The Economics of Successful CMM Project Development

Workshop on Best Practices in Coal Mine Methane Capture and Utilisation
3rd International Coal Conference
Ukrainian Coal Mining Industry in the Times of Decarbonisation

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CMM projects can be attractive investment opportunities

- Only 2 emission pathways: ventilation shafts and degasification wells
- End use technologies proven in the field
- Emissions and emission reductions can be verified
- Manageable scope
- Project design can be replicated at mines with similar conditions
Many factors influence project success

- Gas availability
- Mine plan
- Market access and pricing
- Policy incentives and barriers
- Project structuring
- Capex and Opex
- Financing availability and costs
- CMM project
CMM Utilization Project Development

CMM Developer

- Investor/Active Participant
- CBM/CMM Dominant Estate
- Motivated by Gas Production
- Borehole Placement to Produce Gas as Long as Possible
- CBM/CMM Development Across Entire Property
- CBM/CMM Development Only if Economically Possible

Coal Operator

- Lessor/Passive Participation
- Coal – Dominant Estate
- Motivated by Improved Coal Production
- Desires Degas Plan with Minimal Impact to Mining Operations
- CMM Drainage May be Required Regardless of Economics of Recovery
- Prefers Surface Drainage
CMM Project Economics

- Project Plan
- Project Financing
- Research and Feasibility
- Risks
- Projected Cash Flow
Important considerations

- Define project scope – surface project only or are subsurface improvements added?
- Appropriately size project
- International vs locally produced equipment
- How is cost of gas supplied to the project accounted for?
- Include cost of spares, warranties, replacement
- Adjustments relating to weather, altitude, political climate, and other factors
- Robust investment-grade financial model
Important considerations

- Use conservative assumptions
  - Costs
  - Revenue sources – avoid “hockey stick” revenue projections
  - Escalators
  - Realistic contingencies

- Taxes, permits and other fees

- Identify, and potentially, quantify risks

- Allocate costs, revenue, profit and distributions consistent with project structure
Optimize plant capacity

Source: Sindicatum Sustainable Resources
Including subsurface improvements may improve economics in some cases

Source: Pre-Feasibility Study for Methane Drainage and Utilization at the TengHui Coal Mine, Shanxi Province, China, May 2019
Project and deal structuring

- **MineCo Shareholders**
  - $\rightarrow$ MineCo
  - $\rightarrow$ CMM Project

- **MineCo**
  - $\leftarrow$ MineCo Shareholders
  - $$$$\rightarrow$ CMM Project
  - $\rightarrow$ Supplier

- **Developer**
  - $\rightarrow$ Investors
  - $\rightarrow$ CMM Project

- **Investors**
  - $\rightarrow$ Developer
  - $\rightarrow$ Supplier

- **Supplier**
  - $\rightarrow$ Developer

- **Gas & Site Access**
  - $\leftarrow$ MineCo
  - $$$$\rightarrow$ CMM Project
Sources of CMM Project Finance

- Self-Finance
- Vendor financing
- Forward Purchase
- Debt
- Equity
# Project Risks and risk assessment tools

<table>
<thead>
<tr>
<th>Project Development Risks</th>
<th>Construction and Operations Risks</th>
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<tbody>
<tr>
<td>• Inability to obtain agreements with mining company and adjacent land owners. (Legal)</td>
<td>• Construction cost overruns or delays in construction completion. (Installation)</td>
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<tr>
<td>• Indications of marginal gas resource (such as gas quality, rate of flow, and longevity). (Resource)</td>
<td>• Poor gas productivity (such as flow rate, reliability, and quality). (Resource)</td>
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<tr>
<td>• Inability to negotiate energy sale agreements. (Commercial)</td>
<td>• Technological risk (poor system performance). (Operational)</td>
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<tr>
<td>• Inability to obtain permits. (Legal)</td>
<td>• Market risk (drop in revenues due to price changes). (Commercial)</td>
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<tr>
<td>• Insufficient development capital. (Financial)</td>
<td>• Contractual/legal problems with customers, mine owner/ operator, system suppliers, or regulatory agencies. (Legal)</td>
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<tr>
<td>• Inability to secure financing. (Financing)</td>
<td>• Mine closing or change in mining plan, causing stranded investment. (Resource)</td>
</tr>
</tbody>
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Integrated approach

Source: UNECE. Best Practice Guidance for Effective Methane Drainage and Use in Coal Mines (2016)
Conclusions

- CMM/AMM projects can be attractive investments
- A financially successful CMM/AMM project depends on many factors
- A profitable project can very quickly become unprofitable without effective planning and execution
- Thorough due diligence and a conservative approach will improve the odds for success
- Creative structuring and financing of the project can mitigate risks and effectively allocate rewards of a project
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