

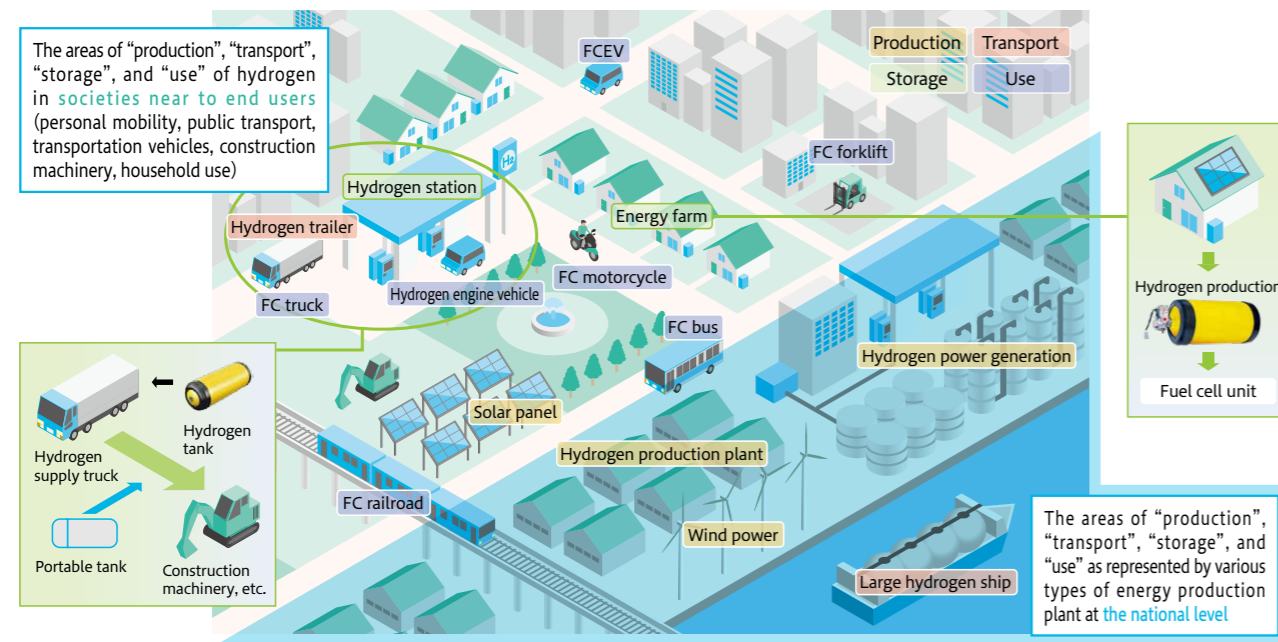
# Moving From “Storage” and “Use” to “Transport” and “Production” for Hydrogen Societies

Toyota Gosei has completed the development of its first hydrogen tank for automobiles, and we began mass production at one of our own plants in 2020. In moving toward hydrogen societies, we started out in the areas of hydrogen “storage” and “use”, which are familiar to end-users. In the future, we will spread this technology to the “transport” and “production” of hydrogen, further contributing to hydrogen societies.

## The Future of Hydrogen Societies

Hydrogen can be produced from a variety of resources, and has the characteristics of not emitting carbon dioxide when used and enabling renewable energy to be stored, transported, and used.

In Japan, initiatives are underway for the utilization of hydrogen as a key energy source so that carbon neutrality can be achieved by 2050, and we are committed to contributing to these hydrogen societies.



