Making Material Change

Medicine Bow Fuel & Power LLC

Presentation
to
Gasification Technology Conference

October 10th 2011

DKRW Advanced Fuels™

Agenda

- Medicine Bow Project Overview & Update
- Direct Benefits of the Medicine Bow Project
- Benefits to United States of the Technology
- Conclusion --- Looking Forward

Medicine Bow Project Overview & Update

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The Medicine Bow Project: A New Force in Energy

- The *Medicine Bow Project* is designed to produce *10,600 barrels per day* of regular gasoline in each train ---with sufficient coal reserves for 4 trains --- up to 42,400 barrels per day
- The project uses *GE Gasification* and *ExxonMobil Methanol to Gasoline* technologies which have been proven at this scale
- The initial gasoline produced will be shipped to the Denver market under a long term contract at market prices---the contract is for up to 25,000 barrels per day --- sufficient for 2 trains
- The project has a *substantial 180mm ton coal reserve* at Medicine Bow and converts 1 ton of coal to 2 barrels of gasoline - creating synthetic oil reserves of *360mm BOE*
- A key feature of the project strategy is to minimize the carbon footprint of producing synthetic fuels utilizing *carbon capture and sequestration technology* ---the project has sold up to 200,000 mcf/day of CO_2 produced to Denbury Resources for enhanced oil production and ultimate sequestration---creates additional oil reserves from existing reservoirs
- DKRW, a *first mover in using this package of these technologies globally*, is developing a franchise that will create substantial value for AF shareholders as energy markets continue to grow and producing conventional crude oil becomes substantially more expensive and environmentally challenging

Medicine Bow will be a new force in the synthetic fuel market --- a leader in utilizing a world class package of proven technologies to produce liquid transport fuels

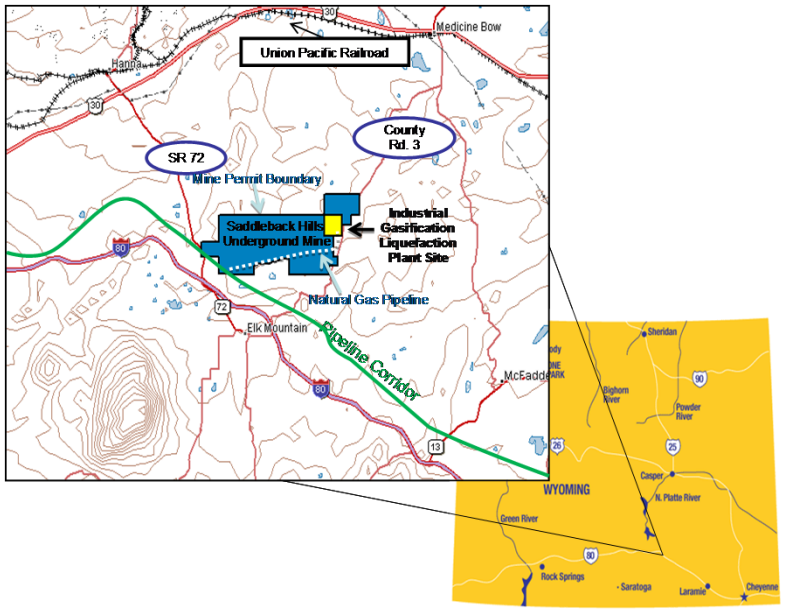
Medicine Bow Project Summary

Summary

Location	Medicine Bow, Wyoming
Expected Production	• 10,624 bpd of gasoline; 6,320 stpd of CO_2; 1,529 bpd of LPG; 30 stpd of sulfur per train
Technology	• GE 900 ft^3 Quench gasifiers • UOP Selexol and Sulfur Recovery • Davy Methanol Synthesis • ExxonMobil Methanol-to-Gasoline
Construction Period	42 months from Financial Close
Anticipated COD	May 1, 2015 first train
FEED Contractor	Kvaerner
O&M Provider	KBR, Inc. (“KBR”)
Coal Feedstock	Arch Coal Inc. (“Arch”)
Gasoline Offtaker	Major Refiner/Marker.
CO_2 Offtaker	Denbury Onshore LLC (“Denbury”)
LPG Utilization	Sale/Internalized
Sulfur Offtaker	Koch Sulfur Products Company LLC
Electricity Provider	Carbon Power and Light, Inc.
Gasoline Pipeline	Plains All American Pipeline (“Plains”)
Lender’s Engineer	R.W. Beck
Owner’s Engineer	Granherne (KBR)

