

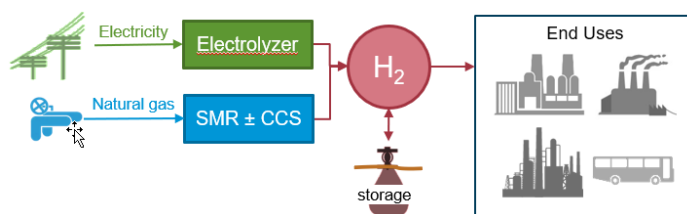
Annual Energy Outlook 2025 Fact Sheet: Hydrogen Market Module

We are introducing a new Hydrogen Market Module (HMM) to represent the domestic hydrogen market in the *Annual Energy Outlook 2025*. Representing an integrated hydrogen market in the National Energy Modeling System (NEMS) allows us to analyze the potential growth in hydrogen use as a clean energy source and to reflect current laws and regulations in our projections. The HMM allows us to evaluate the mid- to long-term impacts of policies, laws, and regulations governing hydrogen markets, such as the Section 45V hydrogen production tax credits in the [Inflation Reduction Act \(IRA\)](#). In addition, this new module allows us to evaluate the possible roles of hydrogen in deep decarbonization scenarios.

The HMM projects hydrogen production by technology and connects the sources of hydrogen supply to existing and future hydrogen consumers. HMM demands electricity and natural gas from other NEMS modules, transforms those fuels into hydrogen, and delivers that hydrogen to consumers.

For AEO2025, HMM focuses on representing a simplified U.S. hydrogen market that integrates with other NEMS modules and reflects key market dynamics. Within NEMS, HMM represents the following elements of a domestic hydrogen market:

Schematic of hydrogen (H₂) market representation in HMM, AEO2025



- Economic competition between three hydrogen production technologies
 - Steam methane reforming without carbon capture and sequestration (CCS)
 - Methane reforming with CCS
 - Electrolysis using electricity from the grid
- A balanced market where hydrogen demand equals hydrogen supply
- Delivered end-use prices to sectors that could consume hydrogen in AEO2025: the industrial, transportation, and electric power sectors
- Energy use and emissions associated with hydrogen production
- Policies such as the IRA that affect hydrogen production and prices:
 - Section 45Q CO₂ sequestration incentives
 - Section 45V hydrogen production tax credits and related IRS guidance, including adherence to incrementality, regionality, and hourly time matching requirements
- Expansion and builds of hydrogen-related infrastructure
 - Limited expansion of interregional pipelines
 - Seasonal storage

In addition to developing the HMM, we are changing NEMS by modifying the existing consumption representation for ammonia plants and refineries and adding new potential sources of hydrogen demand for the industrial, transportation, and electric power sectors.