



Export Infrastructure

LNG Canada Update: Troubles Ahead For Shell's LNG Flagship?

An Empty Module Yard & Mounting Schedule Delays

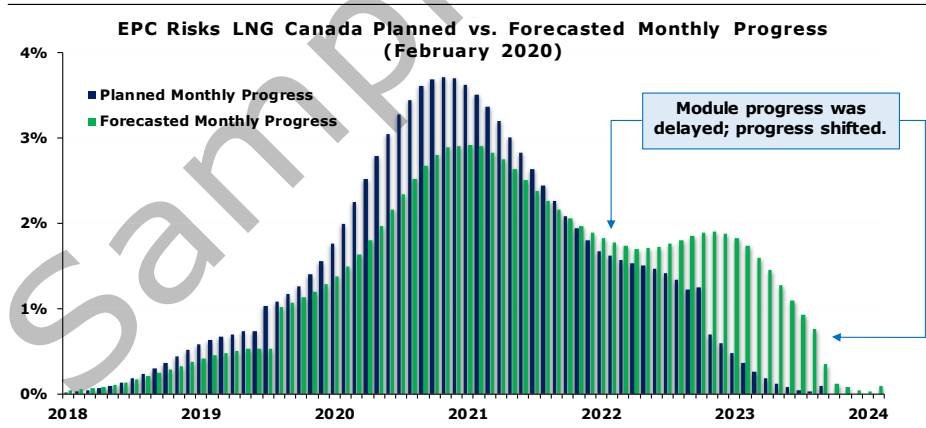
Key Takeaways:

- **Still Moving At A Crawl.** As of May, module fabrication was ~2% complete, **well behind** our ~11% estimate in W|EPC's February 2020 (pre-COVID 19) schedule.
- **Satellite Image Review:** The COOEC-Fluor Heavy Industries (CFHI) module yard pre-assembly areas look **virtually empty**, where JGC & Fluor (JFJV) plan to fabricate ~150 modules for LNG Canada.
- **Playing Catch Up Won't Be Cheap.** The schedule slip should put even *more pressure* on the backend of LNG Canada's timeline. The most likely response – *a surge in construction activity to make up for lost ground* – will be difficult to execute, and expensive. **More craft workers + Labor overtime = Budget overruns.**

In May 2020, COOEC's module fabrication was ~2% complete...well behind our ~11% estimate in our February 2020 (pre-COVID-19) schedule. In August 2019, CFHI announced they started module fabrication. For clarification, we believe CFHI started steel fabrication for the modules and not module assembly. Typically, it takes ~12 to ~16-weeks to fabricate steel and pipe spools to begin module assembly. If steel fabrication started in August 2019, module assembly should have started in Dec/Jan 2020 (Pre-COVID-19). If steel fabrication started in August 2019, steel structures should be in the module yard pre-assembly laydown areas.

Assessing The Schedule Damage. We've laid out a comparison between our estimated project schedules between February & May. We note our February schedule *already included a ~4-month delay* due to engineering & module fabrication lag.

Figure 1. W|EPC Risks February 2020 LNG Canada Schedule



Source: Regulatory and company filings, W|EPC Analysis

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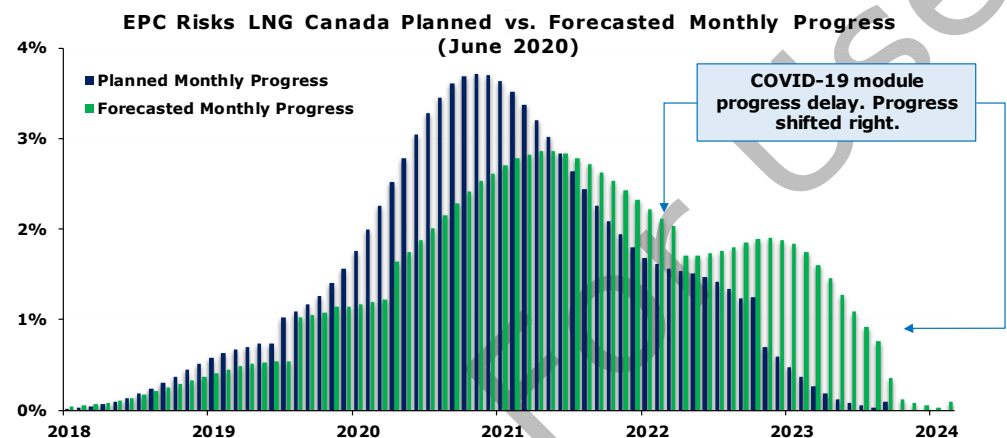
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Due to the 2% module progress from August 2019 to May 2020 (9-months), we shifted and increased monthly progress towards the back end of the schedule (Figure 2). Note: both Feb and Jun 2020 schedules have the same Train #1 COD, May 2024.

