

# The Current State of and Future Perspectives for Wind Power Projects in Japan



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**Japan Wind Power Association**

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**<http://jwpa.jp>**



# Japan Wind Power Association



## ■ History

- December 17, 2001: Voluntary association established
- July 4, 2005: Limited intermediate corporation established
- May 27, 2009: Started as a general incorporated association
- April 1, 2010: Consolidated with the Wind Power Development Association



## ■ Basic philosophy

- We improve the energy security of our country and contribute to solutions for global environmental problems.
- By bringing together all the relevant industries and enterprises, and promote the sound growth of wind power industries.
- As a wind power industry group representing our country, we conduct ourselves with a strong awareness of our responsibility.
- We are accountable and maintain compliance by ensuring the function and ability to exert influence both internally and externally.

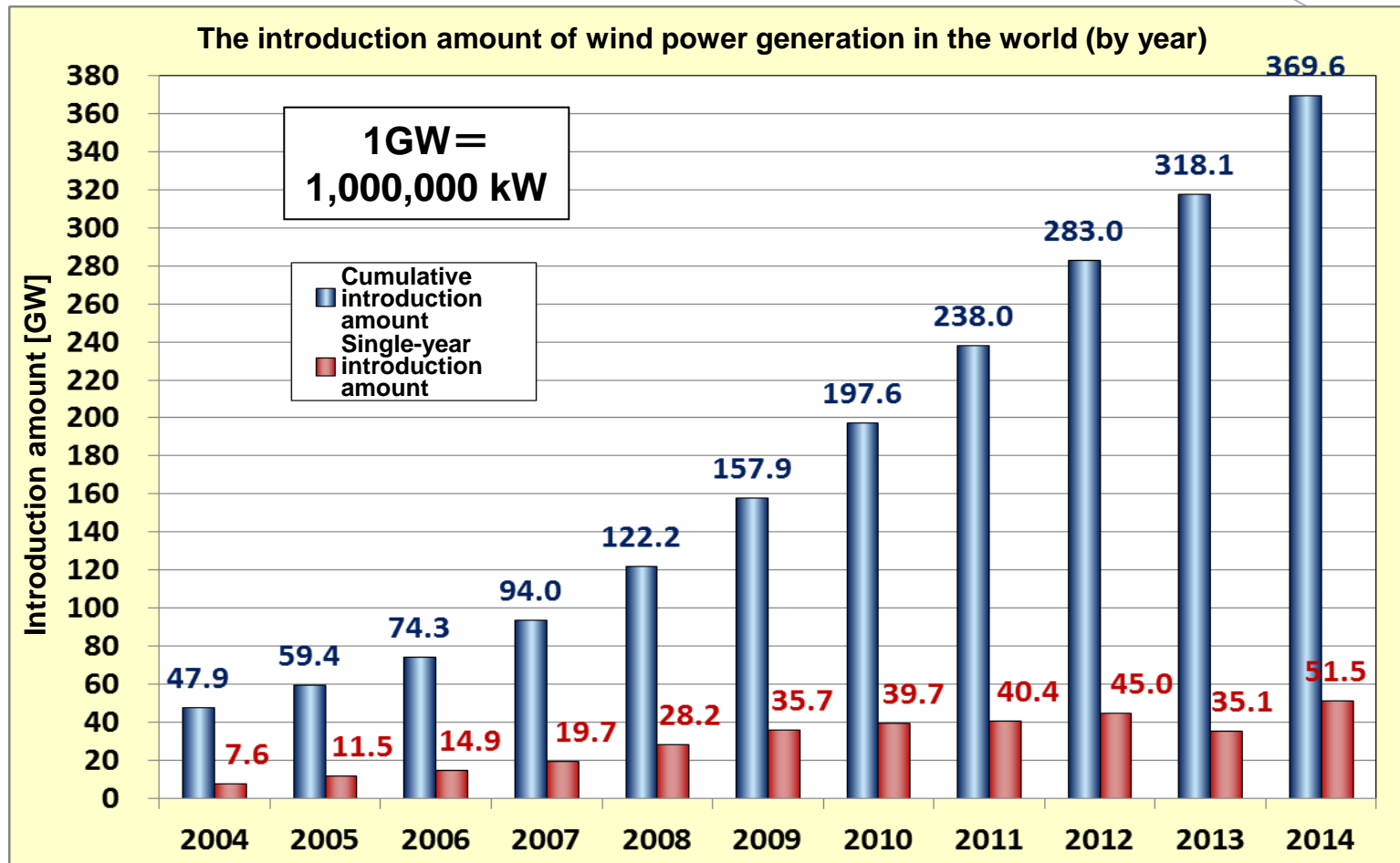
## ■ Member composition

- Total of **263 organizations** related to wind power generation (as of February 1, 2015)
  - Wind power business operators, turbine manufacturers, turbine distributors, parts manufacturers
  - Civil engineering and construction, electrical work, transport and construction, maintenance, consultants, etc.
- Member companies cover **approximately 85%** of installed capacity of domestic wind power generating facility

# The results of introducing wind power generation in the world (calendar year)



- The accumulated amount of introduction in 2014 was **369.6GW** (approximately 1.6 times the installed capacity of all of the domestic electric companies)
- In 2014 alone, introduction of approximately **18 times the amount of wind power cumulatively introduced in Japan**

