



**WindEurope Summit 2016**  
**27 Sep. 2016**

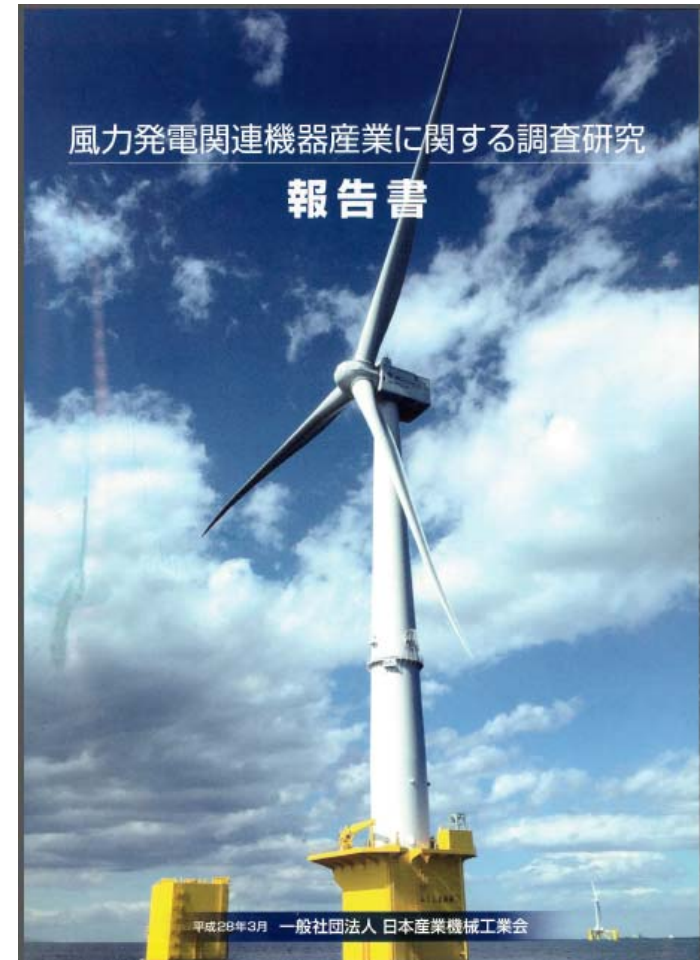
## Wind Turbine Supply Chain and Components Industries in Japan

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**Takashi Matsunobu, The Japan Wind Power Association (JWPA), Tokyo, Japan**  
**Tatsuhiko Shono, The Japan Society of Industrial Machinery Manufacturers (JSIM), Tokyo, Japan**  
**Takatoshi Matsushita, The Japan Electrical Manufacturers' Association (JEMA), Tokyo, Japan**

Photo: MHI

# Backgrounds of this presentation

- Japan has turned to pro-renewable energies including wind power after the Fukushima accident in Mar. 2011.
- 3 industrial associations (JSIM, JEMA & JWPA) have jointly started collecting and reporting production statistics regarding wind turbines & their components made in Japan since FY2009. (FY : Fiscal year, from April to next March)
- This presentation is the outline of the reports for FY2009–FY2014.



Our latest report published in May 2016 <sup>2</sup>

# Research Committee Organization (in FY2014)

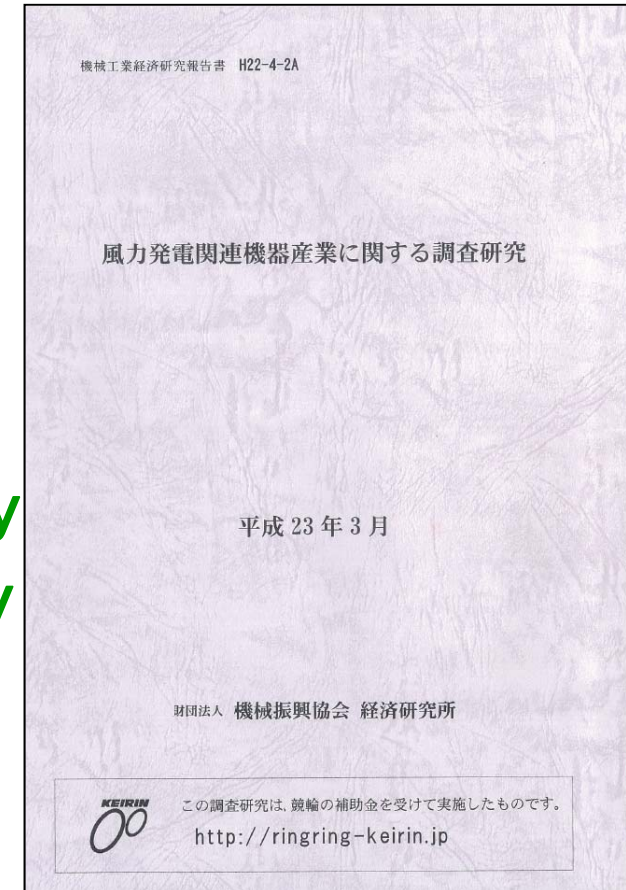
Chairman Prof. Takao Maeda, Mie University, JWEA

Secretary JSIM and JWPA

Board Members: 8	WTG Manufacturers; 2	Mitsubishi Heavy Industries, Ltd. (MHI) Hitachi Co. Ltd.
	Components & Material Manufacturers; 3	Fuji Electric Co. (Electric devices) NTN (Bearing) ISHIBASHI (Gearbox)
	Industrial Associations; 3	The Japan Society of Industrial Machinery Manufacturers (JSIM) The Japan Electrical Manufacturers' Association (JEMA), The Japan Wind Power Association (JWPA)
Committee Members; 10	Small WTG; 1	Zephyr Corporation
	Components & Material Manufacturers; 6	Yasukawa Electric Co. (Generator & Electric devices) Meidensha Co. (Generators & Electric devices) Jtekt (Bearing) NSK (Bearings) Sumitomo Heavy Industries, Ltd. (Gearbox & Yaw devices) GH Craft (Blade)
	Industrial Societies; 3	The Japan Bearing Industry Association (JBIA) The Shipbuilders' Association of Japan (SAJ) Japan Fluid Power Association (JFPA)

