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Factors Affecting Oil Palm EFB Pellet Price

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Abstract: EFB pellet is becoming more and more popular in Malaysia, Indonesia and Thailand. Analysis on the factors affecting oil palm EFB pellet price will give customers a direct view on EFB pellet manufacturing.

There are many factors influencing EFB pellet price, such as raw material cost, fix

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asset investment, operation cost, and transportation etc. Before putting into production, pellet manufacturer should pay more attention to those essential factors, efficiency of the pellet production line and maintenance of the machinery.

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Palm EFB pellet product is becoming more and more popular in the renewable energy market, and due to its high heating energy and efficiency, it will sooner get the higher market share.

Apart from advantages of the products, the availability and pricing are another 2 important factors for determining whether EFB pellet could become a popular commodity. In order for the clients to know about this new renewable energy more directly, we would like to discuss about factors influencing Palm EFB pellet price.

1. Raw Material Cost

Firstly, there are three pieces of advice for clients taking into consideration before pelletizing Palm EFB:

No.1 Raw materials should be sufficient to ensure the continuity of pellet production.

No.2 Quality of the raw materials should be guaranteed. Raw materials with moisture content of 15%, is ideal while when it goes upper than 15%, the raw materials should be dried.

No.3 Location of the **EFB pellet plant** should be convenient for raw materials transportation.

The raw material for EFB pellet is empty fruit bunch discarded from crude palm oil mill. One kg of palm oil produced is accompanied by 4kg of oil palm biomass, such

as oil palm EFBs and oil palm trunks and fronds.

As for raw material cost, it should be the lowest raw material cost in the world due to usage of waste product EFB. EFB is bulky in volume in oil palm plantation areas, such as Malaysia, Indonesia, Thailand in South East Asia. While now the EFB has no more a free item from oil palm mill. EFB price has direct impacted to the EFB pellet price. Currently, EFB pellet manufacturer in Malaysia need to buy in order to acquire the EFB fibre from oil palm mill. In order to get the same amount of biomass, the buyer requires to buy 4 times more raw EFB fibre than the EFB pellet.

The economical value of 1t EFB as a mulch is only RM 14.40(RM refer to Ringgit, the monetary unit of Malaysia. 1USD=3.501RM), while EFB pellet as a fuel for power generation is higher than RM 49.81. The returns are more than 3.5 times! The gain would be substantially higher in those countries whose tariff for electricity is lower.

2. Fixed Asset Investment

Usually, in an entire EFB pellet production line the following equipment are involved:

EFB Shredder (to cut EFB into small pieces)

Dryer (to reduce the raw material's moisture to a suitable level-20%-25% for pelletizing)

Hammer Mill (to grind the small pieces of wood into nearly powdery form for easy pelletizing)

Pellet Mill (to process raw material into pellets)

Cooler (to cool down the output pellets to avoid accumulation of heat that may destroy pellets)

Sieving (to remove the dusts and crushed pellets)

Packing (to pack the pellets into bags of required sizes)

Electric Cabinet (to control equipment)

Major capital investment in a base scenario includes the whole production line mentioned above, storage and handling facilities, peripheral equipment, and miscellaneous equipment. Additional capital cost may include on-site grinding facilities, enhanced emission control system, etc.

The EFB pellet machine maintenance cost will also evenly added into the EFB pellet price. Meanwhile, pellet manufacturer will consider the pellet machine depreciation or amortization so that the amount also be added in part of the fixed cost. Depreciation is estimated by amortizing initial project capital cost under a fixed discount rate. Capital expenditure for plant and equipment varies by plant size, location and production process.

3. Operation Cost

Operation cost can be classified into several field, such as:

3.1 Manpower Cost

Generally, pellet plants require skilled labor, and the cost could be significant. The cost is determined by labor structure and hourly rate.

