



## **Emerging U.S. Greenhouse Gas Policy**

*Implications for Coal Mines and Coal Mine Methane Project Development*

*2009 U.S. EPA Coal Mine Methane Conference*

*Presented by Marisa Buchanan*

*September 30, 2009*

# Introduction to Verdeo



*Verdeo identifies, develops and monetizes emission reduction opportunities...*

*...and is backed by leading institutional investors*

## Our Business

- We provide carbon asset development solutions to companies with high-value emission reduction opportunities, primarily in the Mining and Oil & Gas sectors
- We act as a systems integrator to help catalyze the adoption of new methane emission reduction technologies in these sectors
- We work with some of the leading mining companies with large methane gas assets, and are actively developing some of the first pre-compliance grade emission reduction projects in the U.S.
- We have offices in Washington, DC, Austin and Denver, and have a team of professionals that consist of engineers, and experts in project finance, policy, and carbon monetization

## Our Investors



WOLFENSOHN & COMPANY

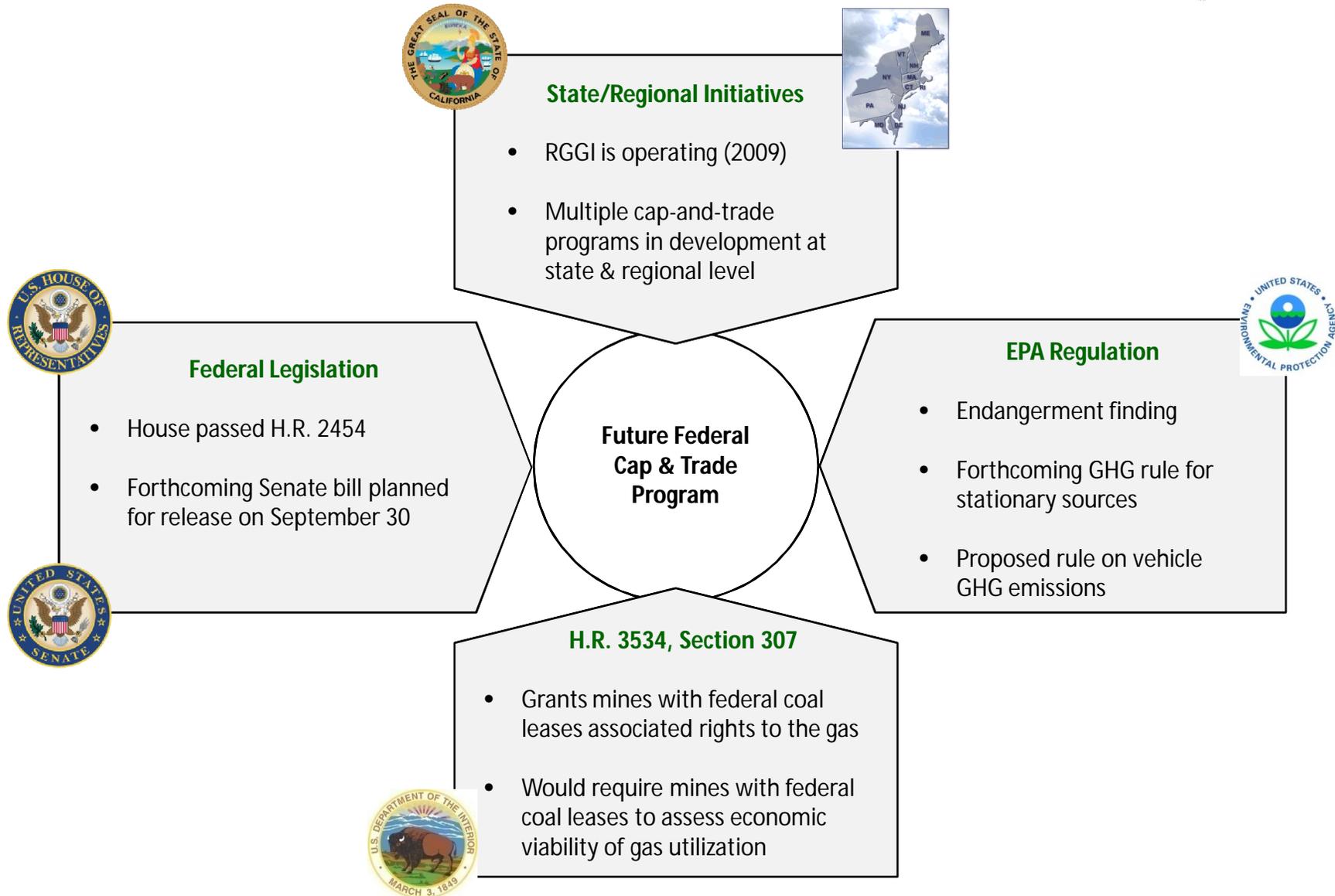
## Executive Summary

- There are a number federal, state and regional policy initiatives underway that should eventually result in a federal GHG cap & trade program
  - Even if Congress does not pass a bill in 2009, passage in 2010 or 2011 is probable
- Coal mines, which will likely be an uncapped sector, have a significant market opportunity to generate carbon offsets
  - The largest customers of coal mines will be capped and will drive demand for offset credits
- Many coal mines have already put in place mechanisms to capture this market through development of offset generating assets
  - Leaders already have carbon offset projects registered or under development
  - Projects can be very profitable with short pay-back terms
- Verdeo, using an adaptable and flexible business model, has partnered with numerous mines to form portfolio-wide strategies, and is developing projects for these mines to realize the value of their assets

