

Status of CMM Recovery and Utilization in the Kuzbass Basin, Russian Federation

Oleg Tailakov
UGLEMETAN & Russian Academy of Sciences/Siberia Branch – Inst of Coal & Coal Chemistry

**UNECE Ad Hoc Group of Experts on Coal Mine Methane - Second Session, Geneva
2 April 2007**

1

Presentation Contents

- UNDP/GEF Project:
 - General description;
 - Attained results.
- Additional financing sources:
 - Possibilities for JI projects realization on coal mines of OAO “SUEK”;
 - GOF project.

2

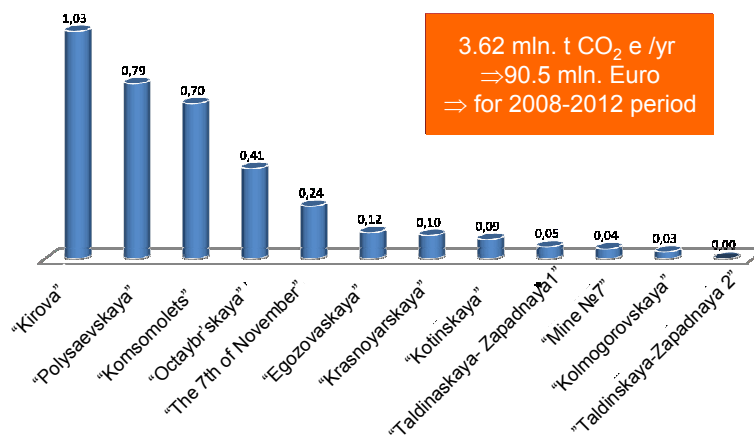
Project Description

- Title:** “Russian Federation – Removing Barriers to Coal Mine Methane Recovery and Utilization”.
- Start date:** October 15, 2003 Region of the highest interest: Kuznetsky coal basin (Kuzbass).
- Goal:** GHG emissions reduction by means of removing barriers for implementation and financing of coal mine methane utilization projects in Russia.
- Key concept:** The establishment of institutional and financial basis to facilitate coal mine methane project development and selected demo projects accomplishment.
- Tools:** Support /creation of coal mine methane recovery and utilization company (CMMRUC).
- Budget:** \$ 8.3 Mln (\$3.1Mln).

3

ERUs potential in Leninsk-Kuznetsky branch of OAO “SUEK”

Annual methane emissions (mln. t CO₂e)



4

Documentation and Technical overview

- Business plan for coal mine methane utilization project on OAO “Komsomolets Mine”.
- Business plan for coal mine methane utilization project on “S.M. Kirov Mine”.
- PIN and PDD for OAO “Komsomolets Mine”.
- PIN for OAO “The 7th of November Mine”.
- April 24-29 2005 - Visit to Donesk of Project Working Team including engineering staff of ANO “Ugлемetan” and OAO SUEK Lenisns-Kuznetsky branch.

5

CMM Utilization Technologies

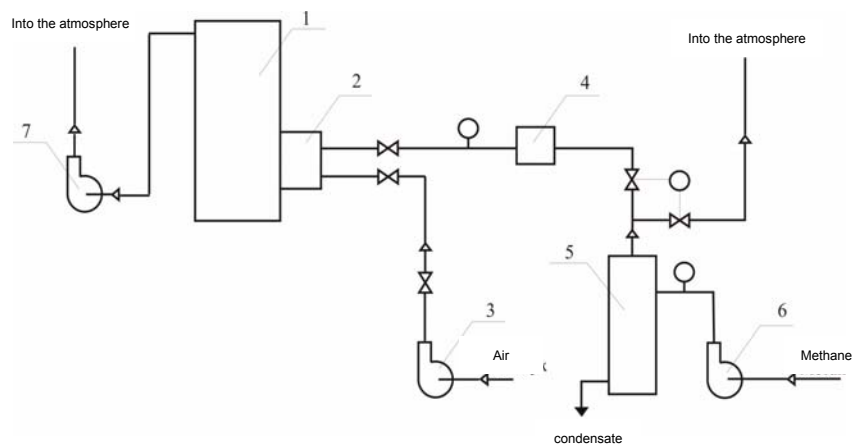
- Generating thermal energy by methane combustion in the boiler
- Generating electrical and heat power in gas generator station
- Generating electrical and thermal power by ventilation air catalytic oxidation
- Vacuum pump operation using methane
- Fueling automobile transport with compressed methane

