ANNEXES

ANNEX A. Financial Analysis

Tabel A.1: Cashflow Pabrik Sei Mangkei & Gunung Tua (milyar IDR)

Komponen	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
0		1	2	3	4	5	6	7	8	9	10	11
Sei Mangkei												
OPERATIONAL CASHFLOW	-	(34.63)	22.24	22.32	22.28	22.24	22.09	22.17	22.12	22.01	22.03	21.98
Revenues	-	28.35	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50
Revenue	-	28.35	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50
	-	-	-	-	-	-	-	-	-	-	-	-
Expenditures	-	62.98	72.26	72.18	72.22	72.26	72.41	72.33	72.38	72.49	72.47	72.52
Expenditure/Operational Cost	-	62.98	72.26	72.18	72.22	72.26	72.41	72.33	72.38	72.49	72.47	72.52
	-	-	-	-	-	-	-	-	-	-	-	-
INVESTMENT CASHFLOW	-	65.00	-	-	-	-	-	-	-	-	-	-
Investment	-	65.00	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
FINANCIAL CASHFLOW	-	64.97	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Equity - INVESTOR	-	65.00	-	-	-	-	-	-	-	-	-	-
Equity	-	65.00	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Loans	-	-	-	-	-	-	-	-	-	-	-	-
Bank Loan	-	-	-	-	-	-	-	-	-	-	-	-
Stockholder Loan	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Debt service	-	-	-	-	-	-	-	-	-	-	-	-
Principal	-	-	-	-	-	-	-	-	-	-	-	-
Interest and Other	-	-	-	-	-	-	-	-	-	-	-	-
Corporate taxes /a	-	(0.03)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Net working capital	-	-	-	-	-	-	-	-	-	-	-	-
CASH BALANCE	-	30.33	22.10	22.18	22.14	22.10	21.95	22.02	21.98	21.87	21.89	21.84
	-	-	-	-	-	-	-	-	-	-	-	-
Net cashflow	-	30.33	22.10	22.18	22.14	22.10	21.95	22.02	21.98	21.87	21.89	21.84
Cash Available	-	30.33	52.43	74.61	96.75	118.86	140.80	162.82	184.81	206.68	228.57	250.41
Minimum Cash Requirement	-	0.28	0.60	0.60	0.59	0.59	0.60	0.60	0.60	0.60	0.59	0.59
Deposito	-	30.05	51.83	74.01	96.16	118.27	140.20	162.23	184.21	206.08	227.98	249.82
Gunug Tua												
OPERATIONAL CASHFLOW	-	(35.58)	19.10	19.18	19.14	19.10	18.94	19.02	18.98	18.87	18.89	18.84
Revenues	-	27.41	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35
Revenue	-	27.41	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35
	-	-	-	-	-	-	-	-	-	-	-	-
Expenditures	-	62.98	72.25	72.17	72.21	72.25	72.41	72.33	72.37	72.48	72.46	72.51
Expenditure/Operational Cost	-	62.98	72.25	72.17	72.21	72.25	72.41	72.33	72.37	72.48	72.46	72.51
	-	-	-	-	-	-	-	-	-	-	-	-
INVESTMENT CASHFLOW	-	65.00	-	-	-	-	-	-	-	-	-	-
Investment	-	65.00	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
FINANCIAL CASHFLOW	-	64.98	(0.13)	(0.13)	(0.13)	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Equity - INVESTOR	-	65.00	-	-	-	-	-	-	-	-	-	-
Equity	-	65.00	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Loans	-	-	-	-	-	-	-	-	-	-	-	-
Bank Loan	-	-	-	-	-	-	-	-	-	-	-	-
Stockholder Loan	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Debt service	-	-	-	-	-	-	-	-	-	-	-	-
Principal	-	-	-	-	-	-	-	-	-	-	-	-
Interest and Other	-	-	-	-	-	-	-	-	-	-	-	-
Corporate taxes /a	-	(0.02)	(0.13)	(0.13)	(0.13)	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Net working capital	-	-	-	-	-	-	-	-	-	-	-	-
CASH BALANCE	-	29.41	18.97	19.05	19.02	18.98	18.82	18.90	18.86	18.75	18.76	18.72
	-	-	-	-	-	-	-	-	-	-	-	-
Net cashflow	-	29.41	18.97	19.05	19.02	18.98	18.82	18.90	18.86	18.75	18.76	18.72
Cash Available	-	29.41	48.38	67.43	86.45	105.43	124.25	143.14	162.00	180.75	199.51	218.23
Minimum Cash Requirement	-	0.28	0.60	0.60	0.59	0.59	0.60	0.60	0.60	0.60	0.59	0.59
Deposito	-	29.12	47.78	66.83	85.86	104.84	123.64	142.55	161.40	180.14	198.92	217.64

