

# **FINAL TECHNICAL REPORT**

**United States Environmental Protection Agency**

**Project for the Development of Coal Mine Methane  
Projects in Central and Eastern Europe and the  
Commonwealth of Independent States**

**Prepared by**

**UNITED NATIONS  
ECONOMIC COMMISSION FOR EUROPE**

**Geneva, Switzerland  
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## **1.0 Introduction**

This is the Final Technical Report for Assistance Agreement XA-831780-01, a cooperative agreement between the United States Environmental Protection Agency and the United Nations Economic Commission for Europe (UNECE). The term of the agreement was September 1, 2004 through September 30, 2008. The original intent was to complete the scope of work within a 3-year period; however, reduced staffing resources at the UNECE's Sustainable Energy Division delayed full implementation of the work programme until September 2005.

## **2.0 Background**

Throughout the 1990's and into the early part of this decade, the coal industry in the region suffered from underinvestment and poor enforcement resulting in numerous methane-related accidents and deaths. Although the situation has improved somewhat, the mining industry, especially in the CIS countries, continues to be plagued by accidents with mines in Kazakhstan, Poland, the Russian Federation, and Ukraine all suffering major methane explosions in the last 2 years.

Capture and use of methane from coal mines delivers many benefits including improved mine safety, mitigation of greenhouse gas emissions, and more effective use of available energy resources. Unfortunately, a range of barriers have impeded implementation in many countries including those of the CEE/CIS region. One of the most significant through the early part of this decade was access to capital to finance construction and operation of methane drainage and utilization projects. In some cases they were simply not economical, but in many other instances the problem could be traced to the inability of project hosts to adequately prepare and present investment grade documents such as project identification forms, business plans, feasibility studies and requests for indicative offers to potential investors. This problem was exacerbated by the limited capital available and no clear and significant emission reduction revenue stream for greenhouse gas projects until 2005-2006.

The scope of work under the agreement was designed to address this important barrier. The UNECE had prior experience in the field of energy efficiency in addressing similar barriers. Although CMM and energy efficiency are different in many respects, there are also some similarities, especially as alternative energy options. In addition, the UNECE infrastructure also included an existing technical expert group on coal in sustainable development. With this background in energy efficiency and coal and a great desire by UNECE member states to address the mine safety problems, the UNECE structured a project to address the financing problems for CMM projects in the CEE/CIS region.

In addition to building capacity, the UNECE also sought to deliver concrete results during the term of the project working with 3-6 mines in the region to develop early-stage documentation. The UNECE then planned to assist the mines with securing additional funding for full feasibility/business plan development and even full funding by providing the channel to various private, bilateral and multilateral funding sources. In fact, it was the UNECE's original intent that these projects could enter the project pipeline of a USD 100+ million public/private investment fund created under UNECE's Energy Efficiency 21 Project.

The UNECE created an independent Ad Hoc Group of Experts on Coal Mine Methane reporting directly to the UNECE Committee on Sustainable Energy, an intergovernmental body consisting of representatives from the 56 UNECE member States to oversee the activities under the cooperative agreement.

The total project budget was USD 205,000 divided into annual increments of USD 75,000, USD 65,000 and USD 65,000 for Years one through three respectively.

To carry out the tasks in the statement of work it was necessary to secure the services of a financial expert skilled in the preparation of financial documents for alternative energy projects and a technical expert with a background in CMM project identification, design and implementation. In addition, several missions were planned to the CEE/CIS region with the first to the Russian Federation in Year 1, Kazakhstan in Year 2, and another country in the region in Year 3 along with participation in the Methane to Markets Expo in Beijing, China. Regional experts were also necessary to support the missions. Throughout this report, the ECE staff and consultants are referred to as the ECE Team.

### **3.0 Activities Conducted During the Period of Performance**

The purpose of this section is to summarize the activities undertaken during the project cycle, the results of those activities, and the lessons learned. More detail can be found in the quarterly reports, trip reports and other information submitted during the four-year period.

To deliver on the statement of work, the ECE conducted the following activities and deliverables:

- Missions
  - 6 missions to the Russian Federation
    - February 2006 - Moscow
    - June 2006 (including seminar<sup>1</sup>) – Moscow and Kemerovo
    - September 2006 (workshop) – St. Petersburg
    - July 2007 (workshop – consultant only) - Kemerovo
    - May 2008 (consultants only) – Moscow and Kemerovo
    - June 2008 (seminar) - Kemerovo
  - 1 mission to Ukraine in June 2006 (workshop in cooperation with PEER and EPA)
  - 1 mission to Kazakhstan in February 2007
  - 1 mission to London, UK in February 2007 to meet with Arcelor Mittal
  - Carbon Expo in May 2007 to promote the project and assess investors' interest in ECE-vetted projects.
  - Participation in the Methane to Markets Expo in Beijing, China in October 2007
  - 1 mission to Poland in February 2008 (seminar)
  - 1 mission to Sardinia, Italy for M2M Coal Subcommittee meeting in April 2008
  - 3 missions to London to meet with the technical and financial consultants, both of whom were based in London.
    - More cost-effective than bringing the two consultants to Geneva
    - UNECE and others covered the cost of an additional three missions to Geneva
  - 1 mission to London, UK, September 2008 to participate in the Mine's road show
  - 1 mission to Beijing, China December 2008 to participate at the CCII 8th International Symposium on CBM/CMM and Carbon Trade in China
- Ad Hoc Group of Experts on Coal Mine Methane (proceedings including PowerPoint presentations)
  - 1<sup>st</sup> Session – December 2004
  - 2<sup>nd</sup> Session – January 2006 (workshop)
  - 3<sup>rd</sup> Session – April 2007
  - 4<sup>th</sup> Session – October 2008
  - CMM Workshops

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<sup>1</sup> All seminars and workshops were focused solely on developing financial skill sets. Seminars were brief 2 hour classroom sessions, usually in combination with another event such as a conference, while workshops were ½ day to 2 day intensive programmes.

- Geneva - January 2006 in conjunction with the 2<sup>nd</sup> Session
  - St. Petersburg, Russia – September 2006 in cooperation with VNIMI, Gazprom, SUEK and others
  - Szczyrk, Poland – February 2008 in cooperation with the Central Mining Institute of Katowice and others
- Expert Travel
  - 3 experts to Methane to Markets Expo
  - 2 experts to seminar in Kemerovo, Russia in June 2008
  - 3 experts from the Russian Federation including two from the Krasnogorskaya Mine to participate in the Mine's road show in London during September 2008
- Website created and maintained throughout the life of the project.
- Quarterly reports submitted with annual reports submitted once per year.
- Development of tools for preparation of bankable documents (all in English and Russian)
  - Project Identification Form
  - Criteria for consideration
  - Project description
  - Business plan template and guidance with Excel spreadsheet model
- Mine-specific work
  - Bankable project document for the Krasnogorskaya Mine in the Kuzbass Basin, Russia and road-show in September 2008.
  - Project identification forms
    - Severstal mines in Pechora Basin
    - Arcelor-Mittal Mines in Kazakhstan (never received permission to post on website)
- Trip reports for all missions to CIS/CEE countries
- Hosted Methane to Markets Coal Mine Methane Subcommittee Meetings
  - April 2005
  - April 2007

## **4.0 Results of the Project**

### **4.1 Original Objectives**

The original scope of work envisaged a very systematic and logical progression for developing bankable documents and conveying lessons learned. The project intended to focus on specific countries in the first two years, Year 1 in Russia and

Year 2 in Kazakhstan, and then open to the entire CEE/CIS Region in Year 3. The initial step within each country was to be a fact-finding mission to promote the project with government and industry officials and identify one and three potential projects in the targeted countries for further technical assistance. The ECE Team then expected to work closely with the mines to develop early-stage documentation, enhance their presentation skills and provide introductions to investors. The experience gained and lessons learned in Year 1 could then be conveyed through workshops and other means in Year 2, and the same could be done in Year 3 with the lessons learned in Year 2. A very important component of this plan was the necessary involvement of the sponsoring mines. The ECE's intent was to work with and not for the mines to ensure that the capacity developed under the project would sustain after the cessation of the project.