3.1.1 Labor structure

Labor structure is automatically increased depending on the plant capacity, since the number of workers required for operations depends on production rates. For instance, the model utilizes 3 production workers per shift for capacities below 2 tonne/hour, and 1 supervisor, forklift operator, and maintenance technician. For capacities higher than 2 tonne/hour, the model adds one more worker on each category per shift, for every 2 tonne/hour production increase. Administrative personnel are not dependent on production rate; thus, its number changes with the addition of a controller and accounting assistants for capacities higher than 100,000 tonne/year.

3.1.2 Hourly rate

Hourly rate of labor can vary by the unemployment rate and other demographics in different geographic locations. Under different assumptions, direct labor costs can vary from \$4 to \$40 per tonne pellet. Based on the assumption of 7 workers per shift and an hourly rate of \$20~30, and the assumption of operating 8400 hours per year, the cost of labor would be \$7.35/tonne pellet for a 200,000 tonne mill.

This information is summarized as a total annual cost of direct and indirect labor. Consumables costs for a pellet production facility are an important factor to be considered, and these were assumed to be directly linked to the production (no consumables were assumed for office and administrative labor). The direct and indirect labor force required for a 75,000 tonne/year plant totals 30 people over 3 shifts per day.

Considering that a pellet factory operates with few personnel, and that it was previously demonstrated that labor costs have a high impact on costs per metric tonne of pellets produced (Fig. 1), it becomes extremely important to adequately dimension, plan, and monitor the personnel needs of a pellet plant.

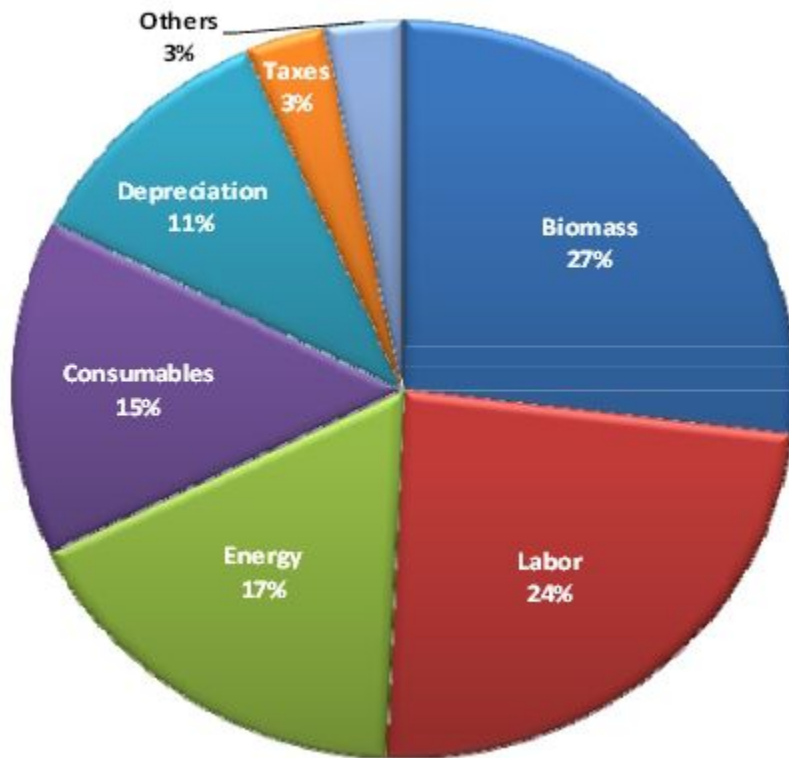
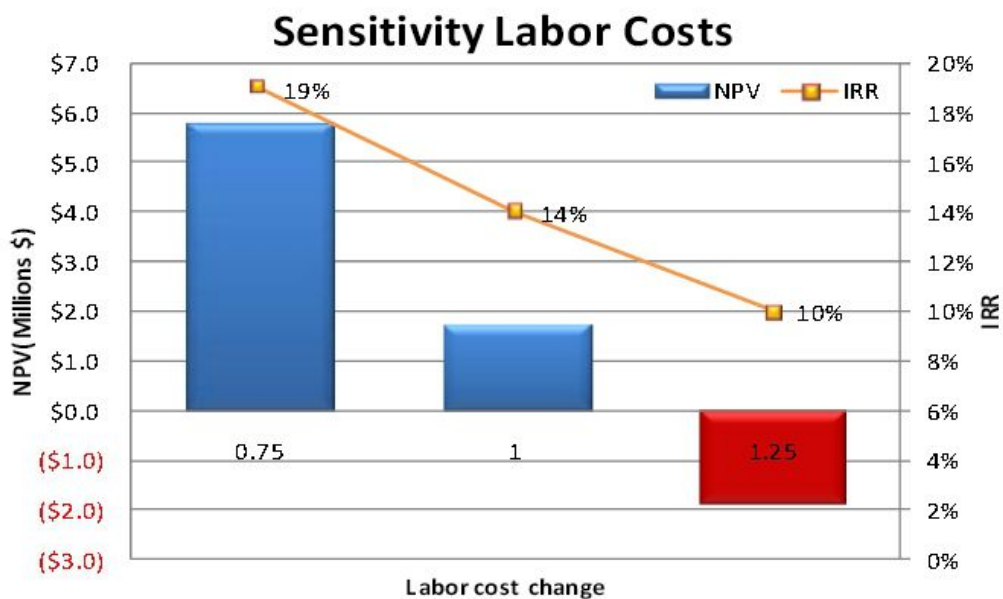


