M/s. Hutah Industries Private Limited

10 MW Biomass based Power Project in Nagaland

Detailed Project Report

Variate Consultants Private Limited

13th February 2021

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Executive Summary

Project Background

M/s. Hutah Industries Private Limited ("HIPL" or "Company"), incorporated on 4th November 2020 under the Companies Act 2013 and that the Company is limited by shares. The Company registered office is located at Thahekhu Village, House number 125, Dimapur, Nagaland, 797112. The CIN of the Company is U40108NL2020PTC013541. The PAN of the Company is AAFCH5266F and TAN of the Company is SHLH01718D.

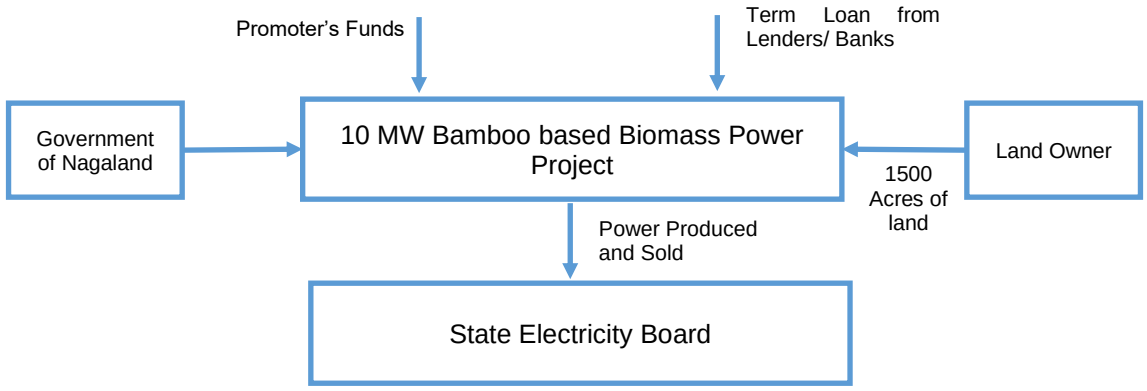
The Management of the Company is now considering setting up 10 MW biomass based power plant in Nagaland. The proposed project will utilise bamboo as the fuel for producing power. It is noted that the state of Nagaland is rich in growth on bamboo and the local Government is willing to provide ample amount of bamboo plantation for the Company to utilise the same. The bamboo will be cut, converted into chips/ briquettes, which will be fed in the boiler system. The bamboo plants will not be uprooted, instead will be cut from stem level, allowing the plant to regrow in next couple of years, to be available for re-harvesting.

The overall project cost for setting up the said Project has been ascertained at Rs. 68.53 Crores, which is proposed to be funded in a debt-equity ratio of 1.86: 1, meaning Promoters Contribution in form of equity/ quasi equity/ unsecured loan to the tune of Rs. 23.98 Crores and long term debt component of Rs. 44.54 Crores. The snapshot of other parameters of the Project are –

1. The project will have an installed capacity of 10 MW, with wet bamboo as basic input as raw material.
2. The Company has already approached the Government of Nagaland for allotment of the project and in-principal approval has been provided by the Government. Apart from receiving the approval from the State Government, the Company has taken 1500 acres of land on long lease of 99 years. The said land already has 500 acres of bamboo plantation and around 950 acres will be further planted during the course of implementation of the Project.
3. The overall project cost for setting up the said 10 MW bamboo based biomass power project will be around Rs. 68.56 Crores, which will be funded in a debt-equity ratio of 1.86:1.
4. The Net Present Value (NPV) of the Project has been ascertained at Rs. 3075 Crores, meanwhile the IRR at 18.71% is higher than weighted average cost of capital (WACC) at 10.65%, indicating the project is financially viable.
5. The average Debt Service Coverage Ratio (DSCR) of the Project has been ascertained at 1.75, indicating fair repayment capacity of the Project.

Project Configuration

As discussed above, the Company proposes to set up a 10 MW bamboo based power Project in the state of Nagaland. The project configuration as understood has been illustrated below –



Source: VCPL Assessment

Project Cost and Means of Finance

The overall project cost of the proposed 50 TPH bamboo fired boiler power plant is estimated at Rs. 68.53 Crores. The summary of the project cost has been provided as exhibit below –

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	Total
Land	Rs. Crores	5.05	-	-	5.05
Building and Civil Work	Rs. Crores	1.60	6.42	2.67	10.70
Plant and Machinery	Rs. Crores	11.18	22.36	3.73	37.26
Miscellaneous Fixed Assets	Rs. Crores	0.06	0.80	0.29	1.15
Preliminary and Pre-operative	Rs. Crores	1.78	2.37	1.78	5.92
Interest During Construction	Rs. Crores	0.34	2.58	2.08	5.00
Contingency	Rs. Crores	0.64	1.48	0.33	2.46
Margin Money for Working Capital	Rs. Crores			1.00	1.00
Total	**Rs. Crores**	**20.65**	**36.00**	**11.88**	**68.53**

Source: HIPL and SCPL Estimates

The proposed project is expected to be funded in a Debt Equity Ratio of 1.86: 1, whereby the promoters will bring in a contribution of Rs. 23.98 Crores and the bank borrowing will be to the tune of INR 44.54 Crores. The means of finance for the proposed project has been provided in the exhibit below –

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	Total
Equity	Rs. Crores	7.23	12.60	4.16	23.98
Debt	Rs. Crores	13.42	23.40	7.72	44.54
Total Means of Finance	**Rs. Crores**	**20.65**	**36.00**	**11.88**	**68.53**

Source: HIPL and SCPL Estimates

The broad terms for the proposed loan have been provided below –

Nature of Borrowing	INR-Term Loan (Proposed)
Loan Amount	INR 44.54 Crores
Interest Rate	10.25%
Commercial Operation Date	Quarter 3 of FY 2022-23
Repayment Start	Quarter 1 of FY 2023-24
Repayment	31 equated quarterly installments

Source: HIPL and VCPL Estimates

Financial Highlights

The financial highlights of the proposed project has been provided in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Revenue	Rs. Crores	17.76	38.05	40.29	40.29	40.29	40.29	40.29	40.29	40.29
Total Operating Costs	Rs. Crores	10.47	22.44	23.76	23.91	24.06	24.21	24.37	24.53	24.70
EBDITA	Rs. Crores	7.28	15.61	16.53	16.38	16.23	16.08	15.92	15.76	15.59
EBDITA Margin	%	41.02%	41.03%	41.02%	40.66%	40.28%	39.90%	39.51%	39.11%	38.69%
Contribution	Rs. Crores	8.00	17.14	18.14	17.99	17.84	17.69	17.53	17.37	17.20
Contribution Margin	%	45.02%	45.03%	45.02%	44.66%	44.28%	43.90%	43.51%	43.11%	42.69%
BEP Sales	Rs. Crores	9.74	19.16	18.10	16.93	15.74	14.53	13.31	12.07	10.85
BEP Capacity Utilisation	%	54.84%	50.36%	44.93%	42.02%	39.06%	36.07%	33.04%	29.95%	26.92%
Cash Break Even	Rs. Crores	6.99	13.61	12.55	11.33	10.10	8.84	7.57	6.27	4.99
Cash Break Even Margin	%	39.34%	35.77%	31.15%	28.12%	25.06%	21.94%	18.78%	15.56%	12.39%
Net Profit	Rs. Crores	2.87	6.76	7.93	8.18	8.53	8.87	9.21	10.17	9.00
Net Profit Margin	%	16.15%	17.75%	19.69%	20.31%	21.17%	22.02%	22.86%	25.23%	22.35%
Equity Share Capital	Rs. Crores	23.98	23.98	23.98	23.98	23.98	23.98	23.98	23.98	23.98
Reserves and Surplus	Rs. Crores	2.87	9.62	17.56	25.74	34.27	43.14	52.35	62.52	71.52
Tangible Net Worth (TNW)	Rs. Crores	26.85	33.61	41.54	49.72	58.25	67.12	76.33	86.50	95.50
Term Loan	Rs. Crores	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31	-
Debt Equity Ratio	Ratio	1.66	1.15	0.80	0.55	0.37	0.24	0.13	0.05	-
Total Outside Liability (TOL)	Rs. Crores	47.88	42.46	36.92	31.19	25.45	19.71	13.98	8.24	3.94
TOL/ TNW	Ratio	1.78	1.26	0.89	0.63	0.44	0.29	0.18	0.10	0.04
Closing Cash Balance (incl Invst)	Rs. Crores	4.11	7.51	12.14	17.07	22.36	27.98	33.94	40.86	48.05
DSCR	Ratio	2.80	1.35	1.50	1.56	1.64	1.73	1.84	2.07	2.61
Minimum DSCR	Ratio	1.35								
Maximum DSCR	Ratio	2.80								
Average DSCR	Ratio	1.75								
NPV	Rs. Crores	30.75								
IRR	%	18.71%								
Cost of Capital	%	10.65%								

Source: VCPL Estimates

- The average EBDITA margin for the proposed project is 40.14%, while the net profit margin is 20.84%.
- The minimum DSCR for the project is 1.35, while the average DSCR is 1.75. The interest coverage ratio for the project is comfortable all throughout. Both parameters indicating fair repayment capability of the Project
- The NPV of the Project has been estimated at Rs. 30.75 Crores, while the IRR of the project is 18.71%, which is higher than the post-tax cost of capital at 10.65%. Hence the project is financially viable.

The breakeven analysis of the project has been provided in the exhibit below:

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Total Revenue	Rs. Crores	17.76	38.05	40.29	40.29	40.29	40.29	40.29	40.29	40.29
Total Fixed Cost (incl Dep and Int)	Rs. Crores	4.38	8.63	8.15	7.56	6.97	6.38	5.79	5.20	4.63
Total Variable Cost	Rs. Crores	9.76	20.91	22.15	22.30	22.45	22.60	22.76	22.92	23.09
Contribution	Rs. Crores	8.00	17.14	18.14	17.99	17.84	17.69	17.53	17.37	17.20
Contribution Margin	%	45.02%	45.03%	45.02%	44.66%	44.28%	43.90%	43.51%	43.11%	42.69%
Break Even Sales	Rs. Crores	9.74	19.16	18.10	16.93	15.74	14.53	13.31	12.07	10.85
Break Even Margin	%	54.84%	50.36%	44.93%	42.02%	39.06%	36.07%	33.04%	29.95%	26.92%
Cash Break Even	Rs. Crores	6.99	13.61	12.55	11.33	10.10	8.84	7.57	6.27	4.99
Cash Break Even Margin	%	39.34%	35.77%	31.15%	28.12%	25.06%	21.94%	18.78%	15.56%	12.39%

Source: VCPL Estimates

Sensitivity Analysis

A sensitivity analysis was carried out to assess the impact of the following scenarios on the major financial parameters.

The summary of sensitivity analysis is provided in the following exhibit –

Description	Project Cost	NPV	IRR	Post-tax CoC	Min. DSCR	Avg. DSCR
	Rs. Crores	Rs. Crores	%	%	Ratio	Ratio
Base Case	68.53	30.75	18.71%	10.65%	1.35	1.75
5% decrease in Capacity Utilisation	68.47	26.29	17.66%	10.65%	1.28	1.67
5% decrease in Selling Price	68.49	22.21	16.67%	10.65%	1.22	1.59
5% increase in Operational Expenses	68.53	30.08	18.55%	10.65%	1.34	1.73
10% increase in Hardware Cost	74.09	25.76	17.07%	10.65%	1.25	1.62
1% increase in Interest Rate	69.04	27.54	18.47%	11.07%	1.29	1.69
2% increase in Interest Rate	69.57	24.55	18.26%	11.49%	1.24	1.64

Source: VCPL Assessment

Conclusions

Based on the assessment undertaken by the Consultants, following are the conclusion –

1. HIPL is proposing to set up 10 MW bamboo based biomass project close to Dimapur in Nagaland.
2. The Company has already acquired 1500 acres of land, on long lease basis for 99 years. There is an existing 500 acres of bamboo plantation at the site and the Company will be further planting 950 acres during the course of implementation of the Project.
3. The overall cost of the project has been estimated at Rs. 68.53 crores, which is expected to be funded in a debt-equity ratio of 1.86:1. Meaning Promoter's Funds of Rs. 23.98 Crores in form of equity/ quasi equity/ unsecured loan and balance Rs. 44.54 Crores as term debt from Lending Institutions/ Banks.
4. The average EBDITA margin for the proposed project is 40.14%, while the net profit margin is 20.84%.
5. The minimum DSCR for the project is 1.35, while the average DSCR is 1.75. The interest coverage ratio for the project is comfortable all throughout. Both parameters indicating fair repayment capability of the Project
6. The NPV of the Project has been estimated at Rs. 30.75 Crores, while the IRR of the project is 18.71%, which is higher than the post-tax cost of capital at 10.65%. Hence the project is financially viable.
7. The project remains viable (i.e. NPV is positive, IRR being higher than WACC, average DSCR being above 1.33) under all adverse scenarios

Project Background

Hutah Industries Private Limited

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The objective of the Company is –

1. To carry on the business of manufacturing, distribution and , generation of power through biomass energy, geothermal energy, solar energy, wind energy, etc, and also to carry on the business of producers, refiners, processors, manufacturers, buyers, sellers, distributors, importers, exporters, traders, agents of bio fuels such as 2G ethanol and its by-products.
2. To carry on the business of developing bamboo plantation and to engage in new practices of growing, cultivating and harvesting of bamboo and related products

The Management of the Company is now considering setting up 10 MW biomass based power plant in Nagaland. The proposed project will utilise bamboo as the fuel for producing power. It is noted that the state of Nagaland is rich in growth on bamboo and the local Government is willing to provide 1500 acres of bamboo plantation to the Company to utilise the same. The bamboo will be cut, converted into chips/ briquettes, which will be fed in the boiler system. The bamboo plants will not be uprooted, instead will be cut from stem level, allowing the plant to regrow in next couple of years, to be available for re-harvesting. This was the forest cover will remain and the bamboo will be utilised in optimum manner for generation of power.

The overall project cost for setting up the said Project has been ascertained at Rs. 68.53 Crores, which is proposed to be funded in a debt-equity ratio of 1.86: 1, meaning Promoters Contribution in form of equity/ quasi equity/ unsecured loan to the tune of Rs. 23.98 Crores and long term debt component of Rs. 44.54 Crores. The snapshot of other parameters of the Project are –

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5. The average Debt Service Coverage Ratio (DSCR) of the Project has been ascertained at 1.75, indicating fair repayment capacity of the Project.

Promoters and Shareholders

Shareholding pattern of the Company is shown in the exhibit below –

Shareholder's Name	No. of Shares	% of Shareholding
Mr. Aditya Pandit	6,000	60%
Mrs. Indrani Pandit	3,300	33%
Mr. Vinatoli Yeptho	700	7%
Total	**10,000**	**100%**

Source: HIPL

The Management of HIPL has approached and is in discussions with Variate Consultants Private Limited for providing EPC Services for setting up the said 10 MW biomass based power Project at Nagaland.

Variate Consultants Private Limited

Variate Consultants Private Limited ('VCPL' or Consultants) is an engineering, procurement and construction contracting company, which is primarily focussed on renewable energy project. The Company since its inception during the year 2014 has been involved in undertaking PV cell based solar power project, wind power project, biomass based projects, along with waste to energy projects, across India. The Company is promoted by Technocrats, with combined experience of over 120 years of project implementation and management experience between them.

Recently, VCPL has implemented its own cow dung to fertilizer and power project, under Public Private Partnership model, along with the Government of Rajasthan in Shri Ganganagar district. The Project is currently undergoing commissioning and will commence commercial operations from December 2020.

The team at VCPL has prior experience in handling biomass based projects with various feedstocks which include mustard stalk, sweet shorgum stalk, rice husk, molasses and bamboo to name a few.

Scope of Services

Based on the discussions with the Management of the HIPL, the team from VCPL has prepared this detailed project report for HIPL for purpose of raising the debt and to acquire various statutory approvals and clearances as required to set up the proposed project. The Scope of Services for the preparation of the DPR as envisaged by the Consultants include –

Market Assessment

1. Demand and market
    a. Structure and characteristics of the power/ electricity sector in India
    b. Approximate present size of demand power/ electricity in India
    c. Supply of the power/ electricity in the domestic markets
    d. Its past growth, estimated future growth
    e. Commenting on the current, as well as the future demand-supply gap scenario

1. Review and comment on the projection configuration as proposed by the Company.
2. Review and comment on the processing method proposed to be followed and suggest variations/ changes (if any).
3. Review and comment on the land purchase/ sales deed and understand the availability of the land for implementation of the Project. Based on the review undertaken, comment on the adequacy of land for implementation of the Project and possible future expansions (if any).
4. Review the prevailing Environment Policies of the Local Government and comment on the same.
5. Review and comment on the block project cost as estimated by the Company/ technology providers. The project cost will be review and commented on upon based on the following sub-heads –
    a. Hardware Cost
        - Land and Land Development Cost
        - Building and Civil Works
        - Plant and Machinery Cost (including the civil works for plant and machinery foundation)
        - Miscellaneous Fixed Assets
    b. Soft Costs
        - Preliminary and Pre-operative Expenses
        - Interest During Construction Period
        - Contingency
    c. Margin Money for Working Capital
6. Review/ Assess and/ or comment on -
    a. Water requirement
    b. Secondary fuel requirement (if any)
    c. Utilities requirement etc.

7. Review the manpower requirement and manpower recruitment policy as proposed by the Company. Understand the organogram as proposed by the Company for operations of the Project post implementation and commenting on the suitability/ adequacy of the same.

8. Review and comment on the implementation schedule as proposed by the Company. In case need be, suggest modification in the implementation schedule.

Financial Assessment

Undertake an independent financial evaluation/ assessment which would comprise of –

1. Project Financing
    a. Proposed capital structure and proposed financing
    b. Cost/ Means of finance
2. Production cost (significantly large cost items to be classified by materials, personnel and overhead costs, as well as by fixed and variable costs)
3. Financial evaluation based on the above-mentioned estimated values
4. Commenting on the Viability of the Project, based on -
    a. Net Present Value
    b. Internal Rate of Return
    c. DSCR

Risk and SWOT Analysis

1. Based on market, technical and financial assessment, undertake a detailed risk assessment exercise
2. Suggest possible mitigation measures of the risk
3. Undertake SWOT Analysis of the Project

Approach and Methodology

VCPL adopted a consultative approach during the course of the assignment. The team from VCPL worked closely along with the team from Client for successful and early completion of the assignment. All the information required for successful completion of the assignment collated by team VCPL from the following sources –

- In house information available with the Consultants
- Information available with the Client Organization

- Published information available with various Government Departments
- Sector/ Industry/ Country reports published by reputed consultancy organizations
- Journals/ Publication of trade association
- Discussions with industry/ sector experts

Based on the secondary market assessment, the Consultants estimated the facilities planning including service offerings. The Consultants have provided estimates of capital investments required and operating costs based on revenue and cost streams

Disclaimers

- VCPL has relied on the data provided by the Company and their Contractors with regards to the price of plant and machinery, building and construction work. The team at VCPL has tried it level best to confirm the quotations with the market and where ever not available the team has utilised it best estimates to arrive at the Project Cost.
- VCPL has prepared and presented financial projections in this Report, based on the information provided by Client and their Contractors. Financial projections present, to the best of the Management's knowledge and belief, the company's expected financial positions, results of operations and cash flow statement. Financial projections require the exercise of judgment and are subject to uncertainties concerning the effects that the change/s in legislation or economic or the other circumstances may have on the future events and different people may have a different perception in future. Therefore, no assurance can be provided that the assumptions or data upon which these projections have been based are accurate or whether these business plan projections will actually materialise.
- This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from VCPL and from the party which commissioned it. Variate Consultants Private Limited accepts no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.
- The team from VCPL has collated the secondary information as published by Government Agencies and Reputed Consultancy organizations and have relied on the information published. The team from VCPL has not independently verified any such information.

Market Assessment

Introduction

Power sector in India is broadly segmented into three segment electricity generation, transmission & distribution. In India, electricity generation take place from variety of sources including both non-renewable and renewable sources. Non-renewable sources are primary energy sources comprising of fossile fuel i.e (coal /petroleum /oil) that get consumed in the process of energy generation and cannot be replenished back.

Government Policies and Regulatory Scenario

Government Regulatory Authority

The Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commission (SERC) are the two main regulatory bodies governing power sector. Below are the key policy guidelines for power sector.

Government Regulations

Electricity Act 2003:

This was established as a framework for accelerated and more efficient development of the power sector. It is applicable to all the sub segments-Generation, Transmission and Distribution. It is the apex rule to govern power sector activity in India. Prime focus areas are:

- De-licensed generation and transmission.
- Recognizing trading as an independent activity.
- Multiple licenses in distribution.
- Encouraging captive generation.