# Agenda

- **Overview of GHG legislative and regulatory policies**
- The carbon opportunity for coal mines under cap-and-trade
- Why coal mines are taking action today
- How Verdeo is positioned to help coal mines realize value

# Overview of Key Policy Forces at Play



## Status of Congressional Action



### House of Representatives

*Passed the American Climate and Energy Security Act (ACESA) on June 26*

- Would establish a federal, economy-wide cap-and-trade program for GHG emissions
- Relies heavily on a robust carbon offset program to provide cost-containment
- Establishes “early action” program to recognize offset credits generated under eligible certification programs before implementation of the ACESA
- Includes Section 811, which would impose regulatory performance standards on coal mines (would disqualify mines from offset generation)



### The Senate

*Expected to release a GHG cap-and-trade bill on September 30*

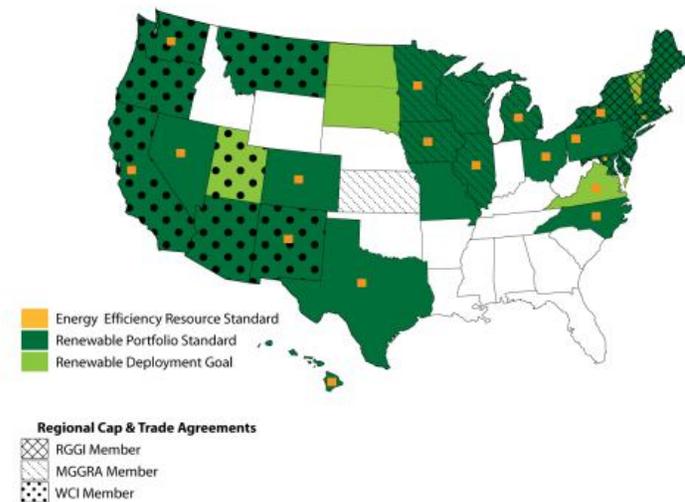
- Effort is led by the Environment and Public Works (EPW) Committee, chaired by Senator Boxer (D-CA)
- The bill is expected to resemble the ACESA, but could include differences such as a “collar” on the price of allowances
- A prominent group of Senate Democrats have weighed in by providing legislative recommendations on coal research and technology
- Numerous Senators have expressed support for eliminating Section 811 – has been called a “non-starter”

# State and Regional GHG Program Development

*States and regions are moving forward on the design and implementation of mandatory cap-and-trade programs*

Compliance Program	Geographic Region	Program Model	Includes Offset Program	Date of Operation
<b>Regional Greenhouse Gas Initiative (RGGI)</b>	CT, DE, ME, MD, MA, NH, NJ, NY, RI, VT	Cap-and-trade	Yes	Operating (2009)
<b>Western Climate Initiative (WCI)</b>	AZ, CA, MT, NM, OR, UT, WA (US) and BC, MB, ON, QC (CAN), plus 13 observers (US, CAN, MEX)	Cap-and-trade	Yes	2012
<b>Midwest Regional GHG Accord</b>	IL, IA, KS, MI, MN, WI, MB (CAN)	Cap-and-trade	Expected	2012 (May be postponed)
<b>State of California</b>	CA	Cap-and-trade	Yes	2012

