scale implementation.

Program implementation is conducted by the ESCO using EPC mechanism on commercial and self-sustainable basis.

Timing: Months 10 – 70 (November 2001 to December 2006, investment period), including pilot (demonstration) project from Month 10 – 22 (November 2001 to December 2002).

Costs: \$24,000,000 (GEF contribution 4,000,000), including \$1,100,000 pilot project (GEF contribution 900,000).

Activity 3. Project replication measures.

Description:

40. Measures to ensure project replication will be implemented under the supervision of the SCEC and PSC. Replication measures will be conducted in several directions: informational, methodological, educational. Materials prepared for setting up of the Rivne ESCO (model EPC, analysis of legal and fiscal issues, necessary local commitments to attract investors etc.) will be freely circulated and provided to other municipalities willing to replicate the project. Project replication activities will be conducted with participation of the SCEC, Association of Ukrainian Cities (AUC), leading Ukrainian NGOs dealing with energy efficiency and environmental problems.

Barriers:

41. The following essential barriers prevent wide-scale expansion of even commercially viable energy efficiency activities: 1) lack of information about efficiency improvement opportunities and difficulties in obtaining competent consultations; 2) lack (and in regard to foreign investors' involvement, practically non-existent) experience in establishing ESCOs and their commercial operation based on environmental performance contracting; 3) insufficient experience in preparing bankable projects in accordance with the necessary standards; and 4) lack of public awareness about the environmental problems associated with fossil fuel combustion.

Rationale:

42. Replication measures will remove the indicated barriers by means of preparing and widely disseminating relevant informational, methodological, technical materials and providing incentives to energy efficiency activities. The following effect is to be achieved: better awareness of officials and population about energy and environmental issues, formation of favorable public opinion,

facilitation of access to informational and methodological materials, promotion of the ESCO-approach to efficiency activities and facilitation of its setting up process.

Activities:

43. a) Compiling the results and analysis of work to date conducted in the EE/NIS region on district heating financing and producing a report on its relevance to Ukraine for release in Ukrainian and English for key target audiences.
- b) Disseminating information about the Rivne city project (organization of interaction with TACIS program in Ukraine; creation of a web site for the project; publicizing project on TV, in newspapers, magazines and newsletters; conducting awareness raising campaigns, seminars and workshops together with the SCEC, AUC, environmental and other NGOs etc.);
- c) Making the materials prepared for setting up of the Rivne ESCO widely accessible (including the model ESCO charter and foundation agreement, the model energy performance contract, the analysis of legal and fiscal issues, the local commitments necessary to attract investors, etc.);
- d) Conducting targeted training, individual outreach to decision-makers, focused consultations, and collection and adaptation of relevant policy templates by the information specialist in order to disseminate experiences with consumption-based billing and other policy reform issues; and,
- e) Providing consultations to municipalities and district heating companies regarding technical solutions, energy saving and emissions reduction potential for supply and demand side energy efficiency improvements in district heating system, preparation of bankable projects, and the ESCO approach to financing energy-saving projects.

Timing: Months 5 – 70 (December 2001 to December 2003)

Costs: \$312,000 (GEF contribution 292,000)

Note: This activity will be phased. \$30,000 will be utilized for activity a) in the first phase of GEF Support and the remainder of the funds will be utilized in the second phase for activities b) – d).

Activity 4. Monitoring and evaluation.

Description:

44. Monitoring and evaluation activities will include standard UNDP/GEF procedures (Annual Project Report, Tripartite Review, Project Implementation Review, Mid-term and Final evaluations, Terminal Report and Audit) and specific procedures that include regular Project Steering Committee meetings and preparation of technical report on pilot phase (demonstration project) results. The technical report will present actual achieved energy savings and emissions reduction figures determined using the International Performance Measurement and Verification Protocol developed by the U.S. Department of Energy for energy efficiency projects. Feedback collected from project stakeholders will be included into progress reports (submitted to the UNDP Country Office and PSC) together with indicators reflecting the overall performance of the project and each of its components. Overall responsibility for monitoring and evaluation tasks will be assumed by the national executing agency (SCEC) assisted by the national implementing agency (Arena-ECO).

Rationale:

45. Monitoring and evaluation is particularly important for GEF projects because in accordance with its mission the GEF designs and implements more innovative and experimental projects than regular development projects. Monitoring, by continuous collection and analysis of relevant information, allows for the measurement of the progress of the project towards expected results. Monitoring and systematic reporting is mandatory for all GEF projects. The proposed monitoring and evaluation activities follow the guidelines contained in the UNDP/GEF Information Kit on Monitoring and Evaluation.

Activities:

46. a) Fulfillment of the standard UNDP/GEF procedures during the project cycle;
b) Measurement and verification of energy savings and emissions reduction on pilot project;
c) Monitoring to track the achievement of expected results during setting up of the ESCO, arrangement of financing, operation of the ESCO;
d) Monitoring for progress in full-scale implementation of the municipal energy efficiency program;
e) Collection of regular feedback from project stakeholders and all interested parties through workshops, meetings, and questionnaires;
f) Preparation and submission of regular progress reports;
g) Supervision of project progress through regular meetings of the PSC.

Timing: Months 5 – 70 (June 2001 to December 2006)

Costs: \$600,000 (GEF contribution \$550,000)

RATIONALE FOR GEF FINANCING

47. Ukraine signed the UNFCCC in June 1992, ratified it on October 29, 1996, and became a Party in August 1997. As a Party to the Convention, Ukraine has accepted a commitment to formulate, implement, publish and regularly update national and (where appropriate) regional programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not covered by the Montreal Protocol. The Government of Ukraine also signed the Kyoto Protocol in March 1999. The proposed activity is a part of the Government's strategy to fulfill its commitments to the UNFCCC while simultaneously addressing local problems related to the inefficient use of fossil fuel.
48. As an economy in transition, and in accordance with its commitments to the UNFCCC, the Government of Ukraine has requested support from UNDP/GEF to overcome barriers to the measures reducing GHG emissions, such as improvement of energy efficiency and promotion of the use of renewable energy technologies. Further consultations with the Government of Ukraine identified the removal of barriers to the improvement of demand and supply side energy efficiency in district heating systems as a priority area for GEF financing.
49. Operationally the project falls under the GEF Operational Program # 5, "Removing Barriers to Energy Efficiency and Energy Conservation".

50. GEF participation accounts for 21% in the total project cost and would ensure financial leverage at the ratio of about 1:4.