In addition, the project also consisted of two other major components. The first was the creation of an Ad Hoc Group of Experts on Coal Mine Methane that would meet annually in Geneva to oversee the progress of the project and also act as a forum for CMM experts worldwide to discuss other issues impacting the CMM and coal industries as they related to methane capture and use. The second was the creation and maintenance of a project website.

## **4.2 Results & Impact**

Overall the UNECE believes the project delivered value-added delivering benefits to the global coal and CMM industries, USEPA and the UNECE. Bankable documents were prepared for one mine, several capacity-building seminars and workshops were held and feedback was positive, supporting documents were prepared and are available to assist others, and the profile of CMM capture and use projects and associated benefits was raised in the region. The Ad Hoc Group of Experts has been active with regular meetings and has supported two technical workshops. The Group of Experts have also developed a glossary of terms and definitions used by the global CMM and coal industries as a first step toward a uniform set of terms and technical standards. As this project closes, the Group of Experts has a launched a project with the World Coal Institute and the Methane to Markets Partnership to develop a best practice guidance for methane drainage and use.

The primary objective of the project, to deliver bankable documents for 3-6 CMM projects in the region, was not entirely successful, however. This aspect of the project did not progress as originally intended due to a number of factors highlighted in Section 4.5. By the conclusion of the project, three mining companies had agreed to cooperate in any formal manner: the Krasnogorskaya Mine in Kemerovo Oblast, Russia; Severstal Resources in Russia (Pechora Basin mines), and Arcelor-Mittal in Kazakhstan. SUEK in Russia had expressed interest and willingness to cooperate, but their internal processes did not match the schedule we set for the project. Only one, the Krasnogorskaya Mine, extended this cooperation to development of investment-oriented documents. It

should be noted though, that during the project the UNECE served as a clearinghouse for information and contacts amongst investors and coal mines, especially in the ECE region but in other regions of the world as well. We believe many of the informal introductions and leads led to development of relationships and even investment in some projects. For example, the Romanian mining group INSEMEX delivered a presentation on their mines at the 2006 Ad Hoc Group of Experts meeting. This generated significant interest from several project developers.

### **4.3 Activity and Assessment of CMM Prospects by Country**

The UNECE conducted missions to Russia, Kazakhstan, Ukraine and Poland and also investigated potential in Bulgaria, Czech Republic, Hungary, Romania, Slovakia and the Balkan countries. The following briefly summarizes the situation in each of the countries:

#### Russian Federation

The larger mining companies, notably SUEK, Severstal Resources, EVRAZ, and Yuzhkuzbassugol along with large independent mines such as Rospadskaya are well-financed, integrated and sophisticated companies that easily attract attention from investors. With the exception of VAM utilization, these operators had little need for the services offered by the ECE although some saw benefit in working with the UNECE for public relations benefit and the opportunity to receive free consulting services. On the other hand, the public nature of the process was a concern.

There are, however, smaller mines such as Krasnogorskaya and, possibly others, that could benefit from these services. It was difficult to get to these mines initially, but the ECE Team was able to do so at the end of the project. One challenge with the smaller mines may be that the projects are either too small or have unattractive internal rates of return. Many investors look for a 20% or more rate of return. In terms of size, 2 MW is usually an absolute minimum for a power project, and many investors will not consider anything below 5-10 MW potential.

Another challenge during the project period was Russia's delay in adopting and implementing rules for Joint Implementation projects under the Kyoto Protocol.

#### Ukraine

Although the UNECE did not conduct a formal outreach mission to Ukraine similar to those in the Russian Federation and Kazakhstan, it did publicize the project in a workshop sponsored by Partnership for Energy & Environmental Reform which was attended by several mines in the Donetsk Basin. Participants in the workshop expressed interest, but it was reported to us that their management were not interested. Investors have been very

active in approaching Ukrainian mining companies in recent years, and this may have been the reason for the lack of interest.

### Kazakhstan

The mines in Kazakhstan can be easily divided into large underground mines owned and operated by Arcelor-Mittal, small underground mines operated by the GEFEST Assoc with a total output of around one million tones per year from 30 mines, and closed underground mines managed by a state-owned company. All underground mines are in the Karaganda Basin. In addition, there are large surface mines in the Ekibastuz Basin. With the exception of the GEFEST mines, project developers and investors have already secured agreements with the mining companies or undertaking the projects internally, as is the case with Arcelor-Mittal.

Attempts were made to meet with GEFEST and to also obtain data from them, but these attempts were unsuccessful. It is not clear if methane drainage is used at any of the GEFEST mines, and the small size of the mines means that there is probably very limited opportunity for CMM projects even if drainage is available. It was reported to the ECE project officer that GEFEST will be developing a high capacity underground mine in the near future, and the mine will require methane drainage. No additional information was ever provided.

### Poland

The project was publicized at workshop on CMM drainage and use during the International Mining Forum in Poland in February 2008, however, there was no interest from the mines present. Based on discussions at the Forum, the Polish mines are undertaking projects internally or already have agreements in place for financial support to develop CMM projects.

### Other Countries in the Region

Aside from the Russian Federation, Ukraine, Kazakhstan and Poland, there were no other missions in the CEE/CIS Region. The ECE Team did contact experts the remaining coal mining countries for a preliminary assessment of CMM potential. If real potential existed, the Team was prepared to conduct a mission to the remainder of the region, principally Central and Southeast Europe. Based on the contacts, however, the Team did not feel such a mission was warranted as no promising mines (mines with evidence of sufficient methane emissions and drainage potential) were identified.

CMM development in Czech Republic is well-documented, and almost fully developed. Romania has a limited number of gassy mines but has attracted substantial interest from private investors and there was no need for ECE support. The underground mines in Hungary are all reported to be closed. In Bulgaria, the Government reported that the one remaining underground mine with methane issues does not generate enough methane to make a



project viable. Government officials in Serbia and Bosnia & Herzegovina reported that there may be some mines with methane problems but could not provide any additional information sufficient to warrant a mission to the Balkans.

