

Ministry of Industry, Science and Technology of the
Russian Federation

Terminal Evaluation Report

of the GEF/UNDP project RUS96G31:

*"Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian
Residential Building and Heat Supply"
based on the example of the city of Vladimir, Russia*

Final Draft

by

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Russian Residential Building and Heat Supply

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Abbreviations and terminology

Autonomous heating	In the context of this project the term ‘autonomous heating’ relates to building level space and hot water heating systems not connected to a district heating network. It does not refer to boilers installed in each flat (apartment) within the building, and implies a building-level central heating network.
CIS.....	Commonwealth of Independent States
DHCS	Department of Housing and Communal Services
Dynamic sustainability	refers to the use and / or adaptation of the projects’ results by the original target groups and / or other target groups
Gcal	Unit of work (energy) – 10^9 calories. 1 Gcal is approximately 1.16 MWh
GEF	Global Environment Facility
GHG	Greenhouse gases
HCS	Housing-Communal Services
HREE	Housing rayon exploitation enterprises
MST.....	Ministry of Industry, Science and Technology of the Russian Federation. In March 2004 the MST was closed and responsibilities were transferred to a new Ministry of Industry and Energy of the Russian Federation. This report will refer to the Ministry of Industry, Science and Technologies which carried out the functions of the project National Executing Agency of the project from 1998 to March 2004
MWh.....	Unit of work (energy) – 10^6 Wh. 1 MWh is 3600 MJ
NGO	Non-profit, non-governmental organisation
NICE.....	Nizhny Novgorod Regional Training-Scientific Innovation Center for Energy Saving
Oblast	Region – the Russian Federation is made up of 89 regions.
PDU	Payment Distribution Units
PMU	Project Management Unit
Rayon	Each region (oblast) is divided into many rayons (sub-regions or districts)
RBM.....	Results Based Management
RECs.....	Regional Energy Commissions
RF	Russian Federation
RTBRF	World Bank Project on Transfer of Budgetary Residential Funds
SNiP	Stroitelnie (Construction) Normi (Norms) i (and) Pravila (Rules) – the norms and rules government construction of buildings in the Russian Federation
Static sustainability	refers to the continuous flow of the same benefits to the same target groups
TOR.....	Terms of Reference
TPS	Thermal Power Station
UNDP	United Nations Development Programme
UNECE.....	United Nations Economic Commission for Europe
UNOPS.....	United Nations Office for Project Services
WB	World Bank, part of the International Bank for Reconstruction and Development (IBRD)

Executive summary

This report contains the terminal evaluation of the UNDP/GEF project “Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Building and Heat Supply” which has taken place in the city of Vladimir between 1997 and 2004. The project has aimed to enhance capacities in both the private and public sectors in the city to overcome barriers to energy-efficiency investments in residential buildings and the related heat-distribution systems, and disseminate experiences to other cities in the Russian Federation.

The evaluation was conducted in parallel by two teams with a more informal analysis aimed at formulating the project results and lessons for further dissemination in other regions and through out UNDP/GEF networks, and the present Terminal Evaluation contained in this report.

The terminal evaluation team, lead by the Nizhny Novgorod Regional Training-Scientific Innovation Centre for Energy Saving (NICE) carried out an independent, results-based and comprehensive assessment of the project during the close of 2004 with the support of UK expert Grant Ballard-Tremeer. This report contains the assessment of the evaluation team of the project success in addressing the identified barriers to energy efficiency and conservation.

Brief description of the project

In 1995, on the initiative of the UN Economic Commission for Europe (UNECE) and in co-operation with the UNDP, an application for the preparation of an energy efficiency project focused on the reduction of negative environmental impacts in the heating sector was prepared and submitted to the Global Environmental Fund (GEF). In the mid-1990s UNECE was supporting the development of a system of Demonstration Zones of High Energy Efficiency in the Russian Federation (RF) together with Government Ministries and as part of the Energy Efficiency 2000 project in countries of the CIS, to which the Vladimir GEF project contributes. Following a call for tenders in 1996 for the selection of a demonstration zone in which the GEF project would take place, the Vladimir Demonstration Zone was selected by the Ministry of Science and Technology. In the period 1996 to 1997 preparatory activities were conducted, with the GEF Council giving approval to the full-scale project in 1997.

The project aimed to:

- develop a prototype system for consumption-based metering and billing that would create new incentives for tenants, tenant associations and district-heat distribution companies to invest in energy efficiency
- study and demonstrate the technical, economic, institutional, and geographical feasibility of developing autonomous (building-level) heat supplies
- develop the skills to conduct the economic and financial project analyses that are required by private and public financing institutions for energy efficiency investment projects.

The Ministry of Industry, Science and Technologies (MST) executed the project and the national implementation of the project is being carried out by Project Management Units in Moscow and Vladimir. The Vladimir team came under the authority of the Department of Housing and Communal Services of the Administration of the City of Vladimir.

The following activities were planned in order to achieve these objectives:

1. Develop a prototype system for heat and hot water consumption-based metering and billing on the basis of the actual consumption data in Vladimir and to disseminate this experience to other Russian cities via publications and the mass media.
2. Study and demonstrate the technical, economic, institutional, and geographical feasibility of investments into autonomous (building-level) heat supply sources, demonstration of autonomous and development of scenarios for further introduction of autonomous heat sources, identifying institutional-legal barriers and market issues, and consequences for heating and gas distribution systems.
3. Capacity building of personnel of administrations, municipal and private companies, to enable them to carry out financial-economic analysis and development of the feasibility studies and business-

plans for projects that meet the requirements of public and private financial institutions. Dissemination of the project lessons learned.

4. Establish and operate project implementation units in Vladimir and Moscow

During project implementation, two additional intermediate objectives were added, namely:

5. Development and implementation of the Project Dissemination Programme in the Russian Federation and the CIS countries.
6. Assess and measure environmental impact (climate change mitigation potential) of the project.

Main conclusions, recommendations and lessons learned

Relevance

In the opinion of the evaluators, all objectives and directions that were included were urgent and highly relevant for the Russian Federation as defined during the period of formulation of the project document and definition of tasks. The project was timely and topical throughout the implementation period and remains urgent up to the present time. Because the project was highly relevant and touched the core of numerous economical and social factors, project tasks were not without difficulty

Design

While the project design would have benefited from more concrete performance indicators, the evaluation team believes that the project design, although having some drawbacks, could not have been substantially different from that proposed. This particularly applies to the two key objectives (1 and 2).

Project replication took place principally through publications – these took the form of booklets, papers, and conference participation. While in the original design, dissemination was implicit within objectives 1 and 2, the project team added a new objective “Develop and implement the Project Dissemination Programme in the Russian Federation and the CIS countries.” This added substantially and positively to the plans in the original project document.

Main achievements

The project implementation team achieved the following concrete achievements:

- A prototype of a billing system for heat and hot water for 92 residential buildings in the city Vladimir was created (objective 1). The Project Service Unit forms bills for each apartment basing on the results of monitoring of actual consumption of heat energy for heating and hot water supply for the residential buildings. It transfers these bills to the DHCS of the city Administration for conduction of comparative analysis and further submission to the city legislative body in order to influence deputies to adjust the city norms for the heat consumption which are currently based on per 1 square meter and per person charges.
- The prototype billing system was however not fully implemented since the required legislation and normative policy has not been approved by the city administration. The fact that the billing system could not be implemented in reality was certainly most unfortunate. It is clear however that the project team made commendable efforts to get the system approved despite lack of sufficient political support in the city administration, and have managed to get good value out of the simulation activities, which were carried out.
- Autonomous boiler houses are installed and are operating in 3 residential buildings in the city Vladimir (objective 2). The Municipality, the owner of buildings, receives bills for the generated heat energy. Bills for tenants are issued by exploitation service of the residential building basing on the legally approved norm. Boiler houses are controlled and managed in automotive mode.
- In accordance with the Project Document objectives, trainings are conducted in the city Vladimir and Moscow in 1998 (objective 3).
- Experience is being disseminated by the nongovernmental organization RUSDEM and Vladimir services in accordance with the specifically developed Programme (on business-planning and financial engineering), and is being replicated in Russian regions to an extent allowed by actual Russian legislation and normative policy.

- Experts of the federal environmental organization developed a methodology and sequence of assessment and inventory of the greenhouse gases emissions for the Project. In accordance with the methodology the calculation of the Project greenhouse gases emissions reduction was carried out. The documentation on procedures of legalizations, verification and certification of the potential Project climatic result has been prepared.

Recommendations

In spite of the fact that objective 1 was not fully achieved (the billing system was only simulated), its achievement is well developed and all indications are that it will be completed when the process of consumption-based billing is defined more fully in Federal legislation. In the meantime the simulation of the billing system provided useful information for the formulation of policy at all levels.

After adoption of a range of legislative acts by the Government of the RF – a process that is currently underway – to improve the payment system for communal services, including heat supply for residential buildings, and sets federal standards, the project is becoming more attractive, and the implementation of the heat supply metering-billing system is likely to proceed.

Ongoing activities on these issues are strongly recommended to build on the progress made during this project.

Objective 2, on autonomous boiler houses, can and should be widely replicated. This requires the introduction of compulsory technical norm setting for energy consumption in residential buildings and ensuring control through governmental decrees.

Implementation of objectives 3 and 5 should be continued on a broader scale, not limited to just the Vladimir Project results, but also using results of other projects, including those with the World Bank loans and other projects targeted at improvement and increase of efficiency of energy use and conservation.

It is also recommended to ensure wider dissemination of the project publications – with the use of State support for publishing on a federal level and dissemination via the state sector of Ministry of Education and Science of the RF.

It would also be valuable to publish and disseminate the methodologies, following their adjustment and after approval from Ministry of Education and Science (Agency for Education) of the RF, for use for education in special educational establishments.

The methodologies developed by the project team are recommended for distribution to Russian regions and Gosstroy of the RF for their study and analysis. After the analysis, it is possible that the Gosstroy will be able to use these methods as the basis for recommendations and include them into a regular Decree of the Government of the RF in respect of payment for communal services.

Significant benefits

While the evaluation has shown possible areas for improvement of the project, principally in the field of project design and building on lessons learned over the full 8 years of project implementation, it is the opinion of the evaluation team that the project has made a major contribution, as part of the high energy efficiency demonstration zones, and in the context of the UNECE “Energy Efficiency – 2000” project.

1. Introduction

1. This report contains the terminal evaluation of the UNDP/GEF project “Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Building and Heat Supply” which has taken place in the city of Vladimir between 1997 and 2004. The project has aimed to enhance capacities in both the private and public sectors in the city to overcome barriers to energy-efficiency investments in residential buildings and the related heat-distribution systems, and disseminate experiences to other cities in the Russian Federation.
2. The evaluation was conducted in parallel by two teams with a more informal analysis aimed at formulating the project results and lessons for further dissemination in other regions and through out UNDP/GEF networks, and the present Terminal Evaluation contained in this report.
3. The terminal evaluation team, lead by the Nizhny Novgorod Regional Training-Scientific Innovation Centre for Energy Saving (NICE) carried out an independent, results-based and comprehensive assessment of the project during the close of 2004 with the assistance of UK expert Grant Ballard-Tremeer (Eco Ltd). This report contains the assessment of the evaluation team of the project success in addressing the identified barriers to energy efficiency and conservation. The introduction which follows, describes briefly the project background, the aims and objectives of the evaluation exercise, highlights key issues which the evaluation team assessed, and outlines the evaluation methodology. The overall structure of the evaluation report is also presented.

1.1 Project background

4. In 1995, on the initiative of the UN Economic Commission for Europe (UNECE) and in co-operation with the UNDP, an application for the preparation of an energy efficiency project focused on the reduction of negative environmental impacts in the heating sector was prepared and submitted to the Global Environmental Fund (GEF). In the mid-1990s UNECE was supporting the development of a system of Demonstration Zones of High Energy Efficiency in the Russian Federation (RF) together with Government Ministries and as part of the Energy Efficiency 2000 project in countries of the CIS, to which the Vladimir GEF project contributes. Following a call for tenders in 1996 for the selection of a demonstration zone in which the GEF project would take place, the Vladimir Demonstration Zone was selected by the Ministry of Science and Technology. In the period 1996 to 1997 preparatory activities were conducted, with the GEF Council giving approval to the full-scale project in 1997.

The project aimed to:

- develop a prototype system for consumption-based metering and billing that would create new incentives for tenants, tenant associations and district-heat distribution companies to invest in energy efficiency
 - study and demonstrate the technical, economic, institutional, and geographical feasibility of developing autonomous (building-level) heat supplies
 - develop the skills to conduct the economic and financial project analyses that are required by private and public financing institutions for energy efficiency investment projects.
5. The Ministry of Industry, Science and Technologies (MST)¹ executed the project and the national implementation of the project is being carried out by Project Management Units in Moscow and Vladimir. The Vladimir team came under the authority of the Department of Housing and Communal Services of the Administration of the City of Vladimir.

1.2 Purpose of evaluation

6. This evaluation is an independent, results-based evaluation intended to provide a comprehensive overall assessment of the project, and provides an opportunity to assess critically the administrative

¹ In March 2004 the Ministry of Industry, Science and Technologies of the Russian Federation was closed and replaced by a Ministry of Industry and Energy of the Russian Federation. This document will refer to the Ministry of Industry, Science and Technologies, which carried out the functions of the project National Executing Agency.

and technical strategies, and issues and constraints associated with the project. The evaluation aims to assess the project success in overcoming the identified barriers to energy efficiency and conservation.

7. In accordance with the UNDP/GEF guiding principles for results based evaluation², the assessment of the results of this project was conducted in accordance with the following objectives:
 - a) to examine and evaluate the results and impact of the project;
 - b) to ensure a sound basis for decision-making required corrections and improvements;
 - c) to promote reporting on resource use; and
 - d) to confirm results by feedback from the project location and to disseminate the lessons learned.
8. The major project evaluation goals are:

To assess the project relevance at the end of the project as well as at the time of project formulation as described in the project documents, including:

- Reviewing project implementation priorities on local and federal (national) level,
- Defining target groups covered by the project; and review of the target groups specific needs in relation to their roles and responsibilities,
- Assessment of project relevance against the needs of directly involved stakeholders including government, local authorities, public services, and residents, and
- Contribution of the project to achieving the UNDP mission of sustainable human development (SHD).

Evaluation of project implementation approaches and progress (what has been done by the project to achieve its objectives and what measures have been taken in this respect), including:

- Quality of project execution and approaches to meet the desired project objectives,
- Quantitative evaluation, in particular the level of reduction of greenhouse gas (GHG) emissions, and
- Timeliness in provision of inputs and achievement obtaining results.

Evaluation of the organization of the management of the project implementation, including:

- Quality and timeliness of inputs and activities on financial and human resource management, and
- Efficiency and effectiveness of the Steering Committee, National Advisor and other Project Management Units.

Evaluation of the overall project success against the following criteria:

- Impact of achievement of results with reference to the development objectives of the project,
- Perspectives for replication of positive project results after the end of the UNDP support; including both static and dynamic sustainability, and
- Contribution to capacity development including the extent to which the project has empowered state establishments and municipalities to use the positive project experiences; and ownership of project results.

Comparison with other similar activities (synergy) financed by the government or other donors.

Evaluation of effectiveness, efficiency and relevance of financial mechanisms established in the framework of the project, including potential impact on leveraging future financing.

Recommendations and lessons learned for the further realization on the achievement of objectives of this project, including possible future support by UNDP and/or Government.

² “Handbook on Monitoring and Evaluating for Results”, UNDP Evaluation Office 2002.

1.3 Key issues examined

9. While the evaluation was comprehensive, the evaluation team, as per the request in the terms of reference of the evaluation team, focused on the following key issues:

- a) The effectiveness of the project to create financial incentives for investing into energy saving measures with subsequent reduction of other barriers to energy saving.

Metering and payment for the metered consumed energy systems (at household, supplier and generator levels – ie. throughout the heat supply system) is the first important step towards:

- (i) the creation of interest of tenants and housing organizations in the use of energy saving measures and investment in energy efficiency;
- (ii) the creation of interest of energy suppliers in reduction of heat losses in supply / distribution; and
- (iii) the creation of conditions where the financial profits of capital investments will be returned to the investors.

The evaluation of prototype of the metering-billing model system created in the project supporting the creation of these incentives for tenants, tenant associations and rayon (regional) heat supply enterprises has been carried out.

- b) The effectiveness of the study and demonstration carried out during the project of the technical, economic, institutional and geographical issues for the use of building level heat sources ('autonomous heating' systems). The evaluation included an analysis of the extent to which these issues, and the three demonstration units installed during project execution, are relevant and catalytic for the Russian heating sector.
- c) The effectiveness of the capacity building – related to the lack of knowledge and skills, identified in the project document, for selection, assessment and formulation of investment projects with multi-party or private financing. While Russia possesses huge capacities in scientific and technological field, there are significant gaps in economic and financial analysis as well as the institutional basis for project development and formulation in accordance with the requirements of multi-party financing and Western and Russian private investors is absent, and the project specifically aimed to overcome these capacity gaps.

1.4 Evaluation methodology

10. The approach used for the evaluation was based on the results-oriented 'outcome evaluation' approach within the framework of Results Based Management. This approach generally covers a set of related projects, programmes and strategies intended to bring about outcomes³. In this case, the focus of the review was a single project. The evaluation thus has focused more on the project's contribution to the outcome through the project outputs, and possible improvements that could have increase the performance of delivery of outputs and ultimately the desired outcomes.

11. The team of five experts carried out the evaluation of the project based on the results during November and December 2004. The analysis focused on all aspects of the project activities, project management and administration, project results, as well as defined main project lessons learned in economic, technical, institutional structure and social sphere⁴.

12. For the evaluation the team of experts used a combination of various processes, including:

³ An outcome evaluation focuses on the 'developmental changes between the completion of outputs and the achievement of impact' (the outcomes), and encompasses efforts of partners working on the same issues. The evaluation assesses how and why outcomes are or are not achieved within a given context, and the role that UNDP and project management has played in bringing these about. Outcome evaluations also help to clarify underlying factors affecting the situation, highlight unintended consequences, recommend actions to improve performance in future programming, and generate lessons learned.

⁴ These evaluation activities were conducted in accordance with the Contract for the evaluators (Ref. RUS96G31 – PO#10973, from 29 November 2004) concluded between the United Nations Office for Project Services (UNOPS) and NICE.

- Desk review of all relevant project documentation, including legislative and normative-legislations of the Vladimir region and city of Vladimir connected with the project (a full list of literature consulted is given in ANNEX D List of documents reviewed and ANNEX E Other relevant materials reviewed)
 - Project site visits (the itinerary of site visits is given in ANNEX B Evaluation itinerary);
 - Interviews with Ministry of Education and Science of the RF, Administrations of the city of Vladimir and Vladimir region, UNDP, representatives of government of various levels, NGOs, RUSDEM, local communities, autonomous heating companies (see ANNEX C List of people interviewed);
 - Consultations with Ministry of Education and Science of the RF, the City of Vladimir Administration, UNDP, PMU (in Moscow and Vladimir); and meetings with tenant associations;
 - Comparison of the Project implementation with other similar projects, including those in Nizhny Novgorod region and other regions based on the experience of the evaluation team;
 - Evaluation of the state of the achieving of objectives and barriers resistance;
 - Formulation of recommendations and alternative forms for the project results and dissemination of lessons learned;
 - Discussion with project stakeholders, in particular relevant Ministries, the project management, and the UNDP to verify and test findings.
13. All results of the evaluation study are documented in this evaluation report and coordinated in accordance with the feedback from key stakeholders.
14. The report was prepared according to recognized UNDP and GEF guidelines on conducting evaluation projects, including:
- “On project terminal evaluation” (Annex VII Guidelines for Implementing Agencies to conduct Terminal Evaluations),
 - “On development of Terms of Reference for the terminal evaluation” (Annex VIII Guidelines for developing TORs for Final Evaluations).
15. This terminal evaluation is complemented by the work of a second evaluation team which focused on a more informal analysis aimed at formulating the project results and lessons for further dissemination in other regions and through out UNDP/GEF networks. EnEffect (Sofia, Bulgaria) carried out the project analysis for dissemination purposes, and information was exchanged during the process of evaluation. EnEffect conducted evaluation of the Project Presentation and provided it to NICE for the use during the overall comprehensive project terminal evaluation. For comprehensive information about the achievements of the entire Vladimir project, the reader is encouraged to refer to both reports.

1.5 Structure of the evaluation report

16. This evaluation report consists of three main sections. These are:
- *The project and its development context* (section 2): in which we describe and analyse the formulation of the project within the socio-economic and policy context in the Russian Federation in 1997-8 when it was developed, and the changing circumstances during project execution. A good understanding of the local context and challenges is essential to an understanding of the project achievements as evaluated in subsequent sections. This section thus forms the basis on which project achievements can be assessed.
 - *Findings and conclusions* (section 3): this section is the main body of the evaluation in which we discuss and assess the original project formulation and design (including relevance and country ownership), and issues of project implementation (including management and planning, progress in achieving objectives, stakeholder participation, financial planning, and project sustainability).
 - The report ends with two chapters (section 4 and 5) in which we present the *major recommendations* from the evaluation, and highlight the *key lessons learned*.

