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Ad Hoc Group of Experts on Coal Mine Methane
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**PROJECT ON DEVELOPMENT OF
COAL MINE METHANE PROJECTS IN CENTRAL AND EASTERN EUROPE
AND THE COMMONWEALTH OF INDEPENDENT STATES**

(Prepared by the secretariat)

I. INTRODUCTION

1. The UN Economic Commission for Europe Industrial Restructuring, Energy and Enterprise Development Division (IREEDD) prepared a project proposal on facilitating development and financing of coal mine methane (CMM) projects in Central and Eastern Europe and the Commonwealth of Independent States (CIS). In April 2004 this project proposal was submitted for funding to the United States Environmental Protection Agency (US EPA) Office of Air and Radiation, Coalbed Methane Programs. The submission was successful and the US EPA awarded a Grant at the end of September 2004 for a total amount of US\$ 205,00 over three years.

2. UNECE IREEDD is actively pursuing parallel financing for this CMM project from the United Nations Foundation (UNF) to the level of 50 per cent of the Grant provided by the US EPA. In June 2004, UNECE was informed that the UNF Board of Directors and the UN Fund for International Partnerships (UNFIP) Advisory Board had approved a US\$ 6 million grant for the proposal "Financing Energy Efficiency Investments for Climate Change Mitigation". The UNF/UNFIP approved UNF Core Funds of US\$ 2 million with co-financing of USD 4 million at a one to two ratio. It is through this initiative that the parallel financing is being sought for the project.

3. This paper serves to provide an overview of the Scope of Work for the portion of the project that will be funded by the US EPA Grant.

II. EXECUTIVE SUMMARY OF SCOPE OF WORK

4. The United Nations Economic Commission for Europe (UNECE) requested support from the US EPA for a three-year project to develop bankable coal mine methane (CMM) projects in Central and Eastern Europe and the CIS, collectively called “the Region”. The UNECE undertook, with cooperation from a number of governments, multi-lateral organizations, and industry, to form a CMM Experts Group (Ad Hoc Group of Experts on Coal Mine Methane) under the UNECE Committee on Sustainable Energy and its subsidiary body, the Ad Hoc Group of Experts on Coal in Sustainable Development. The assistance provided by US EPA shall support preparation of viable CMM investment documents for submission to one or several investment funds directly affiliated with the UNECE’s Energy Efficiency 21 (EE21) Project. The US EPA funding shall also support travel for experts from Central and Eastern Europe and the CIS to participate in approximately two meetings per year as well as the technical and logistical support for these meetings and seminars in selected host countries. The UN Foundation and possibly other governments and organizations would be approached to provide additional funding/parallel financing to support these project efforts.

5. The expected outcomes of the project include:

- Three or more bankable project documents, which shall be considered by investment funds affiliated with the UNECE’s Energy Efficiency 21 Project;
- Lessons learned and disseminated to project developers from the Region and elsewhere on how to prepare the most effective bankable project documents for approval by financing organizations; and,
- Elaboration of a roadmap for financing additional CMM projects in the Region formulated by the end of the project period.

6. To successfully implement and complete the project the UNECE requested total funds of US\$ 205,000 from the US EPA; US\$ 75,000 for year one and US\$ 65,000 for years two and three.

III. PROJECT DESCRIPTION

(a) Background

7. Methane is a greenhouse gas (GHG) with a radiant forcing about 23 times greater than that of carbon dioxide (CO₂) on a mass basis. Methane emissions as a result of coal mining constitute 10% of the total human-related methane emissions. Methane is a by-product of coal formation, which is released during mining.

8. Many of the economies of Central and South-Eastern Europe and the CIS are significant emitters of CMM. The Russian Federation, Ukraine, Kazakhstan, Poland, Romania and the Czech

Republic are particularly large sources of methane. In these countries, and possibly also in Hungary, Bulgaria and Croatia, there is significant potential for CMM projects to provide multiple benefits, benefits that encompass the three pillars of sustainable development: economic, social and environmental. The coal industries of these aforementioned countries would also benefit economically from the additional revenue streams CMM may bring, as well as from the enhanced coal productivity, due to improved gas drainage efficiencies.