#### **4.4 Summary of Cooperation with Specific Mines**

Of the three mines that cooperated, only Krasnogorskaya agreed to work closely with the ECE Team to develop the early stage bankable documents originally envisaged for this project. These documents have been included as Attachment I. and demonstrate project viability given certain economic conditions, but not in every case. In addition, the ECE team also supported a road show to London for the mine staff to present the project to investors.

##### **Results of Krasnogorskaya Road Show**

A road show to present the Pre-Finance document prepared in the framework of the UNECE Project for the Development of Coal Mine Methane Projects in Central and Eastern Europe and the Commonwealth of Independent States. The UNECE was unable to support full feasibility or project financing or any design and engineering services; however, the UNECE can act as a bridge to others who can provide these services.

The underlying purpose of the project was to improve mine safety, reduce greenhouse gas emissions from the mining industry, and encourage the rational use of energy resources in support of the goals and objectives of the Methane to Markets Partnership. Through this project, the UNECE seek to achieve these goals by catalyzing project development through support of the early activities that were necessary, but often overlooked, in conceptualizing, planning and implementing a CMM project.

A project was identified at Krasnogorskaya Mine and Pre-Finance documentation was developed and placed on the UNECE web site. A copy of the document is attached to this report.

The main aim of the mission to London was to present the document to a wide variety of financial institutions, specialized companies and investors, which may be interested to pursue the project further.

All the visited investors/specialized companies have a genuine interest to finance and implement the project.

The mine owners would need to make their choice and decide how to proceed with the project implementation.

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Severstal Resources prepared a very general Project Identification Form (PIF) for VAM projects at its mines in the Pechora Basin. The PIF was posted to the UNECE website and notice sent to the Ad Hoc Group of Experts; however, the posting did not generate further interest from investors. It is possible that Severstal was approached directly by or with investors. There was no requirement that mines work with the UNECE after the initial development of a PIF or even the more detailed bankable documents.

Arcelor-Mittal initially appeared to be very interested in cooperating with the UNECE following the mission to Kazakhstan, and requested that the ECE Team go to London to meet with the headquarters staff in February 2007. The company was not interested in external financing, but instead was planning to develop their project internally. Never-the-less, they were interested in expert consulting. The ECE Team held a very promising meeting with senior staff and received excellent documentation to begin preparing the early stage documents for financing. In addition, we requested permission to post the PIF previously submitted by senior Arcelor-Mittal staff in Kazakhstan. Unfortunately, there was no further communication with Arcelor-Mittal despite several attempts to follow – up with the London staff after the February 2007 meeting. It was later revealed that the company had received a loan of \$100 million corporate loan from the European Bank for Reconstruction & Development under their health and safety portfolio to upgrade mine safety include methane drainage and use. It is our understanding that they have hired consultants and are managing their project internally.

#### **4.5 Difficulties & Challenges in Implementing the Scope of Work**

As noted earlier, the central activity of the project was not as successful as originally envisaged. Simply put, it was much more difficult to engage mines than originally presumed. The original goal was to develop bankable documents for three to six projects, but at the end of the project the UNECE had prepared bankable documents for only one project. Although we were often able to meet with very senior officials who offered sincere interest<sup>2</sup>, it was difficult to retain that interest over time. This, in turn, made it very difficult to develop a capacity building programme on lessons learned.

In reviewing the project, we identified several factors that we believe contributed to the difficulty in securing interest from mining companies:

- *The profound changes in the carbon markets have resulted in a shift from a buyer's market to a seller's market.* The carbon markets have jumped from very little liquidity in 2003/2004 to almost USD 15 billion in carbon-

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<sup>2</sup> E.g., SUEK (Chief Executive Officer and two advisors to the Board) and Arcelor-Mittal (Senior VP and an advisor to the Board)

related funds and over USD 70 billion in clean energy funds in addition to direct funding by corporate and bilateral investors. This has, in turn, led to significantly greater human and financial resources dedicated to project origination. There is enormous competition amongst investors and project developers for good projects, and many will absorb the costs of feasibility studies and development of business plans.

- *The one-year delay in commencing most of the work under the project meant that the UNECE was providing financing support services when capital was much more easily available.*
- *Coal prices are very high. Within the region, and especially the CIS countries, state-owned mines have consolidated, privatized and evolved into integrated companies with an international presence and strong asset base. The coal companies now have the resources and confidence to pursue these markets at the same time attracting greater interest from investors*
- *CMM projects are relatively small in terms of revenue potential for major mining companies and these projects are also outside their core business.*
- *The delay in adopting JI rules in Russia and Kazakstan's delay in ratifying the Kyoto Protocol have delayed projects in those countries.*

## **5.0 Budget**

Changes from plan were due to the decrease in value of the dollar and increase in travel costs.

Contracts: The Year 2 contract for the financial expert was much less than expected because the expected workload did not occur. The team contacted several mines and the expectation was that at least one of these would pursue a project. However, this was not the case.

Staff Travel: Staff travel was effectively double for several reasons. The ECE underestimated the number of trips necessary to support the project. Another factor was the decline of the US dollar and the increase in travel costs in the subject countries during the term of the agreement.

Expert Travel: When the scope of work was originally drafted, the ECE believed that up to 3 projects per year would be identified and representatives from these projects would be provided important travel support to participate in ECE meetings, meet with investors, and other activities supporting the project. The difficulty in attracting projects meant that there were fewer opportunities to provide expert travel.

Supplies: We did not have a need to pay for any supplies. The ECE absorbed these costs.

## **6.0 Conclusion - Lesson Learned**

Throughout the term of the project, the ECE was in contact with the mining companies, project developers, investors, government officials and other stakeholders. Much was learned through these contacts. As a conclusion to the Final Technical Report, the ECE wishes to convey the lessons learned in implementing the scope of work and also the lessons learned in financing CMM projects. It is hoped that future activities supported by the US EPA, Methane to Markets Partnership, or UNECE can benefit from this knowledge to make further strides in catalyzing the deployment of CMM projects.

### **6.1 Lessons Learned Implementing the Scope of Work**

- The objective to identify 3-6 mines over the entire region was probably overly ambitious. The scope of work should have been more flexible to account for changes in market conditions, and probably should have targeted one or two countries rather than the entire region whilst retaining the flexibility to change countries if need be.
- The ECE underestimated the number of missions required to have a positive effect. It is critical to have the ability to meet with government and mining officials multiple times over brief periods to be effective. Just one or two meetings, especially with the larger mines, is insufficient.
- In both Russia and Kazakhstan it was difficult to get to smaller mines even though they were the mines that would have benefited most from the technical assistance provided by the UNECE.
- The public nature of the technical assistance was a concern to many mines, and we may have seen more success if we would have kept the information private. However, the UNECE continues to believe that a public process is necessary for a UN-sponsored project to ensure transparency.
- Generally the UNECE's interest and involvement in supporting project financing and development was well-received, especially amongst investors, project developers, and technology suppliers who saw benefit in a UN-vetted pipeline of projects. Governments were also generally positive, and were especially interested in the capacity-building

component. Mining companies were more ambivalent, and, as previously noted, were especially concerned about the public process. The companies did see value in the capacity-building and training because many were attempting to educate and train their own regional and mine staff to prepare proposals and business plans for CMM projects.

