

Technical Issues for  
Consideration  
and Recommendations for  
Design

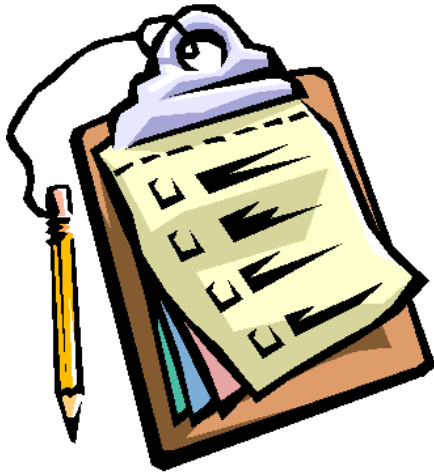
Development of Liquid Fuel  
Market Module (LFMM) of  
National Energy Modeling  
System (NEMS)



September 30,  
2009



## Agenda



- ✓ Overview of PMM  
Limitations/Concerns
- ✓ Recommendations from EIA Review
- ✓ Key Market Trends to Capture
- ✓ Hart Concepts and  
Recommendations



# Model Limitations and Concerns

(EIA, Reviewers, *Hart*)

- Cost and time for maintaining the model.
- Overly complex refinery representations
  - *model is large relative to information received,*
  - *current model is a layering of fixes,*
  - *model approach and options added over the years have led to unnecessary expansion of size – many options not needed/used.*



# Model Limitations and Concerns

(EIA, Reviewers, *Hart*)

- Outdated refinery structure
  - *existing software has grown unduly costly and time consuming – it has reached end of useful life,*
  - *the model has gone against modern software engineering.*



# Model Limitations and Concerns

(EIA, Reviewers, *Hart*)

- Difficulty developing reasonable price differentials and margins
  - *model cannot capture actual market variability,*
  - *model cannot provide intelligent margins without international interface,*
  - *the regional model should have a degree of over-optimization,*
  - *the existing structure increases over-optimization,*
  - *any aggregate LP is subject to over-optimization.*



# Model Limitations and Concerns

(EIA, Reviewers, *Hart*)

- Difficulty developing reasonable crude versus product imports
  - *US refining has stronger interaction with foreign oil than with domestic sources of non-petroleum supplies,*
  - *model cannot provide intelligent margins without international interface,*
  - *undoubtedly there is a relationship between international and US markets,*
  - *One of the greatest challenges for LFMM will be representation of the relationship of international markets,*



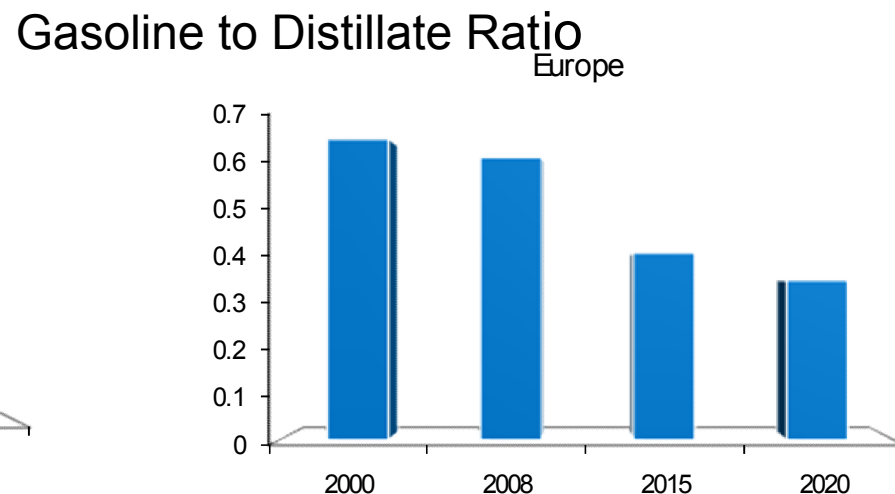
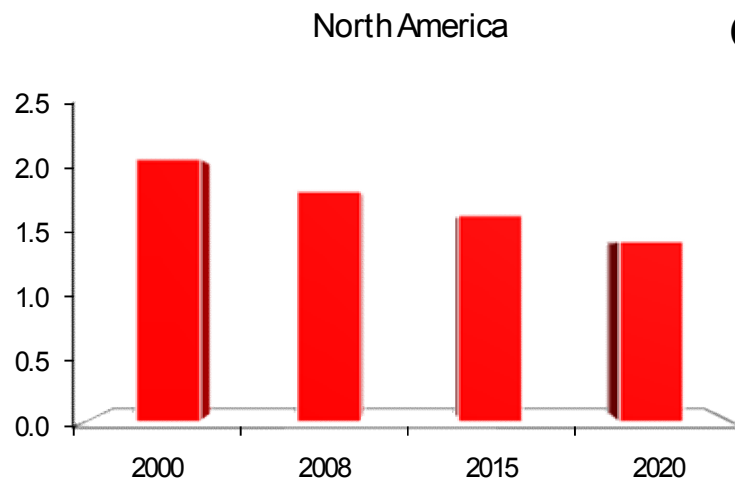
## “Consensus” Review Recommendations

