

Global Project Scale and Emissions

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The Coal Industry and CMM Emissions

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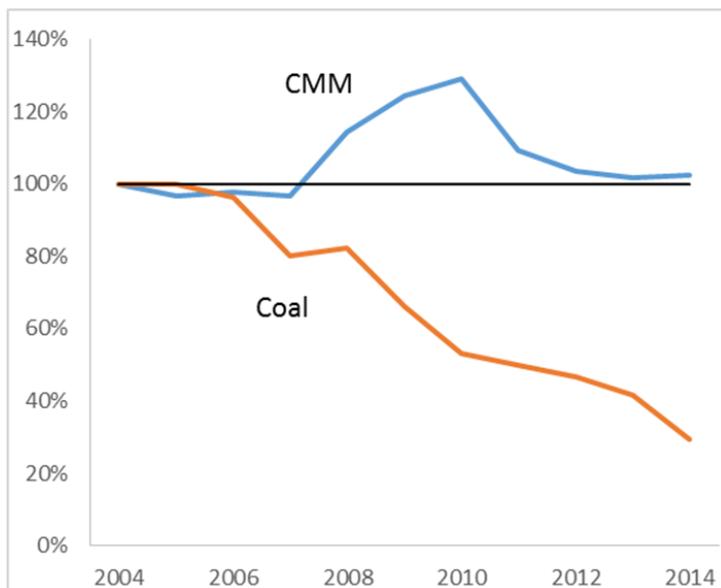
Introduction: CMM Emissions and Coal Production

- Country data show flat or declining coal production, while CMM emissions remain large
 - Examples of Poland and Germany
- Future CMM emissions depend on coal production scenario, but AMM continues in all scenarios
- Scale of CMM or AMM emissions is large
- It is possible to capture and utilize fairly significant amounts of methane emissions from mining activities

Underground Coal Production and CMM Emissions, 2004-2014

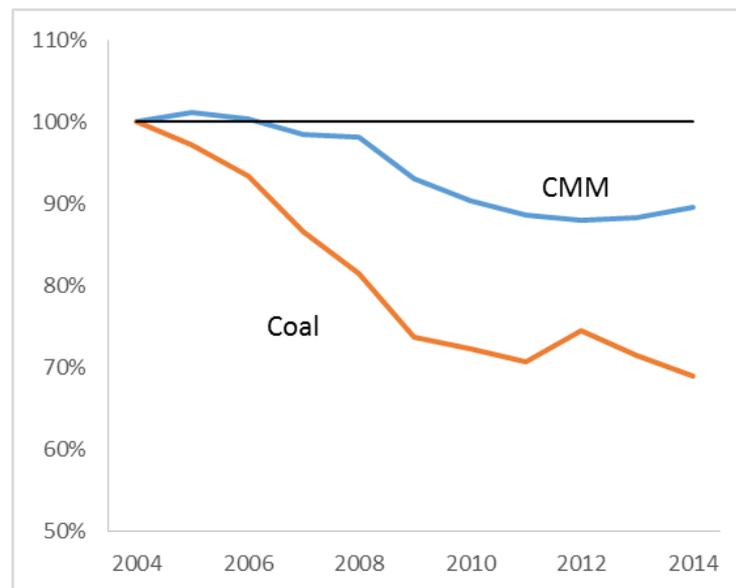
Germany

- Production fell by 70%
- CMM emissions in 2014 at the same level as in 2004



Poland

- Production fell by 31%
- CMM emissions decreased by 10%



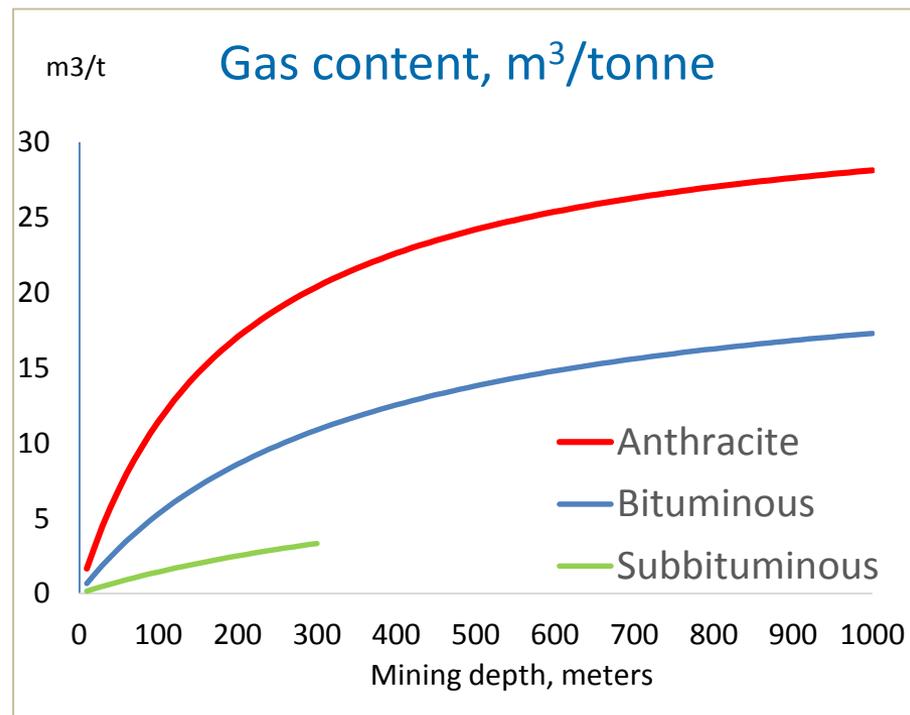
Analysis of Future CMM and AMM: Methodology

