

A Changing Product Slate: Implications for Refinery Configurations

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NEMS Conference

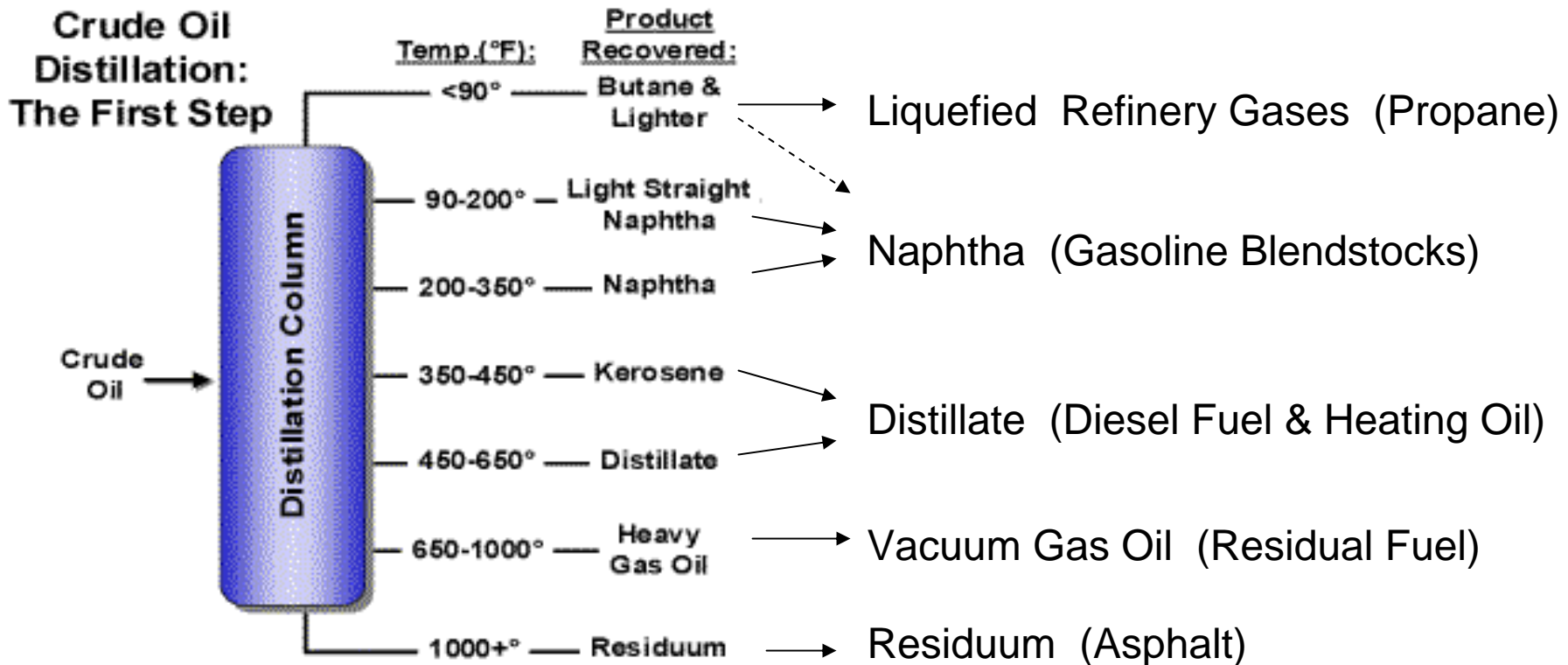
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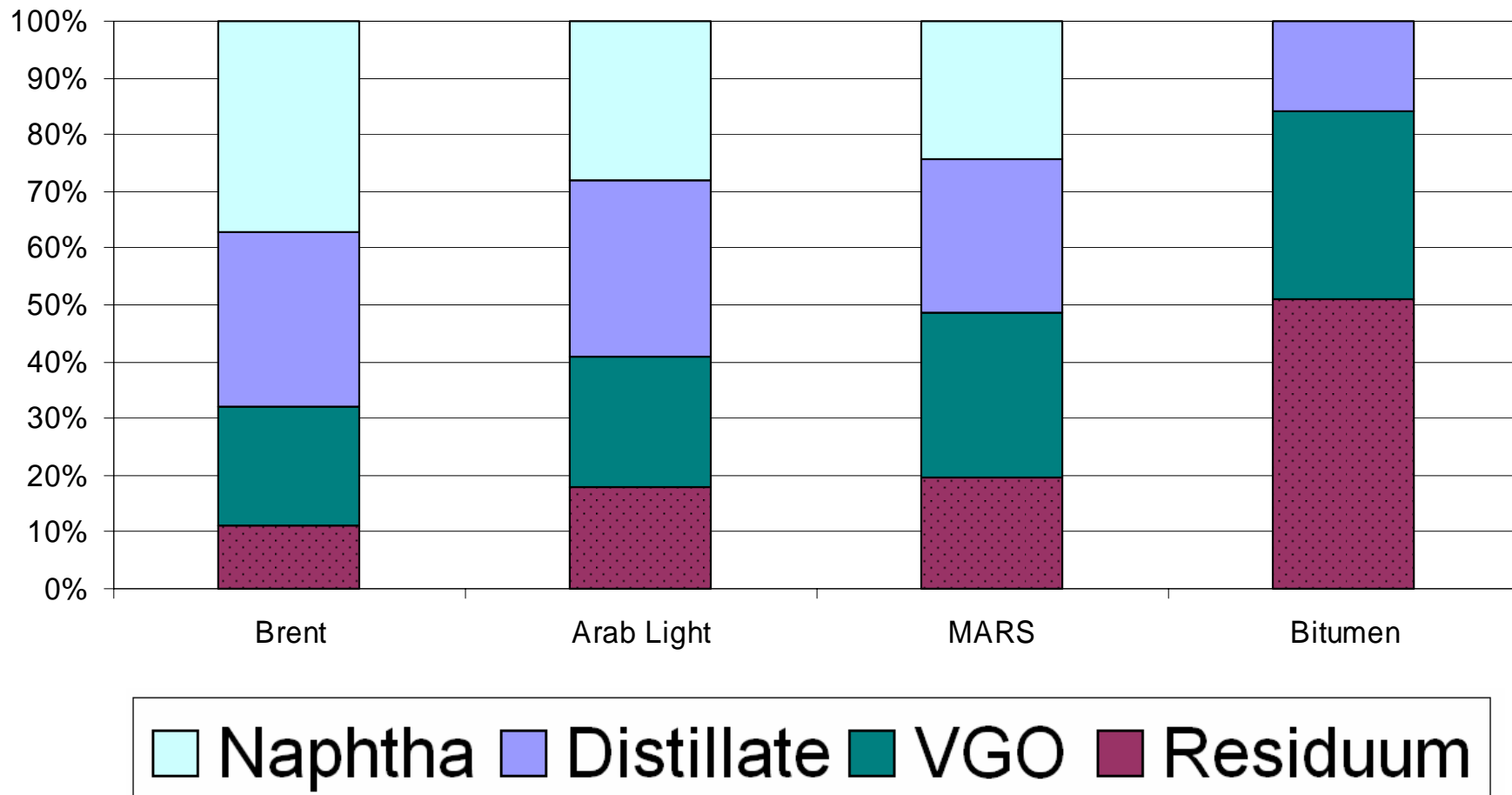
Refiners today face major challenges

