Unlocking Additional Revenue by Early Deactivation of Condensate Processing Plant: Case Research in Banua Petroleum Company

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ABSTRACT

Banua Petroleum Company holds 20 years of Production Sharing Contract (PSC) to manage Oil and gas field in East Borneo field by Government. The field has been producing hydrocarbons (Natural Gas, Oil and Condensate) for over than 50 years and in its declining phase. By nature, production decline is inevitable even though new wells were drilled and being maintained properly, while production cost increases as the aging of production facility. Refer to production forecast, The Company will deactivate Condensate Processing Plant (CPP) at the end of 2033 as condensate production will be below turn down capacity. While Oil Processing Plant (OPP) can still operate, since oil production will still above turn-down capacity at least until 2038. This study will provide a thorough analysis of CPP’s early deactivation (in 2023) by diverting all condensate production to OPP (instead of CPP), to unlock additional revenue to The Company. Business situation analysis and project economic is done in this study by considering Oil & Condensate’s market price difference and cost of revenue structure changes. Project valuation are calculated by Discounted Cash Flow (DCF) by applying cost-recovery term of PSC. While the risk is assessed by performing simulating uncertainties of parameters and review its sensitivities to the outcome.

Keywords: Discounted Cash Flow, Facility Preservation, Project Valuation.

I. INTRODUCTION

Naturally, oil and gas production on from the well consists of a certain amount of natural gas, liquid (oil or condensate) and water. Since water cannot be monetized, it’s treated as per prevailing environmental regulation. While natural gas and its liquid production need to be separated and treated to meet buyer’s specification requirement.

In Banua Petroleum Company, the separation and treatment process technically be done by Gas Processing Plant (GPP), Oil Processing Plant (OPP) and Condensate Processing Plant (CPP). In general, Banua Petroleum Company’s production stream is as illustrated in Fig. 1.

Banua Petroleum Company sells processed natural gas (NG) to buyer via pipeline, while its treated oil production named BAO (Banua Oil) and its treated condensate production named BAC (Banua Condensate) are sold to buyers with different physical and chemical properties. Both BAO and BAC are sold with different market price refer to Indonesia Crude Price (ICP), although they’re generally following global oil price. As indicated by Fig. 2, BAC and BAO market price differs over time. As consequence, BAC & BAO market price fluctuation is one of determining factors that largely affects The Company’s revenue beside its sales volume (barrels).

The Company’s Reservoir Engineering team forecasted future production, by reservoir models taking into account CAPEX that will increase production figures, such as new wells drilling, and new processing facilities. OPEX that will increase production is taken into account also, such as a well-intervention/maintenance campaign. By adding all efforts expressed by the above-mentioned CAPEX and OPEX, Banua Petroleum Company’s production forecast is indicated in Fig. 3.

This forecast will be realized by Surface Facility Team that operates OPP & CPP where each consist of rotating equipment, power generation, steel pipes, tanks and other main equipment that works as design to deliver Natural Gas, BAC and BAO product to buyers. To keep OPP & CPP works as it supposed to be, OPEX need to be spent for surface facility’s preventive maintenance, corrective maintenance, inspection, construction and other works necessary for surface facility operation continuity.

In summary, Banua Petroleum Company’s operation income will largely depend on the following factors:

- Revenue: Sales of NG, BAC and BAO at corresponding market price.
- Cost of Goods Sold; exploration expenses: exploration drilling to find new reserve discoveries; production expenses: rentals, well intervention/maintenance/work-over, repair and maintenance.
The problem is, CPP as processing plant to treat condensate into a marketable product (BAC) has to be operated within 1,000–45,000 barrel condensate per day due to its technical limitation. If CPP operated beyond that range, major technical problem will occur and CPP need to be shut-down.

Refer to Fig. 3, it is forecasted that BAC’s production will be below 1,000 barrels per day at 2034, which is below its minimum operating range. This condition technically called as “below turn-down”. This condition is unfavorable, since it may cause surface facility equipment to operate unsafely. As consequence, CPP will be permanently decommissioned at 2034 and remaining condensate product will be diverted to OPP instead.

