# Best practices and technologies to reduce methane emissions from coal mining

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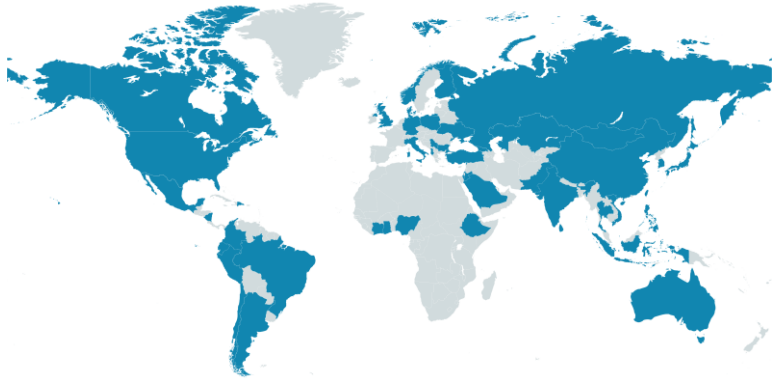
# GMI Structure and Participants

- GMI is an international public-private partnership focused on reducing barriers to the recovery and use of methane as a valuable energy source.

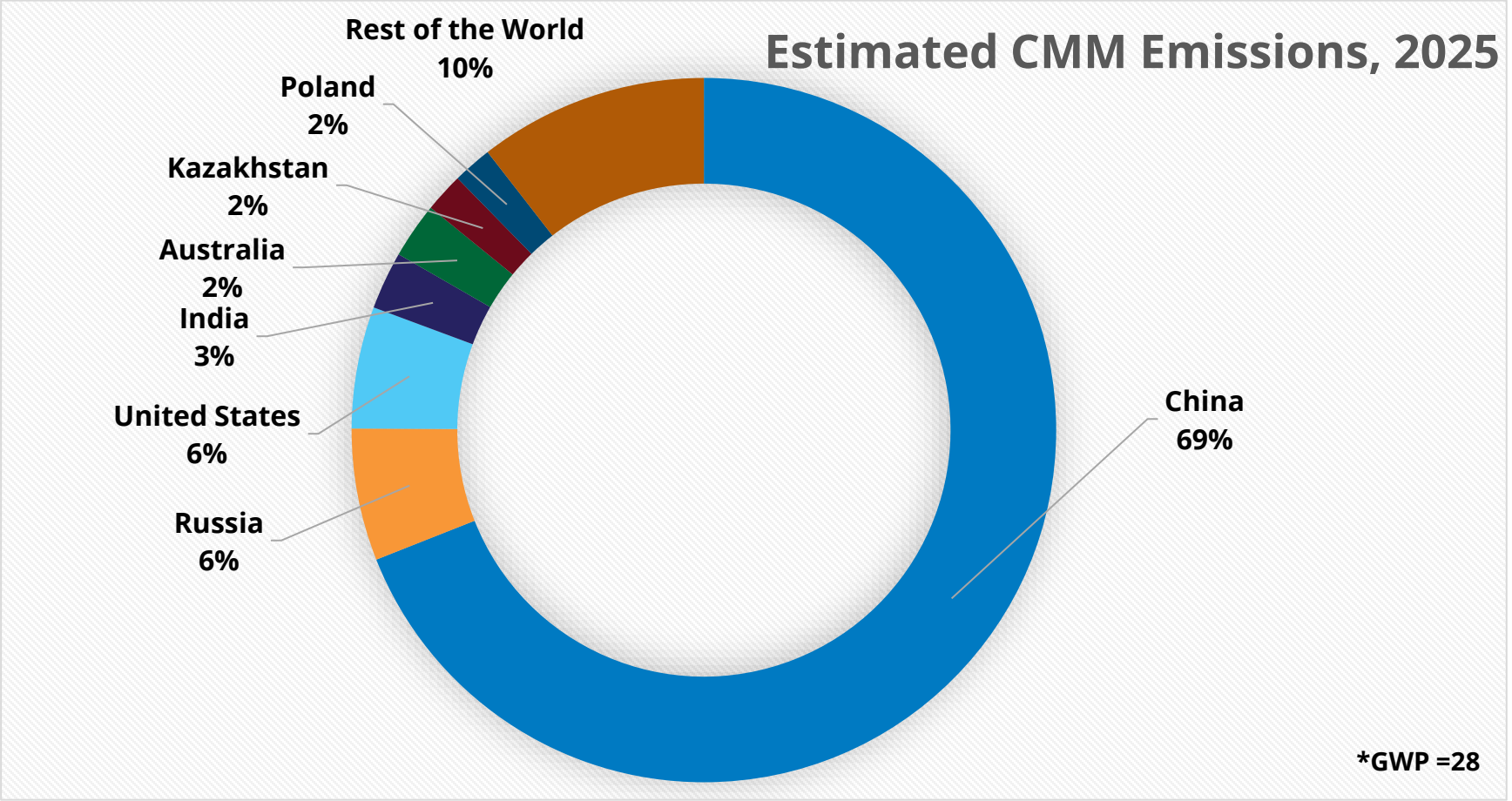
- 46 Partner Countries
- 700+ Project Network members
- Alliances with international organizations focused on methane recovery and use

