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Socioeconomic Analysis of Offshore Wind Power Development in Japan

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Acknowledgments

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This report was written by the Offshore Wind Study Team at Renewable Energy Institute.

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About Renewable Energy Institute

Renewable Energy Institute is a non-profit think tank which aims to build a sustainable, rich society based on renewable energy. It was established in August 2011, in the aftermath of the Fukushima Daiichi Nuclear Power Plant accident, by its founder Mr. Son Masayoshi, Chairman & CEO of SoftBank Corp., with his own resources.

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Introduction

At the end of 2021, the total offshore wind power generation capacity installed worldwide reached 56GW. Installations are accelerating, not just in Europe, where this technology has been most concentrated up to now, but also in Asia. China added 16.9GW of capacity in 2021 alone, bringing its cumulative total capacity to 26.4GW and overtaking the U.K. as the world's No. 1 producer of offshore wind power systems.[1] This intensification of investment has also driven down costs.

One of the factors behind the accelerating adoption of offshore wind power is its ability to produce large quantities of energy reliably, thereby enabling a rapid energy transition. Given the increasing severity of climate change and energy security issues, there are high hopes for offshore wind power as a new utility-scale technology, as it will also attract large-scale investments and form a broad supply chain.

Japan has set itself the goal of forming sufficient projects to achieve a total capacity of 10GW by 2030 and 30-45GW by 2040. It has also set the goal of achieving a 60% Japan content rate by 2040.[2] A system for designating areas for the development of offshore wind power in accordance with the "Renewable Energy Sea Area Utilization Act" (Act on Promoting the Utilization of Sea Areas for the Development of Marine Renewable Energy Power Generation Facilities) has begun. As of the end of 2021, developers had been selected for a total capacity of around 1.7GW in five sea areas. Concrete action has started on the supply chain side too, including construction of domestic production facilities by wind turbine manufacturers, building of new ships for offshore wind power construction work, and the launch of training courses to nurture human resources by universities and private companies.

To make steady progress on the large-scale deployment of offshore wind power technology, some challenges will become increasingly important. One of these is the need to coordinate with preexisting sea area users (e.g., fishing operators). For this purpose, it is desirable to quantify and visualize the economic impact of offshore wind power, both nationally and locally, and to clarify more concretely how the energy transition will coexist with other industries and local communities.

This report examines the benefits of offshore wind power development in Japan by analyzing the overall domestic socioeconomic ripple effects of constructing and operating offshore wind power facilities.

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[1] The UK has 12.9GW at the end of 2021; International Renewable Energy Agency, IRENA (2022), "Renewable Energy Statistics 2022.

[2] "Vision for Offshore Wind Power Industry (Phase 1) Overview (December 15, 2020)," Public-Private Council on Enhancement of Industrial Competitiveness for Offshore Wind Power Generation

1 Setting analysis goals and a development scenario

1-1 Goals of the socioeconomic analysis

Quantitatively analyzing the social, economic, and environmental ripple effects of a new industry driven by technological innovation is essential for providing evidence to support the implementation of policies to accelerate innovation, as well as for setting up legal mechanisms and streamlining systems to support industrial development and regional revitalization.

A variety of organizations have conducted socioeconomic analyses of wind power development in Japan. In 2013, the Ministry of Education, Culture, Sports, Science and Technology[3] (MEXT) conducted a quantitative analysis of the social and economic effects of adopting renewable energy using an extended input-output table. Using a similar analysis technique, in 2014, the Japan Wind Power Association[4] (JWPA) analyzed the economic ripple effects and impacts on job creation and CO_2 emissions reduction of deploying wind power based on medium- to long-term goals up to 2050. These studies both quantitatively assessed the socioeconomic ripple effects of developing wind power, including offshore wind, on the whole of Japan, including detailed examinations of economic ripple effects and job creation in related industries.

Developing offshore wind power is of growing importance in helping to meet the commitments many countries have made to achieving carbon neutrality by 2050. For this reason, they have set ambitious goals for the development of offshore wind power. In 2020, Japan set some clear goals for itself in its Vision for Offshore Wind Power Industry (Phase 1). The vision calls for the public and private sectors to work together on forming increasingly large-scale development projects, to install a total capacity of 10GW by 2030 and 30-45GW by 2040. JWPA and research institutions such as Mitsubishi Research Institute are now conducting socioeconomic analyses of offshore wind power based on these new goals.

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[3] "Analysis of Economic and Environmental Ripple Effects of Renewable Energy Facility Construction Using Extended Input-Output Table," Research Center for Science and Technology Trends, National Institute of Science and Technology Policy, Ministry of Education, Culture, Sports, Science and Technology (2013)

[4] "Wind Power Installation Potential and Medium- and Long-term Goals for Development V4.3," Japan Wind Power Association (2014)

To help meet Japan's goal of becoming a carbon-neutral society, Renewable Energy Institute has announced a strategy for achieving 100% renewable energy by 2050.[5] Based on this strategy, we analyzed a renewable energy development scenario for minimizing the annual cost of energy systems during the energy transition period up to 2050.[6] In this report, we specify a scenario for offshore wind power development that is compatible with our renewable energy scenario and analyze its socioeconomic effects using an extended input-output table.

1 - 2 Setting a scenario for development of offshore wind power

The details of our offshore wind power development scenario are summarized in Table 1-1. The quantities of installed capacity and costs for the scenario are specified for every five years. The costs are divided into two components, capital expenses (CAPEX) and operation and maintenance expenses (OPEX). In analyzing for this report, we used data that had leveled out those components on an annual basis.

