# UNITED NATIONS DEVELOPMENT PROGRAMME

# GLOBAL ENVIRONMENTAL FACILITY

## PROPOSAL FOR PDF BLOCK B & C GRANTS

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| Country: | The Russian Federation |
| Project Title: | Reduction of Coalbed Methane Emissions In The Kuznetsk Coal Basin, The Russian Federation |
| GEF Focal Area: | Climate Change |
| Amount of PDF Funding Requested: | US $ 199,800 |
| Government Cofunding: | US $ 80,000 |
| Duration: | 10 months |
| GEF Implementing Agency: | UNDP |
| Executing Agency: | UN OPS |
| Block B __X__ | Block C _____ |
| Block A Grant Awarded: | No |

## I. Summary of Project Objectives and Description

***Objective:*** *The objective of the full scale project to be developed with the PDF resources requested here is to reduce coalbed methane emissions in the Kuznetsk coal basin, in the Russian Federation. The project is expected to consist of a technical assistance component to build the capacity of the local stakeholders to develop and implement projects of this type and of a demonstration component to finance the pilot demonstration facility.*

*The coal mines in Russia's Kuznetsk Coal Basin emit approximately 1 billion cubic meters of methane (approximately 16 million metric tons of carbon dioxide) annually. Preliminary studies indicate that a large portion of the methane could be recovered and used as energy in an efficient manner. To date, however, the lack of financial resources, information and experience with the available technologies has hampered the development of coal bed methane recovery in the Kuznetsk coal basin. Also, no detailed technical, economic, environmental or social feasibility study of such projects has been made yet.*

*Operationally, the project falls under the GEF criteria for short-term projects.*

**Background**

Coalbed methane (CBM) is a potent greenhouse gas as well as a valuable energy source. Methane normally emitted during coal mining can be recovered through the use of degasification systems, after which it can be used for energy purposes. Coal mines in countries such as the United States, China and Australia are using recovered methane to generate power, to meet on-site space and water heating needs, and to fuel vehicles. In addition, coal mines are selling the gas to natural gas companies and supplying it to local mining communities. Since coalbed methane recovery and use can result in cost savings and/or increased revenues to the mine owner or project developer, such projects provide cost-effective means of reducing greenhouse gas emissions.

The Russian Federation is one of the largest emitters of coalbed methane. Much of this methane comes from the Kuznetsk Coal Basin in south-central Russia. Also known as the Kuzbass, this basin is the largest in Russia and contains some of the gassiest mines in the world. In 1994, Kuznetsk Basin mines produced over 90 million tons of hard coal. Over 70 percent of this coal was sold in other parts of Russia or exported for hard currency. The Basin contains over 5 billion tons of coal reserves and 60-120 billion cubic meters of coalbed methane reserves.

Most of the coal-bed methane is liberated from the Basin's 76 underground mines. Many individual mines emit more than 40 million cubic meters annually. Using the latest technologies, over 70 percent of these emissions could be recovered and used. Accordingly, a project at just ten of the gassiest Kuznetsk basin mines could achieve annual reductions of approximately 4.6 million metric tons of carbon dioxide equivalent. A preliminary analysis performed by the Kemerovo Coalbed Methane Center indicate that coalbed methane projects could reduce emissions at extremely low costs. Even when the profits from methane utilization are not taken into consideration the estimated cost of emission reductions at individual Kuzbass mines is under 1 USD per metric ton of carbon equivalent (e.g., Chertinskaya mine - 0.77 USD/tC; Komsomolets mine - 0.33 USD/tC; Oktyaberskaya mine - 0.52 USD/tC).

In recent years, many groups both within and outside of Russia have expressed an interest in promoting CBM projects in the region. There is strong local support for coalbed methane projects both for environmental and economic reasons. The Russian Coal Ministry worked with the U.S. Environmental Protection Agency (EPA) and Partners in Economic Reform (PIER) to establish the Russian Coalbed Methane Center in Kemerovo in 1994. The center has produced information material on coal bed methane utilization. Together with EPA, the Center published a report entitled *Reducing Methane Emissions from Coal Mines in Russia: A Handbook for Expanding Coalbed Methane Recovery and Use in the Kuznetsk Coal Basin,* which is available in English and Russian. This report profiles some of the gassiest mines in the Kuznetsk. In addition, EPA and the Center have worked together to collect data and prepare a preliminary report on the feasibility of a potential coalbed methane project at the Kirov mine in the Kuznetsk Basin.

