Usibelli Coal Mine, Inc.

Emerging Coal Markets and Technologies

Alaska Capitol Building

Lunch and Learn Program

March 23, 2010

Steve Denton, VP Business Development

Emerging Coal Markets and Technologies

- Coal Formation and Rank
- Alaska's Coal Resources & Markets
- Alaska's Export Infrastructure
- Export Markets
- Combustion Technologies
- Coal Gasification

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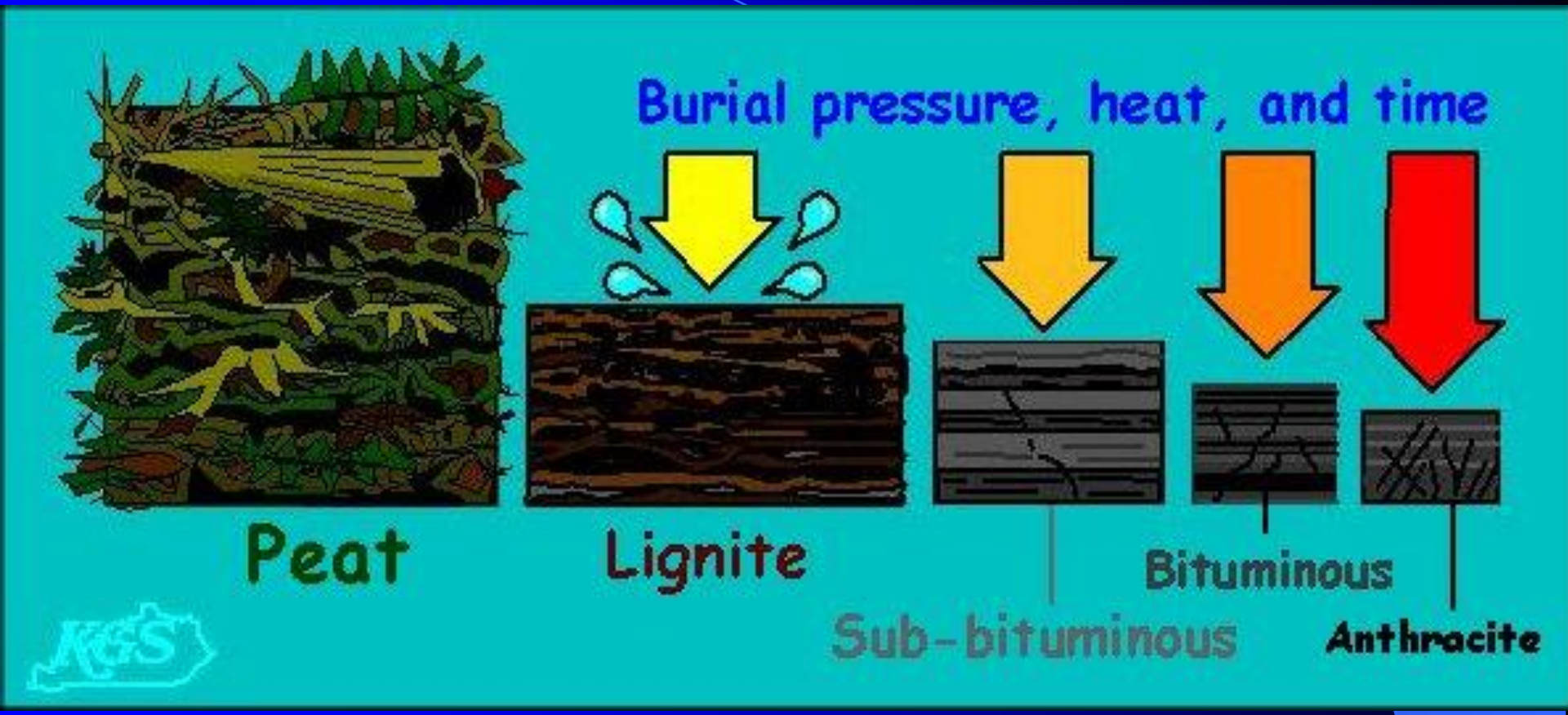
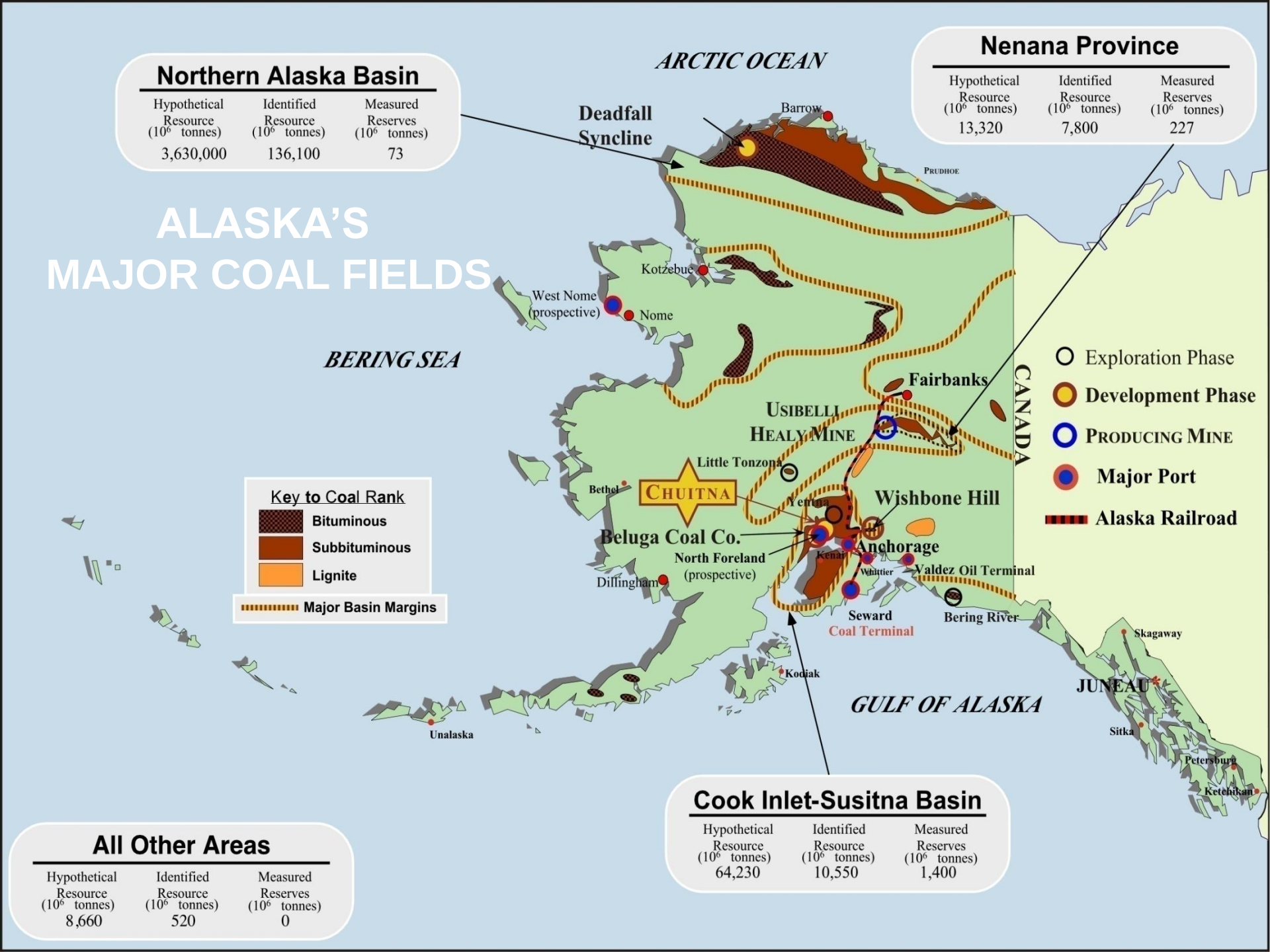
Coal Rank



