

Trends for Refining Residual Fuel Oil



Prepared for
Bunker Asia Forum 2011
Singapore – 7 September 2011



PURVIN
& GERTZ
INC.

Agenda



- Introduction
- Refiner View of Bunker Fuel
- Product Quality
- Crude Oil Influences
- Likely Refining Industry Outcomes

Purvin & Gertz, Inc.

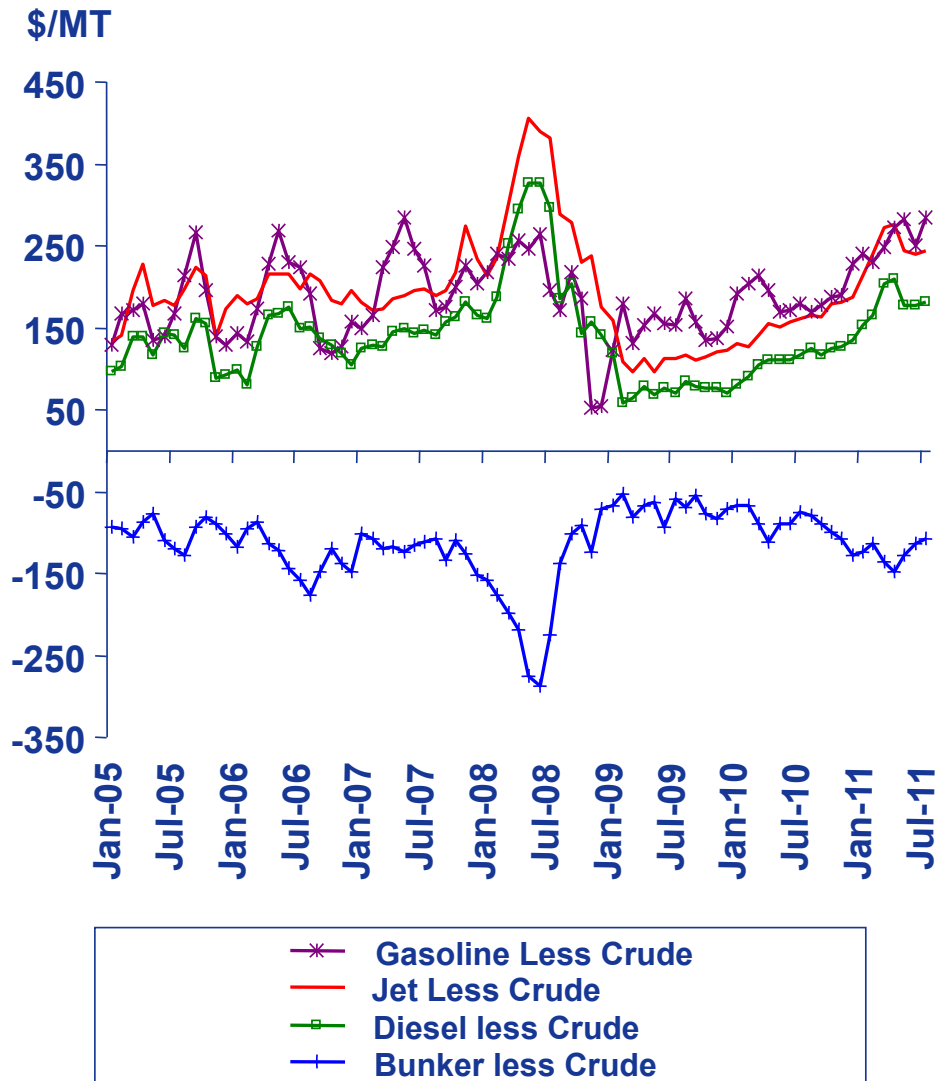
Technical, strategic and commercial advisory services for the global energy industry