2. The development context

17. Following an initial application to the GEF council for project development support in 1995, the UNECE and UNDP worked to design the project which was to become the Vladimir “Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Building and Heat Supply” project. In the year 1997 the preparatory stages of the project were carried out; during this stage the GEF project brief and project document was prepared, training of 5 representatives of the city Vladimir on financial engineering basics and business planning was organized, and activities on problems of introduction of autonomous boiler houses and analysis of the heat supply system of the city Vladimir started. The full scale project brief “Capacity building to reduce key barriers to energy efficiency in Russian residential building and heat supply” was approved by the GEF Council in November 1997, and the main phase of the project started in February 1998, with a planned duration of 52 months.

2.1 Project context

18. The Russian Federation, the world’s largest country is characterised, in general, by a cold climate with mean annual temperatures of less than +5°C across most of the country. This means special requirements and costs for energy resources for heating and creating acceptable living conditions: central heating is thus a major factor in Russia’s energy balance.

Following glasnost (openness) and perestroika (restructuring) in the late 1980s and the eventual break-up of the USSR resulting in 15 independent republics by December 1991, Russia has struggled to build an effective market economy, and institutional structure to replace the earlier central planning system. The command-control economy of earlier years resulted in large inefficiencies in energy production and use since decisions were seldom based on economic and efficiency considerations. There is consequently significant room for improvements in efficient use of heat and energy saving measures in existing Russian residential buildings; however several barriers exist.

19. As described in the Project Document, these barriers, which exist throughout the Federation, include:
 - a) absence of financial resources for necessary investments;
 - b) lack of technological developments, financial evaluation, and human knowledge / experience;
 - c) absence of heat meters at buildings and apartment levels;
 - d) lack of incentives for tenants to improve heat efficiency of buildings or to reduce heat and hot water consumption because they do not pay for actual metered consumption (they pay a fixed monthly fee);
 - e) tenants (even if they are owners) are not responsible for the maintenance of buildings;
 - f) tenants are not united in associations, and are thus unable to make decisions on housing sector investments collectively;
 - g) subsidies for heat and hot water provided by the city authorities reduce incentives for tenants;
 - h) regional boiler houses have no incentive to improve energy efficiency of the heat distribution network because they collect payment from city authorities for the amount of heat produced by the boiler house and not for the heat that was delivered to buildings;
 - i) metering of the heat consumption in individual apartments is difficult and expensive due to physical location and arrangement of the pipelines in buildings.
20. In the Russian Federation, to a greater degree than in many countries – partly as a result of large energy reserves, and partly resulting from the size of the heating sector – reforms in the energy sector are closely linked with the overall economic reform.

However, in general, attempts to overcome barriers for energy efficiency on the governmental level are not sufficient because the issues of heat supply are the responsibility of municipal authorities. However, municipalities have insufficient resources in the budgets and there is a lack of knowledge and skills. Without state involvement they are not capable of solving the multiple problems of the heat supply sector in an appropriate and sustainable way. To reduce barriers to the creation of favourable

investment climate to improve energy efficiency in heat supply on local level means gradual change of the chain of interdependent Russian legislative norms and creation of wide information zone to provide citizens with the option to select comfortable variants and interest of service companies to provide this comfort. Further details of this difficulty are given in Box 1: Complexity of changing policies and norms in the heating sector, below.

Box 1: Complexity of changing policies and norms in the heating sector

To re-approve / re-adjust (by issuing a Decree) norms means to create a legal right for citizens to pay more/less than previously. Consequently, authorities and legislative bodies have to vote for or against this “right”. For authorities to make this decision means that they have to have additional means to pay for the implementation of the norm, which may include a subsidy for citizens.

For example, in accordance with metering results, tenants might use more energy than was planned by a municipality (eg. for a corner apartment in an obsolete building), but the family living in such an apartment is listed as a family with low income with the right for state support. Moreover, authorities can change internal policy, re-approve / re-adjust (by issuing a Decree) normatives of wages of budgetary workers (teachers, doctors, officials and etc.) and pensions, as well the minimum living standard.

Before the Project it was not even possible to assume such a need in additional subsidies.

Work to reform the heating sector by the relevant ministries (see the structure and some activities of responsible ministries described in Box 2) has been underway during implementation of the project, and in general reflects the aims and approaches of the project.

Box 2: Structure of responsible government Ministries in the heating sector

Ministry of Economic Development and Trade – includes into draft budget for the prognoses (next) year those programmes that are to be approved by the Government of the RF.

For example, for reforming of the housing-communal services (HCS) the line in the federal budget appeared from the year 2002. To which regions and how much to provide financing from federal budget? Firstly to those regions those are lacking regional taxes to maintain existing HCS. However, to reduce solely the basing only on the deficit of monetary means in a region - money from federal budget are not provided basing on this.

Gosstroy of the RF (former Ministry for Construction and HCS) – up to now part of the Ministry of Industry and Energy – is responsible for forming programmes on HCS reform and resource saving in HCS together with the regions. In accordance with this, regions annually have to defend in Gosstroy various programmes and projects which will receive interest-free loans by Ministry of Finance of the RF. The selection process is hidden, and in relation with the reorganization of the governmental structural departments – even more so.

Ministry of Finance – finances in accordance with the defended programmes and project for each region separately (Main condition: to manage to defend projects and programmes in time during the period of the budget of the RF formation for the following year)

21. For international organisations working in the Russian Federation, the period 1993-1995 was characterized by the studying of opportunities for energy saving and meeting the requirements of investors. There was virtually no money in Russia during this period (nor financial resources – on accounts, in particular). In the country payments were frequently done by “barter”. Various schemes of “financing” were created, including "bills (promissory notes)" – regional energy experts became acquainted with the system of promissory notes only in the year 1995. Based on this scheme, for example, an Energy Saving Fund in the Nizhny Novgorod region was built, as described in the RUSDEM and UNECE Book "Regional normative-legislative basis for energy saving. Demonstration Zone - Nizhny Novgorod". Other regions were replicating this experience.
22. It was only in late 1995 that international investors could understand mechanisms for the provision of loans to municipal enterprises. However, in 1996, being uncertain about the financial returns of such loans – they were providing loans for municipal enterprises only in the form of sub-loans via the Ministry of Finance of the RF.

At this time, three loans mostly related to heat supply were made by the World Bank. They were supervised by three different institutions:

- a) Ministry of Economy and Development of the RF - Project on Transfer of the Budgetary Residential Funds (PTBRF),
 - b) Ministry of Energy - project to improve energy efficiency,
 - c) Gosstroy RF - project on modernization of urban economy sector. In the framework of this loan municipal enterprises of regions received sub-loans. The Gosstroy project was terminated, then reanimated in 2001 with the title "City heat supply "- 85 million dollars for 17 years.
23. Starting from the year 1995 UN ECE was actively working with Russian state organizations and RUSDEM in the framework of Programmes "Demonstration Zones" and "Energy efficiency -2000". The Ministry of Energy of the RF united energy experts from Administration of up-front regions with the goal to create a normative-legislative basis on energy saving on the basis of existing Russian experience and with the use of international ones: the first seminars in foreign countries took place at the end of the year 1995. During these years demonstration projects were implemented in many Russian regions.
24. In general technical skills were acquired faster than energy policy was formulated. Therefore people in authorities structures tended to focus on technical solutions (eg – “the main task is to install heat energy meter and laws will work by themselves, and would not need to be rewritten”). This was the main mistake at the time. With technical knowledge and skills came the skills to properly read existing laws and look for paragraphs to justify actions.
25. For the period 1996-97 the Project became highly relevant, because in 1996 the Federal Law “On energy saving” was effected, which guaranteed metering of energy resources consumption and equipment certification, as well as state inspection of rational use of fuel and energy resources. This meant being equipped with means for heat energy consumption metering and control.
26. The year 1998, when the project started, was one of economic upheaval for the Russian Federation with the country seeing a real fall in GDP of almost 5% during that year and a devaluation of the Russian rouble from 5.6 to 24 roubles to the US dollar.

2.2 Problems addressed by the project

27. The project addressed three primary problems, namely:
- a) Misplaced or missing incentives for tenants, tenant associations and heating companies to improve energy efficiency and reduce energy consumption in residential buildings and district heating pipelines
 - b) Fundamental uncertainties about the feasibility (technical, economic, legal, institutional, and political) associated with autonomous (building-level) sources of heat supply as replacements for centralized district heating systems
 - c) Lack of capacity to conduct economic and financial analyses for energy efficiency projects funded by public and private financing institutions.

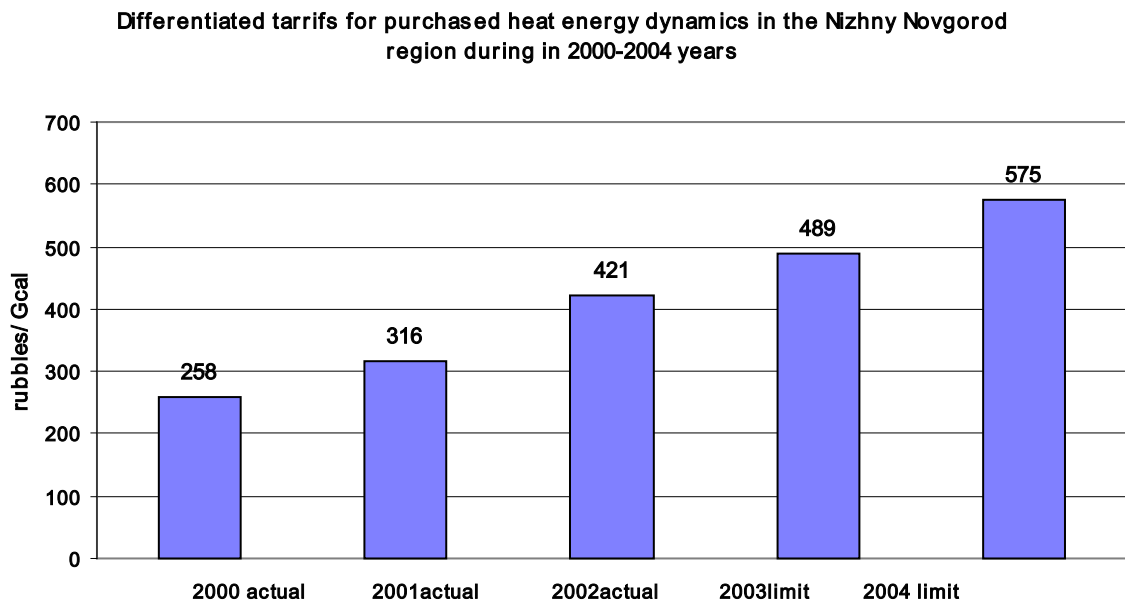
2.2.1 Misplaced or missing incentives

28. Tenants, associations and heating companies have misplaced and missing incentives for energy saving in buildings and district heating networks. This is a result, in part, of the absence of heat meters at buildings and apartment levels, thus meaning that users do not pay actual metered consumption. In addition tenants and even owners are not responsible for the maintenance of their buildings, and are not able to make decisions on investments affecting the whole building fabric or heating system. Without metering of supplied heat, regional boiler houses have no incentive to improve energy efficiency of the heat distribution network because they receive payments for the amount of heat produced by the boiler house and not for the heat that is delivered to the buildings. In addition, subsidies for heat and hot water provided by the city authorities reduce incentives for tenants (see Box 3, below which describes in detail the policy and price reforms that have taken place since 1997/8).

Box 3: Evolution of heating tariffs since 1997/8

In 1998 the limitation of consumption of all energy resources for all budgetary organizations financed from the federal budget was introduced (Decree of the government of the RF from 05.01.98 №5). Regional authorities, basing on the recommendations of this document, also introduced limitations in their respective regions.

Analysis of tariffs applied in Central Russia regions shows that tariffs are changing in the same way as a result of this decree, as in the Nizhny Novgorod region (purchased heat energy tariffs dynamics is published in the Nizhny Novgorod scientific-technical magazine «Energy efficiency» in the comments to the annual Decree of the Governor on Approval of limits on heat in physical and price indicators (www.nice.innov.ru). The changes in tariffs for purchased heat are shown in the graph below:



Prices for heat energy from boiler houses in Central Russia are currently on average approximately 700 roubles (ranging from 30 to 1500 roubles) for 1 Gcal depending on installed capacity, boiler houses load and fuel type.

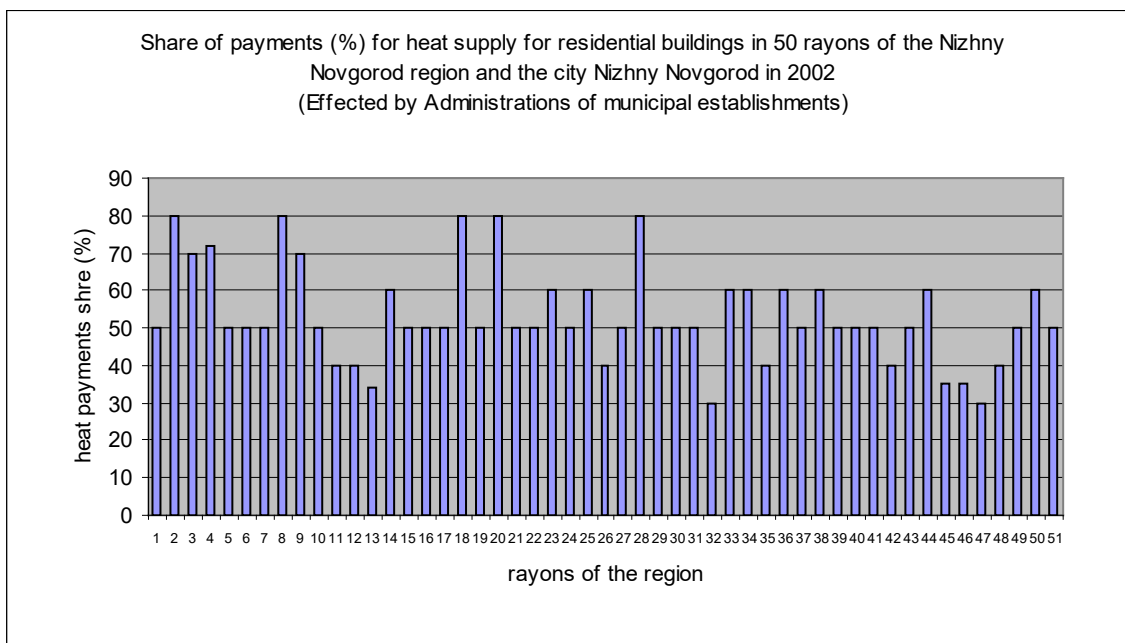
In comparison to earlier years, 1997 was not a typical year from the point of view of tariffs analysis and comparison due to the conducted in the year 1997 prices denomination and change of the dollar currency rate from 5,6 to 24 Roubles per dollar in the year 1998.

However, it may be mentioned that up to 1992 the price of 1 Gcal was uniform over the whole of the USSR at a rate of 8 Roubles (as there was a uniform pricelist for TPS generated energy in the USSR), heat supply tariffs in the year 1992 were set up by the Decree of the Government of the RF №55 (year 1991) «On measures for prices liberalization...» with the increasing coefficient $K=5$. This led to the situation where regional energy commissions were setting only increasing coefficients (indexes) for heat supply to the TPS generated heat tariffs almost each 3 months. After the year 1995 the Federal Law “On state regulation of power and heat energy tariffs in the Russian Federation” N 41-Φ3 from 14.04.95 was adopted. The Law stipulated that RECs were to set tariffs for heat energy not only generated by the TPS (as have been the case previously) but also generated by boiler houses (except from municipal ones, tariffs for which were approved by city Administration); and also sets up uniform prices for all tenants for hot water for 1 person and heat for 1 square meter of living area independently from the type of a heating source.

Dynamics of tariffs for boiler houses appeared only in 1998, when RECs with trained personnel were established in the regions (before this, tariffs were set up by officials who attracted other experts for the purpose of analysis conduction on a volunteer basis (for free)).

At the same time, city administrations started to set payment shares for heat supply costs by tenants. This share in the year 1993 hardly reached 10%. In the same region (in its rayons and cities) the sizes of such share could differ significantly even for neighbouring regions.

For example, the dynamics of payment shares for heat approved for the Nizhny Novgorod in the year 2002 (regionally differentiated– 60%) is shown below. In accordance with the federal standard set by the Gosstroy of the RF for the year 2003 the payment share is set at the rate of 80%, and for the year 2004 – at the rate of 90%. It was not possible to obtain like information for the Vladimir region.



29. As has been described above, the difference between payments to heat producers and payments received from tenants is met by the city subsidy. In the year 1997 this difference, which was reimbursed by budgets, was more than 50%. At present, in the majority of cities the share of payments for heat supply by tenants is 90% of overall sum of the due payment. City administrations provide payments to the heat suppliers of approximately 10% of price for heat supplied to residential buildings. When costs for heat supply to residential buildings will be completely borne by the consumers, tenants will carry a significant burden of monthly payments for heat and hot water (even at 90% the rates are quite significant). These costs are estimated at approximately one third or even a half of the average monthly income. Thus, with the increase of costs the interest from tenants in participation in formulation of tariff policy, and thus in technical improvement, will also grow.
30. The remaining challenges in the area of missing and misplaced incentives, however, are substantial, as described by I.A. Bashmakov, Head of the Russian Center for energy efficiency (non-governmental center), in his article «HCS Reform: we are doing incorrectly what we have planned, or we have planned incorrectly what we are doing?» (2004) – see Box 4: Challenges of HCS reform, below.

Box 4: Challenges of HCS reform

I.A. Bashmakov, Head of the Russian Center for energy efficiency (non-governmental center), in his article «HCS Reform: we are doing incorrectly what we have planned, or we have planned incorrectly what we are doing?», (Published in Nizhny Novgorod magazine «Energy efficiency» №3-2004 and №4-2004 (www.nice.nnov.ru) , - states:

«...The market» of many HCS (housing-communal services) is being well without weight and consumers. Services are «supplied/released» to consumers as if they were sins. Population is eliminated with elementary “market rights”: it can not control volumes and quality of provided services, can not bid the price and even to refuse from consumption of services, the volumes of consumption remains unknown and ,most probably, unchanged. For many of services even suppliers can not ensue implementation of the principle «get exactly the amount you paid for». There is no clarity on the issue who is buying a service: housing sector, housing company, direction of the uniform order or municipality. Moreover, there is no clarity in respect of what is exactly the product being

purchased: resources, basing on which consumption normatives are calculated (Gcal, litres, m³, kWh), or comfort parameters that serve as a basis to assess the fact of the provision or absence of provision of a service and quality of works of the HCS (temperature and humidity in apartments, operation of water-collecting devises, illumination and clearness of streets and etc.). Therefore we are talking about a market, for which we know who is standing at the trading floor but for which we do not know what is laying on the floor for trade, we know who is paying, but we do not know who is making a decision on a purchase»

2.2.2 Uncertainties about use of autonomous heating boilers

31. There are potential opportunities for the reduction of energy used for heating and hot water through the use of building-level boilers (referred to as 'autonomous boilers' in this report). Research conducted in 1996 in the framework of the UNDP and World Bank Programme "ESMAP" showed that in particular circumstances autonomous heat boilers were the most attractive from an economic point of view. However, there are significant information gaps and lack of clarity on the use of autonomous heat supply as alternative to the centralized one in 1996-8. At the time of the project there were only very small number of feasibility studies and demonstration projects that could serve as a learning basis. In particular, the following issues were largely unknown in Russia: the process of technical design and implementation, costs of installation and use, required technical arrangements for the gas supply system and what would be necessary to change its structure, as well the impact on the rayon or regional heat supply systems and their costs and profits. In addition, institutional issues including problems with ownership, responsibility for operation and maintenance, organization of metering and payments, as well as limitations for placement in buildings as a result of existing construction norms and structural factors. Location of boilers in building basements or on roofs is in general a significant problem in Russia (throughout the country), because construction norms prohibit the use of gas equipment, for example in building basements, and the Gosstroy of Russia can change these norms only on the bases of the experiment results.
32. Until 1997 the policy on the use of such boilers was unclear and a lot of information gaps and vagueness (ownership issues, construction norms, absence of the small gas boilers production and etc.) existed. Before the information barriers and lack of experience issues were addressed private investors could not invest into autonomous heating due to uncertainty associated with investment returns and viability of the new approach.

Box 5: Analysis of key issues and experience for 'autonomous' boilers in the RF

Analyzing issues related to autonomous boiler houses it is necessary to take discuss two aspects: 1) 'autonomous' boilers, and 2) private investment. These two aspects should be considered separately.

Until the year 1998, there were no construction norms and rules (SNiP) allowing construction of autonomous boiler houses. Therefore small boilers were not produced in Russia. To detach residential buildings from centralized network also presents is a problem (the major ones are limits on gas and tariffs). From the year 2000 small boilers started to appear in Russia, and thousands of establishments have opted for autonomous boilers, with, in many cases only residential buildings with poor heat supplier remaining with municipalities. Municipalities do not need extra problems with improving conformability for tenants– they will not detach residential buildings to autonomous boilers on their own initiative. These buildings cannot be presented to a private firm, and a private firm cannot invest its own resources into improvement of comfort due to uncertainty the return of its investment.

An example of the difficulties of establishing autonomous, privately owned boilers follows:

There were attempts to transfer boilers into rent in two cities of the Nizhny Novgorod region (Dzerzhinsk and Sergach) with the conditions:

Firm was to do the following: for the 1st municipality to reconstruct boilers and networks by its own means, that were incorporated in the form of investment component into tariff for 7 years;;

for the 2nd municipality - to construct gas instead of black oil - 8 module boiler houses and to sell to it (to municipality) heat energy for residential buildings for 100% of its cost (municipality has to collect from tenants in accordance with the set normative).