## 6.2 Lessons Learned in Developing Investment Grade Documents for CMM Projects

### Carbon and Capital Markets

- Among regions, the economies in transition, especially the countries of the CIS, are viewed as tremendous growth areas for carbon reduction projects. Attention is now shifting to include JI markets, and the stabilization of many transition economies and the corporate interests in those economies is attracting foreign and domestic investment. There is substantial opportunity for CMM projects given the long history of mining and degasification.
- There is substantial liquidity in the market, but access to capital is tightening as investors grow more conservative after two to three years of relatively easy access. Carbon markets are moving forward, although there is growing concern over uncertainty over post-2012 regimes. Still there is substantial liquidity in the markets. More interestingly, there is no longer clear demarcation between institutional finance and carbon finance meaning carbon mitigation projects also have access to larger “clean energy” funding.
- There are a range of financing options availed as the markets mature, but this also adds confusion, especially for smaller mines (or at least those staff in smaller mines with an interest in CMM) that do not have experience in capital markets. With the growth in carbon and clean energy finance, there are a wide range of financing options available including debt, equity, and mezzanine finance. Likewise the business models for so-called “carbon” firms have multiplied and include brokers, traders, project developers, banks, and equity investors. Within these groups, business models are further subdivided so that a developer, for instance, may have all technical and financial expertise in-house whilst another developer will out-source some of the technical and operational aspects of a project. The positive side of all this is that financial solutions can be tailored to the specific needs of each project host. The difficulty, however, is the confusion caused by so many choices, especially for the smaller mines not accustomed to international financial markets.

- Buyers/developers/investors are demonstrating flexibility during these early years in carbon trading, although this may change as regulatory regimes tighten. Many acknowledge that they expect some projects to not deliver contracted quantities, but are willing to accept this liability if the seller acts in good faith. Purchasers are also more willing to contract for smaller volumes, even as low as 50,000 tonnes from 2008-2012.
- Early-grade documentation is an appropriate level of technical support. Many investors are prepared to absorb the costs for feasibility studies if there is a realistic chance that the project could proceed. The entry-level documentation can also be used to seek indicative offers early on.
- Uncertainty over Post 2012 is impacting project implementation. The market for Post-2012 emission reductions is very limited at this time and prices are low due to the uncertainty. The economic impact for larger projects that require longer lead times is substantial. Many project hosts are hesitant to enter emission reduction purchase agreements for the low post-2012 prices.

### CMM Projects

- CMM is an attractive carbon asset class but there are concerns that many projects will fail to deliver the full amount of contracted emission reductions. The resource base is expected to grow from 450 MtCO<sub>2</sub>e in 2005 to 530 MtCO<sub>2</sub>e in 2020 (US EPA), and CMM projects are considered by many to be “high quality” offsets. CMM projects are large in comparison to many other types of offsets, utilize conventional, emission baselines and reductions can be easily measured and verified. Of concern, though, are difficulties in assessing the methane resource at mines and accurately modelling methane production over time. Many projects are believed to have overestimated the emission reduction potential as has happened with landfill gas.
- There is some early market confusion as some buyers/aggregators believe the quantity drained (and even emitted) equals avoided emissions. This, of course, is not always accurate, and may be one of the problems that has led to overstatement of expected avoided emissions.
- Transaction and development costs can be high leading project developers to set minimum project sizes for investment. For example, the standard minimum for an internationally developed/financed CMM-fired electric generating project is 2 MW, and many developers will not look at any project under 6 MW. This is adjustable depending on country and access. For some countries in CEE, the lower threshold may hold, but the

difficulties and distances to the Russian, Ukrainian and Kazakh coal basins will probably mean developers are looking for the larger projects.

- *Much is made of the value of the carbon emission reductions, but the benefits of electricity and gas sales or use should not be ignored.* Much is made of the carbon markets with many focusing only on the price of carbon; however, the additional revenues/cost savings brought by sales or avoided costs from electricity and natural gas markets can be just as important or even more important to the viability of a CMM project, even in the CEE/CIS region. The significant risks in securing credit approval are great, but likewise sometimes challenges in securing gas rights and rights to sell power/energy are also of concern.
- *Mines view a “CMM project” as one addressing both upstream methane degasification and downstream utilization.* Mines in emerging economies are demanding the full package of services and expect support to improve the upstream ventilation and degasification in addition to hosting a utilization project. This can be problematic for investors because they have little or no control over the subsurface operations. It can also drive the economics to unacceptable levels, i.e., low rates of return and negative net present values. On the other hand, sometimes subsurface improvements can result in better quality and quantity of the methane resource improving the project economics.
- *For some mining companies CMM projects remain outside their core business and are of little interest, especially for larger, integrated companies.* In our experience, some companies were simply not interested due to the small size and revenue potential of projects relative to the other revenue centres in their operations. The fact that CMM projects were outside of the core business just reinforced this decision. In those instances, the ECE Team attempted to promote CMM recovery and use as a visible demonstration of corporate social responsibility and good governance. Even then, some were still not interested, though their public pronouncements may suggest otherwise. It is the ECE Team’s belief that interest could grow when carbon prices and electricity and natural gas rates rise and carbon markets show greater permanence. Additional focus on corporate image (corporate social responsibility) required for securing international finance may also heighten interest in coal mine methane projects.
- *Inconsistent communication within mining companies delays project implementation.* Financial expertise and corporate strategy are usually concentrated at headquarters offices while the technical expertise is at the mines or in the mining regions. In a number of companies, these two are far apart in distance and culture. Often one will push to move forward

while the other holds back. The result is stagnation and nothing moves forward.

- Many mines are interested in VAM utilization and there is great opportunity to provide project-specific support. There is great interest in VAM utilization especially with the commercialization of the West VAMP project in Australia. Investors are approaching the mines to work on methane drainage projects but not as much for VAM. There could be very good opportunities to provide the financial support services for VAM projects as VAM continues to mature.
- The big picture still eludes many investors. The ECE directed its focus on the mining industry because this segment of the market was seen as having great difficulty in preparing adequate documentation and unable to effectively present their case for financing. In our work, we also communicated extensively with project developers and investors. Although some are well-prepared for the challenges inherent in developing CMM projects, we found many others who, in their rush to sign up project partners, did not adequately address key aspects of a CMM project, especially those noted below.
  - Reliable gas supply
  - Appropriately sized project
  - Off-take for product and emission reductions
  - Adequate capital to ensure proper construction and start-up
  - Adequate revenue stream to support operations and regular maintenance
  - Applicable licenses and permits
  - Qualified, integrated team
    - Ensure all partners are motivated by mutually beneficial incentives to optimize project design and operations
    - Need an effective, knowledgeable and experienced coordinator of all aspects of projects
  - Effective integration with mining operations
    - Understand mine plan and degasification operations
    - Coordinate closely with mine management, staff



**Attachment I**  
**CMM PRE-FINANCE INFORMATION**

**Krasnogorskaya Mine Methane Utilisation**

**JUNE 2008**

## IMPORTANT NOTICE

This Pre-Finance Information (“Information”) was prepared by UNECE with contribution by its UNECE advisors Karl Schultz, Climate Mitigation Works; Oleg Tailakov, Uglemetan and Deltcho Vitchev, Renaissance Finance International (the “UNECE”) solely for information purposes from materials provided to the UNECE by SDS Coal (“SDS” or the “Company”) and material publicly available. The UNECE on behalf of SDS is distributing this Information solely for use by interested investors to determine whether they would like to proceed with further investigation into the proposition as detailed in accompanying request for proposal (the “Transaction”).