Fig. 1 Share costs of EFB pellets per ton



NPV: Net Present Value IRR: Internal Rate of Return

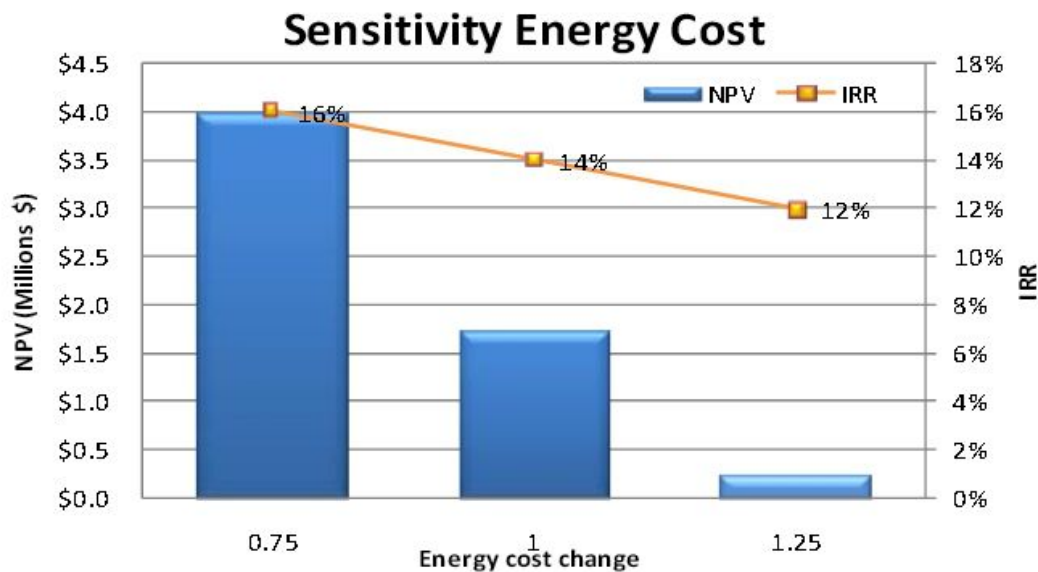
Fig. 2 Sensitivity of the pellet plant project to changes in labor costs

3.2 Energy Cost

Energy is a major plant operation cost due to the large amount of heat and electricity

required throughout the manufacturing process of drying, hammer milling, pelletizing and cooling. Drying consumes almost 70% of the total energy. Previous research suggest that per tonne pellet production requires approximately 400~600 Kwh of energy in total.