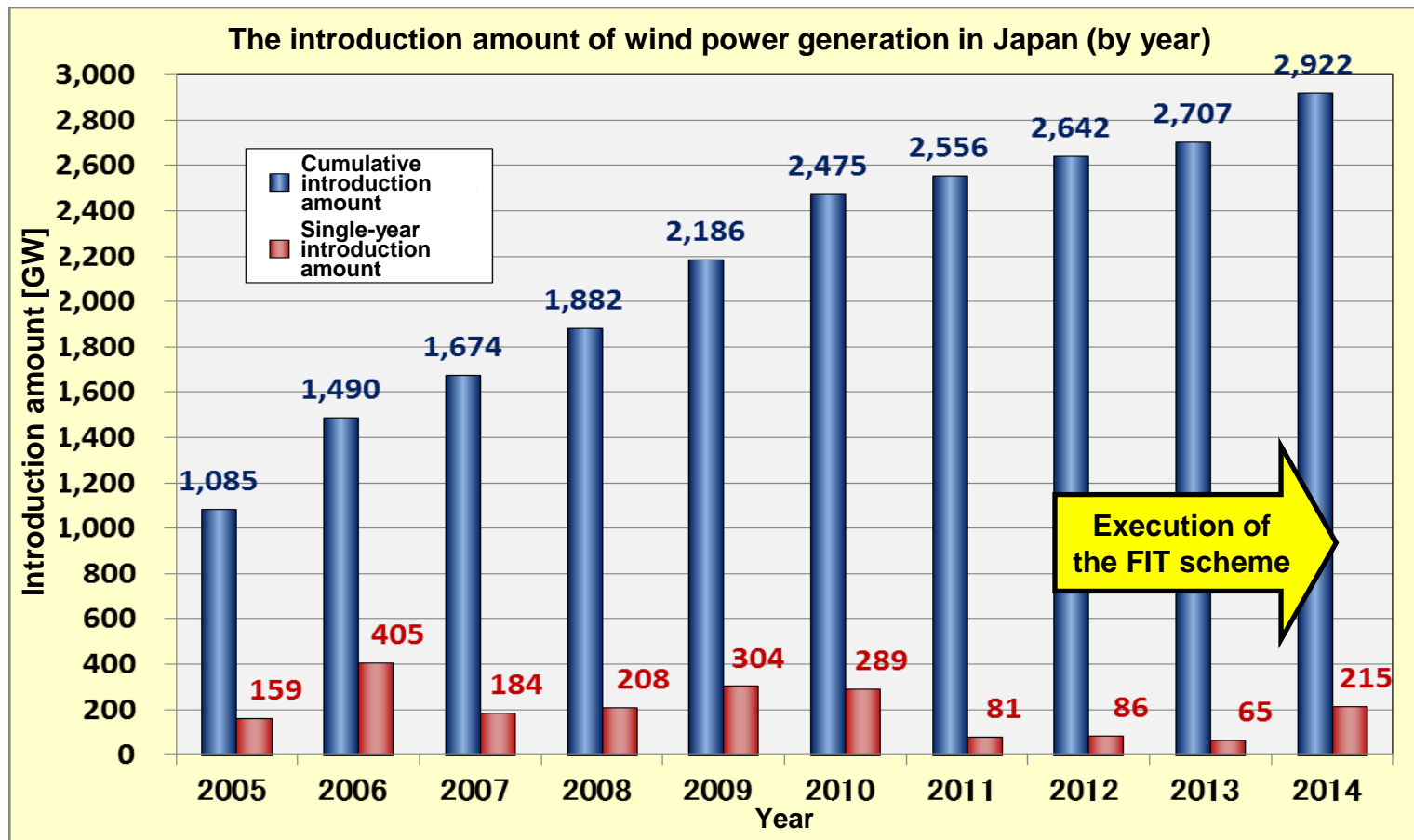


\* : Source: GWEC Global Wind Statistics 2014

# The results of introducing wind power generation in Japan (fiscal year)



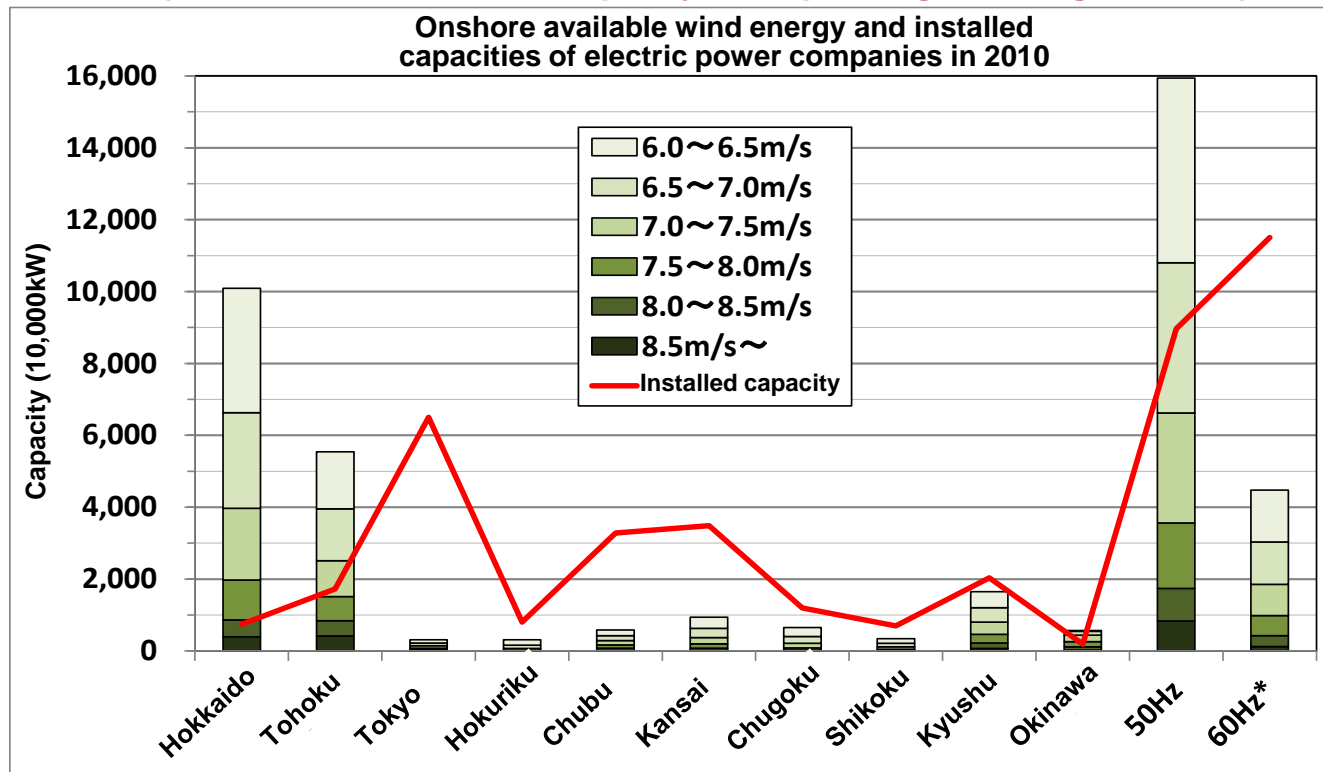
- Estimated accumulated amount introduced in fiscal 2014: **2,922,000 kW, 2,031 turbines, 428 power plants**
- Fiscal 2007: Execution of the revised Building Standards Act
- Fiscal 2010: On the premise of changing to the FIT scheme, the construction grant system for new WF was discontinued.