However, both programmes were not defended in regional Departments, were not approved by Governors and are not included into the regional budget.

As the result, the results were negative:

for the municipality (tariff increased, but no additional resources were added to the budget. – they were simply waiting for the tariff to decrease again),

for the private company, that hoped that it will receive in a tariff a payment for heat and investments return, did not even receive payments for the supplied heat. Private company therefore has significant losses, and the planned programme did not finish.

Population did not win: there was a budget deficit, – residential buildings were cut off from hot water or heat was not supplied before temperatures dropped significantly;

Such an end of projects in the cities of Dzerzhinsk and Sergach took place due to unqualified actions of a municipality and in-correct actions of a company that targeted only gain of profits.

However, if the requirements of the legislation and normative-legislative documents are met and in accordance with the developed business-plans and feasibility studies, - projects could have been efficient and demonstrative.

2.2.3 Low financial and business capacities

33. Capacity building of private and public sector of the city Vladimir and throughout the Russian Federation was required to reduce barriers to investments into energy efficiency in residential sectors. These issues could be resolved through effective results dissemination followed by introduction of concrete legislative and normative measures.

Projects can be better if administrative potential, its skills and knowledge, would be used in a more efficient way. The major part of residential buildings in the city of Vladimir and all Russia is under municipal management. The more competent experts are also under municipality management. Dissemination of information and model recommendation of variants of installation metering and regulation systems in existing residential buildings depends on actions of these experts.

2.3 Project objectives

2.3.1 Development objective

34. The development objective, as defined in the project document, was to provide sustainable and replicable models and to build the required capacities for overcoming barriers to implementation and realization of energy-efficiency improvements and energy conservation in residential buildings and heat delivery systems in Russia.

2.3.1 Immediate objectives

35. To achieve the project's development objective, the following would be required:
- Achieved outcomes and experience assessed by a maximum possible number of experts and partly applied during the implementation of demonstration projects in Russian regions.
 - Study and dissemination of existing experience, accumulation and collection of data on results of demonstration projects in other Russian regions and abroad is constantly performed, - all this would allow developing scenarios for the further introduction of autonomous heating sources.
 - Ownership, exploitation and maintenance, metering and billing models, which satisfy various stakeholders and are in conformity of the legislation in force, created.
 - Combined effect from the implementation was delivered to and voted by federal and legislative authorities.
 - New technical and building-construction normatives and rules approved; these normatives and rules will further promote development of the autonomous heating where it is appropriate and which are to show energy audit results, feasibility study and business plan. Such actions will make a success from creditors and investors.

- Consequences for rayon (sub-regional) heating and gas distribution systems defined.
 - Continuous training, demonstration and replication of efficient experience conducted.
36. Therefore, the technical, legislative, geographical, economic and environmental expediency criteria and recommendations on the proper policy measures and approaches towards development of the autonomous heating sources network, including creation of the necessary environment and/or provision of technical assistance in support of reduction of main market barriers, are to be developed.
37. The specific immediate objectives of the project defined in the project document were:
- Objective 1:** Creation of a prototype of the legislative and institutional model of the heat and hot water consumption-based metering and billing system – a more fair system of payment - in the city of Vladimir.
- Objective 2:** Study and demonstration of the technical, economic and environmental expediency and consequences of the autonomous heat sources installation in three residential buildings.
- Objective 3:** Human resources training and creation of the base for the analysis and replication of energy efficient projects.
- Objective 4:** Creation and functioning of the Project Implementing Units in Vladimir and Moscow.

2.4 Main stakeholders

38. For the coordination and successful implementation of the project activities the following organizations are relevant:
- a) UNDP/GEF (GEF Executive Agency),
 - b) UNDP and GEF Representations in Russian (Project Manager)
 - c) UNECE (UN Economic Commission for Europe) and the «EE-2000» project
 - d) Ministry of Industry, Science and Technology of the RF (Steering Committee of the Project, National Execution Agency, National Adviser)
 - e) RUSDEM (Agency for the dissemination of Project results)
 - f) State Committee of the RF on Environmental Protection
 - g) Administration of the city Vladimir
 - h) Department of Housing and Communal Services (National Implementing Agency)
 - i) Associated Agency – Management on UN project services (national manager).
 - j) Project Implementing Unit in the city Vladimir
39. National Adviser on policy, coordination and experience dissemination is to ensure coordination with the Moscow Project Implementation Unit for the World Bank Project on Transfer of the Budgetary Residential Funds (PTBRF) on the political decision-making level. On the level of execution in the city of Vladimir, the coordination with the PTBRF is conducted by the Department of Housing and Communal Services of the City Vladimir Administration.
40. A number of project goals are linked with other projects conducted in the city Vladimir. To this end, coordination during the project duration between various organizations is a necessary element for the project implementation, including activities of the Government of the RF on the basis of loans provided by World Bank, with United States Agency for International Development, European Union, Government of the Kingdom of Norway and other organizations, whose activity in one way or another are linked with this Project.
41. There are some groups to which the project brings concerns related to their financial stability. These include local organizations in Vladimir that provide centralized heat supply (AO-Energo, MUEs for heat distribution networks, HCS, repair enterprises and fuel supply organizations). These organisations are understandably the least interested in successful project implementation and replication, for the following reasons:

- a) Their profits would decrease with a decrease in heat energy and hot water consumption. This means that they are likely to submit proposals to regulatory authorities on tariff increase or increase of the overhead costs for the intermediary services for other groups of consumers that do not participate in the project.
- b) Repair enterprises potentially lose a share of their annual activities on rehabilitation of outdoor heat distribution networks.
- c) Fuel supply providers also lose part of their profit due to a potential decrease of fuel consumption due to a shift of consumers (buildings) to autonomous heat and gas sources. Efficient autonomous boilers may require between 155 and 160 kg of oil equivalent to generate 1 Gcal of heat in comparison with the declared average statistics 231 kg of oil equivalent per Gcal (this figure implies gas boilers efficiencies below 62%). However, Gosstandart of the RF set a standard on all gas boilers applied in Russia stipulating gas boilers efficiency shall be not less than 92%, which in general does reflect the reality. Moreover, The RAO «EES Rossii» declared that losses in heat distribution networks of thermal power stations are 20%. For autonomous boilers we would expect system efficiencies over 90%.

2.5 Results expected

42. The project was designed in such a way as to address the three main issues as identified at the time for formulation: 1) misplaced or missing incentives; 2) uncertainty on the use of autonomous boilers, and 3) capacity to analyse financial and economic aspects of investments and develop bankable proposals.

The expected results, as described in the Project Document, were thus:

- a) Removal of the incentive-related barriers, providing:
 - (i) Incentives for energy saving investments by households and tenant associations;
 - (ii) Incentives for district heating companies to reduce losses in district heating networks; and
 - (iii) Structures allowing financial returns from energy saving to flow to those making the investments.
- b) Demonstration of the optimum use of autonomous heating systems resulting in energy saving through the economically optimal balance between building level and district heating systems depending on urban geography and population densities. This would remove barriers to investments in autonomous heating systems.
- c) Increased capacity to conduct economic and financial analyses for energy efficiency projects funded by public and private financing institutions.

Once the key barriers tackled were removed, future energy saving activities were expected to follow.

43. The project document includes the general expected results as described above, but does not give indicators against which the achievement of envisioned results can be measured. This gap is discussed in more detail in section 3.1 below.

3. Findings and conclusions

3.1. Project formulation

3.1.1 Design

44. In the opinion of the evaluators, all objectives and directions that were included were urgent and relevant as defined during the period of formulation of the project document and definition of tasks. The Project Document was formed in the period marked by:

- a) Non-understanding of technical norm setting in Russia and almost its complete absence because it was not needed for the municipal heat supply systems exploitation and when costs of heat supply to residential buildings were financed up to 90 % from a budget;
- b) Absence of the basis and experts to correct formulation of calculations of costs of implementation of heat HCS supply system projects in market conditions;

At the time of project formulation there was no system in place that would require municipalities or heating companies to make calculations of heat production costs from each boiler house. If municipal heat networks enterprise had under its jurisdiction 5-15 boiler houses and networks from TPS then costs were summed up and the differentiated tariff was set up. To date the normative basis is under development. Regional energy commissions (RECs) have started since 2003 to train heating companies to formulate calculations for each boiler house and to differentiate them, in case there are sever boiler houses

- c) Absence of state and administrative controlling bodies (institutions) for energy saving processes in the HCS sector, and thus related to it – absence of model financial schemes for the design, development and implementation of regional programmes.

In the interim, a number of these issues have been tackled – partly as a result of activities implemented under this project, and the current situation is thus quite different from that at the start of the project.

45. The project document contains numerous outputs - some of which turned out to be hardly relevant, virtually impossible to implement, or ambiguous. In the opinion of the evaluators these outputs could not have been designed differently without the benefit of hindsight.

For example, "Output 2.7: "Research on impact for future changes in gas distribution and heating system..." Although such research is urgent, the output achieved depends strongly on the perspective of the researcher (supplier or consumer; of heat or gas). In any case, for a city, in general, it is not possible to make this an achievable and useful task, since General Plans and Schemes of heat supply of the city development do not depict reality. After the year 1992, due to numerous transfers of engineer networks from one balance into another and reduction of production loads of boiler houses and TPS, it became unreasonable to use General Plans and Schemes for research on a city level. The actual and correct information could have been obtained only on the level of a particular site, but these are numerous and diverse. In addition, for each period of time at which the study would be carried out, the result will be different as well. Thus, Output 2.7 could not be objectively achieved within the context of the project.

46. Somewhat unusual in project designs is the fact that immediate objective 4: "Establish and operate project implementation units in Moscow and Vladimir" was in reality mostly completed before the project started (ie. these activities took place in 1997 before the project was approved). This does not appear to have had any substantial negative impacts on the project. Objective 4 was removed during project implementation and replaced with other objectives / activities.

47. Under objective 1: "Create a prototype residential heat and hot water metering and billing system on the basis of metered consumption", there is some ambiguity as to whether the intention was to establish and operative the billing system "for real" or merely to create the model by which it could be run. While it is clear that the project team would have implemented the billing system fully if they had been given the opportunity by the local authorities in Vladimir, the ambiguity of the project design reduced the pressure to test the billing system and record the real impacts on energy saving from the incentives that would immediately have been created.

48. Sufficient objectively measurable indicators for ensuring successful achievement of activities, outputs, objectives and energy saving not given in the project document. It is thus difficult to measure objectively the efficiency and effectiveness of project implementation. This is closely related to the issues described in paragraph 46 above since clear and measurable indicators would have aided the project management to determine exactly what was required.

Also notable is the fact that no indicators were given as to expected CO₂ emission reductions as a direct and indirect result of implementation of the project. This is particularly noticeable by its absence since the overall project aim is CO₂ emission reductions under the GEF. It should however be noted that the lack of objectively verifiable indicators for climate change impacts / greenhouse gas emission reductions is not uncommon for GEF projects approved in 1996/7.

In the year 1997 tenants paid 10-20% of the costs of heat delivery. The authorities considered that those who were receiving payments, i.e. the heat suppliers, correctly supervised tariffs. But suppliers simply divided costs per square meters and received their profit. To date the norms for heat consumption per 1 sq. meter are approved even though this takes no account of different consumptions for residential buildings constructed with different materials, construction methods or different decades. The Project Document did not highlight this necessity. One of the overall project indicators could have been the achievement of budgetary means savings as the result of introduction of autonomous boiler houses and billing. Billing system required a change in regional legislation on the issue of changing norms and payments by tenants for heat supply.

49. The outputs and activities described under Objective 3: "Build the skills and capacity for energy efficiency project analysis and feasibility studies" appear un-ambitious in retrospect – they were completed within the first 6 months of the start of the project. This meant that ongoing training and capacity building did not explicitly take place after 1998. In the light of the project only being completed in 2004, while beneficial, it is apparent that a more ambitious capacity building design would be beneficial. In addition – but closely related - no mechanism was designed to provide for sustainability of capacity building activities.
50. During implementation the project team realized that two important objectives were missing from the project design, namely:
- Develop and implement the Project Dissemination Programme in the Russian Federation and the CIS countries (added as objective 4 or 5, replacing the original objective 4 which was achieved before the project started – see paragraph 46 above).
 - Assess and measure environmental impact (climate change mitigation potential) of the project (added as objective 5 or 6).

Unfortunately, no new verifiable indicators were created for the two new objectives.

It is the opinion of the evaluation experts that the additional objectives positively influenced approaches for the replication of the project design and project results.

51. The rules of payments of bills by citizens needed to be reviewed by the city Deputies in connection with the project. This could have taken place if the Project implementation had been conducted with greater participation of region and city Deputies on the initial stage of design and if the Project Document would have included relevant indicators to guide the decision-making process. This could have improved Project outputs and results and the project efficiency and sustainability.
52. All risks mentioned in the project document were clearly present at the time of project design. During implementation a number of other risks became evident which had not been explicitly identified in the project document. There was, for example, a risk not to get approval for the installation of autonomous boiler houses on buildings at all, but this work was conducted and, to an amazement, fully. There was a risk not to have opportunity to conduct monitoring of heat consumption in apartments in the Project Activity Zone (92 residential buildings), but the database is available at the Project Service Unit, - thus it has been done successfully. The risk of not finding money for co-financing in Russian HCS sector always have been and still remains always.
53. One risk correctly highlighted in the project document was the risk "that municipal regulations may not be enacted (Output 1.3), thus preventing all remaining portions of the objective (Outputs 1.4-1.8) from being realized, and preventing the establishment of the proper incentives for future energy

efficiency improvements”. (Output 1.3 states “Enact municipal regulations necessary for consumption-based metering and billing”). To mitigate this risk a ‘prior obligation’ was set stating “Prior to grant effectiveness, the Vladimir city administration will enact a decree stating its commitment to produce Output 1.3 of Objective #1.”. However, in reality, the city administration did enact the required decree, yet, despite this precaution, the billing system could only be simulated, not implemented in reality. Indeed, in the experience of this project, decrees supporting projects cannot be considered sufficient to change of legislation, norm setting or financing, and the only sufficient guarantee is to vote on a legislative act of the region.

54. Overall, in the light of the above discussions, which benefit from hindsight, and with provisos on the lack of project indicators, the evaluation team believes that the project design, although having some drawbacks, could not have been substantially different from that proposed. This particularly applies to the two key objectives (1 and 2).

3.1.2 Relevance and country ownership/drivenness

55. The project has been timely and topical over all period of project implementation and remains urgent up to present. Because the project was highly relevant and touched the core of numerous economical and social factors, it has not been implemented without pain and difficulty (see Box 6: Highly relevant, but painful and difficult).

Box 6: Highly relevant, but painful and difficult

Major directions of the Project – they are urgent to present. But they are solved painfully as they touch all sectors of economy. Of course, the major in all these - population (tenants). They are to pay for everything. How and how much, and whether family budgets will be enough for this, and whether exactly this amount shall be paid, how to calculate it and to check it – these are main question to day. They have not been put before, because the payments were so small. Nobody spent time for such an investigation.

Due to un-forecasted increase of heat supply costs and ongoing barriers to administration of processes of energy efficiency improvements from behalf of governmental organizations (due to constant reorganization of state energy inspection bodies, that was ongoing during all the period of the project implementation), – the Project acquires even bigger importance.

56. The administration of the city Vladimir is also proud of the implemented GEF/UNDP project in the region, especially as regard to installed autonomous boiler houses for heat supply to 3 residential buildings. This is proven by speeches of heads of the city on various forums, including the celebration of the launch of the first boiler house in the year 2001. Development principles towards implementation of similar projects are used by other regions for the HCS sector and by NGOs in the city of Vladimir. This proves the project expediency and local ownership / drivenness.

The project remains in the ownership of the municipality of the city of Vladimir because the city was promoting the Project and provided with its normative and legislative functioning.

57. Transfer of three autonomous boiler houses into confiding management to a private company allows to trace (monitor) functioning of the whole Russian market mechanisms applicable for a use in municipal system of heat supply to residential buildings and to disseminated the experience. Russian regions are in need of this experience.
58. On the basis of the created prototype of the consumption-based heat and hot water metering-billing system the monitoring of calculated-actual heat carrier consumption on apartment level is conducted. The differences between these data and set up norms are then analyzed with the city Administration. All this played a positive role – the database of planned and actual consumption of heat carrier is created, it is possible to dispute and correct normatives that are set only in agreement of city deputies – and to transfer experience on the monitoring results into other regions.

Box 7: Relevance of the billing system as identified by the project team

The Project Service Unit provides “plusses” of the created prototype of the consumption-based metering-billing system in order to justify actuality of the created in the framework of the Project Model of Billing, follows:

- Formation of real economic incentives for population for heat energy consumption in a economic way.
- Transparency of the heat energy payment system between “Seller” - the heating company, and “Buyer” – municipality, tenants. Reduction of opportunities for “misreporting by intent“ and other mismanagement activities. (methodology of distribution of volumes and costs of the supplied heat energy between consumers).
- Cure of the payment system and increase of investment attractiveness of municipal hat supply.
- Creation of a database on city residential building sector funds (Methodology of Certification).
- Quality and quantity control of supplied heat energy from behalf of the «Buyer» - municipal enterprise (Methodology of Monitoring).
- Creation of conditions for stimulating energy saving measures and installation of meters (heat meters, meters of cold and hot water, thermostatic valves, DHP and etc.);
- Transition from monopoly – like generalization-distribution model to a market competitive relations in the field of heat supply and involvement of public into this process.

Cumulative social effect linked to the understanding of tenants-owners of privatized apartments, of tenants associations and HCE of their role in management of ownership and control of communal payments

59. The methodology and sequence for assessment and inventory of greenhouse gases emissions level are developed in Russia on the basis of the Project. The documentation on legalization, verification, certification of the climatic result is prepared (see Box 8).

Box 8: Ownership of results of work on GHG emission reductions

In the framework of the Project the “Sequence of centralized accounting of materials on greenhouse gases emissions and absorption by sinks and results of climatic projects, which reduce anthropogenic greenhouses gases emissions or enhancing sinks by subjects of economic activities that perform their activities on the territory of the RF” is developed and approved by the Order of the Roshydromet from 23 March 2001 with №40 (Registration of the Ministry of Justice of the RF from 21 may 2001with the № 2719). Report of V. Potapov *Implementation of Environmental Activities under the Project*, 26 pages.

The experience of conduction of calculations and testing of the “Sequence” are presented in Book 6 « Stimulation of greenhouse gas emission reduction as a mechanism for energy saving and energy efficiency in Russian residential building sector and heat supply” (is ready to send to press, distribution – specialized seminar)

60. For a long time (1992-2004) the direction of investments for improvement of production and consumption of energy remains urgent in the Russian Federation due to low wages and significant inefficiency of existing system of energy production and consumption in Russian municipal housing sector.

Energy saving activities that are being stimulated with the introduction of billing, monitoring and certification:

- Installation of individual hot and cold water consumption on apartment level (decrease of water consumption and decrease in payments for heating hot water supply).
- Installation of heat radiators with thermostatic valves in new buildings (improvement of comfort and reduction of heat consumption).
- Installation of DPH (heat distributors) in buildings equipped with thermostatic valves on heat radiators (real monetary savings for tenants due to available direct regulation of heat consumption).
- Warming of buildings (basements, garrets, entries, glassed balconies, installation of glass packages).

- Installation of heat meters in buildings allowing for quality control of actually consumed heat and elimination of possibilities of misreporting by intention and other mismanagement activities from behalf of heat supply companies.

Box 9: Major priorities of the 2003 energy strategy

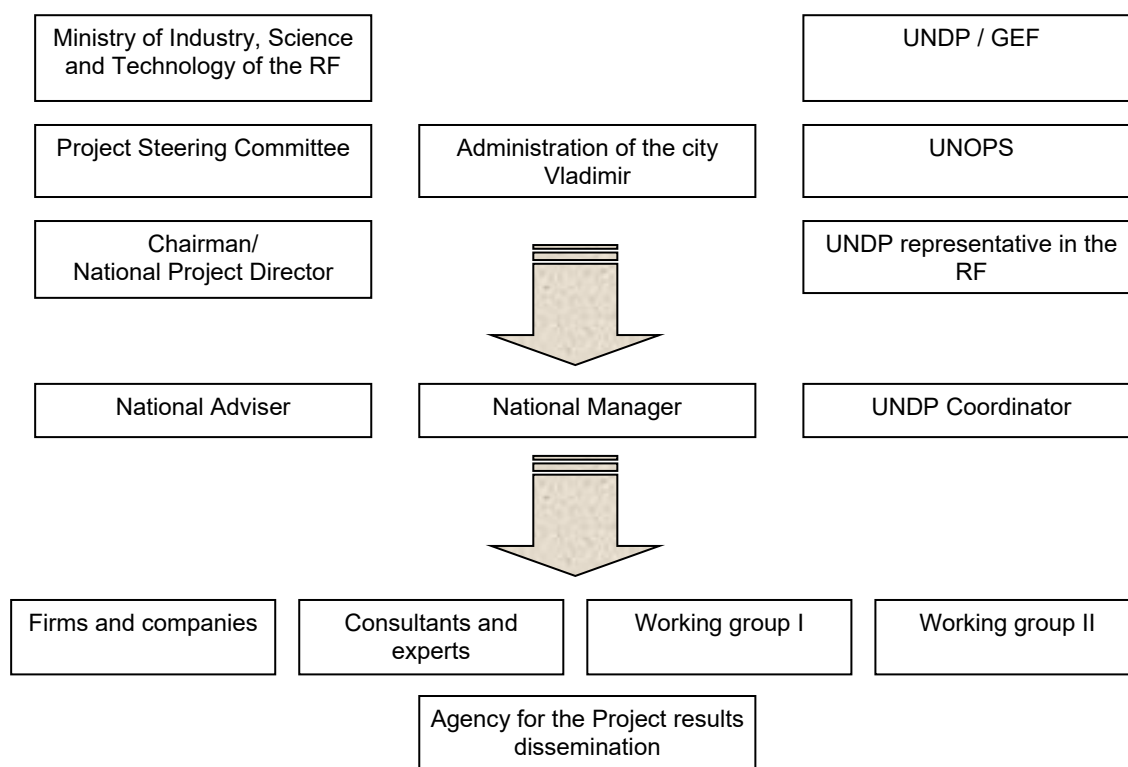
Major priorities of the 2003 Energy Strategy of the RF for the period up to 2010, include

- reduction of specific costs for generation and use of energy resources by means of rational use, application of energy saving technologies and equipment, losses reduction;
- improvement of financial sustainability and efficiency of the use of a energy sector potential, increase of the labour productivity.
- Maximally efficient use of natural fuel-energy resources and energy sector potential for economic growth and improvement of the quality of living of the citizens.

