FY2005 ENVIRONMENTAL PROJECTS COMMISSIONED BY THE MINISTRY OF THE ENVIRONMENT

FY2005 CDM/JI PROJECTS FEASIBILITY STUDY

Feasibility Study of Joint Implementation project for Recovery and Destruction of HFC23 from Refrigerant Gas Plant in Russia

REPORT
(SUMMARY)
MARCH 2006

SUMITOMO CORPORATION

1. Basics of the Project Implementation

- An overview of the proposed project, and the background of the project planning:

HFC23 is a byproduct of the process for production of HCFC22 used mainly as a refrigerant. It occurs about 3% of the product HCFC22. HFC23 has a global warming potential of as much as 11,700, and is designated as a controlled substance in the Kyoto Protocol.

HCFC22 is one of the controlled substances in the Montreal Protocol, which calls for the phasing-out of production and use of ozone depleting substances. At present, however, the Russian Federation has no judicial framework limiting or controlling the emission of ozone depleting substances. Nor it has any law or regulations for limiting or controlling HCF23 gases. Accordingly, HCF23 gas generated as a byproduct of HCFC22 gas production process is directly released into the atmosphere.

In the project proposed herein, it is contemplated as a JI project with Chimprom, a producer of chemical compounds including refrigerant based in Volgagrad, Russia, to completely destroy HFC23 before release into the atmosphere air by incorporating an off-gas collection and incineration system in the HCFC22 production line. The Japanese participants have agreed to conduct a feasibility study jointly with the Russian counterpart on condition that they become partners of a JI project to be implemented following the feasibility study.

The Russian Federation ratified the Montreal Protocol in 1986 when it was still subsumed under the former USSR, for the purpose of protecting the ozone layer, declaring its commitment to halt the production and release of ozone depleting substances (ODS). After the collapse of the USSR, however, this commitment experienced a series of delays. It was not until May 2002 that the production of CFCs and halogen gases was totally shut down under the financial assistance of the world bank and ten leading countries including Japan, USA and EC countries. Currently, the Russian refrigerant industry is continuing to produce HCFC22 as an alternative to CFCs and as a feedstock for teflon and other fluororesins, and there is no economic incentive for them to recover and destruct HFC23, byproduct of HCFC22, or to develop alternative gas for reduction or elimination of the production and consumption of HCFC22 for the sake of environment. But it is expected that the Kyoto mechanism

will make it possible through greenhouse gas emissions trading to facilitate the recovery and destruction of HFC23 for the improvement of atmospheric environment in a short time. Chimprom is a half state-owned corporation, and the federal government of Russia has a 51% stake in it. Chimprom has been producing 120 different chemicals. Its production lines including one for HCFC22 production, in general, have no major modernization since 1980s.

- Outline of the host country

Russia is the third largest emitter of greenhouse gases following the U.S.A. and China. In accordance with the data (below) in the "The National Inventory Report of the Russian Federation (Ver.3)", three gases (HFC,PFC,SF6) account for more than 50% of greenhouse gases (GHG) generated in the industrial processes, and the GHG emissions are estimated to have amounted to 42,000,000 tons-CO2eq in 1999.

Of this quantity, more than 20%, or 9.5 million tons-CO2 (estimated for 1999) is calculated to be ascribable to HFC23 gas. Namely, more than 10% of the total emissions of GHG from industrial activities are accounted for by HFC. Since Russia has a relatively small semiconductor industry to speak of, the major source of HFC gas emissions is considered to be the refrigerant industry.