LESSONS LEARNED AND TECHNICAL REVIEW

51. There have been two recent activities in district heating and/or energy efficiency involving international financial institutions: an EBRD loan and a World Bank loan. In 1998, the EBRD provided a sovereign loan of \$30 million to establish the first Ukrainian ESCO, UkrEsco. UkrEsco is state-owned, and it has also involved the participation of Bechtel and Econoler. Its mandate is to identify and implement energy-saving investments in small and medium-size enterprises and public sector institutions.
52. The proposed municipal ESCO approach complements this effort. For example, research during project preparation indicated that the state-owned ESCO could provide useful lessons, but that its minimum size requirements would be too large for the municipal district heating systems targeted by this project. For this reason, a municipal ESCO was proposed as having a more appropriate scale for the target cities. The ESCO approach also fits well with EBRD activities in Central and East European countries, where 16 ESCOs have been established since 1994, when the Energy Efficiency Team was created in the Bank. The project structure suggested in this GEF brief was developed with the input of Mr. Bernard Jamet, the former director of the EBRD Energy Efficiency Team, and the structure is supported by the EBRD Country Office in Ukraine.
- 52.a The project team was able to learn several other important lessons from the establishment of UkrEsco. First, UkrEsco's start-up was delayed significantly due to the need to obtain a sovereign guarantee. This project is structured so that a sovereign guarantee is not necessary. Second, despite initial delays, UkrEsco has an active portfolio, which indicates that ESCOs can indeed operate in the Ukrainian market. In fact, there are currently plans to privatize UkrEsco.
- 52.b Furthermore, the project will leverage know-how from the UkrEsco. The project will adapt the legal documentation prepared by the UkrEsco project team, including performance contracts. The State Committee for Energy Conservation, the executing agency for the proposed GEF project, was a direct beneficiary of the support provided by EBRD and TACIS in establishing UkrEsco, and they will ensure that all of the project documentation that was provided to them will be shared with the GEF project team. While the legal documentation will not be identical for the two ESCOs (UkrEsco was a state-owned entity with private clients), this existing experience with contracting and documentation will reduce start-up time. The role of the State Committee in the GEF project will also ensure that there is no duplication of effort.
- 52.c UkrEsco also provided interesting data on performance contracting in Ukraine. UkrEsco does not use straight performance contracting, but rather a shorter investment amortization period than that determined by the energy savings themselves. Therefore, UkrEsco client repayments are generated both from energy savings and from other sources of financing. The project team intends to use straight performance contracting with the Rivne ESCO model, but would also be able to develop this type of alternative if necessary.

52.d It is important to note that UkrEsco is not, and could not be, a competitor to the Rivne ESCO. UkrEsco targets privatized industries, while the Rivne ESCO will target municipalities and municipal district heating companies. These are large, and entirely separate, markets. It is also important to note that much has changed in the last three years in terms of the investment environment (viz. the planned privatization of UkrEsco). UkrEsco has signed 8 contracts to date (for a total of \$2.1 million) and plans to sign 24 additional (for more than \$14 million) in 2001.

53. In January 2000, the World Bank approved an \$18.3 million loan to the government of Ukraine for the Kyiv Public Buildings Energy Efficiency Project. The project, which is designed to support the government's comprehensive State Energy Conservation Program, will involve targeted investments in the following areas: energy efficiency measures in institutional buildings, technical audits and training, consulting services for project management and a public awareness campaign, and financial audits. The Kyiv Municipality serves as the implementing agency for this project.

54. The proposed project will complement this effort, because it will provide financing for other Ukrainian cities without the need for obtaining a sovereign guarantee (which requires an act of the Ukrainian Parliament). The project team will also be able to leverage some of the lessons and training materials to emerge from the loan-related activities. The project team is in contact with the World Bank staff in Ukraine, and the project will observe the progress of the loan and findings that may be relevant to the GEF project.

54.a The proposed project also studied the work of several private ESCOs that have emerged in Ukraine. The project team concluded that these ESCOs are an indication that there is indeed a healthy market for ESCOs in the country. However, it also found that these ESCOs lacked the necessary access to capital to undertake large-scale retrofits – the market for the proposed Rivne ESCO.

55. The project team used its experience with other projects and studies on demand and supply-side energy efficiency in district heating systems extensively during the preparation of the pre-feasibility study under the PDF Block B. The technical solutions proposed in the project for improving energy efficiency in heat generation, transportation and consumption are reliable and well proven. Based on existing experience, most problems are associated with non-technical barriers, primarily a financial and institutional lack of capacity. The project has undergone an independent technical review by the Finnish company Electrowatt-Ekono (formerly Econo Energy), which has significant experience with district heating efficiency projects in Central Europe and CIS countries, including projects prepared for financing by international financial institutions and the GEF. In addition, the proposed implementing agency is well acquainted with the State Energy Conservation Program and has conducted work in support of this strategy.

SUSTAINABILITY AND PARTICIPATION

56. Sustainability of the project is ensured by the fact that suggested ESCO-approach is commercially viable and capable of supporting itself after the GEF involvement is terminated. Initial GEF contribution is aimed at capacity building through setting up of the pilot city ESCO by facilitating involvement of private investors crucial for the project. This is also helped by clearly stated

commitments of local project stakeholders – the municipality, the district heating company, and the regional government, which would improve local investment environment by necessary regulatory and policy measures.

57. The commercial viability of the ESCO-approach is also a basis for further project replication. To promote this process, specific measures for information dissemination and methodological support are envisioned. Project replication activities will be coordinated by the SCEC (national executing agency for the project) and will be conducted with participation of prominent NGOs concerned with environmental and energy efficiency problems. As the project targets primarily municipal-level energy efficiency improvements, considerable role in disseminating the project information and materials belong to the AUC already participating in the project as a member of its steering committee.

PROJECT FINANCING AND BUDGET

58. The indicative total cost of the project is US\$ 25,709,400, which includes \$189,400 already provided by the GEF in the form of PDFB funds. The project will finance the following four components: the establishment of the Rivne ESCO, implementation of a municipal energy efficiency investment program, conduct of project replication activities, and implementation of monitoring and evaluation (M&E) activities. The distribution of the project cost among the four components and financing sources is shown in Annex 2.
59. The major part of the project cost (\$24,000,000) is accounted for by the municipal energy efficiency investment program, implementation of which requires setting up of the ESCO with the equity base of at least \$4,000,000. Main contributor to the ESCO's equity will be a private investor (\$2,400,000 or 60% of shares). The rest of the equity capital would be distributed equally between the municipality, the district heating company, the regional government, and the EBRD (0.4 million or 10% each). In addition to equity contribution, funding for implementation of the energy efficiency program will be provided by debt financing from the EBRD, western and local banks (\$6,600,000, \$4,800,000 and \$2,100,000 respectively). The rest of investment program costs will be financed by the municipality (\$1,200,000) and district heating company (\$1,300,000) through financing of works executed by the ESCO under energy performance contracts over a 5-year investment period. The GEF funding (\$4,000,000) under the investment program will finance the major part of pilot implementation phase, and also the implementation of longer-payback measures, less economically attractive and more risky to private investor.
60. The GEF will serve as the main contributor to the implementation of the rest of the project components. GEF will provide \$640,000 out of the total \$740,000 for setting up the ESCO, \$160,000 out of the total \$180,000 for replication measures and \$550,000 out of the total \$600,000 for monitoring and evaluation. The rest of the required funding will be provided by the municipality and the district heating company (\$50,000 each), and the SCEC (\$20,000 for replication measures). Foreign investors/financiers will cover their own costs during the process of setting up the ESCO (estimated as \$30,000 and \$20,000 respectively). Thus, the total GEF expenditure for these activities will make up \$1,350,000. Taking into account GEF funding under investment program, its total contribution will amount to \$5,350,000.