Site Description

- Located on approximately 200 acres near the town of Medicine Bow, Wyoming in southeastern Carbon County
- Adjacent to the Elk Mountain Mine, a surface coal mine owned and operated by Arch, and a 180 million ton underground coal reserve known as the Saddleback Hills Mine, also owned by Arch
  - Amount and quality of coal has been confirmed by several reputable coal engineering firms, including Weir International
- Produced gasoline to be delivered to the Rocky Mountain Pipeline (“RMP”) Terminal in Cheyenne, Wyoming, and then transported across the existing RMP pipeline, owned and operated by Plains, to the Dupont terminal in the Denver area



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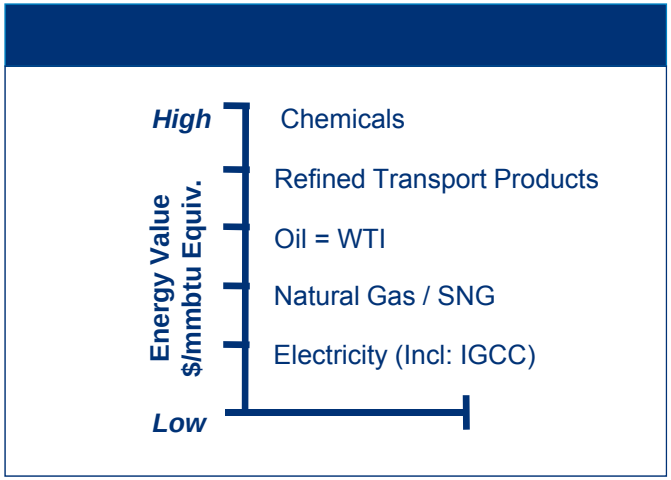
Medicine Bow Project: Right Strategic Decisions

- Right Products: Transportation Fuels
- Right Feedstock: Coal
- Credible/Financeable Technologies
  - Gasification: GE
  - Cleanup: UOP Selexol
  - Methanol: Davy
  - Transportation Fuel: ExxonMobil MTG
- Long term off-take agreements
  - Major Refiner/Marketer for gasoline
  - Denbury Resources Inc for CO2
- Lump-sum Turnkey EPC Contract
- CCS mitigation: Sequestration of CO2 with EOR
- Optimal scale: 10,600 bpd per train



Competitive advantage is in the products, feedstock, scale, and contracts.

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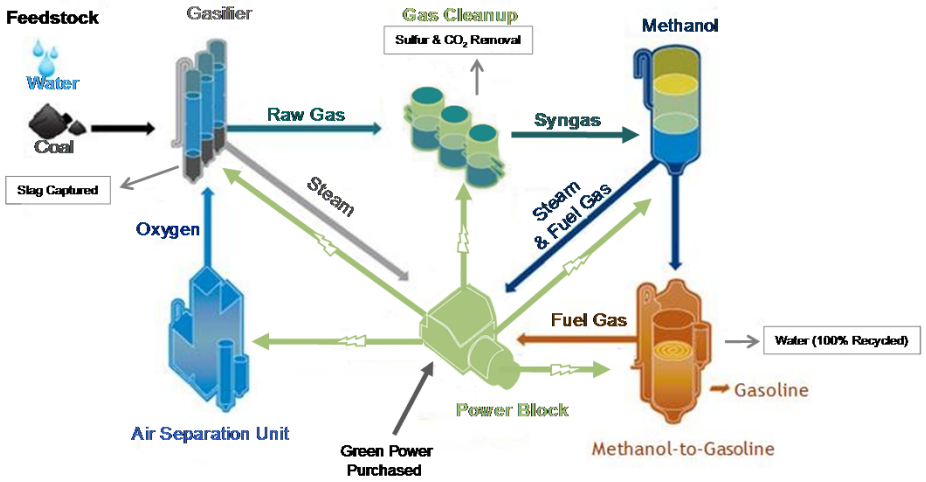
Medicine Bow Technology