Table A: Greenhouse gas emissions due to human activities in the Russian Federation (in million tons-CO2)

	Year						
GHG	1990	1994	1995	1996	1997	1998	1999
CO2	2,360	1,660	1,590	1,500	1,530	1,510	1,510
CH4	550	410	390	390	300	310	290
N2O	98	49	43	41	44	34	35
PFC,HFC,SF6	40	35	38	36	39	41	42
Total	3,050	2,150	2,060	1,970	1,910	1,900	1,880

Table B: Greenhouse gas emissions in the Russian Federation due to human activities as classified by sources (as of 1999)

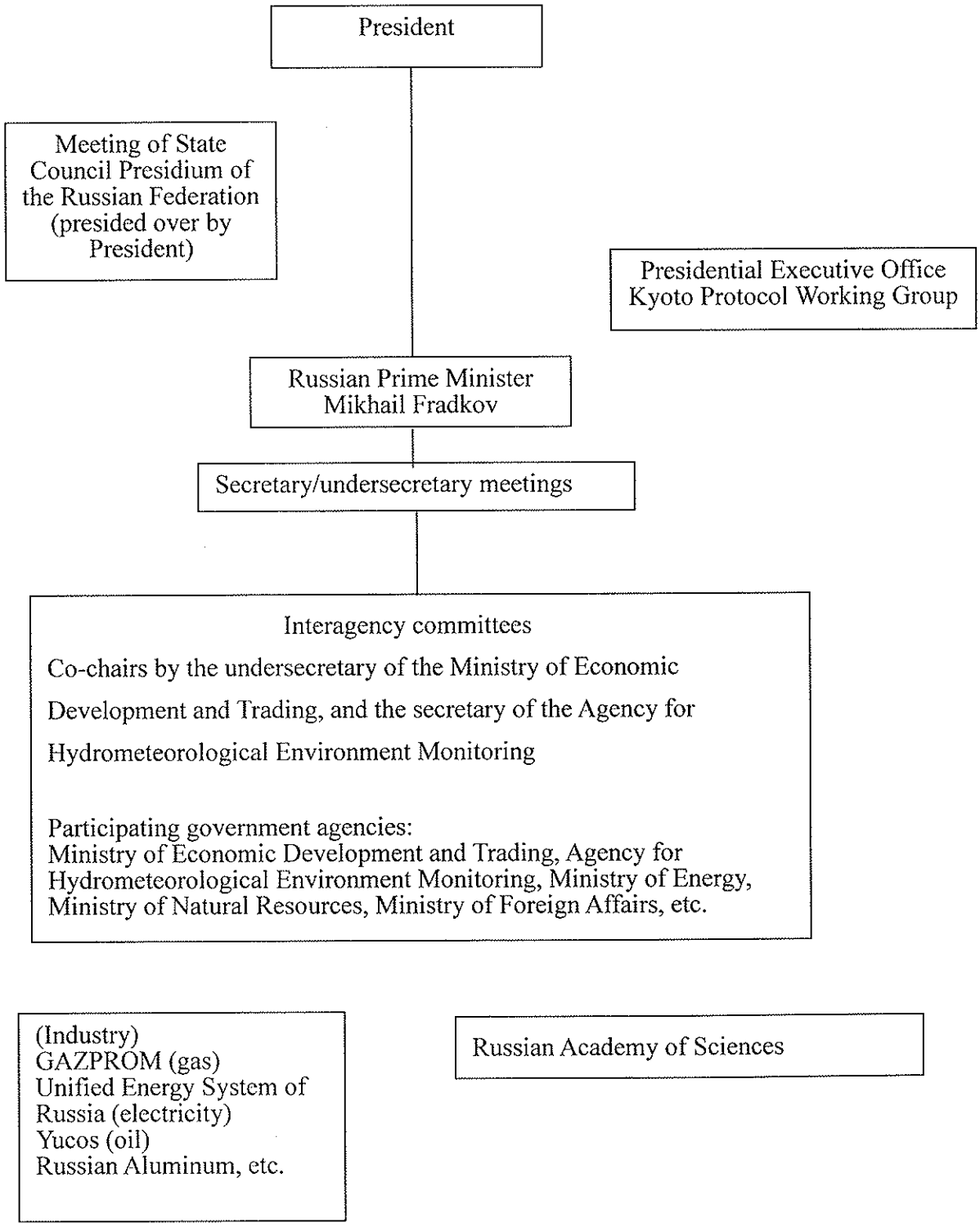
Source of emission	GHG			
	CO2	CH4	N2O	PFC,HFC,SF6
Fossil fuels and their processed products:	1,470	199	3.1	—
Combustion loss and leakage resulting	1,452	2.2	3.1	—
from energy production	18	197	—	—
Industrial production	39	0.5	0.3	42
Use of solvents and the like	--	--	0.6	--
Agriculture	--	51	27	--
Change in land use, and forestry	--	2.9	0.3	--
Wastes	--	38	3.4	--
Total	1,510	290	36	42