3.1.3 Role of stakeholders

61. The role of stakeholders at the stage of the Project Document formulation was evaluated in accordance with their capacities at that period. Based on the participation of stakeholders in Project implementation the functional system of Project execution and coordination has been developed and realized, as well as the model of implementation of international project of national execution has been created
62. The organizational scheme of the Project is presented below. It was improved by the project implementation team, but with minor differences from that described in the project document.

Organizational scheme of the project.



63. The three-level system implementation has allowed the participation of international organizations, federal agencies and municipal formations. International organizations have provided financing of works on projects and attraction of international specialists.
64. Federal level was necessary to secure national contributions in cofinancing of works and to guarantee the conformity of projects goals to urgent problems of Russia, to disseminate results obtained on local (municipal) level being a testing ground for creation and testing of real replicable models.

65. This system has allowed determining necessity of involving particular organizations and their role in achievement of project goals, including:

- UNDP/GEF (Executive Agency GEF) – Project Goals are in conformity with the GEF Working Programme № 5 (“Elimination of barriers to energy saving and energy efficiency”) adopted in February 1996. Since district heating systems and residential buildings in Russia have standard devices and performances, there is a great potential of CO₂ reduction via dissemination of successful models and positive experience over the country if efficiency improvement activities show to be successful in solving problems under conditions of a region. GEF/UNDP Project Manager carries out general management of the Project.

UNDP Representation and project GEF Group (Project Management Group) in Moscow exercise control over project budget and all project expenditures.

The Representation is also responsible for conclusion of contracts with personnel and subcontractors in Russia.

- United Nations Economic Commission for Europe (Project Energy efficiency – 2000) – exercises control and monitoring of project implementation for the purposes of dissemination of experience of High Energy Efficiency Demonstration Zones in environmental, social consequences and economic results of climate change.
- World Bank – has secured the subloan granting for installation of heat energy consumption metering devices according to the Project of Transfer of Budgetary Residential Fund (PTBRF) in Vladimir. World Bank investments in the city Vladimir allow the GEF financial investments in efficiency increase to achieve especially good results in this city, since the conditions created will become a support and addition to the current and future capital investments.
- Ministry of Industry, Science and Technologies of the RF (at the present time: Ministry of Education and Science of the RF) – acts as the Project Steering Committee: provides realization of project policy, carries out management, bears responsibility for implementation of project measures and use of project resources by the most efficient means and for obtaining specified results called for promotion of socio-economic development of the Russian Federation. A significant part in carrying out management of project is given to coordination of cooperation between diverse organizations within the framework of project objectives and goals, including personnel selection and its activities in project implementation, settlement of matters of payment for work carried out.
- National Director of Project manages Project Committee and is responsible for fulfillment of directives of the Committee and provision of proper execution of a Project.
- National Adviser, functions of which are determined by the Project Document, ensures coordination of experience dissemination on the level of political decisions.
- Russian Association of Demonstration Zones of Energy Efficiency (RUSDEM) – acts as the Agency of Project Results Dissemination: executes interactive cooperation and exchange of experience between Project participants and Russian region representatives via holding virtual conferences. Uses information exchange system of Russian demonstration zones of high energy efficiency for exchange of experience and replication of Project results. The permanent project information portal - Web-site of Project - was created.
- Vladimir City Administration – ensures establishing normative-legal and legislative basis for project implementation. Provides organizational support for the project by providing premises and placing of Project Services. Matches selection of buildings and organizations for participation in the project. Formulates and realizes tariff policy. Decisive factor for project success is the intention and possibility to support actual consumption - based metering and billing system on the part of Vladimir city administration.
- Vladimir region Administration – ensures establishing normative-legal and legislative basis in the region enabling conduction of experimental activities for reconstruction of heat supply systems and fuel use in cities of the region. Determines the region tariff policy for heat supply in conformity with the federal tariff policy.

- Vladimir City Department of Housing and Communal Services – acts as a National Implementing Agency: provides interaction of present project with Moscow group for implementation of the World Bank Project of Transfer of Budgetary Residential Fund (PTBRF). Provides premises for the Project Services. Important coordination spheres are as follows: a) installation of heat energy meters (in the course of PTBRF) in buildings, where the UNDP/GEF project metering and billing measures are planned; b) coordination of repair and construction operations in buildings which are subject to reconstruction according to PTBRF and construction operations related to installation of autonomous heating boilers in the framework of the UNDP/GEF project; c) social studies among the tenants; d) activities aiming at public information.
- Project Implementation Service in Vladimir City – the National Manager:
- Project Implementation Service: provides creation of key strategy and tasks setting for development of information-methodical and institutional provisions of works on certification, monitoring and billing of heat supply system, including technical and economical aspects. Works out efficient approaches and standard forms for the execution of survey and certification. Executes survey, building selection, development of techniques and software for maintenance of operation of metering and billing system model.
- National Manager - coordinates works on Project between the city authorities and other Project participants in Vladimir. Is responsible for coordination of works with the administrative bodies and other Project participants (World Bank, USAID) in Vladimir. Ensures preparation of personnel duties, contract terms and conditions, specifications for subcontracts and technical requirements, technical characteristics of equipment, training course programmes, lists of prospective consultants and firms. Manages the Work Groups.
- OOO NPP “Electrontechnoservice”: Private firm for maintenance of system of functioning of metering and billing system model. Carrying out normative calculations, monitoring of energy actual consumption and preparation of heat supply bills payable by tenants.
- OOO ‘VladESCO’ – Private firm for maintenance of autonomous boilers functioning and carrying out of measures on optimization of fuel use and heat energy production, to which the boilers are transferred into trust management according to an agreement with Municipal Property City Management Unit.
- Heat supply enterprises in the city of Vladimir - responsible for qualitative heat supply for consumers in accordance with the set up norms.

3.1.4 Replication approach

66. Project replication takes place principally through publications from the project – these took the form of booklets, papers, and conference participation. While in the original design, dissemination was implicit within objectives 1 and 2, the project team added a new objective “Develop and implement the Project Dissemination Programme in the Russian Federation and the CIS countries.”. This added substantially to the plans in the original project document.
67. A second objective was added during execution, “Assess and measure environmental impact (climate change mitigation potential) of the project.”. These two additional objectives positively influenced approaches for the replication of the project design and project results.
68. In the opinion of the evaluators, the somewhat passive replication approach (based mostly on publications) was appropriate for this project given the high interest in the subject from stakeholders throughout the country. A more active approach to replication of the capacity building activities under objective 3 would have been very valuable.
69. From a design-for-replication point of view the virtually 100% grant provided by the GEF for project activities is certainly questionable. Equipment purchased was certainly state-of-the-art, but appears to have been the ‘most expensive that could be afforded’ rather than the ‘most appropriate for local needs’. This is evident in the choice of metering and controls installed (the project used electronic meters and thermostatic valves, both of which are fairly luxury items and less common than simple evaporative meters and manual valves even in Western Europe), and the three imported building-level boilers. In the case of the boilers, however, there is justification in those selected since the

demonstration focused mostly on what could be done. It would however be interesting to know how decisions might have been different had there been a substantial amount of local co-financing in capital expenditures. This may have added to the replication value of the project. From a design point of view, it should be noted that projects with almost 100% GEF funding were not exceptional in 1996, and that the GEF has changed co-funding approaches substantially in the intervening years (currently GEF expects leverage of at least 1 to 5 (five times more co-funding than the GEF grant), and preferably 1 to 8 in the climate change portfolio).

3.2. Project implementation

3.2.1 Project execution

70. The project implementation team performed activities aimed at reaching objectives stated in the Project Document. These activities were adjusted and performed with some additions in order to ensure smooth project progress.
71. Due to interdependence between projects (the UNDP/GEF project made use of equipment installed under the World Bank project) the project stages were synchronized with implementation phases of the World Bank projects, including the World Bank Project on Transfer of the Budgetary Residential Funds (PTBRF) (supervised by the Ministry of Economic Development and Trade of the RF). This caused some delays in project execution, for example because billing system meters for heat energy consumption by residential buildings, covered in the WB Project Activity Zone, were installed in the framework of the World Bank loan.
72. Execution of the terms stipulated in the Project Document faced additional barriers due to changes in federal and regional policies. In particular, the following influenced negatively the Project progress:
 - a) inflation processes in the RF (with the taken forecasted inflation at the rate of 17-10%, the actual inflation in heat supply was 30%),
 - b) dollar exchange rate growth in the year 1998 of over 400%,
 - c) structural changes in the energy sector administration and management (up until the year 1997 the Department on energy saving was a part of the Ministry of Energy of the RF. It was abolished and part of its responsibilities and tasks was put on Gosenergonadzors. The latter ones at that moment and were also at present are still in the process of internal reorganization);
 - d) change of the top-management of the Executing Agency
 - e) other issues related to licensing and certification, as well as tariff policy.
73. Project results information dissemination in support of the project implementation was conducted by the nongovernmental organization RUSDEM, which used its regional network and electronic information technologies, as well as traditional means of information dissemination (forums, seminars, conferences, exhibitions, publications).
74. Three-level system of the international project execution ensured participation of international organizations (UNDP and UNECE), federal bodies and municipal establishments. The international agencies provided for project activities financing and attraction of international experts. This system allowed identifying necessity of involvement of particular organizations and their respective roles in achieving project objectives. It also ensured the three-level analysis of the process. It is not however without drawbacks, which became evident during initial conflicts during the project start-up and long-decision-making chains. A concrete example appears to be in the decision-making process for selecting project evaluators – the entire process lasting almost one year from initial call to final execution of the work. This decision-making process is discussed further in paragraph 80 below.
75. The project implementation team achieved the following concrete objectives, which are reflected in the creation of interlinked institutional (management), methodological, normative and technical activities set up to reach the Project objectives stipulated in the Project Document:
 - The prototype of the billing system for heat and hot water for 92 residential buildings in the city Vladimir was created. The Project Service Unit forms bills for each apartment basing on the results of monitoring of actual consumption of heat energy for heating and hot water supply for the residential buildings. It transfers these bills to the DHCS of the city Administration for conduction

of comparative analysis and further submission to the city legislative body in order to influence deputies to adjust the city norms for the heat consumption which are currently based on per 1 square meter and per person charges.

The prototype billing system has not yet been implemented since legislation and normative policy has not been approved by the city administration. Thus, the final state consisting of the introduction of payments for heat energy in accordance with the bills issued by the private company «Electrotekhservices», which service the billing system, with the calculated-metered data of heat and hot water consumption by tenants in the Project Activity Zone is still to be implemented. The original project design certainly recognised this risk and attempted to put in place the necessary prior obligations (see paragraph 53 above). The fact that the billing system could not be implemented in reality was certainly most unfortunate. It is clear however that the project team made commendable efforts to get the system approved despite lack of sufficient political support in the city administration, and have managed to get good value out of the simulation activities, which were carried out instead.

- Autonomous boiler houses are installed and are functioning in 3 residential buildings in the city Vladimir. The Municipality, the owner of buildings, receives bills for the generated heat energy. Bills for tenants are issued by exploitation service of the residential building basing on the legally approved norm. Boiler houses are controlled and managed in automotive mode.
- In accordance with the Project Document objectives, trainings are conducted in the city Vladimir and Moscow in 1998. The training was comprised of several stages, including:
 - (i) Training of Russian experts in skills of efficient analysis and development of business-plans of energy saving projects;
 - (ii) Training of top-managers that are not dealing directly with business-plans development but who require understanding of processes of project development and structure of its business-plan;
 - (iii) Generalization of experience of activities on training course and dissemination of full information on financing of energy saving projects for municipal authorities in other cities of the RF.
 - (iv) As the result of analysis of presented applications the organizations of the city Vladimir, which personnel was invited to attend training courses, were defined and selected:
 - (v) Administration of the city of Vladimir represented by the Department of Housing and Communal Services (DHCS);
 - (vi) Housing rayon exploitation enterprises (HREE);
 - (vii) GEF Project personnel;
 - (viii) Personnel of the World Bank Project on Transfer of the Budgetary Residential Funds (PTBRF);
 - (ix) Municipal enterprise “Heating networks”
- Experience is being disseminated by the nongovernmental organization RUSDEM and Vladimir services in accordance with the specifically developed Programme (on business-planning and financial engineering), and is being replicated in Russian regions to an extent allowed by actual Russian legislation and normative policy.
- Experts of the federal environmental organization Roshydromet developed a methodology and sequence of assessment and inventory of the greenhouse gases emissions for the Project. In accordance with the methodology the calculation of the Project greenhouse gases emissions reduction was carried out. The documentation on procedures of legalizations, verification and certification of the potential Project climatic result has been prepared.

3.2.2 Project management and planning

76. Planning and administration of the project were carried out in conformity with the strategy and organizational scheme of the project document, and according to the laws of the Russian Federation.

77. Ongoing monitoring of project implementation and the achievement of intermediate results was carried out by the UN Economic Commission for Europe in the framework of the larger, international programme “Energy Efficiency - 2000” and “Demonstration zones of high energy efficiency”, which was taken into account during Project implementation planning and administration.
78. The National Project Steering Committee under the auspice of the Ministry of Science of the RF and with the organizational control by RUSDEM met every 6 months to discuss overall project policy, strategies and implementation issues. The National Project Manager lead the project on behalf of the National Executing Agency and by employment of project staff (management Unit) in the city Vladimir, and with the established in the year 2002 Project Service Unit together with attracted private companies OOO NPP “Elektrotekhnoservice” and OOO “VladEsco” to maintain the Project Activity Zone (i.e. the zone of the billing model application) and to maintain functioning of autonomous boiler houses. The UNDP project manager together with a project manager in Vladimir defined personnel responsibilities and duties, developed technical parameters and requirements for subcontractors, specified equipment, assessed ongoing training needs and maintained the list of consultants and firms.
79. In accordance with the Project Document and the planned project objectives, outputs and activities, the project implementation team held planning meetings with the head of the city Vladimir Administration, defined urgent activities and activities for future years of the project implementation, defined participation from relevant stakeholders and arranged direct involvement of relevant experts in Working Groups and the Project Service Unit.

Decisions on investments and construction – such as the installation of heat consumption meters and the construction of the three autonomous boiler houses – were made in consultation with experts within the city DHCS. In addition costs and urgent activities were estimated, as well as implementation arrangements made with the participation of the city department on pricing policy and the financial department of the DHCS. Other key areas of co-operation included:

- a) installation of heat energy meters;
 - b) coordination of construction and repair works in buildings, where the meters have been installed, and construction works;
 - c) social studies among the tenants of residential buildings;
 - d) measures on public information;
 - e) participation of personnel from the five other cities in training measures;
 - f) dissemination of experience of metering and billing system operation;
 - g) creation of a database of building characteristics.
80. Project administration had a fairly complicated structure, with multiple levels of approval and decision-making in Vladimir (Project Management Unit, city Administration), in Moscow (Moscow project leader, UNDP and Ministry), and internationally (UNOPS). In the opinion of the evaluators the administrative structure was generally beneficial, ensuring necessary intervention of project coordinators and decision-makers. The long decision-making chain however does appear to have delayed decisions, and on occasion produced frustrations at various levels. There were also crises at various stages – during project start-up as well as following criticism during the mid-term evaluation – which took a long time to resolve. These disadvantages however were more than compensated for by the benefit of ensuring buy-in at the city and federal levels. A balance however needs to be struck between participatory approaches and efficiency of decision-making. In retrospect this balance appears to have been ‘fair to good’ in this project.
81. The proposed project schedule was not kept, and the project extended far longer than originally envisioned (the original plan given in the project document gave, for example, a deadline for ‘Final project review of all results’ as August 2001). While it would have been preferable that some of the avoidable delays had been avoided – particularly during the first years of the project – the evaluators believe that the flexibility in timing, and extended implementation, was the right decision and was justified. Project budgets were not extended (the costs and activities were spread over the longer period).

82. To achieve Project objectives in accordance with the project plan and to enable the possibility for needed changes in the administration of state structural departments, the following regional normative acts and Governmental decisions were adopted:

Decrees of the Government of the RF:

- from 02.08.1999 №887 «On perfection of the households and communal services payments system and social protection measures for the population »;
- from 01.07.2002 № 490 «On conduction of experiment on application of economic model of the HCS reform»;
- from 02.04.2002 №226 «On pricing on electric and heat energy».
- from 15.06.98 N 588 “On additional measures to stimulate energy saving in Russia” ;
- from 27.12.97 N 1629 "On perfection of the state regulation of tariffs on electricity and heat energy " ;
- from 21.12.99 № 1410 «О создании и ведении единого государственного фонда данных о состоянии окружающей природной среды, ее загрязнении»;
- from 14.02 2000 .№ 128 «On adoption of decree on provision of information on the state of environment media ...».

Order of the Gosstroy RF from 26.06.1998 №17-125/1 «On adoption on the normative-methodological materials on realization of the HCS reform conception» approves the HCS reform in the RF sequence.

(In accordance with the HCS reform conception, the transition towards 100 per cent payment for housing and communal services by population shall be reached to the year 2004: in the year 2001 – up to 80%, in the year 2002 – up to 90%, in the year 2003 – up to 100%).

Gosstandart RF starting from the year 1998 introduced and effected new construction Rules (additions to operational SNiP II-35-76 «Boiler facilities »), which allows construction of autonomous boiler houses.

Regional normative acts of the city authorities, including:

a) Decrees of the Head of the Vladimir city Administration:

- from 14.09.1999 №244 "On organization of activities in the framework of the Government of the RF project under the GEF/UNDP programme "
- from 20.03.1997 № 325-p "On preparation and implementation of the Government of the RF project under the GEF/UNDP programme”
- from 10.09.2001 №203 «On measures for the implementation of the GEF/UNDP project», which transfers autonomous boiler houses into confiding management to the private company ООО «VladESCO».

b) Instructions Head of the Vladimir city Administration::

- from 03.01.2002 №1 «On payments for heat energy fro autonomous boiler houses» with amendment from 20.02.2002 №47 .

c) Order of the DHCS of the city Vladimir

- from 07.04.2003. №143 "On creation of the experimental Activity Zone of the Government of the RF project under the UNDP/GEF programme" .

Each of the listed above documents positively influenced reduction of administrative barriers to project implementation.

3.2.3 Monitoring and evaluation

83. Project monitoring was conducted by all organizations, acting as Project coordinators, partners and participants, as well as on the permanent basis by the DHCS of the city Vladimir.

Due to the importance of envisaged Project results, monitoring was conducted at a governmental level, as well as on the level of neighbouring relations, basing on the Forum discussions results, - by the Fuel and Energy Complex and Housing and Communal Services Complex experts from regions (Moscow, Nizhny Novgorod and others).

General Project monitoring was conducted by the Project management Group and Project Steering Committee in Moscow with the permanent monitoring from the Project National Manager.

84. Overall monitoring and evaluation followed normal UNDP practice: A Project Steering Committee met every 6 months to discuss overall project policy, strategies and implementation issues. A tripartite review took place annually, annual project reports (APR) were prepared, and an annual Project Implementation Review (PIR) prepared. The project was audited annually. A mid-term evaluation was carried out and completed in 2002. The quality of ongoing monitoring appears to have been satisfactory. The project team made careful note of results of evaluations and the project was adjusted according to feedback.
85. The reporting system used was appropriate for the project needs. The documentation system used both within the UNDP regional office and the project office in Vladimir appeared to have gaps, and it was not easy to locate all relevant information, and track changes in objectives and project scope.
86. Monitoring was hampered by the lack of objectively verifiable indicators in the original project design. This design gap has been discussed under paragraph 48 above. The project did not include a comprehensive logical framework analysis which could have guided implementation.
87. Technical monitoring was detailed and entirely adequate. Details are given in Box 10 below.

Box 10: Technical monitoring approach

The following monitoring is subject of evaluation in accordance with the Project Document:

- (a) monitoring of heat, hot water, gas consumption and in-door temperature during one heating season,
- (b) monitoring of boilers functioning during one heating season including heat, hot water, gas consumption and in-door temperature metering.

Details are given below:

- (a) Monitoring of heat, hot water, gas consumption and in-door temperature.

The goals of the monitoring in the Project Activity Zone were:

1. Comparison of quality and price of heat energy, actually consumed and paid in accordance of issued by heating companies bills.
2. Assessment of the possible change of volumes of payments during introduction of billing into practice.