Tabel A.2: Income Statement Pabrik Sei Mangkei (milyar IDR)

Komponen	2019 0	2020 1	2021 2	2022 3	2023 4	2024 5	2025 6	2026 7	2027 8	2028 9	2029 10	2030 11
Revenue	-	28.35	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50
Wood Pellet	-	28.35	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Expenditure	-	62.98	72.26	72.18	72.22	72.26	72.41	72.33	72.38	72.49	72.47	72.52
	-	-	-	-	-	-	-	-	-	-	-	-
CAPITAL COST :	-	36.27	-	-	-	-	-	-	-	-	-	-
Land permit	-	0.35	-	-	-	-	-	-	-	-	-	-
Building (Plant,Warehouse,Office)	-	9.68	-	-	-	-	-	-	-	-	-	-
Water, Elect and Telecommunication	-	0.14	-	-	-	-	-	-	-	-	-	-
Infrastrcture (parking area)	-	0.30	-	-	-	-	-	-	-	-	-	-
Briquette Machine	-	23.00	-	-	-	-	-	-	-	-	-	-
Warehouse Equipment	-	0.02	-	-	-	-	-	-	-	-	-	-
Office Equipment	-	0.02	-	-	-	-	-	-	-	-	-	-
Heavy Equipment + Opr. Vehicle	-	2.77	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
OPERATIONAL COST :	-	26.72	72.26	72.18	72.22	72.26	72.41	72.33	72.38	72.49	72.47	72.52
Production Cost	-	24.65	68.26	68.14	68.14	68.14	68.26	68.14	68.14	68.21	68.14	68.14
Raw Material Cost	-	12.59	41.96	41.96	41.96	41.96	41.96	41.96	41.96	41.96	41.96	41.96
Packaging RM	-	0.22	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Transportation Cost of Raw Material	-	5.25	6.99	6.99	6.99	6.99	6.99	6.99	6.99	6.99	6.99	6.99
Electricity	-	5.01	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70
Maintenance	-	1.27	1.93	1.81	1.81	1.81	1.93	1.81	1.81	1.87	1.81	1.81
Insurance	-	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	-	-	-	-	-	-	-	-	-	-	-	-
Selling Cost	-	1.32	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
Marketing/Travel Cost (0.25%xSales)	-	0.07	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Packaging Briquette	-	1.25	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
Transportation Cost of Briquette	-	-	-	-	-	-	-	-	-	-	-	-
Fare of Loading Briquette	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
General and Adm. Cost	-	0.75	0.98	1.02	1.06	1.10	1.14	1.18	1.22	1.26	1.31	1.36
Salaries	-	0.68	0.85	0.89	0.92	0.96	1.00	1.04	1.09	1.13	1.18	1.23
Office supplies	-	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Land Use	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Repair and Maint (0,25% x Vih)	-	0.04	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Fuel of Vihicle	-	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Gross Profit Margin	-	1.63	22.24	22.32	22.28	22.24	22.09	22.17	22.12	22.01	22.03	21.98
Depreciation/amortization	-	2.63	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
Earning before interest and tax	-	(0.99)	18.85	18.94	18.90	18.86	18.70	18.78	18.74	18.63	18.65	18.60
Interest	-	-	-	-	-	-	-	-	-	-	-	-
Earning before tax	-	(0.99)	18.85	18.94	18.90	18.86	18.70	18.78	18.74	18.63	18.65	18.60
Corporate Tax	-	0.03	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Earning after tax	-	(1.03)	18.71	18.80	18.76	-	-	-	-	-	-	-

Tabel A.3: Income Statement Pabrik Gunung Tua (milyar IDR)

