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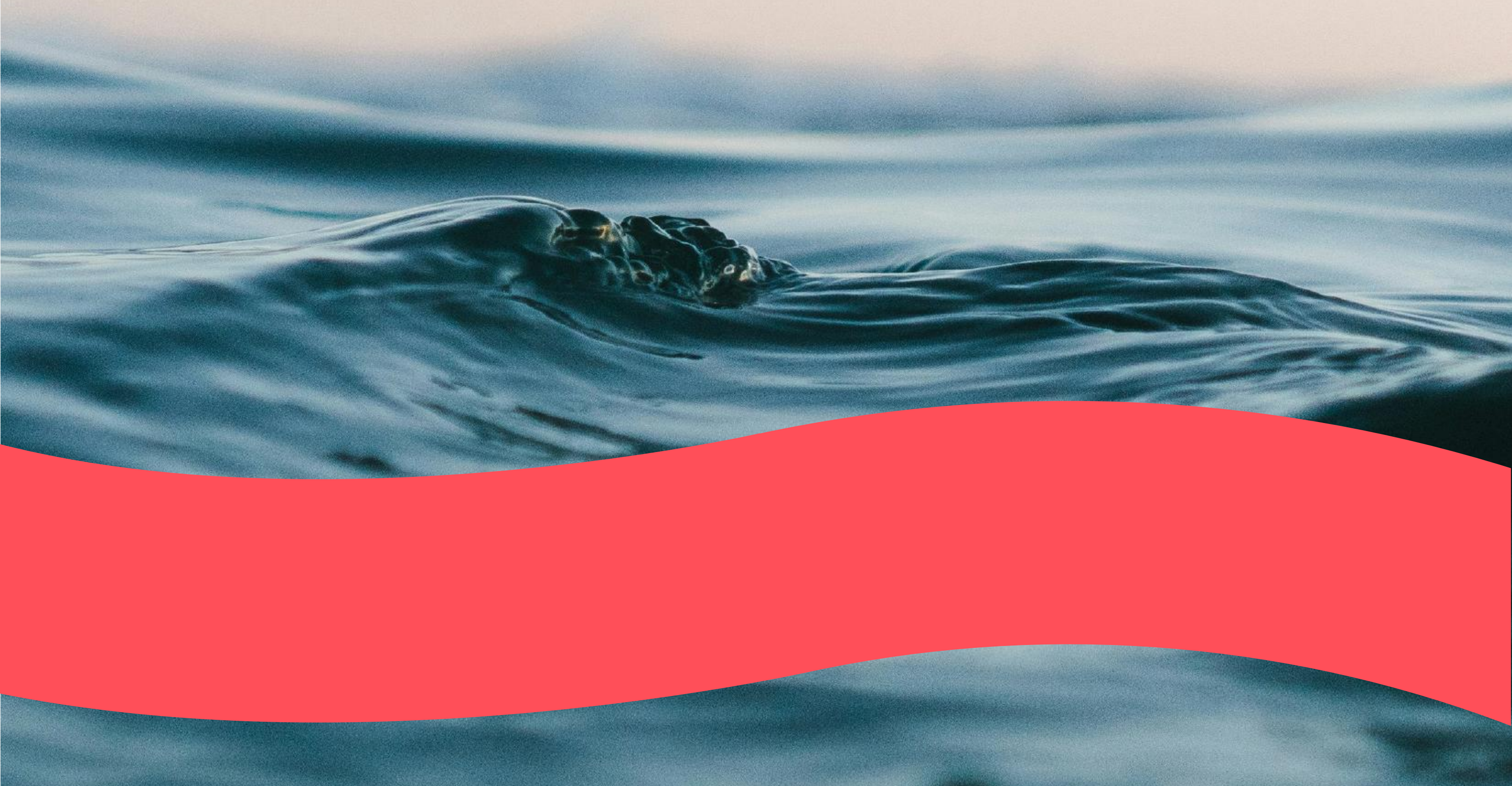
Powering the Offshore Wind Future in Northern Japan: Opportunities and Recommendations



Analysis of feasible socioeconomic benefits of offshore wind to the Northern Japan region, including GVA analysis of Hokkaido Prefecture, and the necessary initiatives required to achieve them.

Contents

Executive Summary

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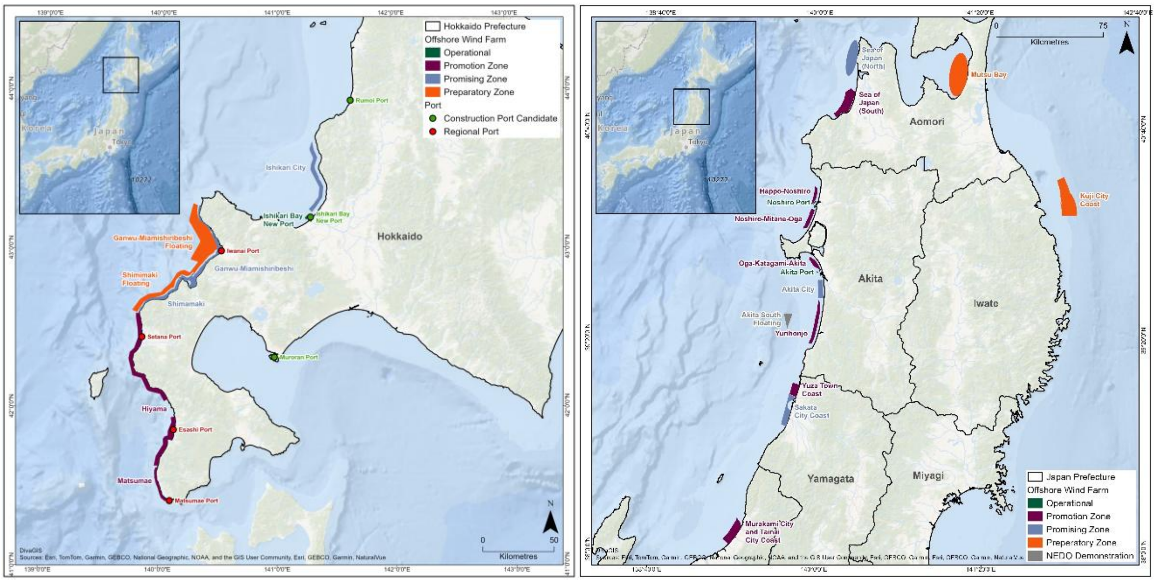
Offshore wind (OSW) is positioned as a key pillar in Japan's push to make renewable energy the primary electricity supply by 2040, as outlined in the Seventh Strategic Energy Plan. Northern Japan (defined here as Hokkaido Prefecture, Tohoku Region, and Niigata Prefecture) is expected to play a significant role in the deployment of offshore wind projects. There are currently 23 offshore wind projects totaling 12.7 GW (gigawatts) across Northern Japan (shown in Figure 1), of which approximately 250 MW (megawatts) is operational and thus significant growth is expected in the coming decade.

Figure 1 Map of Offshore Wind Projects in Hokkaido Prefecture (Left) and Tohoku Region Including Niigata Prefecture (Right)



The Strategic Energy Plan also explicitly references the significant "economic ripple effects", or gross value added (GVA), that the offshore wind projects can generate for local communities. Understanding these ripple effects is crucial to build local consensus for the development of offshore windfarms. This study therefore aims to evaluate the feasible socioeconomic benefits of offshore wind to the Northern Japan region and the necessary initiatives required to achieve them. Over 25 consultations were conducted with key stakeholders throughout the region to understand the opportunities and challenges faced by the local offshore wind industry.

Focusing on Hokkaido Prefecture, the GVA from eight offshore wind projects in the prefecture was calculated using input-output analysis. Two scenarios for the prefectural rocurement within the offshore wind projects were calculated based on information gathered through stakeholder consultations, desktop research and literature review:

- **Possible**: Estimated prefectural procurement rates that are achievable considering the current supply chain capabilities in Hokkaido Prefecture.
- **Potential**: Prefectural procurement rates that are considered achievable in the future through feasible, additional initiatives and investments by local suppliers.

This study found significant opportunity for socioeconomic benefits through GVA from offshore wind projects in Hokkaido Prefecture. The total offshore wind project expenditure in Hokkaido Prefecture was estimated to be 5.5 trillion JPY. The GVA and total induced employment was then calculated to reach up to 641 billion JPY under the possible scenario and 2.12 trillion JPY under the potential scenario, as shown in Table 1. This corresponds to 45,000 and 124,000 jobs created for the two scenarios respectively. The GVA and employment effects reflect the total amount generated across the project lifetime. The “potential” GVA was over three times the value under the “possible” scenario, driven by factors such as increased involvement in the O&M phase and future development of the floating offshore wind supply chain.

Table 1 Summary of Possible and Potential GVA and Induced Employment Results

Scenario	Total GVA (billion JPY)	Total induced employment (persons)
Possible	**641.2**	**44,954**
Potential	**2,122.9**	**124,390**

Under the possible scenario, the “business services” industry sector, mainly made up of development and O&M phase services, contributed approximately 270 billion JPY, equating to 42% of the total GVA. The “construction” sector also contributed roughly 160 billion JPY which accounts to 25% of the total value, due to the possible involvement of prefectural companies in onshore cable and substation works. Economic ripple effects totalling 71.9 billion JPY were also generated in the “real estate” and “commerce” sectors, even though there was no direct OSW project expenditure in these categories.

When also considering the projects in Tohoku Region and Niigata Prefecture, the total expenditure of offshore wind projects in Northern Japan exceeded 10 trillion JPY, equating to potential socioeconomic ripple effects worth trillions of yen. Further socioeconomic effects may be realised through increased fixed asset tax revenue and the utilisation of the Community Coexistence Fund established by the project developers.

However, thus far supply chain considerations in Northern Japan have been fragmented at the prefecture or sometimes even project level. This has led to challenges such as greater exposure to changes in project plans and uncertainty of long-term supply chain demands. The development of a wider regional industry strategy is crucial for local supply chain initiatives and investments to be carried out. Below are five recommendations developed for Northern Japan's OSW industry.

1. **Map industrial strengths throughout Japan to set direction for Northern Japan offshore wind supply chain development.**

   A national government-led assessment of OSW related industrial capabilities throughout Japan will allow for the roles of each region's supply chain to be defined. Considering how Northern Japan's localised industrial strengths and wind power potential can be leveraged within the context of the domestic and international OSW sector is crucial to develop opportunities for local procurement.

2. **Promote regional supply chain clusters to develop the offshore wind industry in Hokkaido and Tohoku.**

   Supply chain clusters offer a platform for collaboration among key stakeholders within the Northern Japan OSW industry. By leveraging international good practices, clusters can support local companies transitioning to offshore wind. Institutional and financial support from the national government will strengthen cluster initiatives to develop regional industry.

3. **Encourage greater focus on long-term regional industry development beyond individual offshore windfarms**

   The development of long-term, regional industry development strategies by national and local governments, aligned with auction frameworks, will provide greater visibility of opportunities for local businesses. Increased export opportunities to APAC (Asia Pacific) through the development of internationally competitive suppliers will also allow further economic ripple effects to be generated.

4. **Ensure socioeconomic ripple effects for communities surrounding project areas**

   In geographically vast areas like Hokkaido, utilisation of local ports and the development of a skilled workforce in the O&M phase allows for greater distribution of economic ripple effects. Continued coordination between municipalities and project developers will ensure the effective utilisation of local ports to ensure tangible benefits for local communities.

5. **Achieve successful project build out through coordinated risk management**

   Successful project delivery is the precondition to unlocking the possible and potential significant socioeconomic benefits offered by the over 12 GW offshore wind pipeline in Northern Japan. Stakeholder coordination to quantify project risks, such as grid availability and supply chain capacity, at each decision stage-gate provides the backing for supply chain initiatives to yield economic ripple effects. Flexibility in project schedule and offtake price also allow for greater focus on local procurement, as seen by the achievement of 60% domestic content in the Ishikari Bay New Port project.

Whilst the current supply chain initiatives in Hokkaido Prefecture will generate significant “possible” socioeconomic benefits, the implementation of the above recommendations will be crucial to realising the calculated “potential” GVA. Further, the long-term, holistic supply chain approach outlined within the recommendations will maximise economic ripple effects from offshore wind throughout Northern Japan. The report hopes to encourage greater dialogue and collaboration between key stakeholders to work towards a shared regional industry vision and establish Northern Japan as the centre of the nation’s next “energy revolution”.

1 Introduction

1 Introduction

Japan's Seventh Strategic Energy Plan was announced in February 2025 and for the first time established the target for renewable energy to become the primary power supply by 2040[1]. Offshore wind (OSW) has been positioned as a key pillar in this accelerated growth of renewable energy. The 2020 Vision for Offshore Wind Industry (1st) document[2] initially outlined the national government's ambitions, with a target to develop 10 GW (gigawatts) of projects by 2030 and 30~45 GW by 2040. The 2nd Vision document[3], released in 2025, further outlined additional goals for floating offshore wind, with a 2040 target for 15 GW. OSW development in the coming years represents a significant shift in the domestic energy landscape, analogous to Japan's "first energy revolution" in the 1960s which saw the transition from coal to crude oil[4].

Northern Japan is expected to play a significant role in the deployment of offshore wind projects due to the availability of strong wind resources throughout the region. Hokkaido Prefecture, the northernmost of Japan's main islands, presents the highest bottom-fixed and floating offshore wind potential in Japan.[5] The commercial operation of the 112 MW (megawatts) Ishikari Bay New Port offshore windfarm in 2024 presented a significant milestone in Hokkaido Prefecture's offshore wind sector. However, there are seven further projects totalling over 6 GW under development in its waters. The Tohoku Region and Niigata Prefecture add a further 6.3 GW of offshore wind projects at various stages of development.

The government's Seventh Strategic Energy Plan explicitly states the potential of significant "economic ripple effects", or gross value added (GVA), from offshore wind projects. Particularly, the broad industrial reach and contribution to job creation through construction and O&M (operation and maintenance) activities is highlighted.

Thus far, three rounds of offshore wind auctions have been conducted for projects within the general sea area. To meet the demands of development for these projects, local supply chain development has been initiated, though primarily conducted at a prefecture-by-prefecture level thus far. However, challenges for the participation of local businesses have started to be identified. These include the scale of investment required, the lack of experience in related industries (e.g. offshore oil and

[1] METI (2025). https://www.meti.go.jp/press/2024/02/20250218001/20250218001.html
[2] MLIT (2020). https://www.mlit.go.jp/kowan/content/001382705.pdf
[3] MLIT (2025). https://www.mlit.go.jp/kowan/content/001910877.pdf
[4] METI (2018). https://www.enecho.meti.go.jp/about/special/johoteikyo/history3shouwa.html
[5] Renewable Energy Institute. https://www.renewable-ei.org/pdfdownload/activities/Saitou_230413REHokkaido-Japan.pdf

gas (O&G)), and uncertainty regarding the medium- and long-term project demand. The latter point is particularly exacerbated by developments such as the August 2025 decision by Mitsubishi Corporation to not proceed with the development of their three Round 1 projects[6].

This study therefore aims to evaluate the feasible socioeconomic benefits of offshore wind to the Northern Japan region and the necessary initiatives required to achieve them. Over 25 consultations were conducted with key stakeholders throughout the region to understand the opportunities and challenges faced by the local offshore wind industry. Consultees included local government, industry organisations, project developers, local businesses and financial institutions.

The report first focuses on Hokkaido Prefecture, where preparations for the upcoming Round 4 auctions are progressing, to quantify the offshore wind GVA using input-output analysis. Two scenarios for the participation of the prefectural supply chain were considered, using the information gathered from the consultations. The “possible” scenario reflects the current capabilities of companies based in Hokkaido Prefecture and the “potential” scenario accounts for further investment and upskilling of local businesses. The approach utilised here is analogous to the previous Akita Prefecture Study conducted by OEP and ERM[7]. The wider context of the offshore wind industry in Northern Japan is then considered qualitatively.

To address the challenges identified through consultations and the Hokkaido GVA study, five recommendations for key national and local stakeholders are presented. The discussion includes the possibility of regional supply chain collaboration across prefectural boundaries. OSW supply chain clusters in the United Kingdom are examined as a case study and the potential benefits of a similar framework to Northern Japan are explored. If successful, measures to raise the capability of the OSW industry in Northern Japan may also lead to export opportunities for upcoming OSW projects in the Asia Pacific (APAC) region.

[6] Mitsubishi Corporation (2025). https://www.mitsubishicorp.com/jp/ja/news/release/2025/20250827002.html
[7] Ocean Energy Pathway (2025). https://oceanenergypathway.org/insights/socioeconomic-impact-offshore-wind-akita-prefecture/

2 Methodology

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2.1 Overall Process

This study was developed through a combination of desktop research, stakeholder consultations, and quantitative modelling. Key steps included:

- Literature review of offshore wind related initiatives in Northern Japan, existing GVA studies, regional economic data, and policy documents.
- Consultations with over 25 stakeholders, including local governments, industry associations, developers, and financial institutions.
- GVA estimation from Hokkaido Prefecture’s offshore wind projects, using input-output (I-O) methodology.
- Development of key recommendations to promote the growth of the Northern Japan offshore wind industry and secure regional socioeconomic benefits.

This integrated approach ensured that the analysis reflects both the current state of the regional offshore wind industry and its future potential.

In this study, Northern Japan refers to the eight prefectures of Hokkaido, Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima, and Niigata. Further, the prefectures of Aomori, Iwate, Miyagi, Akita, Yamagata, and Fukushima make up the Tohoku Region.

2.2 Stakeholder Consultations

Stakeholder engagement was a core component of the study and was conducted in three phases. Phase 1 involved consultations with over 10 stakeholders within Hokkaido Prefecture (including local government, industry organisations, local businesses, project developers) to understand the current status and future potential of the prefectural OSW projects and supply chain. Phase 2 then involved over five consultations with government stakeholders throughout the Tohoku Region and Niigata Prefecture to understand the existing industrial strengths and identify opportunities for wider regional collaboration. Finally, Phase 3 focused on consultations with key suppliers in the Japanese offshore wind sector to understand the capability for local businesses to participate in key OSW scope areas.

These discussions provided valuable insights into supply chain readiness, workforce challenges, infrastructure constraints, and local development priorities. They also helped validate assumptions used in the GVA modelling and procurement rate scenarios.

2.3 Hokkaido Offshore Wind GVA

The GVA analysis was conducted using Hokkaido Prefecture's I-O model, which estimates economic ripple effects across 64 industry sectors. The model calculates:

- Direct effects: economic activity generated by prefectural procurement
- Indirect effects: first-round ripple effects through supply chains
- Induced effects: second-round effects from increased household consumption

Three key data categories were calculated to be used as I-O model inputs.

Table 2 Types of Data Utilised and Collection Methodology

Data and Information needed	Unit	Calculation influenced	Data Collection Methods
Costs	JPY	Costs by items	LEnS™ [8], literature reviews
Sectoral classifications by cost items	%	Final demands by sectors	Literature reviews
Prefectural procurement rates	%	Final demands within Hokkaido by sectors	Literature reviews, consultations

Two scenarios for prefectural procurement were developed for this study:

- **"Possible"** prefectural procurement rates refer to the estimated rates that are expected to be achieved, considering the current capabilities of the supply chain and organisations in Hokkaido Prefecture. This includes activities conducted at the operational Ishikari Bay New Port project, as well as announced supply chain initiatives that have made significant progress in preparation for the upcoming projects.
- **"Potential"** prefectural procurement rates are defined as the estimated rates that are achievable in the future through feasible, additional initiatives and investments aimed at increasing the involvement of local suppliers. This includes increased availability of

[8] ERM's proprietary offshore wind project expenditure model. Further detail provided in Appendix 1.

skilled human resources, increased competitiveness of local suppliers in development, construction, and operation, and local suppliers' entry into new supply chain scopes.

These two scenarios were also used in the preceding Akita Prefecture GVA study.

2.3.1 Assumptions and Limitations

Key assumptions within the GVA calculation process include:

- Prefectural procurement rates represent peak estimates and may vary by project. They reflect the capabilities of the supply chain in the prefecture. The true prefectural content of the offshore wind projects will depend on factors such as competition with companies outside the prefecture and resource availability.
- Induced employment is the number of workers required to meet the final demand if it is produced at a single moment in time, when in reality it is generated over decades. It is possible that a single individual occupies a position over multiple years.
- The costs identified include only those that are directly relevant to Hokkaido's OSW projects. Other related infrastructure investments, such as port and grid upgrades, and additional activities conducted by project developers, such as support for fishery industries and local communities, have been excluded from the scope of this GVA study.

Further details regarding the methodologies and assumptions utilised for this GVA study are included in Appendix 1.

2.4 Development of Key Recommendations

Finally, based on the information gathered through consultations and the results of the Hokkaido GVA study, five key recommendations were developed to promote the continued growth of Northern Japan's offshore wind industry. The recommendations build on a review of UK experience in growing regional offshore wind clusters and aim to maximise the socioeconomic benefits of OSW to the region.

3 Background to Hokkaido Prefecture

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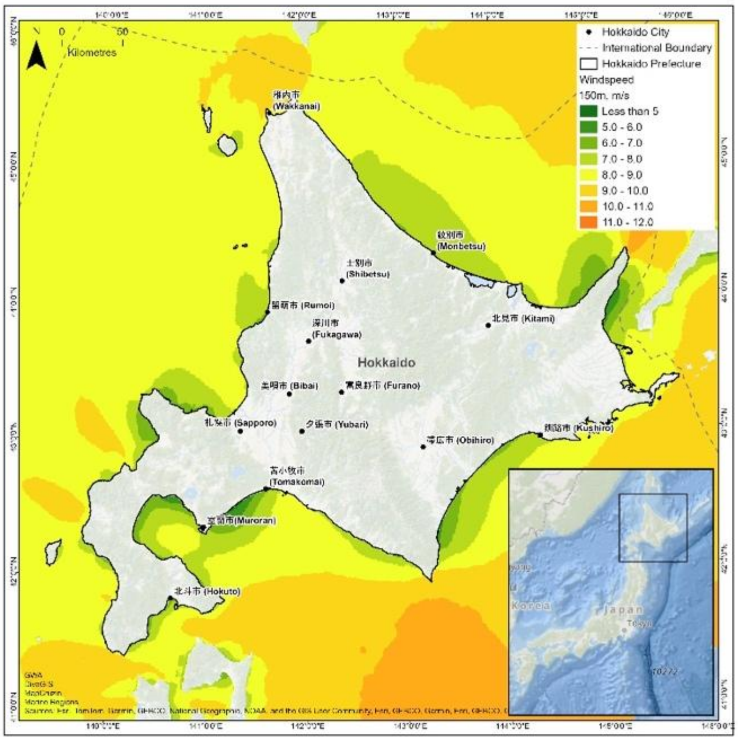
3.1 Prefectural Overview and Strategic Importance

Hokkaido, Japan's northernmost island, is uniquely positioned to play a central role in the country's offshore wind expansion. The island covers an area of 83,450 km^2 (square kilometres) which accounts for approximately 22.1% of Japan's national territory, making it the largest prefecture in Japan by land area[9]. With vast maritime zones, strong and stable wind resources (see Figure 2), and a growing prefectural policy focus on decarbonisation, Hokkaido offers both the physical and political conditions conducive to large-scale renewable energy deployment.

The prefecture's geography, bordered by the Sea of Japan, Pacific Ocean, and Sea of Okhotsk, provides access to some of the most promising bottom-fixed and floating OSW sites in Japan. The southwestern coast, where offshore wind power projects are currently being developed within territorial waters, is known for relatively stable and strong wind conditions exceeding 7 m/s.

Figure 2 Map of Hokkaido Prefecture, Including Offshore Windspeed at 150 m Elevation



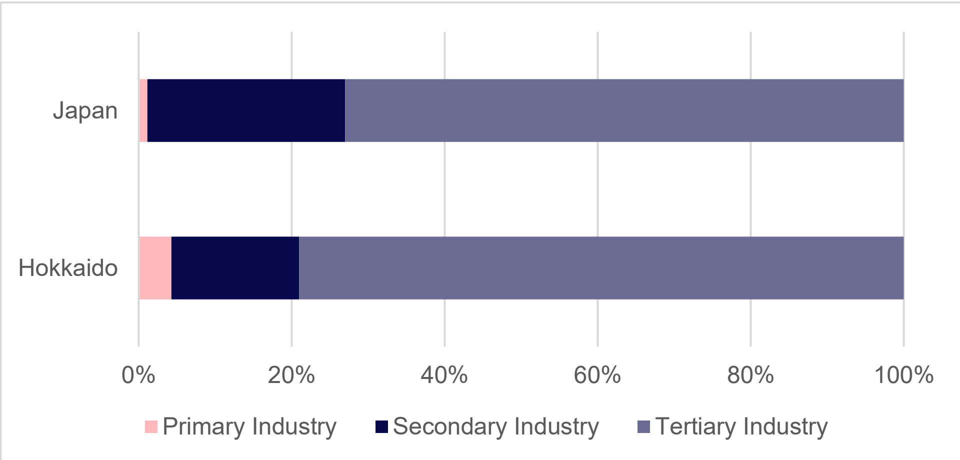
[9] Statistics Bureau of Japan. https://www.stat.go.jp/data/nihon/01.html

3.2 Economic and Industrial Profile

Hokkaido's economy is characterised by a high reliance on the primary and tertiary sectors, with agriculture and fisheries playing a significant role. In 2022, the prefecture's nominal Gross Prefectural Product (GPP) was approximately 20.9 trillion JPY, ranking 8th nationally[10]. However, the secondary sector—particularly manufacturing—remains underdeveloped, accounting for just 8.7% of GPP, compared to the national average of 19.2%[11] (see Figure 3).

This industrial structure presents both a challenge and an opportunity. While the current manufacturing base could provide a challenge for immediate OSW supply chain participation, it also highlights the transformative potential of OSW to stimulate industrial diversification and regional revitalisation. The construction sector, which is relatively stronger in Hokkaido (7.6% of GPP compared to the national average of 5.2%), is well-positioned to support onshore infrastructure and civil works associated with OSW projects.

Figure 3 Comparison of Industry Composition Between Japan and Hokkaido Prefecture



Source: Hokkaido Prefectural Government. (2025)[12]

3.3 Prefectural Demography and Workforce

Hokkaido faces acute demographic challenges. The population is ageing and declining at a rate exceeding the national average, with over 33% of residents aged 65 or older as of 2024[13]. The working-age population is projected to fall by 43% by 2050. These trends pose a significant constraint on workforce availability, particularly in sectors critical to OSW such as construction, engineering, and manufacturing. However, this also

[10] Japan Cabinet Office. https://www.esri.cao.go.jp/jp/sna/data/data_list/kenmin/files/contents/main_2022.html
[11] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/tkk/databook/223729.html
[12] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/tkk/databook/223729.html
[13] Cabinet Office. (2025). https://www8.cao.go.jp/kourei/whitepaper/w-2025/zenbun/07pdf_index.html

underscores the importance of new industries such as OSW. The creation of stable, long-term job opportunities in offshore wind can counteract the outflow of younger generations and attract workers from throughout Japan.

3.4 Local Government Support and Public-Private Coordination

Hokkaido has committed to achieving net-zero greenhouse gas emissions by 2050 and has aligned its energy strategy with Japan's previous 6th Strategic Energy Plan. The prefecture's Action Plan targets 8.2 GW of renewable energy capacity by 2030, with offshore wind expected to play a central role[14].

Hokkaido's Green Transformation (GX) and offshore wind ambitions are supported by a growing ecosystem of public-private collaboration. The prefectural government offers subsidies for workforce training and business entry into the OSW sector. Municipalities such as Ishikari and Muroran are actively promoting local participation through industrial zones and matchmaking platforms.

Organisations such as Team Sapporo-Hokkaido (TSH), a consortium of 21 organisations from government, academia, industry, and finance, are working to position the region as a GX hub. Similar efforts to attract investment and foster innovation are expected to be crucial for the development of Hokkaido's offshore wind industry.

Further details on the economic, industrial and policy context for offshore wind in Hokkaido Prefecture are provided as part of Appendix 2.

[14] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/l.html

4 Offshore Wind in Hokkaido Prefecture

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4.1 Existing Offshore Wind Projects

There is currently one operational offshore wind project in Hokkaido Prefecture, and seven at various stages of development under METI (Ministry of Economy, Trade and Industry) and MLIT's (Ministry of Land, Infrastructure, Transport and Tourism) framework for offshore windfarms within the general sea area. These eight projects are outlined in Figure 4 and Table 3 below.

