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California Alternative Diesel Symposium

Jim Rockwell - Manager, Gas-to-Liquids

August 19, 2003

Agenda

- ConocoPhillips GTL Background
- ConocoPhillips Commercialization Plan
- Semiworks Plant
- Well-to-Wheel Life Cycle Assessment
- Fleet Testing Plan
- West Coast Supply

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ConocoPhillips GTL Background

- Began research in 1997 with DuPont
- Brought in house in 2000
- Currently 150 people
- Dozens of reactors
- Proprietary syngas, FT and hydroprocessing
- Committed to semiworks plant in Feb 2001
- Startup semiworks in last half 2003
- First commercial plant startup 2010

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Basic Fischer-Tropsch Process

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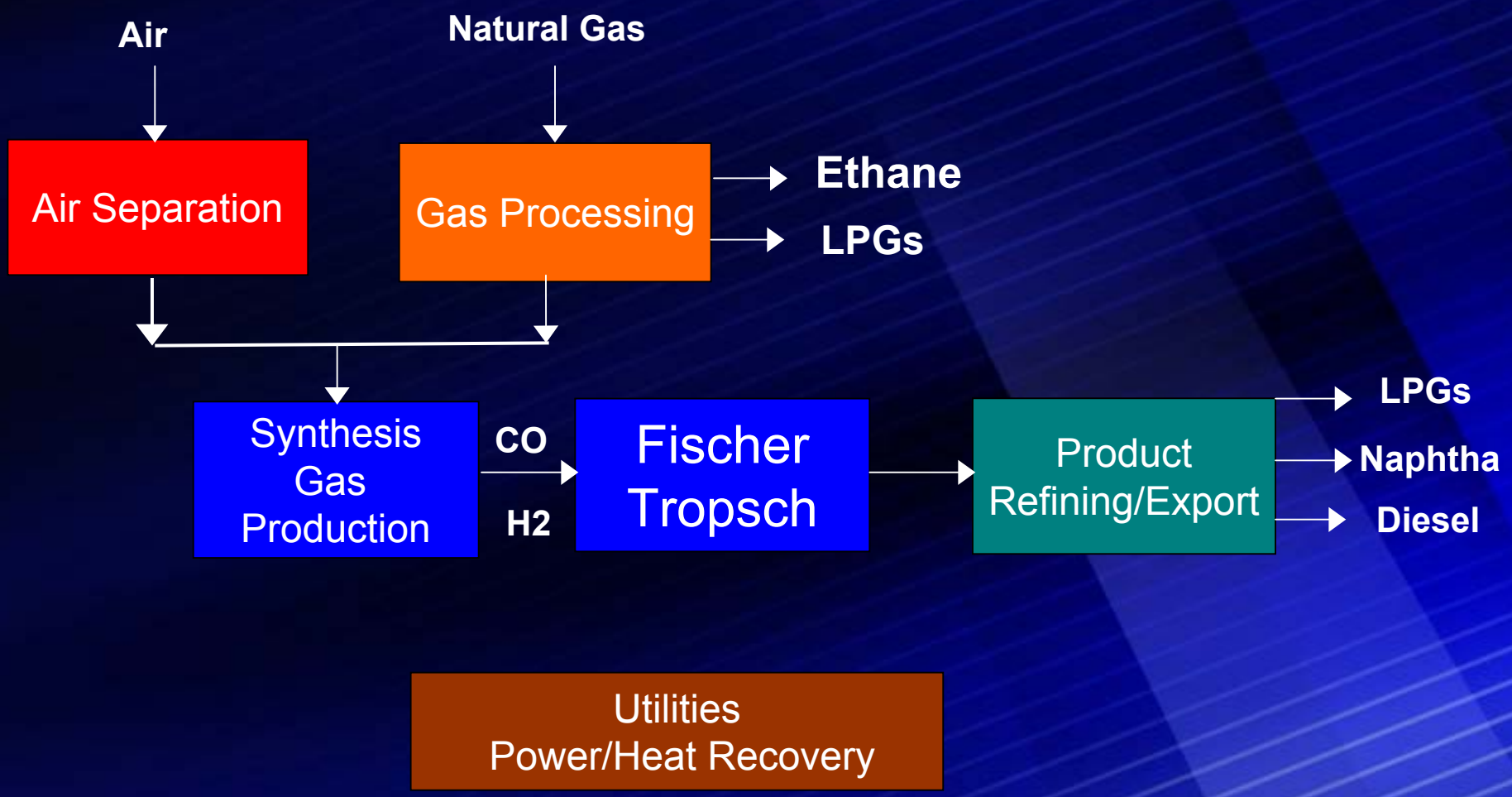
Basic GTL Process