**Regional & State Actions on Climate Change**



*Chart excerpted from the World Resources Institute*



# Federal Regulatory Action

*Federal regulation of GHG emissions under the Clean Air Act is moving forward*

- The EPA just finalized its GHG Reporting Rule
  - Goal is to collect data that would inform development of GHG policies
  - Decided to hold off on finalizing a reporting rule for underground coal mines and suppliers of coal
- The EPA is close to finalizing the endangerment finding
  - Would formalize EPA's finding that GHG emissions endanger public health and welfare
- The EPA has released a proposed rulemaking setting GHG and fuel economy standards for motor vehicles
  - By model year 2016, the rule will require the nation's fleet vehicle to achieve an average efficiency of 35.5 MPG
  - EPA expects to finalize the rule in March 2010
- The EPA is close to proposing a regulatory rule that would apply PSD rules (prevention of significant deterioration) to stationary sources that emit more than 25,000 tons of CO<sub>2</sub> per year
  - PSD rules require companies to install best available control technology (BACT) to manage pollutants covered under the Clean Air Act

## New Legal Development

### **Overview:**

On September 21, the Second Circuit court issued a long-delayed climate change decision, and held that public nuisance actions can be brought against private emitters of GHG emissions.

### **Consequence:**

- This could lead to more nuisance charges against other emitters.
- This could also lead to more support for Congress to pass GHG legislation so as to "preempt" nuisance lawsuits.

# Progress of Federal and State Action on GHG Policy

Conceptual

Implemented

<p><b>Federal GHG Legislation</b></p>	<ul style="list-style-type: none"> <li>• House passed the ACESA</li> <li>• Senate expected to release Cap &amp; Trade bill September 30</li> </ul>	
<p><b>State and Regional GHG Program Development</b></p>	<ul style="list-style-type: none"> <li>• RGGI is already operating</li> <li>• California's program and Western Climate Initiative are in development</li> </ul>	
<p><b>EPA GHG Regulation</b></p>	<ul style="list-style-type: none"> <li>• Finalizing endangerment finding</li> <li>• Will propose GHG regs. for stationary sources of CO<sub>2</sub></li> </ul>	
<p><b>H.R. 3534, Section 307</b></p>	<ul style="list-style-type: none"> <li>• Very low probability of progressing</li> </ul>	

## What Can We Conclude?

*We are moving toward a future where GHG emissions will be addressed under a federal cap-and-trade program*

"American Electric Power supports the American Clean Energy and Security Act. No legislation is perfect...but we believe this climate bill will work and it represents the best of the available options."

**Michael G. Morris, Chairman, President and CEO, American Electric Power**  
*September 14, 2009*

"This [EPA regulation] is a road we'd rather not go down, but only Congress can steer things in a better direction."

**Dan Reidinger, spokesman for the Edison Electric Institute**  
*Washington Post, April 18, 2009*

"The president has made clear his strong preference that Congress act to pass comprehensive legislation rather than address the climate challenge through administrative action."

**Spokesman for President Obama**  
*CNN, April 17, 2009*

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- **The carbon opportunity for coal mines under cap-and-trade**

- Why coal mines are taking action today

- How Verdeo is positioned to help coal mines realize value

# How Cap-and-Trade Will Affect Different Sectors

*The sectors responsible for generating the largest sources of emissions will be capped*

	Emission Source	2007 Emissions (MMtCO <sub>2</sub> e)	% of Total U.S. Emissions
Sectors and sources likely to be capped for their CO <sub>2</sub> emissions	Electricity Generation	2,397	34%
	Transportation	1,887	26%
	Industry	845	12%
	End Use Consumption of Natural Gas	554	8%
Sectors and sources likely to be offsets	Soil Management (N <sub>2</sub> O)	207	2.8%
	Oil & Gas (CH <sub>4</sub> )	133	1.8%
	Landfills (CH <sub>4</sub> )	133	1.8%
	<b>Coal Mines (CH<sub>4</sub>)</b>	<b>63</b>	<b>0.8%</b>
	Agriculture Manure Management (CH <sub>4</sub> )	44	0.6%
	Wastewater Treatment (CH <sub>4</sub> )	24	0.3%

