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Opportunities and Barriers for CMM Development: A Perspective from Developing Countries and Transition Economies (Part II)

Oleg Tailakov, Director, International Coal and Methane Research Center (Uglemetan)

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Overview:

- CBM Resources and CMM Emissions in Russian Coal Industry
- Technical, Economic and Institutional barriers for CMM Recovery and Utilization Development
- CMM Emissions Reduction Projects Development Potential in Russia

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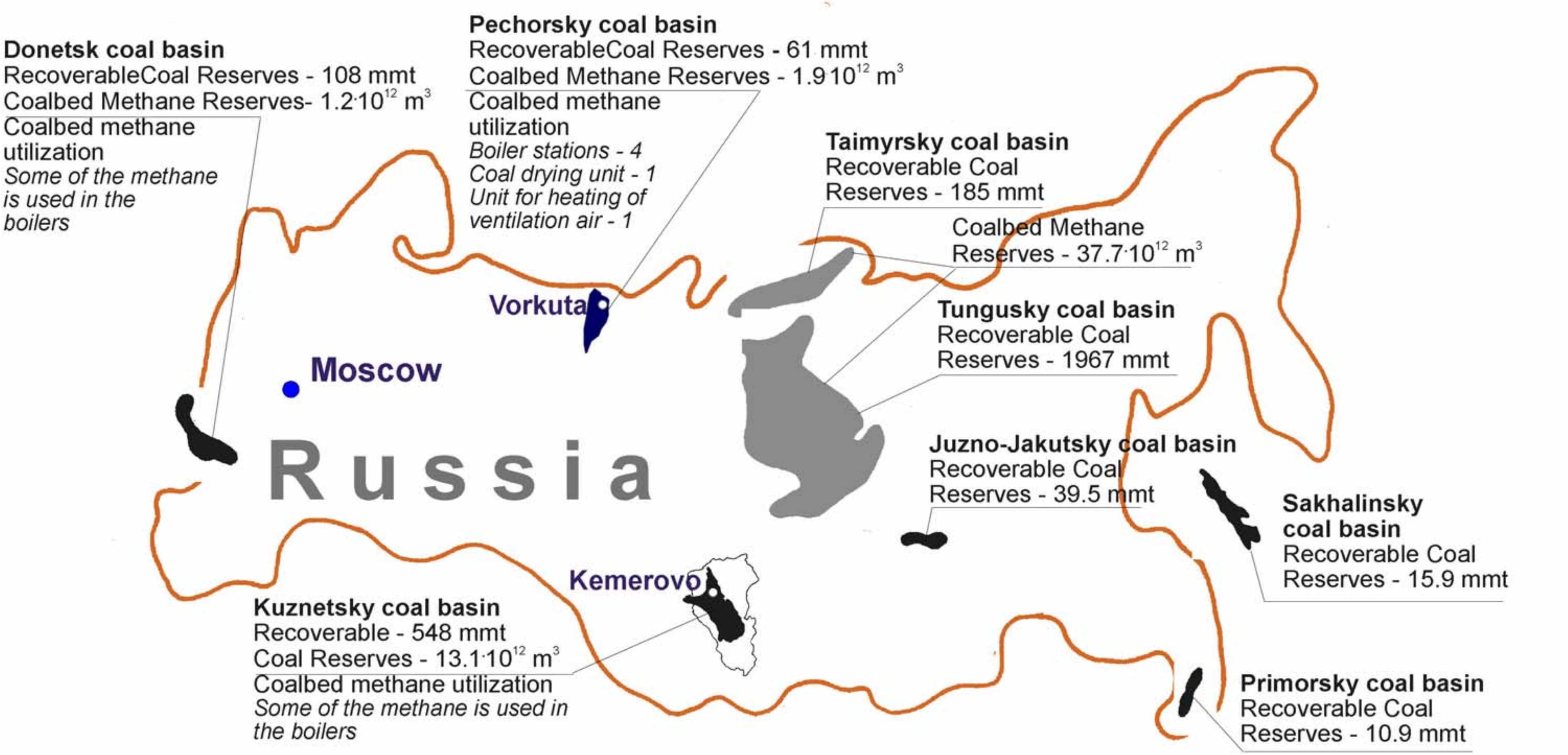
Hard Coal and Methane Deposits of Russia



