“MIRAI”, Toyota FCV toward Hydrogen Society

Koichi Kojima, Aki Kabeya

Toyota Motor Corporation

1, Toyota-cho, Toyota, Aichi, 471-8571 Japan

Fuel Cell Vehicle (FCV) offers one of solutions to the issues in energy and climate change. It is well known that FCV is zero-emission and hydrogen can be made from a variety of energy resources. FCV has such environmental friendly features but the recent FCV also has useful features in cruising range of more than 500km, startability under subzero condition and about 3 minutes refueling time. Furthermore, it shows attractive drivability in excellent response under lower vehicle speed cruising; another feature is that it can be used as emergency power supply, that roughly estimated to supply a household for one week by FCV, and a shelter for several hundred people for about five days by Fuel Cell Bus (FC bus) with fully fueled condition.
It is considered that FC system is applicable to from small car to large bus since it has longer cruising range and shorter refueling time compared to EV which is more popular than FCV now. However, both FCV and EV need years before these vehicles will be widespread because of higher cost and lack of infrastructures. For the moment, HV or Plug-in HV are considered to be major vehicle in next generation because of advantages in cost reduction and infrastructure development. FCV will increase gradually in the market according to progress of its development.

Toyota started the development of FCV in 1992. After several model changes and market experiences with limited market introduction in 2002, the model “FCHV-adv” in 2008 shows excellent performances in drivability under subzero condition, cruising range and durability. These performances are reaching the levels of gasoline vehicle. Toyota announced to start selling commercial FCV “MIRAI” in December 2014 in Japan. “MIRAI” cruising range is approximately 650 km (JC08 mode) and FC power is 114kW. FC stack power density is 3.1kW/l and hydrogen tank energy density is 5.7wt%.

Toyota and Hino have been collaborating on FC bus development since early 2000’s. Starting from Tokyo municipal bus in 2003, our FC buses have been operating in many demo programs in Japan. The FC buses were well accepted by the passengers for their quietness and smooth accelaration by the electric motor without any gear shift shock. Local authorities expect to introduce the FC bus in early stage of FCV market because FC bus consumes much hydrogen compared to FCV and thus helps hydrogen station maintenance. Toyota and Hino are developing next generation FC bus, targeting market introduction around 2016.

I will also explain the renewarable energy, for example, hydrogen produced by wind power for FC buses in Hamburg.