



The Coal to Liquids Opportunity

DKRW Advanced Fuels LLC

**Gasification Conference
Washington DC
October 10th 2006**



Coal to Liquids (CTL)



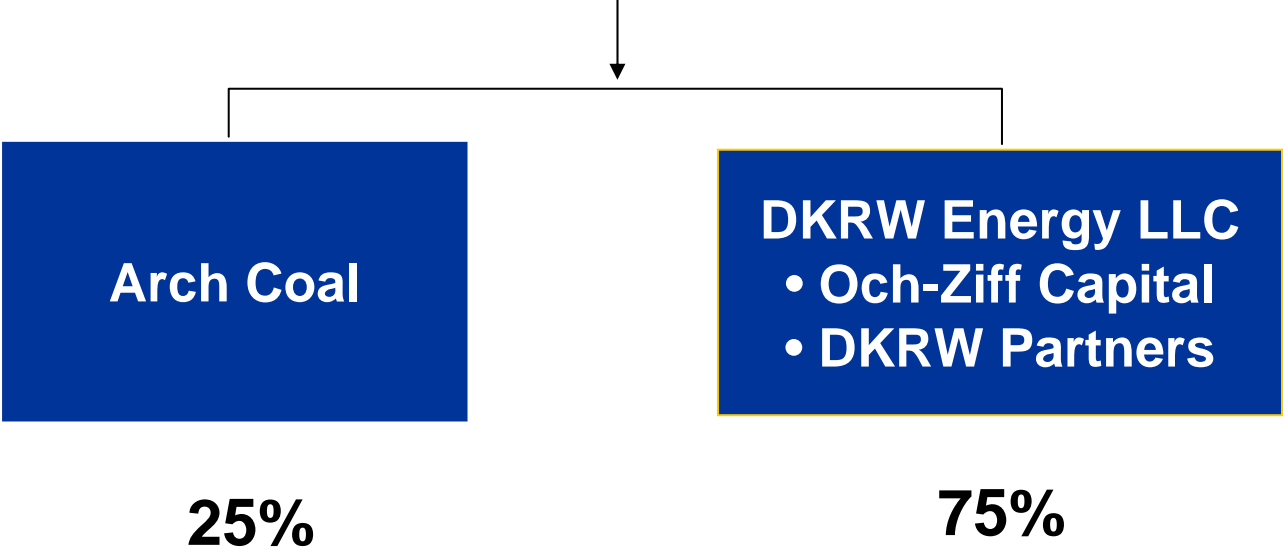
Gasification

Liquefaction
(Fischer Tropsch)



- ❖ Significant amounts of underutilized or stranded coal reserves exist in many locations throughout the world
- ❖ Proven processes and technologies are available to convert those resources to liquid hydrocarbons
- ❖ The relative price of oil and coal make this btu arbitrage play a significant value creation opportunity

DKRW Advanced Fuels LLC



Vision *To become a world leader in the utilization of coal gasification and Fischer Tropsch technologies that convert coal reserves into valuable liquid fuels and other products.*



