

21 MEXICO



21.1 Summary of Coal Industry

Mexico holds less than 0.1 percent of the world’s estimated proven coal reserves; however, due to the high gassiness of its resources, it boasts between 120 and 160 billion cubic meters (m³) of coal mine methane/coalbed methane (CMM/CBM) resources. The country has a history of CMM degasification and flaring, but recent changes to the Mexican Federal Constitution and liberalizations of the energy sector have paved the way for larger-scale CMM utilization and CBM extraction. Additional development of a greenhouse gas (GHG) registry in 2012 provided the regulatory infrastructure to treat CMM/CBM projects as carbon offsets, thereby further incentivizing CMM/CBM development in the country. Although Mexico has yet to develop CMM utilization projects, proposals have been filed for numerous mines in the Coahuila Basin, which, if implemented, can help Mexico achieve its Paris Agreement target.

21.1.1 ROLE OF COAL IN MEXICO

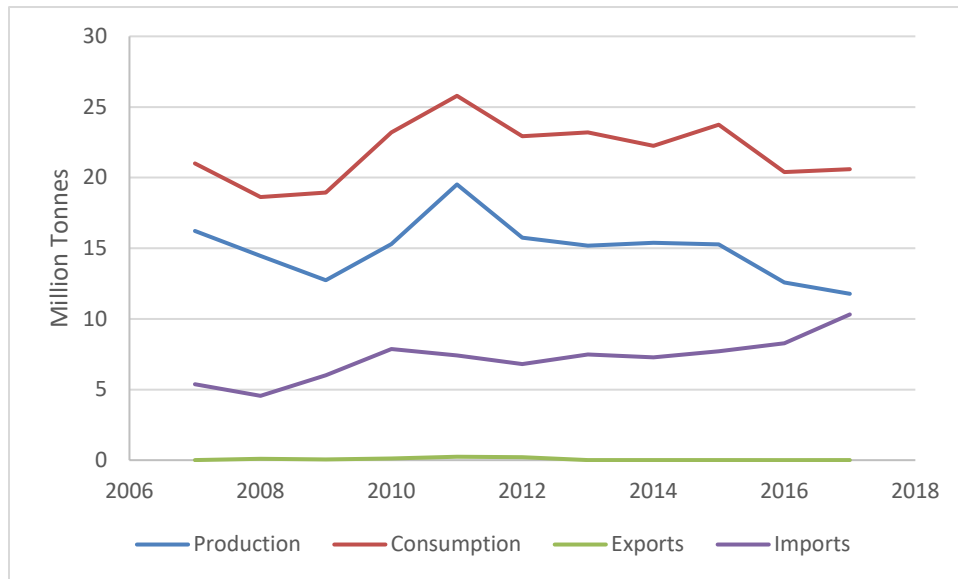
- Coal accounts for 6.9 percent of Mexico’s total primary energy consumption.
- Coal production totaled 12 million tonnes in 2017 (Table 21-1). This represented a 24.7 percent decrease from 2007 (Figure 21-1).
- Coal consumption in 2017 is approximately equal to consumption from 2007 (Figure 21-1).
- Mexico’s electricity generation in 2017 was 45.9 percent oil, 39.7 percent natural gas, 6.9 percent coal, 3.6 percent hydroelectric, 2.3 percent renewables, and 1.3 percent nuclear (BP, 2018).

Table 21-1. Mexico’s Coal Reserves and Production

Indicator	Anthracite & Bituminous (million tonnes)	Sub-bituminous & Lignite (million tonnes)	Total (million tonnes)	Global Rank (# and %)
Estimated Proved Coal Reserves (2017)*	1,160	51	1,211	31 (0.1%)
Annual Coal Production (2017)**	4.6	7.2	11.8	25 (0.11%)

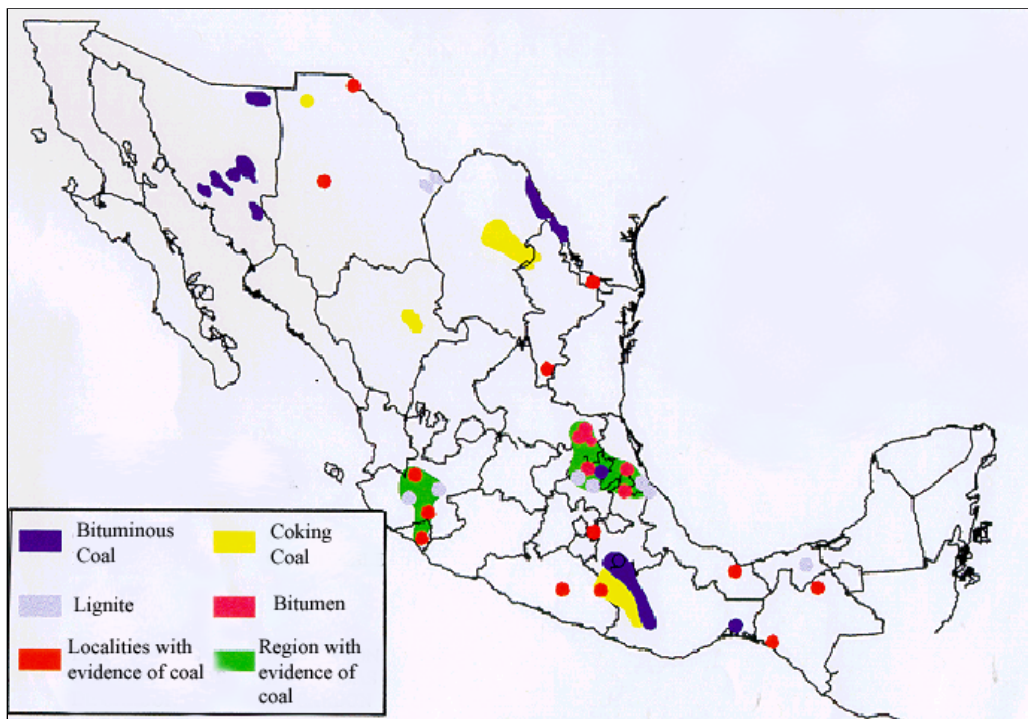
Sources: * BP (2018), ** EIA (2019).

