CAPTURING AND USING METHANE: CREATING VALUE THROUGHOUT THE COAL MINING LIFE-CYCLE

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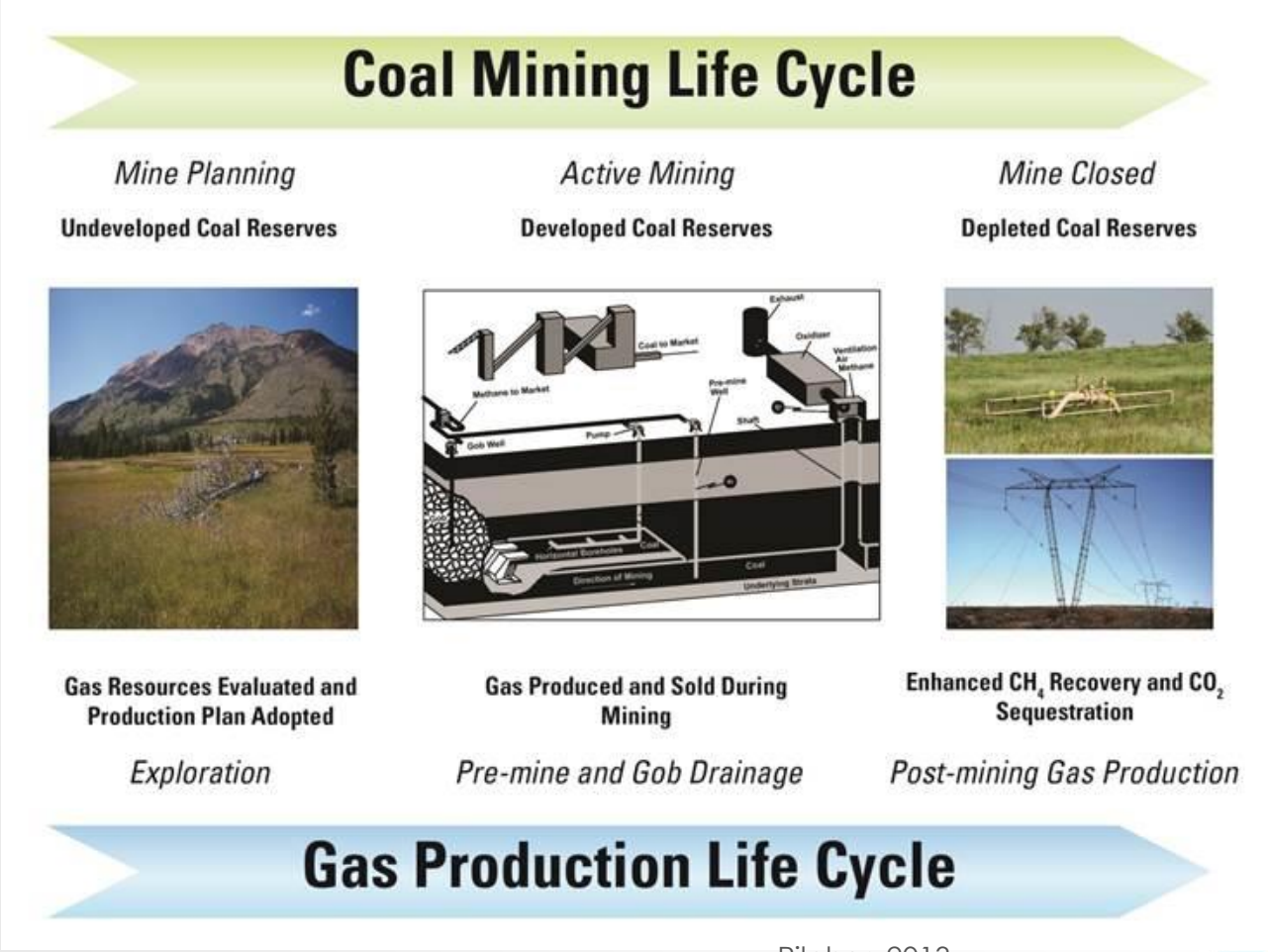
INTRODUCTION