Figure 2. W|EPC Risks June 2020 LNG Canada Schedule



Source: Regulatory and company filings, W|EPC Analysis

After analyzing Figure 2, one may draw the conclusion a flattened progress curve is a good thing and more achievable; unfortunately, what it likely means is the backend loaded schedule will increase construction activities done in parallel. Backend loaded progress curves have a higher probability for construction acceleration to mitigate schedule delay (more craft workers + labor overtime = budgets blown). This could be a dangerous scenario given the high cost Canadian labor, limited craft availability, and limited craft accommodations.

In 2015, Fluor (FLR) acquired a 49% ownership (COOEC owns the remaining 51%) in a module fabrication yard in Zhuhai, China for \$489MM. COOEC has engineering, fabrication, and construction capabilities. JFJV is planning to use CFHI to fabricate >150 pre-assembled units and pipe rack modules. We believe JGC/ Fluor is using three module yards for LNG Canada:

- 1) CFHI- Zhuhai, China
- 2) COOEC – Qingdao, China
- 3) PJOE in Shandong, China

CFHI is among the biggest fabrication yards in the world and designed to maximize efficiency, workflow, and blend indoor facilities and outdoor laydown yards (Figure 3).

Figure 3. COOEC Fluor Module Yard Layout (May 17, 2020).



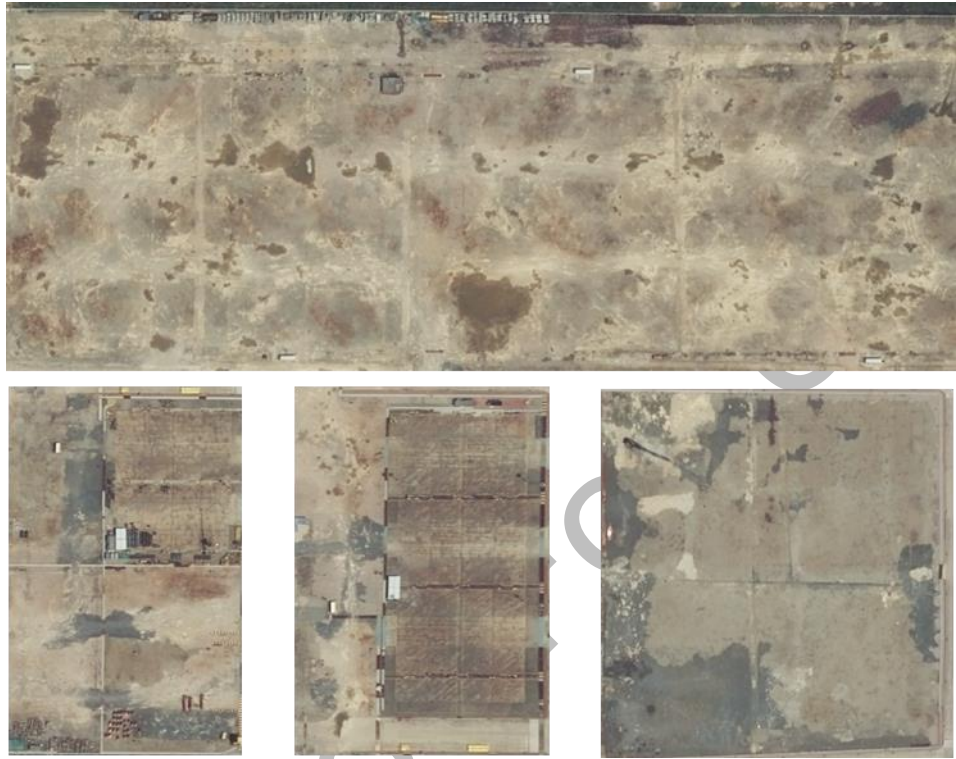
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Module Yard Layout Descriptions