# Onshore available wind energy

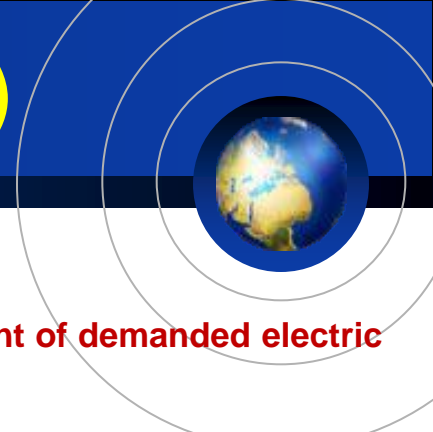


- From a height of 80m in consideration of business feasibility, and storage potential for an annual average wind speed of **at least 6.0m/s**, the “onshore available wind energy” in consideration of social restrictions and conditions is as stated below.
  - The average capacity factor in the event that potential by wind speed was developed equally is  $\approx 25\%$ 
    - In the event that it is not limited by the installed capacity of each electric power company: 209,830,000 kW (1.02 times the installed capacity of all power generating facilities)
    - In the event that it is limited by the installed capacity of each electric power company: 74,360,000 kW (0.36 times the installed capacity of all power generating facilities)



\* 60Hz excludes Okinawa.

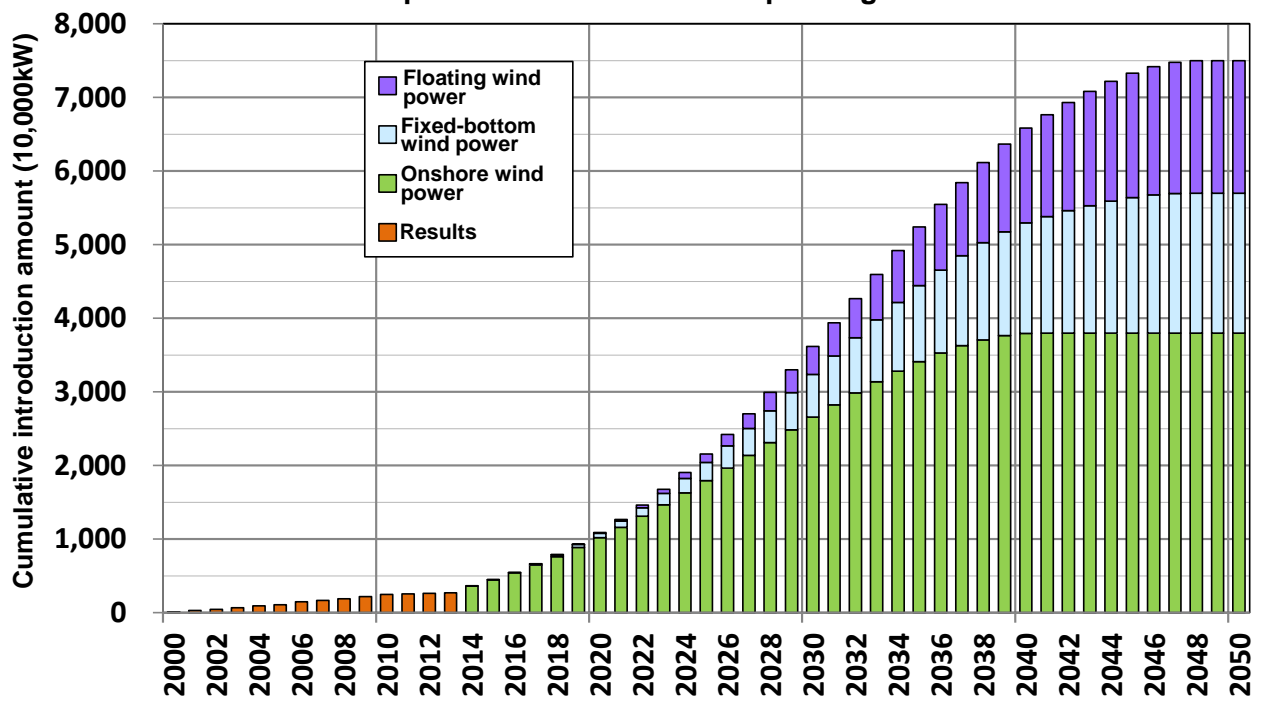
# Road Map (JWPA Vision)