ISSUES, ACTIONS AND RISKS

61. The following are the main risks and mitigation measures for investors/financiers supporting setting up of the ESCO and implementation of the energy efficiency investment program.
62. *Technical risk*, or the risk of actual energy savings being lower than expected. It is mitigated by the high level of expertise and conservative approach used in prepared technical estimates, as well as by independent technical review of the pre-feasibility study estimates. Besides, the private investor of the ESCO will be selected to have substantial experience in energy efficiency, which will reduce technical risks to acceptable level.
63. *Implementation risk*, or the risk that the project will not be fully implemented even though necessary resources will have been engaged. This may happen if implementation costs will prove to be higher than expected. This risk is mitigated by accurate cost estimates based on the latest quotations from suppliers and by 10% contingency added to cost estimates in the pre-feasibility study. ESCO's own experience is also a significant risk mitigation factor. Besides, pilot (demonstration) phase will further reduce this risk by verifying the estimates and allowing necessary adjustment of the full-scale program.
64. *Credit risk* is connected with the client's ability or willingness to meet its obligations on EPCs. To mitigate this risk, ESCO can introduce sufficient securities into each EPC. As a risk mitigation factor, municipal/regional authorities will make necessary commitments, such as keeping tariffs unchanged during investment amortization period, ensuring full and timely payments on heat bills of budgetary institutions and subsidies for residential consumers etc.
65. *Price risk*, or changes in prices for energy resources addressed by the project. This risk is mitigated by the fact that the dynamics of gas and heat prices over the project period was estimated in a conservative way. Based on its experience, the ESCO will introduce appropriate provisions into EPCs with its clients to eliminate this factor of uncertainty.
66. *Commercial risk* is connected with the overall legal situation in the country and possible disputes with clients in the course of ESCO operation. This risk is mitigated by the work to be performed during the process of setting up the ESCO when the model EPCs complying with Ukrainian situation will be developed, legal and fiscal issues will be addressed to elaborate the options for repayment guarantees, currency exchange and transfer procedures, arbitration of disputes etc.
67. *Currency exchange risk* is associated with the purchasing power of the loans denominated in a foreign currency, and hard-currency value of repayments collected in a local currency. To mitigate this risk, the ESCO will likely start with shorter-payback EPCs; may try to stipulate hard currency repayments in EPCs (which is difficult) or introduce additional margin into the cost of its services.
68. *Political risk* is connected with political changes at the state or municipal level that may adversely impact operational environment for the ESCO. For possible investors/financiers this risk will be substantially mitigated by the EBRD's participation in the project because of the political influence of the EBRD as a multi-lateral development bank.

69. From the GEF viewpoint, the above-listed risks to investors/financiers are also the risks for the project as a whole, and the mitigation measures for GEF will be those that satisfy investors/financiers. However, there are also specific risks for GEF support of the project:
70. *Financial risk*, connected with the possibility that targeted participation of investors/financiers in the ESCO and investment program may not be realized to the planned extent, which would mean lower returns for GEF funding in terms of GHG emissions reductions. This risk can be mitigated through staged and conditioned grant allocation providing that the following phases are implemented as expected: preparatory work on setting up the ESCO, signing of the ESCO's founding and debt financing documents, pilot implementation. The grant may also be conditioned on obligatory participation of municipality and district heating company in project financing and fulfillment of investment risks mitigation commitments by local stakeholders. There is also a possibility of using GEF guarantee facility for partial investment risk guarantee to provide additional securities for international financial institutions and/or commercial banks loans.
- 70.a It is understood that some of the project phases will occur sequentially (e.g., the ESCO will be designed, established, and capitalized before the pilot implementation project begins) whereas the work on the billing and policy changes will be conducted simultaneously with the pilot implementation project. The specific sequence and criteria for proceeding on to the implementation project will be specified in detail in the project document (e.g., expected time needed to establish the ESCO). However, it is currently estimated that 12-18 months will be needed to establish the ESCO, which will occur when the company has been established on a legal basis (within 6 months), has hired core staff (within 6 months), and has attracted sufficient participation by investors contributing equity and/or debt in order to proceed with the second phase of the project. Sufficient participation will be defined in the business plan of the ESCO, which will be drafted by core staff upon its establishment. It is anticipated that this participation would include 2-3 major investors in addition to the municipality and the municipal district heating company, that these investors would be committed by Month 18 of the project's operations, and that the ratio of external funds to GEF funds would be at least 3:1.
71. *Institutional risk*, arising from the fact that the project is dealing with a subject area in which broad consultations and involvement of all the relevant stakeholders are of crucial importance to make the project a success. These include key government ministries, local authorities, heat supplier etc, whose positions and expectations have to be taken into account during project implementation. The project has addressed this risk by establishing the PSC, thereby seeking to facilitate active cooperation and coordination between the key stakeholders of the project.

INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

72. The project will be executed by the SCEC with coordination and the oversight by the PSC and UNDP (GEF Implementing Agency for the project). The PSC includes representatives from:
- State Committee for Energy Conservation;
 - United Nations Development Program;
 - Ministry of Ecology and Natural Resources (Minecology);
 - Rivne Municipality;
 - Rivne District Heating Company;

- Agency for Rational Energy Use and Ecology.

73. The national implementing agency is the Agency for Rational Energy Use and Ecology (ARENA-ECO) that will implement the project in close consultation and coordination with the PSC, UNDP Country Office, SCEC, Minecology, and local project stakeholders - Rivne Municipality, the district heating company, and regional government. For coordination of local activities and ongoing support, GEF project group will be created by Rivne municipality with participation of the district heating company.
74. The fundamental project activity – the establishment of the Rivne ESCO -- will be managed by the implementing agency assisted by local GEF project group. Implementation plan includes as its key milestones distributing the project memorandum and a call for participation to possible investors/financiers in early February 2001, selecting a shortlist of applicants in April, and preparing ESCO supporting materials by July, followed by agreement in principle on the ESCO equity structure. By the end of November, ESCO legal documentation should be prepared and signed by equity investors. Work on arrangement of debt financing from the EBRD and other banks will proceed in parallel, with the following tentative milestones: February 2001 - initial review, May - final review, June - board approval, November - signing.
75. After the Rivne ESCO is established, it will start the pilot implementation phase and, operating on commercial basis, will manage both the pilot and full-scale implementation of the energy saving program. Decisions about its own investments and debt resources will be taken by the ESCO independently, whereas the use of grant funding and local financial contribution will be coordinated with the executing agency, UNDP, and local project stakeholders.
76. Project replication and monitoring and evaluation activities will be managed by the national implementing agency under the supervision of the national executing agency and in coordination with the PSC, UNDP Country Office, Minecology, AUC, and other project participants. Monitoring and evaluation will be performed during the whole project period as presented in project description and will follow the guidance provided by the UNDP/GEF Information Kit on Monitoring and Evaluation.

REFERENCES

77. UNDP-GEF-SCEC: Removing Barriers to Greenhouse Gas Emissions Mitigation through Energy Efficiency in District Heating System. Pre-feasibility study for the investment program: Integrated Supply and Demand Side Improvement of the District Heating System in the City of Rivne. Second Draft, October 2000. Prepared by the Agency for Rational Energy Use and Ecology. Kiev, 2000.

