

Strategic Planning and Implementation

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Introduction

The goal of this project is to coordinate infrastructure planning activities for the DOE Hydrogen, Fuel Cells, and Infrastructure Technologies Program (Program). NREL works with the DOE, DOE Hydrogen Technical Advisory Panel (HTAP), industry, and other key stakeholders to identify key RD&D needs for infrastructure planning and deployment. NREL helped to organize the DOE Hydrogen Vision meeting and participated in “Delivery” (infrastructure) section of DOE Hydrogen Roadmap workshop and provides technical and administrative support to the Infrastructure Committee of the HTAP. NREL is also developing data and analytical tools to assess infrastructure deployment options and opportunities, particularly for the near-term

As part of this project, NREL continued to support the HTAP Scenario Planning Committee and published a draft NREL technical report on scenario planning and analysis. Paper on HTAP scenario planning was presented at the World Hydrogen Energy Conference (WHEC) in June. The scenario planning activity will be folded into the DOE Roadmapping effort and into the infrastructure planning work.

This project is taking a two-pronged approach to infrastructure planning and deployment. First, NREL is developing institutional links and collaborations with key stakeholders through a series of regional hydrogen infrastructure forums. Second, NREL is developing analytical data and tools to assess infrastructure options. Project plan: prepare national hydrogen infrastructure blueprint based on regional insights and opportunities

Regional Hydrogen Infrastructure Forums

Effective national hydrogen infrastructure planning requires cooperative and collaborative efforts at the local and regional levels. In early 2002, NREL helped HTAP organize an Infrastructure Committee to address key issues in planning and deploying a national hydrogen fuel infrastructure. The Committee had its origin in the HTAP Fuel Choice Committee, which was disbanded when the Infrastructure Committee was formed. The Committee planned a series of

regional infrastructure forums to complement and enhance the national Hydrogen Vision and Roadmap effort. The HTAP held the first Regional Hydrogen Infrastructure Forum in Houston at the Houston Advanced Research Center in April 2002 with a focus on petroleum, petrochemical, and energy industry perspectives. Participants from energy companies, hydrogen producers, regional and state agencies, research institutes, and federal agencies provided information about infrastructure-related activities and interests. The Committee and the participants discussed potential infrastructure projects, and a potential collaboration with Texas DOT, Texas State Energy Office, Fuel Cells Texas, and Texas Railroad Commission on a propane-based hydrogen fueling infrastructure emerged from this discussion.

NREL also organized and held a regional hydrogen infrastructure forum in Denver in December 2001 and May 2002. The Rocky Mountain Hy, a collaborative among key stakeholders in the region to accelerate hydrogen R&D and hydrogen infrastructure deployment, was formed as a result of the forums. Rocky Mountain Hy will focus on legislative initiatives, education, public outreach, and RD&D priorities for the region.

The HTAP decided to focus its effort on conducting a strategic review of the DOE hydrogen RD&D portfolio and discontinue its sponsorship of the regional hydrogen infrastructure forums. However, NREL and DOE will continue to conduct the forums to solicit input from industry and other key stakeholders in each of the DOE regions. The inputs and information from these forums along with the HTAP's strategic review will be synthesized into a national RD&D investment plan for hydrogen infrastructure.

NREL is working with other national laboratories, other federal agencies, state and local governments non-governmental organizations, universities, and industry to organize the regional infrastructure forums. The forums will be co-sponsored and co-hosted by key stakeholders in each region in which the forums are held. NREL will work with the appropriate DOE Regional Office in each region in which the forums are held. Collaborative regional efforts, similar to Rocky Mountain Hy, will be initiated in each region in which a forum is held.

Data and Analysis Tools

A key assumption in this project is that hydrogen infrastructure deployment will begin at the local and regional level and grow outward from key local and regional nodes. To complement the regional infrastructure forums, NREL has developed data on the existing hydrogen infrastructure and has employed geographical information system (GIS) tools to explore potential near-term deployment options.