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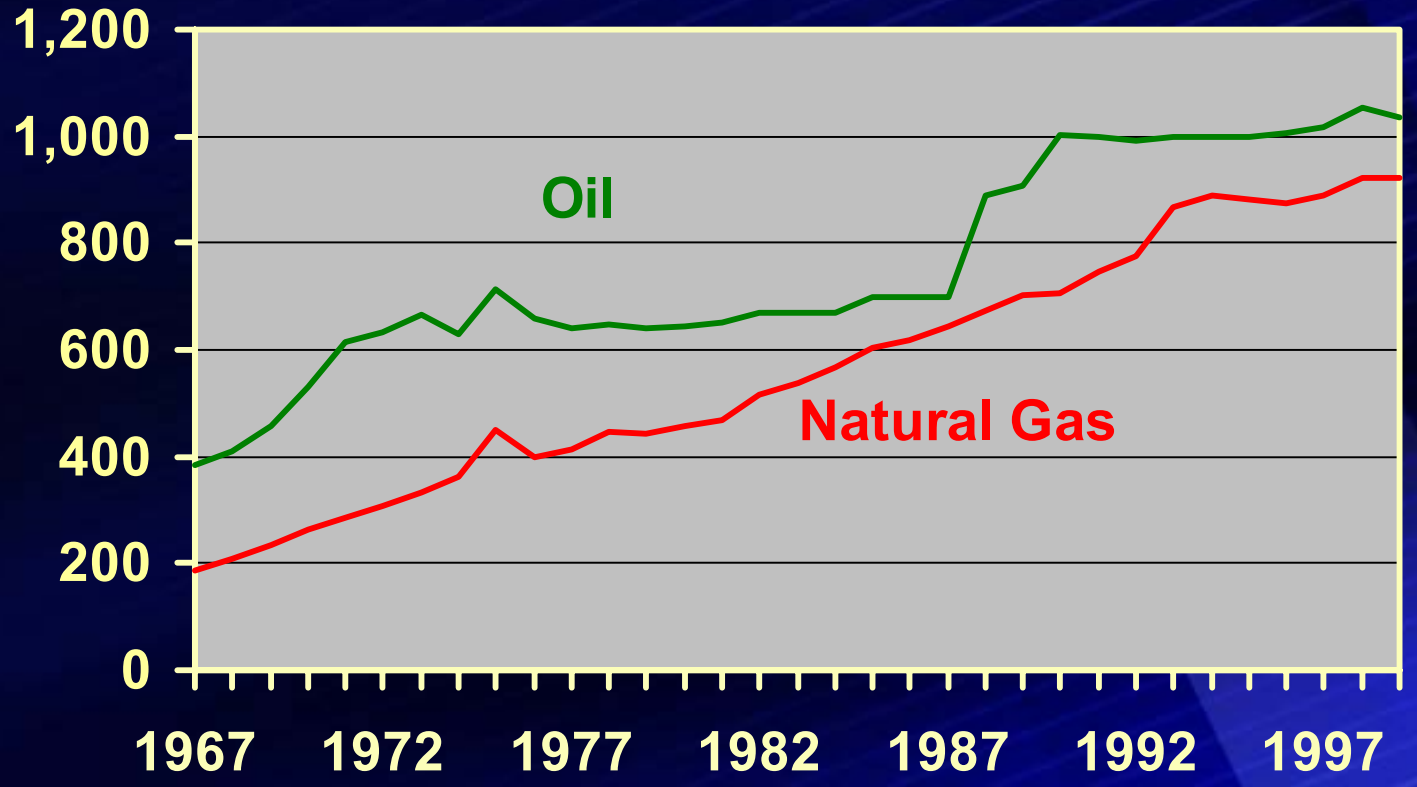
World Reserves (Billion BOE)



