Report No. 13076-RU

Russian Federation

Greenhouse Gas Reduction Project
(A Component of Gas Distribution and Energy Efficiency Project)

Project Document
November 1995

Infrastructure, Energy and Environment Division
Country Department III
Europe and Central Asia Region

PART I: PROJECT SUMMARY

CURRENCY EQUIVALENTS

Unit of Currency = Ruble
Rubles per US Dollar
Moscow Inter-Bank Foreign Currency Exchange/Foreign Exchange Auction Market (VEB) rate

	Period Average	End of Period
1991	62	169
1992	228	415
1993	1018	1247
1994		
I Quarter	1591	1753
II Quarter	1877	1989
III Quarter	2166	2633
IV Quarter	3191	3550
1995		
I Quarter	4311	4899
II Quarter	4931	4539
III Quarter	4467	4499

WEIGHTS AND MEASURES

toe	= ton of oil equivalent	MW	= megawatts
BCM	= billion cubic meters	TCM	= trillion cubic meters
MCM	= thousand cubic meters	ton	= metric ton (tonne - 1,000 kg)
kWh	= kilowatt-hour		

ACRONYMS AND ABBREVIATIONS

FSU	-	former Soviet Union
GDC	-	Gas Distribution Company
GEF	-	Global Environment Facility
GHG	-	Greenhouse Gases
ICB	-	International Competitive Bidding
IS	-	International Shopping
MOFE	-	Ministry of Fuels and Energy
OECD	-	Organization for Economic Cooperation and Development
RESF	-	Russian Energy Savings Foundation

FISCAL YEAR
January 1 - December 31

RUSSIAN FEDERATION
GREENHOUSE GAS REDUCTION PROJECT

Grant and Project Summary

Grantee: Russian Federation

Beneficiaries: Volgograd Gorgas, Gazprom, Ministry of Fuel and Energy

Amount: SDR 2.2 million (US$3.2 million equivalent)

Terms: Grant

Financing Plan: Including financing for the Gas Distribution and Energy Efficiency Project

(in US$ million)

Financing Source	Local	Foreign	Total	% of Total*
I.B.R.D.		106.5	116.5	81
G.E.F.	0.5	3.2	3.7	2
Bilateral Sources		1.5	1.5	1
Gas Distribution Companies	13.4		13.4	10
Other Local Enterprises	6.3		6.3	5
Total	20.2	111.2	131.4	100%
Percentage of total	15%	85%	100%	

* Totals may not add up due to rounding

Economic Rate of Return: Not Applicable

Map: IBRD No. 25919R

RUSSIAN FEDERATION
GREENHOUSE GAS REDUCTION PROJECT

1. **Background:** Oil and gas production are critically important elements in Russia's economic recovery and play a key role in the global economy. Russian proved reserves of natural gas amount to about 48 trillion cubic meters (TCM), 33 percent of the world's total. The largest gas producing fields are located in western Siberia and smaller fields are located in the trans-Ural region. Future development efforts are expected to be directed toward the discovered but unproved reserves in the Arctic regions. In 1990, the year of peak production, the USSR gas industry produced a total of 815 billion cubic meters (BCM) of natural gas, with 80 percent (652 BCM) coming from Russian fields. From 1991 to 1994 gas production declined gradually reaching 607 BCM in 1994 due to a contraction in demand. The principal sources of non-associated natural gas are the Urengoy, Yamburg and Medvezhye fields which produce over three quarters of Russia's total gas supply. Gazprom is solely responsible for non-associated gas production, gas transmission and export within Russia. Rossgazifikazia is responsible for co-ordinating gas distribution activities across Russia.

2. About two thirds of gas delivered is consumed within Russia. However, exports are one of the major sources of hard currency and represents approximately 20 percent of Russia's total foreign exchange earnings in 1994. Russian gas represents 44 percent of the total gas that is transported internationally via pipelines. Predictions of demand growth in western Europe over the next two decades range from about 140 BCM/year to as high as 250 BCM/year.[1] Although other sources of gas are expected to contribute to this increased demand, it is projected that Russia will continue to be the primary source of imported gas to Central and Western European countries for the next 10 to 15 years.

3. The greenhouse gases which are the primary focus of this study are carbon dioxide, methane and nitrous oxide. These gases can produce a number of changes in the terrestrial biosphere which are difficult to predict and can result in damage to habitats, loss of agricultural production, extinction of species and other undesirable consequences. Russia is one of the largest sources of methane gas emissions from oil and gas production in the world. Although there are no reliable estimates of methane emissions, the limited data available indicates that approximately 10 million tons per year of methane, 28 percent of all the methane from oil and gas production operations in the world, are emitted in Russia. The next largest source, the United States, produces about half that amount. Russia's methane emissions are equivalent to over 200 million tons of carbon dioxide annually as methane is 20-30 times more potent as a greenhouse gas than carbon dioxide.

4. **Project Objectives:** The principal objectives of the project are: (a) to assess the release of methane to the atmosphere and propose methods for its reduction; and, (b) to identify and appraise projects to decrease CO_2 emissions by increasing the efficiency of gas use. Methane releases to the atmosphere have a particularly strong impact on global warming. Since Russia is the largest producer of gas in the world, with long pipelines delivering gas over 5,000 km from Western Siberia to markets in Western Europe, Russia is generally considered to be the largest source of methane releases in the gas industry. Russia also has among the worst records on efficient use of energy, with an energy intensity level 3-12 times higher than OECD countries. This project is closely linked to the Gas Distribution Rehabilitation and Energy Efficiency Project which will address the rehabilitation of the gas distribution system in Volgograd and investments to increase the efficiency of energy use, for which a loan was approved by the Board of Directors on May 2, 1995 (Report No. P-6352-RU). A portion of the proposed

[1]Prospects for Russian Gas Sales to Europe, Arthur D. Little, November 1992.

grant would be used to carry out leak detection surveys in Volgograd, to propose methods for leak reduction and to develop a long term leak detection program. A portion of the proposed grant would also be used to identify investment projects to increase the efficiency of gas use which would be financed under the Gas Distribution Rehabilitation and Energy Efficiency Project.

5. **Environmental Policy Framework:** The environmental protection system in the former Soviet Union (FSU) was highly fragmented and uncoordinated, with as many as 70 government agencies having some responsibilities for environmental regulations. In 1988, a State Environmental Protection Committee (Gaskompriroda) was formed to strengthen environmental regulations, enforce the environmental protection standards, and coordinate the activities of government organizations which had some type of environmental control responsibilities. This structure has undergone a series of reorganizations in an effort to improve the decision-making capability and effectiveness of the Ministry of Environmental Protection and Natural Resources. There is a strong trend toward decentralization of the responsibilities and authority to regional and local agencies. The Russian Supreme Soviet has adopted a number of laws and decrees which, for the most part, are short on meaningful actions. In 1991, the Supreme Soviet passed legislation entitled "On Environmental Protection", which delegates certain responsibility at various levels of government. The federal government sets environmental standards and establishes fees for the use of natural resources. The oblast governments issue permits for pollution emissions and are responsible for monitoring emissions.

6. The Russian law requires a State Environmental Impact Review for all development activities. The law defines the obligations of enterprises for complying with air and water emission standards as well as other environmental controls such as waste management and land use. The Federal Environmental Fund, which was established in 1992, supports the federal activities to some extent, but the largest share of the funds are allocated to territorial environmental activities (30 percent), and to municipal/local activities (60 percent).

