

Toray German Subsidiary to Construct Second Plant for key components for Hydrogen Fuel Cells and Water Electrolyzers

Tokyo, Japan, March 3, 2020 – Toray Industries, Inc., announced today that German subsidiary Greenerity GmbH held a groundbreaking ceremony a day earlier for its second plant. This will be in an industrial area of Alzenau, Bavaria, around 10 kilometers southwest of Hanau. That company develops, manufactures, and sells components for hydrogen fuel cells. The new facility is scheduled to go on line in November 2021.

The new facility will install equipment to efficiently produce catalyst coated membranes and membrane electrode assemblies, which are key components of hydrogen fuel cells (see glossary note 1). Once running at full capacity, the combined annual output of both offerings would be an estimated 10 million units. That level would cover the needs of about 80,000 range extender-fitted delivery vans.

Countries around the world have rolled out regulations and standards as part of policy and legislative initiatives to curb carbon dioxide emissions from gasoline, diesel, and other vehicles with internal combustion engines. Such moves aim to combat global warming in keeping with the Paris Agreement (glossary note 2) and the Sustainable Development Goals (glossary note 3) of the United Nations.

Major Tier 1 suppliers and automakers in Europe and China have accordingly entered the arenas for range extenders for buses, trucks, delivery vans, and other commercial vehicles, as well as for hydrogen fuel cells for fuel cell vehicles (glossary note 4), including passenger models.

Greenerity will therefore position itself through the new plant to add capacity and thus cater to surging demand for catalyst coated membranes and membrane electrode assemblies in the years ahead.

The Toray Group offers materials and components for hydrogen and fuel cell applications such as high-strength carbon fiber, prepreg (see glossary note 5), liner resins with a good durability against hydrogen embrittlement for high-pressure hydrogen tanks, gas diffusion layers, catalyst layers, and hydrocarbon –based electrolyte membranes that have both good durability at elevated operation temperature and also low gas permeability ideal for hydrogen fuel cells as well as for water electrolysis and hydrogen compression applications.

In 2015, Toray acquired Greenerity for the latter’s catalyst coated membrane and membrane electrode assembly design technologies, combining them with related material technologies of its own to expand the businesses as a manufacturing and sales bases.

Toray will bolster its efforts in the years ahead through this relationship to contribute to creating low-carbon, hydrogen societies.

The Toray Group’s mission is to deliver innovative technologies and advanced materials that provide real solutions to the world’s challenges by balancing development and sustainability with innovative ideas,

technologies, and products.

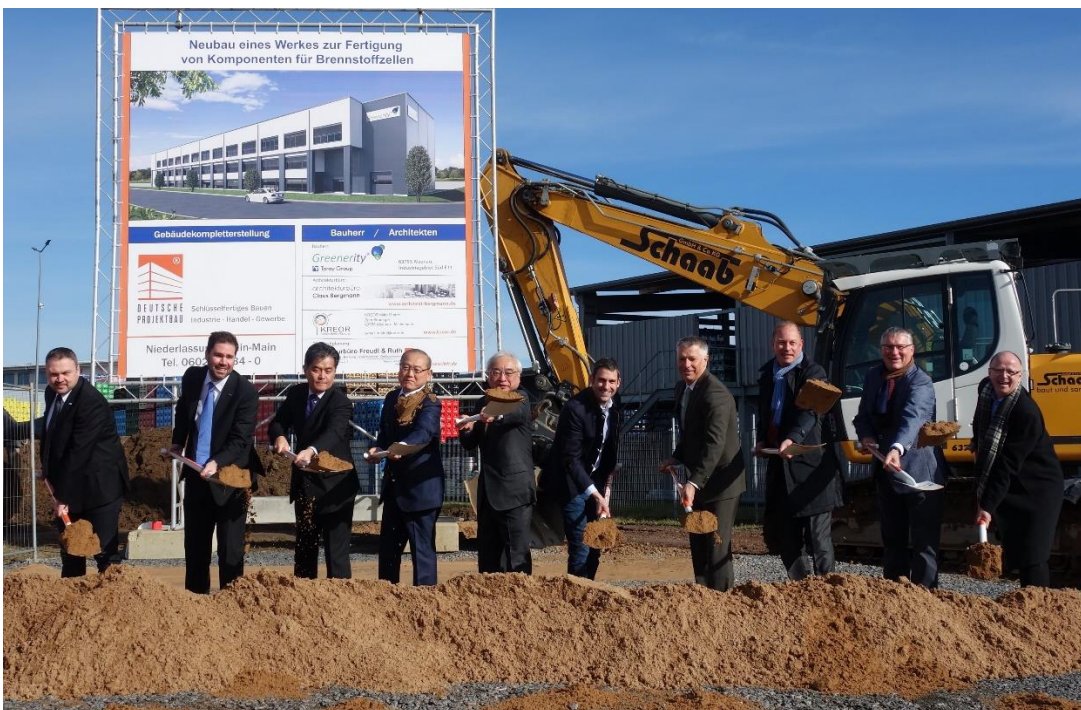
In keeping with its commitment to creating new value to contribute to social progress, it will collaborate with partners around the world in an intensive effort to materialize Paris Agreement objectives, Sustainable Development Goals, and other targets of the international community.