- Develop new model with modern software – do not “fix” existing,
- Continue to utilize the LP approach,
- Regional PADD approach (or small modification of PADDs),
- Single regional model approach,
- Foreign refining representation – offline, partially in model, further study,
- Forecasting and policy analysis require separate tools – may be same model but separate structure/approach,
- Include CO<sub>2</sub> emissions – stationary source and product
- “Validation”, “calibration”, “recalibration” are essential.



## Key Market Trends to Capture

- Ethanol Role in gasoline and other non-petroleum liquid supply,
- Shift from gasoline to diesel,





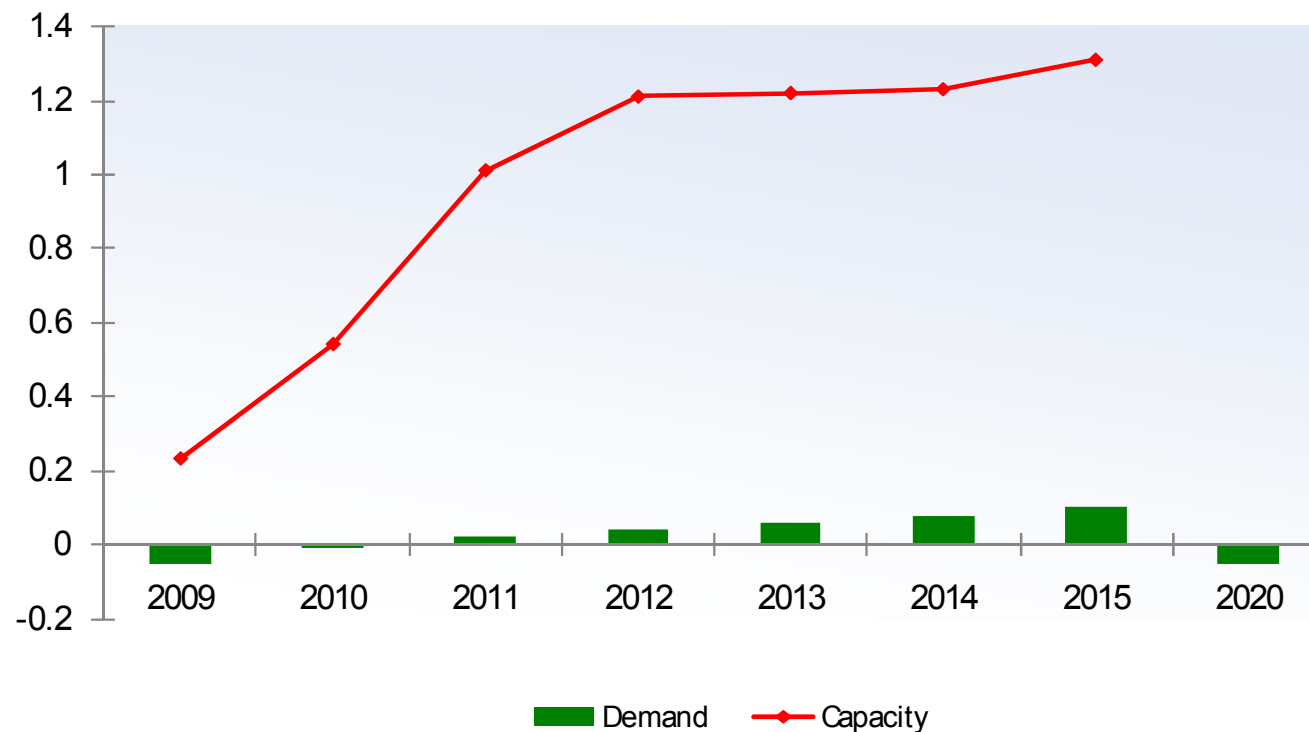


## Key Market Trends to Capture

- Ethanol Role in gasoline and other non-petroleum liquid supply,
- Shift from gasoline to diesel,
- Regulation of Low carbon fuel standards, carbon intensity, CO2 emissions,
- Impact of bunker fuel reformulation,
- Oil sand crude processing,
- Reduction of refinery utilization/capacity requirements/capacity rationalization.

