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INDUSTRY DIRECTION^{TM}

Long-distance gas pipelines and TAPI: look before you leap

TAPI

In the recent times the hopes of decades old concept of Turkmenistan-Afghanistan-Pakistan-India (TAPI) gas pipeline have resurfaced. There are discussions for beginning work about the 1,800 kilometre Tapi pipeline, Tapi is designed to carry 33 billion cubic meters (BCM) of natural gas each year from the Galkynysh fields, the world's second-largest, across Afghanistan and Pakistan into Fazilka in southern Punjab of India. Rather simplistically, the project has been seen as a win for all its participants. Landlocked Turkmenistan would find markets for its gas, cash-strapped Afghanistan and Pakistan would gain from transit fees, and hydrocarbon-hungry India from reliable, cheap energy. Even as it fought the Afghan state, the Taliban promised not to attack any Tapi-related construction work, knowing it would also bring windfall gains.

THE TAPI PIPELINE

Ever since 2016, India has backed TAPI; government-owned energy giant GAIL owns a 5% stake in the Tapi Pipeline Company, the special-purpose consortium behind the project. Huge questions hang over the project – and it is not just about the obvious issues related to pushing a pipeline through a war-torn country. Financing the pipeline is the biggest of them. The Asian Development Bank (ADB) has estimated the cost of building the pipeline itself at some $10 billion. Experts believe the actual figure somewhat higher, at $14-16 billion, not counting upstream investments needed for Turkmenistan to produce the promised 33bcm.

While the proposal has not left the table to the implementation, such natural gas pipelines need to be seen more in the lights of what one may not get than what one can get.

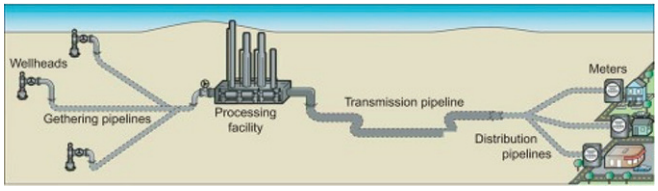
BACKGROUND

Compared to traditional fossil fuels, natural gas has a higher calorific value and combustion efficiency, and its combustion products cause less pollution. With the development of green economy, the global consumption of natural gas has been increasing rapidly. As the main method of natural gas transmission, natural gas pipeline networks play a key role in connecting sources and users. However, there are many complex problems in the pipeline operation, e.g., the region span between sources and users, complex geographies, demand fluctuations, and high operation pressures. These problems make natural gas pipeline networks to be one of the most complex and arduous pipeline network systems worldwide.

Oil and natural gas are the most used energies in the world, contributing to 57.5% global primary energy consumption .Pipelines are critical infrastructure for the transportation of oil and natural gas, connecting producing areas to refineries, chemical plants, home consumers and business needs. In the United States, there are more than 190,000 miles of liquid petroleum pipelines and over 2.4 million miles of natural gas pipelines (including the distribution lines that serve homes, offices and businesses). This constitutes the largest pipeline network in the world. However, oil and natural gas are flammable and explosive substances, usually delivered in high-temperature high-pressure conditions via pipeline networks.

Generally, all long-distance oil and gas pipelines are laid underground with surrounding soil as support and protection. The pipe-soil interaction element model is often

used to simulate the soil movement and the interaction between the pipe and its surrounding soil. Simulation of the contact surface between the pipe and soil body is suitable for the issue of interaction between the deeply buried pipeline and its surrounding soil, which simplifies the simulation of pipe-soil contact. In long-distance natural gas pipeline routing, not only the needs of pipeline transportation customers but also the safety risks that local economic development poses on pipelines should both be taken into consideration.



THE WELL TO THE CONSUMER NATURAL GAS SUPPLY

The efficient and effective movement of natural gas from producing regions to consumption regions requires an extensive and elaborate transportation system. In many instances, natural gas produced from a particular well will have to travel a great distance to reach its point of use. The transportation system for natural gas consists of a complex network of pipelines, designed to quickly and efficiently transport natural gas from its origin, to areas of high natural gas demand. Transportation of natural gas is closely linked to its storage: should the natural gas being transported not be immediately required, it can be put into storage facilities for when it is needed.

There are three major types of pipelines along the transportation route: the gathering system, the interstate pipeline system, and the distribution system. The gathering system consists of low pressure, small diameter pipelines that transport raw natural gas from the wellhead to the processing plant. Should natural gas from a particular well have high sulfur and carbon dioxide contents (sour gas), a specialized sour gas gathering pipe must be installed. Sour gas is corrosive, thus its transportation from the wellhead to the sweetening plant must be done carefully.

Pipelines can be characterized as interstate or intrastate. Interstate pipelines are similar to in the interstate highway system: they carry natural gas across state boundaries, in some cases clear across the country. Intrastate pipelines, on the other hand, transport natural gas within a particular state.

STATUS

Turkmenistan in 2021 will begin construction of the 1,125-mile, 33-billion cu.m/year Turkmenistan-Afghanistan-Pakistan-India (TAPI) natural gas pipeline in Afghanistan. Turkmenistan plans to complete TAPI's construction inside its territory this year and then begin work on the line's Afghanistan segment, according to Foreign Minister Rashid Meredov. Construction of power transmission and fiberoptic communication lines along TAPI's route is also nearing completion, according to Turkmenistan's foreign ministry. TAPI is laying 56-in. OD pipe from Galkynysh field in Turkmenistan to Fazilka, India, with completion expected in late 2022. This schedule, however, is contingent on the timely completion of work in Afghanistan and the start of construction during 2021 in Pakistan.

Associated regulatory and competition-led risks

In engineering, we do not assume that risk is bad. Competitive businesses do not always 'solve' risks by reducing or eliminating them. More competition would pose new problems for gas pipelines only if they were asked to bear transition costs without adequate compensation, or if regulation impeded their ability to compete and earn a competitive profit.

There are five major issues of risk with the natural gas pipeline industry:

1. Natural gas pipelines are not low-risk businesses. They are not traditional public utilities with protected markets and stable and adequate returns. In some dimensions – exposure to regulatory rule changes, for example – they are definitely high-risk businesses. The view that the pipeline industry's troubles are past and that regulation can be counted on to fix any remaining problems is simply not borne out by the evidence.
2. The pipeline industry has endured roughly several decades of extreme danger and difficulty. Many pipelines suffered enormous losses. The specific risks that caused these losses seem to be receding. However, new risks threaten, reflecting unsettled markets, unsettled regulation, new and more intense competition, and more difficult environmental and operating requirements. And all these will only be more complex in the future but shall not be intractable.
3. Pipelines' business strategies and profits will be constrained by competition and also by traditional rate of return regulation. Competition is increasing and rate of return regulation is getting tighter. However, regulators (and the courts) have not completely specified the regulatory system or the boundaries of competition. Pipelines must not plan future investments without knowing the detailed rules of the game and under a cloud of doubt whether any such hybrid system of regulation and competition can be sustained in the long run.
4. One thing is nevertheless certain: if competition creates downside risks, and tight rate of return regulation eliminates profits above the cost of capital, then pipelines cannot earn fair profits on average. Consequently, investment in the natural gas pipeline industry will eventually be retarded and biased toward safe activities. Risky investments necessary to provide reliable service will be discouraged.

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