- **Heavier Crudes yet Lighter Products**
- **High Sulfur Crudes yet Low-Sulfur Products**
- **Other Specification Concerns**

Classes of Refined Products



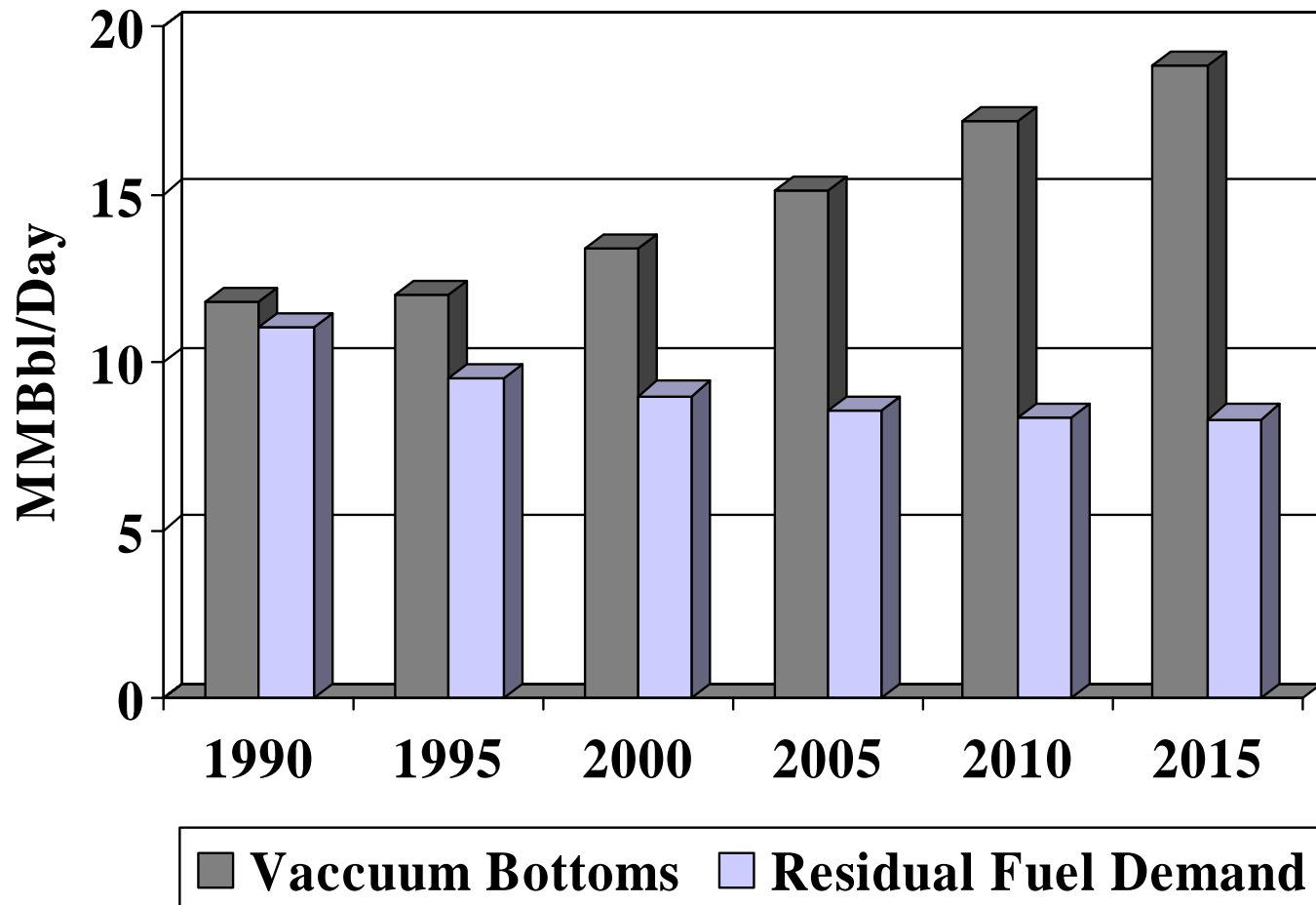
Typical Yields from Various Crude Types



Source: Purvin & Gertz for all but MARS (Shell)

What to do with Bottoms?