7. Given the historical neglect of environmental issues and the recent upheavals of all governmental structures, it is not surprising that the environmental policy and management structure are in a state of disarray. The problems which will most directly impact the Greenhouse Gases (GHG) reduction program are as follows: a) environmental data are unreliable, as the information gathered heretofore is limited, and the reports published on the basis of that information are based on gross estimates of emissions derived from unreliable literature data rather than data collected in the field; b) environmental regulations and laws to govern and control the most egregious of environmental problems, such as nuclear waste disposal, have been slow to appear, and GHG emissions have received little attention at the legislative level; and, c) responsibilities are poorly defined. Although the concept of environmental impact assessment has been recognized, little attention has been given to the impact of GHG emissions attendant to development activities. The gas producing associations, Gazprom, and the distribution enterprises have not been charged with reducing GHG emissions by the federal or local authorities and as a result, little action has been taken.

8. **Project Description:** The primary objective of the GEF energy project is to identify and prioritize investments and changes in procedures in the natural gas supply and utilization system, which will be part of a cost-effective GHG mitigation program. This project would complement the Environmental Management Project (Report No. 12838 dated October 19,1994) particularly in the city of Volgograd. The Environmental Management Project includes a component for assessing the air quality in Volgograd and recommending methods for improvement.

9. The work effort will include the following operational activities:

- identify and evaluate potential sources of GHG emissions, develop reliable estimates of quantities of GHG emissions from associated and non-associated gas production (including drilling, gathering and processing), and identify appropriate equipment, measures and procedures to reduce these losses.

- assess: (a) the potential for reducing methane leakage from high pressure mainlines, compressor stations and storage facilities; (b) the quantities of methane which are vented from pipelines, compressors and other equipment when lines are shut down for maintenance or liquids are purged; (c) the quantities of gas which are vented from pneumatic regulators and other control equipment on the pipelines and at city gate stations; and (d) the quantities of CO_2 emissions from mainline compressor stations, flare pits and other sources along mainline routes.

- identify and evaluate sources of fugitive methane losses from the distribution network, develop reliable estimates of quantities, and define means and procedures to successfully reduce and mitigate these losses.

- identify and quantify, to the extent possible, the sources of greenhouse gas emissions in industrial, power generation, district heating installations and households and assess the potential for reducing emissions by improving the energy efficiency of equipment and technologies.

- based on these assessments, identify investment projects and changes in construction and operation procedures required to reduce GHG emissions. The cost-effectiveness of investments in GHG reducing projects which do not meet the economic hurdle rate will be assessed and ranked on the basis of net cost per ton of equivalent CO_2 reduction.

10. **Implementation**: The Ministry of Fuel and Energy (MOFE) would have primary responsibility for the proposed GEF component. MOFE has established a Coordinating Committee which includes representatives from the MOFE, the Ministry of Environment and Natural Resources, Gazprom and Rossgazifikazia. The Committee has appointed a Project Manager who would be responsible for day-to-day direction of GEF project activities as well as budget control. Gazprom has appointed a Working Group which will be responsible for the field studies and analyses relating to gas production and high pressure transmission. The field investigations of the distribution networks would be carried out in Volgograd by Volgograd Gorgas which is implementing the Gas Distribution Rehabilitation Project. Rossgazifikazia has appointed a person to coordinate these field studies. The field audits and investigations of the gas utilization facilities would be directed by the Russian Energy Saving Foundation (RESF). It is anticipated the GEF component of the Project will be completed by June 30, 1997 and the Grant would be closed by December 31, 1997.

11. **Project Sustainability**: This project is closely linked to other projects in the Bank's energy sector lending program and is an essential precursor to the investment projects required to reduce GHG emissions. The information concerning the condition of gas pipelines and compressor stations could be used to identify specific equipment requiring rehabilitation. The project would provide information which ultimately may increase revenues of enterprises in the natural gas sector, as well as of natural gas consumers. Funds required to ensure the application of project results would be generated, in part, by revenue from additional natural gas which is being conserved for local use or which will be exported in exchange for hard currency.

12. A law "On Improving Energy Efficiency" has been drafted. If adopted, this law would facilitate the implementation of a program to increase natural gas use efficiency, thereby reducing GHG emissions.

13. **Lessons from Previous Bank-Financed Energy Projects:** The first Bank loans in the energy sector in Russia are for rehabilitation of existing oil fields. It is too soon to draw many general lessons that would be relevant to this project. However, the Borrower responded quickly in evaluating bids, largely due to considerable resources being allocated to the procurement process. The Bank has approved loans for natural gas development and, has approved a GEF grant as part of a similar gas sector rehabilitation loan in China. These projects have shown the need for coordination between the various enterprises which will be responsible for implementing the project. This problem could be especially acute when implementing the GEF grant project, because a number of entities will be responsible for carrying out field investigations and audits of geographically dispersed facilities. The problem has been addressed by establishing a Coordinating Committee to oversee the entire project and an overall Project Manager has been appointed. Use of computer based communications is also expected to mitigate this problem.

14. **Rationale for GEF Funding**: The Russian gas industry is the largest in the world. In view of the size and complexity of the gas supply and utilization system and the number of sources of GHG emissions, a rigorous and carefully designed analytical approach is necessary to ensure that the investment program addresses the priority targets, so that maximum environmental benefits can be derived from the limited funds available. The study is needed to prioritize the wide spectrum of policy and investment options available to the Russian Federation in defining and implementing a program to mitigate GHG emissions. However, many internal problems including limited capital resources have resulted in a focus away from environmental concerns. The purpose of the GEF funding would be to support a more balanced investment program that addresses both immediate commercial needs and environmental priorities.

15. **Agreed Actions**: The Government has declared its commitment to the objectives of the project and to carrying out the project in accordance with the Implementation Program. The MOFE has already established a Coordinating Committee and appointed a Project Manager. They have also agreed to establish a Special Account, in compliance with Bank requirements, to expedite disbursements. The duties of the Project Manager have been agreed upon. He would be responsible for developing short lists for consultants; directing the preparation of procurement packages in accordance with Bank guidelines; and, maintaining control over the budget for the GEF grant. Equipment and consultant selection would be reviewed by the Coordinating Committee.

16. **Environmental Aspects**: The proposed GEF grant would be used to identify sources of GHG emissions and to prepare a cost-effective investment program which could be supported, in part, by further GEF grants. One of the principal goals of the GEF grant would be to provide the documentation required to support an application to the GEF for implementation funds. Therefore the long range impact cannot, at this time, be expressed in terms of the amount of methane, CO_2 or other GHGs which will be eliminated. However, as gas industry operations expand they will contribute to increased emissions of: (a) CO_2 and methane from the production field facilities; (b) CO_2, methane and nitrogen oxide from the high pressure pipelines and compressor stations; and (c) methane which escapes or is intentionally vented during production, transport, and storage operations. These increased emissions could offset the benefits of increases in overall efficiency unless investments are made in technologies which enable lower GHG emissions.

17. **Project Benefits**: Through the implementation of project objectives, investment opportunities would be identified which could have a significant impact on the reduction of GHG emissions. By identifying, quantifying and demonstrating the benefits of reduced GHG emissions and improved energy efficiency, the results of the project will stimulate the interest of MOFE and encourage enterprises to include the benefits of reducing GHG emissions in the energy sector investment planning process. Furthermore, the results of the analyses will support the establishment and enforcement of environmental laws and regulations.