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GUIDE TO ANNEXES:

ANNEX 1. RIVNE ESCO FINANCING STRUCTURE

ANNEX 2. PROJECT COST AND FINANCING

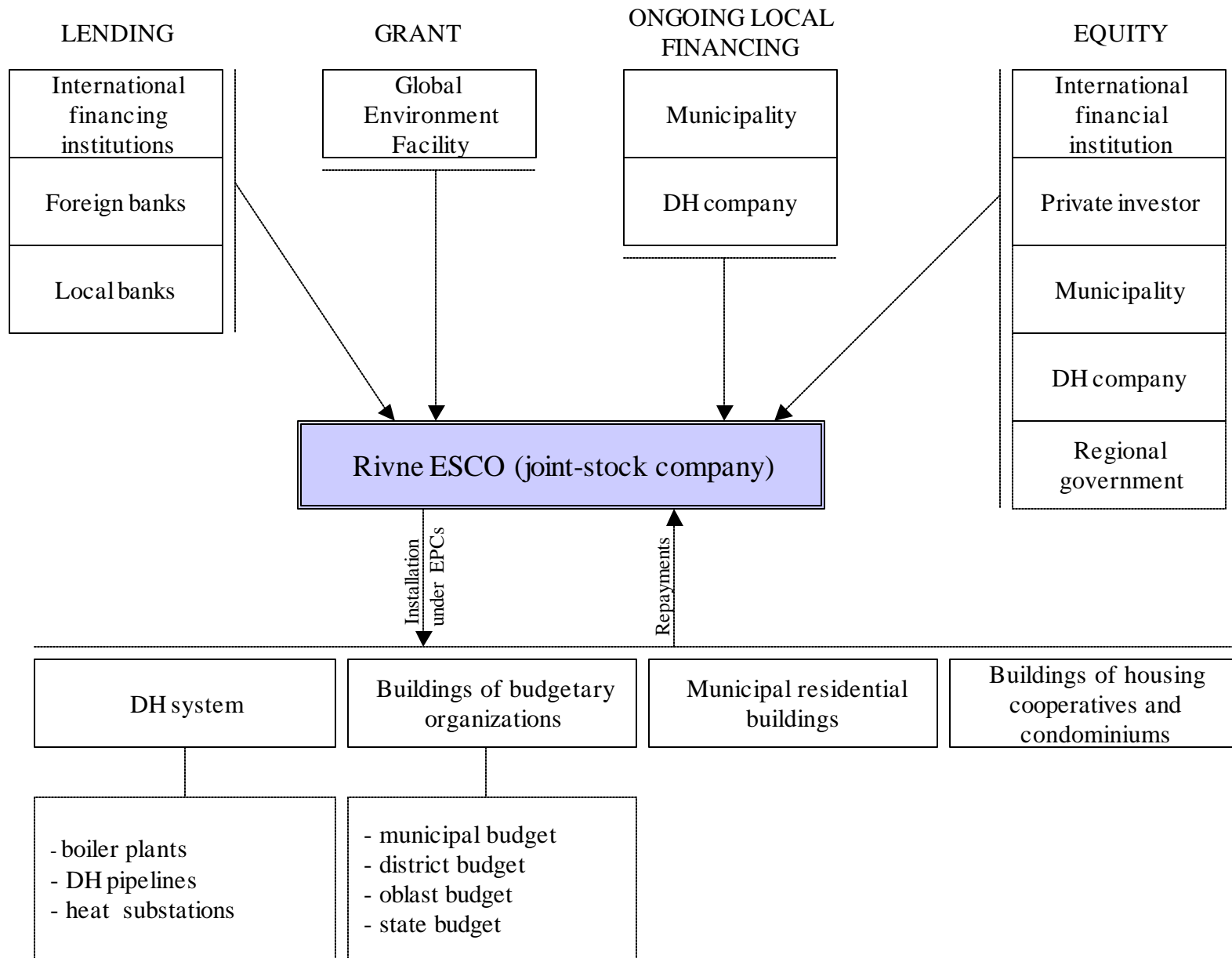
ANNEX 3. INCREMENTAL COSTS

ANNEX 4. PROJECT INVESTMENT DETAILS

ANNEX 5. PROJECT PLANNING MATRIX

ANNEX 6. STAP REVIEW AND RESPONSE

ANNEX 1. RIVNE ESCO FINANCING STRUCTURE



ANNEX 2. PROJECT COST AND FINANCING

Table 2-1. Overall project cost data

#	Component	Cost, \$1000	Financing, \$1000								
			GEF	City	RDHC	Region	SCEC	Private investor	Foreign banks	Local banks	EBRD
1	Setting up ESCO	740	640	25	25			30	20		
2	Investment program	24 000	4 000	1 600	1 700	400		2 400	4 800	2 100	7 0
3	Replication	354	334					20			
4	M&E	600	550	25	25						
	TOTAL	25 694	5 350	1 650	1 750	400		2 430	4 820	2 100	7 0

Table 2-2. Investment component

Source of financing	Cost, \$1000	Financing, \$1000									
		GEF	City	RDHC	Region	SCEC	Private investor	Foreign banks	Local banks	EBRD	
GEF grant	4 000	4 000									
ESCO equity	4 000		400	400	400		2 400				4
Debt financing	13 500							4 800	2 100		6 6
Local contribution	2 500		1 200	1 300							
TOTAL	24 000	4 000	1 600	1 700	400	0	2 400	4 800	2 100		7 0

Table 2-3. Project contributions summary

Source	Contribution, \$1000
GEF Grant	5 524
Country Contribution	3 820
EBRD	7 000
Foreign Private Investor	2 430
Foreign Banks	4 820
Local Banks	2 100
TOTAL	25 694

ANNEX 3. INCREMENTAL COSTS

Baseline:

In the absence of GEF support, energy efficiency in municipal district heating system and buildings will improve slowly, and many technically feasible and financially attractive opportunities will not be realized. The level of locally possible efficiency activities in the city of Rivne is determined by available financing resources envisioned in the “Municipal Comprehensive Energy Efficiency Program for the Period 1999-2010”. The program was adopted by the City Council and introduced by the city mayor's decree #2574-p of December 30, 1988 in pursuance of the Cabinet of Ministers' Decrees #148 of February 5, 1997 "On the Comprehensive National Program on Energy Conservation in Ukraine" and #731 of July 10, 1997 "On Comprehensive Measures for Implementation of the National Energy Program of Ukraine until 2010".

According to the municipal program, expenditures of the city budget and district heating company during proposed investment period (2002-2006) are about \$0.45 million annually or \$2.25 million over the whole investment period. This amount presents realistic baseline investment level achievable without GEF support. Estimated potential for cost-effective investments in supply and demand side energy efficiency is about \$ 24 million. So in the absence of the GEF support, limited financial resources would allow to realize only about 9% of the cost-effective potential.

In the municipal program it is planned to use these resources for a number of projects in the district heating system and the public sector. A major part of the funding should be used to modernize the heat supply system by shutting down some inefficient boiler plants and connecting their load to more efficient plants, replace a number of obsolete boilers by more efficient ones, partially replace heat transmission pipes by pre-insulated ones, and implement some other lower-cost measures. Plans concerning the heat consumption are limited to installing heat meters and controls for a part of consumers.

Baseline activities under the other three suggested project components (setting up of the ESCO, replication measures, measurement and evaluation) are practically absent.

GEF alternative intervention:

With GEF assistance, major financial and institutional barriers in the pilot city will be reduced through establishment of the Rivne ESCO and leveraging financing for the investment program from the private sector and international financial institutions. Setting up of the ESCO will provide necessary capacity building to prepare, manage and implement suggested investment program and possible other energy efficiency projects in the region.

Under the suggested energy efficiency investment program, all technically feasible and cost-effective opportunities will be realized both in the district heating system and connected buildings. In the district heating system, retrofitting/replacement of generating capacity will be performed. Where it is cost-effective, pipes in transmission/distribution network will be replaced by pre-insulated ones. Based on economic criteria, it is envisioned to eliminate part of group substations and replace them with modern individual substations in buildings. Modern heat supply management system will be introduced. In buildings it is planned to install heat meters and controls, apartment-level hot water meters, heat insulation of pipes and other measures. Consumption-based metering

and billing will provide incentives for households and budgetary organization to take appropriate steps to improve the energy efficiency of their buildings and to start saving heat and hot water.