- Coal will continue to be a significant source of energy for both industrialized and developing countries, but the global coal industry must continue to evolve.
- In order to thrive (survive), coal companies will have to adapt to the changing regulatory environment, low energy prices, and assess the impact of its extractive activities on global climate change.
- Although co-located methane and coal are not assessed and evaluated in the same manner by coal companies.
- Methane (CMM, SMM, AMM, VAM) that is extracted from coal mines rarely, if ever, appears as an asset on a mining companies' balance sheet.
- Value of the methane ,resources and reserves need to be systematically classified and documented throughout the coal mining life-cycle in order to bring maximum value to all stakeholders

WHAT ANALYSIS CAN WE PERFORM THAT GUIDES OPTIMIZATION OF CMM PRODUCTION AND MONETIZATION OF ITS VALUE THROUGHOUT THE COAL MINE LIFECYCLE?



Pilcher, 2013

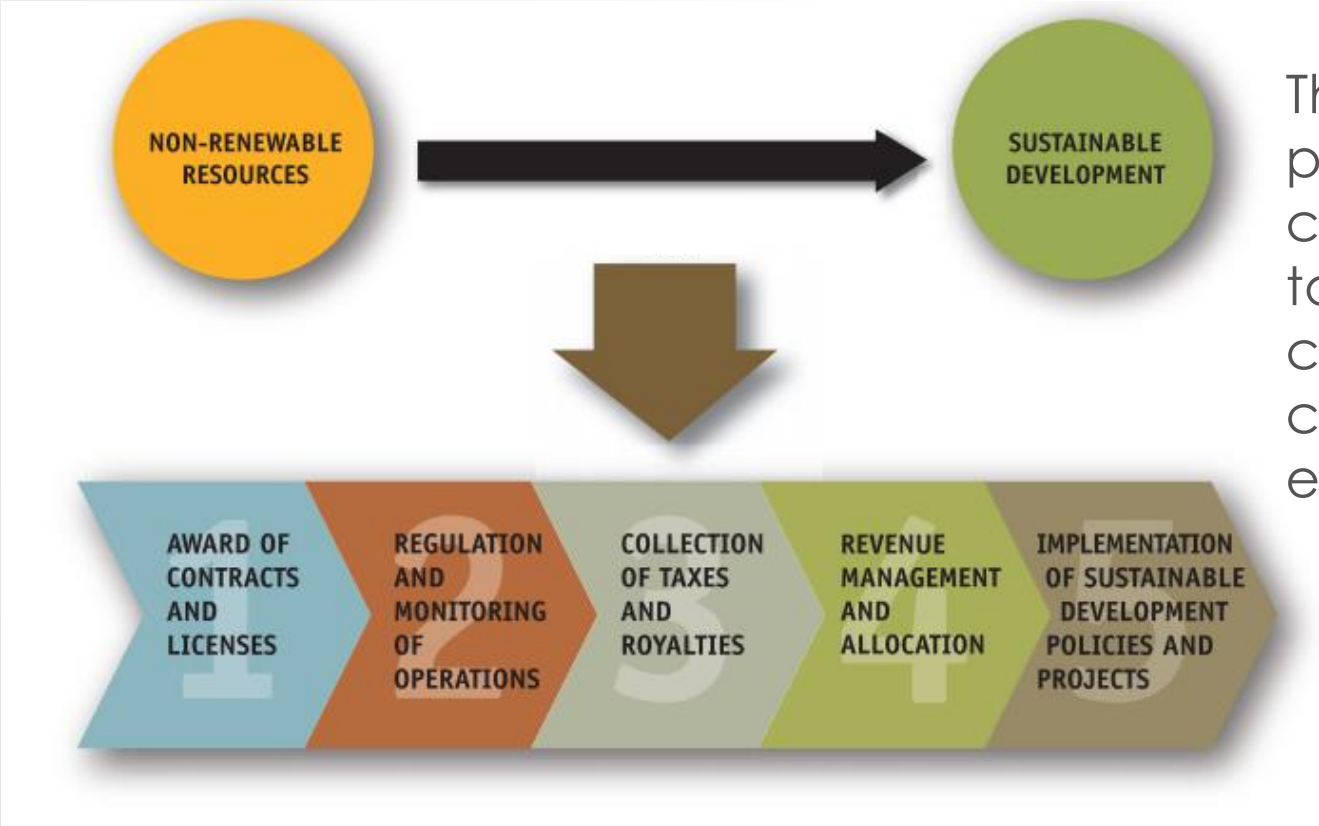
THE VALUE CHAIN CONCEPT

