

# COAL MINE METHANE PROJECT OPPORTUNITY

## MIMOSA CMM Project

### Minera del Norte, S.A. de C.V.

### Sabinas Basin, Coahuila, Mexico

#### OVERVIEW OF COAL MINE METHANE PROJECT:

Minera del Norte S.A. de C.V. (Minosa) is the largest coal producer in Mexico. The Mimosa unit is situated in Coahuila State, mainly over the Sabinas and Saltillo Basin, across 3 operational mines. Coal production in 2010 was 4.5 million tonnes and 5.1 million in 2011. The mined coal is entirely used by Altos Hornos de Mexico for the production of steel. The three mines for this project activity are Mine 5 'La Esmeralda', Mine 6 and Mine 7. Mine 5 and 6 are situated in Sabinas Basin, and mine 7 is situated in Saltillo Basin, all in Coahuila State.

The Micare unit sells the coal to CFE to produce 10% of Mexico's electricity. Both units also have a VAM project. This project activity involves four active mines and will involve four additional mines in the future. Two of the mines are in Micare and the remaining are at Mimosa.

**ESTIMATED ANNUAL EMISSION REDUCTIONS: 52.5 MMTCO<sub>2</sub>E**

#### PROJECT DETAILS

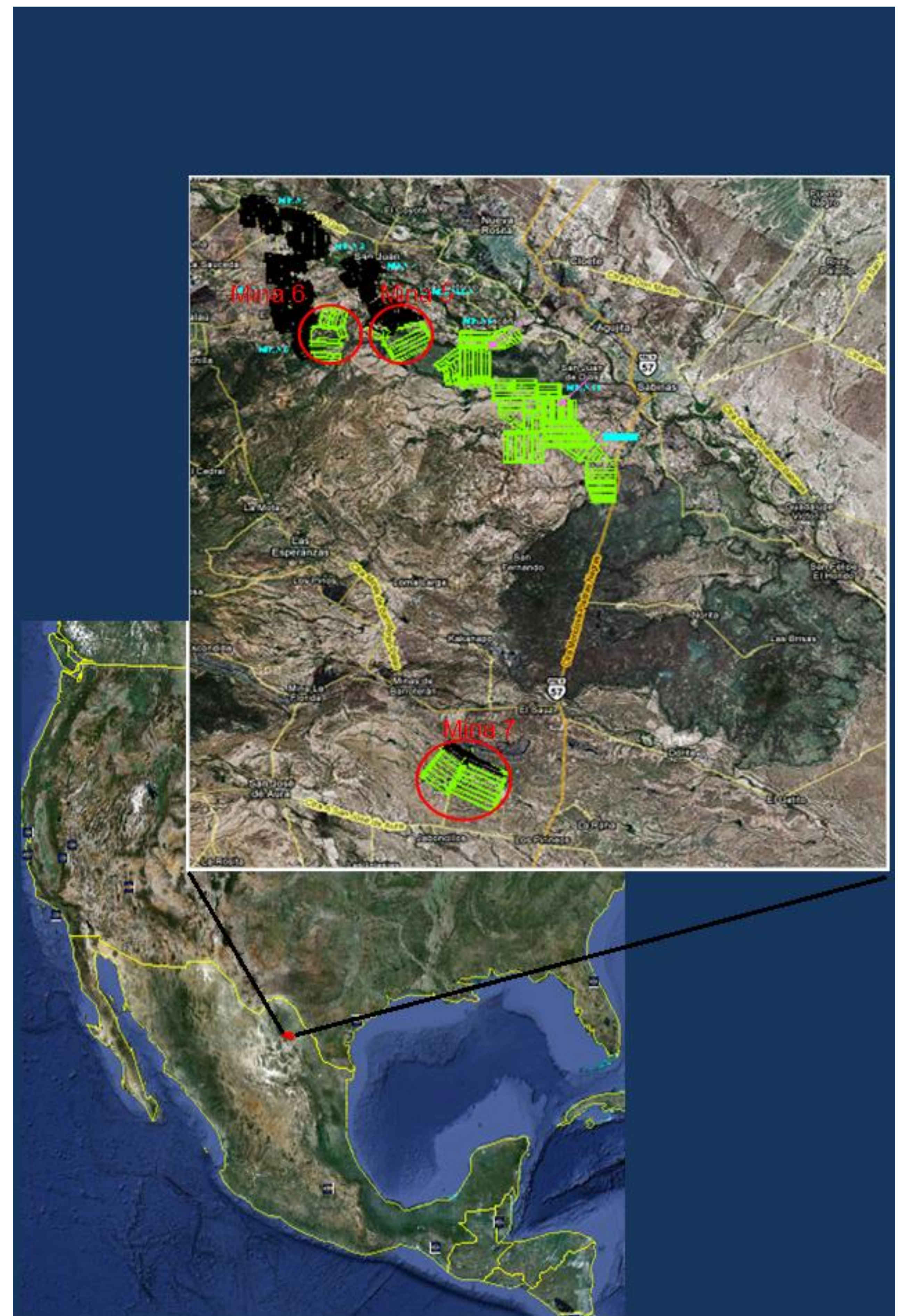
- Name of Project: MIMOSA COAL MINE METHANE PROJECT
- Name of Mine: MINERA DEL NORTE, S.A. DE C.V.
- Type of Ownership: Private
- Type(s) of assessments performed: Full-scale feasibility
  - When performed: 2010
  - By whom: BCS