DKRW Advanced Fuels Shareholders

❖ Arch Coal

- 2nd Largest Coal Producer in the US
- Listed on the New York Stock Exchange

❖ Och-Ziff Capital Management

- Large New York Private Equity Firm
- Significant Investment Portfolio

❖ DKRW Partners

- Founders of DKRW Energy LLC
- Experienced Energy Developers

Key Drivers of the CTL Business

❖ Economics

- Strong Liquid Fuel Demand & Prices
- Stable Coal Feedstock Prices

❖ Energy Security

- Large Reserves in Key Industrial Nations

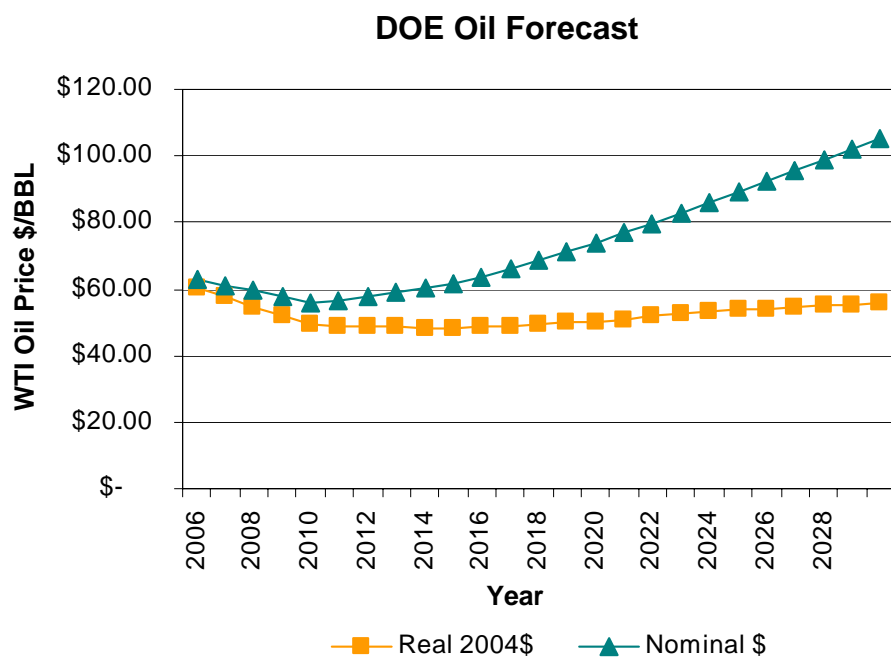
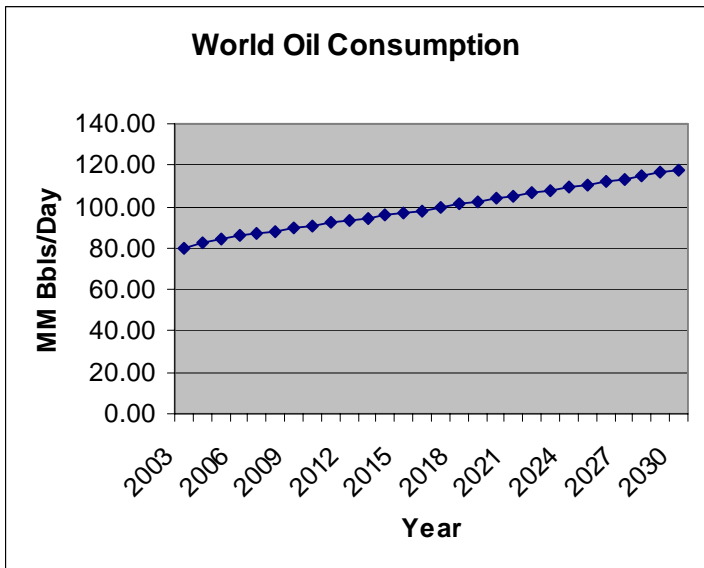
❖ Environment