## ■ Setting method of fundamental conditions of the vision and a road map

- Approximately 20% or more supply from wind power for the fiscal 2050 amount of demanded electric power (scenario A)
- Setting the cumulative introduction amount by an S-shaped curve

Road map of introduction for wind power generation: Vision



Fiscal year	Results of wind power generation introduction, and target volumes for introduction (10,000kW)				Electrical energy (100,000,000kWh)
	Total	Onshore	Fixed-bottom	Floating	
2010	248	245	3	0	43
2020	1,090	1,020	60	10	230
2030	3,620	2,660	580	380	840
2040	6,590	3,800	1,500	1,290	1,620
2050	7,500	3,800	1,900	1,800	1,880

Approximately 20% supply from wind power for the fiscal 2050 estimated amount of demanded electric power (scenario A) is possible.

Approximately 25% supply from wind power for the fiscal 2050 estimated amount of demanded electric power (scenario B) is possible.

Electrical energy is calculated by using 20% for the capacity factor for power plants that were built in 2010 or earlier.

2050 Japan low-carbon society scenario (Ministry of the Environment strategic research and development project: June 2008)

[http://2050.nies.go.jp/report/file/lcs\\_japan/2050\\_LCS\\_Scenario\\_Japanese\\_080715.pdf](http://2050.nies.go.jp/report/file/lcs_japan/2050_LCS_Scenario_Japanese_080715.pdf)

Scenario A: 930,000,000,000 kWh, Increased concentration of population and capital in cities, from pursuit of convenience and efficiency

Scenario B: 758,000,000,000 kWh, Decentralization of population and capital in regions, due to pursuit of comfortable daily lives

# Economic ripple effects, employment creation effects, and CO2 reduction effects



- Construction: Depends on the single-year production amount, including renewal
- O&M and insurance: Depends on the accumulated introduction amount in that fiscal year
  - Pursuant to an increase in the accumulated introduction amount, the effect becomes larger due to the O&M and insurance.
  - ⇒O&M is closely related to the local area.

Fiscal year	Breakdown	Unit	Total	Construction	O&M, insurance
2030	Total construction costs, direct costs	JPY 100,000,000	16,350	10,090	6,260
	Economic ripple effects	JPY 100,000,000	30,440	18,030	12,410
	Employment creation effects	1,000 people	197	121	76
	CO2 reduction effects	10,000t-CO2	4,413		
2050	Total construction costs, direct costs	JPY 100,000,000	22,810	8,110	14,700
	Economic ripple effects	JPY 100,000,000	44,840	14,520	30,320
	Employment creation effects	1,000 people	290	97	193
	CO2 reduction effects	10,000t-CO2	9,888		