The National Electricity Policy:

The National Electricity Policy has been framed under the section 3 of Electricity Act 2003. This policy aims at laying guidelines for accelerated development of the power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view the availability of energy resources, technology available to exploit these resources, economics of generation using different resources, and energy security issues.

Government Initiatives

The Government's vision for "Team India" includes

- Power facility would be provided 24*7 for the people of the country.
- Electrification of the remaining 20,000 villages including off-grid Solar Power- by 2020. Several reforms and initiative has been announced in the power sector in past these include:

Acknowledging the power requirement as key driver to support the social, economic, and industrial development, government has been investing significantly to increase the installed generation capacity and strengthen the T&D network too to cut down the energy losses. The government has set a target

of adding 100 GW of additional power generating capacity during the 12th Five-Year plan (2012-17) period towards which industry is set to witnessed rising investment to support the planned capacity addition.

To achieve this target of additional power generating capacity, the government is encouraging setting up of coal-based ultra-mega power projects (UMPPs) initiative launched in FY 2006. The government has envisaged 16 such UMPPs (each with 4000 MW capacity or above and costing about INR 25,000 Cr each) for which project will be awarded through tariff based competitive bidding route on build, own and operate (BOO) basis.

To facilitate good response from investors Special purpose Vehicle (SPV) has been incorporated against each UMPP by power finance corporation. The UMPP development will happen using super critical technology. The finance ministry has abolished central excise duty for capital goods procured for setting up of UMPPs.

Till Date, 9 UMPP projects have been announced of which four was announced initially and 5 new UMPP project was announced in Union Budget 2015-16. In first phase, 3 UMPP projects are being developed by Reliance Power Ltd. and one by Tata Power Ltd. One each announced at Mundra, Gujarat; Sasan, Madhya Pradesh; Krishnapatnam, Andhra Pradesh and Titaiya, Jharkhand. The projects are at different state of development. The Mundra UMPP is fully commissioned and is generating electricity. Four units of Sasan UMPP (4×660 MW) have been commissioned and one unit (660 MW) has been synchronized so far. The remaining units of Sasan and other awarded UMPPs are expected in 12th Plan (except last unit of Tilaiya UMPP, which is likely to come in 13th Plan.)

5 new UMPP (Ultra Mega Power Projects) of 4000 MW each, envisaging total investment worth INR 1.5 trillion was announced to be set up in Plug-and-Plays mode. However, bid for two such proposed UMPP project in Tamil Nadu and Odisha observed a tepid response from the private sector. Adani Power, CLP India, Jindal Steel & Power, JSW Energy, Sterlite Energy and Tata Power participated in the first round of bidding for the Tamil Nadu project. Of these, only four of them proposed their Request For Proposal (RFP) document but decided not to go ahead further in the process. The Odisha UMPP saw nine interested bidders, including Adani Power, CLP India, GMR Energy, Jindal Steel and Power, JSW Energy and Sterlite Energy.

In the wake of lukewarm response, the government in March 2015 appointed the panel to coming up with revised bidding norm which has been submitted to the cabinet and now pending for its approval. Following which, tenders can be floated for five domestic coal-based UMPPs at Banka in Bihar, Tilaiya in Jharkhand, Bedabahal in Odisha, Deoghar in Jharkhand and Surguja in Chhattisgarh.

Major Schemes Favouring the Power Transmission & distribution Sector:

Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY).

In November 2014**,** DDUGGJY got approval from the cabinet which was announced in interim budget 2014-15 in July 2014. The scheme envisaged a total investment worth INR 430.33 Bn to be made for following two areas i.e.

i) To separate agriculture and non agriculture feeders facilitating judicious rostering of supply to agricultural and non-agricultural consumers in rural areas and

ii) strengthening and augmentation of sub transmission and distribution infrastructure in rural areas, including metering of distribution transformers/feeders/consumers.

With the launch of Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY), the ongoing government scheme Rajiv Gandhi Grameen Vidyutikaran Yojana will get subsumed in DDUGJY.

Integrated Power Development Scheme (IPDS):

The cabinet also approved IPDS in November 2014 where target laid down under Restructured Accelerated Power Development and Reforms Programme (RAPDRP) for 12th and 13th Plans by carrying forward the approved outlay for RAPDRP to IPDS. The estimated investment envisaged for IPDS is The key of objective of IPDS are as below:

i) Strengthening of sub-transmission and distribution network in the urban areas;

ii) Metering of distribution transformers /feeders / consumers in the urban areas.

iii) IT enablement of distribution sector and strengthening of distribution network.

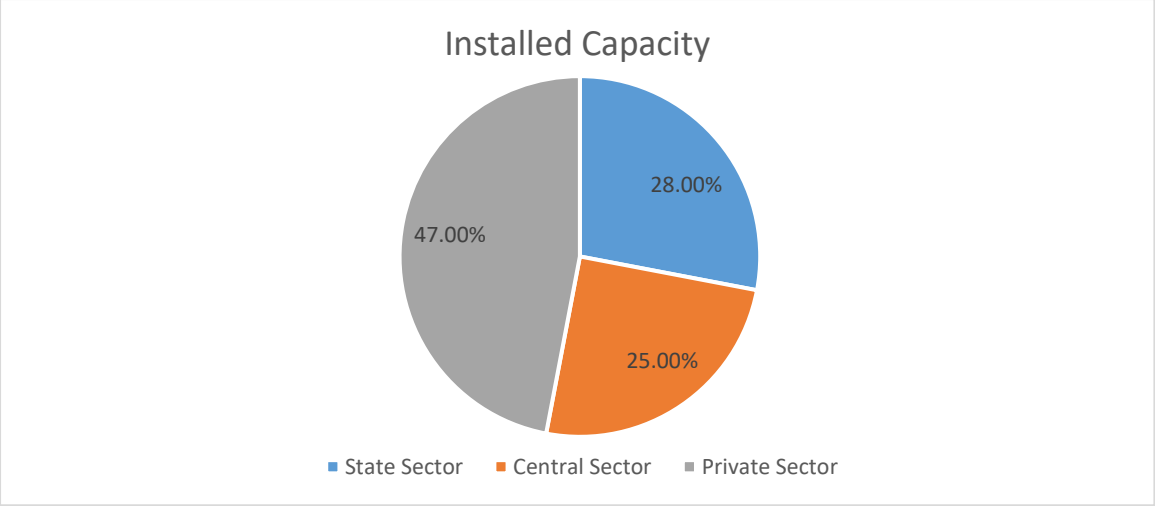
The government has also announced North Eastern Region Power System Improvement project for six states (Assam, Manipur, Meghalaya, Mizoram, Tripura and Nagaland). This is expected to improve the intra-state T & D system. All these schemes together are expected to envisage a cost of Rs.807.4 bn

National Power Training Centre (NPTI), a government body, has announced to train more than 7 lacs people by 2018 to meet the its ambitious target of expanding renewable energy to 175,000 Mw by 2022. Where, one lac people will be trained in current fiscal, 2 lac in FY 2017 and 4 Lacs in FY 2018.

Structure of Power Sector in India

Since Independence of India in the year 1947 till early 1990's, the power sector in India was a state subject i.e. the sector was regulated by the Government at the Central and State Level and all the power generating units in India were operated by entities owned by either the Central or the State Government, with an exception of Tata Group owned power generation units who had been involved in power generation since pre-independence era.

However, with liberalisation of the Indian economy during the early 1990's, the Government liberalised the power sector in India, inviting and allowing the private sector players to implement and operate the power project. Over the last two decades, the private sector players have setup power generation units both independent and captive across length and breadth of the country. Still, after two decades the power generation sector is dominated by Government Sector Enterprises. The exhibit below illustrates the share of Government Sector Enterprises (both Central and State) and Private Sector Enterprises in power generation in India (as on September 2020).



Source: Ministry of Power (Government of India)

Even after liberalisation of the sector in term of power generation, the Government owned entities were responsible for transmission and distribution of power in India till the late 1990's. During the early 21st Century, the Government of India also liberalised the transmission and distribution of power.

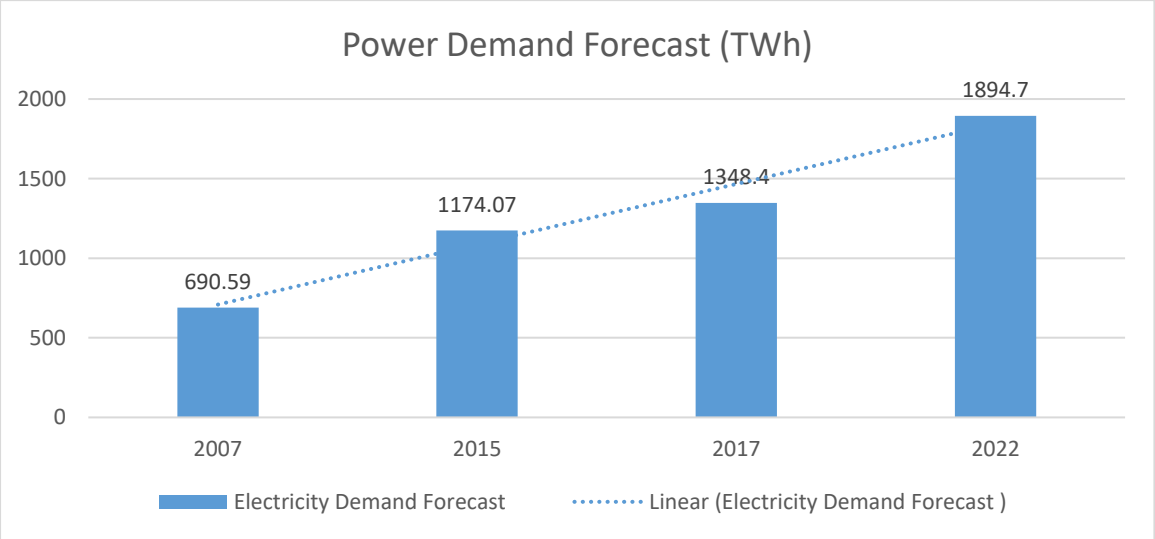
However as in case of power generation, the power transmission and distribution sector in India is still dominated by Government own Enterprise, which command around 53% market share.

Current Market Scenario

Demand

Indian power sector is undergoing a significant change that has redefined the industry outlook. Sustained economic growth continues to drive electricity demand in India. The Government of India's focus on attaining 'Power for all' has accelerated capacity addition in the country. At the same time, the competitive intensity is increasing at both the market and supply sides (fuel, logistics, finances, and manpower).

Total installed capacity of power stations in India stood at 373.02 Gigawatt (GW) as of September 2020. The figure below illustrates the growth in peak demand of power in India during the period 2007-2022.

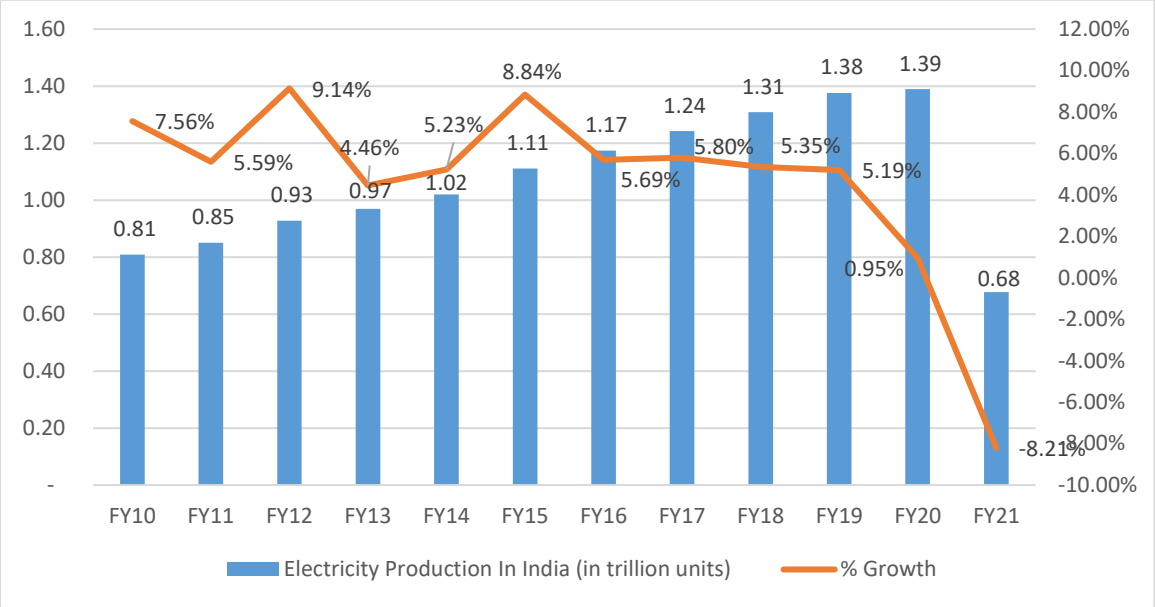


Source: VCPL Estimates

Supply

The domestic supply of power stood at 0.81 Trillion Units during the financial year 2010. Since then the supply of power in India has grown at a CAGR of 5.56% to reach an estimated 1.39 Trillion Units during the financial year 2019-20.

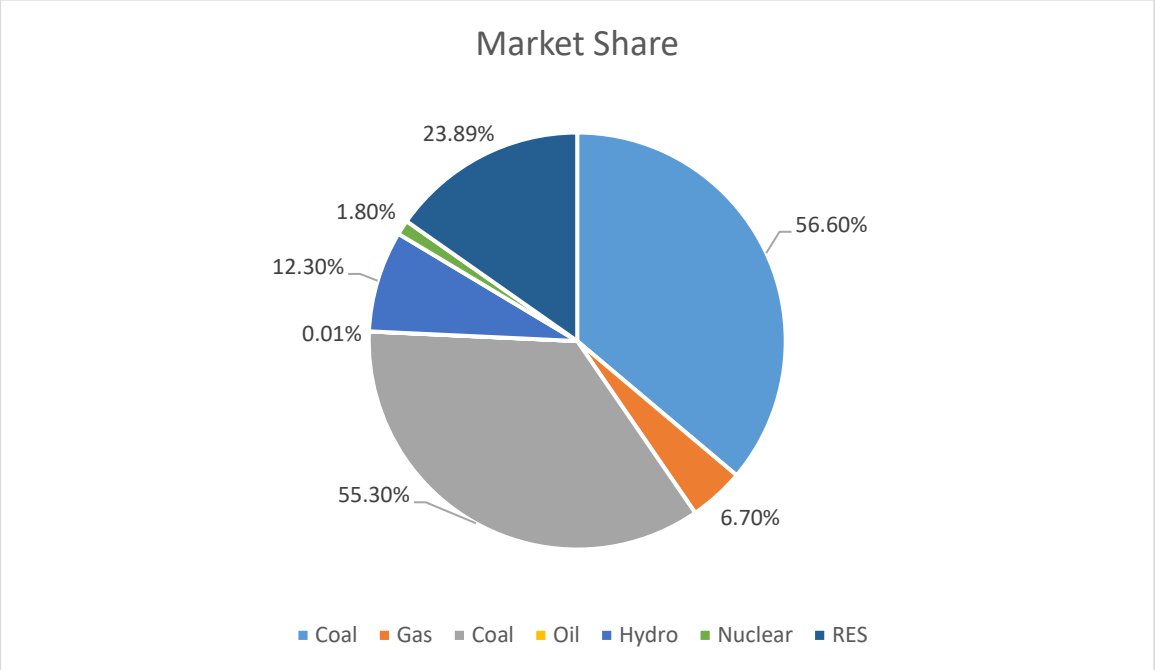
The figure below illustrates the growth of supply of power in India during the period 2010-2020.



Source: Ministry of Power (Government of India)

* - The data for FY 21 is for the period April to September 2020

The exhibit below illustrates the market share of various sources of fuel in providing power in India (as on 30th September 2020).



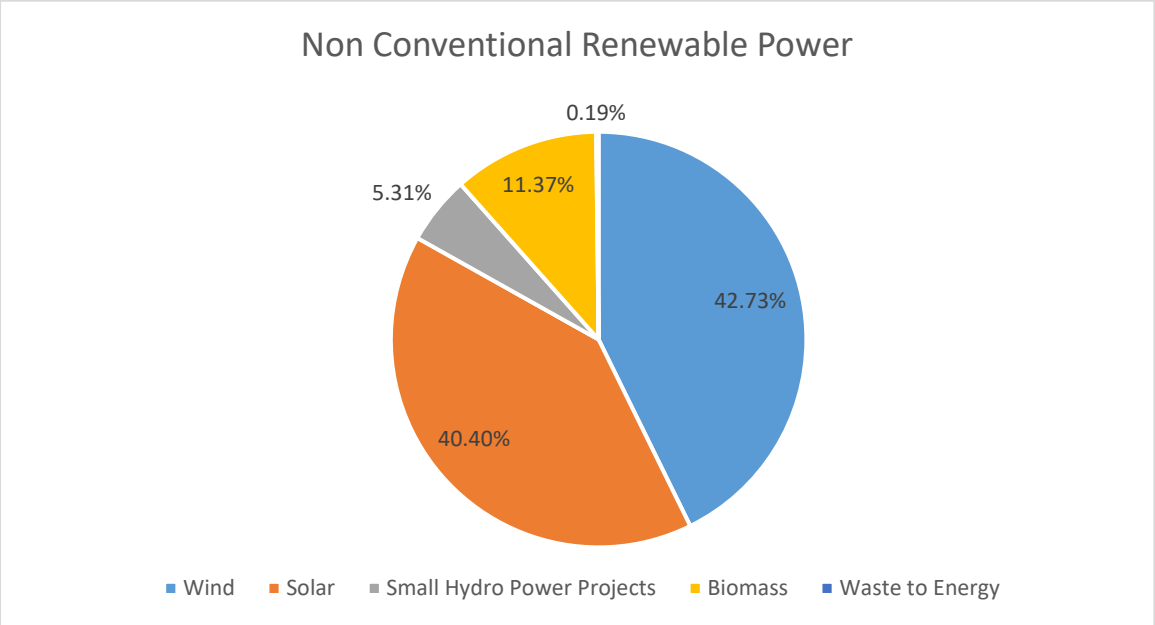
Source: Ministry of Power (Government of India)

It is noted from exhibit above, that non-renewable sources (including nuclear sources) of energy account for about 63.8% of power generated in India, while the renewable sources of energy (including hydro power) account for 36.2% of power generated in India.

Excluding the large hydro power projects which fall under the purview of Ministry of Power, the head "Other Renewable Sources" of energy includes -

- Small Hydro-Power
- Wind Power
- Biomass
- Solar

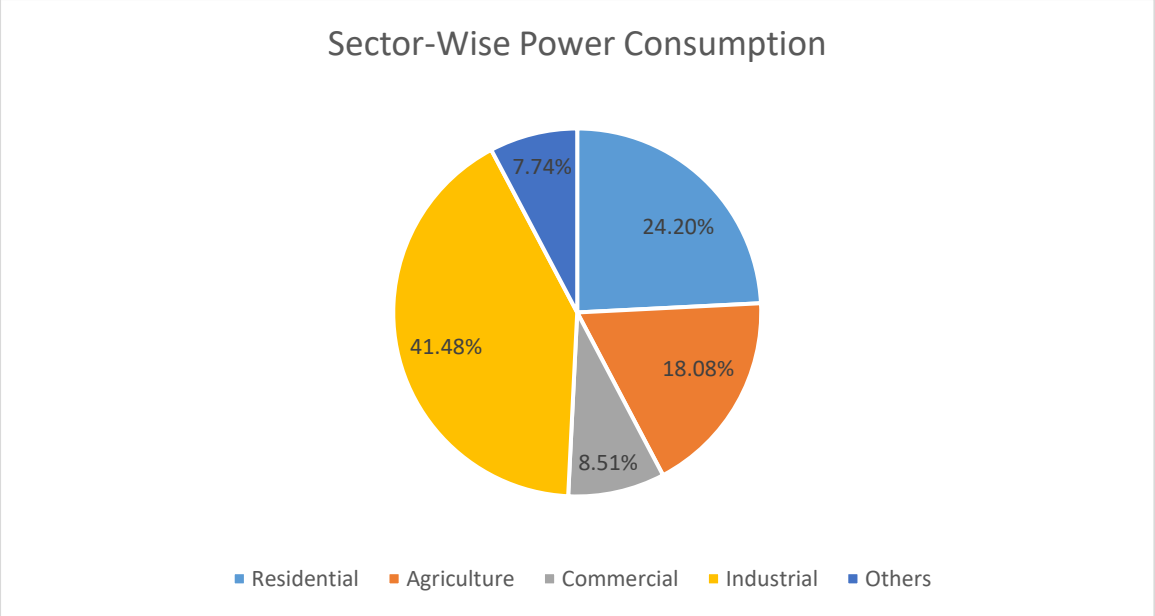
Currently these sources of energy combined generate around 23.89% of the overall power generated in India. The exhibit below provides the current share of each of these sources of power amongst "Other Renewable Sources" in terms of power generation in India (as on 30th September 2020).



