Comparison of the pollution control technology between coal-fired power plants in Japan and ones overseas supported (to be supported) by JBIC

	JICA to be requested (Under E/S loan)	JICA Supported	JBIC Under Consideration	JBIC Supported										Existing coal-fired power plants in Japan			
Name of Power Plant	**Indramayu II**	**Matabari I**	**Vung Ang II**	**Van Phong I**	**Nghi Son II**	**Cirebon II**	**JEPARA III**	**Batang**	**Vinh Tan IV Exp**	**Vinh Tan IV**	**Hai Phong II**	**Cirebon I**	**Paiton III**	**JEPARA II**	**Isogo New 2**	**Isogo New 1**	**Hekinan 5**	**Hekinan 1**
Proponent	PLN	CPGCBL	VAPCO	VPCL	NS2PC	CEPR	BJP	BPI (J-Power)	EVN	EVN	HPTPJSC	CEP	PE	CJP	J-Power	J-Power	Chubu	Chubu
Location	Indonesia	Bangladesh	Vietnam	Vietnam	Vietnam	Indonesia	Indonesia	Indonesia	Vietnam	Vietnam	Vietnam	Indonesia	Indonesia	Indonesia	Kanagawa	Kanagawa	Aichi	Aichi
Capacity (MW)	1000	600*2 (1200)	600*2 (1200)	660*2 (1320)	600*2 (1200)	1000*1	1070*2 (2140)	1000*2 (2000)	60	600*2 (1200)	300*2 (600)	660	815	660*2 (1320)	600	600	1000	700
Operation year	2026 (proposed)	2024 (proposed)	2024 (proposed)	2024 (proposed)	2022 (proposed)	2022 (proposed)	2021 (proposed)	2020 (proposed)	2019	2018	August 2013	July 2012	June 2012	Oct 2011	July 2009	April 2002	November 2002	October 1991
Type of Power Generation	ULTRSC	ULTRSC	ULTRSC	SUPERC	SUPERC	ULTRSC	ULTRSC	ULTRSC	SUPERC	SUPERC	SUBCR	SUPERC	SUPERC	SUBCR	ULTRSC	ULTRSC	SUPERC	SUPERC
Hight of stack (m)	220	275	210	240	200	200	240	240	210	210	200	215	220	240	200	200	200	200
Mitigation measure against SOx	SWFGD	SWFGD	SWFGD	SWFGD	WLST	WLST	SWFGD	SWFGD	SWFGD	SWFGD	FGD (*See "Note 1")	CF	SWFGD	WLST	DFGD	DFGD	FGD (Type of FGD is unknown)	FGD etc. (Type of FGD is unknown)
Emission concentration (ppm)	SO2 = 275 (SO2 = 665 mg/Nm3)	SO2 = 290 to less than 370 (SOx = less than 820 mg/Nm3)	SO2 = 71 to 77 (SO2 = 200 mg/Nm3)	SO2 = 106 to 116 or lower (SO2 = 300 mg/Nm3 or lower)	SO2 = 71 to 77 (SO2 = 200 mg/Nm3)	SO2 = 221 (SO2 = 625 mg/Nm3)	SO2 = 124 (SO2 = 300 mg/Nm3)	SO2 = 124 (SO2 = 300 mg/Nm3)	SO2 = 72 to 93 (SO2 = 204 mg/Nm3)	SO2 = 124 to 158 (SOx = 350 mg/Nm3)	SO2 = 64 to 70 (SO2 = 180 mg/Nm3)	SO2 = 269 (SO2 = 649 mg/Nm3)	SO2 = 35 (SO2 = 84 mg/Nm3)	SO2 = 124 (SO2 = 300 mg/Nm3)	10	20	25	50 (28) () = after improvement in 2002
Mitigation measure against NOx	LNB	LNB	LNB	Unknown	SCR	LNB	LNB	LNB	SCR	LNB	LNB	LNB	LNB	LNB	SCR / LNB / TSC	SCR / LNB / TSC	SCR / LNB / TSC	SCR etc.
Emission concentration (ppm)	NO2 = 248 (NOx = 430 mg/Nm3)	NO2 = 227 to less than 289 (NOx = less than 460 mg/Nm3)	NO2 = 207 to 226 (Nox = 420 mg/Nm3)	NO2 = 178 to 194 or lower (NO2 = 360 mg/Nm3 or lower)	NO2 = 99 to 108 (NOx = 200 mg/Nm3)	NO2 = 252 (NOx = 510 mg/Nm3)	NO2 = 231 (NO2 = 400 mg/Nm3)	NO2 = 150 (NO2 = 260 mg/Nm3)	NO2 = 79 to 102 (NOx = 160 mg/Nm3)	NO2 = 112 to 43 (NO2 = 228 mg/Nm3)	NO2 = 444 to 485 (NO2 = 900 mg/Nm3)	NO2 = 478 (NOx = 829 mg/Nm3)	NO2 = 313 (NOx = 542 mg/Nm3)	NO2 = 268 (NOx = 465 mg/Nm3)	13	20	15	45 (30)
Mitigaion measure aginast PM	ESP	ESP	ESP	ESP	ESP	ESP	ESP	BH	ESP	ESP	ESP	ESP	ESP	ESP	ESP	ESP	ESP	ESP
Emission concentration (mg/Nm3)	49	50 to 64	50 to 55	47 to 51	50 to 55	50	58	58	50 to 65	150 to 191	200 to 218	34	175	58	5	10	5	10 (5)