# Tasks for expanding introduction from now on



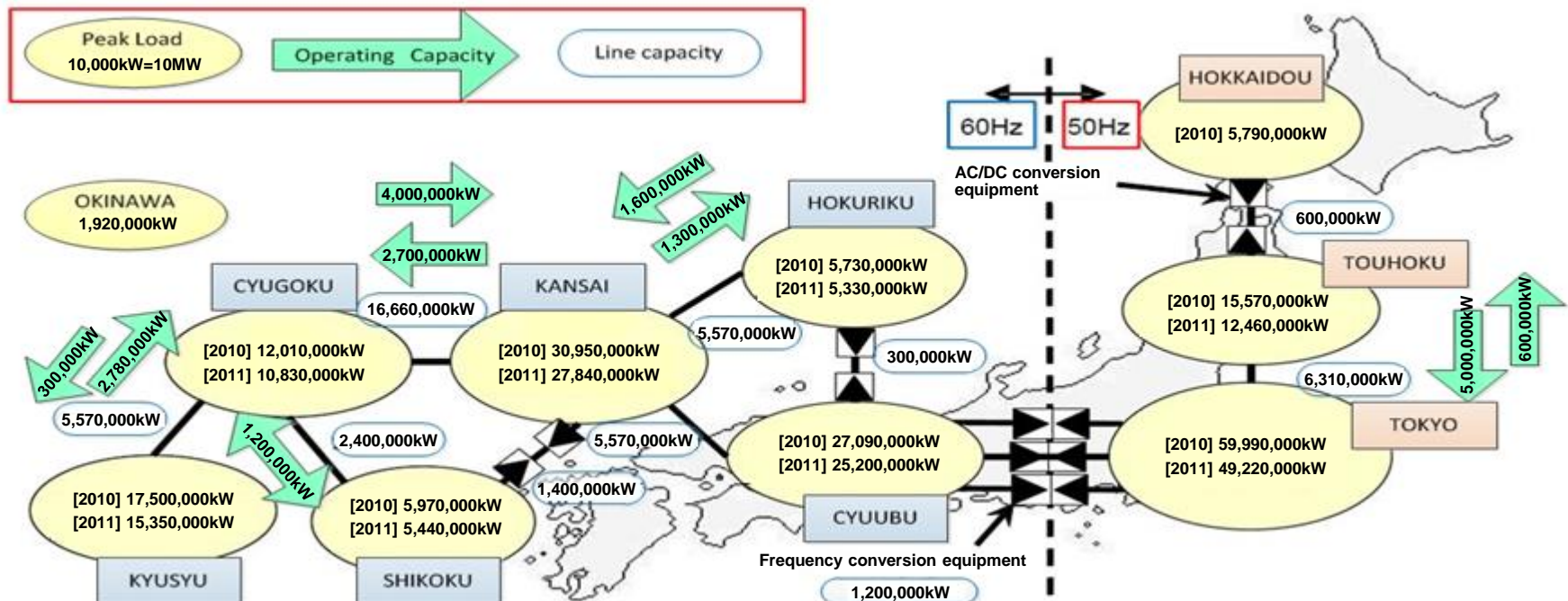
- **First it is necessary to define policies.**
  - **Early formulation of ambitious medium and long-term introduction numerical targets by the national government**
- **The measures below are essential as means of accomplishing these introduction targets.**
  - **Radical system measures**
    - **Broad-area operation of electricity systems (Organization for promoting electricity broad-area operation)**
    - **New and additional construction of transmission facilities, and maximum utilization of existing facilities**
  - **Relaxation of regulations and systems**
    - **Speeding-up and streamlining of environmental assessment**
  - **Reducing power-generating costs**
    - **Application of large, high-performance turbines (Improvement of the capacity factor)**
    - **Utilization of high-performance wind condition simulation (Reduction of the failure rate)**
  - **National support for offshore wind power**
    - **Zoning of offshore wind power**
    - **Maintenance of port infrastructure and construction ships for handling offshore wind power**
  - **Diversification of finances**
    - **Creation of systems for reducing finance risks**



# Radical interconnected system measures



- In order to broadly expand introduction of wind power generation, it is essential to build new and additional interconnected facilities and to make maximum utilization of existing facilities.
  - It is necessary to strengthen interconnected lines between regions and build new and additional key transmission lines within regions, etc.
  - In addition, equalization measures for fluctuations due to things such as broad-area operation that utilizes new and additional power storage facilities and weather prediction systems are also important.



