

Alaska Coal Update

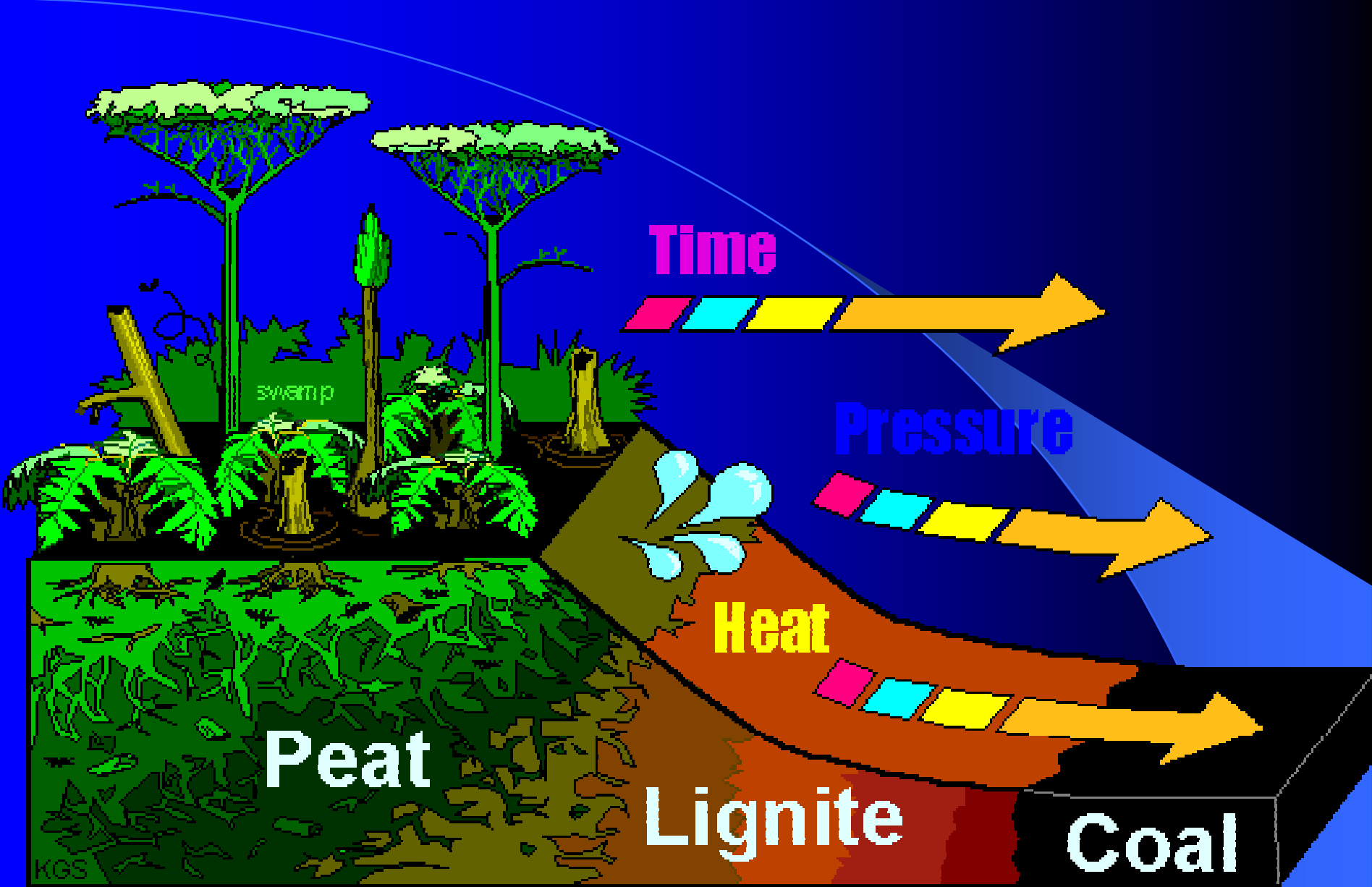
Alaska State House Energy Committee

March 24, 2009

Steve Denton, VP Business Development
Usibelli Coal Mine, Inc.