# Research Methods

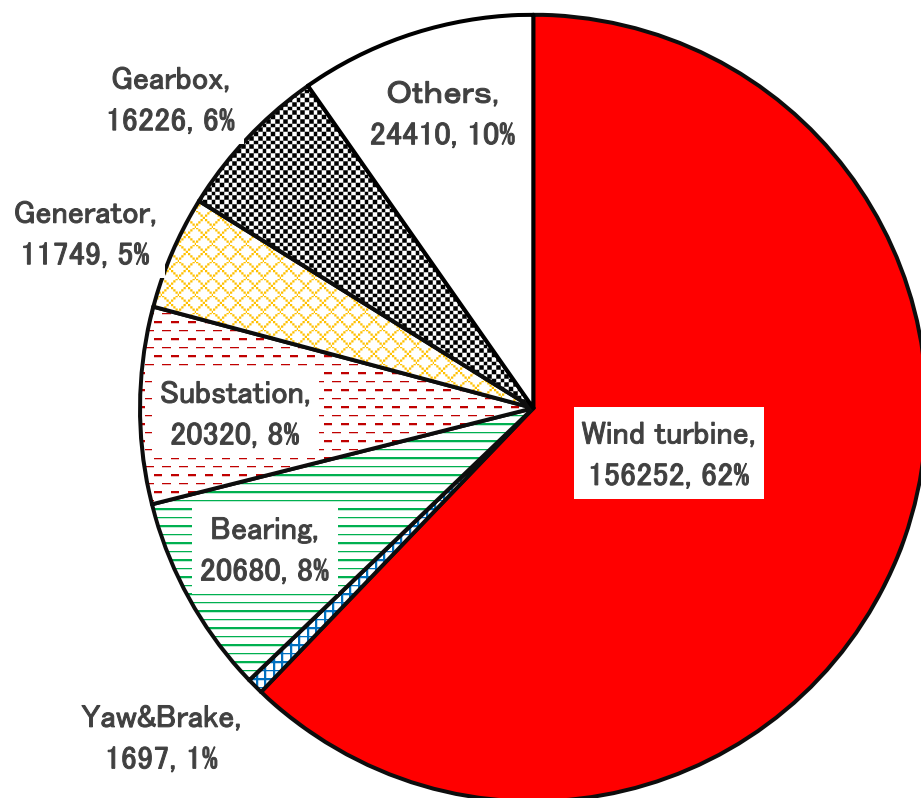
- Prepare “Questionnaire survey sheet” for industrial production (sales) statistics
- Nominate candidate companies relating wind turbine supply chain
- Send “Annual questionnaire survey sheet” to each candidate company
- Collect the survey sheet from companies
- Publish annual report since FY2010. (The statistic data is published one year later.)



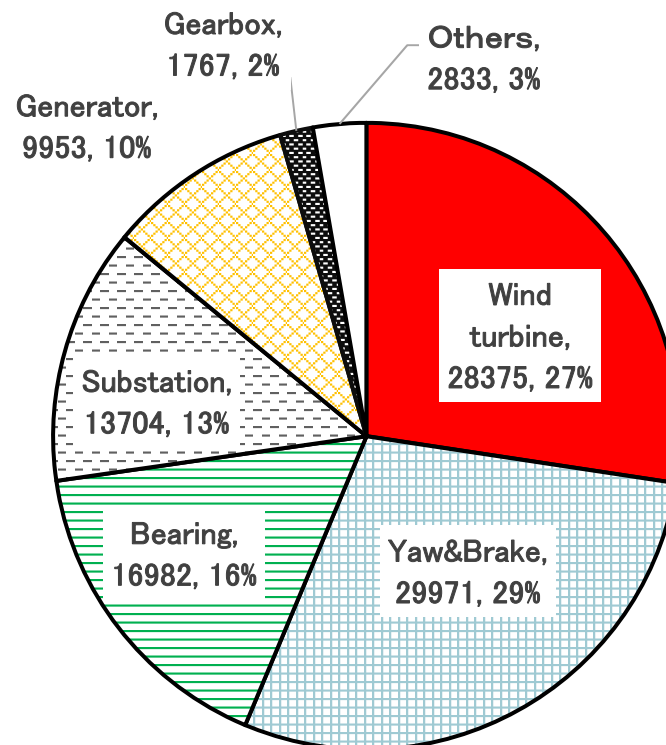
Our 1<sup>st</sup> report in Mar. 2011

# Research Result of “Total Sales” in FY2009 & FY2014

Sales FY 2009  
(251,334 million JPY)



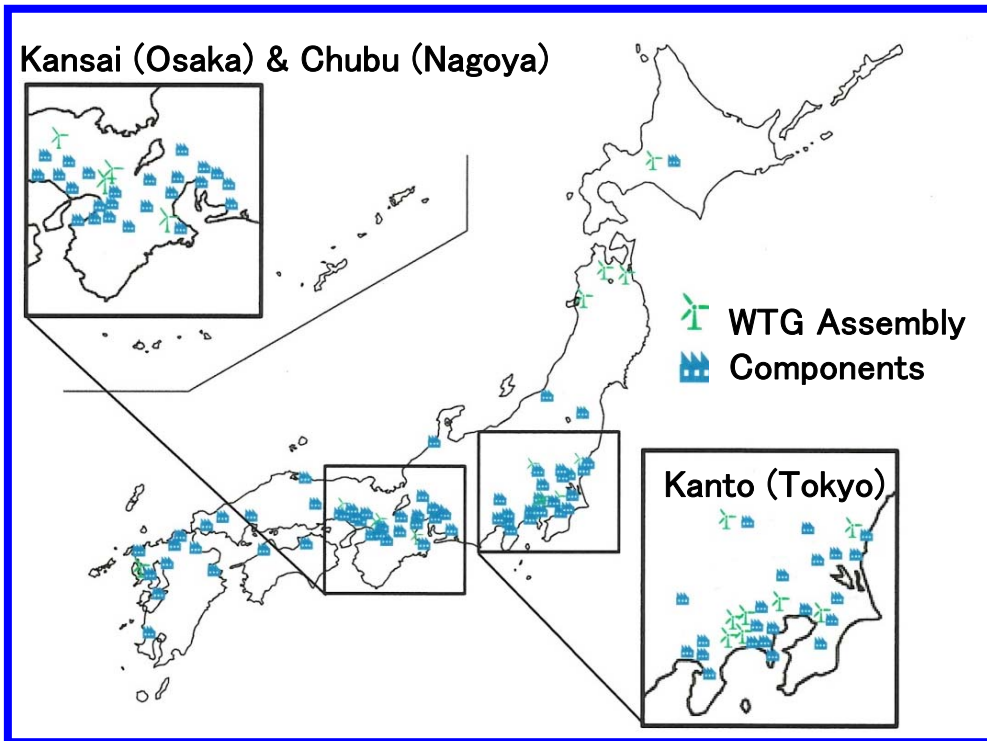
Sales in FY2014  
(103,585 million JPY)  
(0.91 bil.€ / 1.03 bil. \$)