Coalbed methane emissions in the Russian Federation comprise about 15 percent of the total anthropogenic methane emissions in the country. Policies and measures aimed at reducing these emissions have been identified as a priority for the country and are included in the National Action Plan of the Russian Federation.

Local support for coalbed methane projects is also strong due to their economic potential. As the Russian coal industry is restructured, unprofitable coal mines are expected to be closed and the number of employees working in the coal industry in the Kuznetsk is forecasted to decline dramatically. For this reason, the economic development of this region is a priority of the Russian government. Coalbed methane recovery projects will promote the economic development by increasing the number of jobs in the area. In addition, coalbed methane projects may improve the profitability of the mines by increasing revenues (if the methane is sold) or by decreasing costs (if the methane is used on-site). These and other benefits that will result from coalbed methane projects are described in Section IX of this proposal.

***Potential Uses for Coalbed Methane in the Kuznetsk***

There are several options for using recovered coalbed methane in the Kuznetsk Basin. Following is a list of some of the most likely options for using the gas:

- Direct On-Site Use: Several very promising opportunities exist for direct use of the gas on-site. First, methane could be used at the mine to displace the inefficient combustion of low-quality coal. Frequently, unwashed low-quality coal is used to fuel boilers that heat ventilation air and water, and for other purposes. In fact, some of the mines that produce high-quality coal purchase low-quality coal for use in their boilers. Another option could be to use the gas to fuel a mine water desalinization plant or use in vehicles.

- Electricity Generation On-Site: Methane could also be used in a gas-fired turbine to generate electricity to meet on-site power needs or for sale to the local power grid.

- Sale to Existing Pipelines: Many of the mines in the Kuznetsk are located in close proximity to major gas transmission pipelines. Methane recovered at the mines could be sold directly to these pipelines.

- Sale to Nearby Power Generation Stations: A number of large coal-fired power generation stations are located throughout the Kuznetsk region. Gas could be sold to these power generation stations to be used for co-firing with coal.

- Sale to Nearby Industries: The Kuznetsk region is highly industrialized. Numerous steel, chemical, and other industries with large natural gas needs are located in the area. Recovered coalbed methane could be sold directly to these industries.

The preferred option for each mine will depend on site-specific technical, economic, and market considerations.

## II. Description of PDF Activities

### A. Tasks

The proposed PDF phase includes five main tasks: (1) identifying promising sites for the first demonstration facility; (2) conducting site assessments (including a technical, economic, environmental and social feasibility study); (3) identifying technical assistance needs; (4) undertaking a risk assessment; (5) finalizing the project brief for the main project.

***Task 1. Identify Promising Sites for the First Demonstration Facility***

*Purpose:* By building on the earlier work undertaken by the Russian Coalbed Methane Center, identify coal mines in the Kuzbass that would be good candidates for the first demonstration facility for collection and utilization of coalbed methane. This task will require the following steps:

- Step 1: Collect Information: The first step involves collecting information on the location of regions or basins that have gassy mines, the number of large mines in those regions, the amount of methane emitted from each mine, the expected lifetime of each large, gassy mine, and potential uses of recovered methane. The sources of these data are the Russian coal industry institutes and organizations (e.g., Institute of Coal of the Russian Academy of Sciences).

- Step 2: Perform Initial Screening: A step-by-step screening process will be applied to identify candidates for the first demonstration facility. For initial screening purposes, mines producing more than 300,000 metric tons of coal annually and emitting more than 10 cubic meters of methane per ton of coal produced will be considered. These mines will generate sufficient quantities of methane to support a recovery project. For the project to derive economic benefits, the mine should be expected to remain open for at least five years and must be able to find an on-site or off-site use for the recovered methane. Mines that meet such screening criteria will be considered candidates.

- Step 3: Prepare Report: The report prepared will summarize the collected information and provide a list of the most promising mines for the first demonstration facility. The most promising mines will be those that produce the most gas in areas that can use the energy.

