

**PETROLEUM COKE
VS
STEAM COAL**

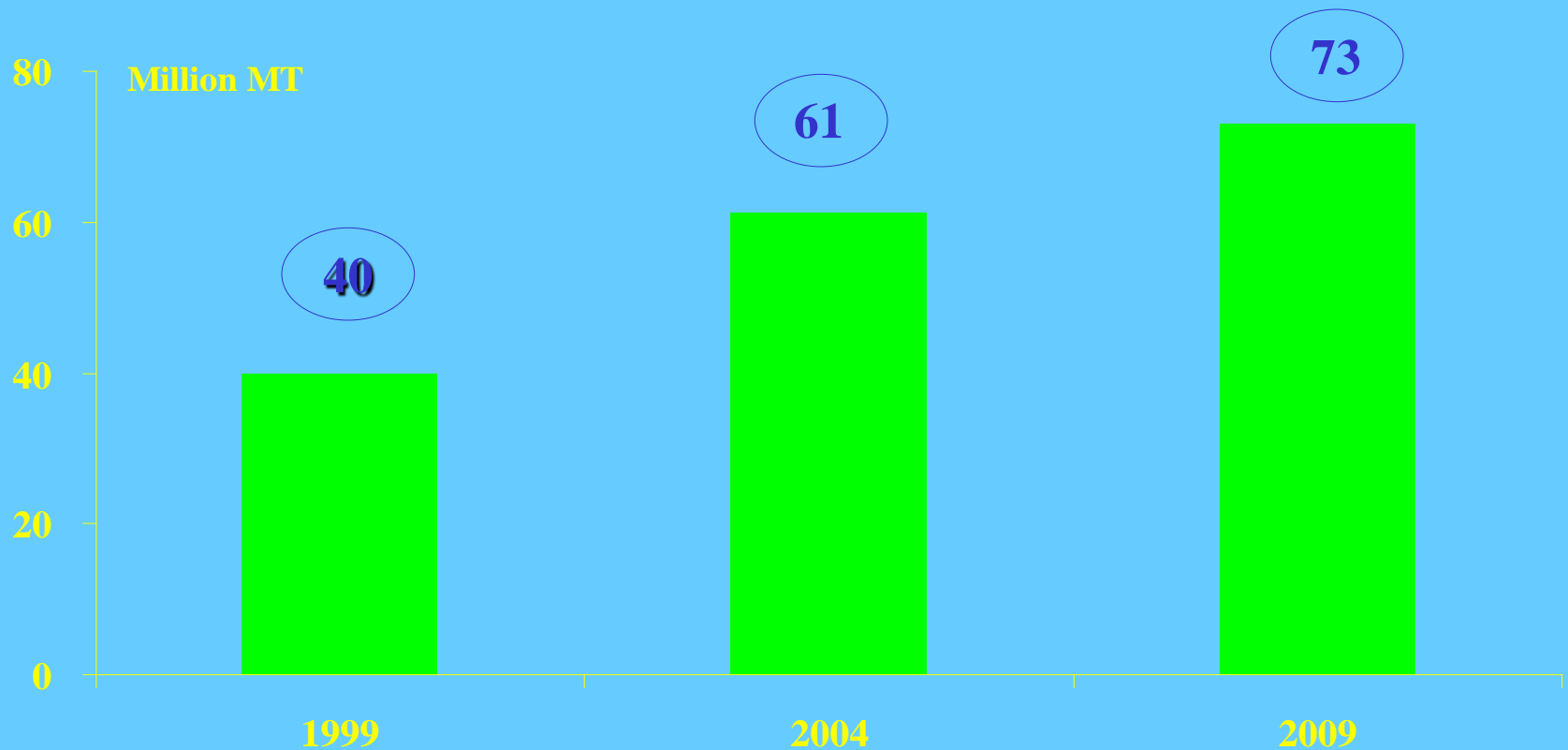
The Fundamentals

Phillip H. Fisher
Coal Trans 2001
Prague

Phillip H. Fisher

- 2 years coke consulting experience with producers, resellers, and logistics companies
- 31 years with Chevron; most recently:
 - 5 years managing Chevron's pet coke business; 3+ MM tons/year
 - 4 years managing Chevron's short term refinery and marketing operating plan
- Contact phfisher@home.com

