

CHALLENGES IN THE DEVELOPMENT OF MARKET-BASED PIPELINE INVESTMENTS

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Abstract

The development of Market-based pipeline investments in the international arena has fundamental differences from projects sponsored by consumer or pipeline user needs, government endeavors or producers desiring to sell their product. Whereas these User-driven projects were the traditional way of developing projects in the past, current global political and economical trends are forcing private pipeline companies to develop new ways of creating business opportunities: the development of Market-based Pipeline Projects.

A proactive strategy for developing energy transmission businesses comprises of identifying energy market opportunities and finding natural gas in enough quantities to justify building a pipeline infrastructure. This strategy also has to be properly linked with other factors to enable the investment to occur. These Market-based business opportunities have unique characteristics and require a strong corporate vision and support before it can be successfully implemented.

This paper will provide an insight to the challenges, risks and uncertainties to be faced when developing Market-based pipeline projects. The discussion focuses on the initial phase of the project, from the moment the business opportunity has been identified to the time when the project sponsors obtain enough confidence in the business to proceed with large capital commitments. The paper includes a description of the pipeline project development process and a review of the variables influencing all the important steps prior to the start of full implementation activities.

While the content of this paper is mostly applicable to all types of pipeline projects, the

discussion will focus on natural gas transmission pipelines.

Introduction

Rapidly growing global energy demands will require pipeline companies to greatly expand the existing pipeline infrastructure in the first part of this new century. Current USA and global growth in natural gas consumption is estimated at 11% and 8% respectively. Based on historical trends and demand forecasts, it is anticipated that US\$ 150 billion will be invested in transportation pipeline projects around the world over the next 15 years (Mohitpour et al 2000).

A large portion of all pipelines to be built in the next decade or two will be driven by pipeline company initiatives. Where both an energy market and an energy source can be found in a certain area, there may be a potential opportunity for an investment in a pipeline infrastructure.

Until a few years ago, private gas pipeline companies almost always relied on the initiative of a third party entity in the identification and development of natural gas transportation business opportunities. That third party organization was the main user of the system (or shipper), who was a government entity, a large consumer (or group of consumers), or in fewer cases, a gas producer. The third party project developer was the entity who had the responsibility for evaluating the preliminary viability of the project. It was also responsible for providing the necessary commercial structure and guarantees to allow the pipeline company to commit large amounts of capital to the project, commonly achieved through long-term transportation contracts.

Governments around the world started to move away from a direct participation in

energy development two decades ago, leaving it to private initiatives. As the natural gas industry matured worldwide and a large natural gas infrastructure was created, very few opportunities to supply large industrial and urban centres with natural gas were left undiscovered and developed. Very often in today's natural gas industry, new pipeline projects are only required to either expand existing transportation capacity or to supply natural gas to markets comprised of a number of medium and small-size industrial and urban centres. These industrial and urban centres are, in most cases, individually unable or unwilling to provide the above-mentioned guarantees to the pipeline company, thus adding a high degree of complexity to the development of the project.

Market-based vs. User-driven Projects

Pipeline companies looking for growth were required to assume the role of project developer. As a result, a complete new way of doing business appeared early in the 1990's: the development of Market-based Pipeline Projects. The initiative in this type of project comes from the owner of the pipeline system, rather than from the user of the system, as is the case of User-Driven Projects. In Market-based projects, the pipeline company develops the market demand, thus the need for the pipeline project.

It is always the pipeline project developer who has the responsibility to manage all commercial and technical aspects of the project and as well to estimate the value of all parameters or variables involved in its economic evaluation (e.g. market demand). The most important characteristic of the development of User-Driven Pipeline Projects is that the most critical of these elements or parameters are defined or estimated by the shipper. Non-critical elements or variables are left to be defined by the pipeline company. In the case of Market-based Pipeline Projects the risks and uncertainties associated to all those critical and non-critical elements or parameters are held by the pipeline company. Clear examples of these critical parameters are the market size (i.e. volumes to be

transported) and transportation contract period.

Pipeline companies have had to change their way of doing business to embrace the ownership and management of these risks and uncertainties that had been traditionally held by others.

Project Phases

In the context of this discussion, all the activities involved in a pipeline project will be grouped into three phases:

- Business Development Phase,
- Project Development Phase, and
- Implementation & Operations Phase.

The investment opportunity is identified in the Business Development Phase and the preliminary viability of the project is tested. A careful scrutiny of the potential project is needed before the company can justify further development.

The Project Development Phase begins with the basic confirmation of project viability. This phase concludes either when the pipeline company approves the project to proceed into the construction and operations phase, or when the business opportunity is abandoned.

