



Manufacturing Briquettes or White Coal from Bamboo/ Agro waste/ saw dust

Introduction

In many parts of our country, agricultural and industrial solid wastes are indiscriminately dumped or burnt in public places, thereby resulting in the generation of air pollution in concentrated areas nearby, making it extremely cloudy. Agricultural wastes are plant residues from agriculture. Agricultural wastes are all parts of crops that are not used for human or animal food. Crop residues consist mainly of stems and leaves. It is very difficult to manage the agricultural waste and it cannot be stored for a long time in its raw form as it takes up a lot of space and gets unusable over time.

Agro wastes like bamboo waste, rice husk and straws are some of the major agricultural waste items found in India. Apart from these agro-wastes, there are industrial wastes like sawdust, bagasse, etc. Even if they are labelled as waste, they can actually be put into various uses. These wastes can help the people to generate a good amount of bio fuel. For easy transportation and longer lifespan, these agro wastes and other wastes like saw dust, bagasse, etc. are converted into briquettes or white coals. These biofuels can be stored easily and even transported from one place to another.

Not only does it solve the problem of treating agro-waste or industrial waste, but it is also a renewable source of energy and can be conveniently used in place of coals or other non-renewable resources. Moreover, turning agricultural or industrial waste into something beneficial can also help the environment as well as the society. The farmers can earn an extra income by selling these waste and the business units producing briquettes or white coals can also earn a good profit by turning waste into something useful.

Market Potential & Northeast Scenario

Global Biomass Briquettes Market was worth USD 429.0 million in 2021 and is projected to reach USD 701.5 million by the year 2028, growing at a CAGR of 7.4% during the period of 2022-2028. The growth of the biomass briquettes market can be attributed to the rising adoption of biomass briquettes as a cleaner fuel for the purpose of power generation leading to lower GHG emissions. Moreover, government policy formulations encouraging the adoption of biomass as an alternative energy source further propelling the market growth over the forecast period.

Agriculture is a very vital part of Northeast India. Many of the households earn their livelihood by working in primary sector and are closely related to agriculture. Some of the major crops and agricultural items found in the Northeastern states are rice, maize, sugarcane, etc. Therefore, even the agro-waste produced in these states is high. Rice is one of the most important cereal crops of the North Eastern Region. The total rice production of NE region is estimated to be around 5.50 million tonnes with average productivity of 1.57 t/ha. Since rice is the staple food of northeast India, the agricultural waste obtained from paddy is quite high. Therefore, northeastern states like Assam, Manipur, Meghalaya, etc. hold a high potential for business units which involve in production of briquettes from agro-waste from rice cultivation.

Apart from that, even bagasse can be used for production of briquettes as sugarcane is produced in large quantities in the districts of Assam like Karbi-Anglong, Nagaon, Dima Hasao, Sonitpur, and Golaghat and also in few districts of Nagaland.

With the help of various sources of knowledge and education along with the support of many government schemes, many people are setting up micro to large industries in the northeastern region. Some of these industries are directly utilizing the resources available in the nature to manufacture their product. One of these industries is the wood/timber or furniture industry. They are leaving a high amount of sawdust as residue of their manufacturing process. Even these sawdust can be utilized to form briquettes or white coal that can provide the people with an alternative source of energy.

Manufacturing Process

The process of manufacturing briquettes/white coal from bamboo/agro-waste/saw dust is as follows.

- **Drying:** The wet or damp agro wastes and other raw materials are sun dried before forming the briquettes
- **Grinding:** The raw materials are then grinded into a uniform size for easing the compression process.
- **Sieving:** The raw materials are sieved and any larger particles are removed and sent for grinding again.
- **Compacting:** A solid briquette is manufactured using a piston press that compresses sandwiched layers of sawdust/agro-waste/other raw materials together.
- **Cooling:** The hot briquettes are cooled using water cooling screw conveyer.
- **Packing:** Packing done manually in HDPE bags.