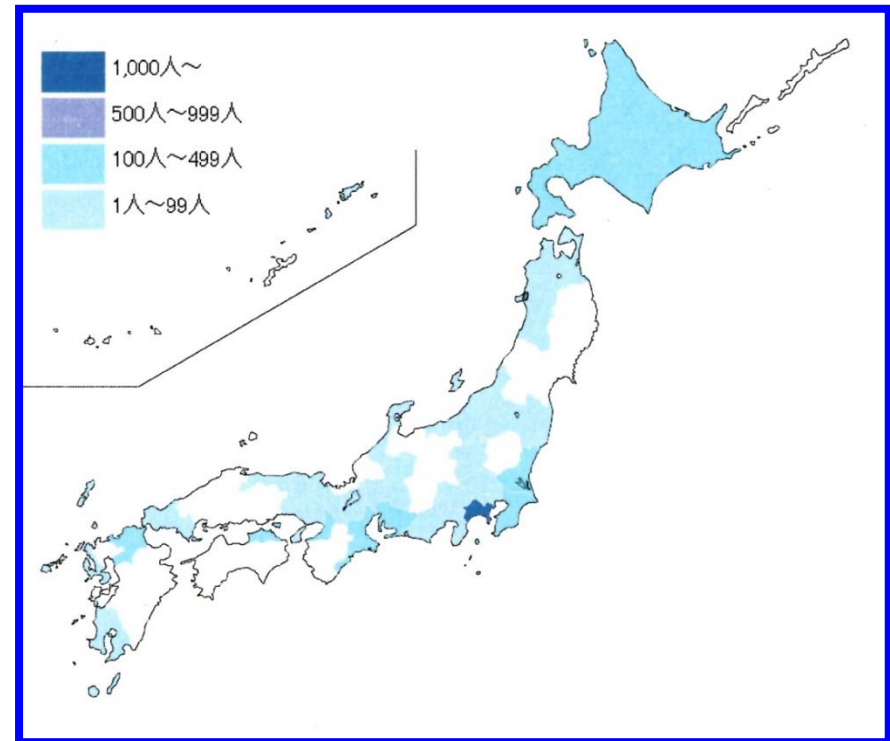
# Japanese Companies relating WTG supply Chain