- Production of Low Sulfur Liquid Fuels
- Sequesterable CO₂ Emissions

Economics: Strong Demand & High Prices

❖ Steadily Increasing World Oil Demand

❖ Strong Demand is Keeping Prices Firm



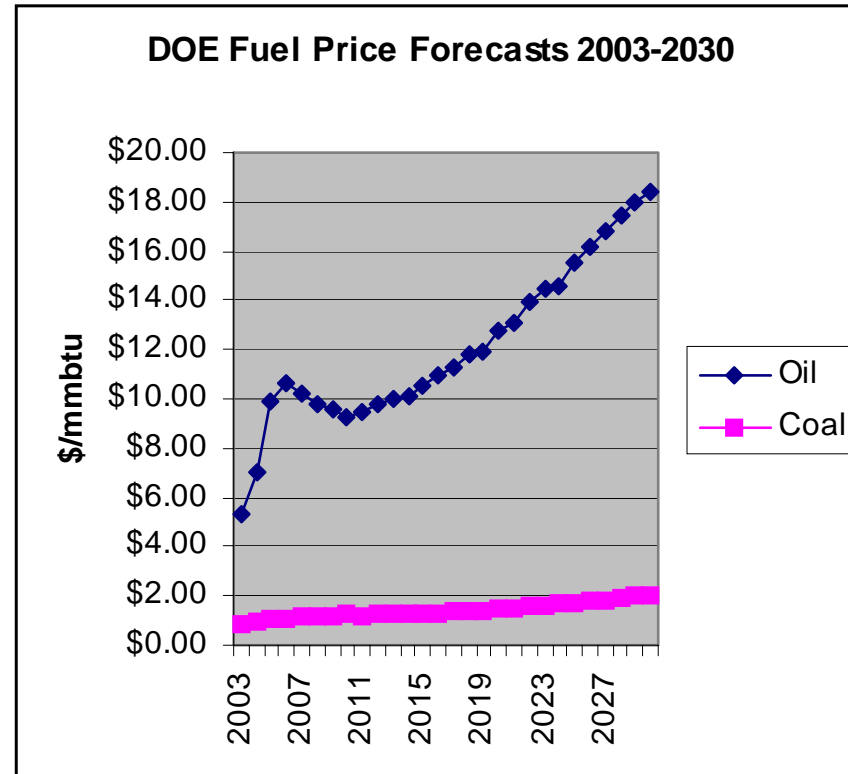
The World Will Consume 40 Million More Barrels of Oil per Day by 2030

Strong Asian Demand and Tight Global Supplies Keep Markets Firm

Source: Annual Energy Outlook 2006 (12/12/05 release)

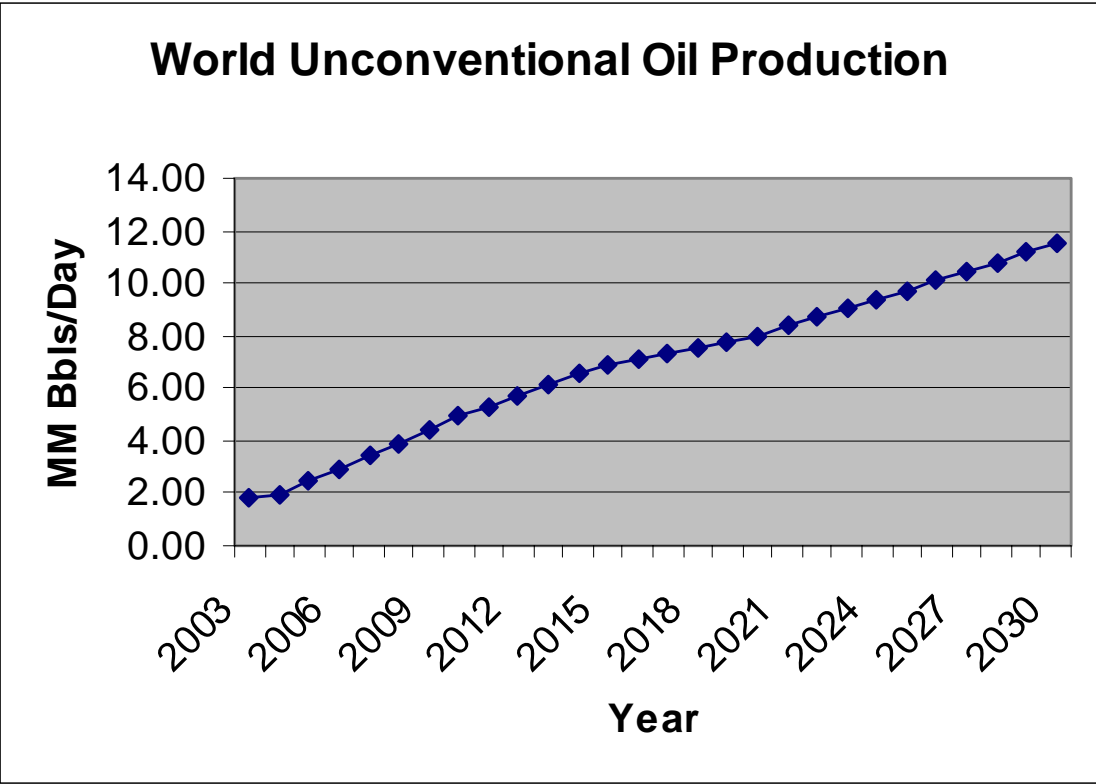


Economics: Low Coal Feedstock Costs



Coal is Projected to Have a Significantly Lower Cost Than Oil Over the Next 25-30 Years—Btu Arbitrage