- **Value chain analysis (VCA)** is a tool used to analyze a company's internal activities. The goal is to recognize which activities are the most valuable to the firm and which ones could be improved to reduce costs and increase revenue.
- Devised by a business guru, Michael Porter, in his 1985 book "*Competitive Advantage*", as a systematic approach to determining an effective way of creating a strategy for development that results in a competitive advantage.
- This analytical technique is often used in the manufacturing business but has been used infrequently in the mining industry.

HOW CAN WE USE VALUE CHAIN ANALYSIS TO FIND A SUSTAINABLE PATH FORWARD?

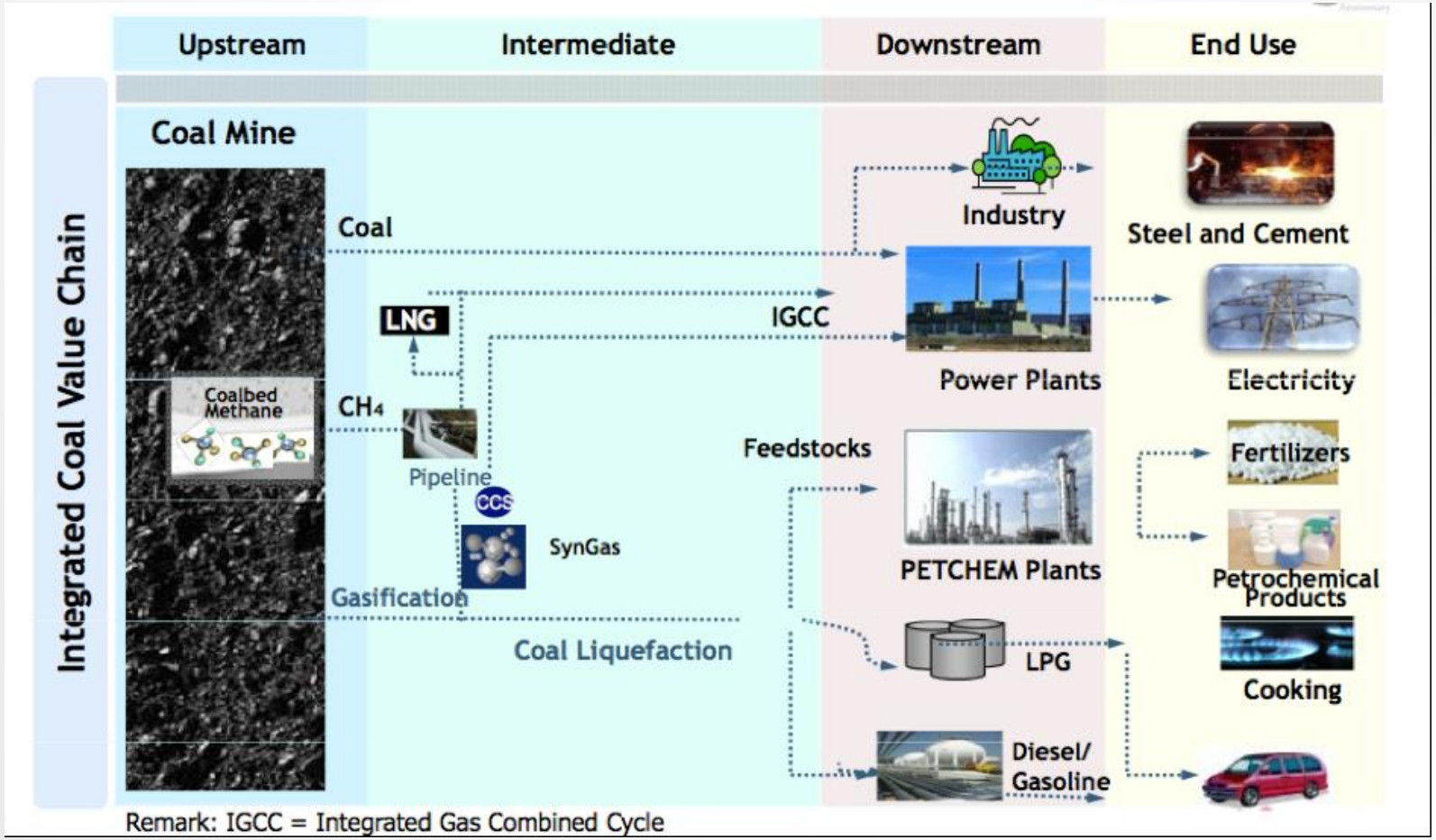
- We can examine the coal mining process to determine ways to add value (and lower costs) at each step — developing a competitive advantage throughout the coal mining lifecycle by co-extracting gas.
- We can use VCA as a window into the thought processes of outside stakeholders.
- We can use VCA as a persuasive tool to argue for improved technology, enabling policy (legislation and regulation), and access to financing.

