

A Stochastic Programming approach for Annual Delivery Program creation in Liquefied Natural Gas Supply Chains

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In this work, a new modeling approach to create annual delivery programs (ADP) for Liquefied Natural Gas (LNG) supply chains is introduced. An ADP is a fulfilling, inventory and delivery plan for a 12-month operation horizon of a LNG producer. It intends to satisfy customers demand under long and short term contracts and possibly spot sales. This work, quantifies the impact of uncertainty both in LNG demand and sale price [1].

LNG sale is generally regulated by contracts [2]. In this work, a variety of contract types is considered through parametrization, including, overstock, understock and shipment cancellation clauses for customers [3]. These are economic clauses that impact on the annual benefit obtained by the LNG producer. The approach also includes the concept of spot market trade which takes place regularly in the LNG business, allowing to alleviate LNG stock fluctuations at production facilities.

To consider uncertainty, the deterministic equivalent of a two-stage stochastic program is described, the scenario generation and solution approach is discussed. The model is validated using a real-world example, results and the value of incorporating uncertainty in price and demand (Value of the stochastic solution) are given and discussed. Conclusions and future research directions are given.

References

- [1] M. Agerton, “Global LNG Pricing Terms and Revisions : An Empirical Analysis,” 2014.
- [2] P. R. Weems, “EVOLUTION OF LONG-TERM LNG SALES CONTRACTS: TRENDS AND ISSUES,” OGEL, 2006.
- [3] V. Guigues, C. Sagastizábal, J. P. Zubelli, “Robust management and pricing of LNG contracts with cancellation options,” J. Optim. Theory Appl., pp. 1–33, 2013.