Given this production forecast, Surface Facility Engineering team proposed to deactivates CPP at 2023, which is 11 years earlier than it forecasted to be. This can be done by diverting all condensate from wells to OPP, instead of CPP. And then CPP to be preserved by inerting method while waiting for permanent decommissioning at 2034. By doing so, Surface Facility Engineering suggest that Banua Petroleum will optimize OPP operation which designed to operates within 2,000 – 90,000 barrels per day. This proposal will exterminate BAC product; hence all Banua Petroleum’s liquid production will be sold as BAO as illustrated in Fig. 4.

The issue is that, is this proposal will provide financial benefit to The Company? Or in the other way around? The Company needs to study this proposal comprehensively and translate it into an executable plan.

II. LITERATURE REVIEW

To explore the business issue described in the previous chapter, Fig. 5 is the conceptual framework is proposed. In general, business issue exploration is divided into: Business Situation Analysis and Project Economic Analysis. Both of the analysis will then be synthesized in this research to develop conclusion & recommendation for Top-Management.
As the first step of the research, business situation analysis is performed by conducting external and internal factors exploration in order to find out whether Company’s strategic options are feasible to be done. The PESTEL (Political, Economic, Social, Technological, Environment and Legal) framework is used to evaluate the impact of external factors on the firm (Rothaermel, 2021). While VRIO (Valuable, Rare, Inimitable, Organized to capture value) framework is applied to assess the competitive implications of a firm’s resources (Rothaermel, 2021).

As the next step of the research, Project Economic Analysis is performed, which includes: Data collection & Consolidation, Economic Evaluation and Risk Analysis & Sensitivities. Data collection & consolidation are done by using Company’s annual financial report, production forecast, Company’s historical records and public statistic data. Economic evaluation is performed by comparing Net Present Value (NPV) and Internal Rate of Return (IRR) on Company’s both Strategic Options (Gittman & Zutter, 2012). NPV is calculated using (1), while IRR is calculated using (2).

\[
\text{NPV} = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - CF_0 \quad (1)
\]

\[
\sum_{t=1}^{n} \frac{CF_t}{(1+IRR)^t} = CF_0 \quad (2)
\]

Where:
- CF0 : Initial Investment
- CFT : Cash Inflows
- r : Firm’s cost of capital

Strategic option that returns higher NPV (1) and IRR will be selected. And then Sensitivity Analysis is performed for selected option, to measure how NPV may swing under the worst to the best scenario. In other words, it’s a method to determine how sensitive a project’s value, is relative to the changes in each variable in the analysis.

Risk analysis by Monte-carlo simulation conducted for selected Strategic Option, to provide a clear picture of the implied risk for Top-Management to decide. Monte-Carlo simulations were done with n=1000, with assumption and calculated parameter shown in Table I.

Some assumptions are taken to limit this study:
- The study evaluation is limited to 2033, whereas CPP will have to be permanently decommissioned due to technical reason.
- Production forecast correlates with existing reservoirs; hence any possible new-reserve discovery is excluded as well as exploration leads and prospects.
- Pro-forma revenue in this research is incremental revenue, where production forecast (where Investment is incurred) were deducted by production rate if there’s no investment (oil production decline rate: 38% per year).
- No incentive, tax relaxation nor other financial relaxation are taken into account.
- Assumed that all technical aspects in diverting all condensate production to OPP were already assessed and technically feasible.

### III. Methodology

This research used quantitative and qualitative method. The research also uses primary and secondary data. Primary data is acquired from the company directly while secondary data was collected from books, journals, articles, and websites.