THE WORLD BANK'S VIEW OF A MINING INDUSTRY VALUE CHAIN



This view is one that is progressively being adopted by countries rich in natural resources to optimize the value of commodity production, reduce conflicts, and protect the environment

VALUE CHAIN DEPICTING CO-EXTRACTING COAL AND GAS RESOURCES



Source: Agus Daniel, 2013 https://agusdaniel.wordpress.com/author/agusdaniel/

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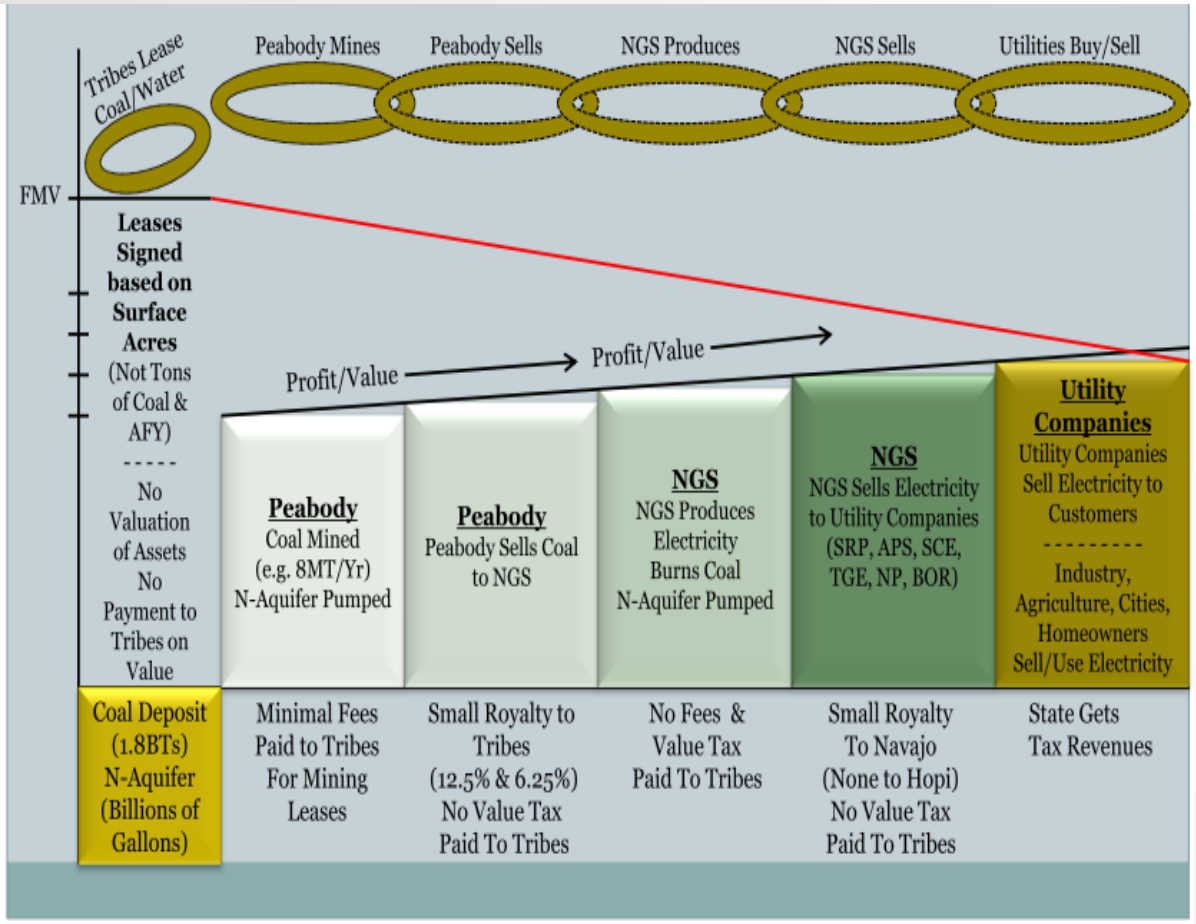
THE VIEW OF A NON-PARTICIPATING STAKEHOLDER