9. Significant socio-economic benefits would come to these mining regions from the improved mine safety, improved regional air quality and increased employment opportunities created by development of CMM projects. These coal mines have many prospects to reduce their methane emissions from mining through expanded methane recovery programs and more efficient use of the recovered gas. Commercialization of these CMM projects would make a significant contribution to the reduction in global methane emissions and the mitigation of an important greenhouse gas.

10. Significant effort and progress has been made in the Region, supported by the US EPA, the UN Development Programme, and others, which has resulted in a higher level of awareness by coal operators, governments, and the financial community of the benefits of developing coal mine methane projects. A Global Environment Facility project in the Russian Federation is currently underway to develop viable demonstration projects and form a CMM service company. A number of economically viable projects have been identified and now developers are attempting to commercialize these projects. One of the key remaining barriers to implementation of these projects has been the lack of institutions interested in and able to invest in commercial-scale CMM projects in the region.

11. One area of the UNECE IREED Division, under which the Committee on Sustainable Energy operates, focuses on Energy Efficiency. This programme, known as EE21, is a region-wide project to enhance trade and co-operation in energy efficient, environmentally-sound techniques and management practices in order to help close the energy efficiency gap between actual practice and best technologies, and between ECE countries, in particular, developed market countries and economies in transition. EE21 is currently seeking to establish a Trust Fund in the order of US\$ 6 million to finance a project over three years entitled "Financing Energy Efficiency and Renewable Energy Investments for Climate Change Mitigation". This Trust Fund project is seeking to provide a pipeline of new and existing projects to dedicated public private partnership Investment Funds that can provide US\$ 500 million of debt, equity or both to project sponsors. The project would also serve to provide case study investment projects in renewable energy technologies, electric power and other energy-related GHG mitigating activities, including development of CMM projects and deployment of clean coal technologies. It is anticipated that both the Trust Fund and the Investment Funds will become active by end-2004/early-2005. Therefore, through the proposed UNECE CMM Experts Group and its activities the UNECE US EPA project will seek to work with the EE21 Trust Fund in order to identify and develop a range of bankable CMM projects that could be financed by the Investment Funds.

(b) Benefits

(i) *Greenhouse Gas Reduction*

12. Because of methane's greater global warming potential than CO₂ and because a gassy coal mine emits very large quantities of methane, a single CMM project may produce significant emission reduction opportunities. For example, a small-scale project in the Kuzbass Basin, Russian Federation, that would introduce advanced in-mine methane drainage, transport that methane to a coal-fired boiler and convert the boiler to co-fire this methane may cost approximately € 1,500,000 and reduce emissions by over 560,000 tonnes of CO₂ equivalent over ten years (EPA, 1997).

(ii) *Creating Investment Opportunities and Economic Development in Economies in Transition*

13. Typical investment requirements for each CMM project range from US\$ 5 million to US\$ 30 million. If the project results, directly or indirectly, in investments in CMM projects at 10 coal mines, this could result in a total of about US\$ 150 million.

14. By 2010, emissions of CMM from economies in transition, including the European part of the CIS are projected to total 82 MtCO₂e (Table 1). Marginal abatement cost analyses performed by the US EPA indicate that a significant quantity (9.3 MtCO₂e) of these emissions may be profitable without additional financial incentives, and at a rate less than €8/t CO₂e, the majority (51.9 MtCO₂e) could be profitably developed.

15. A study of the potential in the Kuzbass Basin in western Siberia indicated that an aggressive programme to develop CMM projects could result in greater than US\$ 100 million in energy revenues (not counting any economic value in reducing the greenhouse gas emissions), up to 1,100 jobs, tax revenues, local environmental benefits (reductions in SO₂, NO_x, particulates)¹, and improvements in mine productivity and mine safety.

(iii) *Local environmental benefits*

16. Establishment of CMM projects in Eastern European coal mining regions will also benefit the local environment and the communities and also cities nearby. Presently, coal is used extensively in these areas for residential cooking and heating, as well as for industrial purposes. The increased use of CMM will result in reduced use of non-clean fuel, mainly in the residential sector. In comparison with coal combustion, the use of methane as a residential fuel will dramatically reduce the emissions of SO_x, particulates and CO₂, leading to a notable improvement in local air quality.

