

## TECHNOLOGY DETAILS

**Technology:** Fuel Cell micro-CHP using solid oxide materials

**Value chain:** Cogeneration  
**Sub-sector or technology:** Heating and cogeneration  
**Sector:** Buildings

**Demand/Supply/Infrastructure:** Demand

## TRL 2023: 9

According to IEA criteria, the TRL of this technology in 2022 was: **9**

## TECHNOLOGY DESCRIPTION

Electrochemical device operating at a high temperature (600-850°C), converting the chemical energy of a fuel directly to electrical energy. High-temperature heat can be applied to boil and cool the water with heat-exchanging technology. They need a back-up option for peak heat demand. Day-night modulation.

## KEY COUNTRIES

Japan, Europe, United States, Korea, Germany

## PROTOTYPE OR DEMONSTRATION PLANS, DEDICATED INVESTMENTS, LEADING INITIATIVES

Ene.field project (2011-2017), Europe

PACE project (Pathways to a Competitive European FC MCHP market), (2016-2021)

Cogeneration Act, Germany

Korea is importing many Fuel Cell technology and distributes their technology with a support by the government.

## DEPLOYMENT TARGETS

Stational applications can be possible such as houses, office buildings, factories, and power generations with grids. These fuel cells generate electricity from the natural gas and hydrogen. In addition to the power generation, they can be reversible operation with hydrogen production.

## COST REDUCTION TARGETS

The capital cost of SOFC system should be reduced to the acceptable level when compared with the other competitive power generation technology. For example, the cost of the fuel cell systems for household (ENE-farm) should be comparable to those of the cost of gas boiler and grid electricity price.

As for the larger size SOFC system, the cost of electricity should be reasonable level when considering the other technology, such as the electricity cost from natural gas turbine with grid (15 JPY/kWh), which is very high target.

### RELEVANT PARAMETERS

Power performance (%)	Electrical efficiency 50-60% LHV
Durability (h)	130,000 hr
Electrical capacity (kW)	0.4 kW to 10 kW
Water management	water self-sustainable system
Temperature (°C)	600 – 800

### Based on expert input:

Horita, Teuhisa (AIST)

Ono, Takashi (Kyocera)