Figure 21-1. Mexican Annual Coal Trends



- The majority of Mexico’s coal reserves are located in Coahuila State in the northeast part of the country (Figure 21-2). Additional resources are located in Sonora (northwest Mexico) and Oaxaca (southern Mexico).

Figure 21-2. Mexico’s Coal Fields



Source: Adapted from Santillan-Gonzalez (2006).

21.1.2 STAKEHOLDERS

Table 21-2 identifies key stakeholders in Mexico's CMM industry.

Table 21-2. Key Stakeholders in Mexico's CMM Industry

Stakeholder Category	Stakeholder	Role
Mining Companies	Minera del Norte, SA de CV (MINOSA)	Major mining company in Mexico that produces a large percentage of Mexico's coking coal. It is a part of Grupo Acerero del Norte (GAN). Potential project host.
	Materiales Industrializados S.A. de C.V. (MINSA)	Owner of 38% of Mexico's coal concessions.
	Minera Carbonifera Rio Escondido (MICARE)	MICARE produces steam coal and is also a part of GAN. Potential project host.
	Grupo México S.A.B. de C.V. (Sociedad Anónima Bursátil de capital variable – limited liability stock corporation with variable capital)	Largest mining corporation (mainly copper) in Mexico. Potential project host.
	Centro Nacional de Control del Gas Natural (CENAGS)	State run gas company tasked in 2016 with overseeing operations, transportation, and storage of natural gas on natural level.
Government Agencies	<ul style="list-style-type: none"> ▪ Mexican Electricity Commission (CFE) ▪ Energy Regulatory Commission (CRE) ▪ Petróleos Mexicanos (PEMEX) ▪ Secretariat of Economy ▪ Secretariat for Environment and Natural Resources ▪ Ministry of Energy 	Drafting of legislation, implementation of laws, government oversight

Source: USGS (2012), Worldfolio (2016).

21.1.3 STATUS OF COAL AND THE COAL MINING INDUSTRY

- The majority of Mexican coal-fired power plants are in the middle of their productive lifespan (20 to 35 years), but the Mexican government anticipates coal-fired power generation to represent just 3.7 percent of installed capacity by 2029, decreasing from 5,600 megawatts (MW) to 4,000 MW (IEA, 2017). Total generating capacity is

expected to grow to 110.2 gigawatts in 2029, largely due to innovations in renewable energy sources, maintaining coal as a staple of baseload generation (IEA, 2017).

21.2 Overview of CMM Emissions and Development Potential

- According to the Global Methane Initiative (GMI) CMM International Projects Database, Mexico had no active CMM projects as of 2018 (GMI, 2019).
- The U.S. Environmental Protection Agency funded one pre-feasibility study at the Conchas Mine Complex in the Sabinas Coal Basin in 2015:
 - The project's forecasted emissions rates were 50 m³ of methane per tonne of coal mined.
 - The project proposed that this amount would capture enough natural gas to fuel 72 MW of onsite power generation (USEPA, 2015).
- MINOSA, Mexico's principal producer of metallurgical coal, employs in-mine directional wells for degasification; it flares the gas and has not utilized CMM for power production or other productive uses. If MINOSA were to recover and use this gas, it would result in emissions reductions of 3.1 million metric tonnes of carbon dioxide equivalent (MMTCO₂e) from the project (CDM, 2014).

21.2.1 CMM EMISSIONS FROM OPERATING MINES

- Emissions related to coal mining activities in Mexico were 2.353 MMTCO₂e in 2010 (USEPA, 2012). Coal emissions across all sectors increased by 217.4 percent between 1990 and 2014. Mexico ranks 21st in CMM emissions globally and is likely to reach 2 MMTCO₂e by 2020 (USEPA, 2012; IEA, 2017).
- The coal mines of northern Mexico are known to be gassy, with the Esmeralda and Sabinas basin mines among the gassiest. Internationally, the accepted standard for a "gassy" mine is approximately 10 m³ per tonne.
- Mexico's 2015 Biennial Update Report to the United Nations Framework Convention on Climate Change (UNFCCC) noted that total GHG emissions increased 49.2 percent between 1990 and 2012 (UNFCCC, 2015), with energy responsible for nearly 500 MMTCO₂e worth of emissions (USAID, 2017).
- Recent estimates by Mexican experts suggest that combined emissions from coal mines total 208 million m³ of methane, equating to an average specific emissions rate of 50 m³ of methane per tonne of coal mined (Santillan-Gonzales, 2013; CDM, 2014).