¹ It is important to note that there may also be negative environmental impacts such as produced water from certain coal mine methane drainage practices, and that the combustion of methane, while resulting in lower emissions than coal combustion, does result in air pollution.

(iv) *Coal mine safety benefits*

17. Mine safety will be improved by expanding methane recovery at Eastern European coal mines. Gas accidents account for hundreds of fatalities per year in the transition economies and this in turn serves to perpetuate the poor image of coal by policymakers and the general public alike. CMM recovery before coal mining can reduce the gas content in coal seams to be mined and mitigate the risk of coal and gas outbursts, so as to effectively prevent the methane accident and improve the production conditions at coal mines.

Table 1: Supply of CMM Emission Reductions in Eastern Europe/CIS

Country	2010 Emissions (MtCO ₂ e) ²	2010 Reductions <\$0/t CO ₂ e (MtCO ₂ e)	2010 Reductions <US\$8.19/t (<€7.51/t) (MtCO ₂ e) ³
Bulgaria	1.2		
Croatia	0.2		
Czech Republic	3.8		
Hungary	2.2		
Poland	13.4		
Romania	6.5		
<i>Eastern Europe (minus CIS)</i>	<i>27.3</i>	<i>9.3</i>	<i>20.0</i>
Russian Federation	30.5		
Ukraine	24.1		
<i>European CIS Total</i>	<i>54.6</i>	<i>0</i>	<i>31.9</i>
Total Eastern Europe/CIS	81.9	9.3	51.9

² Source: EPA. 2001. *Non-CO₂ Greenhouse Gas Emissions from Developed Countries: 1990-2010*. September, 2001.

³ Source: EPA. 2003. *International Analysis of Methane and Nitrous Oxide Abatement Opportunities: Report to Energy Modeling Forum, Working Group 21*. June, 2003. Assumes a project discount rate of 10 per cent and a tax rate of 40 per cent.

(v) *Local environmental benefits*

18. Establishment of CMM projects in Eastern European coal mining regions will also benefit the local environment and the communities and also cities nearby. Presently, coal is used extensively in these areas for residential cooking and heating, as well as for industrial purposes. The increased use of CMM will result in reduced use of non-clean fuel, mainly in the residential sector. In comparison with coal combustion, the use of methane as a residential fuel will dramatically reduce the emissions of SO_x, particulates and CO₂, leading to a notable improvement in local air quality.

(vi) *Coal mine safety benefits*

19. Mine safety will be improved by expanding methane recovery at Eastern European coal mines. Gas accidents account for hundreds of fatalities per year in the transition economies and this in turn serves to perpetuate the poor image of coal by policymakers and the general public alike. CMM recovery before coal mining can reduce the gas content in coal seams to be mined and mitigate the risk of coal and gas outbursts, so as to effectively prevent the methane accident and improve the production conditions at coal mines.

(vii) *Other benefits*

20. CMM recovery can reduce the downtime relating to mine gas control, so as to enhance coal productivity. Generally, when measures should be taken to control high methane concentration (for example, the methane concentration exceeds the specified level), the coal production per shift at the high gas coal face is only 60% of that under normal conditions, and the face productivity will be reduced by about 30%. Other benefits include ventilation power cost savings, reduced development costs and reduced dust problems etc.

IV. PROJECT APPROACH

21. The project, with assistance from internationally recognized financial and CMM experts, shall, over the course of three years, undertake to prepare with project developers from three to six bankable documents for review by the UNECE Ad Hoc Group of Experts on Coal Mine Methane and the investment funds affiliated with EE21. It is anticipated that at least three of these documents shall result in commercial-scale financing.

22. While the Ad Hoc Group of Experts on Coal Mine Methane shall comprise representatives from government and industry from all the major CMM emitters in Central and Eastern Europe and the CIS, together with investors and project developers worldwide, the project shall be undertaken in a phased approach.