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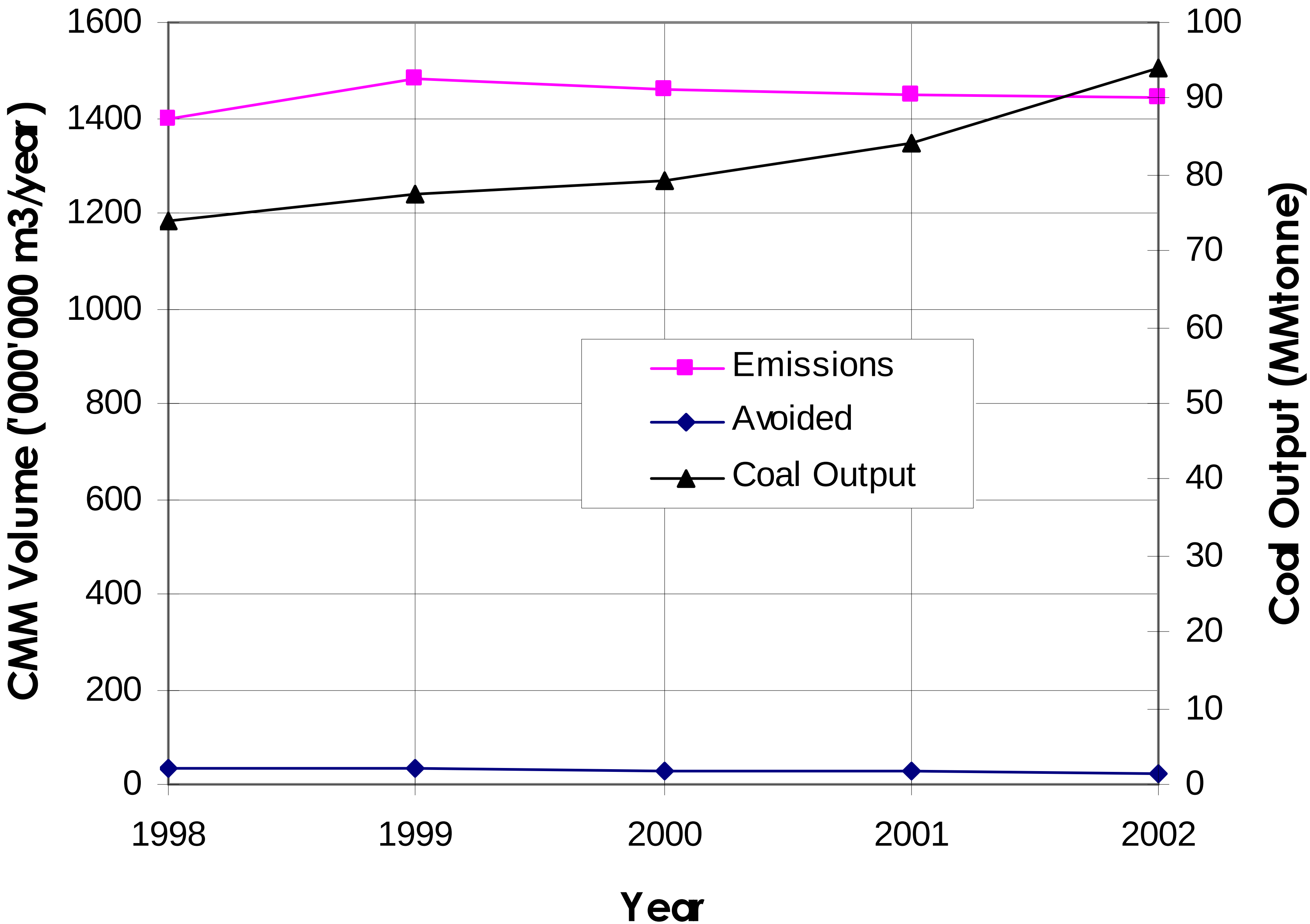
CMM Emissions in Russia



Technical barriers

- The low number of mines employing degasification
- Lack of effective modern drilling equipment for surface and horizontal boreholes
- Variability of methane concentration in methane-air mixture and the lack of equipment to maintain the assigned methane content
- Currently employed drainage systems are designed to meet mining demands - to secure mining sections’ degasification, their layout and technical parameters, but don’t consider options for coalbed methane utilization

Economic barriers

- Absence of economic incentives and legal foundation (such as tax credit for coalbed methane recovery in USA in 1982)
- Ample natural gas reserves