Increasing Volumes, but Declining Residual Fuel Demand

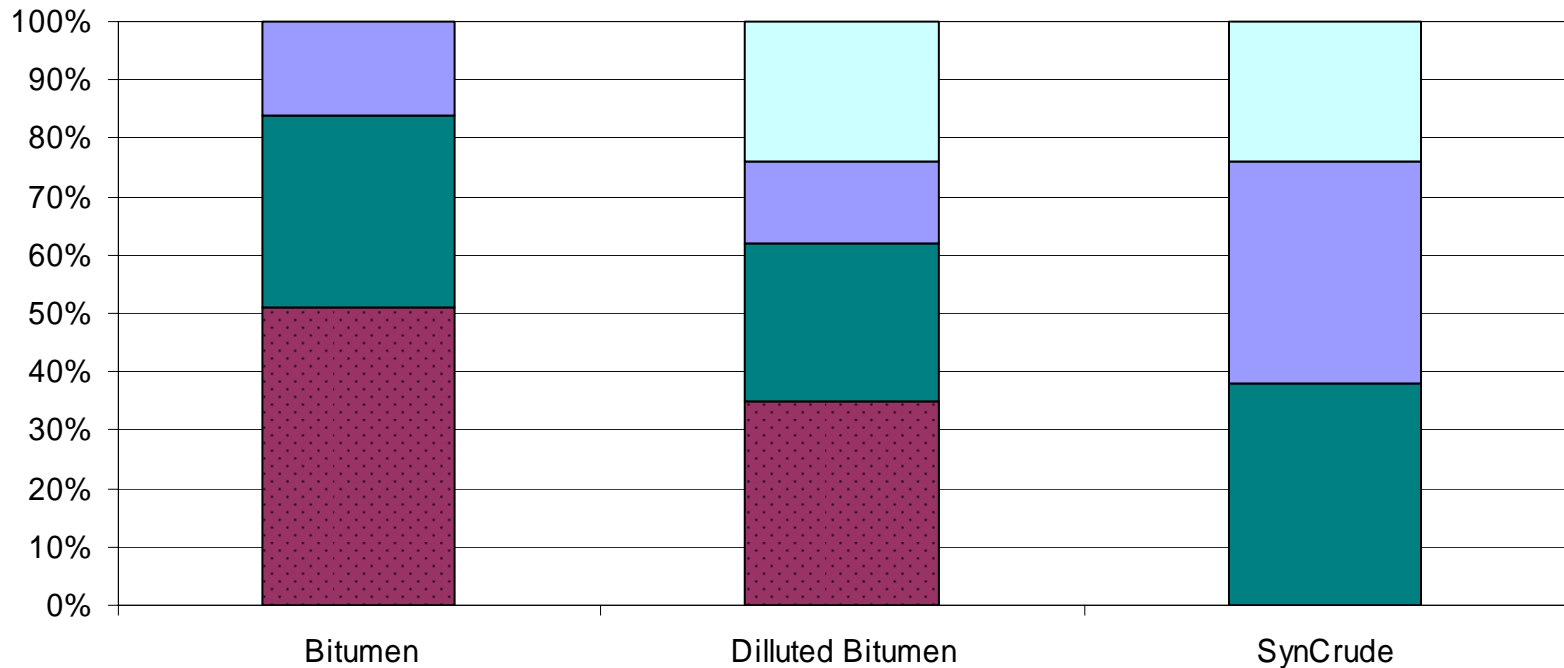


Heavy Crude Options

- **Upgrading**
- **Investment in Conversion Capacity**
- **Investment in Residual Destruction**