# Research Result : Factory Location of Wind Turbine Industries in Japan



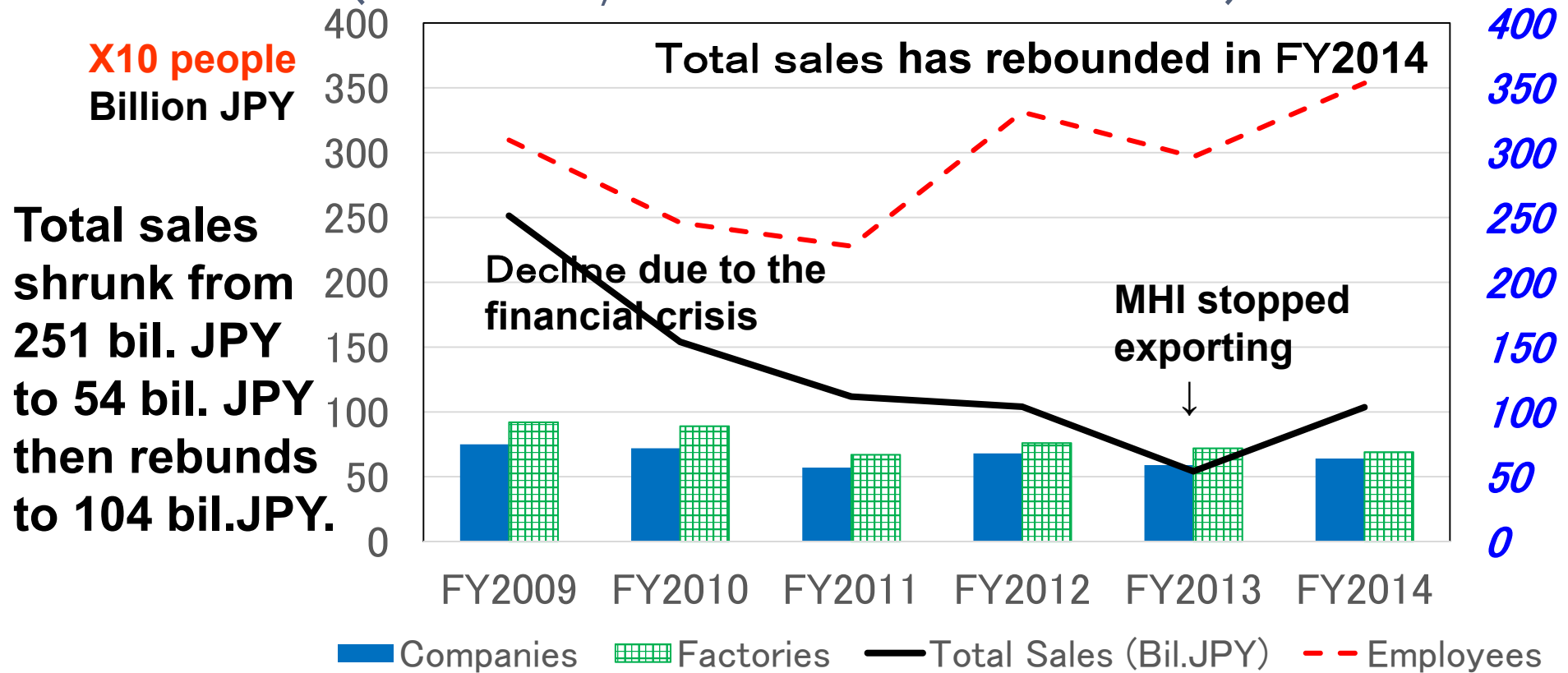
Factory Location



Employer Distribution

# Research Results

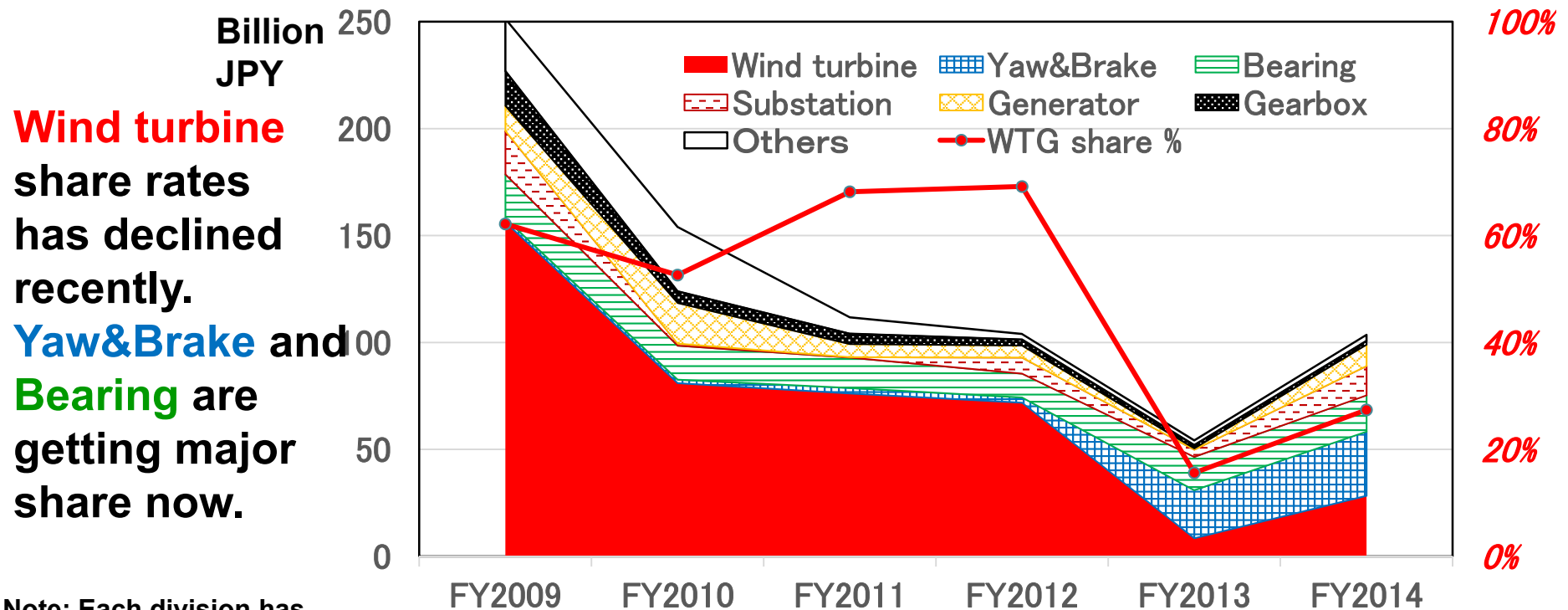
(In Total, for FY2009–FY2014)



	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Total Sales (Bil. JPY)	251.334	153.995	111.781	103.966	54.222	103.585
<b>Employees</b>	<b>3097</b>	<b>2460</b>	<b>2279</b>	<b>3313</b>	<b>2969</b>	<b>3537</b>
<b>Companies</b>	<b>75</b>	<b>72</b>	<b>57</b>	<b>68</b>	<b>59</b>	<b>64</b>
<b>Factories</b>	<b>92</b>	<b>89</b>	<b>67</b>	<b>76</b>	<b>72</b>	<b>69</b>



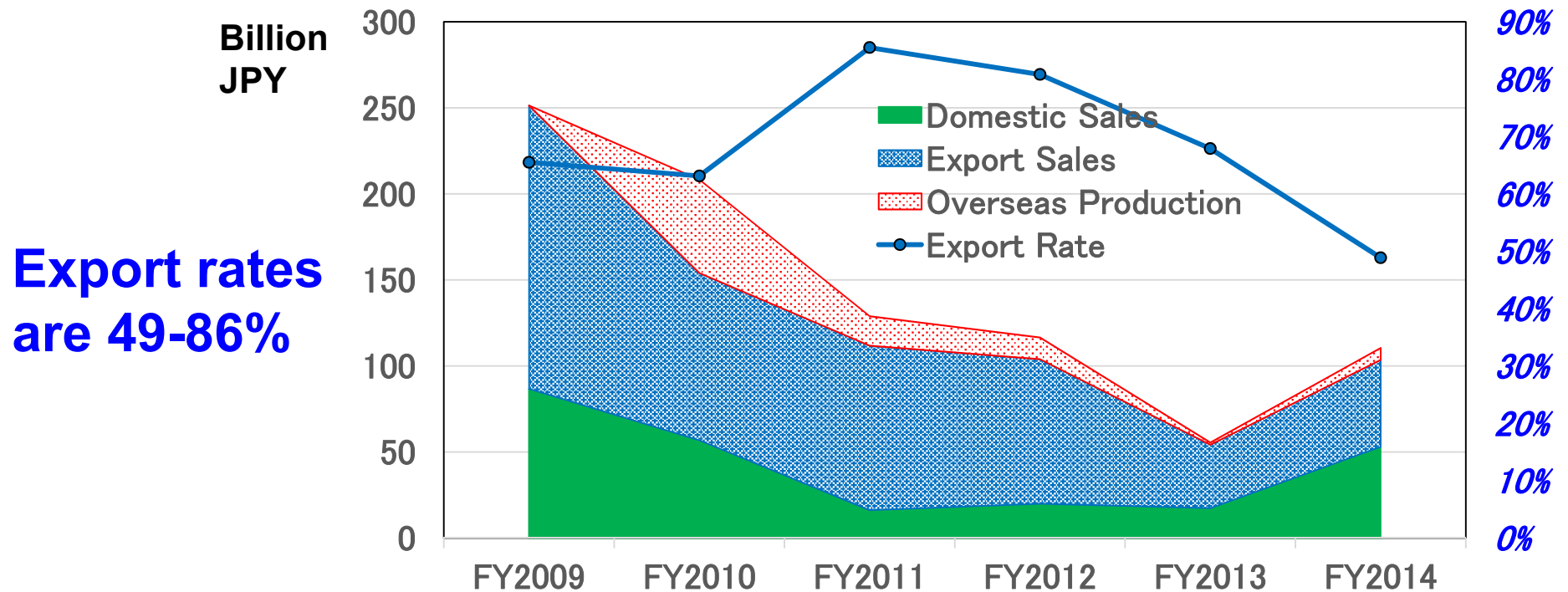
# Trend of Each Sales for FY2009–FY2014



Note: Each division has more than 3 companies to avoid fixing individual data.