Implementation of the investment program will result in reducing about 2 million tons of GHG emissions in CO₂ equivalent over the project lifetime. As the investments are realized through commercially viable ESCO-mechanism, the project is sustainable and can be replicated in other Ukrainian cities.

The measures promoting project replication include preparing and making available supporting materials for setting up of ESCOs, providing necessary consultations, information dissemination, awareness raising etc. Project replication potential for communal heat supply sector in other cities makes up about 64 million tons of CO₂ equivalent.

Domestic benefits:

Project implementation provides several domestic benefits. Most essential of them are: positive economic and financial returns from investments, higher level of heat supply service and reliability of district heating system operation, lower air pollution (in particular by NO_x), creation of incentives to energy savings in public and residential sector, reduction of budgetary expenditures on residential subsidies and institutional buildings' heat bills, improvement of the qualification of district heating company personnel and its management capacity. Operating ESCO will be able to further expand its activity to the region as a whole and implement energy saving measures in industry and infrastructure sectors, thus achieving additional economic and environmental benefits. Creation of the ESCO and expansion of its activity will contribute to the development of local energy service market.

For the country as a whole, the project will help reduce the level of dependence on external gas supplies. Successful operation of the Rivne ESCO will facilitate setting up of similar ESCOs in other cities and attracting foreign private capital and experience to Ukraine. Replication of the project in other Ukrainian cities will bring additional domestic and global benefits, although these benefits cannot to be exactly quantified.

Notes on Calculating Incremental Costs:

Incremental costs were calculated for 5-year investment period (2002-2006) as a difference between the total project cost (\$25.69 million) and local baseline expenditures over the same period (\$2.26 million). In this case the incremental costs are equal \$23.43 million and does not take into account cost saving due to reduced gas, electricity and water consumption and avoided O&M and other costs. Comparison of these total incremental costs with the incremental global environmental benefits (CO₂ emissions reduction in the amount of 1.8 million tons) yields incremental specific reduction cost at the level of \$13.0 per tonne CO₂.

The cost savings (from reduced energy consumption and avoided costs) over the investment period make up \$9.58 million). If these cost savings are taken into account, incremental costs will reduce to \$13.85 million. In this case, incremental specific reduction cost will be \$7.7 per tonne CO₂

Even with cost savings factored into the calculations, incremental costs (\$13.85 million) exceed the GEF share in the project (\$5.52 million). The difference is covered by leveraging external financing and local contribution. GEF funding provides necessary risks mitigation to attract external resources, primarily from private investors.

The municipal investment program is the only program in which net incremental costs (as calculated assuming risk-free investment conditions) would be negative. For this reason, the project must ensure that returns to the Rivne ESCO, a public-private partnership, continue to generate global benefits. During the course of Activity 1 (Establishing the Rivne ESCO), the project team will structure the model performance contract and the subsequent city-wide contract so that returns from the projects proportional to the involvement of GEF investments and equity contributions are recovered for use as equity in future municipal efficiency projects.

Table 3-1. Incremental cost matrix

Component	Benefits/ Costs	Baseline	Alternative	Increment
1. Setting up of a municipal ESCO	Global Environmental Benefits	No systematic activity to improve energy efficiency (EE) in heat supply system and buildings in residential and public sectors.	Systematic energy saving activity on municipal level to provide efficiency improvements.	Systematic energy saving activity on municipal level to provide efficiency improvements.
	Domestic Benefits	No organization specialized in implementation of EE measures both in municipal district heating system and buildings sector.	Municipal ESCO to provide implementation of EE measures both in municipal DH system and buildings sector on sustainable basis.	Municipal ESCO to provide implementation of EE measures both in municipal DH system and buildings sector on sustainable basis.
	Costs	\$0	Municipality: \$25,000 DH company: \$25,000 GEF contribution: \$640,000 Private investor: \$30,000 Foreign banks: \$20,000 <i>Total: \$740,000</i>	Municipality: \$25,000 DH company: \$25,000 GEF contribution: \$640,000 Private investor: \$30,000 Foreign banks: \$20,000 <i>Total: \$740,000</i>
2. Whole-city investment program	Global Environmental Benefits	Slow and limited reduction of GHG emissions (0.19 million tons of GHG reduced over 20 year project period).	Significant GHG emissions reduction (1.99million tons of GHG reduced over 20 year project period). Leverage of financial resources for large-scale energy saving and emissions reduction activities.	Additional GHG emissions reduction (1.8 million tons of GHG reduced over 20 year project period). Leverage of financial resources for large-scale energy saving and emissions reduction activities.
	Domestic Benefits	Benefits correspond to a low level of energy-efficiency related investments being made.	Benefits correspond to investments facilitated through whole-city investment program. Creation of the pilot city ESCO with the prospect of expanding its activity to other energy efficiency projects in the region (including municipal infrastructure and industry)	Comprehensive retrofitting of municipal DH system. Improved heat comfort level. Consumption-based heat and hot water metering and billing in residential sector and public buildings. Creation of the pilot city ESCO with the prospect of expanding its activity to other energy efficiency projects in the region (including municipal infrastructure and industry)

Component	Benefits/ Costs	Baseline	Alternative	Increment
	Costs	Municipality: \$1,100,000 DH company \$1,150,000 <i>Total (over the 5 year program investment period): \$2,250,000</i>	Municipality: \$1,600,000 DH company: \$1,700,000 Region: \$400,000 Private investor: \$2,400,000 Foreign banks: \$4,800,000 Local banks: \$2,100,000 EBRD Financing: \$7,000,000 GEF Contribution: \$4,000,000 <i>Total: \$24,000,000</i>	Municipality: \$500,000 DH company: \$5500,000 Region: \$400,000 Private investor: \$2,400,000 Foreign banks: \$4,800,000 Local banks: \$2,100,000 EBRD Financing: \$7,000,000 GEF Contribution: \$4,000,000 <i>Total: \$21,500,000</i>
3. Project replication measures	Global Environmental Benefits	None	Reduction of GHG emission through replication of the ESCO-approach in other cities.	Reduction of GHG emission through replication of the ESCO-approach in other cities.
	Domestic Benefits	Slow and spontaneous removing of the institutional and financial barriers without any supervision and sound organizational support.	Expansion of energy saving activities through information dissemination, training, specific cost-reduction measures, new financing mechanisms. Creation of ESCO infrastructure and energy service market development.	Promotion of ESCO activities and their commercial operations based on performance contracting mechanism and creation of energy saving infrastructure in Ukrainian regions.
	Costs	\$0	Government: \$20,000 GEF Contribution: \$334,000 <i>Total: \$354,000</i>	Government: \$20,000 GEF Contribution: \$334,000 <i>Total: \$354,000</i>
4. Monitoring and evaluation	Global Environmental Benefits	None	Monitoring and evaluation of all project components, including setting up and operation of ESCO, demonstration project, investment program and replication measures.	Monitoring and evaluation of all project components, including setting up and operation of ESCO, demonstration project, investment program and replication measures.
	Domestic Benefits	Limited monitoring and evaluation of the baseline-related activities	Investment program and project replication is monitored and evaluated and thus can more reliably reach their objectives.	Investment program and project replication is monitored and evaluated and thus can more reliably reach their objectives.
	Costs	Municipality: \$5,000 DH company: \$5,000 <i>Total: \$10,000</i>	Municipality: \$25,000 DH company: \$25,000 GEF Contribution: \$550,000 <i>Total: \$600,000</i>	Municipality: \$20,000 DH company: \$20,000 GEF Contribution: \$550,000 <i>Total: \$590,000</i>