Figure 4 Map of Offshore Wind Projects in Hokkaido Prefecture

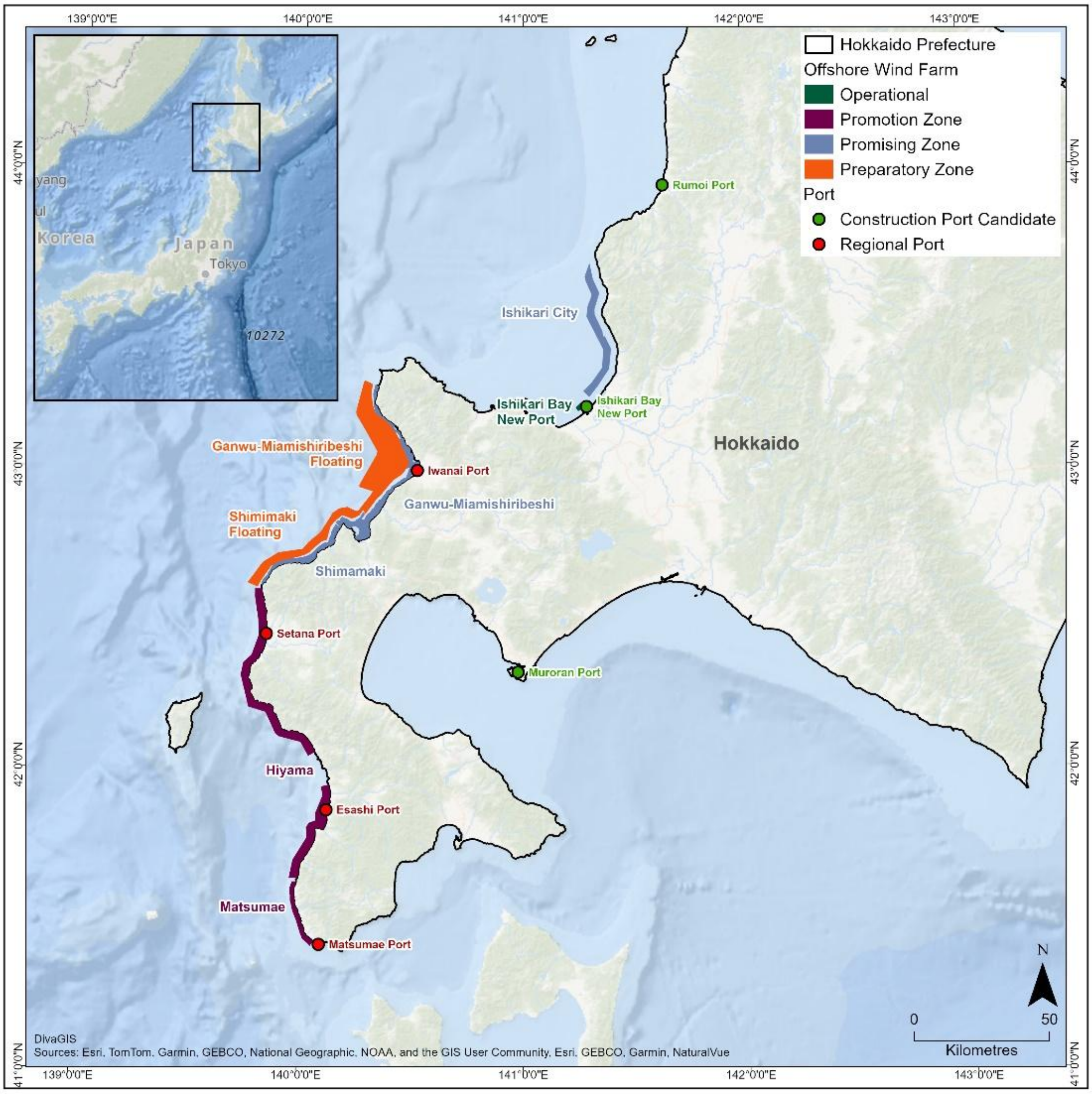


Table 3 Summary of Offshore Wind Projects in Hokkaido Prefecture

Project Name	Project Developer (s)	Status	Project Capacity
Bottom-fixed (BF)			
Ishikari Bay New Port	Green Power Ishikari GK[15]	Operational	112 MW (14 x 8 MW)
Matsumae Coast	Pre-tender	Promotion Zone	285 MW (expected)[16]
Hiyama Coast	Pre-tender	Promotion Zone	1,040 MW (expected)[16]
Shimamaki Coast	Pre-tender	Promising Zone	500 MW (expected)[16]
Ganwu-Minamishiribeshi Coast	Pre-tender	Promising Zone	635 MW (expected)[16]
Ishikari City Coast	Pre-tender	Promising Zone	1,025 MW (expected)[16]
		BF Total	**Approx. 3,597 MW**
Floating (FOW)			
Shimamaki Coast	Pre-tender	Preparatory Zone	Approx. 610 MW (expected)[17]
Ganwu-Minamishiribeshi Coast	Pre-tender	Preparatory Zone	Approx. 2200 MW (expected)[17]
		FOW Total	**Approx. 2,810 MW**
		Total Capacity	**Approx. 6,407 MW**

4.1.1 Ishikari Bay New Port

The Ishikari Bay New Port Offshore Wind Farm, which began operation in January 2024[18], is currently Japan's largest commercial offshore wind power facility, and the first in the country to adopt 8 MW wind turbines. It is located off the coast of Ishikari Bay New Port, which spans the cities of Otaru and Ishikari in Hokkaido. This project is operated by JERA Nex, Hokkaido Electric Power Company, Tohoku Electric Power Company and Green Power Investment through Green Power Ishikari LLC[19]. Siemens Gamesa Renewable Energy (SGRE) supplied 14 wind turbines, with a total output of 112 MW. The windfarm achieved the Japanese government's previous 2040 target of 60% domestic procurement rate which was outlined in the 1st Offshore Wind Industry Vision document.

Onshore construction was carried out by Kajima Corporation, while the offshore construction was handled by a joint venture between Shimizu

[15] JERA Nex Limited, Hokkaido Electric Power Company, Tohoku Electric Power Company and Green Power Investment Corp.
[16] Median value of range provided by METI and MLIT.
[17] Calculated from site area, assuming 5 MW / km^2
[18] JERA. (2024). https://www.jera.co.jp/en/news/information/20240104_1766
[19] HEPCO. (2025). https://www.hepco.co.jp/info/2025/1252915_2068.html

Corporation and Nippon Steel Engineering. Notably, this is the first domestic project to adopt jacket-type foundations, manufactured by Nippon Steel Engineering, and the installation of the offshore turbines utilised Blue Wind, Japan's largest SEP vessel operated by Shimizu Corporation[20]. The subsea cable system was designed, manufactured, and installed by Furukawa Electric.

This project has entered the O&M phase, with SGRE responsible for wind turbine maintenance. SGRE signed a charter agreement for the crew transfer vessel (CTV) "RERA AS," owned by NYK Line, to transport personnel for O&M operations[21]. Vessel management is handled by Hokuyo Kaiun, part of the NYK Group, based in Tomakomai, Hokkaido.

4.1.2 General Sea Area Projects

The general sea area off the coast of Hokkaido Prefecture is characterised by good wind resources and rapidly increasing water depths, as seen throughout Japan. As a result, bottom-fixed projects are largely limited to areas within several kilometres from shore. Furthermore, challenging ground conditions mean that careful consideration regarding the selection of foundation technologies is required.

Currently, two offshore areas in Hokkaido have been designated as “Promotion Zones,” and three areas as “Promising Zones” under the Act on Promoting the Utilization of Sea Areas for Renewable Energy Generation. Further, two floating offshore wind sites are designated as “Preparatory Zones”. These projects are primarily located in the Donan area (southwestern Hokkaido Prefecture), and all sites are located along the Sea of Japan Coast. Coordination with fisheries is a key aspect of offshore wind projects throughout Japan. Positive engagement, both by local government during preparations for auctions and by project developers upon selection, is crucial for the successful deployment of offshore wind in Hokkaido.

Among these offshore wind projects, Hiyama, Shimamaki, and Ganwu–Minamishiribeshi are the first areas where centralised site surveys have been conducted[22]. Previously, each project developer conducted pre-auction wind and seabed surveys. Similarly, grid capacity is now secured by the national government under the “Grid Connection Securing Scheme”. Due to the relatively weak transmission infrastructure in Hokkaido Prefecture, preliminary grid capacity studies were conducted in the five designated bottom-fixed areas in Hokkaido[23]. The studies confirmed the feasibility of non-firm grid connections, which allow earlier grid access without individual grid reinforcements for each project, but also carry a higher risk of output curtailment[24].

[20] Green Power Investment. (2024). https://www.hokkaido-nds.org/pdf/vol.37/37houbun.pdf
[21] NYK Group. (2023). https://www.nyk.com/news/2023/20230705_01.html
[22] JOGMEC. (2023). https://www.jogmec.go.jp/content/300386527.pdf
[23] METI. (2023). https://www.meti.go.jp/press/2023/05/20230512001/20230512001.html
[24] Hokkaido Prefectural Government. (2021). https://www.pref.hokkaido.lg.jp/fs/6/0/4/7/1/1/0/_/keizaibu1.pdf

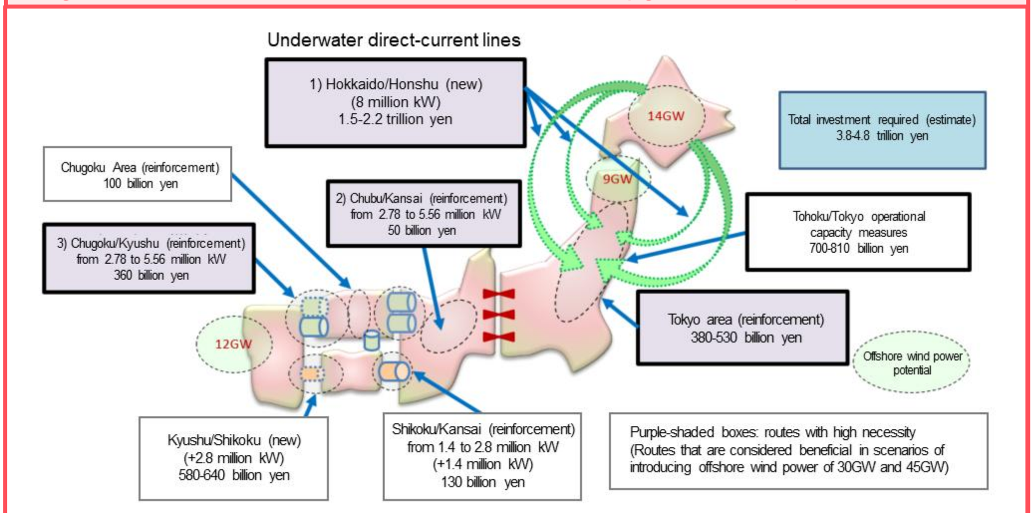
Hokkaido Grid Concern for Offshore Wind

Currently, approximately 3.7 GW of renewable energy capacity (solar and wind) has been introduced in Hokkaido Prefecture[25]. By the mid-2030s, with further additions of offshore wind capacity, the scale of renewable energy may exceed local demand and thus grid curtailment is expected to become a key issue. In 2024, output curtailment was recorded at 0.12% but estimates by the TSO (transmission system operator) suggest this could rise as high as 30% in FY2033, when continued renewables deployment is combined with the potential restart of the Tomari Nuclear Power Plant[26].

Grid stability is also a concern in Hokkaido which will be exacerbated in the coming decades with the further addition of the inverter-based renewable energy sources. This results in a reduction of system inertia, making the grid network in Hokkaido more susceptible to frequency and voltage fluctuations.

Various measures are under consideration to address the issues of balancing capacity, frequency and voltage control, one of which is the strengthening of grid interconnection with Honshu. The current interconnection capacity with Honshu is limited to 1.2 GW and thus OCCTO (Organization for Cross-regional Coordination of Transmission Operators) has outlined grid upgrades plans within their master plan. For Hokkaido, this includes a 4 GW Sea of Japan and a 2 GW Pacific HVDC (High Voltage Direct Current) route (see Figure 5).

Figure 5 Planned Transmission Infrastructure Upgrades in Japan



Source: METI. (2022) [27]

The 2 GW portion of the Japan Sea route is currently under development, with a consortium selected as qualified developers in February 2025.[28]

[25] OCCTO (2025). https://www.occto.or.jp/iinkai/chouseiryoku/2025/files/chousei_111_01.pdf
[26] METI (2025). https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/smart_power_grid_wg/pdf/003_01_00.pdf
[27] METI. (2022). https://www.enecho.meti.go.jp/en/category/special/article/detail_174.html
[28] OCCTO (2025). https://www.occto.or.jp/kouikikeitou/seibikeikaku/higashi-

Whilst the commencement of operation was initially targeted for FY2030[29], the construction timeline could take up to 10 years. The consortium is currently working on the detailed implementation plans. However a one year delay was announced in December 2025, and the plans are now expected to be published by the end of FY2026.[30]

The timing of the HVDC interconnection is a critical factor for offshore wind development in Hokkaido Prefecture, with project developers facing curtailment risk if grid stability cannot be secured and supply-demand balance cannot be achieved. OSW developers will need to understand the construction schedule of the HVDC interconnection in relation to the timeline for the planned offshore windfarms in Hokkaido Prefecture for informed decision making.

4.1.2.1 Promotion Zones

The Matsumae and Hiyama coast areas were designated as Hokkaido's first Promotion Zones in July 2025.[31] The two sites are expected to be part of the Round 4 auction, which could be launched in 2026.

Matsumae Town lies on the Southern tip of Hokkaido Prefecture and the area within 2 kilometres of its coastline, in waters 10 to 50 metres deep, was identified as a suitable zone for OSW development. Kansai Electric Power Company has commenced their Environmental Impact Assessment (EIA) in the area. The Summary of the Committee Meeting for the site emphasises the importance of the relationship between offshore wind development and fisheries, which have seen significant decline in catch over recent years. The selected project developer will be expected to coordinate with local fishers and explore opportunities for regional revitalisation efforts[32].

The Hiyama offshore area lies off the coast of four towns, Setana, Yakumo, Esashi, and Kaminokuni, on the Sea of Japan side in southwestern Hokkaido. The project area is divided into northern and southern sections, due to the omission of Otobe Town from the project area. Currently, six developers have commenced EIAs in the area[33].

4.1.2.2 Promising Zones

The Shimamaki Coast site is located along Shimamaki Village in southwestern Hokkaido and five companies have announced offshore wind power development plans and commenced EIAs[34]. Although the area has been designated as a Promising Zone, no committee meeting

area/20250226_shikakushinsa_kekka.html
[29] METI (2023). https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/pdf/055_02_00.pdf
[30] OCCTO (2025). https://www.occto.or.jp/assets/iinkai/kouikikeitouseibi/96/seibi_96_01_01.pdf
[31] METI (2025). https://www.meti.go.jp/press/2025/07/20250730001/20250730001.html
[32] Summary of Hiyama Committee Meeting. (2025). https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/dl/kyougi/hokkaido_hiyama/04_data06.pdf
[33] J-Power (722 MW), TEPCO Renewable Power (1,350 MW), Cosmo Eco Power (1,000 MW), Hokkaido Offshore Wind Development LLC (1,500 MW), KEPCO (1,680 MW), and Hokkaido Electric Power (1,140 MW).
[34] Hokkaido Offshore Wind Development LLC (585 MW), Cosmo Eco Power (1,000 MW), Japan Wind Development (600 MW), Eurus Energy Holdings Corporation (550 MW), and KEPCO / RWE Renewables Japan (600 MW).

has yet been established. Hokkaido Prefecture has organised study sessions for fishery stakeholders and workshops for local business associations and residents in Shimamaki Village, in preparation for the establishment of the committee meeting[35].

The offshore area of the Ganwu-Minamishiribeshi region in Hokkaido lies approximately 2 to 10 kilometres off the coasts of six municipalities: Kamoeunai Village, Tomari Village, Kyowa Town, Iwanai Town, Rankoshi Town, and Suttsu Town. This area has been designated as a Promising Zone, and two official committee meetings have been held. At the committee meeting, discussions were held regarding existing fishery activity[36] and the safety of the adjacent Tomari Nuclear Power Plant[37].

The Ishikari City Coast has been designated as a Promising Zone for offshore wind power. Ten companies[38] have announced their project plans at Ishikari City Coast. The first committee meeting was held in February 2026 and discussions towards Promotion Zone designation have commenced.[39]

4.1.2.3 Preparatory Zones

Finally, in 2023 the offshore areas of Ganwu-Minamishiribeshi Coast and Shimamaki Coast were designated as preparatory zones for floating offshore wind projects. These areas lie further offshore of equivalent bottom-fixed Promising Zones. JOGMEC (Japan Organization for Metals and Energy Security) began conducting preliminary surveys in these two areas under the Central Method starting in 2025[40].

4.2 Offshore Wind Related Initiatives in Hokkaido Prefecture

Whilst the offshore wind industry in Hokkaido remains at an early stage, many initiatives are currently underway to prepare the local supply chain for the upcoming projects. Information outlined below was gathered through consultations with key stakeholders in Hokkaido Prefecture's offshore wind sector, supplemented with additional desktop research. The supply chain initiatives outlined here were considered in deriving the "possible" and "potential" procurement rates shown in Table 7 below.

4.2.1 Offshore Wind Industry Promotion Organisations

Local governments and industry in Hokkaido are beginning to promote

[35] Hokkaido Prefecture (2024). https://www.pref.hokkaido.lg.jp/kz/gxs/173139.html
[36] Agency of Natural Resource and Energy (2024). https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/dl/kyougi/hokkaido_ganwu/02_docs09.pdf
[37] Agency of Natural Resource and Energy (2024). https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/dl/kyougi/hokkaido_ganwu/02_docs07.pdf
[38] Cosmo Eco Power (1,000 MW), CI Hokkaido LLC (1,333 MW), JERA (520 MW), GPI (960 MW), Marubeni Corporation (1,000 MW), Japan Wind Development (3,000 MW), Ishikari Bay Offshore Wind Power (1,032 MW), KEPCO (1,785 MW), Sumitomo Corporation (1,000 MW).
[39] Hokkaido Prefecture (2026). https://www.pref.hokkaido.lg.jp/kz/gxs/240207.html
[40] JOGMEC. https://www.jogmec.go.jp/content/300390533.pdf

offshore wind through collaborative initiatives aimed at fostering local participation and industry growth.

Muroran Offshore Wind Industry Promotion Association (MOPA)[41] is an industry-academia-government collaboration established in 2020 to position Muroran Port as a hub for offshore wind. With 124 members, it promotes research, information exchange, and workforce development through seminars and partnerships, including a 2025 agreement with IACOW (Inter-Academic Council for Offshore Wind) to provide practical training and internships. MOPA aims for Muroran to emerge as a component manufacturing base through leveraging the city's steelmaking heritage.

Ishikari City has taken a municipality-led approach to foster local participation in the offshore wind sector by creating an organisational body that promotes collaboration and knowledge exchange. Drawing on examples from Akita Prefecture and Choshi City, it is developing a public–private platform to connect local companies with leading regions, support SMEs entering the market, and raise awareness among younger generations.

In addition to the localised initiatives throughout the prefecture, the Hokkaido Prefectural Government, together with the Hokkaido Bureau of Economy, Trade and Industry of METI, launched the HOKKAIDO Offshore Wind Industry Promotion Platform in October 2025. The industry-academia-government platform aims to foster offshore wind-related industries in the prefecture[42]. It aims to create opportunities for information exchange, business matching, and collaboration to support local companies entering the sector. Activities include sharing national and local support measures, promoting GX-related industrial clusters, and coordinating with municipalities and financial institutions.

4.2.2 Manufacturing

4.2.2.1 WTG Related Components

Though there are currently no wind turbine OEMs (original equipment manufacturers) with a domestic manufacturing presence, there are two companies in Hokkaido Prefecture with experience in manufacturing WTG (wind turbine generator) components. Japan Steel Works (JSW) is a manufacturer of industrial machinery and large steel components and structures. JSW entered the wind power sector in 2006 and manufactured 125 turbines but announced their withdrawal from the sales of wind turbines in 2019[43]. JSW now provides WTG maintenance services through their subsidiary JSW M&E based in Muroran City[44]. Mitsubishi Steel Muroran (MSR), an affiliated company of Mitsubishi Steel Mfg., manufactures speciality steel and holds TPG (Transportation & Power

[41] MOPA. https://mopa-j.com/about/
[42] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/238408.html
[43] JSW. (2019). https://www.jsw.co.jp/news/news_file/file/20190424_001.pdf
[44] JSW. (2024). https://www.jsw.co.jp/news/news_file/file/news_20240611.pdf

Generation) certification for supplying materials used in offshore wind components such as tower flange bolts[45].

Despite these existing capabilities, entry into manufacturing of wind turbine components typically requires extensive preparation and dialogue with turbine OEMs over several years. In terms of components such as turbine towers and bottom-fixed foundations, factors such as the size of equipment and land area required have proven to be challenges for participation of local companies.

4.2.2.2 Floating Substructures

Hokkaido is emerging as a key region for floating offshore wind technology development, as efforts are made to capture the deeper water opportunities within the prefecture. Several companies are actively investing in floating foundation technologies and related supply chain capabilities. Taisei Corporation signed a comprehensive partnership agreement with Muroran City in 2021 to promote offshore wind industry development, focusing on floating wind technology. The company plans to build a concrete floating substructure manufacturing plant at Muroran Port which offers significant opportunity for local economic ripple effects[46] [47]. Aizawa Concrete Corporation established a joint research body to explore ammonia production using offshore wind power[48]. The company is developing mass-production methods for concrete floating structures without steel molds, aiming for large-scale deployment of 80,000 units by 2050.

4.2.3 Construction

4.2.3.1 Marshalling Ports

Currently, there are no base ports designated by MLIT in Hokkaido. However, four ports, Wakkanai Port, Rumoi Port, Ishikari Bay New Port, and Muroran Port, have shown interest in being designated as base ports[49]. Ishikari Bay New Port was used as the marshalling port for the Ishikari Bay New Port offshore wind project and is a leading candidate to support construction of the current Promising Zone projects.

Muroran Port is also considered a candidate for base port designation, backed by MOPA's promotional efforts. Due to initial overlap in project schedule, Muroran Port has been considered for the Round 2 Happo-Noshiro project in Akita Prefecture. Though the clustering of offshore wind related businesses and manufacturing bases within the port area is progressing, land availability is emerging as a key issue. Recognising this

[45] Mitsubishi Steel Mfg. (2022). https://www.mitsubishisteel.co.jp/news/release/detail/2022/20221011-02.html
[46] Muroran City. (2024). https://www.city.muroran.lg.jp/business/?content=1887
[47] Asahi. (2022). https://www.asahi.com/articles/ASQ1S71RKQ1LIIPE02J.html
[48] Aizawa. (2024). https://www.aizawa-group.co.jp/news2024041101/
[49] Penta Ocean Construction. (2022). https://www.penta-ocean.co.jp/news/2022/221006.html

challenge, Muroran City is proactively addressing the issue by implementing measures such as collecting additional port usage fees to fund land acquisition for component storage and work areas[50]. Muroran Port also possesses deep, sheltered waters which makes it suitable for wet storage for future floating offshore wind projects.

As offshore wind projects progress in Hokkaido Prefecture, greater clarity regarding the utilisation of these ports will allow for the required construction capabilities to be understood.

4.2.3.2 EPC Contractors

Construction is one of the most accessible entry points for local companies, and Hokkaido firms have strong potential in this area. Iwata Chizaki Construction has conducted parts of the onshore construction scope for the Ishikari Bay New Port offshore wind power project[51]. Though participation of local companies in offshore construction is considered more challenging, the company has invested in the part-ownership of a jack-up vessel[52]. Meanwhile, DENZAI is expanding their capabilities to support offshore wind. The company introduced a 2,500-ton crane in 2024[53] and plans for two additional 5,000-ton cranes by 2029[54] to support port operations.

Penta-Ocean Construction, one of Japan's leading construction companies with strong expertise in marine civil engineering, have also developed manufacturing capabilities in Hokkaido Prefecture. In 2022, the company opened a factory in Muroran to support their offshore wind construction operation, including production of structural frames for the storage of foundations and turbine components[55].

4.2.4 Operation & Maintenance

4.2.4.1 O&M Service Providers

O&M is an area which offers opportunities for local businesses, with the possibility of long-term participation over the 20+ year operational period. Further, several firms in Hokkaido Prefecture have existing O&M experience through onshore wind projects. Hokutaku is a domestic leader in third-party wind turbine maintenance and manages about 80% of Japan's 2,600 onshore turbines.[56] The company is set to handle the O&M of wind turbines of the Hibikinada Offshore Wind Farm in Kitakyushu[57], which is scheduled to start operations before the end of FY2025. In 2021, Hokutaku also established Horizon Ocean Management (HOM) with Mitsui & Co. for offshore wind inspection and maintenance. HOM partners with domestic and global firms, offering services such as quality control

[50] Hokkaido Shimbun. (2025). https://www.hokkaido-np.co.jp/article/1135377/
[51] Iwata Chizaki Construction. https://www.iwatachizaki.jp/result/detail/1060.html
[52] Iwata Chizaki Construction. (2023). https://www.iwatachizaki.jp/kigyo/press-release/2023/20231003.html
[53] Denzai. (2024). https://www.denzai.group/content/uploads/2024/04/JP_LR12500_20240425_fixed.pdf
[54] Denzai. https://www.denzai.group/en/business/heavy-lifting/
[55] Penta Ocean Construction. (2022). https://www.penta-ocean.co.jp/news/2022/221006.html
[56] Hokutaku. https://www.hokutaku-co.jp/windturbine/power/
[57] Hokutaku. https://www.hokutaku-co.jp/windturbine/power/

and inspection for wind power equipment[58].

4.2.4.2 O&M Ports

The use of O&M ports in close proximity to offshore wind sites is crucial to ensure efficient access to turbines. There are several Regional Ports in the vicinity of the offshore wind sites, which could be used as an O&M base, or existing local fishing ports may also be applicable. Local municipalities are also showing strong support for this approach, recognising the potential to boost employment and to encourage the inflow of O&M technicians and related workers. Considering the long and narrow portions of some of the proposed offshore wind sites, such as off the Hiyama coast, a solution of utilising multiple O&M ports may also prove effective.

4.2.5 Finance

Hokkaido and Sapporo City have been designated as National Strategic Special Zones and GX Financial and Asset Management Special Zones, creating an environment that facilitates investment and financing for GX-related projects[59]. North Pacific Bank and Hokkaido Bank are key regional financial institutions actively engaged in offshore wind initiatives[60]. North Pacific Bank aims to provide 2 trillion JPY in sustainable finance by FY2030, allocating 650 billion JPY to GX-related projects[61] including offshore wind[62]. The bank is also pursuing equity participation, business matching, and leveraging special zone advantages to address challenges in offshore wind development. Hokkaido Bank has invested ¥550 billion in next-generation semiconductors and offshore wind from FY2023–2025. The group aims to reach a cumulative total of about 1 trillion JPY in related investments and loans by FY2027[63]. Support from such local financial institutions will be key to promoting the transition of prefectural businesses to the offshore wind sector.

4.2.6 Workforce Development

4.2.6.1 Academia

Hokkaido's academic institutions have long excelled in environmental and sustainability research, making them highly aligned with nature-positive approaches and offshore wind development. Hokkaido University established the Renewable Energy Research and Education Centre, REREC, to cultivate generalists in the offshore wind power sector.[64] REREC is working to develop professionals capable of comprehensively managing the implementation of social systems that balance nature-

[58] Hokutaku. (2021). https://www.hokutaku-co.jp/news/2021/0414.html
[59] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/csr/nsszhokkaido.html
[60] Nikkei Shimbun. (2024). https://www.nikkei.com/nkd/company/article/?DisplayType=1&ng=DGXZQOFC28A0W0Y4A121C2000000&nik_code=0070017
[61] North Pacific Bank. (2025). https://www.hokuyobank.co.jp/ir/library/h_image/infomeeting/20250605.pdf
[62] North Pacific Bank. (2024). https://www.hokuyobank.co.jp/ir/library/h_image/infomeeting/20241205.pdf
[63] HokuHoku FG. (2025). https://www.hokuhoku-fg.co.jp/ir/mid_term/medium-term_business_plan.pdf
[64] Hokkaido University. https://www.fsc.hokudai.ac.jp/REREC/

positive and community-positive outcomes. REREC is expected to serve as a hub for developing specialised human resources in Hokkaido.

4.2.6.2 O&M Training

Currently, there are no specialised training facilities related to offshore wind power in Hokkaido. However, as part of their human resource development efforts, MOPA is aiming to establish a training centre certified by the GWO, which sets international safety and technical standards. Further, Hokkaido Electric Power Company has also announced that they are considering the establishment of an offshore wind maintenance training facility in the Donan region.[65] The demand for O&M training will be expected to increase as the general sea area projects come online in the early 2030s and coordination with existing facilities in the Tohoku Region will be key to ensure there is sufficient supply.

[65] Hokkaido Electric Power Company (2025). https://www.hepco.co.jp/info/info2025/1252919_2069.html

5 Hokkaido Offshore Wind GVA

5 Hokkaido Offshore Wind GVA

5.1 Existing GVA Studies

GVA studies are utilised to predict and evaluate the economic impacts of investments, initiatives and events across a wide range of sectors. Offshore wind-related GVA studies have also been conducted throughout Japan in recent years to assess the local benefits that can be expected through the deployment of offshore wind.

There are two existing GVA studies on Hokkaido Prefecture's OSW projects. The first was conducted by Ishikari City in 2023, with the scope including four offshore wind areas[66]. The second is a GVA study of Muroran Port conducted by Denzai[67] (Table 4). Further details regarding these studies are provided in Appendix 3.

Table 4 Summary of Existing Offshore Wind-Related GVA Studies in Hokkaido Prefecture

Organisation names	Year published	GVA	Induced employment (persons)	Scope–years	Scope–projects*
Ishikari City	2023	2.5 trillion JPY	193,444	20	4 (Ishikari Bay New Port, Shimamaki Coast, Ganwu-Minamishiribeshi Coast, & Hiyama Coast)
DENZAI K.K.	October 2020	Over 20 billion JPY	N/A	5 (2025-2030)	Muroran Port *Not an OSW project, but facility operation

As the Denzai study focuses on GVA associated with the Muroran Port, Ishikari City's study is the sole direct estimation of OSW project GVA in Hokkaido Prefecture. However, the Ishikari study offers limited granularity on prefectural procurement rates.

This study seeks to offer a neutral and independent GVA estimation considering all eight offshore wind projects in the prefecture. Insights gathered from consultations with key offshore wind stakeholders in the prefecture have been incorporated to reflect the evolving prefectural procurement landscape.

