



# FASTER FREIGHT CLEANER AIR

Supply and distribution of Low Sulphur  
Bunker Fuels for Ocean-Going Vessels

31<sup>st</sup> January 2006, Long Beach Convention Centre, California

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Director, Environment & Sustainability, BP Marine



## Regional to Local Scale



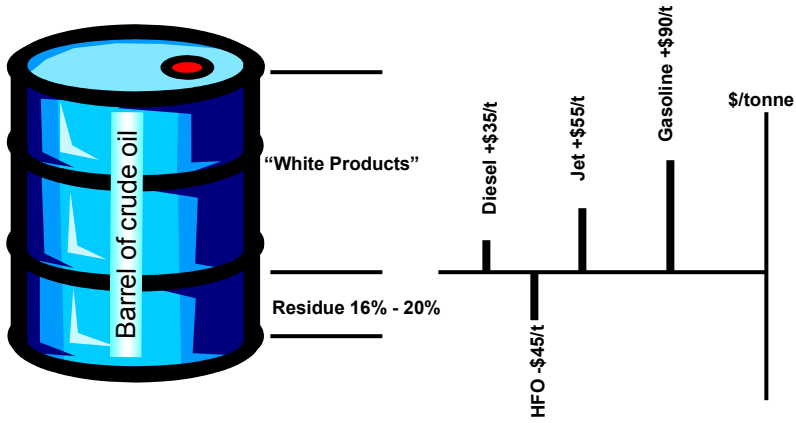
### A multi-pollutant/multi-effect problem

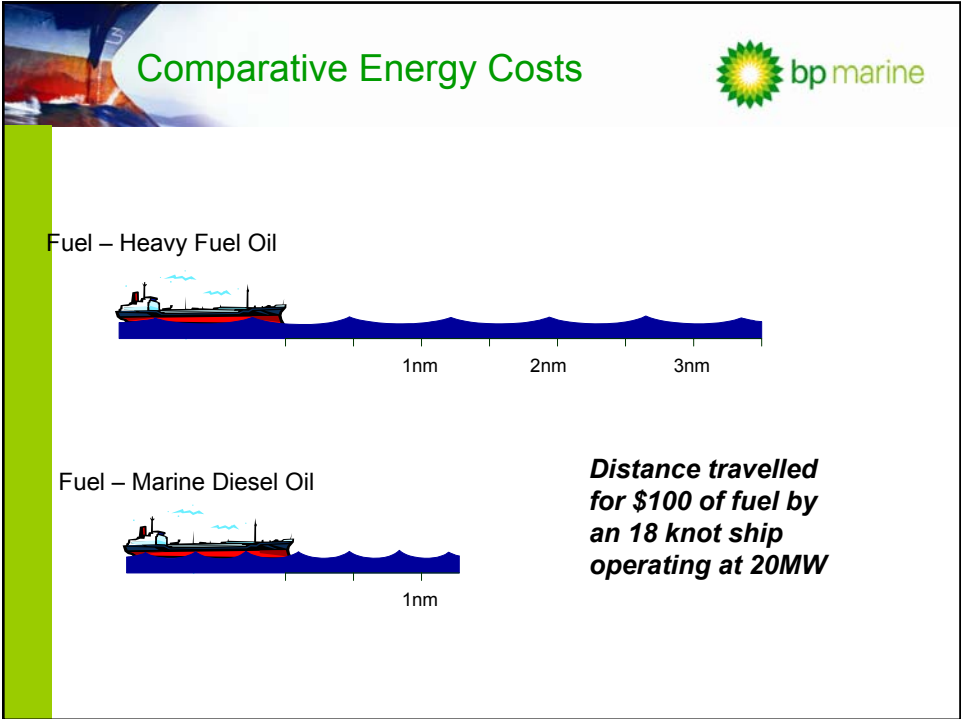
IIASA	SO <sub>2</sub>	NO <sub>x</sub>	NH <sub>3</sub>	VOC	Primary PM
Acidification	√	√	√		
Eutrophication		√	√		
Ground-level ozone		√		√	
Health impacts from fine particles	√ (via secondary aerosols)	√	√	√	√


# Emissions Abatement Technology


Technology	NOx	PM	SOx	BP Activity
Selective Catalytic Reduction	98%	-	-	None
Non Thermal Plasma	~98%	~98% HC	-	Possible synergy with SWS
Exhaust Gas Recirculation	~30 - 50%	~80%	~50%	None
Charge Air Humidification	~30%	-	-	None
Emulsion Fuels	~30%	~50%	-	Activity on invert emulsions
Sea Water Scrubbing	~5%	~80%	>95% (100%)	First successful commercial installation December 2006