Primarily Indoor		Outdoor	
Number	Description	Number	Description
1	Steel Plate Cutting & Welding Shop	6	Pipe Spool Laydown
2	Structural Assembly Hall	7	Outfitting & Pre-Assembly Area
3	Paint Blast Shops	8	Skidway & Loadout Facilities
4	Pipe Spool Fabrication Shop		
5	Pipe Spool Paint Blast Shops		

Source: Regulatory and company filings, W|EPC Analysis

Figure 4 is a closer look at the outfitting and pre-assembly areas. As seen in the images, there does not appear to be any structures or material fabrication progress even though CFHI announced fabrication started in August 2019.

Figure 4. CFHI Module Yard Pre-Assembly Areas

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COVID-19 may provide JFJV schedule relief from liquidated damages. JFJV may incur additional construction costs related to the schedule extension though. On 03-Feb-20, LNGC took measures to limit potential exposure to the novel Wuhan coronavirus (COVID-19) by suspending all business-related travel to China, **demobilizing their China-based contractors**, and not remobilizing them until it was safe.

EPC Contracts typically contain FM clauses with a closed list of events considered as Force Majeure. FM lists can be quite exhaustive. Two typical FM clauses, (1) epidemics or pandemics and (2) government acts, could potentially cause the COVID-19 outbreak to be classified as an FM event.

- 1) Epidemics or Pandemics - The World Health Organization (WHO) classified COVID-19 as a global pandemic on March 11, 2020.
- 2) Government Acts – Specific government acts such as blockades, commercial embargoes, civil disturbances, or wars are typically identified as FM events; however, broader language regarding government halted travel is sometimes, though rarely, used.
- 3) We believe JFJV may be entitled to schedule relief for FM events but is likely not entitled to cost relief, as is typical in major EPC contracts. **JFJV would also have to prove schedule relief via a critical path methodology showing impacts to their contractual guaranteed dates.**
- 4) Given the global nature of LNG projects, there are normally multiple definitions of “the Site”, including the actual project site in Kitimat as well as other locations where

work is ongoing, such as Chinese fab yards. It is likely that FM relief applies to both the Kitimat site and the Chinese yards. However, JFJV's vendor supply chains and manufacturing sites are typically not covered by EPC FM clauses.

Engineering is likely not the reason for the ~2% module fabrication progress.

Engineering should be 60% to 90% complete before starting module fabrication. In September 2019, Fluor reported the 60% model review was on-going. In February 2020, Fluor reported a key upcoming milestone was completing the 90% model review. Both model reviews support starting steel fabrication around August 2019 and module assembly starting in late 2019/ early 2020.

Key Takeaways

- 1) While an LNG project's critical path typically runs through major equipment such as process compressors and the main heat exchangers; we believe JFJV will ultimately be able to demonstrate module assembly being on the critical path.
 - a. We would expect JFJV receiving a ~2-month (Feb – Apr COVID-19 Impact) schedule extension on contractual guarantee dates before having to pay liquidated damages.
- 2) The exact details of the Force Majeure language in the EPC Contract are important for determining cost and schedule relief. If JFJV does not receive schedule relief for COVID-19, it could be hundreds of millions of dollars in cost overruns and liquidated damages could punish balance sheets.
- 3) Reported engineering progress should have supported module fabrication and assembly. The current progress of module assembly is concerning and probably largely driven by COVID-19.

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