***Task 2. Conduct Site Assessments***

*Purpose:* Conduct a technical, economic and environmental assessment at the most promising mines identified in Task 1. These assessments will provide a more comprehensive and concrete evaluation of each of the project opportunities. Using site specific information, project development options that are technically, economically and environmentally most appropriate will be selected for further evaluation. This task will be performed as follows:

- Step 1: Collect Detailed Site Data: The site assessment begins by collecting more detailed data on the selected mines in order to examine the methods for recovering methane, the quantity of gas likely to be produced, and potential uses for the gas recovered. The information will be verified in follow-up meetings with the mine personnel.

- Step 2: Conduct Technical, Economic and Environmental Feasibility Assessments: The technical assessment will (1) identify one or more gas recovery techniques that can be used to produce gas; (2) estimate the gas recovery potential for the preferred gas production methods; and (3) identify uses for the recovered methane. A field team comprised of a coalbed methane recovery expert and gas utilization expert will be deployed for the technical assessment. The economic assessment will be performed by a financial consultant. To perform a NPV analysis (feeding the incremental cost analysis), the following will be estimated: the total capital cost of the system; operating costs for the prospective project; operating revenues for the prospective project; and appropriate financial factors, e.g., the project lifetime, financing rates, project discount rates, depreciation methods. The financial factors used will be consistent with the standards used by Russian and international financing sources. The environmental impact analysis will cover all the expected local and global environmental impacts of the project (both positive and negative).

- Step 3. Prepare Report: This report will summarize results of the technical, economic and environmental assessment of each of the candidate mines and rank these mines based on their expected profitability (i.e., NPV) and emissions reduction potential. The report will also include an assessment of the "social" impacts of the proposes project such as job creation etc.

***Task 3. Identify the Technical Assistance Needs***

*Purpose:* Undertake an assessment of the current capacity of the local stakeholders to develop and implement coalbed methane recovery projects, and identify the needs for training, institutional strengthening, and other technical assistance to increase this capacity up to the level needed.

- Step 1. Identification of the Relevant Stakeholders and Assessment of their Current Capacity to Develop and Implement Coalbed Methane Recovery Projects: The relevant stakeholders will be identified at all levels including management, planning, operations and maintenance. The tentative list of organizations involved will contain the federal and local administration, the investment branch of "Rosugol" – "Kuzbassinvestugol", individual mines, the Russian Ministry of Fuel and Energy, the Russian Ministry for Natural Resources, as well as federal and local committees for environmental protection.

- Step 2. Identify the Needs for Technical Assistance: Based on the analysis above, there will be the identification of the needs for training, institutional strengthening and other technical assistance type

of activities to ensure an appropriate implementation of the first demonstration project, as well as development of the expected follow-up projects.

- Step 3. Formulate a Strategy and a Set of Measures to Provide the Technical Assistance Needed: Based on this assessment, a strategy and a list of specific measures will be formulated to address the technical assistance needs at the federal and local levels. Expected costs and benefits of individual measures will also be evaluated.

***Task 4. Undertake a Risk Assessment and Develop a Risk Management Strategy***

*Purpose:* Undertake a risk assessment identifying all the eventual risk to successful implementation of the main project and develop a risk management strategy.

- Step 1. Develop a Risk Assessment Method: The method for assessing the risk to successful implementation of main project will be developed based on the previous experience in identifying and implementing energy-related projects in the Russian Federation.

- Step 2. Establish a Risk List: A list of potential risks will be compiled based on the past experience of developing coalbed methane projects in Kuzbass, Donbass (Ukraine), China, Poland, and other countries. This list will address such risk sources as equipment quality and costs, CBM prices, investment climate, social, political, and economical situation in the region, etc.

- Step 3. Develop a Risk Management Strategy: A risk management strategy will include a prioritized list of risks to successful implementation of the main project, a description of measures to mitigate those risks, and an assignment of roles and responsibilities for mitigating and containing project risks.

***Task 5. Finalize the GEF Proposal for the Main Project***

*Purpose:* Using the results obtained above, finalize the GEF proposal for the main project.