#### MINE INFORMATION

- Mine owner: MINERA DEL NORTE, S.A. DE C.V.
- Percent ownership: 100 %
- Status and type of mine: Underground mine (active)
- Mining Method: Longwall
- Service Life of Mine: 7 years

#### PROJECT FINANCES

- Projected capital costs: US\$ 70,000,000
- Projected operation and maintenance (O&M) costs for fully implemented project: US\$ 7,090,000 USD
- Estimated Return on Investment (ROI): 2 years





# HISTORICAL AND PROJECTED MINE DATA

## HISTORICAL COAL PRODUCTION AND METHANE EMISSIONS

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<i>Coal (tonnes/yr)</i>	4,877,380	4,557,356	3,731,072	2,712,017	2,464,274	2,307,801	3,053,213	3,950,622	3,310,986	3,831,178	4,453,816	5,126,114
<i>Methane (Mm<sup>3</sup>/yr)</i>												
Emitted from ventilation system(s)	137,438,	132,331	113,101	82,976	109,226	130,012	119,773	103,769	117,551	136,366	156,329	176,798
Liberated from drainage systems	9,960	5,631	9,149	10,015	4,823	13,631	14,809	14,380	2,821	8,308	10,142	11,470
Vented to atmosphere	9,960	5,631	9,149	10,015	4,823	13,631	14,809	14,380	2,821	8,308	10,142	11,470
Total Methane Emissions	147,398	137,963	122,251	92,992	117,610	143,643	134,582	118,149	120,983	144,675	166,472	188,269

## PROJECTED COAL PRODUCTION AND METHANE EMISSIONS

YEAR	2012	2013	2014	2015	2016	2017	2018	2019
<i>Coal (tonnes/yr)</i>	8,024,824	8,859,220	8,220,449	11,941,263	11331515	8813,742	9197478	9938732
<i>Methane (Mm<sup>3</sup>/yr)</i>								
Emitted from ventilation system(s)	198,417	201,540	210,110	231,234	211,839	145,614	160,194	256,063
Liberated from drainage systems	9,720	22,680	22,680	38,556	38,556	38,556	23,976	23,976
Vented to atmosphere	9,720	22,680	22,680	38,556	38,556	38,556	23,976	23,976
Total Methane Emissions	208,137	224,220	232,790	269,790	250,395	184,170	184,170	280,039

