A Case Study on Coal Mine Methane Policies in Kazakhstan

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Focus on Coal Mine Methane and Policies

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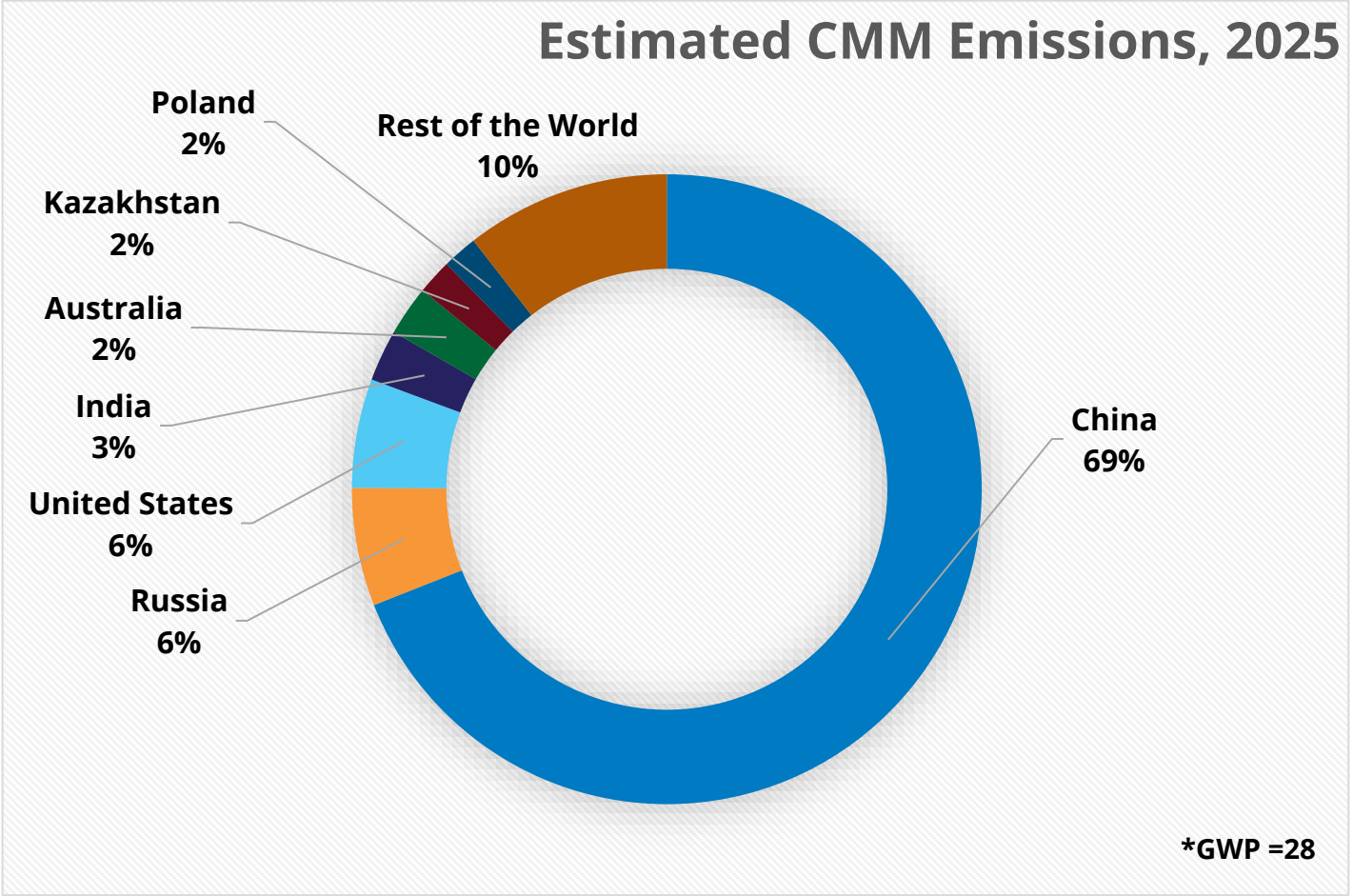
- Kazakhstan is a top-ten coal producer and methane emitter from coal mines.
- Addressing coal mine methane (CMM) is important for the country's decarbonization.
- Kazakhstan has experience in CMM capture and utilization, and stronger policy support could scale up mitigation projects.