18. The GEF grant supported field investigations will identify investments in the following specific areas:

a) the recovery of associated natural gas and natural gas liquids which otherwise would be flared and would produce approximately 20 to 30 million tons of carbon dioxide annually, as well as noxious sulfur compounds and other pollutants.

b) the rehabilitation or replacement of a portion of the natural gas supply system which potentially could reduce fugitive methane emission losses by up to 1 percent of the gas produced, or 5 million tons annually (equivalent to more than 100 million tons of CO_2 in greenhouse gas potential). CO_2 emissions might potentially be reduced by 40 million tons per year.

c) the installation of energy efficient equipment and technology in gas fueled industrial and residential applications. The conservation potential would depend on the level of investment, but a 5 percent reduction in energy use is a realistic goal. This could reduce carbon dioxide emissions by 60 million tons per year.

19. **Risks**: Project-specific risks include: (a) the possibility that the project implementation plan will not be effective in coordinating disparate and sometimes conflicting interests of producers, transporters, and consumers of natural gas; and, (b) the information required to identify the most cost-effective application of the evaluative methodology would not be available. The risk associated with creating financial incentives adequate to attract investments in GHG reduction has been addressed, with the price of most energy products near the estimated economic cost of supply. The risks associated with project implementation would be reduced by establishing a Coordinating Committee and an overall Project Manager. Consultants with relevant international experience, financed from bilateral sources, have been retained to initiate project implementation.

20. There are no significant technical risks which could limit the benefits of this project. However, the techniques for quantifying fugitive methane emissions are still under development and the results of the evaluations will be limited by the accuracy of the techniques and equipment. This risk would be reduced by retaining consultants with the required specialized knowledge to assist the implementing agencies develop the programs and reporting of the results.

B. Financing Plan

(US$ million equivalent)

Financing Source	Local	Foreign	Total	% of Total
I.B.R.D.	-	106.5	106.5	81
G.E.F.	0.5	3.2	3.7	2
Bilateral Sources	-	1.5	1.5	1
Gas Distribution Companies	13.4	-	13.4	10
Other Local Enterprises	6.3	-	6.3	5
Total	20.2	111.2	131.4	100
% of Total	15	85	100	

Note: Discrepancies may occur due to rounding.

Schedule B
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RUSSIAN FEDERATION
GREENHOUSE GAS REDUCTION PROJECT

A. Procurement Method for the Aggregate Project (US$ million equivalent)

Project Element	Procurement Method		N.B.F.[2]	Total Costs
	ICB	Other[1]		
1. Metering				
1.1 Industrial Meters	11.6 (11.6)	0.4 (0.4)	1.9	14.0 (12.0)
1.2 Commercial Meters	0.9 (0.9)	--	0.1	1.0 (0.9)
1.3 Private Home Meters	2.7 (2.7)	--	1.4	4.1 (2.7)
1.4 Apartment Meters	6.5 (6.5)	0.1 (0.1)	2.5	9.1 (6.6)
1.5 Meter Test Equipment	0.3 (0.3)	--	0.1	0.4 (0.3)
2. Asset Preservation				
2.1 Pipeline Replacement	1.1 (1.1)	--	0.4	1.5 (1.1)
2.2 Cathodic Protection	5.9 (5.9)	0.3 (0.3)	5.1	11.3 (6.2)
2.3 Leak Detection Equipment	2.1 (2.1)	--	0.6 [0.4]	2.7 (2.1)/[0.4]
2.4 SCADA	2.1 (2.1)	0.2 (0.2)	0.7	3.0 (2.3)
2.5 Network Modelling	0.8 (0.8)	--	0.3	1.1 (0.8)
3. Energy Efficiency [3]	52.0 (52.0)	6.0 (6.0)	6.3	64.3 (58.0)
4. Consulting				
4.1 Implementation Support	--	1.5 (1.5)	--	1.5 (1.5)
4.2 Twinning / Training	--	--	2.0[4]	2.0
4.3 Technical Assistance	--	12.0 (12.0)	--	12.0 (12.0)
5. GHG Reduction - Goods and Services	--	--	3.3 [2.8]	3.3 [2.8]
Total IBRD Financed GEF Financed	86.0 (86.0)	20.5 (20.5)	24.9 -- [3.2]	131.4 (106.5) [3.2]

Notes: Figures in ( ) are the amounts financed by the Bank loan. Figures in [ ] are financed by GEF. N.B.F.: Not Bank Financed

1. Goods would be procured by International Shopping (IS). Consulting services would be procured in accordance with Bank guidelines.
2. Includes local costs for engineering, procurement and installation.
3. Breakdown between ICB and IS is based on the sample of identified projects.
4. Includes US$0.5 million local costs, and $1.5 million co-financing.

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GREENHOUSE GAS REDUCTION PROJECT
B. Procurement Method for G.E.F. Component (thousand US$)

Project Element	Procurement Method		N.B.F.[2]	Total Cost
	I.C.B.	Other[1]		
1. Production				
1.1 Methane Analyzers	--	90.0 (90.0)	5.0	95.0 (90.0)
1.2 Analytical Equipment	--	100.0 (100.0)	5.0	105.0 (100.0)
1.3 Reboiler Test Units	--	100.0 (100.0)	5.0	105.0 (100.0)
1.4 Laboratory (Mobile)	160.0 (160.0)	100.0 (100.0)	10.0	270.0 (260.0)
1.5 Office Equipment	--	70.0 (70.0)	5.0	75.0 (70.0)
2. Transmission				
2.1 Analytical Laboratory	165.0 (165.0)	100.0 (100.0)	10.0	275.0 (265.0)
2.2 Leak Detectors(Pipeline & Stations)	--	120.0 (120.0)	6.0	126.0 (120.0)
2.3 Compressor Emissions Measure	150.0 (150.0)	100.0 (100.0)	15.0	265.0 (250.0)
2.4 Blowdown Compr.(Rental)	--	100.0 (100.0)	10.0	110.0 (100.0)
2.5 Diagnostic Kit	--	90.0 (90.0)	5.0	95.0 (90.0)
2.6 Test Equipment	--	105.0 (105.0)	3.0	108.0 (105.0)
3. Distribution (Pipeline Leak Detectors)	310.0 (310.0)	100.0 (100.0)	20.0	430.0 (410.0)
4. Utilization				
4.1 Equipment Analyzers	--	103.0 (103.0)	6.0	109.0 (103.0)
4.2 Heat Meters	120.0 (120.0)	100.0 (100.0)	10.0	230.0 (220.0)
4.3 Emissions Laboratory (Mobile)	150.0 (150.0)	100.0 (100.0)	15.0	265.0 (250.0)
5. Consulting				
5.1 Production and Transmission	--	278.5 (278.5)	200.0	478.5 (278.5)
5.2 Distribution	--	157.8 (157.8)	70.0	227.8 (157.8)
5.3 Utilization	--	230.7 (230.7)	100.0	330.7 (230.7)
Total	1,055.0	2,145.0	500.0	3,700.0
GEF Financed	(1,055.0)	(2,145.0)		(3,200.0)

Notes: Figures in ( ) are the amounts financed by GEF. N.B.F.: Not Bank Financed.

1. Goods would be procured by International Shopping (IS). Consulting services would be procured in accordance with Bank Guidelines.
2. Includes local costs for engineering, procurement and support services.