Alaska Coal Update

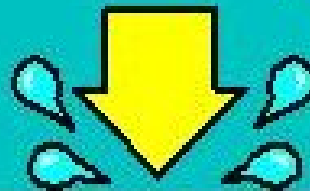
- Formation of Coal
- Coal Resources
- Transportation Infrastructure
- Alaska Coal Consumption
- Coal Exports
- Coal Utilization and Technology



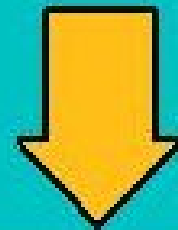
Coal Rank



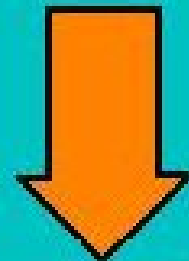
Peat



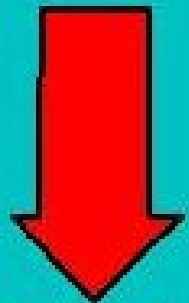
Lignite



Sub-bituminous



Bituminous



Anthracite

Today



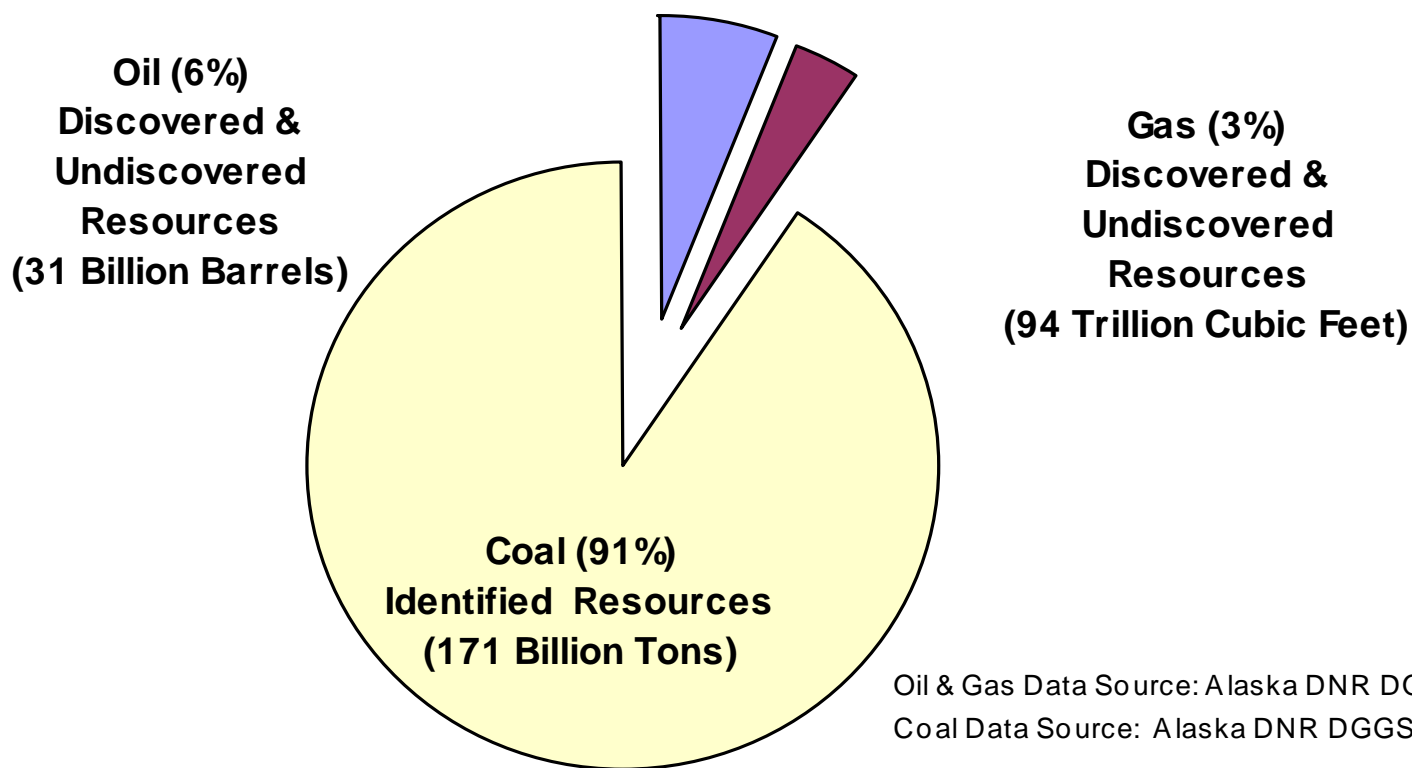
300 million
Years

Usibelli Coal – Sub-bituminous
About 20 million years old

Alaska's Coal Resources

Alaska Fossil Fuel Energy Resources

(Based on contained energy)