Today → 300 million Years

Usibelli Coal – Sub-bituminous
About 20 million years old


Northern Alaska Basin
Hypothetical Resource (10^6 tonnes) 3,630,000
Identified Resource (10^6 tonnes) 136,100
Measured Reserves (10^6 tonnes) 73
ALASKA'S MAJOR COAL FIELDS
ARCTIC OCEAN
Deadfall Syncline
Barrow
Prudhoe
Nenana Province
Hypothetical Resource (10^6 tonnes) 13,320
Identified Resource (10^6 tonnes) 7,800
Measured Reserves (10^6 tonnes) 227
Kotzebue
West Nome (prospective)
Nome
BERING SEA
Fairbanks
CANADA
USIBELLI
HEALY MINE
Little Tonzona
Bethel
CHUITNA
Yentna
Wishbone Hill
Beluga Coal Co.
North Foreland (prospective)
Kenai
Anchorage
Whittier
Valdez Oil Terminal
Dillingham
Seward
Coal Terminal
Bering River
Skagaway
Kodiak
JUNEAU
GULF OF ALASKA
Unalaska
Sitka
Petersburg
Ketchikan
Exploration Phase
Development Phase
PRODUCING MINE
Major Port
Alaska Railroad
Key to Coal Rank
Bituminous
Subbituminous
Lignite
Major Basin Margins
Cook Inlet-Susitna Basin
Hypothetical Resource (10^6 tonnes) 64,230
Identified Resource (10^6 tonnes) 10,550
Measured Reserves (10^6 tonnes) 1,400
All Other Areas
Hypothetical Resource (10^6 tonnes) 8,660
Identified Resource (10^6 tonnes) 520
Measured Reserves (10^6 tonnes) 0

Alaska Coal Deposits With Export Potential

Deposit	Coal Rank	Million Short Tons	
		Reserves	Resources
Nenana (Healy)	Sub-Bituminous	500	7,000
Wishbone Hill	HV Bituminous	20	52
Cook Inlet	Sub-Bituminous	1,400	10,000
Deadfall Syncline	HV Bituminous	30	100+
Bering River	LV Bituminous	35	60

1 billion tons coal ~ 15 – 25 tcf natural gas

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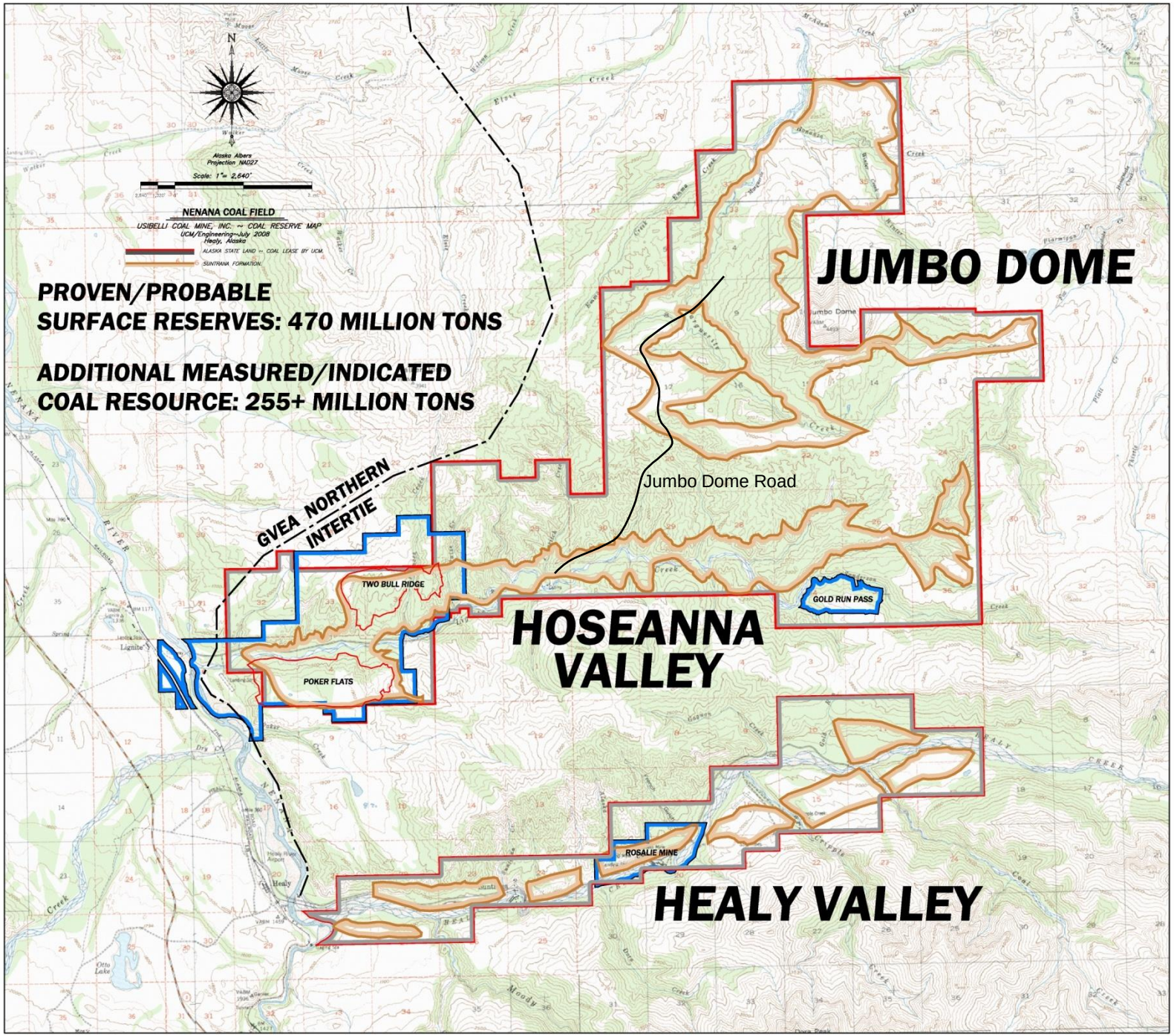
N
Alaska Albers
Projection NAD27
Scale: 1" = 2,640'
NENANA COAL FIELD
USIBELLI COAL MINE, INC. ~ COAL RESERVE MAP
UCM/Engineering--July 2008
Healy, Alaska
ALASKA STATE LAND ~ COAL LEASE BY UCM.
SUNTRANA FORMATION.
PROVEN/PROBABLE
SURFACE RESERVES: 470 MILLION TONS
ADDITIONAL MEASURED/INDICATED
COAL RESOURCE: 255+ MILLION TONS
JUMBO DOME
Jumbo Dome Road
GVEA NORTHERN INTERTIE
TWO BULL RIDGE
GOLD RUN PASS
HOSEANNA VALLEY
POKER FLATS
ROSALIE MINE
HEALY VALLEY

