HP Viewpoint | **R. BECK**
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The LNG market needs digital disruption

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The impact of digital transformation on the LNG value chain is an area of active discussion and urgency. The LNG market is poised for continued growth, due equally to strong gas supply in the US and robust gas demand, especially in Asia. Worldwide demand for natural gas is driven by growing interest in natural gas as a cleaner alternative to coal in power generation, the role of natural gas in reducing particulate emissions (a problem in many urban areas), the crucial role of natural gas in reducing greenhouse gas emissions and price.

Recent questions sparked by this transformation are whether the burgeoning gas supply and growing LNG export market in the US are encountering bottlenecks. Industry-wide, there is concern about access to capital expenditure (CAPEX) due to perceived risk in the changing marketplace, which could lead to shortages in the future. The answers to reducing such risk are contracting CAPEX time scales, increasing export facility reliability and increasing supply chain agility. The capital-intensive nature of LNG forces a strong focus on optimizing logistics and improving operational excellence; therefore, it will benefit greatly from the latest analytics, artificial intelligence (AI) and machine learning solutions, which are already proven to reduce risk, increase reliability and shrink CAPEX timelines.

Much of the business urgency is driven by the transformation of the natural gas/LNG market from a "long-contract" to a "short-contract," or near-commodity, business. This time scale change and reduction of contract certainty changes financing parameters for the high CAPEX required for LNG refrigeration plants. The entrepreneurial LNG players (e.g., Cheniere and Tellurian), which have the spirit to drive the transformation with their agility, will be leading the utilization of these new, disruptive technologies to gain a competitive advantage.

It is clear that the time delay in bringing LNG projects to fruition needs to be shortened in light of new market realities. LNG producers have talked about developing new contracting models and de-risking project execution as factors in their ability to drive down CAPEX on existing projects, as well as through simplifying the process and utilizing floating regasification plants (e.g., FSRUs).

As operators seek ongoing investment and replacement of assets for the stability of hydrocarbon markets, what is next in LNG and beyond? How do firms rise to the top of the class in terms of returns on exploration investment, instead of bottom of the barrel? Industry leaders point to the "accelerated schedule," the goal of which is early monetization of successful discoveries, bringing all aspects of an asset development into concurrency—from exploration to reservoir studies to engineering design to construction and operation—and the use of digitalization, technology and big data.

The LNG industry's interconnected ecosystem of owner, engineering, procurement and construction (EPC) companies; consultants/technology implementers; technology licensors; and fabricators share an interest in adopting new digital technologies to improve their asset-heavy businesses. Successful digital transformation will be a combination of existing technologies with new technologies for LNG and upstream assets.

Those in the LNG marketplace willing to utilize real-time operational data, advanced analytics (enabled by machine learning), multivariate analysis and rich process knowledge will be the industry leaders of tomorrow. The following examples are intended to show how asset optimization across the entire design, operation and lifecycle will achieve the highest levels of operational excellence in the future:

- Machine learning keeps expensive LNG assets running, increasing the reliability and uptime of LNG compressor trains
- Digitally twinning crucial LNG assets: "Light" digitally enabled dynamics models online can save millions of dollars across the lifecycle for a wide range of operating benefits and safety assurance
- Concurrent and smart engineering software optimizes the LNG design process, reducing the time and CAPEX of LNG projects
- Collaboration improves workflows and relationships with contractors and eliminates cost and time overruns
- To produce at optimum capacity, advanced control has proven able to provide several thousand times return on investment. **HP**