Fuel Cell Power (FCPower) Model

(National Renewable Energy Laboratory)

Objectives

Serve as a financial tool for analyzing high-temperature, fuel cell-based trigeneration systems. ¹

Key Attributes & Strengths

Evaluates integration of building electricity and heat energy flows with hydrogen production. Performs hourly energy analysis and detailed grid time of use cost evaluations, which then feed into a discounted cash flow evaluation. Ability to analyze several fuel cell technologies: molten carbonate, phosphoric acid, solid oxide, and proton exchange membrane. Model is mainly used for analysis of CHP systems, but can also model building integration with solar panels and fuel cells.

Models and Tools MA3T STREET MSM HYTRANS SERA SERA EIN STREET **Financial** Cash ANL and Employment Flow JOBS **UCDavis** MA3T **SERA** ADOPT STREET UCDavis **Market Assessment** MSM STREET **GREET** VISION **Environmental and Life Cycle** (NREL) MA3T ADOPT (ORNL) **Vehicle Penetration** VISION HYTRANS ADOPT AUTONOMIE Component, Infrastructure and HDSAM HyPRO MSM Vehicle Assessment

Modules related to electrolyzers, storage, and dispensing are included in the model, also allowing analysis of renewable hydrogen from electrolysis.

Platform, Requirements & Availability

Freely available to the public from the Systems Analysis program's website (http://hydrogen.energy.gov/fc_power_analysis.html) but registration is required. Easy to use interface in Microsoft Excel environment (provides access to assumptions, inputs, and outputs).

Users may also access the model's case study data to download building energy demand profiles and renewable energy supply

Building hourly energy use (predetermined or custom profiles). Fuel cell performance and cost

• Weather data for energy analysis in presence of solar panels.

specifications.

 Sizing of solar arrays, electrolyzers, and peaking PEM fuel cells.

ASSUMPTIONS & DATA

- Uses standard H2A financial assumptions.
- Natural gas, electricity and gasoline prices from U.S. EIA.
- Model has access to building and weather data for multiple climates.
- Allows for the modeling of solar and fuel cell technology, electrolyzers, and integration with buildings.

OUTPUTS

- · Cost of delivered energy.
- Cost of produced hydrogen.
- · Energy inputs/outputs.
- · GHG emissions.

profiles that can be imported into the model, at: http://hydrogen.energy.gov/cf/fc power analysis model data.cfm.

¹ Tri-generation systems use natural gas to produce electricity and heat for buildings, and co-produce hydrogen for transportation use.