The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

How to Get a Pipeline Built - Revisited

Posted by Jerome a Paris on November 6, 2010 - 10:50am in The Oil Drum: Europe
Topic: Economics/Finance
Tags: central asia, finance, natural gas, pipelines [list all tags]

This is a post that was originally written in 2007.

There are regularly stories in the media or in the blogosphere about various pipeline projects that are announced with much publicity, and are seen to have major strategic consequences, or conversely about projects that are more discreet but are seen as the "real" justification for various military or diplomatic acts. For instance, the announcement last month of an agreement between Russia and several central Asian republics about a new pipeline was widely interpreted as a major move against European energy security. Similarly, the war in Afghanistan has often been blamed on a long mooted Turkmenistan-Afghanistan-Pakistan pipeline.

These analyses (which are absurd to anyone with a basic knowledge of the oil&gas industry) completely ignore the dynamics of what it takes to actually get a pipeline deal done, and what it means for relations between the parties involved. Therefore they fail to understand the significance (or lack thereof) of announcements by energy companies or governments and wrongly interpret the geopolitical implications of both pipelines, and announcements of pipelines.

So, in order to help oildrummers better interpret pipeline news, here's a primer on why and how pipelines get built - which essentially means how they get financed.

In order to understand pipelines, it's easiest to cut the task into smaller pieces, and see how these are required to be put in place and fit together.

But even before that, one fundamental question to ask whenever an article or anyone talks about a pipeline is: oil, or gas? The two are completely separate businesses, and are totally independent one from the other, but they are very often mixed up by uninformed commentators. An article that includes a map that does not separate and identify the two networks, or that talks blithely about pipelines between two countries without identifying what resource is actually transported can safely be ignored as fundamentally clueless. Beyond that first step, a cursory look at what is to be linked by any pipeline can allow to further eliminate many stories. For instance, the article linked above about the Afghanistan pipeline talks throughout about oil, when the pipeline that was discussed for a while was a gas pipeline - for the simple reason that Afghanistan's neighbor, Turkmenistan, has gas but little oil, and any oil pipeline would need to come from even further afar and involve more countries.

From now on, I will only be discussing gas pipelines. The logic is mostly similar for oil, if a bit simpler (I'll comment on the differences where relevant). With this point clarified let us address the components of a pipeline:

- A supply of gas
- A supplier of gas
- A market for gas
- A purchaser of gas
- An entity operating the pipeline
- Government authorisations for pipelines crossing their territory -for each country
- A price for gas transport
- An entity (or more) building the pipeline
- An entity (or more) paying the pipeline

The fundamental point is that all of the relevant components and parties need to be present at the exact same time for the project to exist. And by "being present", I mean "irrevocably making binding commitments, representing large sums of money." And it is a surprisingly difficult job to bring all the parties to the table in that way at the right moment - which is why fewer pipelines than one would expect are built, and why few entities are actually able to pull it off. And, as we will see, being able to pay for the pipeline is not quite enough.

A pipeline concept will usually come to life via 3 circumstances: (i) when a large supply of gas needs to be brought to the market, (ii) when a large enough market/customer not or insufficiently supplied needs gas, and (iii) when a large supply of gas and a large market are close enough that it might be worth linking them. But that's just a *concept*. At that point, economics have not been examined, and parties even less. The concept may be floated by analysts, examined by energy companies, pushed by entrepreneurs, or developed by politicians on any territory potentially involved. This may already lead to punchy announcements by either of these. What is important to understand is that at this point, the pipeline has no existence and no prospects yet. What happens at this stage is a PR drive to try to give reality to the project and get serious players interested. It may also be part of a campaign to favor one potential project over another, as companies and countries jockey to try to get their hands on potentially juicy assets - and also

scare off competitors and alternatives.

If the concept looks potentially attractive (basic economics look okay, the resource base is sufficient, there exists a need for transport capacity), more detailed studies will get funded to look a bit more closely at the engineering side and get a better handle of potential costs. These studies will, again lead to further (often triumphant) announcements before and after the study, and fancy-sounding but, at this point, worthless, "memorandums of understanding" or similarly fluffy agreements will be signed in front of the media. At this point, the pipeline is still nowhere near existing, and has not been subject to any kind of investment decision.