	Billion JPY					
	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Wind turbine	156.252	81.02	76.202	71.905	8.468	28.375
Yaw&Brake	1.697	1.609	2.559	2.424	22.473	29.971
Bearing	20.68	15.9	14.2	11.118	15.59	16.982
Substation	20.32	0.93	0.2	7.512	3.384	13.704
Generator	11.749	19.042	6.136	5.68	0.617	9.953
Gearbox	16.226	5.413	4.798	2.743	1.485	1.767
Others	24.41	30.081	7.686	2.584	2.205	2.833
Total	251.334	153.995	111.781	103.966	54.222	103.585
WTG share %	62%	53%	68%	69%	16%	27%

# Trend of the Total Sales for FY2009–FY2014



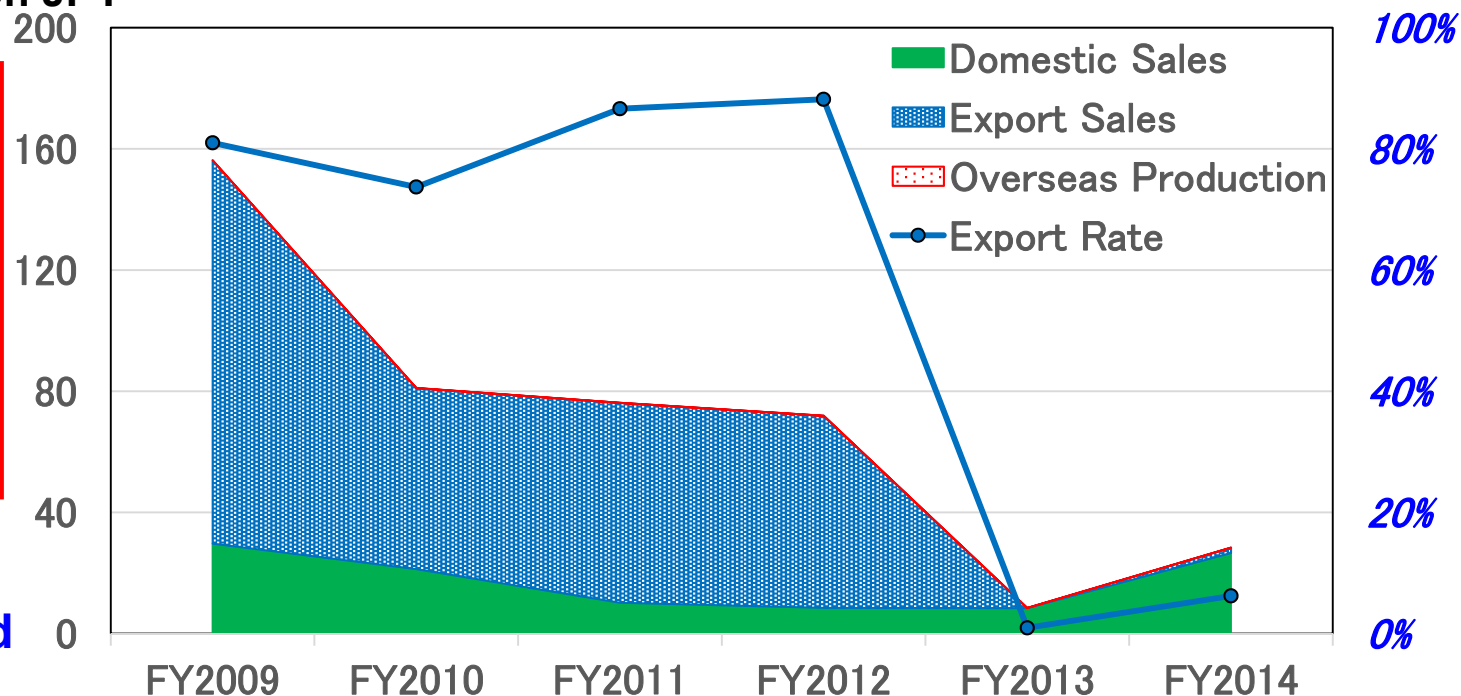
	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
						Billion JPY
<b>Overseas Production</b>	<b>0</b>	<b>54.328</b>	<b>17.152</b>	<b>12.604</b>	<b>1.273</b>	<b>6.858</b>
<b>Export Sales</b>	<b>164.616</b>	<b>97.205</b>	<b>95.579</b>	<b>84.017</b>	<b>36.808</b>	<b>50.614</b>
<b>Domestic Sales</b>	<b>86.718</b>	<b>56.79</b>	<b>16.202</b>	<b>19.949</b>	<b>17.414</b>	<b>52.971</b>
Domestic Production	251.334	153.995	111.781	103.966	54.222	103.585
Total Production	251.334	208.323	128.933	116.57	55.495	110.443
<i>Export Rate %</i>	<i>65%</i>	<i>63%</i>	<i>86%</i>	<i>81%</i>	<i>68%</i>	<i>49%</i>

# Trend of the Wind Turbine Sales for FY2009–FY2014

Billion JPY

- Mitsubishi Heavy Industries (MHI)
- Hitachi Co.
- Japan Steel Works (JSW)
- Toshiba/Unison
- Komaihaltec
- Zephyre, etc.

MHI's WTG export has almost stopped since FY2013.