Source: Ministry of Power and Ministry of New & Renewable Energy, Government of India

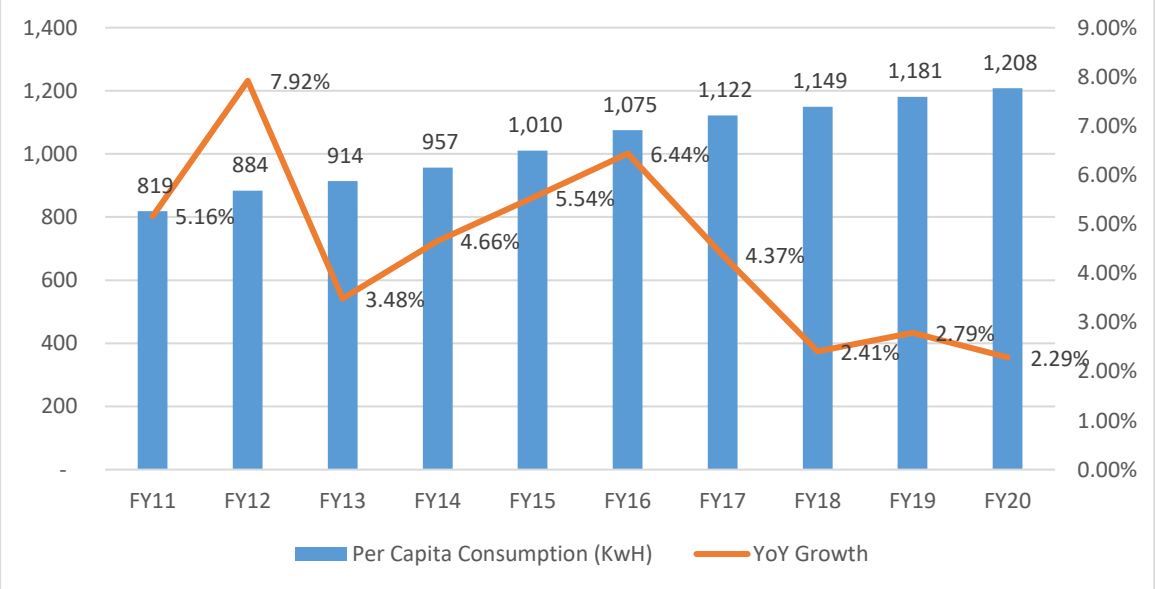
It is noted from figure above, that wind power has the largest share amongst the other renewable sources of power in India with a market share of around 42.73%, followed by solar, biomass and small hydro with share of 40.40%, 11.37% and 5.31% respectively. Waste to Energy is in nascent stages of development in India and accounted for only 0.19% of the power generated by other renewable energy sources.

In terms of sector-wise consumption of power in India, agricultural sector and industry are the dominant sector with a share of 18.8% and 41.48% respectively. The sector-wise consumption pattern of power in India is illustrated in the figure below.



Source: Ministry of Power and Ministry of New & Renewable Energy, Government of India

The per capita power consumption in India during the last decade has been presented in the exhibit below –



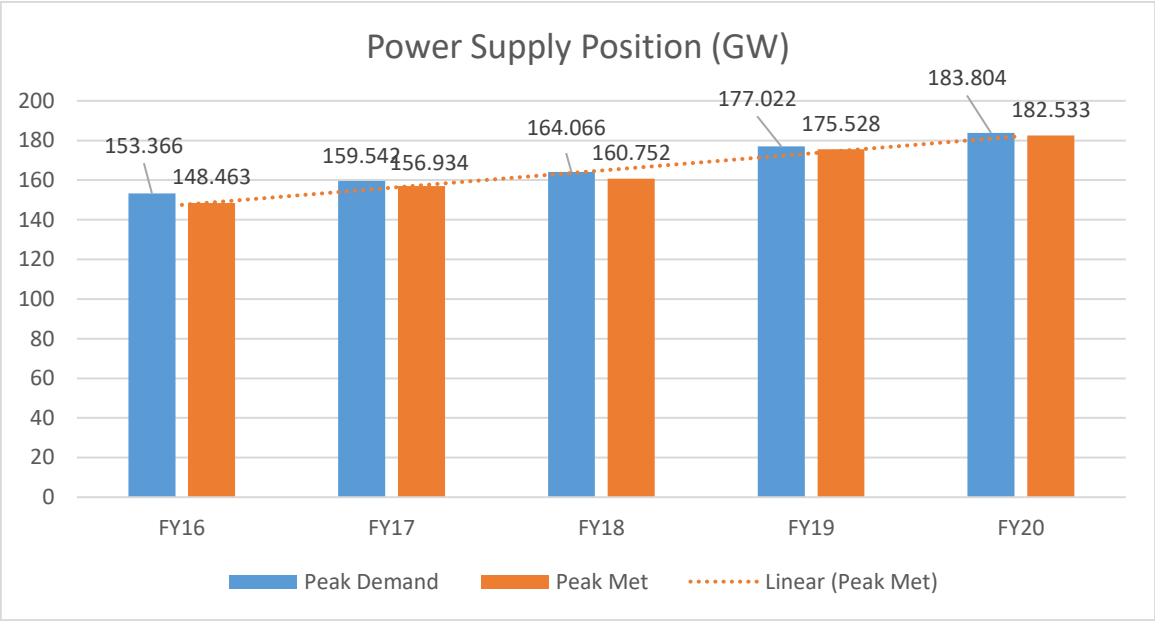
Source: Ministry of Power (Government of India)

Demand Supply Gap Scenario

Based on the discussion in the sections above, it is understood that there has been a demand supply gap in the power sector in India during the entire period of 2014-18.

- The demand supply gap of power in India stood at 4,903 MW during the financial year 2013-14
- Since then the demand supply gap has shrunk at a CAGR of about 28.65% to reach 1,271 MW during the year 2019-20

The exhibit below illustrates the growth in demand supply gap of power in India during the period 2016-20.



Source: Ministry of Power (Government of India)

Projected Demand Supply Scenario

India has the fifth largest power generation capacity in the world. The country ranks third globally in terms of electricity production. In May 2020, India ranked 4th in the Asia Pacific region out of 25 nations on an index that measures their overall power. Electricity production in India reached 1.39 Trillion Units (BU) during FY20.

Renewable energy is fast emerging as a major source of power in India. The Government of India has set a target to achieve 175 GW installed capacity of renewable energy by FY22. Wind energy is the largest source of renewable energy in India, accounting for 42.73 per cent (38.124 GW)* of total installed renewable capacity (89.299 GW)*. There are plans to increase wind power generation capacity to 60 GW by 2022. India has also raised the solar power generation capacity addition target by three times to 100 GW by 2022. The Union Government of India is preparing a 'rent a roof' policy for supporting its target of generating 40 gigawatts (GW) of power through solar rooftop projects by 2022. All the states and union territories of India are on board to fulfil the Government of India's vision of ensuring 24x7 affordable and quality power for all by March 2022. As of August 2020, all villages as per census 2011 have been electrified, under the Pradhan Mantri Sahaj Bijli Har Ghar Yojana-“Saubhagya” scheme. The Government of India has been supportive to growth in the power sector. As of September 2018, the Government of India launched a voluntary based programme to promote energy efficient chiller systems in India. It labels the energy performance by providing star ratings and will be effective up to December 31, 2020.

The Cabinet Committee on Economic Affairs (CCEA) has approved commercial coal mining for private sector and the methodology of allocating coal mines via auction and allotment, thereby prioritising transparency, ease of doing business and ensuring the use of natural resources for national development.

The Government of India is planning to invite bids for the largest solar tender in the world, for installing 20 gigawatts (GW) of solar power capacity, to give a boost to manufacturing of solar power equipment in India.

Power Scenario in Nagaland

Nagaland is one of the seven states in the north-east. The state is flanked by Myanmar in the east, Arunachal Pradesh in the north, Assam in the west and Manipur in the south. Nagaland's agro-climatic conditions favour agriculture, horticulture and forestry, offering immense potential in these areas. State has a high literacy rate of 80.11 per cent. A majority of the population in the state speaks English, which is the official language of the state. The state strongly focuses on technical and medical education.

Between 2011-12 and 2018-19, Gross State Domestic Product (GSDP) expanded at a Compound Annual Growth Rate (CAGR) of 12.05% to Rs 0.27 trillion (US$ 3.81 billion) whereas the Net State Domestic Product (NSDP) expanded at a CAGR of 15.72% to Rs 0.19 crore (US$ 2.82 billion) between 2011-12 and 2015-16. Agriculture accounts for a significant share in Nagaland's economy. It contributed 27.47% to the state's total GSDP during 2018-19. Around 60% of the population is engaged in the agriculture sector.

As of September 2020, Nagaland had total installed power generation capacity of 99 MW, of which is primarily based on 2 hydropower projects installed in the state and these are –

1. Likimro Hydro power plant which has capacity to generate 24MW. The projects is a state owned project and becomes non-operational in summers as the water sources becomes dry
2. Doyang Hydro power plant which has capacity of 75MW. But this plant was built by NEEPCO so as per agreement between NEEPCO & Nagaland Government, Nagaland gets only 12% i.e. 9MW.

The state has considerable resources of natural minerals, petroleum and hydropower. Nagaland has around 600 million metric tonnes (MT) of crude oil and more than 20 million tonnes (MT) of hydrocarbon reserves, which are unexploited. Moreover, the state has 315 MT of coal reserves and 1,038 MT of limestone reserves.

Nagaland Industrial Development Corporation (NIDC) is responsible for the development of industrial infrastructure in the state.

Promoted by NIDC, the Export Promotion Industrial Park (EPIP) at Dimapur has received formal approval as a special economic zone (SEZ) for agro and food processing. A proposed multi-product SEZ spread across 400 hectares in Dimapur has received formal approval.

According to the Department for Promotion of Industry and Internal Trade (DPIIT), cumulative FDI inflows into the state, during April 2000 to December 2018, reached US$ 113 million.

The following are some of the major initiatives taken by the government to promote Nagaland as an investment destination:

- The Government of India had approved allocation of about Rs 3,000 crores (US$ 463.39 million) up to March 2020 in North East Industrial Development Scheme (NEIDS) 2017. Before March 2020, the government will provide necessary allocations for its remaining period after assessment.

- The state provides institutional support through various central and state government agencies viz., North East Council, Ministry of Development of North Eastern Region and Nagaland Industrial Development Council.
- Ministry of Tourism, Government of India, has included 24 villages in Nagaland under the rural tourism scheme in order to promote traditional rural art, craft, textile and culture.
- In 2018-19, International Fund for Agriculture Development (IFAD), financial wing of Food and Agriculture Organisation (FAO) plans to provide Rs 612.42 crore (US$ 95.02 million) to improve agricultural sector in eight districts of Nagaland which would cover about 650 villages in the first phase.
- In May 2018, Indian Railways plans to construct several rail projects costing almost Rs 90,000 crore (US$ 13.96 billion) to improve connectivity in the North East by 2020. These projects will help to connect Nagaland with rest of neighbouring states.
- An Industrial Growth Centre (IGC) has been developed in Ganeshnagar near Dimapur. It has supporting infrastructure such as water supply systems, banks, post offices, police stations, etc.

Conclusions

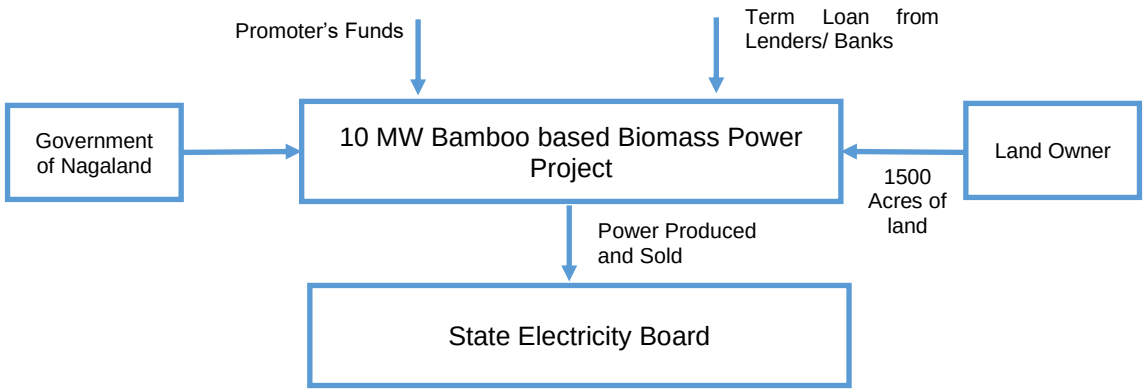
The Consultants conclude the following from the discussions in the chapter –

- Total installed capacity of power stations in India stood at 373.02 Gigawatt (GW) as of September 2020.
- The domestic supply of power stood at 0.81 Trillion Units during the financial year 2010. Since then the supply of power in India has grown at a CAGR of 5.56% to reach an estimated 1.39 Trillion Units during the financial year 2019-20.
- Non-renewable sources (including nuclear sources) of energy account for about 63.8% of power generated in India, while the renewable sources of energy (including hydro power) account for 36.2% of power generated in India.
- Wind power has the largest share amongst the other renewable sources of power in India with a market share of around 42.73%, followed by solar, biomass and small hydro with share of 40.40%, 11.37% and 5.31% respectively. Waste to Energy is in nascent stages of development in India and accounted for only 0.19% of the power generated by other renewable energy sources.
- The demand supply gap of power in India stood at 4,903 MW during the financial year 2013-14. Since then the demand supply gap has shrunk at a CAGR of about 28.65% to reach 1,271 MW during the year 2019-20

Project Details

Project Configuration

As discussed above, the Company proposes to set up a 10 MW bamboo based power Project in the state of Nagaland. The project configuration as understood has been illustrated below –



Source: VCPL Assessment

Land Details

The Company has taken land on lease for 99 year of area 1500 acres with 500 acres of existing bamboo plantation. The proposed plant is to be located at A.K. Industrial Village Ganesh Nagar, Block-Dhansaripar, Dimapur, Nagaland 797112.

The land is surrounded by-

- On East by Toshezu Village.
- On West by Khekiho Village.
- On North by Khekiho Village.
- On South by AK Industrial village Road

Location Analysis

The distance of the key demand driver from the plot have been provided in the exhibit below –

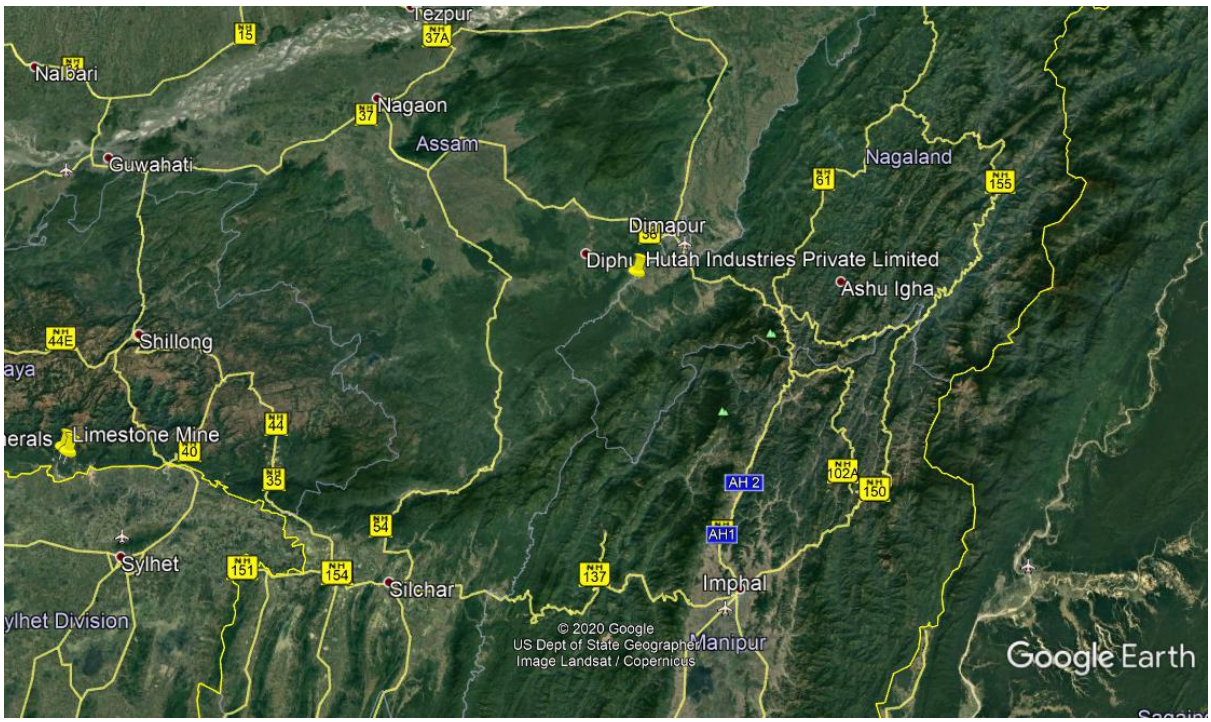
Description	Distance (in Km)
Nearest Road	Industrial Road (0 Km)
Nearest State Highway	SH 36 (25 Km)
Nearest City	Dimapur (30 Km)
Nearest Railway Station	Dimapur Railway Station
Nearest Airport	Dimapur Airport (30.1 Km)

Source: Google Earth

The location of the site has been provided as exhibit below –

Source: Google Earth

The location of site with respect to proposed unit has been provided in the exhibit below –



Source: Google Earth

Agreement Details

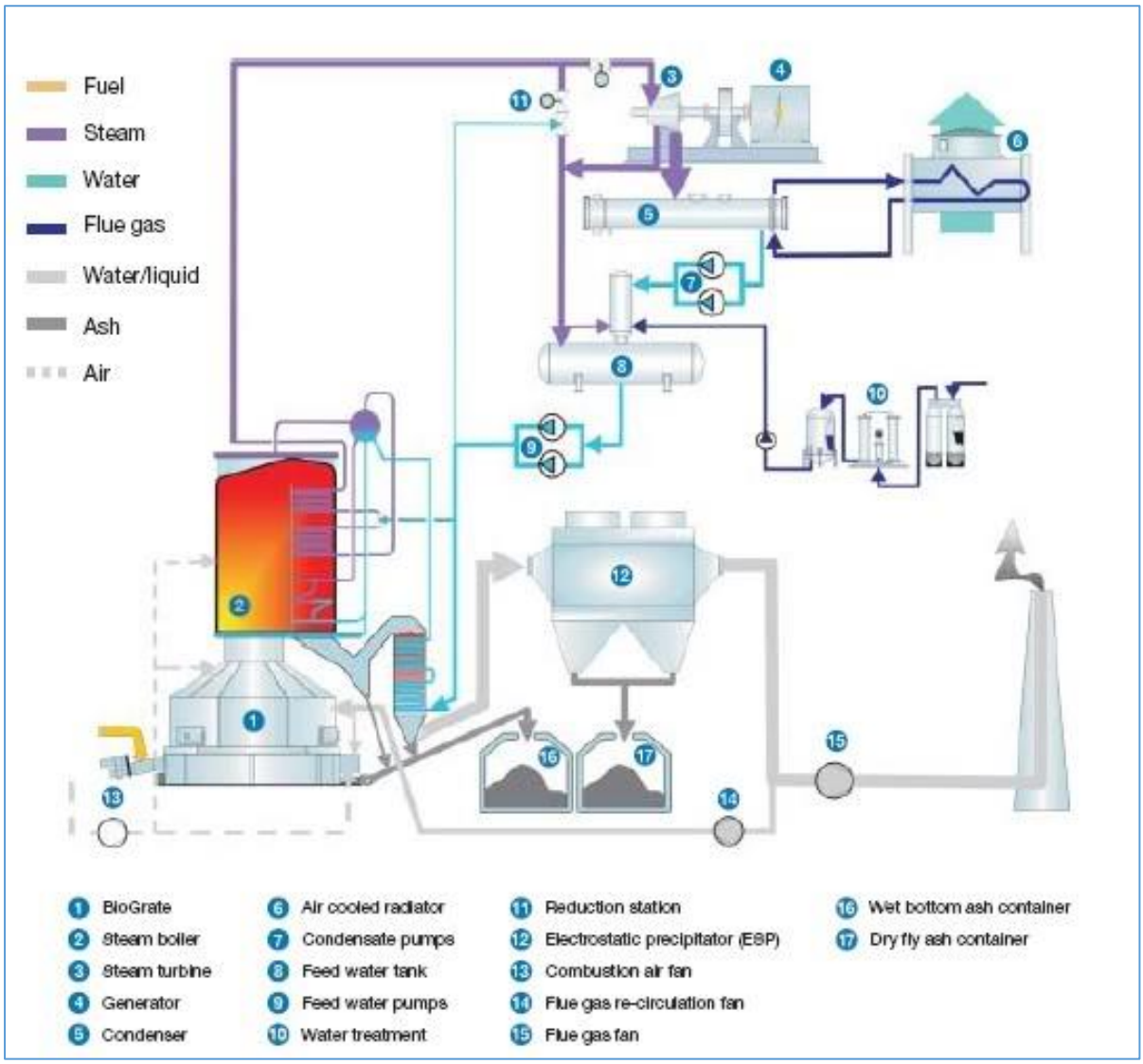
Summary of agreement is provided in the exhibit below –

Description	Agreement
Lessor	Mr. Atomi Zhimomi
Lessee	Mr. Aditya Pandit
Location	A.K. Industrial Village, near Ganesh Nagar, Block Dhansiripar, Dimpaur, Nagaland
Area	1500 Acres
Period	99 Years Commencing from 30th October 2020
Yearly Rental	Rs. 1,00,00,000
Plot Allotted For	Setting up of Biomass Power Plant and 2G Ethanol Plant

Source: HIPL

Manufacturing Process

The flow diagram for a Rankine Cycle based biomass power plant has been provided in the exhibit below –



Source: Wartsila

It is understood that the power can be generated from biomass from the following methods –

1. **Direct combustion of the biomass** – In this method of power generation from biomass, the collected biomass is directly combusted to release energy for generation of power though turbine.