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## **1 UNECE PROGRAMME**

The UNECE has received funding from the US Environmental Protection Agency (US EPA) to provide technical assistance to coal mines in Russia and other countries to develop early stage bankable documentation for coal mine methane (CMM) projects and to introduce such projects and their sponsors to potential investors. The UNECE is unable to support full feasibility or project financing or any design and engineering services; however, the UNECE can act as a bridge to others who can provide these services.

The underlying purpose of the project is to improve mine safety, reduce greenhouse gas emissions from the mining industry, and encourage the rational use of energy resources in support of the goals and objectives of the Methane to Markets Partnership. Through this project, the UNECE seeks to achieve these goals by catalyzing project development through support of the early activities that are necessary, but often overlooked, in conceptualizing, planning and implementing a CMM project.

The project began in 2004 and concludes in September 2008.

## 2 THE MINE AND THE PROJECT

### 2.1 INTRODUCTION

Krasnogorskaya mine is located in the southern part of the Kuzbass coal region near the town of Prokopyevsk in Kemerovo Oblast. The mine is owned by SDS Coal, part of SDS Group headquartered in Moscow. The mine produces coking coal for local markets. The proven reserves of coal are 18 million tons, which is 35 years at current planned production of 600,000 tons per year. The current production is 300,000 tons/year. However the mine plans to increase the production to 1 million tons per year by 2012.

В производственную группу Угольной компании «Прокопьевскуголь» входят пять шахт крутого падения, расположенных в черте г. Прокопьевска, две обогатительные фабрики, ремонтно-механический комплекс «Подземтрансаш», автотранспортное предприятие. Шахтами Угольной компании «Прокопьевскуголь» разрабатывается месторождение, запасы которого представлены мощными, средней мощности и тонкими пластами с углами падения от 90° до 20-30°. Преобладающие мощности обрабатываемых пластов 3,5-6,0 м, в отдельных случаях 10,0 и более метров. Минимальная мощность пластов, запасы которых отнесены к категории промышленных - 1,2 м.

Геологическая структура месторождения представляет собой ряд чередующихся синклинальных и антиклинальных складок, осложненных множеством тектонических нарушений различных типов. Горные работы по добыче угля ведутся на глубине 250-450 м от дневной поверхности, что обуславливает повышенное газовыделение и увеличение горного давления. По этой причине часть угольных пластов отнесена к угрожаемым или опасным по горным ударам и внезапным выбросам угля и газа.\*

Объем добычи угля по планам на 2007 г. на рассматриваемой в Проекте шахте, составит – 325 тыс. тонн.

The depth of mine coal seams is 450 meters bellow surface with steeply angled dip.

Specific emissions of methane from the mine are estimated at 14.0 to 22.0 m<sup>3</sup>/ton of coal. The mine currently drains methane through in-mine boreholes. Methane from the boreholes is collected by a gathering system at a single point and all of it is vented. The mine operator estimates the methane drained to 3.5 to 4.0 million m<sup>3</sup>/year. In addition the ventilation system releases an estimated 8.5 million m<sup>3</sup>/year with an average concentration of 0.4%. The mine does not utilise any methane either from the ventilation or the drainage systems.

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\* Большинство шахт в черте города Прокопьевска отнесены к категории шахт опасных по внезапным выбросам угля и газа

The current concentration of methane in the gas drainage system is below 30% for one third of the operation time.

The mine has expressed interest in utilising the methane from the drainage system in on-side boilers for heat and generation of electricity. In addition, the mine has also expressed interest in flaring any excess methane resulting from not use in the summer months.

To utilise the methane for heat or electricity generation it is necessary to upgrade the drainage system to deliver concentrations above 30% consistently. The mine stated its intent to upgrade the system and schedule the coal production in order to achieve such concentration.

The utilisation of ventilation methane from the mine with the currently available technologies would be non economical.

At current production, the mine has a heat demand of 18 Gcal from October through May, met by 4 coal boilers with a total capacity of 24 Gcal and uses electrical heaters of 250 kW for hot water in the summer. To power the boilers the mine buys 15,000 to 17,000 tons of coal per year at current price of 543 R/ton. An increased production of the mine is not expected to materially increase the demand for heat.

The base load electrical demand of the mine is 17 MW throughout the year. The expected increase of coal production is expected to result in 30-40% electricity demand by 2012.

There are plans to drill test wells – 3 in the pillar area and 1 in the virgin coal seam. The methane potentially produced by these wells – as reported by the developer - from 10,000 to 20,000 m<sup>3</sup>/day from each well is not being taken into account in this analysis. For comparison, the current volume of the methane from the mine to be used is assumed to be 10,000 m<sup>3</sup>/day.

## **2.2 EXPECTED BENEFITS FROM PROJECT IMPLEMENTATION**

### **Direct Financial Benefits**

1. Fuel substitution – replacement of a part of the coal used and reducing the cost of purchased coal
2. Electricity generation – substitute part of the purchased electricity
3. Sale of Carbon Credits – compliance credits and/or voluntary credits – financial benefits to the mine
4. Reduction of payments for methane emissions – reduction of payments to the Federal Authorities

### **Indirect benefits**

1. Productivity of the mine – increases expected as a result of timely and more effective draining the methane from the works

2. Safety – reduction of the methane concentration at works would result in improved safety

### **Costs**

1. Incremental cost of converting the boilers to dual – coal/gas use
2. Purchase of electricity generation equipment
3. Payment for use of methane
4. Enhanced operational cost and maintenance of the improved of methane drainage system
5. Construction of pipelines, electricity, pumping and other infrastructure
6. Legal and administrative cost, including transaction cost for carbon credits approval

## **2.3 TECHNOLOGIES FOR HEAT AND ELECTRICITY PRODUCTION**

### **2.3.1 Overall assumptions**

It is assumed that the mine owners are investing 110 million Roubles in improvement of the drainage system. This amount is not included in the economic analysis, as the costs will be incurred regardless of this project.

A cost of 20 million Roubles per year of operation and maintenance of the improved methane drainage system is assumed in all scenarios.

Each 1,000 m<sup>3</sup> of methane utilised will result in reduced payments of 50 Roubles to the Ministry of Environmental Protection and save the mine from penalty payments for increased emissions of methane (250 Roubles/1000m<sup>3</sup>).

It is assumed that the mine has full property control over its coal production and will have full property right over the drained methane.

### **2.3.2 Heat Production**

One of the options to utilise the mine methane is to use 100% of the available methane as Boiler fuel replacing part of the coal purchases for boiler fuel from October through May. A flaring of the methane will be required from May to October.