Table 1-1 Scenario for offshore wind power adoption

Offshore Wind	2020	2025	2030	2035	2040	2045	2050
Cumulative installed capacity (GW)	0.1	0.1	7	21	36	52	63
CAPEX (k¥/kW)	600	430	329	266	260	257	256
OPEX (k¥/kW/year)	17.1	12.3	9.5	7.7	7.4	7.3	7.3

Note: Operation and maintenance expenses are all the costs of repairs, inspections, equipment, and other elements needed to operate offshore wind turbines.

Source: Created by Renewable Energy Institute

If we consider the progress of current projects and the required timeframe for environmental impact assessments at this time, there is little or no possibility of constructing new offshore wind power facilities by 2025. For this reason, the cumulative installed capacity for 2025 in this report is set at 0.1GW, the same level as 2020. From 2025, the new capacity added each year will steadily grow, hitting a peak around 2040 before starting to decline. As a result, the total installed offshore wind power capacity in 2050 will be 63GW (Fig. 1-1). The Ministry of the Environment estimates Japan's total potential for offshore wind power capacity to be 715GW, assuming wind speeds of at least 7 m/s for fixed-bottom and 7.5 m/s for floating wind turbines, and excluding sea areas where natural conditions, legal impediments, and social conditions relating to land utilization make implementation difficult. Based on this estimate, it is fair to conclude that there is sufficient potential to achieve 63GW of total installed capacity under our scenario.

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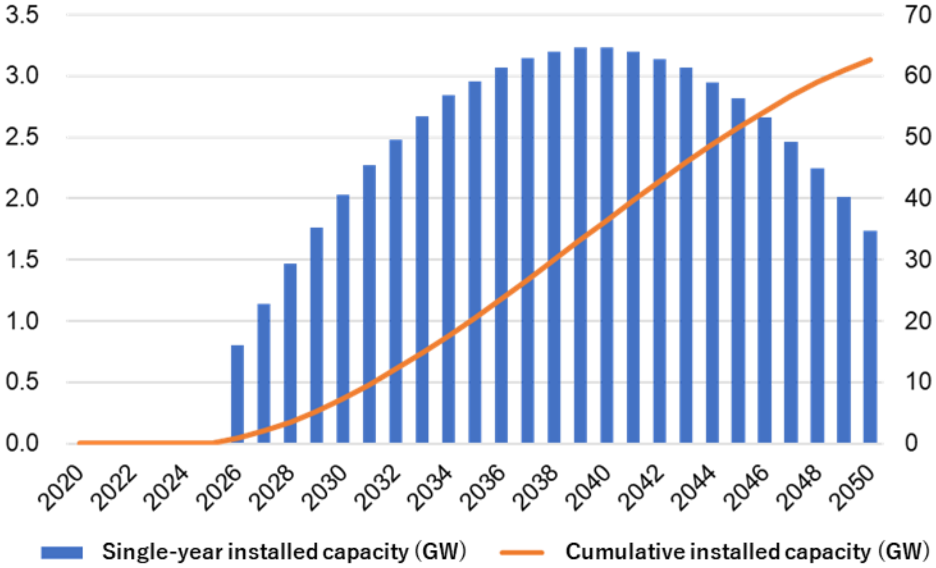
[5] "Proposal for Energy Strategy Toward a Decarbonized Society: Achieving a Carbon-Neutral Japan by 2050," Renewable Energy Institute (2019)

[6] "Renewable Pathways to Climate-neutral Japan: Reaching Zero Emissions by 2050 in the Energy System," Renewable Energy Institute (2021)

Fig. 1-1 Trend in installed capacity of offshore wind power

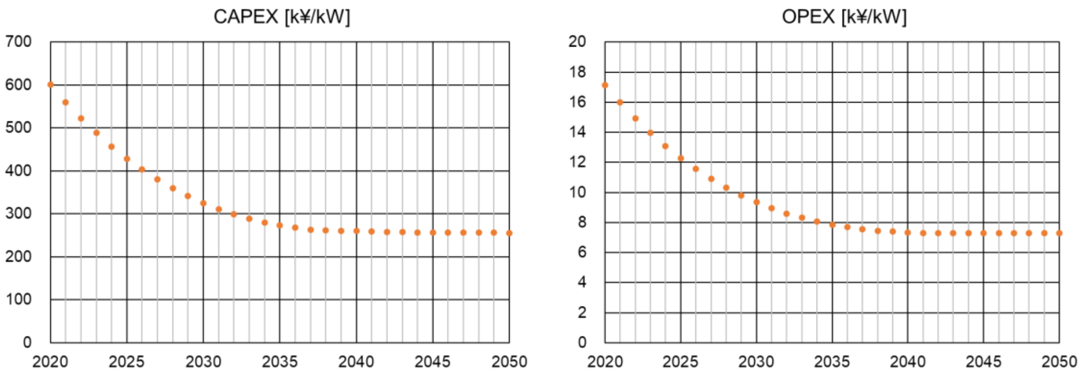


Source: Created by Renewable Energy Institute

Figure 1-2 shows the trend in capital expenses (CAPEX) and operation and maintenance expenses (OPEX). Global technological innovation and economies of scale will work to drive down costs, so both kinds of expenses will decline sharply from 2020. However, as the level of industrial development matures, the rate of cost decline will fall, and by 2035 the cost will flatten out.

After 2035, capital expenses will fall below 300,000JPY/kW, less than half the 2020 level. At the same time, in this scenario, annual operation and maintenance expenses are predicted to fall from 17,000JPY/kW in 2020 to around 7,000JPY/kW, a drop of approximately 60%.