Process



- Gasifier consumes approximately 4,422 stpd of coal, combining a coal/water slurry and oxygen to produce syngas
  - Approximately 365 stpd of slag is collected from the gasifier and will be disposed in the surface coal mine
- The syngas is purified through several steps, including passing through activated carbon beds designed to remove mercury
- The gas flows to the Selexol exchanger and passes through two absorbers removing hydrogen sulfide and carbon dioxide
  - 30 stpd of sulfur is captured in the Sulfur Recovery Unit
  - 6,320 stpd of CO_2 is captured under the process
- Feed gas enters converters where it flows over a methanol synthesis catalyst causing methanol to condense out
- The methanol undergoes several reactions in the MTG reactor to produce 10,624 bpd of gasoline and 1,529 bpd of LPGs

Integration Risk Mitigants

- Project utilizes mature, proven technologies from reputable providers to create the first major IGL facility in the U.S.
  - Each technology is sufficiently mature at the appropriate scale
  - The JAMG project in China began commercial operations in 2009 and is currently producing 2,500 bpd of gasoline from coal
- Several steps performed to ensure the Project is designed properly
  - Critical conversion processes modeled by technology licensors
  - Each technology supplier has provided a detailed, tailored process design package for the related equipment
  - Kvaerner is working closely with licensors during the FEED process
  - Each licensor will have teams present during commissioning and startup; performance tests will verify guarantee limits

Advantages

- IGL technology can capture CO_2 cost effectively
  - 95% of the CO_2 is extracted during the gas clean up phase to ensure the most efficient conversion of syngas to product, which is not the case for IGCC or PC coal facilities
- Produces a better CO_2 footprint than traditional refining
  - Produced gasoline has a well-to-wheels CO_2 footprint that is better than gasoline produced from almost all of the major crude oils imported to produce refined products in the U.S.
- IGL products are clean and processes conserve water
  - Minimal water consumption compared to other coal facilities
  - Sulfur and mercury levels reduced significantly
- Takes advantage of U.S. coal reserves

Processes have operated at commercial scale and have been vetted as a whole by R.W. Beck