23. In the first year of the project, the Russian Federation shall be selected as the pilot nation for identifying and financing bankable projects. The Russian Federation has perhaps the greatest potential for developing a large number of projects, and work already supported by the US EPA and its counterparts in the Russian Federation, especially the private non-profit organization Uglemetan, have resulted in good prospects for identifying and securing financing for projects.

During year two of the project, projects in Kazakhstan shall be selected for assistance in preparation of bankable documents. During year three support shall be made available for the creation of project financing documents in other economies in Central and Eastern Europe and the CIS.

24. Parallel financing to the level of 50 per cent of the Grant provided by the US EPA is being sought from the UN Foundation to support a complementary project to the US EPA's to assist in achieving the goal of financing CMM projects. This UN Foundation funded project would focus on supporting technical work with coal operators and project developers to define and refine the bankable project documents, and developing strategies to address the technical, market, and policy barriers to implement CMM projects. Specific tasks would include vetting the projects for technical and market viability, collaborating with CMM experts and government officials to ensure that the investments receive prompt governmental approval, and quantifying the additional environmental benefits that the projects bring. Additional support for experts in the region to travel to project meetings would also be provided. This work would be coordinated by the UNECE secretariat to ensure that efforts are integrated.

25. Specific objectives and activities of the project are detailed in Section VI.

V. QUALIFICATIONS OF PROJECT TEAM

26. UNECE serves as a regional arm of the United Nations and is one of the five UN Regional Commissions. It provides a forum where 55 countries of North America, Western, Central and Eastern Europe and Central Asia come together to forge the tools of their economic cooperation. The regional nature of UNECE facilitates agreement and understanding between its members, as well as between its members and other UN member States. Cooperation, information sharing and joint action take place across a wide range of activities. The main areas of activity of UNECE are economic analysis, environment and human settlements, statistics, sustainable energy, trade, industry and enterprise development, timber and transport. UNECE pursues its goals through policy analysis, the development of conventions, regulations and standards, and the provision of technical assistance. UNECE also provides technical assistance to countries and groups of countries, in particular to countries with economies in transition.

27. The Committee on Sustainable Energy is one of the UNECE's Principal Subsidiary Bodies. It covers the harmonization of energy policies and practices; the formulation of recommendations based on assessment of new developments and issues related to the price of energy; the security of both the supply and the environment; and the development of classification systems for energy and mineral reserves/resources. The Committee provides oversight and guidance to its expert groups, operational activities and capacity building projects including the: Working Party on Gas; Gas Centre; Energy Efficiency 21 Project and Ad Hoc Group of Experts on Coal in Sustainable Development, Ad Hoc Group of Experts on Supply of Fossil Fuels, Ad Hoc Group of Experts on Electric Power; on the UN Framework Classification for Reserves and Resources; on Natural Gas Resources and on the Supply and Use of Gas.

28. The UNECE carries out a cooperative programme on coal under the auspices of the Ad Hoc Group of Experts on Coal in Sustainable Development, which was established by the

Committee on Sustainable Energy in November 2002 to succeed the former Ad Hoc Group of Experts on Coal and Thermal Power. The Ad Hoc Group of Experts on Coal and Thermal Power was itself established in 1997 as the successor body to both the Working Party on Coal and the Working Party on Electric Power. The coal programme forms part of the activities of UNECE to promote sustainable development within the energy sector and to enhance international economic cooperation in order to achieve this goal.

29. The project shall be managed by the Secretary of the Ad Hoc Group of Experts on Coal in Sustainable Development, who has extensive experience organizing experts groups on energy and environmental issues, and shall oversee all work performed under this Grant.

30. The project shall identify an international financing expert and an international CMM project development expert to assist coal companies and project developers to prepare and present bankable documents for consideration by the investment funds directly affiliated with EE21. The project shall also identify a qualified web designer to develop and maintain a project web site.

VI. OBJECTIVES AND ACTIVITIES OF THE PROJECT

31. The main objective of this project is to perform the necessary work to secure financing for three to six commercial projects in the Region.

32. The UNECE Project Manager shall identify international expertise in project finance and CMM project development, and working with these experts consult on the criteria necessary for projects to successfully obtain financing from the investment funds directly affiliated with EE21.

