EIA's Modeling Priorities

For

Hydrogen in the U.S. Energy System: Webcast Forum on Modeling Challenges

March 24, 2022 | Washington, DC on-line

By

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EIA is committed to modernizing our modeling systems

- Energy systems are rapidly evolving
  - Increasing interest for EIA to address deep decarbonization
    - FY2021 Budget “180-day report”
    - Bipartisan Infrastructure Law (BIL) section 40417
  - DOE clean energy research, development, and demonstrations

- Current related modeling activities include:
  - Commission of the Energy Modeling Architectural Assessment
  - Preparation of responses to Congress related to the 180-day report and BIL requirements for long-term domestic modeling
  - Participation with DOE to improve hydrogen and carbon capture representation in our long-term domestic model

EIA's Energy Modeling Architectural Assessment (EMAA)

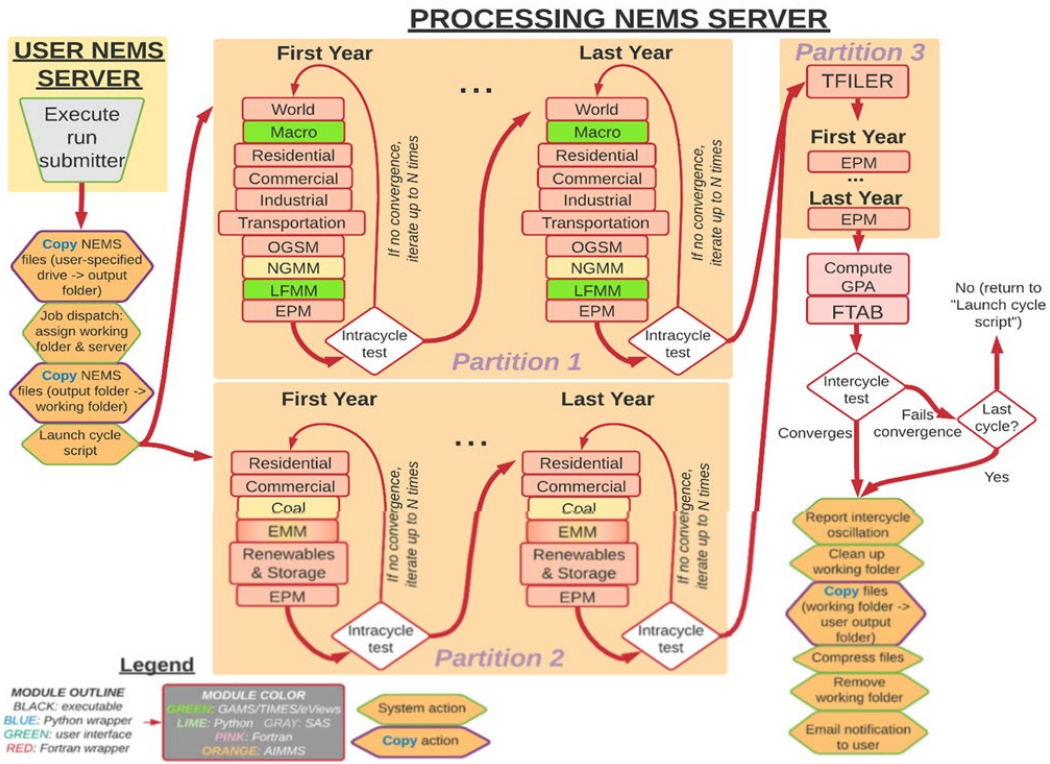
Phase 1 As-Is Assessment (Delivered January 2022)

Goal: Evaluate all of EIA's modeling systems, documenting the current state in order to identify vulnerabilities.

This includes an assessment of software, model and system architecture, and the systems' ability to respond to anticipated market and policy evolutions (i.e. deep decarbonization scenarios).

The As-Is Assessment will help EIA prioritize addressing the vulnerabilities that are identified.