Table C: Emissions of HFC, PFC and SF6 (in million tons-CO2/year)

GHG	Year				
	1990	1994	1997	1998	1999
HFC	9.7	7.0	9.4	9.5	9.5
PHC	30	28	30	31	33
SF6	—	—	0,016	0,016	0,016

- JI policies and status in the host country

(1) Organizational structure and preparedness of Russian Federation for Kyoto Protocol



(2) Status quo

The Russian Federal Government's overall scheme for achieving emissions targets through various measures including the joint implementation mechanism is summarized in the Complex Plan of Actions approved by it in February 2005. The Complex Plan lists 35 agenda to be implemented for the purpose of achieving the emissions targets in accordance with the Kyoto Protocol, together with their deadlines, numerical targets, and responsible government agencies, and is to be implemented by the Federal Executive Body, an inter-ministry organization. The Russian Federal Government is currently pushing forward with preparations for acquisition of qualifications for JI mechanism, and is expected to complete its preparedness by 2007.

- Proposed project's contributions toward the host country through sustainable development and transfer of technologies:

The JI project will provide business and employment opportunities to the local industry in terms of site work and equipment procurement. The systems to be introduced are environmentally friendly ones free from any fear of causing secondary contamination with hazardous substances such as dioxins. They can possibly be used for processing of large volumes of CFCs and HCFCs recovered and left hoarded without destruction all over Russia. The technologies for the proposed project are not limited to the destruction of HFC23, but can also be used for destruction of a great variety of ozone-depleting substances (ODS).

- Organization for feasibility study

Collaborating parties of the investing country and host country, and their roles

Members representing the investing country:

Sumitomo Corporation:	Organizing and coordinating the project participants an their activities
Kansai Electric Power Co., Inc.:	Coordination with the Russian counterpart in relation to project implementation
Daikin Industries, Ltd.:	Engineering supervision, design and engineering of waste liquid/gas disposal systems
Tsukishima Nittetsu Engineering, Ltd.:	Technical assessment, design and engineering of thermal cracking furnaces
The Japan Consulting Institute:	Preparation of PDD

Members representing the host country:

Chimprom: HCFC22 producers, project participants

Russian Federal Government (Ministry of Natural Resources, Ministry of Economy, Trade and Development, Agency for Hydrometeorological Environment

Monitoring): Responsible for the formulation of national policies associated with Kyoto Protocol, joint implementation system, and development of legal framework.

