Global Hydrocarbon Supply Model Project Overview

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By

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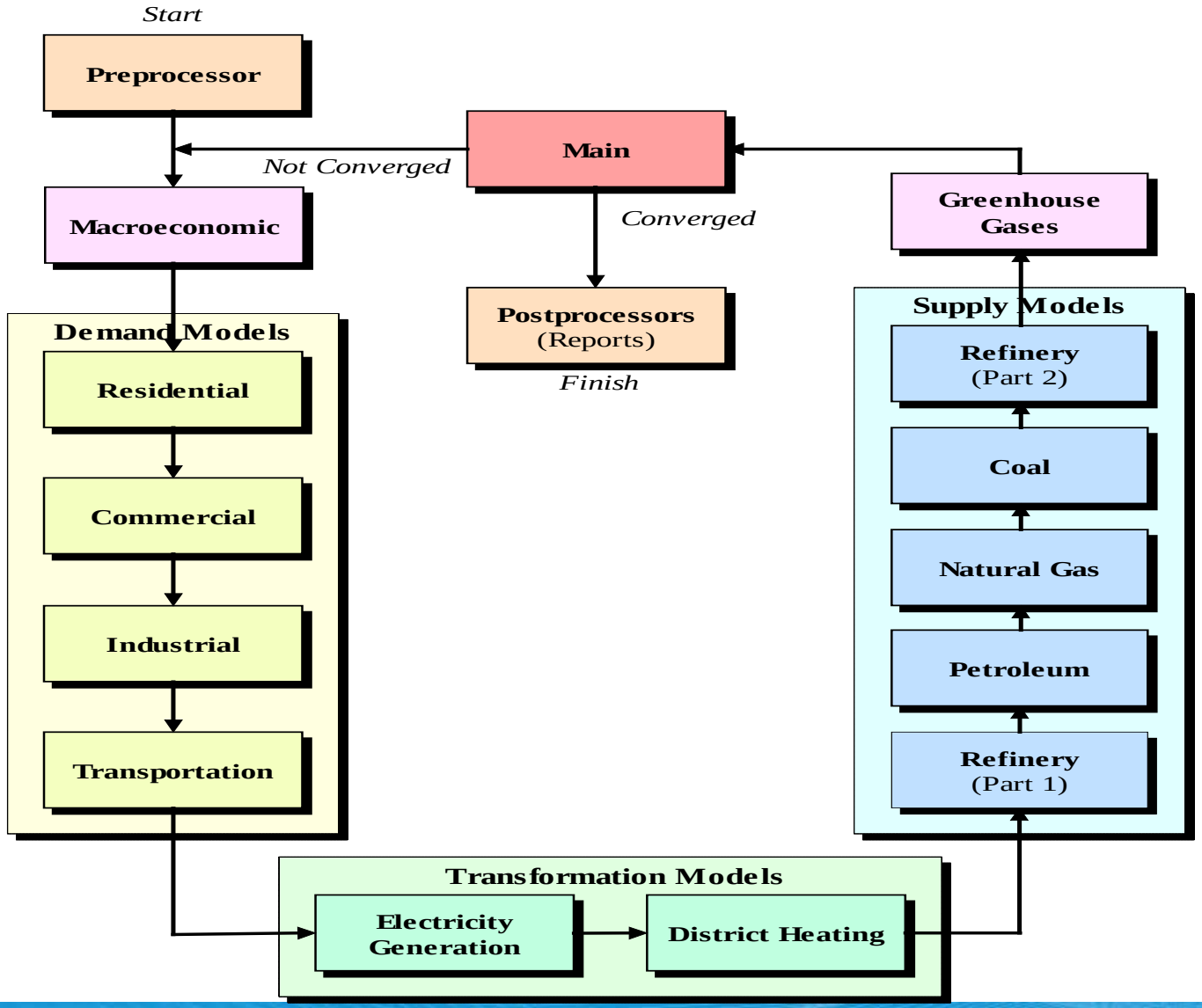
Project Overview

- Motivation
  - The markets and technology for crude oil, petroleum products, natural gas and biofuels are increasingly interconnected and interdependent globally
  - Current international modeling approach utilizes individual models that are built, maintained, and executed in isolation with minimal interaction with other models
  - Desire to enhance global hydrocarbon models to allow for greater analysis capability
- Approach
  - Improve, update, and/or replace EIA's existing suite of international energy supply models over the next 2-3 AEO/IEO cycles
  - Long term goal: create an integrated system where global macroeconomic, hydrocarbon supply, and hydrocarbon demand models can be simultaneously evaluated with real-time feedback between each model converging on both prices and quantities of energy demanded.