Electrical tariff is one of the main cost for operation, perhaps it affected the EFB pellet price significantly. Pellet machine requires huge electric current in order to press the EFB fiber into dense pellet. Malaysia is one of the low electric tariff country in south East Asia, and this is also one of the advantages to have high electric consumption plant being setup in low tariff country like Malaysia.



NPV: Net Present Value IRR: Internal Rate of Return

Fig. 3 Sensitivity of the project of Energy Costs

3.3 Packing Cost

The EFB pellet is packed under jumbo bag. A one ton bag can only load with 700kg of EFB pellet. Even though the jumbo bag does not directly affected the EFB pellet quality, it may reach certain quality for protecting the EFB pellet during the entire storage and handling stage.

3.4 Maintenance Cost

Costs for maintenance purposes include replacement of parts, shutdowns, and overhaul to extend useful life of major equipment. Maintenance costs for most facilities and equipment are around 2~3% of the capital costs except pellet and hammer mills, which can be as high as 10% due to more wear and tear. Total repairs and maintenance costs are estimated around \$5~6/tonne pellet

3.5 Supporting Cost

Even though the EFB pellet factory is highly automated, but there are many activities that need supporting facility, such as fork lift, shovel. This could also part of the operation cost which always neglected.

4. Transportation

Transportation fee is another pivotal factor influencing pellets price.

Assuming that pellets have to be loaded, hauled, and unloaded from the factory to retailers and distributors, with trucks loading 20 tonne/truck, and a traveling average distance of 50 miles, such as in America, this transportation cost is assumed to be similar to have a fixed element of \$15/tonne, and a variable element of \$0.12/mile, giving a total of \$15.3/tonne in the case study. This transportation element, added to the pellet price determined for a 14% IRR (rate of return), totaled \$244.3/tonne at the retailers/distributors gate. When comparing this price to an average retailer selling price of \$276/tonne for the U.S. internal market, a revenue margin of approximately \$31.7/tonne can be obtained by retailers. Based on the fact that the majority of factories in the U.S. are in the range of 70,000 tonne/year, similar to the 75,000 tonne/year assumed for the case study, it demonstrates that the wood pellets industry is profitable for both the majority of producers and distributors in the internal U.S.market.

5. Additional Costs

Additional costs include marketing and sales fees, and incentives, which accounts for marketing and sales costs for promotions, discounts, rebates, broker fees, placement fees, and other forms of compensation and incentives.

6. Tips

Before putting into production, pellet manufacturer should pay more attention on the below two aspects:

6.1 Efficiency of the Pellet Production Line

Choosing pellet line with high efficiency, long service life, great production capacity, and durable operating hours. All those are crucial elements for manufacturers to take into consideration when purchasing the pellet production line.

Pellet manufacturing is a race against time. If one machine can only run 8 hours per

day but others can operate 15 hours per day, others will absolutely make double profit than the previous one.

Pellet mill from many suppliers in China are with reasonable price and high quality. For customers, there are greater choices of the species, price and after-sale service.

6.2 Maintenance of the Machinery especially the Pellet Mill

Roller Adjustment

Accurate roller adjustment is necessary for maximum capacity and long die and roller life. Die breakage can result because of poor roll setting.

In the heat treating process, a certain amount of distortion occurs which leaves high spots on the face of the die. Both rollers should be adjusted so that when the die is turning at a low RPM, the rolls should hit the high spot only. This type of adjustment prevents excessive metal-to-metal contact between the roller and the die but exerts sufficient pressure to maintain high capacity.

Die Care

By following a few simple rules, die life will be prolonged.

You had better to use a plastic hammer or piece of wood rather than strike it with a hammer or drop it on a hard surface if force is necessary to install the die.

Magnets, sifters and other cleaning devices are vital to the life of a die - they are to be cleaned and checked regularly to make certain they are doing the job of removing metal and other material from feedstock.

Periodic inspection of the die for presence of foreign material is advisable. Also, when a die is removed from the pellet mill, store in a protected dry area to eliminate rust.