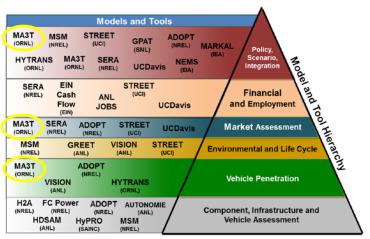
Market Acceptance of Advanced

Automotive Technologies (MA3T) Model

(Oak Ridge National Laboratory)

Objectives

Forecasts sales of competing vehicle technologies among consumer segments. Analyzes how technology, infrastructure, consumer behavior, and policy affect sales of new technologies and determines the resulting societal, environmental and economic impacts.



Key Attributes & Strengths

MA3T can be used to investigate the societal benefits, costs, and employment impacts of market transitions toward hydrogen-powered vehicles. It forecast sales of 40 vehicle choices (for both passenger cars and light-duty trucks) among 1,458 consumer segments in response to changes in technologies, infrastructure, consumer preferences, energy prices, and policies. The consumer segments included represent demand heterogeneity

with respect to regions, residential areas, driving patterns, technological attitude, home charging and work charging access.

Platform, Requirements & Availability

Programmed with Visual Basic in Microsoft Excel and can run on computers with Microsoft Excel 2010 or newer versions. Free to use. Can be downloaded from <u>http://cta.ornl.gov/ma3t</u> / or requested by contacting

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INPUTS

- Vehicle Attributes: Fully-learned retail prices; urban and highway fuel economies and electric ranges; cost of key powertrain components.
- Consumer Segmentation and
 Preferences: Shares of region, residential
 area, driver, adopter, home and
 workplace charging availability; driving
 intensities of each driver type.
- *Energy Prices:* Gasoline, diesel, natural gas, hydrogen and electricity.
- Infrastructure: Infrastructure availability for gasoline, diesel, natural gas,
- hydrogen, and electric charging.
 Policies: PHEV/HEV tax credits, additional purchase subisidies, additional
- tax credits, feebates, free HOV access, free parking, fuel economy standards.

ASSUMPTIONS & DATA

- Vehicle attributes and costs based on Autonomie model.
- Well-to-pump GHG emissions based on GREET model.
- Driving pattern and driver mix based on National Household Travel Survey.
- Daily distance variation based on Gamma distribution, validated with multi-day GPS-tracked travel data.
- Calculation of total energy use and GHG emissions based on vehicle age and survival rates from Transportation Energy Data Book or obtained by integrating with VISION model.
- Model calibrated by 2005-2011 sales and price data and validated by 2012 sales and price data.
- Consumer segmentation used for identifying early and mainstream markets and the enabling factors.

OUTPUTS

- Vehicle sales by powertrain type, consumer segment, and year.
- Vehicle population by powertrain type and year.
- Tailpipe and well-towheel GHG emissions by year.
- Consumption of gasoline, diesel, electricity, hydrogen, and natural gas by year.
- Government expenditure on vehicle subsidies by year.
- Consumer surplus by year.