ALASKA'S MAJOR COAL FIELDS

Northern Alaska Basin

Hypothetical Resource (10 ⁶ tonnes)	Identified Resource (10 ⁶ tonnes)	Measured Reserves (10 ⁶ tonnes)
3,630,000	136,100	73

Nenana Province

Hypothetical Resource (10 ⁶ tonnes)	Identified Resource (10 ⁶ tonnes)	Measured Reserves (10 ⁶ tonnes)
13,320	7,800	227

BERING SEA

ARCTIC OCEAN

Deadfall
Syncline

Key to Coal Rank

	Bituminous
	Subbituminous
	Lignite

 Major Basin Margins

-  Exploration Phase
-  Development Phase
-  PRODUCING MINE
-  Major Port
-  Alaska Railroad

CHUITNA

Beluga Coal Co.

North Foreland
(prospective)

USIBELLI
HEALY MINE

Little Tonzona

Wishbone Hill

Anchorage

Seward
Coal Terminal

Valdez Oil Terminal

Bering River

GULF OF ALASKA

Cook Inlet-Susitna Basin

Hypothetical Resource (10 ⁶ tonnes)	Identified Resource (10 ⁶ tonnes)	Measured Reserves (10 ⁶ tonnes)
64,230	10,550	1,400

All Other Areas

Hypothetical Resource (10 ⁶ tonnes)	Identified Resource (10 ⁶ tonnes)	Measured Reserves (10 ⁶ tonnes)
8,660	520	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

Coal Transportation



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

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.



Port MacKenzie Bulk Terminal



Port MacKenzie

- Located about 150 miles closer by rail, about 2 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

Alaska Coal Consumption

2008 – 962,024 tons of 1.54 million



Co-Generation

- Both heat and electricity production
- High efficiency
- Low cost space heating
- High building density best
- Improved air quality