Monitoring results of the year 2003 shows:

In accordance with the heating companies bills an aggregate heat energy consumption accounts to 99,8 % from the actual (calculated in accordance with billing) consumption for the same period (including for heating – 95,4 %, for hot water supply– 107,4 %), including:

- In accordance with the bills of the 1st heating company (MUE “Teploservice”) was 4,5 % less.
- In accordance with the bills of the 2st heating company (MUE «Teplovie seti») was on 8,6 % more.

Monitoring on the monthly basis shows even large deviations.

For example for the Hot Water Supply – bills of these heating companies showed the following figures for the ration of the consumption to actual (calculated in accordance with billing):

- In accordance with the bills of the 1st heating company in March – 83,3%.
- In accordance with the bills of the 2st heating company in May - 173,1 *(It is possible that the second company did not perform the full heating turn off in all buildings after the official end of the heating season in April, and thus significant extra heat consumption for heating were accounted for the hot water supply.*

(b) Monitoring of boilers functioning is conducted on the commissioned three gas boiler houses. The applied local automatics of the Dispatch System TAC Vista ensured management and control of the uniform dispatch point via modem connection without employing maintenance personnel at boiler houses.

The goals of the monitoring in the Project Activity Zone were: to evaluate parameters of boilers operation and boiler equipment in an prompt way;

- switch on and off boilers and boiler equipment;
- introduce changes in the mode of boilers operation;
- introduce changes in "temperature schedule " of heat supply ; introduce changes in temperature of the supplied hot water;
- introduce changes in "settings" of boilers and boiler equipment operations (consumption of gas, electricity, water; quantity of generated heat for heating and hot water supply);
- to archive parameters and data on boilers and boiler equipment operations.

3.2.4 Progress of the project in achieving its stated objectives/results

88. The project objectives and outputs are assessed individually in the table below.

Objective/outputs	Output
<p><u>Objective №1 (terms of reference).</u></p> <p>To create a prototype of the legislative and institutional model of heat and hot water consumption metering and billing system based on actual metered consumption, aimed at the wide dissemination. To develop necessary legislative and institutional model and relevant software in the city of Vladimir and to disseminate this experience in other cities of Russia.</p>	<p><u>Objective 1 (execution):</u> The legislative and institutional model of the heat and hot water consumption-based metering and billing prototype was created.</p> <p>The model incorporates legislative requirements, institutional scheme, calculation target groups and payment mechanism, energy metering schemes on the building level and proportional distribution of bills per tenant on the basis of the heat distribution models, as well as rules for accounting-calculation procedures on the flat level.</p> <p>The buildings and flats parameters database is developed (98 buildings).</p> <p>Due to lack of agreement in the City Administration the billing system was not used in reality, and data is based on simulations.</p>
<p>Output 1.1 Conception and design of model for consumption-based metering and billing</p>	<p>Output 1.1 The conception and design of the model for consumption-based metering and billing was created:</p> <ul style="list-style-type: none"> (i) Conception of certification of municipal heat supply systems was developed and experimental certification of buildings in Project Activity Zone was conducted. (ii) Database on the city Vladimir buildings and heat supply characteristics and database user manual were developed. (iii) Monitoring of the heat supply in the Project Service Unit activity zone was conducted. (iv) Functioning of the billing system in terms of issuing bills for payments by citizens for heat based on actual consumption was been started:

	<p>(v) Relevant methodologies and special programme software was developed.</p> <p>REPORT “Monitoring results of the municipal heat and water supply in the Project RUS96/G31activity zone” was developed in 2003. The report consists of 3 chapters, conclusions and 19 annexes. Major part of the report with conclusions is presented on 111 pages, includes 56 graphics and pictures, as well as 29 tables.</p>
<p>Output 1.2. Proposed municipal regulations necessary for consumption-based metering and billing</p>	<p>Output 1.2. Normative-legislative basis necessary for consumption based metering and billing was prepared, as follows:</p> <p>During the period of the project implementation:</p> <p><i>Federal Law</i> from 11.02.99 № 33-Φ3 “On amendments and additions to the Federal Law “On state regulation of electric and heat energy tariffs in the RF from 14.04.95 № 41-Φ3 ” was enacted;</p> <p>Following Decrees of the Government of the RF are adopted:</p> <p>from 02.08.1999 №887 «On perfection of the household payments and communal services payments and measures for the social protection of the population»;</p> <p>from 01.07.2002 № 490 «On conduction of an experiment on application of the economic model of the HCS reform»;</p> <p>from 02.04.2002 №226 «On pricing of electric and heat energy».</p> <p>Order of Gosstroy of the RF from 26.06.1998 №17-125/1 «On approval of normative-methodological materials for the realization of the HCS reform conception in the RF» approves sequence of the HCS reform.</p> <p>In accordance with the conception of the HCS reform in the RF, the transition towards 100% payments by population for the housing-communal services should be done in the year 2004: in the year 2001 – up to 80%, in the year 2002 – up to 90%, and in the in the year 2004 - - up to 100%.</p> <p>While the above legislation was adopted, it should be noted that this was not directly as a result of activities of this project, but part of country-wide reforms.</p>
<p>Output 1.3. Enacted municipal regulations necessary for consumption-based metering and billing.</p>	<p>Output 1.3. City authorities decrees enacted, including:</p> <p>Decree of the Administration of the city Vladimir from 03.01.2002 №1 «On payments for the heat energy from autonomous boiler houses» with amendments from 20.02.2002 №47, and the Order of the Vladimir City Department of Housing and Communal Services from 07.04.2003 №143 «On establishment of he experimental project activity zone», by which the experimental Project activity zone was created for the purpose of</p>

	<p>effecting payments by tenants and organizations of 98 buildings in the South-Western part of the city with the use of heat carrier consumption-based metering-billing model. It was defined that for the heat supply for buildings payments will be effected in accordance with the calculated heat consumption norms for 1 m² and 1 person:</p> <p><u>From autonomous boiler houses</u> - basing on the data of the unit on the building level (installed at the boiler house);</p> <p><u>In the billing Zone</u> – basing on the data of the unit on the building level with the consequent comparison with the actual distribution data on flat level with the use of the heat payment distribution units (PDU) data and hot-water-supply tools.</p> <p><u>From the Project Service Unit’ report for the year 2003</u> basing on the actually collected payments for heat supply, the sum comprised:</p> <p>93,5% from costs of the autonomous boiler houses;</p> <p>in the billing Zone:</p> <p>108,6% by the MUE «Teplovie seti»,</p> <p>95,5% by the MUE «Teploservice».</p> <p>(comparison showed difference between actual and calculated distribution between apartments).</p>
<p>Output 1.4. Database of building and apartment characteristics for 40-100 pilot buildings under the domain of one housing-maintenance organization (including more detailed data on 10 pilot buildings for detailed apartment-level metering).</p>	<p>Output 1.4. A database of building and apartment characteristics incorporating 98 buildings, including 92 residential buildings, 6 non-residential buildings (school, three kinder gardens and two shops) was created. Seven of the residential buildings are equipped with heat payment distribution units (PDU), and for 31 residential buildings in addition to building metering units for the aggregate heat energy consumption separate metering units for heat energy for the hot water supply are installed. The rest of the buildings from the zone are equipped with the group commercial metering units for measurement of the heat carrier.</p> <p>The database was created as the result of the conducted certification and the “Certificate of the Project activity zone” and “Information on sub-subscribers” in MS Excel format. For each of the Project activity Zone buildings the information on heat supply systems, hot and cold water supply, ventilation, on conducted energy saving measures, and on sub-subscribers was collected.</p> <p>23,5 thousand people are leaving in the activity Zone; 74% of many-storey buildings (nine and more storey) from which (approximately 70%) are constructed in 1980s; composition of residential buildings: 65 panel, 26 bricks and one-block; in 92 residential buildings there are 8805 apartments, including 41,3% - 2-flat that are inhabited by 1/3 of the micro-rayon tenants, and 31% - 3-flat, that are also inhabited by 1/3 people. Total</p>

	residential buildings area that is heated is 492,6 thousand m ² , from which 54,7 thousand m ² (11,1 %) – are public places, and 8,2 thousand m ² (1,7 %) are under sub-subscribers.
Output 1.5. Ten buildings with flat-level meters installed	<p>Output 1.5. Seven buildings with the heat meters on apartment level and 31 residential buildings with the commercial heat and hot water meter unit on building level were installed.</p> <p>In 344 apartments of 7 pilot buildings the testing and work out of the heat energy consumption metering on the apartment level was conducted with the use of heat payment distribution units – PDU (buildings №5, 9, 12, 13, 16, 20a on the str. V.Dubrova and building №8a on the str. Vasilisina). As a result of an audit the following data was recorded: number of inhabitants, area of rooms, availability and characteristics of meters and controllers for the heat carrier use, data on heating devices. In 31 buildings in addition to the building level metering units for the aggregate heat energy consumption the separate metering units for heat and hot water are installed.</p>
Output 1.6. Established meter reading and billing service with trained and equipped personnel (with capacity to service 40-100 multi-flat buildings)	Output 1.6. The Project Service Unit to run the billing system in the city Vladimir was created consisting of 9 staff members. Meters reading and billing of the Department of Housing and Communal Services (DHCS) of the city Administration for 92 residential buildings was carried out by the Service OOO «Electrotechnoservice», which is staffed with trained and equipped personnel, MUE «Teploservice», MUE«Teplovie seti ». The billing system is fully functional, although residents are not paying according to the bills issued.
Output 1.7 Experience from one year of operating the meter reading and billing “system” and the metering/billing service.	<p>Output 1.7 Experience from one year of operating the meter reading and billing “system” and the metering/billing by project Service Unit, to serve during the comparison with the set normatives if the DHCS of the city Administration, is presented in the Book 5 of the National Report and Certificate of the Project Zone.</p> <p>Calculation algorithm described in the Section III of the «Methodology» serves as a basis for the computer programme for billing population for heat and hot water supply</p>
Output 1.8. Handbook based upon experience with implementing consumption-based billing	<p>Output 1.8. The following documents have been developed and made available:</p> <p>“Instructions and reporting forms for reading group, building level and apartment level meters”</p> <p>“Methodology of volumes and payments distribution for heat energy between consumers”</p> <p>“Municipal heat supply system monitoring results in the Project activity zone”</p> <p>“Certificate of the Project Activity Zone”</p>

	<p>“Software for calculation of heat, fuel needs, losses and payments”</p>
<p>Output 1.9. Ten other cities in the Russian Federation have the full information and experience from activities under Objective 1 of the project</p>	<p>Output 1.9. Experience is being disseminated in other Russian cities. Document package (methodology and software) of the metering-billing system models is being studied in the city Nerungri with the purpose to introduce it in the framework of the World Bank project.</p> <p>The following cities have the full information on the results of the activities conducted in the framework of the Objective №1: Dubna, Moscow, Zelenograd, Omsk, Mytishi, Pereslavl-Zalesskiy, Saint-Petersburg, Saratov, Maloyaroslavec, Irkutsk, Nizhny Novgorod, Arzamas, perm, Vladimir, Ulan-Ude, Cheboksary, Petrozavodsk, Nerungri.</p> <p>There are positive responses with the appraisal of the billing model.</p>
<p><u>Objective №2 (from terms of reference)</u></p> <p>Assess and demonstrate feasibility and future implications of installation of autonomous heating sources in residential and public buildings.</p>	<p><u>Objective №2 (execution):</u> Autonomous gas boiler houses were constructed at three multi-storey buildings with the purpose to demonstrate aggregate institutional, economic, and technical effects from the use of new heating sources constructed and installed with modern equipment and use of technologies in accordance with world experience, at the following addresses:</p> <p>Lenina Avenue, 62; basement boiler house, 2 Boilers, ARIMAX EETA 650, total capacity of 1,300 MW.</p> <p>Besimenskogo Street, 9B; Rooftop boiler house, 6 boilers-modules. WESSEX COUNTY 200, total capacity of 1,200 MW.</p> <p>Levitana Street, 49; detached boiler house, 2 boilers, ARIMAX EETA 650, total capacity 1,300 MW.</p> <p>An audit of residential buildings with the purpose of selection of three buildings for installation of autonomous boiler houses was conducted. Priority was given to those buildings that had poor quality heat supply.</p>
<p>Output 2.1 Experience of operational in Russia and Western Europe autonomous boilers accumulated.</p>	<p>Output 2.1 New construction Rules has been effected in since 1998 (additions to the operational SNiP II-35-76 «Boiler facilities»), they allow for construction of autonomous boiler houses. As a result of this and due to expediency for the last 5-6 years a lot of small gas boilers production facilities have appeared in Russia. For example, in the Nizhny Novgorod region the share of such boiler houses amounts to 54 %, including of unit capacity of up to 200 kW: 1300 units working on gas, the half of which are equipped with the foreign boilers; 207 units working on diesel, 578 units working on coal and, 20 units working on black oil.</p> <p>While the project team fully implemented the requirements of the project, it is accurate to say that circumstances overtook the planned activities.</p>

<p>Output 2.2 Study on technical-economic aspects of autonomous heat supply technology, including boilers disposition.</p>	<p>Output 2.2 Assessment of environmental and economic efficiency of autonomous heat supply was conducted. Books 3-4 with a comprehensive analysis were issued. The draft of the Book “Generalized experience of a private company on exploitation of autonomous boiler houses (financial, technical, methodological, institutional and legislative)” has been prepared and will shortly be published.</p>
<p>Output 2.3. Study on buildings types and infrastructure geographical characteristics, which enable expedient use of autonomous boilers from technical, economic and legal point of view.</p>	<p>Output 2.3. Selection of a building for the construction of a basement boiler house was done on the bases of developed feasibility criteria for autonomous heating installations, which included technical, legislative, geographical and economic criteria.</p> <p>Developed feasibility criteria for autonomous heat sources construction are presented in Book 3 "Methodological recommendation on construction and start of exploitation of autonomous boiler houses".</p> <p>For the selection of particular autonomous heating source configurations the following was taken into account: density of the building construction area in a particular region, as well as the opinion of inhabitants (Inhabitants were quite active in responding to tests: at the house on the avenue Lenina, 62, 48 questionnaires were filled in (30,3%), at street Besimenskogo, 9B – 59 questionnaires (37%) and at street Levitana, 49 – 114 questionnaires (81%).)</p>
<p>Output 2.4. Three buildings are equipped with installed and operational demonstration autonomous boilers.</p>	<p>Output 2.4. Boiler equipment for three separate buildings was purchased and installed via tender procedure and “turnkey” contract. Design, construction and launch works for 3 autonomous boiler houses are conducted in accordance with Russian SNIIP.</p>
<p>Output 2.5. Reporting on experience of three autonomous boilers operations during one full year.</p>	<p>Output 2.5. The draft of the Book “Generalized experience of a private company on exploitation of autonomous boiler houses (financial, technical, methodological, institutional and legislative)” was prepared. Experts demonstrated functioning of the boiler house operations monitoring and controlling software.</p>
<p>Output 2.6. Researching and reporting on institutional-legislative market issues and problems (property, metering and billing, certification, legislative norms).</p>	<p>Output 2.6. A draft of the Book “Generalized experience of a private company on exploitation of autonomous boiler houses” presenting research results on institutional and legislative issues and problems of a market, has been prepared and will shortly be published.</p>
<p>Output 2.7. Assessment of the impact of various scenarios of autonomous heat sources introduction on the future changes in gas distribution and heating systems of the city Vladimir.</p>	<p>Output 2.7. In the books referred to under outputs 2.5 and 2.6 the results of the influence on the future changes are generalized:</p> <ul style="list-style-type: none"> (i) improvement of the heat supply quality in connection with the selection of those buildings for decentralized heat supply, which have poor characteristics of heat carrier;

	<ul style="list-style-type: none"> (ii) fuel consumption decrease as the result of decrease of losses as the result of absence of street heat networks; (iii) functioning of the autonomous heating sources in automotive mode allow the release of experts-operators at boiler houses; (iv) freeing of resources used for exploitation of district heat networks as a part of centralized heat supply.
<p>Output 2.8. Other ten Russian cities have full information and experience from Objective №2 of the Project.</p>	<p>Output 2.8. Books 1-2 of the National Report National Report “Heat Supply in the Russian Federation. Ways to overcome the crisis” was disseminated to all Russian regions. Books 3-4 were disseminated to the most active in the modernization of a regions heat supply.</p> <p>The following cities have the full information on the results of the activities conducted in the framework of the Objective №2: Dubna, Moscow, Zelenograd, Omsk, Mytishi, Pereslavl-Zalesskiy, Saint-Petersburg, Saratov, Maloyaroslavec, Irkutsk, Nizhny Novgorod, Arzamas, perm, Vladimir, Ulan-Ude, Cheboksary, Petrozavodsk, Nerungri and others.</p>
<p><u>Objective №3 (terms of reference).</u> Build the skills and capacity for energy efficiency project analysis and feasibility studies.</p>	<p><u>Objective №3 (execution):</u> Project training programme was conducted in accordance with the Project Document and included the following stages:</p> <ul style="list-style-type: none"> • Russian experts training in efficient analysis and development of energy saving projects business plans; • Training of top and medium level managers who do not deal with business plans development themselves, but needs to understand the business plan development process and structure; • Generalization of activities from training courses for further information dissemination for municipal authorities on financing of energy saving projects in other Russian cities. <p>Training was completed by the end of 1998.</p>
<p>Output 3.1. Group of 20-30 people - the project personnel, district heating enterprises, city administrations, universities and largest enterprises of a city - are trained.</p>	<p>Output 3.1. In accordance with the programme the following personnel was trained: permanent Project staff, DHCS staff– 6 people.,</p> <p>Housing exploitation enterprise – 10 people, Municipal enterprise «Teplovie seti» - 10 people.</p> <p>Two groups of top-managers comprised of 33 and 49 people, representatives of different organizations of the city Vladimir, were trained</p>
<p>Output 3.2. Group of 50 people trained on the basics of the development of energy efficiency projects and understanding of feasibility studies</p>	<p>Output 3.2. In accordance with the programme 3 stages of training for the group of municipal and regional managers comprised from 33 persons were conducted. As the result of training programmes, 3 business-plans for projects accepted by the Vladimir city administration for the realization in the framework of the World Bank</p>

	<p>projects and 2 business plans for implementation in the framework of the GEF/UNDP were prepared.</p> <p>The quality of the business plans prepared as a result of the training sessions appears to be fair. However based on these plans the evaluators were not convinced that the training was sufficiently vigorous.</p>
<p>Output 3.3. Ten other cities in the Russian Federation have the full information and experience from activities under Objective 3 of the project</p>	<p>Output 3.3. An informative project web page was developed and is functioning. It has several thematic sections which can convey information covered in the training.</p> <p>Virtual conference “Problems of metering and energy resources consumption management” is conducted. Scientific-practical internet conference “Energy and resource saving – 21 century” is prepared. Demo-version of the Vladimir buildings and heat supply characteristics database is presented with the wide use of the modern information technologies.</p> <p>Dissemination of the Project implementation experience is conducted with the use of information exchange network of the demonstration zones of high energy efficiency.</p>
<p><u>Objective №4 (terms of reference)</u> Establishment and functioning of the Project Implementation Units in Moscow and Vladimir</p>	<p><u>Objective №4 (execution):</u> Project Implementation Units in Moscow and Vladimir were created in accordance with the set up described in the project document</p>
<p>Output 4.1. Project Implementation Units in Moscow and Vladimir, Steering Committee and Working groups 1 and 2 are established.</p>	<p>Output 4.1. Project Steering Committee was established in Moscow; and was managed by the Project National Director. The Deputy Project national Director carried out direct management of the Project Service Unit in Vladimir. A National Advisor ensured coordination on the political decision-making level.</p> <p>The total Russian personnel involved in the project was 31 persons. From which, thirteen persons are permanent staff (4 persons in Moscow and 9 in Vladimir), comprising two working groups (for implementation of Objectives 1 and 2), and Project Management Groups in Moscow and Vladimir.</p> <p>In January 2002 in Vladimir, the Project Service Unit in Vladimir was established to implement tasks under objectives 1 and 2; it is managed by the National Project Manager.</p> <p>National Manager: coordinates Project activities between city authorities and other Project participants in the city Vladimir. It executes Project implementation in the city Vladimir under the management of the Project National Director.</p> <p>The units’ operations have been conducted in accordance with the tasks stipulated in the main Project Document.</p>
<p>Output 4.2. Project coordination, Steering</p>	<p>Output 4.2. Coordination of Project activities was</p>

<p>committee meetings and analysis of intermediate implementation results throughout the whole project duration</p>	<p>conducted in accordance with the tasks stipulated in the main Project Document.</p> <p>Analysis of intermediate implementation results was conducted by all involved stakeholders in accordance with their respective duties.</p> <p>Assessment activities on long-term result leading to actual CO₂ emissions reduction was conducted during the whole project duration, including preparation of the basic assessment parameters, market reaction prognoses and assessment of positive factors.</p>
<p>Objective №5 Develop and implement the Project Dissemination Programme in the Russian Federation and the CIS countries</p>	<p>Output 5 This objective is additional and was added during project execution. The objective was met through dissemination activities of RUSDEM, as has been described earlier.</p>
<p>Objective №6 Assess and measure environmental impact (climate change mitigation potential) of the project</p>	<p>Output 6. This objective was also added after the project started. Activities aimed at assessing and measuring the long-term impact of CO₂ emissions reductions was including on the preparation of the baseline parameters of assessment, market reaction forecast and assessment of positive factors.</p> <p>A methodology for the development of assessment plan and monitoring of the Project climatic result was developed.</p> <p>Assessment of the project’s emission reductions was conducted.</p> <p>Documentation and procedural support for legalizations, verification and certification of the Project climatic result, i.e. reduction of anthropogenic emissions and enhancement of absorption by sinks, was prepared.</p> <p>Book 6 “Stimulation of greenhouse gas emission reduction as a mechanism for energy saving and energy efficiency in Russian residential building sector and heat supply” (is ready to send to press, distribution – specialized seminar).</p>

89. Relating to objective 1, the project could certainly have been improved if the city deputies would have voted for and approved the Methodology of Billing so it could have been implemented in reality during the execution of the project. Instead, project experts proposed to test it on experimental basis – using actual data of existing devices and making calculations according to the methodology developed. Calculations for a heating period 2004/2005 and introduction of results and proposals on a change of heat supply normative policy by city deputies is planned to be performed by Project Service Units and DHCS in the future: experts believe that this will be possible, and that it can ensure positive voting of the Methodology of Billing for the budget year 2006.
90. Installation and launch of the demonstration autonomous boilers in 3 buildings took place under objective 2. Installation and launch of demonstration autonomous boilers in three buildings, establishment of a private company and transfer of boilers into its confiding management, ensures strong ownership of knowledge gained from experience of use of technical, economic and institutional expediency for capital investments into autonomous heating sources in residential and public buildings.