5.2 Input Data

5.2.1 Project Expenditure Estimation

Table 5 shows the totalled cost composition of the eight offshore wind

[66] Ishikari. (2023). https://www.city.ishikari.hokkaido.jp/_res/projects/default_project/_page_/001/003/724/1003724_004.pdf
[67] Nikkei. (2020). https://www.nikkei.com/article/DGXMZO65680490Q0A031C2L41000/

projects in Hokkaido Prefecture, as provided by ERM's proprietary LEnS™ model. The scope of this study includes items that are directly associated with OSW projects: development expenditure (DevEx), capital expenditure (CapEx), operational expenditure (OpEx), and decommissioning expenditure (DecomEx). The breakdown of cost packages was obtained from LEnS™ and publicly available literature[68] [69]. The total lifetime project costs of the offshore wind projects in operation and under development exceeds 5.5 trillion JPY.

Table 5 Breakdown of Hokkaido Offshore Wind Project Expenditure

Expenditure	Cost items	Costs (million JPY)	Composition ratio
DevEx (3.3%)	Development	181,334	3.3%
CapEx (80.6%)	WTG supply	1,597,081	28.8%
	WTG Transport	123,123	2.2%
	WTG Installation	38,593	0.7%
	FOU Supply (Jacket)	495,055	8.9%
	FOU Supply (Floating)	473,287	8.5%
	Mooring Supply (Floating)	92,979	1.7%
	Marine Operations (Floating)	41,917	0.8%
	Foundation (FOU) Transport	4,681	0.1%
	FOU Installation	100,340	1.8%
	Array Cable	166,530	3.0%
	HVAC: Off ExC	238,840	4.3%
	HVAC: On ExC	668,479	12.0%
	HVAC: OnSS Electr+Civils	161,816	2.9%
	Project Management	165,803	3.0%
	Insurance	30,175	0.5%
	Other	78,660	1.4%
OpEx – 20-year total (14.0%)	Generation OpEx	702,172	12.6%
	Transmission OpEx (OnSS, ExC)	6,918	0.1%
	Non-technical OpEx	69,124	1.2%
DecomEx (2.1%)	Generation & Transmission Decommissioning	117,741	2.1%

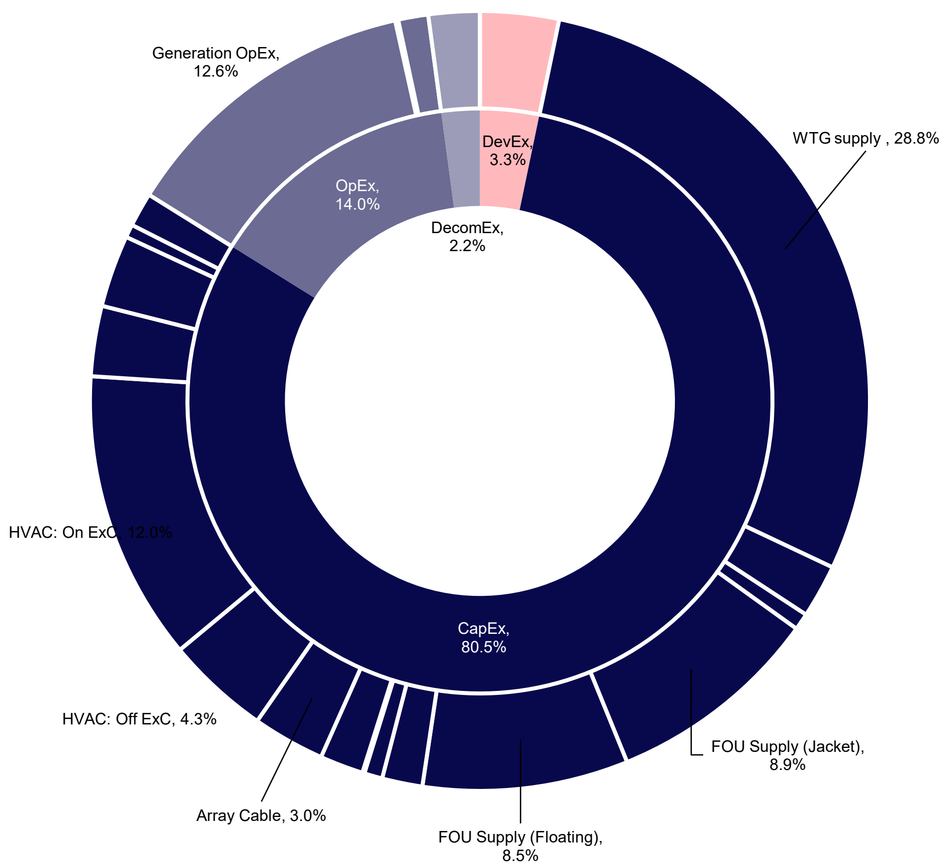
The pie chart (Figure 6) below shows the composition of the project expenditure across the eight offshore windfarms. For offshore wind projects based in Hokkaido Prefecture, CapEx accounts for over 80% of the total cost. The remainder is made up predominantly by OpEx (14.0%), followed by DevEx (3.3%) and DecomEx (2.1%).

For comparison, the breakdown of cost components for offshore wind projects in Akita Prefecture, from OEP and ERM's previous study[70], was

[68] BVG Associates. (2019). https://bvgassociates.com/wp-content/uploads/2019/04/BVGA-Guide-to-an-offshore-wind-farm-r2.pdf
[69] BVG Associates (2025). https://guidetoanoffshorewindfarm.com/wp-content/uploads/2025/06/BVGA-16464-Fixed-Guide-rF.pdf
[70] Ocean Energy Pathway (2025). https://oceanenergypathway.org/insights/socioeconomic-impact-offshore-wind-akita-prefecture/

8.1% for DevEx, 70.4% for CapEx, 18.7% for OpEx, and 2.8% for DecomEx. The increase in proportion of CapEx is primarily associated with the foundation types under consideration. Monopiles are expected to be the predominant bottom-fixed foundation type in Akita Prefecture. However, challenging seabed geology means that pin piles and jackets are likely to be favoured in Hokkaido Prefecture, though monopiles may be applicable in some limited areas. Though the selection of jacket foundations can lead to savings in steel material costs, they tend to be more costly than monopiles due to the intricate engineering and complex welding of the steel structure. Further, nearly 3 GW of the planned capacity in Hokkaido is floating offshore wind. Floating substructures for offshore wind are not yet commercial technology and are expected to remain more expensive than bottom-fixed alternatives in the future, reflecting their installation in deeper and more challenging waters.

Figure 6 Composition of Hokkaido Offshore Wind Project Expenditure



Another difference between projects in Akita and Hokkaido includes the greater onshore transmission distances seen in Hokkaido due to the weaker grid infrastructure, particularly in the southern areas. Further, the increased distance between marshalling port and project site also means that greater time is required for the offshore construction works. These two factors also have the effect of increasing the proportion of CapEx for offshore wind projects in Hokkaido.

Similar project cost estimates for projects in other geographies tend to present expenditure profiles which average approximately 65% for CapEx and 30% for OpEx[71 72]. Therefore, in comparison, the offshore wind cost breakdown for the Hokkaido Prefecture and Akita Prefecture shows a higher proportion of CapEx (80.5% and 70.4% respectively) and low proportion of OpEx (14.0% and 18.7% respectively). The discrepancy in CapEx is attributed primarily to the low level of maturity within the Japanese supply chain which adds a price premium in the procurement phase. The lower OpEx reflects the shorter assumed project lifetime of 20-years (rather than 30 years in some other markets) as well as the relative proximity of the offshore wind projects to shore and thus more efficient transfer between the O&M bases and project sites.

5.2.2 Sector Allocation

Table 6 shows the sector allocation rates for the 21 large cost items. 15 sectors were found to be relevant to the offshore wind power projects in Hokkaido. Steel (20.0%), Business Service (15.6%), Construction (13.9%), Nonferrous metal (13.9%) account for the largest share of total expenditure for the eight offshore wind projects.

Steel represents the highest share of the total costs, primarily attributed to the use of jacket-type foundations and potentially steel floating foundations in Hokkaido. Business services represent the second largest share of the total costs due to significant contributions from the development and O&M phases, as well as project management costs. Offshore installation, onshore construction and decommissioning works are distributed to construction (13.93%) whilst material costs for inter-array cables (IAC) and export cables are allocated under nonferrous metal (13.86%).

[71] BVG Associates (2025). https://guidetoanoffshorewindfarm.com/wp-content/uploads/2025/06/BVGA-16464-Fixed-Guide-rF.pdf
[72] BVG Associates (2025). https://guidetofloatingoffshorewind.com/wind-farm-costs/

Table 6 Allocation of Offshore Wind Costs to Industry Sectors

Expenditure categories	Cost items	Allocated sector
DevEx	Development	Services for business[73](100%)
CapEx	WTG supply	General purpose machine (36.2%), Electric machine (22.0%), Ceramic and stone products (21.7%), Steel (13.5%), Nonferrous metals (3.82%), Metal products (1.07%), Chemical products (0.61%), Other products (1.07%)
	WTG Shipping	Transport & telecommunication (100%)
	WTG Installation	Construction (100%)
	FOU Shipping	Transport and telecommunication (100%)
	FOU Installation	Construction (85%), Steel (12.0%), Ceramic and stone products (3.0%)
	FOU Supply (Jacket)	Steel (94.2%), Ceramic and stone products (4.9%), Other products (0.9%)
	FOU Supply (Floating)	Steel (67.0%), Ceramic and stone products (21.0%), General purpose machine (7.0%), Other products (5.0%)
	Mooring Supply (Floating)	Steel (51.0%), Metal products (33.9%), Textile Industry Products (15.0%)
	Marine Operations (Floating)	Construction (100%)
	Array Cable	Nonferrous metal (50%), Construction (50%)
	Off ExC	Nonferrous metal (50%), Construction (50%)
	On ExC	Nonferrous metal (70%), Construction (30%)
	Onshore substation	Electric machine (70%), Construction (30%)
	Management & Co.	Services for business (100%)
	Insurance	Finance and insurance (100%)
OpEx	Generation OpEx	Services for business (80.9%), Transport and telecommunication (14.6%), Education (4.5%)
	Transmission OpEx (OffSS, OnSS, ExC)	Services for business (100%)
	Non-technical OpEx	Services for business (100%)
DecomEx	Generation decommissioning	Construction (100%)
	Transmission decommissioning	Construction (100%)

5.2.3 Prefectural Procurement Rate

5.2.3.1 Scenarios for Prefectural Procurement

As highlighted in Section 4.2, many companies in Hokkaido Prefecture have entered or are beginning preparations to enter the offshore wind sector. In this study, two kinds of prefectural procurement rates, named

[73] Services for business is defined as services provided for other business establishments. It includes Goods Rental (excluding rental cars), Industrial Machinery and Equipment Rental (excluding construction machinery and equipment), Construction Machinery and Equipment Rental, Computer and Related Equipment Rental, Office Machinery and Equipment Rental (excluding computers, etc.), Sports and Recreational Equipment and Other Goods Rental, Car Rental, Advertising, TV and Radio Advertising, Newspaper, Magazine, and Other Advertising, Automobile Maintenance, Machinery Repair, Legal, Financial, and Accounting Services, Civil Engineering and Construction Services, Worker Dispatch Services, Building Services, Security Services, Other Business Services. The items in DevEx are thought to belong to Civil Engineering and Construction Services and Other Business Services.

“possible” and “potential”, were set, as defined in Section 2.3.

The “possible” prefectural procurement rates reflect current supply chain capability. Meanwhile, the “potential” prefectural procurement rates will be realised when relevant initiatives are successfully implemented to maximise local supply chain capabilities. For example, if plans to manufacture concrete floating substructures in Muroran City are realised, this could generate significant economic ripple effects for the region. Table 7 illustrates “possible” and “potential” prefectural procurement rates by cost items in Hokkaido. The total prefectural procurement rates across the project lifetime comes to 7.0% for the “possible” scenario and rises up to 22.7% for the “potential” scenario.

Table 7 Summary of Possible and Potential Prefectural Procurement Rates in Hokkaido Prefecture

Expenditure category	Cost item	Prefectural procurement rates		Examples of items locally procured (Potential)	Examples of potential organisations influencing the prefectural procurement rates
		Possible	Potential		
DevEx	Development	47%	82%	Environmental and Social Surveys, Onshore Construction Design, Permit Application	Docon (Environmental surveys), Econixe (Marine survey), Sun-S Electric & Communications (Wind condition survey), GOTEC and Nissokugiken (geophysical and geotechnical survey)
CapEx	Wind turbine generators (WTG) supply	0.2%	4.9%	Small engineering components	Mitsubishi Steel Muroran (Tower Flange Bolt)
	Wind turbine transportation	10%	10%	In-port operations, steel frames for storage.	Kuribayashi Corporation (Transportation services), Narasaki-Stax (Port Operations and Cargo Handling),
	Wind turbine installation	5%	5%	Offshore construction	Iwata Chizaki Construction (Joint Ownership of SEP Vessel)
	Foundation transportation	10%	10%	In-port operations, steel frames for storage.	Kuribayashi Corporation (Transportation services), Narasaki-Stax (Port Operations and Cargo Handling)
	Foundation installation	3%	15%	Scour Protection Installation, Pin pile installation	
	Foundation supply (Jacket)	0.5%	13%	Scour protection, Secondary steel	
	Foundation supply (floating)	0%	27%	Concrete primary structure, Secondary steel	Taisei Corporation, AIZAWA concrete
	Mooring/Anchor (floating)	0%	40%	Steel material for mooring chain	
	Marine Ops (floating)	0%	0%		

Expenditure category	Cost item	Prefectural procurement rates Possible	Potential	Examples of items locally procured (Potential)	Examples of potential organisations influencing the prefectural procurement rates
	Array Cables	0%	0%		
	Offshore export cable	2.5%	5%	Landfall Construction	GOTEC (Submarine Cable Laying)
	Onshore export cable	15%	30%	Onshore export cable laying	Hokkaidenko Corporation, Kitasapporo Densetsu
	Onshore Substation	15%	30%	Onshore substation construction	Hokkaidenko Corporation, Kitasapporo Densetsu, Iwata Chizaki Construction (Foundation Work for Battery Storage Systems)
	Insurance	0%	0%		
	Management & Co	0%	0%		
OpEx	Generation O&M （20 years）	13%	61%	Maintenance and inspection, vessel management and charter, parts repair, onshore & offshore logistics, ROV	Hokutaku (Inspection, Parts Replacement, and Repair Services), Kuribayashi (Inspection and Ship Management Services), Iwata Chizaki Construction (Joint Ownership of SEP Vessel), GOTEC (ROV), Hokuyo Kaiun (CTV operation)
	Electrical O&M （20 years）	90%	90%	Maintenance and Inspection	Hokkaidenko Corporation, Kitasapporo Densetsu
	Other O&M (20 years)	25%	50%	Maintenance and Inspection, Patrol Vessels, ROV supply	
DecomEx	Generation decom.	2%	2%	Scour protection removal	
	Transmission decom.	71%	71%	Onshore cable and substation removal	

5.2.3.2 DevEx

During the development phase, local companies have participated in assessments and surveys, demonstrating sufficient capability to manage these tasks locally. When it comes to engineering and design, a few local companies may possess the necessary capabilities to contribute. Consequently, this phase is expected to be primarily handled by large construction or consulting firms, as OSW engineering and design require specialised expertise in the field.

Regarding potential rates, the rates are projected to increase to some extent if the number of workers and the competitiveness of local organisations against external entities improve. On the other hand, items such as project management for development works are expected to remain unchanged, as the majority of project developers are based outside of Hokkaido Prefecture.

5.2.3.3 CapEx & DecomEx

Offshore wind turbine components are considered a challenging area for local companies to participate in. There are expected to be some companies in Hokkaido Prefecture with the capability to produce small turbine parts. However, supplying such components can require significant investment, as well as comprehensive dialogue and approval from turbine manufacturers, which is likely to be a barrier to entry for many local companies. Further, these companies currently produce products for other existing sectors and significant incentives to transition to offshore wind component production will be required. Whilst there are initiatives between turbine OEMs and local Japanese companies to manufacture turbine components locally in Japan[74] [75], the reality is that the majority of the WTG supply chain remains based abroad.

Transportation is expected to be challenging, as the large vessels required for importing WTGs and foundations are unlikely to be sourced locally. In both the Possible and Potential scenarios, transportation rates for WTGs and foundations are set at 10%, reflecting the role of local companies in conducting onshore staging in Hokkaido. Prefectural procurement for installation is also anticipated to be difficult, since offshore construction will be carried out by domestic or international firms that own large wind turbine installation vessels (WTIV). Hokkaido-based Iwata Chizaki has made a minor investment to own a WTIV, but multiple jack-ups will likely be required in Hokkaido simultaneously considering the expected overlap of project schedules. Patrol boats and installation of scour protection are areas where prefectural procurement is feasible.

For the foundation supply, the preparation of scour protection filter units is an area where local companies are expected to be able to participate. Further, businesses in Hokkaido Prefecture could participate in secondary steel components (such as work platforms, ladders, and boat landings) if underlying capabilities are effectively leveraged. In this study, it is assumed that the majority of floating foundations will be made from steel, but the small proportion made from concrete will have a high potential for production within Hokkaido Prefecture. Meanwhile, steel floaters are expected to remain more challenging for local manufacturing capabilities. Steel substructures will likely require shipyard facilities which are predominantly based outside of Hokkaido Prefecture, with the 10 largest domestic shipbuilders located in either the Kanto Region or Western Japan[76]. Generally, the global floating offshore wind supply chain is still developing and there is still some uncertainty regarding the capabilities required.

Onshore construction works such as cable landing, burial, and substations offer significant opportunities for local company involvement.

[74] Vestas (2025). https://www.vestas.co.jp/ja-jp/news/2025/20250730Vestas-enters-public-private-partnership-with-Japan-METI
[75] METI (2025). https://www.meti.go.jp/press/2025/06/20250624004/20250624004.html
[76] MLIT. https://www.mlit.go.jp/common/001353025.pdf

Construction firms in Hokkaido have relevant experience from projects at Ishikari Bay New Port. Since these scopes are not highly specialised in offshore wind, local companies are already well-positioned to contribute. It is noted that many construction companies in Hokkaido Prefecture are experiencing shortage of workers, so ensuring sufficient human resources will be key to securing onshore works for offshore wind.

For decommissioning works, the prefectural procurement for generation facilities (turbine and foundation) has been assumed to be equal to the offshore installation works. Meanwhile, the decommissioning of onshore transmission infrastructure is expected to allow for significant involvement of local firms.

5.2.3.4 OpEx

Prefectural procurement for generation O&M was calculated to be 13% for the possible rate and 61% for the potential rate. Thus far, companies in Hokkaido have gained experience in onshore wind O&M, with Hokutaku forming a new joint venture to enter the offshore wind O&M sector. These developments form the basis for the possible rate mentioned above.

Potential areas for further growth include entry into blade inspection, preparation of further CTVs, and investment into ROVs (remotely operated vehicles) and other maintenance equipment. Particularly regarding CTVs, in Akita Prefecture, there have been cases of local companies partnering with major domestic shipping companies owning and operating the vessels for O&M[77]. Further, there is expected to be a shortage of skilled O&M technicians in the prefecture, which will need to be addressed. The rate is expected to increase if the above is addressed successfully. The prefectural procurement rate for electrical O&M was set at 90% as there are existing capabilities within the prefecture which are expected to be leveraged.

5.3 Results

5.3.1 Possible Scenario

Based on the input data prepared above, the gross value added of the eight offshore wind projects off the coast of Hokkaido Prefecture was calculated. The results for the “possible” scenario are outlined in Table 8 below.

With the possible prefectural procurement rates, the estimated GVA by OSW projects in Hokkaido was approximately 641 billion JPY. The largest share of GVA came from direct effects, which accounted for 59%, while indirect and induced effects contributed 22% and 19% respectively.

[77] Tokyo Kisen (2021) http://www.tokyokisen.co.jp/company/news/2021/202103.html

Table 8 Summary of Possible GVA and Induced Employment Results

Effects	GVA (billion JPY)	Induced employment (persons)
Direct effects	380.7	29,367
Indirect effects (first ripple effects)	139.2	7,895
Induced effects (second ripple effects)	121.3	7,692
Total	**641.2**	**44,954**

The estimated total number of induced employment by OSW projects in Hokkaido was 44,954 persons. Similarly to the GVA, the estimated 65% of induced employment was from the direct effects, with 18% by indirect effects and 17% by induced effects.

It is noted that the induced employment calculated is the number of workers required to meet the final demand within a single year. In reality, this demand is generated over several years (e.g. 20 years for O&M activities). Therefore, it is possible that a single individual is employed over multiple years (i.e. an O&M worker working in the same position for 20 years is considered 20 persons).

Figure 7 Breakdown of Possible GVA By Industry Sector (Billion JPY)

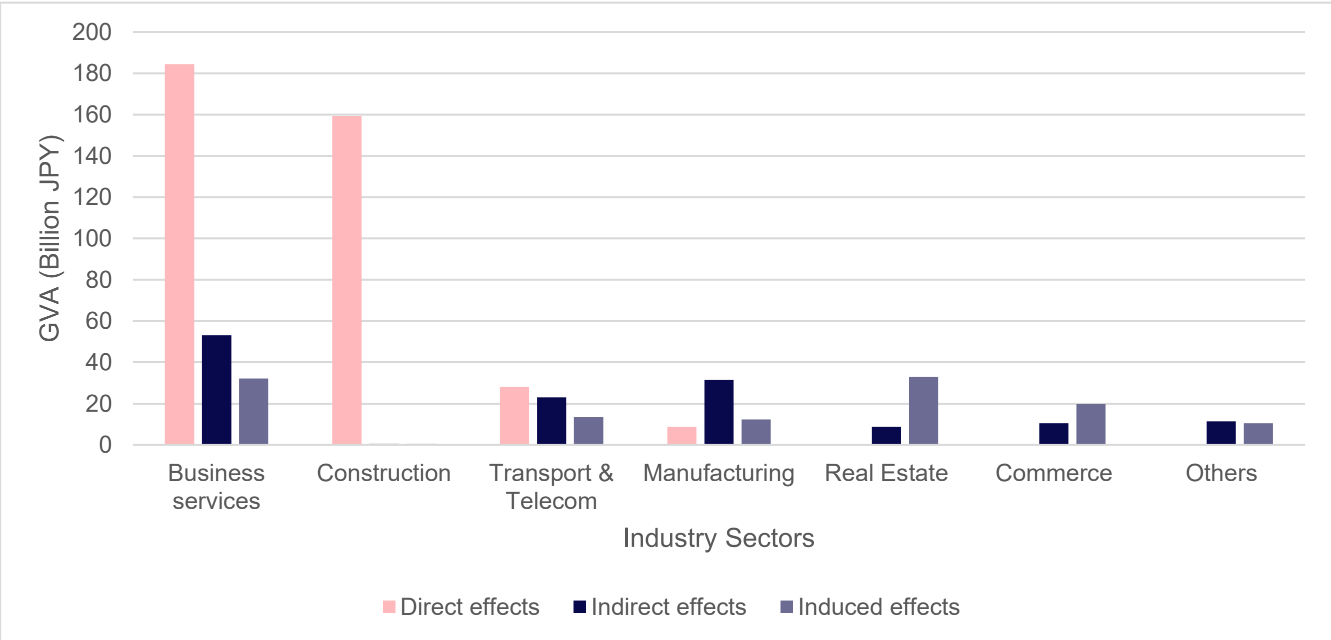
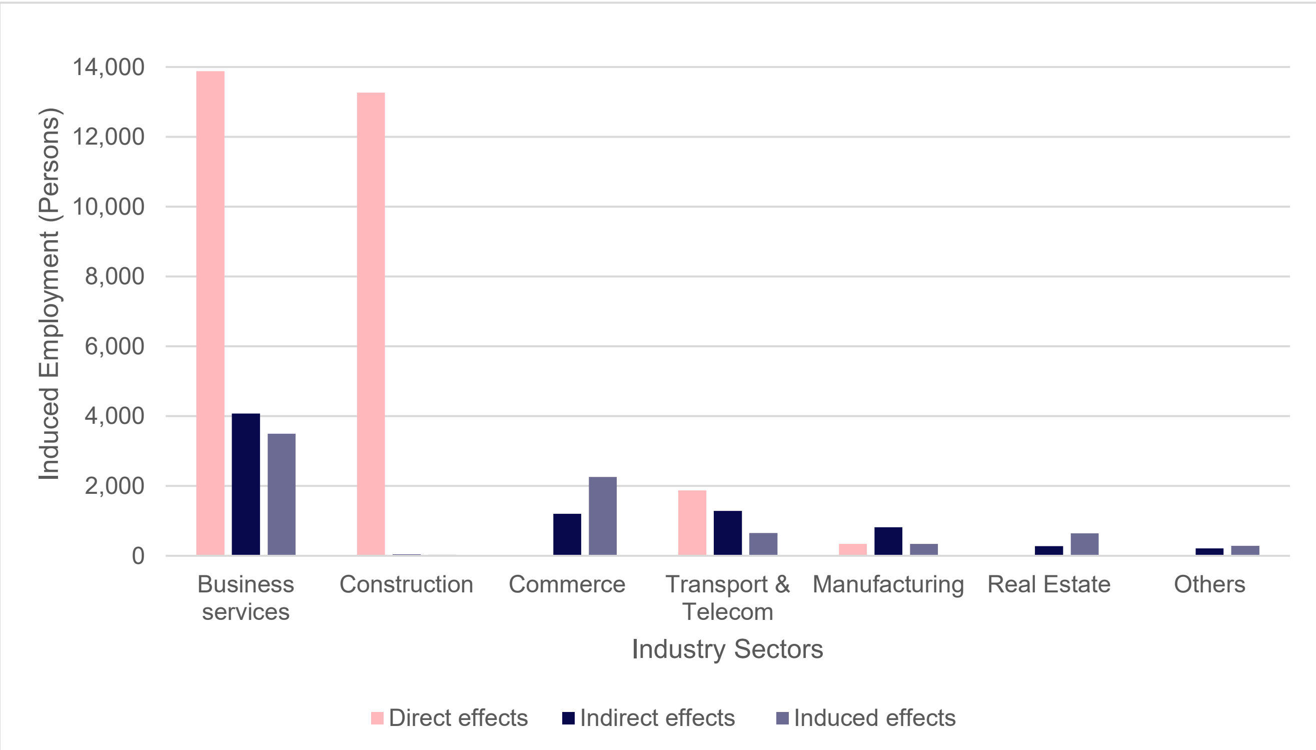


Figure 7 provides a breakdown by industry sector of the results under the "possible" prefectural procurement rates. The data indicates that the business service and the construction sector play important roles in the calculated GVA. The GVA contribution from business services was roughly 270 billion JPY, which is 42% of the total value. The direct effect within the business services sector is mainly driven by activities in the development and O&M phases, accounting for 46% of DevEx and 54% of O&M. Notable ripple effects were generated within the business services sector too, with approximately 53 billion JPY and 32 billion JPY worth of impacts in the indirect and induced effects respectively.

The construction sector followed with a GVA of approximately 160 billion JPY. More than 99% of the effects in this sector came from direct demands, with contributions of only 1.1 billion JPY from the first and second ripple effects combined.

Another important result is that the real estate and commerce sectors demonstrated high economic ripple effects despite zero direct effects being generated from the offshore wind projects. The commerce sector saw demand in both the indirect and induced effects, combining to about 30 billion JPY. This corresponds to increased household consumption driven by rising income. In the case of real estate, demand significantly increased in the secondary effects. The 9 billion JPY worth of indirect effects rose over three-fold to 32 billion JPY for induced effects. Overall, these sectors show the wide reach of the economic ripple effects from offshore wind projects.

Figure 8 Breakdown of Possible Induced Employment by Industry Sector (Persons)



Similar to the GVA results, Figure 8 shows that business services and construction contribute the greatest value toward induced employment. Business services account for almost 50% of the total number of induced jobs from the Hokkaido OSW projects, translating to an estimated 21,450 new hires. This is broken down into 13,879 persons from direct effects, 4,077 persons from the first round, and 3,494 persons from the second round of economic ripple effects.

The construction sector is expected to hire approximately 13,330 individuals, primarily through direct effects (13,270). Meanwhile the transport and telecommunication sector also generates a relatively high number of new jobs across direct and ripple effects (3,813).

Again, the commerce sector shows a relatively large number of job creations despite having zero direct effects. Around 3,500 jobs are projected to be created in this sector, with an estimated 1,204 jobs from the first round and 2,256 from the second round of ripple effects.

