Replacing Residual Fuels With Distillates – A Reality Check

ARACON Conference

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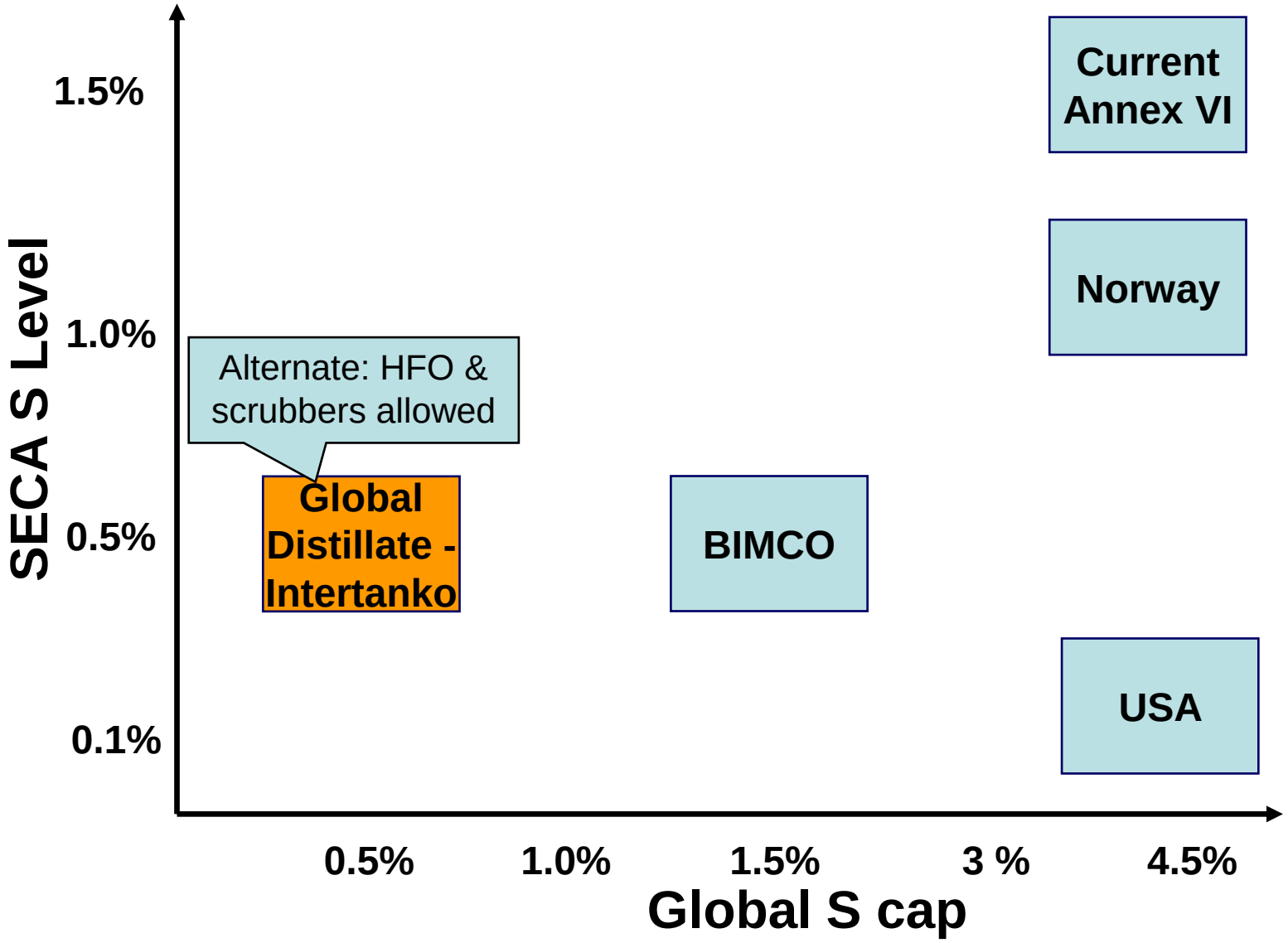
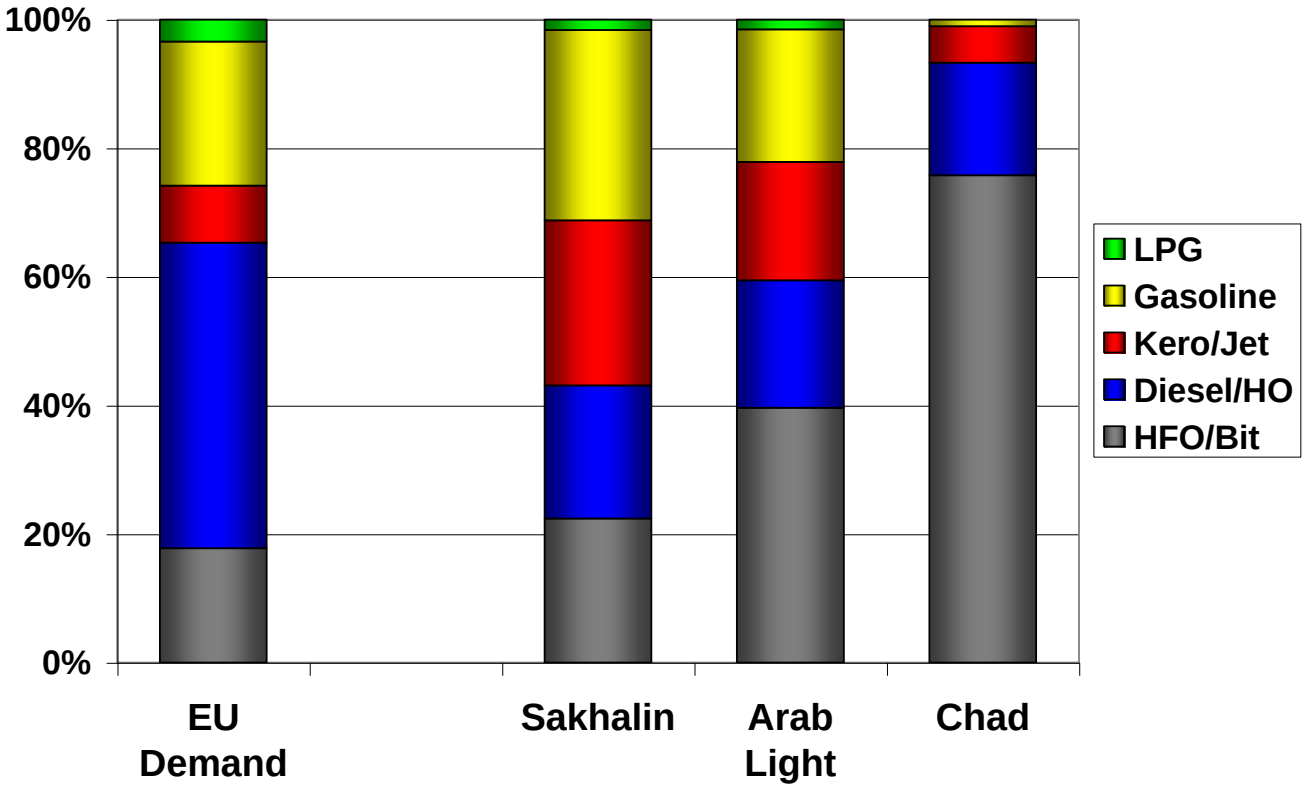
Options under Consideration