2. **Thermo chemical conversion** - Thermo chemical conversion can be further divided into two forms gasification and liquefaction. Gasification takes place by heating the biomass with limited oxygen to produce low heating it with steam and oxygen at high pressure and temperature to produce medium heating value gas. The latter may be used as fuel directly or used in liquefaction by converting it to methanol (Methyl alcohol) or ethanol (Ethyl alcohol) or it may be converted in to heating value gas.

3. **Bio-chemical conversion** - Biochemical conversion can also be divided in to two forms viz. anaerobic digestion and Fermentation. Anaerobic digestion involves the microbial digestion of biomass. Biogas (high on methane) is generated in this process along with by-products like organic pest repellent and organic fertilizer. The biogas so produced in used in gas engine to generate power.

It is noted that HIPL will be utilizing the first method of conversion of biomass energy to power, as the other methods are quite capital intensive. In the subsequent section of this chapter, the team VCPL has discussed the direct combustion of biomass process.

Procurement of Raw Material

The procurement of raw material (biomass) is the most critical component for successful operations and long term viability of biomass based power plants. The proposed plant will be utilizing bamboo as the basic raw material. The Company has already entered into a long term lease of 99 years for 1500 acres of land at Nagaland. The said land already has over 500 acres of bamboo plantation and additional about 950 acres will be planted, during the construction of the Project. So effectively, by the time the project becomes operational, the project will have captive bamboo farmland of around 1450 acres, which will be sufficient for constant supply of bamboo for the Project.

Additionally, the plant is designed to utilize other biomass available in plenty in the region during all seasons.

Receipt of Raw Material

The biomass feedstock will be collected from across the catchment area and brought by trucks/ tractor trolley to the location of the plant. Weight Bridge is used to weight the biomass brought in the plant premises and the raw material is subsequently sorted and stored in the raw material storage area.

Feeding the Biomass

The biomass is fed into the system through the grate stroker. HIPL is proposing to install a travelling grate stroker at site. In traveling grate stoker, grate surface is made up of a series of cast-iron bars joined together by links to form an endless belt running over two sets of sprocket wheels with a surface as wide as needed. A fuel gate at one end of the traveling grate dumps the fuel on to the grate surface. The fuel will be conveyed to the fuel bed by moving the grate surface. All the fuel dumped on to the surface will be burnt in the furnace and nothing remains except ash at the other end of the grate.

Boiler and Auxiliaries

To generate 10 MW of electrical power at the generator terminals, approximately 50 TPH of steam of 66 ksca and 480 ± 5 ºC is required at the Turbine inlet. While calculating the main steam requirement, bleed steam of about 4.8TPH at 4 ata @150ºC for feed heating in deaerator no process steam is considered.

The exhaust steam parameters considered are 0.16 ata @ 46ºC which will be condensed and pumped to the deaerator. In deaerator, the condensate will be heated to 125º C by the auxiliary steam taken from the turbine extraction. The operating pressure of the deaerator will be 2.5 kg/cm^2. The outlet of deaerator feed water will be fed to the boiler through economizer by boiler fed pumps.

The approximate quantity of fuel required to generate high pressure and high temperature steam at 66 kgcm^2 (g) @ 490ºC will be around 13.0 TPH. The superheated steam from the boiler will be fed to the turbine. Depending on length of piping system between the turbine and boiler, the steam parameters at the turbine inlet are slightly less that the boiler steam parameters which are considered as 64 kg/cm^2 (g) / 485ºC.

Constructional Features

The boiler envisaged is to generate and supply the superheated steam at required parameters to the Steam Turbine i.e. 66 ksca and 480 ± 5 ºC/ 50 TPH. The boiler considered for the 10 MW Biomass power plant is of bi-drum, vertical, natural circulation, balanced draft unit, travelling grate type suitable for outdoor installation. The boiler will be designed and constructed according to the latest version of “Indian Boiler Regulations”. The material and the design of pressure parts will be approved by “Chief Inspector of Boilers” and will be inspected and certified by inspecting authorities approved by I.B.R. during fabrication and construction.

Furnace Wall Construction (Membrane Type)

Membrane construction will ensure gas tightness and minimum radiation losses. Membrane walls of the boiler will be cooled with boiler water. Furnace walls are generally lined with refractory materials to prevent heat losses etc. but with the advent of new boiler technologies, use of refractory materials is reduced and is limited to the furnace walls only. Instead, furnace and boiler walls are made with water-cooling arrangement in modern types of boilers so as to prevent heat loss and facilitate efficient heat transfer to the water. The water wall consists of a number of water or evaporation tubes spaced all around the walls of the furnace and carry away the heat released in the furnace. In membrane wall construction, membranes are welded to the tubes at centre lines. The membranes act as fins to increase the heat transfer as well as strengthen the furnace construction. Heat Insulation is provided on outside of the wall with a metal cladding to protect the insulation. By this arrangement, use of refractory materials is almost eliminated thus saving the cost of refractory materials and their maintenance.

Other boiler elements include Drums, Economizers and Super heaters. All modern boilers are usually equipped with these elements.

Water Circulation System

The feed water will be pumped to the steam drum through the economizer and HP heater by means of two feed water pumps of which, normally one will be working and the other will be a standby.

The boiler water circulation system will be consisting of two sections – the boiler bank tubes and water wall tubes. The boiler bank tubes will have a self-adjusting circulation pattern, with a few tubes

connected to the water space, serving as down comer tubes and the remaining serving as riser rubes. A portion of the water circulated will be evaporated and the steam water mixture will rise up into the steam drum where steam will be separated from water. Dry steam will leave the steam drum, while the separated water mixes with the incoming feed water for further circulation. The water wall tubes will receive water from water drum through down comer/connecting pipes. The steam-water mixture, rising through water wall tubes, will enter the steam drum and the dry, saturated steam will leave the drum through the demister pads. The steam space of the steam drum will be provided with two numbers of safety valves as per IBR. The Dry steam will leave the drum to the super heater where it will get super-heated.

Deaerator

Deaerator will be “spray cum tray” type complete with a horizontal storage tank of 30 minutes hold up (at full load with filling factor of approximately 0.6).

Condensate from the condenser will be fed to the deaerator at inlet. All non-condensable gases and dissolved oxygen will be removed from the condensate in Deaerator. The Deaerator is single with header and feed water storage tank. Content of dissolved oxygen at the outlet of feed water storage tank will be limited to 0.005 cc per liter. The deaerator will be capable of handling all incoming condensate & make-up water at required rate to provide boiler feed to match the outlet superheated steam requirements.

Deaerator operation will be suitable for the condensate flow range from 30% to 100 % without water hammering. The storage tank will have one fixed and another sliding support to take expansion of the equipment.

Feed control station

Two sets of feed control station of 100% capacity, one working and one standby with manual isolation valves on suction and discharge side will be provided for controlling the feed water flow to the boiler depending on the boiler load conditions and maintaining water level in drum through three element control system.

Chemical dosing system

Chemicals will be dosed into the boiler feed water circuit at appropriate points for control of boiler water quality. Two (2) types of dosing systems, viz., the high pressure and the low-pressure systems will consist of tanks for solution preparation, pumps and agitators with motors. The pumps will be provided with stand-by. HP dosing system at the steam drum to maintain the TDS level and scale control will inject phosphate. Hydrazine will be injected in the feed water to control the PH of the feed water.

Electrostatic Precipitator

The flue gases exiting the boiler will be passed through one multi-field Electrostatic Precipitator (ESP) to remove the dust particles. The dust content in the gas downstream of ESP will be limited to 100 mg/Ncum. The ESP unit will be complete with casing, hoppers, GD screen, rapping arrangement, emitting and collecting system, heating elements for hoppers and insulators, transformers, rectifier and controls. The dust particles collected in the hoppers will be stored in silos in dry form to facilitate transportation by means of trucks for commercial use.

Soot blowing equipment

The boiler shall be provided with a complete system of soot blowers to effectively remove deposits from the heat transfer surfaces. The soot blowers will be electrically driven units utilizing steam as the blowing medium. Steam required for soot blowing will be taken from the primary super heater output header, after reducing the steam pressure to suit the pressure required for the operation of soot blowers. Soot blowers of long retractable type and / or rotary type will be provided. Necessary instrumentation and controls shall be provided for on-load cleaning equipment to ensure maximum availability without necessity for a shutdown to clean the boiler frequently.

Steam Turbine

Steam turbine is a prime mover, which converts the thermal energy in the form of high pressure and temperature steam into mechanical energy. Mechanical energy will be converted into electrical energy in the Generator.

Energy conversion in steam turbine from thermal to mechanical occurs in two steps. The high pressure, high temperature steam first expands in nozzles and comes out at a high velocity. The velocity jets of steam coming out of the nozzles impinge on the blades producing torque on the wheel. The wheel or rotor rotates due to the torque produced by impingement of high velocity steam. Nozzles are arranged stationery to facilitate expansion of steam and blades be arranged in a wheel to facilitate rotation due to torque.

Depending on the arrangement of nozzles and blades, steam turbines are classified into three main categories depending on the expansion of steam, which are given below.

- Impulse Turbines
- Reaction Turbines
- Impulse – Reaction Turbines

Discussions with Management of HIPL indicate that the proposed power plant will be utilizing the impulse reaction turbine for power generation.

One multistage, steam turbine coupled to an electric generator complete with condenser, air ejector system for condenser, condensate pumps, lubricating oil and governing oil system, controls and instrumentation as required will be provided. The steam turbine will be a straight condensing type machine with uncontrolled bleeds for deaerator feed water heating. The output capacity of the turbine will be 10 MW as measured at generator terminals.

Alternator/ Generator

Alternator/ Generator are machines, which converts mechanical energy into the electrical power. Mechanical energy is imparted to the alternator by the steam turbine.

Only the generation voltage and the type of excitation system are the criteria for selecting the proper Alternator. Other aspects like no. of poles / speed of Alternator, Frequency, etc. depend on the local conditions and the prime mover.

Generating voltage is the voltage that can be generated at the generator terminals and is fixed at 11 KV as a general practice. Generated voltage will be stepped up or stepped down to export to the grid or for auxiliary consumption.

Brushless excitation system has been selected for the alternator. All electrical machines in India operate on 50 Hz power supply. Hence, machine is proposed to generate at 50 Hz Frequency. Accordingly, the speed of the machine will be 1500 rpm is more appropriate because the steam turbines can be directly coupled to the generator without any gear box.

Auxiliary Plants and System

Fuel Handling System

A covered storage shed of mild steel structural construction is envisaged near the feeding zone to store about 15 days of fuel. In addition to this an open storage yards will be provided to store fuel required for continuous operation of the plant. Existing briquetting plants infrastructure, in addition to open storage yard at project site, will be utilised to store fuel in the open yards. The fuel will be stock piled to a height of about 3 to 4 metres, The fuel from the collection points will be transported to the power plant. Biomass fuel received at site in trucks, tractor trailers, etc, will be weighed on a pit-less type static electronic road weigh bridge provided in the plant premises. Bamboo received, from the storage shed will be fed through a grizzly hopper by means of a tractor dozer. From the grizzly hopper, bamboo will be conveyed to the set of belt conveyors BC-l and BC-2. A screen is provided to remove stones of from bamboo. The screened fuels will be directly discharged onto belt conveyor BC-2 for onward transportation to the bunker in the boiler bunker house.

Quantity of fuel will be controlled by variable frequency drives depending on the steam requirements for the power plant. Necessary discharge chutes are also considered to feed multi-fuels into boiler.

Belt conveyors are envisaged to convey fuel-to-fuel hoppers. Construction of belt conveyors include magnetic separator, belt weigh scale to weigh the rate of fuel conveyed, belt sway switches, pull chords, hoods, cover etc., and walk-ways for maintenance purpose.

Ash Handing System

Ash generated during the operation of power plant will be suitably collected and disposed. A system for collection and commercial disposal of this waste product to end users' works will be planned. The ash generated in the traveling grate boiler will be collected from the furnace, riddling hopper, economizer and air heater zones and the electrostatic precipitator.

The ash handling system consists of two independent systems. One system is to collect wet ash through submergible belt conveyors as the temperature of bottom ash collected from traveling grate boiler is expected to be around 860ºC. The bottom ash from the furnace and also from riddling hopper falls into the water filled submerged belt conveyor where the bottom ash gets cooled. The ash coming out from the submerged belt conveyor is collected in trolley and disposed off. The other system will collect the dry ash through rotary air lock feeders, screw conveyors and slat chain conveyors which in

turn will discharge into silo. Ash silos shall be of RCC construction (30 cu m capacity each). The ash shall be periodically collected at the outlet of silo by a truck/trailer. Necessary water sprinkler system will be provided to suppress the ash fines.

The ash can be generally used for manufacturing building materials such as ash bricks, ceramic tiles etc., or for mixing with cement in small quantities for making pozzolana cement. It can also be used as land fill material.

Circulating Water System

The re-circulating cooling water system will consist of the following major items of equipment:

I. Three (3) electrically driven horizontal split casing pumps of 1100 m3/hr capacity (two working and one standby) with associated drive motor for TG condensor cooling.

II. Two (2) electrically driven pumps of 200 cu m/hr capacity (one working and one standby) with associated drive motor for auxiliary cooling.

III. Induced draft cooling tower of total capacity 2,400 m3/hr. The tower will be of RCC construction with two cells each having a capacity to cool 1200 m3/hr over a temperature range of 8-9°C.

Cold water from the cooling tower basin will be pumped by the re-circulating cooling water pumps to the TG condenser and other auxiliary consumers in the power plant. The hot water return from the consumers will return to the cooling towers for cooling and recirculation. About 48 m3/hr of make-up water will be added in the cooling tower basin to compensate the evaporation, drift and blow down losses.

DM Plant

Boiler make-up requirement for the boiler is considered as 5.0% of the total flow rate. Make up water is required to replenish the losses of water through leakage form fittings and boiler blow-down, escaping water with non-condensable gases in the deaerator, turbine glands. The make-up water needs to be treated prior to feeding it to the boiler for:

- Prevention of hard scale formation on the heating surfaces.
- Elimination of corrosion.
- Control of carryover to eliminate deposition on super heater tubes.
- Prevention of silica deposition and corrosion damage of the turbine blades.

To meet the requirement of demineralized water as make-up water for the boiler package, a demineralization plant of one (1) stream of capacity 3 m3/ hr is to be provided. In order to maintain total silica as SiO2 below 0.02 ppm in DM water, RO and deionisation by mixed bed is recommended. RO

will reduce the dissolved solid level below 40 ppm thereby drastically cutting down ionic load on MB and acid / alkali requirement for the regeneration.

DM water quality will meet the boiler manufacturer's recommendation. Two demineralised water storage tanks of 50 cu m capacity each is proposed to hold one (1) day's DM water requirement.

Water from raw water reservoir will be pumped to the multi-grade filter for removal of Turbidity. Filtered water is then pumped through strong acid cat-ion exchanger for the removal of cationic impurities. The outlet water of cat-ion unit will be passed through degasser tower to remove gasses and then stored in the DG water tank. The degassed water will be pumped to the strong base anion exchanger unit for the removal of anionic impurities. The demineralized water is further passed through mixed bed polishing unit for the removal of residual impurities and produce water to the desired quality, which will be the fed to boiler.

Two demineralized water storage tanks of 50 cu m capacity each is proposed to hold one (1) day's DM water requirement. Two numbers of DM water transfer pumps (1W + 1S) each of 6 m3/hr capacity is considered to pump DM water to boiler.

One neutralizing pit is considered in DM plant area for treatment of effluents of plant.

Compressed Air System

Instrument air, as required for the power plant will be provided from compressed air plant with air dying unit, which is installed near the boiler area. It is proposed to install two (one working and one standby) non-lubricated type reciprocating compressors along with a dryer. The compressor-dryer package will have a capacity of 100 N m^3/hr at a discharge pressure of 8.0 ksca. The compressor will be complete with suction filter, silencer, air receiver and necessary electrics and instruments.

Two numbers of air receiving tanks will be used for the storage of compressed air from where air will be drawn to the points of application i.e. to the instruments as per the requirement.

Fire Protection Systems

The unit will be provided with appropriate firefighting equipment including pumps for emergency requirement in the power plant. Any one or combination of the following system will protect all yards and plant.

Fire Hydrant System is proposed to cover the complete plant. The system will consist of, one (1) electric motor driven pump. Fire hydrants pipe work will be running all along the plant to cover all the buildings, boiler and TG areas, fuel storage area, etc. Inside the buildings hydrant landing valves will be provided.

Portable fire extinguishers of dry chemical powder, C02 type have been proposed for buildings, electrical control rooms, cable gallery, etc.

Electrical and Instrumentation Systems

Electrical Equipment and Systems

The proposed biomass power plant consists of one number steam turbine driven generator of capacity 10 MW along with other electrical equipment and systems like excitation system, power distribution and evacuation systems, switch yard etc. Details of the equipment proposed are given in the following pages.

Generator

The generator is a 4 pole, 3-phase, air-cooled synchronous generator and is designed for continuous operation at its rated output. The constructional feature ensures reliability. The generator is suitable for operation with any of the modern excitation systems.

Stator

The will be provided stator mainly of stator frame, stator core, stator winding etc. The stator frame consists of two end clamping plates with integral pressing fingers designed to accommodate the laminations and are held in position by means of axial ribs welded under pressure at the back of the core and to the clamping plates.

The rectifier feeds the generator field winding with direct current include in the form of alternating current in the 3-phase rotor winding of the main exciter. The main exciter is of the rotating armature type in which the field winding is accommodated in the stator. The winding of the generator rotor, the rectifiers, and the 3-phase winding of the main exciter are mounted on a through the shaft.

The 3-phase alternating current produced in the armature of the main exciter is fed to the rotating rectifiers where it is rectified in a 3-phase bridge connection. The direct current is then fed through the hollow machine shaft direct to the rotor winding of the synchronous generator. Time proven silicon rectifiers are used throughout. Since they rotate with the shaft, they are automatically provided with effective self- ventilation.

Automatic Voltage Regulator

The generator is equipped with Automatic Voltage Regulator (AVR) to maintain the generated voltages within the permissible range. AVR is of transistorized, thyristor controlled equipment with very fast response. It has two independent channels, the auto channel with closed loop voltage regulation and the manual channel with closed loop field current regulation. Each channel consists of a control part and a power part. The two channels of the voltage regulator are designed for operation of station auxiliary power supply of 433 V, 3 phase, 50 Hz and power supply from generator terminals. A power supply selector switch is provided and it is recommended to operate the voltage regulator on auxiliary power supply normally and on power supply. A control feature is incorporated to affect automatic transfer from auxiliary supply to power supply from generator terminals when the former fails and to trip the exciter field breaker field breaker when both the power supplies fail.

Synchronizing Panel and Control Panel

The generator relay and control panel will be industrial, floor mounting, cubicle type design, fabricated out of 3 mm thick sheet for the load bearing frames and 2 mm thick sheet for the front panel and covers. The degree of protection for the enclosure will be IP 50.

The different protective relays for the generator along with really testing facilities, logic circuits, tripping and signaling arrangements will be housed in the generator relay panel. A schematic diagram of Generator protection scheme is enclosed for ready reference.