B. Disbursement of the G.E.F. Grant
(US$ million equivalent)

Bank Fiscal Year	FY96	FY97	FY98	FY99	Total
Equipment	0.2	2.0	0.3	-	2.5
Consulting	0.1	0.5	0.1	-	0.7
Total	0.3	2.5	0.4	-	3.2
Percent of Total	9	78	13	-	100
Cumulative Total	0.3	2.8	3.2	-	

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GREENHOUSE GAS REDUCTION PROJECT

C. Withdrawal of the Proceeds of the GEF Grant

The table below sets forth the Categories of items to be financed out of the proceeds of the GEF Grant, the allocation of the amounts of the GEF Grant to each Category, and the percentage of expenditures for items so to be financed in each Category:

Category	Amount of the GEF Grant Allocated (expressed in SDR equivalent)	Percent of Expenditures to be Financed
(1) Goods	1,500,000	100% of foreign expenditures; 100% of local expenditures (ex-factory cost) and 70% of local expenditures for other items procured locally
(2) Technical Assistance	400,000	100%
(3) Unallocated	300,000	
TOTAL	2,200,000	

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GREENHOUSE GAS REDUCTION PROJECT

TIMETABLE OF KEY PROCESSING EVENTS[2]

(a) Time taken to prepare:	12 months
(b) Project prepared by:	Bank
(c) First IBRD mission:	June 1993
(d) Departure of Appraisal Mission:	March 1994
(e) Negotiations (Gas Distribution Project):	February 1995
(f) Negotiations (GHG Project:)	July 1995
(g) Planned Date of Effectiveness:	January 1996
(h) List of Relevant PPARs:	Not Applicable

[2] Project processing timetable was linked to the Gas Distribution Rehabilitation and Energy Efficiency Project.

Schedule C
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PROPOSED SUPERVISION PROGRAM

Approximate Dates	Activity	Expected Skills Required	Manweeks
Jan - 96	**Project Launch**	Task Manager	1
	Recruit Consultants	Gas Engineer	1
	Prepare tender documents	DH Engineer	1
	Set-up project accounting	Financial Analyst	1
		Total	4
Feb - May '96	**Bid Document Review**	Task Manager	1
	Review Bid Documents	Gas Engineer	1
	Review Project Accounts	DH Engineer	1
		Financial Analyst	1
		Total	4
Jun - Dec '96	**Bid Evaluation**	Task Manager	1
	Review Bid Evaluations	Gas Engineer	2
	Review Implementation Logistics	DH Engineer	1
		Procurement Spec.	2
		Total	6
Jan - 97	**Year 1 Review**	Task Manager	1
	Review audit progress	Gas Engineer	2
	Review Implementation Logistics	DH Engineer	1
	Review Project Accounting	Financial Analyst	2
		Total	6
Jun - 97	**Project Completion Review**	Task Manager	2
		Gas Engineer	1
		DH Engineer	1
		Financial Analyst	1
		Total	5

RUSSIAN FEDERATION
GREENHOUSE GAS REDUCTION PROJECT

STATUS OF BANK GROUP OPERATIONS IN RUSSIA

A. STATEMENT OF BANK LOANS [a/]

(As of October 6, 1995)

Loan No.	Fiscal Year	Borrower	Project	US$ Million (Less Cancellations) Loan	Undisbursed
One fully disbursed loan (Rehab)				600.00	0.0
Loans Under Disbursement:					
35320	1993	Russia	Employment services and Social Protection	60.00	56.40
35460	1993	Russia	Privatization	90.00	83.50
36230	1993	Russia	Oil Rehabilitation	604.80	482.60
37060	1994	Russia	Highway Rehabilitation and Maintenance	300.00	287.90
37340	1994	Russia	Financial Institutional Development	200.00	200.00
37560	1994	Russia	Land Reform Implementation Support	80.00	80.00
37570	1994	Russia	Agriculture Reform Implementation Support	240.00	239.95
37630	1994	Russia	Enterprise Restructuring	200.00	200.00
37680	1994	Russia	Oil Rehabilitation II	500.00	495.85
38060	1995	Russia	Environment Management	110.00	110.00
38240	1995	Russia	Management and Finance	40.00	39.40
38440[b/]	1995	Russia	Portfolio Development	40.00	40.00
38500	1995	Russia	Housing	400.00	400.00
38530	1995	Russia	Tax Administration	16.80	16.80
38720	1995	Russia	Emerg. Oil Spill. Mit	99.00	52.60
38760[b/]	1995	Russia	Gas Distribution and Energy	106.50	106.50
38850[b/]	1995	Russia	Urban Transport	329.00	329.00
38980	1995	Russia	Rehabilitation II	600.00	0.00
			Total	4,016.07	3,244.75
			Of Which: Repaid	0.00	
			Total Now Held by the Bank	4,616.07	
			Total Amount Sold	0.00	
			Of Which: Repaid	0.00	
			Total Undisbursed		3,244.75

a/The status of these projects is described in a separate report on all Bank/IDA financed projects in execution, which is updated twice yearly and circulated to the Executive Directors on April 30 and October 31.
b/Not yet effective.

Schedule D
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RUSSIAN FEDERATION
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B. STATEMENT OF IFC INVESTMENTS

(As of September 30, 1995)

FY Appr.	FY Committed	Description	Sector	Loan	Equity	Total	Other	Undisbursed
A. Approved and Committed (Signed) Projects [a/]								
93	94	International Moscow Bank	Financial Services	15.0	0.0	15.0	0.0	12.0
93	94	Polar Lights	Oil, Gas and Mining	60.0	0.0	60.0	0.0	0.0
94	94	Framlington Russ. Inv. Fund	Financial Services	0.0	8.0	8.0	0.0	2.0
94	94	Tokobank	Financial Services	0.0	0.0	0.0	5.0 [b/]	0.0
94	95	Russian Telecom Dev. Corp.	Infrastructure	0.0	7.5	7.5	0.0	0.0
95	95	Russian Trade Enhance. Fac.	Financial Services	0.0	0.0	0.0	10.0 [c/]	0.0
95	95	Nizhniy Newsprint Holding	Timber, Pulp and Paper	30.0	11.0	41.0	0.0	16.8
95	95	National Registry Com	Financial Services	0.0	1.5	1.5	0.0	0.5
95	95	Vasyugan Services	Oil, Gas and Mining	9.0	0.0	9.0	0.0	0.0
95	96	Depsona	Agribusiness	1.5	0.0	1.5	0.0	1.5
95	96	Sector Capital Finance	Financial Services	0.0	0.47	0.47	0.0	0.12
95	96	Sector Capital Fund	Financial Services	0.0	4.55	4.55	0.0	4.22
		Total gross commitments		115.5	33.02	148.52	15.0	37.14
		Less cancellations, terminations, repayment & sales		18.0	-	18.0	-	-
		Total commitments now held		97.5	33.02	130.52	15.0	37.14
B. Approved Projects Pending Commitment								
94		Savvinskaya- Seiyo Co.	Office Building	5.6	2.1	7.7	0.0	7.7
95		CTC Foods	Agribusiness	0.0	7.0	7.0	0.0	7.0
95		Framlington Volga Fund	Financial Services	0.0	20.0	20.0	0.0	20.0
95		Russian Technology Fund	Financial Services	0.0	2.0	2.0	0.0	2.0
		Total pending commitments		5.6	31.1	36.7		
		Total commitments held and pending		103.1	64.12	167.22		
		Total undisbursed commitments held and pending		12.0	9.36	21.36		

a/ In addition, the First NIS Fund, a regional private equity fund for the FSU, is expected to be directed largely to projects in Russia. IFC approved and committed $15 million in equity for this project in FY95, of which $4.5 million was undisbursed as of August 31, 1995.

b/ Loan equivalent value of risk management (hedging) facility.

c/ Guarantee.

