



Overview of Coal Liquefaction

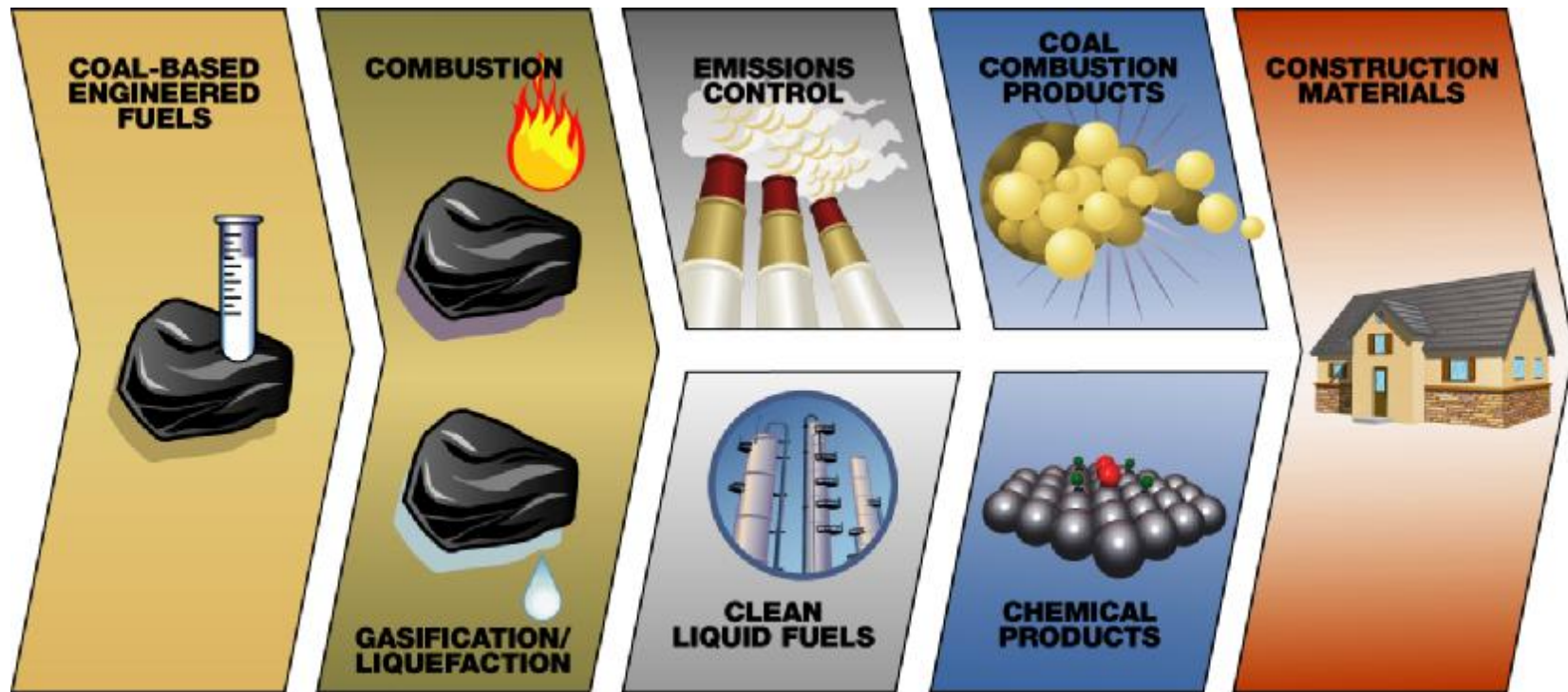
**Montana Energy Summit
Bozeman, MT
October 18, 2005**

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Headwaters at a Glance

Coal Value Chain



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Coal Liquefaction Technologies

