

## FEASIBILITY STUDY OF EXTRA NEUTRAL ALCOHOL DEVELOPMENT at PT. ENERGI AGRO NUSANTARA

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### ABSTRACT

*The aim of this study is to determine whether it is feasible or not the development of Extra Neutral Alcohol in PT. Energi Agro Nusantara. This study uses qualitative descriptive method which has a primary data source. This study was conducted at PT. Energi Agro Nusantara and also PT. Indo Acidatama as a benchmarking company. Legal Aspect, Technical Aspect, Market Aspect and Financial Aspect are the aspects that was studied in this study. Benchmarking study was conducted at PT. Indo Acidatama by interviewing one of company member that in charge in Marketing, the result is as confirmation of the data that was taken from internal data of PT Indo Acidatama and also from Published data of External Entities. The Result of this study are as follows. Legal Aspect are feasible with the formal letter that issued by Ministry of Industrial Affair. Technical aspect is feasible by upgrading several equipment. Marketing Aspect is feasible by implementing penetration pricing strategy to enter the market. Financial Aspect is feasible by checking the Internal Rate of Return, Payback Period, Net Present Value, Benefit Cost Ratio, Profitability Index and Break-Even Point meet the requirement.*

**Keywords** : Extra Neutral Alcohol, Feasibility Study, Sugar Industry

### INTRODUCTION

The sharp decreasing of oil price in the world will have a significant impact to the growth of renewable energy such as ethanol. At the beginning ethanol as an alternatives energy is at the first place to change the fossil fuel energy, but currently it has been affected by the decreasing of oil prices. At that time, the ethanol price is cheaper than the oil price that increasing significantly. Every country has the ambition to conduct research and arranging regulation to use the renewable energy sources such as ethanol to replace the price of fossil fuel that becoming expensive day by day. But today the ambition is different because of the fall of oil prices, and currently the ethanol price is becoming more expensive than the price of fossil fuel that is decreasing day by day.

PT. Energi Agro Nusantara (Enero) has been in ethanol fuel-grade market since 2014. Even though Enero committed to provide ethanol to fulfill the demand of fuel-grade ethanol in Indonesia, the oil company as the customers of Enero, has not implemented fuel-grade ethanol as the mixed of gasoline. Because of that reason, Enero exporting the product to the international market since 2014, but at the end of 2015, the molasses price was soaring high to Rp 1,800 per Kg, from Rp 1,000 per kg in 2013. It means the production cost is increasing sharply, the cost of raw material only is about Rp. 7,200 per liter of ethanol. In line with the fall of the ethanol price, Enero decided to stop the export because of the price of ethanol is lower than production cost itself.

The ambition of Indonesia in implementing the renewable energy such as fuel-grade ethanol, that has been regulated in Regulations of Energy and Minerals Ministry no 15 2015 cannot be implemented. Eneo has been appointed by government to provide fuel-grade ethanol to Pertamina. Pertamina itself has a doubt to implement offtake the ethanol because of cheaper oil prices currently. This condition increases the risk of fuel-grade ethanol continuity, hence Eneo as the producer of fuel-grade ethanol has to have strategy to ensure the sustainability of the company.

Eneo has no other choice than developing Extra Neutral Alcohol (ENA) to ensure the sustainability of the company, ENA is high-grade ethanol with the lowest impurities, its usage is very wide such as for cosmetics industry, food and beverages industry, perfume industry and pharmaceutical industry. By diversifying the product, Eneo will reduce the dependency to fuel market and ensure the operation stability of the plant, it means Eneo as a company will grow well.

## **LITERATURE REVIEW**

### **Previous Research**

Goncharuk, Anthony G. (2013) has conducted the research of benchmarking, organizational culture, strategic ideas, marketing business process and key marketing performance measures are becoming the object of benchmarking of the Ukrainian pharmaceutical companies. It has an aim to determine the best practices and possibilities of their use for the purpose of improving performance outcomes of companies participating in the research.

The Research showed that the differences of mission, vision and strategic aim are applied to the three pharmaceutical companies. Market takeover has become the strategic aim of global company while retaining their market position has become strategic aim of the local company.

