PROGRAM SCOPE OF WORK

Table 1: Program Scope of Work—150/20 kV Substations

Nº	Province	Substation	Voltage	Scope of Project	Ext	Tot. MVA	Capacity (MVA)	Fc (MUSD)	Lc (MUSD)	Est. Cost (MUSD)	COD
1	ACEH	Lhokseumawe	150/20 kV	uprate, 1 TB, 1 TRF	uprate	60	1x60	2.24	0.38	2.62	2015
2	ACEH	Nagan Raya	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
3	ACEH	Banda Aceh	150/20 kV	uprate, 1 TB, 1 TRF	uprate	60	1x60	2.24	0.38	2.62	2016
4	ACEH	Arun	150/20 kV	1 TB, 1 TRF	New	60	1x60	2.24	0.38	2.62	2016
5	SUMUT	Glugur	150/20 kV	uprate, 1 TB, 1 TRF	uprate	100	1x100	3.29	0.56	3.84	2016
6	SUMUT	Tebing Tinggi	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
7	SUMUT	Aek Kanopan	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
8	SUMUT	Galang	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	60	1x60	2.24	0.38	2.62	2015
9	SUMUT	Lamhotma	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	60	1x60	2.24	0.38	2.62	2015
10	SUMUT	Pangkalan Brandan	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	60	1x60	2.24	0.38	2.62	2016
11	SUMUT	GIS Listrik	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.62	0.45	3.07	2015
12	SUMUT	Perdagangan	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2017
13	SUMUT	Titi Kuning	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
14	SUMUT	Paya Geli	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
15	SUMUT	Padang Sidempuan	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
16	SUMUT	Kuala Namu	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
17	SUMUT	Kuala Tanjung	150/20 kV	Ext, 1 TB, 1 TRF	Ext	100	1x100	3.29	0.56	3.84	2017
18	SUMUT	Namurambe	150/20 kV	Ext, 1 TB, 1 TRF	Ext	100	1x100	3.29	0.56	3.84	2018
19	SUMUT	Sei Rotan	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	100	1x100	3.29	0.56	3.84	2017
20	SUMUT	Binjai	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2019
21	SUMBAR	Kiliranjao	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	60	1x60	2.24	0.38	2.62	2015
22	SUMBAR	Bungus	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2015
23	SUMBAR	GIS Simpang haru	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.62	0.45	3.07	2016
24	SUMBAR	Pariaman	150/20 kV	Ext, 1 TB, 1 TRF	Ext	30	1x30	1.63	0.28	1.90	2016
25	SUMBAR	Batusangkar	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	20	1x20	1.30	0.22	1.52	2016
26	RIAU	Pasir Putih	150/20 kV	Ext, 1 TB, 1 TRF	Ext		1x60	2.24	0.38	2.62	2017
27	RIAU	Koto panjang	150/20 kV	Ext, 1 TB, 1 TRF	Ext	30	1x30	1.63	0.28	1.90	2016
28	RIAU	GIS Kota Pekan Baru	150/20 kV	Ext, 1 TB, 1 TRF	Ext	100	1x100	3.66	0.62	4.29	2017
29	RIAU	Kit tenayan	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2019
30	JAMBI	Sarolangun	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
31	JAMBI	Sei Gelam	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
32	SUMSEL	Sungai Kedukan	70/20 kV	Ext, 1 TB, 1 TRF	Ext	30	1x30	1.48	0.24	1.72	2015
33	SUMSEL	Sungai Juaro	70/20 kV	Uprate, 1 TB, 1 TRF	Uprate	30	1x30	1.48	0.24	1.72	2015
34	SUMSEL	Bungaran	70/20 kV	Uprate, 1 TB, 1 TRF	Uprate	30	1x30	1.48	0.24	1.72	2015
35	BENGKULU	Pekalongan	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2017
36	SUMSEL	Talang Ratu	70/20 kV	Uprate, 1 TB, 1 TRF	Uprate	30	1x30	1.48	0.24	1.72	2015
37	SUMSEL	Gumawang	150/20 kV	Ext, 1 TB, 1 TRF	Ext	30	1x30	1.63	0.28	1.90	2016
38	SUMSEL	Betung	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	60	1x60	2.24	0.38	2.62	2016
39	SUMSEL	Gandus	150/20 kV	Ext, 1 TB, 1 TRF	Ext	100	1x100	3.29	0.56	3.84	2017
40	SUMSEL	Boom Baru	70/20 kV	Ext, 1 TB, 1 TRF	Ext	30	1x30	1.48	0.24	1.72	2017
41	SUMSEL	Jakabaring	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2018
42	SUMSEL	Kenten	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2018
43	LAMPUNG	Teluk Betung	150/20 kV	Ext, 1 TB, 1 TRF	Ext	60	1x60	2.24	0.38	2.62	2016
44	LAMPUNG	Tarahan	150/20 kV	Uprate, 1 TB, 1 TRF	Uprate	60	1x60	2.24	0.38	2.62	2018
45	BABEL	Air anyir	150/20 kV	Ext, 1 TB, 1 TRF	Ext	30	1x30	1.63	0.28	1.90	2016
		TOTAL				**2,570**	**2,570**	**101.14**	**17.10**	**118.24**	