### Impact on Coal Users

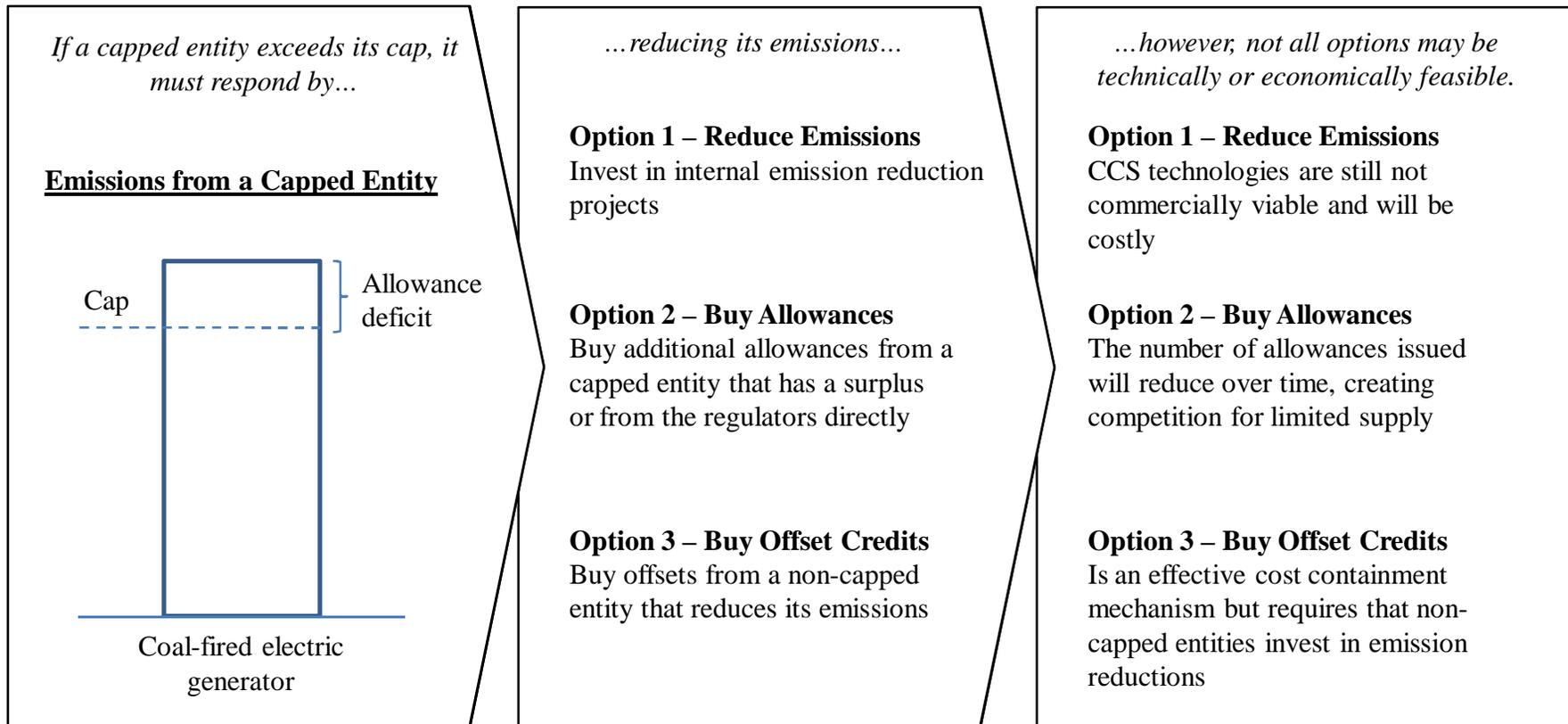
The largest customers of coal mines – electricity generators and industrial users – will be capped sources

### Impact on Coal Mines

Coal mines should not be capped and can provide a source of offset credits for capped facilities

# Options for Compliance

*Cap-and trade is designed to set a price on carbon and allow the market determine how to achieve reductions most efficiently and cost-effectively*

