



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



International Hydrogen
Energy Center

DEMONSTRATION PROJECT OF THE INTERNATIONAL HYDROGEN ENERGY CENTRE

Commercial Hydrogen Fuel Cell Buses in Zhangjiakou, Hebei Province, China

The International Hydrogen Energy Centre (IHEC) a demonstration project started developing in 2016 for the commercial use of hydrogen fuel cell buses (FCBs) in Zhangjiakou, in the northwest part of China's Hebei Province. The first fleet of 25 FCBs was introduced in 2018, and by 2021 there were 444 on the road, clocking up in total over 21 million kilometers and transporting some 65 million passengers. The buses safely refueled more than 140,000 times and consumed about 1,700 tons of green hydrogen, which saved an estimated 17,000 tons of carbon. During Beijing 2022 Winter Olympic Games, more than 1,000 hydrogen fuel cell buses were operated.

The buses are manufactured by Foton, Yutong Bus, Geely, Zhongtong Bus and ZEV (Zhongzhi Yike Chengdu Automobile Co., Ltd.), and are operated by the Zhangjiakou Public Transport Group. The provider of the fuel cell engines is SinoHytec and the key producer of green hydrogen is HyPower.

The total investment for the FCBs is about US\$170 million, supported by the Zhangjiakou Municipal Government with a state subsidy of US\$7.5 million. SinoHytec invested US\$18 million to build a green hydrogen production plant and US\$4.5 million to build two hydrogen refueling stations.

The results of the project have been impressive:

- The performance of FCBs has been significantly improved, particularly their successful operation in extreme cold weather. The hydrogen fuel cell engines could be operated at -30°C with support of new technologies; the excess heat is used to warm the buses' interior compartment. From 2018 to 2022, the stable and smooth operation of the FCBs has been observed.
- The buses were successfully deployed during the Beijing 2022 Winter Olympic Games. A total of 357 FCBs were used at the Games without any accidents, which is an important milestone for FCBs in terms of the relatively matured technology and paving the foundation to scale up their commercial application.
- The IHEC, together with the Zhangjiakou Municipal Government, founded the Zhangjiakou Institute of Hydrogen Energy and Renewable Energy, established the Hebei Provincial Hydrogen Energy Industry Innovation Centre, and built the first big data monitoring platform for the entire hydrogen energy chain in China.
- The Zhangjiakou Institute of Hydrogen and Renewable Energy serves as the provincial industrial innovation centre on hydrogen energy in Hebei Province.

About the International Hydrogen Energy Centre

The Government of China and the United Nations Industrial Development Organization (UNIDO) jointly founded the IHEC and officially launched in June 2021. IHEC's headquarter is located in the Haidian District of Beijing in China. It mainly undertakes core technology R&D and key equipment development, industrial scale applications and the promotion of the carbon neutrality to support the Sustainable Development Goals on climate change. IHEC is leading three key demonstration applications on commercial hydrogen fuel cell vehicles (FCVs) in Zhangjiakou; logistic FCVs and the world's largest refueling station in Daxing; and the world's largest and most comprehensive green hydrogen metallurgical chemical demonstration park in Baotou, Inner Mongolia.