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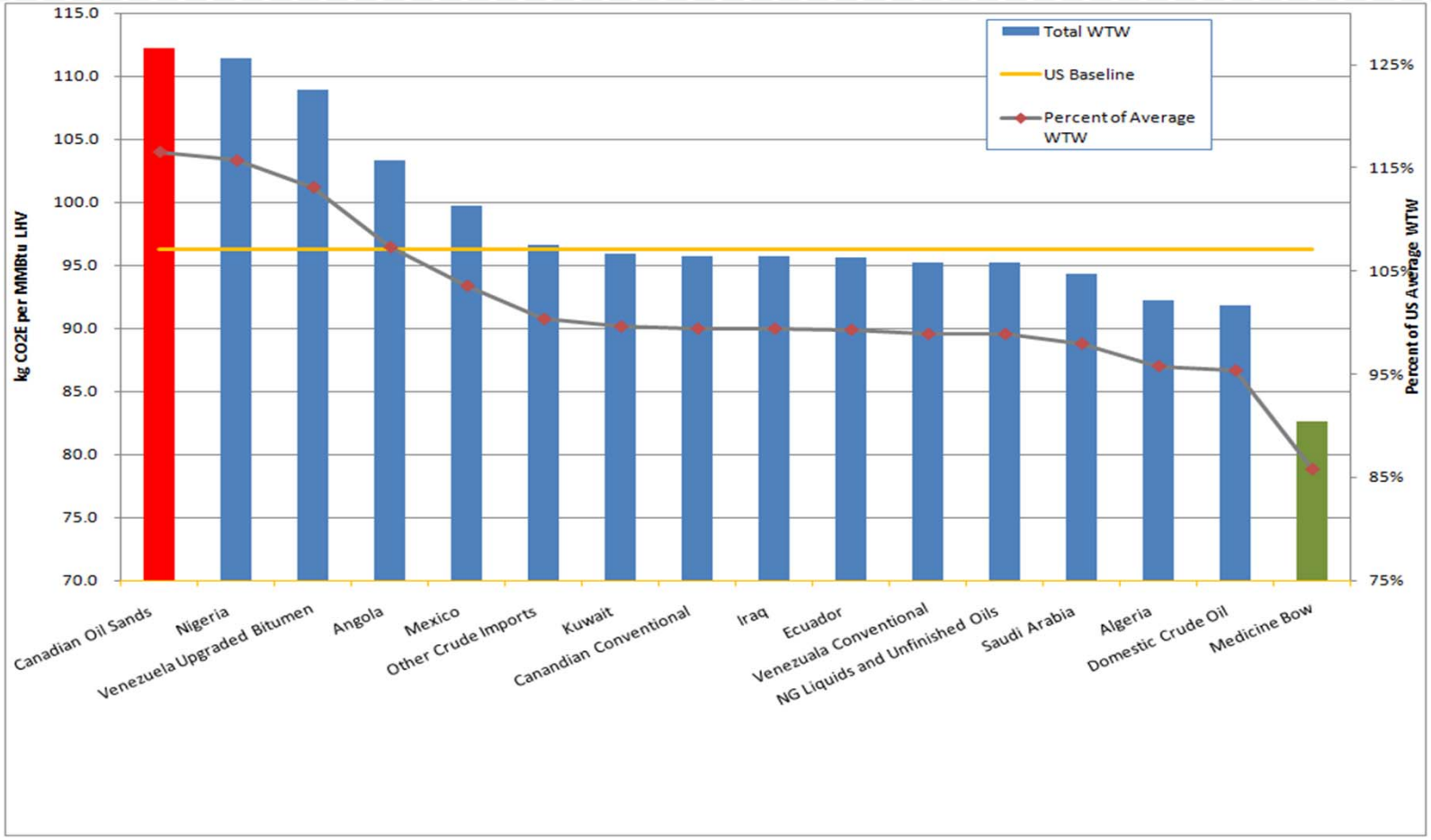
Low Wells-to-Wheels CO_2 Emissions Profile



Medicine Bow "Well-to-Wheels" CO_2 emissions are better on a lifecycle basis than all other US refining alternatives. Compared to the marginal alternative, Canadian Oil Sands, Medicine Bow in Phase 1 will save 11.7 million tons of CO_2 emissions over the life of the Project.

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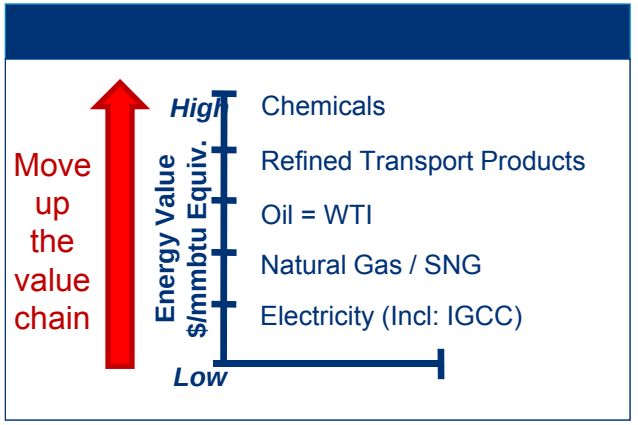
Medicine Bow: Long Run Technology Goals

- Develop Improved Value Products: Chemicals; chemical derivative products; modified transportation fuels; move up value chain
- Develop Intellectual Property ("IP")
  - Have filed for multiple patents
  - Have identified key areas of expanded research
  - Evaluate value added technologies
  - Leverage MBFP facility into IP, "know How" and technology ownership
- 5 year goal:
  - Be the first and only project financed coal to transportation fuels facility in U.S.
  - Development of related technologies including carbon capture & sequestration
  - Leader in research and development of coal to liquid transportation fuel products
- 10 year goal: alternative transportation fuels leader; transition to value added chemicals
- 20 year goal to become leader in hydrogen energy market



Use transportation fuels market to finance the project and create the opportunity to move up the value chain and capture technology and Intellectual Property.