Institutional barriers

- Disengagement and uncoordinated action undertaken by Russian institutions in the matter of coalbed methane recovery and use
- Potential property issues
- Poor knowledge about how coalbed methane can enhance mine profitability
- In near past, Russia’s inefficient use of energy because of energy resource abundance

Factors Encouraging CMM Recovery and Utilization

- The advent of free market conditions
- Greater economic independence stimulate mines' managers to make their mines more profitable
- Preliminary degassing is required to increase coal production
- Pechora Coal Basin lacks the network of gas lines connecting the region with basic gas fields
- Fines are paid in Russia for pollutant emissions, which may be lowered by utilizing coalbed methane

Kuzbass

Market Facts

Power consumption:

Electric = 21,343 MkWh @0.58 RUR/kWh

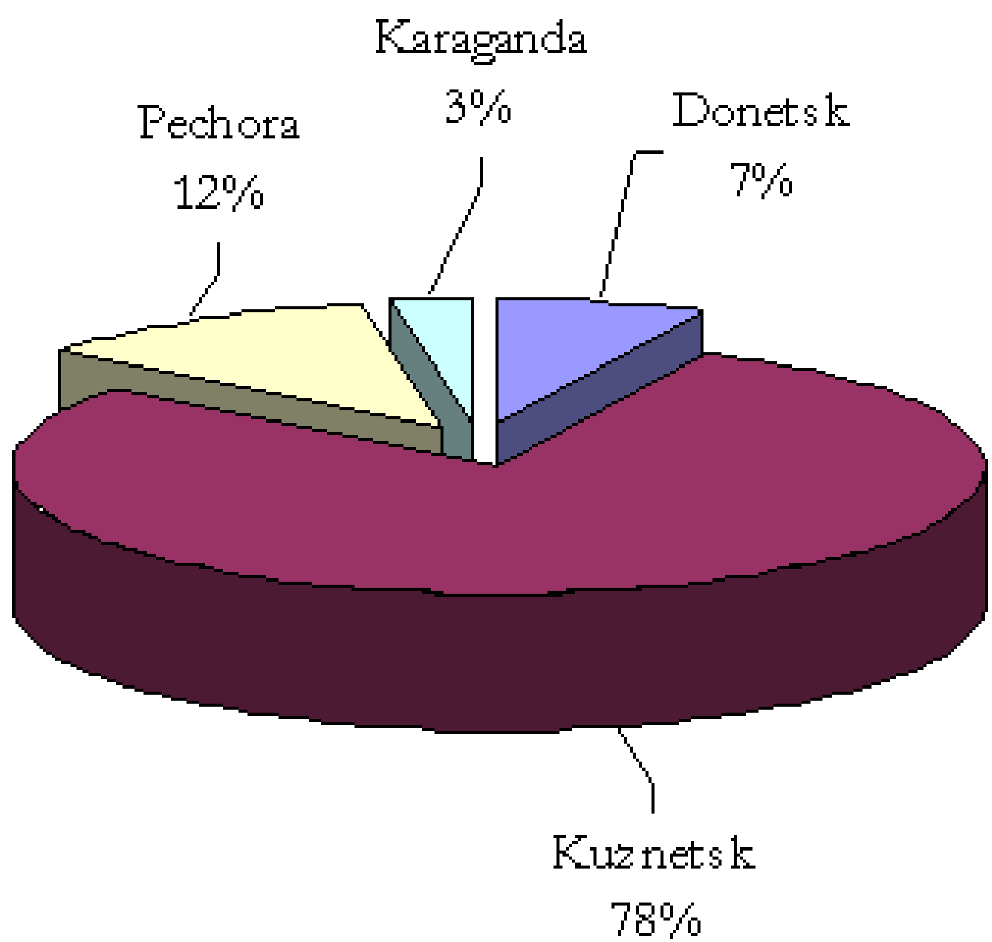
Thermal = 31,113 Tcal @266 RUR/Gcal

NG consumption = 3,010 Mm^3 @720 RUR/1,000 m^3

Exchange rate:

$1 = 28,5 RUR

CBM Resources Distribution Among Basic Coal Areas of CIS



Local Initiatives to Encourage CBM/CMM Projects

- Tax credits for:
  - Scientific research, experimental and design work related to CBM resources exploration (Law № 44-O3, Apr. 19, 2001)
  - Companies actively investing in Kemerovo region (Law № 105-O3, Nov. 19, 2001)
  - Companies receiving investments as a capital inputs in Kemerovo region (Law effectives on Jan.1, 2002)
- The overall impact of these laws for CBM/CMM projects might be a reduction of income taxes from 24 to 13.5 percent