3.2.5 Project efficiency and effectiveness

91. As has been mentioned before (see paragraph 48 above) the project document did not include many objectively verifiable indicators against which project efficiency and effectiveness can be evaluated. The evaluators also could not locate the project logical framework and incremental cost analysis, so were unable to make many objective assessments of effectiveness.
92. In the framework of objective 6 the CO_{2eq} emission reductions as a result of the project have been estimated, The following tables give details of emission reductions from objective 1 and 2:

Table 3.1: Greenhouse gas emissions as a result of metering, control and billing activities (objective 1)

	CO ₂	CH ₄	N ₂ O	Total in CO _{2eq} .
Greenhouse gases baseline, before conduction of activities (tonnes CO ₂ annually)	45194	45	5	45243
Greenhouses gases emissions levels after conduction of activities, (tonnes CO ₂ annually)	43467	43	4	43515
Greenhouse gases Project emissions reduction (tonnes CO ₂ annually)	1726	2	0	1728
Project emissions reduction during the exploitation project period of 20 years				34566 tonnes

Table 3.2 Greenhouse gas emissions as a result of installation of three autonomous boilers (objective 2)

	CO ₂	CH ₄	N ₂ O	Total in CO _{2eq} .
Greenhouse gases baseline, tonnes annually	3018	3	0	3021
RUS/96/G31 project greenhouse gases levels	2267	2	0	2269
Project reduction of the greenhouses gases emissions, tonnes of CO ₂ annually	751	1	0	752
Emissions reductions for the project exploitation life-time of 20 years				15041 tonnes

93. For a GEF contribution of 2.98 million USD the project resulted in direct CO_{2equi} emission reductions of 49607 tonnes over the 20 year lifetime of the project. This means a direct cost of approximately 60 USD per tonne of CO₂. From an international standpoint this is a very high cost. It is however important to stress that in this project the majority of project costs were in research, training, and capacity building, not in the investments which brought about direct CO₂ emission reductions – metering / control and autonomous boilers. For metering and control where 20 year lifetime savings were an estimated 34600 tonnes CO₂ and costs relatively small (data was not available to the evaluators on details of these costs – they were part of the WB loan), reductions per tonne will be highly competitive. Taking the installation of the three boilers under objective 2, for which cost data is

readily available, costs (excluding operation and maintenance) were about 340 000 USD. The cost per tonne of CO₂ reduced in this case is 22 USD over 20 years.

94. Many studies conducted by Russian and international organizations have shown that energy saving potential in the residential heating sector offers excellent opportunities for CO₂ emissions reductions in Russia, as a result of the estimated 25 to 35 % savings, which are technically possible. As a result of this project it appears that the savings for metering / control and billing are significant and cost effective. The data for the autonomous boilers however shows that this intervention is costly from a greenhouse gas perspective.
95. In contrast to the greenhouse gas savings from the metering / control and billing (Objective 1), at the time metering and control valves were installed this was not considered a good investment (financially speaking) since the decrease in consumption was only approximately 10%. Since then however, heat energy prices have grown substantially and the market of various types of heat meters has grown (as meters became cheaper). The application of various systems for actually supplied heat and hot water for residential buildings is now cost effective.
96. Undoubtedly, the provision of billing for heat supply independently from the quality of heating and actually consumed hot water, does not itself provide for heat savings. However, it has been evident through this project that even the provision of information to tenants and authorities, highlighting discrepancies in billing for heat energy, gives them an incentive to think and search for the ways to overcome the problem.
97. The production of project dissemination materials – website, publishing of books, reports, conference presentations, and TV programmes – has been on the basis of the issued books in the framework of the National Report “Heat Supply in the Russian Federation. Ways to overcome the crisis” and their further distribution via state channels (Ministry of Education and Science of the RF) and private channels is necessary.

3.2.6 Stakeholder involvement

98. One of the most important priorities catalyzed by the Project is the three level system for the implementation of international project, which ensured participation of international organizations, federal bodies and municipal establishments.
99. Cooperation between local departments responsible for the implementation of particular Project objectives or milestones for achieving a particular objective is evaluated positively. On the local level partnership has developed faster than on Federal or International levels due to the common purpose of striving to overcome local barriers.
100. The Project allowed to activate informational activities, organization of forums (conferences, seminars, exhibitions) to acquire additional information for the direct and indirect use for the promotion of its creativity (production of various types of heat supply equipment and devices is organized).
101. Parties involved in the project, to a large or smaller degree impacted reduction of barriers to energy efficiency in heat supply. The degree of involvement of stakeholders is assessed in the form of their financial, intellectual, institutional and technical input and results. Major input to achieve objectives was provided by the following organizations:
 - Financial input – GEF/UNDP, Government of the RF, Administration of the city Vladimir,
 - Intellectual input – GEF/UNDP, Ministry of Industry and Science of the RF, RUSDEM, National Advisor, National Manager.
 - Technical input - GEF/UNDP, Ministry of Industry and Science of the RF, RUSDEM, National Advisor, National Manager, Administration of the city Vladimir.
 - Institutional input - RUSDEM, National Advisor, National Manager, Administration of the city Vladimir.
102. While there is a common interest from state structures and low income levels of population in successful Project implementation, there are some groups that due to some circumstances are not interested in the Project progress.

103. These are local organizations that provide centralized heat supply (AO-Energo, MUEs for heat distribution networks, HCS, repair enterprises and fuel supply organizations), which financial stability depends on physical volumes – the bigger are volumes the bigger are profits.

3.2.7 Financial planning

104. The original project design included a grant of 2.98 million USD, and an in-kind contribution from the Government of the Russian Federation of 4.9 million Roubles.

105. Major exchange rate fluctuations mean that the precise amount of in-kind contributions from the Government could not easily be determined, but the project evaluation team were given data which appeared to show that the Russian contribution was substantially more than originally envisioned.

106. UNOPS controlled the GEF budgets and provided the project with contractual and procurement services. Annual project audits and reporting to the steering committee confirmed overall sound financial management.

107. Data relating to the costs of the boilers was received from the project manager, and is given in the table below.

Financing of construction and start of exploitation of autonomous boiler houses

Boiler house, address	Costs, Dollars USD			
	Equipment	Construction-mounting works (CMW)	Design works and other costs	Total:
Besimenskogo, 9-B	82699,91	17494,89	9674,04	109868,84
D.Levitana, 49	88272,98	5815,85	9590,71	103679,54
Lenina, 62	86366,89	30074,95	9799,04	126240,88
Total:	257339,78	53385,69	29063,79	339789,26
Building monitoring before and after boiler houses installation (<i>subcontracting</i>)				88000
Guaranteed technical maintenance of boiler houses				84000
Total, USD dollars				511789,26 USD
Moreover, City Vladimir expenditures (office rent, telecommunication, transport), thousand roubles				300,000 roubles

3.2.8 Sustainability and replication

108. A complex system of project results dissemination was implemented in accordance with the project document, as well as added activities during implementation. These included:

- a) issuing of a series of brochures which describe the progress of the project implementation and its achievements;
- b) publicity of project results through seminars and publications in periodicals (scientific and in the press; and
- c) use of new information technologies – the project website.

Over the period of project implementation the following outputs were delivered, contributing to project replication:

- 10 seminars on the themes of Project were held, and
- 60 speeches at diverse exhibitions and conferences in different cities of Russia and CIS were given.

Experience accumulated as a result of the Project implementation, being generalized, allowed to prepare the National Report: “Heat Supply in the Russian Federation. Ways to overcome the crisis”, which consists of 6 Books presenting main conclusions and recommendations on reforming of heat supply system of city communal and housing sector.

- **Book 1** “Reform of heat supply and consumption system in the RF” (distributed in all subjects of the RF, conferences, seminars, exhibitions).
- **Book 2** “Recommendations on working out of regional and municipal programmes of heat supply development” (distributed to all subjects of the RF, conferences, seminars, exhibitions).
- **Book 3** “Methodical recommendations on design, construction and commissioning of autonomous boilers” (distribution – conferences, seminars, exhibitions, administration of several regions).
- **Book 4** “Methodical instructions on introduction of basement autonomous gas boiler house” (distribution – conferences, seminars, exhibitions, administration of separate regions).
- **Book 5** “Monitoring and assessment of efficiency of municipal heat supply system modernization” (is currently in press and still to be distributed).
- **Book 6** “Stimulation of greenhouse gas emission reduction as a mechanism for energy saving and energy efficiency in Russian residential building sector and heat supply” (is ready to be sent to press, and will be distributed at specialized seminars).

as well as:

- “Album of engineering decisions of energy-efficient heat supply systems” (is sent to all subjects of the RF, distributed at conferences, seminars, exhibitions).

and in the press:

- “Album of energy efficient systems for energy resources supply for facilities of the housing and communal sector” (not sent, will be sent to subjects of the RF)

The main purpose of the distribution of these books was dissemination of project results and achievements in cities of the Russian Federation.

All books comprise a unified system of analysis of a current state of heat supply systems, recommendations on legal, institutional – economical and technological ways of their reforming and are illustrated by concrete examples of those transformations executed in series of regions of Russia and CIS.

The system for dissemination and replication is evaluated positively by the evaluation team.

109. In addition to formal publications, the project experts in Vladimir prepared and published 7 articles on the realization of the project in the newspaper "the Vladimir Telecourier". Together with employees of Vladimir TV, a DVD-film of the "Realization of the Project" (30 minutes) was prepared, as well as 15 broadcasts on the key subjects of the project. The broadcast of television debates on ГТПК "Vladimir" devoted to the process of realization of the project was held and a DVD-film prepared. The DVD-film of the tele-debates with experts of the project (1 hour 20 minutes) was also prepared. The project was also highlighted on Vladimir TV in the program of "Message - Владимир" (4-5 minutes). Questions and responses on messages on the project in mass-media were received from all sectors of the population: from students to pensioners. The television debate also included interactive voting which registered more than one and a half thousand calls, with 70% of callers supporting the idea of metered billing of heat and hot water. The studio also accepted more than 100 calls, which were answered during the show by 10 experts participating in the programme.

The evaluators were particularly impressed by these informal activities and the project team is to be commended for their efforts in this regard.

110. The RUSDEM web-site (www.rusdem.com) contains comprehensive information materials dedicated to the project. Since 2000 the project has also been represented on www.environment.da.ru. Project materials are also presented at the Russian virtual exhibition of energy efficient technologies and materials (www.energy-exhibition.com). In the opinion of the evaluators, these sites are professionally constructed, and contain useful information for a wide audience.
111. Concerning ‘static sustainability’ (the ongoing activities and flow of benefits in Vladimir), activities aimed at reduction of barriers during implementation of investment projects in a period of time are the most efficient when the permanent team of coordinators from city and regional authorities is in place and fully involved in the process. However political changes are fairly inevitable, and activities, which coincide with mayoral or regional governor elections have caused difficulties in ensuring continuity. In many cases, possible replacement of the authorities through elections halts the project pace that was gained with the previous team – and this was the experience in the Vladimir project. These are risks that can negatively influence the implementation process due to temporary lack on knowledge and awareness (or even electoral promises) from new officials.
112. On the other hand the National Project Manger was living in the city Vladimir, and the project supervisor from the DHCS of the city Administration was involved in the World Bank PTBRF Project and the UNDP / GEF meant good co-operation and local ownership. Such process of local organizations participatory process influences positively projects success. The co-operation was not always ideal, as was also pointed out in the Mid-term Evaluation, and awareness of the project was evidently not very high during interviews with stakeholders from the city administration, and there is certainly room for improvement in this regard.
113. The project was unable to implement the proposed billing system in reality. This was caused by opposition to perceptions that the change in billing systems would adversely effect poorer sectors of the population (who have the worst quality housing). These negative impacts to some part of the citizens of the city could not receive approval of the Duma representatives. Clearly there is a need to develop more comprehensive policy which would mean subsidies to poorer households, or (better), some mechanism to implement thermal upgrading in social housing, possibly using some earmarked revenues from the heating tariff to a fund for this purpose.

The legislation in force and technical means of state organizations do not allow in a short-term (a) to conduct audit of all municipal residential sector, (b) to define the depreciation rate of each building and to set individual norms for heat supply for each building and each apartment with the use of increasing/decreasing coefficient. Replication process of the consumption-based heat energy metering-billing system in other cities remains challenging and can take a long time due to the city budget deficit.

Further work on these issues is recommended.

114. Overall the evaluators believe that the project is attractive for replication, dissemination of results has been well implemented, and the results are likely to be sustainable for the long-term, as federal and regional legislation support is introduced, and on the condition of financial support and investments (from local or foreign sources) into replication.

3.3 UNDP common rating system

115. The evaluation team has attempted to make use of the UNDP common rating system for evaluations. Evaluation of the status of objectives is based on subjective assessments, since quantifiable indicators were not always given at the objective level in the project document. This table summarizes conclusions given in other parts of the evaluation report.

Rating outcomes:			
	Positive change	Unchanged	Negative change
Development objective: to provide sustainable and replicable models and to build the required capacities for overcoming barriers to implementation and realization of energy-efficiency improvements and energy conservation in residential buildings and heat delivery systems in Russia.	X		
Objectives:			
	Yes (achieved)	Partial (two-thirds or more of a target)	No (not achieved)
Objective 1. Create a Prototype Residential Heat and Hot Water Metering and Billing System on the Basis of Metered Consumption.		X	
Objective 2. Study and Demonstrate the Feasibility and Future Implications of Autonomous Heat Production in Residential and Public Buildings.	X		
Objective 3: Build the skills and capacity for energy efficiency project analysis and feasibility studies (note that the evaluators believe that the targets under this objective were unambitious and unnecessarily static).	X		
Objective 4: Establishment and functioning of the Project Implementation Units in Moscow and Vladimir	X		
Objective 5: Develop and implement the Project Dissemination Programme in the Russian Federation and the CIS countries	X		
Objective 6: Assess and measure environmental impact (climate change mitigation potential) of the project	X		
Rating sustainability:			
The rating system assesses the degree to which progress towards achieving the outcome appears to the evaluator to be sustainable. Sustainability is determined by evidence of local ownership of outcome and systems/institutions in place to carry forward progress in the outcome or cement gains.			
	Sustainable	Too soon to tell or cannot be determined	Unsustainable
Sustainability	X		
Rating relevance:			
The rating system assesses the degree to which an outcome is relevant given a country's development situation and needs. Essentially, it tests the development hypothesis. 'Somewhat' indicates that the outcome is somewhat relevant but perhaps not the best one for addressing the development situation per se.			
	Yes (relevant)	Somewhat	No (not relevant)
Relevance	X		
Rating cost-effectiveness:			
The rating system assesses the degree to which the progress towards—or the achievement of—the outcome is cost-effective, given the financial resources and time invested in the outcome and the degree of change actually achieved. 'Somewhat' indicates that evidence is found that the outcome is somewhat cost-effective but could have been more so.			
	Yes (cost-effective)	Somewhat	No (not cost-effective)
Cost-effectiveness		X	

4. Recommendations

4.1 Corrective actions for design, implementation, monitoring and evaluation of the project

116. The Project Document did not set up sufficiently detailed verifiable indicators for project objectives and did not define indicators to trace steps (outputs) of financial planning and budgetary procedures of financing, as well on definition of efficiency indicator for financial mechanism.

The *design correction* could have more wide implications, however, in the project document the following is missing or absent, based on lessons learned during execution:

- a) Necessary indicators, which could serve for determination of concrete results.
- b) There is no adequate assurance of project sustainability at a country level, which would have included, for example an opportunity for more comprehensive study of legislative and normative possibilities for the country, and the creation of preconditions for lobbying for the adoption of required laws at the level of federal legislative authorities.
- c) The project design does not include adequate institutional mechanisms to ensure sustainability at the local level. Despite this, the evaluators believe that the project implementation team should be commended for the creation of two companies– «VladEsco» and «Project Service Unit» - that have inherent strong incentives for continuation of these activities. Creation of these two companies, however, is potentially of concern since public finance was used to support them in the conditions of quite an uncompetitive market. In addition there is a risk that after the end of Project, the companies may start to hide information to ensure their competitive advantages, which will negatively influence on activities on «dissemination ».

However, taking into account the good quality of dissemination activities in the framework of the project, as well as the institutional potential of the National Agency (DHCS), the evaluators believe that such risks are minimized. Nonetheless, the design could have included from the start project activities aimed at the creation of a commercial mechanism and conditions for private sector (i.e. business-oriented approach), rather than direct support of individual commercial companies.

- d) The objectives are not defined based on requirements for changes of federal legislation but only for regional legislation. This contradicts the three-level system of international projects implementation.
- e) There are no clear tasks on monitoring of the project and its objectives so that the economic effectiveness of the project could be assessed.
- f) Risks are defined according to “supply/no supply of meters” and “voting/non-voting of legislative acts” *on local level* and do not cover legislative basis of regional and federal levels, which makes the project success impossible as regard to the change of normative policy for citizens (which must be changed at a higher level than the city).
- g) The level of rate involvement of tenants associations and heating companies, despite their involvement in the project in some cases in training and for example on provision of information was not clearly defined.

4.2 Proposals for future directions underlining main objectives

117. Despite the fact that **objective 1** was not fully achieved (the billing system was only simulated), its achievement is well developed and all indications are that it will be completed when the process of consumption-based billing is formed in the country. In the meantime the simulation of the billing system provided useful information for the formulation of policy at all levels.

Until the transition towards 100% payment for housing-communal services is completed the system of reimbursement for uncovered profits (e.g. in the city of Vladimir 10% of costs for heat supply for residential buildings are reimbursed to heat supply companies from the city budget) will be maintained. Presently, work on abolishment of privileges and their transfer into subsidies for low-income sectors of the population is being conducted at a Federal level (Decree of the Government of the RF from 30.08.2004 №444).

Therefore, all international projects being implemented in the Russian Federation should be based on the country legislation in force and should include objectives for a change in legislation of an appropriate type and level, if necessary. In the current project there were clear challenges to implement activities through local legislation, which really required Federal legislation to bring into effect (since local administration and political staff are naturally very hesitant to make changes which are not sanctioned at the Federal level).

In addition, the adoption of head of city or rayon *decrees* supporting projects cannot be considered as a panacea in regard to a change of legislation, norm setting or financing. For example, for financing such decrees are in force only for the duration of one budget year. For the longer-term (such as for decisions on billing systems), which was required for the project implementation, it is necessary to pass legislation – dependent on the vote of the regional Duma.

After adoption of a range of legislative acts by the Government of the RF – a process that is currently underway – to improve the payment system for communal services, including heat supply for residential buildings, and sets federal standards, the project is becoming more attractive, and the implementation of the heat supply metering-billing system is likely to proceed.

Ongoing activities on these issues are strongly recommended to build on the progress made during this project.

118. **Objective 2**, on autonomous boiler houses, can be and must be widely replicated. This requires the introduction of compulsory technical norm setting for energy consumption in residential buildings and ensuring control through governmental decrees.
119. Implementation of **objectives 3 and 5** should be continued on a broader scale, not limited to just the Vladimir Project results, but also using results of other projects, including those with the World Bank loans and other projects targeted at improvement and increase of efficiency of energy use and conservation.

It is also recommended to ensure wider dissemination of the project publications – with the use of State support for publishing on a federal level and dissemination via the state sector of Ministry of Education and Science of the RF.

It would also be very useful to publish and disseminate the methodologies, following their adjustment and after approval from Ministry of Education and Science (Agency for Education) of the RF, for use for education in special educational establishments.

The methodologies developed by the project team are recommended for distribution to Russian regions and Gosstroy of the RF for their study and analysis. After the analysis, it is possible that the Gosstroy will be able to use these methods as the basis for recommendations and include them into a regular Decree of the Government of the RF in respect of payment for communal services.

120. Ownership rights on the Project results to present are under jurisdiction of the following organizations:
 - City Administration– for three autonomous boiler houses that are transferred by it to confiding management to private company «VladEsco»,
 - Project Service Unit (and private company «Electrotekhservice») – on Methodology of Billing (*before* approval of this Methodology by city Administration).
 - RUSDEM– on Books and electronic production aimed for dissemination.

All heat energy meters, installed under the World Bank project PTBRF are under management of the city Administration.