Alaska Coal Markets

- 2009 Alaska consumption – 975,578 tons
  Total for 2009 – 1,861,714 tons.
- Existing Customers
  - 5 cogeneration plants, Clear, Wainwright, Eielson, Aurora, University
  - GVEA Unit 1 mine mouth plant in Healy
  - North Pole Coal, residential/commercial space heating
  - Seward Terminal, residential/commercial space heating
- Potential new markets.
  - Healy Clean Coal Project
  - Railbelt power generation
  - Synthetic fuel production

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Alaska Railroad Corporation

- Owned by State of Alaska
- Fairbanks to Seward – 470 miles
- Healy to Seward – 358 miles
- Mostly single line
- Severe grades and corner radius areas
- Summer traffic congestion
- Maximum 80 car unit train to Seward

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Seward Coal Terminal

SEWARD COAL TERMINAL

- 1.5 million mt/year capacity
- 12,000 to 16,000 mt/day loading rate
- 120,000 mt stockpile capacity
- 16 meter draft (53 feet)
- 90,000 ton maximum ship size
- Owned by the Alaska Railroad Corp.
- Operated by Aurora Energy Services, LLC, affiliate of Usibelli Coal Mine, Inc.

Stacker/Reclaimer

- Bucket wheel reclaimer
- 1000 tons/hour reclaim

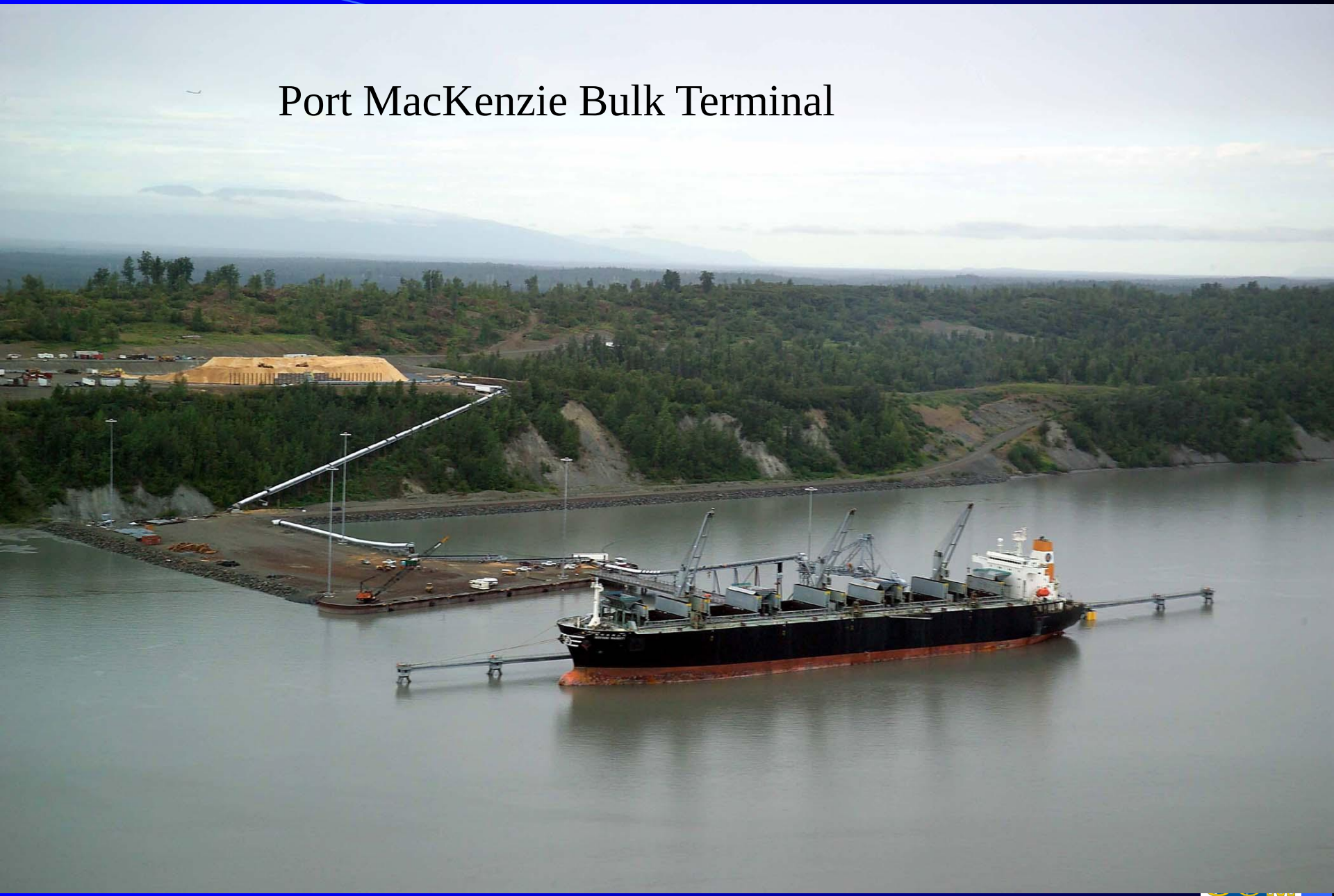
Ship Loader

- Fixed position, slewing and luffing
- Maximum reach 160’
- 3 hatches from one ship position

