
VIII.1 Systems Analysis Overview

Introduction

Systems Analysis supports decision-making by providing greater understanding of the contribution of individual components to the hydrogen energy system as a whole, and the interaction of the components and their effects on the system. Analysis will be used to continually evaluate the alternatives for satisfying the functions and requirements of the future hydrogen system/economy and the Program's progress. Analysis is conducted to assess cross-cutting and overall hydrogen system issues, and to support the development of the production, delivery, storage, fuel cell and safety technologies. Particular emphasis is given to transition analysis, as recommended by the National Research Council in the February report, *The Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs*.

The Systems Analysis activity made several significant contributions to the Hydrogen Program during FY 2006. To establish a systems approach to analysis and modeling, a Systems Analysis Plan was developed, peer reviewed and completed in FY 2006. The H2A Production model was completed and issued for public use to ensure a consistent analysis of hydrogen production pathways. To complement the analytical tools, a web-based Hydrogen Analysis Resource Center was developed, peer reviewed and issued for public use to provide consistent, transparent data and assumptions for Hydrogen Program analysis.

Goal

Provide system-level analysis products to support transition-strategy development and the 2015 technology readiness goal by evaluating technologies and pathways, guiding the selection of RD&D projects, and estimating the potential value of RD&D efforts.

Objectives

- By 2008, develop and utilize a macro-system model of the hydrogen fuel infrastructure to support transportation systems. By 2011, enhance the model to include the stationary electrical generation and infrastructure for a full hydrogen economy.
- By 2009, identify and evaluate feasible transition scenarios consistent with infrastructure and hydrogen resources, including an assessment of timing and sequencing issues for an operational hydrogen economy.
- By 2014, complete environmental studies that are necessary for the 2015 technology readiness goal.
- By 2015, analyze the ultimate potential for hydrogen and fuel cell vehicles. The analysis will address necessary resources, hydrogen production, transportation infrastructure, vehicle performance, and interactions between a hydrogen economic sector and other sectors.
- Provide milestone-based analysis, including risk analysis, independent reviews, financial evaluations and environmental analysis, to support the Program's needs prior to the 2015 technology readiness milestone.
- On an annual basis, update the Well-to-Wheels analysis for technologies and pathways for the Hydrogen Program to include technological advances or changes.

FY 2006 Status

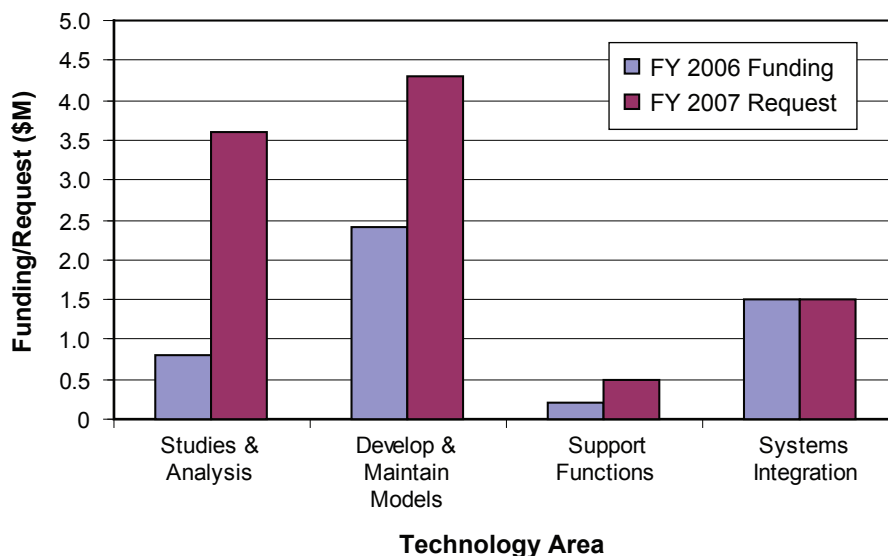
Systems Analysis was established within the DOE Hydrogen Program to develop a consistent, comprehensive framework for examining the economics, benefits, risks, realities, opportunities, and impacts of a hydrogen economy. Existing analysis projects were evaluated in FY 2006 to identify analysis gaps, and a Systems Analysis Plan was created to address these gaps and to further progress toward the goals and objectives laid out in the Multi-Year Research, Development and Demonstration Plan.

FY 2006 Accomplishments

- The Systems Analysis Plan was reviewed and completed. The plan will be issued in FY 2006.
- The first version of the Hydrogen Analysis Resource Center (HyARC), previously the Hydrogen Program Data Book, was peer reviewed and issued to the Hydrogen Program website (www.hydrogen.energy.gov) for public use. This web-based resource center provides assumptions, data, and guidelines for modelers and analysts to use to ensure consistency between analyses sponsored by the Hydrogen Program.
- The H2A Central and Forecourt Production models were completed and issued to the Hydrogen Program website (www.hydrogen.energy.gov) for public use. Work has commenced on a second version, which will incorporate scaling, efficiency and CO2 emissions.
- Three key analysis and modeling projects accelerated work in FY 2006 which was started in FY 2005 on modeling and analyzing scenarios for the various phases of a hydrogen economy. These three projects are employing different modeling approaches to maximize understanding of issues and opportunities in each phase.
- The test version of the Macro-Systems Model, a dynamic engineering transition model that will simulate the performance and evolution of hydrogen infrastructure using a distributed architecture to link existing and emerging models for system components, was completed. The test version of the model will be peer reviewed in the later part of FY 2006.
- A consistent pathways analysis approach was developed for transparent Well-to-Wheels analysis using the Argonne National Laboratory GREET model and the H2A production and delivery models.

Budget

The budget for the Systems Analysis activity is consistent with the goals and objectives of the effort and is responsive to the recommendations of the National Research Council. The FY 2007 budget request includes significantly increased funding for transition and infrastructure analysis, as well as increases for environmental analysis, program analysis, modeling, and systems integration.



2007 Plans

The Systems Analysis activity will focus in FY 2007 on conducting analyses with available models to resolve known gaps in understanding of hydrogen and fuel cell systems and infrastructure. The FY 2006 appropriation included \$5.0 million for Systems Analysis; the FY 2007 request is \$9.8 million. The budget request for FY 2007 reflects the recommendation of the National Research Council to increase funding for well-to-wheel, transition and infrastructure analysis.



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