- NGS is the Navajo Generating Station, a 2250 MW powerplant located near Page Arizona on the Navajo Indian Reservation
- Most of the coal that supplies the NGS is mined and the water that is used for mining and transport comes from Navajo lands

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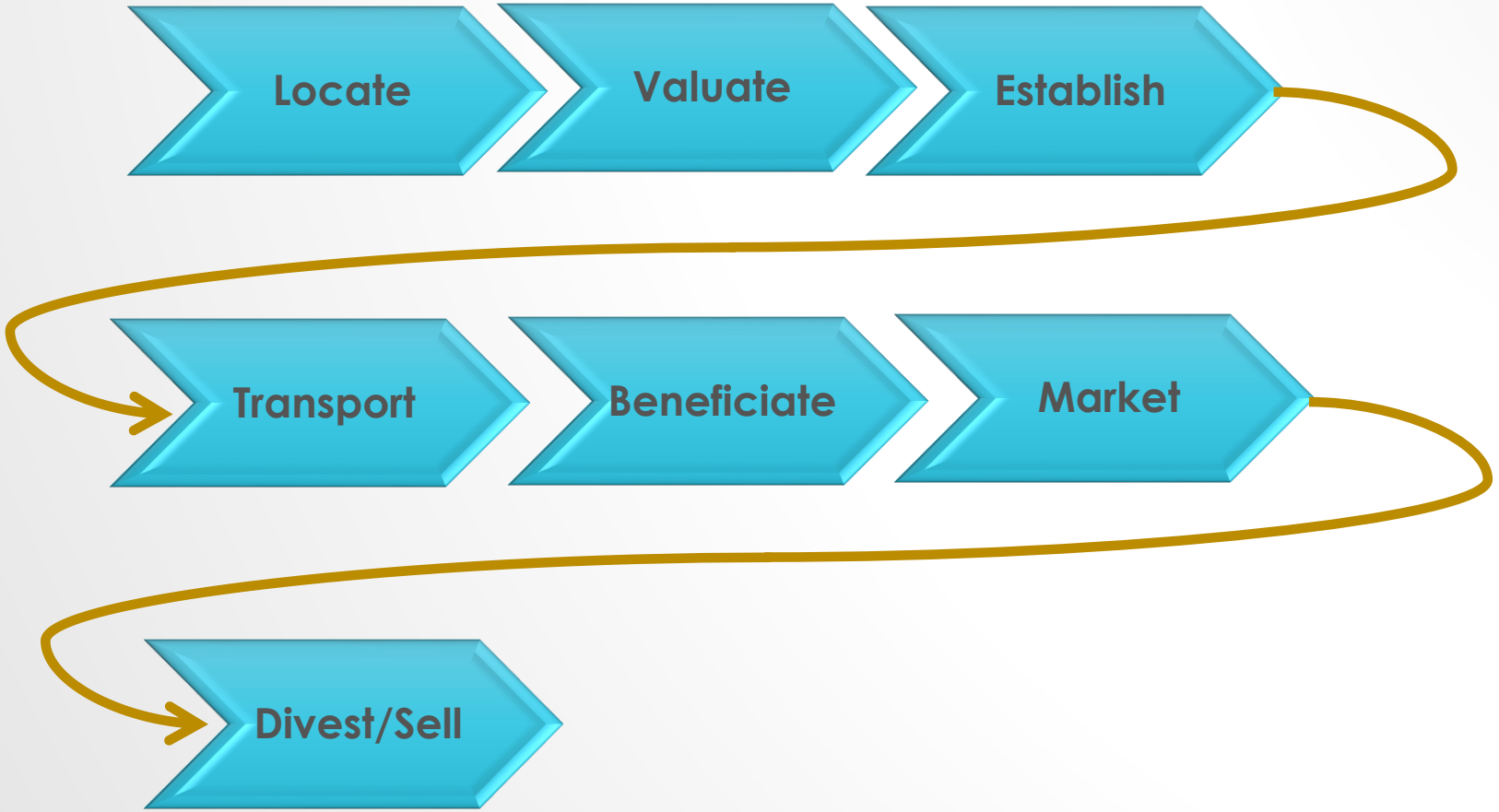
THE IMPACT OF THE VALUE CHAIN ANALYSIS IS DEPENDENT ON THE POINT OF VIEW OF THE ANALYST