6

Pilot Project on Methane Utilization on “Komsomolets” Mine

7

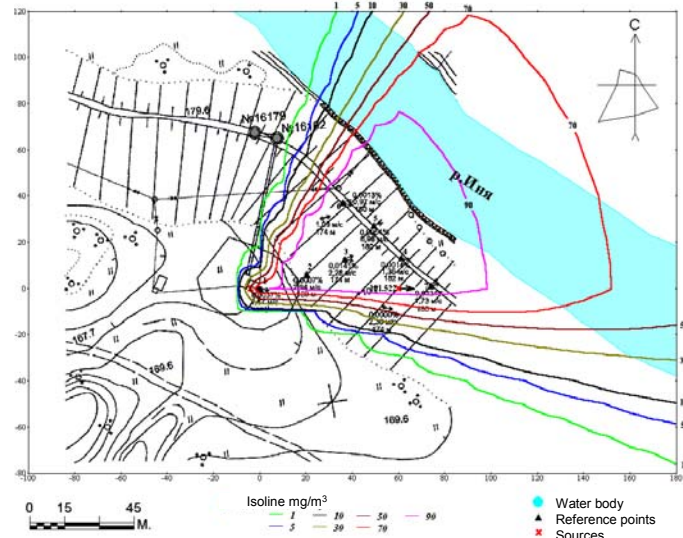
Principal Layout of Methane Combustion in the Boiler House



1 – Boiler, 2 – Burner, 3 – Air blower, 4 – Flame arrester, 5 – Drop catcher, 6 – Vacuum pump VVN-50 (Q= 30 m³/min, CH₄ =38.5%), 7 – Smoke exhauster

8

Methane spot distribution



Maximum concentration in windward direction in section 220-270 (2.5 m/sec velocity).

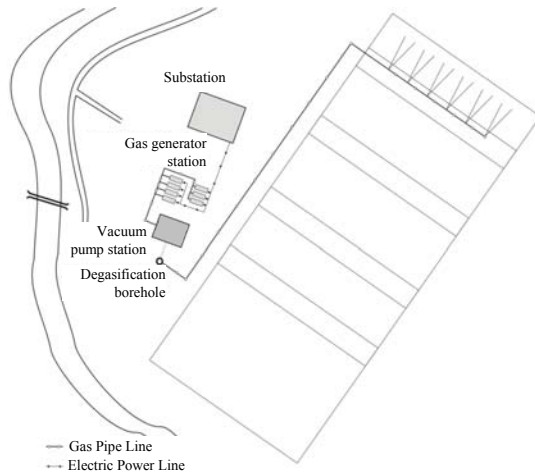
9

Planned Schedule

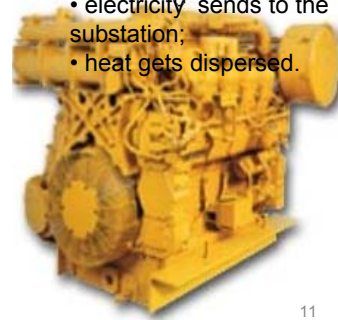
Stages	1 st month	2 nd month	3 ^d month	4 th month
Applying for technical assistance	Dark Grey	Dark Grey	Light Blue	Light Blue
Boiler manufacturing	Dark Grey	Dark Grey	Dark Grey	Light Blue
Assembly work	Light Blue	Light Blue	Light Blue	Dark Grey
Personnel training	Light Blue	Light Blue	Light Blue	Dark Grey

10

Methane Utilization on “S.M Kirov Mine”



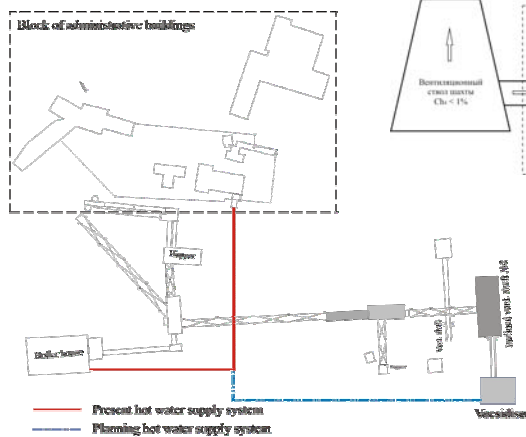
- VVN-150;
- CH₄ concentration 60-80% in the flow of 120 m³/min;
- 7 gas generators 1.021 MW_e each;
- electricity sends to the substation;
- heat gets dispersed.



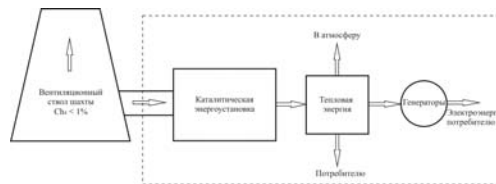
11

CMM utilization at the 7 November mine

Surface layout



Utilizing low-concentration methane in a catalytic oxidation unit



Ventilation:

- 12 mln. m³/year CH₄
- (5 mln. m³ – g/w #19;
- 3 mln. m³ – g/w #26;
- 4 mln. m³ – g/w #29)

12

Sources of income from methane utilization

- Reducing operating costs.
- Saving coal replaced by methane.
- Heat and electricity generation.
- Reduced fines for methane emissions into the atmosphere.
- Revenues from ERU sales.