PART II: TECHNICAL ANNEX

RUSSIAN FEDERATION
GREENHOUSE GAS REDUCTION
IN NATURAL GAS SUPPLY AND UTILIZATION

1. **Background**: The FSU countries, with approximately 5.4 percent of the world population, are responsible for approximately 18 percent of global energy use and 17 percent of global carbon dioxide emissions from industrial processes.[a] Russia is the largest energy producer of the FSU countries (providing 80 percent) and consumes approximately two-thirds of the production; thus remaining the largest source of natural gas-related GHG emissions.

2. Natural gas supply systems and utilization processes contribute a significant portion of CO_2 emissions. Based on reports for previous years, it is estimated that CO_2 emissions in 1991 from industrial processes in Russia totalled 2.5 billion tons. Gaseous fuels accounted for 700 million tons and gas flaring produced 30 million tons. Normally gas utilization processes are not significant sources of methane emissions.

3. This project would be the first step in a program to reduce greenhouse gas (GHG) emissions in the Russian Federation, one of the largest sources in world. It includes an extensive effort to identify and evaluate the potential for reducing the GHG emitted from the natural gas production, delivery and utilization system. The project would: (a) identify the sources and estimate the quantity of GHGs emitted into the atmosphere during natural gas production, processing, transportation, and distribution operations and utilization by end-users; (b) establish a prioritized ranking of the sources based on the quantity of GHGs emitted and the cost of mitigation; and (c) determine the equipment, preventative measures, procedures, and the required changes in the construction and operating practices which would reduce GHG emissions. The results of the study would be used to identify related investments which are either commercially attractive or those which would be viable with the addition of environmental benefits.

4. Objectives of the GEF Project: While the work to be supported by the GEF grant is an integral part of the gas sector rehabilitation project, the primary objective of the project is to identify and prioritize investment projects and changes in procedures in the natural gas supply and utilization system which will result in a reduction of GHG emissions. The preparatory work for the non-grant portion of the project has identified numerous projects which are already economically viable. Those projects would be funded on a commercial basis. Several projects relating to the GDCs operations and gas utilization which do not meet the minimum economic hurdle rate were also identified. These projects would be further evaluated to determine which are the most cost-effective in terms of reducing GHG emissions. Little work has been done in identifying and quantifying GHG emissions from the production and supply facilities. The objective of the GEF supported studies would be to identify those sources with the greatest potential for reducing GHG emissions at the minimum cost.

5. The work effort would include the following operational activities:

- identify and evaluate potential sources of GHG emissions and develop reliable estimates of quantities of GHG emissions from associated and non-associated gas production (including drilling, gathering and processing) and identify appropriate equipment, measures and procedures to reduce these losses.

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[a]/ World Resources 1992 - 93, The World Resources Institute, Oxford University Press, 1992.

- assess: (a) the potential for reducing methane leakage from high pressure mainlines, from compressor stations and storage facilities; (b) the quantities of methane which are vented from pipelines, compressors and other equipment when lines are shut down for maintenance or liquids are purged; (c) the quantities of gas which are vented from pneumatic regulators and other control equipment on the pipelines and at city gate stations; and (d) the quantities of CO_2 emissions from mainline compressor stations, flare pits and other sources along the mainline routes.

- identify and evaluate sources of and develop reliable estimates of fugitive methane losses from the distribution network and define means and procedures to successfully reduce and mitigate these losses.

- identify and quantify, to the extent possible, the sources of greenhouse gas emissions in industrial, power generation, district heating installations and households and assess the potential for reducing emissions by improving the efficiency of gas-fueled equipment and technologies.

- identify investment projects based on these assessments, along with changes in construction and operation procedures. Natural gas investment projects that are commercially attractive and those which would be viable if environmental benefits were added would be identified.

6. **Project Description**: The proposed project would be the initial phase of support from the Global Environmental Facility (GEF) to the Russian Federation in its efforts to reduce GHG emissions in the natural gas supply and utilization system. Its purpose would be to identify and evaluate the potential for the reduction of greenhouse gases in the natural gas supply and utilization system. The work effort would concentrate on five different tasks: (a) production/processing of gas; (b) gas transmission; (c) gas distribution; (d) energy utilization; and, (e) evaluation of projects. Each of the first four tasks would include technical audits of equipment and procedures used in each segment of the system in order to identify existing and potential sources of GHG emissions. Successful completion of the tasks and long term implementation of the recommended projects would require close coordination among consultants and the counterparts from the Russian Federation. Counterparts from gas production associations, Gazprom, Rossgazifikazia, and Volgograd Gorgas would participate in carrying out the field studies of the gas supply system. The Russian Energy Saving Foundation (RESF) would direct the field studies for energy utilization installations. Each task would include a technology transfer component consisting of a structured training program at each of the field audit sites and in-the-field training of counterpart personnel by consultants who would be selected in accordance with Bank procurement guidelines.

7. Diagnostic and analytical equipment required to carry out the field audits would be purchased with GEF project funds. The consultants would train the counterpart personnel in the application and use of this equipment. The Project Manager would be responsible for soliciting pre-qualifications and proposals from consultants. The final selection of equipment and consultants will be made by the Coordinating Committee.

8. ***Task 1 - Reduction of GHG Emissions from the Producing/Processing System***: This task is designed to identify and evaluate potential sources of GHGs and develop reliable estimates of current and future levels of GHG emissions from non-associated and associated gas production and processing. Facilities and processing equipment that would mitigate this problem, as well as changes in operating procedures which could reduce GHG emissions, would be identified.

9. The scope of work would include the following:

- The consultant would conduct a training course to provide information on the sources of GHGs; identification and measurement methods; mitigation methods; and, the techniques used to conduct cost/benefits evaluations. The training course would be presented at each field site. Training facilities, translation services and other support services to be provided by the counterpart organizations.

- A detailed field audit of the production and separation equipment and procedures would be conducted at one non-associated gas producing field and one associated gas producing field. The audit would identify sources of GHG emissions and develop preliminary estimates of the emission factors, that is the quantity of GHGs emitted from each source. The fields would be jointly selected by the consultant and the Coordinating Committee as being reasonably representative of gas production operations throughout Russia. The audit would include an assessment of the physical condition of the equipment; the operating procedures; the maintenance programs; and other factors which affect the rate of GHG emissions. The equipment and operations to be audited include, but are not limited to: procedures used for well testing and workovers; the condition of the field gathering pipelines; the procedures used to blow down the lines to remove liquids and/or make repairs; the type of high-pressure and low pressure separators used and the safety and operational controls installed and the blowdown frequency of operations which vent gas; the type, capacity and operational procedures used for dehydrators and other gas treatment equipment; and the gas driven field compressors, chemical pumps or other items of field equipment which are potential sources of GHG emissions.

- Based on the field data, the team would estimate the volumes of GHGs which are emitted from the audited field operations. The data would then be used to estimate the total losses from all non-associated gas producing fields, identify and rank the principal sources.

- The equipment and procedural changes which would be required to reduce GHG emissions will be identified and a cost/benefit analysis of a program to reduce the principal sources would be conducted.

- A GHG mitigation program would be prepared. It would identify the sources to be reduced; the procedures and equipment which would be required; the investments which would be required; a timetable for implementation; and the level of GHG mitigation which is anticipated.