Component	Benefits/ Costs	Baseline	Alternative	Increment
Total	Global Environmental Benefits	Existing institutional and financial barriers make energy efficiency investments happen slowly. Limited reduction of GHG emissions (0.19 million tons of GHG reduced over 20 year project period).	Institutional and financial barriers to energy efficiency on municipal level are removed to essential degree. Significant reduction of GHG emissions (1.99 million tons of GHG reduced over 20 year project period).	Institutional and financial barriers to energy efficiency on municipal level are removed to essential degree. Significant additional decrease of GHG emissions (1.8 million tons of GHG reduced over 20 year project period).
	Domestic Benefits	Limited improvement of energy efficiency with low financial, economic and environmental benefits.	Substantial improvement of energy efficiency with considerable financial, economic and environmental benefits.	Significant additional improvement of energy efficiency with essential financial, economic and environmental benefits.
	Costs	Municipality: \$1,105,000 DH company: \$1,155,000 Total: \$2,260,000	Municipality: \$1,650,000 DH company: \$1,750,000 GEF Contribution: \$5,524,000 Government: \$20,000 Region: \$400,000 EBRD Financing: \$7,000,000 Private investor: \$2,430,000 Foreign banks: \$4,820,000 Local banks: \$2,100,000 Total: \$25,694,000	Municipality: \$545,000 DH company: \$595,000 GEF Contribution: \$5,350,000 Government: \$20,000 Region: \$400,000 EBRD Financing: \$7,000,000 Private investor: \$2,430,000 Foreign banks: \$4,820,000 Local banks: \$2,100,000 Total: \$23,260,000

ANNEX 4. INVESTMENT DETAILS

The pilot implementation phase (demonstration project) will include a typical medium-sized boiler plant (partial modernization) and a part of its heat transportation network and consumers. The physical scope of the project is determined by the requirement of achieving tangible effects in the form of reduced fuel consumption when the heat consumption in buildings decreases. Technical measures are representative of the city-wide program; estimates of their financial and environmental performance are presented in the following table.

Energy saving measures	Costs, \$1000	Annual average benefits, \$1000	Simple pay-back period, years	Discounted pay-back period, years	NPV, \$1000	IRR, %	Gas savings, million m ³	Reduction of CO ₂ emissions, 1000 tons	Specific costs, \$ / ton CO ₂
1. HEAT SOURCES									
1.1. New boiler installation	112.0	24.7	4.8	6.9	90.3	21.0	5.4	10.7	10.4
1.2. Retrofitting of two existing boilers	60.4	25.0	2.6	3.6	138.0	45.0	5.8	11.8	5.1
1.3. Whole-plant efficiency measures	87.2	32.0	3.0	4.2	164.0	36.0	7.1	15.1	5.8
1.4. Dispatch management system	57.2	10.3	5.6	8.5	31.4	16.2	2.9	5.4	10.5
SUB-TOTAL FOR HEAT SOURCES	317.0	92.0	3.7	5.2	424.0	28.6	21.2	43.0	7.4
2. HEAT TRANSPORTATION SYSTEM									
2.1. Replacement of pipes	501.6	72.0	7.0	10.8	144.0	13.0	15.8	29.8	16.8
2.2. Modernization of group heat substations	46.6	9.7	4.8	6.9	38.0	21.0	2.8	5.2	9.0
TOTAL FOR DH SYSTEM (1+2)	865.0	166.3	5.2	7.3	606.0	20.0	39.8	78.0	11.1
3. BUILDINGS									
Building-level heat metering	43.8								
Heating system controls	17.3	7.0	2.5	3.5	42.0	46.5	2.0	3.7	4.7
Apartment-level hot water metering	73.9	17.1	4.3	5.3	78.0	27.1	3.3	6.2	12.0
Insulation of pipes	21.2	10.4	2.0	2.3	69.0	77.0	3.0	5.6	3.8
Radiator reflectors	10.0	2.1	4.7	6.2	9.0	23.5	0.6	1.1	8.8
TOTAL FOR BUILDINGS	170.6	36.6	4.7	6.1	154.0	23.6	8.9	16.6	10.3
TOTAL	1035.0	211.0	5.1	7.1	760.0	20.2	48.7	94.5	11.0

In addition to technical measures, the pilot phase will include shifting to a consumption-based billing system and developing the necessary billing software, as well as introducing regulatory changes to stimulate energy saving, including the adjustment of subsidies allocation system. The total cost of the pilot phase is estimated at about \$1.1 million, with \$0.9 million provided by the GEF.

City-wide investment program details.

Energy efficiency measures proposed for the district heating system and its users consist of the following:

- *Supply-side measures for large and medium-size boiler plants:* Retrofitting the existing boilers (making the boiler furnace and gas ducts air-tight; installing high-quality insulation over the boiler surfaces, fittings and heat pipes; improving the air distribution system of the burners; installing modern burners; reconstructing convective shafts and convective surfaces; heat recovery from exhaust gases; re-circulation of exhaust gases; installing automatic controls for combustion processes; installing variable speed drives on boiler fans and ventilators); replacement of boilers (together with installing re-circulation of exhaust gases); measures for the boiler plants as a whole (automated water treatment; anticorrosive make-up water treatment; automatic control of the technological processes at the boiler plant; variable speed drives on circulating pumps; information system for the operation of the boiler plant); and a heating region dispatch management system with a commercial metering subsystem.
- *Supply-side measures for small boiler plants:* Replacing the boilers and heat recovery from exhaust gases; automating the water treatment and information systems for boiler plant operation.
- *Supply-side measures for the heat transportation system (transmission/distribution pipelines and heat substations):* Replacing transmission and distribution pipelines with pre-insulated pipes; retrofitting part of the existing group substations (installing modern heat exchangers, controls, etc.); creating an information system for group substation operation); decentralizing the hot water supply by eliminating part of the group substations and installing individual building-level substations.
- *Demand-side measures:* installing commercial metering of heat consumption; heating system controls; hot water apartment-level metering; heat insulation of pipes; installation of radiator reflectors.

In evaluating financial returns from the investment program, achievable energy and cost savings were estimated on a conservative basis; cost estimates were based on current quotations of suppliers and include 10% contingency. The following assumptions were used in cash flow analysis: 10% nominal discount rate; 5-year investment period; period of analysis -- 20 years; gas price (practically only fuel consumed by the heat supply system) -- \$47 per 1000 m³ in the year 2002 with annual growth rate at 4.5%; electricity price at \$0.04 per kWh with 3.5% annual growth rate.