- Magnitude of the costs and/or revenues and placement of the activities in the value chain differs and is dependent upon the role and viewpoint of the party performing the analysis.
- A company will view the value chain analysis as a way of finding ways to change or improve the status quo
- Governments and financial institutes may use VCA as a map of the extraction and use of the commodity providing an input to the economy and a tax revenue stream
- A government's environmental regulator or NGO may use VCA to determine pathways to achieve its mandate, such as protecting the environment and encouraging sustainable development. VCA may reveal that environmental and social costs have not been fully recognized and lead to more extensive life-cycle cost analysis.
- Careful comparative analysis can allow all viewpoints to be expressed and considered.

PORTER'S VALUE CONCEPT APPLIED TO MINING



After Vorster, 2000

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OVERVIEW OF THE VALUE CHAIN ANALYSIS FOR A CO-LOCATED COAL AND NATURAL GAS DEPOSIT

Activity	Definition	Input	Output
Locate	Determine extent and magnitude of coal and gas deposit	Suspected location of coal and gas resources	Resource estimates for coal and gas
Valuate	Determine profitability of co-located deposits	Coal and gas resource estimate	Bankable feasibility and "Go—No Go decision"
Establish	Implementation of extraction plan	Bankable feasibility and "Go—No Go decision"	Coal and Gas resources prepared for extraction
Transport	Transport of mined coal and produced gas	Coal and gas moved from mine to surface	Stockpiled coal and stored or transported gas
Beneficiate	Coal is washed and gas is treated	Stockpiled coal and stored or transported gas	Saleable products
Market	Maximization of profit	Saleable products	Revenue and profit
Divest/Sell	Curtailment of operations	Revenue and profit	New Economic circumstances

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CONCLUSIONS

- Value chain analysis can be used to examine the cost and value of activities undertaken to explore for, assess, valuate, produce, market and sell a commodity, including any environmental attributes. It may also may be a first step in life-cycle cost analysis.
- CMM is often viewed by the coal mining community as a nuisance, when in actuality, it is a co-located and valuable commodity.
- Coal and associated gas should be viewed and appraised independently, but the value of each can be increased by synergistic production where technical and economically possible. Accrued environmental attributes are a product of synergistic production.
- In times of low commodity prices it is beneficial to have independently valued but co-located producible commodities.

THANK YOU!

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