

Policy Incentives to Stimulate Investment in Conversion of Coal to Liquid Fuels

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History of Synthetic Fuels

- Germany had 9 indirect and 18 direct liquefaction plants during WWII, which produced 4MTons/yr fuels meeting 90% of the nation's requirement.
- South Africa developed 3 CTL facilities during 1950-80 which produced 10MTons/yr fuels meeting 40% of nation's requirement at their peak production.
- China is developing a 1MTons/yr direct liquefaction plant for 2007.

Synthetic Fuels in U.S.

- Synfuels program was started in 1979 by President Carter in an effort to use coal, shale, and tar sands to produce synthetic liquids and synthetic gas.
- U.S. Synthetic Fuels Corporation (SFC) was established in 1980 as part of Energy Security Act.

SFC's Production goal was 500,000 b/d capacity by 1987 and 1.5 million b/d capacity by 1992

The total cost for the program went up to \$88 billion instead of the original \$3 billion commitment. It was funded from "windfall profits tax" on oil companies that made profits from deregulation of domestic oil production.

(Source: Copulos, 1985)

Synthetic Fuels in U.S.

- U.S. SFC was a quasi-public corporation which had the authority to contract with private firms for projects using indirect financial incentives such as loan guarantees, price guarantees, guaranteed purchase, and direct investment.
- The Board chose projects based on industry proposals responding to specific goals and avoided Congressional role in picking projects.
- SFC managed to sponsor four projects: Great Plains Coal Gasification, two shale projects, and Exxon Donor Solvent
- Ultimately the SFC failed because of plummeting oil prices.

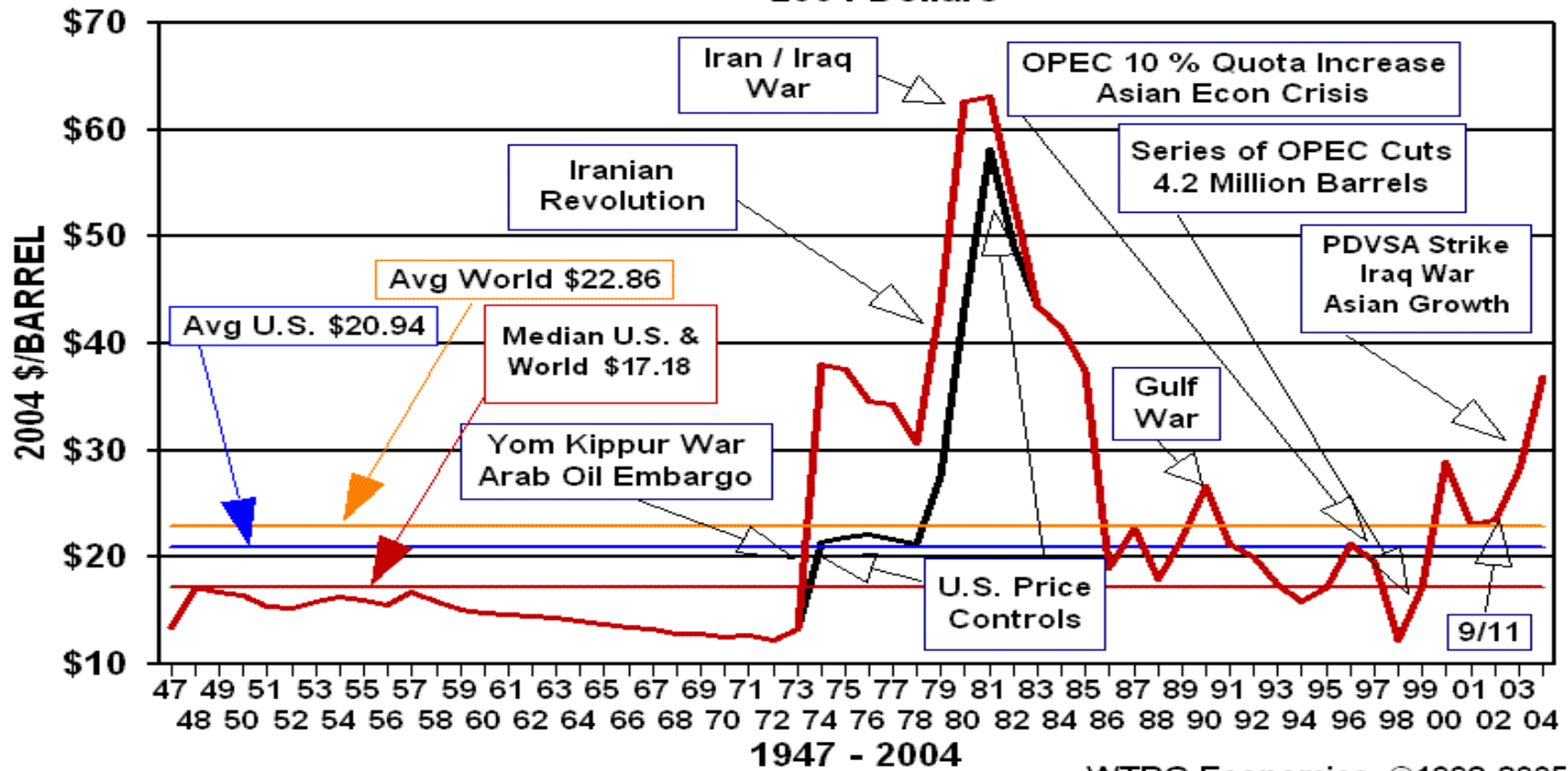
(Source: Copulos, 1985)