The energy efficiency investment program has the following economic parameters:

Objects	Cost, \$million (nominal)	Annual average benefits, \$million	Simple payback period, years	Discounted payback period, years	NPV, \$million	IRR, %
District heating system, including:	19.4	3.4	6.0	10.0	12.9	19.6
Boiler plants	5.7	1.4	4.5	7.5	6.7	28.5
Transmission/distribution networks	12.1	1.7	7.4	12.4	4.7	14.8
Group heat substations	0.6	0.2	3.8	6.8	0.9	33.8
Individual heat substations	1.0	0.2	6.3	9.2	0.6	19.0
Buildings	4.3	0.6	6.6	10.9	2.3	18.2
TOTAL	23.7	4.0	6.1	10.1	15.3	19.4

An analysis of the environmental impact of efficiency measures was made based on IPCC methodology. The main results concerning greenhouse gas emissions reduction are the following:

Objects	Gas savings, million m ³	CO ₂ emissions reduction, 1000 tons	Specific cost, US\$ / ton CO ₂ (nominal)
District heating system, including:	827	1 607	12.1
Boiler plants	367	741	7.7
Transmission/distribution networks	362	685	17.7
Group heat substations	49	91	6.3
Individual heat substations	49	90	10.9
Buildings	207	384	11.2
TOTAL	1 034	1 991	11.9

The emissions reduction depicted is almost totally due to reduced gas consumption. Emissions reductions due to electricity savings account for less than 4% of the total and are calculated based on the average emission factors for power production in Ukraine.

The GEF funding (\$4 million) under the investment program will finance the major part of pilot implementation phase and also the implementation of longer-payback measures (like pipe replacement and measures in buildings), less economically attractive and more risky for private investors. These measures may also receive the majority of financing provided by local stakeholders. This approach will help to reduce the risks and ensure involvement of private financing in the project.

ANNEX 5. PROJECT PLANNING MATRIX

PROJECT STRATEGY	Indicator	Sources of Verification	Assumptions
GLOBAL ENVIRONMENTAL OBJECTIVE			
<i>Reduction of greenhouse gas emissions through reduced fossil fuel consumption</i>	CO ₂ emissions are reduced by 2 million t per year over the project lifetime at the district heating project site. Cumulative natural gas consumption is reduced by at least 1,000 million m ³ at project sites.	Yearly reports of the Rivne district heating company and the Rivne ESCO. Yearly reports of the Rivne district heating company and the Rivne ESCO.	
Immediate Objective:			
The sustainable use of energy in district heating systems through an integrated approach to energy efficiency is promoted and increased in Ukraine	By the end of the project an ESCO will be in full operation. By the end of the project at least 2 addition contracts for the Rivne ESCO at the local and/or regional level will be signed.	Yearly reports of Rivne ESCO and its clients.	Cities continue with progress made in management of DH systems.
Outputs:			
<p>1. Project management is in place and functioning</p> <p><i>Activities:</i></p> <p>1.1 Appoint a national project director and establish the project steering committee</p> <p>1.2 Appoint a project manager</p> <p>1.3 Organize the project kick-off workshop</p> <p>1.4 Finalize the project workplan</p>	By the end of month 3 after the project contract has been signed 100% of the long-term management staff is contracted and a number of long- and short- term consultants/ companies is identified.	Project report and shortlist of external consultants.	

<p>2. Access to financing for EE improvements is increased for municipalities, district heating companies, and regional governments</p> <p><i>Activities:</i></p> <p>2.1 Prepare and distribute project description materials and a call for participation to potential equity investors.</p> <p>2.2 Develop and formulate commitments to be made by the local stakeholders in order to secure foreign investment.</p> <p>2.3 Develop necessary project documents for loan/equity approval process to EBRD and other banks and equity investors.</p> <p>2.4 Prepare supporting materials for ESCO operation, including a model energy performance contract.</p> <p>2.5 Conduct negotiations and select investors.</p> <p>2.6 Develop founding documents and register the ESCO.</p>	<p>An ESCO is created by the end of the first year of the project, including the ESCO charter and registration.</p> <p>Supporting materials for the ESCO operation is developed.</p>	<p>Project reports.</p> <p>Model energy performance contract and other project materials.</p>	<p>Current trends in the Ukrainian investment climate and exchange rate continue.</p>
<p>3. A visible example of a commercially-viable project in municipal EE is implemented</p> <p><i>Activities:</i></p> <p>3.1 Implement a pilot EE project in the City of Rivne that will include energy audits, procurement of materials, installation, development of necessary billing software, and introduction of regulatory changes.</p> <p>3.2 Implement a city-wide project on a commercial basis using an energy performance contract.</p>	<p>Pilot phase is implemented and EE measures are undertaken.</p> <p>Energy performance contract for city-wide program signed and measures undertaken.</p>	<p>Project progress reports.</p> <p>Contract and project progress reports.</p>	<p>Current trends in the Ukrainian investment climate and exchange rate continue.</p>

<p>4. Awareness of how to finance integrated DH system improvements and improve efficiency is increased.</p> <p><i>Activities:</i></p> <p>4.1 Disseminate information about the Rivne ESCO project.</p> <p>4.2 Make materials developed in the course of the project available for use by other interested parties.</p> <p>4.3 Provide consultations to potential clients on technical solutions, energy saving potential, and the preparation of bankable projects.</p>	<p>By the end of the project at least 2 additional contracts for the Rivne ESCO at the local and/or regional level are signed.</p> <p>Lessons learned are documented and made available to investors and Government.</p> <p>Project is mentioned in the media at least 2 times/year.</p> <p>Project website is created.</p> <p>Project workshops are conducted.</p>	<p>Final project report.</p> <p>Final project report.</p> <p>News clippings and video footage.</p> <p>Project website on Internet.</p> <p>Project reports.</p>	
<p>5. Project mechanisms and impacts are monitored and evaluated.</p> <p><i>Activities:</i></p> <p>5.1 Conduct standard UNDP and GEF monitoring procedures during the project cycle.</p> <p>5.2 Measure and verify energy savings and emissions reductions from the pilot project.</p> <p>5.3 Collect regular feedback from project stakeholders and all interested parties</p> <p>5.4 Prepare and submit regular progress reports</p>	<p>By the end of the first quarter (by month 5), a detailed monitoring and evaluation plan will be put into place.</p> <p>APRs, TPRs, PIRs, and the terminal report will be submitted in a timely and complete fashion.</p> <p>Fuel savings will be measured and GHG reductions calculated.</p>	<p>Monitoring and evaluation plan.</p> <p>Project reports and reference documents.</p> <p>ESCO documentation and project progress reports.</p>	

ANNEX 6. STAP REVIEW AND RESPONSE

STAP Technical Review by

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January 5, 2001

Project Number: UKR/98/G41

**Project Title: Removing Barriers to Greenhouse Gas Emissions
Mitigation through Energy Efficiency in the District
Heating System**

Rational for the project

The project objective is to reduce overall fossil fuel consumption and associated GHG emissions by removing barriers to supply and demand side energy efficiency improvements in district heating systems in the main cities of Ukraine.

The major barrier in mining large-scale energy efficiency improvements potential in Ukrainian heat supply sector is insufficient internal funding and difficulties in accessing external financial sources. Ukraine is among a few countries, which possesses the very substantial low cost GHG emission reduction potential, and has unfriendly investment climate. That is especially true when investments in district heating systems are considered partly as a result of the absence of visible examples of commercially viable mechanisms operating in the energy efficiency in this area.

The project consists of four components: 1) establishing an energy service company (ESCO) as a mechanism for financing energy efficiency activities in the city of Rivne; 2) phased implementation of a municipal energy saving program, including a pilot project on a typical segment of the municipal district heating system and its users; 3) project replication measures; and 4) monitoring and evaluation.

Global environmental benefits

Ukraine is one of the least energy efficient countries in the world and has the greatest among CIS countries emissions level per unit of GDP. Existence of large scale low costs potential to reduce C

costs for relatively small energy efficiency projects; 5) lack of information about existing opportunities for energy efficiency.

How does the project fit within the context of the goals of the GEF?

