

# ExxonMobil to Work with Partners to Commercialize On-Vehicle Hydrogen Fuel System for Lift Truck Application

# Unique Technology Reduces Carbon Emissions And Offers Advantages Over Other Hydrogen Delivery Systems

IRVING, Texas--(BUSINESS WIRE)--

Exxon Mobil Corporation (NYSE:XOM) today announced it is partnering with QuestAir Technologies, Plug Power Inc. and Ben Gurion University on plans to commercialize an onvehicle hydrogen production system for use in a fuel cell-powered lift truck application.

Under the arrangements, Plug Power will seek to commercialize unique technologies developed by ExxonMobil, QuestAir Technologies and Ben Gurion University that take liquid fuels -- gasoline, diesel, ethanol or biodiesel -- and convert them into hydrogen onboard the vehicle where it will be used in a fuel cell power train.

"By developing a system that converts liquid hydrocarbons into hydrogen directly on a vehicle without the need for storage, we hope to demonstrate significant infrastructure, logistics and cost advantages compared to other hydrogen vehicle systems, all while reducing the impact on the environment," said Dr. Emil Jacobs, Vice President of Research and Development at ExxonMobil Research and Engineering.

"There is a long road ahead before this technology could be deployed on a mass scale in passenger vehicles, but it has the potential to be up to 80% more fuel efficient than today's internal combustion engine technologies and reduce CO2 emissions by up to 45%. The use of this technology in a practical, commercial setting such as in a lift truck application is an important early step in demonstrating the potential benefits this technology may hold in the long-term."

Most prototype hydrogen vehicles on the road today are powered by highly-compressed or liquefied hydrogen that is delivered to distribution points and then stored at high pressures on-board the vehicle. For these vehicles to be widely adopted a significant hydrogen generation and delivery infrastructure must be developed.

As the ExxonMobil system uses conventional fuels and produces hydrogen on demand, no such infrastructure or on-board storage would be necessary.

"With ExxonMobil's research leadership, and the technical capabilities of our partners, we found a way to scale down the traditional hydrogen steam reforming process so that it will fit on a vehicle and connect to a fuel cell," said Dr. Jacobs. "Since this system does not require changes to fuel delivery infrastructure - unlike compressed hydrogen fuel systems - this

overcomes one of the key challenges manufacturers face in developing hydrogen vehicles for potential consumer use."

Today's announcement follows several years of work by ExxonMobil, QuestAir Technologies and Ben Gurion University to develop the individual components that make up the onvehicle hydrogen fuel system. The system promises high efficiency, quick startup time, and reduced CO2 emissions versus today's vehicles.

The on-vehicle hydrogen fuel system comprises an advanced reformer developed by ExxonMobil and hydrogen separation using QuestAir Technologies' Rapid Cycle Pressure Swing Adsorption system.

Sulfur is controlled by an ExxonMobil proprietary S-Trap developed in conjunction with Ben Gurion University. Plug Power will be responsible for integrating the fuel system with its GenDrive(R) fuel cell power system for lift truck applications. GenDrive power units allow users in large distribution centers or manufacturing facilities to increase productivity and reduce operating costs through a quick refueling process that eliminates the need to change batteries repeatedly throughout the day. GenDrive also eliminates the environmental and safety issues traditionally associated with lead-acid batteries.

### About ExxonMobil

ExxonMobil is the world's leading non-government petroleum and petrochemical company. The company has consistently led the industry in research and development, and is one of the world's largest producers of hydrogen via its global network of refineries.

## About QuestAir Technologies Inc.

QuestAir Technologies, Inc. is a developer and supplier of proprietary gas purification systems for a number of significant international markets, including existing markets such as oil refining, biogas production, hydrogen generation, hydrogen recovery and natural gas processing, as well as emerging markets such as fuel cell vehicle refueling stations. QuestAir is based in Burnaby, British Columbia and its shares trade on the AIM Market of the London Stock Exchange Plc. and on the Toronto Stock Exchange under the symbol "QAR".

## **About Plug Power**

Plug Power Inc. (NASDAQ:PLUG), an established leader in the development and deployment of clean, reliable, on-site energy products, integrates fuel cell technology into backup and primary power products for telecommunications, material handling, utility and uninterruptible power supply applications. The Company is actively engaged with private and public customers in targeted markets throughout the world, including North America, Europe, the Middle East, Russia, South Africa and South America. For more information regarding Plug Power, please visit <a href="https://www.plugpower.com">www.plugpower.com</a>.

## About Ben Gurion University of the Negev

The Blechner Center for Industrial Catalysis and Process Development at Ben Gurion University of the Negev serves as a link between industry and academic research supporting researchers in developing their inventions into commercially valuable products. The Blechner Center for Industrial Catalysis and Process Development founded in 1995 is

committed to the fundamental research, exploration and development of novel catalysts and catalytic processes.

Source: Exxon Mobil Corporation