

H₂One™ Models and Related Hydrogen Energy Technologies

Drawing on a unique hydrogen energy management system (EMS) technology, Toshiba has developed H₂One™, a hydrogen-based autonomous energy supply system that produces hydrogen using renewable energy and uses the produced hydrogen as a fuel for power generation.

The H₂One™ series is available in several varieties, including business continuity planning (BCP) models, remote island models, and business facility models.

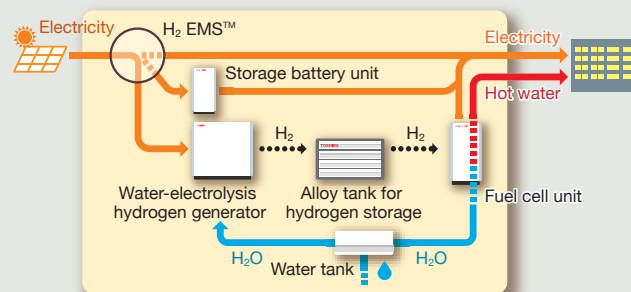
A BCP model has been in operation at a park near the Port of Kawasaki since April 2015. In March 2016, another BCP model was installed at the Yokohama Cargo Center (YCC) on Daikoku Futo, an artificial island and pier in the Port of Yokohama.

In March 2016, a remote island model was also deployed at the Phase 2 building of the Henn na Hotel in the Huis Ten Bosch theme park in Nagasaki.

Furthermore, we have improved our hydrogen EMS technology to realize automatic operation in order to maximize the utilization of renewables. The enhanced EMS was installed as part of the Levenmouth Community Energy Project in Fife, Scotland, in July 2016.



H₂One™, Toshiba's hydrogen-based autonomous energy supply system, at the Phase 2 building of Henn na Hotel in the Huis Ten Bosch theme park, Nagasaki



System structure

New Trends in Fuel Cell Technology

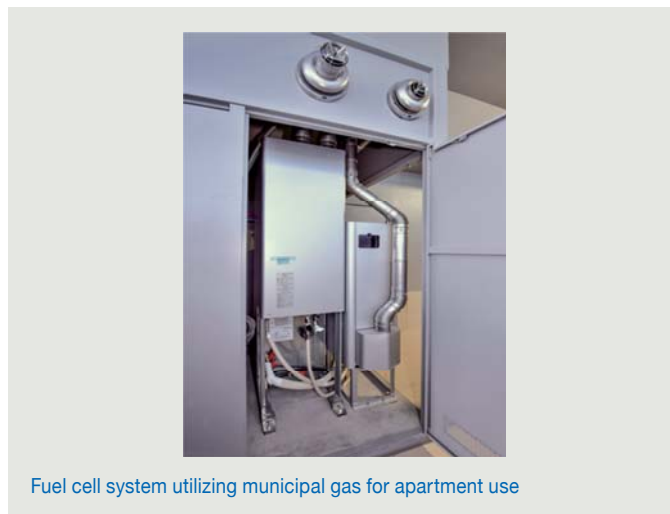
Toshiba began developing fuel cells in the 1970s. Drawing on this experience, we started the development of a residential fuel cell system in the late 1990s and achieved its commercialization in 2009.

Our latest fuel cell systems provide the industry's longest cell design life of more than 80 000 hours^{(*)1}, a total energy efficiency of 95%, and a self-sustaining operation mode that makes it possible to continue generating power even during power grid failures. As of the end of October 2015, the cumulative shipments of our fuel cell systems reached 70 000 units, and we held a share of approximately 50% in the domestic market.

In October 2015, we started commercial shipments of a fuel cell system utilizing municipal gas for apartment use, which is expected to contribute to an expansion of the residential fuel cell market.

Furthermore, we have developed a next-generation 700 W pure hydrogen fuel cell system based on a 2014 prototype for a project sponsored by Yamaguchi Prefecture. This model provides the world's highest electrical efficiency of 55%^{(*)2} and has been on sale in the domestic market since March 2016.

We are currently developing a fuel cell system with a capacity of several kilowatts for retail store use and a 100 kW system for industrial use. These models will be well suited to operation in tandem with our H₂One™ hydrogen-based autonomous energy supply system, as well as at renewable-powered building facilities, hydrogen stations, and other facilities.



Fuel cell system utilizing municipal gas for apartment use

(*)1 As of March 2016 (as researched by Toshiba)

(*)2 As of March 2016 (as researched by Toshiba)