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Komsomolets Mine Case Study

- The mine is among the prospective mines in Kuzbass, mining a high quality coking coal
- The mine is located in central-western part of Kuzbass and incorporated within a stock company SUEK
- Mine's coal field amounts to 15.5 square km
- Coal production was initiated in 1933

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CMM Removing Technologies

- Three techniques for keeping unexplosive CH4 concentration in the workings:
  - Ventilation
  - Bleeder discharge with ventilation at active workings
  - Degasification of coal seams and gob areas
- The mine released 47.90 million cubic meters of methane (32,554 tonne) in 2003

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Overall Annual Coalmine Methane Emissions

- Ventilation System: 17.18 million m3 of CH_4 (11,662 tonne) or 11,662 tCH_4 x 25 = 291,550 tCO_2-eq
- Gob Bleeder System: 9.04 million m3 of CH_4 (6,148 tonne) or 6,148 tCH_4 x 25 = 153,700 tCO_2-eq
- Degasification System: 21.68 million m3 of CH_4 (14,744 tonne) or 14,744 tCH_4 x 25 = 368,600 tCO_2-eq

Technologies

- Methane combustion in the boilers for heating the ventilation shafts in the winter time
- Running vacuum pump methane buster for coal seams degasification purposes
- Producing electricity by internal combustion engines, e.g. Caterpillar
- Flow-reversal reactors for oxidizing dilute methane in ventilation air and produce useable energy from a heat exchanger
- Using compressed coalmine methane to fuel vehicles

Analysis

Technology	Boiler	Generator (2 units x 1 MW)
Estimated project cost ($'000'000)	0.5	1.6
Estimated reductions (tCO2-eq/year)	100,475	100,475
Implementation time (months)	6	3
Cost Effectiveness ($/tCO2-eq)	1	3.2

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Emission Reduction Data

Parameters	Year		
	2003	**2005 (baseline)**	**2005 (project implementation)**
Overall Methane Emission (tones/year)	32,554	21,830	21,830
Methane Emission from Ventilation & Bleeder Systems (tones/year)	17,811	17,811	17,811
Methane Emission from Ventilation & Bleeder Systems (%)	54.7	81.6	81.6
Methane Emission from Dagasification System (tones/year)	14,743	4,019	0
Methane Emission from Dagasification System (%)	45.3	18.4	0
Utilized Methane (tones/year)	0	0	4,019
Utilized Methane (% from overall methane emission)	0	0	18.4

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Strategy

- To facilitate methane recovery and utilization projects successfully, Russian and foreign stakeholders could enter into consortium agreements with coal mining entities
- Making a joint venture on recovery and utilization of coal mine methane, as a coal mining by-product, the investor escapes the necessity for licensing a methane recovery procedure
- Get licenses on CBM resources recovery to start independent project

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UNDP/GEF Project

- Title: Russian Federation – Removing Barriers to Coal Mine Methane Recovery and Utilization started
- Beginning: 15 October 2003
- End: October 2007
- The primary area of focus: Kuzbass, further replication potential in other coal producing areas in Russia
- Goal: To mitigate greenhouse gas emissions by removing barriers to the implementation and financing of CMM utilization projects in Russia
- Main idea: To strengthen the institutional and financial framework in order to promote CMM projects and facilitate the implementation of selected demonstration projects
- Vehicle: To support the establishment of a specialized service Coal Mine Methane Recovery and Utilization Company
- Budget: $8.3 million

Successful Outcome

- For company:
  - Making profit (potential for >$100 Million revenues)
  - Enterprise development, sustainable job base
- For region:
  - New jobs (potential for > 1,100 Jobs)
  - Ecological benefits (reducing CH_4, sulfur, particulate, carbon, and NO_X)
  - Mine safety from lower methane levels

Conclusions

- CMM emissions is rapidly growing in Russia since 2000
- Main barriers for the CMM projects development are low number of mines employing degasification and poor knowledge about how coalbed methane can enhance mine profitability
- The CMM emission reduction project might cost 1-3 $/tCO2-eq versus 8-15 $/tCO2-eq in Europe

Contact Uglemetan:

WWW.UGLEMETAN.RU

Oleg Tailakov
tailakov@uglemetan.ru
+ 7 (3842) 281366

Tamara Panchisheva
contact@uglemetan.ru
+ 7 (3842) 259366

Thank you!