Fig. 1-2 Trends in capital expenses and operation and maintenance expenses



Source: Created by Renewable Energy Institute

1-3 Analysis goals and methods

Developing offshore wind power will have ripple effects not only on the wind power industry, but also on a variety of other related fields, such as equipment manufacturing, business operations, maintenance, and transportation. Accordingly, for this report, we analyzed the ripple effects in the two phases of "construction" and "operation" separately. We also considered two kinds of ripple effects: economic ripple effects, measured by increases or decreases in production, and employment ripple effects, measured by changes in the number of jobs created (or people employed). These were the two analysis goals we set.

If thermal power were replaced by offshore wind power in the operation phase, we would expect to see production increases or decreases in related industries. Therefore, we included the impact of such production changes on the economy and employment as the targets of analysis for this report. Furthermore, since CO_2 emissions from thermal power generation make up a large proportion of total CO_2 emissions,[7] replacement with offshore wind power is likely to reduce CO_2 emissions significantly. For this reason, the changes in CO_2 emissions resulting from the replacement of thermal power are also included in the analysis targets.

For our analyses, we used the Input-Output Table for Analysis of Next-generation Energy Systems (hereinafter IONGES), as well as estimates based on previous studies by the Ministry of Internal Affairs and Communications (MIC) and Yokohama National University.

Details of analysis methodology

The Institute for Economic Analysis of Next-generation Science and Technology at Waseda University developed the Input-Output Table for Analysis of Next-generation Energy Systems (IONGES) by adding data on renewable energy-related sectors to the input-output table of the MIC. IONGES is an analysis tool that makes it possible to comprehensively analyze the economic, social, and environmental effects of adopting renewable energy technologies.

As Fig. 1-3 shows, IONGES added 15 renewable energy sectors to the regular input-output table. We divided the added sectors into construction and operation sectors and estimated intermediate inputs, final demand, added value, and gross output for each of the 15 kinds of power generation technologies. The total gross domestic product of the power generation operation sectors in IONGES is equal to the total gross output of the operation sectors in the input-output table of the MIC (MIC table).

[7] CO_2 emissions from the energy conversion sector (e.g., power plants, oil refineries) in FY2020 were approximately 422 million tons (40.4% of total emissions), with thermal power accounting for 76% of emissions from power sources in the same year. Greenhouse Gas Emissions Report (April 2022), p.5, p.14, Ministry of the Environment

On the other hand, the concept of the power generation construction sectors in IONGES is different from that of the power facility construction sectors in the MIC table. In the former case, activities include the mechanical equipment and civil engineering work required to construct power generation facilities, whereas in the latter case, only the civil engineering work for power generation facilities is included. The total of the gross outputs of the construction sectors in IONGES is equal to the sum of the gross outputs of the power facility construction sectors in the MIC table and the total value of the materials for power generation equipment in the fixed capital formation to meet final demand.

Fig. 1-3 IONGES after addition of renewable energy sectors (image)

		Usual intermediate input sector	Renewable energy		Final demand	Gross output
		j= 1……n	Construction sector (z= 1……n)	Operation sector (o= 1……n)		
Usual intermediate input sector	i= 1……n	X_{ij}^{11}	X_{iz}^{12}	X_{io}^{13}	f^1	x^1
Renewable energy	Construction sector (z= 1……n)	x_j^{21}	x_z^{22}	x_o^{23}	f^2	x^2
	Operation sector (z= 1……n)	x_j^{23}	x_z^{23}	x_o^{33}	f^3	x^3
Added value		v_j^1	v_z^2	v_o^2		
Gross output		x_j^1	z_z	z_o		

Source: Created by Renewable Energy Institute

To analyze employment ripple effects and changes in CO_2 emissions, we estimated coefficients for employment and CO_2 emissions based on the IONGES[8] and previous studies by MIC[9] and Yokohama National University.[10] These coefficients were multiplied by the domestic output induced in the construction and operation phases, respectively, to analyze the employment and CO_2 emissions changes in each phase.

[8] Input-Output Table for Analysis of Next-generation Energy Systems (IONGES), CO_2 emissions factor table (2015 renewable energy table), Institute for Economic Analysis of Next-generation Science and Technology, Waseda University

[9] Input-Output and Employment Tables (2015), Ministry of Internal Affairs and Communications

[10] Izumi Mori et al. (2017), Renewable Energy and Employment Potential: A Comparative Analysis Based on an Input-Output Model, *Journal of the Japan Institute of Energy*, 96(1), 16-27

2 Analysis of the socioeconomic ripple effects of offshore wind power development

2 - 1 Analysis of the ripple effects of offshore wind power construction

Table 2-1 shows a breakdown of the expenses of offshore wind power construction sectors.[11] In the IONGES, the proportion of the domestic demand for wind turbines met by imports is assumed to be 46%, based on the quantity of domestically produced and imported wind turbines installed in 2015 and the price difference between domestic and imported wind turbines (ratio of domestic price to import price). At the same time, we assume that all offshore wind power facility construction is performed by domestic operators, based on the track record up to now.

Table 2-1 Breakdown of offshore wind power construction expenses

Towers	6.6%
Blades	6.3%
Gearboxes	5.6%
Other items	5.0%
Converters	1.7%
Pitch/yaw mechanisms	1.7%
Generators	1.3%
Transformers	1.3%
Cast metal	1%
Bearings	1%
Forgings	1%
Control devices	0.7%
Interconnectors, submarine cables, substations, etc.	12%
Project costs	2%
Transportation and installation	19%
Construction and financing	12%
Foundations	22%
TOTAL	100%

Source: Ayu Washizu and Satoshi Nakano (2021)

[11] Three sectors were added to the IONGES—wind turbines sector, bladee sector, and offshore power facility construction sector—as construction expense items for creating input vectors for the construction sector. All outputs from the wind turbine and blade sectors are input to the offshore wind facility construction sector.

