

ECONOMIC IMPACT OF THE NORTHEAST HYDROGEN AND FUEL CELL INDUSTRY

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The Northeast Electrochemical Energy Storage Cluster (NEESC) recently completed a second IMPLAN economic analysis of the region’s hydrogen and fuel cell industry to assess the growth and trends of the industry since it was last analyzed in 2012.^{1, 2} The region consists of the states from Maine to New Jersey and the industry includes the original equipment manufacturers (OEMs) and supply chain for the hydrogen and fuel cell industry. The study’s findings suggest that the hydrogen and fuel cell industry in the Northeast region has experienced growth over the last four years based on several factors including employment, revenue and investment, labor income, and state and local tax revenue.

An IMPLAN is an economic impact analysis tool that combines databases concerning economic factors, multipliers and demographic statistics with modeling software. IMPLAN allows the user to develop local-level input-output models that can estimate the economic impact of certain activities, including the direct, indirect and induced impacts by sector using industry-specific multipliers, local purchase coefficients, and income-to-output ratios.

In 2015, the hydrogen and fuel cell supply chain had a significant bearing on the region’s economy, contributing over \$1.4 billion in revenue and investment; more than 6,550 direct, indirect and induced jobs; and labor income of approximately \$620 million. The growth of the industry from 2011 to 2015 is shown below:

	Northeast Cluster Economic Data 2011	Northeast Cluster Economic Data 2015
OEMs	30	30
Supply Chain Members	1,091	1,179
Direct Jobs	2,135	1,806
Total Rev & Investment (\$M)³	\$1,179	\$1,421
Total Jobs³	5,770	6,558
Total Labor Income (\$M)³	\$449	\$620

The study also reported that 2015 state and local tax revenues stemming from the Northeast region’s hydrogen and fuel cell industry were in excess of \$83 million.

¹ NEESC is a network of industry, academic, government and non-governmental leaders working together to provide electrochemical energy storage solutions. The cluster is focused on the innovative development, production, promotion and deployment of hydrogen and fuel cell products. The cluster is based in the New England States, New York and New Jersey. The NEESC program is funded through the [US Small Business Administration’s Innovative Economies Initiative](#). The Connecticut Center for Advanced Technology administers the cluster in partnership with the Connecticut Hydrogen-Fuel Cell Coalition, New Energy New York, the Massachusetts Hydrogen and Fuel Cell Stakeholders, the Hydrogen Energy Center and the Clean States Energy Alliance.

² The 2012 IMPLAN analysis was based on 2011 data.

³ Includes direct, indirect, and induced impacts.

Key findings from the 2015 IMPLAN economic analysis include:

- Including multiplier effects, the Northeast hydrogen and fuel cell industry has a total economic impact of an estimated \$1.421 billion in revenue and investment, 6,558 full- and part-time jobs, and \$619.6 million in labor income.
- Within the region, the industry's largest impacts are felt in Connecticut (e.g., total employment impact of 3,406 workers), New York (e.g., total employment impact of 1,618 workers), and Massachusetts (e.g., total employment impact of 1,138 workers).
- Along with its impact on economic activity, the Northeast hydrogen and fuel cell industry also generates an estimated \$83.8 million, or, depending on the method used in the analysis, \$95.3 million in state and local taxes.
- Several states in the region, e.g., Connecticut, Massachusetts, New Jersey, and New York, are among the top locations for the hydrogen and fuel cell industry, based on their current activities or potential for future growth.
- Analysis of the employment growth of hydrogen and fuel cell companies in the Northeast region shows that a greater percentage of businesses grew than declined between 2011 and 2015, and 17 companies (with data available for both periods) had a combined employment growth rate of 16 percent.
- Some of the region's largest hydrogen and fuel cell companies, notably FuelCell Energy of Connecticut and Plug Power of New York, have experienced substantial growth in revenue and R&D activities in recent years.⁴

The study also notes the geographic concentration of OEMs and supply chain companies in the Northeast and identifies the region as a global leader in the hydrogen and fuel cell sector with all of the hallmarks of a vibrant and strong cluster. This cluster provides benefits to its companies (including suppliers) and workers, and the entire region. The proximity of the OEMs and supply chain companies in this cluster has provided a competitive advantage for research, design, development, manufacturing, and export of commercial products to national and international markets.

The ultimate drivers for business development and markets for commercial deployment can be divided into a stationary market for fuel cell distributed generation (DG) and a transportation market for fuel cell electric vehicles (FCEVs) with hydrogen refueling.

Locations where stationary fuel cell installations for DG are both technically and economically viable include a wide range of private, state, and federal buildings for offices, manufacturing, data management, warehousing, education, food sales and services, lodging, in-patient healthcare, and public order and safety. Similarly, fuel cell installations are potentially

Potential Stationary Fuel Cell Sites

- Education
- Data Management
- Food Sales & Services
- Inpatient Healthcare & Lodging
- Public Order and Safety
- Energy Intensive Industries
- Government Operated Buildings
- Telecommunication Towers
- Wastewater Treatment Plants & Landfills
- Airports & Ports
- Military

⁴ Examples of commercial progress by Northeast-based fuel cell companies: Plug Power has deployed over 10,300 GenDrive material handling equipment power packs and FuelCell Energy has an installed base and backlog of stationary fuel cells, with customers on three continents, exceeding 300 megawatts.

viable at wastewater treatment plants, landfills, telecommunications towers, seaports, high traffic airports, and for electric grid service. NEESC has identified nearly 5,000 potential stationary fuel cell sites located in the Northeast region. The market potential for stationary fuel cell deployment with clean, reliable, cost effective, and on-site generation is substantial and is projected to grow.

Locations for FCEVs and hydrogen refueling would be technically and economically viable in urban areas where fleets, early market adopters, and hydrogen producers exist. Similarly, fuel cell powered material handling equipment, aircraft tugs, and street sweepers would be technically and economically viable at warehouses, airports, construction sites, manufacturing plants, and wholesalers. Prime early market adopters and fleets could serve as commercial pilots for FCEV deployment with hydrogen refueling. NEESC has identified approximately 13,000 potential hydrogen refueling sites and over 280,000 registered fleet vehicles for potential FCEV deployment in the Northeast region. The market potential for zero emission FCEV deployment and supporting hydrogen infrastructure development is substantial and is projected to grow.⁵

Potential Hydrogen Refueling Sites

- Current Gasoline Stations
- Alternative Fueling Stations
- DOT Owned Sites
- Distribution Center/ Warehouses
- Ports

Registered Fleet Vehicle Inventory

- Private Fleet Vehicles
- Federally Owned Passenger Cars
- Federally Owned Trucks/Vans
- Directly Operated Transit Buses

Hydrogen and fuel cell technology provides an opportunity for the Northeast region to more fully utilize its renewable energy industry using hydrogen and fuel cells for transportation, energy storage, and use at consumer sites. Such use continues to make the region a showcase for renewable energy while reducing greenhouse gas (GHG) emissions as new jobs are created. This configuration will also increase local end user reliability, which is of high value for business and industry.

⁵ Air Liquide has announced locations for four (of twelve) hydrogen fueling stations planned for the Northeast region of the United States. These locations for hydrogen stations will be located in Hartford, CT, Braintree, MA, Mansfield, MA, and Bronx, NY.