Ship Capabilities

- Dolphin Mooring System
- Max length approx. 900’
- Max. beam 140 feet’
- Max. draft 53’
- Max air draft 90’

Port MacKenzie Bulk Terminal



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Port MacKenzie

- Located about 150 miles closer by rail, 2-3 days longer for bulk carriers.
- Currently no rail service, 43 miles new track required.
- Cape class draft, high tide departure due to shoals.
- Extreme tide range – 35 feet
- Currents to 5 knots at angle to dock
- 9 – 10 month ice free season
- Fixed loading arm
- Currently loading wood chips and gravel

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World Coal Production

EIA Preliminary 2007 Data
(million short tons)

North America	1,234
Central/South America	92
Europe	814
Eurasia	537
Middle East	1.4
Africa	289
Asia & Oceania	4,069
Total	7,036

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PacRim Coal Importers

EIA Preliminary 2007 Data
(million short tons)

	Production	Consumption	Imports
Japan	0	207	207
South Korea	3	106	103
China/Hong Kong	2,804	2,904	100
India	528	579	51
Taiwan	0	73	73
Thailand	20	36	16
Malaysia	1	12	11
Mexico	12	19	7
Chile	1	6	5

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PacRim Coal Exporters

EIA Preliminary 2007 Data
(million short tons)

	Production	Consumption	Net Export
Australia	428	146	282
Indonesia	180	50	130
Russia	347	261	86
South Africa	283	203	80
Vietnam	44	19	25
USA	1,146	1,129	17
Canada	76	62	14

Approximate Total Seaborne Coal Trade – 750 million metric tons

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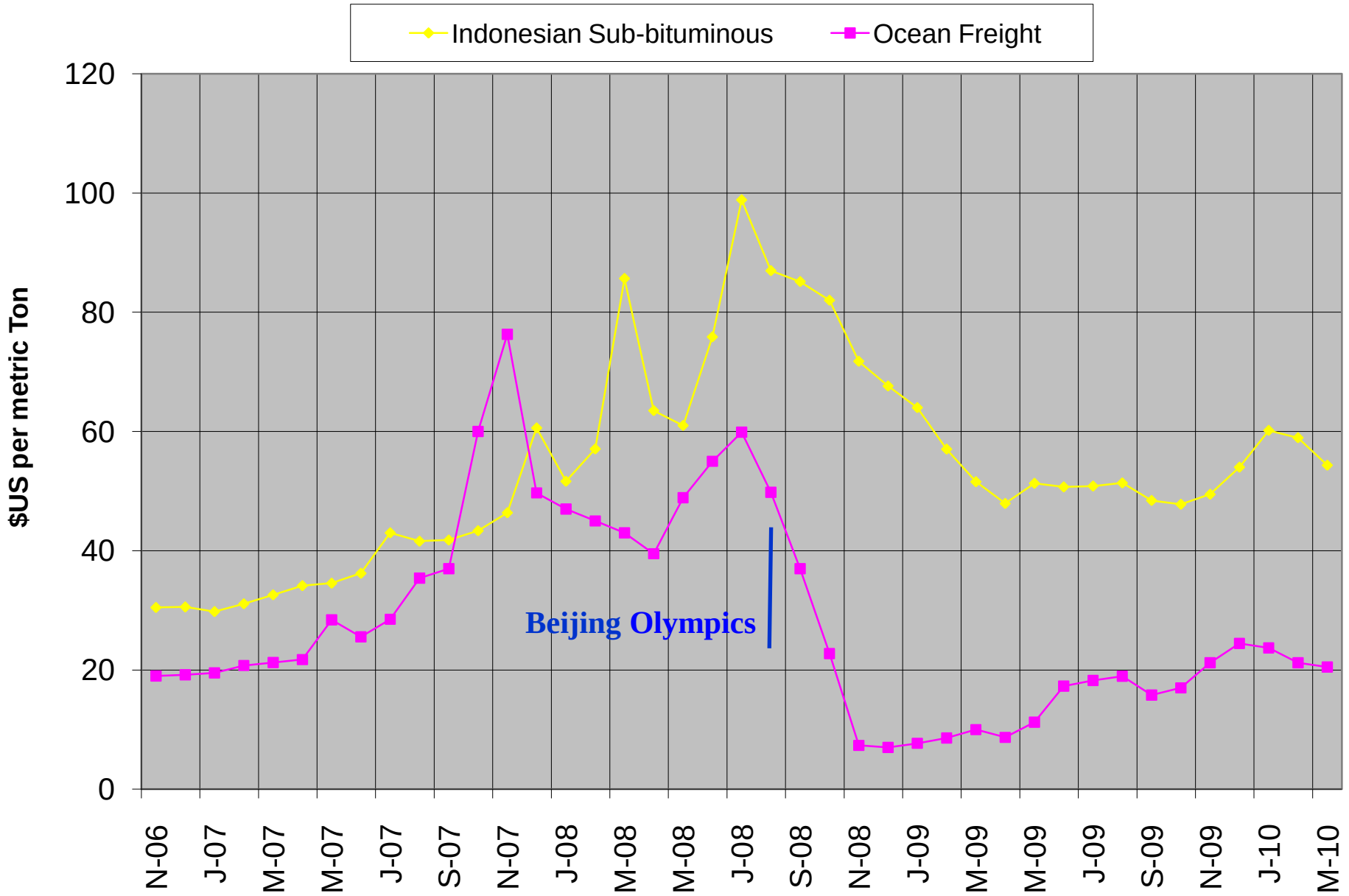
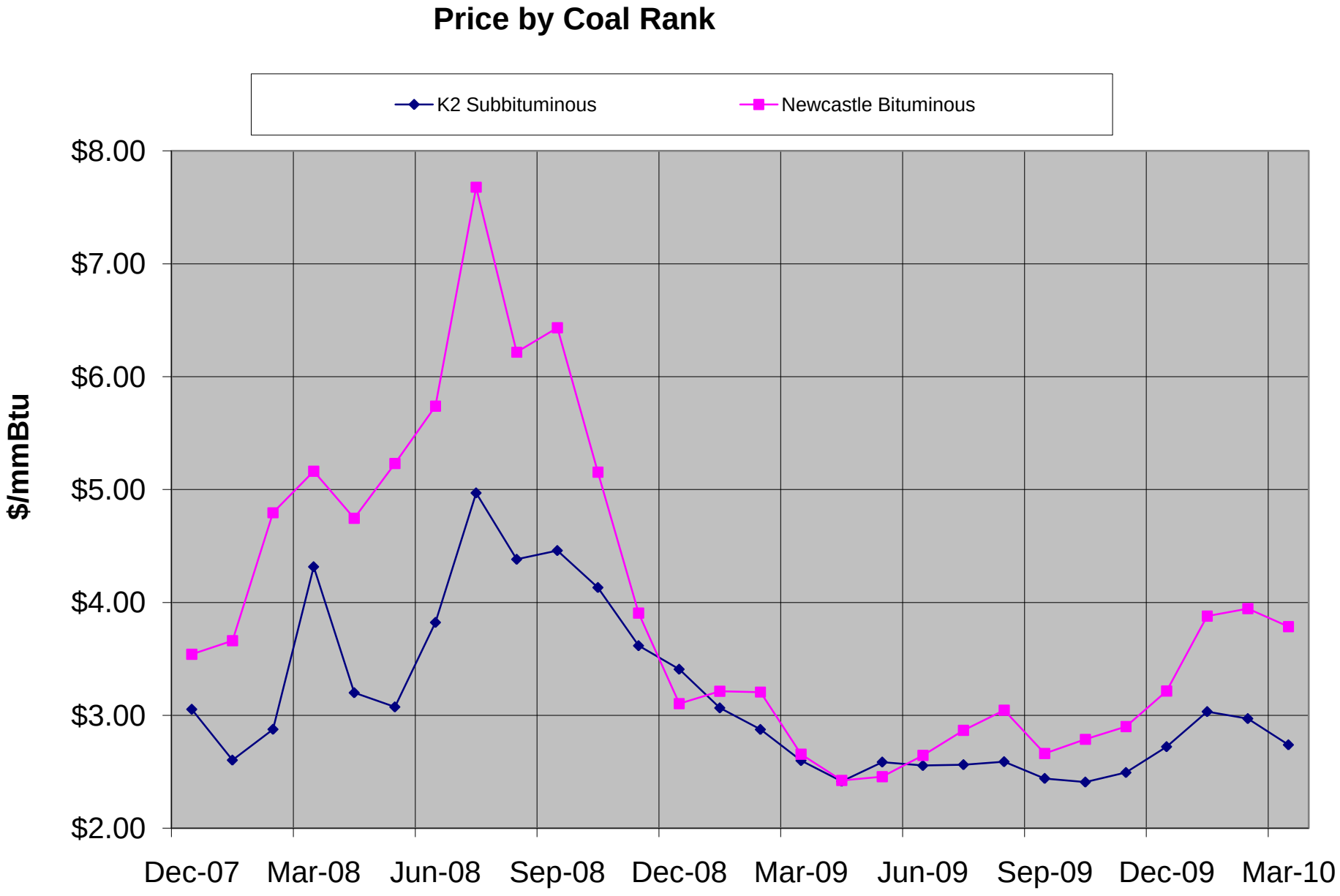
Pacific Rim Coal Price History




