

Environmental and Sustainability Assessment: Current and Prospective Status of Coal Mine Methane Production and Use in the European Union

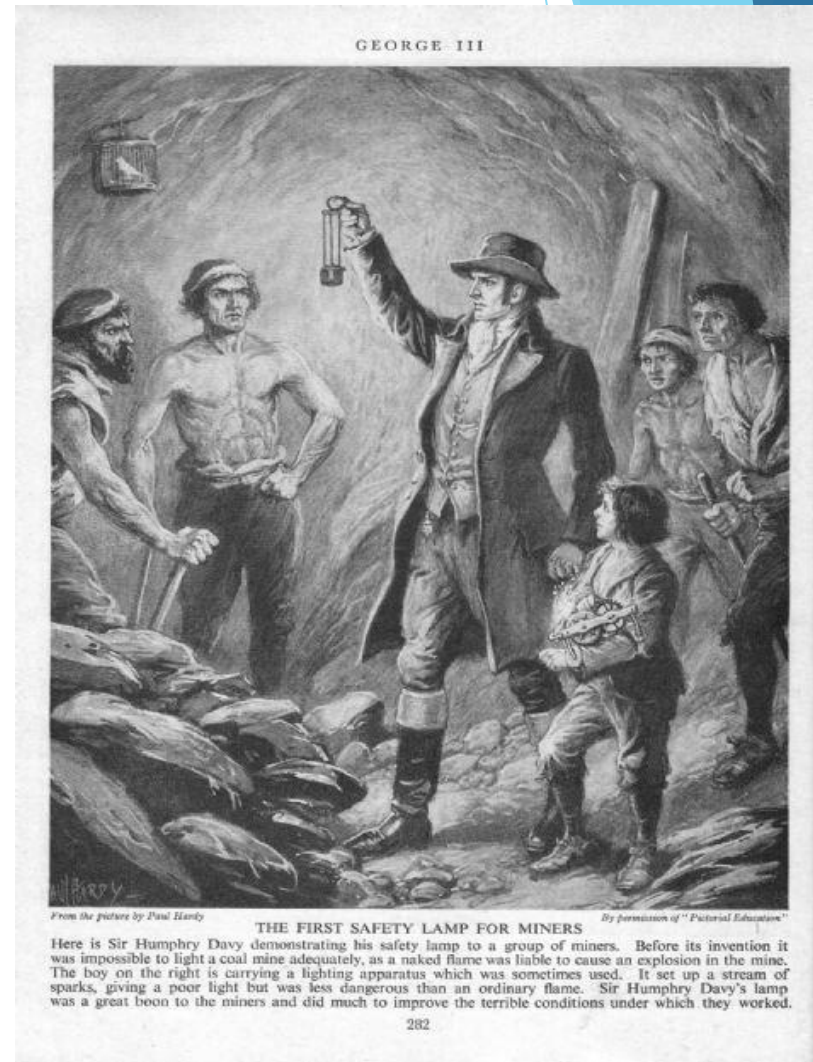
UNECE Group of Experts on Coal Mine Methane
28 October 2015