Let's take a look again at the criteria for attractiveness:

- **The resource base**
  Enough gas must be available from the production area to fill up the pipeline. Filling it up means using up the capacity for at least 20 years. A 10 bcm/y (billion cubic meters per year - 10 bcm/y is almost equal to 1 mmcfd - one million cubic feet per day) pipeline will thus require a resource of at least 200 bcm (or 7 Tcf - trillion cubic feet) that needs to be transported.
  This is not a trivial issue: many gas fields are called "stranded reserves" because they are not big enough (or too far away) to justify economically the construction of a pipeline to bring them to market.

- **The need for transport capacity**
  The gas resource must not have any other existing or obviously cheaper transport alternatives to be brought to market. Any project where the gas is already using some other route, or could use another route, is unlikely to happen. For instance, all the gas pipeline projects from Central Asia (including the recently announced Russian one) make no sense because a pipeline already exists and is not full - the mere existence of that available capacity is enough to undercut any alternative project and kill it.A slightly more interesting situation happens when there is a real need for transportation capacity, but there are competing projects. In that case, it is not necessarily the most economic that will happen, but that (amongst those that are economically viable) which first fulfills the condition stated above - bringing all the necessary parties together. As the parties include the governments where the gas production takes place, and of the transit countries, it is necessary to convince these to come on board. That's where the PR/announcement wars will take place to try to make one project appear inevitable and align the necessary support of all the third parties behind it. For so long as no firm investment commitment has been made, no project is actually inevitable, however strongly it may appear to have support.

- **Basic economics look acceptable**
  This will come from a combination of the price of gas (production costs plus taxes) and the distance it needs to be transported, compared to the expected price on the destination market - which itself depends on whether the pipeline connects to a liquid market/network, to a single client or to other transport facilities (LNG terminal, more pipeline transit) which impose additional costs before the gas is actually sold. **A very rough estimate is that it costs 1-2$ to transport a tcm (thousand cubic meters) over 100 km (approximately - it costs 5-10c to transport a MBTU over 100 miles).** The way these estimates are usually done is to start form the point of sale, deduct all transport and other costs to bring the gas there, and identify the **"netback"** that market provides at the point of production, i.e. the net amount that would end up in the producers's pocket.

After the basic economic "smell test" has been run, the more detailed studies will give potential players a better grasp of the potential cost of the pipeline, and of the volumes of transit gas required to cover that cost in an economically sensible way. Such a study will usually have been paid for by one or more potential parties along the gas chain (a gas producer, a contractor, a government, a buyer), andmade available in more or less detail to possible partners. What's needed at that point is an entity able to drive the project to fruition. Such an entity has to have a direct interest in getting the project done (any of the above can play that role), but it needs

something more, which is a lot rarer, and which explains why so many pipeline projects don't become reality: that entity needs to *be able to credibly convince others that the project will happen* and thus that they can actually make their own commitment to it in the certainty that it's not one-sided. In other words, that entity needs to be an acceptable counterparty to all the other participants to the project - all those listed above.

That argument is enough to kill the notion that "China has billions of dollars, it can pay to build a pipeline (from Turkmenistan or elsewhere)". Money is not enough. China cannot credibly convince the Turkmens that it will pay for the gas even if Kazakhstan blocks transit for some reason. It cannot credibly promise to the Kazakhs that it will pay the transit fees even if gas is not delivered. Because the amount at stake is not just the cost of the pipeline, it's potentially the value of gas sales over 20 years. And, more importantly, the Chinese themselves cannot trust the Turkmens to deliver the gas even if they have built the pipeline.

So, in practice, the leader the project is either a company or an entity that controls most of the chain (say, Gazprom, which has the gas, the technical know how, the financial means and the ability to get approval for pipelines inside Russia), or a company that both has a stake in the pipeline and the track record to lead such projects - i.e. an oil major or, in a few cases, very large gas buyers like the aluminium smelting companies. Absent these, a project is highly unlikely to ever happen.