CMM

- Use projections of coal production in the reference and policy scenarios
- Split by underground and surface coal
- Estimate the rate of change in mining depth
- Use emission factors which depend on depths and coal rank
- Adjust for the difference between emissions and gas content

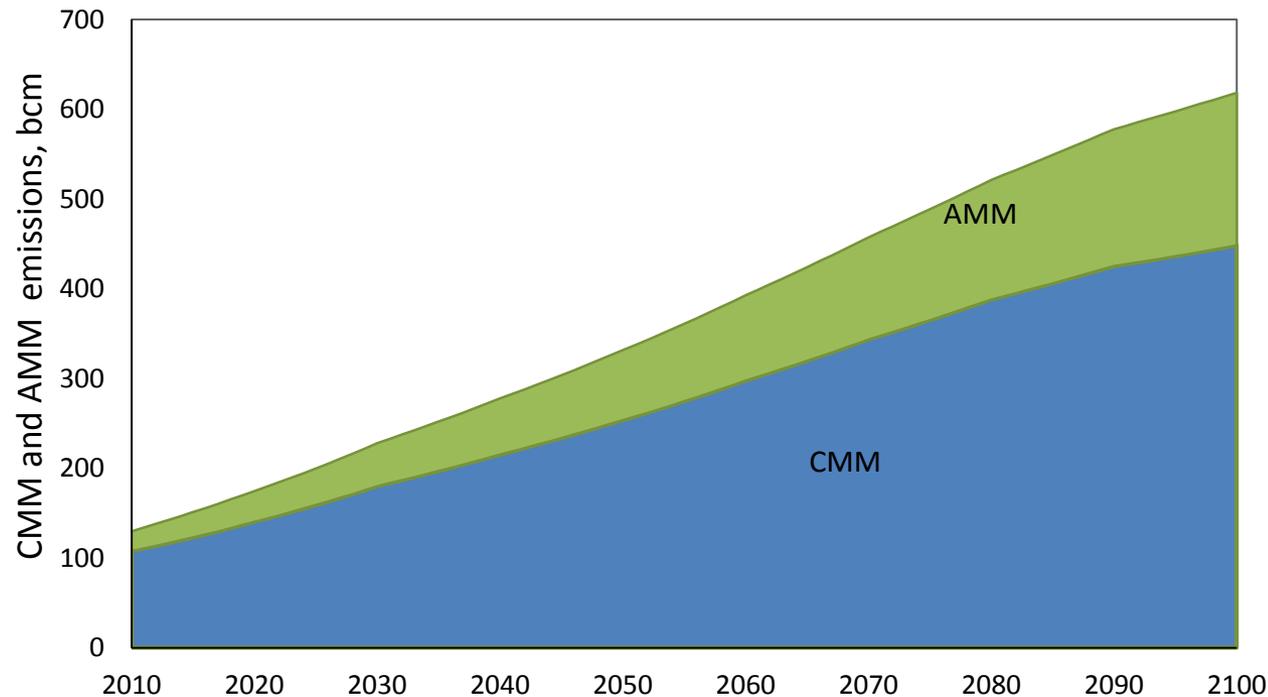
AMM

- Calculate the global average coal abandonment rate
- Make assumptions on the decline rates in emissions over time
- Account for emissions from mines abandoned in the past