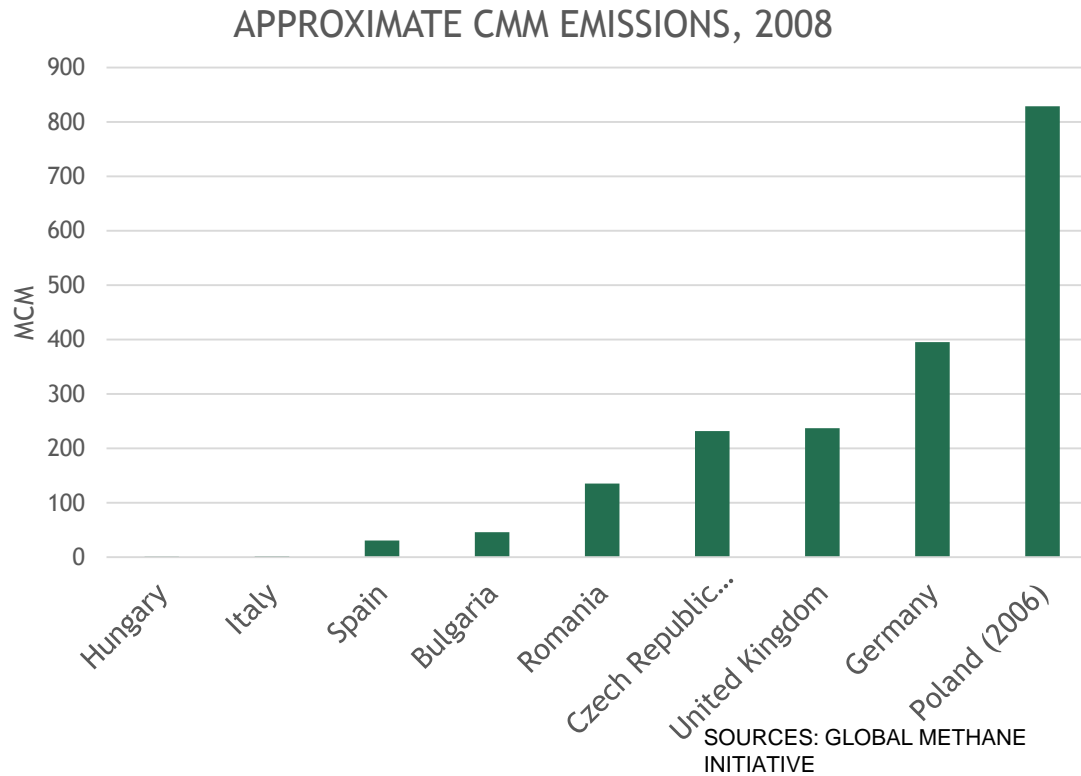
Presented at UNECE, Geneva
Karl Schultz

CMM in the European Union

- ▶ European coal mines were first to face problems with methane and begin addressing these; precursors to modern drainage systems first developed in the 18th Century
- ▶ Depth of mines means relatively high gas content
- ▶ Low permeability of many coals has limited options for methane drainage and attempts to do commercial CBM in virgin seams have not yet taken off



CMM in the European Union

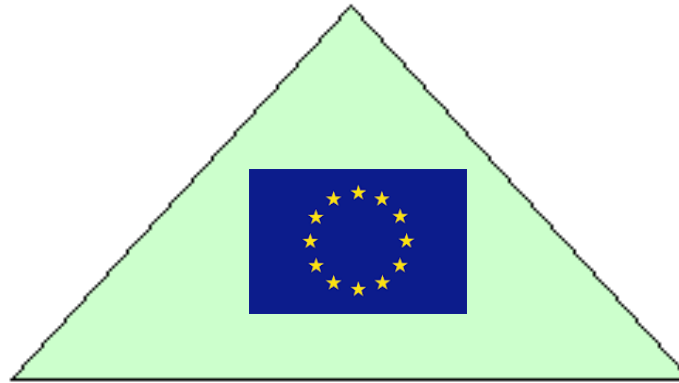


TOTAL: 1900 mcm = 42 MMTCO₂e

Why is CMM use important?

Energy policy *The 3 EU pillars*

Environment



Competitiveness

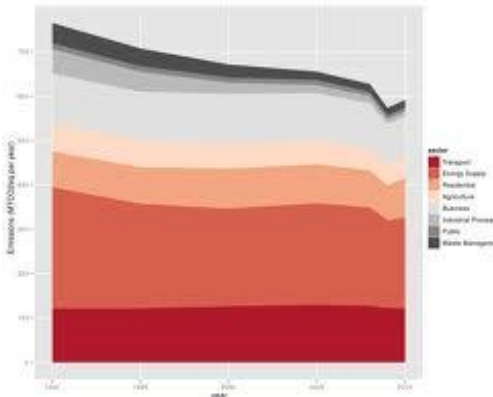
Security of supply

Market where possible, government when necessary

Why is CMM use important?