But let's see in more detail what the various commitments mean, who needs them, and how they can be credibly provided. Let's take the items listed above in the same order:

- **A supplier of gas**
  Identifying a potential gas producing area is one thing. The more relevant question, when plans become more concrete is - who will supply the gas? How much of it? For how long? Does that entity have the physical resource to do so? Does it have the legal rights to produce it and sell it? Has it committed all or part of that resource to anyone else? Does it make economic sense for it to bring the gas into the proposed pipeline? Are there, or will there be more attractive (and likely) alternatives in the future?In practise, that means identifying a particular gas field (or group of fields), or a particular player active in that production basin, and convincing the owner(s) of that field, or that player, to join the project. In fact, in many cases, pipelines are going to be driven by producers that are looking for an outlet, so that question is solved in the sense that the gas supplier is the initiator and is looking for cost effective ways to sell its gas. But for projects talked up by other players, this should be one of the first questions: who will fill up the pipeline, day in and day out, for the next 20 years. And it's that question that makes pipelines like the trans-Afghanistan one, or any trans-Caspian gas pipeline no more than pipe dreams - because the only entity that has the resources to conceivably provide for that requirement (the Turkmenistan national company) will not commit it: (i) because commitments from that country over 15 years are not credible, and (ii) because they can already ship their production in an existing pipeline, the one going to Russia which, not having to support any construction or financing costs, can always undercut any alterantive that does. But that factor also makes Russian announcements of more Central Asia to Russia pipelines just as silly, because they are equally unneeded and impossible to fill up.

- **A purchaser of gas**
  The same question needs to be asked at the other end of the line: who will actually purchase the gas to be transported, and pay for it? Does that entity need it? For the next 15 years? Can it afford it? Does it have the relevant infrastructure to use that gas?Now that issue is the single major difference between oil and gas - once your oil is on the market (i.e. on a boat on open ocean, or in a big, open network), you don't really need to care who will buy it. Oil cargoes will always be sold, at or close to the prevailing market prices, and paid for in hard currency. So finding a buyer (unless the end destination of your pipeline is a narrow market with only one or a few buyers) is not usually as burning an issue for oil pipelines.
  But for gas, it is a fundamental issue. Gas is a lot more dependent on infrastructure, and you cannot just expect to dump your gas on a market exchange and be done with it - you need to know that it will be handled properly, and that someone will do it consistently for you, for all the relevant volumes pumped day in and day out. So you need an end buyer.

  There are basically 4 kinds of buyers: utilities (those with retail gas distribution networks), power producers (operators of gas-fired power plants), a few big industrial users

(essentially in the metallurgic sector - especially steel and aluminium - and the petrochemicals industry), and a few big traders (which are usually the trading arms of the oil companies or of the 3 other kinds of buyers, and are thus backed by real physical capacity needs or very strong parents). One or more of these four categories will imperatively need to be a party to the pipeline project. In a very real way, the buyer underpins the project - it is the payments it makes over the long run that will allow to pay for the pipeline - as well, of course, as the gas itself.

Nothing underlines more the importance of the buyer than the almost systematic nature of the contracts they are asked to sign: the so-called "take-or-pay" contracts. Take-or-pay means that the buyer has to take the gas (*and pay for it, of course*), or pay for it (*even if it does not take delivery*). Buyers are in effect asked to guarantee a minimum level of income, irrespective of their physical ability to deal with the gas, provided that it *can be* delivered by the proposed pipeline. That means, of course, that the buyer is willing and able to make such a commitment, and that such commitment is considered credible, both in that there is a binding contract and that it actually makes sense for the buyer to make it. It should therefore be a large user (or distributor) of gas, with a strong balance sheet and, in all likelihood, a strong credit rating. It must need that gas, and not have a surplus of alterative cheaper supplies. The price it will pay must make sense for it (by being close to market conditions, or by providing some other advantage, such as a fixed price, or a maximum price).As this requirement mirrors that above for the gas provider, it is obvious that both ends to the chain must be satisfied with one another, as they underpin what the other actually needs - a reliable supplier and a reliable buyer (or "offtaker"). In most cases, the main commercial contract (the Gas Sales and Purchase Agreement) will be between these two parties alone, not inbcluding the other links in the chain, which will have their own contracts.

