Offshore Wind Power Experience in Japan (2016)

Setana
2003
Vestas
600kW
X 2 units

Black: Early exam.
Green: Fixed type
Brown: Floating(small)
Blue: Floating type

Note: FHI’s WTG division has merged by Hitachi in July 2012.
Offshore Wind Power Experience in Japan (2016)

- 59.6 MW, 28 turbines, 9 projects at 8 locations in total at the end of Feb. 2017. It is 1.8% of total wind power installation (3,234 MW) in Japan.

- 44.2 MW, 23 turbines (74%) are commercial or local government owned projects. Almost all of them are very close to seashore, so-called “Semi-offshore”. Dolphin type or Monopile type foundations are used at these projects.

- Real offshore projects (more than 1 km from seashore) are National projects.
  Fixed type by NEDO: 4.4 MM, 2 turbines at Choshi and at Kitakyusyu (Gravity type) (Jacket type foundation)
  Floating type by MOE: 2 MW, 1 turbine at Kabashima (Spar type floater) (GOTO-FOWT) → It granted to Goto city, relocated 10 km southeast to Fukue island, reconnected to grid, and started commercial operation in Apr. 2016.
  Floating type by METI: 9 MW, 2 turbines at Fukushima (Semi-sub type floater) (Fukushima FORWARD, on going) → 5 MW turbine on advanced spar type floater was anchored in 2016 and it starts official operation in Mar. 2017.

### Offshore Wind Power Experience in Japan (2016)

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Distance (km)</th>
<th>Depth (m)</th>
<th>Rated (MW)</th>
<th>No. of WTG</th>
<th>Total (MW)</th>
<th>Start operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>Hokkaido Setana Port</td>
<td>0.7</td>
<td>13</td>
<td>0.6</td>
<td>2</td>
<td>1.2</td>
<td>Dec. 2003</td>
</tr>
<tr>
<td></td>
<td>Akita Akita Port</td>
<td>0.1</td>
<td>-</td>
<td>3.0</td>
<td>1</td>
<td>3.0</td>
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<tr>
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<td>Yamagata Sakata port</td>
<td>0.05</td>
<td>4</td>
<td>2.0</td>
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<td>10.0</td>
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<tr>
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<td>Ibaragi Kamisu</td>
<td>0.04</td>
<td>4</td>
<td>2.0</td>
<td>7</td>
<td>14.0</td>
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<tr>
<td></td>
<td></td>
<td>~0.05</td>
<td>4</td>
<td>2.0</td>
<td>8</td>
<td>16.0</td>
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<tr>
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<td>Chiba Choshi*</td>
<td>3.1</td>
<td>12</td>
<td>2.4</td>
<td>1</td>
<td>2.4</td>
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<tr>
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<td>Fukuoka KitaKyuusu*</td>
<td>1.4</td>
<td>14</td>
<td>2.0</td>
<td>1</td>
<td>2.0</td>
<td>Jun. 2013</td>
</tr>
</tbody>
</table>

| Floating | Nagasaki Kabashima* | 1.0 | 100 | 2.0 | (1) | (2.0) | Oct. 2013 |
|          |                     |     |     |     |     |       |           |
|          | Fukushima Fukujima  | 5.0 | 20  | 2.0 | 1   | 2.0   | Apr. 2016 |
|          |                      |     | 120 |     |     |       |           |
|          |                      |     | 7.0 |     | 1   | (2.0) | Dec. 2013 |
|          |                      |     |     |     |     |       | (Mar. 2016) |

| Floating | Fukushima Iwaki city | 20  | 120 | 2.0 | 1   | 2.0   | Dec. 2013 |
|          |                     |     |     |     |     |       |           |
|          |                     |     | 7.0 |     | 1   | (5.0) | Dec. 2016 |
|          |                     |     |     |     |     |       | (Mar. 2017) |
|          |                     |     | 5.0 |     | (1) |       |           |

**Total** 28 59.6

*National projects () : Relocated, Under commissioning
Offshore projects by Local governments and private companies

Dec. 2003
At Setana port in Hokkaido
By Local government (Setana)
700m offshore, 3m in depth
Vestas 600kW x 2 turbines
Dolphin type foundation
1st offshore wind power in Japan

Feb. 2010 at Kamisu in Ibaragi
By Wind Power Group
Offshore from 40～50m, 4m in depth
FHI (Hitachi) 2MW x 7 turbines
Monopile foundation (¢3m)
They withstood huge Tsunami in 2011.

Demonstration of Offshore Wind Power Generation by NEDO, at Choshi, Chiba Pref.

WTG: MWT92/2.4 offshore model
Foundation: Gravity type
Output: 2.4MW
Rotor Dia.: 92m
Hub Ht.: 80m
Water Depth: 12m
3km from seashore

Ref: NEDO (New Energy and Industrial Technology Development Organization)
Demonstration of Offshore Wind Power Generation by NEDO, at Hibikinada, Fukuoka Pref.