	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Overseas Production	0	0.079	0	0	0	0
Export Sales	126.55	59.711	66.01	63.41	0.08	1.762
Domestic Sales	29.702	21.309	10.192	8.495	8.388	26.613
Domestic Production	156.252	81.02	76.202	71.905	8.468	28.375
Total Production	156.252	81.099	76.202	71.905	8.468	28.375
Export Rate %	81%	74%	87%	88%	1%	6%

## 3 large WTG manufacturers in Japan



**Mitsubishi Heavy  
Industries (MHI)  
2.4 MW, geared**

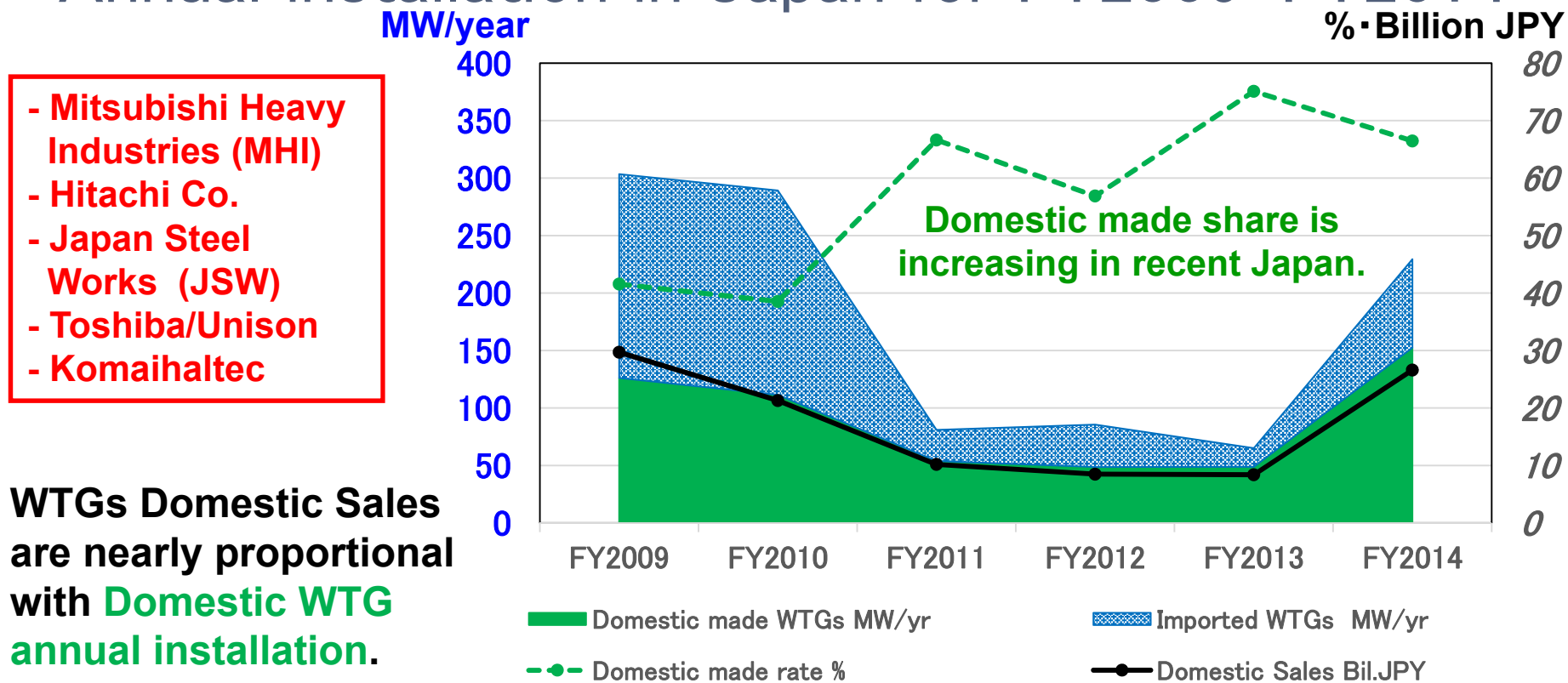


**Hitachi Co.  
2MW, downwind, geared**



**Japan Steel Works (JSW)  
2.7MW, gearlessPMSG**

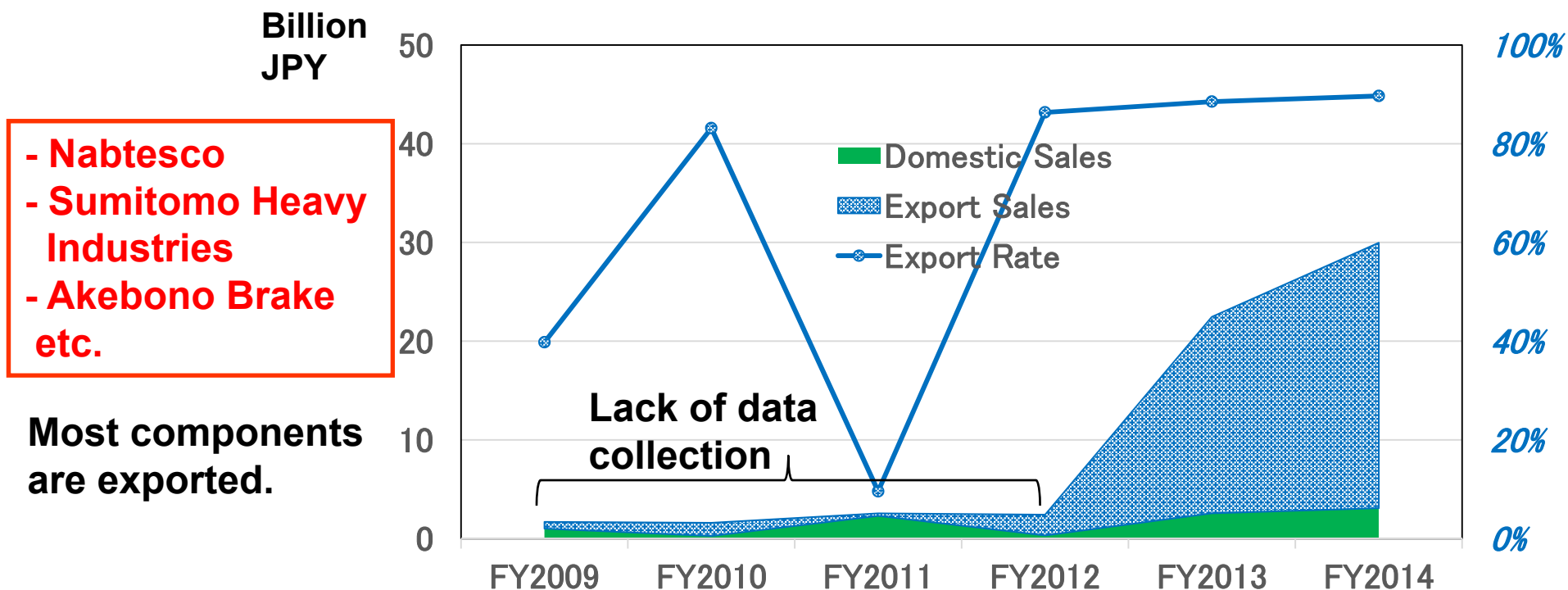
# Trend of the Domestic Wind Turbine Sales and Annual installation in Japan for FY2009–FY2014