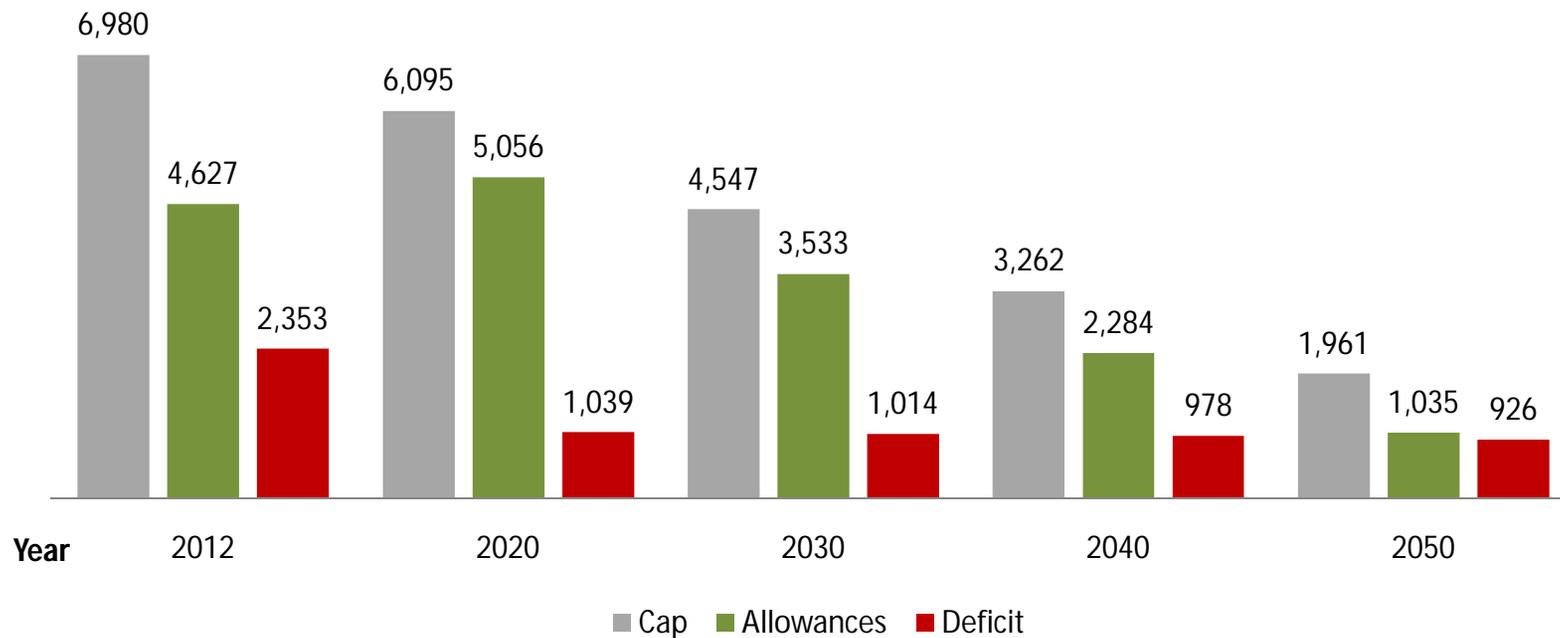


***Because offsets are typically generated at a lower cost of abatement than internal reductions, offsets can significantly reduce the costs of compliance in a cap-and-trade program***

# Scale of GHG Reductions Anticipated

*Capped entities will need access to low-cost offset credits to help meet GHG reduction requirements*

**Emissions Cap And Allowances under the ACESA (MtCO<sub>2</sub>e)**



# Coal Mines Will Be a Preferred Offset Supplier

High  
Volume

A capped electricity generator that needs to buy 300,000 credits could buy offsets from...

*1 coal mine methane project...*



- Simple combustion or gas utilization technology
- Total gas flow at 4,000 cfm @ 60% CH<sub>4</sub>
- \$2-4/ton cost of abatement