5.3.2 Potential Scenario

Table 9 Summary of Potential GVA and Induced Employment Results

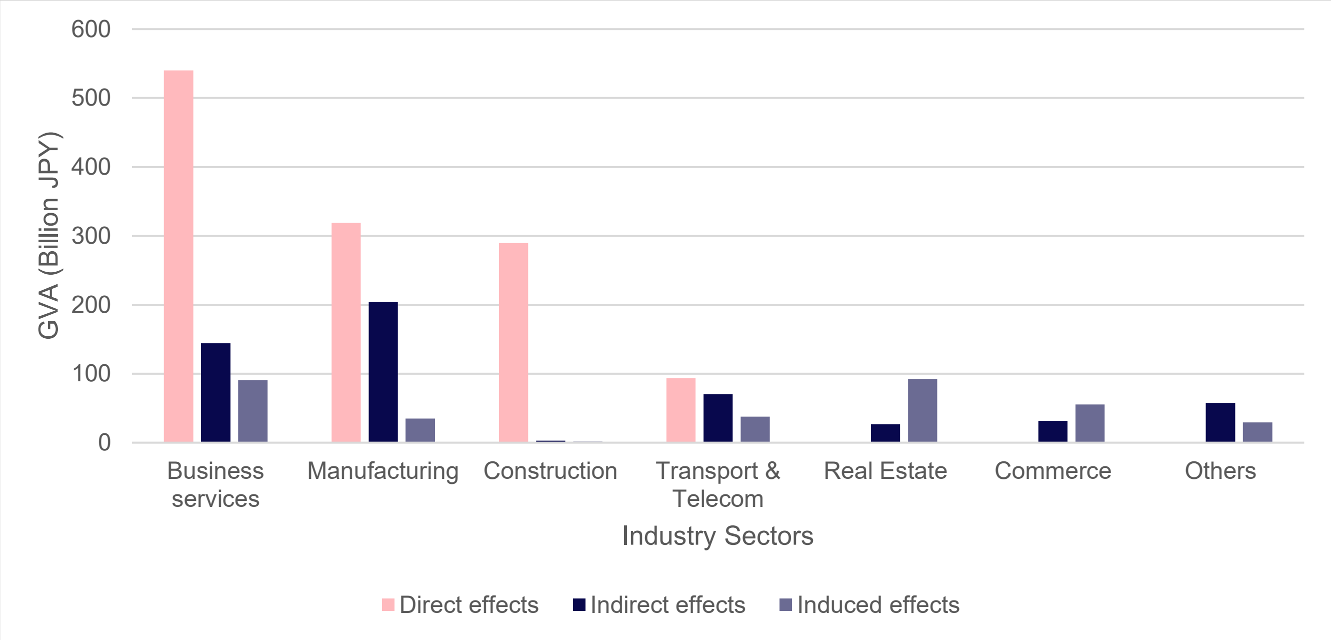
Effects	GVA (billion JPY)	Induced employment (persons)
Direct effects	1242.6	78,819
Indirect effects (first ripple effects)	537.8	23,860
Induced effects (second ripple effects)	342.5	21,711
Total	**2122.9**	**124,390**

Table 9 shows the economic ripple effects estimated under the “potential” scenario. With these prefectural procurement rates, the estimated GVA from offshore wind projects in Hokkaido Prefecture reached approximately 2.12 trillion JPY. The largest share of GVA comes from direct effects, which account for 59%, while indirect and induced effects contribute 25% and 16% respectively.

The estimated total number of induced employment by OSW projects in Hokkaido is 124,390 persons. Similarly to the GVA, the estimated 63% of induced employment is from direct effects, with 19% by indirect effects and 17% by induced effects.

Similar to the “possible” scenario, the business services sector was found to play the strongest role in the economic impacts of OSW (Figure 9). The estimated GVA was approximately 775 billion JPY in this sector, which accounts for 36% of the total. As in the possible scenario, the potential scenario shows that O&M and DevEx continue to make up the majority of the direct effect within this sector, with DevEx accounting for 28% and O&M rising to 66%. In terms of the employment effects, this sector is estimated to have more than 62,000 workers, which accounts for about 50% of the total number of the estimated job creation.

Figure 9 Breakdown of Potential GVA By Industry Sector (Billion JPY)



Likewise, the construction sector also contributes to the economic impacts. The estimated GVA of this sector was about 294 billion JPY. This figure is the second largest, accounting for about 14 % of the total. The employment effect of this sector is 24,375, approximately 20 % of the estimated potential job creation.

5.3.3 Possible-Potential Comparison

5.3.3.1 GVA

A comparison of the possible and potential GVA by industry sector is shown in Figure 10. The estimated GVA with potential rates, about 2,122 billion JPY, is over three times larger than the result of 641 billion JPY for the possible prefectural procurement rates. This significant increase highlights the economic impact of enhancing local supply chains across both CapEx and OpEx phases.

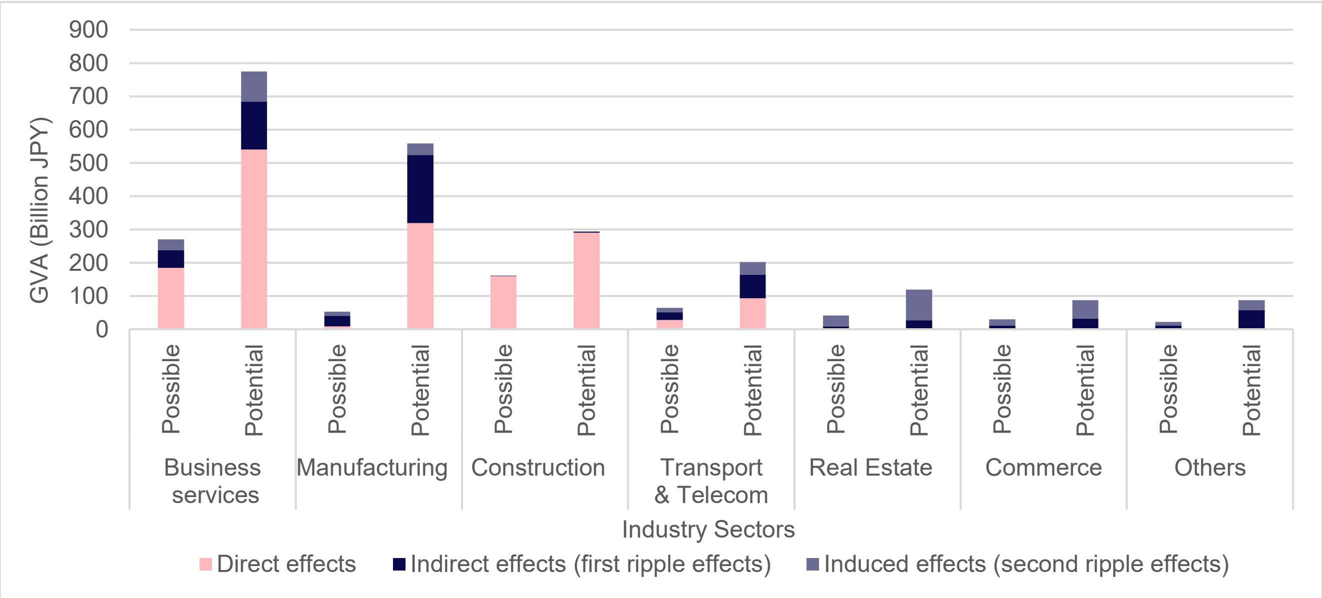
A major contributor to this rise is the business services sector, where final demand increases from 269 billion JPY to 775 billion JPY, accounting for 34% of the total GVA increase. This was primarily driven by the nearly 5-fold rise in prefectural procurement rates for generation O&M, which represent 13% of total costs. Increased prefectural procurement for development expenditures also contributes to the rise of the business service sector, particularly in assessment jobs such as geophysical and geotechnical surveys.

Under the potential scenario, the manufacturing sector ranked second in terms of GVA, following the business service, construction, and transport and telecommunications. The manufacturing sector was ranked fourth in the possible scenario. The increase in the manufacturing sector is largely attributed to the potential for local supply of concrete floating foundations, increasing the supply rate to 27%. This outlines the future importance of supply chain initiatives relating to floating offshore wind, although there remains some uncertainty regarding what the predominant floater design will be.

For onshore construction works where prefectural procurement is “possible”, further increases in prefectural procurement can be achieved through securing the necessary human resources. As a result, the final demand for onshore construction work will rise by more than 130 billion JPY, accounting for approximately 15% of the total demand increase.

Overall, the comparison between possible and potential prefectural procurement rates suggests that targeted efforts to increase local supply chain capabilities can greatly contribute to regional economic benefits. Section 7 discusses measures that could allow for prefectural procurement to exceed the possible rates and realise the potential GVA.

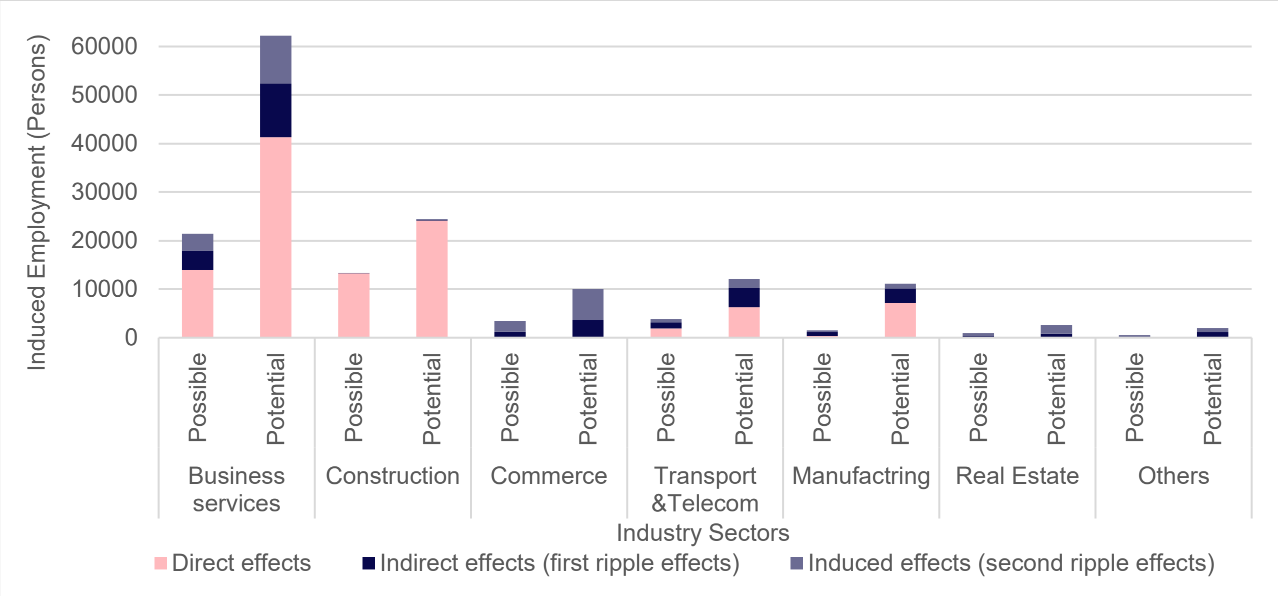
Figure 10 Comparison of Possible and Potential GVA by Industry Sector (Billion JPY)



5.3.3.2 Induced Employment

The potential employment effects (124,390 persons) increased by nearly 180% compared to the results with possible rates (44,954 persons). Business services and construction contribute the greatest value in both the possible and potential scenarios. The business services sector sees an increase of 40,795 persons under the potential scenario compared to the possible scenario, accounting for approximately 51% of the total employment increase (79,436 persons).

Figure 11 Comparison of Possible and Potential Induced Employment (Persons)



The manufacturing sector again shows an increase in employment due to rising procurement rates. Under the possible scenario, it ranked fifth, but in the potential scenario, it climbs to fourth place. Manufacturing is expected to employ 11,115 people under the potential scenario, which is 6.9 times more than its total employment under the possible scenario. This growth rate is higher than that of the business services and commerce sectors, which each show a 7-fold increase.

5.3.3.3 Comparison With Akita Offshore Wind GVA

In Akita Prefecture's GVA study[78], the possible scenario estimated a GVA of 356 billion JPY and 33,999 induced jobs (Hokkaido: 641 billion JPY and 44,954 jobs), while the Potential scenario projected 570 billion JPY and 51,908 jobs (Hokkaido: 2,122 billion JPY and 124,390 jobs). For reference, the total offshore wind capacity in Akita Prefecture considered was approximately 2.6 GW and is thus roughly 40% of the 6.4 GW assumed for Hokkaido Prefecture.

Akita Prefecture has made notable progress in raising awareness and understanding of offshore wind among local businesses. Therefore, the "possible" prefectural procurement rates, based on current capabilities, are generally higher in Akita Prefecture. This is also reflected in the smaller difference in Akita Prefecture between the "possible" and "potential" GVA results compared to Hokkaido Prefecture.

The primary driver for the over three-fold difference between the potential

[78] It should be noted that Akita's GVA estimates were developed prior to Mitsubishi Corporation's withdrawal from the Round 1 projects in Akita and therefore do not reflect the potential impact of this change on future project implementation or regional economic outcomes.

GVA values for Akita and Hokkaido Prefecture is the capacity of the planned offshore wind developments outlined above. Further, while floating projects off the coast of Akita Prefecture were limited to the two turbine NEDO demonstration project, there are two Preparatory Areas in Hokkaido, approaching up to 3 GW in total capacity. The potential for local manufacturing of concrete floating foundations therefore has a significant impact on the Hokkaido Prefecture GVA. Additionally, Muroran City in Hokkaido Prefecture offers a stronger local industrial base in steel manufacturing, presenting greater potential for prefectural involvement in offshore wind supply chains.

5.4 Other Economic Benefits

Offshore wind power projects offer substantial economic benefits beyond job creation and supply chain development. Local governments and communities benefit from mechanisms such as fixed asset taxation and the Regional Coexistence Fund. These frameworks provide long-term fiscal stability and support investments in fisheries, education, disaster preparedness, and infrastructure. In the offshore area of Yurihonjo City, Akita Prefecture (845 MW, 13 MW x 65 turbines), the estimated tax revenue over a 20-year project period from the initial Round 1 project plans was approximately 20 billion JPY[79]. Hokkaido's Kaminokuni Town estimates the annual tax revenue to be roughly 23 million JPY per turbine[80].

The Regional Coexistence Fund, contributed to by selected developers under the Renewable Energy Sea Area Utilization Act, is calculated based on installed capacity and occupation period. In Hokkaido alone, with approximately 6.3 GW of planned offshore wind capacity, the fund could exceed 47 billion JPY. Effective use of both the fixed asset tax and the Coexistence Fund will be crucial in addressing regional challenges such as depopulation and maximising the socioeconomic impact of offshore wind development.

[79] Yurihonjo City. (2023). https://www.city.yurihonjo.lg.jp/1001504/1002001/1003993.html
[80] Kaminokuni Town. (2021). https://www.town.kaminokuni.lg.jp/hotnews/files/00000300/00000350/20211213133646.pdf

6 Offshore Wind Opportunities in Northern Japan

6 Offshore Wind Opportunities in Northern Japan

6.1 Regional Economic and Industrial Landscape

Beyond Hokkaido Prefecture, Northern Japan holds strategic importance for Japan's offshore wind ambitions. As shown in Figure 12 below, a significant portion of the northern coast of Japan benefits from strong wind resources, with annual mean wind speeds ranging from 7 to 9 m/s.

Figure 12 Map of Northern Japan, Including Mean Offshore Wind Speeds at 150 m Elevation

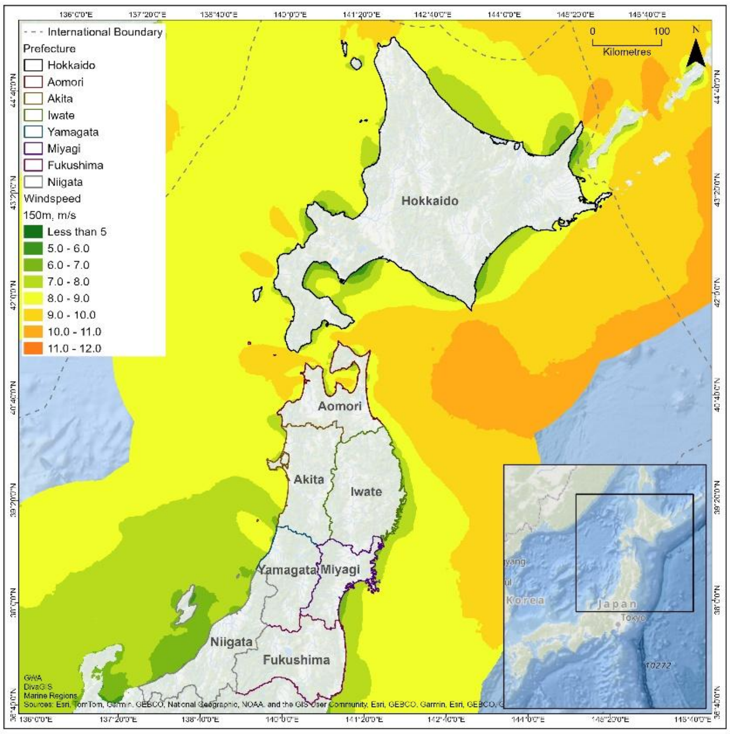


Table 10 summarises key characteristics of the eight prefectures considered within Northern Japan. The economic structure of Northern Japan is diverse, with each prefecture exhibiting distinct characteristics. Hokkaido, the largest prefecture by land area, leads in total gross prefectural product (GPP), while Miyagi and Niigata also contribute significantly. However, for per capita GPP Fukushima and Miyagi rank highest, reflecting differences in industrial productivity and population density.

Table 10 Summary of Key Statistics by Prefecture in Northern Japan

Prefecture	Land area (km^2)[81]	Population[82]	GPP (million JPY) [83]	GPP per capita (million JPY)[84]
Hokkaido	83,422.27	5,044,825	20,889,250	4.14
Aomori	9,645.1	1,185,767	4,439,055	3.74
Iwate	15,275.05	1,153,900	4,797,050	4.16
Miyagi	7,282.3	2,224,980	9,614,668	4.32
Akita	11,637.52	907,593	3,629,335	4.00
Yamagata	9,323.15	1,012,355	4,340,427	4.29
Fukushima	13,784.39	1,771,314	7,864,963	4.44
Niigata	12,583.88	2,110,754	9,042,891	4.28

The region's industrial base is generally skewed toward the primary and tertiary sectors, with agriculture, fisheries, and services playing dominant roles, as seen in Table 11. The secondary sector, particularly manufacturing, lags behind national averages in several prefectures and few prefectures specialise in manufacturing directly applicable to offshore wind, such as steel processing and shipbuilding.

Table 11 Summary of Key GPP Share by Sector Within Northern Japan

Prefectures	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	GPP Share of Construction (%)	GPP Share of Manufacturing (%)	Key Manufacturing Industries
National Average	1.0	25.6	72.3	5.2	19.2	-
Hokkaido	4.2	16.4	77.7	7.6	8.7	Food products
Aomori	4.3	20.6	75.1	6.8	14.0	Food products
Iwate	3.0	26.7	70.3	7.2	18.1	Transportation equipment
Miyagi	1.2	24.3	74.5	6.0	15.3	Food products
Akita	2.5	25.8	71.7	8.3	19.6	Electronic parts / devices / electronic circuits
Yamagata	2.4	33.1	64.5	5.3	26.3	Electronic parts / devices / electronic circuits
Fukushima	1.2	34.8	63.9	7.8	26.6	Chemicals
Niigata	1.5	31.2	67.4	6.3	22.5	Chemicals

Further, as is the case with Hokkaido Prefecture, the wider Northern Japan region is also grappling with population decline and ageing

[81] Statistics Bureau of Japan. (2025) https://www.stat.go.jp/data/nihon/01.html
[82] Statistics of Japan. (2025) https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&toukei=00200241&bunya_l=02&bunya_s=0201&tstat=000001039591&cycle=7&year=20250&month=0&tclass1=000001039601&stat_infid=000040306651&result_back=1&result_page=1&tclass2val=0
[83] Cabinet Office. (2022) https://www.esri.cao.go.jp/jp/sna/data/data_list/kenmin/files/contents/main_2022.html
[84] Calculation Method: Total Population/Gross Prefectural Product

demographics. These trends are particularly acute in rural areas, where workforce shortages are already impacting the construction and manufacturing sectors. Addressing these challenges requires coordinated efforts in workforce development, training, and talent retention across the region.

6.2 Energy Policy of Northern Japan

Northern Japan holds some of the country's most abundant renewable energy resources, particularly in wind and solar. Prefectures such as Aomori and Iwate already generate over 40% of their electricity from renewables. In Aomori, if the target for installed renewable capacity is achieved and the introduction of FIT (feed-in tariff)-certified but yet-to-be-operational facilities progresses by FY2030, the share of renewables is expected to reach over 60%. (Table 12). These ambitious targets reflect strong local policy support, and a growing recognition of the role renewable energy can play in regional revitalisation.

Table 12 Renewable Energy Overview by Prefecture in Northern Japan

Prefecture	RE Installed Capacity (Excluding Hydro) (MW)[85]	Renewable Energy Target (Year & % or MW)	Renewable Energy Share of Generation Mix (%)[86]	Main Renewable Sources[87]
Hokkaido	3,296	8,240 MW by FY2030	15.0	Solar Power
Aomori	1,791	36% by FY2030 (from non-FIT sources)	59.0	Wind Power
Iwate	1,492	2,081 MW by FY2025	43.2	Wind Power
Miyagi	2,300	3,800 MW by FY2030	9.4	Solar Power
Akita	1,164	1,759 MW by FY2025	12.5	Wind Power
Yamagata	517	1,530 MW by FY2030	3.5	Wind Power
Fukushima	3,425	4,520 MW by FY2030	9.5	Solar Power
Niigata	516	Additional 1,700 MW by FY2030	0.9	Solar Power

However, the region's renewable energy deployment is constrained by infrastructure limitations such as grid capacity. Further, there have been cases of local opposition to renewable energy projects in the region,

[85] Ministry of Environment. https://repos.env.go.jp/web/target/target
[86] The generation results reflect for April 2025. Renewable Energy refers to sources such as wind power, solar power, and geothermal energy. METI. (2025) https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.enecho.meti.go.jp%2Fstatistics%2Felectric_power%2Fep002%2Fxls%2F2025%2F2-2-2025.xlsx&wdOrigin=BROWSELINK
[87] Ibid.

resulting in prefectures such as Aomori[88] and Miyagi[89] introducing new zoning ordinance to promote the deployment of solar and onshore wind with greater consideration for the local environment.

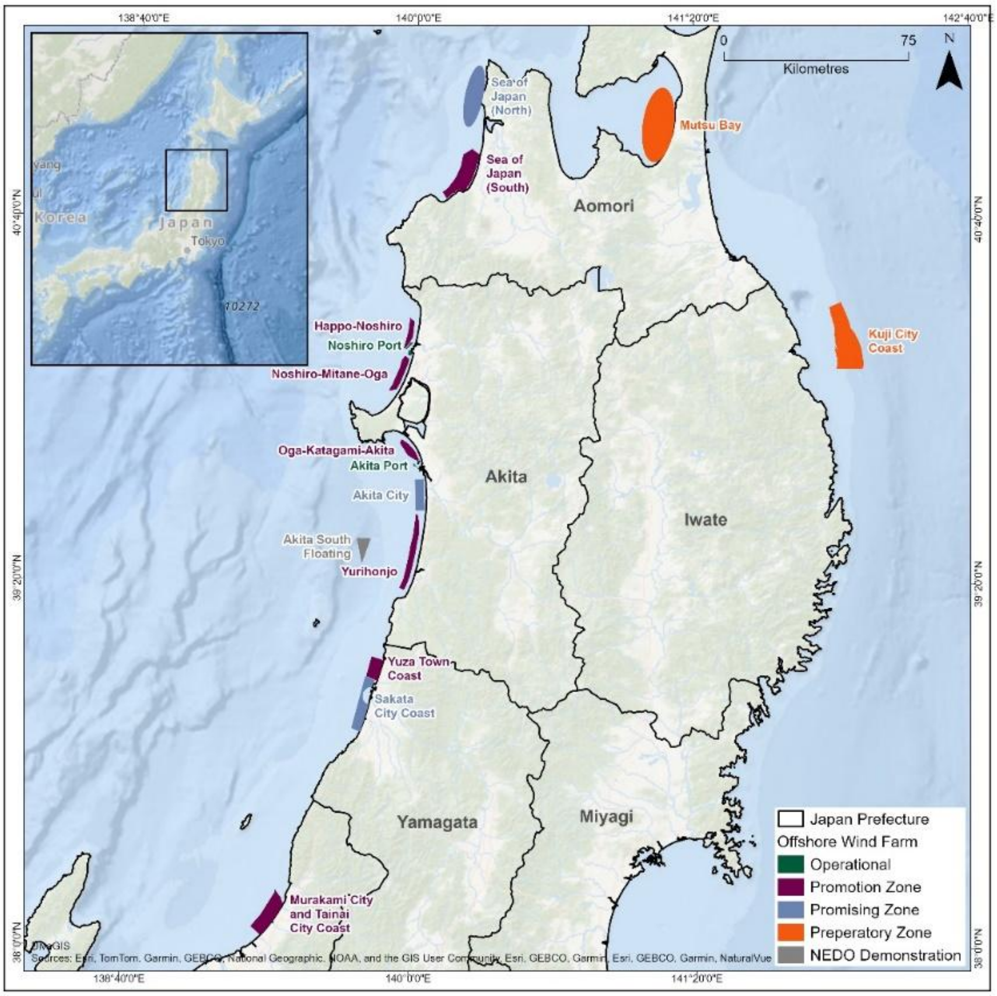
Further details on the economic, industrial and policy context for offshore wind in Northern Japan are provided as part of Appendix 2.

6.3 Offshore Wind in Northern Japan

6.3.1 Existing Offshore Wind Projects

As outlined in the 2020 Vision for Offshore Wind Power Industry (1st), Japan aims to auction 10 GW of offshore wind capacity by 2030, with the Tohoku Region expected to contribute between 4.07 GW and 5.33 GW—highlighting its central role in achieving national OSW goals.[90]

Figure 13 Map of Offshore Wind Projects in Tohoku Region and Niigata Prefecture



[88] Aomori Prefecture (2025). https://www.pref.aomori.lg.jp/soshiki/kankyo/kankyo/reene_kyousei_jyourei_seido.html
[89] Miyagi Prefecture (2025). https://www.pref.miyagi.jp/soshiki/saisei/kyousei_tax.html
[90] METI. (2020) https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/dl/vision/vision_first.pdf

There are currently 15 offshore windfarms at various stages of their project lifecycles in the Tohoku Region and Niigata Prefecture, totaling 6.3 GW. The site boundaries of these projects are shown in Figure 13, with details summarised in Table 13 below. When combined with the eight offshore wind projects in Hokkaido (detailed in Section 3.1), this represents 12.7 GW of offshore wind capacity in Northern Japan across 23 projects, of which 250 MW is currently operational, showing the significant growth expected in the coming years. For reference, there are 20 offshore wind projects across the rest of Japan (one Port Area project, three Promotion Zones, three Promising Zones, and 13 Preparatory Zones), as of January 2026.

Table 13 Summary of Offshore Wind Projects in Tohoku Region and Niigata Prefecture

Prefecture	Project Name	Technology	Project Developer (s)	Status (expected COD)	Project Capacity[91]
Aomori Prefecture	Sea of Japan (South)	Bottom-fixed	Tsugaru Offshore Energy GK[92]	June 2030	615 MW
	Sea of Japan (North)	Bottom-fixed	Pre-tender	Promising Zone	300 MW
	Mutsu Bay	Bottom-fixed	Pre-tender	Preparatory Zone	800 MW[93] (estimated based on EIA)
Iwate Prefecture	Kuji City	Floating	Pre-tender	Preparatory Zone	400 MW[94] (estimated)
Akita Prefecture	Akita & Noshiro Port	Bottom-fixed	Akita Offshore Wind Corp.[95]	January 2023	138.6 MW
	Noshiro City, Mitane Town, Oga City	Bottom-fixed	To be re-tendered	Promotion Zone	494 MW[96]
	Yurihonjo City	Bottom-fixed	To be re-tendered	Promotion Zone	845 MW[96]
	Oga City, Katagami City, Akita City	Bottom-fixed	Oga Katagami Akita Offshore Green Energy LLC.[97]	June 2028	315 MW
	Happo Town, Noshiro City	Bottom-fixed	Offshore Happo Noshiro Offshore Wind[98]	June 2029	375 MW

[91] Agency for Natural Resource and Energy (2025). https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/seido.html
[92] JERA Co., Inc., Green Power Investment Co., Ltd. and Tohoku Electric Power Co., Inc.
[93] Ministry of Environment (2018). https://assess.env.go.jp/2_jirei/2-2_search/result_houhou.html?start=1&maxrows=20&keyword=&jigyokbn1=0507&state=02&yy1=&yy2=&maxcount=13&page=search_result&jid=0000_2017_038-0-0&reassess=0
[94] Based on consultations with regional stakeholders.
[95] Marubeni Corporation, OBAYASHI CLEAN ENERGY CORPORATION, Tohoku Electric Power Co., Inc., Cosmo Eco Power Co., Ltd., Kansai Electric Power Co., Inc., Chubu Electric Power Co., Inc., The Akita Bank, Ltd., Omori Co., Ltd., Sawakigumi Corporation, Katokensetsu.Co.Ltd., Kanpu Co., Ltd., Kyowa Oil Co., Ltd., and Sankyo Co., Ltd.
[96] Based on planned capacity of withdrawn Mitsubishi Corporation project.
[97] JERA Co., Inc., Electric Power Development Co., Ltd., Tohoku Electric Power Co., Inc., ITOCHU Corp.
[98] ENEOS Renewable Energy Corporation, Iberdrola Renewables Japan Co., Ltd., and Tohoku Electric Power Co., Inc.

Prefecture	Project Name	Technology	Project Developer (s)	Status (expected COD)	Project Capacity[91]
	Akita South (NEDO)	Floating	Akita Floating Offshore Wind Corp.	2029	30+ MW
	Akita City	Bottom-fixed	Pre-tender	Promising Zone	370 MW
Yamagata Prefecture	Yuza Town	Bottom-fixed	Yamagata Yuza Offshore Wind LLC[99]	June 2030	450 MW
	Sakata City	Bottom-fixed	Pre-tender	Promising Zone	504 MW
Niigata Prefecture	Murakami City, Tainai City	Bottom-fixed	Mitsui & Co., RWE, Osaka Gas	June 2029	684 MW

6.3.2 Promotion Zones

Seven offshore wind Promotion Zones have been designated throughout the Tohoku Region and Niigata prefecture, with two sites auctioned in Round 1, three sites in Round 2, and two sites in Round 3. These projects are all located on the Sea of Japan coast, with developers progressing project plans in Aomori, Akita, Yamagata and Niigata Prefectures. Commercial operations for these projects are expected between 2028 and 2030.