Energy and gas production



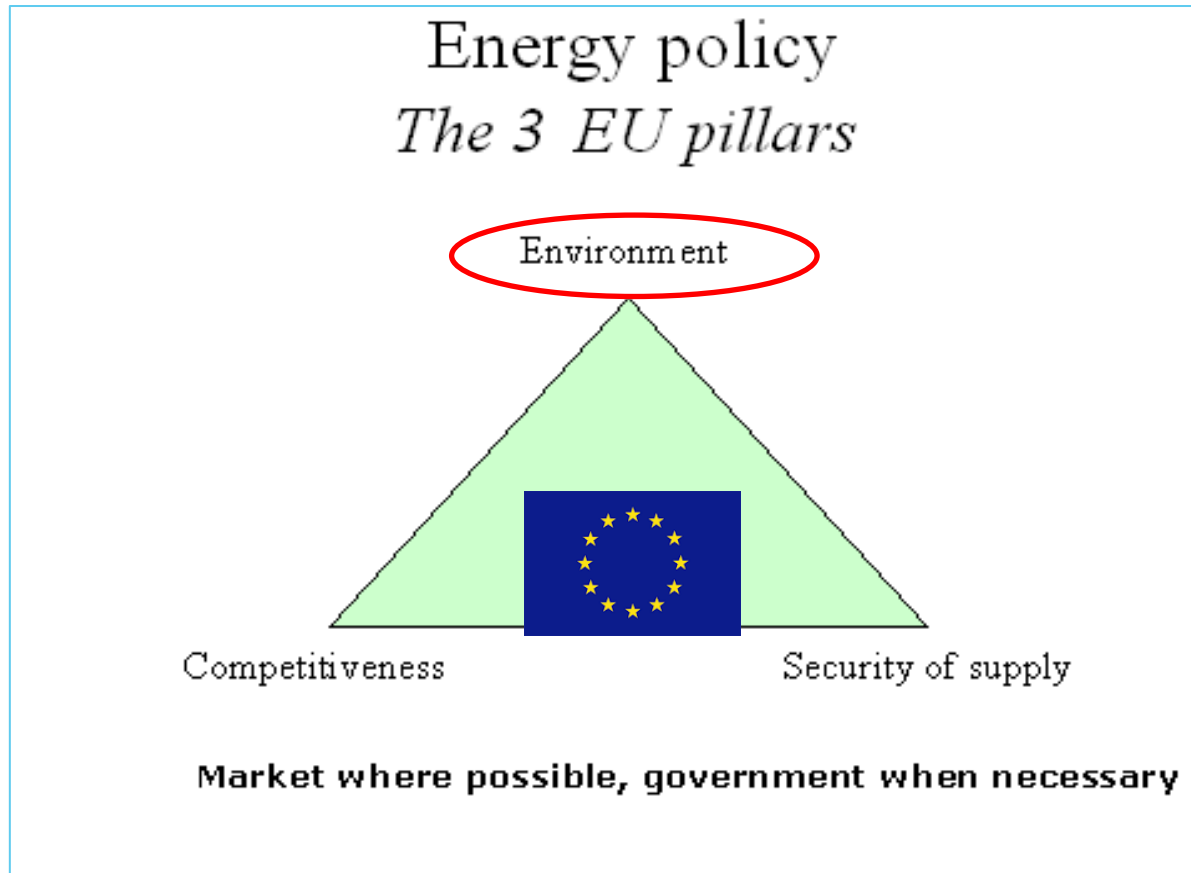
Greenhouse gas emission reduction



Economic and social effects

Use of the CMM resource impacts (positively) all three “pillars” of EU Economic Policy

Why is CMM use important?



