

# Hydrogen Transition Infrastructure Analysis



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This presentation does not contain any proprietary or confidential information

Project ID  
#TVP14

# Overview

## Timeline

- Project Start: FY04
- Project Complete: FY06
- Percent complete: 40%

## Budget

100% DOE project funding

- FY04 Technical Validation Funding: \$115K
- FY05 Cross-Cutting Analysis Funding: \$200K

## Barriers

- Hydrogen Delivery
  - A. Lack of Hydrogen/Carrier and Infrastructure Options
- • Technology Validation
  - C. Hydrogen Fueling Infrastructure

## Partners

- H2A Analysis
- UC Davis Infrastructure Analysis

# Objectives

- Understand the benefits and drawbacks of various options for installing hardware for a developing hydrogen demand
- Identify the most economic pathways for successfully meeting emerging hydrogen demands.
- Identify, describe, and quantify options for hydrogen refueling during the transition to hydrogen as a transportation fuel

# Approach

- Geographic Information System (GIS) used for spatial analysis to identify station locations based on key factors:
  - Interstate highways
  - Traffic volumes
  - Existing H<sub>2</sub> and natural gas infrastructure
  - Driving distance (100 miles west of Mississippi, 50 miles east of Mississippi)
  - Population centers
  - Existing H<sub>2</sub> production facilities

# Approach

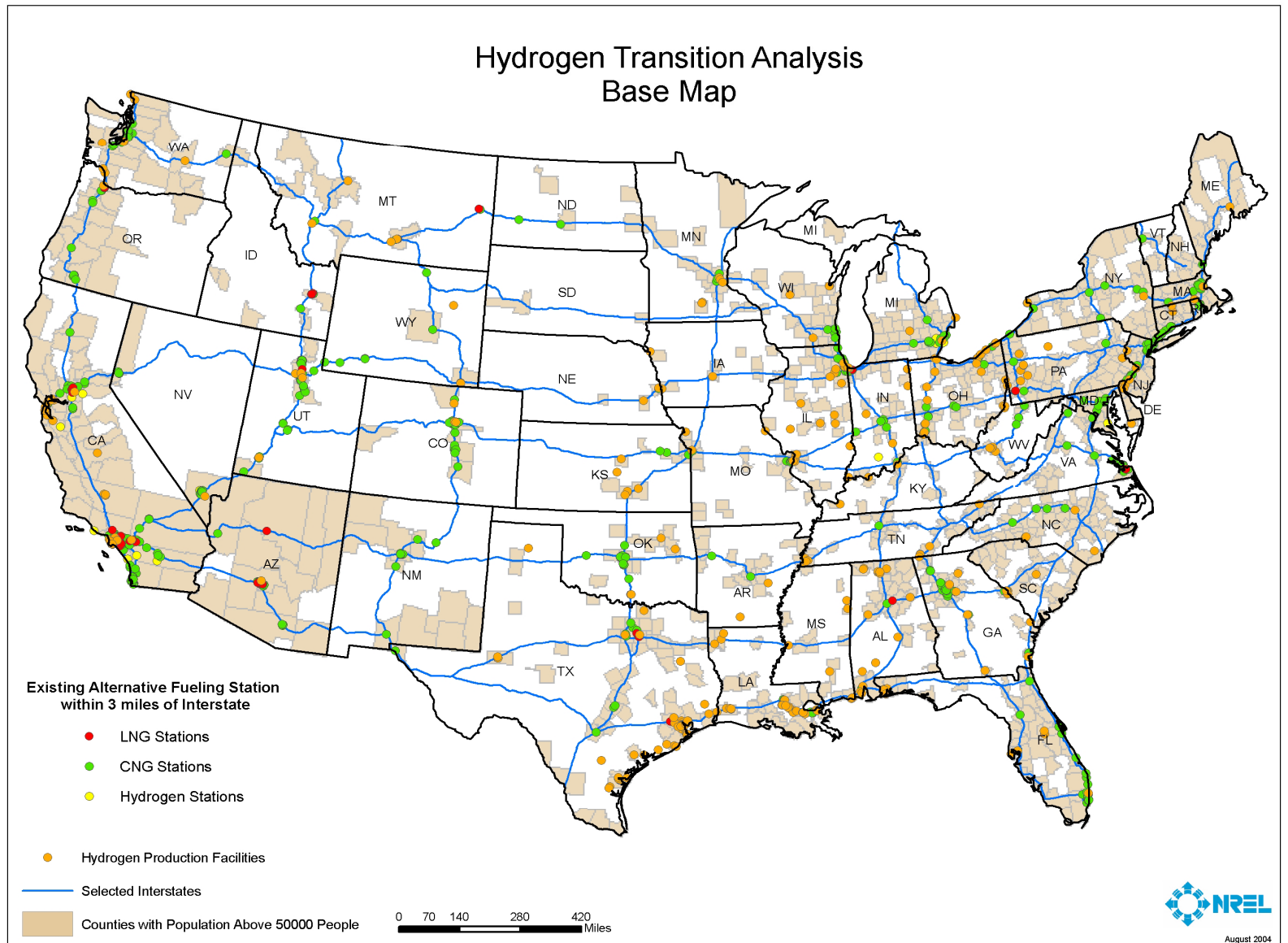
- Identify a basic, minimal network of refueling stations to facilitate interstate travel
  - Incorporates a subset of all U.S. interstates
  - Incorporates stations in all 50 states
  - Uses highway 101 in California because of high traffic volumes on interstate