Economics: Meeting the Oil Demand Challenge

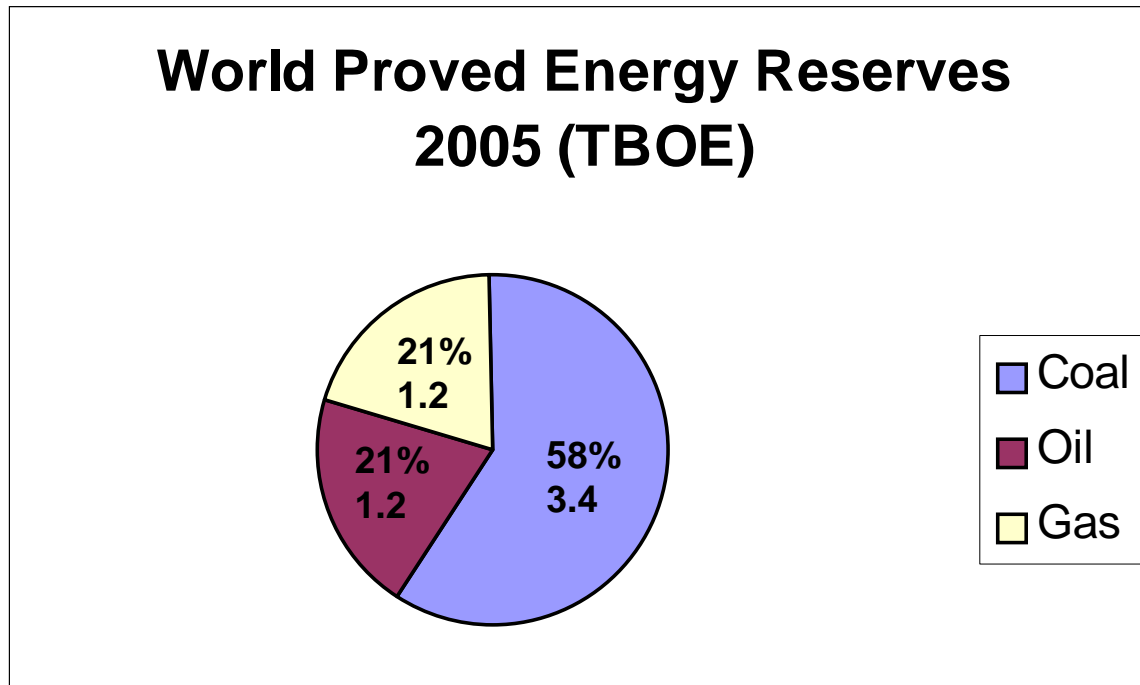


Keeping World Supply and Demand in Balance will Require Significant Growth in Unconventional Oil Production

Source: US DOE Annual Energy Outlook 2006 – Base and High Price Cases Note: Unconventional oil includes CTL, GTL, Oil Shale, Tar Sands and Biofuels



Energy Security: Coal Reserves Are Huge



World Proved Fossil Fuel Reserves Total 5.4 Trillion Barrels of Oil Equivalent (TBOE)-Coal is 58% of this Total

Source: BP Statistical Review of World Energy 2006

Energy Security: Oil Importers Have A Large Amount of Coal Reserves

	US	China	India
Coal Reserves (Billion Tons)	247	115	92
Net Oil Imports (MM BPD)	13.8	3.4	1.7

The Worlds Largest Oil Importers in the Next 20 Years Have Significant Reserves of Coal – 40% of World Total

Source: BP Statistical Review of World Energy 2006



Environmental: CTL Produces Ultra-Low Sulfur Fuels and Sequesterable CO2

❖ FT Fuels Are Ultra-Low in Sulfur – Reducing SOX Emissions

- Environmental Regulators are Pushing for Limitations on the Sulfur Content of Fuels
- US Sulfur levels in diesel <15ppm by 2007