2. Project planning

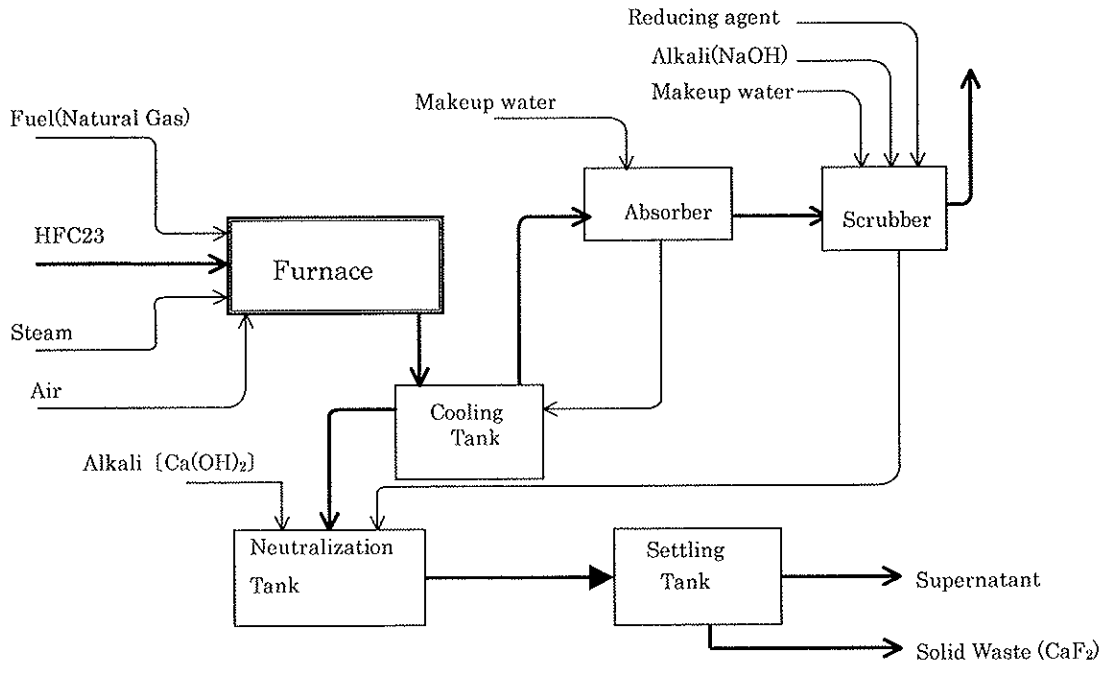
- Project details

The proposed project is designed to reduce GHG by thermal cracking of HFC23 released from the HCF22 production plant of Chimprom, Russia. It is scheduled for startup in early 2008. The credit period is 10 years. Annual GHG reduction (ERU) is 390,563t-C02, or 3,905,630t-C02 in 10 years.

Annual reduction of GHG (ERU)	390,563t-C02
ERU during project period (10 years' credit)	3,905,630t-C02

- Setup of project boundary baseline, and verification of additivity

(1) Project boundary



(2) Establishment of a baseline

The baseline was established according to the approved methodology (Incineration of HFC23 Waste Streams). In Russia, there are no judicial controls concerning the destruction of HFC23. Based on verification of additionality, "release into the open air on an ongoing basis" is taken as a baseline.

(3) Additionality

In the proposed project, the methodologies of the CDM Executive Board were used for verification of alternative plans, barrier analysis, analysis of similar technologies which are widely in use, the effect of joint implementation (JI). As a result, the additonality of the proposed project could be demonstrated successfully. Russia, at present, has no legal constraints concerning the destruction of HFC23, and there are no incentives for the Russian industry to make investments and bear the operating costs for the destruction of GHG.

- GHG reduction and leakage resulting from the implementation of the proposed project

The emission reduction (ERU) can be calculated as follows:

E_R (EUR)= (Q_HFC_23 - Q_BL_HFC_23) x GWP_HFC_23 - E_P (where E_P = E_TOP + E_L)

where,

E_R(EUR):	Reduction in GHG emissions···ton/yearQ_HFC_23: HFC23 waste gas annihilated in the project···ton/year
Q_BL_HFC_23:	Baseline of HFC23 waste gas to be annihilated···ton/year
E_P:	GHG released as a result of project implementation···ton/year
E_TOP:	GHG emission resulting from thermal destruction process··· ton/year
E_L:	GHG emission due to leakage···ton/year
GWP_HFC_23:	Global warming potential of HFC23 =11,700 t-CO_2/t-HFC23

Taking into account Chimprom's operating data over the past 3 years, emission coefficients of steam and electricity, and fundamental data for calculation of emission reduction, the emission reduction is determined as follows.