3

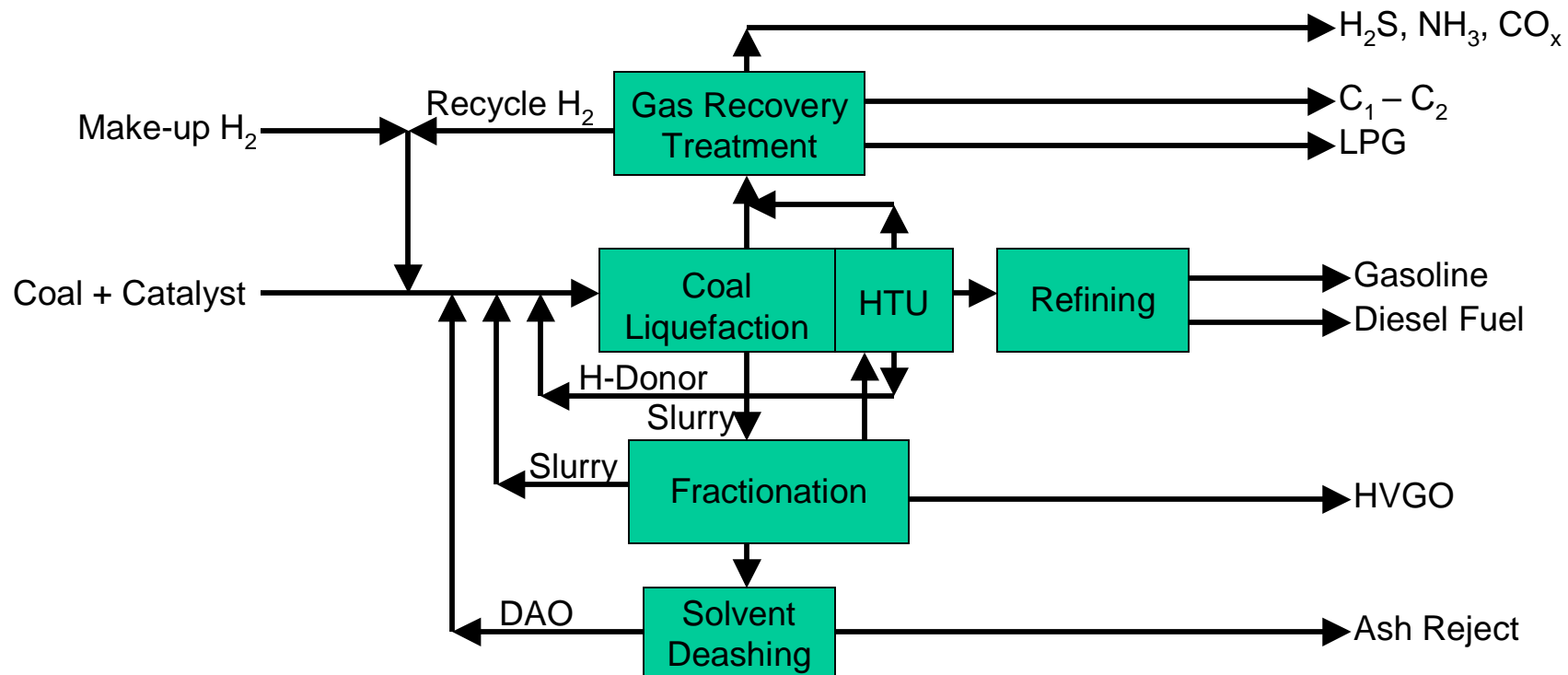


- Direct Coal Liquefaction (DCL)
- Indirect Coal Liquefaction (ICL)
- Hybrid Coal Liquefaction (DCL/ICL)

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Direct Coal Liquefaction Process