13

Economic efficiency of CMM utilization projects without ERU sale

	Kirova Mine	Komsomolets Mine	7 November Mine
Investments, thousand rub.	221256.8	15475.7	98371
Payback period, years	8.2	5.68	9.11
Profitability index (PI)	0.68	1.15	0.59
NPV, thousand rubles	-58072.7	1927.3	-30748.4
IRR, %	3.8	14.2	1.7

14

Revenues from ERUs (at €6/tCO₂e)

Mine	ERU, tCO ₂ e	Income from ERU per year	
		€	Rub
Kirova	508713	3 484 300	120 207 600
7 November	167975	1 007 900	34 267 000
Komsomolets	19502	117 000	4 036 900

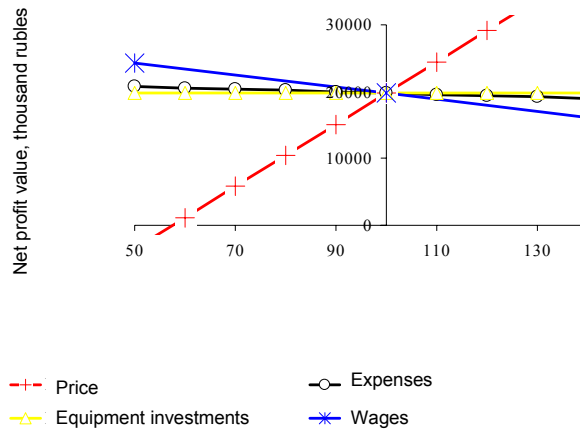
15

Economic efficiency of CMM utilization projects with ERU sales

Item	Kirova Mine	Komsomolets Mine	7 November Mine
Investments, thousand rub.	221256.8	15475.7	98371.0
Payback period, years	2.01	3.25	2.64
Profitability index (PI)	2.63	2.07	1.94
NPV, thousand rubles	292388.7	13757.9	70599.1
IRR, %	45.5	31.7	30.9

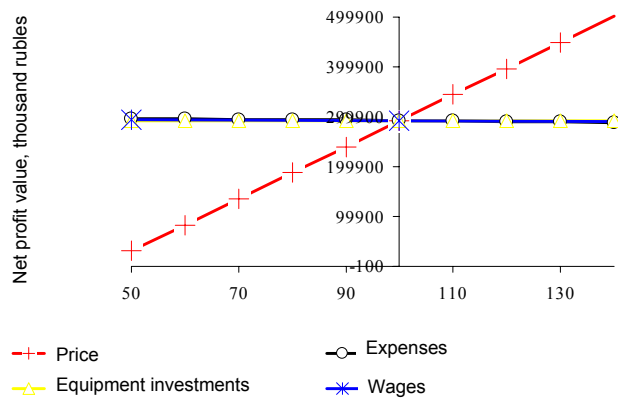
16

NPV sensitivity for the Komsomolets project, with ERU sales



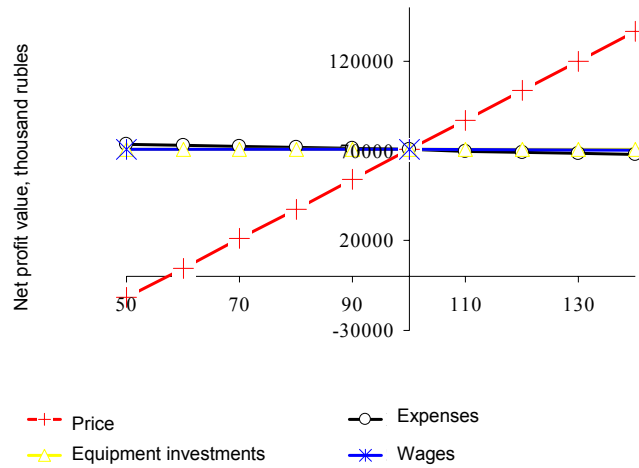
17

NPV sensitivity for the Kirova project, with ERU sales



18

NPV sensitivity for the 7 November project, with ERU sales



19

JI opportunities at the mines of OAO SUEK

20

Factors influencing definition of a baseline

- Gas content of the coal seams.
- Plan of mining activities.
- Commissioning highly productive equipment.
- Alternative options of coal seam degasification.