The research showed that local company's management does not consider marketing as a driving force of the development and sales growth, that is why company lacks of marketing culture and marketing department as such has been substituted with sales and distribution department. The Authors find the urge of structural changes in order to develop, yield profit and avoid attainment by local pharmaceutical company using the better practice of the global companies

### **Feasibility Study**

A feasibility study has objectives to objectively and rationally discover the strengths and weaknesses of an existing business or proposed venture, opportunities and threats present in the [environment](#), the [resources](#) required to carry through, and ultimately the prospects for success. In its simplest terms, the two criteria to judge feasibility are [cost](#) required and [value](#) to be attained.

A good feasibility study has to provide a historical background of the business or project, a description of the [product](#) or [service](#), accounting statements, details of the [operations](#) and [management](#), [marketing studies](#) and policies, financial data, legal requirements and tax obligations. Generally, feasibility research predates technical development and [project](#) implementation.

A feasibility research to study the project for success; therefore, recognized objectivity is most important factor in the credibility of the study for potential investors and lending institutions. It must be conducted with an objective, unbiased approach to provide information upon which decisions can be used.

### **Financial Aspect**

Conducting feasibility study, financial aspect is the most important aspect. The Financial aspect providing quantitative indicator that will confirm whether the project is feasible or not. The indicator that will be used in financial aspect are as follow:

Net Present Value is an indicator of the profitability of an undertaking that is calculated by reducing the present values (PV) of cash outflows (including initial cost) from the present

values of cash inflows over period of time. Outgoing and Incoming cash flows can also be called as benefit and cost cash flows, respectively.

Benefit Cost Ratio is a parameter for cost-benefit analysis, that try to summarize the overall value for money of a project or proposal. A BCR is the project or proposal benefits ratio, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be stated in discounted present values. A BCR is a profitability index in for-profit contexts. Benefit cost ratio (BCR) takes into account the amount of monetary gain realized by performing a project versus the amount it costs to execute the project. The higher the BCR the better the investment. In general, is that the benefit is higher than the project cost is a well-design investment.

Payback period in [capital budgeting](#) refers to the period of time required to recoup the funds expended in an investment, or to reach the [break-even point](#).<sup>[1]</sup> For example, a \$1000 investment made at the start of year 1 which returned \$500 at the end of year 1 and year 2 respectively would have a two-year payback period. Payback period is usually expressed in years. Starting from investment year by calculating Net Cash Flow for each year: Net Cash Flow Year 1 = Cash Inflow Year 1 - Cash Outflow Year 1. Then Cumulative Cash Flow = (Net Cash Flow Year 1 + Net Cash Flow Year 2 + Net Cash Flow Year 3, etc.) Accumulate by year until Cumulative Cash Flow is a positive number: that year is the payback year.

The internal rate of return (IRR) is a tool of calculating return rate. The term *internal* is the fact that its calculation does not include external factors, such as [inflation](#) or the [cost of capital](#).

Profitability Index is the payoff ratio of investment of a project proposal. It is a good tool for ranked the projects because it allows you to quantify the amount of value created per unit of investment.

The break-even point (BEP) is the point at which revenue and expenses or cost are equal: there is no net loss or gain. A loss or a profit has not been made, although [opportunity costs](#) have been "paid" and capital has received the adjusted risk, expectation of return. Or it's the point in which the total revenue of a business exceeding its total costs, and the business begins to create wealth instead of consuming it.<sup>[1]</sup> It is shown graphically as the point where the total cost and total revenue curves meet. In the linear case, the break-even point is equal to the fixed costs divided by the [contribution margin](#) per unit.

The break-even point is gained when the profits generation match the total costs accumulate until the date of profit generation. Establishing the break-even point makes businesses in setting plans for the production level which it needs to maintain be profitable

### **Marketing Aspect**

Marketing aspect are related to the question whether there is still a market opportunity for the product. The aspects can be seen by several things such as:

- a. Market potential, valued by the shape of the market chosen
- b. Quantity of potential consumers, these quantities can be measured by measuring and forecasting the supply and demand of the current product.
- c. Purchase power by calculating the development and the growth of the citizen
- d. Segmentation, target and product positioning
- e. Current competition
- f. Customer satisfaction of the current product.
- g. Marketing Management, consist of competition analysis

### **Technical Aspect**

Based on Heizer and Render (2009), Production feasibility is to make sure whether the operation and production are feasible or not, on the daily routine operation and on the project basis. In terms of operation management, there are 3 things that has to be faced by the company,

the first one is company positioning, design, operation. The implication for the feasibility study is giving the information about product strategy, technology, production capacity, layout for manufacture, production planning and product quality and also daily operation

#### **Legal Aspect**

This aspect will check the validity of the document related to the project and the company itself, this document checking is very important to check whether the project against the law or not.