The characteristics of Market-based Pipeline Projects introduce several challenges, risks and uncertainties to the Development Phase. Due to the presence of these factors, the pipeline company enters into very critical phase for the project and needs to be well aware of the difficulties to overcome and the risks to confront. The pipeline company also requires a clear understanding of all the activities to be executed during all stages prior to the start of the construction phase. Adequate procedures and methodologies applied during the development phase will help the pipeline company to control and mitigate the assumed risks.

A successful completion of the Project Development Phase will allow the company to proceed into the Implementation and Operations Phase.

Project Development Process

The lack of a clearly identified user (or client) early in the development of Market-based Pipeline Projects creates an environment of uncertainty and risk for the developing company. The high uncertainty phase of the project may conclude at the end of the development phase, such as in the case of projects where long-term, defined-demand contracts are signed with one or more users before the pipeline is built. On the other end of the scale, this phase may extend the complete project life period, as for projects where the investment is made based only on expectations of the market being large enough size to provide the desired economic performance (often described as “if you build it, they will come”). The latter type of project is considered a high risk and consequently very unattractive alternative to pipeline companies in today’s highly demanding business environment, therefore will not be considered in this paper.

With the exception of very aggressive companies, the pipeline company will require assurance that the investment in the project will meet or exceed its minimum economic performance requirements. Fully executed agreements with third party entities can provide the guarantees the pipeline company would expect. Depending on the individual characteristics of the project, those agreements may include gas transportation agreements, gas supply agreements, and contracts for the supply of materials and construction of the facilities. Certain regulatory approvals may also be necessary to obtain during the development phase. Only when those agreements and permits are properly secured can the development phase reach conclusion and the project move into the implementation phase. A summary of the process followed during the project development phase is illustrated in Figure No. 1.

A list of the basic activities undertaken in the project development phase is included in Table No. 1.

Table No. 1 – Project Development Phase
Basic Activities

- Estimate the existing and future market size
- Identify fuels currently used by existing users
- Estimate project life period
- Find a suitable source of gas with enough reserves and production capacity
- Geographically locate the potential consumers for the gas
- Estimate natural gas demand by delivery location and for the entire project life
- Determine pipeline configuration, select pipeline route and determine lengths
- Identify potential land right acquisition and community-related problems
- Perform hydraulic calculations to determine pipeline sizes and compression requirements
- Prepare a capital and operations & maintenance cost estimates
- Define transportation contract terms and conditions
- Identify regulatory requirements and constrains for the project
- Consider tax obligations and consequences
- Perform economic modeling to estimate transportation tariffs
- Analyze cost of gas at delivery locations vs. cost of competing fuels
- Confirm natural gas is a viable fuel competitor
- Identify regulatory requirements that may impact the current and future use of different types of fuels in the region
- Confirm market penetration assumptions
- Identify non-quantifiable risks that may compromise the project economic performance during its operations phase