Komponen	2019 0	2020 1	2021 2	2022 3	2023 4	2024 5	2025 6	2026 7	2027 8	2028 9	2029 10	2030 11
Revenue	-	27.41	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35
Wood Pellet	-	27.41	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35	91.35
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Expenditure	-	62.98	72.25	72.17	72.21	72.25	72.41	72.33	72.37	72.48	72.46	72.51
	-	-	-	-	-	-	-	-	-	-	-	-
CAPITAL COST :	-	36.27	-	-	-	-	-	-	-	-	-	-
Land permit	-	0.35	-	-	-	-	-	-	-	-	-	-
Building (Plant,Warehouse,Office)	-	9.68	-	-	-	-	-	-	-	-	-	-
Water, Elect and	-	0.14	-	-	-	-	-	-	-	-	-	-
Infrastrcture (parking area)	-	0.30	-	-	-	-	-	-	-	-	-	-
Briquette Machine	-	23.00	-	-	-	-	-	-	-	-	-	-
Warehouse Equipment	-	0.02	-	-	-	-	-	-	-	-	-	-
Office Equipment	-	0.02	-	-	-	-	-	-	-	-	-	-
Heavy Equipment + Opr. Vehicle	-	2.77	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
OPERATIONAL COST :	-	26.71	72.25	72.17	72.21	72.25	72.41	72.33	72.37	72.48	72.46	72.51
Production Cost	-	24.65	68.26	68.14	68.14	68.14	68.26	68.14	68.14	68.21	68.14	68.14
Raw Material Cost	-	12.59	41.96	41.96	41.96	41.96	41.96	41.96	41.96	41.96	41.96	41.96
Packaging RM	-	0.22	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Transportation Cost of Raw	-	5.25	6.99	6.99	6.99	6.99	6.99	6.99	6.99	6.99	6.99	6.99
Electricity	-	5.01	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70
Maintenance	-	1.27	1.93	1.81	1.81	1.81	1.93	1.81	1.81	1.87	1.81	1.81
Insurance	-	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	-	-	-	-	-	-	-	-	-	-	-	-
Selling Cost	-	1.32	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
Marketing/Travel Cost	-	0.07	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Packaging Briquette	-	1.25	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
Transportation Cost of Briquette	-	-	-	-	-	-	-	-	-	-	-	-
Fare of Loading Briquette	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
General and Adm. Cost	-	0.75	0.98	1.02	1.06	1.10	1.14	1.18	1.22	1.26	1.31	1.36
Salaries	-	0.68	0.85	0.89	0.92	0.96	1.00	1.04	1.09	1.13	1.18	1.23
Office supplies	-	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Land Use	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Repair and Maint (0,25% x Vih)	-	0.04	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Fuel of Vihicle	-	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Gross Profit Margin	-	0.69	19.10	19.18	19.14	19.10	18.94	19.02	18.98	18.87	18.89	18.84
Depreciation/amortization	-	2.63	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
Earning before interest and tax	-	(1.94)	15.71	15.80	15.76	15.72	15.56	15.64	15.60	15.49	15.50	15.46
Interest	-	-	-	-	-	-	-	-	-	-	-	-
Earning before tax	-	(1.94)	15.71	15.80	15.76	15.72	15.56	15.64	15.60	15.49	15.50	15.46
Corporate Tax	-	0.02	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.12
Earning after tax	-	(1.95)	15.59	15.67	15.63	-	-	-	-	-	-	-

Tabel A.4: Balance Sheet Pabrik Sei Mangkei (milyar IDR)