OR

*...or 30 manure management projects*

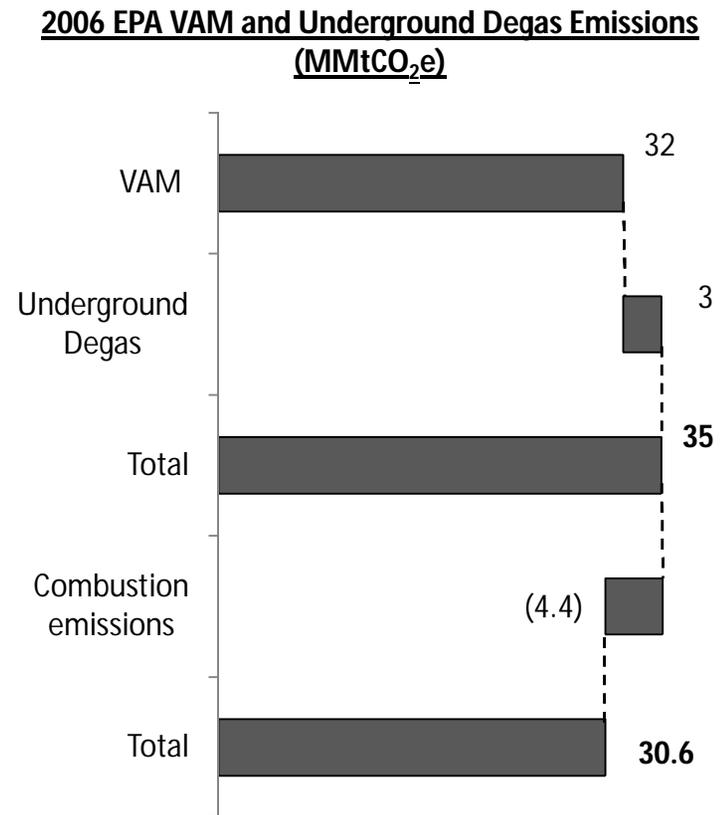
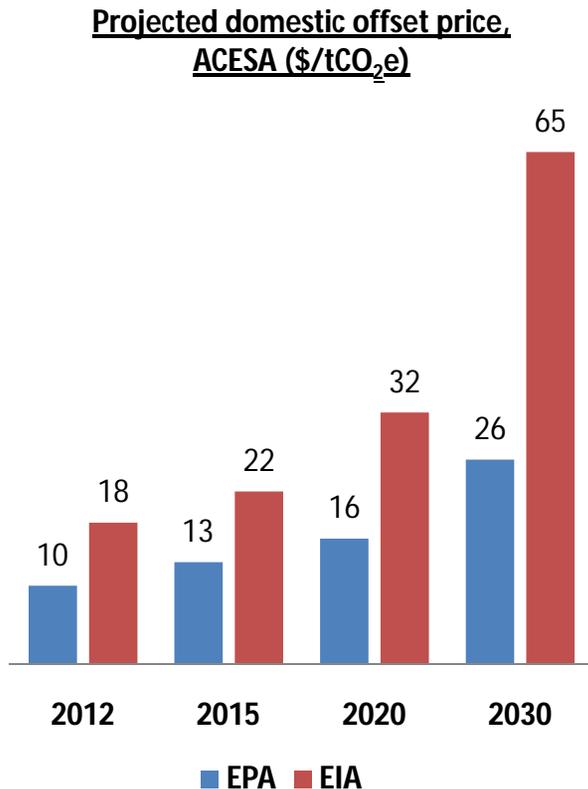


- Anaerobic digester technology
- 30 dairy farms with 2,000 cows/farm
- \$6-20/ton cost of abatement

Existing  
Relationships

- Emitters are the largest customers of many coal mines with long-term supply contracts
- Potential exists to bundle offsets with coal purchases

# The Carbon Opportunity for Coal Mines



Based on an offset price of \$12-\$20 per ton, abating just 50% of VAM and underground degas emissions (15.3 million tons of CO<sub>2</sub>e) leads to a \$183 – \$306 million dollar carbon opportunity per year.