*In our experience - which is backed up by the findings of this study - CMM is primarily an **environmental** play in the EU*

JRC's Requirements



- ▶ EU JRC advises on (but does not create) policy with respect to issues of scientific concern
- ▶ Assessment in depth for three countries and EU overall, providing:
 - ▶ Data feed for land-use modeling input
 - ▶ Policy-relevant analysis for EU Commission

Data Gathering and Analysis - Scope

- ▶ Data Gathering and Methodologies Scope:
 - ▶ Three countries (United Kingdom, Germany, Poland) for baseline year (2010);
 - ▶ Three scenarios for projections to 2030: Market, Augmented Price, Technically Feasible;
 - ▶ 14 Data fields relevant to mine location and production, outgassing, gas use, and local economy/geography
- ▶ Analytic Report Scope:
 - ▶ Discussion of CMM background, economics, and technology; methodology outline;
 - ▶ Social and economic discussion in depth by country and scenario; economic and social barrier analysis; environment and land use discussion in depth by country and scenario;
 - ▶ Scaling of findings to EU level; discussion of implications

Findings: UK (2030)

Measure	Magnitude Range	Significance Relative to National Market	Inter-scenario Sensitivity
Mw _{el} installed	72-73	Medium	Low
Jobs created	50	Low	Low
Direct Income (M GBP)	30.9-48.3	Low	High
GHG Emissions abated (1,000 tCO ₂ e)	758-879	Medium	Low
Costs (EUR/TCO ₂ e abated)	1.3-1.5	na	Medium



Findings: Germany (2030)

Measure	Magnitude Range	Significance Relative to National Market	Inter-scenario Sensitivity
Mw _{el} installed	107	Medium	High
Jobs created	400-430	High	High
Direct Income (M EUR)	91.1-91.5	High	High
GHG Emissions abated (1,000 tCO ₂ e)	1,671-1,733	Medium	High
Costs (EUR/TCO ₂ e abated)	1.2-1.3	na	High



Findings: Poland (2030)

Measure	Magnitude Range	Significance Relative to National Market	Inter-scenario Sensitivity
Mw _{el} installed	119-120	Medium	Low
Jobs created	1,000-2,980	Low	High
Direct Income (M EUR)	72.6-101.3	Low	Medium
GHG Emissions abated (1,000 tCO ₂ e)	3,462-13,977	Medium	High
Costs (EUR/TCO ₂ e abated)	0.4-1.15	na	High



Findings Summary: EU Impacts (Maximum)

Measure	Magnitude Range	Significance Relative to EU Wide Market/Impacts	Inter-scenario Sensitivity
Mw _{el} installed	262-298	Low	Medium
Jobs created	2,300-6,670	Low	Medium
Direct Income (M EUR)	200.1-228.9	Low	Medium
GHG Emissions abated (1,000 tCO ₂ e)	6,634-22,555	Medium	High