- **An entity operating the pipeline**

  The entity that operates the pipeline will be a central contractual counterparty to the other players in the project, dealing with the supplier of gas, the buyer of gas or both. In the simplest case, it is just the provider of a technical service (running the pipeline, providing maintenance and security, ensuring that the requisite capacity is available, transporting and measuring the gas coming in and out, etc...) with no involvement in the commercial arrangements of the project beyond a small fee for the services; in more complex situations, it can be a party to some of the commercial arrangements (such as the financing of the construction, and the corresponding transit tariffs it will receive). In either case, it is the entity that creates the commonality of interest between all the parties, and who does that job has to be representative of the entities with a stake in the overall project. It should be either an emanation of the project leader or a consortium including those entities, and acknowledged by the public authorities. It is an entity that needs to be able to bring together all the players at the right time, and thus be sufficiently credible, even if it is just a shell created for this purpose (a "SPV", or special purpose vehicle).

  Whenever looking at pipeline announcements, identifying the entity which plays this role can go a long way in identifying the strength of a project. Amateurs out of their depth or political wishful thinking can easily be weeded out this way. Projects pushed by politicians (like the Iran-India pipeline) or led by smallish players (like Enron trying to get involved in the TransCaspian pipeline) will go nowhere.

- **government authorisations for pipelines crossing their territory -for each country**

  We've talked about geopolitical factors before, but we need to get back down to plain politics too. A pipeline is a major piece of infrastructure, and will not happen without the explicit support (or, in the best case, the consent) of the local governments. And a pipeline, being a bit of equipement that stretches over large bits of territory, often straddles more than one government and/or local authority. **All** of those involved in any way will need to be brought on board - including the authorities regulating the gas provider and the gas buyer. Each one can kill the project. Each must be accomodated, and must provide its formal support, either via existing formal procedures when they exist, or via ad hoc agreements. In the case of international, cross-border, projects, not only must each government be on board, but they must agree jointly and simultaneously on the package and its terms. The more parties involved, the more complex things are going to be.

  The goals may vary, from getting income to protecting the environment to developing a

particular region, to pleasing a neighbor or another powerful country, to promoting one's corporations. There is an unbreakable rule there: the project must make sense for stricly all involved countries and authorities. The benefits may be unequally shared, but shared with all they must be. That requirement makes a project like the Nabucco pipeline (Turkey to Austria, via Hungary, Bulgaria, Romania, with gas sourced in either Azerbaijan, Iran or Russia) overwhelmingly complex and thus less likely to happen. The BTC (Baku-Tbilisi-Ceyhan) pipeline - an oil pipeline - shows the difficulty of multi-country projects, even with such strong fundamentals (10 billion barrels of Western-controlled oil looking for an access to markets, BP as an undisputed project lead for both the oil production and the pipeline, massive diplomatic support from the US): it took almost 15 years from concept to first delivery

- **a price for gas transport**
  Now that parties have been identified, and begin to discuss terms, the detailed economics of the project must be examined anew. The original smell test simply yielded ball park figures for costs, and found that such estimates were compatible with the expected end price for gas on the targeted market, in view of technical production costs, tax levels and other endogenous price drivers. Now a more detailed case must be made that the pipeline will actually generate enough revenue for all in most forseeable circumstances, and that those that bear the financial risk in the case of shortfall are willing and able to do so.

  Risks are pretty basic: lower production or lower transit capacity than forecast, lower prices on the final market, changes in tax regimes, a party going bankrupt, delays in any part of the project. Who bears them will depend on the project and the parties involved, so it is hard to provide general rules, beyond a few simple ones. As the "take-or-pay" nature of the gas purchase contracts, gas volume risk is usually borne by the buyer - i.e. the seller has a guarantee that it sells every molecule it brings on the market; conversely, price risk is more often borne by the seller - i.e. it will only get the prevailing price for those molecules, unless it manages to get a fixed price or any other hedging mechanism - as part of the gas sales contract or as a separate transaction. The pipeline company itself, which is in the middle, can see all configurations. It may have to bear volume risk (via a payment structure which makes income proportional to volumes transported) or not (via a mostly fixed payment, irrespective of how much gas is actually transported - these are called "capacity charges") - but it must be noted that it may bear volume risk even in the presence of a take-or-pay contract, because if the gas provider fails to provide the expected volumes, the buyer will not pay for unavailable gas. That risk may be covered by the gas seller via a capacity payment guarantee. This depends on the nature of the pipeline company, as a pure service entity (which will then bear very little risk), or as a stand-alone entity which must show a profit. This will usually be determined by the shareholding of the pipeline entity - dominated by the seller, the buyer, or including third parties not otherwise present in the gas chain. If it is controlled by one party, the contracts will usually reflect that: for instance, if the gas seller runs the pipeline, the gas sales and purchase contract will usually incorporate a gas ownership transfer point at the exit of the pipeline.what matters here is that the contractual arrangements and price formulas are coherent with the risk borne by each party. For instance, when you read that India is unwilling to provide any take-or-pay clauses, or that China is unwilling to accept market-driven prices for gas, you can be certain that the Iran-India or Russia-China pipelines are going nowhere, because there is a fundamental disagreement on the economics of the project and basic risk allocation.

