

Cost, schedule and risk: Taking an integrated approach to midstream gas projects

Established pipeline firms as well as electric and gas utilities are making unprecedented investments in the midstream gas sector. Several factors point to a continuation of a build-out that has been under way for five years.

Demand for gas both as a feedstock and a fuel for power generation has increased dramatically, while an aging pipeline infrastructure is also likely to drive midstream investment activity. With low gas prices remaining in place for the foreseeable future, growth in the midstream segment seems assured. All of this adds up to a positive outlook for midstream projects globally.

Regardless of how long the lifecycle is for any given project, whether greenfield or brownfield, the project owner is concerned with three main areas: cost, schedule and risk. Traditional approaches to project design and execution leave room for uncertainty to creep in, but by emphasizing integration and optimization early on, project owners can realize significant benefits in all three areas.

An active global market

Several market trends make investments in gas appealing. An aging coal fleet (and a shift to more gas generation), current and potential environmental regulation, steady projected demand growth (~2% CAGR through 2035) including exports, and vast US reserves are all driving gas infrastructure development in North America. Electric and gas utilities in particular have begun making big midstream bets. Some recent examples include:

- Duke Energy acquired Piedmont Natural Gas Co. for \$4.9 billion and also took a 50 percent stake in the Atlantic Coast Pipeline, together tripling the size of its gas operations.



- Dominion Resources, Inc. acquired Utah-based Questar Corp. for \$4.4 billion.
- Southern Company is buying Atlanta-based AGL Resources for \$12 billion.
- Consolidated Edison and Crestwood Equity Partners LP created a joint venture to own and develop Crestwood's existing natural gas pipeline and storage business in Pennsylvania and New York. In January, Con Ed also acquired a 12.5 percent ownership interest in Mountain Valley Pipeline, which would link West Virginia with northern markets.

In Europe, political concerns about reliance on Russian gas are driving investment in alternative routes to service European markets. Large pipelines are also being built to access new sources such as the Caspian Sea. The Southern gas corridor, for example, spans multiple pipeline systems across 3500 km (2170 mi) to bring Caspian gas to European customers.

Overall capital spending across the natural gas industry is expected to fall 15 to 25 percent this year according to Credit Suisse, but that figure masks a continuing trend of investment in the midstream sector. Industry analysts expect pipeline spending to remain at more than twice pre-shale boom levels, at least over the near term. Clearly the strategic importance of gas is only increasing.

Benefits and risks

The benefits for making investments in the midstream market are threefold. Financially, there is revenue and earnings growth, as noted above, and in the case of power companies, the opportunity to diversify away from the legacy electric business. Demand from the power sector, too, is set to increase. On the environmental side, gas-fired generation is typically the beneficiary of retiring coal-fired plants, but gas can also play a key role in enabling more renewables to come online by smoothing out the intermittency of wind and solar.

In terms of risk, pipeline capacity is a long-term fixed cost. If demand shifts or prices drop, the costs of maintaining the initial investment could outstrip the returns. There is also the matter of maintenance. More than 50 percent of the natural gas pipelines in the United States were constructed in the 1950s and 1960s according to the US Department of Transportation, and with pipeline safety very much front-of-mind, asset health becomes even more important. Even in a greenfield project, though, maintenance plays a major role in the profitability (and even viability) of a project over the full lifecycle. For that reason and others, an integrated approach that optimizes plant systems up front and facilitates condition-based maintenance ongoing is best.

Integration for success

The main automation or electric contractor (MAC/MEC) concept is well established in the oil and gas industry. Now those ideas are being expanded to incorporate safety, security, asset health, efficiency and other broad objectives into a more holistic approach to project execution.

The emphasis here is on early-stage engineering and the value that partnering with a single vendor can bring. By assuming some project risk, the MAC/MEC can identify opportunities early in the project timeline, for example to reduce the footprint of electrical facilities. That in turn means less civil work, less integration at the installation and commissioning phase, and fewer opportunities to deviate from schedule. Modular solutions offer similar advantages, with more work done at the factory and less in later (i.e., on-site) stages of the project.

Integration of power and automation systems is also critical. Some devices might be connected to a process bus while others are connected to the electrical system, for example. Having a single system means less equipment in total and one interface for operators to get a complete picture of pipeline operations. Using common industry protocols and choosing communication buses instead

of hardwired connections also eases configuration for faster startup and commissioning. These are all benefits project owners realize when they work under an integrated approach.

There are many more opportunities for integration. The 1850 km (1145 mi) TANAP pipeline in Turkey, for example, combines telecoms infrastructure (fiber optic lines), pipeline monitoring, safety systems (leak detection), security systems (CCTV, intrusion detection) and an operator training simulator under a single user interface. Operationally, this offers improved safety, increases system availability, and creates a foundation for the sensing and monitoring capability that sophisticated asset management relies on.

Having the sensors and communications pieces in place is important as analytic capabilities continue to advance. Today's cutting-edge systems will soon become the industry norm in terms of business intelligence and situational awareness. Leveraging these rapidly evolving technologies will be a key differentiator: organizations that do it well will reduce opex while improving safety and environmental performance and those that do not will suffer a competitive disadvantage. As time goes on, the ability to turn raw data in to actionable intelligence will only become more vital.

A proven approach, gaining traction

The benefits of an integrated approach are already visible in other sectors (e.g., power): improved safety, avoided equipment failure, more effective O&M budget allocation and improved operator productivity.

Upstream projects in the oil and gas industry have similarly garnered significant savings—often 15 to 20 percent—using an integrated approach to optimize systems at the design stage. One oil and gas major, for example, validated a 20 percent savings on an upstream project using an integrated control and safety system with optimized motor and drive packages. Another cut labor costs by 48% on an LNG facility startup. This project in particular illustrates the value

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of an integrated approach, with more man-hours in the engineering and design stage being offset by far fewer man-hours in installation, commissioning and testing.

The common factor in these examples is the role of a trusted partner. Clearly, if a project owner is going to place a significant portion of the project in the hands of a single supplier, that vendor should be well known, with a proven track record of delivering on the promise that an integrated approach offers. With such a relationship in hand, pipeline investors will be well positioned to meet the challenges of cost, schedule and risk head-on.

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