WEPS+ Schematic



WEPS+ Regions

OECD

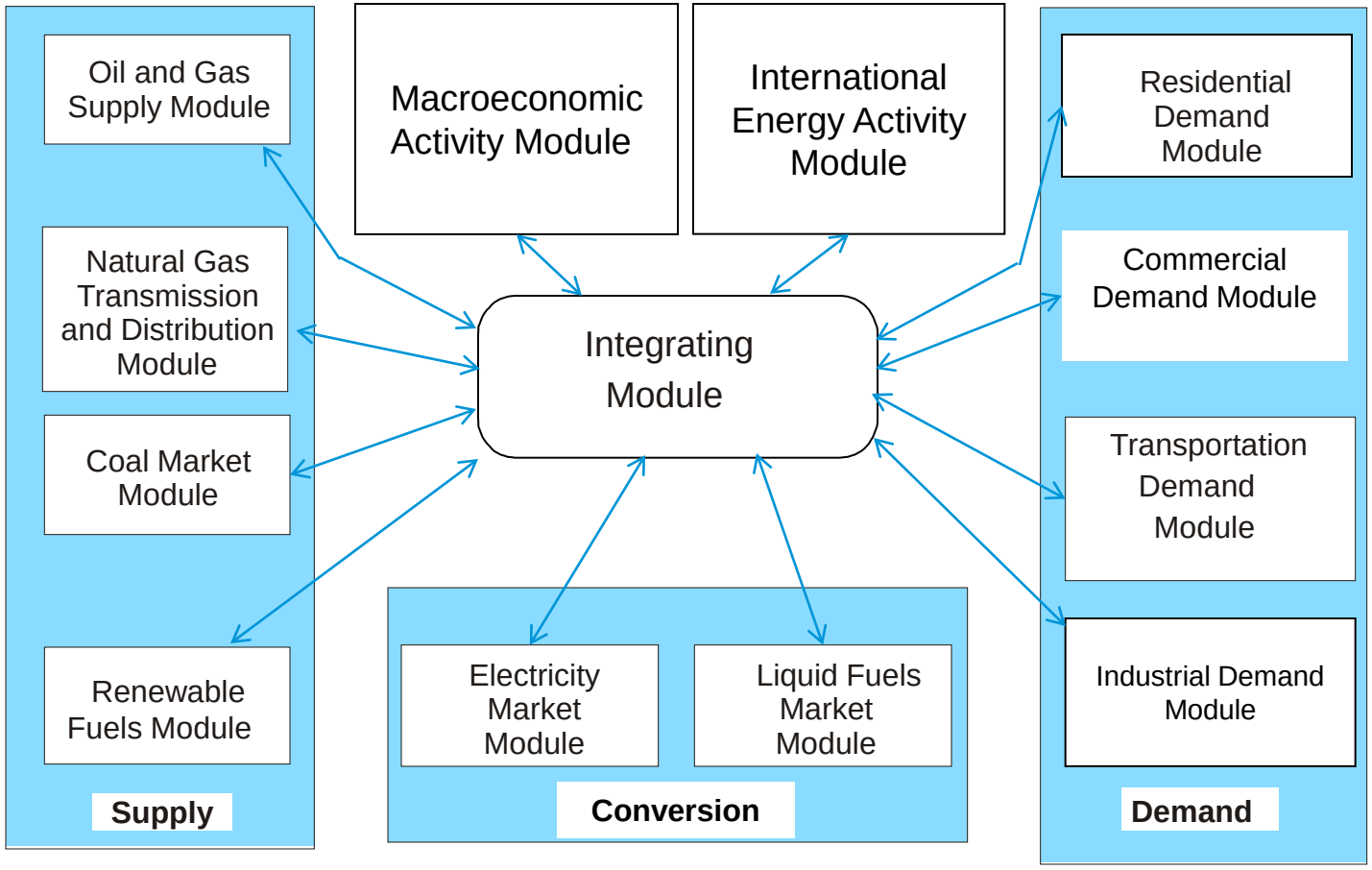
- OECD Americas
  - United States
  - Canada
  - Mexico/Chile
- OECD Europe
- OECD Asia
  - Japan
  - South Korea
  - Australia/New Zealand