For the offshore wind power development scenario described above, we calculated the annual construction expenses by multiplying the quantity of new capacity added at each point in time by the unit cost of construction (kJPY/kW).[12] Based on these annual construction expenses, we used the IONGES to analyze the economic and employment ripple effects on Japan as a whole. The analysis results are summarized in Table 2-2. The table shows both the economic and employment ripple effects. In each case, it shows both the ripple effect of the new capacity added for the single year and the cumulative ripple effect of all years.

Table 2-2 Economic and employment ripple effects of offshore wind power construction

	2030	2035	2040	2045	2050
Added capacity per year (GW)	2.0	3.0	3.2	2.8	1.7
Cumulative installed capacity (GW)	7	21	36	52	63
Economic ripple effects (trillion JPY)					
Single-year effect	1.30	1.60	1.66	1.43	0.88
Direct	0.66	0.81	0.84	0.73	0.45
Indirect	0.64	0.79	0.82	0.71	0.43
Cumulative effect	5.02	12.58	20.81	28.53	34.16
Direct	2.55	6.38	10.55	14.46	17.32
Indirect	2.48	6.20	10.26	14.07	16.84
Employment ripple effects (thousand ppl)					
Single-year effect	54	66	69	59	36
Direct	20	25	26	22	14
Indirect	34	41	43	37	23
Cumulative effect	208	522	863	1184	1417
Direct	79	198	327	448	537
Indirect	129	324	536	735	880

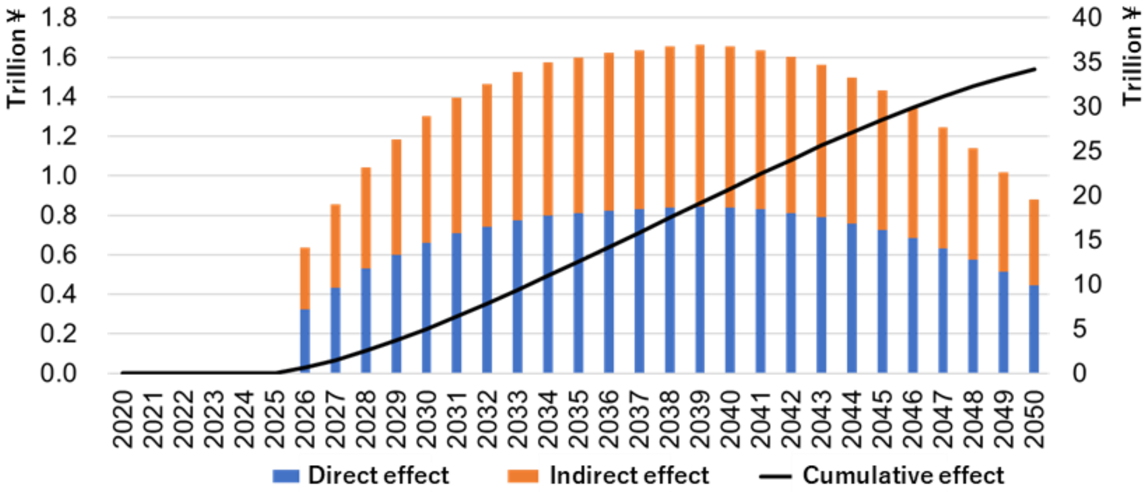
Source: Created by Renewable Energy Institute

The single-year economic ripple effect of constructing offshore wind power is estimated to range from 0.6 trillion JPY to 1.7 trillion JPY. Note that over the peak installation period from 2035 to 2040, the single-year economic ripple effect is slightly over 1.6 trillion JPY, while the cumulative economic ripple effect by 2050 is greater than 34 trillion JPY. Of these quantities, the increase in demand (total construction expenses, including construction work and investment in plant and equipment) due to the construction of offshore wind farms is considered the direct effect. The increase in demand for parts and services from related

[12] These annual construction expenses were substituted into IONGES as the final demand for the offshore wind power facility construction sector, for analyzing economic ripple effects and impact on employment, respectively. For convenience, it is assumed that 100% of construction expenses are incurred in the year of installation, even though construction of offshore wind facilities takes multiple years, which means that construction expenses are incurred over a longer time.

industries to satisfy the demand increase generated by the direct effect is regarded as the indirect effect. The results of our analysis indicate that the direct and indirect effects of developing offshore wind power are of approximately equal magnitude.

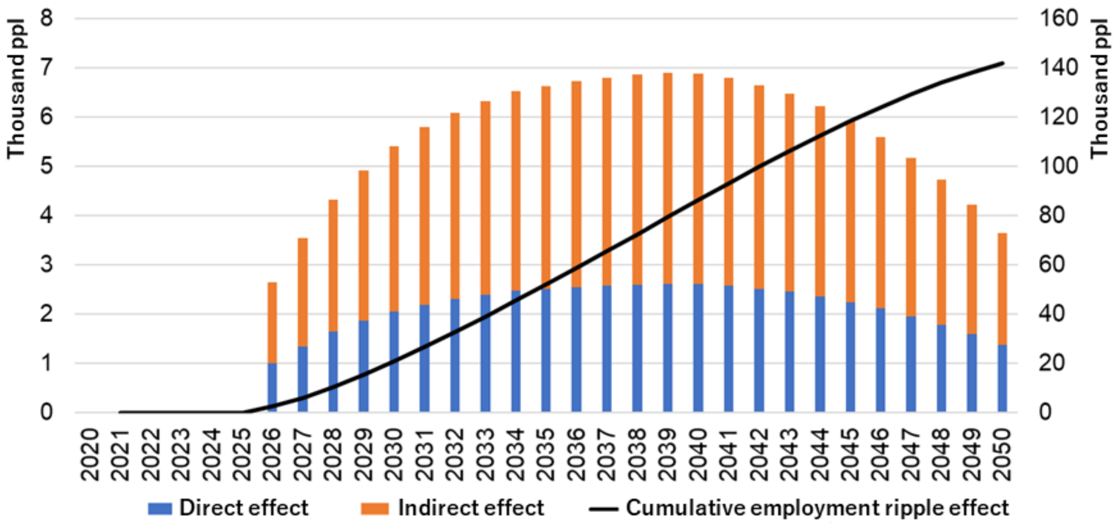
Fig. 2-1 Trend in economic ripple effects of offshore wind power construction