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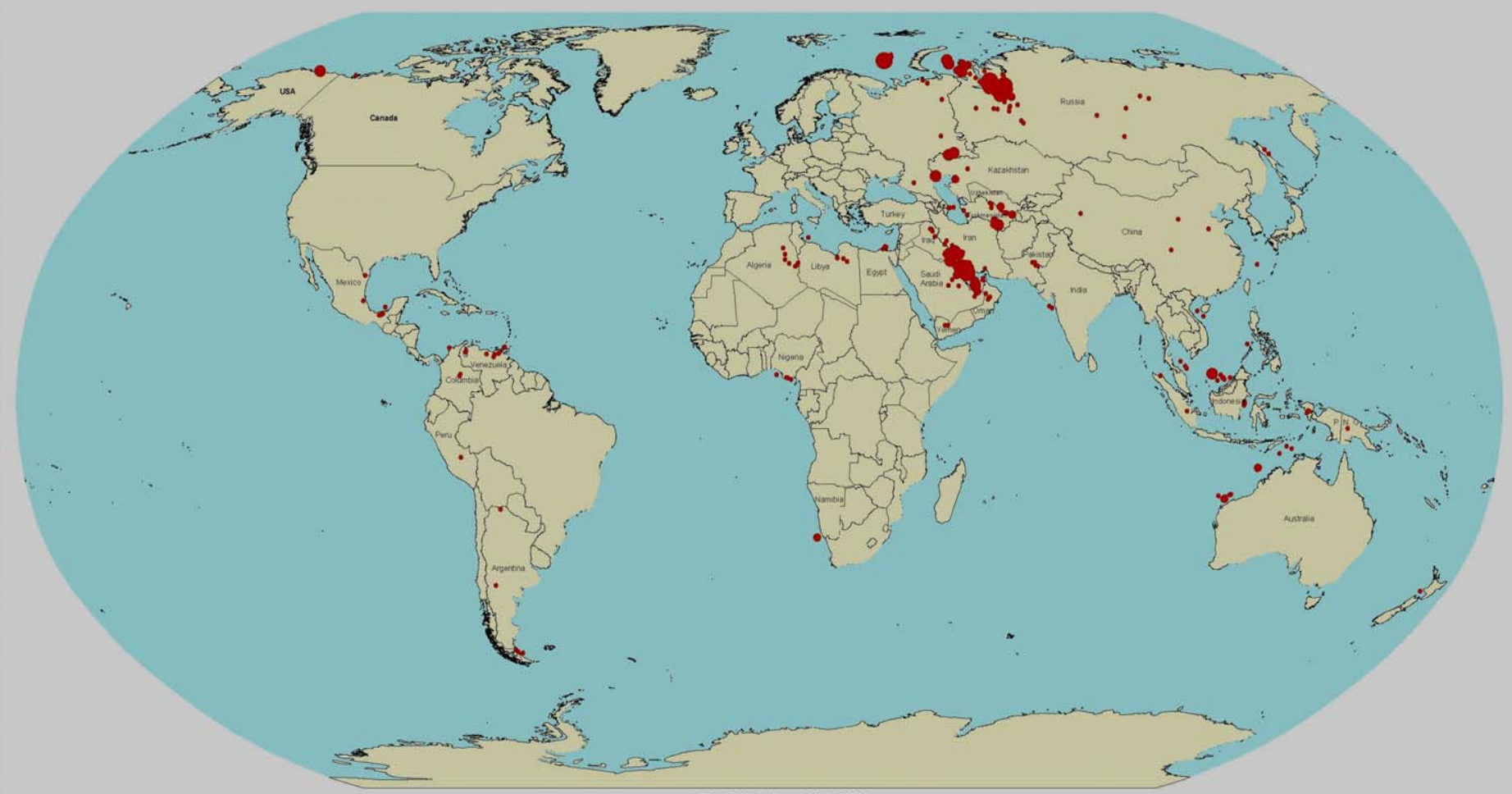
Global Stranded Gas



Field Size (TCF)

- 0 - 10
- 11 - 25
- 26 - 100
- 101 - 350

Commercial Plant

- Large scale
  - 600 MMcfd per plant
  - 80,000 bpd per plant
- Diesel
  - 55,000 bpd per plant
- Naphtha
  - 25,000 bpd per plant
  - All paraffin, zero sulfur

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Unit Cost of Production ($/Barrel)

	GTL	Refinery
Natural Gas (@ $.50/MMBtu)	$ 4.00	
Crude Oil (@ $17/Bbl)		$17.00
Operating Costs	3.00	2.50
Cash Costs	7.00	19.50
Capital Recovery, Taxes	12.00	6.50
Total Cost to Produce	$19.00	$26.00

