

**FINANCIAL VIABILITY OF QUANG NINH LNG POWER PLANT, VIETNAM**

**Nguyen Dieu Hang, National Economics University, Vietnam**

**20 August 2024**

**Keywords:** financial analysis, FINPLAN, LNG power plant, Vietnam **Acknowledgements**

This report was created as a result of the engagement of National Economics University, Vietnam in Climate Compatible Growth programme.

I would like to extend my deepest appreciation to the organizers of the Energy Modeling Platform-Global (EMP-G) 2024: Climate Compatible Growth, the International Centre for Theoretical Physics, the World Bank Group, and Sustainable Energy for All. Their leadership in convening this important gathering has provided an invaluable opportunity for me to understand the solutions to the challenges of energy transition and climate change.

I would like to express my sincere gratitude to Climate Compatible Growth (CCG) and the International Centre for Theoretical Physics (ICTP) for their financial support, which made my participation in the EMP-G 2024 possible. Their support has been instrumental in advancing my insights and contributing to my research and training work in the field of energy and climate change in National Economics University, Vietnam.

This material has been produced with support from the Climate Compatible Growth (CCG) programme. CCG is funded by UK aid from the UK government. However, the views expressed herein do not necessarily reflect the UK government's official policies.

**Executive Summary**

Vietnam committed to phase out coal power by 2040 and achieve net zero emissions by 2050. Energy is the critical sector in the path to net zero emission. Following the National Power Development Plan 8, the total capacity of gas power sources will account for 24.8% - the largest proportion among power sources, with 15 LNG projects in the Priority Project List. Thus, LNG power will play the role of "main actor" until 2030. The USD 2.272 billion Quang Ninh LNG Power Plant is the first power project using imported LNG in the North of the country. Assessing the financial viability of LNG Power Plant is important to get approvement from the government and to attract investors. Using the IAEA financing model FINPLAN, in the base case, the NPV of Quang Ninh LNG Power Plant is VND 73,155.530.15 million. The IRR is 19.72%. NPV is positive and IRR is larger than the discount rate of 6.5. The government should support the investor in arranging the financial sources so that the project can be launched as planned. It is necessary for EVN to commit a power purchase ratio (PPR) of 70% in a long-term PPA. A sensitivity analysis shows that a PPR of 70% and lower would lead to financial loss particularly when the LNG price increases. The project is not particularly sensitive to changes in interest rates or economic conditions.

1. **Introduction**

At the COP26 in Glasgow in 2021, Vietnam Prime Minister Pham Minh Chinh pledged to phase out coal-fired power by 2040 and achieve net zero emissions by 2050. The Power Master Plan VIII was approved by the Prime Minister in Decision No. 500/QD-TTg, dated May 15, 2023. Power Plan 8 aims to control greenhouse gas emissions from electricity production to about 204-254 million tons in 2030 and about 27-31 million tons in 2050. Power Plan VIII aims to replace 18 GW of coal power in 2030 by 14 GW of Liquified Natural Gas (LNG) power and 12-15 GW of renewable energy sources (Vietnam Government, 2023).

Up to now, Vietnam has approved investment policies for 13 LNG power projects, of which 5 projects are being implemented. Quang Ninh LNG Power Plant is the first power project using imported LNG in the North of the country. This paper aims to assess the financial viability of Quang Ninh LNG Power Plant.

**2. Methodology**

The financial viability of Quang Ninh LNG Power Plant is assessed by adopting the IAEA financing model FINPLAN.

Data for analysis is collected from public report of Quang Ninh LNG Power Plant Project. It has a capacity of 1,500 MW, with an expected electricity output of about 9 billion kWh/year. The estimated total investment is USD 2.272 billion (PPC, 2023). The project construction is in 4 years from 2024, it will come into operation by 2028 and last 25 years. The project’s assumed financial data is presented in the Appendix.

On 27 May 2024, the Ministry of Industry and Trade approved the electricity generation price (EGP) range applicable to LNG power plants. The ceiling price of such EGP range is VND 2,590.85 per kWh (10.3 UScents), exclusive of VAT (MOIC, 2023). In this estimation, it is assumed that electricity can be sold at 1,500 VND per kWh in 2028, increasing with inflation. O&M costs are expected to amount to 2,515 billion VND. The annual LNG cost is estimated at USD 83 million. Other assumptions are as follows:

* Inflation USD: 2%
* Inflation Local Currency: 4.5% (The 2024 inflation forecast of General Statistics Office is 4.34%).
* Exchange rate: 25,150 VND per USD for 2024; exchange rate reflects inflation rates.
* Income tax: 25%, losses to be carried forward, no losses in start year.