# HC Fuels - Relative costs

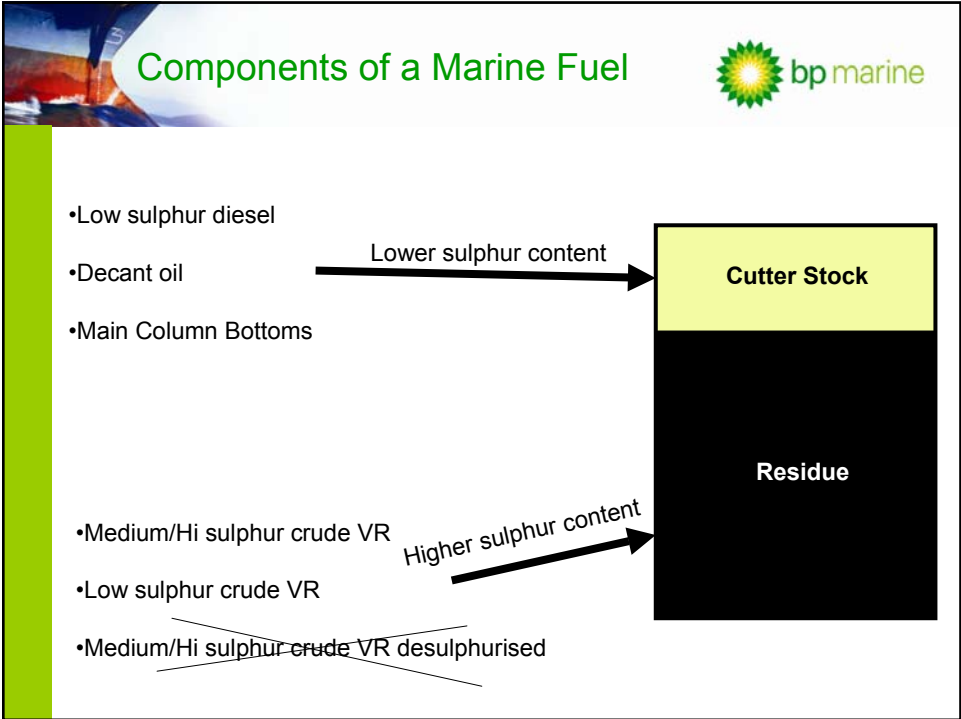




- ## Some options for compliance
- 
- **Alternative power source in port**
    - Ship no longer self contained, move pollution source elsewhere, higher CO<sub>2</sub> impact
  - **Use only diesel oil**
    - High cost, tank size
    - Convenient, lower maintenance, no fuel changeover
  - **Use 1.5% sulphur fuel**
    - Higher cost, availability, tank segregation, fuel changeover
    - Flexible option, little investment
  - **Blend fuel prior to use**
    - Investment, maintenance, verification, reliability
    - Flexible option, low cost
  - **Install abatement technology**
    - Investment
    - Lowest cost fuel, emissions credits, use in port
  - **Join an emissions trading group (not yet an option)**
    - Provides an assured means of achieving compliance, choice and lowest cost options for the ship operator
- difficult



easier



## Beware of mis-leading claims



### Key elements for viable LSFO supply

- Fuel components
- Logistics
- Price

Independent bunker supplier **Chemoil Corp.** can supply 1.5% low-sulphur fuel in the port of **Los Angeles** if there is sufficient demand, Bunkerworld has learned.



"We could supply low-sulphur fuel on a consistent basis," Chemoil's VP of sales and marketing Adrian Tolson told Bunkerworld today.

As Bunkerworld reported this week (see link below), the **Port of Los Angeles** will next month sign a lease with shipowner **P&O Nedlloyd** that will include a requirement for its ships to use 1.5% fuel within 40 nm of port and at berth.

The port and the shipowner were initially concerned that sufficient 1.5% would not be available in the region and at a commercially acceptable price


