MARket ALlocation (MARKAL) Model
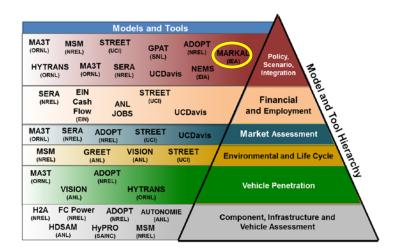*(International Energy Agency)*

Objectives
Integrates hydrogen production, delivery and vehicle components for cost-benefit analysis and policy analysis and determines a market equilibrium solution.

Key Attributes & Strengths
Analysis is conducted in the context of *overall* U.S. energy supply and demand. The model incorporates learning curves and scale economies for cost analysis, and identifies major barriers to the market penetration of alternative vehicle technologies and fuels.

Platform, Requirements & Availability
MARKAL is a linear optimization national economic model. It is available to the public but is large. The model is deployed in 50 countries and 110 institutions.

INPUTS	ASSUMPTIONS & DATA	OUTPUTS
• Technology information from H2A model. • Data from U.S. EIA's Annual Energy Outlook projections and Hydrogen Analysis Resource Center (//hydrogen.pnl.gov/cocoon/morf/hydrogen). • Vehicle information from Autonomie model.	• Hydrogen production and delivery technology representation is based on H2A Production and HDSAM models. • Vehicle cost and attributes for all vehicles based on information from U.S. EIA. • Refinery and technology representations are each sub-models for the NEMS national model. • Region information based on census regions. • Learning impact is built-in for technologies.	• New vehicle sales and stock. • Vehicle use. • Fuel use. • GHG emissions. • Hydrogen produced. • Costs of various policies to stimulate hydrogen vehicles.