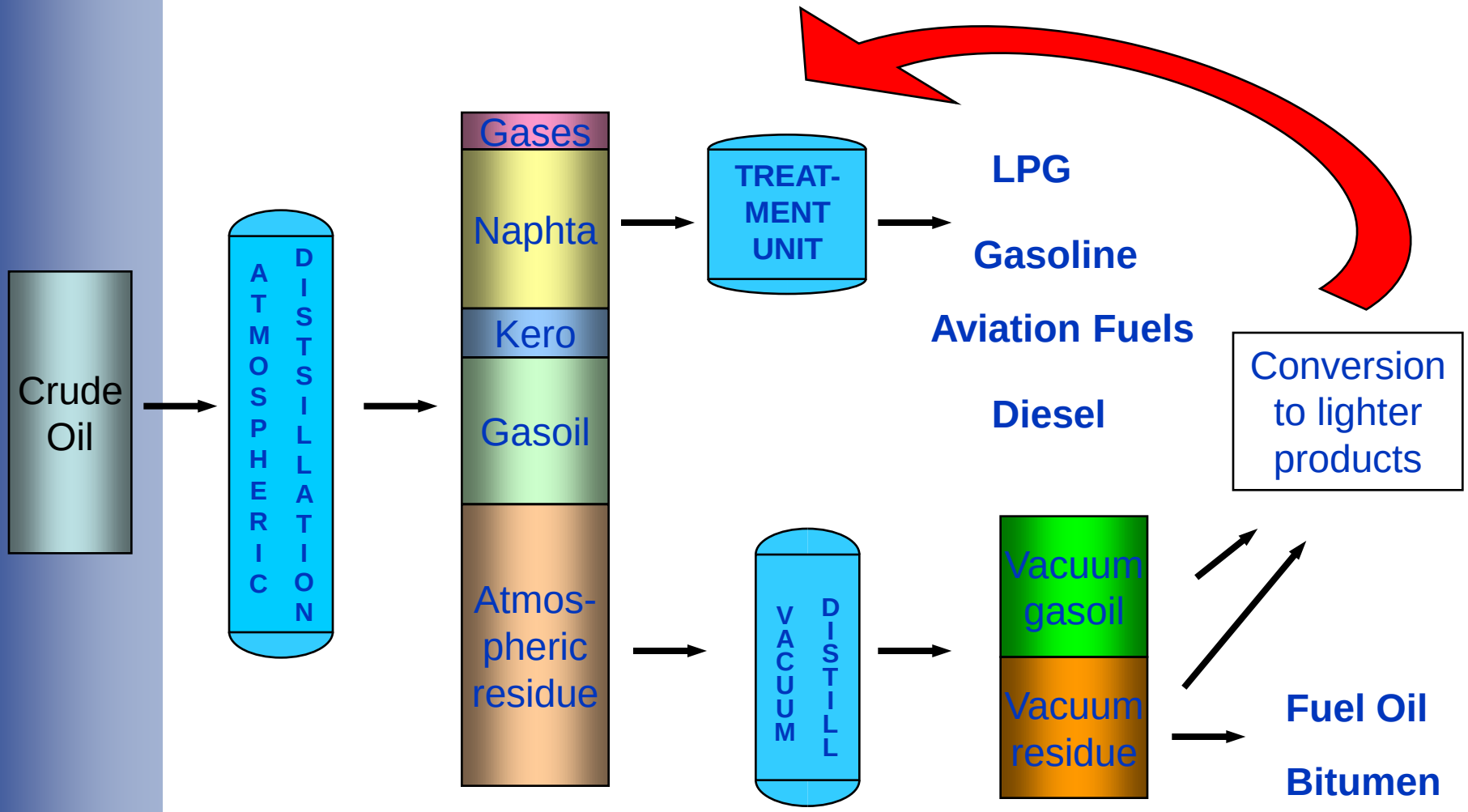


Crude Composition / Demand



- Product yields and qualities vary by crude
- Average world wide crude composition similar to Arab Light
- Product yield from crude heavier than demand
- Additional processing or conversion required to convert Fuel Oil