Komponen	2019 0	2020 1	2021 2	2022 3	2023 4	2024 5	2025 6	2026 7	2027 8	2028 9	2029 10	2030 11
Current Assets												
Cash	-	0.28	0.60	0.60	0.59	0.59	0.60	0.60	0.60	0.60	0.59	0.59
Deposito	-	30.05	51.83	74.01	96.16	118.27	140.20	162.23	184.21	206.08	227.98	249.82
Account Receivable	-	-	-	-	-	-	-	-	-	-	-	-
Less : Allowance for doubtful acc	-	-	-	-	-	-	-	-	-	-	-	-
Total current assets	-	30.33	52.43	74.61	96.75	118.86	140.80	162.82	184.81	206.68	228.57	250.41
	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Assets	-	-	-	-	-	-	-	-	-	-	-	-
Land	-	-	-	-	-	-	-	-	-	-	-	-
Building	-	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Machines	-	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Heavy Equipment	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Operational cars	-	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77
Less : Accumulated depreciation	-	(2.63)	(6.01)	(9.40)	(12.78)	(16.16)	(19.55)	(22.93)	(26.32)	(29.70)	(33.09)	(36.47)
Net Fixed Assets in Service	-	33.64	30.26	26.87	23.49	20.10	16.72	13.33	9.95	6.56	3.18	(0.21)
	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Operation	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ASSETS	-	63.97	82.68	101.48	120.24	138.96	157.52	176.16	194.75	213.24	231.75	250.21
	-	-	-	-	-	-	-	-	-	-	-	-
LIABILITIES AND EQUITY	-	-	-	-	-	-	-	-	-	-	-	-
Current Liabilities	-	-	-	-	-	-	-	-	-	-	-	-
Account Payable	-	-	-	-	-	-	-	-	-	-	-	-
Total Current Liabilities	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Long-term Debt	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Equity	-	-	-	-	-	-	-	-	-	-	-	-
Equity - INVESTOR	-	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
Equity - Partner	-	-	-	-	-	-	-	-	-	-	-	-
Equity - Joint Operation	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-
Retained earnings	-	(1.03)	17.68	36.48	55.24	73.96	92.52	111.16	129.75	148.24	166.75	185.21
Total Equity	-	63.97	82.68	101.48	120.24	138.96	157.52	176.16	194.75	213.24	231.75	250.21
	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL LIABILITIES AND EQU	-	63.97	82.68	101.48	120.24	138.96	157.52	176.16	194.75	213.24	231.75	250.21

Tabel A.5: Balance Sheet Pabrik Gunung Tua (milyar IDR)

Komponen	-	0.28	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	-	0.28	2	3	4	5	6	7	8	9	10	11
Current Assets												
Cash	-	0.28	0.60	0.60	0.59	0.59	0.60	0.60	0.60	0.60	0.59	0.59
Deposito	-	29.12	47.78	66.83	85.86	104.84	123.64	142.55	161.40	180.14	198.92	217.64
Account Receivable	-	-	-	-	-	-	-	-	-	-	-	-
Less : Allowance for doubtful	-	-	-	-	-	-	-	-	-	-	-	-
Total current assets	-	29.41	48.38	67.43	86.45	105.43	124.25	143.14	162.00	180.75	199.51	218.23
	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Assets	-	-	-	-	-	-	-	-	-	-	-	-
Land	-	-	-	-	-	-	-	-	-	-	-	-
Building	-	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47	10.47
Machines	-	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Heavy Equipment	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Operational cars	-	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77
Less : Accumulated	-	(2.63)	(6.01)	(9.40)	(12.78)	(16.16)	(19.55)	(22.93)	(26.32)	(29.70)	(33.09)	(36.47)
Net Fixed Assets in Service	-	33.64	30.26	26.87	23.49	20.10	16.72	13.33	9.95	6.56	3.18	(0.21)
	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Operation	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ASSETS	-	63.05	78.64	94.30	109.94	125.53	140.96	156.48	171.95	187.31	202.69	218.02
	-	-	-	-	-	-	-	-	-	-	-	-
LIABILITIES AND EQUITY	-	-	-	-	-	-	-	-	-	-	-	-
Current Liabilities	-	-	-	-	-	-	-	-	-	-	-	-
Account Payable	-	-	-	-	-	-	-	-	-	-	-	-
Total Current Liabilities	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Long-term Debt	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Equity	-	-	-	-	-	-	-	-	-	-	-	-
Equity - INVESTOR	-	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
Equity - Partner	-	-	-	-	-	-	-	-	-	-	-	-
Equity - Joint Operation	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-
Retained earnings	-	(1.95)	13.64	29.30	44.94	60.53	75.96	91.48	106.95	122.31	137.69	153.02
Total Equity	-	63.05	78.64	94.30	109.94	125.53	140.96	156.48	171.95	187.31	202.69	218.02
	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL LIABILITIES AND EQU	-	63.05	78.64	94.30	109.94	125.53	140.96	156.48	171.95	187.31	202.69	218.02

ANNEX B. List of Wood Pellet Producing Machines with Capacity of 5-10 tonnes/hour