- Aurora Energy
- University of Alaska
- 3 Military Bases

Mine Mouth Generation

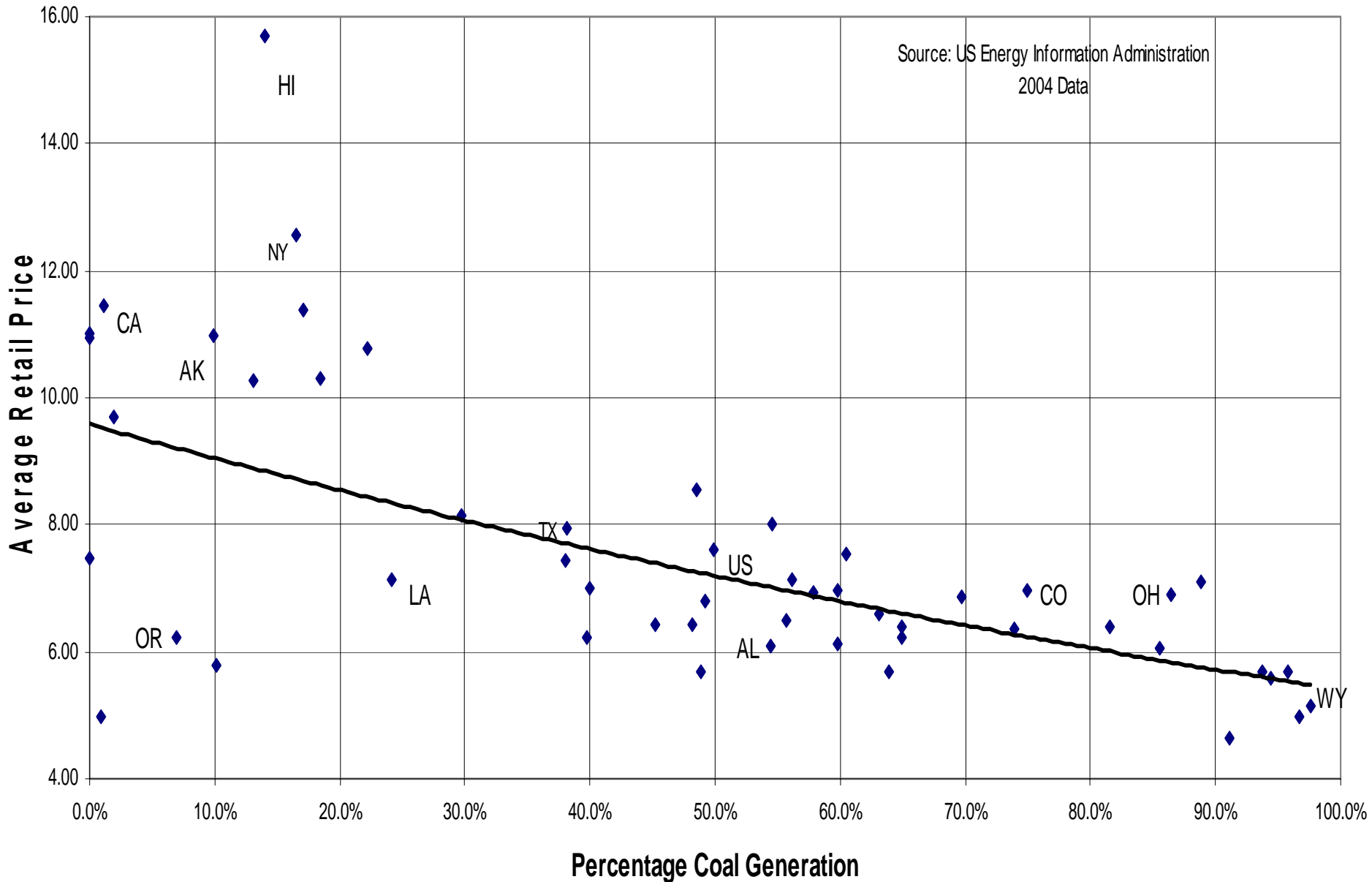
- Lowest fuel transport cost
- Facilitates waste coal use
- Less site conflicts for large units
- HV transmission lines required