REFERENCE: U.S. Environmental Protection Agency. (2019). Global Non-CO_2 Greenhouse Gas Emission Projections & Mitigation: 2015 - 2050. U.S. Environmental Protection Agency, Office of Air & Radiation. EPA 430-R-19-010, October 2019

GMI's Technical Engagement in Kazakhstan

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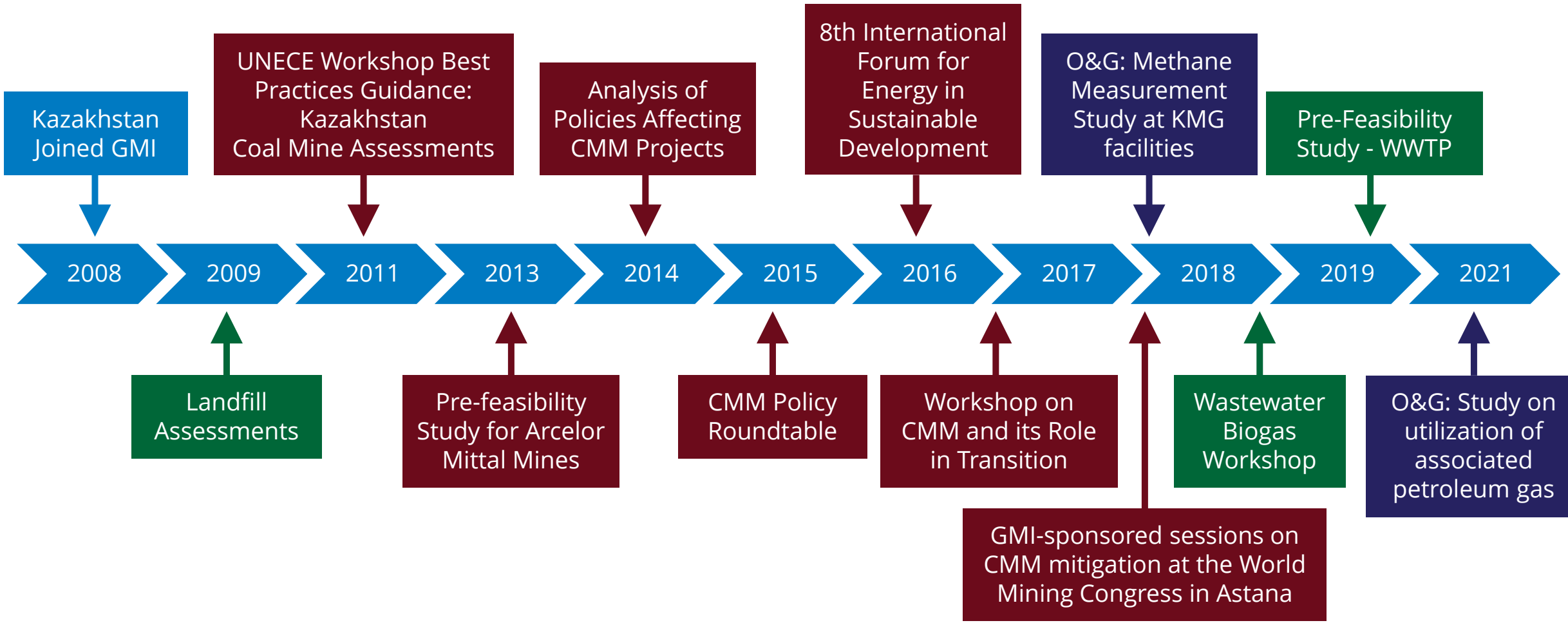


The Role of Policy in Methane Mitigation

- Policy defines the playing field, creating a tipping point for the feasibility of CMM capture and use projects:
  - In several countries (e.g., Australia, Germany, Poland, UK, and China), the introduction of policies supporting CMM has led to the implementation of more projects.
- Providing targeted policy support can, in some cases, incentivize and facilitate the feasibility of CMM projects, even if initial geophysical conditions are less than optimal, such as those related to:
  - gas content of mined coal,
  - method and rate of mining,
  - availability of natural gas pipeline infrastructure, or
  - effectiveness of ventilation and drainage system design.

