

COAL MINE METHANE TO ELECTRICITY IN COLORADO

EVENT & SPEAKERS

July 9 th , 2013 Commissioner Information Meeting	<i>Loretta Pineda</i> - Director, CO Division of Reclamation Mining and Safety <i>Will Allison</i> – Director, Air Pollution Control Division, CDPHE <i>Ronald Collings</i> , P.E. - VP and Senior Engineer, Ruby Canyon Engineering <i>Tom Vessels</i> – President, Vessels Coal Gas, Inc.
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PURPOSE AND CONTENT

With the passage of Senate Bill 13-252 making Coal Mine Methane (CMM) an “eligible energy resource” under the renewable energy standard, the PUC Commissioners desired a greater understanding of the context for qualifying projects. Speakers provided information about the sources and magnitude of coal mine methane, the regulatory framework governing coal mines and methane, and the complex challenges involved in pursuing coal mine methane-to-electricity projects.

Other states that include CMM as renewable or alternative energy include PA, WV, OH, IN, & UT

ELECTRIC GENERATION POTENTIAL

At a minimum, 35 megawatts (MW), enough electricity to power 5,000 homes per year, could be generated from currently drained gas at three Colorado mines with significant methane emissions (Bowie No. 2, Elk Creek & West Elk).

This assumes project viability at about \$1-1.5 million per MW.

Future potentially gassy mines include:

- Redcliff Mine in Mesa County
- Oak Mesa mine in Delta County (Oxbow Mining)

Estimates vary widely and depend on a variety of underlying assumptions. Each mine must be evaluated individually.

COAL MINES IN COLORADO

Colorado Coal Mine Statistics	Number
Mines Producing Coal	9
Underground Mines	6
Surface Mines	3
Other Active Mines (including prospecting)	157
Abandoned Coal Mines	~1000



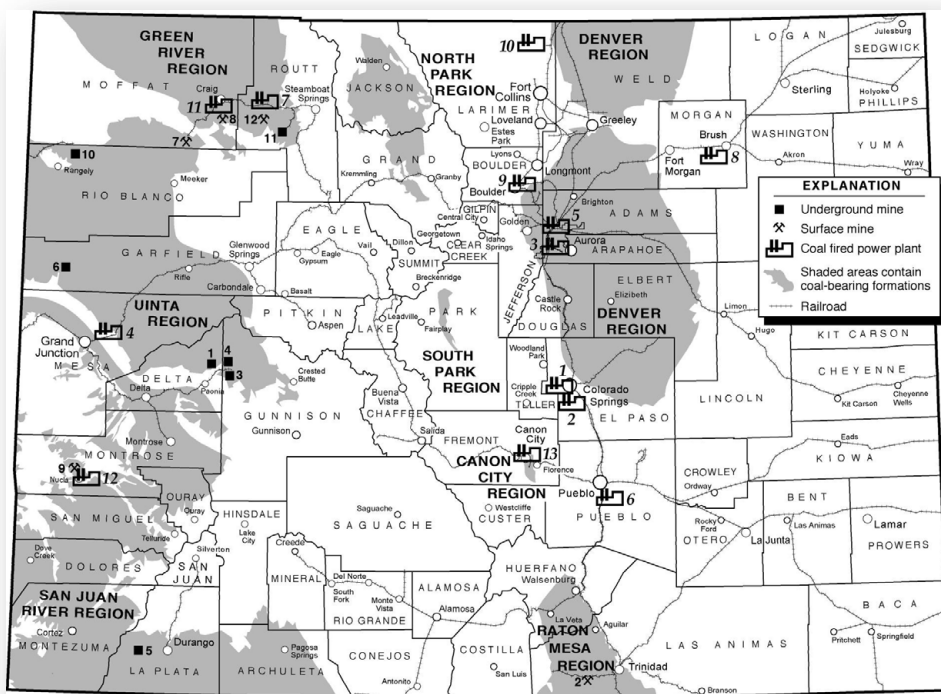
Active Vent Well at Bowie No. 2 Mine in Delta County

METHANE REGULATION

EPA recently denied a petition to directly regulate methane emissions from coal mines (April 2013).

The Colorado Department of Public Health and Environment (CDPHE) regulates Greenhouse Gases (GHGs) via Prevention of Significant Deterioration (PSD) and Title V Operating Permits, required if emissions exceed 100,000 tons/year CO₂ equivalent. Three Colorado coal mines have applied for Title V permits:

- Bowie #2
- Elk Creek
- West Elk



CO COAL MINE METHANE ESTIMATED EMISSIONS

Colorado Mines	Methane (CH ₄) (million cubic feet per year)	CO ₂ equivalent (metric tons per year)
Active Coal Mining	16,402.3	6,634,082
Abandoned Coal Mines	2,229.8	901,868
TOTAL	18,632.1	7,535,950*

Source: Greenhouse Gas (GHG) Inventory Update from EPA's State Inventory Tool (2010 data)

*For context, CO₂ emissions from Colorado's electric power sector were about 40 million metric tons in 2010.

METHANE FROM ACTIVE UNDERGROUND MINES

Mine	Owner	Location (County)	Methane (CH ₄) (million cubic feet per year)	CO ₂ equivalent (metric tons per year)
Foidel Creek	Peabody Twentymile Mining	Oak Creek (Routt)	46	18,517
Deserado	Blue Mountain Energy	Rangely (Rio Blanco)	53	21,296
Bowie No. 2	Bowie Resources	Paonia (Delta)	725	293,205
West Elk	Mountain Coal Company	Somerset (Gunnison)	2,747	1,110,757
Elk Creek	Oxbow Mining	Somerset (Gunnison)	5,852	2,366,742
TOTAL			9,423	3,810,518

Source: Updated data courtesy of Ron Collings, Ruby Canyon Engineering. Compiled for EPA for 2011.

THE ELK CREEK MINE PROJECT IN GUNNISON

- Project partners comprise a diverse group of companies.
- Generating 3 MW of electricity; bought by Holy Cross Energy under a power-purchase agreement.
- Estimated total cost of \$6.6 million as of April 15, 2013.



LESSONS LEARNED

- Talk to Colorado Department of Public Health and Environment (CDPHE) about permitting issues up front.
- Start small if necessary to get the first project off the ground.
- Promote inter-agency communication and coordination to address jurisdictional issues.
- Research mineral estate ownership to ensure project viability. Generally, the following is the case:
 - For active mines, coal estate includes methane
 - For inactive mines, oil/gas estate prevails

MORE INFORMATION

Speakers' slide decks are available on the Commission's website:

https://www.dora.state.co.us/pls/efi/EFI.Show_Docket?p_session_id=&p_docket_id=13M-001AGENDA