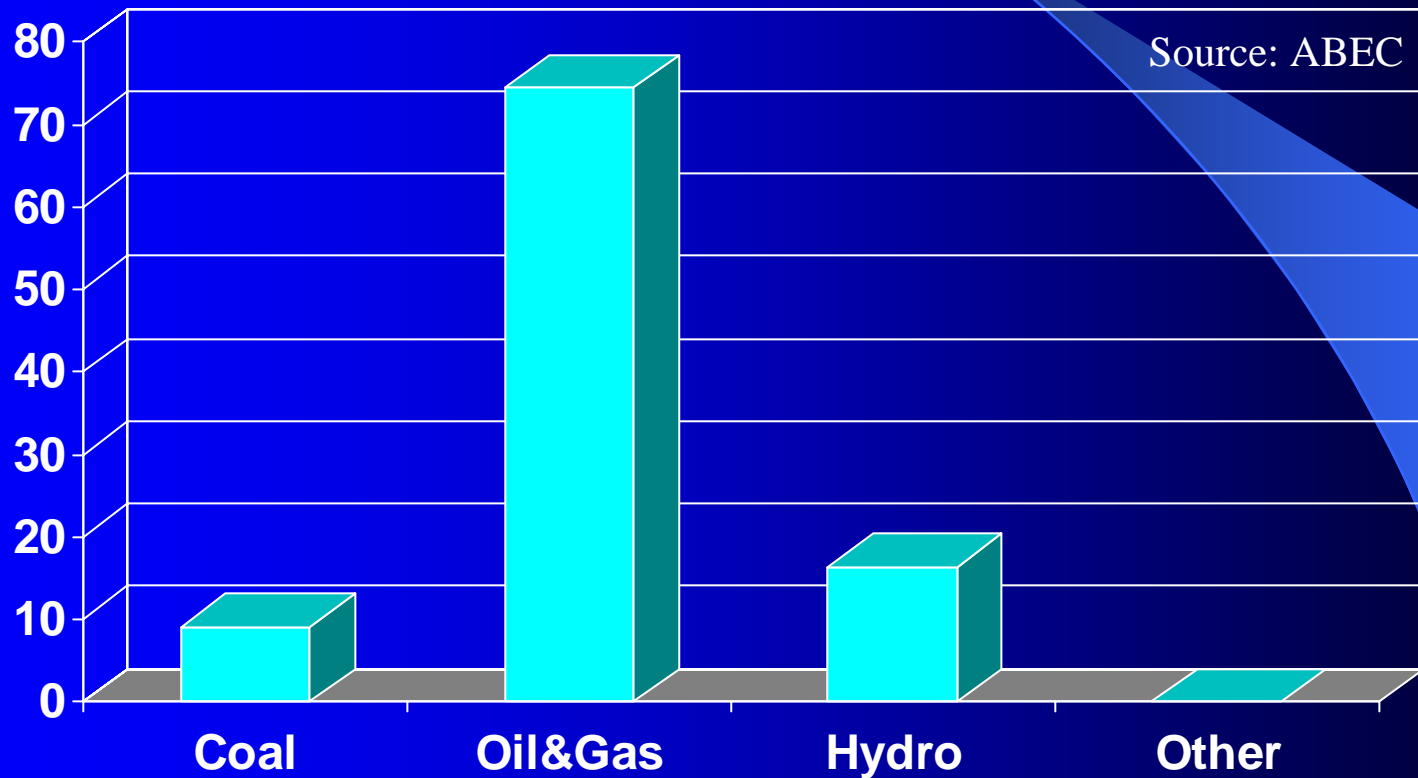
GVEA Unit1 and HCCP

Coal Effect on Electricity Rates By State

Source: US Energy Information Administration
2004 Data



Alaska's Generation Mix



Coal Exports



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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

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
TOTAL	3,369	3,942	573

PacRim Coal Exporters

EIA Preliminary 2007 Data
(million short tons)

	Production	Consumption	Export
Australia	428	146	282
Indonesia	180	50	130
Russia	347	261	86
South Africa	283	203	80
Vietnam	44	19	25
Canada	76	62	14
TOTAL	1,358	741	617

Usibelli Coal Exports

- Maximum 723,000 metric tons - 1990
- 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	157,654	365,160	522,814
2009 (est)	350,000	420,000	770,000

Coal Utilization and Technology

**CLEAN
COAL = CLEAN
COAL
TECHNOLOGY
(CCT)**

Clean Coal Technology

Pollution Control Factors

- Strategies

- Pre Combustion
- Combustion
- Post combustion
- Gasification

- Green House Gases

- Carbon dioxide
- Methane
- H₂O and NO_x

- Pollutants

- ROX, SOX, & NOX
 - Particulates (ROX)
 - Sulfur dioxide (SOX)
 - Oxides of nitrogen (NOX)
- Trace Elements
 - Mercury
 - Chlorine
 - Selenium

CCT Strategies

Pre-Combustion

- Washing and selective mining
- Primary benefits
 - Ash removal (particulates)
 - Higher heat value (improved efficiency)
 - Sulfur removal (pyrites)
 - Some trace element removal

CCT Technologies

Combustion

- Combustion chemistry and temperature.
- Primarily for Particulate and NO_x
- Examples
 - Low NO_x Burners
 - Slagging Combustor
 - Staged combustion
 - HCCP (all of the above)
 - Fluid bed combustion

CCT Strategies

Post-Combustion

- Removes pollutants from gas stream.
- Commonly used for all pollutants
- Examples:
 - Wet scrubbing (ROX, SOX and trace elements)
 - Baghouses (particulates)
 - Duct injection (SOX, NOX and trace elements)
 - Catalytic reduction (NOX)
 - HCCP, scrubbing, baghouse , duct injection

CCT Strategies

Gasification, Coal's Future?

- Provides opportunity to control all pollutants to nearly 100% removal.
- Potential path to carbon capture
- New Life For An Old Technology
 - Fischer-Tropsch (FT) Fuel
 - Very clean burning, zero sulfur and metals
 - Low toxicity and volatile content
 - Fertilizer
 - Chemicals
 - Power generation

Gasification Process

Organic material (C + H) + Water + *Not Enough* (O₂)

+ little heat

Results in gasification:

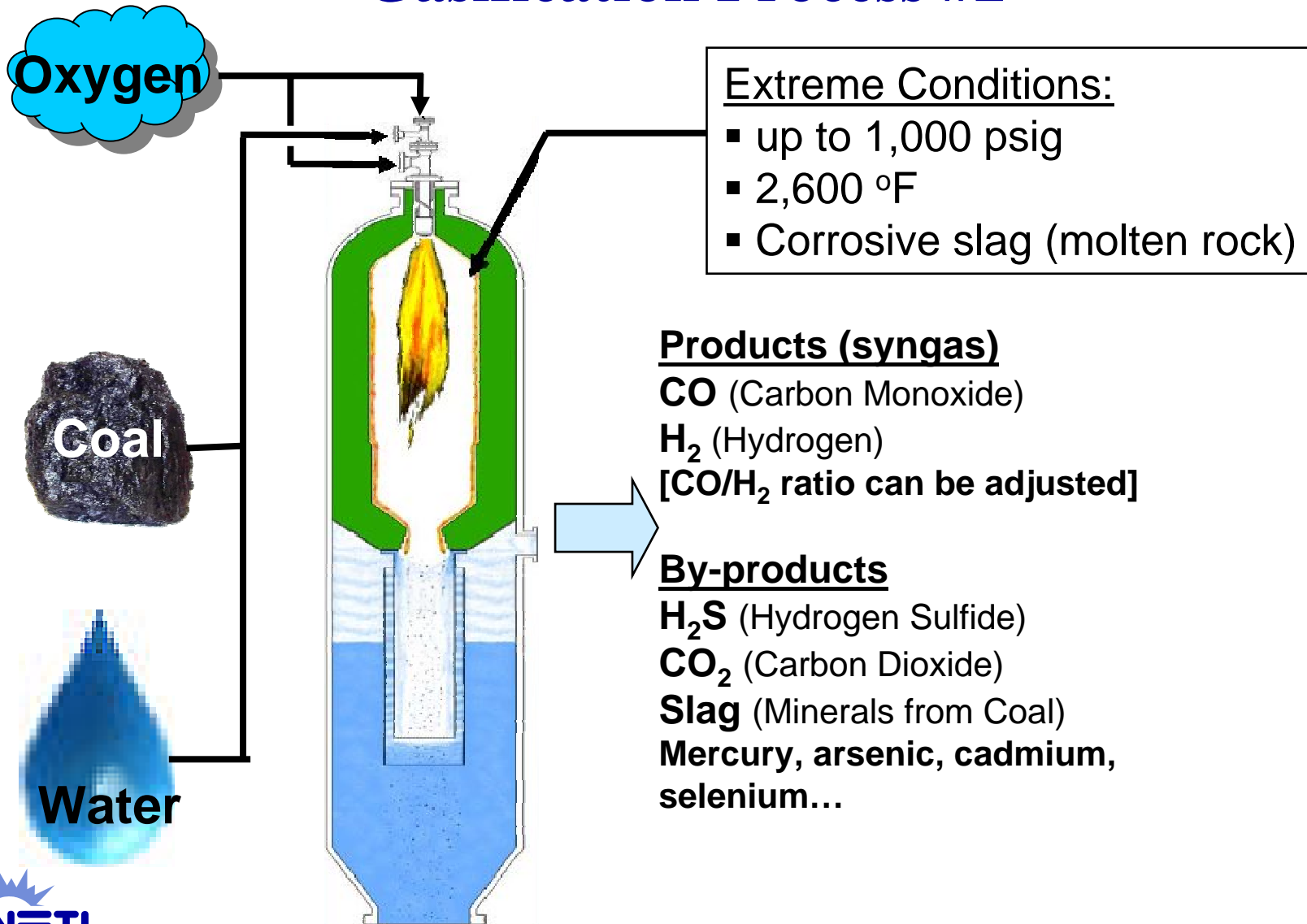
Some Heat + Carbon Monoxide (CO)