CMM Emissions are Expected to Increase

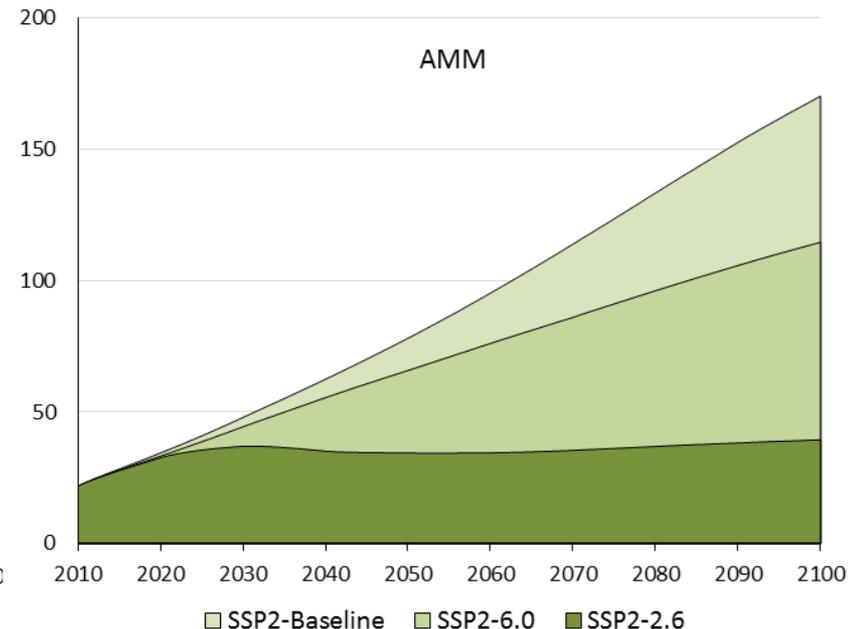
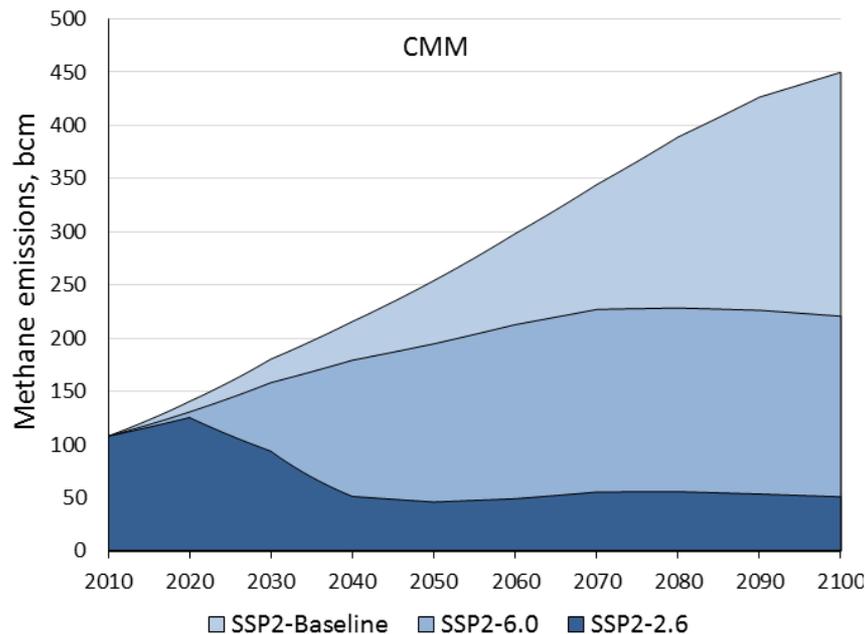
- CMM emissions will increase 2.4 times by 2050; 4.2 times by 2100 (SSP2-Baseline scenario)
- AMM emissions increase faster than CMM; remain significant by the end of the century regardless of future coal production