The model DPR for Briquettes/ white coal manufacturing unit from bamboo/agro-waste/ saw dust is basically prepared based on following assumptions that may vary with capacity, location, raw materials availability etc. An entrepreneur can use this model DPR and modify as per requirement and suitability.

Cost of Project

PARTICULARS	Rs. In lakhs
Owned land	-
Civil works and Buildings (5000 sqft @950/-)	47.50
Plant and machinery (Annexure A)	15.00
Misc. Fixed Assets	2.20
D G Set 60 KV	5.00
Escalation & Contingencies	3.49
Preliminary & Preoperative Expenses	4.64
Sub-total (A)	77.82
Working Capital Margin	10.53
Total Project Cost	88.35
Total Working Capital Req (B)	42.12
MEANS OF FINANCE	-
Total Funds Required(A+B)	119.94
<u>Loan Component</u>	-
TERM LOAN	48.37
WORKING CAPITAL	31.59
Total	79.96
Equity	39.98
Total	119.94

Detailed Cost Element (Annexure A)

Sl. no.	Item	Qty	Rate	In lakhs
1	Turnkey briquette producing plant	1	15,00,000	15.00
	Total			15.00

Contingencies and Escalations

Contingencies and Escalations have been assumed at 5% at cost of project.

Preliminary Expenses

Particulars	Amount (In lakhs)
Incorporation Expenses	0.15
Project Report Preparation and Consultation	0.35
Feasibility and Engineer's/Architect's Report and Plans	1.19
Legal Charges - Drafting for agreements, contracts, stamp paper, notary and affidavit cost	0.10
Other recurring expenses of revenue nature upto start of commercial production - Security Guard & Others salary	1.29
Interest Cost for period before commercial production	1.56
Total	4.64

Salary

Category	No.	Amount (In lakhs)
Production Manager	1	3.60
Accountant	1	1.80
Machine Operator	1	2.40
Factory workers	8	7.68
TOTAL		15.48

Profitability Statement

Particulars	Year- 1	Year-2	Year- 3	Year- 4	Year- 5
<u>A. INCOME</u>					
Production Capacity (MT/annum)	4320	4320	4320	4320	4320
Capacity utilisation	60%	65%	70%	75%	80%
Production per annum at capacity utilisation (MT/annum)	2592	2808	3024	3240	3456
Annual Sales	168.48	182.52	196.56	210.60	224.64
Total Income/ annum	168.48	182.52	196.56	210.60	224.64
<u>B. OPERATING EXPENSES</u>					
Raw Materials	90.37	97.91	105.44	112.97	120.50
Salary	15.48	16.25	17.07	17.92	18.82
Repair & Maintenance	1.39	1.46	1.54	1.61	1.69
Power	13.84	14.54	15.26	16.03	16.83
Depreciation & Amortisation	4.59	4.59	4.59	4.06	4.06
Total Operating Expenses	125.68	134.75	143.89	152.59	161.90
Operating Profit (A-B)	42.80	47.77	52.67	58.01	62.74
<u>C. FINANCIAL EXPENSES</u>					
Interest on Term Loan	4.17	3.26	2.34	1.42	0.50
Interest on WCL	3.32	3.59	3.87	4.15	4.42
<u>D. Other Expenses</u>					
Administrative and general Expenses	3.37	3.65	3.93	4.21	4.49
Total Expenses	10.86	10.50	10.14	9.78	9.41
Profit Before Tax	31.94	37.27	42.53	48.23	53.33
Provision for Tax	7.98	9.32	10.63	12.06	13.33
Profit after Tax (PAT)	23.95	27.96	31.90	36.18	40.00
Dividend Declared	-	-	-	-	-
Retained Profit	23.95	27.96	31.90	36.18	40.00