GMI Partner Countries represent approximately 75% of methane emissions from human activities.

# Global Methane Emissions from Coal Mining

Global estimated CMM emissions for 2025: 1,055 MMT CO2e*




*REFERENCE: U.S. Environmental Protection Agency. (2019). Global Non-CO2 Greenhouse Gas Emission Projections & Mitigation: 2015 - 2050. U.S. Environmental Protection Agency, Office of Air & Radiation. EPA 430-R-19-010, October 2019*

# Sources of Coal Mine Methane

- Underground mines


- Abandoned mines.

- Surface mines

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

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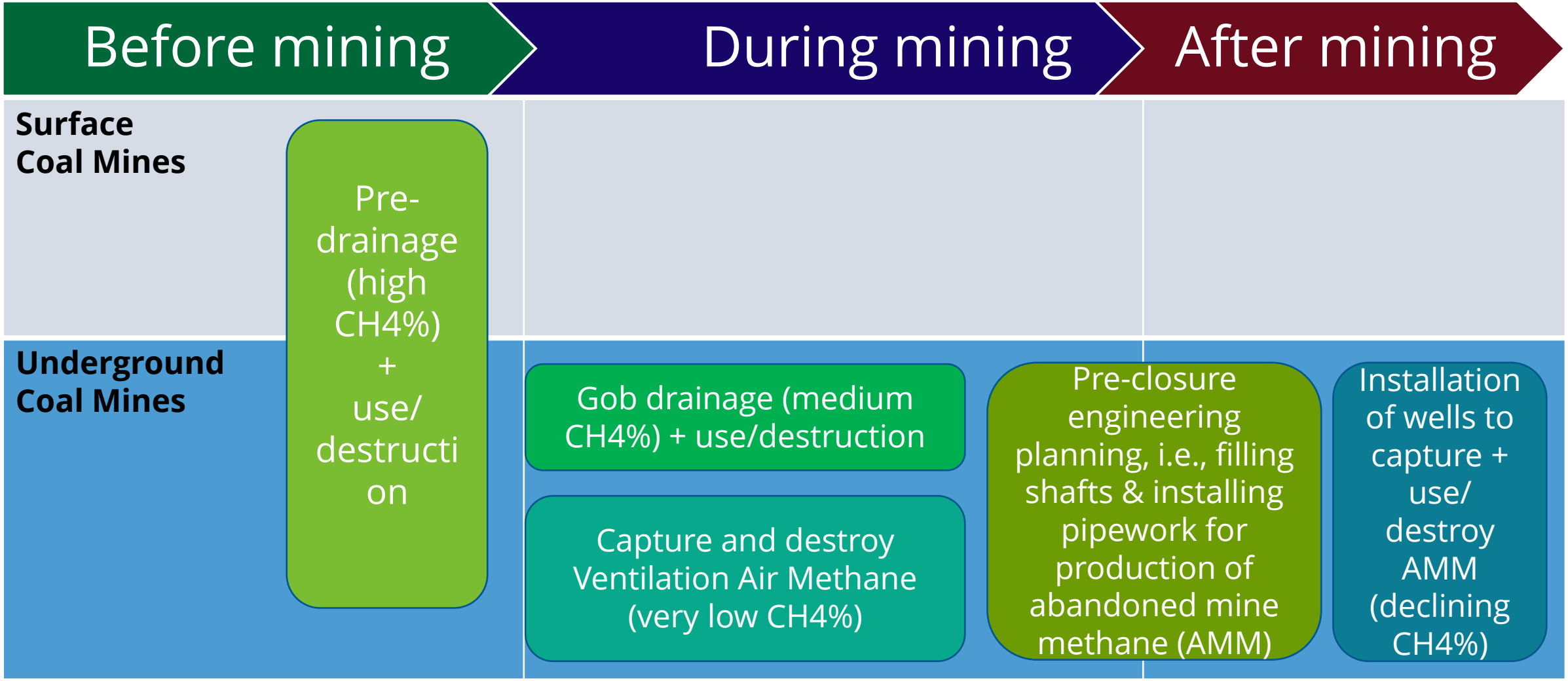