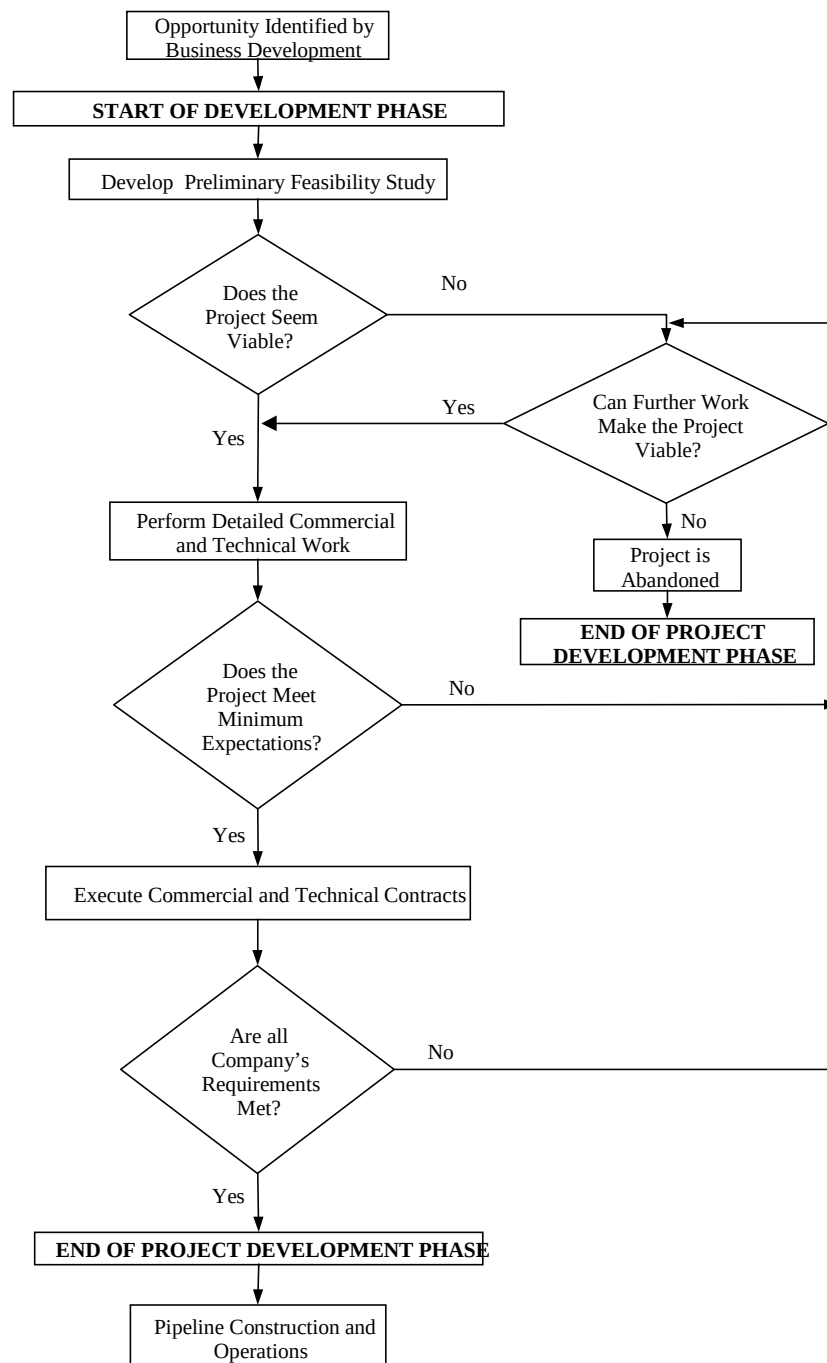


Fig.1 - Market-based Pipeline Project Development Process – Summary Chart

Sensitivity Analysis

It is of no surprise to state that in any for-profit organization, capital and human resources are a valuable commodity. Therefore, the amount of effort put into the project should be kept at the optimum level. A large amount of time and resources often needs to be dedicated to accurately estimate the variables used in the economic analysis of the project. Those variables should only be developed to a level of accuracy compatible

with the desired accuracy of the economic parameters that are used to measure the viability of the project.

A sensitivity analysis is performed early and at different points in the development phase to determine the level of accuracy required for each of the project variables and to ensure all efforts are properly focused on the project most critical aspects. To illustrate this idea, it can be assumed that the internal rate of return (IRR) is used to evaluate the

merits of a particular project (it is actually the most commonly used gauge for project financial performance). Each variable is separately modified a pre-defined amount above and below its most current value (assumed accuracy for the variable) to determine the impact in the performance measurement figure (IRR in our example). Should the impact be above what would be acceptable to the project team (acceptable range), the accuracy of the variable producing the impact needs to be increased, with the consequent utilization of additional effort (and funds) in the process. On the other hand, if the impact is low, the variable accuracy can be maintained at the assumed level or even decreased. It is not uncommon to discover that parameters that intuitively appeared to be critical in the calculation or estimate of the measurement figure have a low impact in its accuracy, while some unexpected variables show themselves as very critical. If the sensitivity analysis is done at the right time in the development phase, it can produce significant savings.

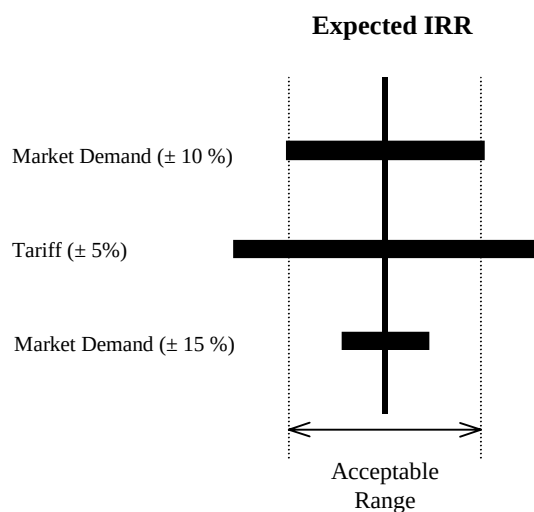


Fig.2 - Sensitivity Analysis, Example

For clarification purposes, consider the example shown in Figure No. 2. It indicates that the accuracy of the estimated market demand is adequate, the transportation tariff accuracy needs to be increased and the capital cost accuracy is excessive. The Expected IRR is the result of using the medium value for all influencing variables.