Non-OECD

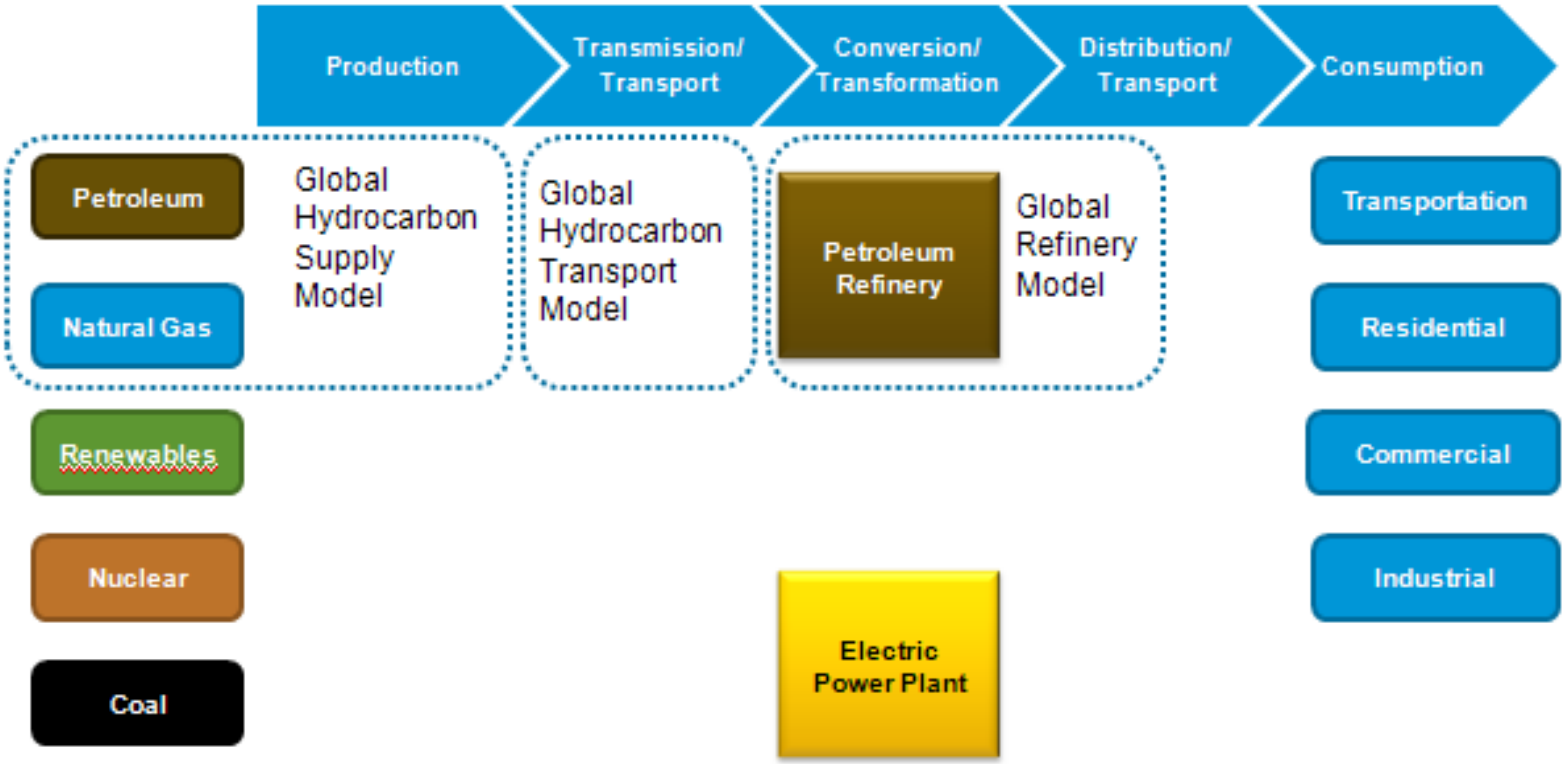
- Europe and Eurasia
  - Russia
  - Other
- Non-OECD Asia
  - China
  - India
  - Other
- Middle East
- Africa
- Central and South America
  - Brazil
  - Other

NEMS Modular Structure

- A key aspect of the NEMS is its modular structure, which allows for individual modeling methodologies for each energy sector and facilitates model management
- Where appropriate and significant information exists, each sector is represented by a detailed structural model of the market.