# Approach

- Evaluate transitional opportunities
  - Identify key partners (federal fleets, private fleets, states, petroleum depots, etc.) based on their activities and resources

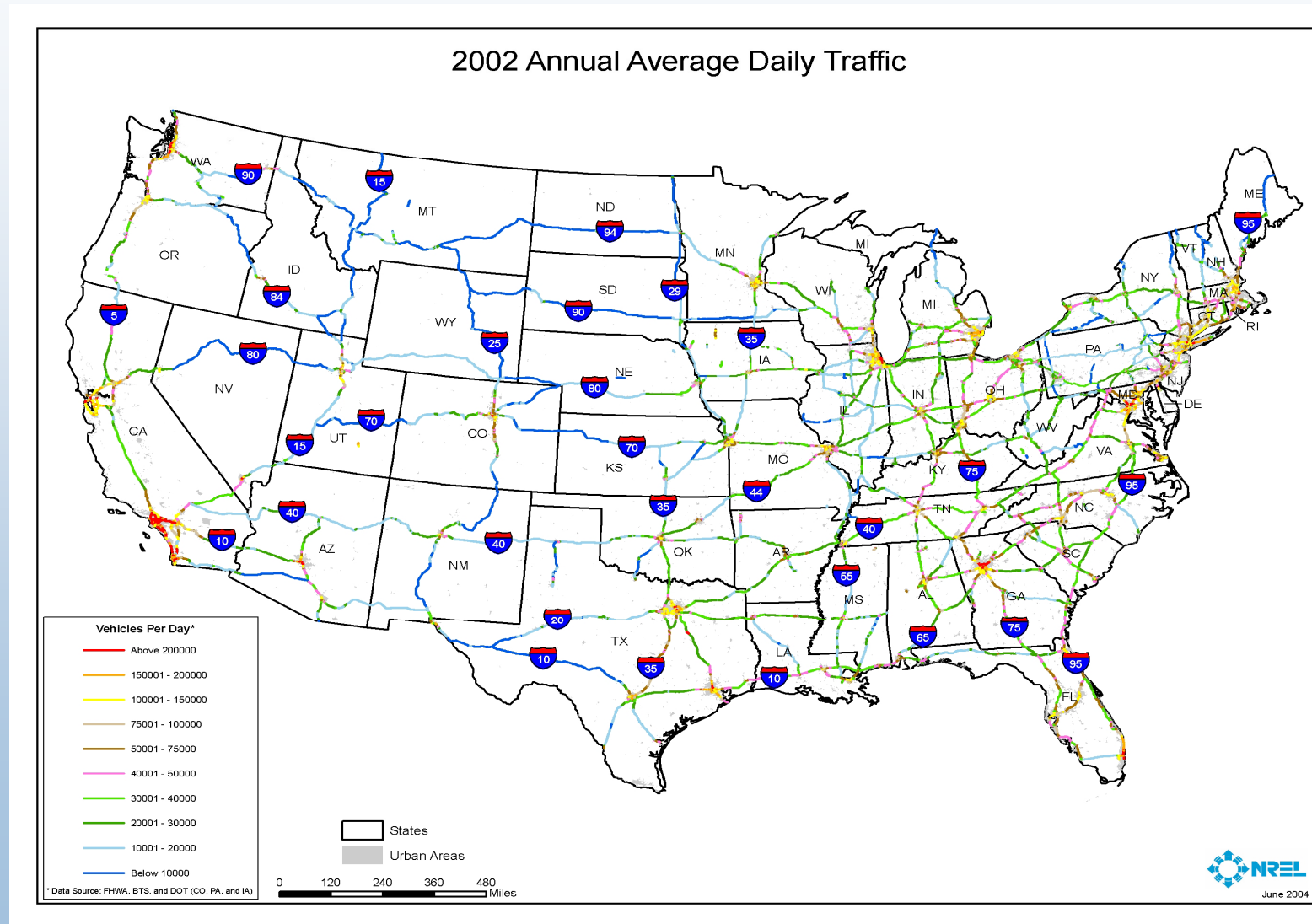
# Technical Accomplishments

Key resources identified



# Technical Accomplishments

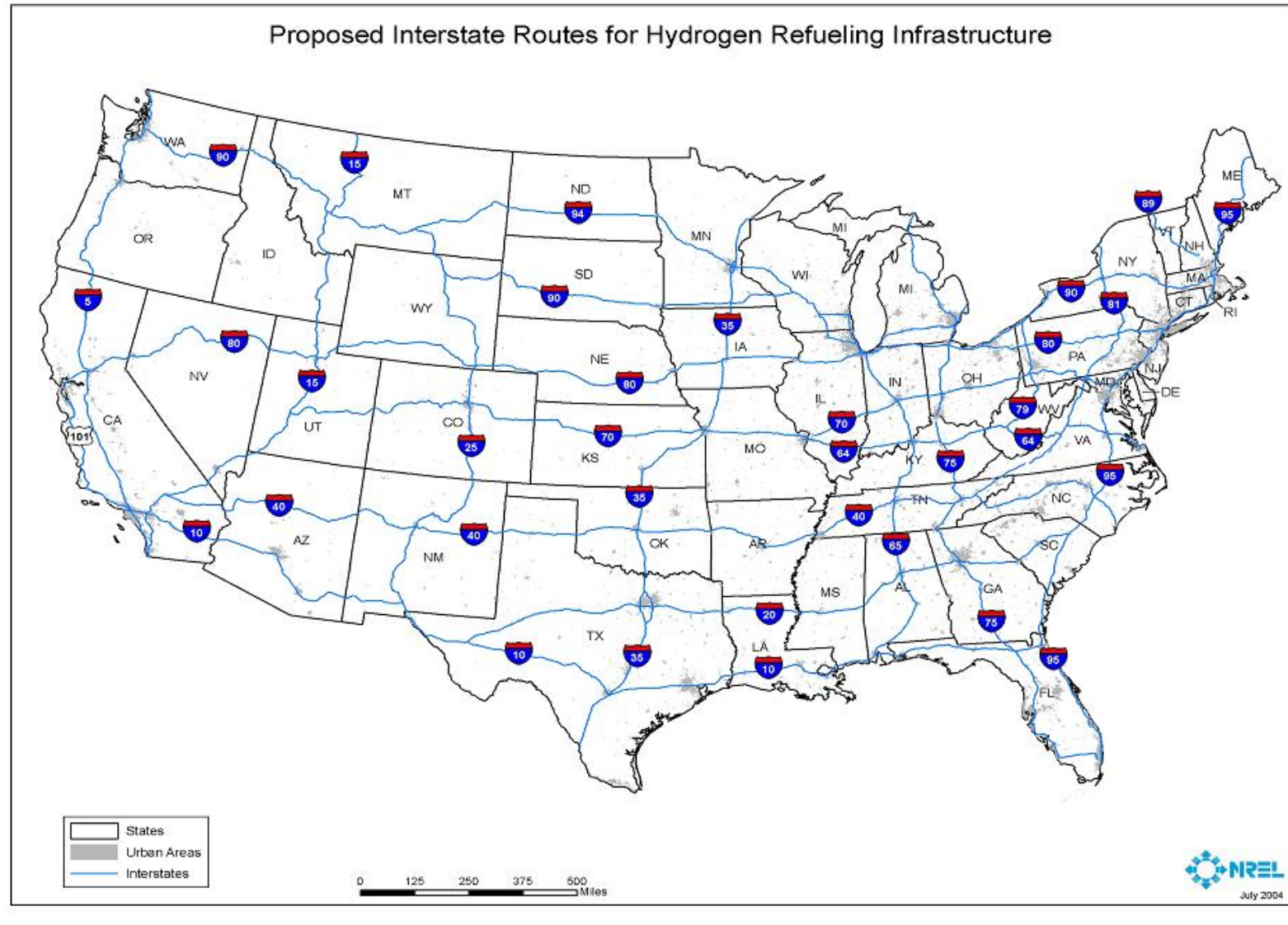