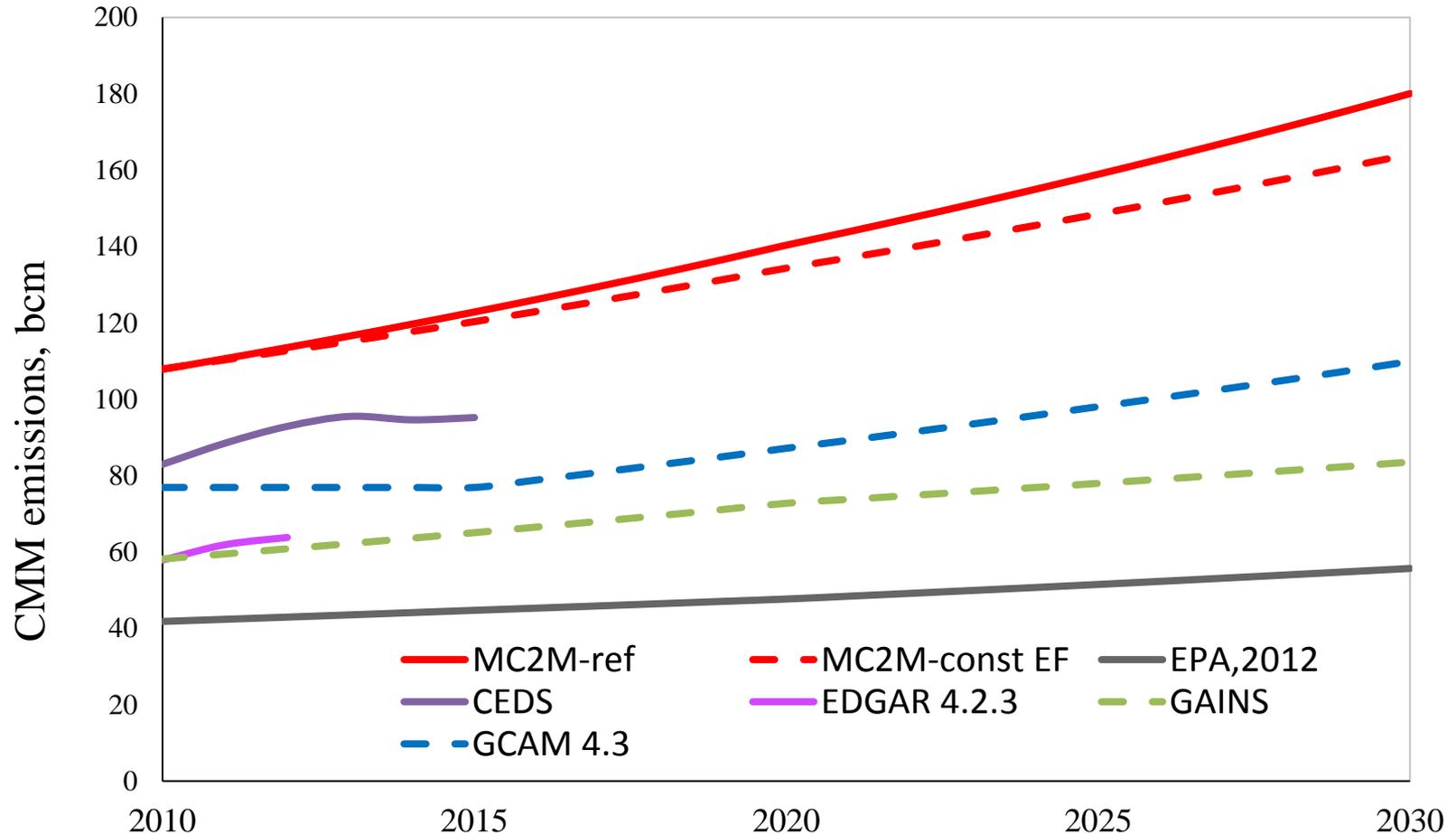
Source: Model for Calculating Coal Methane (MC2M) emissions; Preliminary data

