United Nations Framework Classification of Resources (UNFC) - Guidance for Application to Coal Bed Methane (CBM)

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ENERGY

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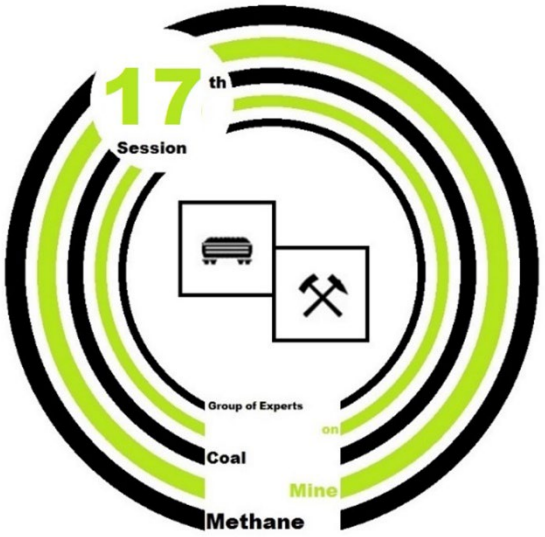

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UNFC Guidance for Application to CBM

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Outline

- Summary
- Introduction
- Classification of CBM
- Environmental-Socio-Economic Viability (E-Axis) CBM
- Technical Feasibility (F-Axis)

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Summary

The application of the United Nations Framework Classification for Resources (UNFC) to all energy sectors is crucial to increasing transparency, reducing risks, and assuring sustainability.

Proper classification, reporting, and management of Coal Bed Methane is key to realizing Sustainable Development Goals (SDGs).

This draft document provides additional guidance for the application of UNFC to Coal Bed Methane projects.

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Introduction

United Nations Framework Classification for Resources

- UNFC provides a tool for managing energy and mineral resources.
- Applicable to renewable energy projects, including geothermal energy, and all extractive activities, including solid minerals, oil, gas and uranium, and injection projects for the geological storage of CO
- UNFC is a generic principle-based system in which quantities are classified by the three fundamental criteria of environmental-socio-economic viability (E), technical feasibility (or field project status) (F), and degree of confidence (or level of knowledge) (G)

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Introduction

Latest State of Coal Bed Methane in the World

- Coal Bed Methane (CBM), variously referred to as natural gas from coal (NGC, Canada) or coal seam gas (CSG, Australia), is generated either from methanogenic bacteria or thermal cracking of the coal
- CBM resources worldwide are immense, with estimates exceeding 9,000 Trillion Standard Cubic Feet (Tscf) in 2008 and up to 6,500 Tscf in 2014.
- The primary producing countries include the US, Canada, and Australia.
- More than 40 countries have evaluated the potential of CBM.

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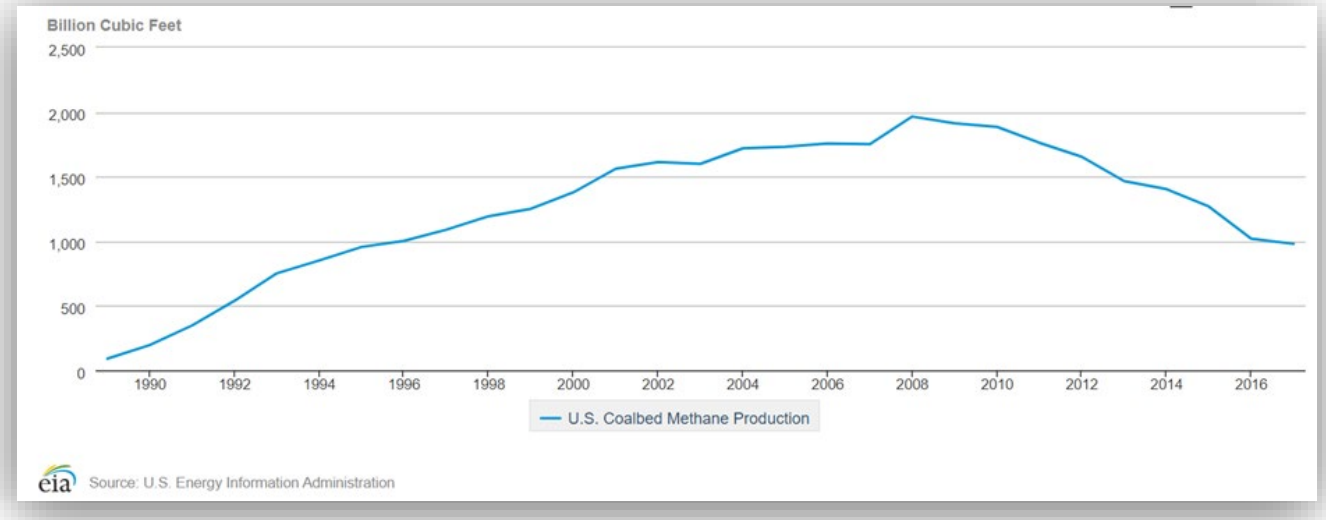
Introduction