It is the opinion of the evaluators that ownership rights should stay with:

- City Administration, *including*:
 - (i) the three autonomous boilers, with the right of the city Administration to transfer to confiding management to a private company on the basis of a tender. It will maintain them, and sell heat energy to municipal organizations that service these residential buildings

- (ii) the methodology of billing (*after* approval of this methodology by city administration). Payments are to be conducted as previously by municipal organizations.
- Ministry of Industry and Science of the RF and RUSDEM, *including*:
 - (iii) books and electronic production for the dissemination purposes under the Project with the participation of the Ministry of Education and Science.

5. Lessons learned

5.1 Best practices and successes

121. The project satisfies requirements set up for the system of energy saving management in the Russian Federation and envisages solution of global objectives for the long-term:

122. The following models have been created:

- a) implementation of international project by national execution,
- b) dissemination of Project results,
- c) reasonable combination of centralized and autonomous heat systems for cities,
- d) consumption-based heat and hot water supply metering and billing system,
- e) introduction of autonomous sources into municipal heat supply,

The models listed above have been created for the first time in Russia. Whether they could be improved further has not been the task of the evaluation team, and it not been commented on here. Most importantly they have been created - and this is a “best practice”.

Further commentary on the models follows:

(a) The formulation of the Project Document – taking into account all its imperfections as raised in this evaluation (after 8 years) – laid a firm foundation for the implementation of international projects under nation execution.

(b) (c) (d) (e) national executors targeting capacity building, technology and equipment as a major objective received “two in one”: they identified gaps in knowledge and skills, they assessed the situation in the country, were trained in making generalizations and forecasts on the country level and regions level, and not on the level of separate projects (although that is of course also important); directed this information at first to the Government of the RF, and then to Russian regions (National Report «Heat supply in the Russian Federation. Ways to overcome the crises»). This experience deserves appreciation, because nothing of that kind (as contained in the publications) with critical materials existed in the USSR.

(c) The benefit of the Project is, also, the creation of the “economic model” of calculating and billing.

123. The following methodologies and databases have been created:

- a) methodology and sequence of assessment and inventory of greenhouse gases (GHG) emissions from enterprises of residential building sector and heat supply,
- b) methodology for certification and database (passport) of the metering-billing system,
- c) methodology for distribution of volumes and costs of heat energy between consumers,
- d) methodology (instructions and forms) to be filled in on the meter reading from group, building level and apartment level meters,

moreover:

- e) the project service unit intended for servicing of the metering-billing system was created. To solve the required tasks the following was method were developed:
 - (i) institutional and normative-legislative activities algorithm model required for calculation of distribution of payments for heat energy and fuel and energy resources;
 - (ii) technical model of the service and activity algorithm required for the complex metering and control of energy resources consumption;
 - (iii) economic model of the Project Service Unit for monitoring of the project implementation;
 - (iv) software for calculation of heat and fuel demand, losses and payments.

124. Based on the work of the project it is evident that the following organizations can participate in competition for the rights to manage heat supply systems: MUEs, joint stock companies (with

participation of municipal capital) that are based on MUEs and private companies. The form of ownership is not that important as confidence in ensuring reliability and efficiency of heat supply. Private companies are still to show that they can work more efficient than municipal ones.

Box 11: Private versus municipal billing services

Is the creation of a private company providing billing service is a best practice?

National experts consider that it is.

Why it is called “Project Service Unit”? It is only to provide services for the GEF project?

The Project Service Unit is created on the basis of previously existed OOO «Elektrotekhservice». It was named following the mode of the Project Document. When the functions of this company for the GEF project will be finished, it will continue to service the Billing Zone: to present – on the basis of theoretical calculations, then, after the approval of the Methodology of Billing – officially – with the Decree of the city Administration (and after voting of Deputies) – on a practical basis. The Project Service Unit in the year 2004 is forming bills on heat energy with the use of software developed during the project on the basis of meters and heat distributors data.

After the end of the Project, the composition of the Service Unit will be defined by the Decree of the city Administration: if billing is to be implemented on practice, then costs of the Service Unit will be incorporated into tariffs by the regional energy commission. In accordance with these calculations the business-plan of this Project Service Unit (OOO “Elektrotekhservice”) will be defined

The two companies (the Project Service Unit and VladEsco) are involved in the Project in order to create an efficient mechanism and to prevent possible termination of project activities, that might have taken place if the model would have been developed and serviced by municipal organizations, which do not usually follow initiatives but simply do what is ordered by a Decree of the Municipality. Their responsibilities are defined in a Statute, which is approved by the city Administration.

However, both private companies are dependant on state policy: VladEsco – on state regulation on tariffs, and the Project Service unit (Elektrotekhservice”) – from instructions and requests of the city administration. If operations are incorrect, inefficient or inadequate, they can be replaced and the tender for the selection of another private company can be opened. This gives flexibility to the city administration.

125. The National Report “Heat Supply in the Russian Federation. Ways to overcome the crisis” comprised from 6 Books, which generalize the situation in the country in the heat supply with results and perspectives of the Project, is developed, published and directed to federal bodies and regional authorities.
126. A number of activities on environmental aspects of the project have been carried out. These provide unique resources related to climate change:
 - a) Assessment of the climatic result and development of a baseline and actual GHGs emissions levels from the project are conducted.
 - b) Documentation on procedures for legalization, verification and certification of the Project climatic result is prepared.
127. The project served to highlight the fact that federal laws, required to mobilize private investments in heat supply modernization, are not yet sufficiently efficient or effective, however a spirit of entrepreneurship, is growing.
128. The project, both instrumentally and documentarily, highlighted missing and inappropriate incentives towards energy efficiency for tenants, tenant associations and rayon heat supply enterprises. The project implementers developed their own flexible methodology of individual metering and billing under conditions of various types of equipment with meters and control devices, that allows to remove principle of normative-equalizing distribution and hidden cross-subsidizing.
129. Gosstroy of the RF, due to the project, at the first time made the decision to incorporate changes into effective construction Rules (SNiP II-35-76) for boiler facilities, which allows construction of autonomous boiler houses (Amendment №1). Thus, with the effective legislation the exploitation of autonomous boiler houses by private company of any form of ownership for heating and hot water

supply became possible, either under private ownership rights, or under transfer of boiler houses into confiding management.

130. Autonomous boiler houses may take a bigger share in city heat supply systems, than 10% from the overall heat generation, as was declared in the beginning of the Project *due to an absence of energy policy for autonomous heat supply*. Transfer of buildings into autonomous heat supply is currently widely used for public buildings (school, kindergarten, administrative, production buildings and offices), especially in small settlements. The number of autonomous heating sources is growing, while the demand for heat from centralized heating sources is declining. The state statistics of these parameters on the federal level is so far absent.

Box 12: The share of autonomous heating sources

Extract from the Book 4 of the "National Report": «Experts believe that the share of autonomous heating sources in Russia will increase up to 5-10 % in nearest future».

Experience in the Nizhny Novgorod region in the field of application of autonomous boiler houses and experience from activities of federal organizations shows that this indicator in the National Report is probably set at a low level: there is a big future for autonomous boiler houses in Russia – in some cases this is alarming, taking into account the current rate of centralization of heat supply in large cities and the possible depreciation of city infrastructure. Including at the first instance heat distribution pipelines that are branched to a many-kilometre distances from each TPS or large (more then 20 MW) boiler house.

The expression: «absence of the policy» means that there was no SNiP (Rule) of the Gosstroy of the RF until the year 1997 that would allow construction of autonomous boiler houses. These type of systems were not included at all in any budgets of any levels of government: they simply did not exist before this time. Metering of natural gas consumption, distributed via low-pressure pipelines, was only done at one place - on the gas distribution point (GDP) by the municipal gas distribution company, taking into account that all the volume put through these gas distribution pipelines “went” to tenants in their apartments. Until 1997 all boiler houses were attached only to gas pipelines of medium pressure and did not have the right to being attached to gas pipelines of low pressure because these pipelines were designated only for tenants with kitchen ovens and water heaters in residential buildings constructed in the 1960s (khurzhshevki), and not into autonomous boiler houses as presently constructed.

Thanks to lobbying by RUSDEM, the Gosstroy of the RF adopted a new SNiP that allowed the construction of autonomous boiler houses.

Also thanks to experience gained from the project in Vladimir and in other cities autonomous boiler houses for individual buildings started to be constructed. There are separate examples on multi-entry residential buildings (Nizhny Novgorod - 2 roof modular (Hungary) boiler houses installed on roofs of multi-entry residential buildings: on st. Ylianova and Yaroslavskaya from 1997). There are many examples of construction of autonomous boiler houses attached to state buildings (school, children garden, office and etc), as well as many examples of private buildings (administration offices and others).

131. Throughout the years of the Project implementation in Russia, the qualification of top managers and experts that exploit systems of municipal heat supply gas grown:
- a) From 1998 to 2004 thousands of heat supply experts visited foreign organizations in order to gain experience and training in basics of economic and financial analysis of projects – financial engineering and business planning for managers.
 - b) In many institutions of higher education in Russia curricula in energy saving were introduced.
 - c) In Russia experts rapidly gained access to computers and software dedicated to achievement of efficient exploitation of heat supply.
 - d) In many Russian regions interregional forums and exhibitions, as well as issues of scientific-practical magazines in energy and energy saving, are being conducted and serve for dissemination of experience in improvement of energy and fuel use efficiency.

- e) The attitude towards municipal property has changed radically, as has its market value and benefits (plusses and minuses) from exploitation and modernization.
- f) In many Russian cities the production of energy saving equipment (boilers) and energy resources consumption meters has started; pre-insulated heat distribution pipelines, heat exchangers, alternative heating sources (infrared radiators, air heaters and others) are also being produced locally.
- g) In majority of Russian regions regional centres in energy saving are established and form energy saving policy for regional authorities, as well as conduct accompaniment of investment projects in the region.
- h) Russian commercial banks, by applying the World Bank experiences, are providing loans for the duration of 1 to 3 years for municipal establishments for heat supply system modernization.
- i) The initiative group submitted the Draft of the Federal law “On heat supply” to the Government of the RF. The Draft envisages rights of private heat energy suppliers for consumers.

All of these benefits have taken place because of the dissemination of experience of RUSDEM in the framework of Demonstration Zones with the support from the UNECE. Regional energy experts have experienced and benefited substantially from this support. Evidence in support of this statement is the participation of Mr Frederic Roomig, manager of the UNECE Project "Energy efficiency -2000" in the organization of most large Forums on energy saving in the RF; and almost quarterly visits to Russia of Mr. Eugene Nadezhdin, the Adviser of the UNECE with a mission to disseminate lessons of other countries in creation of Demonstration Zones and energy efficiency projects. With his missions, the training and dissemination of worldwide experience in energy efficiency and energy saving started in the Russian Federation. Vladimir is one of the Demonstration Zones. At the UNECE the “Energy efficiency – 2000” project has come to an end, but the creation of demonstration projects in Russia is ongoing.

132. As was true at the start of the project, is still true now: the introduction of new technologies and equipment, as well as energy consumption metering and billing system is the key factor to enable the creation of the following:
- a) interest from tenants and tenant associations to save energy and invest into energy efficiency;
 - b) interest from rayon boiler houses, which exploit heat distribution network and that own networks, to reduce heat losses during heat transmission via the network; and
 - c) a situation, where financial gains from such capital investments will be returned to investors.

Box 13: Gradual transformation of the heating sector

The commissioning of each of the three autonomous boiler houses was conducted in the form of a celebration for the residents. At these events city authorities informed citizens of the GEF/UNDP grant, demonstrated equipment, and informed people of advantages of various technologies and plans for the future.

In the future city authorities will inform the public of the results of the autonomous boiler houses and heat supply, comparing with earlier practice. As a result tenants will know that they each pay different amounts – and this is itself a lessons. Tenants will thus start to think how they can improve comfort at their apartments and not increase their payments for a heat supply, and if possible, even to reduce payments. Tenants then start to ask, from which boiler house and TPS they receive hot water and where the heat distribution pipe to their house is located.

Due to high rate of centralization it is not possible to adopt a one-for-all Decree in the country, or in a city. It is only possible to move slowly, gradually «pushing» each move: at first meters, then autonomous boiler houses where appropriate, then consumption-based billing.

Creation of the billing model and its wide discussion made citizens, authorities and municipal bodies more knowledgeable of energy and saving options. The Project in the city Vladimir demonstrated the chain of consequent activities (in technical, economic, legal, institutional and political spheres), that are required for the creation of economic incentives, and what is the key prerequisite for activities aimed at investments into energy efficiency and for gradual reduction of existing barriers.

5.2 Other project activities from which lessons may be learnt

133. The objective of creation of the metering-billing system was implemented slower and less completely than was defined in the Project Document. It was not finalized due to existing legislative barriers of RF (it is currently prohibited to transfer to 100% payment for heat supply by tenants of only some buildings in one city of the RF or buildings of one city of the RF without agreement from deputies and electorate). Deputies of the city Vladimir over the last term did not wish to take responsibility to establish new norms due to their concern that some apartments will have bigger payments in comparison with the previous period, and current legislation at a Federal level does not allow subsidies of the required amount to be paid to them.
134. Up to now it has not been possible to lobby for a positive voting of decrees of the Administration of the city Vladimir to approve the methodology and sequence of payments for supplied heat energy to the city population that was developed by the Project Service Unit. Only very recently, there has been a campaign to provide differentiated privileges to low income families in accordance with the concept of the HCS reform is being conducted in Russia and all the legislative acts of regional and municipal authorities are being harmonized with the federal legislation.

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ANNEX A Terms of reference for the Terminal evaluation

Terms of Reference

“Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Building and Heat Supply ”

UNDP/GEF project: RUS96G31 - Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Building and Heat Supply

Assignment: International Consultant – Terminal Evaluation of the UNDP/GEF Project

Duration: Twenty five (25) working days (estimated)
During 15 May – 30 June 2004

Closing date for Submission of application: 7 May 2004

1. Introduction

UNDP/GEF wishes to engage a professional team to carry out independent terminal evaluation of the project. This work will be carried out in parallel with more informal analysis and packaging of project experience and lessons for further dissemination across the region and through out UNDP/GEF networks. It is expected that two teams (dissemination and evaluation) will coordinate their efforts and exchange findings and information. For this purpose, (1) a joint debriefing with the two teams will be carried out prior to the beginning of their work; (2) a joint work plan will be agreed between the two teams; (3) discussion/consultations on the technical and institutional lessons of the project will be arranged between two teams prior to the finalization of their final reports/dissemination product.

Project objectives

The city of Vladimir located 180km east of Moscow was designated as an Energy Efficiency Demonstration Zone by the Ministry of Industry, Science and Technologies and the Ministry of Energy of the Russian Federation. The purpose of an Energy Efficiency Demonstration Zone is to demonstrate technologies, as well as to demonstrate on a local level, the institutional innovations, regulatory and legal changes, information dissemination, and other types of activities that are intended to remove barriers to market-based investments in greater energy efficiency. The overall objective of this project is to enhance capacities in both the private and public sectors in the city of Vladimir to overcome barriers to energy-efficiency investments in residential buildings and related heat-distribution systems. Experience gained in the city of Vladimir will be disseminated to other cities in the Russian Federation through a network of energy efficiency demonstration zones and through two associated projects being financed with World Bank loans.

The main objectives of the project are to:

- develop a prototype system for consumption-based metering and billing that will create new incentives for tenants, tenant associations and district-heat distribution companies to invest in energy efficiency
- study and demonstrate the technical, economic, institutional, and geographical feasibility of developing autonomous (building-level) heat supplies
- develop the skills to conduct the economic and financial project analyses that are required by private and public financing institutions for energy efficiency investment projects.

The project is executed by the Ministry of Industry, Science and Technologies⁵ (MST) and the national implementation of the project is being carried forward by the Department of Housing and Communal Services of the Administration of the City of Vladimir. The Project Management Unit, headed by a National Project Manager is based in Vladimir.

2. Objective and purpose of the Terminal Evaluation

As the project will be closing in 2004 a results-based evaluation is required. The terminal evaluation is intended to provide a comprehensive overall assessment of the project and provides an opportunity to critically assess administrative and technical strategies, issues and constraints associated with the project. This is particularly relevant since the City of Vladimir designated as an Energy Efficient Demonstration Zone will need to report on the outcomes of the project in order to disseminate best practices.

Furthermore, the evaluation serves to assess project success in addressing identified barriers to energy efficiency and conservation:

1. Misplaced or missing incentives for tenants, tenant associations and direct heating companies to improve energy efficiency and reduce energy consumption in residential buildings and district heating pipelines
2. Fundamental uncertainties about the feasibility (technical, economic, legal, institutional, and political) associated with autonomous sources of heat supply as replacements for centralized district heating systems
3. Lack of capacity to conduct economic and financial analyses for energy efficiency projects funded by public and private financing institutions.

As such the evaluation should also provide recommendations for strategies, approaches and/or activities for replication of the Project to achieve expected outcomes and meet objectives within other contexts cities and end-user energy sectors. Findings of this review will be incorporated as recommendations for enhanced implementation in other cities and as part of the output of the City of Vladimir as a demonstration zone.

The purpose of the Terminal Evaluation is:

- To assess overall performance against the Project objectives as set out in Project Document and other related documents
- To assess the effectiveness and efficiency of the Project
- To critically analyze the implementation and management arrangements of the Project
- To list and document initial lessons concerning Project design, implementation and management
- To assess Project outcomes to date and review planned strategies and plans for achieving the overall objectives of the Project within the timeframe
- To assess Project relevance to national priorities in Russia.
- To provide guidance for the future Project activities and, if necessary, for the implementation and management arrangements.

The Report of the Terminal Evaluation will be stand-alone document that substantiates its recommendations and conclusions.

The Report will be targeted to meet the evaluation needs of all key stakeholders (GEF, UNDP, MST, City of Vladimir, municipal energy management teams, community housing services, NGOs, commercial banks, investment project managers and other stakeholders in Vladimir and other Demonstration Zones).

⁵ In March 2004 in the course of the state government reform, the Ministry of Industry, Science and Technologies of the Russian Federation has been liquidated with transferring corresponding functions to the new Ministry of Industry and Energy of the Russian Federation. This document will refer to the Ministry of Industry, Science and Technologies which carried out the functions of the project National Executing Agency of the project during 1998-March 2004.

3. Scope of Terminal Evaluation

Project elements to be evaluated include:

Project Management and Administration

- Collect, document and assess relevant elements and processes including:
 - Project related administrative procedures
 - Key decisions and outputs
 - Major project implementation documents prepared with an indication of how the documents and reports have been useful
- Assess processes to support national components of the project

Project Substantive and Technical Implementation

1. Project Delivery

The evaluation will assess to what extent the Project has achieved its immediate objectives. It will also identify what outputs have been produced and how they have enabled the Project to achieve its objectives.

This section will focus on following priority areas:

Progress of the Project as whole in achieving anticipated outcomes:

- Efficiency of Project activities.
- Progress in achieving of immediate objectives (level of indicator achievements when available)
- Final results with regard to the indicators of progress;
- Quality of Project activities and assessment of their effectiveness in solving the perceived problems and limitations
- Identify the major factors/constraints which have facilitated or impeded the progress of the project
- Project impacts at the policy making level
- Environmental impact (climate change mitigation potential)

Lessons Learned and Replication Potential: technological, institutional, regulatory, social lessons and best practices and their relevance for other Russian regions, CIS and European countries and worldwide

Partnership:

- Assessment of collaboration between governments, intergovernmental, private sector and non-governmental organizations
- Assessment of collaboration between implementation units of other related projects
- Assessment on national-level involvement and perceptions
- Assessment of local partnerships
- Transfer of capacity to the national institutions;
- Assessment on involvement of stakeholders

Specific technical areas to be underlined in the process of evaluation are presented in the Annex 2.

2. Project Implementation

The Evaluation Team will be provided with an explanation of the implementation structure of the project by MST and UNDP (on need basis). This section will focus on following areas of implementation:

Project oversight:

- MST
- City of Vladimir Administration
- PMU in Vladimir
- UNDP
- Tripartite Review Process
- Steering Committee

Project Execution:

- MST as executing agency (under the UNDP NEX)
- National Project Manager
- PMU (efficiency of project management, including the delivery of inputs in terms of quality, quantity and timeliness; and the monitoring system)

Monitoring and evaluation:

- Has there been a monitoring and evaluation framework for the project, is it efficient?
- Is the reporting framework effective/appropriate?
- Is this framework suitable for replication/continuation for future projects?

Risk Management:

- Identify problems/constraints which have impacted or might have impact on the successful delivery of the Project
- Are they likely to repeat or occur in replicable projects?

3. Project finances

- Review the changes to fund allocations as a result of budget revisions and provide an opinion on the appropriateness and relevance of such revisions, taking into account the project activity timeframe
- Review the effectiveness of financial coordinating mechanisms

4. Methodology for Evaluation Approach

The Terminal Evaluation will be done through a combination of processes including a desk study, site visits and interviews - involving all stakeholders (but not restricted to): MST, City of Vladimir, UNDP, Vladimir Energy Efficiency Center, Government officials on different levels, local municipalities, local NGO's, communities etc.