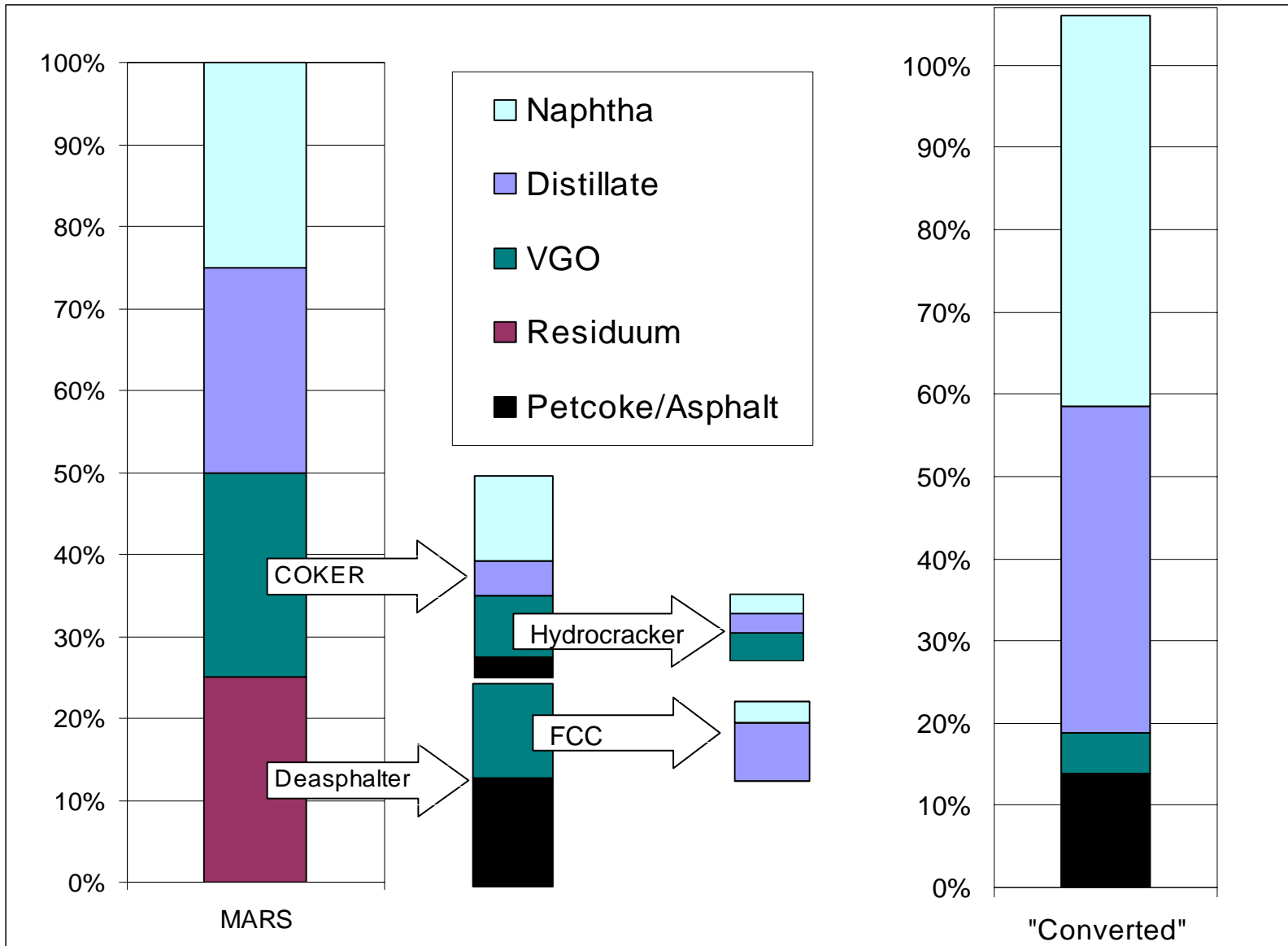
Upgrading

Thinning and Transforming Bitumen



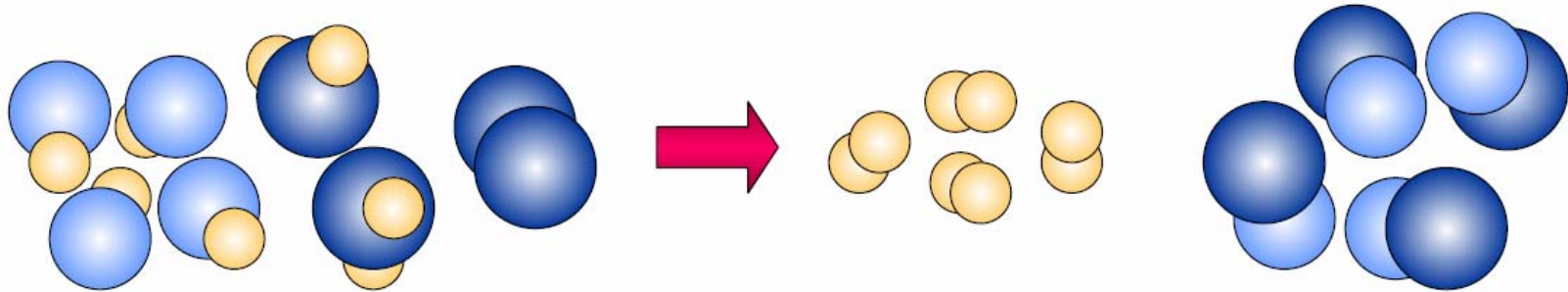
Legend: Naphtha (light blue), Distillate (purple), VGO (teal), Residuum (maroon)