GHG emission reduction (ERU)
= (Q_HFC_23 - Q_BL_HFC_23) x GWP_HFC_23 - E_P(where E_P=E_TOP+E_L)
=391,014-404.5-45.65
=390,563t-CO_2/year

As calculated above, the GHG emission reduction (ERU) is estimated at 390,563t-CO_2/year.

- Monitoring plan

For the monitoring of the proposed project, the monitoring methodology AM0001 ver. 03, "Incineration of HFC23 waste stream," approved by the CDM Executive Board will be used. Its application to the proposed project is judged valid as the applicability of the methodology is in line with the baseline methodology.

- Environmental impact assessment, and other indirect assessments

(1) Waste gas

The gases likely to be released beyond the boundaries of the proposed project as a result of its implementation include: those contained in the waste gas from the HFCF22 production process; and those of the substances (CO2, HF, HCl, Cl2, CO, NOx, C6HsCl, C6H5C10 and dioxins) likely to be generated by the thermal destruction of HFC21, HFC23 and HCFC22. All these will ultimately be guided into a gas processing tank and released into the open air after verification that they meet the environmental standards. CaF sludge trapped in the settling tank will be recovered at the cementation plant in Chimprom factory premises as cement admixture for reuse in the factory. The impact of CO2 and other emissions resulting from the consumption of fuel for the transshipment of the sludge will be negligibly small. Absolute quantities of fuel (natural gas), electricity and steam consumed in the proposed project will be quite small, and their environmental effects will be negligible. As regards dioxins, it has been demonstrated by the verification test on

the combustion gas of plants with about ten years of track records in the cracking and annihilation of waste gases of HFC23 abnd HCFC22 that the dioxins from a submerged HFC23 incineration plant do not do any harm to the environment and human beings.

(2) Wastewater

Wastewater likely to be discharged beyond the boundaries of the proposed project is the effluent of treated wastewater from the settling tank where HF and HCl are neutralized with calcium hydroxide. The effluent drains into a common wastewater treatment facility where it is mixed with the effluents from other sources and treated according to wastewater treatment standards.

(3) Noise

The submerged combustion system to be used for the proposed project will generate little or no noise.

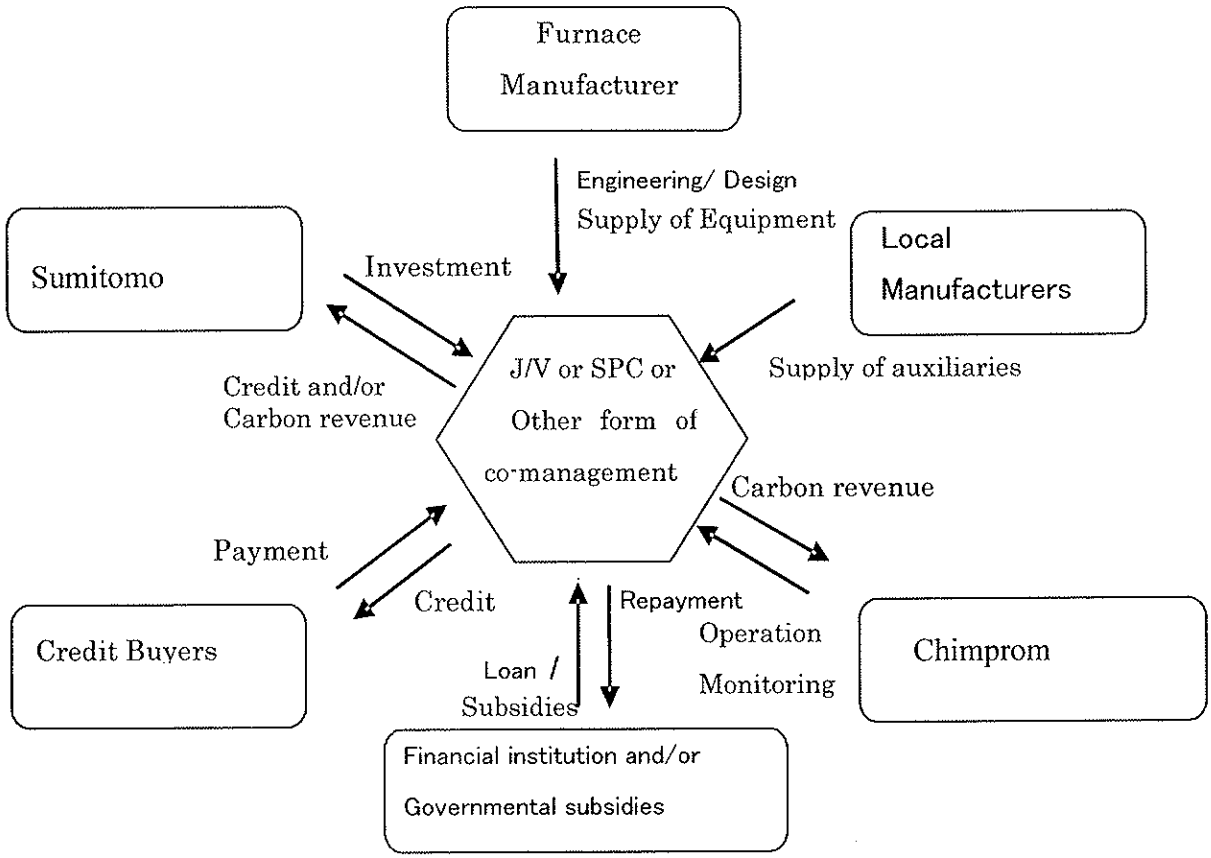
- Comments of stakeholders and interest groups