However, some awarded projects have encountered challenges in the current business environment. On 27th August 2025, Mitsubishi Corporation announced its withdrawal from the three offshore wind projects won in the Round 1 tender (of which two are located in Akita Prefecture), citing increased costs due to factors such as global inflation and supply chain constraints[100]. In response, the national government announced its plans to retender the three sites.[101] In December 2025, METI released the findings from their analysis of factors contributing to the Round 1 OSW projects[102], which will be incorporated within future auction frameworks.

Where OSW sites have been awarded through previous auction rounds, the project developers have begun planning regional development initiatives. For example, for the Murakami-Tainai coast project, five priority areas have been identified: (1) fostering new industries and job creation, (2) human resource development and education, (3) tourism promotion, (4) fisheries revitalisation, and (5) support for local livelihoods. Specific

[99] Marubeni Corporation, The Kansai Electric Power Co., Inc., BP Iota Holdings Limited, Tokyo Gas Co., Ltd., and Marutaka Corporation
[100] Mitsubishi Corporation (2025). https://www.mitsubishicorp.com/jp/ja/news/release/2025/20250827002.html
[101] METI (2025). https://www.meti.go.jp/speeches/kaiken/2025/20250905001.html
[102] METI (2025). https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/yojo_furyoku/pdf/041_01_00.pdf

initiatives within these areas are finalised through discussions within the Committee meetings to ensure long-term regional benefits.[103]

6.3.3 Promising and Preparatory Zones

In addition to the Promotion Zones, there are additional Promising and Preparatory Zones which are being developed for future auction rounds. There are three Promising Zones located in Aomori, Akita and Yamagata Prefecture respectively, although these sites are yet to commence discussions in Committee meetings. Further, there are Preparatory Zones in Aomori and Iwate Prefecture which are continuing to progress consultations with fishery stakeholders.

It is noted that the Kuji City coast site in Iwate Prefecture is the only commercial floating offshore wind project in territorial waters. However, a NEDO floating demonstration project is under development by a Marubeni Corporation-led consortium off the Akita South coast.

Though both Miyagi[104] and Fukushima Prefecture[105] have considered the offshore wind potential off their coasts, no OSW sites are currently designated within METI's auction pipeline. Notably, Fukushima Prefecture was previously the site of a METI-commissioned floating demonstration project. The project tested floating offshore wind technologies with a 2 MW turbine, a 7 MW turbine, a floating substation, and a 5 MW turbine added in 2016.[106] The project was decommissioned in FY2021.

6.3.4 Offshore Wind Industry Organisations in the Tohoku Region

To promote the growth of the local supply chain, industry organisations have been active in Akita, Yamagata and Aomori Prefectures.

Akita Wind Power Consortium, established in September 2013, brings together municipalities, local industries, financial institutions, and manufacturers from inside and outside the prefecture[107]. The initiative promotes "Made-in-Akita" and aims to foster industries compatible with wind power, strengthening regional capabilities and economic resilience.

In Yamagata Prefecture, to maximise economic benefits from offshore wind, the Yuza Offshore Wind Power Industry Promotion Platform was launched[108]. The organisation brings together local stakeholders and the Yuza Town coast offshore wind project developer to promote industrial development, product distribution, business matching, clean energy use, and support for agriculture, forestry, and fisheries.

[103] Murakami City. (2024) https://www.city.murakami.lg.jp/uploaded/life/88993_212445_misc.pdf
[104] Miyagi Prefecture (2018). https://www.pref.miyagi.jp/soshiki/kankyo-s/wind-power-generation-4th.html
[105] Fukushima Prefecture (2025). https://www.pref.fukushima.lg.jp/uploaded/attachment/697272.pdf
[106] Fukushima Offshore Wind Consortium. https://www.fukushima-forward.jp/english/index.html
[107] Akita Wind Power Consortium. https://www.awpc.jp/
[108] Yuza Offshore Wind Power Industry Promotion Platform. https://yowp.jp/

The Aomori Wind Energy Promotion Council was established in 2021 to nurture businesses aiming to enter the wind power sector through collaboration between industry, academia, government and finance[109]. The Council conducts seminars and networking events, and there are subcommittees which conduct research across the wind power lifecycle: planning and research, transportation and construction, operation and maintenance, and human resource development.

Thus far, each organisation has been a discrete initiative, primarily focused on developing the wind power industry in their respective prefectures. However, as the regional offshore wind industry grows in the coming years, greater coordination across prefectural boundaries is expected to become important. To support this transition, the Tohoku Bureau of Economy, Trade and Industry have conducted studies on building regional supply chains, drawing on European case studies of offshore wind clusters. These studies emphasise the formation of regional consortia involving local businesses, major corporations, and government entities. The approach promotes deep local engagement through the prefecture-level initiatives while encouraging cross-regional collaboration to strengthen industrial capacity and ensure inclusive economic benefits.[110]

6.4 Northern Japan Offshore Wind Market Size

In addition to the eight offshore wind projects in Hokkaido Prefecture, ERM's proprietary tool LENS™ was used to calculate the expected project costs for the 15 offshore wind projects in the Tohoku Region and Niigata Prefecture (Table 14). The calculation methodology here is as discussed in Section 2 and Appendix 1.

ERM's estimates of the 23 offshore wind projects totaling 12.7 GW considered here equate to over 10 trillion JPY. Of this total, approximately 77% corresponds to the CapEx phase, followed by 16% in the OpEx phase, 5% in the DevEx phase and 2% in the DecomEx phase. Comparing the expenditure profiles for Hokkaido and Tohoku & Niigata, it can be seen that the proportion of CapEx is higher in Hokkaido, reflecting the relative difficulties of the project sites which are expected to employ jacket and floating foundations. Meanwhile, the DevEx and OpEx costs are higher for the Tohoku and Niigata region as these tend to scale primarily by number of projects, and number of WTGs (lower average WTG rating expected in Tohoku and Niigata region due to more projects with earlier CODs).

[109] Aomori Wind Energy Promotion Council. https://www.awepc.jp/
[110] Tohoku Bureau of Economy, Trade and Industry (2025). https://www.tohoku.meti.go.jp/s_shigen_ene/new_energy/topics/250403.html

Table 14 Summary of Expected Project Expenditure of Offshore Wind Projects in Northern Japan[111]

Region	Hokkaido	Tohoku & Niigata	Total (Northern Japan)
Number of OSW Projects	8	15	23
Project Capacity (GW)	6.4	6.3	12.7
DevEx (million JPY)	181,334	323,227	504,562
CapEx (million JPY)	4,477,359	3,576,159	8,053,519
OpEx - 20-year total (million JPY)	778,214	879,412	1,657,626
DecomEx (million JPY)	117,741	112,307	230,048
Total Expenditure (million JPY)	**5,554,649**	**4,891,105**	**10,445,754**

Local supply chain development has proceeded thus far at a prefecture-by-prefecture level. However, as outlined in Section 6.4, considering the offshore wind industry from a more regional perspective shows the scale of opportunity available. Ensuring that the necessary initiatives are in place to allow local businesses to maximise their involvement in the 10 trillion JPY of offshore wind demand is crucial. This will allow for significant socioeconomic ripple effects for local communities to be achieved.

[111] *Note: The values provided are strictly total project expenditure and do not account for local procurement. Neither the offshore wind related GVA of the Tohoku & Niigata region, nor the GVA of the entire Northern Japan, is explicitly calculated here due to the lack of availability of the interprefectural input-output analysis tools.*

7 Recommendations

7 Recommendations

As outlined in Section 5, looking at Hokkaido Prefecture alone, offshore wind offers the opportunity to generate between 641 billion JPY to 2.1 trillion JPY in economic ripple effects for the local economy. When considering the wider Northern Japan region, the total project expenditure is estimated to exceed 10 trillion JPY across the 12.7 GW regional pipeline which could translate to trillions of yen of potential GVA.

However, through the GVA analysis and consultations conducted in this study, several key challenges have been identified for the development of the OSW industry in Northern Japan. These barriers for local businesses include the fragmentation of local supply chain initiatives and the lack of visibility of long-term market opportunities. Such obstacles need to be addressed for local businesses to be able to confidently commit to the large-scale investments that may be required to enter the OSW sector. Five key recommendations to tackle these challenges, drawn from international and domestic case studies, are outlined below.

7.1 #1: Map industrial strengths throughout Japan to set direction for Northern Japan offshore wind supply chain development

- **A national-level assessment of industrial capabilities will better define roles that each region's supply chain can play to support offshore wind projects.**
- **Wider coordination among national government, prefectures, municipalities, and local industry is key to understanding existing strengths in Northern Japan.**
- **In Northern Japan, localised industrial strengths and regional offshore wind potential offer opportunities for OSW supply chain participation, with capability gaps filled through collaboration with domestic and international partners.**

A comprehensive mapping of existing industrial strengths in each region can ensure effective development of the offshore wind supply chain across Japan. The 2nd Offshore Wind Industry Vision document touches on regional characteristics such as the floating offshore wind potential in Hokkaido, and existing WTG-related suppliers and shipbuilding in Kyushu. However, the national government, in collaboration with local government and stakeholders, could lead efforts to further understand the strengths and weaknesses of each region to define the roles that the local supply chains can play in the OSW sector. This analysis should be conducted in the context of both supplying into projects domestically and throughout the APAC region, to establish a local OSW industry strategy for each region in Japan. This resulting regional strategy for Northern Japan should play to the region's existing capabilities and complement the functions of the supply chains that will be developed in central and western Japan.

By considering the role of Northern Japan within the entire offshore wind industry, a greater focus can be provided to the supply chain development initiatives in the region. In turn, this provides greater support for local businesses to make necessary investments, as well as potentially attracting domestic and international suppliers to the region.

7.1.1 Industrial Strengths for Offshore Wind in Northern Japan

As outlined in Chapters 4 and 6, whilst supply chain considerations are progressing throughout Northern Japan, the region's industrial profile may present challenges for participation in some parts of the offshore wind value chain. Considering the percentage of manufacturing sectors within the regional industry, Hokkaido (8.7%) falls significantly below the national average (19.2%) whilst the Tohoku Region (20.1%)[112] is in the vicinity of this average value. Sectors such as shipbuilding offer high potential for transition to offshore wind, through manufacturing of key components such as monopiles and floating substructures. However, many of the major domestic shipbuilding firms are based in Western Japan. Further, much of the European OSW supply chain has leveraged existing expertise from the offshore O&G but very few companies in Northern Japan have such experience. This means that throughout Northern Japan, there is generally a weaker industrial base for sectors with high relevance for offshore wind.

However, there are also cases of localised expertise throughout the region, such as steel manufacturing in Muroran City, Hachinohe City, Sakata City, and the Tsubame Sanjo area. Further, there are capabilities within automobile and electronic component manufacturing throughout the region. Table 15 shows an initial mapping of industrial strengths relevant for offshore wind for each prefecture within Northern Japan.

Domestically, there is precedent for companies which manufacture automobile components becoming a key supplier within the wind power sector, such as NSK through the production of bearings[113]. Further, power semiconductors (e.g. inverters) play a critical role in wind power generation which presents an opportunity for local businesses with

[112] Tohoku Bureau of Economy, Trade and Industry (2025). https://www.tohoku.meti.go.jp/cyosa/tokei/point/24point/all.pdf
[113] NSK. https://www.nsk.com/jp-ja/industries/wind-power/

electronic component production capabilities. However, the lack of offshore wind turbine OEM manufacturing presence in Japan presents a significant barrier to leverage these existing strengths. Local businesses also face challenges such as extensive efforts to receive vendor certification, capital investment to transition to offshore wind component manufacturing and international cost competition which would need to be addressed.

Table 15 Industrial Strengths Relevant for Offshore Wind by Prefecture in Northern Japan

Prefecture	Strengths
Hokkaido	• Steelmaking and Steel Manufacturing (Muroran City) • Onshore Wind
Aomori	• Onshore Wind • Steel / Non-ferrous Metal Manufacturing (Hachinohe City) • O&M Personnel Training
Iwate	• Automobile Parts Manufacturing • Semiconductor Manufacturing • Electronic Parts Manufacturing
Miyagi	• Shipbuilding (Ishinomaki City) • Automobile Parts Manufacturing
Akita	• Onshore and Offshore Wind • Electronic Parts Manufacturing • O&M Personnel Training
Yamagata	• Steel Manufacturing (Sakata City) • Electronic Parts Manufacturing
Fukushima	• Next-generation Energy Research • O&M Personnel Training
Niigata	• Steel Manufacturing (Tsubame City, Sanjo City)

Additionally, Northern Japan has been a key region for onshore wind domestically and particularly in prefectures such as Hokkaido, Aomori, and Akita, there are local companies with experience in construction and O&M scopes. Further, O&M works for offshore wind are underway in Akita and Hokkaido Prefectures, and there is potential for know-how gained in this area to be transferred across the region. The use of existing O&M training centres in Akita, Aomori, and Fukushima Prefectures could also support the development of a skilled workforce across the region. However, depopulation is a regional issue and thus interprefectural collaboration will be important to mitigate any potential worker shortages in the construction and O&M sectors. The establishment of a large, integrated offshore wind market across Northern Japan, together with a region-wide workforce development framework, has strong potential to help stem population decline across the region.

Finally, the greatest strength for the Northern Japan OSW industry is the significant offshore wind potential of the region. As offshore wind plans progress, there is further potential to attract domestic and international companies to the wider Northern Japan region.

7.2 #2: Promote regional supply chain clusters to develop the offshore wind industry in Hokkaido and Tohoku

- **Clusters offer a framework to unify regional supply chain initiatives and unlock socioeconomic benefits by leveraging complementary strengths across prefectures.**
- **Local government and industry should incorporate learning from European models which allow regional clusters to effectively support businesses transitioning to the offshore wind sector.**
- **Cooperation between stakeholders across prefectural boundaries is critical to maximise effectiveness of the cluster, avoid fragmentation, and ensure efficient use of port infrastructure.**

Offshore wind supply chain clusters are geographically concentrated networks of companies, institutions, and infrastructure that collaborate to support offshore wind development. Clusters can integrate manufacturing, logistics, innovation, and workforce development to enhance regional supply chain competitiveness, attract investment, promote innovation and encourage exports.

The establishment of regional supply chain clusters across Northern Japan offers a framework to allow wider collaboration for the growth of the offshore wind industry. It is important for the clusters to serve the needs of the local companies and may be developed as one or multiple organisations across the region.

To realise effective and mutually beneficial regional collaboration, it is critical for stakeholders in the private sector, public sector, and academia throughout Northern Japan to hold discussions to understand existing strengths in each Prefecture. Whilst collaboration between stakeholders across multiple prefectures could present challenges, there are also synergy opportunities for the strengths of individual prefectures to complement each other. Where gaps in capability throughout the region are identified, partnering of local supply chain with domestic or international companies offers an opportunity to further develop the industrial capability of Northern Japan. If supply chain clusters can lead to Northern Japan's regional supply chain offering becoming more than a sum of its parts, it increases the likelihood of realising the possible and potential socioeconomic benefits to the region.

Offshore wind supply chain clusters in European markets (Case Study 1) have developed over the past decade to serve the build out of offshore wind projects. Their focus on leveraging the existing strengths of the regional industries have realised significant socioeconomic benefits for coastal communities and provides an important case study for the Japanese offshore wind sector.

Case Study 1: UK Offshore Wind Supply Chain Clusters

The United Kingdom is a global leader in offshore wind, with over 16 GW of OSW currently operational, which accounts for roughly 17% of the country's electricity demand[114]. Further growth is expected in the coming years, with a target of 43-50 GW set for 2030. The country's offshore wind industry currently supports nearly 40,000 jobs nationwide[115], and this figure is expected to increase roughly three-fold by the end of the decade.

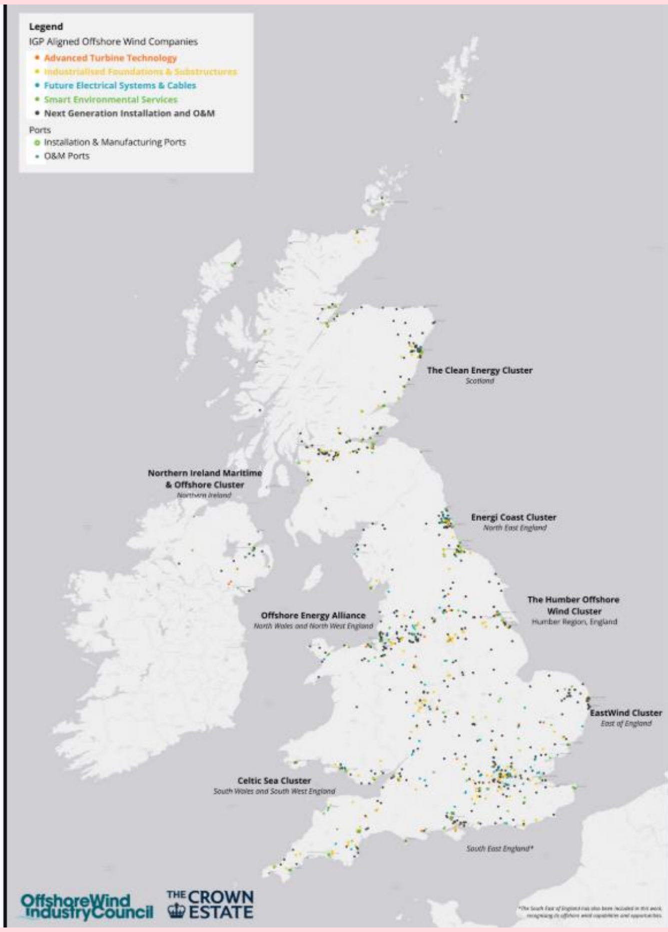
The 2019 Offshore Wind Sector Deal[116], agreed between the UK government and industry, set out targets such as increasing UK local content to 60% and increasing exports by 5-fold. The development of offshore wind clusters was also a key part of the sector deal and they have grown rapidly in recent years throughout the UK. There are currently seven offshore wind clusters in the UK, and their member companies and ports are shown in Figure 14 below. The sector deal was replaced in 2025 by the Clean Energy Industries Sector Plan.

As an example, Energi Coast is Northeast England's offshore wind cluster, with a leadership group made up of 30 key organisations such as project developers, ports, supply chain, skills & academia, innovation & research organisations, national government, and local authorities. Approximately 300 further local companies make up the wider Energi Coast cluster, providing services across foundations, cables, installation ports, training, and specialist subsea services. It is enabled by 5.2 GW of offshore windfarms either in operation or currently under construction, with a further 6 GW at the scoping stage. Seven ports within the cluster serve as bases for a variety of roles including fabrication, marshaling, assembly, installation, and maintenance.[117]

Initiatives for the further development of these offshore wind supply chain clusters are underway. In 2024, the Industrial Growth Plan (IGP) was published with a goal to triple offshore wind manufacturing capacity over the next 10 years.[118] The IGP aims to create an additional 10,000 jobs a year and boost the UK economy by an additional 25 billion GBP (5.1 trillion JPY[119]) between now and 2035. Following on from the IGP, Regional Growth Prospectuses were developed to explore the characteristics of each regional cluster and their potential for future growth within the context of the wider UK OSW industry.

[114] RenewableUK. https://www.renewableuk.com/our-work/offshore-wind/
[115] RenewableUK (2025). https://www.renewableuk.com/news-and-resources/press-releases/55-000-people-now-work-in-the-uk-wind-industry-including-40-000-in-offshore-wind/
[116] GOV.UK (2019). https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal
[117] OWIC (2025). owic.org.uk/media/nvrjeasc/ruk008-p-02-h-chapter-6-energi-coast-cluster.pdf
[118] RenewableUK (2024). https://www.renewableuk.com/news-and-resources/press-releases/offshore-wind-industry-unveils-industrial-growth-plan-to-triple-supply-chain-manufacturing/
[119] 1 GPB = 205 JPY (November 2025).

Figure 14 Map of UK Offshore Wind Supply Chain Clusters



Source: Offshore Wind Industry Council (2025)[120].

Key drivers for the growth of UK offshore wind supply chain clusters include national government ambitions, the existence of a skilled workforce in coastal regions (e.g. from shipbuilding and offshore O&G sectors) and regional collaboration. However, funding is a key issue for the success of the clusters. This may be secured through a variety of methods, such as membership fees or support from local and national governments. Securing the necessary funding allows for the employment of dedicated staff for the supply chain clusters, expanding the reach and effectiveness of the organisation.

Understanding this UK framework, and equivalent frameworks from other mature OSW markets, will allow for supply chain clusters in Japan to effectively support the development of the regional OSW supply chain.

[120] OWIC (2025). https://www.owic.org.uk/work/clusters/

7.2.1 Hokkaido Offshore Wind Industry Development Through Prefecture-Wide Cooperation

Prefecture-wide coordination forms the fundamental building blocks for successful broader regional supply chain initiatives. In preparation for the upcoming offshore wind projects off the Hokkaido Prefecture coast, key challenges in the development of the prefecture's offshore wind industry have been identified. These include information dissemination to local companies regarding the skills and capabilities required for offshore wind and matching these businesses with key suppliers and project developers. Effectively addressing these factors will allow the possible and potential GVA figures calculated in this report to be achieved.

To tackle this, various stakeholders have commenced plans to encourage supply chain development in Hokkaido. In Muroran City, MOPA has been active since 2020 to attract offshore wind related businesses to the city through organising opportunities for discussions between international stakeholders and promoting the capabilities of local companies. Ishikari City is also establishing an organisation, with three subgroups, to act as a one-stop shop for the offshore wind power industry in Ishikari City, consolidating all information related to offshore wind[121].

The establishment of the HOKKAIDO Offshore Wind Industry Promotion Network by the prefectural government and Hokkaido Bureau of Economy, Trade and Industry of METI offers significant promise to enable greater coordination between stakeholders for supply chain development in the prefecture. The network's effective collaboration with members of existing organisations in Muroran and Ishikari City will be a key factor.

Drawing on the example of UK supply chain clusters, the organisation in Hokkaido must ensure to work closely with Tier 1 suppliers and project developers to support the participation of local businesses in the offshore wind sector. Securing dedicated resources to promote the transition of local companies to the offshore wind sector will be another key challenge. Further, support and recognition from the national government, as was seen in the Offshore Wind Sector Deal in the UK, will also be critical to realise the possible socioeconomic benefits of offshore wind.

7.2.2 Benefits of Offshore Wind Supply Chain Clusters in Northern Japan

With the recent addition of the HOKKAIDO Offshore Wind Industry Promotion Network, there are now organisations in Hokkaido, Aomori, Akita and Yamagata prefecture that promote the development of the prefectural offshore wind supply chain. However, similar challenges are faced by local companies throughout the region and the establishment of

[121] Ishikari City (2025). https://www.city.ishikari.hokkaido.jp/sangyo/yuchi/1006557.html

regional clusters which extend beyond prefectural boundaries may offer a streamlined framework to combine the individual initiatives that are already underway. The promotion of offshore wind supply chain clusters throughout Japan will provide each region's offshore wind supply chain a unified voice with understanding for the local context of the region.

Further, supply chain clusters can enable increased collaborations between companies in the region, or with larger suppliers that the cluster is able to attract. This can allow local businesses to participate in new offshore wind scopes which they were unable to enter independently, leading to an increase in prefectural procurement rates. Such initiatives have already been seen in Akita Prefecture, with Toko Tekko partnering with a crane manufacturer from Gifu prefecture to manufacture davit cranes for offshore wind platforms[122] whilst Akita Eisen established a joint venture with major shipping company NYK Line to provide maintenance and management services for CTVs[123].

Whilst European supply chain clusters leveraged existing capabilities from the shipbuilding and offshore O&G sectors, Northern Japan's industry and workforce lack such experience. Thus, local businesses collaborating with domestic and international companies are expected to be particularly beneficial, and supply chain clusters will be expected to play a critical role in facilitating such partnerships. For example, there have been reports that Dutch supplier Fibre Max is considering Akita as a site for their floating offshore wind mooring cable manufacturing base[124]. As offshore wind plans progress, there is further potential to attract domestic and international companies to the wider Northern Japan region.

Existing initiatives such as the Tohoku Automobile Industry Cluster Collaboration Council (Case Study 2) offer a case study in achieving regional industrial growth through interprefectural collaboration.

Case Study 2: Tohoku Automobile Industry Cluster Collaboration Council

Established in 2006, the Tohoku Automobile Industry Cluster Collaboration Council offers a precedent for regional industry collaboration across prefectural boundaries. The organisation is a regional alliance composed of automotive-related industry councils from all seven prefectures in Tohoku and Niigata. Initially formed through individual industry–academia–government partnerships within each prefecture, the council gradually expanded into a unified inter-prefectural organisation.

[122] Toko Tekko (2022). https://www.toko-tekko.co.jp/pages/61?detail=1&b_id=429&r_id=215
[123] NYK Line (2025). https://www.nyk.com/news/2025/20250114.html
[124] Nikkei (2025). https://www.nikkei.com/article/DGXZQOCC15B0B0V11C25A0000000/

The council promotes the development of Tohoku as a major hub for the automotive industry by enhancing the technological capabilities of local companies, supporting their entry into the automotive supply chain, and encouraging the establishment of parts manufacturers. Membership is free, funded through the local government budgets of the participating prefectures.

Its strategic direction focuses on building a strong regional cluster with global competitiveness and future-oriented innovation. Key initiatives include:

- Broad industrial accumulation across diverse sectors
- Development of competitive production bases
- Advancement of next-generation technology,
- Human resource development and supply systems[125]

The council, in collaboration with the Tohoku Bureau of Economy, Trade and Industry, has mapped suppliers across the sector, visualising the distribution of technological capabilities across the region. The council also organises coordinated approaches to automobile manufacturers by setting up exhibitions and business meetings. For the development of next-generation technologies, the council supports collaboration among regional public research institutes in different prefectures. In the past, topics such as 3D scanning, non-destructive testing, metal additive manufacturing, laser welding, robotics, and IoT-based smart manufacturing have been focus areas.

Through such initiatives, the council has contributed to the growth of the automotive industry in the seven prefectures. Between 2006 and 2019, the shipment value of automotive machinery and equipment rose by approximately 50%, from under 1.5 trillion JPY to roughly 2.2 trillion JPY.[126]

7.2.3 Port Infrastructure

Assembly and marshalling ports also play a significant part in defining the key characteristics of an offshore wind supply chain cluster. The presence of a base port in a region can contribute to local economic effects, allowing local businesses to participate in onshore logistic work. Further, offshore wind related manufacturing facilities and other businesses may also be attracted to the vicinity of base ports, leading to economic ripple effects and jobs created.

[125] Tohoku Automobile Industry Cluster Collaboration Council, https://www5.pref.iwate.jp/~hp0405/tohokucar/senryaku/visionkossi2018-2021.pdf
[126] Tohoku Automobile Industry Cluster Collaboration Council. https://www5.pref.iwate.jp/~hp0405/tohokucar/join_2.html

In Japan, offshore wind base ports have thus far been selected based on Promotion Zone designation for offshore wind auctions. Throughout Northern Japan, there are currently 5 offshore wind base ports which were designated to serve seven offshore wind projects across Rounds 1 to 3. For upcoming projects in Hokkaido Prefecture, Muroran Port and Ishikari Bay New Port are feasible candidates but coordination with port facilities in the Northern Tohoku Region, such as Noshiro Port and Aomori Port, will be crucial. Future plans for floating offshore wind, which require greater laydown areas, deeper quayside depth and wet storage capacity, will need to be incorporated too. Future port development plans aligned with long-term, regional project demand and respective supply chain strategies will allow for more effective cluster growth.

7.3 #3: Encourage greater focus on long-term regional industry development beyond individual offshore windfarms

- **An auction framework that is aligned with long-term regional OSW industry strategies will provide extended visibility for local businesses to consider sustained investment and capability building.**
- **National and local governments must consult with regional industry to develop the supply chain strategies in line with the 2nd Offshore Wind Industry Vision.**
- **A competitive offshore wind industry in Northern Japan will allow local businesses to participate in future offshore wind projects throughout Japan and in APAC to realise further economic ripple effects.**

In Japan's offshore wind sector thus far, there has been a tendency for local governments and businesses to only consider participation in individual offshore wind projects off their prefecture's coast. However, this means that most supply chain preparations can only begin post-auction, once the developer has been selected and project plans confirmed. Additionally, without long-term perspective beyond the construction of discrete offshore wind projects, investments into increasing supply chain capability cannot be conducted effectively. Project-level initiatives can also be put at significant risk in cases of project disruption, such as Mitsubishi Corporation's Round 1 withdrawal.

By placing greater emphasis on the long-term, regional perspectives for the local supply chain, the national and local governments can develop a strategy which encourages further participation of local businesses in offshore wind. Meanwhile, local companies can develop more sustainable business plans by considering the long-term offshore wind demand, both regionally and internationally.

The 2nd Offshore Wind Industry Vision document outlines targets such as 65% domestic procurement for offshore wind projects and securing 40,000 offshore wind related workers by 2040. The regional strategies should be aligned with the national government's vision to outline how Northern Japan's industry and other regions throughout the country can contribute to achieving these targets. Regional OSW supply chain clusters discussed in Section 7.2 will be expected to provide a framework to holistically implement the initiatives outlined within the strategies.

7.3.1 Auction Design to Maximise Socioeconomic Effects in Northern Japan

7.3.1.1 Auction Framework

Development of the regional offshore wind supply chain within the auction framework is currently considered at a prefecture-by-prefecture level through evaluation according to prefectural socioeconomic benefits generated. This has been a factor in the prefectural separation of supply chain development initiatives across Northern Japan thus far. There has also been limited coordination between project developers to align their initiatives.

