

# Going Green

Tokyo is building hydrogen power for 2020 and beyond.

by **Tim Hornyak**



One of the Tokyo Metropolitan Government's new fuel cell buses at bus depot near the Kasai Rinkai Park, facing Tokyo Bay. These buses are completely powered by hydrogen.

If you have been to Tokyo Station recently, you may have seen one of Tokyo's futuristic zero emission public buses. The fuel cell electric vehicle (FCEV) buses run on hydrogen, a cleaner energy source than the light oil that powers most public buses in Japan. Manufacturer Toyota Motor Corporation began commercial production of the

Fuel Cell Bus SORA in 2018 and is now rolling them out in greater numbers.

SORA is an acronym for sky, ocean, river, air, which represents the earth's water cycle, as water is the only thing the buses emit. The hydrogen fuel cell system was adopted from Toyota's Mirai FCEV, one of the first hydrogen-powered sedans to be sold commercially. In addition to being a zero emission form of public transport, the SORA fuel cell stack can function as an emergency power station in times of disaster. It has a maximum output of 9 kilowatts and can supply 235 kilowatt-hours, so it would be possible to power the lights in a gymnasium shelter for about five days.

In the battle against global warming, more and more municipalities around the world have recognized and promoted hydrogen-powered vehicles as clean alternatives to carbon-emitting cars, buses, and trucks. The Tokyo Metropolitan Government (TMG) began operating two FCEV buses in March 2017, running them between Tokyo Station and the Tokyo Big Sight international exhibition hall in the Odaiba waterfront district.

As of November 2019, 16 SORA, each able to carry up to 78 passengers, are running in Tokyo starting from the waterfront area, including one operated by a private company. The TMG plans to increase the SORA fleet to 70 for the Olympic and Paralympic Games Tokyo 2020. Escalated rollout of SORA requires development of regular hydrogen-refueling stations; as of

September 2019, there were 14 stations in operation with a further 7 under construction. The TMG is aiming to have 150 hydrogen stations by 2030.

The SORA also provide passenger comfort and safety, and these two aspects are being further enhanced. Aside from their sleek looks and a surprisingly quiet ride with minimal vibration, the interior has universal design features such as seats that automatically fold into the wall, creating space for wheelchairs and strollers. Launched in August 2019, a new version has an optional automatic steering and deceleration function that brings the vehicle right up to the bus stop curb so that wheelchair and stroller users do not have to struggle with gaps between the sidewalk and the bus itself.

Technology to monitor its surroundings and a connected driving feature called Intelligent Transport Systems communication are employed. The bus can receive information from other vehicles as well as roadside infrastructure about oncoming vehicles, traffic signals, and pedestrians, for instance warning drivers about hazards when making right turns. The system allows for buses traveling in a convoy to maintain contact and an appropriate distance from each other so they will not get separated at traffic lights and bus stations. This can help buses run on time, minimizing inconveniences for passengers. Meanwhile, eight high-definition cameras in and around the bus provide the driver with detailed views of the exterior to help ensure passenger and pedestrian safety. Even in the unlikely event of a driver suddenly falling ill, passengers can press emergency brake buttons that cause the bus to automatically come to a safe halt.

The Harumi waterfront district, which is visible from Odaiba, is the venue of the Olympic and Paralympic Village for the Tokyo 2020 Games. The village will be partly powered by hydrogen produced from renewable energy in Fukushima Prefecture. This is one way to promote reconstruction support for the prefecture, which was damaged by the Great East Japan Earthquake in 2011. This place will become a model of an environmentally advanced city after the competition. Tokyo continues to move toward a cleaner future while contributing to regional recovery.