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## **Development of Hydro Shuttle, a Low-Cost, Compact Packaged-type Hydrogen Station**

Taiyo Nippon Sanso Corporation (TNSC) announced today that it has developed a low-cost, compact packaged-type hydrogen station to supply 70MPa hydrogen gas to fuel cell vehicles

### 1. Background

Electric vehicles (EVs) and fuel-cell vehicles (FCVs) are attracting attention as next-generation vehicles that emit no CO<sub>2</sub> when running. Hydrogen stations are the equipment that supplies hydrogen gas, the fuel used to power FCVs. Automakers are planning general sales of FCVs starting in 2015, so the building of hydrogen station infrastructure is urgently needed. In Japan, a project is underway to install hydrogen stations at approximately 100 locations in the nation's four major urban areas over a three-year period beginning in April 2013. Reducing the cost of hydrogen stations has become a major challenge in accelerating their spread.

### 2. Outline of packaged-type hydrogen station

TNSC has integrated the dispenser, pre-cooling device, compressor, and storage vessel — the four major devices that comprise hydrogen stations — into a single unit, thereby significantly reducing fabrication and installation costs. TNSC has also managed to lower the cost and reduce the size of the dispenser and pre-cooling device (able to cool hydrogen up to the temperature of -40°C). The compressor uses an air-driven booster system while a Type IV CFRP vessel (the entire circumference of the plastic-lined vessel is wrapped in carbon fiber and possesses great strength) was chosen for the storage vessel (255 liters, 93MPa). By lowering the cost of each device, we were able to reduce the cost to half that of our previous model.

The packaged-type hydrogen station is 7.0 meters long, 2.0 meters deep, and 2.6 meters high and has a maximum hydrogen supply capacity of 300Nm<sup>3</sup> per hour. The hydrogen filling speed is five kilograms per three minutes, and three FCVs designed to run on 70MPa hydrogen gas can be filled consecutively.

In addition, the hydrogen stations are of a common design and able to deal with all onsite, offsite, and mobile types as stipulated in the laws and regulations of Japan related to high-pressure gas safety. Additional cost reductions through standardization and mass-production are within sight. Further, airtight welding and sleeve nut-type joints were used to increase safety and, by adopting a maintenance-friendly design, we were able to substantially reduce the periodic voluntary inspection process.

### 3. Future plans

TNSC has delivered many hydrogen stations throughout Japan and it will continue to further improve this technology. At the same time, TNSC will contribute to the spread of FCVs and hydrogen stations with the goal of expanding sales, primarily of packaged-type hydrogen stations.