Interstate  
traffic  
analyzed





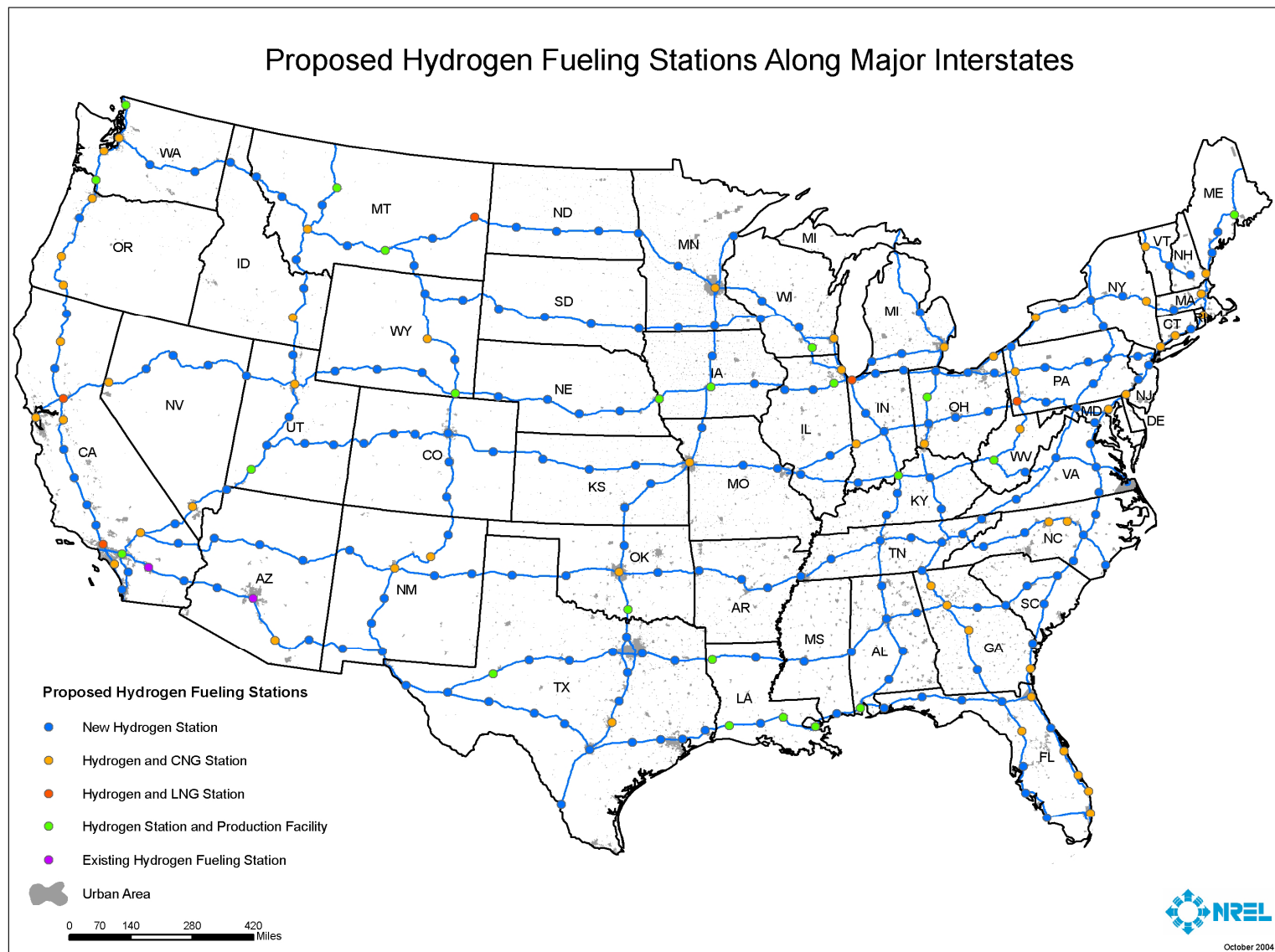
# Technical Accomplishments

Interstate network identified



# Technical Accomplishments

Individual stations placed on interstate network



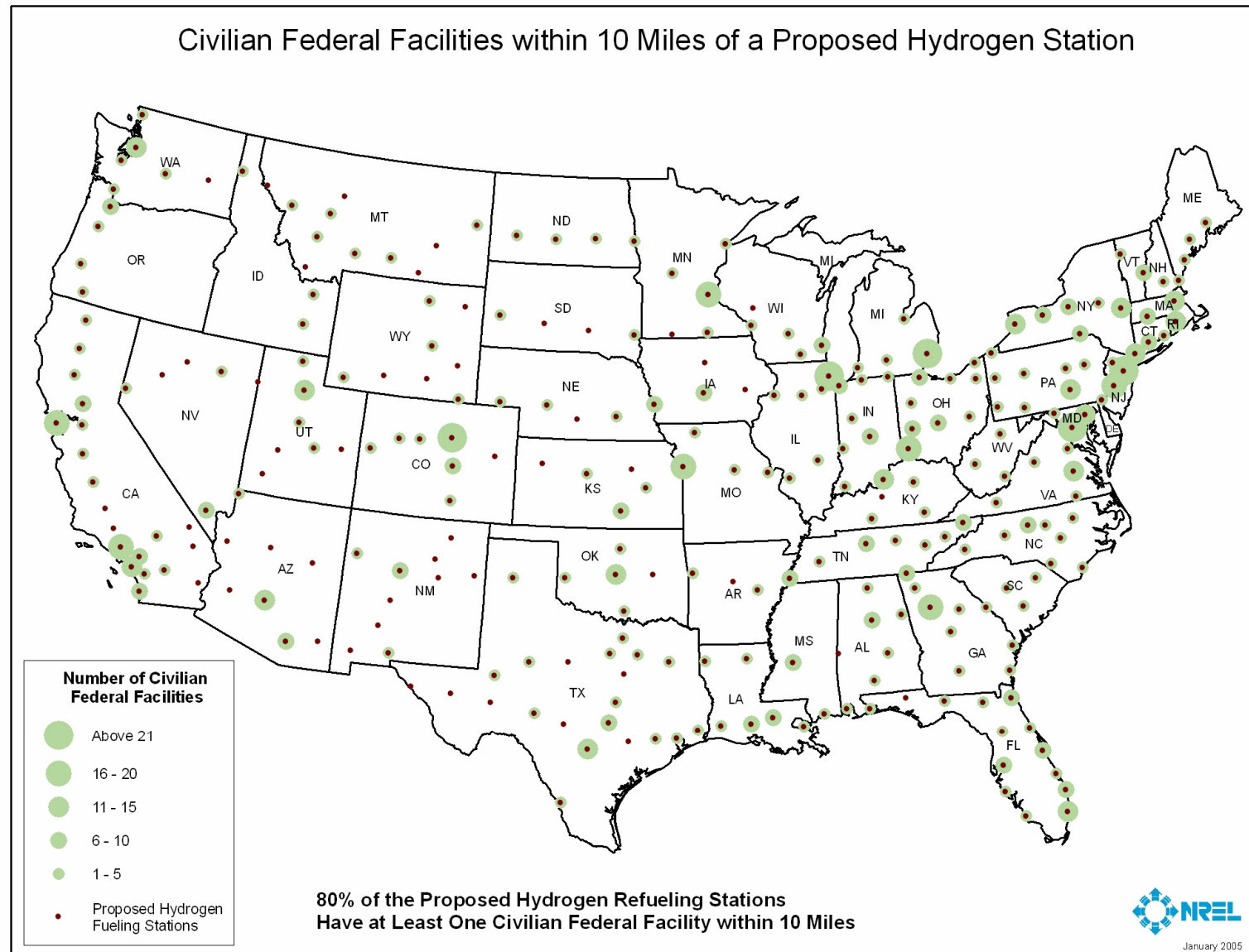
# Technical Accomplishments

## Interstate Station Summary

Interstate	Mileage	Number of Stations	Existing Natural Gas Stations	Existing H2 Stations	Sites Near H2 Production Facilities	New Stations Needed
5	1,381	20	10	0	2	8
10	2,460	29	1	2	5	21
15	1,434	17	5	0	3	9
20	1,539	18	1	0	2	15
25	1,063	13	3	0	1	9
35	1,568	18	4	0	2	12
40	2,555	28	5	0	0	23
64	938	7	0	0	2	5
65	887	11	1	0	1	9
70	2,153	23	3	0	0	20
75	1,786	19	6	0	1	12
79	343	5	3	0	1	1
80	2,900	33	6	0	4	23
81	855	9	0	0	0	9
89	191	3	1	0	0	2
90	3,021	35	7	0	2	26
94	1,585	16	6	0	0	10
95	1,920	30	13	0	1	16
<b>Total Mileage</b>	<b>28,580</b>					
<b>Total Stations</b>		<b>284</b>	<b>58</b>	<b>2</b>	<b>22</b>	<b>202</b>