NREL has developed a map of existing hydrogen production facilities, based on information provided by industrial gas suppliers and on other publicly available data sources.

Figure 1 shows the existing hydrogen production facilities in the United States.

Figure 2 shows the Interstate Highway Systems overlaid onto Figure 1. This figure shows how well the highway transportation system in the United States can facilitate trucking hydrogen (liquid or gaseous) across the large spatial expanse of the country.

Figure 3 shows an overlay of electrical transmission network (230 kV and larger) on production facilities (Figure 1). The transmission network shows that hydrogen could be produced through electrolysis in most parts of the country.

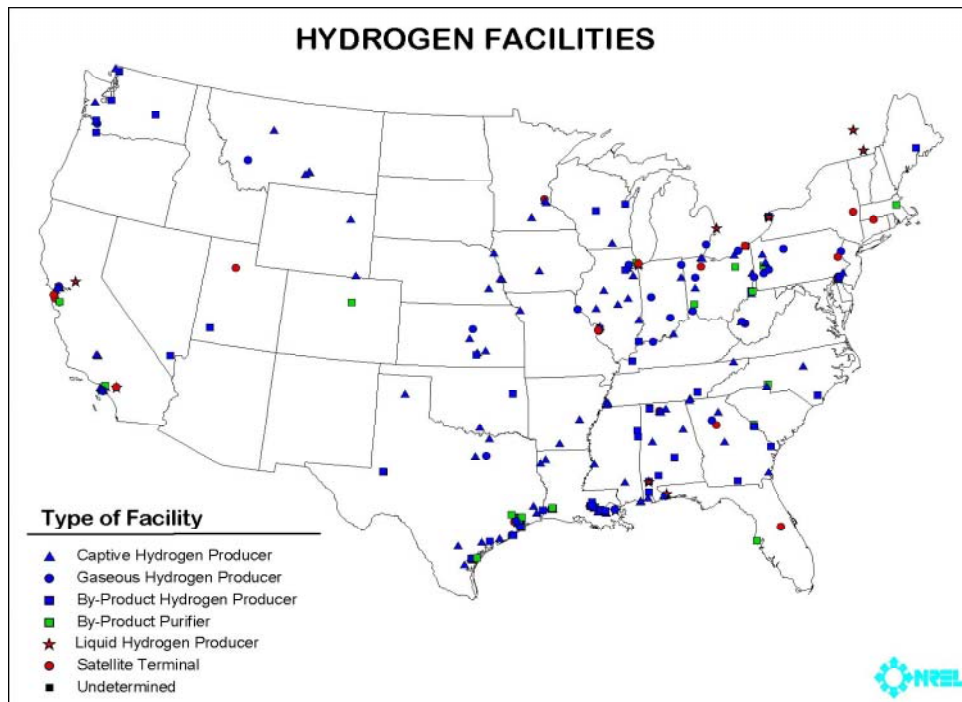


Figure 1: Existing hydrogen production facilities

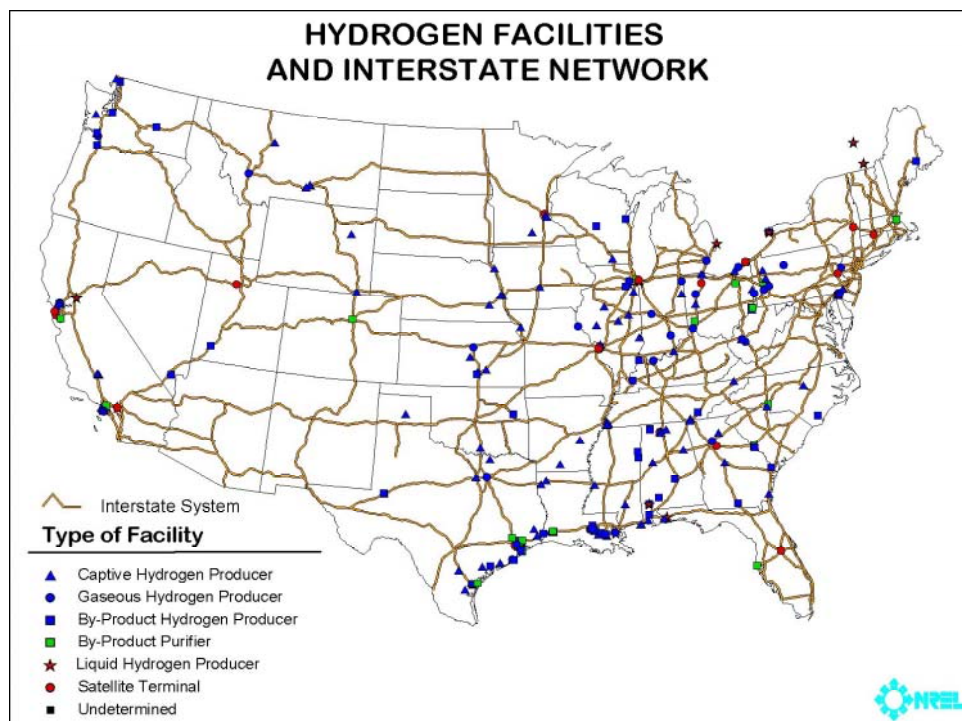


Figure 2: Interstate highway system overlaid on hydrogen production facilities

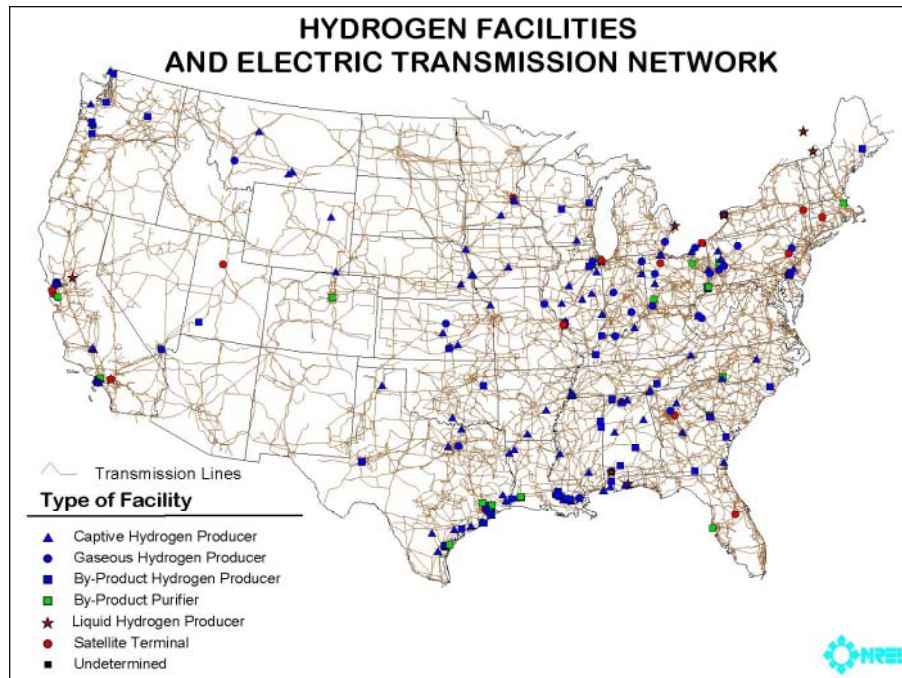


Figure 3: Electric transmission lines overlaid on hydrogen production facilities

Figure 4 shows the possibility that right-of-way for hydrogen pipelines could be available parallel to and within the natural gas pipeline right-of-way. Distribution of natural gas-hydrogen mixtures is also possible.