+ Hydrogen (H₂) + ash + pollutants

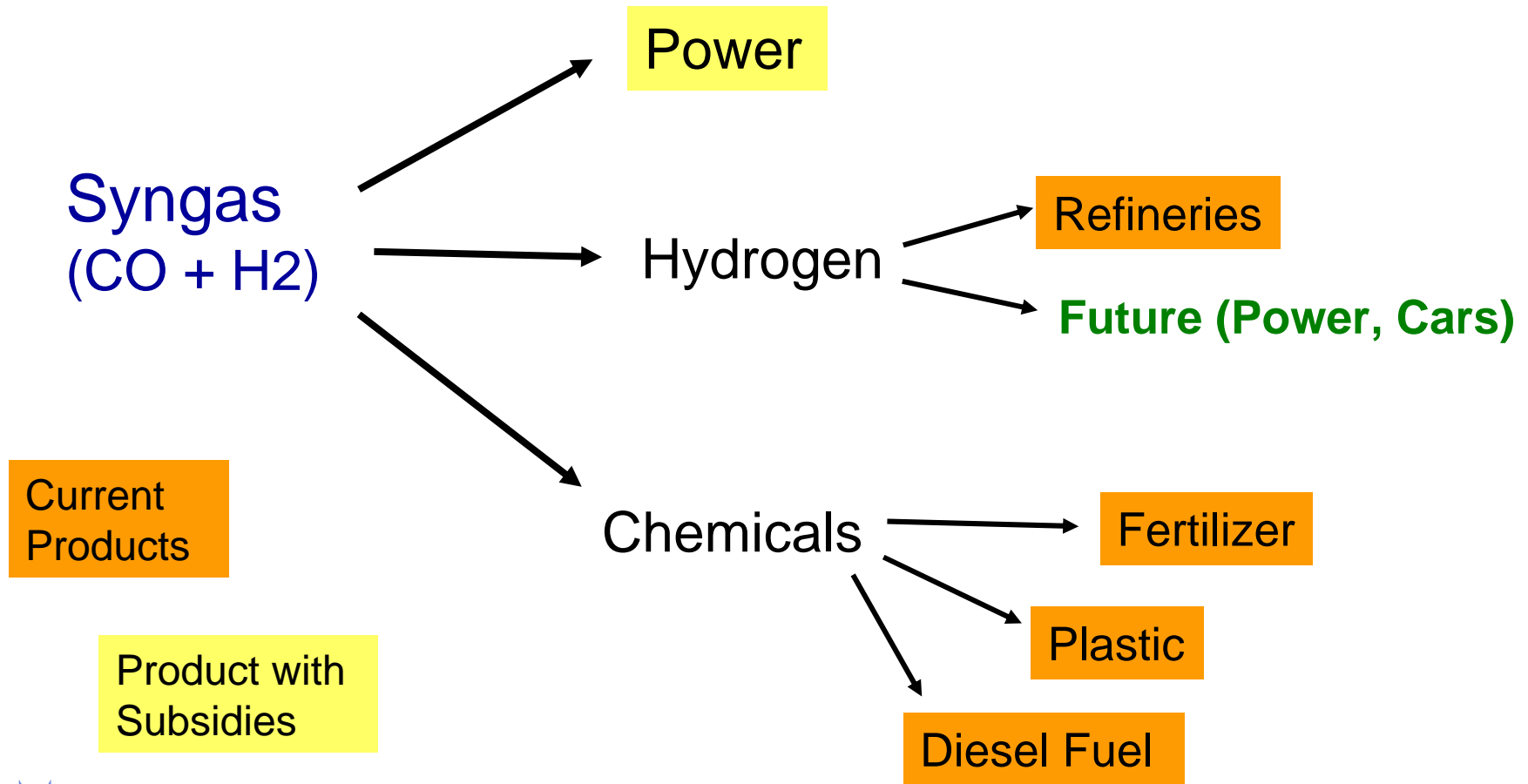
- Can convert almost any organic material into heat and a combustible gas
- Typically the organic material is coal or pet coke, but biomass, municipal waste, natural gas, etc. will all work (pet coke is refinery waste)



Gasification Process #2



Gasification Syngas Possibilities



ICRC's Alaska-Based FT Fuel Activities

Current and Future FT Fuel Plant Feasibility Studies:

FT Plants to Produce DOD Validation Fuel

- ▶ Small-Footprint FT Plants in Rural Alaska

Previous Demonstrations of Syntroleum FT Fuel in:

- ▶ Denali National Park (DNP) Tour Buses, 2004
- ▶ DNP Snow-Removal Vehicles, Winter 2005
- ▶ Fairbanks North Star Borough Transit Buses, 2005
- ▶ Diesel Gen-Set at UAF (Simulates Rural Alaskan Village Power Generation Systems), 2004