### IV. Findings and Argument

**A. PESTEL (Political, Economic, Social, Technological, Legal, and Environment) External Analysis**

1) Political Factors

As the Country is facing oil production deficiency to its consumption, there’s emerging political pressure to review production sharing contract models that have been adopted for many years, in order to increase Government’s take on oil and gas production. As the result, the Ministry of Energy and Mineral Resources ratified Permen No. 08 Tahun 2017 which completely revamped Government-Contractors sharing scheme. However, the changing political policy that may influence sharing scheme between Government and PT Banua Petroleum is most probably will not take effect, since PT Banua Petroleum has 20 years cost recovery production sharing scheme which will end in 2038, while the economic evaluation timeline given for CPP early deactivation is limited to 2033. Therefore, the political factor, in this case, is considered supportive within time-period. But after 2038, there’s no guarantee that PT Banua Petroleum will hold the license again.

2) Economic factors

Economic factor which affects the firm’s external environment largely came from macro-economic. Rothaermel (Rothaermel, 2021) suggest that growth rate, unemployment, interest rate, price stability and currency rates are the factors that may affect the firm’s strategy. However, according to the latest data from Biro Pusat Statistic (BPS), national economic recovery in Indonesia remains intact, given by increasing people and material mobility. Domestic growth is stable at 5%/5.01% YoY at 2022), despite of global economy downturn caused by geopolitical tension between Russia and Ukraine.
3) Sociocultural Factors

Oil and gas still being the most important energy source in Indonesia, as most of people and material mobility largely using fossil fuel-powered as indicated by percentage of petroleum-fueled vehicle sales in Indonesia as seen in Fig. 6. With the population of 271 million people in 2021 and 64 million household, petroleum fuel consumption will increase as the consequence of increasing population, despite of renewable energy vehicle that is still being promoted by The Government of Indonesia.

4) Technological Factors

Rothaermel (2021) suggests that technological factor captures the application of knowledge to create new processes and products. Innovation in lowering capital & innovation expenditure, exploration expenditure, increasing reserve recovery by various method of artificial lift and enhanced oil recovery (EOR) were rapidly growing. In this case, CPP early de-activation decision may be re-visited if in there’s break-through in technology or new reserve discoveries which significantly increase Condensate production. However, any possible technology break-through or new reserve discoveries are omitted in this research.

5) Ecological Factors

As Indonesia took-part in Paris Agreement held in 2015, Indonesia’s House of Representative (DPR-RI) ratified UU No. 16 Tahun 2016 and become main reference for other government law. Therefore, one of additional benefit of CPP’s early deactivation is reduction of flaring activity, which contributes to global warming. More-over, CPP’s fuel consumption will be eliminated and furthermore reduce CO2 emission to environment. Therefore, CPP early deactivation proposal is in-line with world’s ecological concern.

6) Legal factors

As mandated in Undang Undang Dasar (UUD) 1945, Government of Indonesia is obliged to control any production sectors which are essential to people’s livelihood. And also, earth, water and its natural resource shall be retained & controlled by The Government. Oil and gas sector as one of earth’s natural resource, also controlled by The Government through Special Task Force for Upstream Oil and gas (SKK Migas). PT Banua Petroleum thus act as a Contractor, who holds license to explore and exploit oil and gas resource with Production Sharing Contract (PSC) scheme. Therefore, in the case of CPP early de-activation, PT Banua Petroleum will need to ask SKK Migas approval or endorsement. Since the objective of the proposal is to gain additional revenue as well as reducing flare gas consumption which will increase Government’s share and to optimize asset’s capacity, it is believed that the proposal will be in favor.

B. Internal Analysis with VRIO framework

1) Valuable (V)

Banua petroleum now holds 20 years license to explore and exploit East Borneo field that has been one of Indonesia’s giant oil and gas resource. Even though already at the decline phase, East Borneo field is still in top-5 oil and gas producer in Indonesia. Besides that, human capital is also valuable resource for Banua Petroleum. The Company’s human capital with good recruitment, training and succession program succeeded to create solid organization with 50+ years of experience managing oil and gas production with billions of dollar capital expenditure.