❖ Gasification Process and Diesel Fuel Production Help in Reducing CO2 Emissions

- Gasification Process Captures the Pure CO2 Thereby Facilitating Carbon Capture and Sequestration
- Diesel Engines Are Technically More Efficient Than Gasoline Engines Generally Producing Lower CO2 per Mile Driven

Environmental Benefits of CTL in the Liquid Fuel Market

Key CTL Elements

Coal

Secure Coal Resources

- ❖ Acquisition of reserves
- ❖ Operating contract
- ❖ Mine-mouth production

Conversion Facility

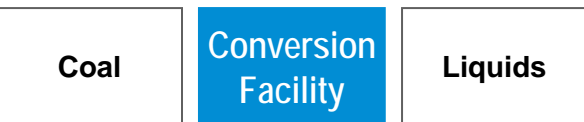
Package Technology & EPC

- ❖ Gasification
- ❖ Fischer Tropsch
- ❖ Hydrocracking
- ❖ EPC
- ❖ Modular Design
- ❖ Scale

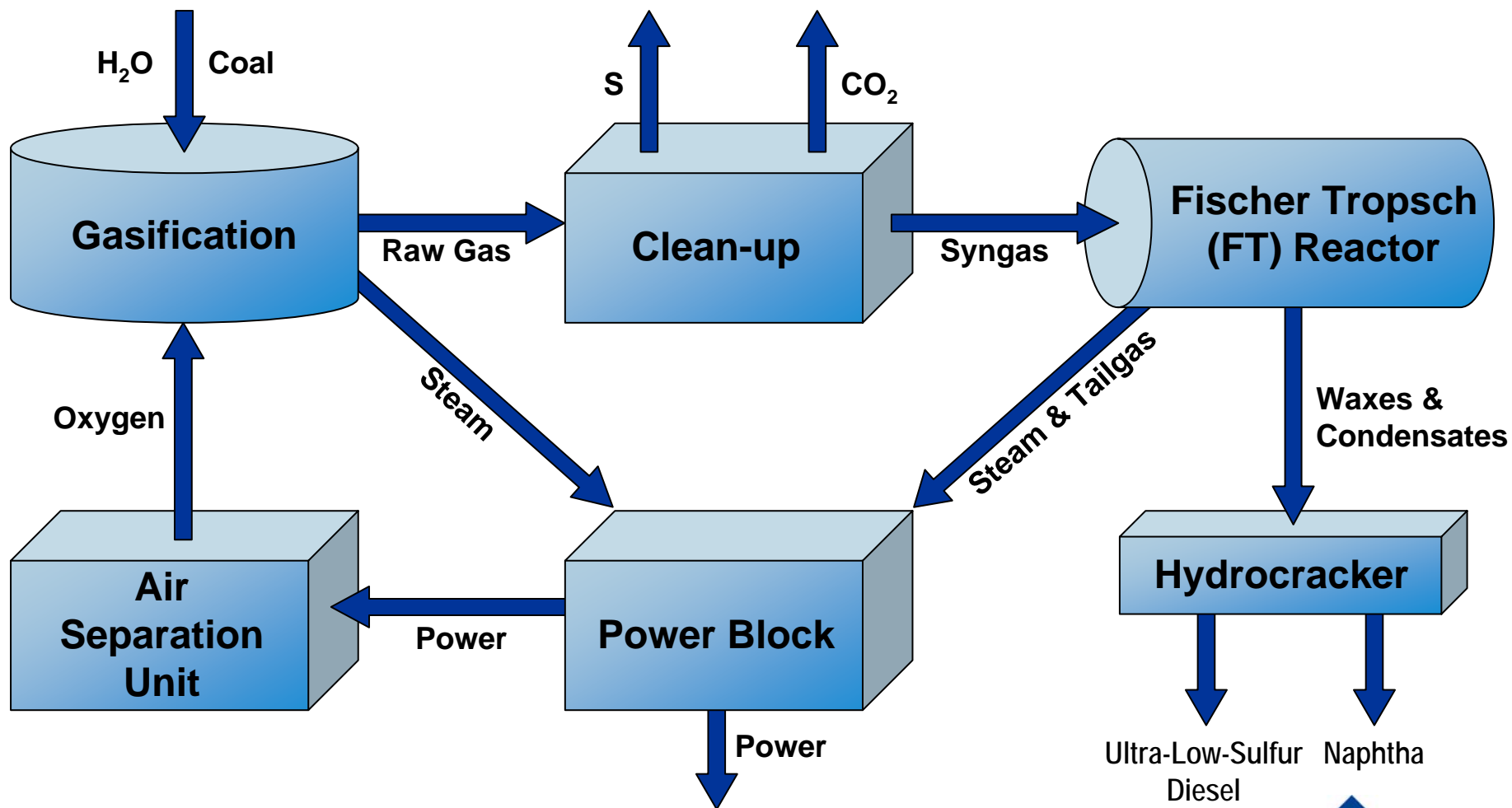
Liquids

Sell Products

- ❖ Diesel (low sulfur)
- ❖ Naphtha
- ❖ CO2



CTL Technology



The Technology is Proven

❖ Coal gasification

- Numerous facilities in operation worldwide

❖ Fischer Tropsch CTL