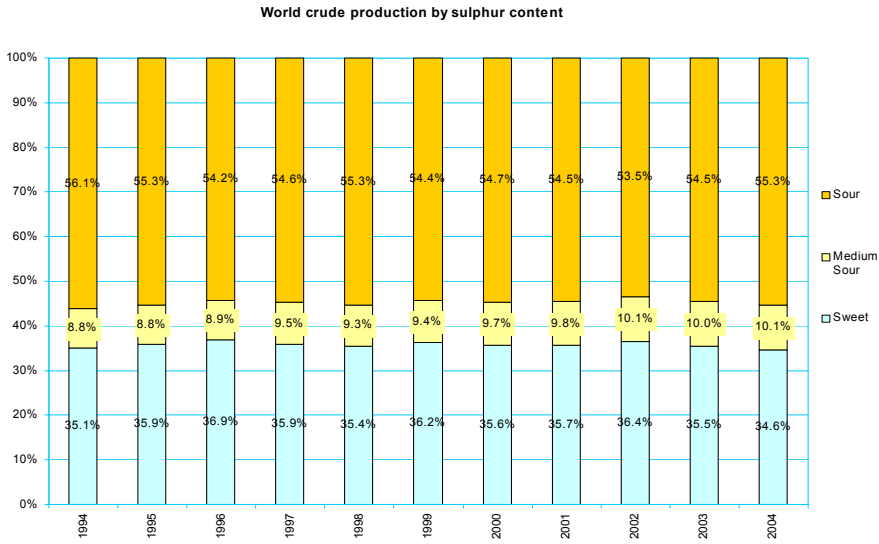
courtesy of bunkerworld

# Sulphur in Crudes & Residues



Region	Crude	Crude % S	VR %Yield	VR %S
<b>Alaska</b>	<b>ANS</b>	<b>0.9</b>	<b>6.0</b>	<b>1.6</b>
Brazil	Marlim	0.8	35	1.1
Canada	Bow River	2.6	33	4.5
Indonesia	Minas	0.1	23	0.2
Iraq	Kirkuk	2	18	5.7
<b>Nigeria</b>	<b>Bonny Light</b>	<b>0.2</b>	<b>8</b>	<b>0.6</b>
North Sea	Forties Blend	0.2	7.4	0.9
Russia	M100 Kirishi	2	44	2.6
<b>Saudi Arabia</b>	<b>Arab Hvy</b>	<b>2.8</b>	<b>32</b>	<b>5.5</b>
<b>Texas</b>	<b>WTI</b>	<b>0.4</b>	<b>10</b>	<b>1.1</b>
Texas Gulf	Mississippi	0.1	21	1.6
<b>Venezuela</b>	<b>Cerro Negro</b>	<b>3.3</b>	<b>34</b>	<b>4.3</b>

# Crude by Sulphur content

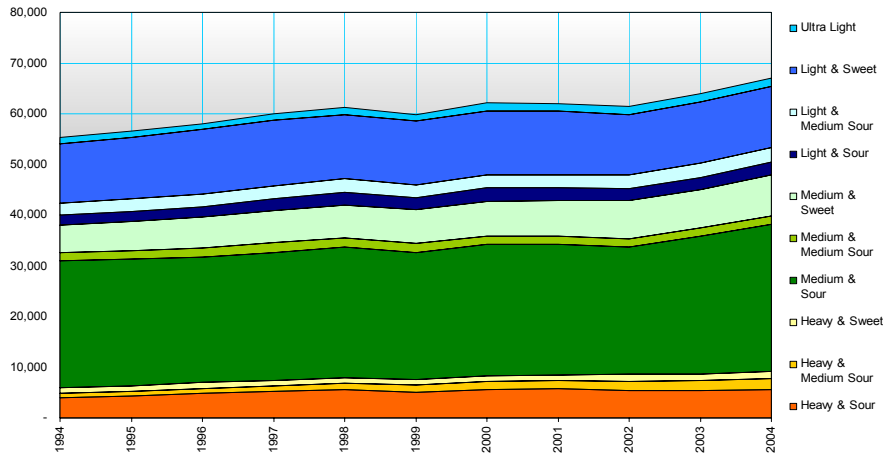



Courtesy of Oil & Gas Review 2005 by ENI

# Crude by quality

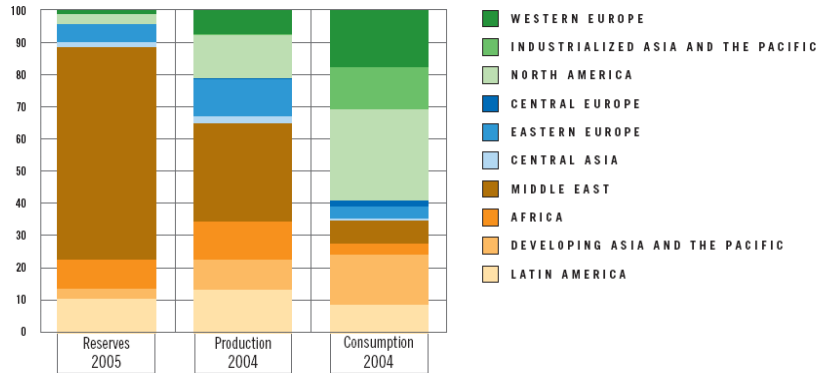


World crude production by quality (thousand barrels/day)