Price by Coal Rank
K2 Subbituminous
Newcastle Bituminous
$/mmBtu
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Mar-10

Expanding Coal Demand

Platts International Coal Report, March 22, 2010

- Seaborne demand up by 300 million tons by 2015
  - India – 125 million
  - China – 45 million
  - Japan – 25 million
  - S. Korea – 15 million
  - Taiwan – 10 million
  - Remaining Pacific – 30 million
  - Atlantic – 45 million
- New power plant construction
  - India – 55,000 megawatts under construction
  - China – 55,000 megawatts in 2010
  - Around 1 billion tons new demand by 2015

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Key Players - Demand

- India
  - Swing buyer –both Pacific and Atlantic sources
  - Committed to major coal generation expansion
  - Supply shortages from domestic producers
- China
  - Continued high growth rate.
  - Internal transportation infrastructure challenged
  - Large coal reserves
- South East Asia
  - High growth rate and internal consumption
  - Primarily Australia/Indonesia sources

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Key Players - Supply

- Australia -Largest export supplier
  - Port and Rail limitations (50+ queue at Newcastle)
  - Large bituminous reserves
- Indonesia
  - Predominant supplier of sub-bituminous
  - High internal demand growth
- South Africa - Pacific and Atlantic supply source
- Colombia
  - Potential source for India
  - Aggressive expansion plans
- Russia
  - Both Atlantic and Pacific ports
  - Long rail transport distances

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Alaska Export Opportunities

- Currently approximately 5,000 megawatts of generation can use 10 - 50% Alaska coal.
- Chile – Plans to add approximately 7000 megawatts by 2017, mostly coal.
- Japan /China/Korea – High demand growth from India and South East Asia will stress supply for North Pacific consumers.
- South Africa– Increased demand from India and SE Asia will create increased demand for Colombian coal in Europe.
- Colombia – Less attractive source for Chile due to high Europe demand.

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Usibelli Coal Exports

- Up to 723,000 mt to Asia 1985 - 2003
- Recent years (metric tons):

	Asia	Chile	Total
2004	408,840	86,110	494,950
2005	362,660	93,360	456,020
2006	319,610	73,170	392,780
2007	0	279,624	279,624
2008	157,582	364,994	521,000
2009	336,843	466,908	803,751

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Power Generation Options

- Traveling Grate Stoker - Fairbanks
- Conventional PC Power Plant – Healy 1
- Circulating Fluid Bed – fuel diversity
- Super and Ultra Supercritical PC
  - Better efficiency and modest cost
- IGCC – high cost and high efficiency
- Gasification for polygeneration
  - Electricity plus liquid fuel or chemicals