- Germany in WWI
- Sasol in South Africa
- Other FT Providers

❖ Hydrocracking

- Conventional refining technology - UOP

The Technology is
Proven & Available

DKRW 10 Year CTL Plan

Cumulative Output 30 Yrs (MM barrels)

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Capacity 2016
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Construct Initial Projects (2) = **66,000 BPD+** **723**

CTL 1 - Medicine Bow Project Expansion Expansion
 CTL 2 - Montana Project Expansion Expansion

Development of Arch sites - CTL 3 and 4 Construction of CTL plants 3 and 4 = **44,000 BPD+** **482**

Identify & capture domestic coal reserves **US** = **110,000 BPD+** **1,205**

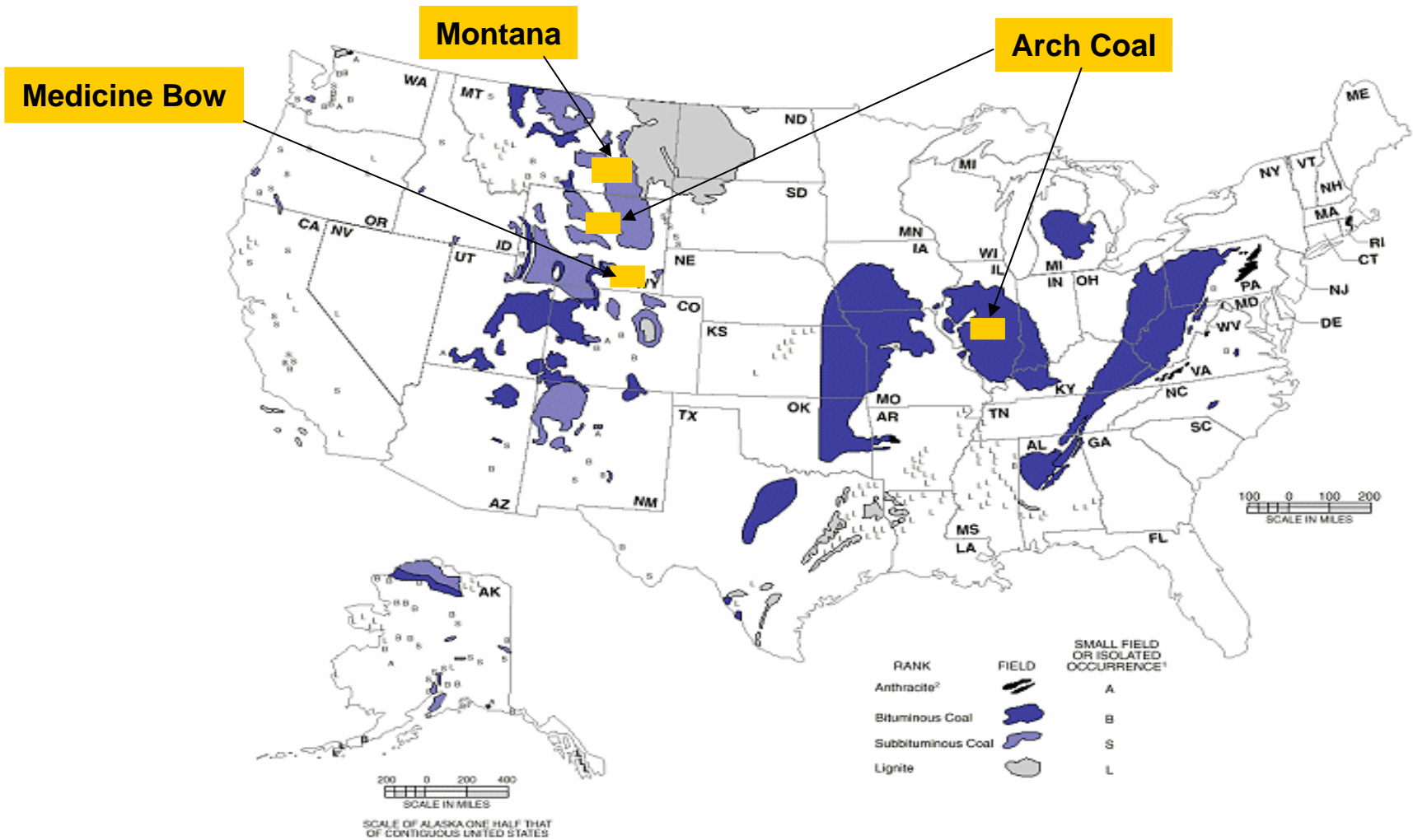
Identify international target markets and partners Development of Next International Projects (2) Construction of Next International Projects (2) = **22,000 BPD** **241**