Latest State of Coal Bed Methane in the World

- The U.S. has the most mature production, with commercial production starting in the 1980s. US production of CBM in 2009 was 1.97 Tscf and 0.98 Tscf in 2017.



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Classification of CBM

UNFC classifies CBM projects based on three sets of basic Categories:

- The E Category designates the degree of favorability of environmental-socio-economic conditions in establishing the viability of the project
- The F Category designates the maturity of technology, studies and commitments necessary to implement the project.
- The G Category designates the degree of confidence in the estimate of the quantities of products from the project.

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CBM Environmental-Socio-Economic Viability (E-Axis)

The environmental-socio-economic viability axis (E Axis) Categories encompass all non-technical issues that could directly impact the development viability

CBM Environmental Criteria

- Environmental factors are not defined in UNFC
- A practical application would be the physical, chemical, and biological impact on or changes to the project area and surroundings, due to a project
- Additional environmental factors include safeguard zones, protected natural areas, wetland sites, flora and fauna protected by legislation, and critical land use in the area.

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Technical Feasibility (F-Axis)

The feasibility of extraction for a development project is evaluated and represented by the F Axis.

The Guidance provides:

- General overview and principles
- Consideration of Risk
- Estimation Procedures
- Analytical procedures
- Volumetric analysis
- Material Balance
- Analogues
- Performance-based Estimates
- Resource Assessment Methods

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Technical Feasibility (F-Axis)

The feasibility of extraction for a development project is evaluated and represented by the F Axis.

- Performance-based Estimates
  - Production Data Analysis
  - Production decline methods
  - Curve Fitting
  - Type curve Matching for dry or dewatered CBM
  - Reservoir Simulation

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Technical Feasibility (F-Axis)

The feasibility of extraction for a development project is evaluated and represented by the F Axis.

Resource Assessment Methods

- (Contingent) Resources should be demonstrated by drilling, testing, sampling or logging hydrocarbon gas content (e.g., coal sample or gas flow) and coal thickness sufficient to establish the existence of a significant quantity of potentially moveable hydrocarbons
- As with other conventional and non-conventional oil and gas resources, the estimation of CBM resources can be determined using deterministic or probabilistic methods

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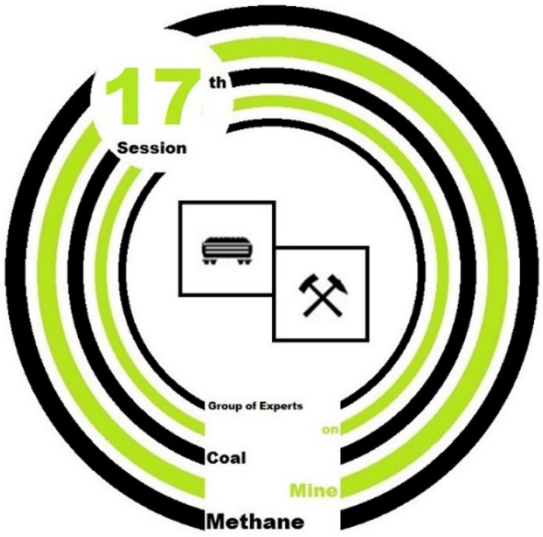
Thank you!



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