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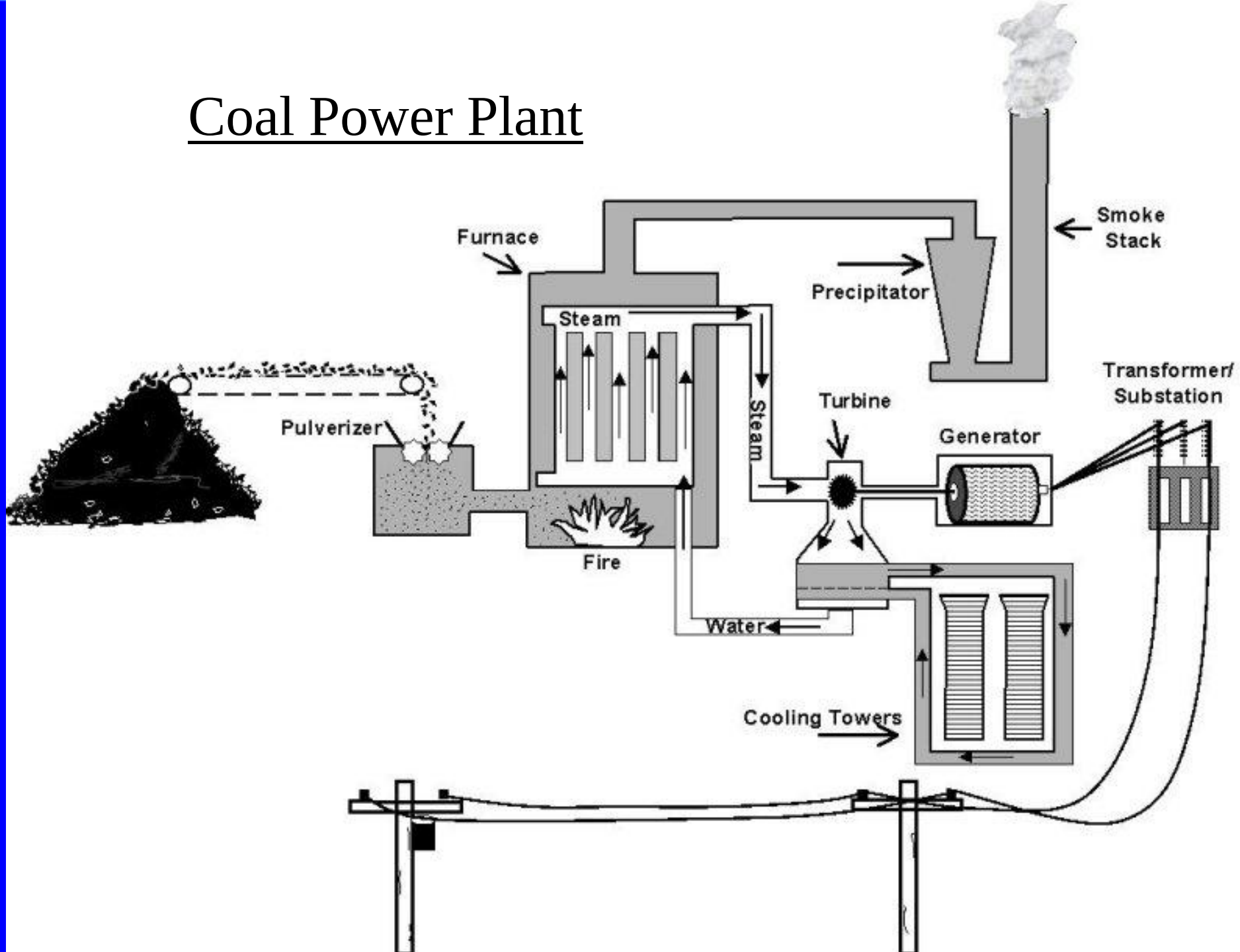
Coal Power Plant



Healy Unit 1 Power Plant

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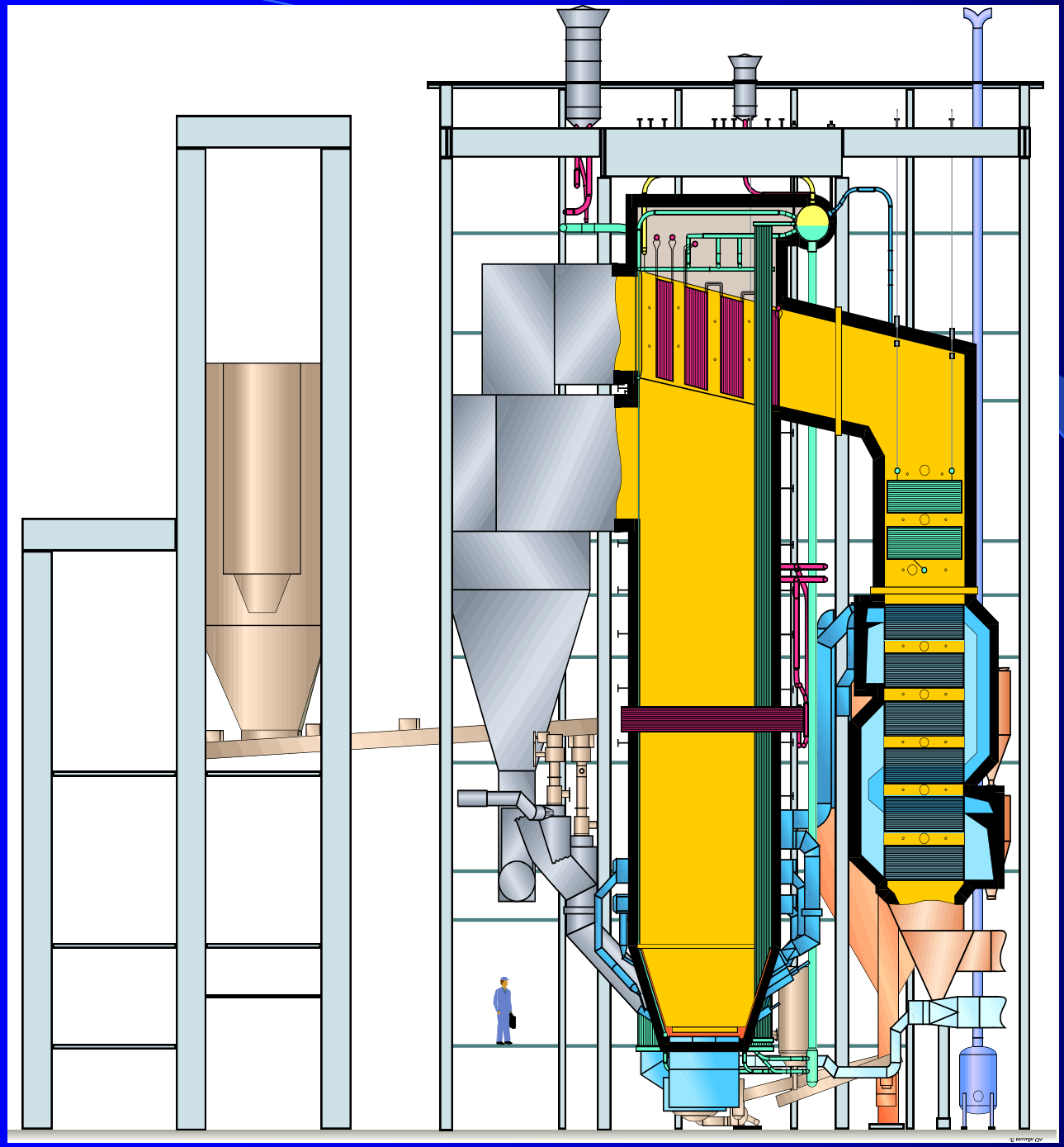

Circulating Fluidized Bed Boiler

Courtesy of:
Harris Group, Inc.