Methodology

Approved consolidated baseline methodology ACM0008
“Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring”

21

CH₄ sources

- Surface degas wells.
- Underground boreholes.
- Gob wells and wells drilled into the collapse dome.
- Methane extraction systems from isolated gob.
- Ventilation systems.

CO₂ sources

- Flaring methane.
- Generating electricity for methane extraction and use.

22

Determining a baseline

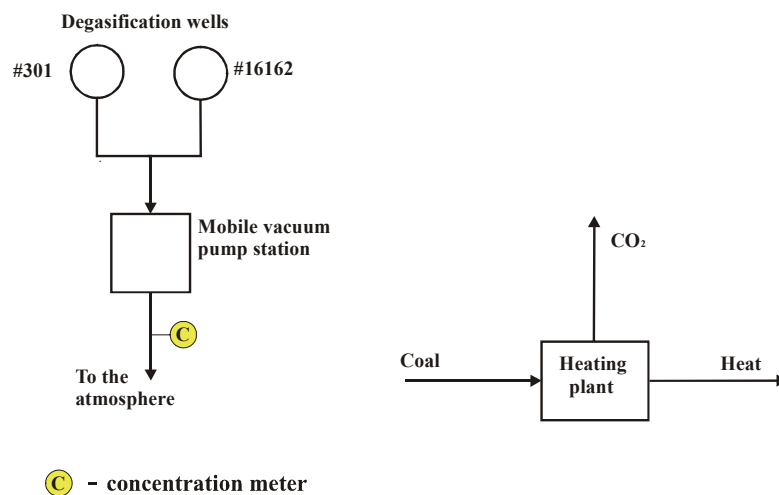
- Assessment of economic attractiveness of alternative baseline scenarios.
- **Identifying the most economically attractive baseline scenario alternative, i.e. with best IRR**

Demonstrating additionality

Economic and technological attractiveness of the baseline is higher than that of a CMM utilization project not registered as CDM/JI.

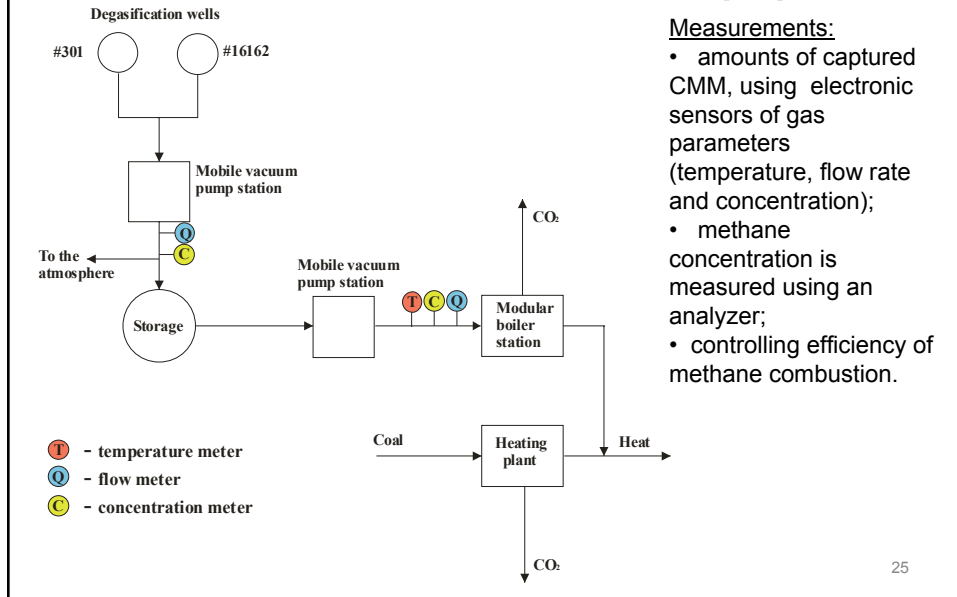
23

Example of monitoring (baseline)



24

Example of monitoring (JI)



Problems in preparation and realization of CMM utilization projects

- Possible issues with methane ownership rights.
- Low prices for gas and electricity.
- Insignificant number of mines using degasification.
- Lack of efficient drilling equipment for surface wells and underground boreholes.
- Permissions from energy companies needed to connect consumers to electricity lines, possible competition with other electricity producing companies.

GOF project
Building Capacity for Effective Implementation
of the Kyoto Protocol in the Kuznetsk Coal
Basin of the Russian Federation

- Grant awarded to Non Profit Organization International Coal and Methane Research Center - Uglemetan.
- NPO Uglemetan will support companies planning a JI project and will develop a few PINs and PDDs free of charge.

27

Contact information

WWW.UGLEMETAN.RU

OLEG TAILAKOV

tailakov@uglemetan.ru

+ 7 (3842) 281366

28