Source: Created by Renewable Energy Institute

Our estimates of the single-year employment ripple effect ranged from 30,000 to 70,000 jobs. At the peak around 2040, the number of jobs generated is around 70,000 per year. And by 2050, construction is expected to have created employment for a cumulative total of more than 1.4 million people. Of all these jobs, 537,000 result from the direct effects of construction, while 855,000 result from indirect effects. Thus, indirect effects generate 1.6 times more employment than direct effects.

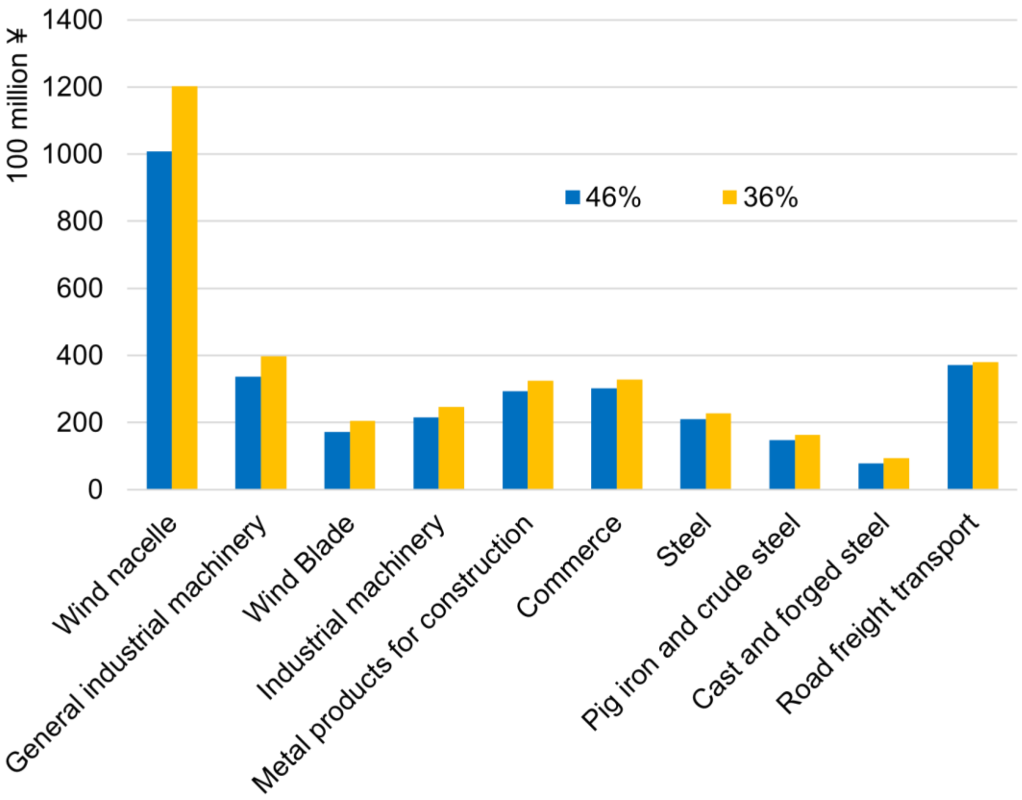
Fig. 2-2 Trend in the employment ripple effects of offshore wind power construction



Source: Created by Renewable Energy Institute

We estimated that if the use of domestically manufactured products were to increase by 10%, or if the proportion of imported wind turbines decreased from 46% to 36%, the construction of 1GW of offshore wind power capacity would have the effect of driving up domestic production by approximately 51.7 billion JPY. A look at this for different sectors (Fig. 2-3) shows that the ripple effects on domestic production are particularly striking in the production sectors of wind turbines, blades, and related machinery and metal products.

Fig. 2-3 Difference in the ripple effects due to changes in the import ratio of wind turbines



Source: Created by Renewable Energy Institute

2 - 2 Analysis of the ripple effects of offshore wind power operation

While the ripple effects of the construction phase are limited to the time of construction (a single year), the ripple effects of the operation phase occur continuously throughout the operating life of offshore wind power facilities. To analyze the operation phase, we therefore performed our analysis by cumulatively adding up the operation and maintenance expenses for the total (cumulative) installed capacity and then substituting into the offshore wind power sectors in the IONGES. The results of the analysis are summarized in Table 2-3.