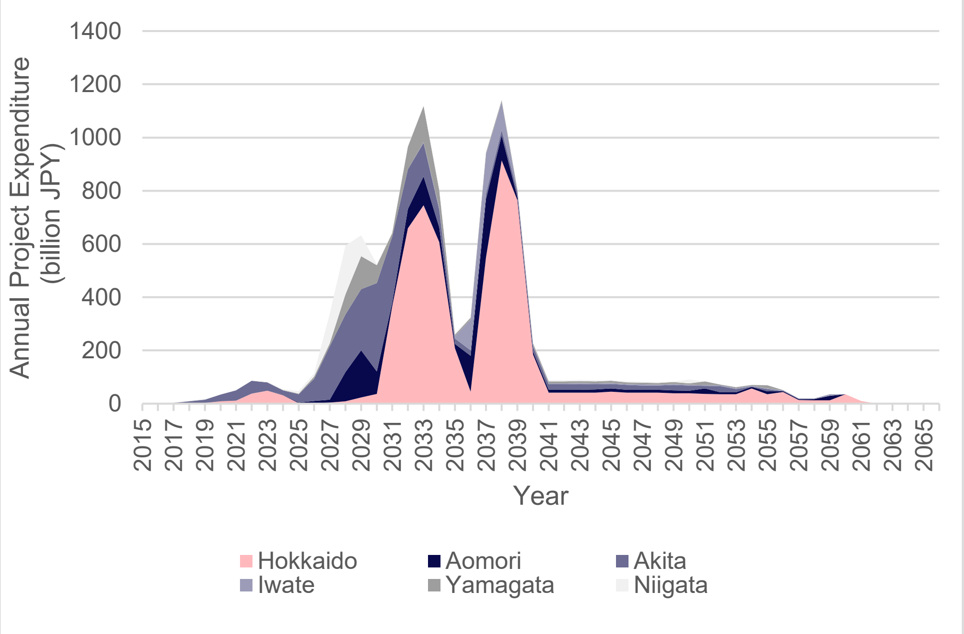
Many local companies in Northern Japan are interested in participating in the upcoming OSW projects. However, if coordination across individual projects do not improve, these companies will only be able to consider supply chain initiatives on a project-by-project level once detailed project plans become known. This also reduces visibility on long-term opportunities and in turn increases the barrier for investment into building supply chain capabilities.

Therefore, long-term regional offshore wind industry strategies, based on the identified industrial strengths in each region (Section 7.1), should be developed across Japan through collaboration between national and local governments. These strategies can then provide a common platform for the supply chain initiatives for individual projects. An auction framework aligned with the regional industry strategy can enable greater coordination of supply chain initiatives across projects. The role of the regional offshore wind supply chain clusters would also be expected to be aligned to such regional industry strategies.

7.3.1.2 Auction Scheduling

For local businesses considering entry into the offshore wind sector, opportunity visibility beyond individual offshore wind projects is crucial. Offshore wind project expenditure is typically concentrated in the several years before COD, associated with CapEx spending. Figure 15 below shows the annual project expenditure by year of the currently announced offshore wind projects in Northern Japan. As shown below, if projects or prefectures were considered individually, the supply chain demands may be concentrated in a period of just a few years. However, if local businesses are able to consider OSW projects across Northern Japan, the supply chain demand is better distributed with annual project expenditure exceeding 200 billion JPY for over a decade, from 2027 to 2040. The expenditure profile could be further flattened and extended in the coming years through management of the auction schedule by the national government to control demand and allow greater flexibility in COD.

Figure 15 Annual Project Expenditure of Offshore Wind Projects in Northern Japan[129]



Source: ERM (2025).

The total lifecycle project expenditure across the 23 offshore wind projects considered here reaches up to 10 trillion JPY, highlighting the scale of the supply chain opportunity across the region. If local businesses are able to consider participation in offshore wind projects across Northern Japan over a period of decades, rather than being limited to individual projects in a single prefecture, investments to improve supply chain capabilities becomes a more attractive option.

7.3.2 Opportunities Beyond Northern Japan

To maximise socioeconomic benefits to Northern Japan, it is crucial for Northern Japan's industrial strategy to consider the region's role in the

[129] Note: The annual project expenditure for each project is calculated using ERM's proprietary tool LENS™, based on the cost profile of global offshore wind projects. The overall schedule of each project has been assumed by ERM, based on typical OSW development schedules in Japan and information collected through consultation with key stakeholders. The actual schedule and COD are expected to vary based on factors such as coordination with stakeholders, port and grid infrastructure upgrades and supply chain constraints.

wider context of the Japanese and APAC offshore wind sector. Suppliers that are successful in Northern Japan should, in the long-term, aim to use their experience to compete domestically and then internationally.

7.3.2.1 Domestic Offshore Wind Projects

Outside of Northern Japan, there are currently 20 offshore wind projects at various stages of development listed as part of METI's auction pipeline. Of these projects, 65% are still designated as Preparatory Areas, compared to 17% for projects in Northern Japan. This means there is significant opportunity for supply chain capabilities built up in Northern Japan in the coming years to be applied to projects throughout Japan in the future.

7.3.2.2 Export to APAC Offshore Wind Projects

In the longer term, companies within Northern Japan should be encouraged to consider the wider, international offshore wind market and explore export opportunities to APAC countries. In the UK, clusters have been increasingly focusing on expanding exports of local products and services, and nationally now over 2 billion GBP (397 billion JPY) is generated from exports annually. This should also be a key function of offshore wind clusters in Japan, to leverage opportunities within the growing APAC offshore wind industries.

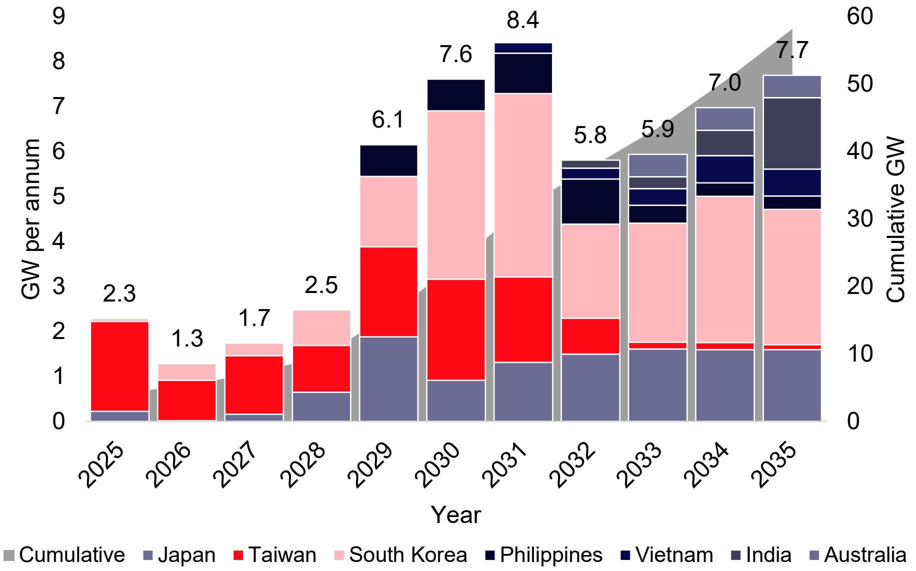
Offshore wind development is progressing throughout APAC, with countries where offshore wind deployment is expected by 2035 (based on ERM forecasts), as indicated in Figure 16. Japan is one of the leading nations within APAC, alongside Taiwan and South Korea. Preparations for the first offshore wind projects are currently underway in the Philippines, Australia, India, and Vietnam. If companies in Northern Japan are able to develop competitive products and services within the domestic supply chain, export to these APAC countries represents an opportunity for further increase in economic ripple effects.

It is noted that China is the largest offshore wind market globally but has been excluded from the discussion below due to the expected difficulties for Japanese companies to participate in Chinese projects.

Figure 16 APAC Countries with Forecasted Offshore Wind Deployment by 2035

Figure 17 shows that offshore wind project commissioning up to 2027 in APAC is primarily focused in Taiwan. From 2028 onward, further projects in South Korea and Japan are expected to begin operations, followed by a broader rollout across the APAC region starting in 2029. Beyond 2029, annual offshore wind deployment across the region is expected to rise to approximately 6 GW per annum or higher, with the cumulative total of operational projects reaching up to 58 GW by 2035. In comparison, Northern Japan's project pipeline up to approximately 2040 is currently 12.7 GW. Thus, considering participation in these APAC projects will significantly increase the volume of opportunities available to companies in Northern Japan.

Figure 17 APAC Offshore Wind Installation Forecast



Source: GRIP, ERM (2025).

Whilst supply chain initiatives such as establishment of WTG and foundation manufacturing capabilities, have been stepping up across APAC, considering the scale of offshore wind deployment in APAC up to 2030 and beyond, significant bottlenecks are expected.[130] This may present opportunities for international supply chain collaboration in the coming years. Further, the future development of the floating offshore wind supply chain in Northern Japan in the coming years may also present export opportunities to other deep-water offshore wind markets such as the Philippines.

However, many of the local supply chain companies in Northern Japan will have limited experience in overseas exports and thus ensuring that the necessary support is provided will be critical. The national government, Hokkaido[131] and Tohoku[132] Bureau of Economy, Trade and Industry, as well as the individual prefectures and local financial institutions, provide support for businesses entering overseas markets. Further, Northern Japan supply chain clusters can promote the expertise of the local businesses through presence at major international conferences and organising business matching opportunities within APAC.

7.4 #4: Ensure socioeconomic ripple effects for communities surrounding project areas

- **Proactive local initiatives related to O&M activities offer long-term, stable economic ripple effects for coastal communities,**

[130] Global Wind Energy Council (2024). https://www.gwec.net/gwec-news/apac-supply-chain-report-2024/
[131] Hokkaido Bureau of Economy, Trade and Industry. https://www.hkd.meti.go.jp/information/export/index.htm
[132] Tohoku Bureau of Economy, Trade and Industry. https://www.tohoku.meti.go.jp/s_kokusai/index_kokusai.html

especially where CapEx-phase benefits are limited.

- **Local governments and industry should consider how to utilise local ports for offshore wind and maximise participation of businesses in O&M work.**
- **Training local talent through collaboration with schools and institutions, as well as attracting skilled workers from across Japan, is key to embedding offshore wind benefits in coastal communities.**

Considering the large scale of offshore wind projects, the involvement of small, local businesses based in the immediate vicinity of the windfarms can be a challenge. This is particularly significant when there is a large geographical separation between project sites and marshalling ports, where economic ripple effects can be concentrated, as is expected for projects under development in Hokkaido Prefecture. In such cases, O&M related activities offer a key opportunity to secure socioeconomic benefits for the municipalities neighbouring the offshore wind projects.

The O&M phase of an offshore wind is critical to maximising the involvement of local businesses. Where CapEx spending leads to supply chain demand limited to several years, O&M activities offer stable demand over 20+ years to provide local businesses with greater visibility of long-term returns. This is reflected in the relatively high prefectural procurement rates in Hokkaido calculated in this study, with a possible rate of 13% which potentially can rise to 61%. Further, the contribution of the O&M phase to the total GVA can be further increased through the extension of the seabed lease (and thus the project lifetime) beyond the current 30-year limit, as has been discussed recently in METI and MLIT committee meetings[133]. As a result, O&M related initiatives have been gaining momentum throughout Japan, with local companies already participating in the inspection of BoP, operation of CTVs and potentially the inspection of turbine components in the future.

O&M ports act as the base for the day-to-day operations of the offshore windfarm and its regular inspection and maintenance. For example, an O&M facility in the UK servicing a 1 GW offshore wind project can employ up to 100 people onsite[134], which generates socioeconomic impacts for the local economy.

Upcoming offshore wind projects in the Donan region of Hokkaido are expected to see more limited economic ripple effects from the construction phases due to the large geographic separation from the potential base ports, as well as due to the limited industrial capabilities within the region. Therefore, the utilisation of the Local Ports or Fishery

[133] METI (2025). https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/yojo_furyoku/pdf/033_05_01.pdf
[134] BVG Associates. https://guidetoanoffshorewindfarm.com/guide/o-operations-and-maintenance/o-1-operations/o-1-2-onshore-logistics/

Ports in the region for O&M can play a significant role in the tangible benefits of the offshore wind projects being felt in the region.

Particularly, many regions currently under consideration for offshore wind have experienced decline in fishery harvest in recent years. Whilst the fishing industry remains a major sector within Hokkaido Prefecture and much of northern Japan, there is also potential to reskill communities for O&M in the offshore wind sector. Initiatives to secure personnel with maritime licences, combined with frameworks such as the Regional Coexistence Fund, can lead to wider socioeconomic benefits to these coastal areas.

Further, the presence of O&M jobs could attract talent from throughout Japan to counteract the impacts of depopulation seen within the local communities. Employment opportunities in O&M may also mitigate some of the outflow of young people in the region. Collaboration with local schools will be critical to spread awareness regarding the available jobs in the offshore wind sector and promote local recruitment of O&M personnel.

7.5 #5: Achieve successful project build out through coordinated risk management

- **Successful project execution is fundamental to generating socioeconomic effects to local communities in Northern Japan.**
- **Careful coordination between national and local stakeholders is crucial to addressing and minimising existing risks within the auction framework.**
- **Addressing areas of uncertainty such as grid infrastructure, ports and supply chain capacity will allow for the successful construction and operation of offshore wind projects in Northern Japan to produce economic ripple effects.**

The approximately 12 GW of offshore wind projects under development in Northern Japan represent significant latent socioeconomic ripple effects to local communities. Measures to promote the regional offshore wind supply chain, such as the establishment of cluster organisations discussed above, are crucial to achieving possible and potential offshore wind GVA. However, the fundamental condition for such benefits is that the offshore wind projects are auctioned, reach FID and then COD successfully. Close coordination across METI, MLIT, OCCTO, TSOs, local governments, and stakeholders are critical to ensure that the existing project risks are reflected within the developer selection process to increase likelihood of successful project execution.

In order to ensure that offshore windfarms are able to successfully reach FID and COD, it is critical for offshore wind developers to be able to understand the full risk profile of the projects.

In the context of Hokkaido Prefecture, the weakness of the existing grid infrastructure is a key concern, with forecasted grid curtailment reaching 30% by FY2033. In addition to managing electricity supply and demand, the reduction in system inertia associated with increased renewable energy capacity is an issue for ensuring stable frequency control in Hokkaido. These issues present a significant risk to OSW project feasibility and whilst grid reinforcement, such as the development of the 2GW HVDC interconnector to Honshu Island is ongoing, there is still uncertainty on the timing of the interconnection. It was expected that the developing consortium of the HVDC interconnector will finalise the Cross-Regional Grid Development Plan by the end of FY2025. However, a one-year delay was announced by OCCTO in December 2025[135], due to several key remaining challenges including project financing. It is therefore important for the grid upgrade timelines to be reflected within the Round 4 auction bid submissions. Close collaboration between OCCTO and METI to ensure alignment between the grid infrastructure plans and development of offshore windfarms throughout Japan is paramount to specify project risk at the auction stage.

Similarly, port availability and supply chain capacity should also be considered for the scheduling of future offshore wind auction schedules. As shown in Figure 15, in the coming years, multiple offshore wind projects are expected to be constructed simultaneously throughout Northern Japan which increases the risk of infrastructure and local supply chain bottlenecks. Particularly in Hokkaido Prefecture, there is the possibility of the Ganwu-Minamishiribeshi, Shimamaki and Ishikari coast projects aiming to use the Ishikari Bay New Port for construction in the early 2030s. Thus, coordination of the auction plans with port upgrades and regional supply chain strategies will support the development of offshore windfarms, as well as maximising the local socioeconomic benefits.

Finally, the auction framework should allow offshore wind projects to incorporate sufficient contingency which is reflective of any residual risks, both in terms of offtake price and project schedule. Offshore wind in Japan remains in its infancy and such measures are critical to the successful implementation of the projects. In turn, this allows for the development of the domestic and regional supply chain, with the 60% domestic procurement rate achieved at the Ishikari Bay New Port project as a prime example.

[135] OCCTO (2025). https://www.occto.or.jp/assets/iinkai/kouikikeitouseibi/96/seibi_96_01_01.pdf

Appendix 1: Detailed Methodology

Appendix 1: Detailed Methodology

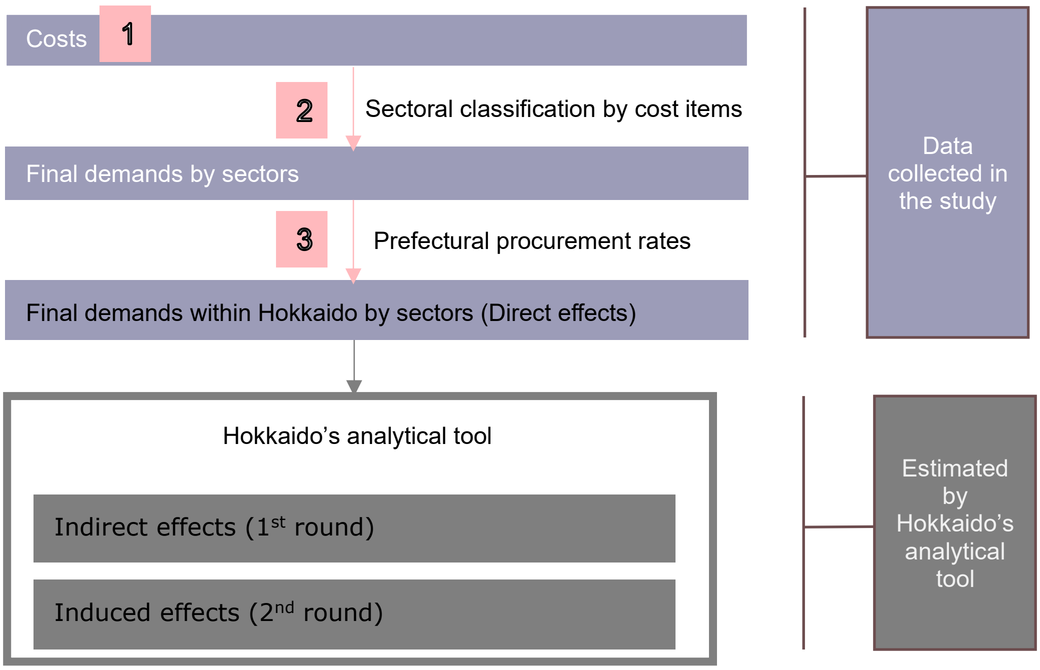
Input-Output Analysis Methodology

Hokkaido Prefecture's analytical tool was used for the input-output (I-O) analysis in this study to calculate the GVA and job creation from offshore wind projects in the prefecture. The Hokkaido Prefectural Government provides two I-O models covering the entire prefecture, which account for 64 and 105 industry sectors respectively[136]. The tool covering 64 sectors was used to be in line with prior study by Ishikari City. It provides coefficients and calculating systems that enable users to estimate the indirect and induced economic effects.

Final demand by industry sectors must be estimated and input by the users. To calculate them, three key data categories (indicated as numbers in Figure 18) were collected regarding the offshore wind projects in the prefecture:

1. Breakdown by category of DevEx (development expenditure), CapEx (capital expenditure), OpEx (operational expenditure), and DecomEx (decommissioning expenditure)
2. Sectoral classification of the cost items
3. Prefectural procurement rates within Hokkaido prefecture.

Figure 18 Overview of GVA Calculation Process



[136] Hokkaido Prefectural Government. (2023). https://www.pref.hokkaido.lg.jp/kz/kks/renkanhyou23.html

The respective approaches to obtaining each of the three data categories are outlined in Table 16 below. To prepare the inputs for the I-O model, LEnS^{TM}, an internal tool to calculate levelised cost of electricity (LCOE), was used to identify the project costs, considering site and market specific characteristics of the offshore windfarms in Hokkaido prefecture. The costs identified include only those that are directly relevant to Hokkaido's OSW projects. Other related infrastructure investments, such as port and grid upgrades, and activities conducted by project developers, such as support for fishery industries and local communities, have been excluded from the scope of this GVA study. It is also important to note that the Input-Output (I-O) analysis conducted does not account for costs associated with energy storage and grid interconnection, which can be substantial. Offshore wind projects typically incur high grid-related expenses due to the need for stable transmission and integration of variable power sources.

Literature was reviewed to categorise cost items into sectors and gather qualitative and quantitative data on prefectural procurement rates in Hokkaido prefecture's OSW projects. Further, consultations with key stakeholders were conducted to refine and validate the prefectural procurement rates.

It should be noted that the prefectural procurement rates assumed in this study represent peak estimates. The prefectural procurement rates provided in this study reflect the capabilities of the supply chain in the prefecture and the true prefectural content of the offshore wind projects will depend on factors such as competition with companies outside the prefecture and resource availability. Accordingly, the resulting economic ripple effects and induced employment figures also reflect these maximum assumed values.

Table 16 Types of Data Utilised and Collection Methodology

Data and Information needed	Unit	Calculation influenced	Data Collection Methods
Costs	JPY	Costs by items	LEnS^{TM}, literature reviews
Sectoral classifications by cost items	%	Final demands by sectors	Literature reviews
Prefectural procurement rates	%	Final demands within Hokkaido by sectors	Literature reviews, consultations

LEnS^{TM} Model

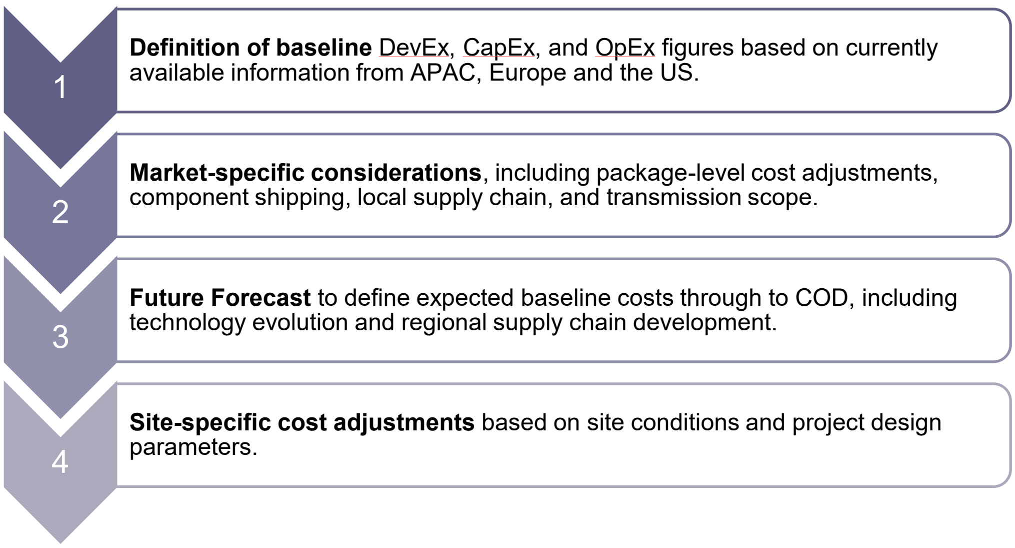
ERM's proprietary LEnS^{TM} model is a cost forecasting tool that generates robust technical CapEx, OpEx, and LCoE estimates for offshore wind globally. The model is underpinned by a series of cost baselines constructed using high-confidence data from 50+ offshore wind farms from APAC, Europe and the Americas.

The tool synthesises a series of market forecasts and site-level costing algorithms to produce a detailed cost and yield profile for each project scenario. Forward cost projections account for the market and technology landscape at COD, and each project is individually adjusted based on site conditions with a series of package-level cost algorithms.

The assessment considers technical cost parameters for each site, including:

- Project nameplate capacity
- Turbine nameplate capacity and rotor diameter
- Forecasted COD year and project lifespan
- Water depths
- Transmission route length (high voltage alternative current (HVAC) cables)
- Port transit distances

Figure 19 LENS™ Model Workflow



Model Inputs and Assumptions

The LEnS™ model considers site-specific parameters for each offshore wind project for cost estimation. Table 17 outlines how each parameter was obtained for the eight offshore windfarms off the coast of Hokkaido Prefecture which are considered within the scope of this study.

Table 17 Input Assumptions For LENS™ Model

Parameter	Description
Project Capacity	Based on information announced by project developers or the national government, using median value where any ranges are given. Where project capacity is not publicly available, a capacity density of 5 MW / km^2 was assumed and project capacity was calculated using the area from available preliminary site boundaries.
COD Years	Based on information announced by project developers where available. For the pre-tender projects, estimated as earliest COD based on project status and infrastructure availability.
Project Operational Life	Assumed to be 20 years.
WTG Design	Wind turbine size based on information announced by project developers where available. Where required, estimated based on expected COD.
Foundation Design	Foundation design based on information announced by project developers where available. Where required, estimated based on foundations information for surrounding projects and information gathered through consultations.
Water Depth	ERM's geographic information system (GIS) team has measured mean water depth based on bathymetry data and announced site boundaries / WTG locations.
Construction and Operations and Maintenance (O&M) Port	Ports were based on information announced by project developers where available and where required, ports in closest proximity within Hokkaido Prefecture which have announced intentions for base port designation were used. Likely vessel route distances were measured by the GIS team for input to the model. Port upgrades have not been factored into this cost modelling analysis.
Installation Vessel	Based on information announced by project developers where available. Assumed Japanese turbine and primary foundation installation vessels will be mobilised for construction.
Offshore Substation (OSS)	No projects were assumed to use offshore substations due to their close proximity to shore.
Export Cable Length	ERM's GIS team has measured the onshore and offshore export cable distances. The distances are measurements from project centre-point to landfall and from landfall to onshore connection/offtake point.
Inter-array cable (IAC) and Export Cable Voltage	IAC and export cable voltage of 66 kV (no offshore substations).
Onshore Interconnection Point	Onshore cable connections points were based on information announced by project developers where available. When such information was not available, the interconnection point was assumed to be the closest 187 kV (or higher) substation or switching station, including those currently under construction.

In addition to the assumptions regarding the key inputs outlined above, further assumptions that are part of the LEnS™ modelling philosophy are given in Table 18 below.

Table 18 LENS™ Model Assumptions for Calculation of DevEx, Capex and Opex

Cost Category	Description
DevEx	• DevEx estimates are intended to cover the costs to develop the project from project initiation to FID (final investment decision).

Cost Category	Description
	• Costs exclude any items considered CapEx (e.g. early works), as well as high uncertainty costs such as lease acquisition and one-off project costs that are ultimately dependent on the development strategy (e.g. supply chain contributions). • This DevEx budget reflects actual DevEx spent required to build each project phase, excluding any front-loading of DevEx across multiple sites or other gaming of development strategies.
CapEx	• CapEx estimates cover assets from the offshore WTGs to the onshore substation, including engineering, procurement, construction, and installation (EPCI). It should be noted that associated costs and contingency will vary based on the selected contracting strategy. • Costs include typical developer-investments in local facilities, though are not intended to cover major one-off supply chain contributions such as fabrication facility set-up. CapEx estimates exclude interconnection fees or upgrade costs to the connecting grid network. • We assume no trade restrictions, and likewise, no additional costs have been added due to environmental, socioeconomical, permitting, or other macroscopic/development restrictions. Steel tariffs or other raw material restrictions have not been considered. • Costs are based on recent historical average commodities pricing, excluding recent short-terms spikes. ERM has not applied any future price forecasts for raw materials markets up to COD.
OpEx	• ERM's O&M costs are informed by the range of expectations for bottom-fixed offshore wind OpEx globally. Costs cover all technical O&M costs and non-technical O&M costs (including project management, and plant-damage insurance), but exclude lease, tax, market fees, or business interruption insurance.

Sector Allocation Methods

For input into the I-O model, each cost item must be allocated into one of the 64 sectors listed in Hokkaido's analytical tool, with reference to the following materials: the sectoral classification table for Input-Output table[137] and a sector search system of Japanese government[138]. The classification table is used as the main source as the sectors are consistent with those in Hokkaido's IO table and tool. The sector search system was used alongside the classification table to complement.

Consequently, the final demand by sectors was estimated by summing the contribution of each cost item to each sector. The process consists of

[137] e-Stat. https://www.e-stat.go.jp
[138] e-Stat. https://www.e-stat.go.jp/classifications/terms/10

four steps (Figure 20).