DCL Plants



Lawrenceville, NJ
30 bpd



Catlettsburg, KY
1800 bpd

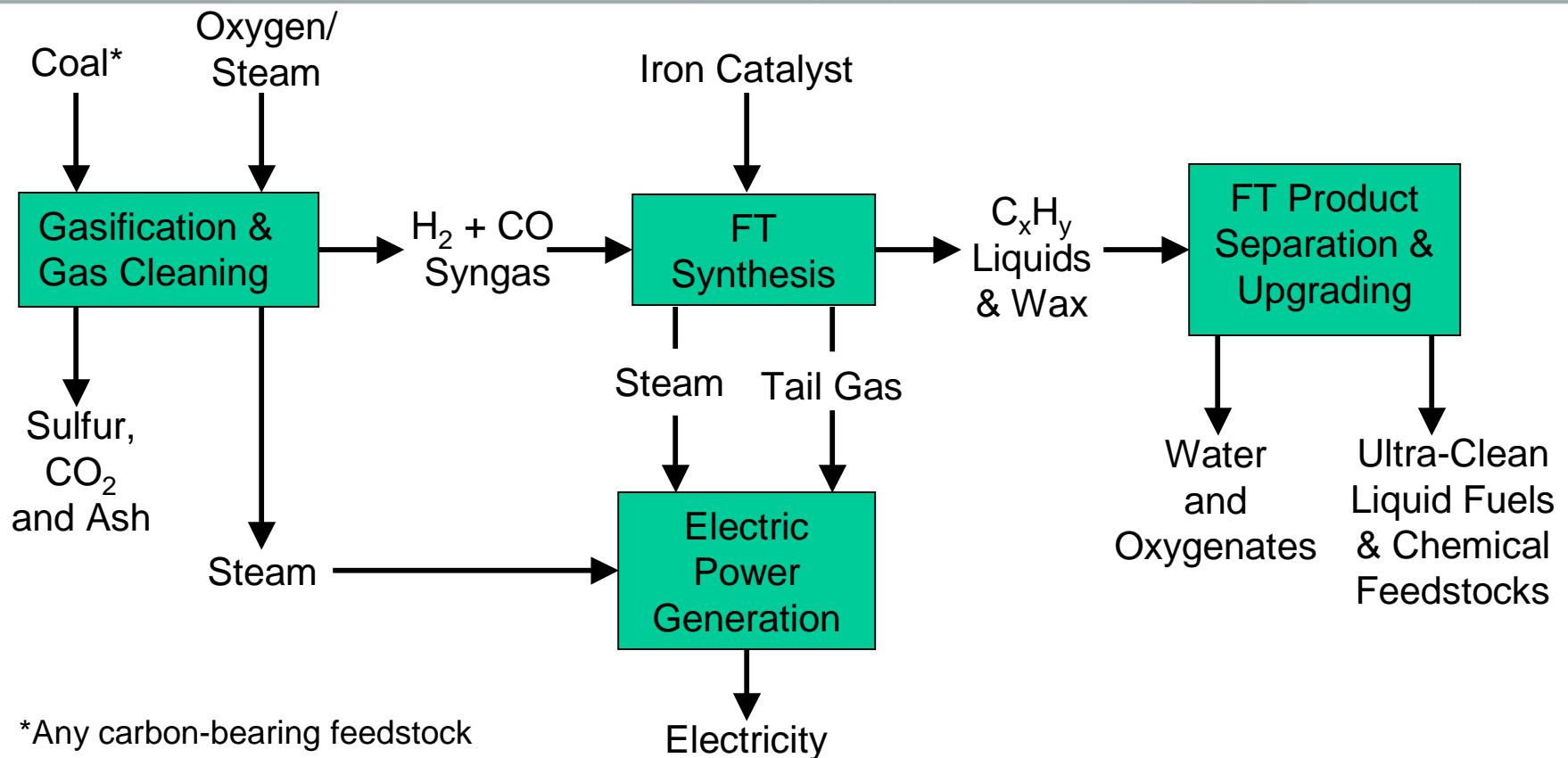


Inner Mongolia, China
17,000 bpd

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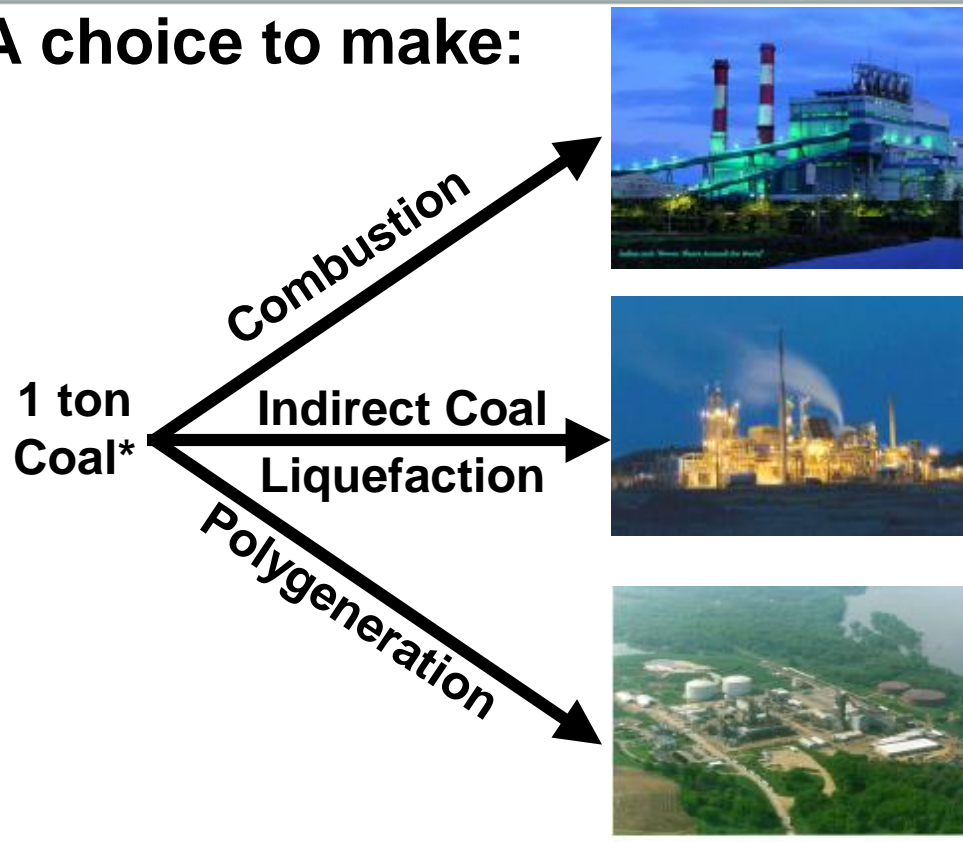
Indirect Coal Liquefaction Process



*Any carbon-bearing feedstock

Maximizing the Value of Coal

A choice to make:



Electricity Production

Products	Value
1.8 MWh electricity	\$72
Total	\$72

Fuel and Power Production

Products	Value
0.05 MWh electricity	\$2
0.17 bbls naphtha	\$8
1.29 bbls diesel fuel	\$100
Total	\$110

Fuel, Power & Fertilizer Production

Products	Value
0.19 MWh electricity	\$8
0.18 bbls naphtha	\$9
0.96 bbls diesel fuel	\$75
0.18 t ammonium nitrate	\$63
Total	\$155

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*Sub-bituminous coal as received basis

Comparison of DCL and ICL Economics

(Based on MT Sub-bituminous Coal at \$1/mm BTU)

8

For discussion purposes only.

	Direct	Indirect
Capex for 50,000 bpd plant (\$billion)	3.3	3.3
Coal required for 50,000 bpd (stpd as rcvd)	23,000	32,000
Coal feedstock cost (\$/bbl)	8	11
Opex excluding coal (\$/bbl)	17	12
Return on investment @ 15% (\$/bbl)*	30	30
Production cost including 15% ROI (\$/bbl)	55	53
Crude oil equivalent (\$/bbl)	41	40

*100% equity basis

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Comparison of DCL and ICL Final Products