10. ***Task 2 - Reduction of GHG Emissions from the Transmission System:*** The purpose of this task is to estimate the emissions and identify the potential for reducing them. The scope would include high pressure pipelines, compressor stations, and gas storage reservoirs and estimate the extent of these emissions. Investigations would be carried out at three or more field sites which would be selected by Gazprom. Based on the results of the study, investment projects to rehabilitate or replace transmission pipelines and fittings, compressors or other equipment would be identified.

11. The scope of this task will include the following specific activities:

- The consultant would present a training course at each of the three sites. The training course would include a review of the potential sources of GHG emissions, including gas-operated

regulators and equipment; blowdown for liquid removal and repairs; and leaks and ruptures. Training would be provided in methods for measuring emissions and the operation of measurement and analytical equipment which would be purchased as part of this project. Emission mitigation and control procedures and equipment would be reviewed; and techniques for conducting cost/benefit analyses would be presented.

- Gazprom would prepare a diagnostic study to evaluate the condition of high pressure mainlines and compressors in order to identify major sources of methane losses and carbon dioxide emissions into the atmosphere from mainline compressor stations. This diagnostic study would be used to investigate high priority sections of the pipeline system in three regional transmission associations to identify and quantify as accurately as possible the sources of emissions from the pipelines, compressor stations and storage facilities.

- Based on the data obtained in the sample regions, current and future methane and CO_2 emissions would be estimated.

- Possible investment projects to replace or rehabilitate high pressure pipelines, compressors and storage facilities, as well as changes in operating and construction procedures which would enable reductions in overall GHG emissions would be identified.

12. The Project Manager from Gazprom would be responsible for: (a) soliciting pre-qualification statements and proposals from consultants; (b) preparing a short list of qualified consultants; and (c) evaluating and recommending consultants to be selected. The selection of the consultant must be approved by the MOFE. The Project Manager would also prepare a budget for each of the tasks. He would be responsible for the preparation of procurement packages for diagnostic and analytical equipment to be used for the project. The procurement will be made in accordance with World Bank guidelines. Preparing a schedule for the field training and audit programs and securing arrangements for the consultants's field work would be guided by the Project Manager, along with coordinating the field work and overseeing the preparation of the consultant's final report.

13. The Gazprom Working Group would prepare a final report presenting a findings and recommendations of the field studies and analyses including a plan to continue the diagnostic and analytical programs and a preliminary timetable for implementing the proposed investment program. Based on the proposed timetable, Gazprom would estimate the quantity of GHGs reductions.

14. ***Task 3 - Reduction of GHG Emissions from the Distribution Network:*** The purpose of this task would be to identify and assess the potential for reducing GHG emissions from the low pressure gas distribution system in Volgograd, which would be a beneficiary of the Gas Distribution Rehabilitation and Energy Efficiency Loan. The distribution system audit would start at the city gate and include the distribution mains, district regulating stations, service lines and meters and regulating equipment installed at the consumers site. Based on the results of the study, investment projects to rehabilitate or replace pressure regulators and control equipment at city gate stations; distribution mains and service lines; and customer regulating and metering equipment would be identified. Changes in operating procedures to reduce GHG emissions would be recommended.

15. The following activities would be carried out to identify and evaluate sources of GHG emissions in the distribution systems:

- The consultant would present a training course in Volgograd. The training course would include a review of the potential sources of GHG emissions, including gas-operated regulators and equipment; blowdown for liquid removal and repairs; and leaks and ruptures. Methods for measuring emissions and the operation of measurement and analytical equipment which would be purchased as part of this project would be explained. Emission mitigation and control procedures and equipment would be reviewed; and techniques for conducting cost/benefits analyses would be presented. The consultant, working closely with Rossgazifikazia and counterparts from the local gas distribution company (GDC), would prepare a work plan for a field audit program to evaluate the condition of the gate stations, distribution pipelines and customer facilities in order to identify major sources of methane losses and carbon dioxide emissions. The minimum sample of sites to be investigated would include two gate stations; three sections of distribution piping; and three customer delivery facilities.

- Based on the data obtained, current and future GHG emissions would be estimated.

- Possible investment projects would be identified. These may include funds to replace or rehabilitate equipment at city gate stations; renovate the pipeline network; or upgrade regulating and metering equipment at customer delivery facilities. The investments may also provide funds to accelerate changes in operating and construction procedures which would reduce overall GHG emissions.

16. The Project Manager, in coordination with the Rossgazifikazia representative on the Coordinating Committee, would be responsible for: (a) soliciting proposals from consultants; (b) preparing procurement packages for diagnostic and analytical equipment to be used for the project (the procurement would be made in accordance with Bank guidelines); (c) preparing a schedule for the field training and audit programs and monitoring the field work; (d) coordinating the field work and overseeing the preparation of the Final Report.

17. The Project Manager and the counterpart personnel from Volgograd Gorgas would prepare a Final Report presenting the findings and recommendations for an investment program to reduce GHG emissions based on the results of the field investigations. The report would also provide a plan to continue the investigative programs and a preliminary timetable for implementing the proposed investment program. The report would include an estimate of the projected reductions in GHG emissions which would occur if the recommended program is implemented.

18. ***Task 4 - Reduction of GHG Emissions from Gas Utilization***: This component would focus on identifying larger point sources within the power generating, industrial, municipal, residential and commercial sectors which use gas inefficiently. It would define a series of possible investment projects which would improve the efficiency at the end-use level and thereby reduce carbon dioxide emissions.

19. RESF would act as a clearinghouse for energy efficiency projects, disseminating "best practices" among potential borrowers and providing guidance on project appraisal and implementation. In addition, RESF would carry out field investigations in at least four of the cities

which are participants in the energy efficiency component of the loan[b]. The tasks which the RESF would undertake will include, but not necessarily be limited to the following:

- develop sector-specific natural gas end-use profile;
- perform building and industrial process/plant-specific natural gas use audits;
- identify and evaluate major point sources in each gas consuming sector which employ natural gas inefficiently;
- estimate current and future quantities of CO_2 emissions into the atmosphere;
- identify and evaluate sector-specific gas conservation and efficiency measures/projects/programs at the end-use level; and
- compile a list of cost-effective investments to replace or rehabilitate gas consuming equipment in order to reduce GHG emissions.

20. The consultant would conduct a seminar at the four cities on the methods and equipment used to determine GHG emissions from industrial and other thermal processes.

21. To develop sector-specific natural gas customers, technology, and end-use profiles, the RESF would perform customer surveys and/or personal interviews to collect accurate data. The surveys and personal interviews would be designed to meet sector-specific needs as briefly defined below.

- **Residential and Commercial Sector:** The residential and commercial market offers significant opportunities to reduce GHG emissions. Although direct use of natural gas for cooking, water heating, etc. is a smaller portion of the total use, a large amount of gas is used in district heating plants to provide hot water for residential heating. Therefore, improvements in the equipment for producing hot water and modifying use patterns could significantly improve efficiency and reduce GHG emissions. Residential consumption may be directly affected when meters are installed and the natural gas prices are raised, thereby encouraging more efficient energy use. Task efforts would focus on determining gas consumption levels and practices. This information would make it possible to identify inefficient uses of gas in this sector and to assess the potential for improving the efficiency with which gas is used.

- **Industrial Sector:** The industrial sector's natural gas use characteristics would be obtained by interviews of preselected samples of industrial customers and local GDC's. The sample would be selected by the RESF and coordinated with the GDCs. Data derived from these interviews would then be summarized in survey form. This may include the age and size of the building, fuel types used, and other general questions necessary to determine whether expansions may be planned for the near future. The investigating team would then identify the reasons for inefficient use of gas and estimate the potential for improving efficiency. The operational, maintenance and equipment charges needed to improve efficiency would be defined and the overall impact of an energy conservation program would be estimated.