Each extreme of a bar represents the IRR resulting from modifying the influencing variable to the limit of its accuracy while maintaining all other variables at their medium values.

Challenges, Risks and Uncertainties

The risks a pipeline company assumes during the development phase are fundamentally different from the risks assumed during the Implementation and Operation Phase of the project.

The risks and uncertainties of the development phase are summarized in Tables No.2 and No.3, respectively. As previously mentioned, the pipeline company is required to dedicate a large amount of human and capital resources to a potential business opportunity. Should the project fail to meet the company's minimum requirements (commercial threshold) during the development phase, the project could be abandoned with all the efforts and funds expended in the project wasted. The company's reputation in the market could be severely damaged. A project failure could also harm relationships the company created or wants to create with local government or regulatory agencies, and with industrial groups or customers. Finally, the long-term corporate success of the company could be impacted by the results of one or several Market-based business ventures.

Once the project has completed its development phase and enters into the implementation or construction phase, and later into operations, the project risks are generally those associated with meeting the financial objectives of the project. Most of the uncertainties present during the development phase will become risks in the implementation and operations phases, each with a different degree of potential impact or severity. A satisfactory financial performance of the project will depend on the development team's success in properly establishing the commercial terms that will rule the investment and accurately evaluating all the parameters that may have an economic impact on the investment.

To illustrate this concept, the potentially negative consequences produced by elements associated with the market (like size, location and characteristics) can be described. A negative market response to the project during the development phase would ultimately force the pipeline company to abandon the project, with the consequent loss of funds, and other possible negative consequences. However, if the project is implemented and the market demand does not develop during the operations phase as expected, it could have a negative economic impact at the project level or even at the corporate level. This negative market response could have much more significant consequences than it would have produced if it had been more accurately forecasted during the development phase.

Table No. 2 - Development Phase Risks

• Development Phase cost • Pipeline Company’s reputation • Damage to relationships with local government, regulatory agencies and customers • Company’s long term success and performance

Table No. 3 - Development Phase Uncertainties

• Market Size, Location, Characteristics • Competing Fuels, Market Penetration • Gas Supply • Competitive Projects • Transportation Contract Terms and Duration • Pipeline User Commitments • Capital and Operating Costs • In-service Date • Regulatory • Political Issues and Risks • Financing • Cultural Issues

First steps

Once the Business Development Team has identified a potential pipeline business

opportunity in a certain region, the pipeline company faces some initial challenges. It will have to make initial assumptions in most or all activities listed in Table No. 1, to allow the project to move forward.

The first piece of information needed to proceed with all other tasks in the analysis and development of the project is a preliminary estimate of the market demand (on a yearly basis) throughout the project life. It is required not only to estimate revenues but also to define the initial and future facilities needed. This information is used in turn to define the physical system and forecast the capital and operating expenditures that will be incurred during the implementation and operations phases. Current energy consumption, type of fuel, load factors, growth factors and market expansion plans are obtained for all existing industrial consumers in the area. Cost of natural gas at the delivery locations is compared with the cost of current fuels used. Regulations influencing the type of fuel used are considered. Operational advantages introduced by the new fuel are identified. As a result, the estimated industrial market penetration can be obtained. Residential and commercial loads are estimated based on experience and data from similar markets in the region.

When all the aforementioned information is combined, the yearly demand (or flow rate) is confirmed or updated and is ready to be used in all other parts of the economic and technical analysis. The characteristics and size of facilities as well as the cost estimates are confirmed. Finally, taxes and several other factors are considered to obtain, when run through a computer-based financial model, the project parameter that the company selects to measure the project performance. Given that during the early stages of the project development most or all of the above is uncertain, the company will need a solid determination and commitment to continue dedicating resources to the Market-based project.

Detailed Commercial and Technical Development

If, after making all the necessary assumptions and obtaining the basic project economic parameters, the project still appears feasible to the pipeline company, it may proceed into the detailed commercial development phase. In this phase, all the uncertainties are further refined and all commercial and technical components of the project are analyzed to confirm or revise the initial project economic results. The performance measurement parameters obtained are then compared with the company's minimum requirements, and if those are satisfied, the project can proceed. At this time, the company will attempt to secure transportation, gas supply, procurement and construction contracts, and to obtain certain regulatory permits that cannot be obtained later during the construction phase due to schedule constraints.