- Step 1. Develop a Detailed Project Design for the First Demonstration Facility: Based on information collected at the previous stages, a detailed design of the first demonstration facility to collect and utilize coalbed methane will be developed. The project design will include: a conceptual layout of the gas recovery system; description of equipment required to recover and utilize coalbed methane; estimates of capital, operation, and management costs; estimation of the revenue stream; a description of all permits and legal documents that are needed to implement a project; and a description of potential project stakeholders, and their rights and responsibilities.

- Step 2. Formulate the Technical Assistance Component of The Project Based on the needs assessment undertaken before, the technical assistance component of the demonstration project will be formulated. This may include activities such as training, institutional strengthening, information dissemination, etc. _

- Step 3. Undertake a Detailed Incremental Cost Analysis of the Proposed Project: Based on the economic analysis of the proposed demonstration facility, a detailed incremental cost analysis of the project, indicating the figure of US $ per ton of carbon reduced, will be undertaken. This analysis will also include a complete description of associated "local" social and environmental benefits of the project.

- Step 4. Agreement on Cofunding: Local and international sources of funding to cover the "baseline" costs of the project will be identified and negotiations to agree on cost-sharing arrangements will be initiated. Potential sources of funding include local and foreign private sector project developers, and multilateral development banks.

- Step 5. Develop a plan and a set of measures for monitoring and evaluating the results of the project: A plan will include a description of parties responsible for performing monitoring and evaluation of the "main" project results, including its financial and technical performance and a time table for these activities. A set of specific measures will be developed to conduct the project monitoring and evaluation, which may include technical, environmental, and economic audits of the "main" project during different stages of its implementation.

**B. Schedule**

The entire project from initial data collection to finalization of the project brief for the main project is expected to take 10 months.

The proposed Project schedule is provided in Table II-1.

Table II-1. Project Schedule.

| Tasks | Months | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1. Identify Promising Sites for the First Demonstration Facility | | | | | | | | | | |
| 2. Conduct Site Assessments | | | | | | | | | | |
| 3. Identify the Technical Assistance Needs | | | | | | | | | | |
| 4. Undertake a Risk Assessment and Develop a Risk Management Strategy | | | | | | | | | | |
| 5、 Finalize the GEF Proposal for the Main Project | | | | | | | | | | |

## III. PDF Outputs

The output of the PDF will be a project brief for the "main project" demonstrating the ability to achieve the goals set for the project including:

1. Results of a technical, economic, social, and environmental feasibility study of the first demonstration facility;

2. A detailed incremental cost analysis following the GEF guidelines;

3. A description of all the eventual risks to successful implementation of the project and a description of the measures how these risks will be addressed;

4. A plan for involvement of all the key stakeholders;

5. A financing plan and agreements on co-funding for the first demonstration facility, and an initial analysis of the resources available for the eventual follow-up investments.

6. A plan and a set measures for monitoring and evaluating the results of the project.

## IV. Eligibility

The Russian Federation ratified the Framework Convention on Climate Change on December 28, 1994. As a Party to the Convention and as an economy in transition the Russian Federation is eligible for assistance from the Global Environment Facility for projects relating to the climate change focal area. Specifically, the project is consistent with the GEF short-term criteria to reduce greenhouse gas emissions. Beside these short term impacts, there is a strong potential for replicating this project in other transitional and developing countries.

## V. National Level Support

This project is supported by the Russian Federation's Ministry of Fuel and Energy, the Russian State Committee for Ecology and Environmental Protection, the Russian Coalbed Methane Center, the Russian Institute of Coal, "Kuzbassinvestugol" (a branch of the state holding "Rosugol" responsible for investments in the Kuznetsk Coal Basin), and the Administration of the Kemerovo region.

The institutions mentioned above will support the project by providing in-kind contribution in the form of data required for project implementation, office space and equipment, electronic communications, analytical equipment, and professional labor (e.g., coalbed methane specialists, engineers, technicians, etc.). The total value of this contribution is apprized at 80,000 USD.

## VI. Items to be Financed

The GEF PDF Block B funds will be used to pay local and international consultants to implement the five tasks outlined in the Section II of this proposal. It is expected that the Kemerovo Coalbed Methane Center in cooperation with the Center for Preparation and Implementation of International Projects on Technical Assistance (CPPI) (a project management branch established by the World Bank and the Russian State Committee on Environmental Protection) will be responsible of the overall project management and coordination under the supervision of the Project Executing Agency (if different) and UNDP. Local and international experts in such areas as coalbed methane recovery and utilization, environmental engineering, project finance, and legal aspects of natural resource use will be hired to complete individual tasks. The specific items to be financed and proposed staffing are presented in Table VI-1.