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Coal
A Safe & Clean Energy Choice

- Safe to transport. Non-toxic if spilled
- Low combustion potential.
- Useful by products from ash.
- Clean burning with modern technology.
- New plants will employ pollution controls for all pollutants, including mercury.
- Mine lands reclaimed and returned to productive use.

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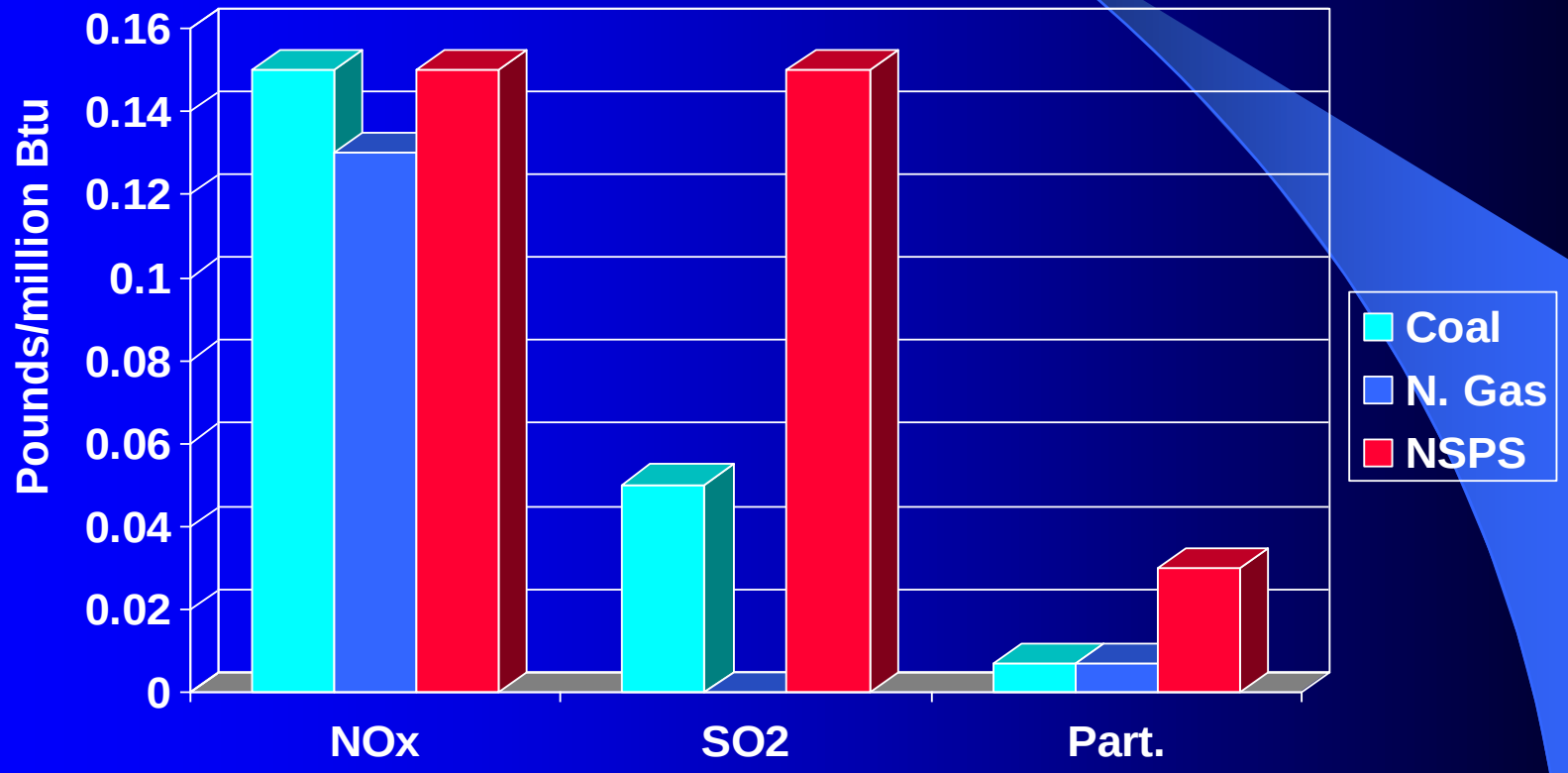
Coal and Natural Gas Emission Comparison



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Gasification Coal's Future?

New Life For An Old Technology

- Integrated Gasification Combined Cycle (IGCC)
- Fischer-Tropsch (FT) Fuel
- Fertilizer/Ammonia
- Petrochemicals

Gasification Process

Organic material (C + H) + Water + *Not Enough* (O_2)