Source: Interim report on a master plan study group related to strengthening thing such as interconnected lines between regions (April 2012, Ministry of Economy, Trade and Industry)

# Speeding-up and streamlining of environmental assessment



- At the same time as introduction of FIT, environmental assessment based on laws was introduced for wind power generation of 10,000kW or more.
- Content of the same level as that of large-scale fire power is required.
- A period of 3 to 5 years is necessary.
- The cost is JPY 100 million to 200 million per 10,000kW.
- Assessment of wind power should be streamlined, simplified, and sped-up in comparison to other power sources.

Type of power plant	Type 1 business	Type 2 business
Hydropower generation	30,000kW or more	22,500kW or more and less than 30,000kW
Thermal power generation	150,000kW or more	112,500kW or more and less than 150,000kW
Geothermal power generation	10,000kW or more	7,500kW or more and less than 10,000kW
Nuclear power generation	All	-
Wind power generation	10,000kW or more	7,500kW or more and less than 10,000kW

# <Reference> The current state of offshore wind power development in Japan



Results and plans for offshore wind power generation

Classification	Form	Water area for installation (planned)		Work classification, etc.	Power output (MW)	Number of turbines (Turbines)	Facility output (MW)	Notes
Operating	Fixed-bottom	Hokkaido	Setana Port	Electric power selling	0.6	2	1.2	
		Yamagata	Sakata Port		2.0	5	10.0	
		Ibaraki	Coast of Kashima Port		2.0	15	30.0	Kamisu offshore wind power
		Akita	Akita Port		3.0	1	3.0	
		Chiba	Off Choshi	Verification	2.4	1	2.4	NEDO
	Fukuoka	Off Kitakyushu City	2.0		1	2.0	NEDO	
	Nagasaki	Off Kabashima Island, Goto City	2.0		1	2.0	Ministry of the Environment	
	Floating	Fukushima	Off Fukushima Prefecture		2.0	1	2.0	Ministry of Economy, Trade and Industry
Subtotal							52.6	
Being planned	Fixed-bottom	Hokkaido	Wakkanai Port	Port planning reflected			10	
			Ishikari Bay New Port		2.5	40	100	Currently following procedures for assessment method documents
		Aomori	Mutsuogawara Port	Port planning reflected	2.5 - 5	32	80	Currently following procedures for assessment method documents
		Akita	Noshiro Port					
			Akita Port		75			
		Yamagata	Sakata Port	Currently reviewing port plans			15	Public offering in 2015
		Ibaraki	Kashima Port	Port planning reflected	5.0	50	250	Currently preparing for construction
		Shizuoka	Omazeki Port					
		Fukuoka	Kitakyushu Port	Currently reviewing port plans				
		Yamaguchi	Off Yasuoka, Shimonoseki City	Ordinary ocean area	4.0	15	60	Currently following procedures for assessment method documents
	Niigata	Off Iwafune, Murakami City	Ordinary ocean area			200	Public offering in 2014	
	Floating	Fukushima	Off Fukushima Prefecture	Verification	7.0	2	14	Ministry of Economy, Trade and Industry; Installed by fiscal 2015
		Niigata	Off Awashimaura Village	Verification field				For small prototypes
		Saga	Off Kabeshima Island, Karatsu City	Verification field				Floating tidal current and wind power hybrid generation
Nagasaki		Off Kabashima Island, Goto City	Verification field					
Subtotal							914.5	
Total							967.1	

Summarized by JWPA

# <Reference> Wind power circumstances in advanced country in wind power generation



- Wind power installed capacity and electric energy supply ratio at the end of 2013

Country	Installed capacity [MW]	Electric energy supply ratio [%]
Denmark	4,747	33.2
Portugal	4,557	27.0
Spain	22,637	20.9
Germany	34,468	11.7
United Kingdom	10,946	7.7
Sweden	4,474	7.0
New Zealand	603	5.0
Netherlands	2,714	4.8
Italy	8,448	4.7
United States	61,292	4.1
France	8,128	3.1
Canada	7,813	3.0
China	91,460	2.6
Australia	3,489	2.4
<b>Japan</b>	<b>2,670</b>	<b>0.5</b>