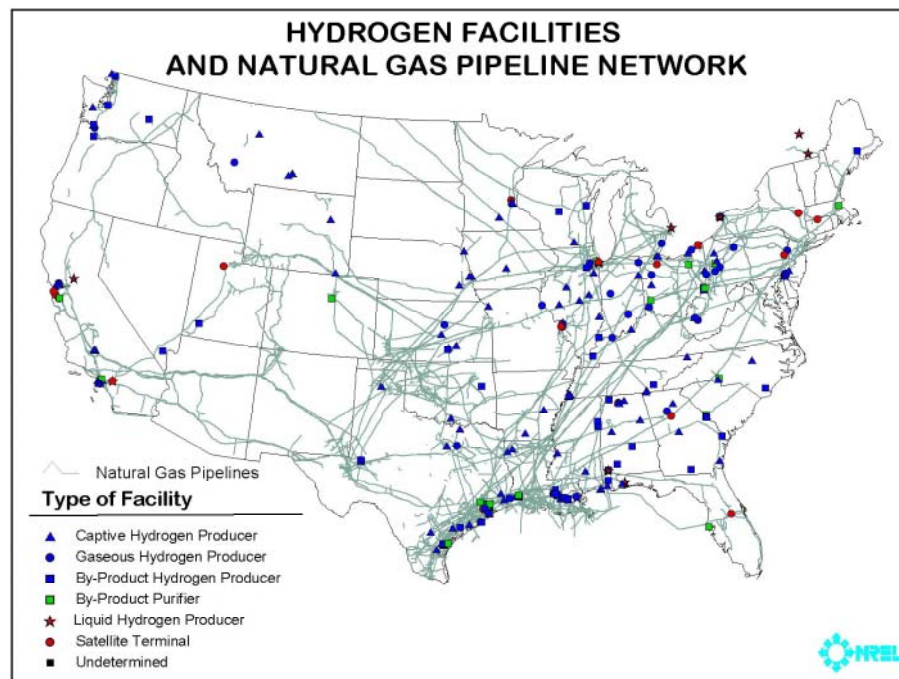


Figure 4: Hydrogen production and natural gas distribution

Figure 5 shows the potential for solar and wind powered electrolysis for sustainable hydrogen production that could be applied in the absence of conventional production infrastructure.

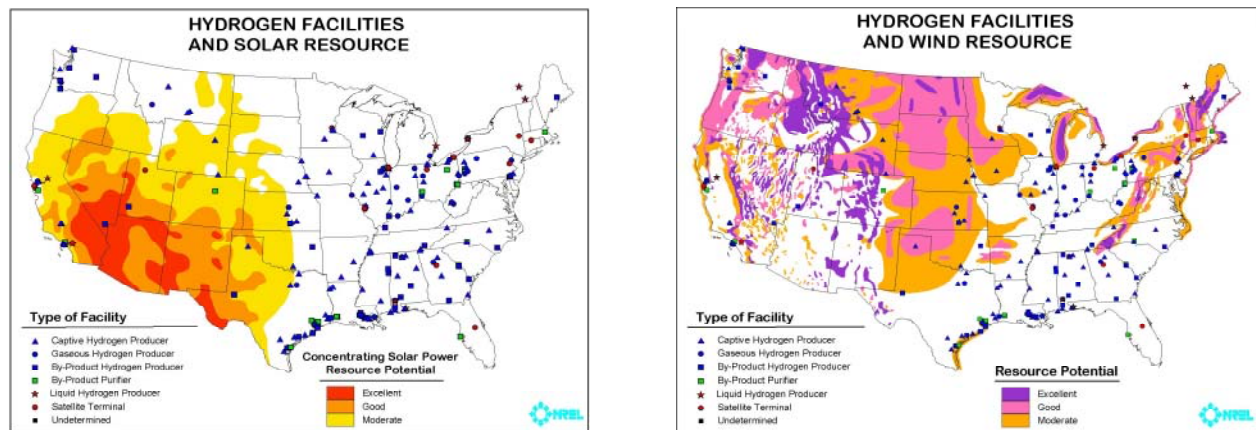


Figure 5: Hydrogen production potential from solar and wind resources

Conclusion

By applying GIS techniques NREL is exploring both near-term and renewable options for hydrogen infrastructure development and deployment.