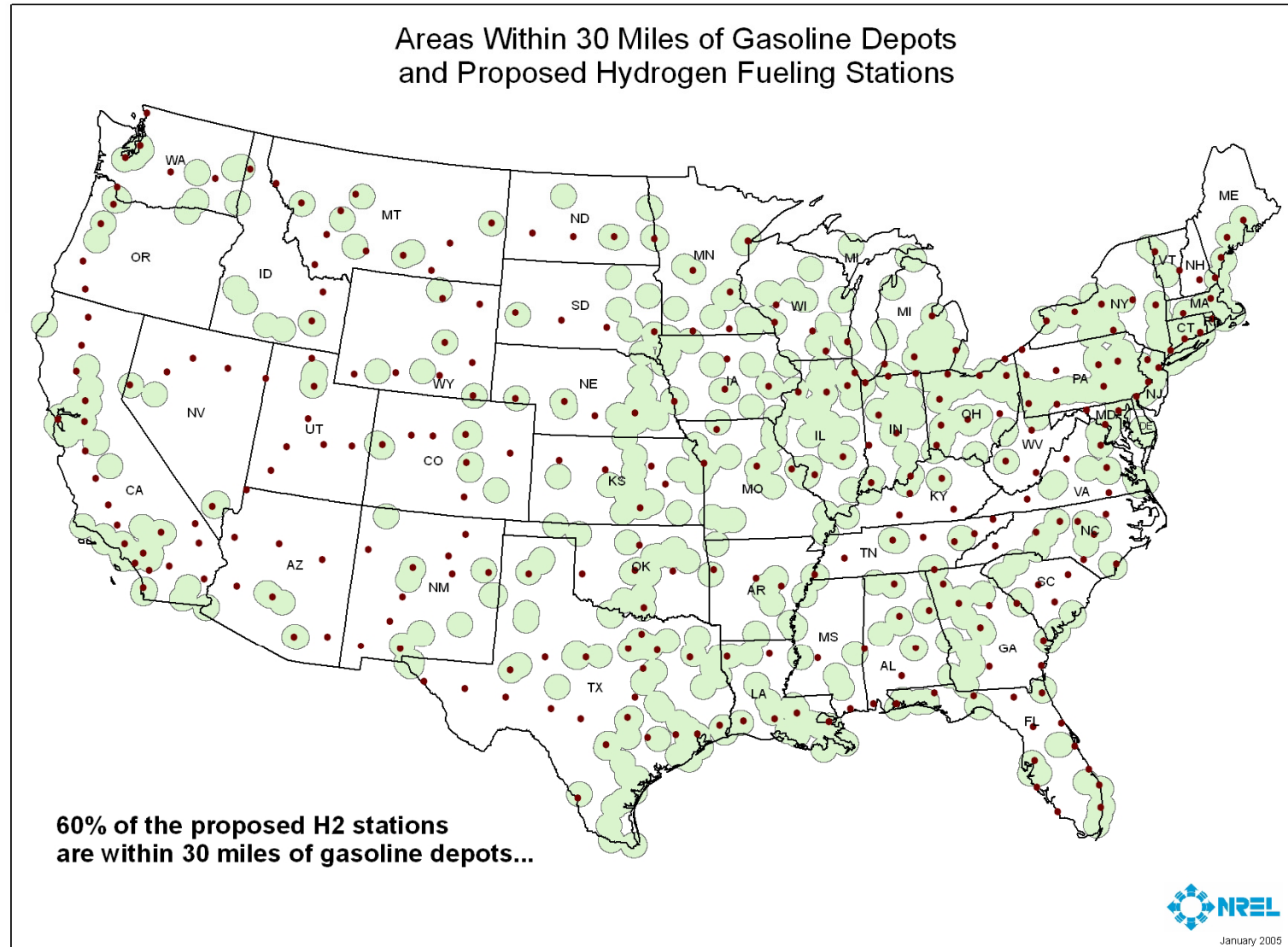
# Technical Accomplishments

Identified significant potential for Federal Government involvement in H<sub>2</sub> infrastructure development



# Technical Accomplishments

More than  
60% of  
stations  
within a 30  
mile radius  
of petroleum  
depots



# Future Work

*FY04 work funded by Technology Validation*

*FY05 work transitioning to Cross-cutting Analysis*

*FY05 Milestone: Technical report - 9/05*

## FY05 Activities

- Incorporate H2A assumptions and results
  - What are the best configurations for stations?
  - What are the costs to construct this basic infrastructure?
- Identify opportunities for renewable H<sub>2</sub> generation
  - Which renewable options are best for each region/station?

# Future Work

## FY05 Activities

- Identify/evaluate transition strategies
  - Who are key partners?
  - Where is the biggest early vehicle penetration?
  - Which stations/geographic areas where efforts should be focused first, second?
- Longer-term economic evaluation
  - Which stations should be built when?
  - How long before stations could be economically profitable?
  - What are the key attributes that make a station profitable?

# Publications and Presentations

## Papers

National Hydrogen Association (April 2005)

DOE Progress Report Deliverable (February 2005)



## Presentations

SAE Government-Industry Meeting (May 05)

American Association of Geographers (April 05)

National Hydrogen Association (March 05)



# Hydrogen Safety

No hydrogen safety issues are addressed