Conversion Capacity: Coking & De-asphalting



Gasification

Another option for low margin products



Hydrocarbon chain + H₂O + O₂ yields

H₂

and

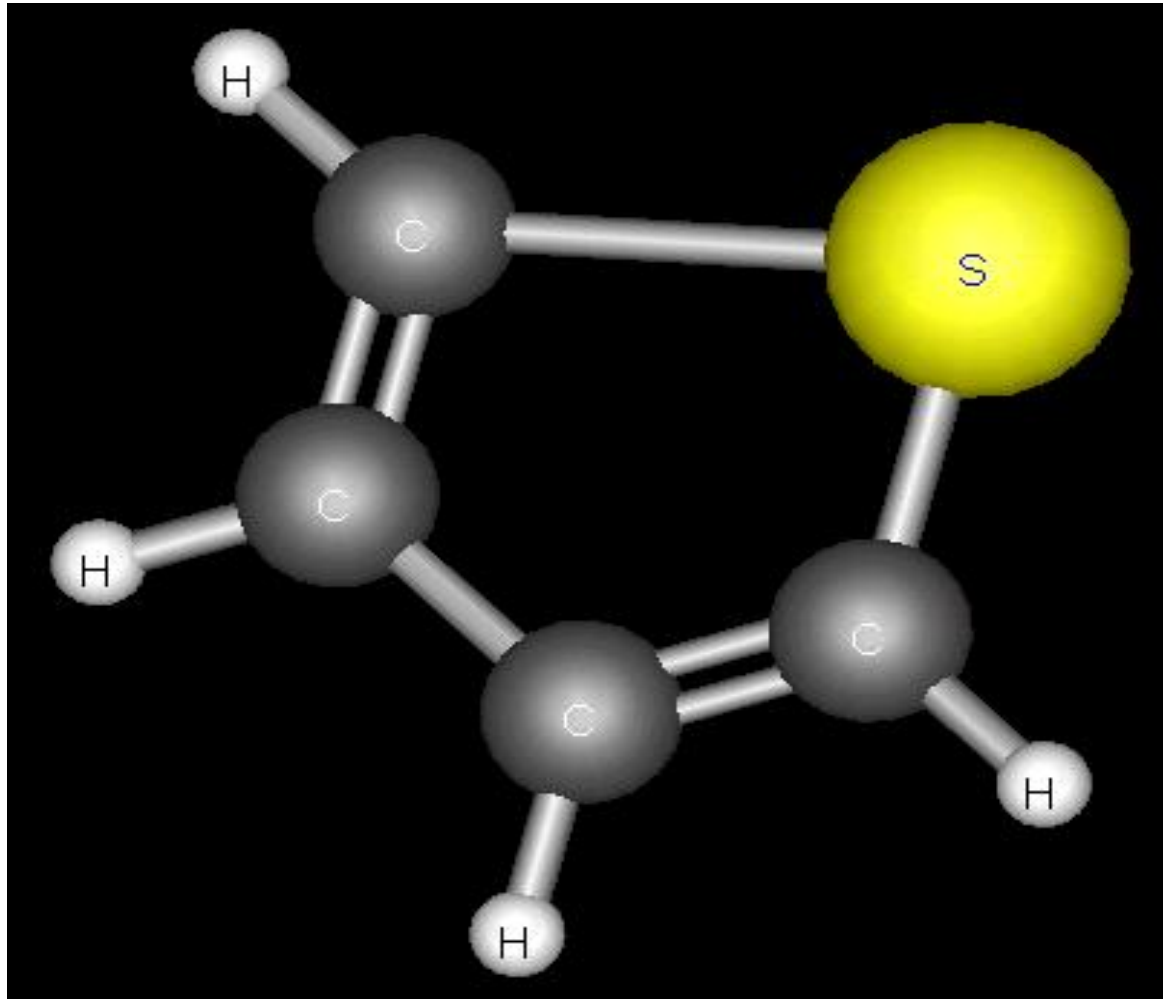
CO

AKA

Syngas