2) Rare (R)

East Borneo field that operated by Banua Petroleum Company, is a giant mature field with operation lies from onshore, swamp to offshore areas. This type operation involves integrated operation of various type of ships, drilling rigs, work-over units, construction barges, land and air logistic, etc. This kind of field operation is the only one ever existed in Indonesia, or may even in the world. Therefore, East Borneo is “a unique” giant oil-field with its capable employees are the resources that are rare.

3) Inimitable (I)

The oil and gas industry is a capital-intensive business with high risk; therefore, only limited company operates in this industry. To have employee’s capabilities that may tackle complex or difficult technical problem in a “unique” giant field like East Borneo, a firm shall undergo decades of experience, continuous learning, strong commitment to learn from past-events, billions dollar of investment and other things that not only costly, but time-consuming as well. As an integrated onshore, offshore and swamp oil and gas Operator, broad capabilities of PT Banua Petroleum considered to meet.
4) Organized to capture value (O)

PT Banua Petroleum and its holding company (Patra Energy) is an integrated company that operates in both upstream and downstream oil and gas sector. By its operation interchangeability, PT Banua Petroleum considered to have a strong organizational capability. Therefore, the valuable & rare East Borneo field’s reserve managed by capable employees are well-organized to capture the value.

Based on VRIO analysis as illustrated in Fig. 11, East Borneo field’s valuable reserve with its capable employees is The Company’s sustained competitive advantage. Current Government license as the only Company to explore and produce a rare oil and gas field in East Borneo until 2038 is also a strong barrier for competitor entrance.

C. SWOT Analysis

By combining both external and internal factors, Strength–Weakness–Opportunities–Threats (SWOT) Analysis is synthesized to evaluate PT Banua Petroleum current situation and prospect, to unlock additional revenue by early deactivation of CPP. The SWOT analysis is illustrated in Fig. 7.

In this case, Banua Petroleum will use ST (Strength – Threat) approach to overcome challenges in realizing Company’s objective. With its big East Borneo field’s reserve and its employee’s capability to handle complex or difficult technical problem, the Company need maximize its income and return to shareholder before 2038, despite of external environment threat i.e. emerging renewable energy sources and oil and gas price volatility.

D. Project Economic Analysis

To maximize shareholder’s wealth, the following are 2 (two) strategic options that The Company may take for the future oil production strategy:

- Base Scenario: CPP de-activation and full decommissioning at 2033.
- Proposed Scenario: CPP de-activation and inert preservation at 2023.

Economic evaluation is performed by using Capital Budgeting Analysis, to identify NPVs for both Company’s strategic option. By comparing both NPVs, best Strategic Option to the firm will be selected. Some assumptions are made to develop pro-forma Company’s Income Statement, Balance Sheet and Cash Flow, as follow:

- BAC and BAO market price forecast using Auto-Regressive Heteroskedasticity (ARCH) time-series analysis forecasting.
- Indonesia’s inflation rate is equal to 5-years (2017-2021) inflation average (source: bi.go.id).
- Production expenses (well intervention, facility’s maintenance, inspection and repair) is equal to percentage of sales.
- Exploration expenses is equal to percentage of sales.
- No selling expenses, since all product certainly bought by buyers.
- G&A expenses increase with inflation.
- Other expenses increase with inflation.
- Long term debt rate: 8.0 %.
- Proposed scenario imposed additional expense for inert-pressurization which need to be done annually, while cost reduction occurred since some maintenance program necessarily reduced.

Table II summarizes the result of NPV & IRR calculation on both scenarios under the same condition (base condition: price, production and expenses forecast, interest rate and long-term debt interest rate.

As the Proposed Scenario offers higher NPV and IRR (both exceed Company’s WACC), the decision of early de-activation of CPP clearly offers more financial benefit for The Company.

Sensitivity Analysis is performed for selected scenario (Proposed Scenario). The analysis involves multiple input variables, as follows:

- Banua Condensate (BAC) price realization to forecast
- Production realization for Banua Condensate (BAC)
- Banua Oil (BAO) price realization to forecast
- Production realization for Banua Oil (BAO)
- Production expenses realization
- Long-term debt interest rate
- Inflation rate

While the output is NPV only (single output).