Three projects make up the Global Hydrocarbon Supply Model Project

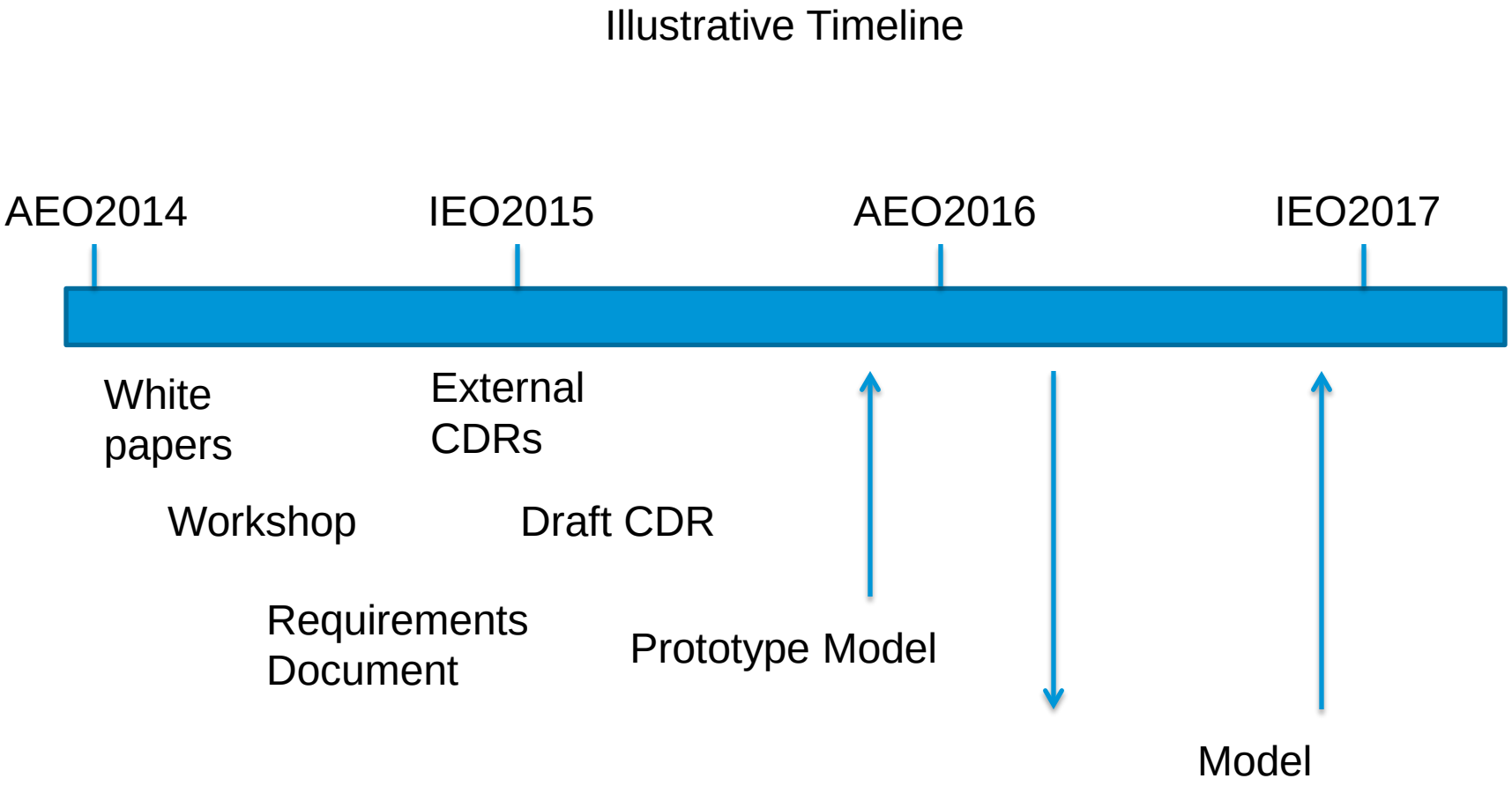


- Global Hydrocarbon Supply Model Project: John Staub (PM)
- Global Hydrocarbon Transport/Logistics Model Project: Angelina LaRose (PM)
- Global Refinery Model Project: John Powell (PM)