EMAA As-Is NEMS Process Flow Diagram



EIA's response to congressional requests

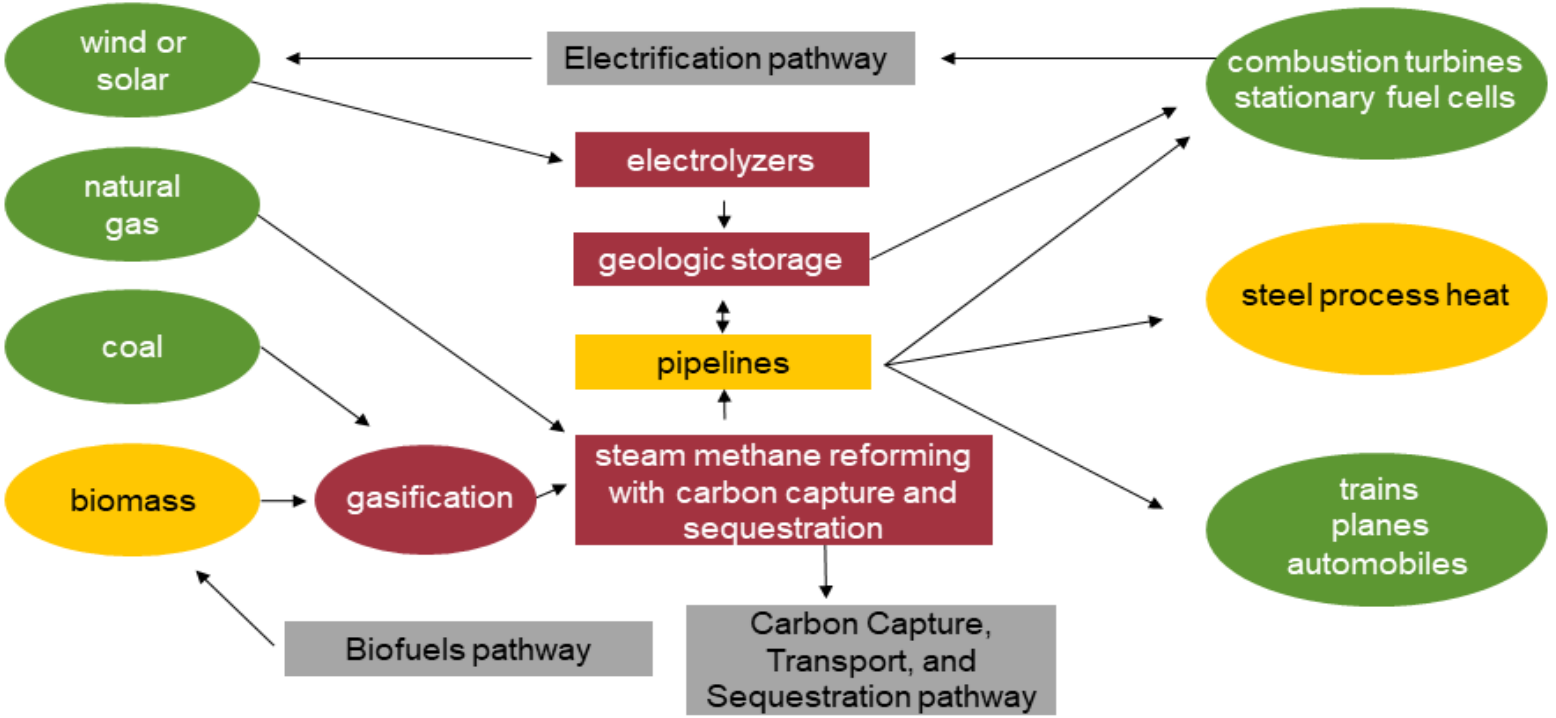
- Response to FY2021 appropriations, which directed EIA to
  - "…provide a report to the Committees on Appropriations of both Houses of Congress not later than 180 days after enactment of this act outlining resources necessary to further develop National Energy Modeling System capabilities to be able to simulate deep decarbonization scenarios, including economy-wide net-zero emissions policies."

- Bipartisan Infrastructure Law Section 40417 specifies
  - "…tools to model multiple-output energy systems that provide hydrogen, … interactions … with the electricity grids, pipeline networks, and the broader economy"
  - Requires technologies and market structures not yet commercially available

Hydrogen as possible decarbonization solution

- Hydrogen may play a major role in our decarbonized energy future
  - Produce from multiple sources – fossil fuels and electricity (including renewables)
  - Transport by pipeline, tanker/barge, truck, and rail (?)
  - Store in underground salt caverns and above-ground tanks
  - Consume in vehicles, industrial processes, power/combined-heat generation
- EIA's data collection and modeling of hydrogen is currently minimal
  - Survey hydrogen purchase/use by refineries, biofuel facilities, select industries
  - Project hydrogen use in transportation and biofuel facilities in AEO
  - Project hydrogen production and use by refineries in AEO
  - No hydrogen modeling in STEO or IEO

Potential representation of a hydrogen pathway in NEMS



EIA is participating with DOE to add hydrogen to NEMS

- EIA joined FECM/EERE efforts to develop new Hydrogen Market Module (HMM) which could be fully integrated in NEMS in future AEOs
  - Engaged in preparation and review of Requirements Document, completed November 2021
  - Actively reviewed Component Design Report (CDR), completed in February 2022
    - Currently in compressed DOE concurrence review
  - Specified preference for Knowledge-Based Modeling and
    - Programming language – AIMMS/Python (not Fortran)
    - Transport pure hydrogen through its own pipelines, low blends through natural gas pipelines
    - Exclude hydrogen export and fuel conversion aboard ships
  - Will need to modify other NEMS modules to incorporate hydrogen
- Currently developing a submodule within NEMS Electricity Market Module to use hydrogen for seasonal storage and reliability

Questions?