As the result, Tornado & Spider Chart as seen in Fig. 8 and Fig. 9 illustrated different input variables sensitivity to outcome (NPV).
Monte-Carlo analysis is performed to quantify the degrees of uncertainty in capital budgeting decisions. In this research, Monte-Carlo analysis was only done for Proposed Scenario only. The objectives of the analysis are the following:

- Quantify the probability of Proposed Scenario’s NPV < 0.
- Quantify the probability of Proposed Scenario’s NPV < Base Scenario NPV.

As the result, Table III showed the descriptive statistic of Monte-Carlo’s simulation, with number of samples, n = 1,000. While Fig. 10 illustrated NPV outcome frequency within a certain range of value.

As can be seen from Table III, the probability of negative NPV is 1.81%, while the probability of NPV less than Base Scenario’s NPV is 16%. In other words, probability that the Proposed Scenario will unlock additional financial benefit is 84%.

This data shows that CPP early deactivation considered to be a robust project (low risk of negative NPV) and have a high probability to unlock additional financial benefit to The Company.

<table>
<thead>
<tr>
<th>TABLE III: MONTE-CARLO SIMULATION DESCRIPTIVE STATISTIC</th>
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<tr>
<td><strong>Descriptive Statistic</strong></td>
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<tr>
<td>Min: 21,570 KUSD</td>
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<tr>
<td>Max: 102,237 KUSD</td>
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<tr>
<td>Mean: 41,157 KUSD</td>
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<tr>
<td>Standard Deviation: 19,658 KUSD</td>
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<tr>
<td>Median: 40,174 KUSD</td>
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<tr>
<td>Probability NPV &lt; 0: 1.81%</td>
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<td>Probability NPV &lt; 21,570: 16%</td>
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V. CONCLUSION

To answer above mentioned research questions, a set of analysis has been carried out in this research. Business situation analysis has been performed by analysing externalities (using PESTEL framework) and analysing internalities (using VRIO framework). PESTEL analysis suggest that political, economic, socio-cultural, technological, ecological and legal external factors are considered to be supportive. Current exploration and production license that held by PT Banua Petroleum can be considered as a strong political support at least until 2038. But
after 2038, there’s no guarantee that PT Banua Petroleum will hold the license again. That’s why any initiative that may maximize shareholder’s wealth have to be done before 2038. While economically & socio-culturally, Indonesia still highly dependent to oil and gas production, so any initiative to optimize revenue will be supported. Ecologically, Proposed Scenario will eventually reduce current flare-gas emission by the time CPP is de-activated.

From internal aspect using VRIO framework, giant reserve of East Borneo field exploration & exploitation license combined with highly capable employees to manage the field, are the main factors that PT Banua Petroleum owned to realize Proposed Scenario and provide additional revenue.

Discounted Cash Flow analysis were also performed to analyse project economic. The NPV for Base Scenario is 21.5 MUSD, while Proposed Scenario (early de-activation of CPP in 2023) offers 40.5 MUSD. The IRR of Proposed Scenario is higher than Base Scenario as well.

By sensitivity analysis, production expense is the most sensitive parameter which significantly increase/reduce project’s NPV. Therefore, The Company shall take more precaution to control spending realization of production expenses i.e. maintenance, repair, inspection, construction, overhead and rentals and well-maintenance program. The second most sensitive parameter is BAO price realization, which highly influenced by external factor. While the third most sensitive parameter is BAO production realization, which highly influenced by Sub-surface Engineers to optimize oil and gas reserve production, and by Surface Facility Engineers to minimize un-planned equipment shutdown which may create loss of production-opportunity.

By Monte-Carlo analysis with n=1000 iterations, the Proposed Scenario has 1.81% negative NPV probability, and 16% probability of NPV < 21.5 MUSD (next best opportunity). Therefore, Proposed Scenario (CPP early de-activation in 2023) considered as better economic feasibility than Base Scenario (CPP de-activation in 2033).

REFERENCES