The results of the first set of assumptions and estimate of the project economics may not be as desired or expected. If the resulting measurement parameters have values that are outside acceptable limits, all the assumptions made in their calculation will have to be modified, which results in an iterative process. Modifying some of the parameters used as input in the financial model could not only have a direct impact but also an indirect impact on the results. To illustrate, it can again be assumed that the performance measurement parameter chosen is the Internal Rate of Return (IRR), and that the financial model initially reports a low IRR value not compatible with the company's expectations for the project. A simplistic way of increasing IRR would be to increase transportation tariff, because it has a direct positive impact on the project economic results (Mohitpour, Mc Manus, 1995). However such an increase may also bring some indirect negative consequences. The gas price at delivery locations (relative to competing fuel prices) will increase, followed by a subsequent reduction in market penetration and demand, creating a negative impact on revenues and project economics. High innovation and creativity is demanded from the project

development team to overcome challenges like this. Such innovation and creativity may include improved tariff structures, more effective facility designs, reductions in capital and operating costs, and the creation of additional business opportunities associated with the pipeline project.

Market Guarantees

One of the most significant challenges that is found in the detailed project development stage is the market reluctance to make the commitments to the pipeline company that are necessary to guarantee some level of project economic results. Established medium or large-size industrial companies see the availability of natural gas as a potential cost-saving opportunity or a convenient method of satisfying environmental demands from the public and government agencies. However, they are already operating a business without natural gas and rightly feel they can continue to do so. They are skeptical about the feasibility of a large pipeline project. They may be approached by the competition, thus increasing skepticism and confusion. They also feel that if they sign any long-term contract with the pipeline company, they will lose all leverage they have in their position as the client. Additionally, natural gas transportation contracts are frequently unfamiliar to industrial users. As a result of all of the aforementioned, and unless they are forced by regulators to use cleaner fuels, they will resist entering into long-term, take-or-pay contracts with the pipeline company during the development phase. This makes the task of obtaining the necessary guarantees to proceed with the project a major effort for the pipeline company.

Cost Management

By the time the project satisfies all the internal requirements the company needs to proceed with the investment, substantial time, effort and funds will have been dedicated to or expended in the project. Unlike other types of projects, Market-based Projects do not have a fixed schedule and the development phase can extend for a long time. Consequently, the funds and resources

committed to the project may reach unexpected levels. The typical cost for the development phase of pipeline projects can be between 1% and 8% of the initial capital cost of the project, depending on several factors such as the size of the project, market characteristics, location, and the company's experience in the business. A typical timeframe for the development phase is between 6 months and 2 years.

Control over the expenditures is another of the major challenges the company faces during the development phase. It is important to note that at this stage it is still uncertain whether the company will build the project (it may be built by its competition or not built at all), so all the money spent is fully at risk.

Development Phase Completion

As more knowledge is gained, assumptions are reviewed and the feasibility of the project is frequently monitored during the detailed commercial development phase. "Go-no go" tests are run and the project team continues with its efforts until the project either successfully concludes the development phase, goes into sudden death (if terminally ill), or goes into hibernation (a presently non-satisfactory market demand may increase in the future, thus making the project feasible).

If the Development Phase is successfully completed, the project moves into the Implementation and Operations Phase, where the pipeline is first built, and later, when it is ready to start commercial activities, operated and maintained. During this last phase, all efforts are focused on making sure the pipeline business performs according to the expectations set up by the project team during the Development Phase.

Conclusion

In the foreseeable future, pipeline companies looking for fruitful business opportunities will be required to develop Market-based projects. These companies will require a clear vision of its near and long term goals, and a strong will to succeed in this type of business endeavor. The company will need to prepare a detailed strategy and policies

clearly defining, among other things, geographic areas of operations, risk tolerance, availability of capital, and expected project performance. Considerable amounts of specific knowledge and experience will also need to be acquired and developed. Venturing into Market-based projects unprepared and unaware of the potential consequences could lead the company to disappointing failures.

The Development of a Market-based Pipeline Project involves the ownership and management of a large number of uncertainties, overcoming significant challenges and assuming considerable risks. An efficient management and execution of all project activities will mitigate the risks of the Development Phase. An effective consideration of the uncertainties will mitigate the risks that the pipeline company will assume later in the Implementation and Operations Phase and will position the project for success.

It will be the company's awareness, commitment, perseverance, expertise and high quality work that will make it successful in this kind of endeavor. Only after satisfactorily completing the Development Phase will the company be able to make the project a rewarding business reality.

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