Osaka Gas invests in next-generation solar technology for overnight industrial heat and power

November 26th, 2024
Osaka Gas Co., Ltd.

Osaka Gas Co., Ltd. (“Osaka Gas”) announced its investment in FPR Energy Limited (“FPR Energy”), an Australian startup engaged in the development of next generation concentrated solar thermal system (CST). Osaka Gas will collaborate with FPR Energy to commercialize its technology and aims to contribute to the decarbonization of industrial heat demands.

Currently, more than 120 countries and regions worldwide have set a target to become ‘carbon neutral by 2050’, and decarbonising industrial heat demand is crucial to achieve this. The CST system is being developed as a next-generation clean energy technology that efficiently converts sunlight into thermal energy, using a thermal medium that absorbs solar energy and stores it as heat, and the high-grade steam generated from it can be used in various industrial and utility applications. By storing solar energy as thermal energy, a more stable and cheaper supply of renewable energy can be achieved in spite of its volatile nature. However, existing technology has significant challenges, such as the need to heat the heat medium with natural gas during adverse weather and corrosive property of the medium, and costs have remained high.

FPR Energy was established in 2023 as a start-up to implement the next generation of concentrating solar thermal technology developed at Australia's leading scientific research organisation, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), into society.
The company's system employs chemically stable ceramic particles as the heat medium, as well as a proprietary receiver and heat exchanger. This enables the system to supply heat at higher temperatures (up to 1,200°C) than existing technologies, and also offers advantages in terms of cost, heat exchange efficiency and operational management.
FPR Energy has already completed a 1 MWt*1 scale demonstration and plans to develop the technology and optimise the operating system to scale up to 50 MWt by the end of 2026. Thereafter, the project will be firstly commercialised on a 50 MWt scale in Australia with future development and implementation on a scale of several times that or more, and subsequently implemented in North America, South America and the Middle East, where solar energy is abundant. By supplying large-scale high-temperature steam, we hope to contribute to the decarbonisation of industrial heat demand, which has been “hard to abate” with existing technologies.
Combined with the Group's expertise in high-efficiency, low-environmental-impact gas cogeneration and gas boilers, this will further enhance the stable and reliable energy supply.

Osaka Gas and its corporate group (Daigas group) are committed to the development of technologies and services that contribute to the decarbonization of society by implementing its Carbon Neutral Vision announced in January 2021 and Energy Transition 2030 released in March 2023. The Group aims to enhance continuous advancement in customers’ lives and businesses by resolving social issues, including climate change.

*1: MWt stands for mega watt (10^6 joule per second) of thermal energy

1. Overview of the CST system
   - The CST system consists of heliostats (mirrors to reflect solar rays with a focus to receiver), receiver, insulated storage to store hot particles heated at receiver, heat exchanger to generate high-grade steam from hot particles, and feed bin to supply

particles to receiver as well as subsystems to circulate particles within the system.

- Key features of the technology are below listed two points. Those enabled the system to supply heat at higher temperatures (up to 1,200°C) than existing technologies, and also offers advantages in terms of cost, heat exchange efficiency and operational management.
  ① Use of chemically stable ceramic particles as heat medium
  ② Proprietary receiver and heat exchanger to make use of the particles

Click here for CST Flowsheet (Image courtesy of FPR Energy Limited)

2. FPR Energy

Company name	FPR Energy Limited
COO	Wil Gardner
Founded	Dec 2023
Address	Sydney, New South Wales, Australia
Business	Development of the CST system