As executers of the proposed project, Sumitomo Corp. and Chimprom met and discussed with the union leaders representing the employees of Chimprom, and environmentalist leaders of Volgograd about the project and heard them out. The importance of the proposed project for environmental protection was put across to the minds of all these interested parties through serious and eager question and answer sessions.

3. Toward implementation

- Organization for project implementation (Investing country, and host country)

An organization for the project implementation is illustrated below.



- Project financing

In addition to the capital contributions by the parties to the proposed project, bank loans, the Japanese Government's financial support program and advance payments by ERU purchasers may possibly be financial institutions for materialization of this project. Taking into account uncertainties of JI in Russia, the export and investment financing by the Japan Bank for International Cooperation is expected to be available together with protection facilities furnished by the Nippon Export and Investment Insurance (NEXI).

The Japanese Government has established the financial support program to help the project developers financially by giving them up-front payment up to a half of project

cost. Since such upfront payment scheme is adopted which requires transference of carbon credits to the Japanese National Registry in advance in proportion to the amount of financial assistance, the allocation of ERUs must be studied in advance.

- Cost-effectiveness

Results of economic analysis

Assuming that carbon emissions will be generated at a rate of 390,000 tons-CO2eqv. per year from 2008 beyond, an economic analysis was made with the price for ERU changed over a range of $5 to 10/t-CO2. The results are as follows.

Internal rate of return (IRR)

ERU price US$/t-CO2	IRR(2007～2012)	IRR(2007～2017)
5.0	10.5%	19.9%
7.5	25.2%	32.7%
10.0	37%	43.2%

- Challenges to the implementation

The problems that must be solved for the proposed project to generate JI credits (ERUs) during the first commitment period (2008-2012) include: 1) establishment of joint implementation rules in COP/MOP; 2) development of Kyoto mechanism infrastructure in Russia, and acquisition of the approval by the Russian Federal Government.

Entering 2006, however, the joint implementation supervisory committee has been stepping up their efforts to develop and formalize the joint implementation rules. In addition, the Russian Federal Government (Ministry of Economic Development and Trading) has become aggressive and ready to issue a Letter of Endorsement to the promoters of joint implementation projects.

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