# GREENHOUSE GAS EMISSION REDUCTIONS

## ESTIMATED GHG EMISSION REDUCTIONS AND TOTAL VOLUME OF METHANE ALREADY RECOVERED/UTILIZED

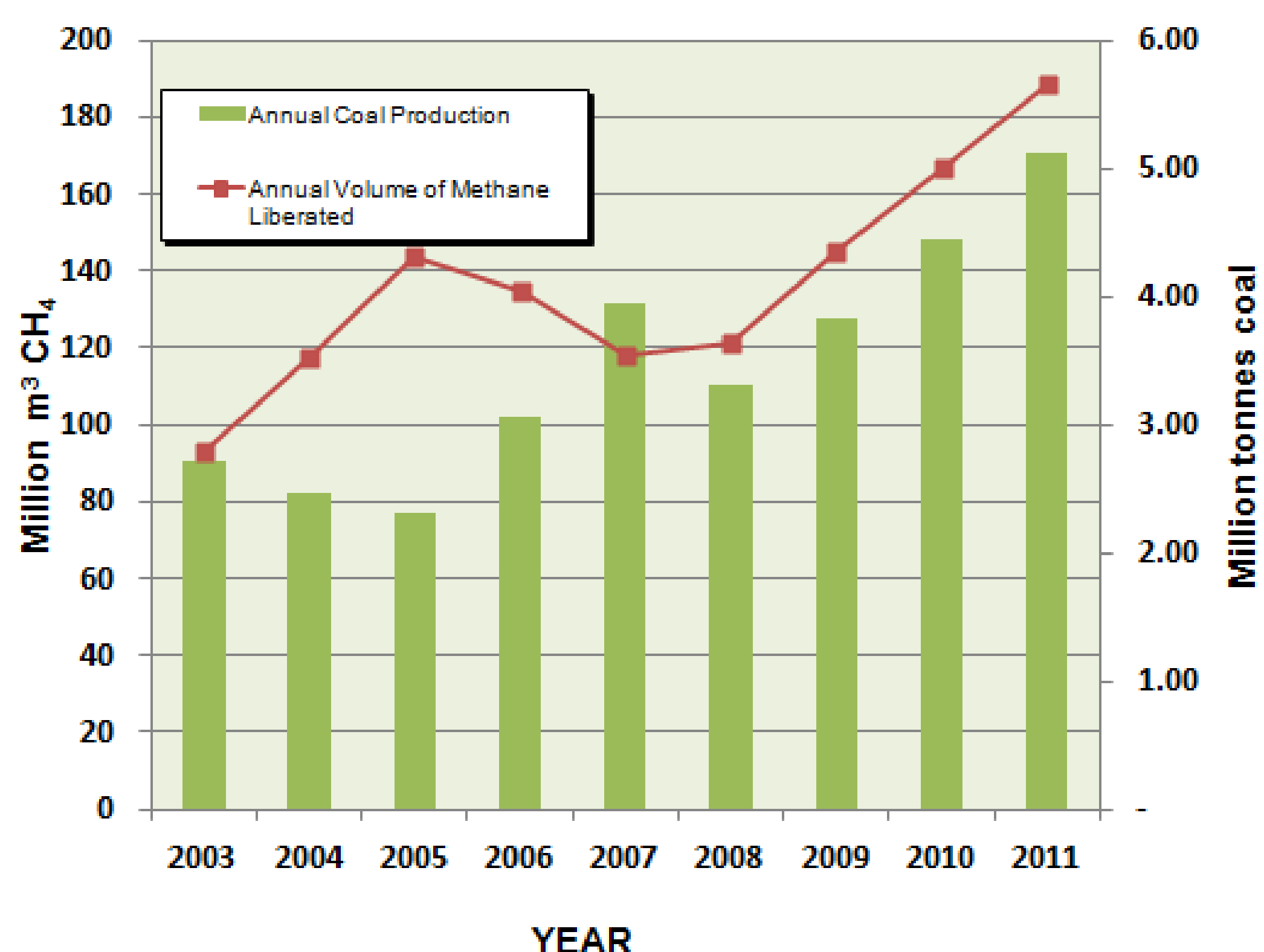
YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total CH <sub>4</sub> vented (ave. m <sup>3</sup> /min)	0	0	0	0	0	0	0	0	0	0	0	0
Average CH <sub>4</sub> concentration	0	0	0	0	0	0	0	0	0	0	0	0
Total CH <sub>4</sub> recovered and utilized (m <sup>3</sup> /year)	0	0	0	0	0	0	0	0	0	0	0	0