Operationally this project - Removing Barriers to Greenhouse Gas Emissions Mitigation through Energy Efficiency in the District Heating System falls under the GEF Operational Program # 5, "Removing Barriers to Energy Efficiency and Energy Conservation" GEF participation will assist in reducing major existing barriers in one pilot city and provide for replication of defined approaches and measures in other main cities of Ukraine.

GEF support to energy efficiency in municipal district heating system and buildings will enlarge the pace of improvements by the order of magnitude.

Domestic benefits

Improving energy efficiency, especially in district heating systems, is a way to substantially reduce the costs of providing utility services both for cities administrations and residents. Therefore, it must be a top economic priority for local and regional governments, as well as for the Federal government. Rehabilitation of heat and water supply systems not only brings the costs down, but also helps improve heat comfort along with heat supply reliability.

Though many realize, that urgent action is required, they lack a comprehensive plan of action and mechanisms motivating actors to apply energy efficient techniques and practices in their day-to-day work. These policies lack institutional and technical details, technical and organizational specifications for given tasks, as well as economic evaluations of the program components, and financial mechanisms for the program implementation. As a result, actions to be taken to improve energy efficiency are delayed. Given project is directed to identification and removal of those barriers and to setting up ESCOs to mobilize local and foreign capital and expertise.

Global experience to date and current best practices

The ESCO business is at least two decades old well-established business in many Western countries. Substantial experience was gained in conducting energy efficiency improvements in district heating systems in East Germany, Czech Republic, Baltic States, and Russia as part of multilateral and bilateral assistance as well as a part of own domestic activities.

Risks and benefits of the approach adopted in the project

The technical solutions proposed in the project for improving energy efficiency in heat generation, transportation and consumption are reliable and well proven in many countries. There is good deal of experience in the application of such technologies in Russia, and Baltic States where district heating

Major focus of this project is given to setting up an innovative financial mechanism in the pilot city for implementing energy efficiency activities on a sustainable basis with the capability for self-replication in other Ukrainian cities. This financial mechanism is innovative for Ukraine.

On the benefit side it is expected to attract private investors to district heating improvement projects. Positive side of the proposed mechanism is using ESCO as a project implementation unit with all institutional responsibilities. Corresponding regulation is to be adapted.

GEF involvement is particularly important, as it will help to reduce the risks and leverage significant private financing for the project

But there are risks and difficulties associated with this project implementation:

- ⇒ non sufficient diversification of ESCO clients (predominantly heat supply company and four owners of public buildings). If owners of private buildings (banks, office buildings etc.) are included this risk can be mitigated;
- ⇒ non-payment risk by the heat supply company may be ameliorated by getting collaterals to guarantee payments (for example using agreement with corresponding administrations and banks which collect residents communal payments to use those payments as collateral);
- ⇒ non-full-payment risk by the heat supply company should be mitigated by application of schemes allowing to have at least partial accumulation of savings to pay for ESCO services;
- ⇒ inefficient structure of heat supply market including system of ownership, terms of heat supply contracts (what precisely is paid for in quantitative and qualitative terms, what are supplier and consumer obligations), system of billing for housing companies and individual residents, heat tariff setting regulations (would be losses of heat supply company compensated by higher tariffs); way of municipal planning and budgeting of heat costs for public buildings and residential subsidies;
- ⇒ ability of heat supply company to compensate revenue losses originated from project savings by billing more to other customers (having no meters) or by providing more heat when is not required (by heating water higher than required by out door conditions temperature);
- ⇒ lack of clearly stated in the proposal incentives for heat supply company to implement the project;
- ⇒ lack of personal incentives for those who runs public building to reduce heat costs;
- ⇒ finally risk that not all legislation and regulation necessary to put this scheme in fo

To identify these barriers, intense information collection is to be launched on what factors prevent energy efficiency potential from being realized. Interviews with local officials, experts, and general public about normative and actual decision-making practices to invest in energy efficiency, will be conducted.

Based on such analysis, a barriers-policies matrix is to be developed. Proposed policies will be checked for consistency with the legislation in force, as well as regulations and practices, to find out if any verification and/or updating is required. Most promising policies will be selected for implementation.

Cost-benefit analysis for each proposed policy would be conducted. Potential effects of policies in terms of increasing the financially secured potential would be evaluated. Such approach would allow for screening policies not only by the level of their cost-effectiveness, but also by fund raising characteristics.

Proposed policies will be formulated in terms of drafts municipal regulations, and corresponding other draft normative documents prepared for adoption by selected municipality. Such policies will first be tested in one municipality, and then, with the necessary corrections, will be recommended by the oblast administration for adoption by other municipalities.

Linkages to other focal areas

As it well shown in the proposal there have been two recent activities in district heating and/or energy efficiency involving international financial institutions: an EBRD loan and a World Bank loan. In 1998, the EBRD provided a sovereign loan of \$30 million to establish the first Ukrainian ESCO, UkrEsco. UkrEsco is state-owned, and it is managed by Bechtel and Econoler. Its mandate is to identify and implement energy-saving investments in small and medium-size enterprises and public sector institutions.

In addition in January 2000, the World Bank approved an \$18.3 million loan to the government of Ukraine for the Kyiv Public Buildings Energy Efficiency Project. The project, which is designed to support the government's comprehensive State Energy Conservation Program, will involve targeted investments in the following areas: energy efficiency measures in institutional buildings, technical audits and training, consulting services for project management and a public awareness campaign, and financial audits. The Kyiv Municipality serves as the implementing agency for this project.

Capacity building aspects

There are two important items in this respect. First is capacity building. To be effective it requires using ARENA-Eco expertise and hiring local experts (not just use foreign experts) to work in ESCO. Second is capacity loading. A strong technical assistance is necessary in both directions. This local experts training component is even more crucial to the project success and sustainability than some informational campaigns. In the proposal more attention is to be given for this component.

Response to the STAP Technical Review

The reviewer raises some important points on the management of project risk that draw upon experiences in district heating efficiency projects in the CIS region to date. These lessons will be incorporated into the project document as outlined below.

Observations on Project Risk

On including technical specifications necessary for monitoring from the start of the project: These components will form an integral part of the monitoring and evaluation plan, which will be in place during the first five months of the project's activity. In addition, these specifications will draw upon regional experience to date by consulting the International Project Monitoring and Verification Protocol, as noted under Activity 4 in the brief.

On risks involving possible insufficient diversification of ESCO clients: The project team will assess this risk and study the possibility of diversification in the course of drafting the charter and business plan for the Rivne ESCO.

On mitigating the risk of non-payments: The project team will propose a plan to provide collateral, accrue savings, and/or other suitable measures in the course of establishing the terms of operation for the Rivne ESCO and in the initial energy performance contract.

On the structure of the heat supply market: The project team is already working closely with the city to ensure a conducive environment for efficiency measures, and the city has already undertaken a series of difficult reforms in the heat sector (see Rationale under Activity 1).

On the incentives and behavior of the district heating company: The project team sees that there is a clear incentive for the district heating company to implement the project because of the revenues that it may accrue through the energy performance contract and because of its role as an equity investor in the Rivne ESCO, whereby its investment will be linked with the success of the pilot and city-wide projects. The project team will work carefully to insure that the incentives in the performance contract are properly structured and will monitor the performance of the district heating company as a part of the project's overall monitoring and evaluation activities.

Observations on Project Implementation

The project team agrees with the STAP reviewer's observation that local experts will form the critical