Getting it Right:
Policies that Provide a Solid Foundation for the Development of CMM/AMM and VAM Projects

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Coal Mine Methane as a Valuable Energy Resource
XXVIII School of Underground Mining

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Outline

▪ Range of policy options for Coal Mine Methane (CMM): ownership rights, incentives and carbon policy

▪ Policies for VAM (Ventilation air methane) and AMM (Abandoned Mine Methane)

▪ Two country examples

▪ Conclusions
Policy is Important to Address Growth in Emissions

- CMM emissions follow the coal production
- AMM emissions grow even if coal production and CMM decline

Source: Model for Calculating Coal Methane (MC2M) emissions; Preliminary data
Range of Policy Options

- Less supportive enabling conditions require more policy support for to make CMM projects feasible

**MORE TARGETED POLICY SUPPORT NEEDED**

- Specific CMM policies
  - Subsidies
  - Feed-in tariffs and obligations
  - Tax incentives
  - Environmental taxes

**LESS TARGETED POLICY SUPPORT NEEDED**

- Underlying policy framework and conditions
  - Strict safety requirements and implementation
  - Access to energy markets
  - Cost-reflective prices for natural gas and electricity
  - Clearly defined property rights
  - Composition of gas flows
  - Mine gassiness
The Importance of Clear Rights in CMM/AMM Utilization

- Ownership is a form of incentive for CMM
  - Poorly defined ownership and leasing rights can create conflicts and obstacles to utilization

- Clear rights reduce uncertainty, risks and costs
  - Basis for producing and selling CMM-based electricity
  - Clear rights is key to multi-party projects
Incentives Can Speed Project Implementation

Examples:
- Carbon price
- Feed-in tariff (FIT)
- Reduced taxes or royalties

Illustrative example:
Impact of carbon price and FIT on project economics
VAM Projects Have Specific Policy Needs

- Majority of CMM is VAM (60~70% of CMM emissions)
- At least 6 projects in Australia, China and the U.S.
- Projects usually not self-financing from energy
- Carbon price or offsets are important (only one known project did not use carbon credits)
- Permitting rules affected initial VAM timelines and costs

Blue Creek Mine #4 Mine, Alabama, USA 2009-2013

Marshall County Mine, West Virginia, USA First commercial-scale project, commissioned in 2012
Key AMM Policy Actions for Success

▪ Enact clear procedures for obtaining AMM ownership rights
▪ Allow for transfer of methane rights from the mine to the gas developer
▪ Set royalties at a low level to encourage investments
▪ Offer reduced taxes or other incentives to support AMM projects
▪ Consider including AMM as a renewable energy resource

Based on draft paper on AMM policies, scheduled for release later this year
## AMM Case Studies: Key Findings

<table>
<thead>
<tr>
<th>Country</th>
<th>AMM utiliz. rate</th>
<th>Royalties</th>
<th>Key Policies</th>
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</table>
| Germany | 99%              | 10%       | • Clear gas rights and licensing process  
          |                  |           | • Feed-in tariffs/market premium for AMM |
| UK      | 58%              | Taxes instead | • Clear rights and licensing procedures  
          |                  |           | • Fairly high taxes  
          |                  |           | • AMM exempted from climate change levy |
| Australia | 31%              | 10%       | • AMM is not defined as a resource  
               |                  |           | • Flaring is prohibited |
| US      | 29%              | 12.5%     | • Royalty relief (some states)  
          |                  |           | • AMM in Renewable Portfolio Standards (some states)  
          |                  |           | • Carbon offsets |

Based on draft paper on AMM policies, scheduled for release later this year
Case Study 1: Germany

- Rights to CMM are provided to coal companies
- Feed-in-tariff (and later market premium incentives) for CMM and AMM
  - Primary factor driving active project development
- As of December 2017, active AMM projects utilized up to 99% of AMM
Case Study 2: Ukraine

- Variable tax policies: royalties
  - 29% of royalty tax for CMM capture (July 2016)
  - Revenues (savings) from CMM utilization became taxable
  - Mines stopped flaring
  - CMM utilization decreased by one third

- Tax Code was amended in December 2017
  - No royalty tax
  - No income tax by 2020
  - Penalties for venting have been increased

<table>
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<tr>
<th>Year</th>
<th>Royalty</th>
<th>CMM Utilization</th>
<th>Flaring</th>
<th>Venting</th>
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<tbody>
<tr>
<td>2016-2017</td>
<td>2016</td>
<td>Down</td>
<td>Down</td>
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<td>2018</td>
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Conclusions

▪ AMM /CMM emissions will likely grow in the future
▪ Countries use a mix of policy instruments to encourage coal methane projects
▪ Clearly defined property rights reduce risks
▪ Projects can be profitable but incentives are important
▪ Consistent policies are critical to project success
Thanks and Contact Information

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Backup slides
Australia

- Each state sets its own regulation
- Companies should apply for a petroleum title
- Royalty rate is 10%
- Australia utilizes 31% AMM emissions

Mining Act 1992 (New South Wales)
Mineral Resources Act 1989 (Queensland)

Gas Electricity Certificate scheme (Queensland)

- Gas Electricity Certificate scheme repealed
- Carbon pricing eliminated

AMM emissions, kt

Carbon pricing mechanism
Germany

- **Policy is important!**

- Germany utilizes 99% of AMM
United Kingdom

- Clear defined property rights
  - Petroleum Act of 1998
  - License fees are relatively low
- Little tax incentive for AMM
- No royalties for extracting AMM

- AMM utilization rate is about 60%
United States

- No federal incentives
- Some states provide royalty relief
- Some states included AMM in Renewable Portfolio Standards
United States: AMM projects

- Illinois: 6 AMM projects
  - Illinois Renewable Energy Requirement Initiative, 2004
- Indiana: 1 AMM project
  - Clean Energy Portfolio Standard, 2011
- Ohio: 1 AMM project
- Pennsylvania: 2 AMM projects
  - Alternative Energy Portfolio Standard, 2004
- Virginia: 6 AMM projects
- West Virginia: 6 AMM projects
  - Alternative Energy Standard, 2009
  - Clean Energy Portfolio Standard, 2012
- Colorado: 1 AMM project
  - Colorado Renewable Energy Requirement Initiative, 2004
- Alabama: 1 AMM project