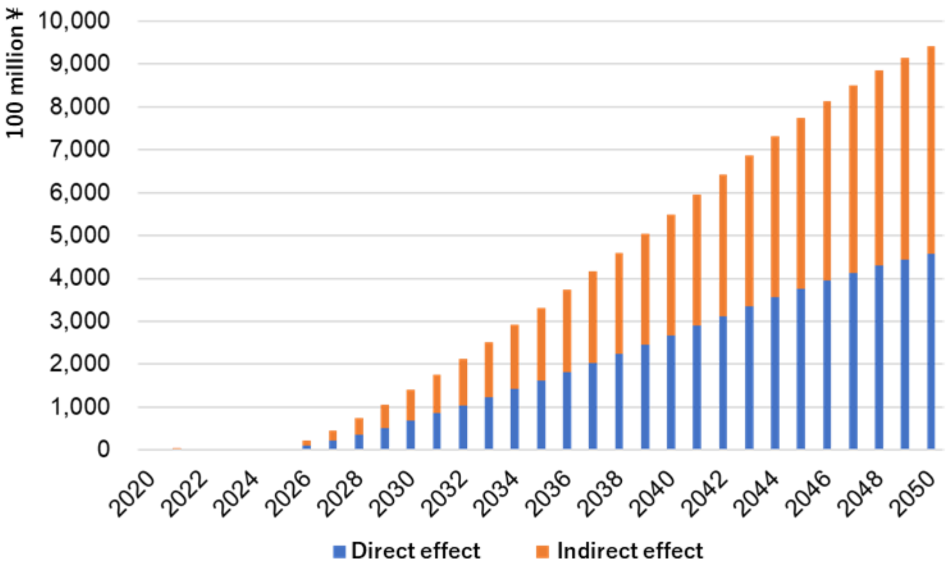
Since we are analyzing the effect on cumulative installed capacity up to a particular year, the results are the cumulative effect, which steadily increases. The value of the economic ripple effect of offshore wind power operation in 2050 will be 940.9 billion JPY, while the cumulative employment ripple effect will amount to 30,000 jobs per year.

Table 2-3 Economic and employment ripple effects of offshore wind power operation

	2025	2030	2035	2040	2045	2050
Cumulative installed capacity (GW)	0.1	7	21	36	52	63
Economic ripple effects (100 million ¥)						
Cumulative effect for year	25	1,404	3,318	5,497	7,740	9,409
Direct	12	682	1,613	2,672	3,763	4,575
Indirect	13	721	1,705	2,824	3,977	4,834
Employment ripple effects (ppl)						
Cumulative effect for year	82	4,563	10,785	17,868 589	24,768	30,107
Direct	27	1,501	3,549	5,879	8,279	10,064
Indirect	54	2,990	7,068	11,709	16,488	20,043

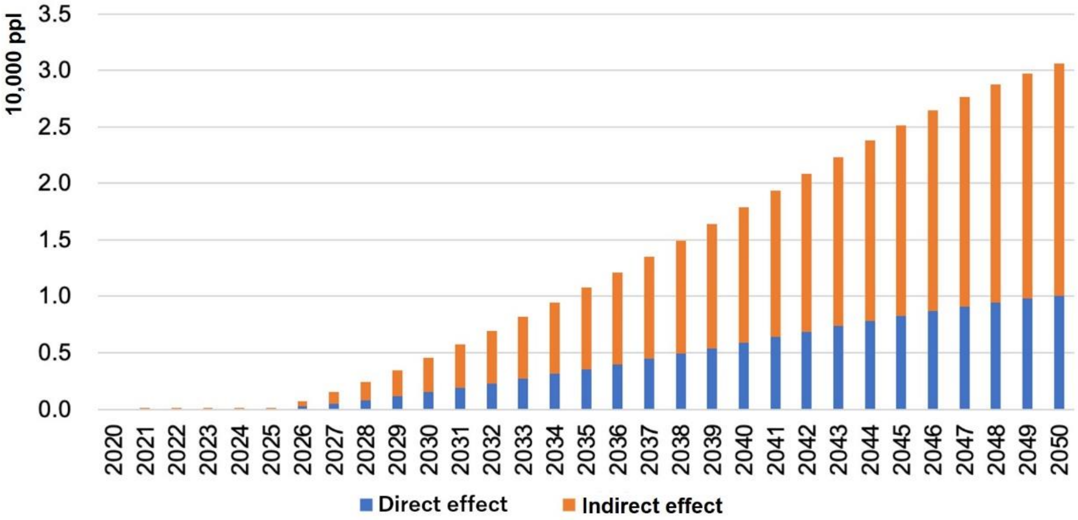
Source: Created by Renewable Energy Institute