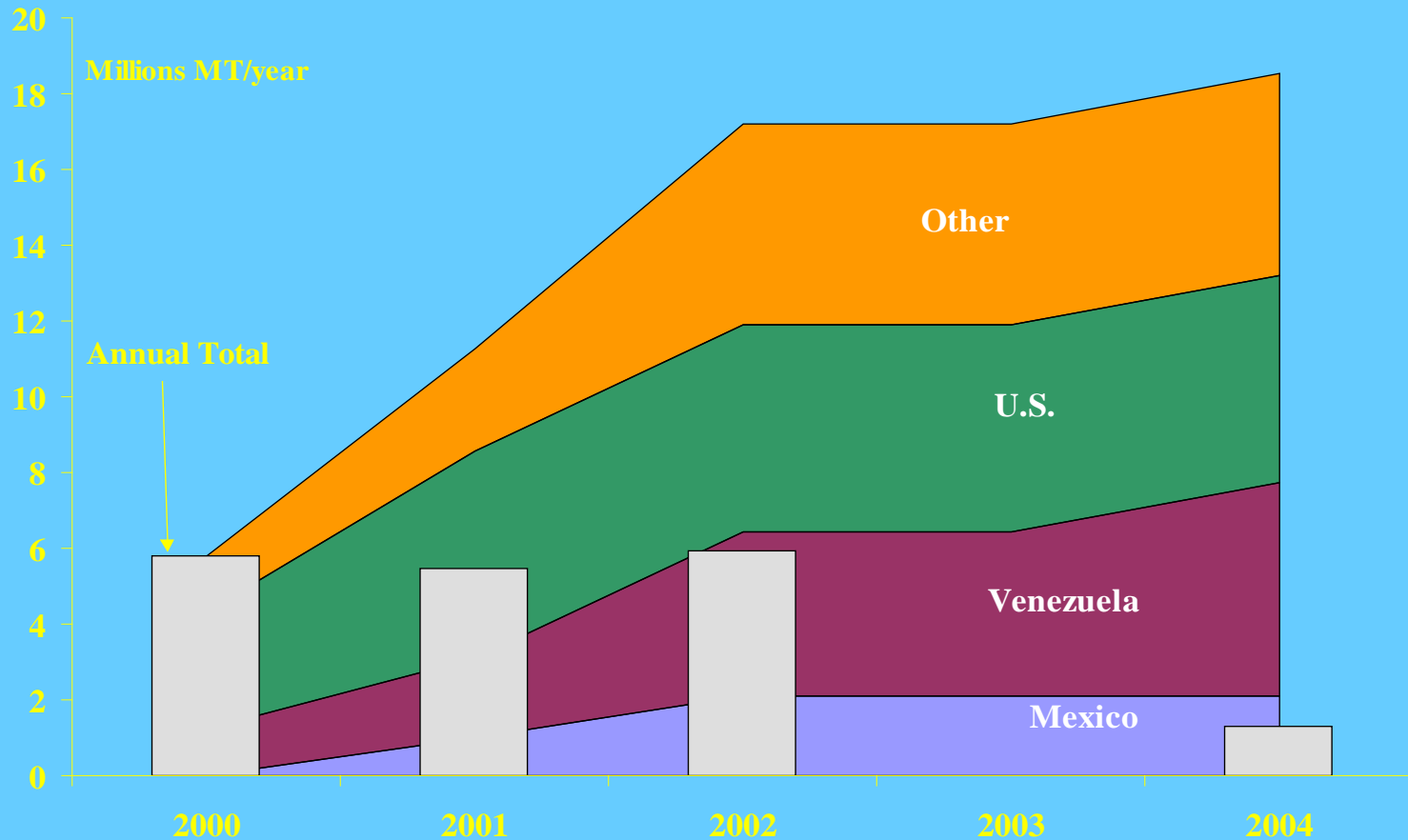
World Fuel Grade Petroleum Coke Production