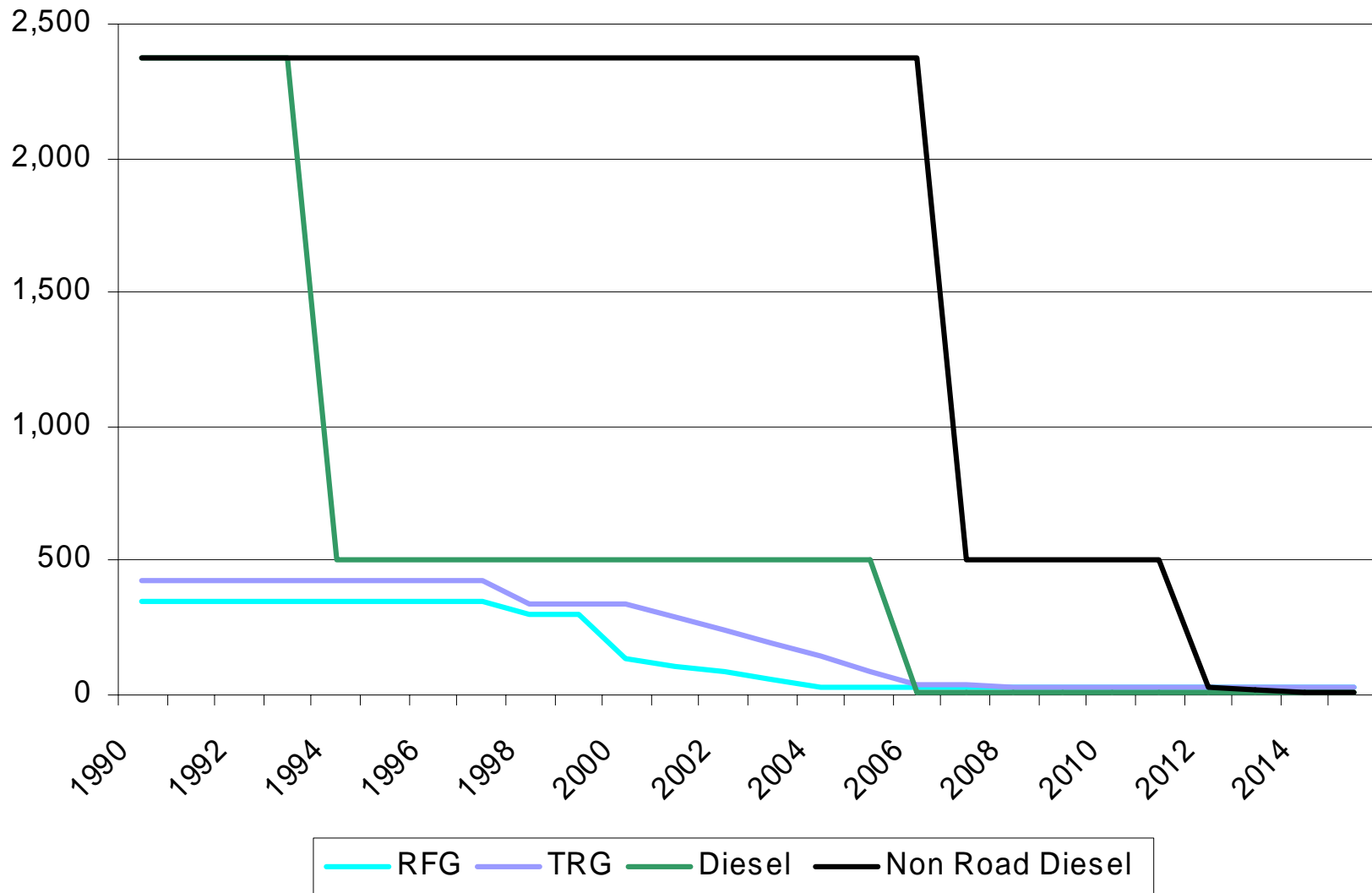
Hydrotreating

The sulfur solution



Product Sulfur Content

PPM Sulfur for Various Fuels



Other Specification Concerns

- Lubricity
- Premium Products
- New Products