Fig. 2-4 Trend in the economic ripple effects of offshore wind power operation



Source: Created by Renewable Energy Institute

Fig. 2-5 Trend in the employment ripple effects of offshore wind power operation



Source: Created by Renewable Energy Institute

2-3 Analysis of the effects of replacing thermal power with offshore wind power

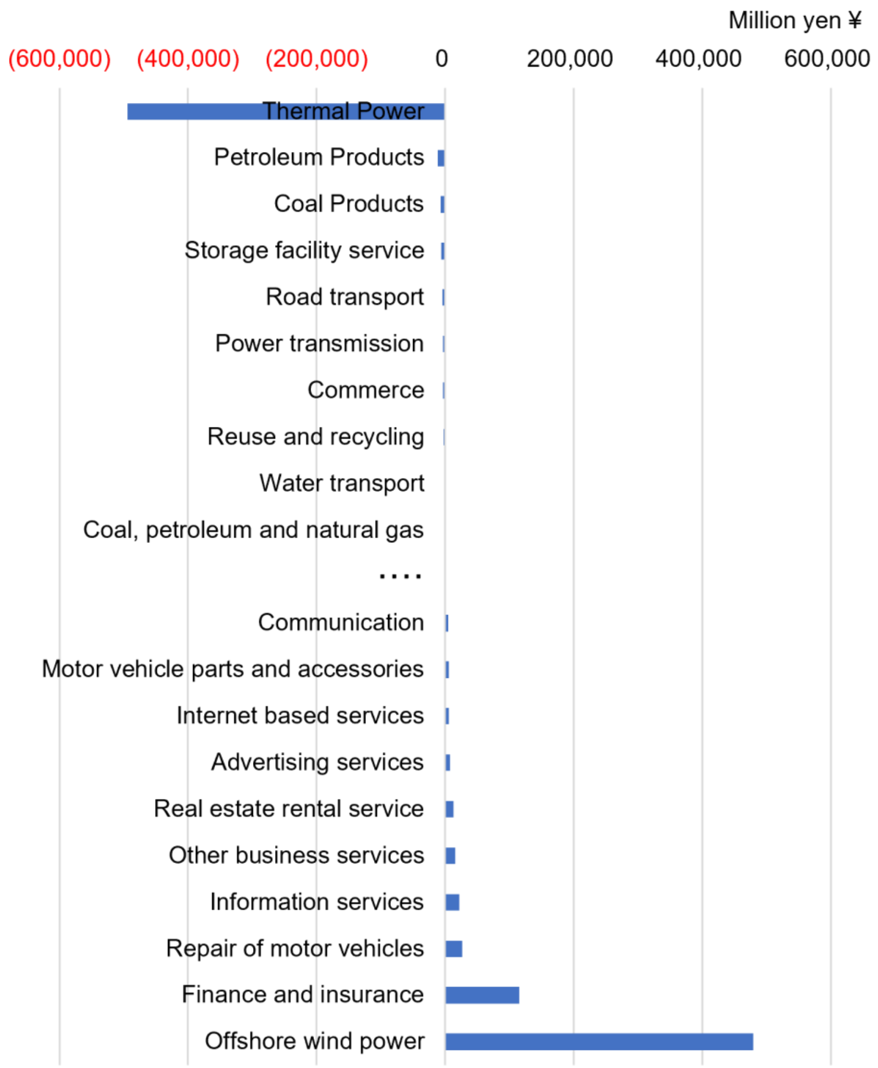
Most of the CO_2 emissions from the power generation sector are generated by thermal power generation. So, if offshore wind power were used to replace thermal power, we would expect a substantial reduction in CO_2 emissions in the operation phase. On the other hand, a reduction in thermal power generation would have some negative economic and employment impacts. For this reason, we conducted an analysis to compare these negative effects with the positive effects of higher offshore wind power production.[13]

This analysis shows that although a decline in production in the thermal power generation sector and related industries has a negative impact on the Japanese economy as a whole, this is outweighed by the positive impact of higher production in offshore wind power and related industries. A look at the amount of change by sector (Fig. 2-6) shows a decrease in production in the thermal power sector and the related fuel supply industry and transportation sector, but there is also a significant increase in production in offshore wind power operation and related financial services, machinery repair, and business-to-business service industries. The net result is an increase in domestic production of approximately ¥200 billion.

[13] IONGES matches the unit price of a power source by adjusting the value-added part. For this reason, the final demand for power sources can be substituted with one another. Thus, we conducted the analysis by substituting 10% of the final demand for thermal power with offshore wind power—that is, decreasing the final demand for thermal power by 10% while simultaneously increasing the final demand for offshore wind power by 10%—and substituting it into IONGES.

It should be particularly noted here that the results of this calculation represent an analysis of changes in domestic production. Since Japan relies on imports for nearly all its fossil fuels, it must purchase these fuels from abroad to generate thermal power. This means that a reduction in thermal power production would cut fuel expenses and help to prevent the outflow of national wealth. According to calculations based on the IONGES, a 10% reduction in final demand for thermal power would save approximately ¥200 billion in the fossil fuel sector.

Fig. 2-6 Economic ripple effects of replacing thermal power generation (left: decline in thermal power, right: rise in offshore wind power)

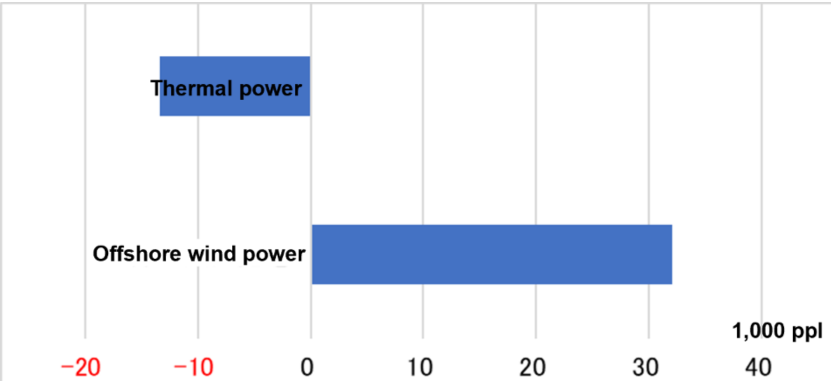


Note: Only the sectors of greatest change are shown in the figure.

Source: Created by Renewable Energy Institute

The amount of change in employment is summarized in Fig. 2-7. As already mentioned, the employment coefficients estimated in previous studies can be used to analyze the ripple effects on employment due to thermal power replacement. Our analysis shows that if 10% of thermal power capacity were replaced by offshore wind power, there would be a reduction in total employment in the thermal power sector and related industries of nearly 13,000 jobs, compared to an estimated increase in employment in wind power and related industries of around 32,000 jobs. Thus, the net employment ripple effect of thermal power replacement would be an increase of 19,000 jobs.