- MINOSA proposed a CMM capture project in 2015 that would produce 7.95 MW of power from captured CMM emissions; however, the project is still in its planning stages (CDM, 2015).

21.2.2 CMM EMISSIONS FROM ABANDONED COAL MINES

- MINOSA estimates emissions from closed mines to be 4.1 million m³ per year. The company seeks to eventually harness this natural gas for power production that can be sold on the electric grid (Santillán-Gonzalez, 2010).
- No definitive data on national abandoned mine methane emissions are available.

21.2.3 CBM FROM VIRGIN COAL SEAMS

- Mexico's CBM reserves are estimated at between 120 billion m³ and 210 billion m³, with the Coahuila Basin being the most promising for development (APEC Energy Working Group, 2018).

21.3 Opportunities and Challenges to Greater CMM Recovery and Use

21.3.1 MARKET AND INFRASTRUCTURE FACTORS

- In 2014, the PEMEX-held monopoly of hydrocarbon production was broken up as part of reforms within the energy sector. The new state-run company, CENAGAS (Centro Nacional de Control del Gas Natural), was created to “manage, administer and oversee the operations, transportation, and storage of natural gas on a national level” (Worldfolio, 2016).
- CENAGAS inherited 9,000 kilometers of pipeline from PEMEX and is expected to more than double this distance of pipeline by 2019 (Worldfolio, 2016). CENAGAS manages Mexico's Integrated National Natural Gas Transportation and Storage System, also known as SISTRANGAS, which currently has 6,256 miles of pipeline and a total transportation capacity of 6.3 billion cubic feet per day (EIA, 2017).
- Currently, all proposed CMM utilization projects are limited to coal mine operations and local power generation, and not to pipeline sales.
- Market access for CMM may be bolstered by the 2014 reforms that granted access to hydrocarbon resources and pipeline capacity to additional market players beyond the traditional state-run PEMEX monopoly. These reforms may be undermined, however,

by Mexico’s current administration strongly favoring the continuation of state-driven, as opposed to private, growth in the energy sector (NGI, 2018).

21.3.2 GOVERNMENT POLICY AND REGULATORY INFORMATION

- Mexico is a signatory to the UNFCCC, the Kyoto Protocol, and the Paris Climate Agreement (Table 21-3). As a Non-Annex I Party to the Kyoto Protocol, Mexico has no national emissions targets but is eligible to host mitigation projects under the Clean Development Mechanism (CDM). As of August 2019, Mexico has 192 registered CDM projects, one of which targets CMM/CBM (UNEP DTU, 2019).

Table 21-3. Mexico’s Climate Change Mitigation Commitment

Agreement	Signature	Ratification
UNFCCC*	June 13, 1992	March 11, 1993
Kyoto Protocol**	June 9, 1998	September 7, 2000
Paris Climate Accord***	April 22, 2016	September 21, 2016

Sources: * UNFCCC (2007b), ** UNFCCC (2007a), *** UN (2016).

- Mineral exploration and mining in Mexico are regulated by the Mining Law of 1992 (as amended in 2006), which establishes that all minerals found in Mexican territory are owned by the Mexican nation, and that private parties may exploit such minerals (except oil and nuclear fuel minerals) through mining licenses or concessions, which are granted by the Federal Government.
- In 1992, passage of the Mexican Mining Law allowed 100 percent private ownership of coal mines by both Mexican interests and foreign mining companies.
- Mexico has committed to reducing GHG emissions by 22 percent and coal by 51 percent by 2030 (IEA, 2016).
- In 2013, the Mexican government approved changes to Articles 25, 27, and 28 of Mexico’s Federal Constitution; along with numerous regulations to encourage private investment in extraction and exportation of oil and gas resources. The passage of this legislation, along with the potential to tap into burgeoning international carbon markets, should provide added incentives for CMM and CBM development.
- The “Safety for Underground Mines” (NOM-STPS-032-2008) law, passed in 2008, contains rules for obtaining permits and authorizations that grant the use and recovery of coal mine gas (Briseño, 2009; Cabrera, 2009). The Secretaria de Energía (SENER), through the agency known as CENAGAS, is in charge of authorizing and monitoring

CBM/CMM activity; and issues permission for the recovery, utilization, and pipeline transport of CBM.

- Mexico's General Law on Climate Change in 2012 created a national registry for GHG emissions and granted authority to establish a voluntary emissions trading scheme with an initial reporting threshold of 25,000 tons of CO₂e. CMM, CBM, and abandoned mine methane have the potential to enter into the emissions trading scheme as emissions offsets that are likely to be administered by the Climate Action Reserve or other designated registry.

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