Hybrid Gravity Foundation In Operation on June 2013. Ref: NEDO

JSW J82 2MW gearless PMSG WTG

MOE Floating WTG Project at Kabashima in Goto Islands, Nagasaki Pref. (GOTO-FOWT)

Hitachi’s Down wind type 2MW wind turbine

28 Oct. 2013: in Operation
2MW floating turbine was relocated in 2016

MOE’s national project has finished in Mar. 2016. The turbine was granted from MOE to Goto city local government. Toda Co. has moved WTG about 10km southwest from Kabashima to Fukuejima. Fukuejima has more population (38k) and larger electricity capacity than Kabashima. It was re-connected to the gridline and started commercial operation in Apr. 2016. METI approved offshore wind tariff 36JPY/kWh for it. (1st and only case in Japan)


Photo: Taken by Mr. Hoichi Nishiyama

Toda Co. announced to develop 21MW floating offshore windfarm at Goto islands on 3 Oct.2016

http://www.toda.co.jp/hairyo.html
**METI’s Fukushima Recovery, Experimental Offshore Floating Wind Farm Project (FukushimaFORWARD)**

**Project Consortium:** 11 members
- Marubeni (Project integrator)
- MHI
- University of Tokyo
- Mitsubishi Corp.
- IHI Marine United
- MES
- Nippon Steel
- Hitachi
- Furukawa Electric
- Shimizu Corp.
- Mizuho Information & Research

**Latest Picture for FukushimaFORWARD**

- Floating substation (Hitachi) on advanced spar type floater (JMU), since 2013
- **1st 2MW turbine** (Hitachi downwind type) on semi-sub type floater (Mitsui Zosen), since 2013
- **2nd 7MW turbine** (Mitsubishi hydraulic type) on semi-sub type floater (Mitsubishi), since 2016

3rd floating turbine
- 5MW turbine (Hitachi, downwind type) is ready for shipping.
- Advanced spar type floater is under construction at dockyard in Osaka.
- The turbine was installed on the floater at Osaka bay and carried to Fukushima in 2016.
5MW Floating Wind Turbine for Fukushima Project has been completed at Osaka on 24 May 2016.

April 2016, at Sakai Dockyard of HITZ
On 2 May at Osaka bay Sumoto port
On 9 May

On 24 May
Hitachi’s Down wind type 5MW turbine HTW126
On 19 May
The floater has leaned temporally. But, it was recovered within 5 days.
On 14 May

On 18 May

This advanced spar type floater is designed by JMU

Coming Offshore Wind Power Projects in Japan (Mar. 2017)

- 2486 MW, 19 projects at 14 locations in total now. Most of them are under EIA procedure.
- 1966 MW, 14 projects are commercial projects. The earliest one shall be "Kashima port 1st".
- 5MW floating turbine is added at Fukushima in 2017
- 3~4 MW floating turbine shall be added at Kitakyushu in 2018 by NEDO new project
- Japanese Government (MOE) settled two offshore Test fields

Legal Hurdles;
- Port associated area: Cleared in 2016
- General common area: Start discussion in 2016
**Coming Offshore Wind Power Projects in Japan (Mar.2017)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Port</th>
<th>WTG (MW)</th>
<th>No.of WTGs</th>
<th>Total (MW)</th>
<th>Start Operation</th>
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<tr>
<td>Fixed</td>
<td>Hokkaido</td>
<td>Wakkanhai port</td>
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<td>Ishikari new port</td>
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<td>25</td>
<td>104</td>
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<td>Aomori Mutsuosawara port</td>
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<td>Kitakyushu</td>
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<td>300**</td>
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<td>Yamaguchi Yusaoka, Shimonsenki</td>
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<td>2</td>
<td>7.5</td>
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<td>Nagasaki Fukujeima</td>
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<td>2.0–5.0</td>
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<td>Kabashina</td>
<td>Gen.</td>
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</tbody>
</table>

Total 2486.3

*National projects  **Estimated by JWPA

**Roadmap for the Wind Power Introduction for Japan, proposed by the JWPA**

- 10GW prospect at Energy mix plan shall be achieved at early 2020s. (3.2GW at 2016 + 10.8GW during EIA process = 14GW)
- JWPA proposes 36.2GW toward 2030 for the next stage.
Japan has Huge Wind Energy Resources

Onshore: ave. wind speed 6.5m/s considering social acceptance
Offshore: ave. wind speed 7m/s
Distance 30km
Sea depth 200m

Hurdles against offshore wind in Japan

- Small official target by Japanese government (820MW).
- Restricted shallow sea area (surrounded by deep sea)
- Floating wind power for deep sea by national projects were very expensive.
- Poor grid infrastructure at good wind area (Hokkaido & Tohoku, northern Japan)
- Moderate wind speed (Low income) at offshore area in central & western Japan
- Big law uncertainty at “General common sea area” (So-called Thomas Hobbes’s “the war of all against all”. “Who has the permission rights?” is not clear now. Concerning Fishermen’s rights, Decommissioning, etc.)
- Small law uncertainty at “Port associated area” (Permission term is 20 years. We need extension procedure)
- Lack of “Jack up ships/SEP”, “Base ports”
- “Cabotage / Labor restriction” for Jack up ships
- Long EIA process (4-5 years)
Jack-up ship problem can be solved in Japan

Penta-Ocean Orders First Japanese-Built Wind Turbine Installation Vessel


Japan’s Penta-Ocean Construction and Japan Marine United Corporation (JMU) have signed a contract for the construction of one multi-purpose self-elevating platform vessel suitable for marine civil engineering works or offshore wind turbine installation in harsher weather and marine conditions.