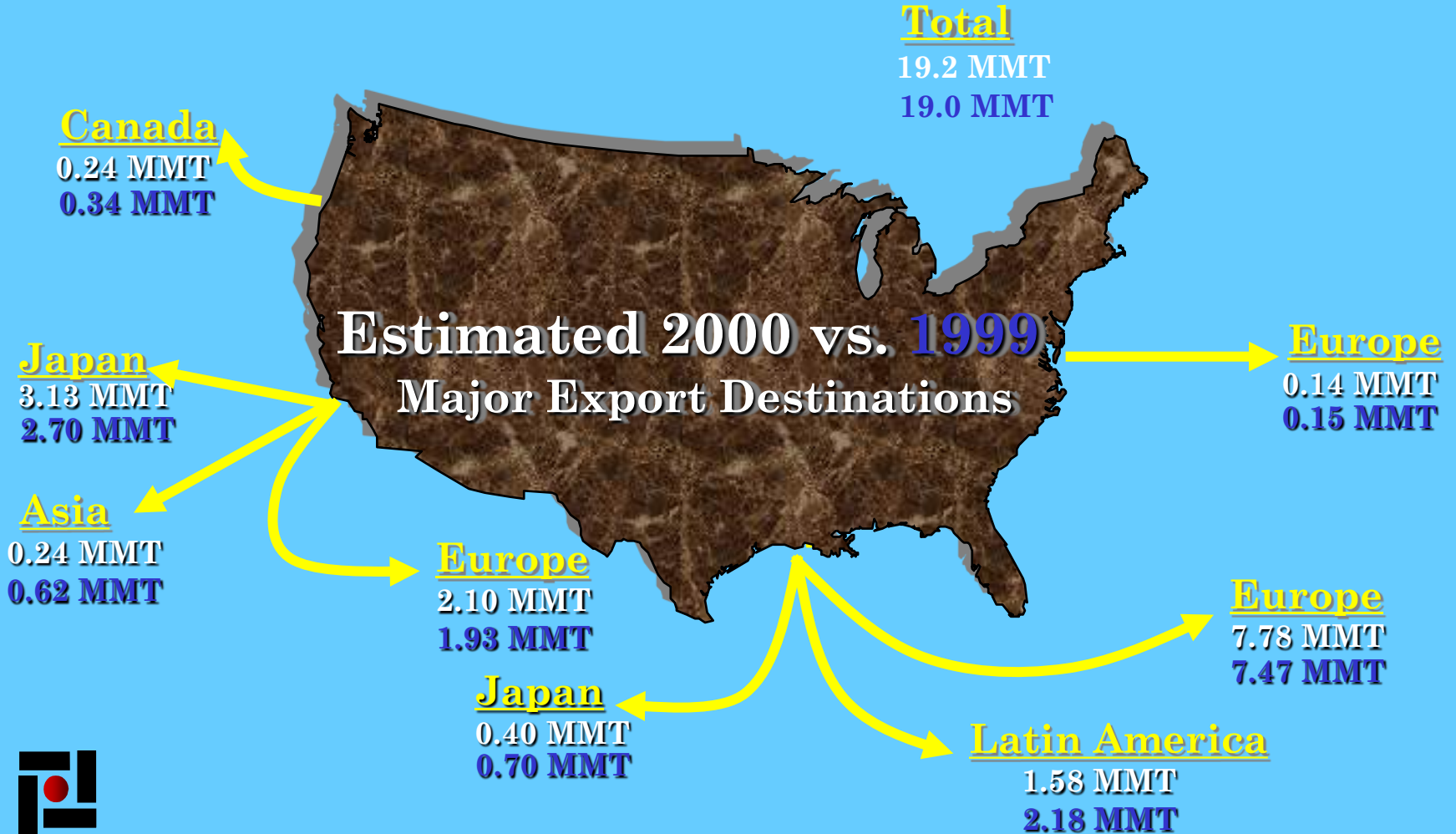
Additional World Coker Capacity

2000-2004

excluding China & FSU



US Green Petroleum Coke Exports



Quality Comparison

	Steam Coal (Typ So Africa)	Fuel Grade Coke
Ash, %	14-15	< 1.0
Moisture,%	8-8.5	8-12
BTU/#	10,800-11,500	14,000-15,000
Sulfur, %	<1	0.75- 8.0
VCM	20-25	8-10
HGI	50	35-80

Quantity vs Quality Producer Guarantees

	Steam Coal	Fuel Grade Coke
Producer	Mine	Refinery Coker
Quantity Guarantee?	YES—seam depth, width, extent all known	NO—Mechanical breakdowns, weather, storage limits,
Quality Guarantee?	YES— Assay the cores	NO— Crude dependent