Core Competencies

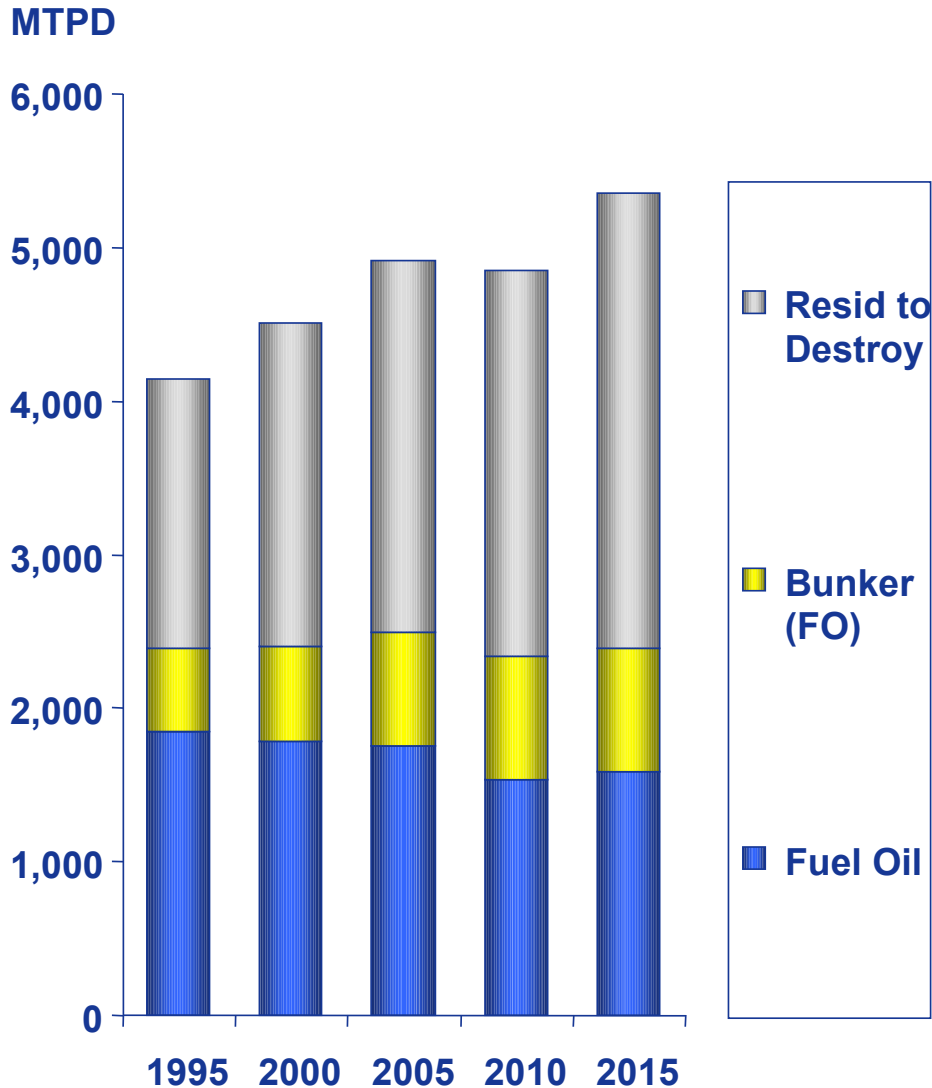
- Energy Market Analysis
- Refinery/Asset Valuations
- Technology Evaluations
- Crude Oil Marketing
- Project Finance Assistance
- Independent Engineer
- Conferences/Training

Bunker fuel is a money loser for the refining industry.