**Over 10 years, this amounts to \$1.8 – \$3.1 billion opportunity for coal mines.**

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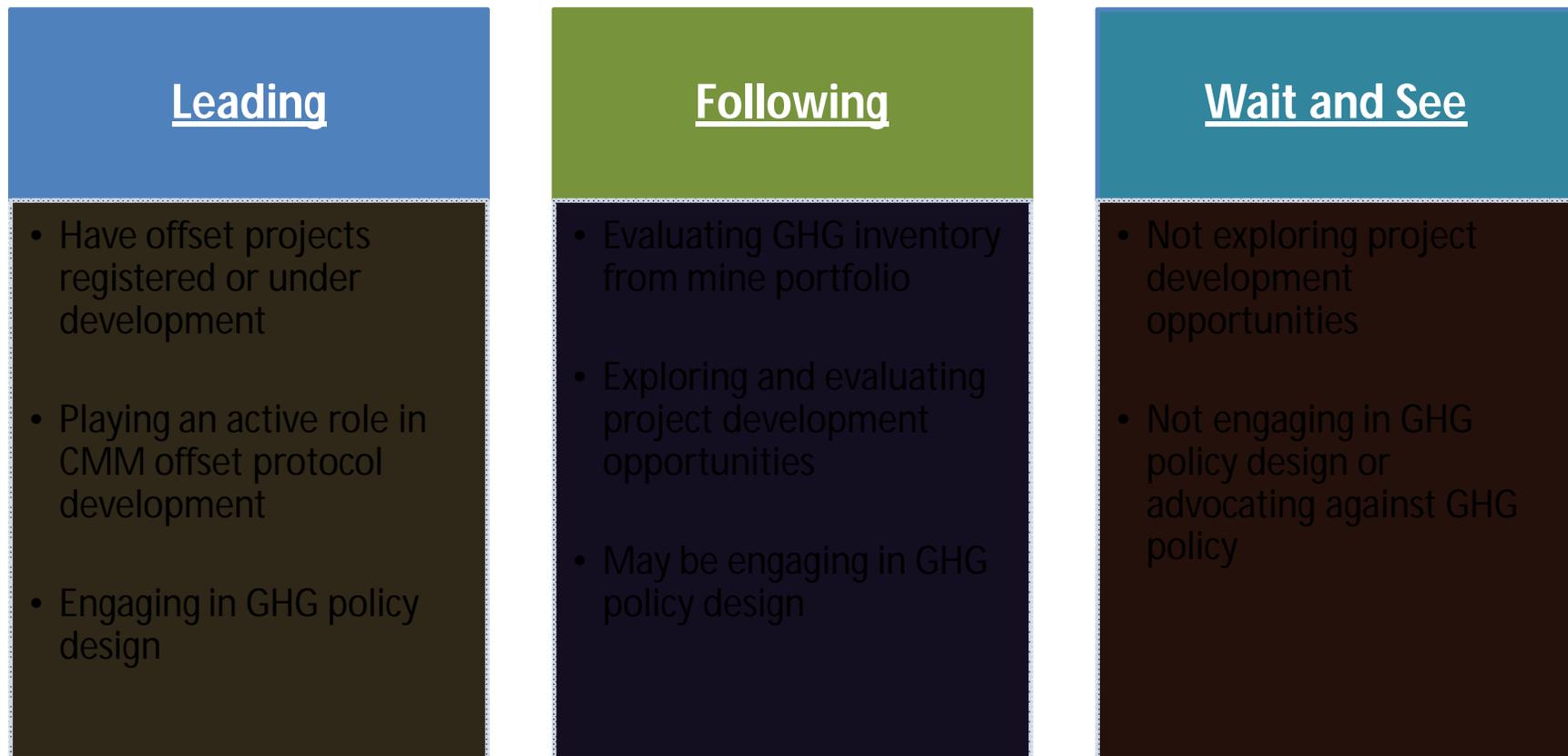
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# Spectrum of Action Among Coal Mines

*Carbon opportunities are turning more coal mines into leaders and fast followers*



# CMM Projects Can Be Highly Profitable

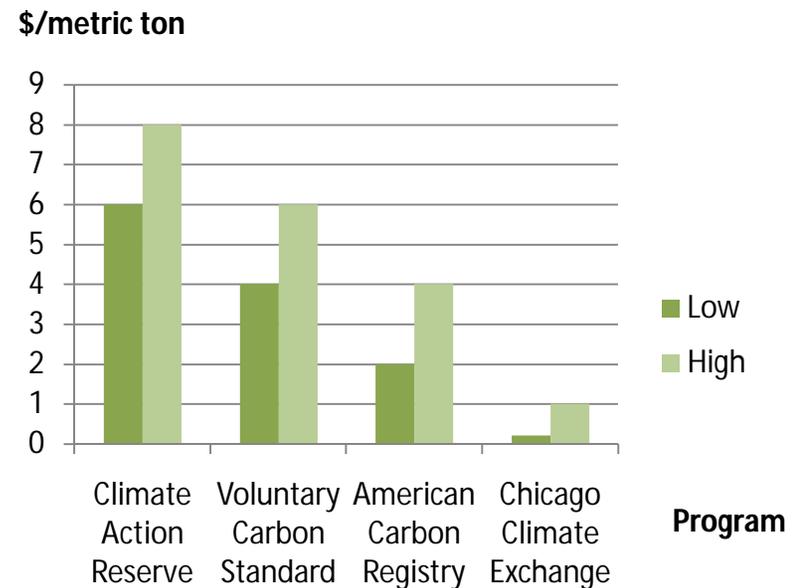
		CH <sub>4</sub> rate (cfm)	Annual offsets (000's tCO <sub>2</sub> e)	EBITDA IRR (%)	
VAM Abatement	a	1280 (0.8% conc.)	220 - 240	27 - 35	
	b	1280 (0.8% conc.)	210 - 230	12 - 15	
Gob Gas Abatement	Incineration	c	~600	70 - 80	35 - 40
		d	~1,500	170 - 200	25 - 30
	Beneficial utilization	e	~1,500	150 - 180	29 - 36
		f	~1,500	180 - 220	30 - 35