No.	Name	Power (kW)	Qty	Remark
1	**Crushing Section**			
101	Chain feeding Conveyor	3	1	1. Power: 5.5kW 2. Length 4 meter 3. Chian conveyor suitable for big log wood and other small wood waste.
102	T-REX 65*120 Wood Chipper	160+5.5+4+5.5	1	1. Main motor 150KW 2. With bottom discharge conveyor 3. Feeder size 650x1200 mm other small wood waste 4. Output chips size 1-3 cm 5. Capacity 40-60 m^3 6. With bottom discharge conveyor
103	Conveyor PSJ 10*14 Belt	7.5	1	1. Power 7.5 kW 2. Belt width 100 cm 3. Length 14 meter 4. Sending the crushed wood chips out of machine and easy for storage
Sub Total		**185.5**	**3**	
2	**Pre-Grinding Section**			
201	PSJ 80*14 Belt conveyor	4	3	1. Power 4.0 kW 2. Belt width 80 cm 3. Length 14 Meter 4. Sending the crushed wood chips into hummer mill
	Inverter		3	Control the feeding speed of the conveyor.
	Magenet plate		3	Remove the metal materals inside the wood chips, to avoid the metal materials broken the hammer mill.
202	GXP 75*100 Hammer Mill	132	3	Crushing all fiber size into fine size, good for pellet making, double roller hammer mill, 2 sets of hammer roll inside the machine, high efficiency. 3 with Φ20mm sieve for pre-grinding functional.
203	CM 8 C Fan blower	37	3	1. Power 37 kW 2. Sending the sawdust into the cyclone.
204	Φ 2000 Cyclone		3	1. Diamter of cyclone 2200mm 2. Let the crushed materials follow donwn, and the air going up.
205	BFY-600 Air Lock	4	3	1. Power 5.5 kW 2. Vale diameter 400 mm 3. Let the sawdust follow down, but no air come out
206	Bag dust filter		3	1. Remove the dust from the top of cyclone 2. 180pcs bug in side the filter

No.	Name	Power (kW)	Qty	Remark
207	Conveyor PSJ 10*21 Belt	7.5	1	1. Power 7.5 kW 2. Belt width 100 cm 3. Length 21 meter 4. Sending the crushed wet wood sawdust out
208	TDJ 50*47 Bucket Elevator	7.5	1	1. Power 7.5 kW 2. Height 8 m 3. Feeding the wet sawdust into the hydraulic bin
209	Φ425*6 screw conveyor	7.5	1	1. Power 7.5 kW 2. Distribut the sawdust into the big hydraulic bin
210	5*8*4M Hydraulic bin	11	1	1. Power 11 kW 2. Size 5*8*4 m 3. The whole bottom of bin moveable by the hydraulic cylinder. 4. Storage the wet sawdust, and can auto discharge to next station, avoid the materials blok insid the bin.
211	Φ 425*6 Screw Conveyor	7.5	1	1. Power 7.5 kW 2. Sending the sawdust out to next station.
212	Inverter		1	Control the speed of the scew conveyor
Sub Total		**572**	**30**	
3	**Drying Section**			
301	PSJ100 x14 Belt conveyor	4	1	1. Power 4 kW 2. Belt width 100 cm 3. Length 14 meter 4. Sending the wood sawdust into dryer
302	Elevator TDJ50 x 47 Bucket	11	1	1. Power 11 kW 2. Sending the wet sawdust into distribult silo
303	Bufer silo	5.5 x 2	1	1. Power 5.5 kW x 2 2. Bottom with 2 screw conveyor 3. The silo size 3 - 3*1*2.7 m
304	50*10 Belt Conveyor	2.2	2	1. Power 2.2 kW 2. Width 50 cm 3. Feeding wood chips into the auto feeding chain type stove.
	Inverter		2	Control the feeding speed of stove.
305	LPRF1000 Auto Chian feeding Hot air stove		1	1. The price just for the base and chain feeding system of stove. 2. The above part we will sending drawing you can buy fire bricks to build it at site.
	Hot air pipes		1	Collecting the hot air stove and the drum dryer.
306	ZR 250 Anti-fire safty device.		1	Using for remove the spark from the hot air, and avoid get fire inside the dryer.
307	BFY-600 air lock	5.5	2	Let the materials go into the dryer, but no cool air go inside the drum, improve the drying efficiency.
308	Dryer GHG3.5*24 drum rotary	37	2	1. Drum diamter 28meter, 2. Length 28meter, 3. Inner side of the drum with paddle axis, incrase the drying efficiency. 4. Drum divid into 2 section with flange to connecting them. 5. Drum drived by gearbox, and with frequency changer can control the rotary speed.