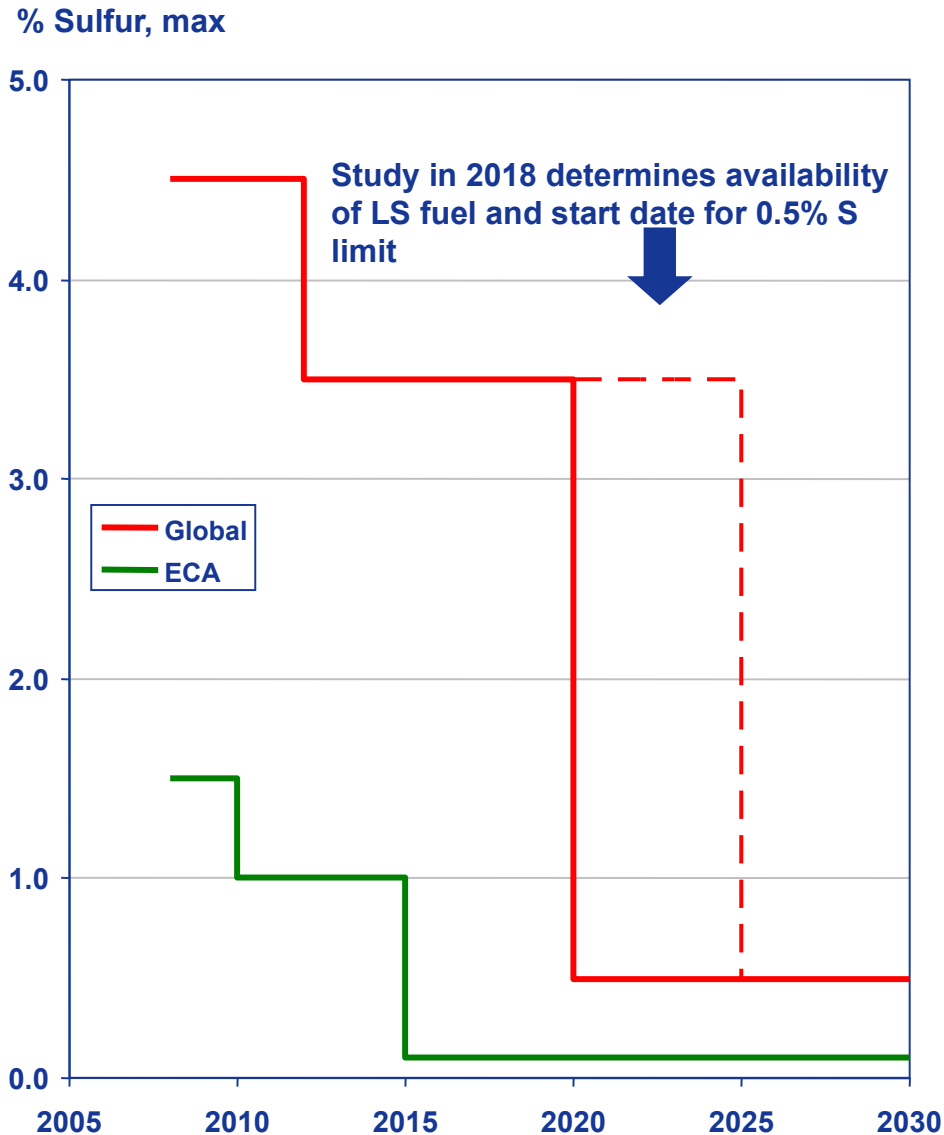
- Bunker fuel sells for less than crude oil
- Refiners can make money only by producing products that sell for more than crude oil.
- Refining investment goes to manufacturing profitable products.
- Why do refiners produce any bunker fuel at all?

World Fuel Oil



- A serious imbalance exists in the bunker fuel contained in crude oil and the amount demanded by consumers.
- Refiners respond to this imbalance by destroying bunker fuel and in the process making more light products.

IMO sulfur regulation timeline



- Pending changes in bunker fuel specifications could have huge refining industry impact.
- If the shipping industry responds by demanding low sulfur fuels, then the refining industry can manufacture them—for a price.
 - Enormous investment would be needed and time required.
- If the shipping industry responds with heavy reliance on scrubbing technology then refiners will need to do little or nothing.

Reduction of bunker fuel emissions is a complex inter-industry issue

Shipping Industry

- Requires low cost fuel – very competitive market
- Resists capital and added complexity of scrubbers
- Facing complex regulatory environment
 - Uncertain ECA and global regulation schedule
 - NO_x, PM and perhaps CO₂