+ little heat

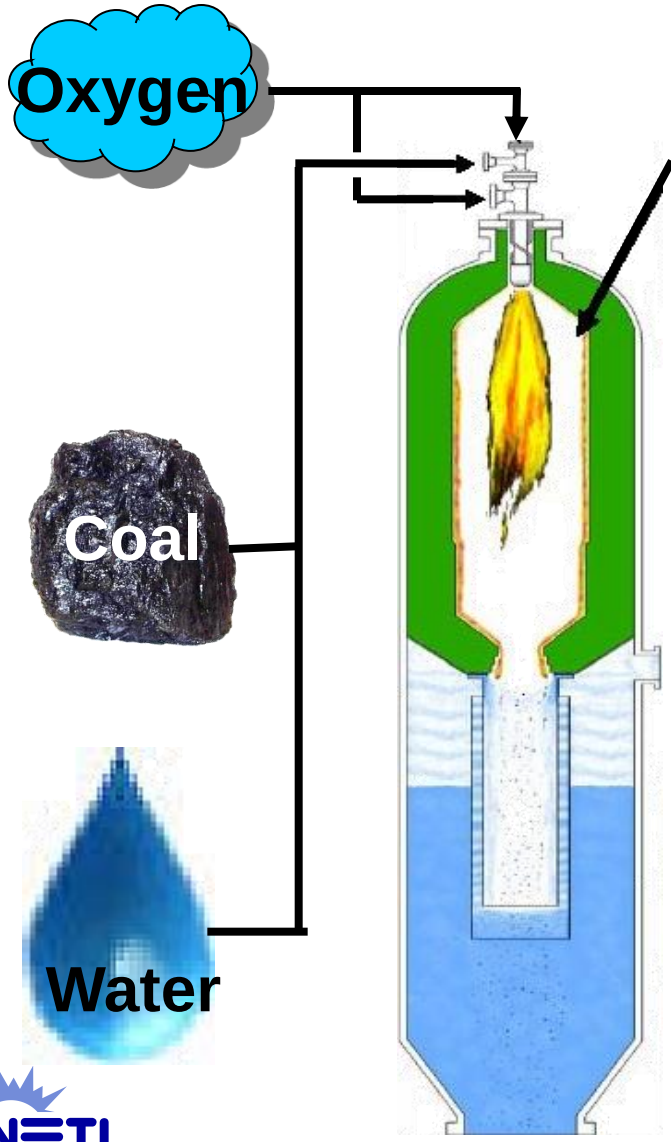
Results in gasification:

Some Heat + Carbon Monoxide (CO)

+ Hydrogen (H_2) + ash + pollutants

- **Can convert almost any organic material into heat and a combustible gas**
- **Typically the organic material is coal or pet coke, but biomass, municipal waste, natural gas, etc. will all work (pet coke is refinery waste)**

Gasification Process #2



Extreme Conditions:
- up to 1,000 psig
- 2,600 ^{o}F
- Corrosive slag (molten rock)

Products (syngas)

CO (Carbon Monoxide)

H_2 (Hydrogen)

[CO/H_2 ratio can be adjusted]

By-products

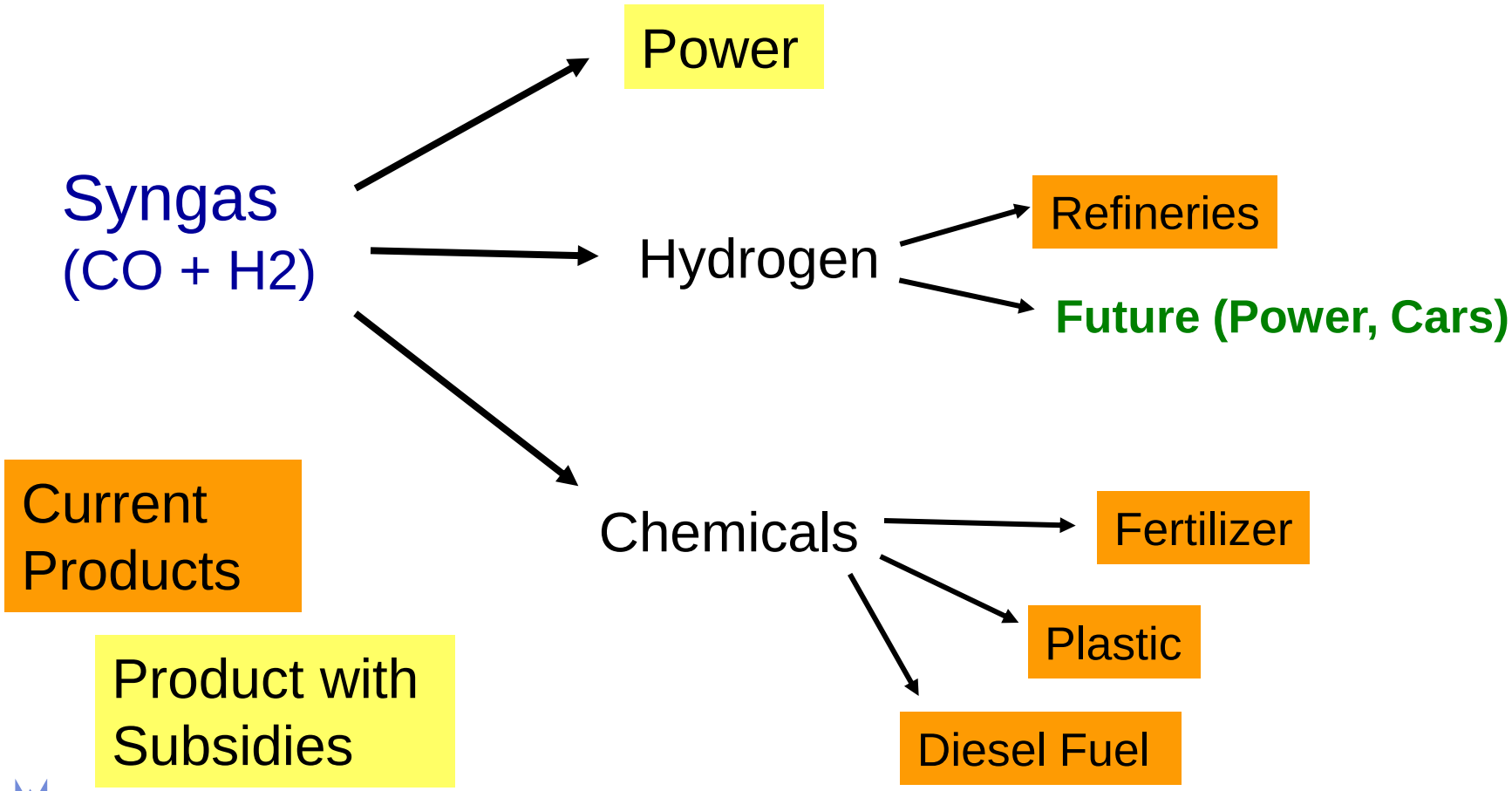
H_2S (Hydrogen Sulfide)

CO_2 (Carbon Dioxide)

Slag (Minerals from Coal)

Mercury, arsenic, cadmium, selenium…

Gasification Syngas Possibilities




Rika Says Thank You
Any Questions?
APR 26 2003

Useful Web Sites

- www.eia.doe.gov
  - Extensive data on all types of energy
- www.teachcoal.org
  - American Coal Foundation site with lots of information for those wanting to teach or learn about coal.
- www.uky.edu/KGS/coal
  - University of Kentucky – Kentucky Geological Survey web site.

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