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[b]/ These include Volgograd, Voronezh, St. Petersburg, Ryazan, Saratov, Nizhny Novgorod, Samara, Rostov-on-the-Don, Stavropol and Vladimir.

- **Electric Power Generating Sector**: The power generating fuel use, cost, unit, and station efficiency and the reasons for inefficiencies would be determined for a minimum of one power generating station in each GDC's service territory. The stations would be selected by the RESF and the selection reviewed with the GDCs and the MOFE. The engineering staff of power plant systems of selected electric generating stations, located within the gas utility service territory, would be interviewed to gather data on fuel use; conservation measures which are in effect or under consideration; and future needs for energy conservation equipment.

- **Combined heat and power systems and district heating systems:** Cogeneration technology would, if appropriate, also be included in this study. A fuel use and operational profile would be developed for stations selected by the RESF and the selection would be reviewed with Rossgazifikazia and the GDCs. Basic information including capacity and energy costs, operating characteristics, and economics (e.g. capital and installation costs, fuel characteristics and prices, fixed and variable costs, and the total levelized electricity and district heat cost of supply) and causes of inefficiencies would be determined and measures required to improve efficiency identified. Any conservation programs under way or under consideration would be assessed. The potential for improving efficiency and reducing GHG emissions would be estimated.

22. The next step in the implementation of this task would be the identification and evaluation of major sources in each consuming sector which employ energy inefficiently. To complete this task, the team would perform a limited number of detailed building, industrial plant, power station, district heating plant energy audits. For commercial and residential buildings, energy audits, on a selective basis, would involve an evaluation of insulation methods, windows, thermal envelopes, gas appliances, and equipment. The industrial plant energy audits would be based on in-depth inspections and evaluations of the major equipment, boilers, and unit operations. Stack gas analyses would be conducted to determine fuel use efficiency, levels of emissions and to identify methods for reducing emissions. As a result, unit operation data (e.g. process temperature, process pressure, hourly profiles, and thermal efficiency) and stream data (e.g. temperature, pressure, mass flow, energy, and specific heat) would be developed. Similar fuel and energy audits would be performed for power generation and district heating plants.

23. The last subtask would be to identify and evaluate sector-specific energy efficiency measures and investments at the end-use level which would make significant contributions to the reduction of GHG emissions. For example, the RESF may identify and propose demand-side management technology options designed to promote more energy-efficient buildings. For the highly energy-intensive gas-consuming industries the RESF would identify and recommend specific measures to reduce energy use. Possible investment projects for upgrading thermal power plant efficiency may include installation of gas turbine/combined cycles (heat-power) units which would increase efficiency in district heating systems and enhance the electric generating capacity. Upgrading industrial boilers and other manufacturing plant components also offers an opportunity to improve heat-cycle efficiency. Recent advances in waste-heat recovery and equipment modification can improve the heat rate of existing plants. For example, recuperators can recover exhaust heat and employ it to preheat combustion air.

24. In addition to the studies in the above four cities, a special study would be conducted of the carbon black plant located at Ukhta. It has been identified as the largest point source of methane losses directly to the atmosphere. A field audit would be conducted to determine the source of the

gas leakage; the quantity of gas lost; and to determine if any conservation measures are under consideration. Possible methods of reducing the losses from the existing plan would be reviewed with the plant operators and other ways to reduce the emissions, such as change the manufacturing process would be discussed. The investment required to significantly reduce methane loses or to substitute modern technology would be estimated.

25. The field investigations of the energy utilization facilities would be carried out by the RESF under the direction of the Coordinating Committee and the Project Manager. The Project Manager would coordinate all procurement activities relating to the utilization studies with the RESF and would be responsible for:

- soliciting proposals from consultants.

- preparing procurement packages for diagnostic and analytical equipment to be used for the project. The procurement would be made in accordance with World Bank procurement guidelines and the Coordinating Committee would approve all procurement.

- preparing a schedule for the field training and audit programs and monitoring the consultant's field work.

- coordinating the field work and overseeing the preparation of the final report by RESF.

26. The RESF would prepare a final report presenting findings and recommendations of the field investigations of utilization facilities. The Report would also provide a plan to continue the field audit program and a preliminary timetable for implementing the proposed investment program. The report would include an estimate of the projected reductions in GHG emissions which would occur if the recommended program is implemented.

27. ***Task 5 - Evaluation and Prioritization of the Proposed Natural Gas Investment Project:*** The purpose of this activity is to review the investment programs developed in each of the previous Tasks and to evaluate the potential for reducing GHG emissions and prioritize proposed investment projects. Each investment project included on the list of proposed projects would be subjected to an in-depth evaluation and ranking. Generic and specific criteria and priorities which are relevant to GEF projects would be applied during the evaluation and ranking processes to calculate the economic cost and benefits of each of the identified investments. Final prioritization would be done on the basis of the net cost of reducing GHG emissions, converted to unit tonnes of CO_2 equivalent reduction.

28. This task will have the following components:

- define generic and specific evaluation and ranking criteria.

- perform evaluations and ranking of proposed investments.

- prepare a final portfolio of projects under each task.

29. The Project Manager, with the support of the RESF, Gazprom and GDC staff who participated in the studies would develop a list of generic criteria with which to perform initial evaluations and rankings of the proposed projects.

30. Once the initial evaluation and screening of the proposed projects is completed, the final evaluation and ranking would be performed. The basis for this evaluation and ranking would consist of two specific criteria: (a) the level of CO_2-equivalent emissions produced by the combustion of fossil fuels and of methane emissions from the supply system; and (b) the cost effectiveness of the technology deployed to reduce GHG emissions.

31. The Project Manager would prepare a final portfolio of investment projects. This would be included in the Coordinating Committee's Final Report.

32. **Professional Training and Development:** As discussed in the scope of work for tasks 1 through 4, each task would include a technology transfer component which would provide the following information:

- a review of the sources of GHG emissions in the gas sector.
- instructions in methods used to identify and measure GHG emissions.
- training in the applications and use of measurement and analytical equipment which would be purchased as part of this project.
- explanation of the methods used to evaluate the benefits and cost of GHG emission reduction investments.

33. A qualified consulting firm with experience in conducting field investigations of GHG sources in the gas industry and applying mitigation programs would be retained to conduct the training courses in accordance with World Bank procurement rules. Funds are also provided for professional staff from the Russian Federation organizations involved in this project to attend technical symposia, conferences and training courses outside Russia. Disbursement of funds for these activities would be approved by the Coordinating Committee.

34. Due to the rapid economic and institutional changes which are taking place in Russia, it is essential that a Project Implementation Unit (PIU) be established within Gazprom to support the activities of the Project Manager. The Coordinating Committee has appointed a Project Manager and Gazprom would provide office space in its headquarters in Moscow. Funds (US$20,000) are provided in the project budget for office furnishings and equipment.

35. **Cost Estimate**: The estimated project costs are presented in Table 1. The foreign component of the project is estimated to be US$3,200,000. The local component, consisting of services for conducting field investigations, transportation and other support services is estimated to be the equivalent of US$500,000.

