

## Initiatives to Achieve Carbon Neutrality

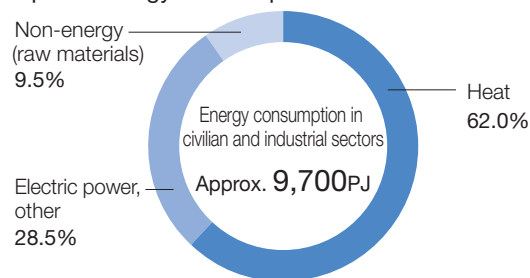


### Low carbonization

Heat demand accounts for approximately 60% of energy consumed in Japan's civilian and industrial sectors. In the industrial sector in particular, there is demand for high temperatures that are difficult to accommodate with electrification.

To achieve its Carbon Neutral Vision 2050, the Daigas Group is proceeding with low carbonization during the transitional phase, including the low carbonization of heat demand through fuel conversion to natural gas and the advanced utilization of natural gas through the implementation

#### Japan's Energy Consumption



[Source] Produced by The Japan Gas Association based on the Energy White Paper 2020

of cogeneration.

In October 2021, Daigas Energy Co., Ltd. realized the reduction of CO<sub>2</sub> emissions from the lime firing kiln\*<sup>1</sup> at the Mishima Mill of Daio Paper Corporation in Shikokuchuo City, Ehime Prefecture by co-firing natural gas and heavy oil in the equipment. By also switching fuel for the mill's paper machines to natural gas, the mill's CO<sub>2</sub> emissions are expected to be reduced by about 22,000 tons per year (lime firing kiln: approximately 19,000 tons per year; paper machines: approximately 3,000 tons per year).

In November 2021, Daigas Energy Co., Ltd. began retrofit of a coal-fired power plant at the Iwakuni Production Center (Iwakuni City, Yamaguchi Prefecture) of Toyobo Co., Ltd. with a thermal power plant fueled by natural gas and RPF.\*<sup>2</sup> The new power plant, which is scheduled to commence operation in October 2023, will reduce CO<sub>2</sub> emissions by about 80,000 tons per year.

With the recent global progress in the introduction of

\*<sup>1</sup> Equipment for firing lime used in the kraft pulp manufacturing process to reuse it  
 \*<sup>2</sup> RPF stands for "refuse derived paper and plastic densified fuel." It is a solid fuel made mainly from used paper and waste plastics.

renewable energy, functions to stabilize the supply-demand balance have taken on increasing importance in order to respond the volatile renewable output, which often fluctuates depending on weather conditions.

Through our wholly owned subsidiary, Osaka Gas UK, Ltd., Osaka Gas signed an agreement to underwrite a capital increase of Jedlix B.V., a startup that operates electricity balancing\*<sup>3</sup> services business in Europe. In doing so, we have participated in Europe's balancing market,\*<sup>4</sup> which is one of the most highly developed in the world.

In Japan, we are engaged in a verification project to build a VPP\*<sup>5</sup> using the residential fuel cell system, ENE-FARM, as well as demand response services\*<sup>6</sup> using cogeneration systems targeting commercial and industrial customers.

\*<sup>3</sup> The power grid balancing needs to be constantly maintained by matching the power supply to demand through electricity charging and discharging in order to avoid causing blackouts and damaging infrastructures.

\*<sup>4</sup> The balancing market provides power grid operators with electricity reserves necessary to match the power supply to demand or maintain the grid frequency stabilization. Power grid operators issue grid balancing orders to electricity generators and aggregators, who receive fees for the services.

\*<sup>5</sup> A virtual power plant is a power supply service which aggregates and controls the capacities of decentralized power generating units as a single power plant by utilizing IT.

\*<sup>6</sup> A demand response service is a power supply service which contributes to grid stabilization by aggregating the capacities of decentralized power generating units.

#### Progress of major initiatives from FY2022.3

		Plan and details of initiatives	Period	Main operators	
Low carbonization	Fuel cell	Invest in Jedlix B.V., an EV balancing service platform developer in Europe P.61	Participate in Europe's balancing market, one of the most highly developed in the world	Signed agreement to underwrite capital increase in November 2021	Osaka Gas UK, Ltd. Jedlix B.V.
		Launch verification project of virtual power plant (VPP) using residential fuel cell ENE-FARM type S (Subsidized by Ministry of Economy, Trade and Industry)	Remotely control approximately 500 ENE-FARM Type S units for: (1) Verification of technology for balancing capacity for stabilization of power grid (2) Verification of technology for control of output in line with grid supply-demand status	June 2022 - February 2023 (scheduled)	Osaka Gas Eneres Co., Ltd.
Low carbonization	Advanced utilization of natural gas and CHP	Contribute to CO <sub>2</sub> emissions reductions by co-firing natural gas and heavy oil in lime firing kiln at Mishima Mill of Daio Paper Corporation	<ul style="list-style-type: none"> <li>Reduce CO<sub>2</sub> emissions by co-firing natural gas and heavy oil in lime firing kiln installed at Mishima Mill of Daio Paper Corporation</li> <li>Contribute to reduction of CO<sub>2</sub> emissions by approximately 22,000 tons per year (lime firing kiln: approximately 19,000 tons per year; paper machines: approximately 3,000 tons per year)</li> </ul>	Announced in October 2021	Daigas Energy Co., Ltd.
		Commence construction of low-carbon power plant fueled by natural gas and RPF at Iwakuni Production Center of Toyobo Co., Ltd.	<ul style="list-style-type: none"> <li>Began construction for an upgrade of coal-fired power plant to a thermal power plant fueled by natural gas and RPF</li> <li>Reduce CO<sub>2</sub> emissions by approximately 80,000 tons per year</li> </ul>	Construction commenced in November 2021 Scheduled to commence operations in October 2023	Daigas Energy Co., Ltd.