The following protective relays will be provided in the generator relay panel.

- Generator differential relay
- Under voltage relay
- Voltage controlled over current relay
- Over voltage relay
- Loss of excitation relay
- Negative sequence relay
- Reserve power relay
- Rotor earth fault relay
- Under frequency relay
- Dc supervision relay
- Generator master trip relay
- Turbine master trip relay
- Loss of field during isolated run relay
- Low forward power relay
- IDMT over current relay
- PT voltage balance relay

In addition, a set of auxiliary relays and time relays will be provided to achieve the desired logic for tripping and signaling functions.

- Generator voltage
- Generator current
- Generator frequency
- Generator power
- Generator power factor
- Generator reactive volt ampere
- KWH energy meter.

One number manual synchronizing panel is considered to synchronize the generated power by the STG to the state gird. Synchronizing panel will help in synchronizing the generated frequency to match with

the state electricity board's frequency. Synchronizing panel is the main element for the generator which aids to run parallel with the state gird frequency.

Switch Gear and Switch Gear Panel

A set of 11 KV Switch gear is considered for connecting the generator output to 11 KV common bus of the switch gear, to export power to 33 KV gird and to cater the auxiliary loads of 415V.

Switchgear panel will be designed to suit indoor conditions and to contain all accessories required for the switch gear. The switch gear sill be metal clad, free floor standing, totally enclosed dust and vermin proof with draw out type circuit breakers. The panel will house the equipment such as circuit breakers, main horizontal bus bars and other controlling devices, indicating meters, protective relays for the incoming and outgoing feeders, indicating lamps, and mimic diagram.

Switch gear comprise three phase main bus bars which shall extend through all units of the switch gear line up.

Bus Bars and Ducts

Totally enclosed bus duct rated for 11 KV and a continuous current of 800A will be provided for interconnection between the generator terminals and the switchboard. One number enclosed LT bus duct is also envisaged between auxiliary transformer and PCC.

The bus duct will be three phase, phase segregated type with common metallic enclosure made of GI sheet. Bus bars will be of aluminium channels, adequately sized to carry a short current of 26 kA for 1 second, and will be suitable for a temperature rise of 50 ˚C over an ambient of 45 ˚C while carrying the rated current. The degree of protection for the enclosure will be IP 50. Insulating barriers between phases will be non- hygroscopic. The bus duct enclosure will be provided with earthling the bus duct. Suitable inspection openings will be provided.

LT Distribution System

Separate LT distribution system is envisaged to take care of all LT Loads and other auxiliary plant drives. One number LT Transformer is proposed to feed the voltage at required level to all auxiliary plant drives. Reliable supply to all plant drives will be ensured while selecting the proper LT Distribution system.

Power Control Centre

One number power control center is considered to cater the need of various MCCs. Power Control Centre will be connected to the LT side of auxiliary transformer.

Motor Control Centers

Appropriate number of Motor control centers will be provided to feed the power to various individual LT drives of the plant, other auxiliary drives etc. Motor control centers will be connected to the Power control center.

Individual Motor control centers are considers for STG Auxiliary drives, Boiler auxiliary drives, cooling tower auxiliary drives, etc.

Potential Transformers and Surge Protection Cubicle

Three single phase draw-out type potential transformers and surge protection equipment for the Generator will be mounted in a common, industrial, free standing, floor mounting, sheet steel clad, dust

and vermin proof cubicle. The terminals will be suitable to terminate 11 KV grade XLPE insulated aluminium conductor cable.

The front side of the cubicle will have the three single phase draw out type potential transformers. The potential transformers along with primary and secondary fuses will be mounted on a draw out carriage will also be provided with suitable scrapping earth connections, which will in-turn be connected to the earth strip provided at the bottom of the cubicle.

The near side of the cubicle will be provided with surge capacitors and lightning arrestors complete with surge counter, to protect the generator winding from over voltages and switching surges.

Neutral Grounding System

The neutral grounding equipment will comprise of the neutral isolator, neutral grounding resistor and cable / bus duct connections to the earth electrodes.

The neutral will be housed in a sheet steel enclosed dust and vermin proof, industrial type, floor mounting cubicle. The neutral isolator board will be located adjacent to the star point cubicle touching the same and the neutral bus connection will be taken at the top. The enclosure will be IP-50.

The isolator will be electrically operated type, load break, fault make design rated at 11 k/v, 450A, 26 kA for I sec, of single pole design conforming to IS: 9920.

The neutral isolator will be operated from the main electrical control desk located in the control room and shall remain normally closed.

The neutral grounding resistor will comprise of undetectable stainless steel cast grid elements in drip proof enclosure confirming to IP-20 degree of protection. The elements will be supported inside the enclosure on 11KV grade porcelain insulators. The value of the resistor will be corresponding to an earth fault current of 35A and rated for 30 seconds. The resistor elements will be designed to attain a maximum temperature rise of 365 deg C when the specified default current flows for the rated item.

Switch Yard and Paralleling With Grid

Two numbers of 33KV single bay switchyard is considered to export the power to the state grid and paralleling with the state grid. The Switchyard mainly consists of the following with appropriate ratings.

- Breakers
- Isolators
- Control Panel
- Lightening Arrestors
- CTs and PTs etc.

Power Transformer

The transformer for power evacuation will be outdoor duty type and rated for 33/11 kV, 11 MVA, and mineral oil cooled (ONAN) with on-load tap changer suitable for bi-directional power flow and all fittings and accessories conforming to IS standards. The range of the tap changer will be selected based on the voltage conditions normally prevailing in the grid.

The HV side (33 kV) terminals will be brought out through bushings suitable for termination with outdoor bus-system.

The 11 kV terminals will be brought out to an outdoor type cable box for connection to 3 core 11 kV XLPE cable from Generator switch board. The vector group of the transformer will be Ynd 11. The HV side will be solidly earthed.

Safety Earthing System

One common earth mat will be formed in the power plant covering all the areas of the power plant. Safety earthing system include continuous running earth conductors, required number of earthing electrodes, Earth pits, clamps, etc.

Earth mat will be laid around all the strategic area as well as for all the equipment and will the requirements of respective IS standards.

Cables and Lighting System

Cables for all applications including power and control will meet the requirements of the power plant and the requirements of IS / IEC standards. Cables include interconnecting cables of 11 KV between Generator and PT SP Cubicles, etc. and other high voltage cables between Switch board and various switch yard elements.

All HT Cables will be of aluminium conductors cross linked polyethylene insulated and PVC Sheathed armoured type confirming to IS 7098 (Part-II) and suitable for unearthed / earthed system. The cables will be provided with conductor and insulation screen of semi-conducting material, followed by copper foil tape on each core.

Selection and installation of cables of 11 KV, 1.1 KV grade power cables and control cables will be carried out in accordance with Indian standards.

Power Evacuation

As per the extant policy framework the project developer, i.e. Hutah Industries Private Limited will be responsible to create the necessary infrastructure for evacuation of power up to the nearest power station / sub-station. In the state of Nagaland, HIPL would be required to develop the infrastructure up to the nearest State Transmission Utility Company (STUC) sub-station, which is estimated to be about 2.5 kilometers from the project site (measured as proposed evacuation line length). The company has included the cost of establishing necessary infrastructure in the project cost. HIPL will make an application with STUC to conduct the power evacuation study for its proposed bamboo/ biomass based power project.

Power would be generated at 11 KV and subsequently stepped-up to either 33 KV or 66 KV as required by the STUC for transmission / evacuation through transformer.

Mode of Implementation of Project

Based on the discussions with the Executives of the Company, the Consultants understand that the Project will be implemented through EPC Mode (Engineering, Procurement, Construction Contract) and

awarded to EPC player on Lumpsum Turnkey Contract basis. The entire EPC works will be divided into following segments –

1. EPC of the main plant, consisting of the Boiler, Furnace, Turbine/ Generator, along with the required civil works.
2. EPC of Balance of Plant, which will comprise of providing DM Water Plant, Cooling Tower, Chimney, STP etc.

The Company is already in final stages of discussion with Variate Consultants Private Limited for undertaking the EPC works for implementation of the Project on turnkey basis.

Raw Material Availability

As discussed in the sections above, the basic raw material for the Project will be bamboo, which is abundantly available in the region. At peak capacity utilisation level of 90%, the project will be consuming around 95,000 Tons of bamboo in a year for 10 MW power plant.

The Consultants note that there is ample supply of bamboo in the region, further it is noted that the Company has acquired 1500 acres of land on long lease basis from Atomi Zhimomi for duration of 99 years, located within the AK Industrial Village Council zone. The said land already has around 500 acres of bamboo plantation.

HIPL proposes to further plant around 950 acres of land with bamboo, during the course of implementation of the Project. Hence by the time the Project commences commercial operations, around 1450 acres of bamboo plantation will be available for captive consumption.

Further, there are other bamboo plantation in near vicinity of the proposed project site and hence in case of shortage, the bamboo can be easily procured from these plantations easily.

Other Technical Aspects

Power Requirement

Since the proposed project is a power project, hence it will itself be producing power. Part of the power produced i.e. 12.50% has been considered for auxiliary consumption (plants own power requirement).

Apart from the auxiliary power consumption, the project will also procure permanent power connection from the State Electricity Board, which will be utilised for overhead requirements during the annual maintenance shut-downs.

Water

The project will require water for process (steam) requirement, DM water plant requirement and for overhead (housekeeping) requirement. As estimated, the water requirement for the project will be around 100 KL per Day or around 33,000 KL per annum.

There is a perennial stream flowing nearby, which will be the source of water for the proposed project.

Manpower

The total manpower required for operating the power plant segment will be 95 personnel. The details of the same have been presented in the table below –

Description	Unit	Value	Unit	Value
Administrative Staff				
Plant Head	Nos.	1	Rs./ Month	75,000
General Manager	Nos.	4	Rs./ Month	65,000
Senior Managers/ Engineers	Nos.	6	Rs./ Month	45,000
Admin and Accounts	Nos.	10	Rs./ Month	25,000
Security	Nos.	10	Rs./ Month	10,500
Plant Staff				
Engineers	Nos.	8	Rs./ Month	25,000
Supervisors	Nos.	12	Rs./ Month	18,000
Skilled Labour	Nos.	24	Rs./ Month	14,500
Unskilled Labour	Nos.	20	Rs./ Month	10,500
Total Manpower	**Nos.**	**95**		

Source: VCPL Estimates

While undertaking financial analysis, the Consultants have considered an annual increase in manpower cost by 3%.

Here it should be noted that HIPL will be taking on contract labour for undertaking the chopping/ cutting of bamboo and transporting the same to the plant premises. There would be a deployment of around 100 unskilled/ semiskilled labour for bamboo chopping and cutting operations and the cost of this manpower is considered as part of the raw material cost of the Project.

Implementation Schedule

The implementation schedule is has been provided in the exhibit below –

Description			2021-22				2022-23			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Financial Closure										
Land and Land Development										
Basic Engineering										
Detailed Engineering										
Placement of Order of Long Lead Items										
Arrival of Plant and Machinery at Site										
Building and Construction Work										
Erection of Plant and Machinery										
Trial Run										
Commercial Operations										

Source: HIPL and SCPL Estimates

Current Status

1. The Company has already been incorporated on 4th November 2020, as per the provisions laid down under “The Companies Act, 2013”.

2. The Company has received no-objection certification from AK Industrial Village Council for setting up bamboo based 10 MW biomass based power project

3. HIPL has signed a long lease agreement of 99 years with Atomi Zhimomi, for 1500 acres of land for implementation of the Project.

4. The Company has contacted and is in final stages of negotiation with VCPL, to undertake the project on EPC basis on behalf of HIPL.

Balance, the Project is in initial stages of planning and implementation and HIPL will acquire the necessary approvals and clearances during the course of implementation of the Project.

Project Cost

The total cost of the project is estimated at Rs. 68.53 Crores based on estimates made by the Company for various elements of the project.

The different heads of the project cost are detailed in the exhibit given below:

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	Total
Land	Rs. Crores	5.05	-	-	5.05
Building and Civil Work	Rs. Crores	1.60	6.42	2.67	10.70
Plant and Machinery	Rs. Crores	11.18	22.36	3.73	37.26
Miscellaneous Fixed Assets	Rs. Crores	0.06	0.80	0.29	1.15
Preliminary and Pre-operative	Rs. Crores	1.78	2.37	1.78	5.92
Interest During Construction	Rs. Crores	0.34	2.58	2.08	5.00
Contingency	Rs. Crores	0.64	1.48	0.33	2.46
Margin Money for Working Capital	Rs. Crores			1.00	1.00
Total	**Rs. Crores**	**20.65**	**36.00**	**11.88**	**68.53**

Source: HIPL and VCPL Estimates

Each of the sub-components of the project cost has been discussed in the subsequent sections.

Land and Land Development Cost

The total area of the land is 1,01,175 Sq.M. The total land and land development cost is Rs. 5.05 Crores. The details of land and land development cost is shown in the exhibit below –

Description	Unit	Quantity	Rate	Value (Rs. Crores)
Land Lease (upfront payment etc.)				2.33
Land Development	Sq.M	85,999	250	2.15
Boundary/ Fence	M	1,272	4,500	0.57
Total Land and Land Development				**5.05**

Source: HIPL and VCPL Estimates

Building and Civil Works

The total cost of building and civil works is Rs. 10.70 Crores. The details of building and civil works cost are shown in the exhibit below –

Description	Unit	Quantity	Rate/ MW	Value
EPC Cost				
Bunker	Rs. / MW	10	31,00,000	3.10
Furnace Boiler	Rs. / MW	10	15,00,000	1.50
Prefab	Rs. / MW	10	12,00,000	1.20
Office & Reception	Sq. M	10	12,500	0.01
Turbine Building	Rs. / MW	10	15,00,000	1.50
Cooling Tower	Rs. / MW	10	9,00,000	0.90
Switch Yard	Rs. / MW	10	1,00,000	0.10
Chimney	Rs. / MW	10	1,00,000	0.10
Foundation for DM W	Rs. / MW	10	3,00,000	0.30
Biogas + Bag House	Rs. / MW	10	2,50,000	0.25
Others Foundation- DG, Liquid Fuel Area, Lime Tank, Lime Holding, ETP	Rs. / MW	10	1,00,000	0.10

Description	Unit	Quantity	Rate/ MW	Value
Other miscellaneous like roads, open area etc.	Sq. M	10	4,000	0.00
Building and Civil Works (Non-EPC Cost)	Lumpsum			-
Taxes, Duties, Charges etc.	18%			1.63
Total Building and Civil Works	**Rs. Crores**			**10.70**

Source: HIPL and SCPL Estimates

Plant and Machinery Cost

The overall plant and machinery cost has been estimated at Rs. 37.26 Crores. The details of plant and machinery cost is shown in the exhibit below –

Description	Unit	Value
Total price for design, engineering, manufacturing/ fabrication, supply and dispatch of 50 TPH Bamboo fired travel grate stocker boiler, with option to use coal as secondary fuel by mixing maximum upto 30% With 10 MW CONDENCING TURBINE ON EX-WORKS BASIS, TAXES ARE EXTRA AT ACTUAL.	Lumpsum	29.50
Non-EPC Plant and Machinery (utilities)	Lumpsum	1.50
Taxes	18%	5.58
Transportation Cost	1%	0.31
Insurance	1%	0.37
Total Plant and Machinery Cost	**Rs. Crores**	**37.26**

Source: HIPL and VCPL Estimates

Miscellaneous Fixed Asset

The miscellaneous fixed assets have been estimated at Rs. 1.15 Crores. The details of miscellaneous fixed assets have been shown in the exhibit below –

Description	Unit	Value
Fire Fighting Equipment	Lumpsum	0.75
Furniture and Fixture	Lumpsum	0.15
Computers and Software	Lumpsum	0.25
Other Miscellaneous Fixed Assets	Lumpsum	5.00
Total Miscellaneous Fixed Assets	**Lumpsum**	**1.15**

Source: HIPL and VCPL Estimates

Preliminary and Pre-operative Expenses

Preliminary and pre-operative expenses have been estimated at Rs. 5.92 Crores, the details of which has been provided in exhibit below –

Description	Unit	Value
Establishment Cost	1.50%	0.74
Bank Processing Charge	0.50%	0.22
Start-up Cost		2.50
Preliminary Studies and Investigation		0.74
Consultancy Charges	3.00%	1.47
Statutory Approvals and Clearances	Lumpsum	0.25

Description	Unit	Value
Total Preliminary and Pre-operative		**5.92**

Source: HIPL and VCPL Estimates

Interest During Construction Cost

VCPL has considered that the debt drawdown will commence from 4th quarter of FY 2020-21 and the final withdrawal will be 2nd quarter of FY 2022-23. Operations are expected to commence in 3rd quarter of FY 2022-23. Interest prior to that will be added to the project cost which is estimated at Rs. 5.00 Crores.

Contingency

The Consultants has taken 5% Contingency on the cost of building and civil works, plant and machinery and miscellaneous fixed assets to consider the risk of escalation in the project. The contingency cost estimated for the project is Rs. 2.46 Crores.

Economic Viability

Introduction

This chapter evaluates the financial viability of the Project. The evaluation parameters considered include Net Present Value ('NPV'), Internal Rate of Return ('IRR') and Debt Service Coverage Ratio ('DSCR'). The key financial ratios and indicators are also discussed. All information required to compute the financial viability has been collected from the promoters, in house database and secondary information sources.

The Consultants note that similar Projects have life of about 35-40 years. However, the project horizon for evaluating the viability is normally 10-15 years. This is due to the fact that such projects are expected to pay back all long-term borrowings within 10-15 years of operation.

Capacity and Capacity Utilisation

The Project is expected to become operational by October 2022 and hence will be operational for half a year during the FY 2022-23. Further considering the fact that new projects take time to stabilise and overcome the tethering problems during the initial 2 years, post commissioning, the utilisation level for the project has been ramped up slowly to reach a maximum utilisation level of 90% by FY 2024-25. The installed capacity and utilisation level as considered for the Project have been presented in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Installed Capacity	MW	10	10	10	10	10	10	10	10	10
Operational Days in Year	Days	181	365	365	365	365	365	365	365	365
Operational Hours in a Day	Hours	24	24	24	24	24	24	24	24	24
Capacity Utilisation	%	80%	85%	90%	90%	90%	90%	90%	90%	90%
Production of Power	Mwh	34,752	74,460	78,840	78,840	78,840	78,840	78,840	78,840	78,840
Gross Power Generation	Mwh	34,752	74,460	78,840	78,840	78,840	78,840	78,840	78,840	78,840

Source: VCPL Estimates

The production of power as indicated in the table above is the gross power production. The Project will consume part of the power produced for its own operations and this part of consumption is called auxiliary consumption of power. In general, the biomass based power plants experience around 11% to maximum of 12.50% as auxiliary consumption.

Apart from the auxiliary consumption, there is also transmission loss, which occurs while transmitting the power from power plant to the nearest grid injection point. Taking both these aspects into consideration, the net saleable power expected from the project has been presented in the table below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Auxiliary Consumption	%	12.50 %	12.50 %	12.50 %	12.50 %	12.50 %	12.50 %	12.50 %	12.50 %	12.50 %
Transmission Losses	%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Transmission Losses	Kwh	760,200	1,628,813	1,724,625	1,724,625	1,724,625	1,724,625	1,724,625	1,724,625	1,724,625

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Billable Power Generated	Lakh Units	296.48	635.24	672.60	672.60	672.60	672.60	672.60	672.60	672.60

Source: HIPL and VCPL Estimates

Selling Price and Sales Realisation

Based on the discussions with the Management of HIPL, it is understood that the power purchase agreement will be signed with the local SEB at Rs. 5.99/ Unit. Considering the same, the sales realisation for the proposed project is shown in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
As per PPA	Rs. / Kwh	5.99	5.99	5.99	5.99	5.99	5.99	5.99	5.99	5.99
Annual Increase	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Final Unit Rate	Rs. / Kwh	5.99	5.99	5.99	5.99	5.99	5.99	5.99	5.99	5.99
Sales Realisation	**Rs. Crores**	**17.76**	**38.05**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**

Source: HIPL and VCPL Estimates

Reason for PPA @ Rs. 5.99/ Kwh

Considering the base case, the cost of generation of power at various levels are –

- Operating Cost (EBDITA) level cots of generation for the proposed project is Rs. 3.59/ Kwh
- Adding depreciation, the cost of generation for the proposed project is Rs. 3.97/ Kwh
- Adding interest cost (term loan and working capital loan), the cost of generation for the project is Rs. 4.41/ Kwh

However, when the sensitivity analysis is undertaken, then these costs increase to Rs. 3.62/Kwh, Rs. 4.01/ Kwh and Rs. 4.46/ Kwh.