Sensitivity analysis: Changes in macroeconomic variables such as fiscal and monetary policies, economic growth rate and so on will affect the discount rate. By varying the discount rate, it is possible to assess the sensitivity of the Net Present Value (NPV) to them. The discount rate will be increased to 8%, 10%, 12% to see if NPV decreases to negative value. The Power Purchase Ratio (PPR) is the ratio of the power sold by the power plant to the total power capacity of the plant. The effect of LNG price and PPR will be considered at the same time to find out the sensitivity of the project to these variables. The LNG price will be increased to USD20/MMBtu and the tested PPR will be 60%, 65% and 70%.

**3. Results**

In the base case, the NPV of Quang Ninh LNG Power Plant is VND 73,155,530.15 million. The Internal Rate of Return (IRR) is 19.72%. NPV is positive and IRR is larger than the discount rate, thus the Quang Ninh LNG Power Plant project is financially viable. The debt-equity ratio in the construction period is around 0.7, which is acceptable for the lenders.

During the construction years, the sources of cash include equity, loans and the stand-by-facility. The stand-by facility is the most expensive financial instrument available in FINPLAN that is used to cover any financial shortfalls in a given year. In cash outflow, Cash Available in Short Term Deposits has a low interest rate, it should be emptied as quickly as possible In this analysis, the stand-by facility is zero, showing that it is rarely used. The Flows from the Short-term Deposits are as low as possible. Thus, the project is balanced.

Figure 1: Influence of discount rates on NPV

The sensitivity analysis shows that when the discount rate increases, NPV is still positive with NPV at VND 21,845,914.84 million at a discount rate of 12%. The project is profitability and is not particularly sensitive to changes in interest rates within this bound (Figure 1).

The influence of Power Purchase Ratio (PPR) in Power Purchase Agreement (PPA) and the fluctuation in LNG price are considered. In the base case, the annual LNG cost is estimated at USD 83 million, i.e. the LNG price is USD15.77/MMBtu and the PPR is assumedly 100%, then NPV is positive. If the PPR is 70%, the NPV is VND 7,984,714.79 million and IRR is 10.09%. The project is still financially viable. But if PPR decreases to 65%, NPV will be smaller than zero, showing that the project will not make profit (Figure *2*).

Figure 2: Influence of PPR when the LNG price is USD15.77/MMBtu

Figure 3: Influence of PPR when the LNG price is USD20/MMBtu

In the case that LNG price goes up to USD 20/MMBtu, at PPR of 70%, the NPV is VND1,463,007.09 million, which is small but still positive, and the IRR is 8.41%, larger than the discount rate of 6.5%. However, when the PPR is 65%, similar to the previous scenario, the NPV is VND -6,244,359.35 million and the IRR is 6.08% (Figure 3). The project will not be profitable.

**4. Discussion**

Financial analysis shows that Quang Ninh LNG Power Plant is a profitable project. If the investor can find sufficient financial resources to invest, they will make profit. A new LNG power plant will also provide a more diversified energy mix, reducing reliance on a single fuel source and enhancing energy security. The construction and operation of Quang Ninh LNG power plant can create jobs and stimulate economic activity in the province. Investing in LNG infrastructure can drive technological advancements in the energy sector. It will reduce carbon emission in comparison to coal power plants, therefore contributing to response to climate change and net zero emissions. However, it is reported that it often takes more than 8 years to implement an LNG power project. One of the main challenges is the lack of commitment of PPR. The PPR is the ratio of the power sold by the power plant to the total power capacity of the plant. Firstly, uncertainty on annual electricity output purchased makes investors concerned about the project's efficiency. Secondly, without the commitment on PPR in PPA with the electricity buyer, which is Vietnam Electricity (EVN), the commercial banks often would not consider granting credit to the LNG power projects. Thirdly, it will prevent the LNG power plants from purchasing LNG at a good price through a long-term or future LNG contract to make the electricity price cheaper. The price of LNG has a significant impact on the NPV of an LNG power plant. LNG is a major input cost for the power plant. Higher LNG prices directly increase operating expenses. If the increase in LNG prices outpaces the increase in electricity prices, the NPV can decrease. Higher PPR in a long-term agreement will help the LNG power plant signing future contracts with LNG suppliers, which will reduce the risk of increasing input price, ensuring the profit of the plant. If this problem is not solved, it is difficult for Vietnam to complete the plan to build 13 LNG power plants by 2030. Delay in developing LNG power sources in National Power Development Plan 8 will lead to a shortage of power supply from the year 2028.

The first policy implication is that the government should support the investor in arranging the financial sources including foreign investment, foreign aid and commercial bank. The Just Energy Transition Partnership (JETP) is a mechanism to help the investor to access the necessary resources for LNG power projects.

For EVN, it is necessary to commit a PPR in a long-term PPA. It would ensure a stable cash flow for the investor to repay the loan. Gas suppliers and transporters can estimate the fuel volume and price in the long term based on this contract.