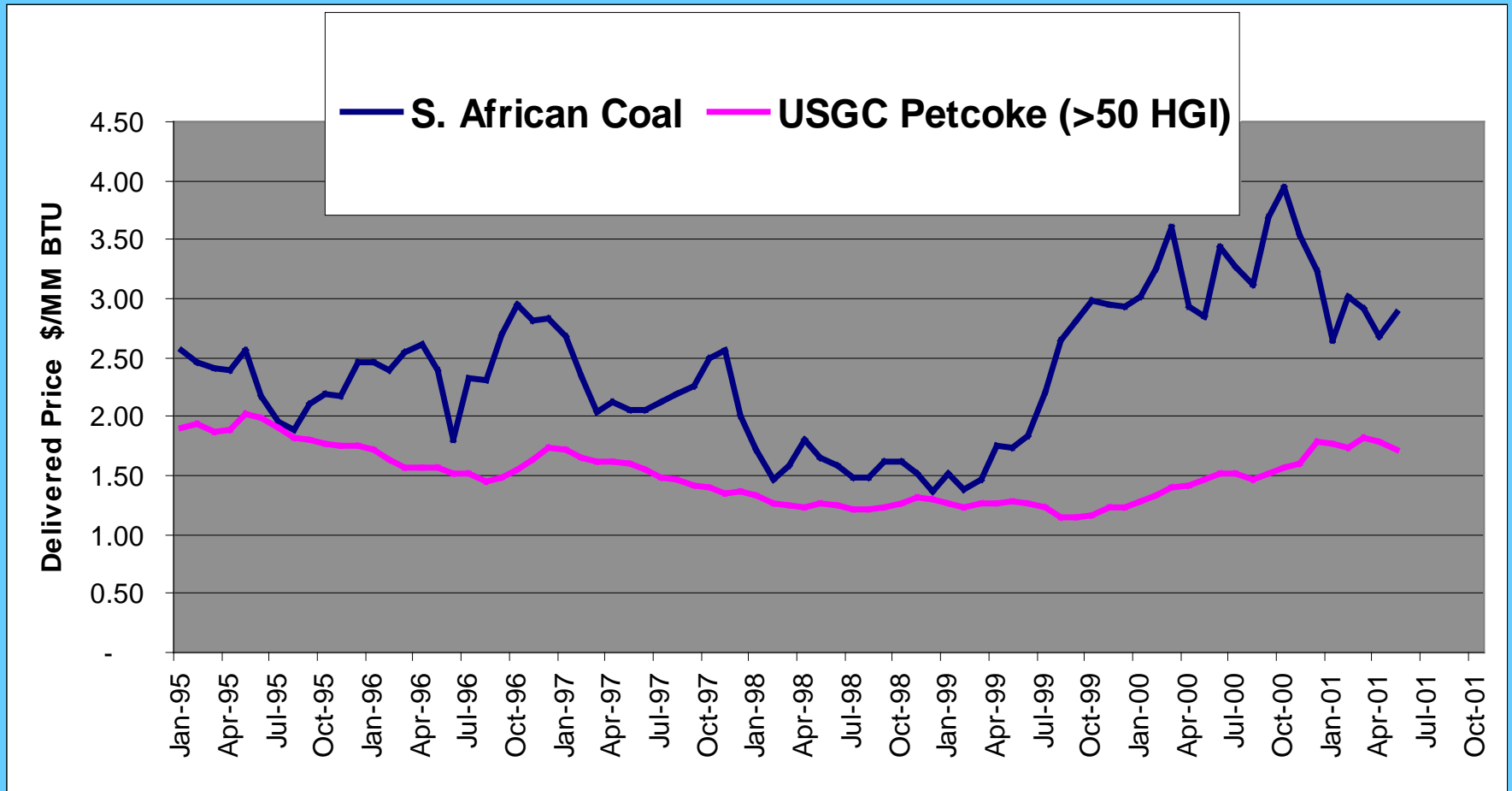
Price Comparison

Fuel grade coke prices on a delivered \$/BTU basis is typically less than steam coal:

- Higher BTU/#
- Generally higher sulfur
- Coke production is not discretionary
- Occasionally have “coke on coke” competition

Price Comparison (Pace)

Delivered ARA \$/MMBTU



Contract Terms Comparison

	Steam Coal from mine to coal buyer	Fuel Grade Coke from refinery to coke buyer
Term	Spot to long term up to 10 yrs	Some spot, most 1-3 yr term; some 10 yr term