Currently there are 4 coal boilers of total capacity of 24 Gcal/h from which the mine uses 18 Gcal/h and one of the boilers is in reserve. A small pilot boiler of 0.6 Gcal/h is being installed in the framework of an UNDP sponsored project. Our understanding is that the existing 4 outdated boilers, commissioned between 1959 and 1961, will be replaced with new, more efficient boilers.

The amount of heat which can be produced using the coal mine methane is estimated at 3.5 Gcal/h. With the planned increase of coal production in 2012 it is estimated that the drained methane would be able to produce 7.1 Gcal/h.

The following assumptions were applied in this scenario:

1. Volume of drained methane: 3.5 million m<sup>3</sup>/year in 2008, increasing on linear basis to 7.0 m<sup>3</sup>/year in 2012.
2. Incremental cost of converting two of the replaced boilers to dual fuel – coal/methane.
3. Distance between the boiler station and the pumping house is 500 m.
4. Purchase and installation of piping and vacuum pumps.
5. 100% of the available methane is used in the boilers from October to May and fared from May to October.
6. Purchase of enclosed flare.
7. The cost of avoided coal is assumed at 460 Roubles/ton + VAT (NDS) 18% (June 2008)
8. It is assumed that the emissions of the avoided coal will be credited to the project at a ratio of 1 ton of coal avoided results in 1 ton of CO<sub>2</sub> avoided.

### **2.3.3 Electricity Generation**

1. The proposed configuration envisages purchase and installation of, initially 1 and in future up to 3, electricity generating installations of installed capacity of 1.3 MWe each.
2. 100% of the electricity generated will be used to contribute to the base load requirement of the mine and offset equivalent amounts of electricity purchased from the grid.
3. The cost of avoided electricity is assumed at 2.0 Roubles/kWh (June 2008)
4. It is assumed that the electricity generated will replace electricity from the grid, which in Kemerovo region is generated by coal power plants.

### **Recommendation for improvement:**

The use of waste heat from electricity production may be a more profitable and energy efficient way of use of the methane resource, but may be technically more complicated. It is recommended that this option is considered in a further study.

## **2.4 THE KYOTO-PROTOCOL RELATED BENEFITS**

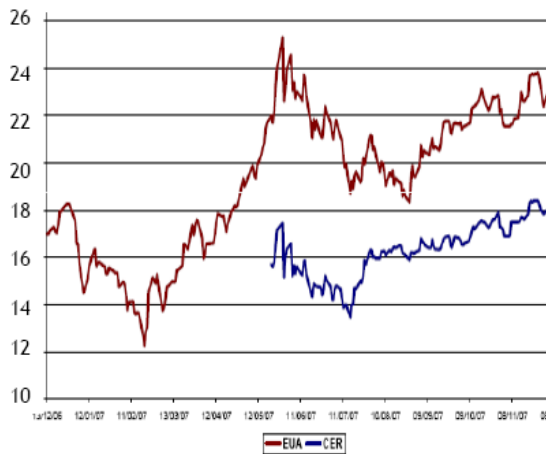
The Russian Federation has ratified the Kyoto Protocol. Any reduction of methane emissions from the mine may qualify for Carbon Credits.

The project benefits from and is highly dependent on “carbon credits” that we expect will be available as “Emissions Reduction Units” (ERUs) under the “Joint Implementation”

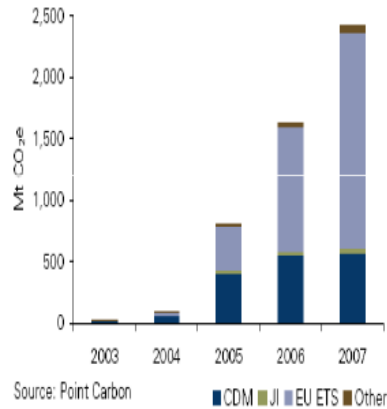


mechanism of the Kyoto Protocol. In the base case, approximately 95% of the revenues from the boiler conversion/flaring project, and 75 percent of the revenues from the power project are expected to come from the sale of ERU carbon credits.

As the below figure shows, the carbon market volumes have grown from a trivial number in 2003 to nearly 2.4 billion t in 2007, with a value in excess of \$65 million U.S. dollars. Prices have also increased and now stand at approximately €18 for project based credits.



**Prices (€) of EUAs and CERs  
2005 -2007**



**Volumes (million t):  
EU ETS, CERs, ERUs and Other**

It is important, however, to note that the process of creating carbon credits like ERUs is lengthy, complicated, and somewhat risky. The process includes:

- development of a project design document (PDD) that describes the project and demonstrates that it would not happen without qualification for Joint Implementation and a detailed emission reduction monitoring plan;
- a determination from a third party auditor (Accredited Independent Entity) that the PDD is in accordance with established baseline methodologies;
- review and a letter of approval from the Russian government;
- registration by the United Nations;
- when the project is operating, careful monitoring against the monitoring plan;
- verification of the monitoring report by a third party auditor (AIE), and only then issuance of credits.

## Registration as JI Project

ACTIVITY	RESPONSIBILITY	Approval Required	
		TRACK 1	TRACK 2
Project Identification	PP		✓
Project Formulation	PP		✓
National Approval	Jl focal point	✓	✓
Validation	IE	✓	✓
Implementation	PP		✓
Monitoring	PP		✓
Verification	IE	✓	✓
Issuance of EEU's	Jl SC	✓	✓

A buyer of the credits also has to be found. Buyers often are interested in signing agreements “Emission Reduction Purchase Agreements” (ERPAs) that lock in sales in advance of a project’s start. Depending on the risks that the buyer perceives and which party bears the risks, the price of the future credits will be discounted (often steeply) from the prices of realized credits.

Today realized credits have a value of around €18/t of CO2 equivalent. If sold in advance, the price might be well below €10/t if the buyer has to take risks that the credits will not be approved or delivered to the buyer. Some buyers will pay up-front for a future flow of credits and some will also package an ERPA with equity and debt financing.

### 3 INVESTMENT PLAN AND FINANCE

#### 3.1 BASE CASE ASSUMPTIONS

The current model has been prepared with limited information of the financial status, situation and forecasts for the mine and its owner – SDS Ugol. To illustrate the financial performance of the different options, it is assumed that they are financed entirely by own equity and any financial impact of taxes, tax rebates, value added tax, inflation, currency depreciation and similar, are not being considered in this preliminary financial analysis. Without knowledge of the actual cost of capital employed, or the hurdle rate used by the company, a discount rate of 10% has been used as a base case.

##### 3.1.1 TIMING OF THE PROJECT

It is assumed that the project will start in 2009, the equipment will be purchased and installed by the end of 2009 and be operational in 2010. An economic life of 15 years is assumed.