World = **132,000 BPD** **1,446**



Coal

DKRW US CTL Opportunities



Source: <http://www.eia.doe.gov/cneaf/coal/reserves/chapter1.html#chapter1a.html>



Medicine Bow Project

- ❖ **Arch Coal: Carbon Basin Reserve Option**
- ❖ **General Electric: Gasification License**
- ❖ **Rentech: Fischer Tropsch License**
- ❖ **Refiner/Marketer: Liquids Off-Take Agreement**
- ❖ **Exploration Company: CO2 Off-Take Agreement**

Getting positioned early in a huge potential market

CTL 1: Medicine Bow Financing Requirement

\$1.4 Billion



- Source
- Fed Loan Guarantee
 - EPC Turnkey Contract
 - Insurance

- Source
- Public Market
 - Strategic Partners



Coal

International CTL Opportunities

<u>Country</u>	<u>World Rank</u> <u>by</u> <u>Reserves</u>	<u>Coal</u> <u>Reserves</u> <u>BT</u>	<u>Share of</u> <u>World</u> <u>Reserves</u>	<u>Petroleum</u> <u>Demand MM</u> <u>BPD</u>	<u>Petroleum</u> <u>Supply MM</u> <u>BPD</u>	<u>Petroleum</u> <u>Imports MM</u> <u>BPD</u>
USA	1	247	27.1%	20.7	6.8	13.8
Russia	2	157	17.3%	2.8	9.6	-6.8
China	3	115	12.6%	7.0	3.6	3.4
India	4	92	10.2%	2.5	0.8	1.7
Australia	5	79	8.6%	0.9	0.6	0.3
South Africa	6	49	5.4%	0.5	0.3	0.3
Ukraine	7	34	3.8%	0.3	0.1	0.2
Kazakhstan	8	31	3.4%	0.2	1.4	-1.2
Poland	9	14	1.5%	0.5	0.1	0.4
Brazil	10	10	1.1%	1.8	1.7	0.1
Total World		827	91.0%			

Top 10 Countries in Coal Reserves – 91% of Reserves

Summary & Conclusions

- ❖ **The Global CTL market will expand rapidly from 2010-2030**
- ❖ **DKRW will be one of the first movers in the market**
- ❖ **Key technologies and coal reserves have been secured early on competitive terms**
- ❖ **Significant public/strategic investment appetite to finance development/first project**

Getting positioned early in a huge global market!