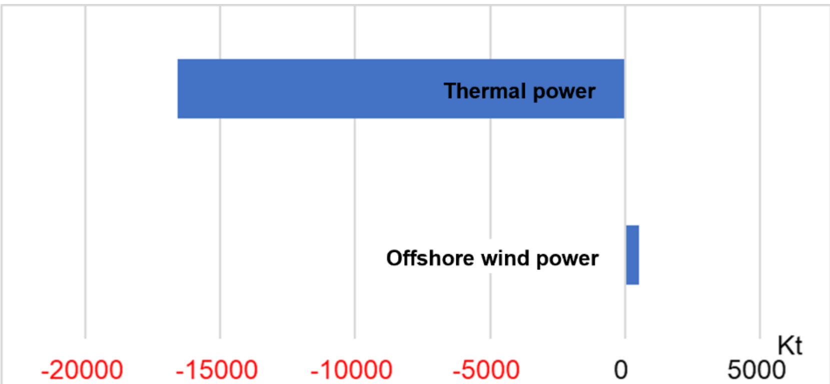
Fig. 2-7 Change in employment due to thermal power replacement



Source: Created by Renewable Energy Institute

In a similar way to employment ripple effects, we can analyze the impact of replacing thermal power on reducing CO_2 emissions based on the estimated CO_2 emissions coefficient. The analysis results (Fig. 2-8) show that if 10% of thermal power capacity were replaced by offshore wind power, the combined CO_2 emissions of the thermal power sector and related industries would be reduced by 16.59 million tons. At the same time, the total increase in CO_2 emissions from wind power and related industries (all sectors) would only be 510,000 tons. Therefore, the net overall effect would be a reduction in CO_2 emissions of 16.08 million tons.

Fig. 2-8 Change in CO_2 emissions due to thermal power replacement



Source: Created by Renewable Energy Institute

3 Conclusion

3 - 1 Reflections on the ripple effects of offshore wind power

To achieve the goals of limiting the rise in global temperature to 1.5° C and achieving carbon neutrality, it is essential to start developing renewable energy sources as far as possible, so that we can generate close to 100% of our energy from renewable sources by 2050. To shape a society in which solar PV and wind are the principal power sources, large-scale development of offshore wind power is vital. Our analysis of the socioeconomic ripple effects of adopting offshore wind power is important for providing evidence to promote policies and institute legal mechanisms to promote technology and industry development, and regional revitalization, and for pursuing rational policy implementation.

In this report, we divided the development of offshore wind power into the two phases of "construction" and "operation" to analyze the economic ripple effects, measured by an increase or decrease in production, and the employment ripple effects, measured by the change in available jobs, in each of the two phases. We also analyzed what would happen if thermal power capacity were replaced by offshore wind power, by estimating the economic and employment ripple effects and changes in CO_2 emissions.

The results of our analysis showed that the single-year economic ripple effect of offshore wind power construction would range from 0.6 trillion JPY to 1.7 trillion JPY, with a cumulative economic ripple effect of 34 trillion JPY by 2050. The single-year ripple effect on employment was estimated at 30,000 to 70,000 jobs, with a cumulative total of over 1.4 million jobs created from construction by 2050.

On the other hand, since our analysis of the operation phase considered the cumulative total installed capacity up to a particular year, the magnitude of the effect increased steadily year by year. We estimated that by 2050, the economic ripple effect of offshore wind power operation would amount to 940.9 billion JPY, with the creation of more than 30,000 jobs.

If 10% of thermal power capacity were replaced by wind power, there would be a negative impact on the Japanese economy as a whole, due to decreased production in the thermal power sector and related industries. However, this would be more than offset by the positive impact of higher production from offshore wind power and related industries, resulting in a net increase in domestic production of approximately 200 billion JPY. Furthermore, the employment ripple effect of this replacement would lead to an increase of 19,000 jobs and a reduction of 16.08 million tons of CO_2 emissions. Lower thermal power production would also affect fuel expenses. For example, a 10% decrease in final demand for thermal power would result in an annual saving of approximately 200 billion JPY in fuel expenses. Since Japan imports most of its fossil fuels, the deployment of offshore wind power would also help to prevent the outflow of national wealth.

3-2 Challenges in offshore wind power deployment

This analysis makes it clear that the adoption of offshore wind power can make a big contribution to socioeconomic development. However, to realize the goal of adopting offshore wind power on a large scale, various challenges need to be faced.

The first is the development of human resources. According to our analysis, the construction of offshore wind power facilities will create 30,000 to 60,000 jobs per year. Of these, 20,000 would be for workers directly involved in construction work. However, in Japan today, the number of workers with expertise and skills suitable for the construction of offshore wind power systems is far fewer than this level of demand. On top of this, it takes a long time to train workers, and due to the lack of specialized facilities and know-how, it is not easy for Japanese companies to develop human resources. For these reasons, there is an urgent need to put in place promotional policies and systems to accelerate the process of cultivating highly specialized human resources.

Another big challenge is the development of domestic supply chains. To adopt and implement offshore wind power reliably and at a low cost, it is important to build domestic supply chains that are globally competitive. Up to now, most of the main manufacturers of offshore wind equipment have been European companies, and Chinese and Korean manufacturers have also grown rapidly in recent years, as the Asian market has expanded. In line with the Vision for Offshore Wind Power Industry (Phase 1), which calls for "forming the foundation of the industry over the next 10 years and rapidly developing an internationally competitive domestic industry by 2030," the goal of a 60% domestic sourcing rate for equipment by 2040 has been set. As mentioned, increasing the domestic sourcing rate will drive an increase in domestic production. So, just as Europe regards the promotion of offshore wind power deployment as an important part of its "green recovery" efforts, the development of a domestic industry for offshore wind power can serve as a key element of Japan's sustainable economic development plans.

The development of a domestic offshore wind power industry requires long-term investment and policy support, implemented in a timely manner and in the appropriate order. To do this successfully, it is vital for the public and private sectors to work together to push projects forward, and for companies and local communities to strengthen their collaboration.

Socioeconomic Analysis of
Offshore Wind Power Development in Japan

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