Challenges for F-T CTL today:

- Price/Market risks
- Technical risks
- Safety and environmental risks

History of Oil Price

Crude Oil Prices
2004 Dollars



— U.S. 1st Purchase Price (Wellhead) — "World Price" *

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Comparison of World Oil Price Forecasts , 2010-2030

(2004 dollars per barrel)

<i>Forecast</i>	2010	2015	2020	2025	2030
AEO2005 (reference case)	27.18	28.97	30.88	32.95	NA
AEO2006					
Reference	47.29	47.79	50.70	54.08	56.97
High price	62.65	76.30	85.06	90.27	95.71
Low price	40.29	33.78	33.99	34.44	33.73
GII	37.82	34.06	31.53	33.50	34.50
Altos	27.58	31.14	34.02	37.89	40.03
IEA (reference)	35.00	36.00	37.00	38.00	39.00
IEA (deferred investment)	41.00	43.50	46.00	49.00	52.00
PEL	47.84	47.84	49.80	50.77	NA
PIRA	44.10	49.95	63.35	NA	NA
EEA	46.74	43.85	42.79	41.76	NA
DB	31.75	31.75	31.75	31.75	31.75
SEER	29.54	31.00	32.00	34.18	36.50
Delphi	NA	52.50	57.50	62.50	67.50

Source: EIA, Annual Energy Outlook 2006

Importance of Market/Price Risks

From the previous two slides, we can clearly see that

- Prior to 2005, it was rare that oil was priced at levels to make coal liquids economically viable.
- Many of the forecasts of future oil prices have oil in ranges that render coal liquids uneconomic.
- The bottom line – private investments **will not** happen without some form of price protection.

Policy Alternatives to be Evaluated

- An investment guarantee, such that the federal government would guarantee some percentage of the investment in the event the plant could not produce fuels at market prices.
- A purchase guarantee, such that the government would agree to purchase the product at some minimum price. The purchase guarantee would not obligate the plant to sell to the government.
- A purchase contract wherein companies would bid for a purchase price at which the government would acquire all the plant's production.
- A fixed subsidy per gallon such as is now available to ethanol and bio-diesel.
- A variable subsidy in which the subsidy would be a function of the oil price, rising as the oil price falls and falling as the oil price rises.

Analysis of Alternatives

- Monte Carlo simulation will be used to estimate the risk reduction to the private sector and the expected cost to the government of each alternative.
- All the options being considered rely on private sector investments with some form of price insurance provided by the government.

Risks of Doing Nothing

- The “Oil Shockwave” simulation experiment in 2005 indicated that taking a small amount of oil off the world market could cause prices, at least in the short term, to rise to \$160/bbl.
- Supply disruptions of this type, which are likely in the future, will impose severe economic costs on our country.
- Is it better to pay some up front costs in implementing alternatives such as coal liquids, or pay more severe costs down the road?

“The real lesson here [is that] it only requires a relatively small amount of oil to be taken out of the system to have huge economic and security implications.”

-Robert M. Gates

Oil Shockwave National Security Advisor

(source: Oil Shockwave, Oil Crisis Executive Simulation)