The Role of Policy in Methane Mitigation (continued)

- Policy conditions that can impact CMM project feasibility include:
  - Strict safety requirements and their implementation
  - Effective policies on measurement, reporting, and verification (MRV) of methane
  - Cost-reflective prices for natural gas and electricity (vs. subsidized energy costs)
  - Access to energy markets

- Targeted policies/measures that impact project feasibility include:
  - Strong institutional support for CMM
  - Clearly defined gas ownership rights to CMM and abandoned mine methane (AMM)
  - Environmental policies, such as carbon tax or cap-and-trade
  - Feed-in tariffs and obligations
  - Tax incentives (e.g., relief from royalties on CMM)

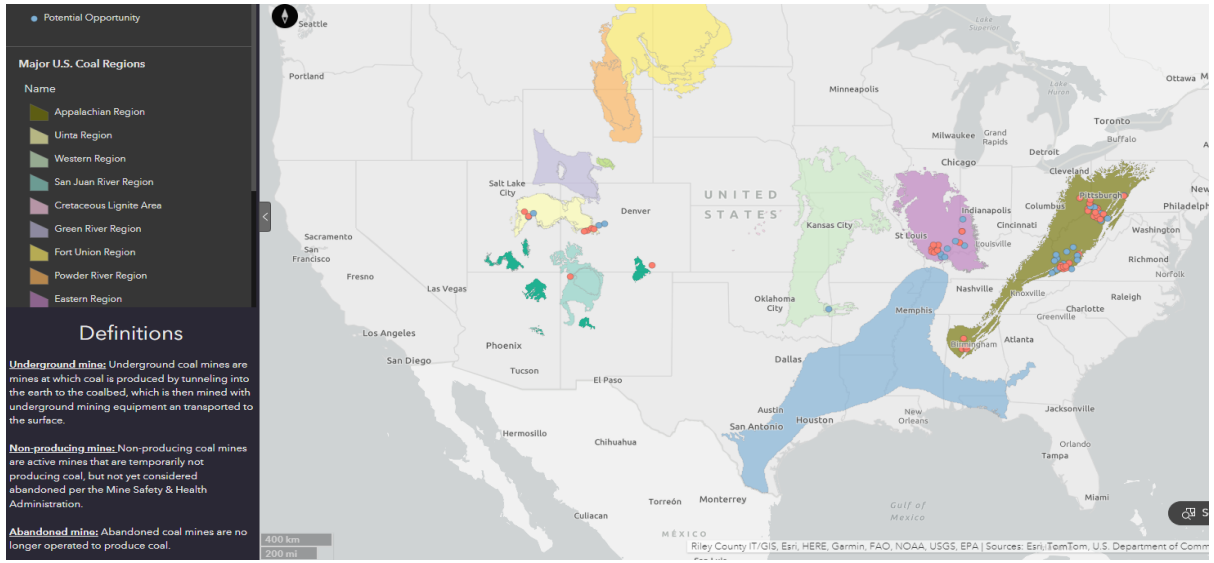
Safety Regulations and Methane Mitigation

- Strong implementation of safety requirements boosts CMM projects, as coal mines would be motivated to have better drainage and ventilation systems, but also investors generally will not consider projects at mines with unsafe conditions:
  - ***Australia***'s CMM development was driven by safety concerns.
  - In ***China***, incentivizing CMM was viewed as a way to improve mine safety and implementation of safety rules.
- The case of Kazakhstan:
  - Detailed/prescriptive safety and degasification procedures; strong structure for oversight of safety; and improvement targets.
  - Considerations: Many industrialized countries have a risk-based approach to safety: focus on safety principles, ease of implementation, and achieving results (safety).

MRV and Methane Mitigation

- Effective mine-based MRV systems incentivize CMM projects, as measured data on mitigatable methane in coal mines is available to project developers.
  - In the **United States**, gassy underground coal mines report emissions to the U.S. Environmental Protection Agency (EPA), calculating it based on measurements collected for safety. Data become publicly available. EPA prepares maps that show existing projects and opportunities, which helps project developers do an initial screen of opportunities.