- Mitsubishi Heavy Industries (MHI)
- Hitachi Co.
- Japan Steel Works (JSW)
- Toshiba/Unison
- Komaihaltec

	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Annual Installation in Japan MW/yr	303.535	289.28	81.023	85.61	65.15	229.455
Imported WTGs MW/yr	177.355	177.77	27.033	36.91	16.217	76.955
Domestic made WTGs MW/yr	126.18	111.51	53.99	48.7	48.933	152.5
Domestic made share %	42 %	39 %	67 %	57 %	75 %	66 %
Domestic Sales Bil.JPY	29.702	21.309	10.192	8.495	8.388	26.613

# Trend of the Yaw&Brake Sales for FY2009–FY2014

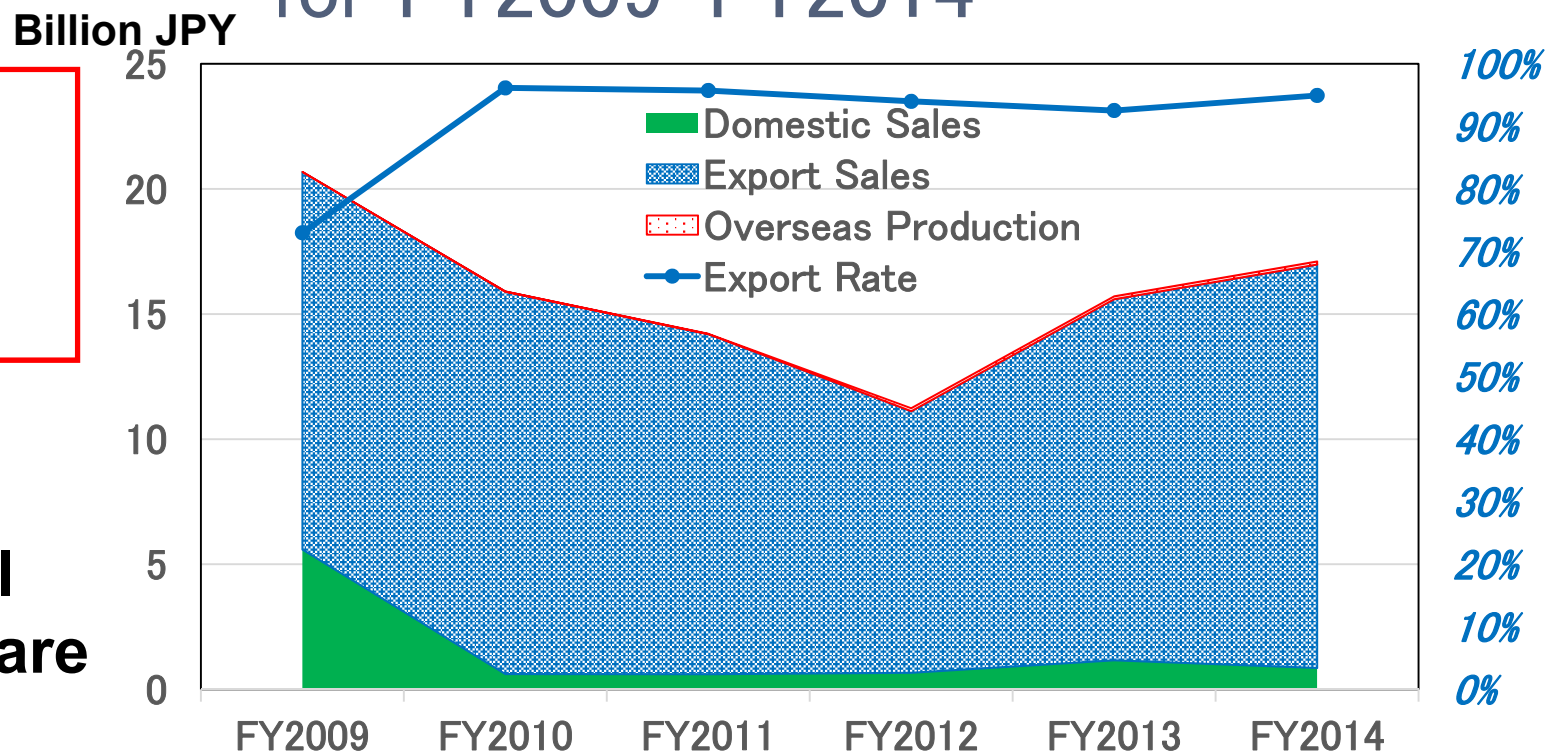


	Billion JPY					
	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
<b>Export Sales</b>	<b>0.675</b>	<b>1.338</b>	<b>0.245</b>	<b>2.093</b>	<b>19.896</b>	<b>26.876</b>
<b>Domestic Sales</b>	<b>1.022</b>	<b>0.271</b>	<b>2.314</b>	<b>0.331</b>	<b>2.577</b>	<b>3.095</b>
<b>Domestic Production</b>	<b>1.697</b>	<b>1.609</b>	<b>2.559</b>	<b>2.424</b>	<b>22.473</b>	<b>29.971</b>
<b>Export Rate %</b>	<b>40%</b>	<b>83%</b>	<b>10%</b>	<b>86%</b>	<b>89%</b>	<b>90%</b>