No.	Name	Power (kW)	Qty	Remark
309	Screw conveyor	7.5	4	1. Power 7.5 kW 2. At bottom of dryer outlet cover.
310	CM-12C Fan blower	55	2	1. Power 55 kW 2. Generating high speed flowing air, sucking the hot air from the hot air stove. Make the drum into negative pressure.
311	Φ 2500 Cyclone		4	1. Cyclone diameter 2.5 meter 2. Remove the dust from the flowing air.
312	BFY - 400 Air Lock	4	4	1. Power 4 kW 2. Vale size 400 mm 3. Discharge the dust from the bottom of the cyclone
313	Conveyor PSJ 80*15 M Belt	3	2	1. Collectiong the sawdust from the screw feeder outlet and bottom of cyclone. 2. Power 3 kW 3. Belt width 80 cm 4. Belt length 15 cm
314	TDJ 50*28 Bucket elevator	7.5	2	1. Power 7.5 kW 2. Feeding the sawdust into Hydraulic bin
315	Conveyor Φ 425*6.5 screw	7.5	1	1. Power 7.5 kW 2. Distribult the sawdust into the big hydraulic bin
316	5*8*4 M Hydraulic bin	11*2	1	1. Storage the sawdust 2. Make the sawdust inside absorb the moisture from each other, make the moisture content more evenly
317	Conveyor Φ325*4 screw	5.5	2	1. Power 7.5 kW 2. Ddischarge the materials out
318	Inverter		2	Control the speed of the screw conveyor
Sub Total		**310.9**	**38**	
4	**Fine-Grinding Section**			
401	PSJ 80*14 Belt conveyor Need feeding hopper	3	2	1. Power 4 kW 2. Belt width 80 cm 3. Length 14 meter 4. Sending the crushed wood chips into the hammer mill
	Inverter		2	Control the feeding speed of the conveyor.
	Magnet plate		2	Remove the metal materals inside the wood chips, to avoid the metal materials broken the hammer mill.
402	GXP 75*100 Hammer mill	132	2	Crushing all fiber size into fine size, good for pellet making, double roller hammer mill, 2 sets of hammer roll inside the machine, high efficiency.
403	CM8C Fan blower	37	2	1. Power 37 kW 2. Sending the sawdust into the cyclone
404	Φ2000 Cyclone		2	1. Diamter of cyclone 2200 mm 2. Let the crushed materials follow donwn, and the air going up.
450	BFY-600Air lock	4	2	1. Power 4 kW 2. Vale diamter 400 mm 3. Let the sawdust follow down, but no air come out.
406	Bag dust filter		2	1. With 180pcs bag filter inside 2. Remove the dust come out of the top of cyclone