Table 1
Project Cost Estimate
(thousand US$)

	Personnel	Travel	Other	Equipment	Total Foreign Costs	Local Costs	Total Project Costs
Production	68.8	21.8	15.1	590.0	695.7	130.0	825.7
Transmission	108.8	40.5	23.5	940.0	1,112.8	149.0	1,261.8
Distribution	100.8	35.9	21.1	410.0	567.8	90.0	657.8
Utilization	153.6	49.2	27.9	573.0	803.7	131.0	934.7
Project Management				20.0	20.0		20.0
TOTAL COST	432.0	147.4	87.6	2,533.0	3,200.0	500.0	3,700.0

36. **Procurement:** Table 2 summarizes the procurement approaches to be used for the project. Procurement would be carried out in accordance with "Guidelines for Procurement under IBRD Loans and IDA Credits," May 1992. The equipment proposed comprises primarily analytical and test equipment and would be available from several suppliers worldwide. International Competitive Bidding (ICB) would be used for contracts estimated to cost in excess of US$100,000. It is estimated that approximately 6 contracts of an aggregate value of about US$1,000,000 would be issued under ICB using the Bank's standard bidding documents. International Shopping (IS) would be used for contracts estimated to cost US$100,000 or less, up to an aggregate amount of US$2,200,000. IS would be carried out on the basis of comparison of price quotations obtained from at least three suppliers from at least three countries eligible under the Bank's Guidelines.

37. Consultant Services would be selected in accordance with "Guidelines for the Use of Consultants by World Bank Borrowers and by The World Bank as Executing Agency" published by the Bank in August 1981. The selection procedure would be on a competitive basis using a short list of firms proposed by the implementing agency. Gazprom would select and manage the consultants for the Production and Transmission portion, Volgograd Gorgas would select and manage the consultants for the Distribution portion and RESF would select and manage the consultants for the Utilization portion of the project. The Consultants would be employed under the World Bank's "Standard Form of Contract for Consultants' Services for Complex Time-Based Assignments."

Table 2
Summary of Proposed Procurement Arrangements
(thousand US$)

Project Element	Procurement Method		N.B.F.[2]	Total Cost
	I.C.B.	Other[1]		
1. Production				
1.1 Methane Analyzers	--	90.0 (90.0)	5.0	95.0 (90.0)
1.2 Analytical Equipment	--	100.0 (100.0)	5.0	105.0 (100.0)
1.3 Reboiler Test Units	--	100.0 (100.0)	5.0	105.0 (100.0)
1.4 Laboratory (Mobile)	160.0 (160.0)	100.0 (100.0)	10.0	270.0 (260.0)
1.5 Office Equipment	--	70.0 (70.0)	5.0	75.0 (70.0)
2. Transmission				
2.1 Analytical Laboratory	165.0 (165.0)	100.0 (100.0)	10.0	275.0 (265.0)
2.2 Leak Detectors(Pipeline & Stations)	--	120.0 (120.0)	6.0	126.0 (120.0)
2.3 Compressor Emissions Measure	150.0 (150.0)	100.0 (100.0)	15.0	265.0 (250.0)
2.4 Blowdown Compr.(Rental)	--	100.0 (100.0)	10.0	110.0 (100.0)
2.5 Diagnostic Kit	--	90.0 (90.0)	5.0	95.0 (90.0)
2.6 Test Equipment	--	105.0 (105.0)	3.0	108.0 (105.0)
3. Distribution (Pipeline Leak Detectors)	310.0 (310.0)	100.0 (100.0)	20.0	430.0 (410.0)
4. Utilization				
4.1 Equipment Analyzers	--	103.0 (103.0)	6.0	109.0 (103.0)
4.2 Heat Meters	120.0 (120.0)	100.0 (100.0)	10.0	230.0 (220.0)
4.3 Emissions Laboratory (Mobile)	150.0 (150.0)	100.0 (100.0)	15.0	265.0 (250.0)
5. Consulting				
5.1 Production and Transmission	--	278.5 (278.5)	200.0	478.5 (278.5)
5.2 Distribution	--	157.8 (157.8)	70.0	227.8 (157.8)
5.3 Utilization	--	230.7 (230.7)	100.0	330.7 (230.7)
Total	1,055.0	2,145.0	500.0	3,700.0
GEF Financed	(1,055.0)	(2,145.0)		(3,200.0)

Notes: Figures in ( ) are the amounts financed by GEF. N.B.F.: Not Bank Financed.
1. Goods would be procured by International Shopping (IS). Consulting services would be procured in accordance with Bank Guidelines.
2. Includes local costs for engineering, procurement and support services.

38. All contracts estimated to cost US$100,000 or more would be subject to the Bank's prior review procedure. This would result in about 33 percent of the total value of the Grant financed goods being subject to review. If, during project supervision, the implementing agencies are found to be undertaking procurement in a satisfactory manner, the review requirement will be modified to exclude contracts of less than US$400,000. The terms of reference for all consulting assignments will be subject to prior review by the Bank. All consulting contracts of US$100,000 or more for firms and US$50,000 for individuals will be subject to the Bank's prior review procedure. This relatively extensive review of the procurement packages is considered necessary because of the inexperience of the implementing agencies.

39. **Disbursement**: A special account would be established by the MOFE in a designated bank acceptable to the World Bank. All categories of expenditures (listed in Table 1) would be eligible for disbursement from this special account. After effectiveness and upon the recipient's request, the Bank would make an initial deposit of US$50,000 which would be increased to US$100,000 when the aggregate disbursement under the grant reaches SDR300,000. Each disbursement from this account would require documentation from the Project Manager to ensure that it is being used exclusively for eligible expenditures. The account would be replenished on a quarterly basis upon submission of a replenishment application supported by monthly statements of the special account which would be reconciled by MOFE. All other applications for direct payment by the Bank must be for an amount not less than US$20,000.

40. **Accounting, Reporting and Auditing**: The project accounts would be audited annually by an accounting firm whose qualifications are acceptable to the World Bank. The Project Manager would submit a quarterly report on project status and expenditures to the Coordinating Committee and the World Bank.

41. **Implementation Plan**: It is anticipated the project would start in January 1996. Because of the limitations on conducting field studies, the project would require 18 months to complete. The key milestones are completion of the technical audits by the end of the eighth month; completion of the analytical work by the end of the twelfth month; and submission of a draft final report by the end of the fifteenth month. Because of the short time schedule and the complex interrelationships between a number of organizations, the project will require close supervision. It is estimated that a total of 25 staff-weeks, including consultants time, will be required. Four supervisory missions are planned to coincide with the project milestones.

42. A Joint Coordinating Committee has been established under the aegis of the Ministry of Fuel and Energy and a Project Manager has been appointed to prepare a project work plan; enter into contracts with implementing agencies; and oversee implementation of the project. The Joint Coordinating Committee would include representatives from the Ministry of Fuel and Energy, the Ministry of Ecology and Natural Resources, GAZPROM and Rossgazifikazia. Rossgazifikazia would supervise the work to be implemented by Volgograd Gorgas and MOFE would supervise the work of RESF. The Committee would carry out the following specific duties:

- approve the terms of reference prepared by the Project Manager and solicit proposals to conduct various analytical studies from Russian technical institutes, Russian enterprises, and foreign companies and consultants.

- coordinate project implementation under each task and guide the course of the project.

- review and approve the final report and the proposed investment program.

43. The Project Manager would be responsible for the overall coordination and implementation of project tasks and for the facilitation of communication and interactions with the Gazprom Working Group, Volgograd Gorgas and RESF.

MAP SECTION

RUSSIAN FEDERATION
GAS DISTRIBUTION PROJECT
MAIN NATURAL GAS FIELDS AND MAIN TRANSMISSION LINES