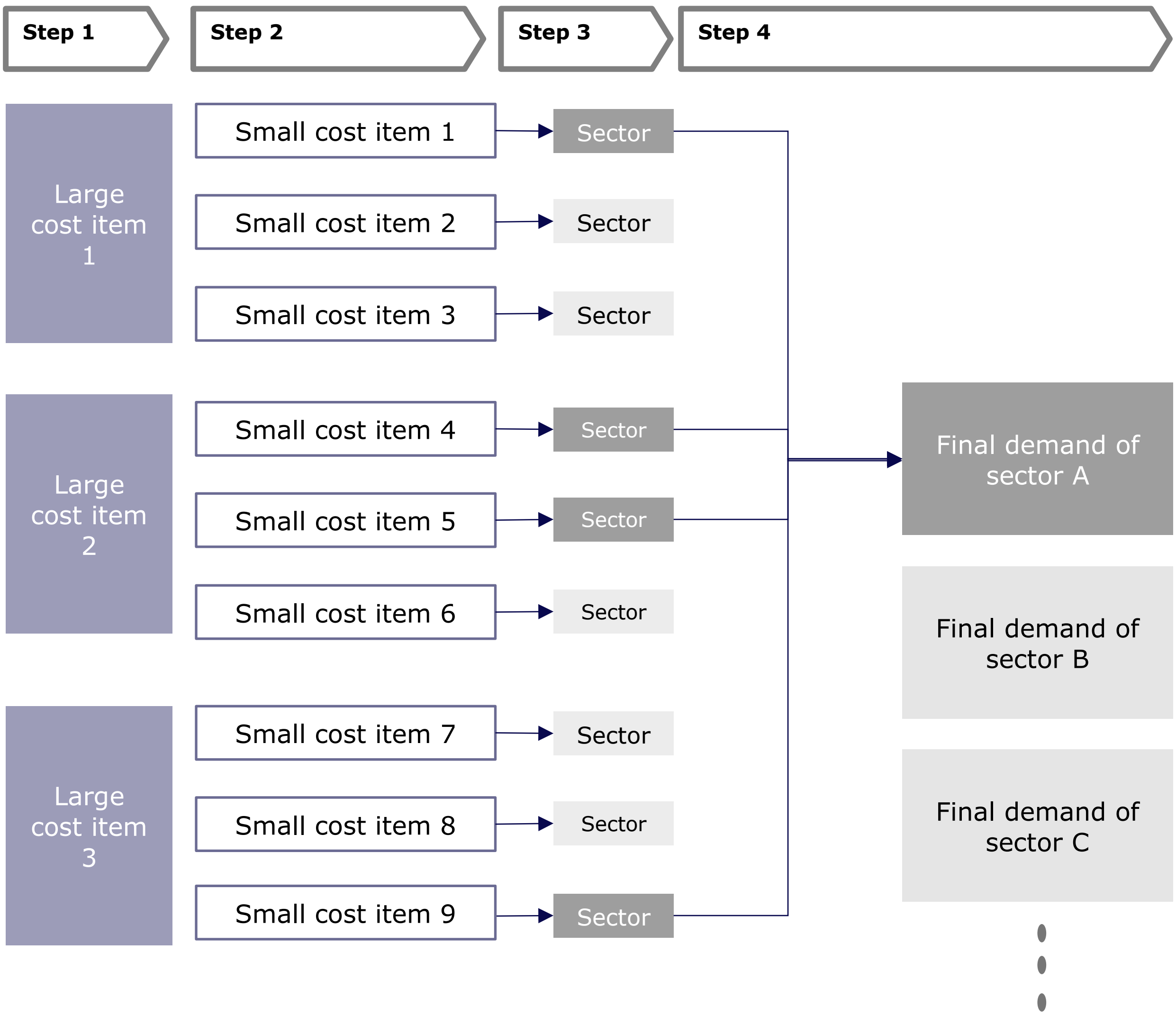
1. The amount (JPY) of the large cost items is identified through LEnS™.

2. The amount (JPY)of the small cost items is identified through LEnS™ and literature review.

3. The amount for each small cost item (in JPY) is calculated and allocated into one of the sectors in Hokkaido's tool with reference to the classification table and the Japanese government's sector search portal.

4. The total cost by sectors is calculated.

Figure 20 Methodology for Allocating Offshore Wind costs to Industry Sectors



Prefectural Procurement Rate

The final step in the preparation of input data for the I-O analysis is to determine the total offshore wind costs that are allocated to organisations based within Hokkaido Prefecture. This is achieved through the estimation of the prefectural procurement rate per cost item.

The prefectural procurement rates presented in this study aim to realistically reflect the current status of the offshore wind supply chain in Hokkaido Prefecture. The procurement rates were derived from two sources:

1. Consultations with industry stakeholders (including municipalities, suppliers, and developers)

2. Review of values indicated within the existing study (Ishikari City) and literature

First, information was gathered regarding the current supply chain capabilities of companies in Hokkaido Prefecture through desktop research and consultations with key local stakeholders, including municipalities, project developers, banks, and academic institutions. During these consultations, the stakeholders were asked about existing experience of local companies in offshore wind projects, as well as the status of current supply chain initiatives. Further, supply chain scopes in which future local participation was deemed feasible but remained under preliminary consideration were also discussed.

Based on this information, the value of the individual scopes which can be contracted to local companies was estimated, to provide a bottom-up calculation of the prefectural procurement rate within each DevEx, CapEx, OpEx, and DecomEx package. In the preparation of such prefectural procurement rates, literature including existing study by Ishikari City were used as a reference.

These draft procurement rates were then reviewed and validated through further consultations with stakeholders.

However, it is crucial to acknowledge that some level of estimation is inevitable in these numbers due to the unavailability of certain data because procurement rates for many ongoing projects are still pre-tender, with project developers and their plans to be determined in future auctions. Despite these limitations, this study aims to set detailed prefectural procurement rates based on the latest publicly available information and consultations with some of the key stakeholders.

Assumptions / Limitations

The data collection methods, analytical model, and tools employed in this study have certain limitations and assumptions:

- The latest available data for the Input-Output table is from 2015, which means that the input coefficients may not accurately reflect the current state of Hokkaido's industry.

- Input-output analysis statically captures the economic structure (input-output relationships between industries) in a specific base year (the data embedded in the tool: 2015). It also assumes that ripple effects occur within one year following the initial demand. Therefore, the GVA and jobs created estimated by the tool in this study are values derived from the economic structure of a given base year (2015), representing demand that would typically unfold over approximately 30 years, calculated all at once.

- Discount rates have not been considered to allow direct comparison with existing GVA studies within Hokkaido Prefecture.

- Employment coefficients are calculated by dividing the total number of employees in each sector by its total output value in the year 2015. In I-O analysis, short-term and long-term employment are not distinguished.

- Income growth since 2015 is not considered in the analysis. The updated employment coefficient can affect the overall number of jobs created as income rises. However, the rate of income growth was limited to 8.7% between 2015, the year the coefficient was established in Hokkaido's tool, and 2024, when the first offshore wind (OSW) projects became operational[139]. This relatively modest increase is not expected to significantly impact induced employment.

- Although prefectural procurement rates are derived from literature reviews and consultations, it is important to note that these figures are estimations. As all but one of the projects are still at a pre-tender stage, procurement decisions have not been determined.

- The future situation of the labour market is not considered in the model. The induced employment is estimated with the employment coefficient in the calculation tool. Thus, future situations, such as the decreased demand of workers through increased automation (e.g., replacement of cashier clerks with self-casher machines in the commerce sector), cannot be considered.

- Hokkaido's tool's calculation range is limited to direct, indirect (first round), and induced (second round) effects to simplify calculation. Because ripple effects diminish with subsequent rounds of ripple effects, the impact of any tertiary effects (and beyond) on this analysis is expected to be minimal. This limitation is common among tools developed by the Japanese government.

- The input-output model assumes that each industry can fully adjust its production capacity to meet demand, even in cases of labour

[139] Ministry of Health, Labour and Welfare. https://www.mhlw.go.jp/toukei/list/chinginkouzou_a.html

shortage.

- The model assumes that GVA will lead to new hires, without considering the potential for existing employees to work overtime, which complicates predictions.
- In the model, the prefectural procurement is treated as constant, despite the typical fluctuations that can occur. The prefectural procurement rate has been assumed to be consistent across the eight offshore wind projects.
- The timing of when ripple effects will materialise remains uncertain, though it is generally expected to happen within one year.

Appendix 2:

Detailed Background for Northern Japan

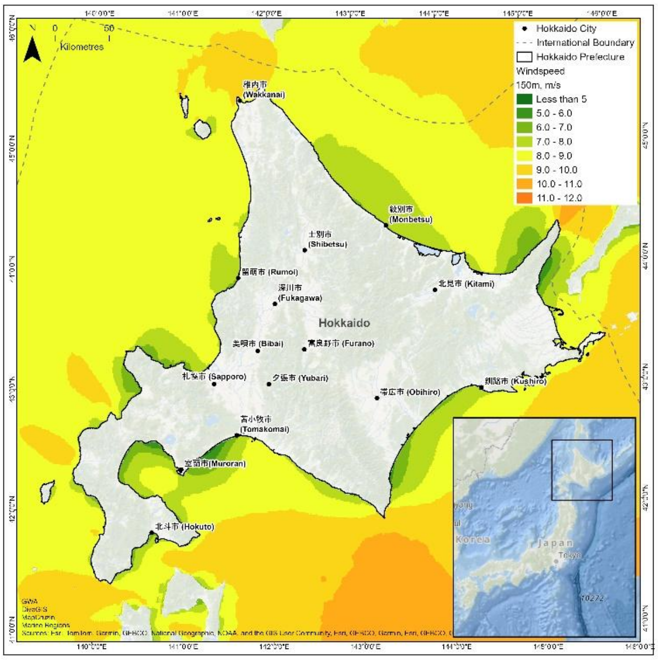
Appendix 2: Detailed Background for Northern Japan

Hokkaido Prefecture

Overview

Hokkaido is the northernmost island in Japan, bordered by the Sea of Japan to the west, the Pacific Ocean to the east and south, and the Sea of Okhotsk to the north. The island covers an area of about 83,450 square kilometres, making it the largest prefecture in Japan by land area[140]. It accounts for approximately 22.1% of Japan's national territory and is larger than Kyushu and Shikoku (the third and fourth largest islands in Japan) combined. The prefectural capital of Hokkaido is located in the central area of the region, in Sapporo. Major cities include Asahikawa, Hakodate, and Tomakomai.

Figure 21 Map of Hokkaido Prefecture, Including Offshore Windspeed at 150 m elevation



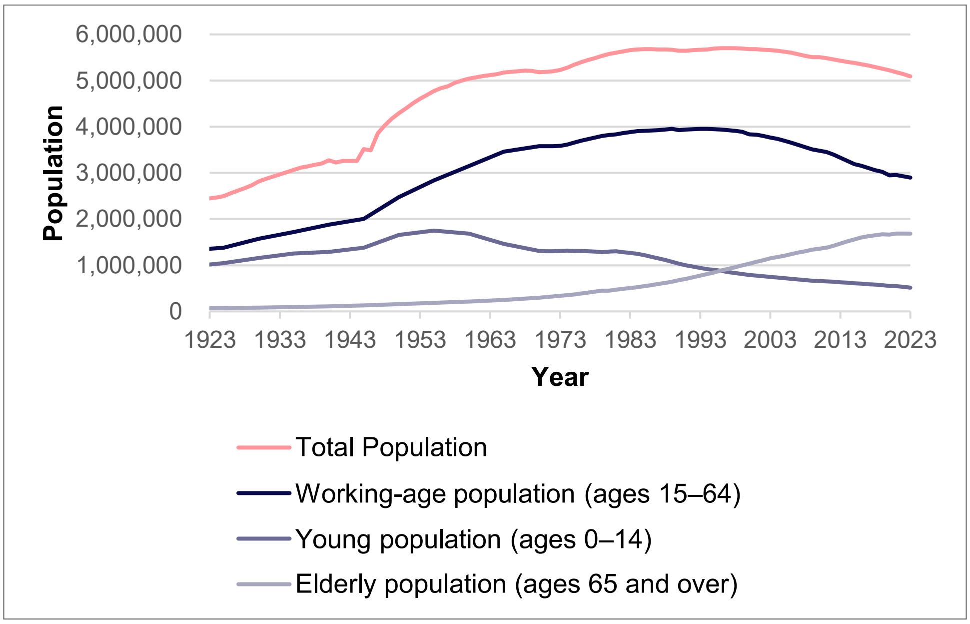
As shown in Figure 21, wind conditions off the coast of Hokkaido are suitable for wind power generation, with wind speeds exceeding 7.0 m/s in most areas. Considering the large landmass, Hokkaido Prefecture is widely considered to be the prefecture with the greatest offshore wind potential in Japan[141]. The Sea of Japan coast experiences powerful seasonal winds in winter, leading to significant snowfall[142]. The southwestern coast, where offshore wind power projects are currently

[140] Statistics Bureau of Japan. https://www.stat.go.jp/data/nihon/01.html
[141] Renewable Energy Institute (2023). https://www.renewable-ei.org/pdfdownload/activities/REI_Analysis_JapanOSWPotential.pdf
[142] Japan Meteorological Agency. https://www.data.jma.go.jp/cpd/j_climate/hokkaido/main.html

being developed within territorial waters, is known for relatively stable and strong wind conditions.

As of 2024, Hokkaido has a population of approximately 5.1 million people, ranking 8th out of Japan's 47 prefectures[143]. The population is concentrated in urban centres such as Sapporo, Asahikawa, and Hakodate, while many rural areas face depopulation and ageing demographics. The population density is significantly lower than in other major regions of Japan, reflecting the vast natural landscapes and relatively limited urban development. With Japan's ageing population, Hokkaido is also experiencing a population decrease. As seen in Figure 22, the number of elderly people aged 65 and over has surpassed that of the younger population (age 0-14) since 1996. As a result, the working-age population has also been declining. In 2024, the proportion of people aged 65 and over in Hokkaido was 33.3%, exceeding the national average of 29.3%[144].

Figure 22 Population Trend in Hokkaido Prefecture, 1923-2023



Source: Statistics Bureau of Japan. (2024)[145]

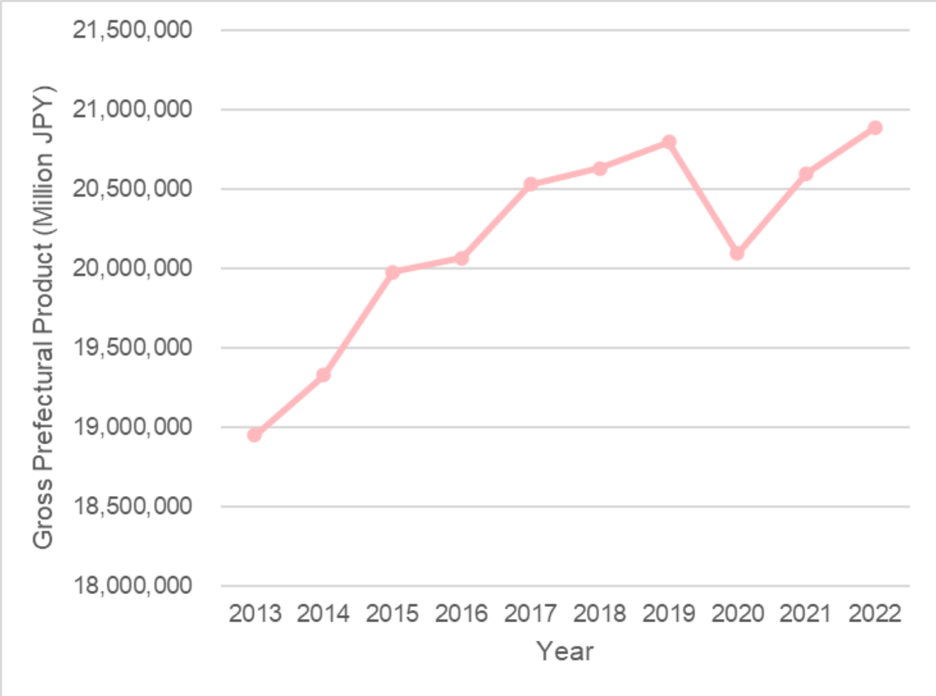
Economy and Industry of Hokkaido Prefecture

In FY2022, Hokkaido Prefecture's nominal Gross Prefectural Product (GPP) was approximately 20.9 trillion JPY[146], ranking 8th among Japan's prefectures, and accounted for about 3.69% of Japan's national GDP of 566 trillion JPY[147]. The graph below (Figure 23) shows the GPP trend in

[143] Statistics Bureau of Japan. (2024). https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&toukei=00200241&bunya_l=02&bunya_s=0201&tstat=000001039591&cycle=7&year=20240&month=0&tclass1=000001039601&result_back=1&result_page=1&tclass2val=0
[144] Cabinet Office. (2025). https://www8.cao.go.jp/kourei/whitepaper/w-2025/zenbun/07pdf_index.html
[145] Statistics Bureau of Japan. (2024). https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&toukei=00200241&bunya_l=02&bunya_s=0201&tstat=000001039591&cycle=7&year=20240&month=0&tclass1=000001039601&result_back=1&result_page=1&tclass2val=0
[146] Japan Cabinet Office. https://www.esri.cao.go.jp/jp/sna/data/data_list/kenmin/files/contents/main_2022.html
[147] Japan Cabinet Office. https://www.esri.cao.go.jp/en/sna/data/kakuhou/files/2022/2022annual_report_e.html

Hokkaido from 2013 to 2022. Nominal GPP showed steady growth over the years, with a temporary dip in 2020 due to the pandemic, and a subsequent recovery by 2021[148].

Figure 23 Gross Prefectural Product Trend in Hokkaido Prefecture, 2013-2022



Source: Hokkaido Prefectural Government. (2025)[149]

Hokkaido's economic growth is being fueled by strong investments in decarbonisation, renewable energy, and public infrastructure[150]. At the same time, the region is accelerating its Green Transformation (GX) and positioning itself as an environmental finance hub. A major milestone in this broader shift was the establishment of Rapidus's next-generation semiconductor facility in Chitose City in 2022, which marked one of the largest investments in Hokkaido, estimated at 5 trillion JPY[151], and is generating significant ripple effects across the region through job creation, business attraction, and industrial development.

As seen in Figure 24, the industrial composition of Hokkaido's GPP is characterised by a high proportion of the primary and tertiary sectors, and a relatively low proportion of the secondary sector. Specifically, the primary industry accounts for 4.2% (compared to the national average of 1.0%), and the tertiary industry accounts for 77.7% (national average: 72.3%). In contrast, the secondary industry makes up only 16.4% (national average: 25.6%)[152].

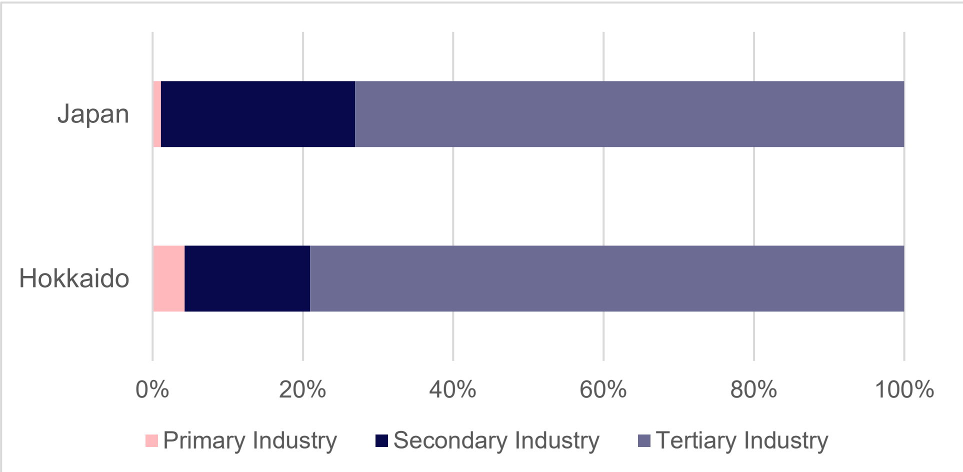
Within the primary sector, the fishing industry in Hokkaido contributes

[148] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/kks/ksk/tgs/keisan-zendou.html
[149] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/kks/ksk/tgs/keisan-zendou.html
[150] North Pacific Bank. (2024). https://www.hokuyobank.co.jp/company/report/h_image/2024/1204.pdf
[151] Nikkei. (2023). https://www.nikkei.com/article/DGXZQOFC028G30S3A600C2000000/
[152] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/tkk/databook/223729.html

significantly to the prefectural economy. In 2023, the production from marine fisheries and aquaculture reached 1.19 million tonnes (31.5% of national production) and 291.6 billion JPY (19.1% of national production). This makes Hokkaido the largest fishing prefecture in Japan, in both volume and value. Further, the fishery processing industry had a shipment value of 805.9 billion JPY in 2022, which equates to approximately 20.9% of the national total[153]. However, fisheries in the prefecture are facing challenges such as the impact of climate change and the associated changes in the marine environment, ageing fishery workers and their decline in numbers, as well as the deterioration of fishing vessels and equipment.

Within the secondary industry, the construction sector has a relatively high share at 7.6% (national average: 5.2%), while the manufacturing sector accounts for just 8.7% (national average: 19.2%), which is less than half the national level. Furthermore, when comparing the manufacturing sector by industry type with the national average, Hokkaido has a higher weight in food production, while the shares of electrical machinery, general-purpose / production / business-use machinery, and chemicals are lower.

Figure 24 Comparison of Industry Composition Between Japan and Hokkaido Prefecture



Source: Hokkaido Prefectural Government. (2025)[154]

Table 19 Breakdown of Industry Sectors in Hokkaido Prefecture

Classification	Hokkaido (%)	Japan (%)
Primary Industry	**4.2**	**1**
Agriculture, Forestry and Fisheries	4.2	1
Secondary Industry	**16.4**	**25.6**
Mining	0.2	0.1
Manufacturing	8.7	19.2
Electricity, Gas, Water Supply and Waste Management	2.9	2.4

153 Hokkaido Prefectural Government (2025). https://www.pref.hokkaido.lg.jp/ss/tkk/databook/223733.html
154 Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/tkk/databook/223729.html

Classification	Hokkaido (%)	Japan (%)
Construction	7.6	5.2
Tertiary Industry	**77.7**	**72.3**
Wholesale and Retail Trade	14.4	14.3
Transportation and Postal Services	6.8	4.7
Accommodation and Food Services	1.7	1.6
Information and Communications	3.1	4.9
Finance and Insurance	3.2	4.5
Real Estate	11.2	11.6
Professional, Scientific and Technical Services; Administrative and Support Services	8.7	9.1
Public Administration	6.8	5.2
Education	4.0	3.4
Healthcare and Social Welfare	11.1	8.3
Other Services	3.7	3.9

Source: Hokkaido Prefectural Government. (2025)[155]

While the working-age population is declining, the number of employed people in Hokkaido reached 2.65 million in 2024, an increase of 10,000 from the previous year[156]. Although Hokkaido's employed population has been gradually increasing over the past decade, this may be attributed to an increase in the employment rate among the elderly and women.

However, due to the ongoing ageing and declining birthrate, the number of non-working individuals is expected to rise, and the total number of workers is projected to decrease at a faster rate than the total population in the future. By 2050, the number of employed persons in Hokkaido is expected to drop by 43% from 2.65 million in 2024 to 1.51 million. According to the Ministry of Land, Infrastructure, Transport and Tourism (MILT), by 2045, employment in the primary industry is expected to decline by 21% to 94,000 people, and employment in the construction industry is projected to fall by 44% to 127,000 people compared to 2024.

The number of job seekers has also been decreasing year by year. Until the COVID-19 pandemic, the job openings-to-applicants ratio had been rising but the figure in FY2024 was 0.94, falling below 1.0 for the second consecutive year. However, in specific fields such as surveying technicians, construction workers, maintenance and repair workers, and civil engineers, the ratio exceeds 4.0, highlighting the ongoing challenge of securing human resources across many job types of high relevance for OSW development in the prefecture.

Energy Policy of Hokkaido

Hokkaido has declared its goal to achieve net-zero greenhouse gas emissions by 2050[157]. The prefecture released the revised Third Hokkaido

[155] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/tkk/databook/223729.html
[156] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/ss/tuk/030lfs/212917.html
[157] Hokkaido Prefectural Government. (2024). https://www.pref.hokkaido.lg.jp/kz/zcs/ontaikeikakukaitei.html

Global Warming Countermeasure Promotion Plan in 2021. As a mid-term target, it aims to reduce greenhouse gas emissions by 46% by FY2030, from FY2013 levels.

Further, as part of its environmental policy toward achieving zero carbon, Hokkaido enacted the Hokkaido Energy Conservation and New Energy Promotion Ordinance in 2001[158]. Based on this ordinance, the Hokkaido Energy Conservation and New Energy Promotion Action Plan was established in 2002. Aligned with the national objectives outlined in Japan's 6th Strategic Energy Plan, Hokkaido has advanced its renewable energy initiatives through the third implementation period of its Action Plan, adopted in 2022. This plan covers a ten-year period from fiscal year 2021 to fiscal year 2030. Progress is reviewed annually, and the prefecture is striving to steadily advance the implementation of related measures.

Renewable energy in Hokkaido Prefecture

Hokkaido is considered to have the highest renewable energy capacity potential in Japan[159]. According to the Ministry of the Environment's Renewable Energy Information System (2023), Hokkaido ranked first nationwide in terms of available resources for wind, solar, and small- to medium-scale hydropower, and second for geothermal resources[160]. For wind energy specifically, Hokkaido accounts for approximately 50% of Japan's total onshore wind potential and about 30% of offshore wind potential, including both bottom-fixed and floating, positioning it as the region with the greatest wind energy development opportunity in the country[161].

Initiatives by Hokkaido Prefectural Government

The renewable energy installation targets for FY2030 are set in the Hokkaido Energy Conservation and New Energy Promotion Action Plan, and the actual values achieved in FY2019 are shown in Figure 25. In fiscal year 2022, the annual amount of electricity generated from renewable energy sources in Hokkaido was 11,907 GWh, accounting for 33.9% of the total annual electricity generation[162]. As of 2022, the total installed capacity of renewable energy was 4,632 MW, of which wind power accounted for 841MW (840MW from onshore wind and 1 MW from offshore wind). With the addition of the 112 MW Ishikari Bay New Port project that began operation in 2024, the achievement rate toward the 2030 offshore wind power installation target of 1,509 MW reached approximately 7.4% as of fiscal year 2024.

158 Hokkaido Prefectural Government. (2024). https://www.env.go.jp/content/900498305.pdf
159 Hokkaido Prefectural Government. (2024). https://www.city.sapporo.jp/kikaku/gx/documents/02_koen3.pdf
160 Hokkaido Prefectural Government. (2024). https://www.jpmac.or.jp/file/1729061184054.pdf
161 Ministry of the Environment REPOS. (2023). https://repos.env.go.jp/web/
162 Hokkaido Prefectural Government. (2024). https://www.city.sapporo.jp/kikaku/gx/documents/02_koen3.pdf

Figure 25 Renewable Energy Capacity and Targets in Hokkaido Prefecture

Renewable Energy Power Generation Equipment Capacity

Category	FY2019 Actual	**FY 2030 Target Value**
Renewable Energy Power Generation Equipment Capacity (10,000 kW)	365.1	**824**

Renewable Energy Power Generation Amount

Category	FY2019 Actual	**FY 2030 Target Value**
Renewable Energy Power Generation Amount (100 million	8,786	**20,455**

(Reference) Breakdown of FY 2030 Target Values for Power Generation Equipment Capacity and Power Generation Amount

Energy Type	Capacity (MW)	Generation Amount (GWh)
Solar (Non-residential)	269.5	3,114
Solar (Residential)	35.4	400
Onshore Wind	184.6	4,188
Offshore Wind	150.9	3,965
Hydropower	92.7	4,133
Biomass	55.8	2,811
Geothermal	11.0	692
Waste	24.1	1,189
Total	824.0	20,455

Source: Hokkaido Prefectural Government. (2025).[163]

As illustrated in Figure 26, *the Hokkaido Energy Conservation and New Energy Promotion Action Plan* sets forth Hokkaido's "vision for the future," promoting both the "establishment and practice of energy-saving awareness among consumers" and "three key areas of focus" related to new energy[164]. These efforts are being pursued collaboratively by residents, businesses, and the prefectural government.

Figure 26 Summary of Hokkaido Energy Conservation and New Energy Promotion Action Plan

Vision For the Future	Achievement of a thoroughly energy-saving society		
	Advancement of regional decarbonization and sustainable energy supply through the full utilization of new energy sources		
	Launch of "Energy Hub Hokkaido"		
	Establishment and practice of consumer awareness on energy conservation		
Three Areas of Fucus	I. Development of diverse local production for local consumption	II. Improvement of business environment towards Establishing Energy Hub Hokkaido	III. Promotion of Environmental Industries in Conjunction with Energy Conservation and the Development and Introduction of New Energy Sources

Source: Hokkaido Prefectural Government. (2025)[165]

In particular, two of the key areas of focus, "II. Establishing Energy Hub Hokkaido" and "III. Promoting Environmental Industries in Conjunction with Energy Conservation and the Development and Introduction of New Energy Sources", highlight specific initiatives related to offshore wind power. These include organising study sessions to raise awareness and promote understanding of offshore wind, holding briefing sessions for fisheries stakeholders who are the initial users of offshore areas, and

[163] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/l.html
[164] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/l.html
[165] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/l.html

supporting local companies' entry into related industries while developing systems for human resource training. The plan also includes advocating to the national government for the development of transmission infrastructure and the securing of grid stabilisation measures such as battery storage, with a view to further expanding renewable energy deployment beyond 2030. This includes reference to the development of subsea transmission connecting Honshu (the mainland of Japan) and Hokkaido.

Hokkaido Prefecture also offers various subsidies for renewable energy[166]. In the area of offshore wind power, the prefecture provides financial assistance, up to 500,000 yen per person, to companies operating in Hokkaido for expenses related to acquiring the knowledge, skills, and certifications necessary for construction and maintenance work[167]. Additionally, Hokkaido organises seminars and study sessions, distributes informational booklets[168], and commissions economic federations to host matchmaking events that connect local businesses with project developers and wind turbine manufacturers[169].

Initiatives by Municipalities

Further, there are municipalities within Hokkaido Prefecture that are working to promote renewable energy related initiatives. Ishikari City aims to foster local participation in the offshore wind power sector by forming an organisational body that promotes collaboration and the exchange of expertise[170]. Drawing on examples from Akita Prefecture and Choshi City in Chiba Prefecture, the city is building a public-private platform to facilitate collaboration between local companies and those in leading regions, supporting small and medium-sized enterprises entering the market and raising awareness among younger generations[171]. In addition, Ishikari City has established a designated area within the municipality's industrial estate called the "RE Zone," where power consumers can access electricity supply derived 100% from renewable sources[172]. The city is promoting the establishment of data centres that operate using renewable electricity.

Muroran City in southwestern Hokkaido hosts Muroran Port, a deep and calm harbor well-suited for assembling, shipping, and maintaining large offshore wind turbines. Its proximity to the Tohoku Region makes it well-positioned to potentially support projects in Aomori, Akita, and Yamagata, as well as within Hokkaido. The city is developing the port as a hub for components, construction, and vessel operations through public-private collaboration, strengthening Muroran's role in Japan's offshore wind expansion.