BABEL = Bangka Belitung, COD – commercial operation date, Est = estimated, Ext = extension, Fc = foreign currency, kV = kilovolt, Lc = local currency, MUSD = million US dollars, MVA = megavolt-ampere, SUMBAR = West Sumatra, SUMSEL = South Sumatra, SUMUT = North Sumatra, TB = transformer bay, TRF = transformer.
Source: PLN

Table 2: Program Scope of Work—150 kV Capacitors

No.	Province	Project	Capacity (MVAr)	Est. Cost ($'million)	COD
1	SUMSEL	HV Capacitor 150 kV in Baturaja s/s	25	0.62	2015
2	SUMSEL	HV Capacitor 150 kV in Gumawang s/s	25	0.62	2015
3	LAMPUNG	HV Capacitor 150 kV in Kalianda s/s	25	0.62	2015
4	JAMBI	EHV Capacitor 275 kV in Bangko s/s	50	5.65	2016
		Total	**125**	**7.50**	

COD = commercial operation date, Est = estimated, HV = high voltage, kV = kilovolt, MVAr = megavolt-ampere reactive, SUMSEL = South Sumatra, S/s = substation
Source: PLN.

Table 3: Program Scope of Work—275/150 kV Substations

No.	Province	Substation	Scope of Project	MVA	Capacity (MVA)	Fx ($'million)	Lx ($'million)	Estimated Cost ($'million)	COD
1	SUMUT	Binjai	Ext, 1 Dia 2 CB, 1 TB, 1 IBT	250	1x250	12.62	2.13	14.75	2016
2	SUMSEL	Lubuk Linggau	Ext,1 TB, 1 IBT	250	1x250	10.79	1.97	12.76	2016
3	JAMBI	Bangko	Ext,1 TB, 1 IBT	250	1x250	10.79	1.97	12.76	2017
4	JAMBI	M.Bungo	Ext, 1 Dia 2 CB, 1 TB, 1 IBT	250	1x250	12.62	2.13	14.75	2017
5	SUMSEL	Betung	Ext,1 TB, 1 IBT	250	1x250	10.79	1.97	12.76	2017
6	JAMBI	Sumsel 5 (IBT Saja)	1 IBT	250	1x250	6.94	1.00	7.94	2015
7	SUMSEL	lahat	Ext,1 TB, 1 IBT	500	1x500	15.31	2.62	17.93	2016
8	SUMSEL	Lumut Balai	Ext,1 TB, 1 IBT	250	1x250	15.31	2.62	12.76	2017
9	SUMUT	Simangkok	Ext, 1 Dia 2 CB, 1 TB, 1 IBT	250	1x250	12.62	2.13	14.75	2017
10	SUMUT	galang	1 IBT	500	1x500	11.45	1.65	13.11	2016
11	SUMUT	galang	1 IBT	500	1x500	11.45	1.65	13.11	2016
12	SUMBAR	Kiliranjao	1 IBT	250	1x250	6.94	1.00	7.94	2017
13	SUMSEL	Lumut Balai	1 IBT	250	1x250	6.94	1.00	7.94	2017
14	SUMSEL	Sungai Lilin	1 IBT	250	1x250	6.94	1.00	7.94	2017
15	SUMSEL	Bangko	1 IBT	250	1x250	6.94	1.00	7.94	2016
16	SUMSEL	M.Bungo	1 IBT	250	1x250	6.94	1.00	7.94	2016
17	SUMSEL	betung	1 IBT	250	1x250	6.94	1.00	7.94	2017
			Total		**5,000**	**172.31**	**27.84**	**194.99**	