- **An entity paying the pipeline**
  This brings us finally to the underlying question throughout this process: who will pay for the pipeline. Pipelines have very simple economics: they cost a lot to build, but are then very cheap to operate. So the main cost, at any time, will the amortization (or financing) of the initial investment, to be spread over a number of years, and whatever volume is transported over that period. So the only thing needed to commit to a pipeline investment (and spend all that money upfront) is a reasonable certainty that the pipeline will be full enough for long enough. As we have seen above, that requires to bring on board a number of parties, and to hash out between them the risk allocation. While in-principle agreements might be easy enough to identify, the devil really is in the details in this case, as all the parties need to make quite specific (and potentially extremely costly) commitments - and will only do these if they have what they are expecting in return. But with everybody coming on board with conditional commitments - and with the conditions attached not being necessarily compatible with one another, someone needs to be able to get everybody to talk

at the same table to bridge the gaps - or to partly cover the gaps itself to encourage others to make improvements to clinch a deal. That phase is extremely work-intensive, and can get quite costly, as it involves multiple parallel contracts negotiated by many parties and their lawyers, which must be made compatible with one another and consistent with one another.

To commit parties to the effort (and get them to allocate internal resources, hire legal and other advisors, and get internally approved negotiation guidelines) they must expect that the transaction has a reasonable chance of happening - which means that some entity must be there to ensure that it will indeed - an entity credible enough, motivated enough, and strong enough to bridge the commitments of the various parties and bear the corresponding risk, even if temporarily. The money at stake is not just the cost of the pipeline, it is the value of the gas transported by it over 20 years or more. Pipelines require contracts that include more or less binding guarantees to pay amounts equal to these full volumes (and that is well understood by PR people, when they trumpet "$100 billion contracts" even if purely in-principle agreements have been signed). That means they have to be driven by at least one of the parties of the Gas Sales and Purchase Agreement - on the understanding that it is committing to its side of that contract as the anchor for the pipeline, and as an incentive for the other players to jump in with their own commitments.

Thus, as long as one of the big Chinese energy companies is not willing to say "I'll buy x bcm/y of gas at market prices (whatever the domestic price)", no gas pipeline will be built to China. And, as long as domestic gas prices are constrained by both price gaps and the competition from cheap coal, no commitment of the sort will be made (nor should be). As long as Pakistan is not seen as an acceptable credit risk for several billion dollars worth of gas per year, no pipeline will arrive to that country from Iran, Turkmenistan or anywhere else. And, as long as Nabucco supporters cannot credibly say where they intend to buy the gas needed to fill that pipeline, it just won't get built. No pipeline will cross the Caspian for as long as the existing pipeline going to Russia is not full. And Gazprom will continue to succeed in building its export pipelines underpinned by existing or future exports until Western buyers have doubts that the Russian giant no longer has the reserves to actually fill these pipelines.

As a final comment, let me note here briefly that LNG is fundamentally similar to pipelines in that respect. Replace the image of a pipeline by that of a liquefaction terminal, a dedicated tanker fleet, and a regasification terminal, and the exact same requirements apply. If anything, LNG contracts bind buyers and sellers even more tightly because the export infrastructure and the import infrastructure must be available at the same time, and the commitments to invest billions have to come from both sides - one is not enough on its own. Thus the dominance of Western oil majors in that business, as they are the only ones which can manage investments in both producing and consuming countries, and have the discipline and management depth to push these projects forward on all fronts at the same time.