The Hokkaido Prefectural Government and Sapporo City have established "Team Sapporo-Hokkaido (TSH)" with the aim of transforming the region into a global and Asian financial hub focused on Green

[166] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/policy.html
[167] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/163024.html
[168] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/223282.html
[169] Agency for New Industry Cluster of Hokkaido. (2024). https://www.anic-hokkaido.jp/info/news/171/
[170] Ishikari City. (2025). https://www.city.ishikari.hokkaido.jp/sangyo/yuchi/1006431.html
[171] JTB Hokkaido Division. (2025). https://www.city.ishikari.hokkaido.jp/_res/projects/default_project/_page_/001/006/279/04-01.pdf
[172] Ishikari City. (2025). https://www.city.ishikari.hokkaido.jp/shisei/shiseiunei/1001914/1003813.html

Transformation (GX)[173]. To accelerate this initiative, in 2024, they jointly proposed the creation of a "Financial and Asset Management Special Zone" and a "National Strategic Special Zone," both of which were approved as designated areas. As a result of this designation, regulations concerning GX-related investment and financing have been eased, which is expected to attract both domestic and international investment and facilitate sufficient capital flows into growth sectors.

TSH is a consortium composed of 21 organisations from industry, academia, government, and finance. It aims to promote the GX industry clusters in Hokkaido and strengthen the financial functions that support them. The consortium supports the entry of domestic and international companies into Hokkaido and promotes renewable energy projects. Specific activities include organising seminars and study sessions, delivering lectures at universities, and participating in business events both in Japan and abroad. In the field of offshore wind power, TSH is working to promote industry and develop human resources[174].

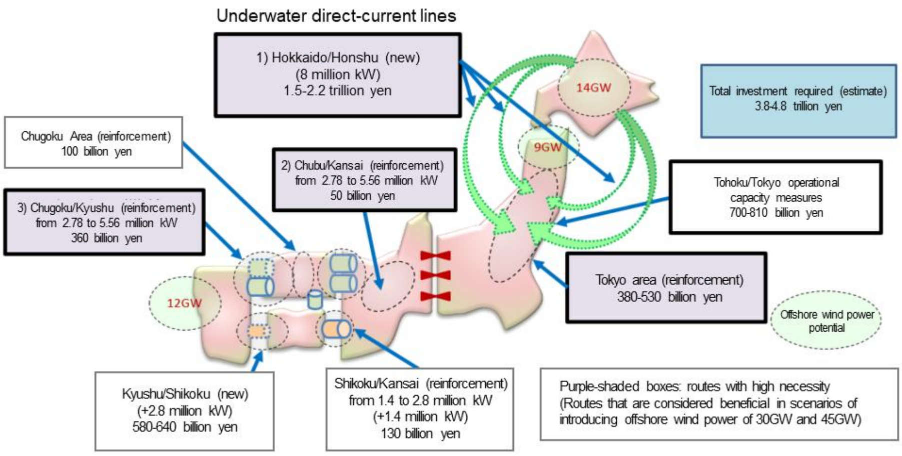
Grid Infrastructure in Hokkaido Prefecture

Considering the significant renewable energy potential within Hokkaido Prefecture, the development of the necessary grid infrastructure to connect generated electricity to demand is critical.

Japan's 7th Strategic Energy Plan includes a major expansion of high-voltage direct current (HVDC) transmission infrastructure to connect Hokkaido's renewable energy resources with demand centres in Honshu[175]. Currently, HVDC lines linking the two regions have a capacity of 1.2 GW including 300 MW under construction[176], which is no longer sufficient to accommodate the scale of renewable energy expected in the near future. To address this, two large-scale submarine HVDC transmission routes are under consideration in the current OCCTO master plan shown in Figure 27: the Japan Sea route, which would connect Hokkaido to Tokyo via Tohoku with a total capacity of 4,000 MW, and the Pacific route, linking Hokkaido to Tohoku with 2,000 MW[177]. Among these, the 2,000 MW section of the Japan Sea route is already under development, with commencement of operation targeted for FY2030[178]. A consortium made up of four companies have been selected as qualified developers and are currently working on implementation plans[179].

[173] Hokkaido Prefectural Government. (2025). https://www.pref.hokkaido.lg.jp/kz/gxs/GX_Special_Zone.html
[174] TSH. https://tsh-gx.jp/projects/wind/
[175] METI. (2025). https://www.enecho.meti.go.jp/category/others/basic_plan/pdf/20250218_01.pdf
[176] OCCTO. (2024). https://www.occto.or.jp/kouikikeitou/seibikeikaku/kitahon/files/hokkaidohonsyu_20240221.pdff
[177] OCCTO. (2023). https://www.occto.or.jp/kouikikeitou/chokihoushin/files/chokihoushin_23_01_03.pdf
[178] METI. (2023). https://www.meti.go.jp/press/2022/02/20230210002/20230210002_1.pdf
[179] OCCTO. (2025). https://www.occto.or.jp/kouikikeitou/seibikeikaku/higashi-area/20250226_shikakushinsa_kekka.html

Figure 27 Planned Transmission Infrastructure Upgrades in Japan



Source: METI. (2022) [180]

These projects are designed to meet the growing need for long-distance, high-capacity transmission as Japan accelerates its transition to renewable energy. Hokkaido presents significant opportunities for renewable energy development, particularly offshore wind, but its relatively low electricity demand compared to Honshu creates a structural imbalance. With several offshore wind projects planned, expected to deliver gigawatt-scale capacity in the coming years, this imbalance is projected to intensify. As a result, curtailment has already occurred, leading to wasted energy and economic inefficiencies. In 2024, output curtailment was recorded at 0.12%[181], and the rate is expected to rise to 0.30% in FY2025[182].

Table 20 Expected FY2033 Grid Curtailment in Hokkaido Prefecture

Hokkaido expected output curtailment rate

Measure	Curtailment rate (%)	Curtailment improvement
No measurement	30	-
Demand side measure	30	0
Supply side measure	26	4 points down
Implementing grid	15	15 points down

METI. (2025)[183]

As shown in Table 20, the expected output curtailment rate based on the projected demand for FY2033 is 30%. This significant increase from FY2024 levels is due to underlying assumptions which includes increased renewable energy installations and the restart of the Tomari Nuclear

[180] METI. (2022). https://www.enecho.meti.go.jp/en/category/special/article/detail_174.html
[181] HEPCO. (2025). https://www.hepco.co.jp/network/renewable_energy/output_control/constraints/pdf/calculation_result_short2025.pdf
[182] METI. (2025). https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/smart_power_grid_wg/pdf/001_02_01.pdf
[183] METI. (2025). https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/smart_power_grid_wg/pdf/003_01_00.pdf

Power Plant. While demand and supply-side measures are estimated to reduce the curtailment rate by up to 4 percentage points, implementing grid (system) measures could reduce it by about half, to approximately 15%. Therefore, the planned HVDC infrastructure plays a critical role in resolving this issue by enabling efficient, low-loss transmission of surplus electricity to high-demand areas. This reduces curtailment to improve the economic viability of offshore wind projects by ensuring that generated power can be reliably delivered to the market. Furthermore, HVDC systems will improve grid stability and flexibility, which are essential for integrating variable renewable sources like wind. By unlocking Hokkaido's full offshore wind potential, the HVDC expansion supports Japan's broader goals of decarbonisation, energy security, and regional economic revitalisation.

In parallel with transmission infrastructure upgrades, energy storage technologies like grid-scale batteries and pumped hydro are key to managing renewable energy variability and limited grid capacity. In Hokkaido, batteries help stabilise output and absorb excess generation that would otherwise be curtailed. METI has established the frequency containment reserve (FCR) market to promote the installation of BESS to stabilise frequency levels in Japan.

Meanwhile, pumped-storage hydro has regained attention as a balancing power source. Originally built during Japan's economic boom to absorb nighttime surplus, METI now promotes the effective use of existing pumped-storage hydroelectric facilities as balancing power sources for renewable energy. Under the Long-Term Decarbonized Power Auction launched in FY2023, pumped hydro, along with battery storage, is included as an eligible power source. Hydrogen is also being explored to utilise surplus electricity, though large-scale use still requires further development[184].

Northern Japan

In this study, Northern Japan refers to the eight prefectures of Hokkaido, Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima, and Niigata. Further, the prefectures of Aomori, Iwate, Miyagi, Akita, Yamagata and Fukushima make up the Tohoku Region. Table 21 below summarises key characteristics of the eight prefectures considered within Northern Japan.

[184] Hokkaido Prefectural Government. (2020). https://www.pref.hokkaido.lg.jp/fs/1/1/6/9/9/7/0/3/_/suisovisionkaiteiban.pdf

Table 21 Summary of Key Statistics by Prefecture in Northern Japan

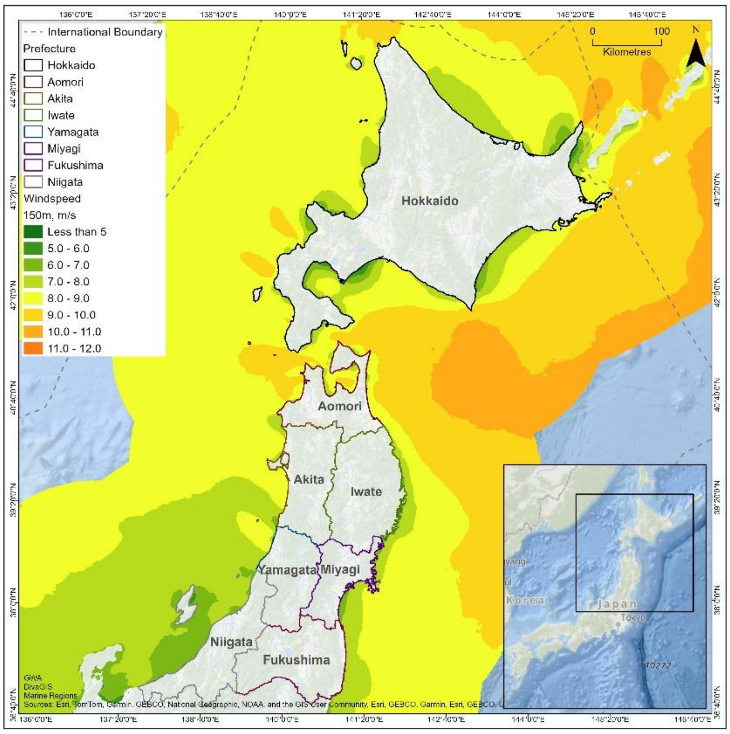
Prefecture	Land area (km^2)[185]	Population[186]	Gross prefectural product (million JPY) [187]	GPP per capita (million JPY)[188]
Hokkaido	83,422.27	5,044,825	20,889,250	4.14
Aomori	9,645.1	1,185,767	4,439,055	3.74
Iwate	15,275.05	1,153,900	4,797,050	4.16
Miyagi	7,282.3	2,224,980	9,614,668	4.32
Akita	11,637.52	907,593	3,629,335	4.00
Yamagata	9,323.15	1,012,355	4,340,427	4.29
Fukushima	13,784.39	1,771,314	7,864,963	4.44
Niigata	12,583.88	2,110,754	9,042,891	4.28

Hokkaido is the largest prefecture in the region by both land area and population. In terms of gross prefectural product (GPP), Hokkaido Prefecture is the largest economy in northern Japan, followed by Miyagi Prefecture and Niigata Prefecture. In contrast, when comparing the per capita Gross Prefectural Product (GPP) by prefecture within Northern Japan, Fukushima ranks first, followed by Miyagi and Yamagata.

As shown in Figure 28 below, a significant portion of the northern coast of Japan benefits from strong wind resources, with annual mean wind speeds ranging from 7 to 9 m/s. Notably, both the Pacific and Sea of Japan coasts of Aomori Prefecture exhibit wind speeds exceeding 9 m/s. This region exhibits diverse climate characteristics due to their unique geography, with mountain ranges and surrounding seas influencing weather patterns—especially in winter, when the Sea of Japan side experiences frequent snow and cloudy days, while the Pacific side tends to be sunnier. Many areas on the Sea of Japan side are designated as heavy snowfall zones,[189] resulting in harsh winters.

[185] Statistics Bureau of Japan. (2025) https://www.stat.go.jp/data/nihon/01.html
[186] Statistics of Japan. (2025) https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&toukei=00200241&bunya_l=02&bunya_s=0201&tstat=000001039591&cycle=7&year=20250&month=0&tclass1=000001039601&stat_infid=000040306651&result_back=1&result_page=1&tclass2val=0
[187] Cabinet Office. (2022) https://www.esri.cao.go.jp/jp/sna/data/data_list/kenmin/files/contents/main_2022.html
[188] Calculation Method: Total Population/Gross Prefectural Product
[189] MLIT. (2025) https://www.mlit.go.jp/kokudoseisaku/chisei/content/001881217.pdf

Figure 28 Map of Northern Japan, Including Mean Offshore Wind Speeds at 150 m Elevation



Economy and Industry of Northern Japan

Table 22 presents a comparative overview of the economic composition across the prefectures in northern Japan, highlighting the proportion of primary, secondary, and tertiary sectors, the Gross Prefectural Product (GPP) contributions of construction and manufacturing, and key manufacturing industries by prefecture.

Table 22: Summary of Key GPP Share by Sector Within Northern Japan

Prefectures	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	GPP Share of Construction (%)	GPP Share of Manufacturing (%)	Key Manufacturing Industries
National Average	1.0	25.6	72.3	5.2	19.2	-
Hokkaido	4.2	16.4	77.7	7.6	8.7	Food products
Aomori	4.3	20.6	75.1	6.8	14.0	Food products
Iwate	3.0	26.7	70.3	7.2	18.1	Transportation equipment
Miyagi	1.2	24.3	74.5	6.0	15.3	Food products

Prefectures	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	GPP Share of Construction (%)	GPP Share of Manufacturing (%)	Key Manufacturing Industries
Akita	2.5	25.8	71.7	8.3	19.6	Electronic parts / devices / electronic circuits
Yamagata	2.4	33.1	64.5	5.3	26.3	Electronic parts / devices / electronic circuits
Fukushima	1.2	34.8	63.9	7.8	26.6	Chemicals
Niigata	1.5	31.2	67.4	6.3	22.5	Chemicals

Hokkaido Prefecture

Hokkaido's industrial structure is marked by a relatively high share of the primary and tertiary sectors, and a notably low share of the secondary sector compared to national averages. While the construction industry holds a larger proportion within the secondary sector, the manufacturing industry remains underdeveloped, particularly in areas such as machinery and chemicals. Instead, food production plays a more prominent role in Hokkaido's manufacturing profile.

Tohoku Region

In FY2021, Tohoku's industrial structure comprised 2.1% in the primary sector (vs. 1.0% national average), 27.8% in the secondary sector (vs. 26.2%), and 70.1% in the tertiary sector (vs. 72.8%). In 2022, Tohoku had a high share of Japan's manufactured goods shipments in electronic components (19.0%), leather and fur products (13.2%), and ICT equipment (12.8%). Half of the region's manufacturing output came from five sectors: electronics, food, transport equipment, machinery, and chemicals. The construction sector's share rose to 7.5%, up 1.7 points from 2010, largely due to post-disaster reconstruction efforts.[190]

Aomori Prefecture

Aomori's economy consists of 4.3% in the primary sector, 20.6% in the secondary, and 75.1% in the tertiary sector. Key manufacturing industries include food products, non-ferrous metals, and electronic components.[191] The construction industry accounts for 6.8% of Aomori Prefecture's GPP, with a total output value of ¥302.7 billion.[192]

[190] METI, Tohoku Bureau of Economy. (2024) https://www.tohoku.meti.go.jp/cyosa/tokei/point/24point/all_en.pdf
[191] Ibid.
[192] Aomori Prefecture. (2024) https://www.pref.aomori.lg.jp/release/files/2023/75690.pdf

Iwate Prefecture

Iwate's economy is composed of 3.0% in the primary sector, 26.7% in the secondary, and 70.3% in the tertiary sector. Key manufacturing industries include transportation equipment, electronic components, and food products. The construction sector accounts for 7.2% of GPP (¥343.2 billion). Although its share has declined, reconstruction demand since the 2011 earthquake continues to support high output levels.[193]

Miyagi Prefecture

Miyagi's industrial structure includes 1.2% in the primary sector, 24.3% in the secondary, and 74.5% in the tertiary sector. Leading manufacturing sectors are food products, electronic components, and production machinery. Miyagi contributes 28.1% of Tohoku's total GRP, the highest among the prefectures. The construction sector makes up 6.0% of GPP (¥518.2 billion), with continued influence from post-disaster reconstruction.[194]

Akita Prefecture

Akita's economy consists of 2.5% in the primary sector, 25.8% in the secondary, and 71.7% in the tertiary sector. Leading manufacturing industries include electronic components, production machinery, and food products. The construction sector accounts for 8.3% of GPP (¥300.6 billion), up 5.8% from the previous year due to increased public civil engineering projects.[195]

Yamagata Prefecture

Yamagata's industrial structure includes 2.4% in the primary sector, 33.1% in the secondary, and 64.5% in the tertiary sector. Key manufacturing sectors are electronic components, food products, and chemicals. Construction accounts for 5.3% of GPP (¥231.7 billion), down 17.6% from the previous year.[196]

Fukushima Prefecture

Fukushima's economy is composed of 1.2% in the primary sector, 34.8% in the secondary, and 63.9% in the tertiary sector. Major manufacturing industries include chemicals, electronic components, and transportation equipment. As a major contributor to Tohoku's industrial output, Fukushima plays a vital role in the region's economic base. It accounts for 22.6% of Tohoku's GRP. The construction sector represents 7.8% of GPP (¥613.7 billion), supported by ongoing post-disaster reconstruction since

[193] Iwate Prefecture. (2022) https://www3.pref.iwate.jp/webdb/view/outside/s14Tokei/tokei.download?fileId=s14TokeiInfo-1jV89q.18OYJ.FVOuh
[194] Miyagi Prefecture. (2025) https://www.pref.miyagi.jp/documents/44276/houkokusyo.pdf
[195] Akita Prefecture. (2025) https://www.pref.akita.lg.jp/uploads/public/archive_0000043842_00/R04/R04kenmin_nenpo.pdf
[196] Yamagata Prefecture. (2025) https://www.pref.yamagata.jp/documents/1593/hokokusyo_r4.pdf

2011.[197]

Niigata Prefecture

Niigata's industrial structure consists of 1.5% in the primary sector, 31.2% in the secondary, and 67.4% in the tertiary sector. Key manufacturing industries include chemicals, food products, and fabricated metal products, reflecting the prefecture's industrial diversity. As one of Japan's top rice-producing regions, Niigata has a strong food manufacturing sector centered on rice-based products, which supports both local employment and regional branding. The construction industry accounts for 6.3% of Niigata Prefecture's GPP, with a total output of ¥572.4 billion.[198]

Energy Policy of Northern Japan

Table 23 Renewable Energy Overview by Prefecture in Northern Japan

Prefecture	Renewable Energy Installed Capacity (Exclude hydropower) (MW)[199]	Renewable Energy Target (Year & % or MW)	Renewable Energy Share of Generation Mix (%)[200]	Main Renewable Sources[201]
Hokkaido	3,296	8,240 MW by FY 2030	15.0	Solar Power
Aomori	1,791	36% by FY 2030	59.0	Wind Power
Iwate	1,492	2,081 MW by FY 2025	43.2	Wind Power
Miyagi	2,300	3,800 MW by FY 2030	9.4	Solar Power
Akita	1,164	1,759 MW by FY 2025	12.5	Wind Power
Yamagata	517	1,530 MW by FY 2030	3.5	Wind Power
Fukushima	3,425	4,520 MW by FY 2030	9.5	Solar Power
Niigata	516	Additional 1,700 MW by FY2030	0.9	Solar Power

[197] Fukushima Prefecture. (2024) https://www.pref.fukushima.lg.jp/uploaded/attachment/664420.pdf
[198] Niigata Prefecture. (2025) https://www.pref.niigata.lg.jp/uploaded/life/739062_2309921_misc.pdf
[199] Ministry of Environment. https://repos.env.go.jp/web/target/target
[200] The generation results reflect for April 2025. Renewable Energy refers to sources such as wind power, solar power, and geothermal energy. METI. (2025) https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.enecho.meti.go.jp%2Fstatistics%2Felectric_power%2Fep002%2Fxls%2F2025%2F2-2-2025.xlsx&wdOrigin=BROWSELINK
[201] Ibid.

Aomori Prefecture

Located at the northern tip of Honshu, Aomori Prefecture offers ideal conditions for renewable energy development, which currently accounts for around 40% of the prefecture's electricity consumption. Aomori targets 1.34 billion kWh of renewable energy by FY2030, mainly through self-consumption systems. As of March 2022, certified FIT-based renewable energy (including those still under development) reached 5.814 billion kWh. If fully realised, renewables could supply 60.2% of electricity by FY2030, well above Japan's national target of 36–38%. Onshore wind power shows particularly high adoption, reflecting Aomori's natural advantages and strategic focus.[202]

The prefecture also hosts key nuclear facilities. The Higashidori Nuclear Power Plant remains offline pending safety inspections, with a restart planned for FY2025. The Ohma Nuclear Power Plant is under construction, expected to be completed around 2030. Another project by TEPCO in Higashidori Village remains suspended, with local calls for resumption but no confirmed timeline.

Iwate Prefecture

Iwate Prefecture is steadily progressing in its renewable energy transition, leveraging its nationally recognised potential in solar and wind power. As of 2023, total installed renewable energy capacity reached 1,967 MW, reflecting consistent regional deployment.[203]

The prefecture aims to achieve 2,081 MW by 2025 and a 66% electricity self-sufficiency rate from renewables by 2030. National estimates rank Iwate second in both onshore wind and geothermal energy potential, and sixth in offshore wind, positioning it as a strategically important region in Japan's renewable energy landscape.[204]

Miyagi Prefecture

Miyagi Prefecture is actively promoting renewable energy under the Miyagi Zero Carbon Challenge 2050 Strategy. By FY2023, installed capacity reached approximately 2,807 MW, with biomass and solar power comprising the majority.[205] The prefecture has set a target of 3,800 MW by FY2030.[206] In 2024, the Onagawa Nuclear Power Plant resumed operations, becoming the first restart in a disaster-affected area and accounting for 34.8% of Miyagi's electricity generation.[207]

[202] Aomori Prefecture. (2023) https://www.pref.aomori.lg.jp/soshiki/kankyo/energy/files/202303ondankakekaku_hontai.pdf
[203] Iwate Prefecture. (2023) https://www.pref.iwate.jp/_res/projects/default_project/_page_/001/067/151/01_revised_version_of_the_2nd_ipgwcap.pdf
[204] Ibid.
[205] Miyagi Prefecture. (2023) https://www.pref.miyagi.jp/documents/42209/250325.pdf
[206] Miyagi Prefecture. (2023) https://www.pref.miyagi.jp/documents/44566/m0cc.pdf
[207] METI. (2025) https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.enecho.meti.go.jp%2Fstatistics%2Felectric_power%2Fep002%2Fxls%2F2025%2F2-2-2025.xlsx&wdOrigin=BROWSELINK

Akita Prefecture

Akita Prefecture has been advancing renewable energy since 2011, focusing on offshore wind as a core strategy for regional revitalisation and industrial development. With strong wind resources, Akita has emerged as a leader in Japan's offshore wind industry. The New Energy Industry Strategy was revised in 2016 and again in 2022 to align with national targets for 2030 and carbon neutrality by 2050. After surpassing its FY2020 target of 1.41 GW with 1.50 GW installed, the FY2025 goal was raised from 1.62 GW to 1.76 GW. As the second phase of the strategy nears completion, Akita is currently formulating the third phase to further expand offshore wind and strengthen local business involvement.[208]

Yamagata Prefecture

Yamagata Prefecture is promoting large-scale renewable energy projects, including offshore wind, as part of its broader environmental strategy outlined in the Yamagata Prefecture Environmental Plan. Development is guided by principles of harmony with local communities and the fishing industry. [209] As of FY2023, installed capacity of renewable energy facilities reached approximately 720 MW, with a target of 1,530 MW by FY2030. [210] Through utility-scale projects, Yamagata aims to become a regional energy supply hub, stimulate related industries, and contribute to local economic revitalisation.[211]

Fukushima Prefecture

Fukushima Prefecture is undertaking a range of renewable energy initiatives as part of its recovery vision following the Great East Japan Earthquake and the Fukushima Daiichi Nuclear Power Plant accident. [212] Guided by the principle of creating a safe, sustainable society free from nuclear dependence, the prefecture reached approximately 3,961 MW of installed renewable energy capacity by FY2023, exceeding its electricity consumption. Fukushima targets 4,520 MW by FY2030 and aims to generate renewable energy equivalent to 100% of its total energy demand—including electricity and fossil fuels—by 2040.[213] Key initiatives include the establishment of the National Institute of Advanced Industrial Science and Technology's (AIST) Fukushima Renewable Energy Institute in 2014[214], the completion of the 10 MW green hydrogen production facility FH2R (Fukushima Hydrogen Energy Research Field) in 2020[215], and regional virtual power plant (VPP) models demonstrations.

Niigata Prefecture

Niigata Prefecture is promoting renewable energy development by

[208] Akita Prefecture. (2025) https://www.pref.akita.lg.jp/pages/archive/89584
[209] Yamagata Prefecture. (2024) https://www.pref.yamagata.jp/documents/8230/02koso.pdf
[210] Ibid.
[211] Yamagata Prefecture. (2025) https://www.pref.yamagata.jp/documents/16835/kankyokeikakuzenbun0703.pdf
[212] METI. https://ondankataisaku.env.go.jp/re-start/interview/30/
[213] Fukushima Prefecture. (2024) https://www.pref.fukushima.lg.jp/uploaded/attachment/652363.pdf
[214] AIST. https://www.aist.go.jp/fukushima/
[215] NEDO (2020). https://www.nedo.go.jp/news/press/AA5_101293.html

leveraging its abundant natural resources and regional characteristics. Hydropower accounts for approximately 90% of its total installed renewable energy capacity. In contrast, solar power adoption has been relatively limited due to heavy snow in the region, resulting in a lower installation rate than the national average.[216]

The prefecture aims to introduce an additional 1,700 MW of renewable energy capacity by FY2030, and if this target is achieved, the total installed capacity is expected to reach approximately 5,459 MW. Strategic priorities include offshore wind, hydropower, biomass, and solar power. Niigata is conducting feasibility studies and supporting local companies in entering the wind power sector to strengthen the regional industrial base and ensure that the economic benefits of the energy transition are shared locally.[217]

The prefecture aims to achieve approximately 5,459 MW of installed renewable energy capacity by FY2030. Strategic priorities include offshore wind, hydropower, biomass, and solar power. Niigata is conducting feasibility studies and supporting local companies in entering the wind power sector to strengthen the regional industrial base and ensure that the economic benefits of the energy transition are shared locally.[218]

[216] Niigata Prefecture. (2022) https://www.pref.niigata.lg.jp/uploaded/attachment/315149.pdf
[217] Niigata Prefecture. (2022) https://www.pref.niigata.lg.jp/sec/kankyoseisaku/r3carbonzero.html
[218] Niigata Prefecture. (2022) https://www.pref.niigata.lg.jp/sec/kankyoseisaku/r3carbonzero.html

Appendix 3:

Prior GVA studies in Hokkaido Prefecture

Appendix 3: Prior GVA studies in Hokkaido Prefecture

Ishikari City

In 2023, Ishikari City released a report including the estimated economic impact of OSW development in Hokkaido Prefecture[219]. The study focused on four key areas within Hokkaido Prefecture which were likely to utilise Ishikari Bay New Port as a marshalling port: Ishikari, Shimamaki, Ganwu-Minamishiribeshi, and Hiyama. The findings project a substantial GVA of approximately 2.5 trillion JPY and the creation of 193,444 jobs across these regions. The construction CapEx is calculated using cost ratios provided by major general contractors. No further details of the data and data collection methodologies are publicly available.

Table 24 Summary of Prefectural Procurement Assumptions in Ishikari City OSW GVA Study

		Ishikari[220]	Ganwu-Minamishiribeshi	Shimamaki	Hiyama
Locally procured cost (Billion JPY)	CapEx	228.4	144.4	137.0	228.4
	OpEx	299.0	179.5	170.3	283.8
Total costs (Billion JPY)	CapEx	819.5	518.3	491.7	819.5
	OpEx	523.6	331.1	314.1	523.6
Prefectural procurement rates[221] (%)	CapEx	27.9%	27.9%	27.9%	27.9%
	OpEx	57.1%	54.2%	54.2%	54.2%

DENZAI

The other existing offshore wind related GVA study was conducted by Denzai in 2020, who have since become an integral part of MOPA, in the development of an offshore wind power hub at Muroran Port (See also cross reference 3.2.2)[222]. This analysis projected a GVA of over 20 billion JPY from the facilities' scheduled operation in 2025 through 2030. However, further details regarding the estimated number of jobs created or the specific methodologies employed in the analysis are not publicly available. Thus, the comparative data obtainable from this study is limited.

[219] Ishikari. (2023).
https://www.city.ishikari.hokkaido.jp/_res/projects/default_project/_page_/001/003/724/1003724_004.pdf
[220] The analysis utilised an Input-Output (I-O) methodology, the same methodology as this study. While the study uses a 2022-specific average propensity to consume, differing from the Hokkaido Prefecture's GVA calculation tool for 64 sectors, which averages data from 2018 to 2022, it still draws from the same underlying dataset used in the tool.
[221] Prefectural procurement rates are not explicitly stated in the study by Ishikari City; however, they were calculated based on the data for locally procured costs and total costs.
[222] Nikkei. (2020). https://www.nikkei.com/article/DGXMZO65680490Q0A031C2L41000/

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