BABEL = Bangka Belitung, CB = circuit breaker, COD = commercial operation date, Dia = diameter, Est = estimated, Ext = extension, Fx = foreign currency, IBT = inter-bus transformer, kV = kilovolt, Lx = local currency, MUSD = million US dollars, MVA = megavolt-ampere, SUMBAR = West Sumatra, SUMSEL = South Sumatra, SUMUT = North Sumatra, TB = transformer bay.
Source: PLN

Table 4: Program Scope of Work—150 kV Transmission Line Reconductoring

No.	Project	Circuit	Conductor Type	Kilometer	kmr	Fc	Lc	Estimated Cost ($'million)	COD
1	Reconductoring T/L Lhokseumawe-Idie	1	cct, HTLS 1x310 mm^2	19.90	82.00	2.12	0.38	2.50	2016
2	Reconductoring T/L Idie-Langsa	1	cct, HTLS 1x310 mm^2	47.30	47.30	5.05	0.90	5.95	2016
3	Reconductoring T/L Lhokseumawe-Langsa	1	cct, HTLS 1x310 mm^2	129.30	129.30	13.80	2.47	16.27	2016
4	Reconductoring T/L Cot Trueng-Lhokseumwe	2	cct, HTLS 1x310 mm^2	60.00	30.00	8.02	1.42	9.44	2016
5	Reconductoring T/L Kuala Tanjung- Perdangan	1	cct, HTLS 1x310 mm^2	57.15	57.15	6.10	1.09	7.19	2018
6	Reconductoring T/L Kuala Tanjung-Tebing Tnggi	1	cct, HTLS 1x310 mm^2	71.45	35.73	3.81	0.68	4.50	2017
7	Reconductoring T/L Porsea-Pematang Siantar	1	cct, HTLS 1x310 mm^2	144.96	72.48	7.74	1.38	9.12	2017
8	Reconductoring T/L Teluk Lembu-Garuda sakti	1	cct, HTLS 1x310 mm^2	82.00	82.00	8.75	1.57	10.32	2016
9	Reconductoring T/L Pangkalan Brandan-Binjai	2	cct, HTLS 1x310 mm^2	101.60	50.80	13.58	2.40	15.98	2017
10	Reconductoring T/L Tebing Tinggi-Seirotan	1	cct, HTLS 1x310 mm^2	64.00	32.00	3.47	0.62	4.10	2017
11	Reconductoring T/L Seirotan-Perbaungan	1	cct, HTLS 1x310 mm^2	43.00	43.00	4.59	0.82	5.41	2017
12	Reconductoring T/L Perbaungan-Tebing Tinggi	1	cct, HTLS 1x310 mm^2	43.00	43.00	4.59	0.82	5.41	2017
13	construction T/L Tenayan-Teluk Lembu	2	cct, 2 Hawk	20.00	10.00	1.13	0.39	1.53	2015
14	Reconductoring T/L New Aur Duri-Sei Gelam	2	cct, HTLS 1x310 mm^2	20.00	10.00	2.67	0.47	3.15	2016
15	Reconductoring T/L Belawan-Payapasir	2	cct, HTLS	12.60	6.30	5.05	0.89	5.95	2017
16	Reconductoring T/L Cot Trueng/Arun-Bireun	2	cct, HTLS 1x310 mm^2	100.00	50.00	13.37	2.36	15.73	2017
17	construction T/L PLTU Teluk Sirih-Kambang	2	cct, 2 Hawk	160.00	80.00	9.06	3.15	12.21	2015
	Total			**1,016.26**	**781.06**	**103.86**	**18.67**	**122.53**	

COD = commercial operation date, Est = estimated, Fc = foreign currency, HTLS = high-temperature low sag conductor, kmr = kilometer reconductored, kV = kilovolt, Lc = local currency, mm = millimetre, PLTU = coal-fired steam power plant, T/L = transmission line.
Source: PLN.