### 3.1.2 INVESTMENT COST

The costs of equipment and O&M are based on the best available information from vendors and on information received from the mine. The following tables summarize the total investment cost of the project options through the years:

#### Electricity Generation Option

CAPEX	Euros	RUR	Cost
CHP Plants/module	740000	27483600	
CHP/year			54967200
Transformer etc/module	100000	3718100	
Transformer etc.			7436200
Development/module	200000	7436200	
Development/year includes carbon credit creation			14872400
<b>Total Cost</b>			<b>77,275,800</b>
<b>O and M</b>			
Extra Drainage O and M/year	0		20000000
O and M/year (euro/kWhel)	0,016		4331011
Monitoring/module	5000		
Moditoring/year			
Admin per module	5000	371810	
Admin per year			742800
Verification of Credits/year	5000	185700	185700
CO2 registration/t/year	0,20	23,52	
CO2 registration/year			333163
Total O&M costs/year			25,592,674

#### Heating Boilers conversion to CMM Option

CAPEX	Dollars	Per Unit	RUR
Pipeline and Construction 500 m			33000000
Burner and Installation (2 burners)	100000		2360000
Vacuum Pump			1000000
Flare (enclosed)			24167650
Development Costs		7436200	14872400
<b>Total Costs</b>			<b>75,400,050</b>
<b>O and M</b>			
Extra Drainage O and M/year	537909		20000000
Moditoring/year			1115430

CO2 registration/t/year	0,2	23,521	4,7042
CO2 registration/year			316129
Total O&M costs			21,478,601

### 3.1.3 ASSUMPTIONS

#### Electricity Generation Option

Operational units	Size of Units in MWel. Number of operational modular units in MWel capacity.
New Units Installed/year	Number of new units installed in particular year.
MWel operational capacity	Number of units times MWel capacity operating in particular year.
Gas Used annual m3	Assuming 40% elec. Efficiency and 100% system availability, 315 m3/hour produces 1 MWel
Operating availability Hours/% per year	8760 hours per year, use % function to calculate total hours per year.
Electrical Efficiency %	40%
KWh per year	Multiply installed capacity times hours available per year
Avoided CO2 emissions (grid)	Grid specific emissions of CO2 per Gwhel.
Avoided methane CO2e	Gas used (m3) times density t methane/m3 times Global Warming Potential methane of 21.
Avoided CO2e per year	Sum of avoided grid emissions CO2 and avoided methane emissions CO2e.
Price EUR CO2e/t/year	Assume higher price until 2013 as no treaty negotiated for after Kyoto period 2008-2012.
Price RUR CO2e/t/year	Exchange rate 37 RUR/euro 10 June 08
Revenue CO2e	Credit price times Total avoided emissions CO2e
CH4 emission fee/m3	Reported by Ministry of Economic Development as 50 RUR per 1000 m3.
CH4 avoided emissions fees/year	Total avoided methane emissions times emission fee.
RUR/kwh	
RUR Elec. revenue/year	
TOTAL Revenue/year	
<b>CAPEX</b>	
CHP Plants/module	Cost of CHP Modules
CHP/year installed	Number of Modules
Transformer etc/module	Cost for transformers and other electrical works
Transformer etc. installed	Number of transformers etc.
Development/module	Cost of development on basis of module
Development/year	Cost of development in a particular year
<b>O and M</b>	
Extra Drainage O and M/year	Mine reports cost to ensure all gas drained exceeds 30% methane concentration. Mine plans on doubling gas production by 2012 but not included in analysis as baseline.
O and M/module	Power plant O and M cost assumption per module

O and M/year	Power plant O and M costs in a particular year
Monitoring/module	
Moditoring/year	Preparation of data logs and reports of avoided emissions and other key parameters.
Admin and Transaction Costs Credit Creation per module	Includes development of project design document, approvals and third party determinations of project.
Admin Transaction Costs Credits in particular year	
CO2 registration/t/year	UN Joint Implementation Supervisory Committee fees simplified as \$0.20/t CO2e (4.7042 RUR at exchange rate of 23.521 RUR/\$)
CO2 registration/year	Multiply CO2e by registration fee.
Total costs	Sum of costs
Net Cashflow	Revenues minus costs

### Heating Boilers conversion to CMM Option

Boilers converted	Project assumes two of four new coal fired boilers will have gas burners installed. Demand for gas sufficient for only one boiler but two conversions provides flexibility.
Boilers Operation Time days/year	Reported by mine as October through May.
Flare Operation Time days/year	Assume flare operates when boilers are not operating; June through September.
Gas available annual m3	Mine currently produces 3.5 million m3/year; mine reports will double production by 2012; production increases calculated using linear interpolation.
Gas used annual m3	Based on below availability % as share of total gas available. Base case assumption is 91% (approximately 8000 hours/year)
Operating availability %/Hours per year	8760 hours per year, use % function to calculate total hours per year.
Gcal of gas available	Calorific value of methane is 8550 Gcal/m3
Gcal of gas used	Calorific value of methane is 8550 Gcal/m3
Total baseline coal consumption for all boilers (t/y)	16000 t/year - Reported by mine.
Total Gcal production of boilers per year	132480 Gcal/year - Reported by mine.
Avoided coal consumption (t coal/year)	Calculated: gas used divided by Gcal total * baseline coal consumptions.
CO2 avoided emissions from fuel switch	One avoided ton of coal consumed reduces approximately one ton of CO2
CO2e per m3 from methane	Multiply m3 gas used times density of gas 0.0007167 t/m3 times global warming potential methane of 21.
TOTAL Avoided Emissions CO2e	Fuel switch avoided CO2e plus CO2e from methane avoided
Price EUR CO2e/t/year	Assume higher price until 2013 as no treaty negotiated for after Kyoto period 2008-2012.
Price RUR CO2e/t/year	Exchange rate 37 RUR/Euro as of 10 June 08
Revenue CO2e	Credit price times Total avoided emissions CO2e
Revenue Avoided Coal Consumption	Mine reports coal price of 460 RUR plus 18% VAT.
CH4 emission fee/m3	Reported by Ministry of Economic Development as 50 RUR per 1000 m3.
CH4 avoided emissions fees/year	Total avoided methane emissions times emission fee.
TOTAL Revenue/year	Sum carbon credit, avoided coal consumption, and avoided methane emission fee.

<b>CAPEX</b>	
Pipeline and Construction 500 m	Included steel pipe from vacuum pump station to boiler house and construction costs.
Burner and Installation (2 burners)	Assumes retrofitting two coal fired boilers with gas burners at cost of \$50,000/retrofit.
Vacuum Pump	Cost to purchase one pump capable of transporting methane to the burners.
Flare (enclosed)	Total hardware and construction costs for one enclosed flare sited near the boiler house.
Development Costs	
Admin and Transaction Costs Credit Creation	Includes development of project design document, approvals and third party determinations of project.
<b>O and M</b>	
Extra Drainage O and M/year	Mine reports cost to ensure all gas drained exceeds 30% methane concentration. Mine plans on doubling gas production by 2012 but not included in analysis as baseline.
Moditoring/year	Preparation of data logs and reports of avoided emissions and other key parameters.
CO2 registration/t/year	UN Joint Implementation Supervisory Committee fees simplified as \$0.20/t CO2e (4.7042 RUR at exchange rate of 23.521 RUR/\$)
CO2 registration/year	Multiply CO2e by registration fee.
Total costs	Sum of Costs.
Net Cashflow	Revenues minus costs.
Discounted cashflow	Assume Discount Rate

### 3.1.4 RESULTS OF COST/REVENUE AND SENSITIVITY ANALYSIS

The results of the analysis show that both project options can be profitable and achieve positive rates of return. The base case for power generation yields a net present value (NPV) of 32 million roubles (RUR) and an internal rate of return (IRR) of 20%. For use in boilers and flaring, the base case delivers an NPV of 16 million RUR and an IRR of 16%. No use of external finance is being considered at this stage.