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Direct Impact of the Medicine Bow Project

- **Stable Energy Markets**: Major new supplies of clean gasoline for the US domestic market from domestic coal resources at low production costs in the $50/bbl range putting downward pressure on gasoline prices and further increasing US supply oil supplies with EOR .
- **Environmental Security**: CO_2 is captured and sold to EOR producers minimizing overall greenhouse gas emissions. EOR reviewed by IPCC and endorsed by the NRDC as valid sequestration technology. One of the lowest CO_2 emission levels in the US refining mix using NETL well to wheels criteria. Ultra low sulfur gasoline meeting EPA requirements and low in benzene. Ultra low water use by design --- 300 gallons per minute --- low water use.
- **Energy Security**: Domestically produced supplies of the largest US transport fuel --- 9mm bpd demand. Reserves of coal are sufficient to provide a feedstock yielding huge domestic reserves. Geographical dispersion of refining capacity from the US coastlines.
- **Job Creation**: The project creates 1500 construction jobs per train for skilled labor. The initial train creates 450 full time well paying jobs in a competitive sector---ultimately 890 jobs with 4 trains. Labor from multiple states across the Rocky Mountain/Gulf Coast. Development of a new US industry creating huge opportunities. Spillover industries include pipelines, petrochemicals, CCS and EOR
- **Improving the US Trade Balance**: $460mm per year of oil imports offset with domestic gasoline prices at $3.00/gallon. $13.8 billion of oil imports reduced over the lifetime of the project --- 30 years.
- **Innovation in Energy Technology**: Integration of proven technologies not commercially operating in the US currently. Capability of making the US a world technical leader in these production techniques. Exporting US CCS know-how is important at reducing CO_2 emissions in China/India. Development of CO_2 trading hub in the Rocky Mountain Region with new CCS reservoir. Collaboration with US national energy laboratories/university energy institutes to foster innovation

Technology Benefits to the United States

Benefits of the Technology to the US

- **Potential Increase in Synthetic Oil Reserves**: The United States has 262 billion tons of coal reserves located across the country. Using the new generation of commercially proven technologies employed at Medicine Bow, these reserves could generate 437 billion barrels of oil equivalent --- or 165% of the oil reserves of Saudi Arabia --- currently estimated at 265 billion barrels.

- **Reduction of Oil Imports**: The United States is currently consuming 19 million barrels of crude oil and other liquid fuels per day and importing 47% of the total or 9 million barrels of oil equivalent per day. It is well within US capability to ramp up the industrial gasification and liquefaction capacity in the US to 2mm to 3mm barrels per day --- as noted in a recent Rand study by Jim Bartis.

- **Efficient Use of Coal Reserves**: Ramping up production of Medicine Bow type facilities to 2 million barrels per day could be done by building 5 facilities producing 40,000 bpd each year over the next 10 years. This level of production would require 1 billion tons of coal reserves per year be dedicated to each project or 10 billion tons of reserves total---or 3.8% of our current coal supply.

- **Expansion of Enhanced Oil Recovery ("EOR")**:In addition to the production of gasoline the associated CO_2 production would produce an additional 2 million barrels per day of oil from EOR operations. The combined total would be 4 million barrels of oil per day or 44% of total US imports.

- **Reducing the US Trade Deficit**: At an oil price of $100 per barrel this would reduce our trade deficit by 28% or almost $140 billion based on the 2010 trade deficit of approximately $500 billion. The long term direct employment effect would be 35,000 additional employees but with multiplier effects (including EOR and pipeline impacts) the employment impact would be in the hundreds of thousands. The direct overall investment would be $400billion.

Conclusions/Next Steps

Why America Needs The Clean Coal Industry

- The smart and strategic use of America's coal
  - America's ---with 26% of the world's coal supply ---can use Advanced Fuel Technology for conversion of coal to domestic fuel supplies, cleanly and strategically
- Economic forces --- dampening escalating oil prices
  - Competitively priced liquids transport fuels
  - Downward pressure on oil prices
- Environmental benefits and opportunities
  - Cleaner gasoline is produced with Coal-to-Liquids (CTL)
  - CO_2 captured and used safely in EOR opportunities
- America's energy security means political and economic security
  - A stronger American energy future, less dependent on foreign imports
  - Vital for both our national security and our economic security


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