# More Opportunities to Mitigate Methane at Underground Coal Mines

- Mines deploy **ventilation systems** to dilute methane in mine workings to create safe working conditions (typically to less than 1% methane in air concentration)
  - Ventilation air methane (VAM) accounts for the largest share (60-80%) of methane emissions released from underground coal mines and the industry as a whole.
  - Because this form of emissions contains methane in very dilute concentrations, combustion of VAM is not possible. Destroying such low-concentration methane requires a thermal or catalytic oxidation process. Technologies for VAM destruction can become cost-effective through policy and carbon market support.
- If coal mines are gassy, mines can drain methane through **drainage systems** at higher concentrations (before or during mining).
  - Such methane is more concentrated and is easier and cheaper to utilize or destroy.
  - Coal mines can opt to capture and remove more methane out of underground coal mines through drainage.

# Commercially Demonstrated Options for Use of Coal Mine Methane

## Flaring

*Abandoned Mine Methane Flare*
*Colorado, USA*

## Chemical Feedstock

*Methanol Production Plant*

## Ventilation Air Methane Oxidation

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

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## 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*

## Transportation Fuel

*CNG Refueling Station for Taxis*
*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

# Resources Available for Mitigation

Prefeasibility studies:

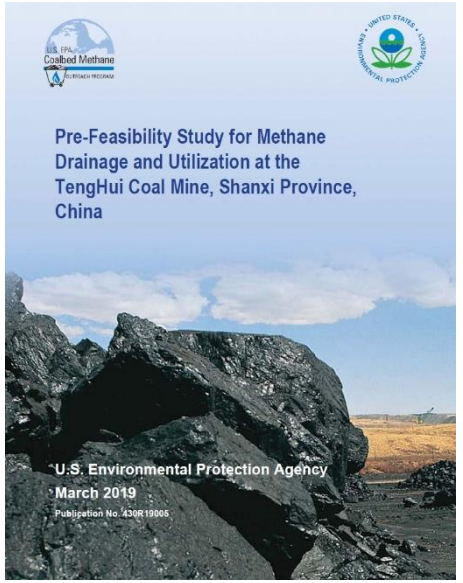
- Over 50 studies in 11 countries, including Kazakhstan

Online trainings:

- Basics of CMM
- Conducting Pre-Feasibility Studies for CMM Projects
- Conducting Pre-Feasibility Studies for Abandoned Mine Methane (AMM) Projects

Other tools and resources:

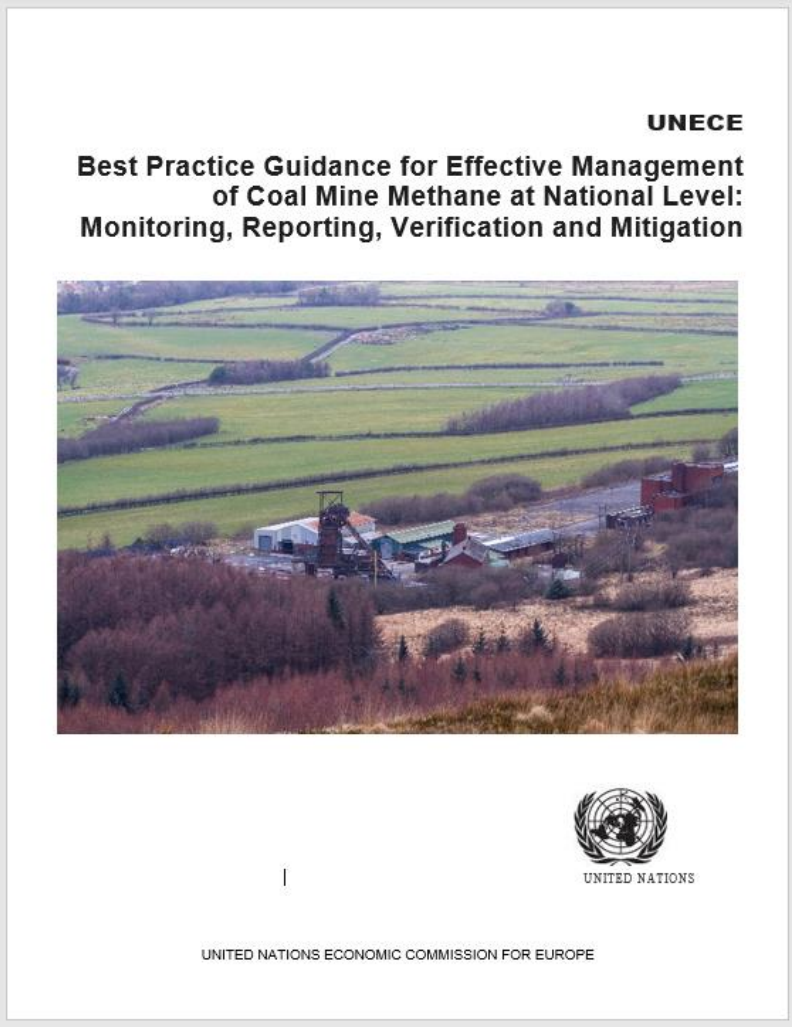
- Available on GMI website: Resource Library