ICRC Recognizes the Importance of the Defense F-T Fuels Initiative

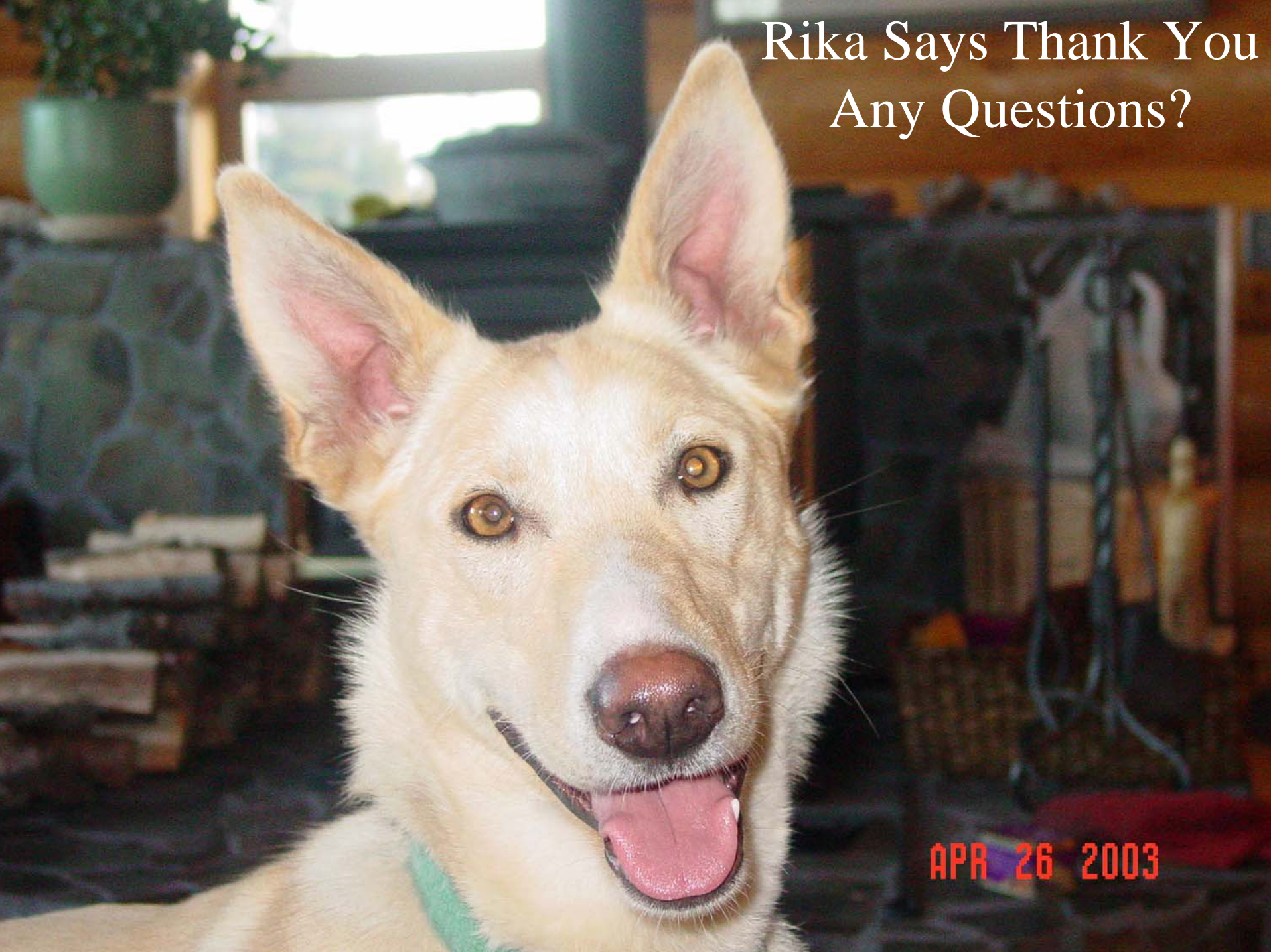


- ▶ F-T fuel can be produced from abundant US domestic energy resources such as coal, reducing dependency on imported petroleum
- ▶ Fuel production can be spread across the country to reduce the terrorist threat
- ▶ Large emission reductions can be obtained with existing military equipment
- ▶ Excellent thermal stability of F-T fuel enables development of high-performance future aircraft



ICRC

Rika Says Thank You
Any Questions?



APR 26 2003