Executive Summary

The global fuel cell and hydrogen energy industry will likely play a pivotal role in the transportation, stationary and portable power sectors in the 21st century. The world's energy solution portfolio is expanding as hydrogen and fuel cells' role in providing a sustainable supply of energy increases. Progress related to the development, production and deployment of hydrogen and fuel cell products and infrastructure is in a transition to becoming a reality, rather than a future aspiration. As these technologies move from the development stages of R&D to commercialization, the vision of a hydrogen revolution is becoming more feasible.

The rate of progress in this industry is complex, as it varies across wide geographical regions. In some areas, the concept of 'advancement' means tangible forward progress in the public eye, while in other regions, it refers to the maintenance of existing infrastructure. Overall, hydrogen and fuel cells are becoming more practical, more innovative, and more familiar as an alternative energy technology of today rather than a futuristic possibility of tomorrow.

Hydrogen and fuel cell demonstrations are increasingly utilized around the world to increase public exposure to the technology. One project, coordinated in four different regions of Europe, delivered a variety of hydrogen powered products to the public, which included midibuses, wheelchairs, and scooters.[1] One city in Italy is currently running a public transit demonstration in order to gauge the functionality of hydrogen-methane fuel. The project is a collaborative effort between the local transit company and a renewable energy organization. In Chinese Taipei, a fleet of 8 fuel cell powered scooters was successfully completed in October 2011. These scooters will be tested and demonstrated through 2012, and will help develop research on the usage of hydrogen fuel technology in personal transportation.

The Olympic Games on several occasions have served as a highly visible outlet for the demonstration of fuel cell and hydrogen energy technology. Most recently, fuel cell electric vehicles served as a component to the logistical plan of the 2012 London Olympics. Five fuel cell taxis were in service throughout the Games and were serviced at a new SmartFuel hydrogen station at Heathrow Airport. In addition, five fuel cell scooters were showcased at the Games, representing another viable mode of transportation using hydrogen. During the 2010 Vancouver Olympics, the world's largest fuel cell electric bus fleet was put into operation. Another fleet of fuel cell electric vehicles was utilized for passenger demonstration purposes at the 2008 Beijing Olympics. Given the progressive nature and ideals of the Olympic Games, they will likely continue to serve as a fitting venue to showcase the development of fuel cells and hydrogen energy in the future.

Companies are beginning to realize the versatility of fuel cells and are incorporating them to support material transport and provide power generation. A major beverage producer now uses fuel cell forklifts that run on hydrogen fuel at a California facility. In addition, dozens of other U.S.-based companies are using fuel cells to power their forklifts and to generate electricity and heat, according to a report by Fuel Cells 2000.[2]

Hydrogen conferences and talks continue to serve as important tools for associations to share research and project developments, and to maintain visibility to the public. Many national hydrogen and fuel cell associations, like Poland and Spain, for example, hold annual or bi-annual forums to discuss new technologies and the state of the fuel cell market, among specialized topics. National governments are beginning to provide additional venues to discuss fuel cell and hydrogen energy technology, in the interest of developing appropriate legislation and regulations.

Fuel cell and hydrogen energy technology is also being utilized for independent projects. In Australia, a university building is under construction will have its power and water sourced through hydrogen storage technology. In Italy, a hydrogen-powered plane prototype was developed and showcased at an event in May 2012.

Fuel cell and hydrogen energy infrastructure promise to enhance lucrative cross-border market development opportunities. To help increase its energy independence while expanding its export portfolio, Japan has taken on fuel cell export manufacturing and intends to market its products to overseas. Throughout Europe, the EU has facilitated joint programs incorporating multiple national governments as well as private corporations with headquarters based in separate countries. In North Africa, private ventures are harnessing the renewable sources available in the Sahara Desert to power communities and produce hydrogen, which may be transported to markets across the Mediterranean.

Despite the progress to date, there are still challenges that must be overcome worldwide. Fueling infrastructure needs to develop further in order to support widespread usage of fuel cell electric vehicles. Cross border market development standards are also slowly developing along with international trade standards for manufacturing and industry best practices standards, but more uniform standards across the industry are still needed.

The 2011-2012 PATH Annual Report has been updated to reflect progress in the hydrogen energy sector in the past year. Each country's section has been revised based on the data submitted and on secondary research. This updated version of the report also includes a best practices section in the Summary & Conclusions section.