# 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)



# Thank you!

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Global Methane Initiative

globalmethane.org

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# Group of Experts on Coal Mine Methane and Just Transition

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Michal Drabik, Secretary
Raymond C. Pilcher, Chair

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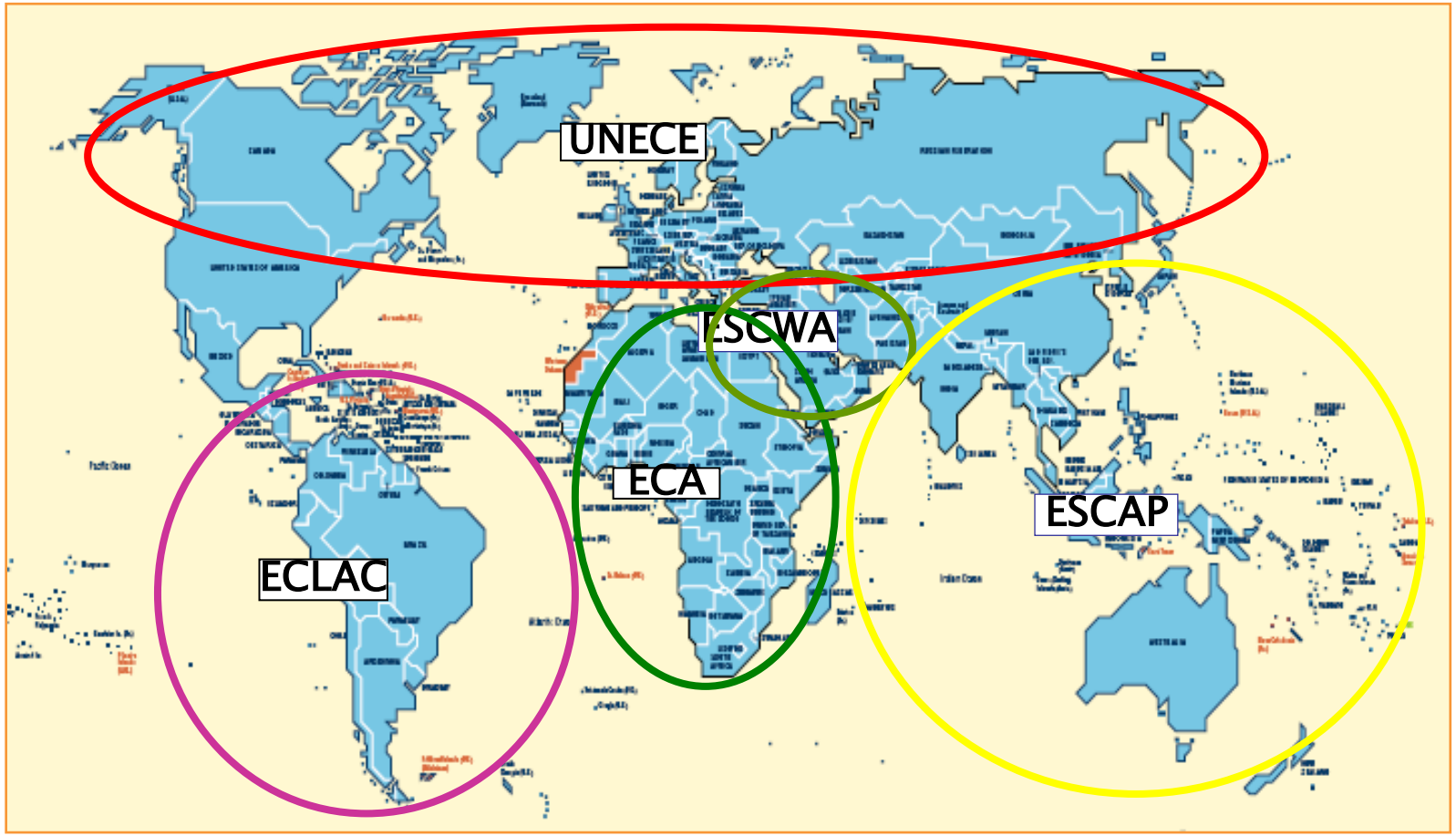
# United Nations
## Regional Commissions