Lastly, the PPR should be 70% minimum. EVN suggested that the ratio is 65% while the LNG power plants expect a ratio of 72-90% (Thanh Huong, 2023). However, the sensitivity analysis shows that 70% is acceptable as a lower than 70% PPR would lead to financial loss particularly when the LNG price increases. Higher LNG price e.g. more than USD20/MMBtu would require a higher PPR. However, imported LNG prices have been stable recently due to expanding capacity of LNG production sources to meet increased demand in late 2021 - early 2023. Currently, the LNG market is in abundant supply, price has little chance of rising sharply.

The study has some limitations. Firstly, the study has not considered the case that the construction may be delayed. It was planned to start in the 3rd quarter of 2024; however, it has not been started yet. There are some reasons for delay, for example land clearance, administrative procedures and so on. Secondly, in the estimation, the PPR is assumed to remain constant in the whole lifespan of the project. Vietnam Ministry of Industry and Commerce suggests that the Power Purchasing Agreement (PPA) will be effective in 7 years maximum. Therefore, the PPR will change in the next PPAs, and it will affect NPV and IRR. Thirdly the LNG price may fluctuate dramatically, which would significantly change the financial situation of the project. These issues would be considered in further research.

**5. Conclusion**

The USD 2.272 billion Quang Ninh LNG Power Plant is the first power project using imported LNG in the North of the country. It is a part in the process of replacing 18 GW of coal power in 2030 by 14 GW of LNG power in the National Power Development Plan 8 to reach net zero emissions by 2050. The project’s financial viability is assessed by adopting the IAEA financing model FINPLAN. In the base case, the NPV of Quang Ninh LNG Power Plant is VND 73,155,530.15 million. The IRR is 19.72%. NPV is positive and IRR is larger than the discount rate of 6.5%, thus the Quang Ninh LNG Power Plant project is financially viable. The government should support the investor in arranging the financial sources so that the project can be launched as planned. It is necessary for EVN to commit a PPR in a long-term PPA. The ratio of 70% is acceptable as a lower than 70% PPR would lead to financial loss particularly when the LNG price increases to USD 20/MMBtu. The project is not particularly sensitive to changes in interest rates or economic conditions. The impact of change in timeline, LNG price and PPR in the PPA on the project should be analysed in further research.

**References**

Thanh Huong (2023). “Negotiations over payment agreement for LNG power stuck in deadlock”. *Vietnam Investment Review*, April 23, 2024. Accessed on August 13, 2024, from <https://vir.com.vn/negotiations-over-payment-agreement-for-lng-power-stuck-in-deadlock-110610.html>

PPC (PetroVietnam Power Corporation) (2022). Annual report. Accessed on August 13, 2024, from <https://pvpower.vn/pow-media/to-ir/Annual-Report-2022---WEB.pdf>

Vietnam Government (2023). National Power Development Plan 8. Accessed on August 13, 2024, from <https://en.baochinhphu.vn/decision-approving-national-power-development-plan-8-111230614195813455.htm>

Vietnam Ministry of Industry and Commerce (MOIC) (2023). Decision 1260/QD-BCT 2024 on electricity generation price range for combined cycle gas turbine thermal power plants using liquefied natural gas.

**Appendix**

***Calculation of LNG cost:***

* The imported LNG price to Vietnam is USD12.9297/MMBtu. Assuming that the annual growth rate of price is 5%, the price in 2028 will be USD15.78/MMBtu.
* The LNG consumption of a 1,500 MW LNG power plant is approximately 5 billion m3.
* The annual LNG cost = 5 billion m3 x USD 15.8/MMBtu x 1,055,056 BTU/m3 x 1/1,000,000 ≈ USD 83.22 million.

***Project financing***

The project is financed with 40% export credit over 10 years with uniform principal and interest repayment at an interest rate of 5.5%. The equity is VND22.5 trillion distributing in 4 years of construction: VND 5.5; 7; 5 and 5 trillion in 2024, 2025, 2026, 2027 respectively. No limit to dividends being paid out. New commercial loans are USD 203.9, 207.2, 195.2 and 243.8 million from 2024 to 2027, over 12 years with interest 3% over inflation. Short term deposits have interest rate of -1% over inflation, while stand-by facility has interest rate of 4% over inflation. A debt-to-equity ratio around 70:30 is envisaged. The assets are depreciated linearly over 25 years.

Shareholder’s targeted return data: The disposal year is 2052, discount rate is 8%.

Terms of project finance loan: 6.5% discount rate. 12 years average loan term, 1.4 security ratio for loan period, 25 years expected life, 1.6 security ratio for project liffe, 2028 first year of debt service.

A white circle with a black background

Description automatically generated