Also, taking into consideration above mentioned costs and considering an IRR of 18%, which is suitable for power projects, the PPA has been proposed @ Rs. 5.99/Kwh without escalation, which is in line with the prevailing industry standards. HIPL has already approached Nagaland Energy Regulatory Commission, for approval of the same and the process of getting approval has been initiated.

Raw Material Cost

As discussed in the technical assessment section, the project will primarily consume bamboo as feedstock for generation of power. Apart from that, the Project will have flexibility to consume coal as secondary fuel.

The Company will be utilising own planted and grown bamboo as raw material, which will be grown in 1450 acres of land, adjacent to the proposed project site. Hence effectively there will be no raw material cost. However, the Consultants have considered raw material cost of Rs. 1800/- per Ton of Bamboo, which is the cost of manpower for chopping/ cutting bamboo, cost of replantation, cost of water for replantation, fuel cost for operating harvesters chippers etc. Based on these assumptions, the raw material cost of the Project as estimated has been presented in the table below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Primary Fuel Cost										
Calorific Value of Bamboo	Kcal/ Kg	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Calorific Value of Coal	Kcal/ Kg	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
Fuel Mix										
Calorific Value of Bamboo	%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Calorific Value of Coal	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Calorific Value of Fuel Mix	Kcal/ Kg	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Station Heat Rate	Kcal/ Kwh	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Fuel Mix Required for Generation of 1 Kwh	Kg/ Kwh	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Fuel Required per Annum	Tons	41,702	89,352	94,608	94,608	94,608	94,608	94,608	94,608	94,608
Price of Fuel										
Price of Wet Bamboo	Rs./ Ton	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Price of Coal	Rs./ Ton	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Price of Fuel Mix	Rs./ Ton	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Increase in Fuel Cost	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Primary Fuel Cost	**Rs. Crores**	**7.51**	**16.08**	**17.03**	**17.03**	**17.03**	**17.03**	**17.03**	**17.03**	**17.03**
Primary Fuel Cost Per Unit	**Rs./Kwh**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**
Total Raw Material Cost	**Rs. Crores**	**7.51**	**16.08**	**17.03**	**17.03**	**17.03**	**17.03**	**17.03**	**17.03**	**17.03**

Source: HIPL and VCPL Estimates

Operation and Maintenance Cost

Operations and maintenance cost of the project is pertaining to various costs associated with repairs and maintenance for the Project including cost of purchase of spares, manpower cost of review by O&M Contractors etc. The Operations and Maintenance cost of the Project has been estimated at 3.00% of Gross Fixed Assets for first year of operations and subsequently has been increase at 3% per annum for balance tenure of the Project. Based on this assumption, the operations and maintenance cost of the Project as estimated has been presented in the table below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Operations and Maintenance Cost	% of GFA	3.00%	3.09%	3.18%	3.28%	3.38%	3.48%	3.58%	3.69%	3.80%
Operations and Maintenance Cost	**Rs. Crores**	**1.00**	**2.09**	**2.15**	**2.21**	**2.28**	**2.35**	**2.42**	**2.49**	**2.57**
Increase in Cost	%	0.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%

Source: HIPL and VCPL Estimates

Insurance Cost

Insurance cost has been considered to be 0.30% of net fixed asset (increase annual by 3%). Insurance cost for the proposed project is shown in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Insurance Cost	% of NFA	0.30%	0.31%	0.32%	0.33%	0.34%	0.35%	0.36%	0.37%	0.38%
Insurance Cost	**Rs. Crores**	**0.10**	**0.20**	**0.20**	**0.19**	**0.19**	**0.19**	**0.18**	**0.18**	**0.18**
Increase in Cost	%	0.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%

Source: HIPL and VCPL Estimates

Manpower Cost

The total manpower required for operating the power plant segment will be 95 personnel. The details of the same have been presented in the table below –

Description	Unit	Value	Unit	Value
Administrative Staff				
Plant Head	Nos.	1	Rs./ Month	75,000
General Manager	Nos.	4	Rs./ Month	65,000
Senior Managers/ Engineers	Nos.	6	Rs./ Month	45,000
Admin and Accounts	Nos.	10	Rs./ Month	25,000
Security	Nos.	10	Rs./ Month	10,500
Plant Staff				
Engineers	Nos.	8	Rs./ Month	25,000
Supervisors	Nos.	12	Rs./ Month	18,000
Skilled Labour	Nos.	24	Rs./ Month	14,500
Unskilled Labour	Nos.	20	Rs./ Month	10,500
Total Manpower	**Nos.**	**95**		

Source: VCPL Estimates

While undertaking financial analysis, the Consultants have considered an annual increase in manpower cost by 3%.

Based on the above assumption, the manpower cost of the Project as estimated has been presented in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Wages	% of Sales	6.50%	6.70%	6.90%	7.10%	7.32%	7.54%	7.76%	7.99%	8.23%
Wages	**Rs. Crores**	**1.15**	**2.55**	**2.78**	**2.86**	**2.95**	**3.04**	**3.13**	**3.22**	**3.32**
Increase in Cost	%	0.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%

Source: VCPL Estimates

Here it should be noted that HIPL will be taking on contract labour for undertaking the chopping/ cutting of bamboo and transporting the same to the plant premises. There would be a deployment of around 100 unskilled/ semiskilled labour for bamboo chopping and cutting operations and the cost of this manpower is considered as part of the raw material cost of the Project.

Administrative and General Expenses

Administrative and general expense has been considered to be 4.00% of sales. Administrative and general expenses for the proposed project is shown in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Admin and General Expenses	% of Sales	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Admin and General Expenses	**Rs. Crores**	**0.71**	**1.52**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**

Source: HIPL and SCPL Estimates

The administrative expenses as estimated include –

1. Salaries/ Renumeration of Directors
2. Audit Fee
3. Overhead cost pertaining to the Head Office of the Company
4. Communication expenses
5. Boarding travelling and lodging of the Directors etc.

EBIDTA Margin

The EBDITA margin working for the proposed project has been provided as exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Sales of Power	Rs. Crores	17.76	38.05	40.29	40.29	40.29	40.29	40.29	40.29	40.29
Total Revenue	**Rs. Crores**	**17.76**	**38.05**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**
Variable Costs										
Raw Material Cost	Rs. Crores	7.51	16.08	17.03	17.03	17.03	17.03	17.03	17.03	17.03
O&M Expenses	Rs. Crores	1.00	2.09	2.15	2.21	2.28	2.35	2.42	2.49	2.57
Insurance Cost	Rs. Crores	0.10	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18
Manpower Cost	Rs. Crores	1.15	2.55	2.78	2.86	2.95	3.04	3.13	3.22	3.32
Total Variable Costs	**Rs. Crores**	**9.76**	**20.91**	**22.15**	**22.30**	**22.45**	**22.60**	**22.76**	**22.92**	**23.09**
Fixed Costs										
Admin and General Expenses	Rs. Crores	0.71	1.52	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total Fixed Cost	**Rs. Crores**	**0.71**	**1.52**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**
Total Operating Cost	**Rs. Crores**	**10.47**	**22.44**	**23.76**	**23.91**	**24.06**	**24.21**	**24.37**	**24.53**	**24.70**
EBDITA	**Rs. Crores**	**7.28**	**15.61**	**16.53**	**16.38**	**16.23**	**16.08**	**15.92**	**15.76**	**15.59**
EBDITA Margin	**%**	**41.02 %**	**41.03 %**	**41.02 %**	**40.66 %**	**40.28 %**	**39.90 %**	**39.51 %**	**39.11 %**	**38.69 %**

Source: VCPL Estimates

From the table above, it is noted that the EBDITA margin of the project will remain in range of 28% to 41% during the tenure of the term loan, with average EBDITA Margin being 40.14%, which is in line with the industry standards.

Working Capital Requirement

The following have been considered while estimating the working capital requirement for the project –

Description	Unit	Value
Working Capital Requirement		
Raw Material	Days	30
O&M Expenses	Days	30
Maintenance Spares	%	15%
Receivables	Days	30
Creditors	Days	30
Margin Money	%	25%

Source: SCPL Estimates

The working capital requirement of HIPL as estimated is provided in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Raw Material	Rs. Crores	1.24	1.32	1.40	1.40	1.40	1.40	1.40	1.40	1.40
Maintenance Spare	Rs. Crores	0.15	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38
Receivables	Rs. Crores	2.94	3.13	3.31	3.31	3.31	3.31	3.31	3.31	3.31
Current Assets	**Rs. Crores**	**4.34**	**4.76**	**5.03**	**5.04**	**5.05**	**5.06**	**5.07**	**5.08**	**5.10**
Creditors	Rs. Crores	0.36	0.38	0.41	0.42	0.43	0.44	0.46	0.47	0.48
Current Liabilities	**Rs. Crores**	**0.36**	**0.38**	**0.41**	**0.42**	**0.43**	**0.44**	**0.46**	**0.47**	**0.48**
Working Capital Gap	**Rs. Crores**	**3.98**	**4.38**	**4.63**	**4.63**	**4.62**	**4.62**	**4.62**	**4.62**	**4.61**
Margin Money	Rs. Crores	1.00	1.10	1.16	1.16	1.16	1.16	1.15	1.15	1.15
Bank Borrowing	**Rs. Crores**	**2.99**	**3.29**	**3.47**	**3.47**	**3.47**	**3.47**	**3.46**	**3.46**	**3.46**

Source: VCPL Estimates

The margin money for working capital during the first year of operations has been ascertained at Rs. 1.00 Crores and the same has been considered as part of the overall project cost, as discussed in the table below.

Project Cost and Means of Finance

As discussed previously, the overall project cost has been estimated at Rs. 68.53 Crores, which has been summarised below –

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	Total
Land	Rs. Crores	5.05	-	-	5.05
Building and Civil Work	Rs. Crores	1.60	6.42	2.67	10.70
Plant and Machinery	Rs. Crores	11.18	22.36	3.73	37.26
Miscellaneous Fixed Assets	Rs. Crores	0.06	0.80	0.29	1.15
Preliminary and Pre-operative	Rs. Crores	1.78	2.37	1.78	5.92

Interest During Construction	Rs. Crores	0.34	2.58	2.08	5.00
Contingency	Rs. Crores	0.64	1.48	0.33	2.46
Margin Money for Working Capital	Rs. Crores			1.00	1.00
Total	**Rs. Crores**	**20.65**	**36.00**	**11.88**	**68.53**

Source: HIPL and VCPL Estimates

The proposed project is expected to be funded in a Debt Equity Ratio of 1.86: 1, whereby the promoters will bring in a contribution of Rs. 23.98 Crores and the bank borrowing will be to the tune of INR 44.54 Crores. The means of finance for the proposed project has been provided in the exhibit below –

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	Total
Equity	Rs. Crores	7.23	12.60	4.16	23.98
Debt	Rs. Crores	13.42	23.40	7.72	44.54
Total Means of Finance	**Rs. Crores**	**20.65**	**36.00**	**11.88**	**68.53**

Source: HIPL and SCPL Estimates

The broad terms for the proposed loan have been provided below –

Nature of Borrowing	INR-Term Loan (Proposed)
Loan Amount	INR 44.54 Crores
Interest Rate	10.25%
Commercial Operation Date	Quarter 3 of FY 2022-23
Repayment Start	Quarter 1 of FY 2023-24
Repayment	31 equated quarterly installments

Source: HIPL and VCPL Estimates

The proposed repayment schedule of the project has been provided as exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Interest Rate	%	10.25 %	10.25 %	10.25 %	10.25 %	10.25 %	10.25 %	10.25 %	10.25 %	10.25 %
Opening Balance	Rs. Crores	36.82	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31
Addition during the Period	Rs. Crores	7.72	-	-	-	-	-	-	-	-
Repayment during the Period	Rs. Crores	-	5.75	5.75	5.75	5.75	5.75	5.75	5.75	4.31
Closing Balance	Rs. Crores	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31	-
Interest for the Period	Rs. Crores	2.28	4.27	3.68	3.09	2.50	1.91	1.33	0.74	0.17

Source: HIPL and VCPL Estimates

The other assumption as considered for the Project have been listed below –

Description	Unit	Value
Debt Equity Ratio	Ratio	1.86
Cost of Equity	%	18.00%
Cost of Long Term Loan	%	10.25%
Cost of Working Capital Loan	%	10.25%
Date of Commercial Operations	**Date**	**01-Oct-22**
Door to Door Tenure	Years	10
Door to Door Tenure	Quarters	40

Description	Unit	Value
Construction Period	Quarters	7
Post Construction Moratorium	Quarters	2
Repayment Duration	Quarters	31

Source: VCPL Assumptions

Depreciation

The rates of depreciation have been considered as under –

Description	Unit	Value
Depreciation Rate - The Company Act		
Land	%	0.00%
Building and Civil Work	%	4.00%
Plant and Machinery	%	4.00%
Miscellaneous Fixed Assets	%	4.00%
Depreciation Rate - Income Tax Act		
Land	%	0.00%
Building and Civil Work	%	10.00%
Plant and Machinery	%	15.00%
Miscellaneous Fixed Assets	%	15.00%

Source: VCPL Estimates

Financial Highlights

The financial highlights of the proposed project has been provided in the exhibit below –

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Revenue	Rs. Crores	17.76	38.05	40.29	40.29	40.29	40.29	40.29	40.29	40.29
Total Operating Costs	Rs. Crores	10.47	22.44	23.76	23.91	24.06	24.21	24.37	24.53	24.70
EBDITA	Rs. Crores	7.28	15.61	16.53	16.38	16.23	16.08	15.92	15.76	15.59
EBDITA Margin	%	41.02%	41.03%	41.02%	40.66%	40.28%	39.90%	39.51%	39.11%	38.69%
Contribution	Rs. Crores	8.00	17.14	18.14	17.99	17.84	17.69	17.53	17.37	17.20
Contribution Margin	%	45.02%	45.03%	45.02%	44.66%	44.28%	43.90%	43.51%	43.11%	42.69%
BEP Sales	Rs. Crores	9.74	19.16	18.10	16.93	15.74	14.53	13.31	12.07	10.85
BEP Capacity Utilisation	%	54.84%	50.36%	44.93%	42.02%	39.06%	36.07%	33.04%	29.95%	26.92%
Cash Break Even	Rs. Crores	6.99	13.61	12.55	11.33	10.10	8.84	7.57	6.27	4.99
Cash Break Even Margin	%	39.34%	35.77%	31.15%	28.12%	25.06%	21.94%	18.78%	15.56%	12.39%
Net Profit	Rs. Crores	2.87	6.76	7.93	8.18	8.53	8.87	9.21	10.17	9.00
Net Profit Margin	%	16.15%	17.75%	19.69%	20.31%	21.17%	22.02%	22.86%	25.23%	22.35%
Equity Share Capital	Rs. Crores	23.98	23.98	23.98	23.98	23.98	23.98	23.98	23.98	23.98
Reserves and Surplus	Rs. Crores	2.87	9.62	17.56	25.74	34.27	43.14	52.35	62.52	71.52
Tangible Net Worth (TNW)	Rs. Crores	26.85	33.61	41.54	49.72	58.25	67.12	76.33	86.50	95.50
Term Loan	Rs. Crores	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31	-
Debt Equity Ratio	Ratio	1.66	1.15	0.80	0.55	0.37	0.24	0.13	0.05	-
Total Outside Liability (TOL)	Rs. Crores	47.88	42.46	36.92	31.19	25.45	19.71	13.98	8.24	3.94
TOL/ TNW	Ratio	1.78	1.26	0.89	0.63	0.44	0.29	0.18	0.10	0.04
Closing Cash Balance (incl Invst)	Rs. Crores	4.11	7.51	12.14	17.07	22.36	27.98	33.94	40.86	48.05
DSCR	Ratio	2.80	1.35	1.50	1.56	1.64	1.73	1.84	2.07	2.61
Minimum DSCR	Ratio	1.35								
Maximum DSCR	Ratio	2.80								
Average DSCR	Ratio	1.75								
NPV	Rs. Crores	30.75								
IRR	%	18.71%								
Cost of Capital	%	10.65%								

Source: VCPL Estimates

- The average EBDITA margin for the proposed project is 40.14%, while the net profit margin is 20.84%.
- The minimum DSCR for the project is 1.35, while the average DSCR is 1.75. The interest coverage ratio for the project is comfortable all throughout. Both parameters indicating fair repayment capability of the Project
- The NPV of the Project has been estimated at Rs. 30.75 Crores, while the IRR of the project is 18.71%, which is higher than the post-tax cost of capital at 10.65%. Hence the project is financially viable.

The breakeven analysis of the project has been provided in the exhibit below:

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Total Revenue	Rs. Crores	17.76	38.05	40.29	40.29	40.29	40.29	40.29	40.29	40.29
Total Fixed Cost (incl Dep and Int)	Rs. Crores	4.38	8.63	8.15	7.56	6.97	6.38	5.79	5.20	4.63
Total Variable Cost	Rs. Crores	9.76	20.91	22.15	22.30	22.45	22.60	22.76	22.92	23.09
Contribution	Rs. Crores	8.00	17.14	18.14	17.99	17.84	17.69	17.53	17.37	17.20
Contribution Margin	%	45.02%	45.03%	45.02%	44.66%	44.28%	43.90%	43.51%	43.11%	42.69%
Break Even Sales	Rs. Crores	9.74	19.16	18.10	16.93	15.74	14.53	13.31	12.07	10.85
Break Even Margin	%	54.84%	50.36%	44.93%	42.02%	39.06%	36.07%	33.04%	29.95%	26.92%
Cash Break Even	Rs. Crores	6.99	13.61	12.55	11.33	10.10	8.84	7.57	6.27	4.99
Cash Break Even Margin	%	39.34%	35.77%	31.15%	28.12%	25.06%	21.94%	18.78%	15.56%	12.39%

Source: VCPL Estimates

Sensitivity Analysis

A sensitivity analysis was carried out to assess the impact of the following scenarios on the major financial parameters. The summary of sensitivity analysis is provided in the following exhibit –

Description	Project Cost	NPV	IRR	WACC	Min. DSCR	Avg. DSCR
	Rs. Crores	Rs. Crores	%	%	Ratio	Ratio
Base Case	68.53	30.75	18.71%	10.65%	1.35	1.75
5% decrease in Capacity Utilisation	68.47	26.29	17.66%	10.65%	1.28	1.67
5% decrease in Selling Price	68.49	22.21	16.67%	10.65%	1.22	1.59
5% increase in Operational Expenses	68.53	30.08	18.55%	10.65%	1.34	1.73
10% increase in Hardware Cost	74.09	25.76	17.07%	10.65%	1.25	1.62
1% increase in Interest Rate	69.04	27.54	18.47%	11.07%	1.29	1.69
2% increase in Interest Rate	69.57	24.55	18.26%	11.49%	1.24	1.64

Source: VCPL Assessment

From the table above, it is noted that the project remains viable (i.e. NPV is positive, IRR being higher than WACC, average DSCR being above 1.33) under all adverse scenarios.

