

# Osaka Gas in brief 2021

## Research and Development

### I. R&D Expenditure

(Billion yen)

FY	2012.3	2013.3	2014.3	2015.3	2016.3	2017.3	2018.3	2019.3	2020.3	2021.3
R&D expenditure	9.0	9.0	9.2	8.8	8.6	7.7	7.4	7.0	7.2	6.5

### II. Major Technological Developments in FY2021.3

Field	Outcome
Utilization technology	<ul style="list-style-type: none"> <li>Start of contact center reception service using AI automated voice response (change of visit date and time for gas facility survey)</li> <li>Start of equipment linkage with Sharp Corporation and Sony Network Communications Inc. using an IoT platform that enables the operation of IoT gas appliances via smartphone applications</li> <li>Start of demonstration of virtual power plant construction using ENE-FARM household fuel cells</li> <li>Launched "Sumapiko," an IoT-compatible alarm</li> <li>Development of AI detection technology for product defects in factories and launch of service</li> <li>Completed development of storage battery system for "D-solar," a self-consumption solar power generation service</li> </ul>
Technology for LNG terminal and distribution	<ul style="list-style-type: none"> <li>Invested in Japan Infrastructure Waymark Co., Ltd., which provides drone based infrastructure inspection solutions.</li> <li>Launched the new digital pressure gauge "Digital Manometer WM-1000".</li> <li>Introduced self-operated BWA system at Senboku LNG Terminal to improve efficiency of on-site operations</li> </ul>
Basic technology	<ul style="list-style-type: none"> <li>Adoption of chemical looping combustion technology as a NEDO contract project</li> <li>Succeeded for the first time in Japan in building a prototype of a practical size cell for a new SOEC (solid oxide electrolysis device)</li> </ul>

### III. Industrial Property Rights in FY2021.3

Number of industrial property right applications, registrations and holdings (Unit: Number)

		Application	Registration	Number of registrations held
Domestic	Patent	236	200	2,499
	Utility model	0	0	1
	Designs	2	3	294
	Trademark	39	23	602
	Total	277	226	3,396
Foreign patents *		14	7	66

\* Applications, registrations, and holdings of the same invention are each counted as one.

#### IV. Awards for R&D in FY2021.3

Awarded in	Name of award, awarding organization	Details
May 2020	Chemical Technology Award, Kinki Chemical Society, Inc.	Development of production method for fluorocellulose fibers and its application
July 2020	Japan Child Care Support Award 2020, Japan Child Care Support Association	Gas clothes dryer "Kanta-kun"
October 2020	Top 10 Innovation, Innovation for Cool Earth Forum 2020	Launch of a household fuel cell with the world's highest power generation efficiency
November 2020	Technology Award, Japan Gas Association	Development of the Si sensor stove "AVANCE"
November 2020	Technology Award, Japan Gas Association	Fusion of training simulator and 3D virtual workplace
November 2020	Technology Award, Japan Gas Association	Development of restoration visualization system
December 2020	Energy Conservation Grand Prize 2020 / Director-General's Prize, Agency for Natural Resources and Energy, The Energy Conservation Center	Ultra-high efficiency gas engine heat pump "GHP XAIR III"
December 2020	Energy Conservation Grand Prize, Chairman's Award, The Energy Conservation Center	EneFarm type S" solid oxide fuel cell for home use with improved power generation efficiency and durability
December 2020	Energy Conservation Grand Prize, Chairman's Award, The Energy Conservation Center	Energy-saving fuel switching boiler "GC-2000AS" that contributes to a stable supply of steam
December 2020	Technology Award, Carbon Materials Society of Japan	Development of activated carbon fiber (ACF) air purification technology
February 2021	2021 Technology Award (Tanahashi Award), the Electrochemical Society of Japan	Development of electrodeposition coating technology for SOFC current collector
February 2021	Artificial Intelligence Technology Consortium Chairman's Award, AI TeC / Osaka Chamber of Commerce and Industry, AI Business Creation Idea Contest 2021	Just choose a photo with your intuition! Concierge service for selecting a restaurant
February 2021	The 14th PS Award for Excellence in Product Safety Measures Awarded to the Company by the Deputy Director-General for Technology and Safety	Product safety measures developed with gas appliance manufacturers and distributors
March 2021	Grand Prize, the 7th Japan Resilience Awards 2021	Development of household fuel cell cogeneration system "ENE-FARM type S"
March 2021	Director-General's Award of the Ministry of Natural Resources and Energy, FY 2020 Excellent Energy-saving Equipment and System Award	Tile-less high-speed regenerative burner with built-in heat storage combustion cylinder