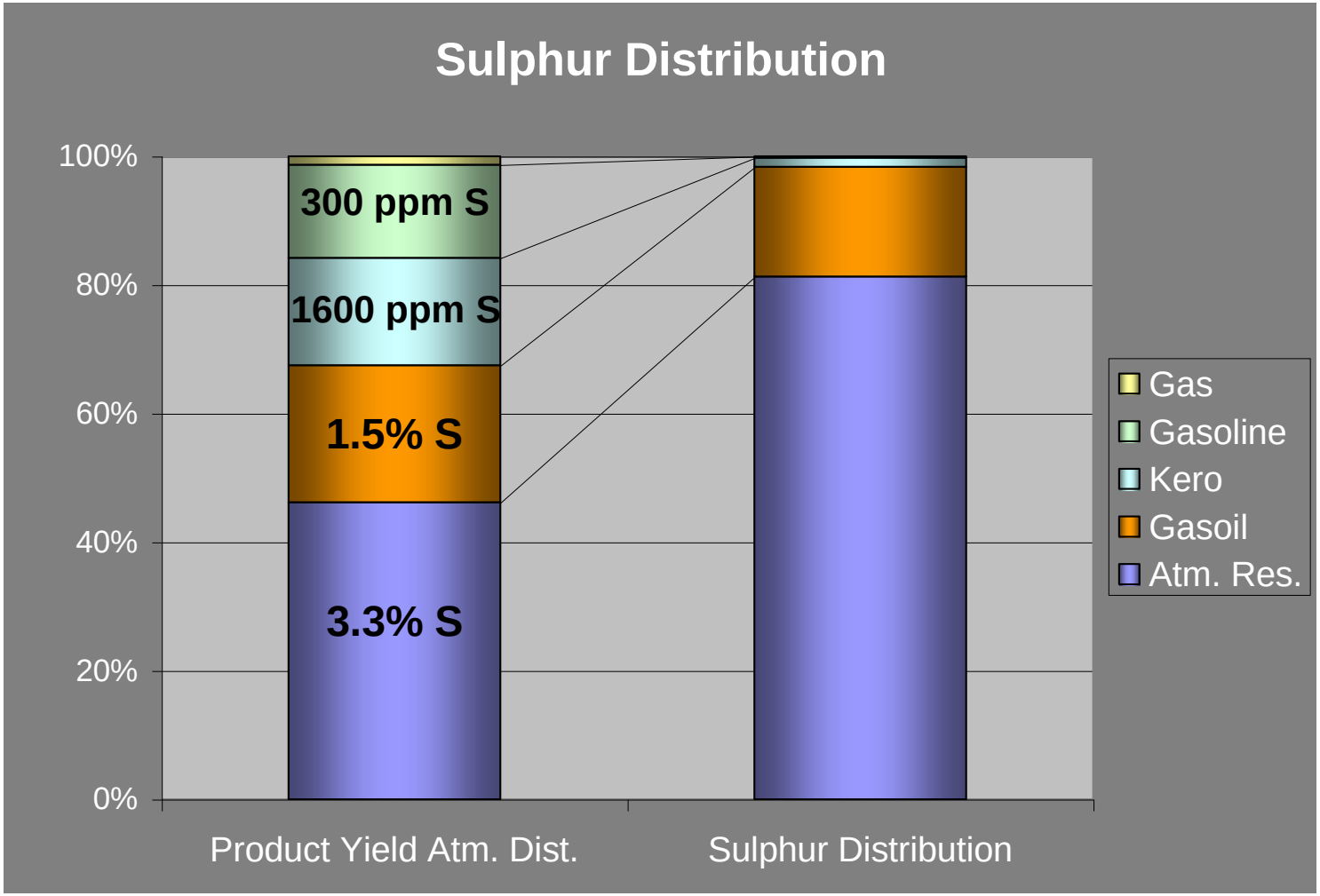
Refining Overview



Large changes to marine fuels

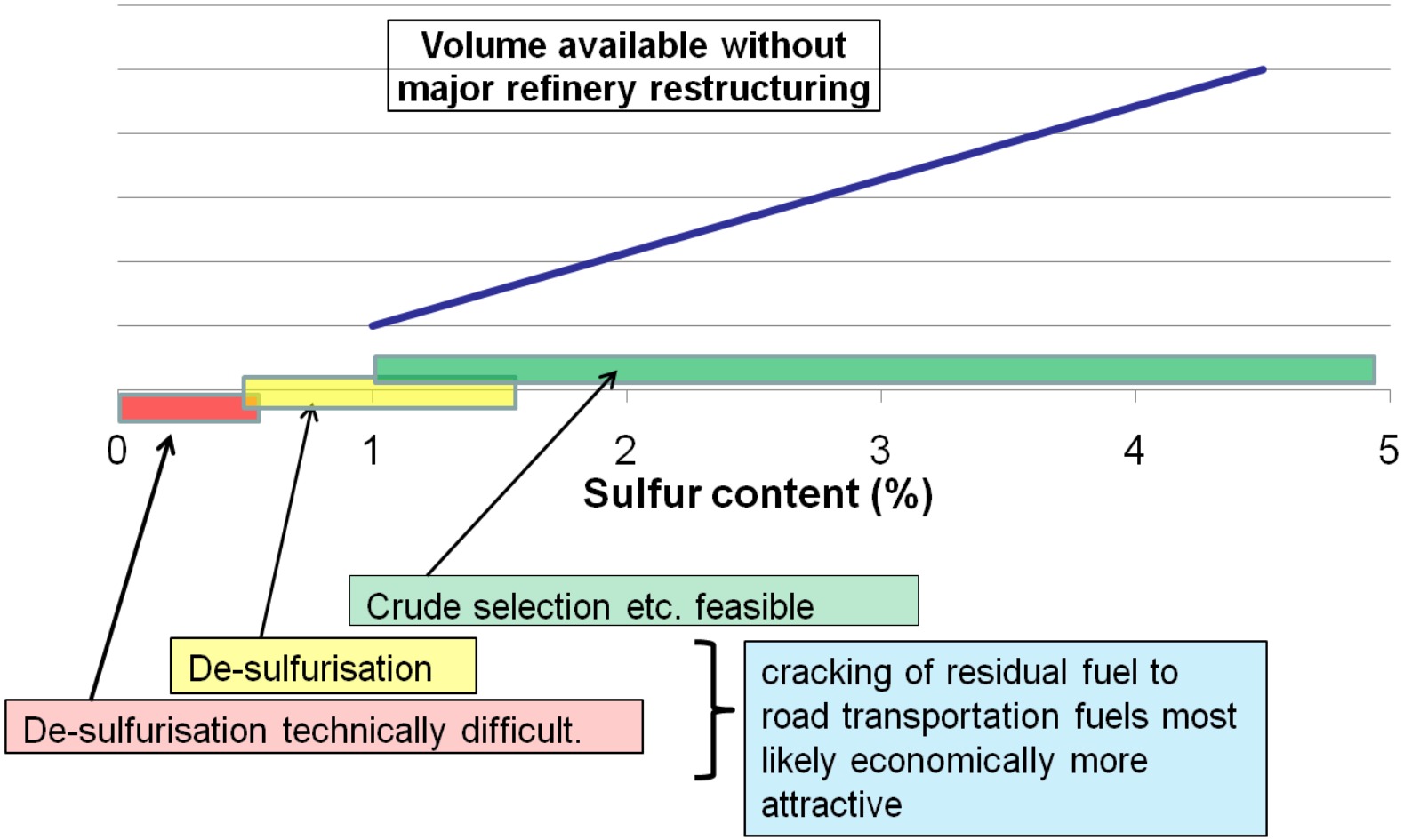
- The distribution of products from a refinery is largely determined by:
  - the crude slate
  - the refinery configuration
- Limited changes to distribution of products can be accommodated by crude choice and operational adjustments
- Large scale changes will require significant changes to the refinery configuration