Note 1: The souces of the data on each power plant are the followings.
* Indramayu II = Feasibility Studies, 2010 (JICA) and EIA (ANDAL), May 2015. The value of mg/Nm3 is in the conditions of 25 Celsius degrees at at O2 of 7%.
* Matabari I = EIA, June 2013. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 75 Celusius degrees at O2 of 6 %.
* Vung Ang II = EIA, September 2018. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 25 Celusius degrees at O2 of 6 %.
* Van Phong I = EIA, November 2017. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 25 Celusius degrees at O2 of 6 %.
* Nghi Son II = EIA, February 2015. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 25 Celusius degrees at O2 of 6 %.
* Cirebon II = EIA (ANDAL), March 2016. The value of mg/Nm3 is in the conditions of 0 Celsius degrees at at O2 of 6%.
* Jepara III = EIA (ANDAL), March 2016. The value of mg/Nm3 is in the conditions of 25 Celsius degrees at at O2 of 7%.
* Batang = EIA (ANDAL), August 2013. The value of mg/Nm3 is in the conditions of 25 Celsius degrees at at O2 of 7%.
* Vinh Tan IV Expansion = EIA, October 2015. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 80 Celusius degrees at O2 of 6 %.
* Vinh Tan IV = EIA, September 2013. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 75 Celusius degrees at O2 of 6 %.
* Hai Phong II = EIA, November 2006. Presuming that the value of mg/Nm3 is in the both conditions of 0 or 25 Celusius degrees at O2 of 6 %. According to the database of Platts WEPP (January 2015), SOx control measure used for Hai Phong II is only "Compliance fuel (CF)".
* Cirebon I = EIA (ANDAL), April 2008. The value of mg/Nm3 is in the conditions of 25 Celsius degrees at at O2 of 7%.
* Paiton III = EIA (ANDAL), 2008. The value of mg/Nm3 is in the conditions of 25 Celsius degrees at at O2 of 7%.
* Jepara II = EIA (ANDAL). The value of mg/Nm3 is in the conditions of 25 Celsius degrees at at O2 of 7%.
* Isogo New 2 and 1 = J-Power, Annual Report 2009
* Hekinan 5 and 1 = CCT Journal No. 1, Center for Coal Utilization, Japan (currently JCOAL), May 2002

Note 2: Conversion from mg/Nm3 to ppm in emission concentration was made with the following calculation.
(When we need to convert the consentration of SOx or NOx from mg/Nm3 into ppm, each moleculare weight of SO2 and NO2 are applied here: M of SO2 = (32+16*2), M of NO2 = (14+16*2))
To convert X mg/Nm3 into Y ppm,
Y = X * 22.4/M * (273+T)/273 * 1013/P (M = Molecular Weight)
Also, to make corrections of temperature as 0 Celusius degrees and of O2 as 6 %, the following caluculation was done when necessary.
Temperature: M2 = M1 * T1/T2
Oxygen concentration: Cs = (21-Os)/(21-On) * Cn

SOx Control		**NOx Control**		**Particulate Control**	
DFGD	Dry FGD scrubber	SCR	Selective catalytic reduction	BH	Baghouse (fabric filter)
SWFGD	Seawater FGD scrubber	LNB	Low NOx Burner	ESP	Unspecified type of electrostatic precipitator
FGD	FGD (Type is unknown)	TSC	Two stage combustion		
CF	Compliance fuel (no scrubbers)				
WLST	Wet limestone FGD scrubber				
WL	Wet lime FGD scrubber				