No.	Name	Power (kW)	Qty	Remark
407	PSJ 100*8 Belt conveyor	5.5	2	1. Power 5.5 kW 2. Belt width 100 cm 3. Length 8 Meter 4. Collecting the sawdust from 2 machines
408	Elevator TDJ50*47Bucket	11	1	1. Power 11 kW 2. Connecting with the conveor to collecting the sawdust 3. Sending the sawdust to the top of the hydralic bin
409	Conveyor LWJ425*6 Screw	7.5	1	Distrublt the sawdust into the big bin evenly
410	5*8*4.8 Hydralic storage bin	11+11	1	1. With 11*2kw Hydrulic station 2. Storage the sawdust after the dryer. Make the sawdust inside to absorb moisture from each other, make the moisture level of the sawdust more evenly.
411	LWJ325*3 Screw conveyor	5.5	2	1. Power 5.5 kW 2. Length 3 Meter 3. At the bottom of the hydraulic bin to sending the dry sawdust out
412	Inverter		2	Control the speed of screw conveyor
Sub Total		**414.5**	**25**	
5	**Pelletizing section**			
501	PSJ 80*6 Belt conveyor	3	2	1. Power 3 kW 2. Belt width 80 cm 3. Length 6 Meter 4. Sending the sawdust out 5. With this conveyor, with make the pit for the next buckt conveyor less deep
502	Elevator TDJ50*28 Bucket	7.5	2	1. Power 7 kW 2. Length 8 Meter 3. Elevating the sawdust into the buffer silo
503	Hydraulic Buffer silo 8*1*2	5.5	1	1. Power 5.5 kW 2. Bottom with blender to avoid bloking the silo 3. With high and low materials level meter 4. Buffer function, keep the there with enough materials feeding into machine 5. Buttom with rotary frame for the screw feeder
504	Screw feeder LWJ 273*2.5	4	4	1. Power 4 kW 2. At the bottom of the buffer silo feeding the mateirals into pellet machine
505	Inverter		4	Control the feeding speed
506	6 TH XGJ 850 High Efficiency Pellet Machine	220+3+0.55+3	4	1. Output (kg/h): 2500-3500/set 2. Power (kW): 220+3+0.37+0.55+3 3. Number of rollers: 3 pcs 4. Weight of machine (kgs): 96600 5. Dimension (mm): 2100*1700*1600 6. Gearbox gears 2 years warranty, any broken in first year, we will give you a new one 7. Whole set include: Fan Blower 3kw, Bag dust collector, Automatic roller and gear lubrication system.
507	PSJ 80*10 Belt conveyor	3	1	Collecting the pellets from the pellet machines
Sub Total		**951**	**18**	

No.	Name	Power (kW)	Qty	Remark
6	**Cooling Section**			
601	TDJ 50*28 Bucket elevator	7.5	1	1. Power 7.5 kW 2. Sending the pellets into pellet cooler
602	BFY-400 Air lock	4	1	1. Power 4 kW 2. Only let the pellets go inside the cooler, no air can go inside from this place.
603	SKLN-8 Pellet cooler body		1	1. Counter flowing pellet cooler, the cooler will cooling the pellets into room temperatuer 2. It will take away few moisture content of the pellets, making the pellet become much stronger and good for storage. 3. Volume: 4 cubic meter 4. Bottom with sieves nature air go inside the cooler from here
604	Fan blower	55	1	1. Power: 22 kW 2. Generate high speed flowing air, sucking the outside cool air into the cooler to cooling the hot pellets.
605	Bag dust filter		1	1. With 360pcs bag filter inside 2. Remove the dust come out of the top of cyclone.
606	Simple screener	0.5	1	1. 0.18 kW shaking motor 2. 2000 N for shaking motor 3. Separate the dust and the broken pellets 4. Installed under the bottom of cooler
607	PSJ 80*6 Belt conveyor	2.2	1	1. Power: 2.2 kW 2. Length: 6 meter 3. Sending the pellets out
Sub Total		**69.2**	**7**	
7	**Packing Section**			
701	TDJ 50*28 Bucket elevator	7.5	1	1. Power: 7.5 kW 2. Sending the pellets into pellets buffer silo
702	Pellet Silo		1	Buffer silo for the finished pellets, with materials level meter, if it is full will sending alarm to the control panel.
703	DBC-100 Jumbo bag packing machine	0,55	1	1. With wieght system 2. Each bags 600-1000kg, can be adjusted 3. With bottom jumb bag transfer system, easy for operating
Sub Total		**8.55**	**3**	

Note: Total Power: 2.548 kVA (kilo Watt)

ANNEX C. Terms of Reference

ITTO Project PD 737/14 Rev. 2 (I)

"Developing Supply Capacity of Wood-based Biomass Energy through Improved Enabling Conditions and Efficient Utilization of Degraded Forest Lands Involving Local Communities in North Sumatera Province of Indonesia"

Terms of Reference

Activity 3.4: To conduct a study on feasibility of investment in commercial manufacturing of wood-based energy including electricity and wood pellet