#### **RESEARCH METHODS**

This type of research is qualitative descriptive study by in-depth interview. This research is gathered the data directly. This research conducted at PT. Energi Agro Nusantara as the object and PT Indo Acidatama as the chosen benchmark company Indo Acidatama has been chosen to be benchmark company because of this company is the only ethanol producer that has been listed and one of the biggest ethanol plant in terms of production capacity in Indonesia, which its quantity is reaching about 200.000 Litre per day.

This study is using data collection method by in depth interview and observation. Data collection is interviewing the person that is expert as marketing in bioethanol and has been in this field for very long time.

This study is to compare the performance of Indo Acidatama with Energi Agro Nusantara

#### **RESULT AND DISCUSSION**

##### **Legal Aspect**

In Legal aspect, the ministry of industrial affairs has release the permit to develop the Ethanol Plant, with the details below :

1. Reducing the cost of production
  - a. By installing bio methanated spentwash to reduce the waste water volume
  - b. Conducting the integration of waste water treatment with the sugar mill
  - c. Installing Yeast Separation System
2. To increase revenue of the company
  - a. Installing CO<sub>2</sub> Recovery Plant, to produce Liquefied CO<sub>2</sub>
  - b. Bioethanol diversification, by producing industrial grade ethanol

With the permission from the ministry of industrial affair, the legal aspect is feasible.

##### **Technical Aspect**

Current existing plant has the weaknesses that has implication on ethanol plant for producing ENA, it is because of its contaminant that will create the high acidity that will produce defect ENA. The other weakness is a lot of inefficiency of energy and steam, a below standard yield that has consequences of low rate ENA production.

Considering the weaknesses above, there will be modification as follows :

1. Fermentation Section
  - Existing Fermentation Section will be converted to operate on PRAJ's Combiform Technology.
  - Existing Two Propagation Tanks will be operated as Yeast Vessel 4 with addition of New Coolers (PHEs) and Recirculation Pumps.
  - Existing Two Yeast Mud Tanks will be operated as Yeast Activation Vessels with addition of New Coolers (PHEs) and Recirculation Pumps.
  - Existing Six Fermentation Tanks will be operated as 'Biostat Reactors' along with its Accessories as it is.
  - Existing Three Storage Tanks will be operated as 'Chemostat Reactors' with addition of New Heat Exchangers and Recirculation Pumps.
  - Existing Single Storage Tank will be operated as 'Beer Well'.

- New Yeast Culturing System consisting of Yeast Vessel 1, Yeast Vessel 2 and Yeast Vessel 3 will be added along with its Accessories.
  - Existing Chiller based Cooling Water System will be discontinued and Fermentation will be operated on Cooling Water based System to reduce Steam and Power Consumption by Chiller System. Existing Cooling Tower Capacity is found to be sufficient for this Modification.
  - Piping & Valves, Instrumentation & Control and Electricals will be modified / replaced to suit the Modified Process Philosophy.
2. Distillation Section
- Existing Distillation System will be converted to PRAJ's Multi Pressure Technology to Reduce
  - Steam Consumption by 1.2-1.3 Kg/Lit i.e. approximately 30-35% Reduction.
  - New Analyser Column, Degasifying Column and Aldehyde Column with its Accessories will be added to Existing Distillation Section
  - Fermented Wash will be supplied to New Degasifying Column instead of Evaporation Section after preheating it with outgoing Partially Concentred Spent Wash from Modified Evaporation Section.
  - Existing 'Distillation Column' will be used as 'Pre-Rectifier Cum Exhaust Column' along with its Accessories.
  - Heat Energy required for Existing Pre-Rectifier Cum Exhaust Column will remain as it was before.
  - Heat Energy from Top of the Existing Pre-Rectifier Cum Exhaust Column will be used to Supply
  - Heat to Existing Evaporation Section which in turn Supply Heat to New Analyser Column.
  - Heat Energy from Top of the New Degasifying Column will be used to Heat the New Aldehyde Column and thus Aldehyde Column does not require Additional Steam Supply.
  - Newly supplied Analyser Column, Degasifying Column and Aldehyde Column will operate under Vacuum. Required Vacuum will be created by Newly supplied Vacuum Pumps.
  - New Alcohol Scrubber will be supplied to strip out the traces of Alcohol from the Outgoing Vapours to Vacuum Pump. Thus ensuring High Recovery of Alcohol
3. Evaporation Section
- Existing Evaporation Section will be operated on Spent Wash from New Analyser Column of Distillation Section instead of Fermented Wash.
  - Out of Existing Four Evaporators, only Two Evaporators will be in operation at any point of time. Other Two Evaporators will remain as Stand-by.
  - Out of Two Evaporators which are in Operation, One will operate on Heat supplied by Existing Pre-Rectifier Cum Exhaust Column and Other Evaporator will operate on Heat supplied by Low Pressure Steam, which in turn will provide Heat required for New Analyser Column.
  - At regular intervals, Evaporators will be cleaned and Stand-by Effects will be taken on operation to avoid long shut down of the entire plant.
  - Suitable changes to be made in pipe routing to integrate Modified Evaporation Section and Modified Distillation Section.