9

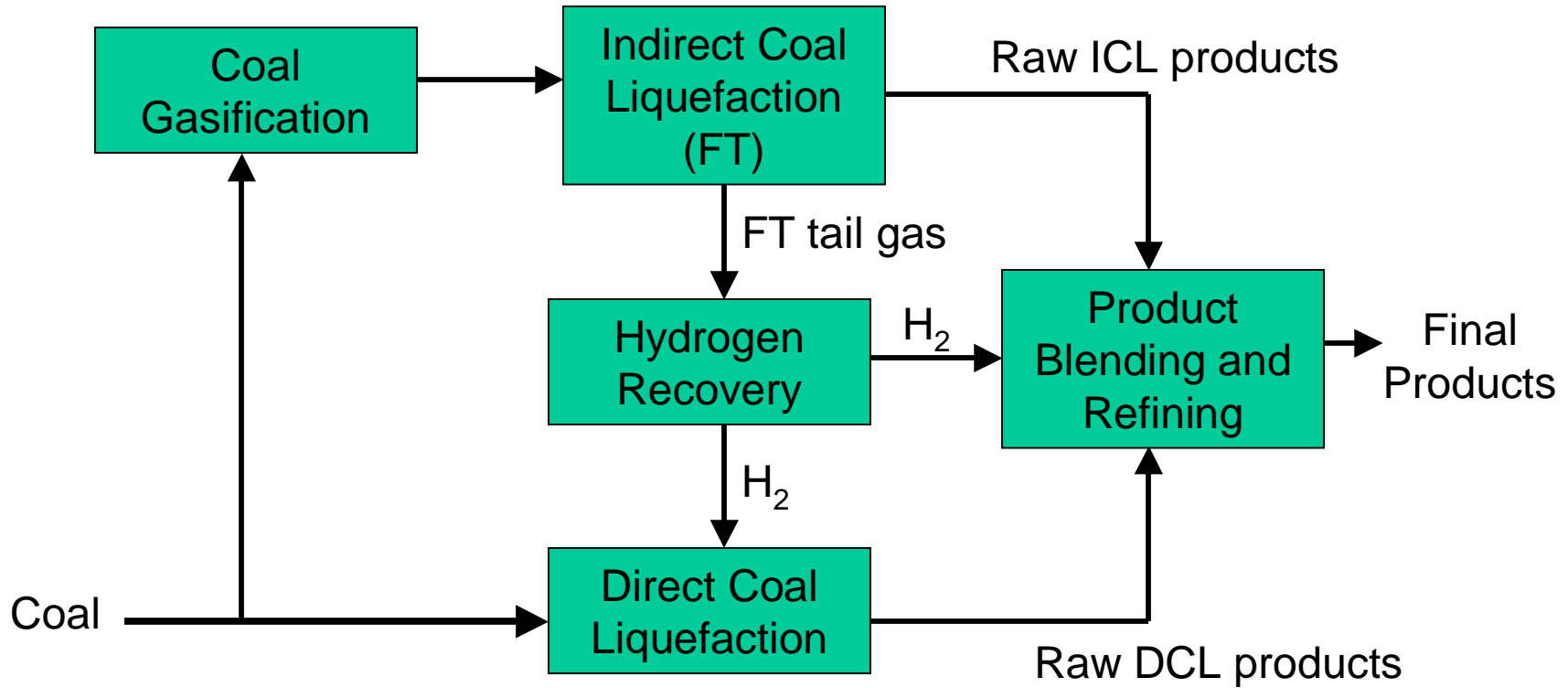
	Direct	Indirect
Distillable product mix	65% diesel 35% naphtha	80% diesel 20% naphtha
Diesel cetane	42-47	70-75
Diesel sulfur	<5 ppm	<1 ppm
Diesel aromatics	4.8%	<4%
Diesel specific gravity	0.865	0.780
Naphtha octane (RON)	>100	45-75
Naphtha sulfur	<0.5 ppm	Nil
Naphtha aromatics	5%	2%
Naphtha specific gravity	0.764	0.673

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Hybrid DCL/ICL Plant Concept

10



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Summary