## Value of Acting Today

*Offsets generated today may have value in a future GHG cap-and-trade compliance market*

- Cap-and-trade program should include provisions to reward early action
- Under the ACESA...
  - Compliance grade offset credits would be issued for voluntary offset credits registered under the Climate Action Reserve
  - EPA has discretion to recognize the Voluntary Carbon Standard or American Carbon Registry
  - Credits would be issued for reductions generated in 2009 and beyond for a limited duration (2-3 years)
- Early action provisions of a forthcoming Senate bill may be more favorable than those under the ACESA

### Current Carbon Offset Prices



***The market is placing a premium on credits that it believes will be accepted under a future compliance market***

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# How We Work With Coal Mines

*Verdeo can customize its project involvement to suit the needs and specific situation of a mine*

## Verdeo Roles

<b>Mine's interest in investing capital</b>	Low	<p><b>Co-Developer</b></p> <ul style="list-style-type: none"> <li>• Verdeo co-invests in the plant, and manages carbon asset monetization</li> <li>• Plant is planned and designed by both Verdeo and mine</li> <li>• Mine builds and operates the plant</li> </ul>	<p><b>Builder, Owner, Operator</b></p> <ul style="list-style-type: none"> <li>• Verdeo designs, builds, owns and operates the plant</li> <li>• Mine supplies methane gas, developmental and operational support for a royalty</li> </ul>
	High	<p><b>Technology Advisor/ Carbon Expert</b></p> <ul style="list-style-type: none"> <li>• Verdeo provides technology expertise and manages all aspects of carbon asset certification and monetization</li> <li>• Mine builds, owns, and operates the plant</li> </ul>	<p><b>General Contractor/ Turnkey Solution Provider</b></p> <ul style="list-style-type: none"> <li>• Verdeo is primary Project Manager responsible for EPCC and carbon asset certification and monetization</li> <li>• Mine owns and operates plant and provides developmental support</li> </ul>
		High	Low
		<b>Mine's interest in investing non-monetary resources</b>	

## Our Expertise

- By focusing on the coal mining sector, Verdeo has been able to cultivate strong relationships with mining companies and developed a very good understanding of mines' requirements and priorities
- In addition to carbon market and technology expertise, Verdeo also brings deep finance and engineering capabilities

# Example of a Gob Gas Utilization Project

*Coal mines can benefit today from opportunities to implement GHG emission reduction projects*

## Project Overview

- This project involves the collection and destruction/utilization of gob gas from a longwall mine that would otherwise be vented to the atmosphere
- Project will be certified under the Climate Action Reserve
  - Protocol expected for release in October 2009
- Project reduces approximately 225,000 metric tons of CO<sub>2</sub>e per year, which provides valuable revenue stream for the mine
- Gas collected and utilized allows the mine to reduce expenditures on natural gas used onsite



## Phased Approach to Development

- In Phase 1, extracted gob gas is combusted using an enclosed flare
- In Phase 2, carbon offset credits generated from Phase 1 will be used to fund investment in onsite utilization equipment including gas gathering and piping infrastructure

### Verdeo's Role

Verdeo is the **outsourced carbon asset developer** and is jointly designing and developing this gob gas destruction and utilization project, which will be financed with carbon offset credits

## Conclusion

*Carbon is a valuable catalyst for helping coal mines to maximize value from methane assets - today*

- Coal mines face a likely future where limits are placed on GHG emissions
  - Eventual passage of a federal cap-and-trade program is still likely, even if Congressional action is delayed in 2009
- Methane emissions from coal mines will most likely not be a covered source under a cap-and-trade program, but will be addressed under a carbon offset program
  - These projects can provide a valuable domestic source of lower-cost credits, which help to mitigate the costs of a cap-and-trade program
- Mines in the “wait and see” category can start taking steps today to position themselves for carbon opportunities
  - Undertaking a comprehensive inventory of mine methane assets and evaluating project development scenarios is low-risk, and , at best, can identify profitable opportunities

### Verdeo's Value Added

*Verdeo is a carbon asset developer, systems integrator, and capital provider to coal mines. We stand ready to assist coal mines to assess and develop CMM assets and pre-compliance grade carbon offset projects.*

## Please Contact Us

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