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**The Executive Committee comprised of representatives chosen from 56 member states directs the activities of eight sectoral committees that work on behalf of the UNECE**

**Committee on Sustainable Energy**

- Develops normative instruments (best practices, standards) that facilitate cooperation and enables needed investments.
- Provides countries with a platform for a dialogue.
- Leads and oversees Sustainable Energy Division's work on implementation of the UN Sustainable Development Goals.

# Group of Experts on CMM & JT

## Overview

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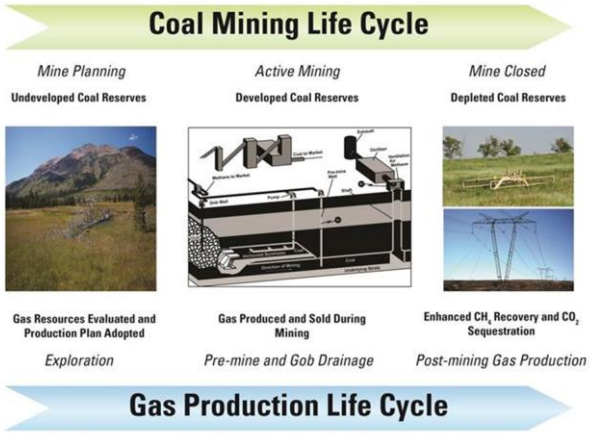
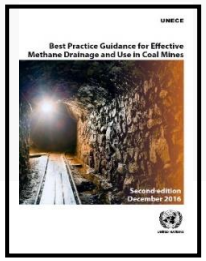
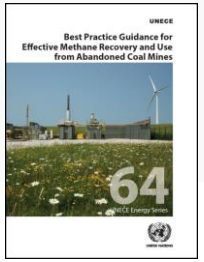
- Rests on **4 pillars**:
  - Environment, Economy, Working Safety, and Social Justice.

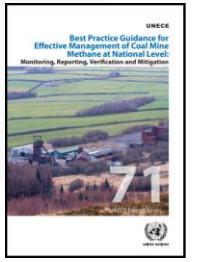
- Has **3 Task Forces**:
  - Safe Operations and Closure of Coal Mines
  - Methane Emissions Reduction
  - Just Transition
- **Focuses** on:
  - the coal value chain and mine life cycle.




- Developed **3 Best Practice Guidance** documents:
  - On (1) active and (2) abandoned mines, and on (3) MRV.



# Group of Experts on CMM & JT

## Transition

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- Modernization of the energy economy cannot be avoided.
- It is in best interest of industry and communities to undertake the process in a planned, efficient, and cost-effective manner.
- UNECE develops tools to facilitate an effective transition to low-carbon economy.
  - Plans must incorporate social and cultural dimensions to ensure sustainability of outcomes
- One objective is to explore a great potential that lies in transformation of large industrial complexes that exist throughout our region.
- Development of a project that addresses modernization encompasses
  - Phase I: mapping readiness for just transition in coal mining areas
  - Phase II: a plan for modernization reorientation towards modern and lower carbon technologies more efficient management of available resources, reclaiming and repurposing abandoned sites,
  - Phase III: a robust and flexible business models for efficient industrial site's transition toward carbon neutrality and is replicable in other industrial sites in similar countries or regions.

# Proposed Projects
## Energy Transition in Kazakhstan

### Components of industrial modernization and energy transition

- **Industrial energy efficiency** to reduce, substitute and compensate for carbon emissions through higher efficiency, installation of heating control system and waste heat recovery.
- **Electrification of heat** coupled with renewable energy or nuclear power to power furnaces by electricity instead of burning fossil fuels.
- **Carbon capture, use and storage (CCUS)** is a solution to capture CO2 and either store it underground or transform it into something useful such ethanol or raw materials to be used in the chemical or cement sector.
- **Hydrogen** carbon neutral can be used as a fuel in a furnace, feedstock in production of chemicals or as a reactant in industrial chemical processes.
- **Circularity** by embracing innovative solutions that encourage reuse and recycling of materials and resources across the whole value chain.

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