The basic design of the jack-up vessel, the first of its kind to be built in Japan, has been supervised by the Netherlands-based GustoMSC. The vessel is designed based on jack-ups used in Europe for installation of oil rigs or offshore wind turbines, but with a jack-up system that matches Japanese natural conditions and on-site characteristics.

It will be equipped with a fully-revolving crane with an 800-ton lifting capacity, as well as a dynamic positioning system, enabling the vessel to perform installation of large-scale marine structures such as offshore wind turbines with a capacity of up to 6MW and foundations in the water depths of up to 50 metres.

The jack-up is also designed for operations in Japan’s Greater Coasting Area and for becoming a shallower draft vessel. It will come equipped with accommodation units and a helicopter deck for emergency transfers. The jack-up is expected to be delivered in September 2018.

As a result of latest amendment to the country’s Port and Harbor Act that took effect on July 1, 2016, the port areas will be more accessible to operators wishing to construct offshore wind farms, and the vessel is optimized to undertake this task, according to Penta-Ocean.

Japanese trade company Marubeni retired from Kashima port offshore project due to low profitability with low wind speed. (SBEnergy/Softbank retired from neighbor port project. Local developer Komatsuzaki group continues it.)

WIND POWER OFFSHORE 10 Jan. 2017

Marubeni cancels part of port-based project

13 January 2017 by Martin Foster, Be the first to comment

JAPAN: The Marubeni Corporation has informed the Ibaraki prefectural government it will stop developing a wind project planned for a site in Kashima port.

Marubeni said it would discontinue the project based on estimates that the wind power was not strong enough to meet targets.

The Ibaraki prefectural government said Marubeni had scrutinised profitability throughout the development period and found it fell below acceptable levels, making it difficult to approve an investment decision.

Marubeni was originally selected to develop the southern part of the port area in August 2012.

Another developer, Windpower Energy Group, won the bidding for the southern portion of the port area and will reportedly continue with the project.

The prefectural government will reopen bidding for Marubeni’s portion of the port project in February.

In August 2016, Marubeni signed an agreement with a consortium of companies, including utilities, to carry out feasibility studies for two proposed projects at two port sites in the Akita prefecture, in the northern part of the major Japanese island, Honshu.
“Port and Harbor Law” has been amended to promote offshore wind power development in Japan on 13 May.

Japanese News for GWEC, reported by JWPA
You can see them at JWPA's Web site http://jwpa.jp/index_e.html

Japanese MILT amended “Port and harbor law” to promote offshore wind power at Port associated area in May 2016

The contents of amendment make it clear;

- “How to bid for the offshore wind power” at port associated area.
  (including how to expand “port associated area”)
- The concrete contents for the bidding/auctions
  (including decommission at the end of the projects)
- The winners get “20 years occupation permission”.
  (It's too short for “from planning to decommissioning”. We have to request permit extension during project lifetime.)
Offshore Wind Project at Kitakyusyu port


http://www.city.kitakyushu.lg.jp/kou-ku/30300004.html
Kitakyushu city Gov. has large interest for “Contribution for local economy & job”. They dislike “Wimbledon Effect” like UK’s Able port met this summer.

Local Industry Group (Kyushu Electric Power, J Power, etc.) won the Kitakyushu bidding in Feb.2017

Consortium picked to build Japan's largest offshore wind farm

A consortium led by regional Japanese utility Kyuden Mirai, has been chosen to develop what would be the Asian country's largest offshore wind farm to-date, a ¥175bn ($1.5bn) project expected to add 229MW to the current fleet.
Akita North Offshore Wind Project (Max. 455MW) by Obayashi Co.

5MW x 91 units = 455 MW

Akita South Yuri Honjo Offshore Wind Project (Max. 560MW) by Eco Power, Renova, JER-East

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日本経済新聞

レノバとエコ・パワーとJR東日本エネルギー開発、「（仮称）秋田県由利本荘市沖洋上風力発電事業」で地元に協力を要請

発表日：2017年3月3日

（仮称）秋田県由利本荘市沖洋上風力発電事業に関する協力を要請

～国内最大級 約560MWの洋上風力発電～

株式会社レノバ（本社：東京都千代田区、代表取締役社長CEO 木南陽介）、エコ・パワー株式会社（本社：東京都渋谷区、代表取締役社長 狛原宏彦）、JR東日本エネルギー開発株式会社（本社：東京都港区、代表取締役社長 山本義裕）の3社は、現在、秋田県由利本荘市沖洋上風力発電（仮称、以下、「本洋上風力発電」といいます。）の検討を進めております。
Offshore wind power developments in Japan have many hurdles now, but we can clear them gradually. Thank you for hearing.