- Final Solid Concentration of Spent Wash will come down substantially, which shall be favorable to downstream Waste Water Treatment Plant i.e. Bio methanation.

By modifying the current existing plant, the technical aspect is feasible for developing ENA product.

### Market and Marketing Aspect

Current condition of the market in general is as below

1. Global market especially for Asia-Pacific, still need 1.5 Million Liter of ethanol, with the composition 63.9%=68.1% is ENA
2. Domestic Ethanol consumption is about 135-142 Million Liter just for ENA grade.

Marketing mix for ENA project are as follow:

1. Product  
ENA that will be produced is as higher purities than existing market
2. Price  
The Price that will be released to the market is lower than existing market, this has to be done because Ereno needs to penetrate the existing market, this strategy is possible because enero has the distribution channel of molasses as raw material which means it is easier to reduce cost and price.
3. Distribution Channel  
The Distribution channel will be through trader, and of course Ereno will start opening direct sales to end user
4. Promotion  
The promotion will be conducted in 2 ways which are exhibition and cold calling, because the customers will be for industries.

With the current condition of the market and the marketing mix strategy the Market Aspect is feasible for Ereno developing ENA.

### Financial Aspect

| No | Deskripsi                       | Perhitungan   | Parameter Penilaian                               | Parameter Proyek  |
|----|---------------------------------|---|---|-------------------|
| 1  | a Net Present Value (NPV)       | $NPV = C_0 + \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_t}{(1+r)^t}$ | > 0   | 37,213,537,590.50 |
|    | b Benefit Cost Ratio (BCR)      | $BCR = \frac{PV \text{ alira kas yang akan diterima}}{\text{Investasi Awal}}$         | > 1   | 1.64              |
|    | c Payback Period (PP)           | $PP = 1x \left( \frac{\text{Jumlah Investasi}}{\text{Jumlah Arus Kas Masuk}} \right)$ | < 16 (umur ekonomis mesin industri menurut pajak) | 3.04              |
| 2  | a Internal Rate of Return (IRR) | $IRR = -1_0 + \sum_{n=0}^N \frac{C_n}{(1+r)^n} = 0$                                   | > 10.25%  | 60.82%            |
|    | b Profitability Index (PI)      | $PI = \frac{\text{Nilai Aliran Kas Masuk}}{\text{Nilai Investasi}}$                   | > 1   | 1.64              |
|    | c Break Even Point (BEP)        | $BEP = \frac{\text{Fixed Cost}}{\text{Harga Jual} - \text{Variabel Cost}}$            | = 1 impas, < 1 laba                               | 0.22              |

The indicators above show that all of them meet the requirement, which means the Financial Aspect of Developing ENA is feasible

### CONCLUSION

Based on the overall feasibility study above, which are Legal Aspect, Technical Aspect, Market Aspect and Financial Aspect, it can be concluded that Developing ENA at Ereno is feasible, if all the assumption can be fulfilled.

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