The role of the international experts will be to work closely with the local experts, imparting their knowledge on the methods and procedures used for assessing coalbed methane projects in their country.

Such skills transfer will enhance domestic capabilities within Russia for conducting coalbed methane project assessments.

## VII. Special Features

The Russian Federal and regional government is particularly interested in promoting coalbed methane projects because, in addition to the reduction in greenhouse gases and the increase in energy efficiency, these projects have a variety of other potential benefits that make them more attractive to the Federal and regional governments. These benefits include:

- Local Environmental Benefits: Depending on how the gas is used, coalbed methane projects can also achieve local environmental benefits. If methane is used in place of coal in mine boilers or co-fired with coal at coal-fired power plants, local air quality can be improved. Many mines use their lowest quality coal, which burns inefficiently, to meet their on-site energy needs. Additionally, if methane is used to fuel mine water desalinization plants, local soil and water contamination may be avoided. Pollution resulting from the release of saline mine water into surface waters is considered to be particularly acute in the Kuznetsk basin.

- Energy Benefits: Coalbed methane projects can take advantage of an otherwise wasted energy resource. By increasing the amount of locally available energy, coalbed methane projects can eventually alleviate the energy shortages experienced in some parts of the region. Although natural gas is not produced in the Kuznetsk basin, it is widely used. Approximately 5 billion cubic meters of gas are imported from other regions in Russia annually, only one-third of the amount requested by the regional government each year.

- Safety Benefits: Methane is a safety hazard to coal miners everywhere. Every year, coal miners are killed in explosions resulting from unsafe methane levels. Degasification systems greatly reduce the methane levels in working areas by removing methane before and during mining.

During the PDF phase, a detailed incremental cost analysis will be conducted to evaluate the domestic and global benefits of the project and to determine the funding to be requested from the GEF to cover the incremental costs.

**CPPI** / **NPAF**

*Center for preparation and implementation of international projects for technical assistance*

*National Pollution Abatement Facility*

*Kedrova 8/1, Moscow, Russia, GSP-7*

*Our Reference No* 112

*Date:* May 26th, 1997

Mr. Richard Hosier
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Dear Mr. Hosier:

I am writing this letter to support the attached Project Development Facility Block B proposal entitled "Preparation of Investment Projects to Reduce Coalbed Methane Emissions In The Kuznetsk Coal Basin, The Russian Federation". The project submitted by the Russian Coalbed Methane Center (Kemerovo, Russia) and supported by the Russian Federation's Ministry of Fuel and Energy proposes to conduct technical, economic, and institutional feasibility assessments of coalbed methane utilization at several gassy mines in the Kuznetsk Coal Basin (commonly known as the Kuzbass) and prepare several detailed project proposals to be offered to domestic and international investors.

The proposed project is an important and necessary step to substantially and economically reduce atmospheric methane emissions and therefore mitigate the global change threat. Moreover, it leads to the improved sustainability of natural resource use and provides additional benefits such as regional economic development, improved mine safety, and transfer of technology and knowledge in the CBM-utilization sector.

Original proposal foresees that the project will be managed by the Russian Coalbed Methane Center (CMC) with co-operation with CPPI and with assistance from the Ministry of Fuel and Energy of the Russian Federation. A team of local and foreign consultants will be implementing specific Project tasks. The CMC was established in 1994 by the Russian Coal Ministry, the U.S. Environmental Protection Agency (EPA) and Partners in Economic Reform (PIER) to stimulate investment in coalbed methane projects in Russia by acting as a liaison between the Russian coal industry and potential investors. Since than, the Center was instrumental in establishing working contacts with individual coal mines, coal producing associations, and organizations conducting

research and engineering design in the Russian coal sector. The CMC have assembled a database of methane reserves in the region and is assisting individual mines in developing their degasification projects.

I hope that you will find this project of interest and it will be considered for submission to the GEF.

Sincerely,

Alexander Averchenkov,
NPAF Executive Director;
GEF Political Focal Point in the Russian Federation