Refining Industry

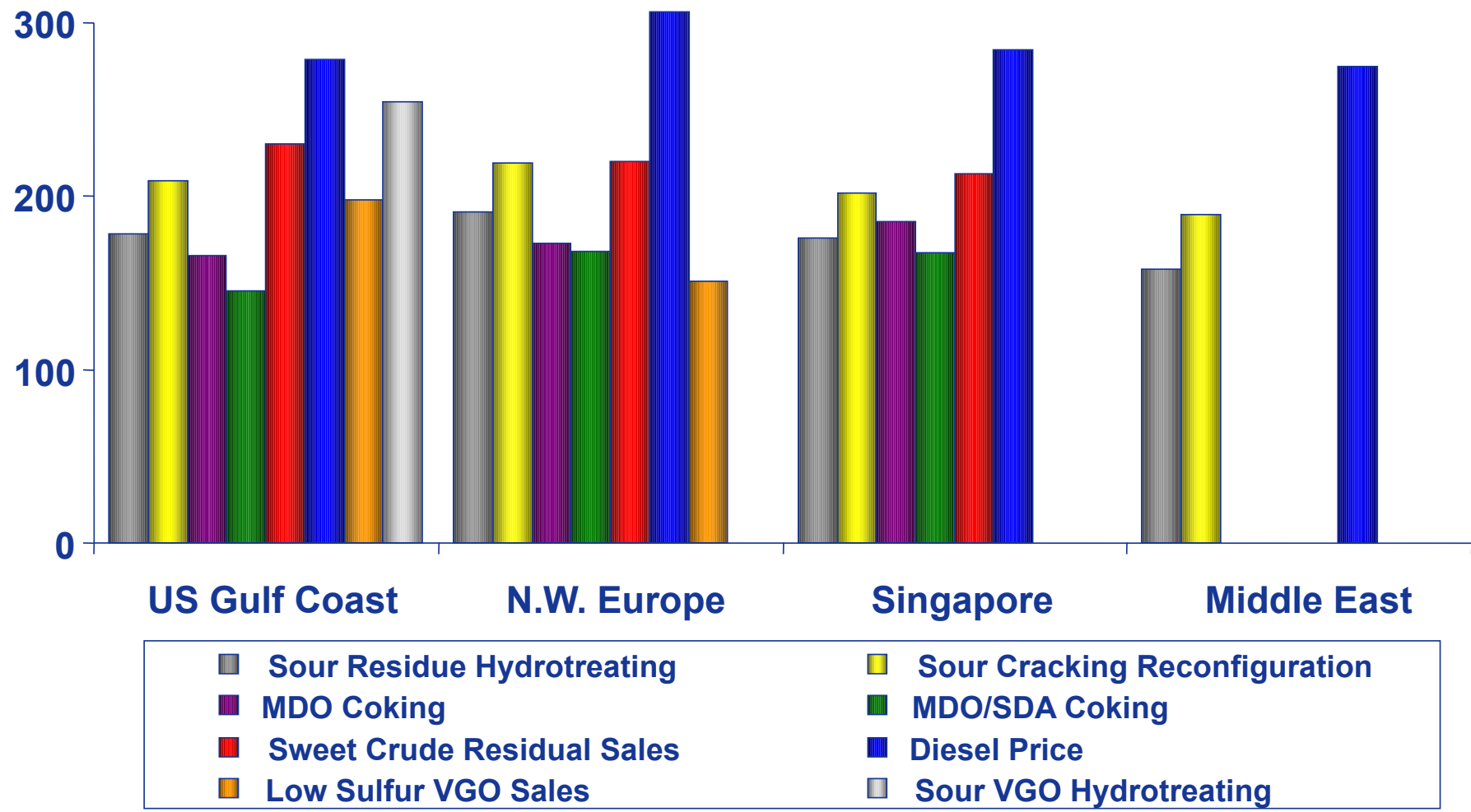
- Bunker has traditionally been a low-value by-product
- Difficult to envision investing for bunker production
- Stranded investment risk if emissions technology evolves
- Concerned with magnitude of investment required
- Needs clear signal from fragmented shipping industry on fuel requirements

Refineries have different options to produce the new ECA and new LS bunker fuels

- **Refining analysis completed to estimate production cost for a range of options**
 - **Sour and sweet crude refining ranging from simple to complex configuration**
 - **Incremental production with existing equipment and considering FCC shutdowns**
 - **Capital investment in coking, residue hydrotreating and other routes**
 - **Regional analysis considering cost of hydrogen and utilities in different regions**