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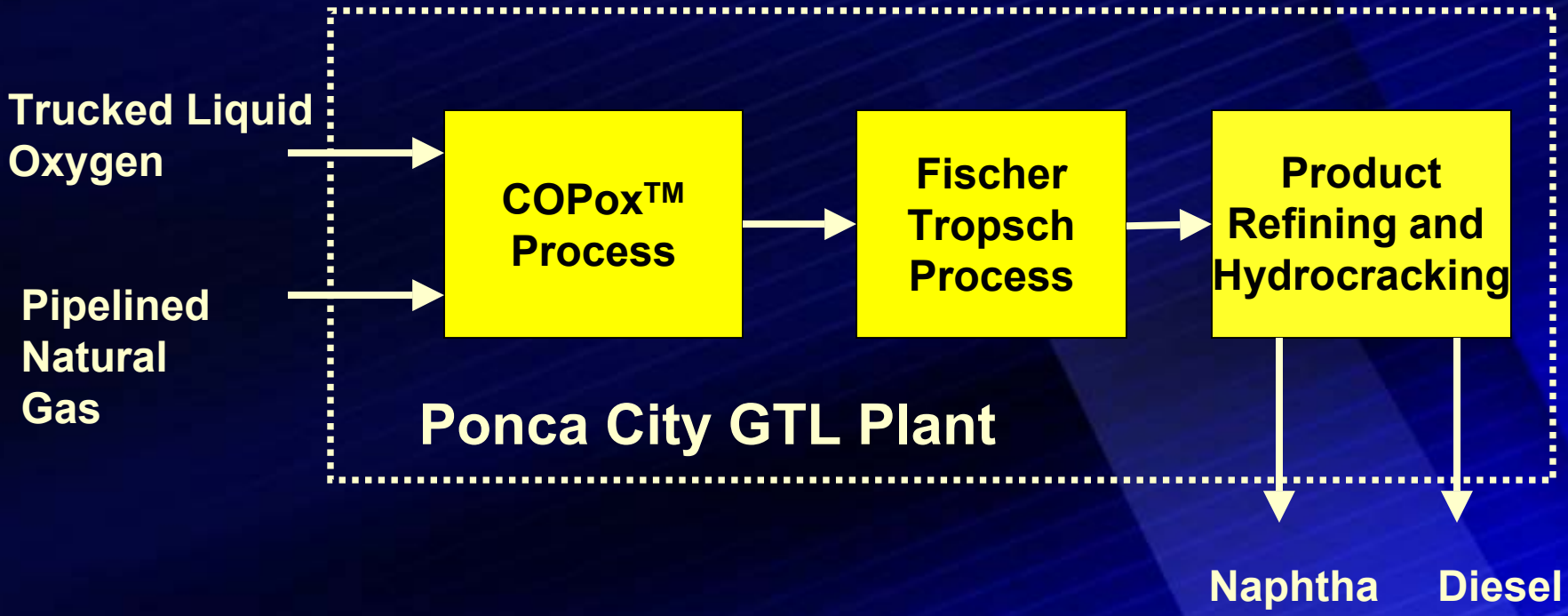
Demonstration Plant



400 bbl/day total capacity~250 bbl/day GTL diesel

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GTL Diesel Physical Properties

Property	EPA 2006 Diesel	CARB Diesel	ConocoPhillips GTL Diesel
Appearance			Transparent
Aromatics (vol. %)		10	<1
Sulfur (ppm)	15 max	15 max	<1
Dist. Temp (ºC) 90% recovered	338	321	325
Cetane Number	40	48	>75
Density @ 15 ºC, (kg/m^3)		820-870	770
Viscosity @ 40 ºC (cst)		2.0-4.1	2.2

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GTL Diesel Product Evaluation

- On Going Blend Studies
- Southwest Research Engine Emissions Testing
- Small and Large Scale Fleet Tests
- DOE Ultraclean Fuels Initiative
  - Emissions Tests-Penn State
  - GTL Life Cycle Analysis
  - DOE Funded Fleet Test ?

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GTL Life Cycle Analysis

- Conducted in partnership with DOE under the Ultra-Clean Fuels Initiative
- Determine whether GTL is a viable source of transportation fuels
- Determine the energy utilization and life cycle emissions of GTL in accordance sustainable development principles

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GTL Life Cycle Analysis

- **Well-to-wheel analysis of GTL fuels versus:**
  - Conventional diesel
  - Ultra low sulfur diesel
  - Federal reformulated gasoline
- **Energy use, greenhouse gas and criteria pollutant emissions**
- **Vehicle configurations:**
  - Spark ignition engines
  - Compression ignition engines
  - Hybrid electric
  - Fuel cell vehicles

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FT Diesel LCA Conclusions

- More energy intensive to produce than ULSD, but on par with FRFG
- Produces equivalent greenhouse gas emissions as ULSD, but less than FRFG
- Emits less criteria pollutants (NOx, SOx, VOC, PM10) than ULSD or FRFG
- Reduced environmental impacts of acidification, eutrophication, human health and ecotoxicity

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Possible West Coast Supply Points

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GTL Diesel Potential

- High quality supplement to conventional supply
- Logistics
  - Transport costs will increase prices
  - Product blending adds complexity and costs

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Conclusions

- GTL technology is advancing
- GTL diesel properties are desirable
- GTL engine emissions are reduced
- Markets will facilitate GTL fuel use

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