- The case of Kazakhstan:
  - Methane concentration is measured for safety in underground coal mines.
  - <u>Considerations</u>: Emissions can be estimated using measured methane concentrations x flow volume. Information on recovered methane vs non-recovered methane can be available to stakeholders and the public.



Strong Institutional Support for CMM Mitigation

- A central/regional body with authority to bring stakeholders together, offer resources, disseminate best practices, answer questions, and address barriers:
  - ***China:*** CMM Clearinghouse; International Center for Excellence in Coal Mine Methane.
  - ***Australia:*** National programs provide grants and support research on deploying newer technologies to reduce GHG emissions.
  - ***United States***: Coalbed Methane Outreach Program (CMOP) provides informational resources. CMOP supported a technology demonstration project in collaboration with other U.S. agencies that resulted in first Ventilation Air Methane (VAM) project. Now: Department of Energy offers grants for VAM technology R&D.
- The case of Kazakhstan:
  - Strong expertise in the government on coal mines and methane issues.
  - Considerations: Increase visibility (online presence) of resources available for CMM mitigation, build capacity to offer resources, promote dialogue, and identify issues and solutions.

Clearly Defined Gas Ownership Rights

- Clear rights to owning (leasing) CMM reduces uncertainty, conflicts, risks, and costs:
  - ***Australia:*** CMM is owned by states; in New South Wales, a coal lessee may apply for inclusion of petroleum or gas. If CMM rights are refused, the government auctions them off.
  - ***Germany:*** CMM ownership rights are automatically transferred to a coal mining company for the duration of the coal mine lease, provided there are plans for a CMM project.

- The case of Kazakhstan:
  - Arcelor Mittal owns rights to methane from its coal mines.
  - Considerations: Clear rights and procedures for transfer are key to multi-party projects; right to methane from closed mines could be further clarified.

Environmental Policies

- Environmental policies, such as carbon pricing through taxation or cap-and-trade:
  - ***UK:*** CMM-based power became exempt from Climate Change Levy. Under the 2002 Finance Act, CMM is defined as an exempt renewable because of environmental and employment benefits.
  - ***United States/Canada:*** The State of California and the Province of Quebec both have cap-and-trade systems that allow offset credits from CMM/AMM projects. Both jurisdictions issued methodologies for accounting emission reductions from CMM projects. Additionally, the two systems are linked, and offset credits issued by one jurisdiction can be used to meet compliance obligations within the other.
- The case of Kazakhstan:
  - Environmental taxation legislation is in place.
  - Considerations: Include CMM mitigation in planned environmental policies; prepare for potential international markets under Article 6 of the Paris Agreement.

Feed-in Tariffs and Obligations

- Feed-in tariffs and obligations can help create a market for CMM-based energy:
  - ***United States:*** State-level requirements for retail electricity providers to provide a share of their electricity supply from "alternative" energy.
  - ***Germany:*** A 20-year fixed payback tariff for electricity produced from pre-approved CMM and AMM projects (regulatory stability is important!).
  - ***Poland:*** In early 2010, utilities were obligated to purchase a % of electricity from highly efficient cogeneration, like CMM (Purple Certificates).
  - ***China:*** Province-level feed-in tariff of 0.25 yuan/kWh ($0.04/kWh).
- The case of Kazakhstan:
  - Experience with feed-in tariffs and obligations for other types of alternative/renewable energy.
  - Considerations: Inclusion of CMM-based energy into existing incentive schemes would boost utilization.

Tax Incentives

- Tax incentives: reduced/removed royalties and/or taxes on production, income, or capital purchase:
  - ***United States:*** Before 2002, income tax credit- $1 per 1.06 GJ of CMM.
  - ***Germany***: CMM-based energy is exempt from local taxes and royalties.
  - ***China:*** Several tax rebates were introduced to encourage CMM, such as exemption from royalties, VAT on CMM/CBM sale, and income tax.
- The case of Kazakhstan:
  - No known tax incentives; consider such incentives and a clear implementation mechanism.