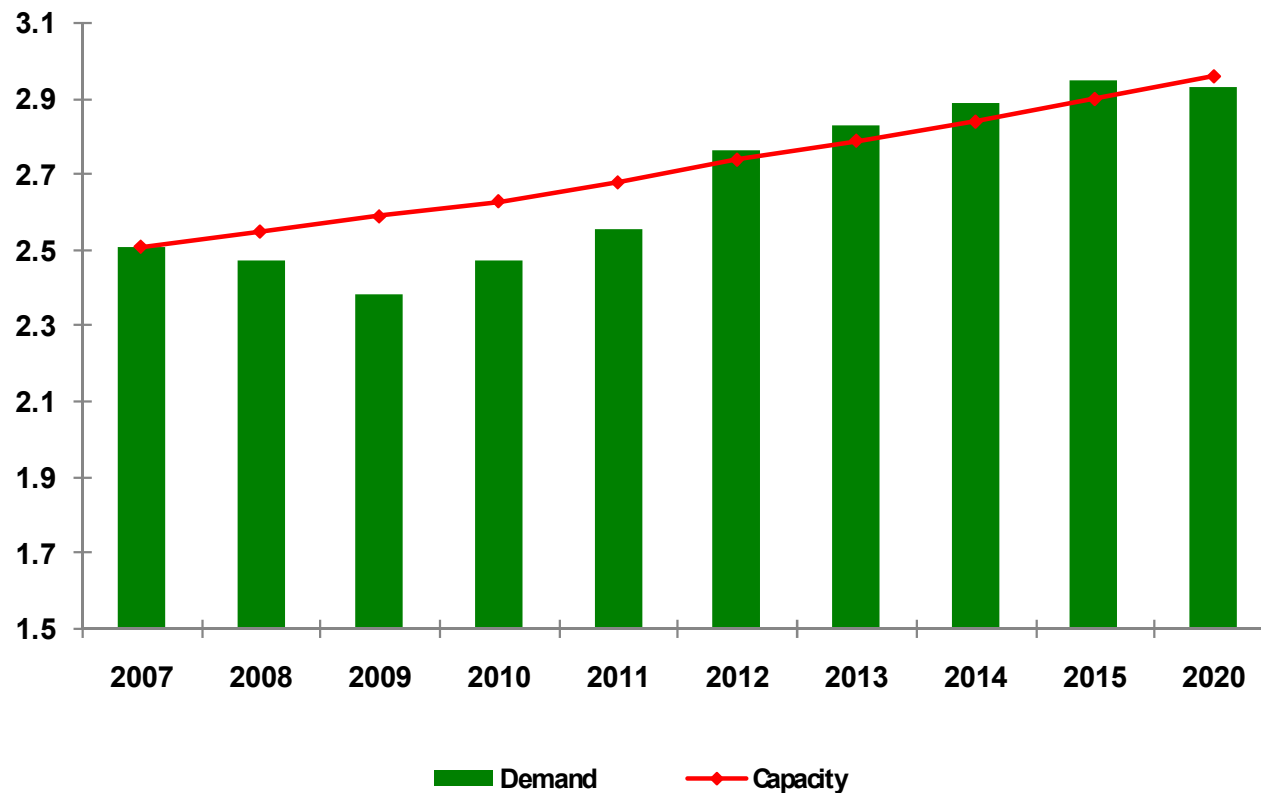


## North America/Europe Demand vs Capacity Additions Million Barrels per Day





## North America Coker Capacity vs Capacity Requirements *Million Barrels per Day*



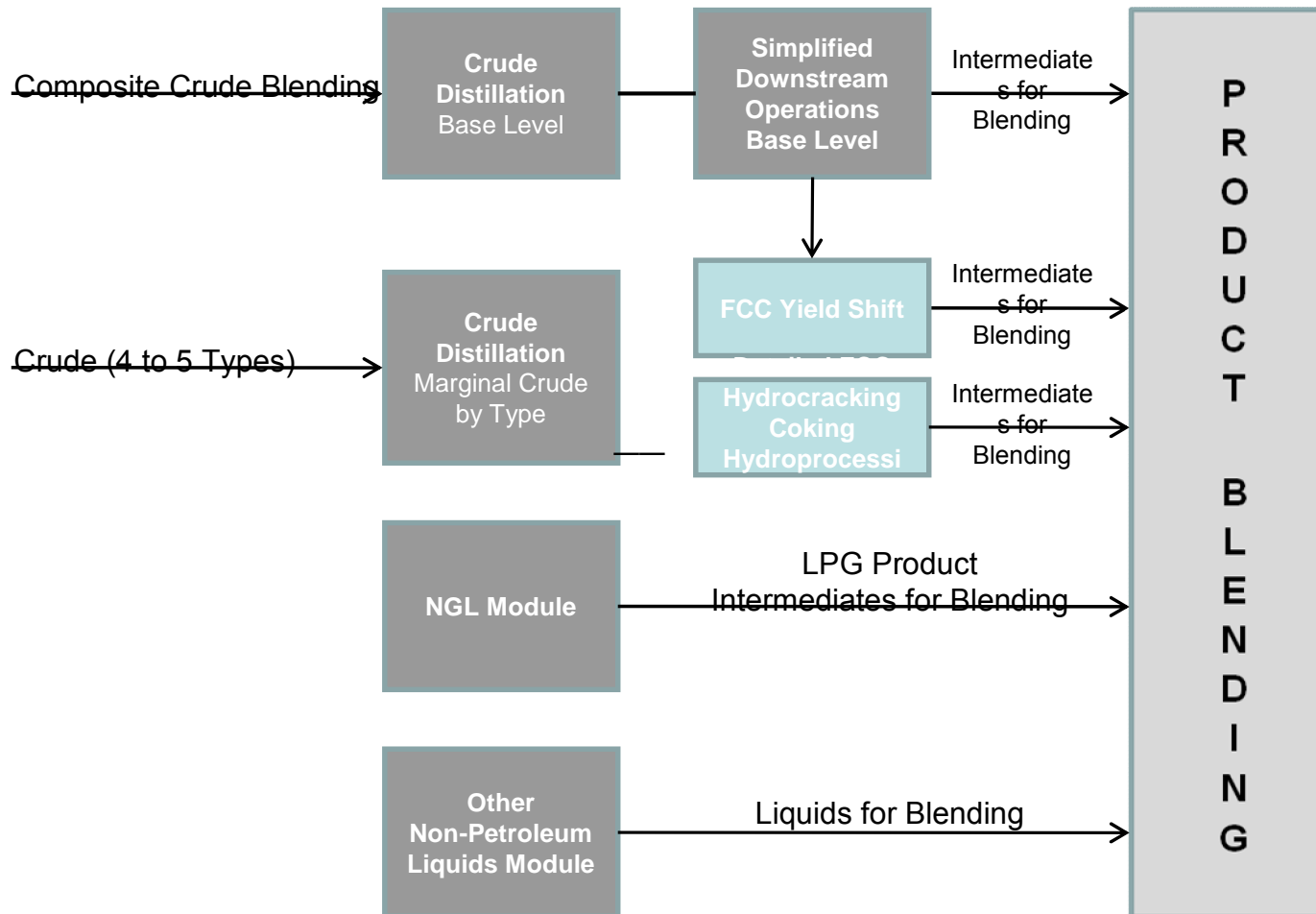


## Hart's Concepts and Recommendations

- Develop new model – LP based,
- Develop enhanced formulations for capturing key market trends,
- Single regional model approach,
- Incorporate base level simplicity with detail representation of marginal, market driving activities,



## Recommended LFMM Processing and Blending Representation





## Hart's Concepts and Recommendations

- Enhance international market interface,
  - Incorporate East Canada, PR/VI into PADD I
  - Enhance Europe representation
  - Fix others with simplified representation.
- Utilize PADD regions,
- Incorporate CO<sub>2</sub> /carbon relationships,
  - Product carbon factors,
  - Stationary source fuel consumption and CO<sub>2</sub>.



## Hart's Concepts and Recommendations

- Separate model formulation for forecast versus policy analysis,
- Include investment in marginal detailed representations,
  - Single year view,
  - Per barrel capacity charge
- Validate models



# Thank You

## Q&A

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