Conclusions

Based on the assessment undertaken by the Consultants, following are the conclusion –

8. HIPL is proposing to set up 10 MW bamboo based biomass project close to Dimapur in Nagaland.
9. The Company has already acquired 1500 acres of land, on long lease basis for 99 years. There is an existing 500 acres of bamboo plantation at the site and the Company will be further planting 950 acres during the course of implementation of the Project.
10. The overall cost of the project has been estimated at Rs. 68.53 crores, which is expected to be funded in a debt-equity ratio of 1.86:1. Meaning Promoter's Funds of Rs. 23.98 Crores in form of equity/ quasi equity/ unsecured loan and balance Rs. 44.54 Crores as term debt from Lending Institutions/ Banks.
11. The average EBDITA margin for the proposed project is 40.14%, while the net profit margin is 20.84%.
12. The minimum DSCR for the project is 1.35, while the average DSCR is 1.75. The interest coverage ratio for the project is comfortable all throughout. Both parameters indicating fair repayment capability of the Project
13. The NPV of the Project has been estimated at Rs. 30.75 Crores, while the IRR of the project is 18.71%, which is higher than the post-tax cost of capital at 10.65%. Hence the project is financially viable.
14. The project remains viable (i.e. NPV is positive, IRR being higher than WACC, average DSCR being above 1.33) under all adverse scenarios

Appendix 1 – Financial Statements of Project

Profit and Loss Statement

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Sales of Power	Rs. Crores	17.76	38.05	40.29	40.29	40.29	40.29	40.29	40.29	40.29
Total Revenue	**Rs. Crores**	**17.76**	**38.05**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**	**40.29**
Variable Costs										
Raw Material Cost	Rs. Crores	7.51	16.08	17.03	17.03	17.03	17.03	17.03	17.03	17.03
O&M Expenses	Rs. Crores	1.00	2.09	2.15	2.21	2.28	2.35	2.42	2.49	2.57
Insurance Cost	Rs. Crores	0.10	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18
Manpower Cost	Rs. Crores	1.15	2.55	2.78	2.86	2.95	3.04	3.13	3.22	3.32
Total Variable Costs	**Rs. Crores**	**9.76**	**20.91**	**22.15**	**22.30**	**22.45**	**22.60**	**22.76**	**22.92**	**23.09**
Fixed Costs										
Admin and General Expenses	Rs. Crores	0.71	1.52	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total Fixed Cost	**Rs. Crores**	**0.71**	**1.52**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**	**1.61**
Total Operating Cost	**Rs. Crores**	**10.47**	**22.44**	**23.76**	**23.91**	**24.06**	**24.21**	**24.37**	**24.53**	**24.70**
EBDITA	**Rs. Crores**	**7.28**	**15.61**	**16.53**	**16.38**	**16.23**	**16.08**	**15.92**	**15.76**	**15.59**
EBDITA Margin	**%**	**41.02%**	**41.03%**	**41.02%**	**40.66%**	**40.28%**	**39.90%**	**39.51%**	**39.11%**	**38.69%**
Depreciation	Rs. Crores	1.24	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Interest on Term Loan	Rs. Crores	2.28	4.27	3.68	3.09	2.50	1.91	1.33	0.74	0.17
Interest on Working Capital Loan	Rs. Crores	0.15	0.34	0.36	0.36	0.36	0.36	0.36	0.35	0.35
Expenses Written Off	Rs. Crores	-	-	-	-	-	-	-	-	-
Non-Operating Expenses	Rs. Crores	-	-	-	-	-	-	-	-	-
Total Expenditure	**Rs. Crores**	**14.15**	**29.54**	**30.30**	**29.86**	**29.42**	**28.98**	**28.55**	**28.12**	**27.72**
Profit Before Tax	**Rs. Crores**	**3.61**	**8.51**	**9.99**	**10.43**	**10.87**	**11.31**	**11.74**	**12.17**	**12.57**
Applicable Tax	Rs. Crores	0.74	1.75	2.06	2.25	2.34	2.44	2.53	2.00	3.56
Profit After Tax	**Rs. Crores**	**2.87**	**6.76**	**7.93**	**8.18**	**8.53**	**8.87**	**9.21**	**10.17**	**9.00**
PAT Margin	%	16.15%	17.75%	19.69%	20.31%	21.17%	22.02%	22.86%	25.23%	22.35%

Balance Sheet

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Sources of Funds										
Equity	Rs. Crores	23.98	23.98	23.98	23.98	23.98	23.98	23.98	23.98	23.98
Reserves and Surplus	Rs. Crores	2.87	9.62	17.56	25.74	34.27	43.14	52.35	62.52	71.52
Total Shareholders Capital	**Rs. Crores**	**26.85**	**33.61**	**41.54**	**49.72**	**58.25**	**67.12**	**76.33**	**86.50**	**95.50**
Term Loan	Rs. Crores	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31	-
Working Capital Loan	Rs. Crores	2.99	3.29	3.47	3.47	3.47	3.47	3.46	3.46	3.46
Total Loan Funds	**Rs. Crores**	**47.53**	**42.08**	**36.52**	**30.77**	**25.02**	**19.27**	**13.52**	**7.77**	**3.46**
Total Sources of Funds	**Rs. Crores**	**74.38**	**75.69**	**78.06**	**80.49**	**83.27**	**86.39**	**89.85**	**94.27**	**98.96**
Application of Funds										
Gross Fixed Assets	Rs. Crores	67.53	67.53	67.53	67.53	67.53	67.53	67.53	67.53	67.53
Cumulative Depreciation	Rs. Crores	1.24	3.74	6.24	8.74	11.24	13.74	16.23	18.73	21.23
Net Fixed Assets	**Rs. Crores**	**66.29**	**63.79**	**61.29**	**58.79**	**56.29**	**53.79**	**51.30**	**48.80**	**46.30**
Investments	**Rs. Crores**	-	-	-	-	-	-	-	-	-
Current Assets, Liabilities and Provisions										
Inventories	*Rs. Crores*	*1.39*	*1.63*	*1.72*	*1.73*	*1.74*	*1.75*	*1.76*	*1.77*	*1.78*
Spares and Consumables	*Rs. Crores*	-	-	-	-	-	-	-	-	-
Receivables	*Rs. Crores*	*2.94*	*3.13*	*3.31*	*3.31*	*3.31*	*3.31*	*3.31*	*3.31*	3.31
Cash	*Rs. Crores*	*4.11*	*7.51*	*12.14*	*17.07*	*22.36*	*27.98*	*33.94*	*40.86*	48.05
Current Assets	***Rs. Crores***	***8.45***	***12.28***	***17.17***	***22.12***	***27.41***	***33.04***	***39.01***	***45.94***	***53.15***
Creditors	*Rs. Crores*	*0.36*	*0.38*	*0.41*	*0.42*	*0.43*	*0.44*	*0.46*	*0.47*	0.48
Current Liabilities	***Rs. Crores***	***0.36***	***0.38***	***0.41***	***0.42***	***0.43***	***0.44***	***0.46***	***0.47***	**0.48**
Net Current Assets	**Rs. Crores**	**8.09**	**11.90**	**16.77**	**21.70**	**26.98**	**32.60**	**38.56**	**45.47**	**52.67**
Miscellaneous Expenses Written Off	Rs. Crores	-	-	-	-	-	-	-	-	-
Total Application of Funds	**Rs. Crores**	**74.38**	**75.69**	**78.06**	**80.49**	**83.27**	**86.39**	**89.85**	**94.27**	**98.96**

Cash Flow Statement

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Sources of Funds												
PAT	Rs. Crores	-	-	2.87	6.76	7.93	8.18	8.53	8.87	9.21	10.17	9.00
Depreciation	Rs. Crores	-	-	1.24	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Expenses Written Off	Rs. Crores	-	-	-	-	-	-	-	-	-	-	-
Increase in Equity	Rs. Crores	7.23	12.60	4.16	-	-	-	-	-	-	-	-
Increase in Term Loan	Rs. Crores	13.42	23.40	7.72	-	-	-	-	-	-	-	-
Increase in Working Capital Loan	Rs. Crores	-	-	2.99	0.30	0.19	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Total Sources of Funds	**Rs. Crores**	**20.65**	**36.00**	**18.97**	**9.56**	**10.62**	**10.68**	**11.03**	**11.37**	**11.71**	**12.66**	**11.50**
Application of Funds												
Increase in Gross Fixed Assets	Rs. Crores	20.65	36.00	10.88	-	-	-	-	-	-	-	-
Increase in Working Capital	Rs. Crores	-	-	3.98	0.40	0.25	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Other Payments	Rs. Crores	-	-	-	-	-	-	-	-	-	-	-
Repayment of Term Loan	Rs. Crores	-	-	-	5.75	5.75	5.75	5.75	5.75	5.75	5.75	4.31
Total Application of Funds	**Rs. Crores**	**20.65**	**36.00**	**14.86**	**6.15**	**5.99**	**5.74**	**5.74**	**5.74**	**5.74**	**5.74**	**4.31**
Net Cash Flow	Rs. Crores	-	-	4.11	3.41	4.62	4.94	5.28	5.62	5.96	6.92	7.19
Opening Balance	Rs. Crores	-	-	-	4.11	7.51	12.14	17.07	22.36	27.98	33.94	40.86
Closing Balance	Rs. Crores	-	-	4.11	7.51	12.14	17.07	22.36	27.98	33.94	40.86	48.05

Depreciation

Depreciation - The Company Act - Straight Line Method

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Gross Fixed Asset	**Rs. Crores**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**
Land	Rs. Crores	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05
Building and Civil Work	Rs. Crores	13.11	13.11	13.11	13.11	13.11	13.11	13.11	13.11	13.11
Plant and Machinery	Rs. Crores	47.99	47.99	47.99	47.99	47.99	47.99	47.99	47.99	47.99
Miscellaneous Fixed Assets	Rs. Crores	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Depreciation	**Rs. Crores**	**1.24**	**2.50**	**2.50**	**2.50**	**2.50**	**2.50**	**2.50**	**2.50**	**2.50**
Land	Rs. Crores	-	-	-	-	-	-	-	-	-
Building and Civil Work	Rs. Crores	0.26	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Plant and Machinery	Rs. Crores	0.95	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92
Miscellaneous Fixed Assets	Rs. Crores	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cumulative Depreciation	**Rs. Crores**	**1.24**	**3.74**	**6.24**	**8.74**	**11.24**	**13.74**	**16.23**	**18.73**	**21.23**
Land	Rs. Crores	-	-	-	-	-	-	-	-	-
Building and Civil Work	Rs. Crores	0.26	0.78	1.31	1.83	2.36	2.88	3.41	3.93	4.46
Plant and Machinery	Rs. Crores	0.95	2.87	4.79	6.71	8.63	10.55	12.47	14.39	16.31
Miscellaneous Fixed Assets	Rs. Crores	0.03	0.08	0.14	0.19	0.25	0.30	0.36	0.41	0.47
Net Fixed Asset	**Rs. Crores**	**66.29**	**63.79**	**61.29**	**58.79**	**56.29**	**53.79**	**51.30**	**48.80**	**46.30**
Land	Rs. Crores	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05
Building and Civil Work	Rs. Crores	12.85	12.33	11.80	11.28	10.76	10.23	9.71	9.18	8.66
Plant and Machinery	Rs. Crores	47.04	45.12	43.20	41.28	39.36	37.44	35.52	33.60	31.68
Miscellaneous Fixed Assets	Rs. Crores	1.35	1.29	1.24	1.18	1.13	1.07	1.02	0.96	0.91

Depreciation - Income Tax Act - Written Down Value Method

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Gross Fixed Asset	**Rs. Crores**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**	**67.53**
Land	Rs. Crores	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05
Building and Civil Work	Rs. Crores	13.11	13.11	13.11	13.11	13.11	13.11	13.11	13.11	13.11
Plant and Machinery	Rs. Crores	47.99	47.99	47.99	47.99	47.99	47.99	47.99	47.99	47.99
Miscellaneous Fixed Assets	Rs. Crores	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Depreciation	**Rs. Crores**	**3.63**	**8.20**	**7.03**	**6.03**	**5.18**	**4.45**	**3.82**	**3.29**	**2.83**
Land	Rs. Crores	-	-	-	-	-	-	-	-	-
Building and Civil Work	Rs. Crores	0.48	1.26	1.14	1.02	0.92	0.83	0.75	0.67	0.60
Plant and Machinery	Rs. Crores	3.08	6.74	5.73	4.87	4.14	3.52	2.99	2.54	2.16
Miscellaneous Fixed Assets	Rs. Crores	0.07	0.19	0.17	0.14	0.12	0.10	0.09	0.07	0.06
Cumulative Depreciation	**Rs. Crores**	**3.63**	**11.83**	**18.86**	**24.89**	**30.07**	**34.51**	**38.34**	**41.62**	**44.45**
Land	Rs. Crores	-	-	-	-	-	-	-	-	-
Building and Civil Work	Rs. Crores	0.48	1.74	2.88	3.90	4.82	5.65	6.40	7.07	7.67
Plant and Machinery	Rs. Crores	3.08	9.82	15.54	20.41	24.55	28.06	31.05	33.59	35.75
Miscellaneous Fixed Assets	Rs. Crores	0.07	0.27	0.44	0.58	0.70	0.80	0.88	0.96	1.02
Net Fixed Asset	**Rs. Crores**	**63.90**	**55.70**	**48.67**	**42.64**	**37.46**	**33.02**	**29.19**	**25.91**	**23.08**
Land	Rs. Crores	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05
Building and Civil Work	Rs. Crores	12.64	11.37	10.23	9.21	8.29	7.46	6.72	6.04	5.44
Plant and Machinery	Rs. Crores	44.91	38.18	32.45	27.58	23.45	19.93	16.94	14.40	12.24
Miscellaneous Fixed Assets	Rs. Crores	1.30	1.10	0.94	0.80	0.68	0.58	0.49	0.42	0.35

Term Loan Schedule

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Interest Rate	%	10.25%	10.25%	10.25%	10.25%	10.25%	10.25%	10.25%	10.25%	10.25%	10.25%	10.25%
Annual Summary												
Opening Balance	Rs. Crores	-	13.42	36.82	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31
Addition during the Period	Rs. Crores	13.42	23.40	7.72	-	-	-	-	-	-	-	-
Repayment during the Period	Rs. Crores	-	-	-	5.75	5.75	5.75	5.75	5.75	5.75	5.75	4.31
Closing Balance	Rs. Crores	13.42	36.82	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31	-
Interest for the Period	Rs. Crores			2.28	4.27	3.68	3.09	2.50	1.91	1.33	0.74	0.17
Quarter 1												
Opening Balance	Rs. Crores		13.42	36.82	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31
Addition during the Period	Rs. Crores		5.85	3.86								
Repayment during the Period	Rs. Crores				1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
Closing Balance	Rs. Crores	-	19.27	40.68	43.10	37.36	31.61	25.86	20.12	14.37	8.62	2.87
Interest for the Period	Rs. Crores	-	0.42	0.99	1.12	0.98	0.83	0.68	0.53	0.39	0.24	0.09
Quarter 2												
Opening Balance	Rs. Crores	-	19.27	40.68	43.10	37.36	31.61	25.86	20.12	14.37	8.62	2.87
Addition during the Period	Rs. Crores		5.85	3.86								
Repayment during the Period	Rs. Crores				1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
Closing Balance	Rs. Crores	-	25.12	44.54	41.67	35.92	30.17	24.43	18.68	12.93	7.18	1.44
Interest for the Period	Rs. Crores	-	0.57	1.09	1.09	0.94	0.79	0.64	0.50	0.35	0.20	0.06
Quarter 3												
Opening Balance	Rs. Crores	-	25.12	44.54	41.67	35.92	30.17	24.43	18.68	12.93	7.18	1.44
Addition during the Period	Rs. Crores	-	5.85									
Repayment during the Period	Rs. Crores			-	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
Closing Balance	Rs. Crores	-	30.97	44.54	40.23	34.48	28.74	22.99	17.24	11.49	5.75	-
Interest for the Period	Rs. Crores	-	0.72	1.14	1.05	0.90	0.75	0.61	0.46	0.31	0.17	0.02
Quarter 4												
Opening Balance	Rs. Crores	-	30.97	44.54	40.23	34.48	28.74	22.99	17.24	11.49	5.75	-

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Addition during the Period	Rs. Crores	13.42	5.85									
Repayment during the Period	Rs. Crores			-	1.44	1.44	1.44	1.44	1.44	1.44	1.44	
Closing Balance	Rs. Crores	13.42	36.82	44.54	38.79	33.05	27.30	21.55	15.80	10.06	4.31	-
Interest for the Period	Rs. Crores	0.34	0.87	1.14	1.01	0.87	0.72	0.57	0.42	0.28	0.13	-

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NPV and IRR Calculations

Description	Unit	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
Initial Cash Outflow												
Capital Investment	Rs. Crores	-20.65	-36.00	-10.88	-	-	-	-	-	-	-	-
Margin Money	Rs. Crores	-	-	-1.00	-	-	-	-	-	-	-	-
Total Initial Cash Outflow	**Rs. Crores**	**-20.65**	**-36.00**	**-11.88**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Operating Cash Flow	**Rs. Crores**											
PAT	Rs. Crores	-	-	2.87	6.76	7.93	8.18	8.53	8.87	9.21	10.17	9.00
Depreciation	Rs. Crores	-	-	1.24	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Expenses Written Off	Rs. Crores	-	-	-	-	-	-	-	-	-	-	-
Interest Coverage	Rs. Crores	-	-	1.93	3.66	3.21	2.71	2.24	1.78	1.32	0.91	0.37
Total Operating Cash Flow	**Rs. Crores**	**-**	**-**	**6.04**	**12.91**	**13.64**	**13.39**	**13.27**	**13.15**	**13.03**	**13.58**	**11.88**
Terminal Cash Flow												
Salvage Value	Rs. Crores											46.30
Working Capital	Rs. Crores											52.67
Total Terminal Cash Flow	**Rs. Crores**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**98.96**
Net Cashflow	**Rs. Crores**	**-20.65**	**-36.00**	**-5.84**	**12.91**	**13.64**	**13.39**	**13.27**	**13.15**	**13.03**	**13.58**	**110.84**
NPV	Rs. Crores	30.75										
IRR	%	18.71%										
Post-tax Cost of Capital	%	10.65%										

DSCR

Description	Unit	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31
PAT	Rs. Crores	2.87	6.76	7.93	8.18	8.53	8.87	9.21	10.17	9.00
Depreciation	Rs. Crores	1.24	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Expenses Written Off	Rs. Crores	-	-	-	-	-	-	-	-	-
Interest on Term Loan	Rs. Crores	2.28	4.27	3.68	3.09	2.50	1.91	1.33	0.74	0.17
Total	**Rs. Crores**	**6.39**	**13.53**	**14.11**	**13.78**	**13.53**	**13.28**	**13.03**	**13.40**	**11.67**
Interest on Term Loan	Rs. Crores	2.28	4.27	3.68	3.09	2.50	1.91	1.33	0.74	0.17
Repayment for the Period	Rs. Crores	-	5.75	5.75	5.75	5.75	5.75	5.75	5.75	4.31
Total	**Rs. Crores**	**2.28**	**10.02**	**9.43**	**8.84**	**8.25**	**7.66**	**7.07**	**6.48**	**4.48**
DSCR	Ratio	2.80	1.35	1.50	1.56	1.64	1.73	1.84	2.07	2.61
Average DSCR	**Ratio**	**1.75**								

Annexure 2 – Company Documents

Certificate of Incorporation

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF CORPORATE AFFAIRS

Central Registration Centre

Certificate of Incorporation

[Pursuant to sub-section (2) of section 7 and sub-section (1) of section 8 of the Companies Act, 2013 (18 of 2013) and rule 18 of the Companies (Incorporation) Rules, 2014]

I hereby certify that HUTAH INDUSTRIES PRIVATE LIMITED is incorporated on this Fourth day of November Two thousand twenty under the Companies Act, 2013 (18 of 2013) and that the company is limited by shares.

The Corporate Identity Number of the company is U40108NL2020PTC013541.

The Permanent Account Number (PAN) of the company is **AAFCH5266F** *

The Tax Deduction and Collection Account Number (TAN) of the company is **SHLH01718D** *

Given under my hand at Manesar this Fourth day of November Two thousand twenty .