Pricing	Tied to index or escalator	Negotiated quarterly or tied to an index
Quantity & Quality	Guarantee	No guarantee

Key contract philosophies from the producer's point of view:

- **Coal: “I’ll sell you known quantities of coal at known quality from my named mine for a price that will escalate using typically published indices”**

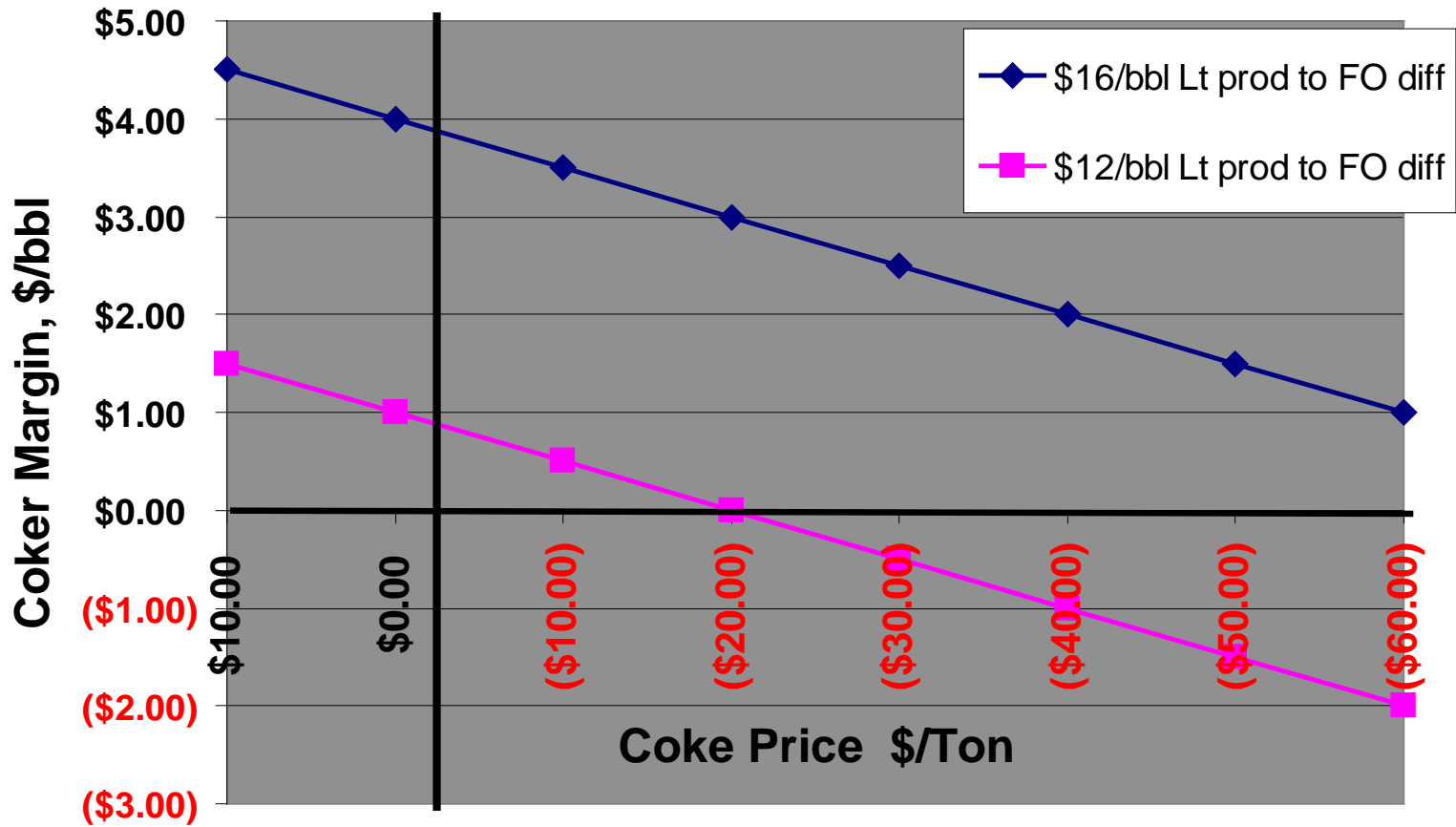
Key contract philosophies from the producer's point of view:

- Coal: “I’ll sell you known quantities of coal at known quality from my named mine for a price that will escalate using typically published indices”
- **Coke: “I’ll sell you coke of variable quality and quantity from my coker. Price can relate to forecast quality and quantity, but you cannot refuse to lift it. I will not make up shortfalls.”**

Coke Economics to Refinery

- 20-40% of crude is the heavy fuel oil (FO) fraction
- Cokers feed the FO and convert 75% of it into lighter products: gasoline, jet, and diesel
- Remaining 25% of coker yield is coke
- **It is economic to run the coker and make coke even if coke value is low or negative**

Coke Price vs Coker Margin



What a Coking Refinery Needs from Coke Buyer

Priority differs by Refinery but all want:

- Reliable Lifting
- Market price (Quality adjusted)
- Safe and Clean Handling
- Product Stewardship

What a Coke End User needs from a Coke Supplier

Priorities differ by end user, but all want:

- Meet quality requirements
- Reliable deliveries
- Competitive market price

End User Coke Quality

	Cement	Power	Bricks, ceramics, space heat, etc
Sulfur	Plant specific	Very Price sensitive	Price sensitive
Ash	Can be an issue	Can be an issue	May be needed for grate coating
Sizing	2" max preferred	2" max preferred	Important to stokers, grates, etc
Hardness	Grinder dependent	Grinder dependent	Lump coke is usually soft

What it Takes to be a Coke Reseller



- Many sources of coke to match end user requirements



- Good logistics operations to move, store, blend



- Track record of delivering on promises

Major Coke Resellers

Year 2000 millions of tons

	US Exports	Total coke
Aimcor	3.3	7
Koch Carbon	2.4	7
Oxbow	1.4	7
SSM	2.0	6
TCP	4.9	9
Others	5.8	
Total	19.8	

Type	Mois- tuire, %	Vol, %	Ash, %	HV, KB/#	S, %
Coke	8-11	9-13	<1	14.6	1 - 8+
Anthracite	2-3	3	7	13.5	<1
Semianthracite	2	12	18	12.3	<1
Bituminous	3-12	18-40	4-10	11.5- 14	<2
SubBituminous	16-25	25-40	4-11	8.5- 10	<2
Lignite	35	28	6	7	