The methodology for the evaluation is envisaged to cover the following areas:

- Desk study review of all relevant Project documentation (see Annex 3)
- Consultations with MST, City of Vladimir Administration, UNDP, PMU (Moscow, Vladimir)
- Site visits to the pilot buildings and meetings with tenant associations
- Interviews with stakeholders
 - MST
 - City of Vladimir Administration
 - Local community representatives
 - NGO's
 - Tenants in pilot areas
 - Autonomous heating companies

5. Outputs

The main product of the Terminal Evaluation will be:

Terminal Evaluation Report

The final Terminal Evaluation report will include:

- Findings and conclusions in relation to issues to be addressed identified under the *Evaluation* section of this TOR
- Assessment of gaps and/or additional measures needed that might justify future GEF or any other funding to Energy Efficiency Demonstration Zones
- Project impact assessed on:
 - The assisted institution and its staff;
 - End-users including specific groups;
- Sustainability of the project based on:
 - Commitment of the host government to the project targets
 - Involvement of the local organizations (participatory process)
 - Management and organizational factors
 - Funding
 - Human resources development

The draft and final report will be written in the format outlines in Annex 1 of this TOR. The draft report will be submitted to the MST no later than 12 June 2004. Based on the feedback received from stakeholders a final report will be prepared by June 30th 2004.

The report will be submitted both electronically and in printed version, in Russian and English.

The report will be supplemented by:

Summary presentation of findings to be presented in final evaluation meeting

Team leader will conduct a final meeting for selected stakeholders and prepares summary presentation of conclusions and findings of the Terminal Evaluation. The presentation will be followed by a question & answer session and round-table discussions on effective implementation of evaluation recommendations.

6. Evaluation Team

Evaluation team should possess the following experience and qualifications:

- Experience in international projects' monitoring and evaluation with the focus on energy sector, energy efficiency systems economics, and financial investment;
- Proven expertise on energy sector and housing;
- Experience and knowledge of the Russian context for policy, institutional and regulatory issues related to energy efficiency and privatization at various Government levels.
- Additional knowledge on training methodologies and promotion of energy efficient strategies would be an asset
- Proficiency in English and in Russian languages

The evaluation team is responsible for the successful completion of the evaluation and finalizing the Terminal Evaluation report. The team is expected to be familiar with the region and have basic knowledge of the project area (such as the district heating system, socio-economic background of the region and barriers to energy efficiency promotion)

7. Implementation Arrangements

Evaluation management arrangements

- Role of MST
 - Overall coordination of evaluation activities
 - Overall administrative arrangement of evaluation
 - Organization of site visits
 - Organization of meetings with selected stakeholders

Focal point: Mr. Boris Reutov, Head of Department, Deputy National Project Director (+7 095 2297870, Reutov@minstp.ru)

- Role of Vladimir project team
 - Coordination of evaluation activities and logistics

Focal point: Mr. Anatoly Abramchenko, Project Manager (+7 0922 237509, vpiu@gef.elcom.ru)

- Role of UNDP
 - Coordination of evaluation activities in Moscow
 - Administrative and logistical support for Evaluation Team in Moscow

Focal point: Ms. Natalia Olofinskaya, Programme Officer (+7 095 7872139, nataly.olofinskaya@undp.org)

By the beginning of the evaluation the project team will provide evaluators with the proposed list of people and organizations to be interviewed.

Tentative timeframe

- Selection of evaluators May 2004
- Briefings for evaluators May 2004
- Desk review May 2004
- Debriefings in NY/Bratislava and Moscow May 2004
- Visits to the building sites (including allocation for travel), interviews, questionnaires
May 2004
- Validation of preliminary findings with stakeholders through circulation of initial reports for comments, meetings, and other types of feedback mechanisms
May 2004
- Preparation of final evaluation report June 2004
- Presentation of report & roundtable meeting June 2004

APPLICATIONS SHOULD BE SENT TO:

lilianai@unops.org

MS. LILIANA IZQUIERDO

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ONLY THOSE CANDIDATES THAT ARE SHORTLISTED WILL BE NOTIFIED

Annex 1 of the Terms of Reference: Outline of Mid-Term Evaluation Report

Executive summary

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

Introduction

- Project background
- Purpose of the evaluation
- Key issues addressed
- The outputs of the evaluation and how will they be used
- Methodology of the evaluation
- Structure of the evaluation

The Project and its development context

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

Findings and Conclusions

- Project delivery
 - Progress of the project as a whole in achieving its stated objectives
 - Effectiveness, efficiency and timeliness of project implementation
 - Stakeholder participation, partnerships
- Project implementation
 - Project oversight
 - Project execution
 - Project implementation
 - Project administration
 - Project planning
 - Monitoring and evaluation
 - Risk management
- Project finances
 - Financial planning
 - Budget procedure

- Disbursements
- Effectiveness of funding mechanism
- Risks

Recommendations

- Corrective actions for the design, implementation, monitoring and evaluation of the project
- Proposals for future directions underlining main objectives

Lessons learned

- Best and worst practices in addressing issues relating to relevance, performance and success

Annexes

- TOR
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Questionnaire used and summary of results

Other relevant material

Annex 2 of the Terms of Reference

Technical areas to be outlined in the evaluation report

The evaluation should be carried out against the following result-based indicators:

Development Objective	Indicator(s)
<p>The development objective of the project is to provide sustainable and replicable models and to build the required capacities for overcoming barriers to implementation and realization of energy-efficiency improvements and energy conservation in residential buildings and heat delivery systems in Russia. GEF grants will develop the institutional, regulatory, information, and human resource capacities necessary to reduce three key barriers to energy efficiency and energy conservation. These three key barriers are:</p> <p>(1) misplaced or missing incentives for tenants, tenant associations, and district heating companies to improve energy efficiency and reduce energy consumption in residential buildings and district heating distribution pipelines;</p> <p>(2) fundamental uncertainties about the feasibility of and issues (technical, economic, legal, institutional, and political) associated with autonomous sources of heat supply as replacements for overly centralized district heating systems; and</p> <p>(3) lack of capacity to conduct economic and financial analyses and feasibility studies of energy efficiency projects that may be financed by public and private financing institutions. GEF grants will also allow dissemination of this experience to other cities in Russia, providing sustainable global benefits through replication of successful project experience.</p>	<p>1. Key economic, social, legal, technical and institutional barriers to elaboration of incentives for tenants, tenants associations, energy suppliers, federal, regional and municipal authorities for greater energy efficiency and energy conservation are identified. Recommendations for regional and federal level authorities are elaborated.</p> <p>Prototype consumption-based billing system developed by the project ensures increase of households' interest in energy conservation.</p> <p>2. Recommendations on the optimal combination of autonomous and centralized heat supply are elaborated. Benefits of the autonomous heat supply are studied and demonstrated accounting legal, technical, economic, institutional and geographic factors.</p> <p>3. System of business infrastructure is established at the federal, regional and municipal level to ensure increase in capacity for economic and financial analysis, and feasibility studies of energy efficiency initiatives as well as management skills to implement those.</p>

Immediate Objectives	Indicator(s)
<p>Create a Prototype Residential Heat and Hot Water Metering and Billing System on the Basis of Metered Consumption.</p>	<p>Prototype consumption-based residential billing system created:</p> <ul style="list-style-type: none"> - concept and design of the billing model is created. - appropriate resolutions of municipal administration are prepared and adopted. - database of building and apartment characteristics (40-100 buildings) is created. - social implication of introducing changes to the existing billing system are studied; population awareness campaigns are conducted. - heat metering equipment procured and installed at the pilot buildings. - meter reading and billing service is established,

	<p>monitoring mechanisms are in place.</p> <ul style="list-style-type: none"> - handbook on consumption-based billing is created. - pilot information and experience from activities under project objective No. 1 is disseminated in 10 cities of the Russian Federation.
<p>Study and Demonstrate the Feasibility and Future Implications of Autonomous Heat Production in Residential and Public Buildings.</p>	<ul style="list-style-type: none"> - Russian and international experience in autonomous heat supply is studied. - Studies of legal, technical, economic, institutional and geographic implications of autonomous heat supply are completed. - Autonomous boilers are purchased and installed in three buildings. - Evaluation report on the autonomous boilers operation over one full year is created. - Proposals are elaborated on creation of institutional models of ownership, operation and maintenance, metering and billing mechanisms that fit existing legal frameworks. - Impact of autonomous boilers installation on district heating and gas distribution is studied; report is created. - pilot information and experience from activities under project objective No. 2 is disseminated in 10 cities of the Russian Federation. (conferences, seminars, publications).
<p>Build the skills and capacity for energy efficiency project analysis and feasibility studies</p>	<p>Increased skills and capacity of the local personnel to conduct financial and economic analysis, to select and develop economically feasible heat delivery systems:</p> <ul style="list-style-type: none"> - modalities and schedule of training programmes are created. - group of 20-30 selected personnel taken from the project staff, municipal administration, universities, and major local enterprises are trained. - business plans for projects implemented within the framework of the World Bank loan and the GEF/UNDP Project are developed. - group of 50 people is trained on basic issues of feasibility studies and business plans. - pilot information and experience from activities under project objective No. 3 is disseminated in 10 cities of the Russian Federation. (conferences, seminars, publications).
<p>Develop and implement the Project Dissemination Programme in the Russian Federation and the CIS countries</p>	
<p>Assess and measure environmental impact (climate</p>	<p>The Project impact on the GHG emission reduction</p>

change mitigation potential) of the project	is verified
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The evaluation report should above all make note of the following technical aspects of the project:

Objective 1: Monitoring and billing service

- A description of metering and billing model;
- An explanation of how individual apartment bills are calculated;
- An assessment of the Pro's and Con's of this model vs other options;
- A description of the incentives for saving energy, whom they target; and what saving measures, if any have been recorded as a result;
- The reason why this model was chosen given country conditions.

Objective 2: Autonomous heating

- A description of the autonomous and district heating systems being compared, and an analysis of how representative these systems are;
- A summary of the energy consumption comparisons between the autonomous and the district heating system;
- An assessment of how applicable and catalytic the demonstration is likely to be in Russia.

Objective 3: Capacity building and dissemination:

- a summary of the measures to catalyze energy efficiency;
- the problems they were expected to address, and an analysis of how effective they have been;
- and an assessment of energy efficient measures and investments into energy efficiency they have catalyzed

ANNEX B Evaluation itinerary

- *Vladimir, 2-3 November 2004:* Mission to the city Vladimir of NICE and team
- *Moscow 15 November 2004:* Inception meeting before the start of works with NICE experts, GEF/UNDP representatives, project Steering Committee representatives, national Advisor, representatives of RUSDEM and Mr. Grant Ballard Tremeer.
- *Vladimir 16-18 November 2004:* Mission to the city Vladimir of NCIE and team and Mr. Grant Ballard Tremeer
- *Moscow 19 November:* Meeting on results of the mission to Vladimir
- *Moscow 23 November 2004:* Final meeting on results of the mission to Vladimir
- *Moscow 2-3 December 2004:* Final meeting at the GEF/UNDP on the Project results.

ANNEX C List of people interviewed

Mr. Boris F. Reutov	Head of the Department, Deputy National Director, city Moscow
Mr. Valerii P. Kalinina	Head of the Unit of the DHCS of the region Vladimir Administration, Supervisor of the HCS
Mr. Vladimir V. Novozhilov	Deputy Head of the DHCS of the city Vladimir Administration (national Implementing Agency)
Mr. Mikhaul Y. Sukharev	Head of the DHCS of the city Vladimir Administration
Mr. Igor N. Pyzhov	Senior National Advisor for the Project. Responsible for the replication programme, city Moscow
Mr. Vladimir Arbuzov	Expert in coordination and dissemination RUSDEM, city Moscow
Mr. Alexei P. Antropov	Expert in information technologies RUSDEM, city Moscow
Mr. Anatloiy P. Abramchenko	National Manager of the Project, city Vladimir
Mr. Viktor E. Vakhromeev	Director of the Project Service Unit, city Vladimir
Ms Elena N. Senatorova	Senior expert in economic aspects of the Project Service Unit, city Vladimir
Mr. Alexandr S. Ryabov	Expert in institutional-legislative aspects the Project Service Unit, city Vladimir
Mr. Semen A. Dragulskiy	Director General of the union for Energy Efficiency, city Moscow
Mr. Victor G. Semenov	Member of Intergovernmental group for development of the heat consumption strategy in Russia, editor in chief of the magazine «news of Heat supply » , city Moscow
Mr. Victor V. Potapov	Expert in ecology, Federal Service for hydrometeorology and environmental monitoring of the RF, city Moscow

Results of the interviews were used during the preparation of this report.

ANNEX D List of documents reviewed

1. National Report: *Heat Supply in the Russian Federation. Ways out of Crisis*, comprising:

- 1.1. Book 1 *Reform of Heat Supply and Heat Consumption Systems in the Russian Federation*, the RF Ministry of Industry, Science and Technologies, GEF, UNDP, 2002
- 1.2. Book 2 *Recommendations for Elaboration of Regional and Municipal Programmes for Heat Supply Development*, the RF Ministry of Industry, Science and Technologies, GEF, UNDP, 2002
- 1.2. Book 3 *The Album of Technical Approaches to Energy Efficient Heat Supply Systems* the RF Ministry of Industry, Science and Technologies, GEF, UNDP, RUSDEM, International Centre of Information, Training and Consulting, HVAC, ACTET, 2002.
- 1.3. Book 4 «Methodological recommendation on design, construction and commissioning of autonomous boiler houses »
- 1.4. Book 5 «Album of energy efficient systems for energy resource provision for the objects of the housing-communal sector ».
- 1.5. Draft Book 6 «Stimulation of the greenhouse gases emissions reduction as a mechanism for energy efficiency in Russian residential building and heat supply ».
- 1.6. Draft Book 7 «monitoring and assessment of efficiency of modernization of municipal heat supply systems ».
- 1.7. Draft Book 8 «Dispatching and software for autonomous gas boilers houses

As well as, based on recommendations in the ToR:

In English

1. Annual project report for the years 1999-2002 in English and in Russian
2. GEF Project Implementation Reviews for the years 1999-2002 in English and in Russian
3. Mid-term Evaluation report

In Russian

4. Project *Methodology for Distribution of Scope and Cost of Supplied Heat between Consumers*, 99 pages
5. Outcomes of Municipal Heat Supply System Monitoring in RUS96/G31 Project Zone from January to September 2003, 90 pages
6. Report On Implementation of Project *Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Building and Heat Supply*
7. Reports of international consultant Niels de Terra
8. Reports of international consultant Trond Dahlsvein
9. Report of international consultant Krassimir Kanev (b/l 11.54) from Hagler Bailly *Methodology of Cost Estimate for Feasibility Evaluation of Various Configurations of Autonomous Boiler Units*, 54 pages
10. Report of international consultant N. Velikanov (b/l 11.56) from Electrotek Concepts Inc. *Institutional Issues of Autonomous Boiler Units Installation in Vladimir*, 54 pages
11. Report of Stage 2.2. *Study of Technical and Economic Aspects of Autonomous Heat Supply Technology, Including Boiler Location*, 89 pages (a total of 133 pages with Appendixes)
12. Report of OOO NPO Termek *Monitoring of Three Residential Buildings in Vladimir*, 78 pages
13. Report of V. Potapov *Implementation of Environmental Activities under the Project*, 26 pages
14. *Financial Engineering and Business Planning*. Computer version of guidelines for managers in b/l formation, 2001, 187 pages
15. Quarterly Bulletin of CENEF *Energy Efficiency*,

- №№ 2, 3/2001;
16. № 31/2001, article *Improvement of the Russian Heat Supply System's Energy Efficiency*, B. Reutov, A. Naumov, V. Semyonov, V. Muravyov, I. Pyzhov, pp. 2-7
 17. Journal *Novosti Teplosnabzheniya* (Heat Supply News), №№ 5, 8/ 2002
 18. Monthly popular scientific and political journal of Russian Academy of Sciences Presidium *Energiya*, №1/2002, article *Heat Supply of the Country on the Eve of ...*, B. Reutov, A. Naumov, V. Semyonov, V. Muravyov, I. Pyzhov, pp. 3-8
 - № 2/2002, article *How to Reform a Heat Supply System*, B. Reutov, A. Naumov, V. Semyonov, V. Muravyov, I. Pyzhov, pp. 7-15
 - № 3/2002, article *Economic Mechanism of Heat Supply*, B. Reutov, A. Naumov, V. Semyonov, V. Muravyov, I. Pyzhov, pp. 2-9
 - № 4/2002, article *Economic Mechanism of Heat Supply*, B. Reutov, A. Naumov, V. Semyonov, V. Muravyov, I. Pyzhov, pp. 18-25
 - № 5/2002, article *Expertise in Heat Supply Arrangement in the CIS*, B. Reutov, A. Naumov, V. Semyonov, V. Muravyov, I. Pyzhov, pp. 11-16
 19. Monthly popular scientific and political journal of Russian Academy of Sciences Presidium *Energiya*, № 6/2002, article *Heat Supply is a State Matter*, PhD in technical issues M. Maslennikov, PhD in technical issues S. Lazarenko, V. Kudryavtsev, PhD in technical issues G.Osipov, A. BOgdanov, pp. 18-26
 20. Quarterly information bulletin *RSE INFORM*, № 2/1999, № 3/1999, № 1-2/2000
 21. Specialized journal *Energy Conservation*, № 5/ 2000, № 5/2001
 22. Information bulletin *Association of Russian Banks*, № 5/2001
 23. Information bulletin *Thermal Energy Technologies*, St. Petersburg, 2001, article *Full Information on the Album of Technical Approaches*
 24. Analytical Note on Implementation of GEF/UNDP Project Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Buildings and Heat Supply, Objective 1
 25. Journal *Teploenergetica*, article *The Concept of Scientific and Methodological Support to Heat Supply Reform in Residential and Communal Sector*, A. Naumov, HVAC Vice-President, pp. 6-7
 26. Journal *Ventilation. Heating. Conditioning.*, № 6/2003, article *Heat Monitoring as an Instrument for Objective Assessment of New Heat Supply Technologies*, A. Naumov, B. Reutov, A. Abramchenko, I. Pyzhov
 27. Theses of conferences held under the Project
 28. Reports of international consultant Zdravko Genchev (Analytical report by Mr. Z.Genchev and consultants' team. Center of Energy Efficiency EnEffect (Bulgaria), 2004)

Project publications

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82. Report and presentation of the project «Billing system on the basis monitoring of municipal heat supply systems» (VI All –Russia conference «regional problems of energy saving and ways of their solution », 28-30 October 2002 in the city Nizhny Novgorod)
83. Report on «Monitoring and prospective of billing in municipal heat supply systems» (XIX conference «Moscow – energy efficient city », Moscow,17 April 2003)
84. Report on «Monitoring and billing in municipal heat supply systems» (All Russia meeting on HCS problems, Moscow 25 April 2003)
85. Report on «Monitoring and billing in the system of payments for heat energy of the municipal establishment of Russian cities» (conference «Code of best practices as an instrument to improve quality of public finance management» , Moscow, Golitsino, 9-10 July 2003)
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ANNEX E Other relevant materials reviewed

87. Legislative and normative acts of the RF (Laws of the RF, Decrees of the Government of the RF on issues related to FEC, tariff policy, energy and HCS reform.
88. Contract on Transfer of the municipal property of the administration of the city Vladimir into confiding management of the private company OOO «VladEsco» of 3 autonomous boiler houses
89. Certificate №475 on approval of the supplied by the Company «Finreila OY» (Finland) equipment as a technical assistance in accordance with the Protocol from the meeting of the Commission on international technical assistance for the government of the RF from 07.12.2000 #316
90. Agreement on provision of technical assistance between UNDP and Administration of the city of Vladimir from 21.11.2000.
91. Instruction of the Head of the city Vladimir on approval of acts of state commission for approval of exploitation of constructed 3 autonomous boiler houses from 04.01.2003 №№3-p,4-p,5-p.
92. Project «Methodologies for distribution of volumes and payments of supplied heat energy between consumers » and decrees on its voting.
93. Letters of Support for «Methodologies for distribution of volumes and payments of supplied heat energy between consumers », including:
 - from 24.07.2003 Fund «Institute of urban economics », city Moscow,
 - from 29.06.2004 MUE «Тепловодоканал» city of Noyabrsk, Tumen region.
 - from 11.08.2004 Administration of the Nurengri region, republic Sakha (Yakutia).
94. 108. Information on financing of the construction and commissioning of autonomous boiler houses
95. Decrees, orders and instructions, including :

(a) Decrees of the Head of the Vladimir city Administration:

- from 14.09.1999 №244 "On organization of activities in the framework of the Government of the RF project under the GEF/UNDP programme "
- from 20.03.1997 № 325-p "On preparation and implementation of the Government of the RF project under the GEF/UNDP programme"
- from 10.09.2001 №203 «On measures for the implementation of the GEF/UNDP project», which transfers autonomous boiler houses into confiding management to the private company OOO «VladESCO».

(b) Instructions Head of the Vladimir city Administration:

- from 03.01.2002 №1 «On payments for heat energy fro autonomous boiler houses» with amendment from 20.02.2002 №47 .
- from 20.02.2002 №47 «On amendment to the decree from 03.01.2002 №1«On payments for heat energy from autonomous boiler houses » .
- from 21.03.2003 №125 «On approval of the Regulation of the Department of HCS of the Administration of the city Vladimir ».

(c) Orders of the DHCS of the city Vladimir:

- = from 07.04.2003. №143 "On creation of the experimental Activity Zone of the Government of the RF project under the UNDP/GEF programme".
- = from 22.09.1999 №388 «On organization of activities under the GEF/UNDP организации работ по проекту ГЭФ/ПРООН №RUS/96/G31».

(d) Permission of the body for state tariff regulation

- from 25.06.2004 «On setting tariffs for heat energy supplied by OOO «VladEsco»

96. Scientific-technical magazines in energy saving and development of the FEC of regions and Russian cities
97. RUSDEM web-site (www.rusdem.com).