DS MINISTRY OF CORPORATE AFFAIRS 6

Digital Signature Certificate
ALOK TANDON
Deputy Registrar Of Companies
For and on behalf of the Jurisdictional Registrar of Companies
Registrar of Companies
Central Registration Centre

Disclaimer: This certificate only evidences incorporation of the company on the basis of documents and declarations of the applicant(s). This certificate is neither a license nor permission to conduct business or solicit deposits or funds from public. Permission of sector regulator is necessary wherever required. Registration status and other details of the company can be verified on www.mca.gov.in

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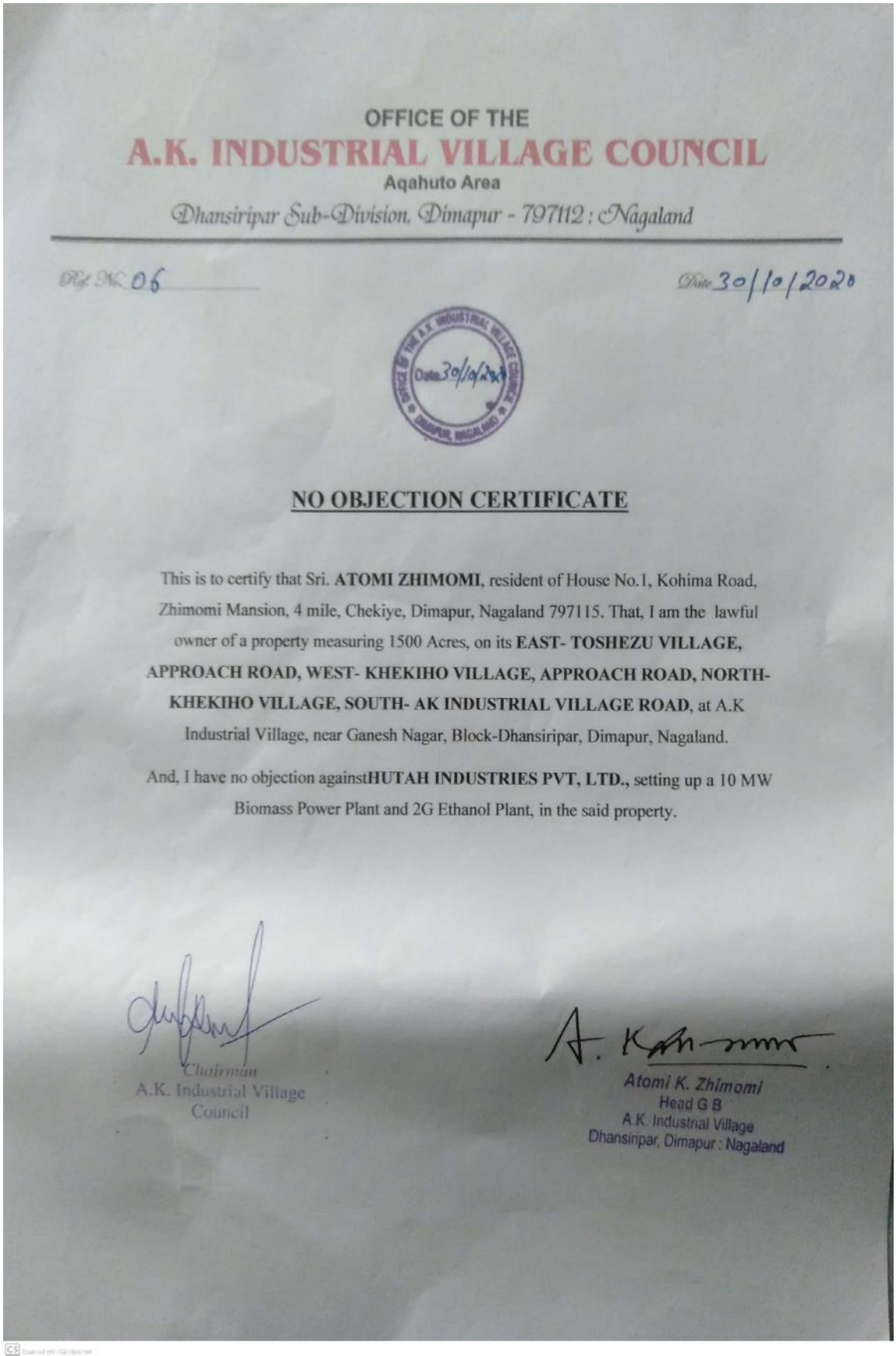
Mailing Address as per record available in Registrar of Companies office:

HUTAH INDUSTRIES PRIVATE LIMITED
H.NO 125, THAHEKHU VILLAGE,, NEAR LOCAL GROUND,,
DIMAPUR, Dimapur, Nagaland, India, 797103

* as issued by the Income Tax Department

No Objection Certificate from Local Council



OFFICE OF THE

A.K. INDUSTRIAL VILLAGE COUNCIL

Aqahuto Area

Dhansiripar Sub-Division, Dimapur - 797112 : Nagaland

Ref No 06 Date 30/10/2020

NO OBJECTION CERTIFICATE

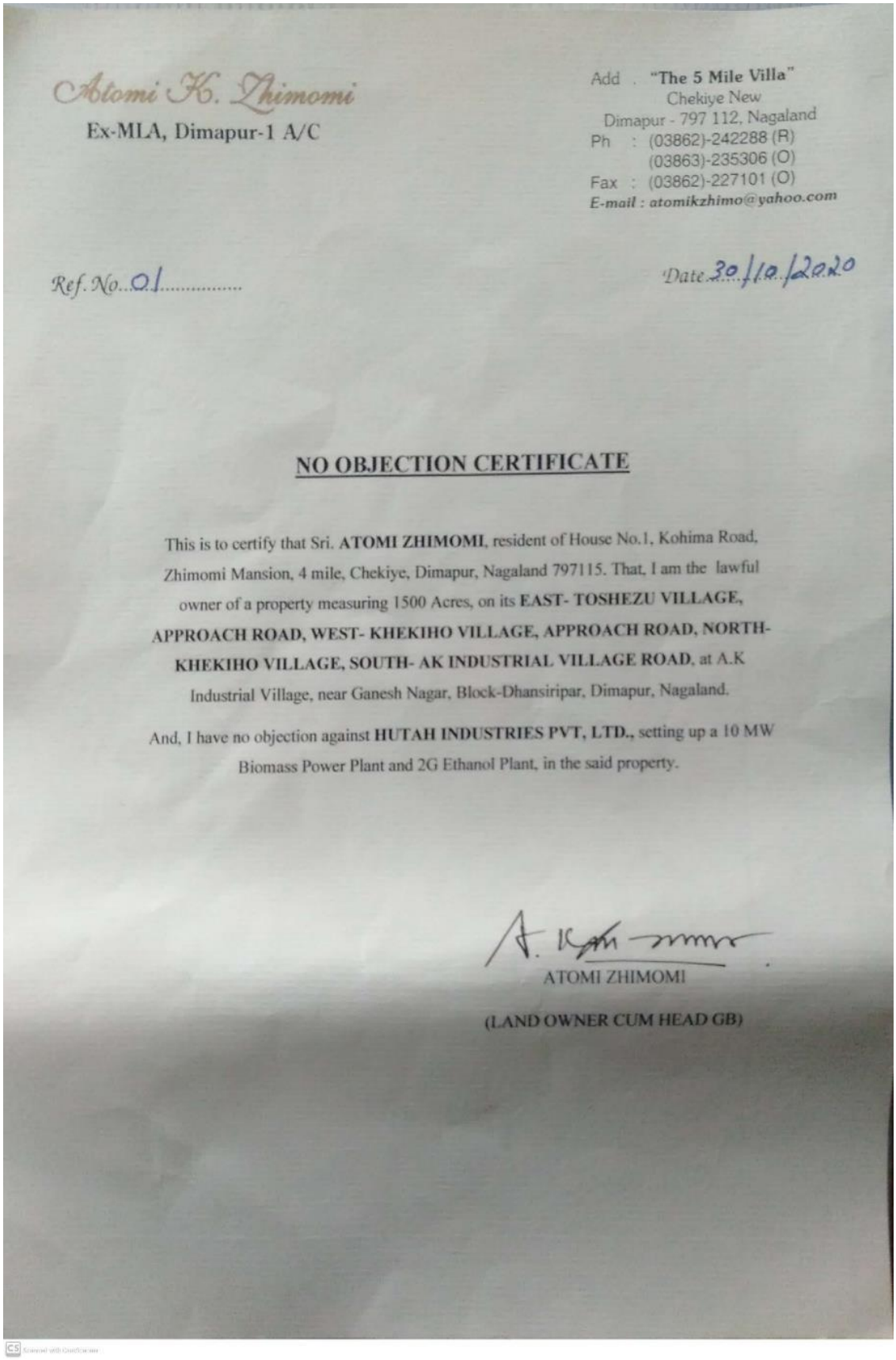
This is to certify that Sri. **ATOMI ZHIMOMI**, resident of House No.1, Kohima Road, Zhimomi Mansion, 4 mile, Chekiye, Dimapur, Nagaland 797115. That, I am the lawful owner of a property measuring 1500 Acres, on its **EAST- TOSHEZU VILLAGE, APPROACH ROAD, WEST- KHEKIHO VILLAGE, APPROACH ROAD, NORTH-KHEKIHO VILLAGE, SOUTH- AK INDUSTRIAL VILLAGE ROAD**, at A.K Industrial Village, near Ganesh Nagar, Block-Dhansiripar, Dimapur, Nagaland.

And, I have no objection against**HUTAH INDUSTRIES PVT, LTD.,** setting up a 10 MW Biomass Power Plant and 2G Ethanol Plant, in the said property.

Chairman
A.K. Industrial Village
Council

Atomi K. Zhimomi
Head G B
A.K. Industrial Village
Dhansiripar, Dimapur : Nagaland

No Objection Certificate from Land Owner



Atomi K. Zhimomi
Ex-MLA, Dimapur-1 A/C

Add . "The 5 Mile Villa"
Chekiye New
Dimapur - 797 112, Nagaland
Ph : (03862)-242288 (R)
(03863)-235306 (O)
Fax : (03862)-227101 (O)
E-mail : atomikzhimo@yahoo.com

Ref. No. 01

Date 30/10/2020

NO OBJECTION CERTIFICATE

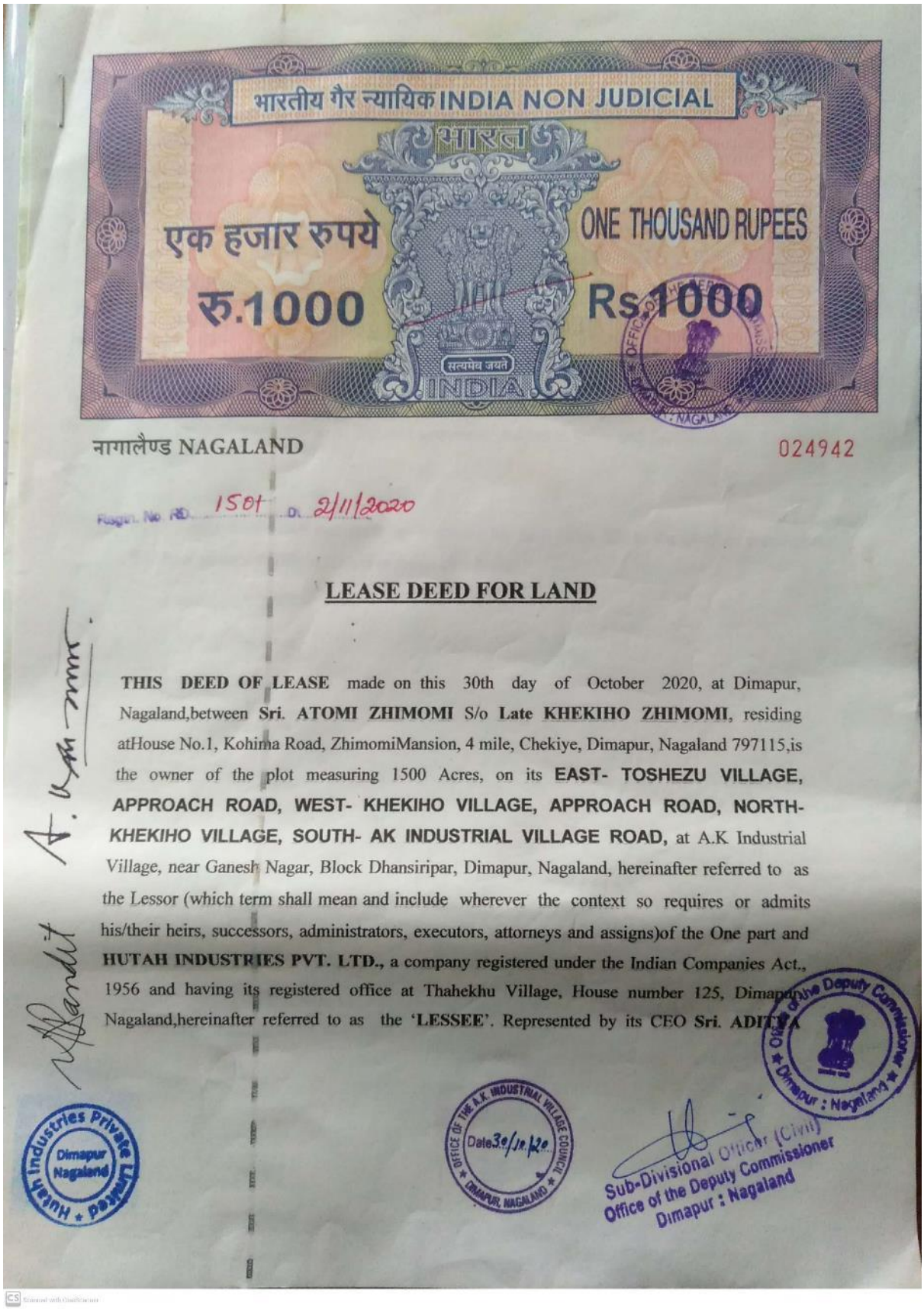
This is to certify that Sri. **ATOMI ZHIMOMI**, resident of House No.1, Kohima Road, Zhimomi Mansion, 4 mile, Chekiye, Dimapur, Nagaland 797115. That, I am the lawful owner of a property measuring 1500 Acres, on its **EAST- TOSHEZU VILLAGE, APPROACH ROAD, WEST- KHEKIHO VILLAGE, APPROACH ROAD, NORTH- KHEKIHO VILLAGE, SOUTH- AK INDUSTRIAL VILLAGE ROAD**, at A.K Industrial Village, near Ganesh Nagar, Block-Dhansiripar, Dimapur, Nagaland.

And, I have no objection against **HUTAH INDUSTRIES PVT, LTD.**, setting up a 10 MW Biomass Power Plant and 2G Ethanol Plant, in the said property.

ATOMI ZHIMOMI

(LAND OWNER CUM HEAD GB)

Land Lease Papers



भारतीय गैर न्यायिक INDIA NON JUDICIAL

भारत

एक हजार रुपये ONE THOUSAND RUPEES

रु.1000 Rs.1000

सत्यमेव जयते

INDIA

नागालैण्ड NAGALAND 024942

Regn. No. RD 1501 Dt. 2/11/2020

LEASE DEED FOR LAND

THIS DEED OF LEASE made on this 30th day of October 2020, at Dimapur, Nagaland,between **Sri. ATOMI ZHIMOMI** S/o **Late KHEKIHO ZHIMOMI**, residing atHouse No.1, Kohima Road, ZhimomiMansion, 4 mile, Chekiye, Dimapur, Nagaland 797115,is the owner of the plot measuring 1500 Acres, on its **EAST- TOSHEZU VILLAGE, APPROACH ROAD, WEST- KHEKIHO VILLAGE, APPROACH ROAD, NORTH- KHEKIHO VILLAGE, SOUTH- AK INDUSTRIAL VILLAGE ROAD,** at A.K Industrial Village, near Ganesh Nagar, Block Dhansiripar, Dimapur, Nagaland, hereinafter referred to as the Lessor (which term shall mean and include wherever the context so requires or admits his/their heirs, successors, administrators, executors, attorneys and assigns)of the One part and **HUTAH INDUSTRIES PVT. LTD.,** a company registered under the Indian Companies Act., 1956 and having its registered office at Thahekhu Village, House number 125, Dimapur, Nagaland,hereinafter referred to as the '**LESSEE**'. Represented by its CEO **Sri. ADITYA**

Hutah Industries Private Limited Dimapur Nagaland

OFFICE OF THE A.K. INDUSTRIAL VILLAGE COUNCIL Date 30/10/20 DIMAPUR, NAGALAND

Office of the Deputy Commissioner Dimapur : Nagaland

Sub-Divisional Officer (Civil)
Office of the Deputy Commissioner
Dimapur : Nagaland

PANDIT s/o **Sri .S.K PANDIT** resident of 228-2A Saket Nagar, Bhopal, Madhya Pradesh-462024, Authorized signatory as per the Resolution passed by the Board of Directors.

WHEREAS the Lessor is the exclusive owner of piece of landsituated at A.K Industrial village, near Ganesh Nagar, block Dhansiripar, Dimapur, Nagaland, hereinafter referred to as the demised premises.

AND WHEREAS the Lessor has agreed to grant to the Lessee a lease in respect of the said premises for a period of 99 years, vide Agreement of premises lease dated 30th October, 2020 hereinafter referred to as "the said agreement" subject to terms and conditions laid down in the said agreement.

AND WHEREAS the lessor has made out his marketable title to the demised premises free from all encumbrances, claims or reasonable doubts.

NOW THIS DEED WITNESSETH AS FOLLOWS:

1. The lease of the plot shall at no point create any ownership rights in favour of the **LESSEE** and the ownership of the land shall remain with the **LESSOR.**
2. That the plot/land has been allotted to LESSEE by LESSOR for setting up of Biomass Power Plant and 2G Ethanol Plant.
3. The Lessor hereby demise unto the lessee the demised premises, to hold the demised premises unto the Lessee (and his heirs, executors,

Hutah Industries Private Limited Dimapur Nagaland

Office of the A.K. Industrial Village Committee Dimapur, Nagaland Date 24/1/20

Office of the Deputy Commissioner Dimapur : Nagaland

administrators and assigns) for a period of 99 years commencing from the 30th day of October, 2020, at a yearly rent of the year for which it is due, the first of such yearly rent shall be paid on 30th January and the subsequent rent to be paid on or before the 30th January day of every succeeding year regularly.

4. This lease for purposes of payment of rent and period of lease shall be deemed to have commenced from the signing of this deed by both the parties.

5. This lease shall be in force for a period of 99 years certain from 30th of October 2020. The Lessee shall, however, have the option to continue the lease thereafter for a further period with the permission from the Lessor. The Lessee shall be at liberty to vacate the "Said Premises or part thereof" at any time during the period of lease on giving 3 month/s notice.

6. The Lessee shall pay to the Lessor/s in respect of the 'said premises' a yearly rental of Rs.10000000 (Rupees One Crore only/) for the option period ofleasepayable beforethe end of the financial year.

7. The Lessee shall be at liberty to under-lease / sub-lease the 'said premises' or part thereof to any of its subsidiaries or to any other party, with prior permission from the Lessor.

8. The Lessee shall have the right to utilise the leased premises or part thereof for any of their various needs.

9. The Lessor shall grant all rights of way, water, air, light and privy and other easements appertaining to the 'said premises'.

10. The Lessee shall have the absolute & exclusive right to use the entire space in 'said premises' both outside and inside for making full use of frontages and the side walls in displaying Lessee's signboards / advertisements without any additional charges to the exclusion of third parties. If anybody causes any intrusion, trespass or encroachment restricting the peaceful enjoyment of the Lessee over the space which is specifically meant for usage of the Lessee, the Lessor on receipt of such Notice from the Lessee shall take all possible legal actions against such violations including criminal action, if necessary. If the Lessor fails to take legal recourse to remove such intrusions, trespass or encroachments within one month from the date of receipt of such Notice from the Lessee, the Lessee shall be at liberty to

Hutah Industries Private Limited Dimapur Nagaland

OFFICE OF THE A.K. INDUSTRIAL VILLAGE COUNCIL Date 30/10/20 DIMAPUR, NAGALAND

Office of the Deputy Commissioner Dimapur : Nagaland

legal action against the violators and recover the cost / expenses incurred for such removal out of the rent payable to the Lessor or from any other monies payable to the Lessor."

11. The Lessee shall be liable to pay all charges for electricity and water actually consumed by the Lessee during the occupation and calculated as per the readings recorded by the respective metres installed in the `said premises'.

12. The Lessee may at their cost and expenses construct any additional structure/ building for the purpose of setting up unit/project in the 'said premises'.

13. The Lessee shall hand over possession of the `said premises' to the Lessor on the expiry of the period of lease fixed herein or on the expiry of the period of option should the Lessee avail itself of the same and on refund of deposit made by the Lessee, if any, in the same state and condition as on the date of occupation but subject to natural wear and tear due to ordinary use and lapse of time.

14. It is hereby agreed that if default is made by the lessee in payment of the rent for three years, or in observance and performance of any of the covenants and stipulations hereby contained and on the part to be observed and performed by the lessee, then on each such default, the lessor shall be entitled in addition to or in the alternative to any other remedy that may be available to him at his discretion, to terminate the lease and eject the lessee from the premises demised and from the building, that may have been constructed thereon; and to take possession thereof as full and absolute owner thereof, provided that a notice in writing shall be given by the lessor to the lessee of his intention to terminate the lease and to take possession of the demised premises but if the arrears of rent are paid or the lessee comply with or carry out the covenants and conditions or stipulations, within thirty days from the service of such notice, then the lessor shall not be entitled to take possession of the said premises and building.

15. This Lease Deed shall be executed in duplicate. The original shall be retained by the Lessor and the duplicate by the Lessee.

16. The stamp duty and all other expenses in respect of this Lease Deed and duplicate thereof shall be borne and paid by the Lessee.

Hutah Industries Private Limited * Dimapur Nagaland *

* OFFICE OF THE A.K. INDUSTRIAL RELEASE COUNCIL * DIMAPUR, NAGALAND * Date 20/10/20

* Office of the Deputy Commissioner * Dimapur ; Nagaland *

17. Any disputes, claims, questions or differences arising in relation to this deed, its construction, validity, performance, breach or any other question shall be referred to the Indian Chamber of Commerce for settlement by Arbitration or Conciliation and the decision of the said Arbitrator shall be final and binding on both the parties

SCHEDULE OF THE PROPERTY

(Here enter the boundaries and other details of premises leased out).

In witness whereof the parties hereto have set their hands hereunto in full agreement of the terms and conditions set-forth herein above the day and year hereinbefore first mentioned.

LESSOR / S

WITNESSESS

(1). ANATO

(2). MARKUS

Hutah Industries Private Limited Dimapur Nagaland

LESSEE

OFFICE OF THE A.K. INDUSTRIAL VILLAGE COUNCIL Date 30/10/20 DIMAPUR, NAGALAND

Office of the Deputy Commissioner Dimapur : Nagaland

Intentionally Left Blank for Notes