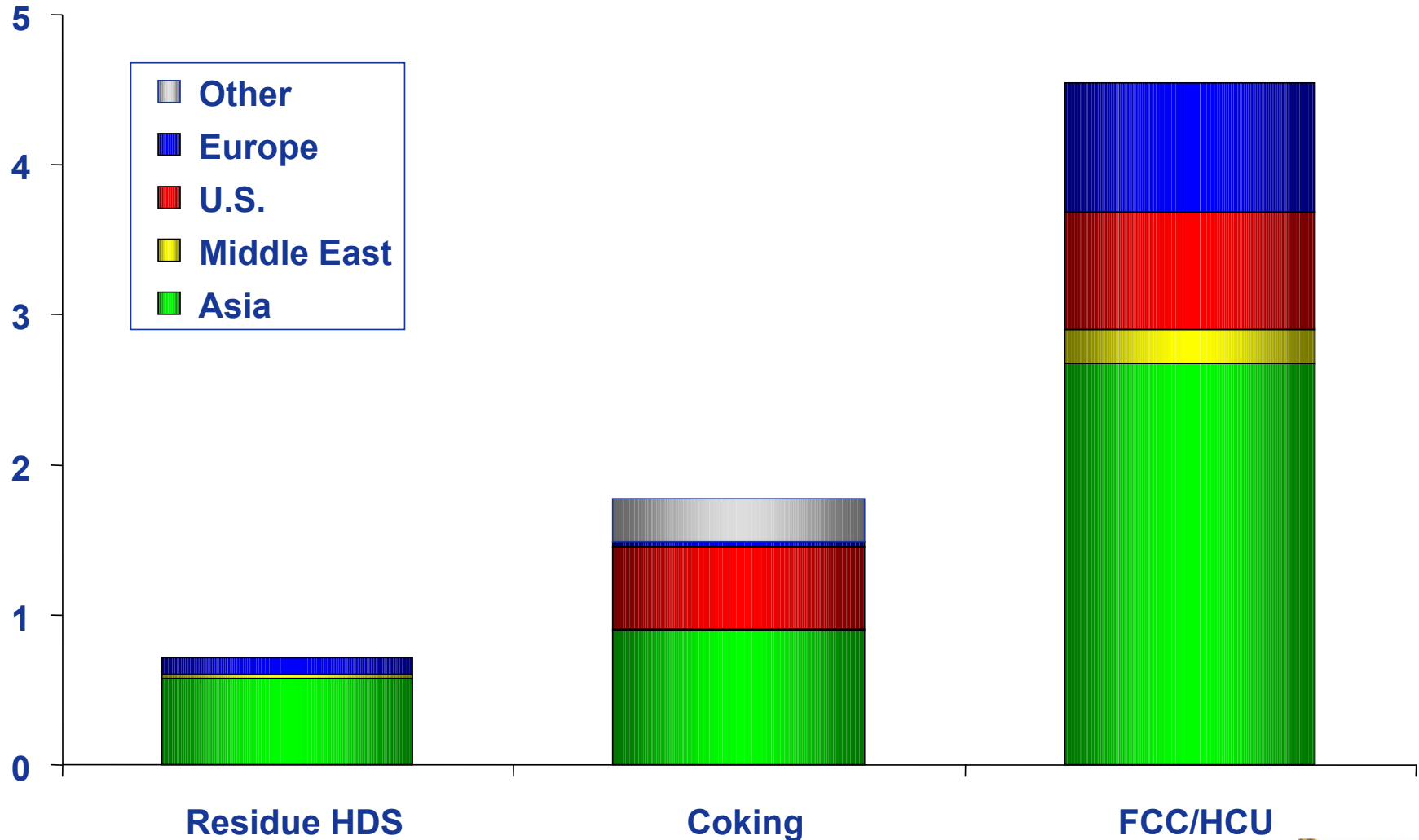
Refineries have different options to produce the new ECA and new LS bunker fuels

