

## **Chapter 6.**

### **RESULTS OF ANALYSIS, CONCLUSION AND RECOMMENDATION**

#### ***6.1 Results of Analysis and Conclusion***

This project is a study of preliminary feasibility of the Northern refined petroleum products pipeline. The pipeline is a single pipeline in order to transport the petroleum products, which consist of Unleaded Gasoline (ULG), Unleaded Regular (ULR) and High Speed Diesel (HSD) into the Multi-Products Pipeline for providing service to the customers in the Northern part.

The objective of the project is to study the feasibility of a refined products pipeline project to serve the Northern provinces in term of marketing, technical (or engineering) and economic. This study will involve with the project feasibility with respect to the technical analysis and economic analysis. From all mentioned chapters, it can be summarised as follows:

##### **6.1.1 Summary of technical analysis**

From the result of the technical analysis, it can be concluded as follows:

- The suitable locations for construction of terminal oil depots are Nakhon Sawan, Pitsanulok and Lampang provinces. These sites can be selected according to Transportation problem technique (the least cost method) in an attempt to establish the oil terminal depots by using the lowest expenditure. Moreover, the optimum places to locate the oil depots also have to base on the demand of oil consumption.
- Lampang oil depot consists of 8 oil storage tanks with total capacity of 18 million-litres each, Pitsanulok has 8 oil tanks with 15 million-litres of capacity, and the last terminal oil depot, Lampang comprises of 8 oil storage tanks with capacity of 23 million-litres.
- To achieve maximum safety for pipeline and minimum disturbance to the affected landowners, the suitable route of pipeline installation is the EGAT High-Voltage power line. Because this routing is more convenient, and

has the least environmental and public impacts, compared to other alternatives.

□ Pipeline Description:

The North pipeline has an overall length of 510 km from Saraburi oil depot to Lampang oil depot. The section from Saraburi to Nakhon Sawan will be 170 km of NPS 14 (355.6 mm) diameter pipe, and this reduces to NPS 12 (323.8 mm) diameter pipe for the next 130 km of the pipeline through to the Pitsanulok. And the pipe size is reduced to NPS 10 (273 mm) diameter pipe in the last section between Pitsanulok and Lampang terminal oil depot.

### 6.1.2 Summary of results of economic analysis

The estimation of Initial cost of this project is approximately 5,429 million-baht. The results of the economic analysis are further adjusted for finding from the sensitivity analysis to yield a result with the required level of assurance to be used in an investment decision.

Before the analysis on the initial cost will be launched to decide whether the project should be invested or not, the exact pipeline transportation cost has to be assessed. And then, the cost received will be compared with that for the transport by tanker trucks.

To determine the internal rate of return of pipeline project compare to the effective existing mode that is tanker truck, the process starts with examining the pipeline transportation cost of products. Firstly, it should know about the actual transportation cost (Tariff rate) of pipeline before comparing to transportation cost by truck. Tariff rate of pipeline is estimated to be 21.88 Satang/Litres (or 0.043 St./Litres/Km). In addition, tariff rates from Saraburi to Nakhon Sawan, Pitsanulok and Lampang oil depots are 7.31, 12.90, and 21.93 St/Litre, respectively, while transportation costs by truck are much higher, at 16.14, 23.91, and 34.91 St/Litre, respectively.

This is the economic result of the oil transportation by pipeline project compare to the oil transportation by truck based upon tariff rate. According to tanker truck is the most effective mode of oil transportation at present. The result of economic analysis can be summarised as following. After the cash flows are

computed, in order to analyse them, the investors have to calculate the net present value (NPV), internal rate of return (IRR), payback period and benefits/costs ratio (B/C Ratio) from the cash flows.

#### □ **The Economic Analysis**

On the economic analysis, the costs for transport by oil tanker trucks will be compared. Thus, NPV, IRR, B/C Ratio and Payback period are received from the comparative analysis. In this study, the cost for train transportation was not compared to see whether the pipeline transmission could compete with it or not. Because the train transportation is the mode probably inefficient and not widely used since it has many limitations, including the transport capacity and route. Due to these limitations, the goods cannot be directly delivered to clients at the destinations. In the future, the oil transportation by train will gradually be stopped.

The Northern refined petroleum products pipeline project gives:

- Internal Rate of Return (IRR)	12.94%	
- Net Present Value (NPV)	2,088	million-baht
- Payback Period	9.83	years
- and Benefits/Costs Ratio (B/C Ratio)	1.26	

Which yield higher return than that specified under every criterion (IRR 15%,  $NPV \geq 0$ ,  $B/C \text{ Ratio} \geq 1$ , and  $\text{Payback Period} \leq 10$  years). Especially, NPV of 2,088 million-baht shows that it is well above zero. The theory of NPV mentions that if NPV of project is more than zero, the project can be accepted. Not only NPV but IRR also performs same as NPV. Thus, this project could be confidently accepted in terms of investment rule. Finally, it can be summarised that this pipeline can be efficiency competed with the existing main modes of transportation.

#### □ **The Sensitivity Analysis**

From the analysis of sensitivity, it is found that *Investment fund* is the most critical factor affecting return of the project. Therefore, the administrator of the project must control investment funds to ensure that they are within the estimate. Moreover, Tariff Rate and Throughput are others more significant factors affecting of the project. As for Throughput and Tariff rate, they are beyond the control of the project. However, in the economic situation of the country, there is the trend that the

government would raise oil tax, which will increase oil price as a result. This will in turn lead to increase of transportation costs by car, which will automatically result in increasing tariff rate. This tariff rate should be a positive factor rather than negative one.

*The results of the technical and economic analyses show that this is a feasible and sustainable project.* In addition, the study found that the pipeline is the most efficient and effective form of liquid hydrocarbon transportation for the existing and projected market. As a consequence, the investor could be confident in investing in the project.

## **6.2 Recommendation**

In order to assure this Project's success and reality, the Government of Thailand or PTT should support and approve this Project. This project will provide large benefits to the country and the refined products industry of Thailand. The economic downturn has hurt the Project financial returns by causing a decrease in demand. However, the existing market combined with the anticipated growth, although less than before, is large enough to make this project viable and a financial success.

Moreover, for this project to be successful the Government of Thailand needs to support policies that encourage the use of the pipelines. Examples of these policies include enforcement of safety standards for trucks and having trucks pay their way in terms of road surface wear, roadway safety and environmental mitigation due to spills. The removal of subsidies from the rail transportation system would decrease distortions attributed to this subsidisation and make the economy of the country more efficient.

This project will deliver a wide range of indirect and direct benefits to the country as a whole, including the provinces through which it passes, and to the individual communities. Circumstances will affect the specific benefits available to any given community or individual. Advantages will include:

- Decrease in tanker truck traffic and road wear
- Increased security of supply

- Environmentally superior mode of transport
- Local business opportunities
- Construction employment opportunities
- Career opportunities in operations and maintenance

This Project *is the solution* to many of the liquid hydrocarbon transportation problems in Thailand. It will bring foreign investment into the country and provide skilled, well paying jobs.

About the suggestion, the environmental impacts have to be thoroughly studied. And, more importantly, local people have to be invited to participate in making decision. The public hearing should be launched. Moreover, to be an efficiency feasibility project, this study should also be a full-scale feasibility study that should be carried out the economic and environmental analysis, including more detailed investigation.