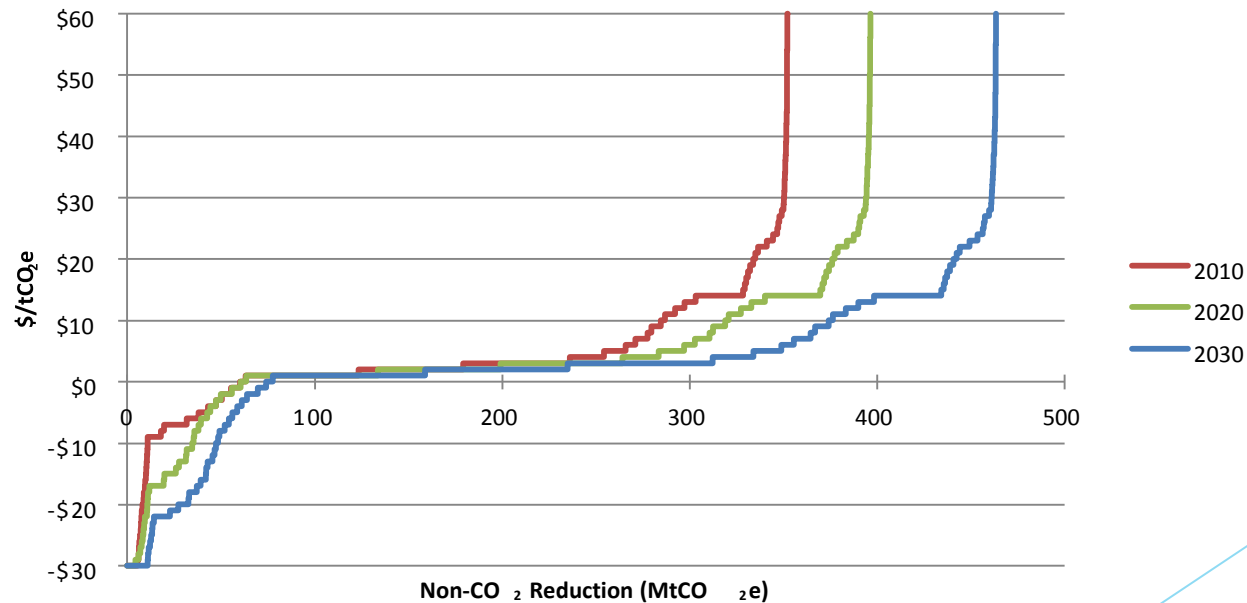


Where next for CMM in the EU?

Markets and Uses for CMM

▶ Greenhouse gas abatement

- ▶ 2010 worldwide CMM emissions nearly 600 MMT CO₂e
- ▶ Abatement potential will depend on policy tools (carbon price, Feed-In-Tariff, non-price interventions, etc.) and marginal production costs



SOURCE: USEPA

Barriers to meeting “economic” CMM development

- ▶ **Lack of project opportunity information and evaluation resources**
- ▶ **Lack of market understanding/information by broader stakeholders**
- ▶ **Technological information**
- ▶ **Legal constraints: resource rights and energy revenue**
- ▶ **Market uncertainties: restructuring of the coal industry**
- ▶ **Lack of financial and development resources**

A Tale of Two Countries: Germany and a Price Incentive

- ▶ Following the Renewable Energy Act of 2000, CMM from German coal mines is treated like a renewable resource and is eligible for feed-in-tariffs when used to generate electricity.
- ▶ Modeling suggests that FiT price support has been quite efficient at economically utilizing available gas since 2000
- ▶ Owing to mine closures starting in 2008, however, gas available for CMM projects has reduced (see following slide)

