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# Venture Global LNG: Calcasieu Pass Engineering Update

Details, Background, & Key Questions


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*****Over the next few weeks we'll be rolling out a new line of Energy EPC research, centered around the unique and insightful work of EPC Risks. We'll be following up with more details, but we're giving a preview to our existing research clients. Please let us know if you have any questions, and we're excited to share more details soon!*****

**Key Points:**

- **CPLNG's engineering, procurement, and construction workflow/ sequencing is not following "traditional" EPC industry standards.**
- **It is too early to tell if that differentiated sequencing has helped expedite the project or if procurement and construction activities will be impacted in later stages.**
- **CPLNG's recent engineering filings point to significant, relatively *late-stage* engineering changes (at least by historical standards) that warrant monitoring from a cost and timeline perspective.**

On February 27, 2020 Venture Global Calcasieu Pass, LLC ("Calcasieu Pass" or "CPLNG") submitted to FERC two engineering deliverables in compliance with Environmental Condition #46, which demonstrates CPLNG can produce 12.0 MTPA of LNG. Usually, developing the heat and material balance and the process flow diagrams to demonstrate your peak capacity is achievable is one of the first engineering milestones completed. Based on our experience, CPLNG should have completed these activities in 2016 – 2018 and prior to the EPC Contract award to Kiewit (Dec 2018). It is unclear how the late submittals of these documents will ultimately impact CPLNG's cost and schedule forecasts. However, these and future engineering documents, such as the hazard and safety studies and plot plans, must be approved by FERC with zero changes, before we can safely say CPLNG can produce 12.0 MTPA of LNG.

In the meantime, **CPLNG continues announcing procurement awards**, most notably for Siemens to supply the Boil-Off Gas Compressor (February 2020). In addition to their procurement progress, site construction activity is poised to ramp up with recent announcements on increased craft labor.

Generally speaking, EPC projects **need to maintain a delicate balance between engineering design development and progressing procurement and construction activities**. Procurement is responsible for purchasing what engineering designs; construction is responsible for installing what is purchased based on the engineering design. It is almost impossible to stay *on schedule* and *on-budget* while constructing and/or installing concrete, pipe, steel, and/or cables if the engineering work is changing simultaneously.

## *...continued*

While CPLNG has demonstrated a degree of engineering progress and design development, *the timing* of that progress (relatively late-stage) raises the question of whether any changes to key design elements could have a significant negative knock on effects in procurement and construction activities (and ultimately, project costs). Whether that balance is upended, or whether it simply wobbles a bit is unclear, however it's a dynamic we'll continue to watch closely.

### Background

According to public filings and EPC Risks' conversations with FERC, CPLNG took a final investment decision ("FID") with engineering drawings that demonstrated CPLNG could **produce 11.6 MTPA of LNG instead of their peak production of 12.0 MTPA.** Accordingly, FERC included Environmental Condition ("EC") #46 in CPLNG's February 2019 FERC order, which mandated the following activity:

> **Prior to construction of the final design**, Calcasieu Pass shall file up-to-date Process Flow Diagrams ("PFDs") with Heat and Material Balances ("HMB") that demonstrate the peak liquefaction rate of 12 MPTA is achievable and a complete set of Piping and Instrumentation Diagrams ("P&IDs"), which must include the following information:
>
> a) equipment tag number, name, size, duty, capacity, and design conditions;
> b) equipment insulation type and thickness;
> c) storage tank pipe penetration size and nozzle schedule;
> d) valve high pressure side and internal and external vent locations;
> e) piping with line number, piping class specification, size, and insulation type and thickness;
> f) piping specification breaks and insulation limits;
> g) all control and manual valves numbered;
> h) relief valves with size and set points; and
> i) drawing revision number and date.

**The H&MB is a foundational document to the overall design**: it represents every process stream on the PFDs and tabulates their operating temperatures, density, viscosity, vapor fractions, heat ratios, molecular weights, etc. In layman terms, this document represents a balancing of energy from the inlet and outlet streams for each piece of process equipment and forms the basis for the type and sizing of process equipment used. More importantly, when designing process plants, **this is normally one of the first engineering documents completed.** However, for various reasons normally having to do with games associated with the performance guarantee, the H&MB may be finalized later than what would be considered ideal.

**Process Flow Diagrams (PFDs) are a schematic representation of the plant's process scheme:** they show the major process equipment, controls, and pipelines based upon the H&MB data. These are basically the first engineering drawings that convey how the plant's equipment must be connected, which in turn drives how equipment must be arranged within the plant and the overall plant layout. The PFDs schematic are anon-geographically accurate design, but function like a map of the plant in the same way that subway maps or London Underground maps represent the connection of train lines between stations.