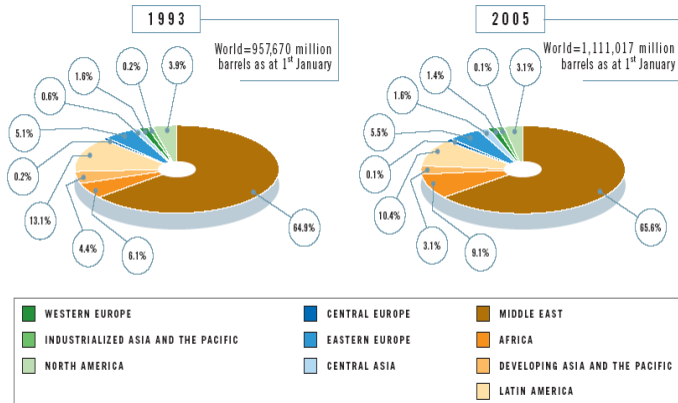
Courtesy of Oil & Gas Review 2005 by ENI

# Global crude statistics



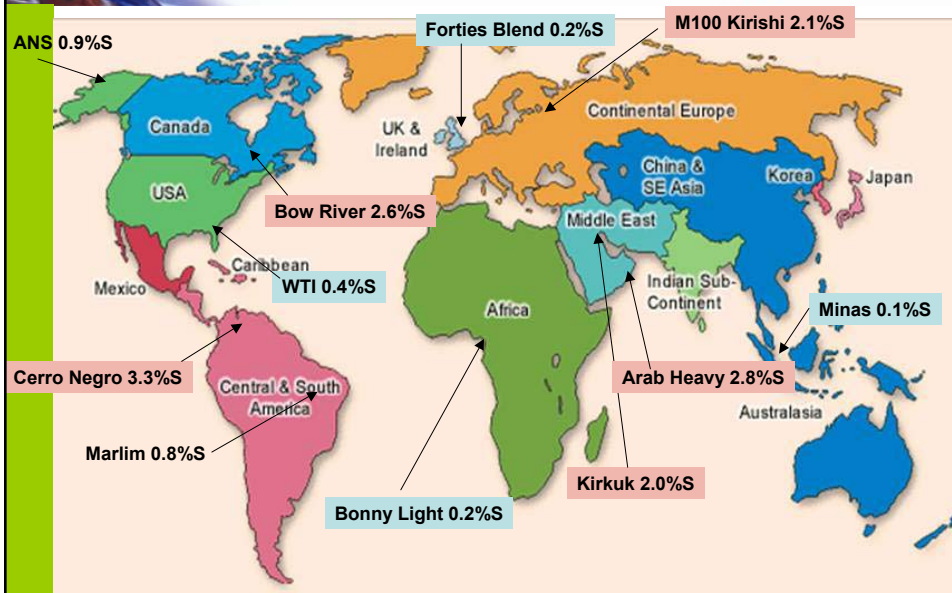
Courtesy of Oil & Gas Review 2005 by ENI

# Global crude sources

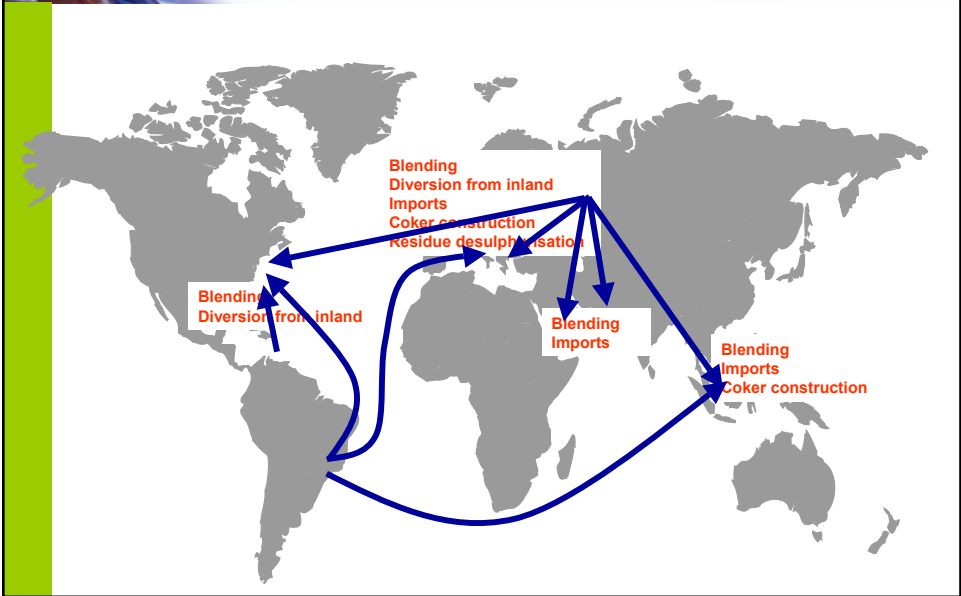


Courtesy of Oil & Gas Review 2005 by ENI

# Typical global crudes



# Current flows of Marine LSFO



**THANK-YOU**