# Trend of the Large Bearing Sales for FY2009–FY2014

**- NSK**  
**- Jtekt**  
**- NTN**

**Stable business. Almost all bearings are exported.**

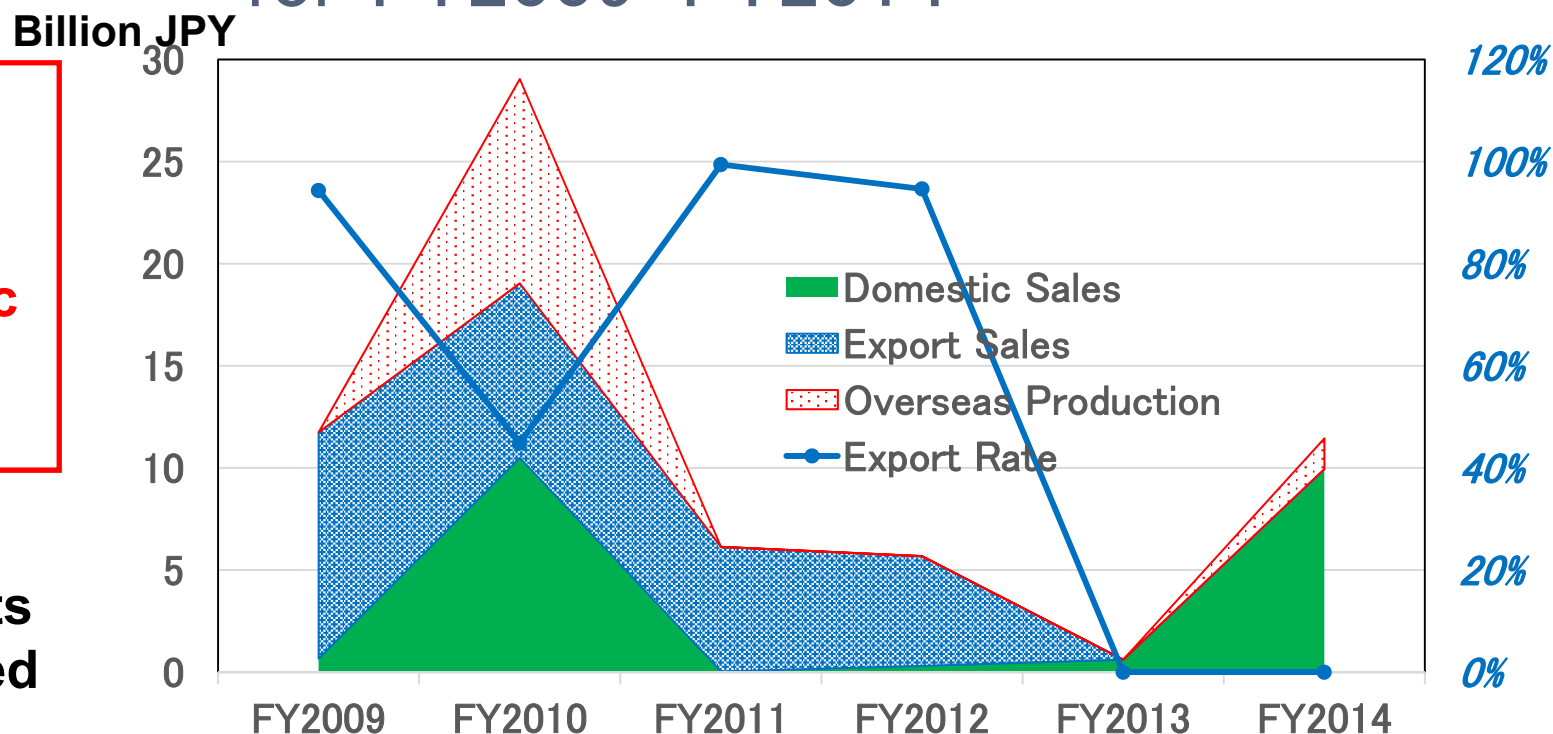


	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
<b>Overseas Production</b>	<b>0</b>	<b>0</b>	<b>0.01</b>	<b>0.12</b>	<b>0.12</b>	<b>0.12</b>
<b>Export Sales</b>	<b>15.09</b>	<b>15.286</b>	<b>13.591</b>	<b>10.449</b>	<b>14.423</b>	<b>16.122</b>
<b>Domestic Sales</b>	<b>5.59</b>	<b>0.614</b>	<b>0.609</b>	<b>0.669</b>	<b>1.167</b>	<b>0.86</b>
Domestic Production	20.68	15.9	14.2	11.118	15.59	16.982
Total Production	20.68	15.9	14.21	11.238	15.71	17.102
<b>Export Rate %</b>	<b>73%</b>	<b>96%</b>	<b>96%</b>	<b>94%</b>	<b>93%</b>	<b>95%</b>

# Trend of the Generator Sales for FY2009–FY2014

- Hitachi Co.
- Yasukawa Electric
- Fuji Electric
- Meidensha etc.

**Business environments have changed each year.**



	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
						Billion JPY
Overseas Production	0	10	0	0	0	1.5
Export Sales	11.084	8.545	6.1	5.376	0	0
Domestic Sales	0.665	10.497	0.036	0.304	0.617	9.953
Domestic Production	11.749	19.042	6.136	5.68	0.617	9.953
Total Production	11.749	29.042	6.136	5.68	0.617	11.453
Export Rate %	94%	45%	99%	95%	0%	0%



# Conclusion

- The annual production of Wind Turbines & their Components is 104 billion JPY (0.91 bil. €/1.03 bil. \$) in FY2014. It decreased from 251 bil. JPY in FY2009, but rebounded from FY2013.
- 64 companies have 69 factories and hire 3,537 people for wind turbine industry in Japan.
- Breakdown of 104 bil. JPY in FY2014 : Wind turbine(WTG) 27%/28 bil.JPY, **Yaw&Brake 29%/30 bil.JPY**, **Bearing 16%/17 bil.JPY**, Substation 13%/14 bil.JPY, Generator 10%/10 bil.JPY. **Japanese Mechanical industries** are well trained by Automobile industry, so they have strong competitiveness worldwide.
- WTG production has shrunk from 156 bil. JPY to 28 bil. JPY, because MHI has stopped new production recently.
- Export rate is very low now at WTG, on the contrary, **most of WTG components made in Japan are exported.**
- By recent M&A(Yasukawa/The Switch, Toray/Zoltek), oversea production by consolidated subsidiaries shall increase in future.