Model Development Overview

Step	Main Deliverable(s)
1. Define requirements	[Requirements Document]
2. Solicit multiple external CDRs	[2+ External CDRs]
3. Synthesize multiples into single draft CDR	[Draft CDR]
4. Construct and test prototype model	[Prototype Model]
5. Review prototype with external experts	[IER I]
6. Implement and test model	[Model, Documentation]
7. Review results with experts	[IER II]

Opportunity for two-way learning in EIA environment



Questions for all models

- What are the key policy and market questions that could arise in the next 5-10 years?
- How can the models support the AEO, EIA and the STEO?
- What is the common data set? What data is to be passed between models?
- What is the appropriate structure of input/output communication between models?
- How many and what types of energy commodity flows can/must/should be modeled?
- Which common geographic representation should the models use? Does it have to be the same as WEPS+?
- Which processes should be handled in the production model (e.g., upgraders) and which by the refining model?
- Which process should be handled by the logistics model and which by the refining model?
- How should these models relate to other EIA efforts to project global commodity prices? Should crude oil pricing be endogenous if coupled with a demand model?
- How should uncertainties be represented with regards access (e.g. political risk, cartel behavior, etc.), resources, technology, and economics?

Questions with model-specific answers

- Which model structures are the most appropriate to the problem(s)?
- Which regional structure should the model use internally?
- How should the model address uncertainties? Sensitivity or other?
- Which temporal structure should be adopted internally? Are there advantages to a seasonal representation?
- How should the probability of future disruptions be modeled?
- What level of detail should be included for technology change and technology in general?
- How should non-competitive behavior (e.g., cartel, national strategic) be modeled?
- What are the data sources of the future? How should the model be structured to easily adapt to new data as it becomes available?
- Are there existing models that would be sufficient and/or adapted for EIA's purposes? Could existing NEMS models be repurposed?
- Is a mathematical model required at all?

Global Refining Model: Project Team

- John Powell, Project Manager
- Beth May, lead modeler (design, programming and code review)
- Michael Cole, modeling (design, programming and code review)
- Adrian Geagla, modeling (design, programming and code review)
- Bill Brown, biofuels and HGL SME
- Brian Murphy, code review, WEPS integration requirements
- David Daniels, model structure
- Susan Grissom, Product supply logistics SME

Global Logistics Model: Project Team

- Angelina LaRose, project manager
- David Manowitz, lead modeler (design, programming and code review)
- Joe Benneche, design, programming, code review support
- Brian Murphy, code review, WEPS integration requirements
- David Daniels, model structure
- Justine Barden, natural gas markets
- Susan Grissom, crude markets

Global Supply Model: Project Team

- John Staub, project manager
- Troy Cook, oil and natural gas resources
- Dana Van Wagener, production scheduling, programming
- Michael Scott, model structure, programming
- Justine Barden, natural gas resources
- David Manowitz, code review
- Brian Murphy, code review, WEPS integration requirements

Workshop Format

- Each session structured around a topic with a presenter, discussant and moderator
  - Presenter: 20-25 minutes
  - Discussant: 5-10 minutes
  - Rebuttal: 5 minutes (optional)
  - Question & Answer: Remainder of session
- Sidebar rooms
- Written or emailed comments to Aloulou Fawzi
- “Name that model!”

We want your input!!

For more information

U.S. Energy Information Administration home page | www.eia.gov

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Annual Energy Outlook | www.eia.gov/aeo

EIA Annual Energy Outlook 2014:

http://www.eia.gov/forecasts/aeo/

NEMS Overview:

http://www.eia.gov/oiaf/aeo/overview/index.html

Detailed EIA Model Documentation Reports on NEMS and other EIA models:

http://www.eia.gov/analysis/model-documentation.cfm