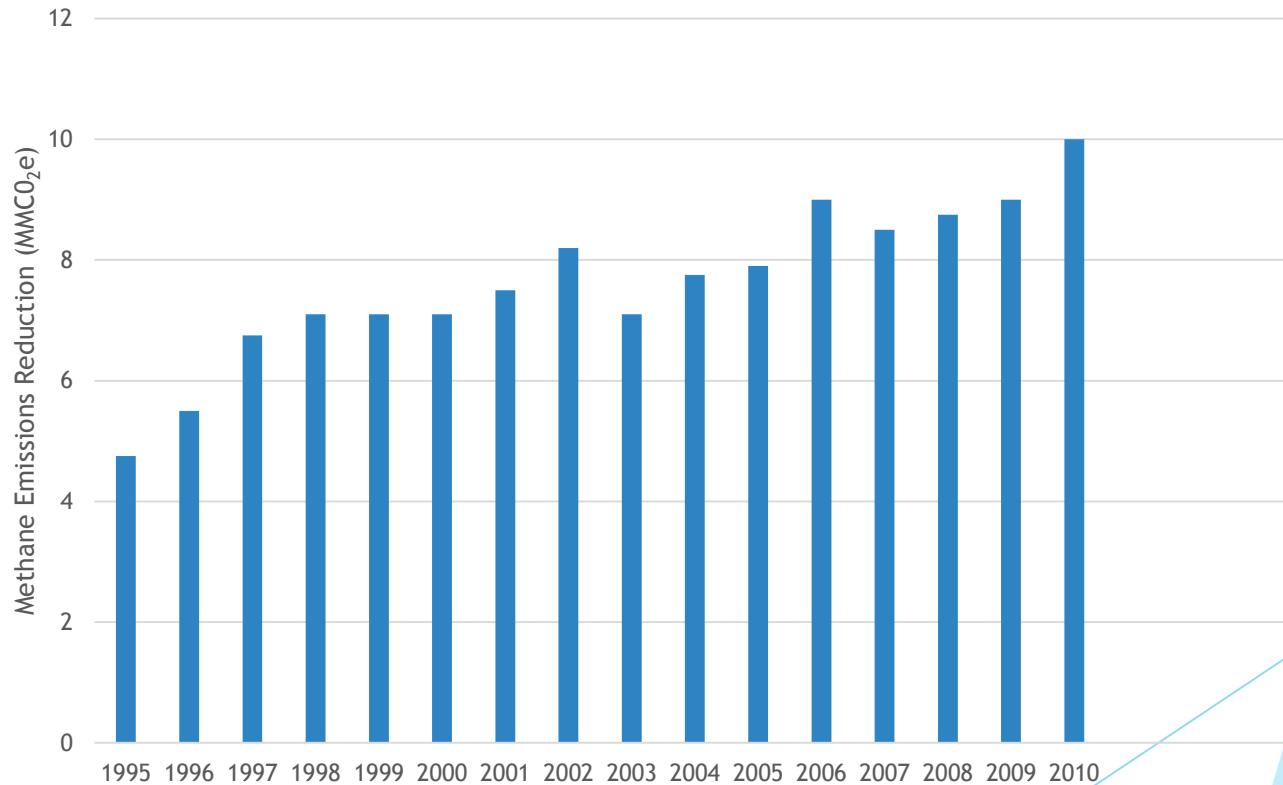
Success of the Renewables Act: German CMM reductions since 2000



A Tale of Two Countries: United States and Market Promotion

- ▶ In 1994, the USEPA launched the Coalbed Methane Outreach Program (CMOP), which strives to reduce methane emissions from coal mining activities as well as from abandoned underground mines
- ▶ CMOP provides high-quality, mine-specific information and technical assistance to the coal mining industry and project developers, including
 - ▶ identifying project sites,
 - ▶ analyzing and demonstrating technologies,
 - ▶ conducting mine-specific project pre-feasibility assessments and market evaluations,
 - ▶ analyzing financial incentives and regulatory hurdles.
- ▶ U.S. reduced CMM emissions by cumulative 326 MMTCO₂e from 1994-2012

Success of CMOP in US: Emission reductions since 1995



Implications for EU Policy

- ▶ CMM can bring about considerable Greenhouse Gas Abatement at low marginal cost (from 6 to 22 million TCO₂e pa at an average of around 1.0 EUR/T CO₂e)
- ▶ Modest energy resource from EU-wide perspective, and will decline further with mine closures (approximate emissions decline of about 6 Mcm - or about 0.7 Mwel capacity - pa)

[Coal Bed Methane resource, however, could potentially have orders-of-magnitude higher impact in contribution to economic and energy security benefits. In the US in 2013, CBM represented 7% of natural gas production.]

- ▶ Local economic and social impacts can be important, especially in terms of utilizing existing capital and workforce (potential for around 7,000 jobs created in mining regions)
- ▶ Price incentives and outreach to promote CMM can play a low-cost, politically attractive means of meeting EU's 2020 and 2030 climate targets.

Thank you

For more information:

Public Report: <https://ec.europa.eu/jrc/en/research-topic/integrated-sustainability-assessments>

Karl Schultz
Climate Mitigation Works Ltd.
karl@climate-mitigation.com
+44 (0) 207 354 3595