Bottom Products have Higher S Concentrations



- Arab Light – crude sulphur content 1.9 %

Low Sulfur marine fuels
Means and availability



Example: An “all distillates world”

- Large scale change:
  - On a global basis:
    - 200 Mton/yr of additional distillates (2001 estimate)
    - Recent projection for 2012: 311 Mton/yr*
  - For Europe:
    - Projection for 2015: 51 Mton/yr of additional distillates**
    - Europe currently imports ca. 30 Mton/yr of distillates from a.o. Russia
- Putting these numbers in perspective:
  - Production of 200 Mton of distillate requires roughly 600 Mton of crude oil
  - Crude oil production Saudi Arabia (2006): 507 Mton
  - EU crude refining capacity (2006): 723 Mton/yr

* Estimate by EnSys/Navigistics (September 2007)

** Estimate by CONCAWE (Spring 2007)

Example: An “all distillates world”

- Would have a negative impact on the CO2 emissions
  - Refinery energy consumption (and CO2 production)
    - Simple refinery: 4-5 % of crude intake
    - Complex refinery with no residual fuel production: 9-10 % of crude intake
  - EU: 33 Mton/yr p.a. increase in refinery CO_2 emissions (25 % increase)
    - Partly compensated by reduced CO2 emissions from fuels – net increase 21 Mton/yr
- Would require large investments in refineries
  - Global estimate for 2012: $ 67 billion*
  - Global estimate for 2020: $ 126 billion*
  - European estimate for 2015: Euro 29 billion **

* Estimate by EnSys/Navigistics (September 2007)

** Estimate by CONCAWE (Spring 2007)

Large changes to marine fuels

- Fuel specifications can be set by regulation, but availability/production will be driven by economics
- Individual refiners will make investment decisions based on normal prudent business logic
  - Expected margins
  - Alternative investment opportunities
  - Alternatives to changing production
  - Regional strategy
  - Confidence in market stability

Market Impacts

- Individual refiners will seek their best course of action
- Market reactions can only be predicted in qualitative terms
- Supply situation could become uncertain
  - Who will invest and when?
- Cost of marine fuels would be significantly affected
- Price impacts likely for all distillate products
  - Automotive diesel, jet, home heating oil
- Change in refinery configuration can only be gradual and could take some 20 years
  - Distillate fuels and residual fuels would need to co-exist in the market for a long time
  - Significant price difference would require international compensatory mechanisms to avoid competitive distortions

Conclusion

- A complete change to distillate fuels for shipping would
  - Most likely not be a cost-effective means to improve air quality
  - Would add significantly to energy consumption and CO2 emissions
  - Would be very difficult to implement in practice without complex international compensation mechanisms
  - Would take a long time to deliver

Revision of MARPOL Annex VI
EUROPIA views

- Any revision to MARPOL Annex VI should
  - Yield a tangible and cost-effective improvement in air quality.
  - Technology neutral, not prescriptive (let innovation free to work)
  - Not replace one environmental problem with another
  - Be implementable in practice
- Measures close to the affected areas are generally the most cost-effective way to improve air quality.
  - This is precisely the logic behind SECAs: change where it matters.
- Large scale changes to marine fuels will require time and could entail significant market disruptions and distortions and an additional CO2 burden

What is a good solution?

Current Annex VI already allows for further environmental improvements through establishment of additional SECAs

⇒Focus on the shortcomings of current Annex VI

A good solution:

- Addresses air quality problems that cannot be solved with current Annex VI
- Is cost-effective compared to land-based sources (is local)
- Allows innovation to find the best way to achieve the objectives
- Does not create new problems
  - Environment/climate change
  - Socio/economic
  - Market distortions
- Can be implemented by simple regulatory measures

Thank you for your attention