FUTURE OF ICE-CMMs IN RUSSIA

Genève, Switzerland
7th November 2019
### COAL RESERVES IN RUSSIA

#### World coal reserves, billion t. (2018)

<table>
<thead>
<tr>
<th>Country</th>
<th>Reserves, billion t.</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>250.2</td>
</tr>
<tr>
<td>Russia</td>
<td>160.4</td>
</tr>
<tr>
<td>Australia</td>
<td>147.4</td>
</tr>
<tr>
<td>China</td>
<td>138.8</td>
</tr>
<tr>
<td>India</td>
<td>101.4</td>
</tr>
<tr>
<td>Indonesia</td>
<td>37</td>
</tr>
<tr>
<td>Germany</td>
<td>36.1</td>
</tr>
<tr>
<td>Ukraine</td>
<td>34.4</td>
</tr>
</tbody>
</table>

#### Distribution of coal reserves in Russia

<table>
<thead>
<tr>
<th>Region of Russian Federation</th>
<th>Deposits of coal, billion t.</th>
<th>Coal production, million t.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kemerovo region</td>
<td>635</td>
<td>255,3</td>
</tr>
<tr>
<td>Krasnoyarsk region</td>
<td>630</td>
<td>29,78</td>
</tr>
<tr>
<td>Republic of Komi</td>
<td>242</td>
<td>9,9</td>
</tr>
<tr>
<td>Sakhalin region</td>
<td>47,8</td>
<td>10,5</td>
</tr>
<tr>
<td>Yakutia</td>
<td>14</td>
<td>17,8</td>
</tr>
<tr>
<td>Zabaikalsky Krai</td>
<td>2,24</td>
<td>20</td>
</tr>
<tr>
<td>Primorsky Krai</td>
<td>2,24</td>
<td>9</td>
</tr>
</tbody>
</table>


- 57 underground mines
- 119 open-pit mines
- 65 concentrating factory
- 144,000 employees (600 000 with them families)
• Total world reserves of coal methane – 260 trillion m³
• Projected reserves of coal methane in Russia – 83.7 trillion m³ or 32% from world reserves
• Methane content of coal in Russia up to 25-30 m³/t.
• Underground mine Russia - 90% gas emission rate and 80% high gas emission rate
PREDICT OF DISTRIBUTION OF METHANE OF COAL SEAMS IN RUSSIA
CBM IN RUSSIA

Average production of methane-coal wells in the world
COAL METHANE EMISSIONS

Emission of CMM – 1.7-1.9 billion m³/ per year

Utilization - 0.05 billion m³/ per year

Dynamics of CBM production by LLC «Gazprom dobycha Kuznetsk» in Kuzbass, million m³/ per year

- CBM production – 4 million m³/ per year
- Increase up to 18-21 million m³/ per year
ENERGY WEEK 2019 (MOSCOW, RUSSIA)

DIRECTIONS OF DEVELOPMENT RUSSIAN ENERGY SECTOR

- Adaptation to new pricing trends in international oil markets
- Cooperation between fuel and energy companies with military-industrial complex for import substitution and technological development
- **Environmental security of the energy market.**
- Digital transformation of the industry
- **The development of the coal mining market**
- The development nuclear energy
PREDICT OF EXPORT OF RUSSIAN COAL

Export of Russian coal, mil. t.

Direction of export of Russian coal, mil. t.

- To West
- To East
1. Safety
2. Effective mining
3. Environmental mining
DYNAMICS OF ACCIDENTS ASSOCIATED WITH COAL METHANE
CREATION OF ICE CMM IN RUSSIA

“Center of problems of methane and gas-dynamic phenomena of coal and ore deposits”
Founded on 17th May 2018

Lab. 2.1 Physico-chemical and thermodynamic processes in rocks
Lab. 2.2 Geodynamic and gas-dynamic processes in the development of coal and ore deposits
Lab. 2.3 Geotechnological risks in the development of gas-bearing coal and ore deposits

Employees – 25: 8 – Dr., Prof.; 9 – Ph.D.; 8 – engineers;
PRIORITY TASKS AND AIM OF ICE-CMM IN RUSSIA

• Research and development CBM, CMM, AMM technologies for increase the volume of mine methane extraction at all stages of the life cycle of the coal-methane field
• Development of methods of extraction of useful gas-air mixtures suitable for utilization, including in gas-piston / gas-turbine engine plants for produce electric and thermal energy for the needs of mining enterprises
• Development of methods for increase the use of methane captured in mines for local industry and housing
• Formation of conditions for reducing the volume of coal methane pollution into the atmosphere
• Creation and development of methods of cleaning CMM, extracting methane from it and obtaining LNG or compressed methane as a commercial product.
• Research and organizational activities to form a new resource-producing industry of the Russian Federation.
INTERNATIONAL COOPERATION

COMPREHENSIVE SCIENTIFIC AND TECHNICAL PROGRAM
«Methane safety and energy efficiency in the development of coal-gas deposits»

847338 – DD-MET – RFCS2018
«Advanced methane drainage strategy employing underground directional drilling technology for major risk prevention and greenhouse gases emission mitigation»
Thank you for your attention!