Conclusions

- Countries where CMM capture and use/destruction have been successful created a favorable regulatory environment to achieve results, such as:
  - ✓ Safety regulations are in line with best practices and are comprehensively implemented.
  - ✓ MRV systems are providing mine-level data.
  - ✓ A central/regional body provides resources to interested stakeholders.
  - ✓ Rights to ownership (leasing) of CMM/AMM and procedures for their transfer are clear.
  - ✓ Environmental policies create incentives for CMM.
  - ✓ Financial incentives are available through feed-in tariffs and obligations.
  - ✓ Tax incentives are in place to increase financial feasibility of potential projects.

Thank you!

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Appendix

Sources of Coal Mine Methane

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- Underground mines



- Abandoned mines


- Surface mines

Technologies and Practices for Methane Capture and Use/Destruction at Coal Mines

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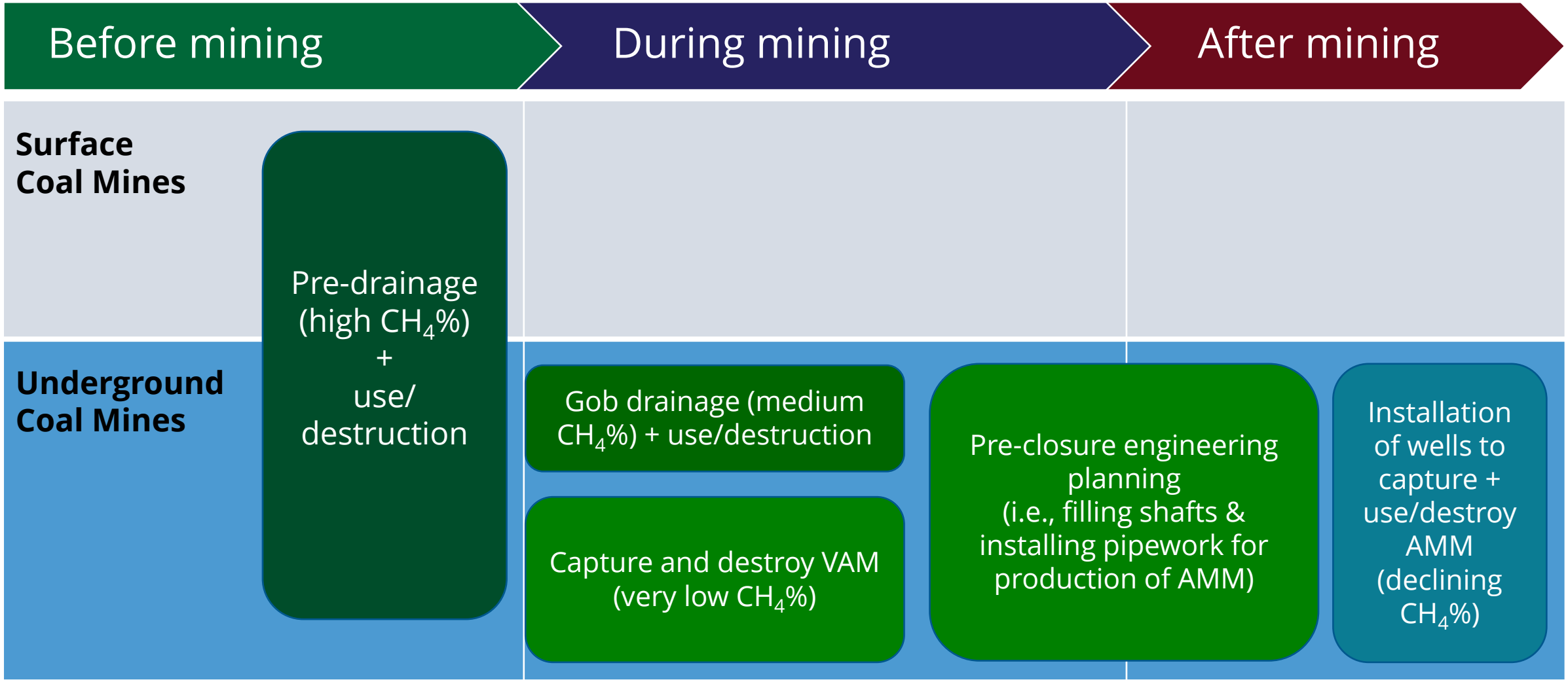