US Dollars per Metric Tonne vs. HS Fuel Oil

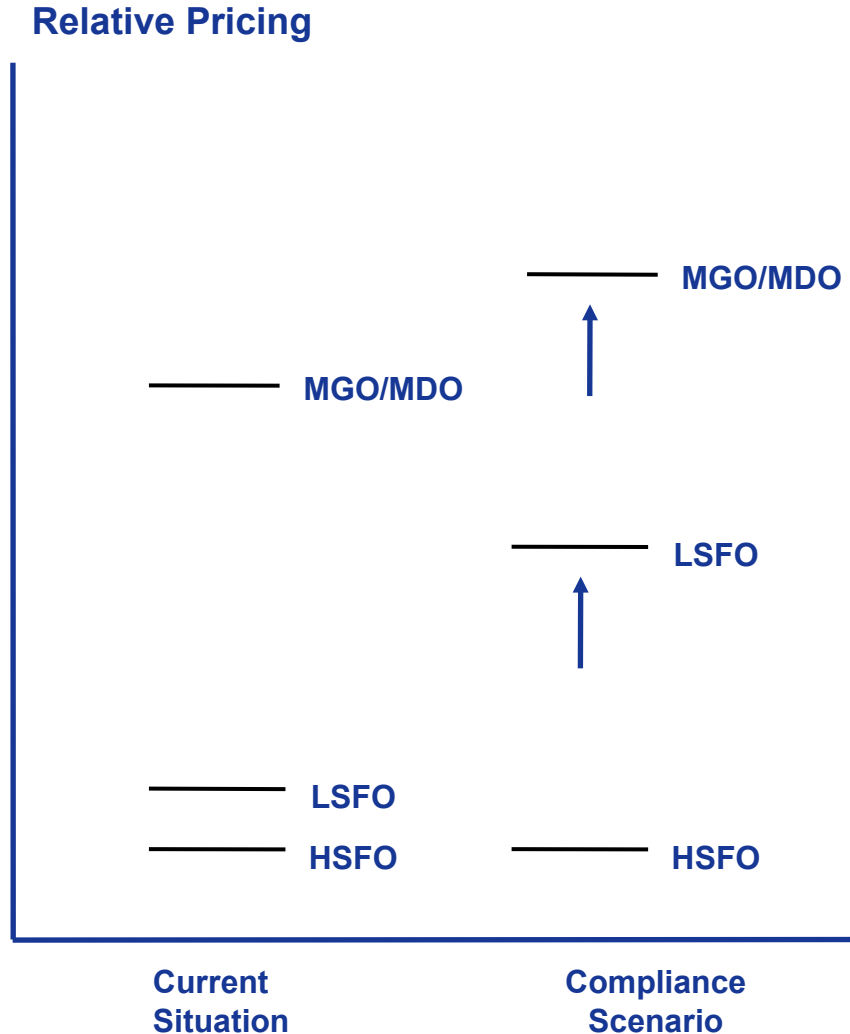


Residue hydrotreating has been added in Asia but most upgrading capacity has been coking and cracking

Capacity Additions 1998-2008 - Million Barrels per Day



Bunker market is large enough to shift price relationships



- Currently, LSFO-HSFO spread is small compared to diesel-HSFO
- LSFO demand today is small relative to bunker
- Adding LS spec to bunker fuel will increase LSFO-HSFO spread
- LSFO might move from being a “HSFO plus” product to more of a “diesel minus” product

Bunker quality changes will impact refining, bunkering and shipping industries

- Regional impact in the ECAs is most immediate but global changes are more significant
- Residue upgrading or desulfurization required – level of investment depends on ship-based scrubber adoption
- Refineries have alternatives to low sulfur bunker production – i.e. transportation fuels
- Ship owners face fleet investment or significantly higher fuel costs through gasoil purchases
- Complex inter-industry issue
 - What fuel quality is needed?
 - Who invests?
 - What new blending streams are available?
 - How do these move through the supply chain?

About this presentation...

This analysis has been prepared for the sole benefit of attendees. Any third party in possession of the analysis may not rely upon its conclusions without the written consent of Purvin & Gertz. Possession of the analysis does not carry with it the right of publication.

Purvin & Gertz conducted this analysis utilizing reasonable care and skill in applying methods of analysis consistent with normal industry practice. All results are based on information available at the time of review. Changes in factors upon which the review is based could affect the results. Forecasts are inherently uncertain because of events or combinations of events that cannot reasonably be foreseen including the actions of government, individuals, third parties and competitors. **NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.**

Some of the information on which this analysis is based has been provided by others. Purvin & Gertz has utilized such information without verification unless specifically noted otherwise. Purvin & Gertz accepts no liability for errors or inaccuracies in information provided by others.

PURVIN & GERTZ INC.

www.purvingertz.com

John H. Vautrain
Senior Vice President
jhvautrain@purvingertz.com

Purvin & Gertz, Inc.
69 Duxton Road
Level 3
Singapore 089528
Tel: +65-6227-2758
Fax: +65-6227-2753

S5870 – BunkerWorld – Sep 2011 - SIN