## TOTAL VOLUME OF METHANE EXPECTED TO BE RECOVERED/UTILIZED

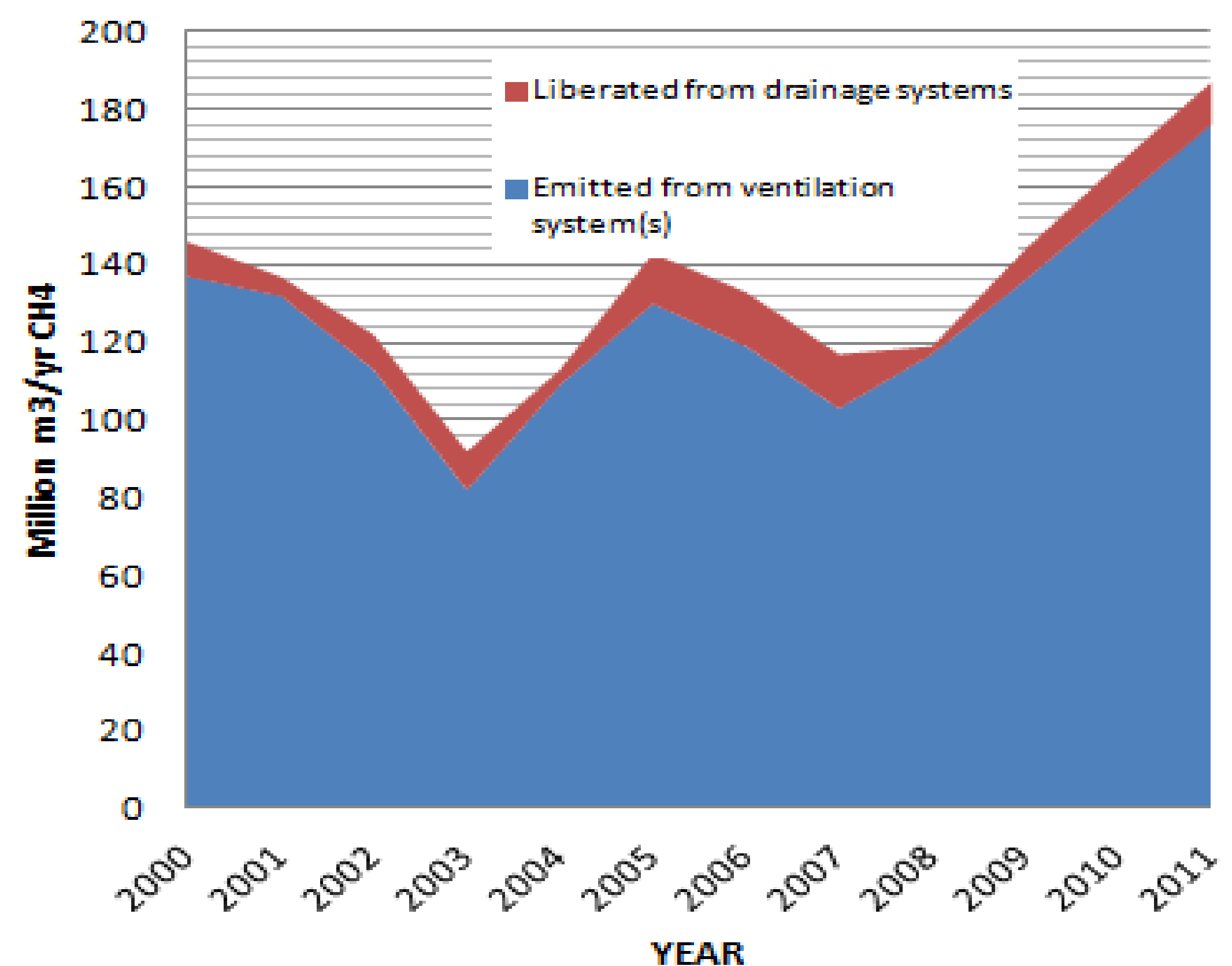
YEAR	2012	2013	2014	2015	2016	2017	2018	2019
Total CH <sub>4</sub> recovered and utilized (m <sup>3</sup> /year)	9,720,000	22,680,000	38,556,000	38,556,000	38,556,000	38,556,000	23,976,000	23,976,000

# COAL PRODUCTION AND METHANE EMISSION CHARTS

**Annual Coal Production and Methane Liberated at MIMOSA Coal Mine**



**Methane Available for Use at MINOSA Coal Mine**





## MARKET ANALYSIS / DEMAND ANALYSIS

The MINOSA mine will use power generation at the mine for self consumption. The proposed power generation project will offset 7 MW of electricity consumed by the mine and improve overall operating costs.

### TYPE(S) OF ASSISTANCE SOUGHT

- Financial Assistance: \$10 US million for internal combustion engines for the flare system; \$33.3 US million for methane destruction with VAM technology; and \$95.65 US million for power generation.
- Technical Assistance: For power generation and methane destruction using VAM technology.

### PROPOSED TECHNOLOGIES

Proven technology installed at the MIMOSA mines



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