Commercially Demonstrated Options for Use of CMM

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Flaring

Abandoned Mine Methane Flare
Colorado, USA

Chemical Feedstock

Methanol Production Plant

VAM Oxidation

VAM destruction plant with 25 MW steam turbine to generate electricity
Working Mine, Yangquan, Shanxi, China

Power Generation w/ Internal Combustion (IC) Engines

Gas-fired Generator – Working Mine, Pingdingshan, China

Industrial Use

Industrial Burner at a Fertilizer Plant
Shanxi Province, China

Cooling

Working Mine
Upper Silesian Basin, Poland

Regional and Export Gas Sales

Gas Conditioning & Upgrading System for Gas Pipeline Sales
Abandoned Mine, Illinois, USA

Gas-fired Turbine Power Plant

Working Mine
Virginia, USA

Combined Heat & Power w/ IC Engines

Transportation Fuel

CNG Refueling Station for Taxis
China

Resources Available for Mitigation

Pre-feasibility studies:

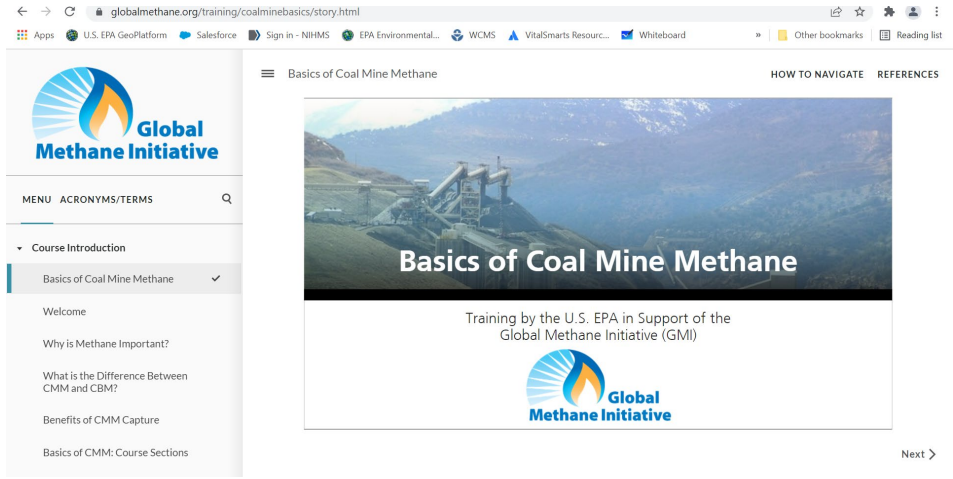
- Over 50 studies in 11 countries, including Kazakhstan

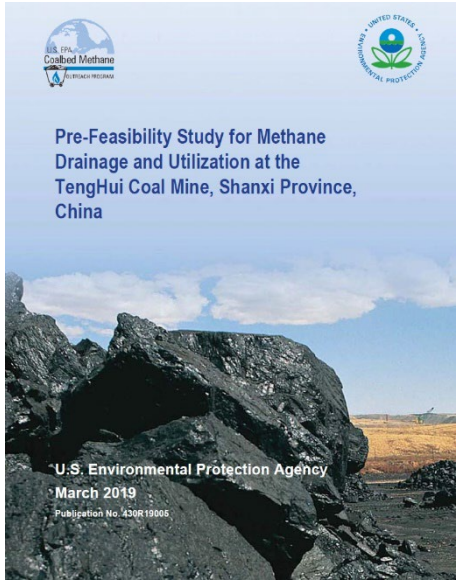
Online trainings:

- Basics of CMM
- Conducting Pre-Feasibility Studies for CMM Projects
- Conducting Pre-Feasibility Studies for AMM Projects

Other tools and resources:

- Available on GMI website: Resource Library





Joint GMI/UNECE Resources

Three Best Practice Guidance reports:

- Best Practice Guidance on Effective Methane Drainage and Use in Coal Mines (2010 and 2016 editions)
- Best Practice Guidance for Effective Methane Recovery and Use from Abandoned Coal Mines (2019)
- Best Practice Guidance for Effective Management of Coal Mine Methane at National Level: Monitoring, Reporting, Verification and Mitigation (2022)