Breakeven Point

Sl. No.	Particulars	Year - 1	Year - 2	Year - 3	Year - 4	Year - 5
A.	Net Sales	168.48	182.52	196.56	210.60	224.64
B.	Variable Cost					
	Raw Material	90.37	97.91	105.44	112.97	120.50
	Power	13.84	14.54	15.26	16.03	16.83
	Total Variable Cost	104.22	112.44	120.70	128.99	137.33
C.	Contribution (A-B)	64.26	70.08	75.86	81.61	87.31
D.	Fixed and Semi-Fixed Cost					
	Salary	15.48	16.25	17.07	17.92	18.82
	Repair & Maintenance	1.39	1.46	1.54	1.61	1.69
	Interest on WCL	3.32	3.59	3.87	4.15	4.42
	Interest on term Loan	4.17	3.26	2.34	1.42	0.50
	Depreciation	4.59	4.59	4.59	4.06	4.06
	Total Fixed Cost	28.95	29.15	29.40	29.16	29.49
E.	Breakeven Point	45%	42%	39%	36%	34%
F.	Cash BEP	38%	35%	33%	31%	29%

Debt-Service Coverage Ratio

Sl. No.	Particulars	Year - 1	Year - 2	Year - 3	Year - 4	Year - 5
i	Profit	23.95	27.96	31.90	36.18	40.00
ii	Depreciation	4.59	4.59	4.59	4.06	4.06
iii	Interest	4.17	3.26	2.34	1.42	0.50
A	Total (i + ii + iii)	32.72	35.80	38.82	41.66	44.56
i	Interest	4.17	3.26	2.34	1.42	0.50
ii	Principal repayment	9.67	9.67	9.67	9.67	9.67
B	Total (i + ii)	13.85	12.93	12.01	11.09	10.17
	DSCR (A / B)	2.36	2.77	3.23	3.76	4.38

Interest on Term Loan and Principal Repayment

Refer Annexure I.

Address of Vendors

	Address and Contact Number
Jay Khodiyar Machine Tools	Samrat Industrial Area, Street No.2, Gondal Rd, opp. Kaneriya Oil Industries, Rajkot, Gujarat 360004 Phone: 076000 00019
Sindhu Enterprises	Monjit Pegu Silimpur, Gogamukh Silimpur Dhemaji - 787034, Assam, India
Deqon Industries LLP	Gat No - 1298, A/P - Shigaon, Tal - Walwa , Dist - Sangli Vadgaon - 416302, Kolhapur, Maharashtra, India

ANNEXURE- I

Year	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Annually
I													
Principal													
Opening	48.37	47.57	46.76	45.95	45.15	44.34	43.53	42.73	41.92	41.12	40.31	39.50	
Repaid	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	9.67
Closing	47.57	46.76	45.95	45.15	44.34	43.53	42.73	41.92	41.12	40.31	39.50	38.70	
Interest	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.32	0.31	4.17
II													
Principal													
Opening	38.70	37.89	37.09	36.28	35.47	34.67	33.86	33.05	32.25	31.44	30.64	29.83	
Repaid	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	9.67
Closing	37.89	37.09	36.28	35.47	34.67	33.86	33.05	32.25	31.44	30.64	29.83	29.02	
Interest	0.31	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.24	0.24	3.26
III													
Principal													
Opening	29.02	28.22	27.41	26.60	25.80	24.99	24.19	23.38	22.57	21.77	20.96	20.16	
Repaid	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	9.67
Closing	28.22	27.41	26.60	25.80	24.99	24.19	23.38	22.57	21.77	20.96	20.16	19.35	
Interest	0.23	0.22	0.22	0.21	0.20	0.20	0.19	0.19	0.18	0.17	0.17	0.16	2.34
IV													
Principal													
Opening	19.35	18.54	17.74	16.93	16.12	15.32	14.51	13.71	12.90	12.09	11.29	10.48	
Repaid	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	9.67
Closing	18.54	17.74	16.93	16.12	15.32	14.51	13.71	12.90	12.09	11.29	10.48	9.67	
Interest	0.15	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.10	0.10	0.09	0.08	1.42
V													
Principal													
Opening	9.67	8.87	8.06	7.26	6.45	5.64	4.84	4.03	3.22	2.42	1.61	0.81	
Repaid	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	9.67
Closing	8.87	8.06	7.26	6.45	5.64	4.84	4.03	3.22	2.42	1.61	0.81	0.00	
Interest	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.01	0.01	0.50