CMM and AMM Emissions: Policy Scenarios

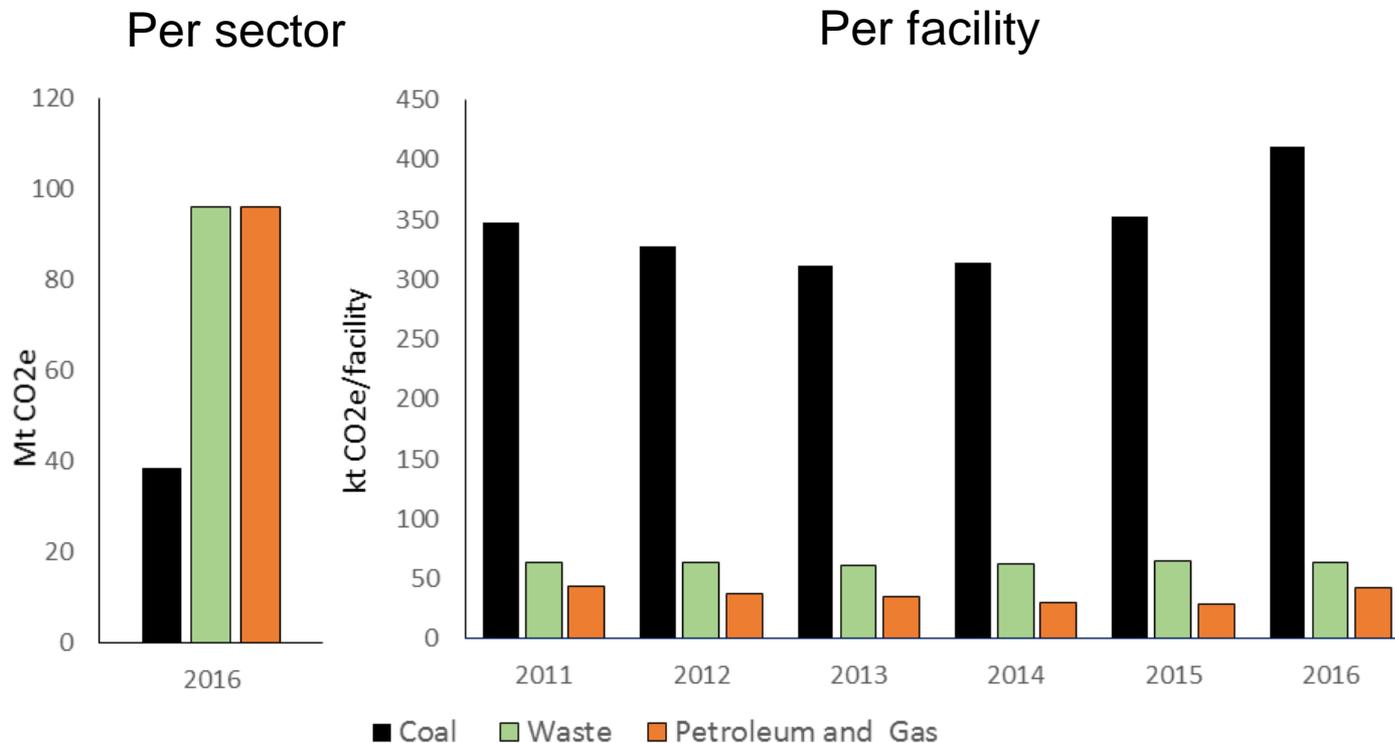
- AMM increases faster than underground coal production and CMM
- AMM emissions grow even if coal production and CMM decline



Comparison with Other Studies



Anthropogenic U.S. Methane Emissions: Coal and Other Sectors

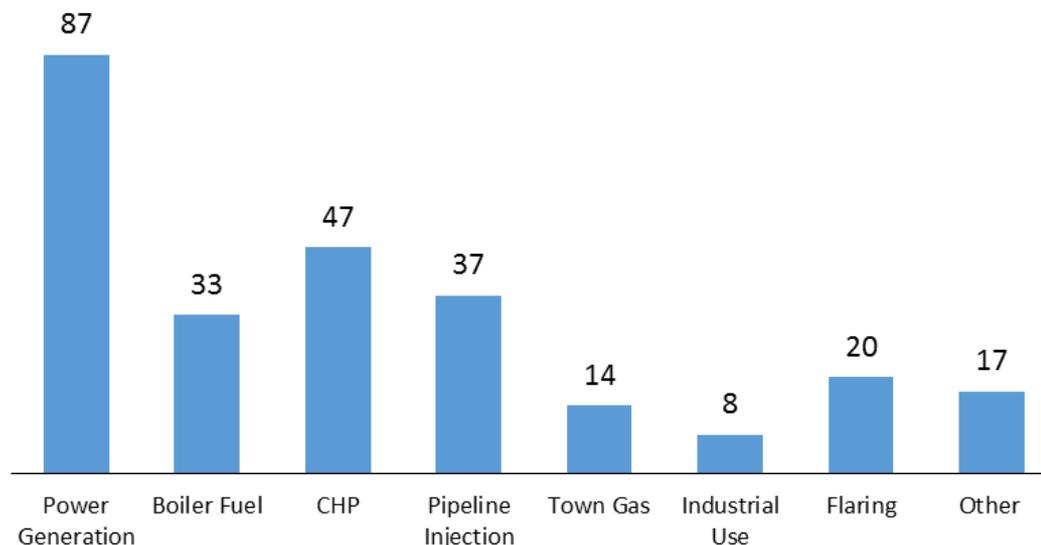


- Emissions from coal are lower than from waste or gas and oil sectors
- However, coal mines offer potential of large, single facility emission reductions



Operational CMM/AMM Projects Around the World

- Over 260 active CMM and AMM projects operated in 2017:
 - 162 at active underground mines
 - 85 at abandoned mines
- Large methane emissions per facility allow for many CMM/AMM applications



Take Home Messages

- As mines grow deeper with future coal production, CMM emissions will grow
- AMM emissions will remain significant by the end of the century regardless of future coal production
- CMM and AMM projects are large and can help capture and utilize significant amounts of methane
- In short, CMM and AMM projects offer real potential to reduce emissions and meet energy needs