To test alternative cases, several sensitivity analyses were run considering differing power prices, cost, discount rates and carbon prices. The results show great sensitivity to changes in these key factors, especially carbon prices, resulting in negative NPVs and IRRs.

	CAPEX (RUR)	IRR (%)	NPV (RUR)
<b>ELECTRICITY</b>			
Base Case	77 mil	20%	32 mil
CO2 Credit at Euro 16/t thru 2025	77 mil	32%	103 mil
No CO2 Credit Price 2009-2025	77 mil	0	-128 mil
No CO2 Credit Price after 2012	77 mil	0	-38 mil
Electricity Price of 3.00 RUR	77 mil	30%	73 mil
Cost increase 10%	84 mil	16%	23 mil
15% Discount Rate	77 mil	14%	-1.2 mil
<b>HEAT</b>			
Base Case	75 mil	16%	16 mil
CO2 Credit at Euro 16/t thru 2025	75 mil	30%	82 mil
No CO2 Credit Price 2009-2025	75 mil	0	-142 mil
No CO2 Credit Price after 2012	75 mil	0	-51 mil
Cost increase 10%	82 mil	14%	10 mil
15% Discount Rate	75 mil	11%	-8 mil

### 3.2 ОЦЕНКА РИСКОВ

Для оценки рисков применена пятибалльная система. Наивысший риск оценивается пятью баллами, наименьший – одним баллом. При реализации разрабатываемого проекта существуют следующие риски:

1. Смена собственника или руководства (изменение условий и параметров заключенных ранее соглашений, расторжение соглашений, отказ от реализации проекта). В настоящее время собственником ОАО «УК «Прокопьевскуголь» является СДС - уникальная многоотраслевая

- структура, годовой оборот которого только в машиностроительной отрасли составляет 9,5 млрд. рублей. Надежность позиции “Сибирского делового союза” обеспечивается протекцией со стороны Администрации Кемеровской области. ОАО «УК «Прокопьевскуголь» приобретена СДС в 2007 г. и маловероятно, что компания будет продавать этот актив в ближайшие 1-2 года. Оценка риска – 2 балла.
2. Финансовые риски (рост затрат на оборудования и материалы, услуг подрядчиков и поставщиков, изменение курса валют). Проекты утилизации шахтного метана в Кузбассе не получили развития. Возможно, что в ходе выполнения данного проекта затраты на его реализацию, оцененные на основе существующих цен на подобное оборудование и услуги в других отраслях промышленности, окажутся значительно выше планируемых. Оценка риска – 3 балла.
  3. Законодательный риск (изменение законодательства, ввод дополнительных нормативов к эксплуатации объектов, установление новых налогов и сборов, появление новых экологических норм). В настоящее время отсутствует нормативная база по проектированию и эксплуатации систем утилизации шахтного метана. Внедрение таких технологий будет сдерживаться этими обстоятельствами. Оценка риска – 3 балла.
  4. Технологические риски (недостаточный объем и концентрация дегазационного или вентиляционного метана, выход из строя оборудования, отсутствие промышленных испытаний каталитического теплоагрегата). Для обеспечения концентрации дегазационного метана более 30% необходимо соблюдение технологической дисциплины угольными шахтами, включая герметизацию устья скважин и соединений подземных и наземных газопроводов. В Кузбассе отсутствует опыт эксплуатации установок утилизации шахтного метана. Оценка риска – 3 балла.
  5. Недобросовестность подрядчиков и поставщиков (невыполнения работ в необходимом объеме, недостаточный уровень качества работ, несоблюдения сроков поставки необходимых материалов и оборудования). При выполнении проекта утилизации шахтного метана в Кузбассе в рамках проекта ПРООН/ГЭФ в некоторых случаях возникали проблемы, связанные с невыполнением обязательств проектными и строительно-монтажными организациями. Для снижения этого риска рекомендуется привлекать к выполнению проекта организации, которые имеют положительную рекомендацию проекта ПРООН/ГЭФ. Оценка риска - 2 балла.
  6. Риск возникновения техногенных катастроф (возникновение чрезвычайной ситуации на объекте или на шахте, внезапные выбросы метана на шахте). На угольных шахтах регулярно происходят аварии. Так, на шахтах компании «Южкузбассуголь» в 2007 г. произошло два взрыва газа метана, в результате которых погибло 149 человек. Кузбасс является сейсмоопасной зоной. В 2005 г. в регионе произошло землетрясение, сила которого составила 4 балла. Однако на горном отводе ОАО «УК «Прокопьевскуголь» возможно лишь эхо землетрясений, которое обусловлено близостью к Горно-Алтайскому хребту. Оценка риска – 3 балла.



#### 4 NEXT STEPS

Although a detailed business plan and feasibility study will eventually be necessary for project financing, the documentation we have prepared is adequate in today's capital markets to raise initial interest in the project from project developers and private, bilateral and multilateral investors and even solicit an indicative offer. The market conditions today are quite competitive and there is a great interest in CMM projects, if they generate an adequate amount of Carbon Credits. It is likely that an investor attracted to the project would take on the financial cost of preparing the feasibility studies, business plan and necessary documentation for carbon-related transactions. We, therefore, believe that the best and most expeditious strategy is to use the existing report to attract interest directly from the investment community and suggest the following next steps:

1. **Complete the report by providing additional detail relevant to financial markets.** Deltcho Vitchev will add additional detail to the report necessary for submission to the financial community. This is necessary for the road show described below but not for posting on the UNECE website which can occur immediately.
2. **Post the report on the UNECE website to reach the many investors and developers looking for CMM projects.** The UNECE plans to broadcast availability of this report to the UNECE Group of Experts on Coal Mine Methane and will also notify contacts at a number of reputable project development/investment firms. This is important to the UNECE to ensure transparency in the project, and necessary for continued support from the UNECE. We request your concurrence by the end of June to allow adequate time to complete activities by the close of the project in September.
3. **Conduct a "roadshow" to London to meet with prospective investors.** The UNECE will arrange a road show in London for experts and management from SDS and/or the Mine to present the project to prospective investors. Through the funding agreement with US EPA, the UNECE is able to cover travel costs (economy class airfare and subject to UN travel policies) for up to two technical experts from the Mine to travel to London. UNECE consultants will also participate in the meetings, advise as appropriate and assist with interpretation and translation. In presenting the project to investors, it will help if SDS can identify other mines that could be hosts for additional CMM projects.
4. **Identify other sources for funding additional feasibility work, business plan development and/or other technical assistance if earlier efforts do not generate interest in the project.** The project size is relatively small, thus investment interest may be limited at the current time. If this is the case, the UNECE will strive to identify other funding sources that could support further funding and technical assistance.