1. Background information

- ITTO Project PD 737/14 Rev. 2 (I) aims to improve enabling conditions for developing supply capacity of wood-based biomass energy through efficient utilization of degraded forest lands involving local communities in North Sumatera Province of Indonesia. Enabling conditions are defined as sustainable supply of energy wood as the raw material, availability of skilful manpower for energy forest development and favourable environment for investment in the utilization of energy wood, harvested from energy forests established on degraded forest lands, for electricity and wood pellet.
- For securing sustainable supply of raw material, i.e. energy wood, the first step taken is to initiate development of energy forest on a trial basis by planting 3 energy wood species (gamal, kaliandra, lamtoro) at 3 different FMUs (Humbang Hasundutan, Padang Sidempuan, Simalungun). The main purpose of this trial planting is to demonstrate growth and development of the species to beneficiaries (local communities, FMUs, potential investors) and volumes of harvest at different ages and sites for individual species. The planting trial has started in June – July 2018 and completed in September 2018.
- Training on skills for planting, growing and harvesting will be conducted in years 2 and 3 starting October 2018. The main objective is to have 100 farmers of 50 villages trained as trainers for community members.
- For the promotion of investment, there is a need to develop favourable environment; to this end, relevance of existing policies on new renewable energy (EBT) development will be reviewed. As needed, policy incentive for investment will be formulated. In addition, there is a need to provide reliable information on feasibility of investment in the utilization of energy wood for electricity and wood pellet. Making such information available to potential investors is certainly useful to convince potential investors to invest;

2. Expected outcomes

The feasibility study is expected to generate reliable information on:

- Demand for electricity and wood pellet both by domestic and overseas markets as appropriate.
- Estimates of established supply of wood-based raw material originating from forest and non-forest sources.
- Availability and quality of manpower in the area.
- Supply capacity of electricity or wood pellet plant based on sustainable supply of raw material and market potential
- Most efficient plant sites identified taking distribution of degraded lands and ports into account; and
- Profitability of investment under different business scenarios as regard cost of inputs, price of product (electricity and wood pellet) magnitude of capital and rate of interest, demonstrated using B/C ratio, NPV and IRR as the criteria.

3. Task to be undertaken

In close consultation with the PMU, the Consultant shall undertake the following tasks:

i) To assess potential demand for electricity by PLN in target area and for wood pellet (domestic and overseas markets)

ii) To identify extent and distribution of degraded lands for energy forest development by legal land status. (state/community lands), land use type and suitability class.

iii) To provide estimates of sustainable energy wood supply under realistic assumptions and strategies for plantation development using gamal, kaliandra and lamtoro species.

iv) To make estimates of sustainable supply of raw material originating from palm oil and rubber estates in the region

v) To identify most strategic port for exporting the products (electricity and wood pellet)

vi) To identify most strategic site(s) for processing plants taking wood-based raw material supply and port sites into account

vii) To identify most efficient technology for converting wood-based raw material to electricity or wood pellet

viii) To make estimates for cost of inputs, price of outputs, magnitude of needed capital and rate of interest (cost of capital) used and their rationales

ix) To identify profitability of investment for each product (electricity and wood pellet) using B/C ratio, NPV and IRR as the criteria

x) To conduct sensitivity analysis on profitability

xi) To present findings of the study to a FGD to be organized by the project

xii) To finalize the study report for distribution to prospective investors.

4. Inputs

- Time schedule

  To undertake the study, a team of professionals will be hired for 5 (five) months starting January 2019. Proposed work time schedule is as follows:

  - January 2018 **:** to conduct a desk study on information gathering,
  - February 2018 **:** to gather field information,
  - March 2018 **:** to draft study report,
  - April 2018 **:** to review the draft involving EA, CA as well as selected professionals on forest management, forest-based industry and energy development,
  - May 2018 **:** to finalize the report and distribute it to potential investors.

- Study costing

- Honoraria	**:**	USD 13,000
- Duty travel (3 persons, 7 days)	**:**	USD 4,500
- FGD on draft report (40-50 participants)	**:**	USD 7,000
- Translation, printing and dissemination	**:**	USD 3,000
- Miscellaneous	**:**	USD 1,000
Total	**:**	**USD 28,500**





ITTO Project PD 737/14 Rev 2 (I)

Developing Supply Capacity of Wood-Based Biomass Energy through Improved Enabling Conditions and Efficient Utilization of Degraded Forest Lands involving Local Communities in North Sumatra Province of Indonesia

Directorate of Production Forest Business Development (UHP),
Directorate General of Sustainable Management of Production Forest (PHPL)

Indonesian Sawmill and Woodworking Association (ISWA)

International Tropical Timber Organization (ITTO)