## Toyota Gosei’s Involvement with Hydrogen

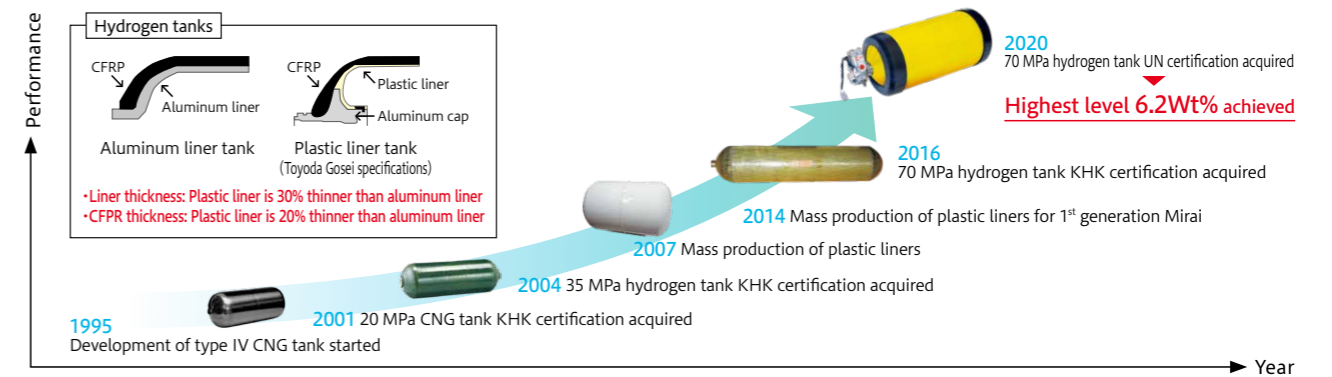
Using our strengths in polymer materials, we began developing compressed natural gas (CNG) tanks with plastic liners for natural gas vehicles in 1995, and obtained Japan’s first certification in 2001. Tanks with plastic liners are lighter and less expensive than tanks with conventional aluminum liners.

In 2002, we began developing hydrogen tanks for fuel cell electric vehicles (FCEVs) utilizing our CNG tank technology. This was recognized in a NEDO<sup>\*1</sup> subsidized project. Hydrogen molecules are smaller than those of natural gas, and the development of materials to prevent fuel permeation was a challenge. This was solved by modifying the plastic material.

In 2007, we began production of 70 MPa<sup>\*2</sup> plastic liners for leased FCEVs, and in 2014 we began mass production of plastic liners for the first generation of the Toyota Mirai. This was a stepping stone to the development of hydrogen tanks, and carbon fiber winding and epoxy curing technologies were brought in-house. In 2016, we obtained certification for 70 MPa hydrogen tanks, and in 2020 we began mass production of hydrogen tanks in one of our own plants for the second generation Mirai. This contributes to hydrogen “storage” and “use”.

<sup>\*1</sup> New Energy and Industrial Technology Development Organization (National Research and Development Agency)  
<sup>\*2</sup> Megapascal (unit of pressure)

## Toyota Gosei’s History of CNG / Hydrogen Tank Development



## Contributing to Hydrogen Societies

- STEP 1** Hydrogen “storage” and “use”  
 Hydrogen tank technology for passenger cars will be applied to commercial vehicles, motorcycles, ships, railroads, and other forms of mobility. We will offer variations in size, pressure resistance, and other characteristics to meet the needs of our customers, and work to ensure performance in a variety of operating environments.
- STEP 2** Hydrogen “transport”  
 In hydrogen societies, the need for hydrogen supply will emerge not only in relation to mobility, but also for use at construction sites, homes, and many other places. Our hydrogen tank technology will make it possible to load hydrogen onto “transport” vehicles, as well as increase the hydrogen loading volume and contribute to weight reduction. We will also develop portable, removable containers in which hydrogen can be easily carried for use in a wide range of applications.
- STEP 3** Further hydrogen “storage”  
 As hydrogen usage grows, the need for more efficient, large-capacity hydrogen storage will increase. We will further develop our existing hydrogen tank technology to develop hydrogen tanks that are compact and capable of storing large amounts of hydrogen.
- STEP 4** Hydrogen “production”  
 Gray hydrogen is currently the main method for producing hydrogen, and it emits CO<sub>2</sub> in the manufacturing process. There is a need to expand the production of green hydrogen, which uses sunlight or other natural energy sources and water and does not emit CO<sub>2</sub> in the production process. Toyota Gosei will build relationships while leveraging its strengths to contribute to the realization of carbon-neutral societies.