Profile of Greenerity GmbH

1. Date established: July 1, 2015
2. Headquarters: Alzenau, Bavaria, Germany
3. Capitalization: 45 million euros
4. A wholly owned Toray subsidiary
5. Managing director: Holger Dziallas
6. Business: Developing, manufacturing, and selling catalyst coated membranes and membrane electrode assemblies for hydrogen fuel cells, water electrolyzers, and hydrogen compression

Overview of new Greenerity plant

1. Location: Alzenau, Bavaria
2. Scheduled operational launch: November 2021



**The mayor of Alzenau (6.f.l.) at the groundbreaking ceremony for the factory of Greenerity GmbH
Dr. Tetsuya Goto; managing director Greenerity (4.f.l.), Yasuo Suga; Chief Representative for Europe, Toray
Industries, Inc. (5.f.l.), Dr. Holger Dziallas; managing director, Greenerity (7.f.l.)**

f.l.t.r.: Roberto Fürst (construction project leader, Greenerity), Dr. Thomas Nitzsche (plant manager Alzenau, Greenerity), Takayuki Toyosaki (managing director, Greenerity), Dr. Tetsuya Goto (managing director Greenerity), Yasuo Suga (Chief Representative for Europe, Toray Industries, Inc.), Dr. Alexander Legler (mayor of the city of Alzenau), Dr. Holger Dziallas (managing director, Greenerity), Claus Bergmann (architect), Jürgen Dedio (Kreor planning), Helmut Brückner (Deutsche Projektbau)

Glossary

1. Key components of hydrogen fuel cells

In a hydrogen fuel cell, a hydrogen electrode acts as a catalyst to generate electrons and H⁺ protons. An electrolyte membrane conducts these protons, combining them with oxygen at an air electrode catalyst to form water. The efficiency of a process in which hydrogen and air produce electricity and water depends on the core material characteristics of the catalyst and electrolyte (collectively, the catalyst-coated membrane) and the gas diffusion layer materials (membrane electrode assembly that combines gas diffusion layer and catalyst coated membrane) controlling the gas supply and the efficient conduction of electricity.

2. Paris Agreement

This international accord on reducing greenhouse gas reductions entered into force on November 4, 2016, following its adoption by the parties to the UN Framework Convention on Climate Change. The 159 national and regional signatories account for about 86% of global greenhouse gas emissions. The main long-term goals of the Paris Agreement are to:

- Keep the increase in global average temperature to less than 2°C above levels before the Industrial Revolution and endeavor to limit the increase to 1.5°C.
- Peak greenhouse gas emissions as soon as possible, balancing emissions by sources and removals by sinks of greenhouse gases in the second half of the 21st century.

3. Sustainable Development Goals

United Nations Member States adopted Transforming our world: The 2030 Agenda for Sustainable Development in September 2015, including its 17 Sustainable Development Goals and 169 targets.

4. Range extender

The unit uses on-board hydrogen stored in tank(s) and fuel cells to charge the battery powering the motor of an electric vehicle while it is moving. Filling hydrogen is quicker than charging battery with improved ranges. A fuel cell vehicle is a vehicle that uses power that hydrogen fuel cell generates in accordance with accelerator operations to directly drive the motor.

5. Prepreg

The sheet of semi-cured intermediate molded product in which the carbon fiber is impregnated with a resin. The prepreg is laminated, thermoformed, and cured to create a composite.

About Toray

Toray is a leading global company in innovative technologies and advanced materials. Since its foundation in 1926, the Company has contributed to society through the creation of new value and addressed global challenges by delivering high value-added products including fibers and textiles, resins and films, and carbon fiber composite materials. It operates in 26 countries and regions with about 48,000 employees worldwide.

For more information, please visit our website at www.toray.com.

Press Contact

newsrelease.toray.mb@mail.toray