Table 5: Program Scope of Work—20 kV Switchgear

No.	Province	Substation	Voltage (kV)	Scope of Project	Extension
1	ACEH	Nagan Raya	150/20	Ext, 1 TB, 1 TRF	Ext
2	SUMUT	Tebing Tinggi	150/20	Ext, 1 TB, 1 TRF	Ext
3	SUMUT	Aek Kanopan	150/20	Ext, 1 TB, 1 TRF	Ext
4	SUMUT	GIS Listrik	150/20	Ext, 1 TB, 1 TRF	Ext
5	SUMUT	Perdagangan	150/20	Ext, 1 TB, 1 TRF	Ext
6	SUMUT	Titi Kuning	150/20	Ext, 1 TB, 1 TRF	Ext
7	SUMUT	Paya Geli	150/20	Ext, 1 TB, 1 TRF	Ext
8	SUMUT	Padang Sidempuan	150/20	Ext, 1 TB, 1 TRF	Ext
9	SUMUT	Kuala Namu	150/20	Ext, 1 TB, 1 TRF	Ext
10	SUMUT	Kuala Tanjung	150/20	Ext, 1 TB, 1 TRF	Ext
11	SUMUT	Namurambe	150/20	Ext, 1 TB, 1 TRF	Ext
12	SUMUT	Binjai	150/20	Ext, 1 TB, 1 TRF	Ext
13	SUMBAR	Bungus	150/20	Ext, 1 TB, 1 TRF	Ext
14	SUMBAR	GIS Simpang haru	150/20	Ext, 1 TB, 1 TRF	Ext
15	SUMBAR	Pariaman	150/20	Ext, 1 TB, 1 TRF	Ext
16	RIAU	Pasir Putih	150/20	Ext, 1 TB, 1 TRF	Ext
17	RIAU	Koto panjang	150/20	Ext, 1 TB, 1 TRF	Ext
18	RIAU	GIS Kota Pekan Baru	150/20	Ext, 1 TB, 1 TRF	Ext
19	RIAU	Kit tenayan	150/20	Ext, 1 TB, 1 TRF	Ext
20	JAMBI	Sarolangun	150/20	Ext, 1 TB, 1 TRF	Ext
21	JAMBI	Sei Gelam	150/20	Ext, 1 TB, 1 TRF	Ext
22	SUMSEL	Sungai Kedukan	70/20	Ext, 1 TB, 1 TRF	Ext
23	BENGKULU	Pekalongan	150/20	Ext, 1 TB, 1 TRF	Ext
24	SUMSEL	Gumawang	150/20	Ext, 1 TB, 1 TRF	Ext
25	SUMSEL	Gandus	150/20	Ext, 1 TB, 1 TRF	Ext
26	SUMSEL	Boom Baru	70/20	Ext, 1 TB, 1 TRF	Ext
27	SUMSEL	Jakabaring	150/20	Ext, 1 TB, 1 TRF	Ext
28	SUMSEL	Kenten	150/20	Ext, 1 TB, 1 TRF	Ext
29	LAMPUNG	Teluk Betung	150/20	Ext, 1 TB, 1 TRF	Ext
30	BABEL	Air anyir	150/20	Ext, 1 TB, 1 TRF	Ext

BABEL = Bangka Belitung, Ext = extension, kV = kilovolt, Lx = local currency, SUMBAR = West Sumatra, SUMSEL = South Sumatra, SUMUT = North Sumatra, TB = transformer bay, TRF = transformer.
Note: Costs of above are included in Table 1.
Source: PLN.

Table 6: Program Scope of Work—MV/LV Distribution

Year	20 kV OH (kilometer)	20 kV OH (kilometer)	20 kV/LV Trafos No.	LV (kilometer)	Service Conductor (kilometre)	Meters No.
2015	2,887	227	4,432	2,991	61,923	692,987
2016	3,512	257	5,167	4,737	32,822	648,153
2017	3,846	287	4,889	5,649	38,144	650,195
2018	4,127	312	7,006	6,981	47,075	655,713
2019	4,434	335	6,853	8,485	58,529	649,168
Total	**18,805**	**1,418**	**28,348**	**28,843**	**238,493**	**3,296,215**

kV = kilovolt, LV = low voltage, MV = medium voltage, OH = overhead, Trafos = transformers, UG = underground
Source: PLN