33. In year one of the project the experts shall then identify one to two projects in the Russian Federation with good prospects for securing financing, following which assistance will be given to the coal operators and project developers to package their projects into bankable investments. This shall take place in consultation with the EE21 officials and representatives of the investment funds directly affiliated with the EE21 at UNECE's headquarters in Geneva and during missions to the Russian Federation.

34. The UNECE, representatives of the investment funds, international CMM project developers, government officials, and CMM experts from the UNECE region shall then gather for a CMM experts group meeting/workshop provisionally tabled for November 2005. At this event experts shall deliver presentations covering the objectives and criteria of the Investment Funds, the CMM projects identified in the Russian Federation, and barriers and issues to developing these and other projects in Central and Eastern Europe and the CIS. A key objective of the workshop will be to critique the proposed projects for further consideration by the Investment Funds, and also to elaborate the necessary technical, policy, and investment steps required to advance these projects. Representatives from other transition economies shall also provide feedback on the key issues and steps required to develop their CMM industries, and provide suggestions on how the UNECE may support this.

35. Following the workshop, the finance and CMM experts shall work with the selected project developers to improve and advance the project(s) based on advice given during the workshop. The objective of this portion of the project includes to seek to complete the necessary

project preparation to the point where the UNECE EE21 Trust Fund will agree to assist in completing the projects' business plans for financing and project construction in 2006/2007.

36. A project web site, available to the public, shall be developed which shall communicate the findings of the project and to encourage efficient project replication. This web site shall be prepared in 2005 and will be routinely updated with reports and other materials developed during the project.

37. In year two of the project, the same process shall be undertaken to advance one to two projects in Kazakhstan to obtain financing. The approach shall be modified to take into account lessons learned from the first year of the project. In year three projects will be identified and supported from other countries in the Region, with the expectation of securing financing for one-two projects. Support shall be provided for participation of experts from the region who have secured financing to attend a major international conference (as yet to be determined) to convey the lessons learned to the international methane mitigation community.

VII. PROJECT SCHEDULE

38. Upon award of the Grant, the UNECE shall perform the activities according to a schedule agreed upon with the US EPA.

39. Detailed year two and three schedules shall be submitted for approval at the end of years one and two.

VIII. GOALS AND OUTPUTS

40. The goal of the project is to develop commercial CMM projects in Central and Eastern Europe and the CIS that will lead to GHG emission reductions. This will be accomplished by identifying, packaging, and securing the financing of one or two CMM projects in the Russian Federation, one or two in Kazakhstan, and one or two elsewhere in the Region. Successful financing and installation of projects may then serve as examples for future investments throughout the region.

41. Specific outputs of the project include:

(a) *In Year One:*

- A brief report identifying the necessary criteria for CMM projects in the Russian Federation to secure financing from the UNECE Investment Funds.
- A trip report identifying one to two projects that meet the UNECE's criteria.
- A meeting report following discussions with UNECE staff and Investment Fund representatives that summarizes feedback on the eligibility of the identified projects and next steps to package the projects for the Ad Hoc Group of Experts on Coal Mine Methane Meeting/Workshop.

- A trip report summarizing progress made while in the Russian Federation packaging the CMM projects.
- Meeting/Workshop proceedings with presentations by participants, including presentations by mission experts and one to two Russian CMM project developers.
- A post-meeting/workshop summary outlining key findings of the meeting/workshop and opportunities for future activities.
- A trip report and project documents for the one or two projects identified for financing.
- A project web site shall be developed to post project reports and to communicate the results to the broader CMM and investment community.
- A project update report highlighting the progress made during the first year of the project and the lessons learned for inclusion in the work program for years two and three of the project.

(b) In Years Two and Three:

42. The project shall include the same set of activities as in year one, except that the focus during year three of the project shall be Kazakhstan. Modifications to the scope shall be presented based on lessons learned in the first year of the project. During year three of the project experts involved in the project, and who have secured financing for their CMM projects shall participate in a major international conference addressing mitigation of GHG emissions to report their findings to the wider CMM and climate mitigation communities. At the end of the third year, a project summary report shall be prepared, which shall discuss the lessons learned during the project and provide recommendations for replicating the project's successes.