Book cover image for 'The Shale Oil and Gas Debate'

April 27th, 2015 1:47pm Posted In: Featured Articles, Shale & Unconventionals

INTERVIEW: PHILIPPE CHARLEZ, UNCONVENTIONAL RESOURCES DEVELOPMENT AT TOTAL

Natural Gas Europe was pleased to interview Dr Philippe Charlez about his book co-written with Pascal Baylocq "The shale oil and gas debate" which is about to be published in its English version in May 2015

The title of your book, *The shale oil and gas debate*, suggests that there are some perceived outstanding issues related to the development of shale oil and gas and in particular the fracturing technology. Is that true?

Over the last thirty years, few subjects have generated as many column inches, as much debate, aggression and accusations as those of shale oil and gas and hydraulic fracturing. The film GASLAND and its shocking image of the "faucet on fire" had a stunning effect on its viewers. Even though the scene was filmed in a region where shale gas has never been exploited, the lie doesn't matter. The allegory spread like wildfire, arousing a clamor of indignation from the general public and firmly planting in the collective imagination the idea that hydraulic fracturing is an environmental threat requiring huge amounts of water, creating major earthquakes and polluting all the water-bearing layers of the planet. Insofar as in Europe most countries have no real Oil & Gas culture, hydraulic fracturing discovered by public opinion in 2009 (remembering that the first HF test dates...from 1947) is felt as an ontological threat. Faced with an ontological threat, there is no compensation that can offset the anguish except that of sheltering behind the principle of precaution

Is your work also about to demystify the negative image people and media have about the shale oil and gas extraction activity? How?

An efficient leverage to change this very negative impact and clarify the debate is to provide to public opinion open, transparent and rigorous information. In particular orders of magnitude and analogies are particularly important for the layman to make his own opinion.

In collaboration with Pascal Baylocq, we have therefore covered in 20 key questions for all public and without bias geopolitical, economic, technical, environmental and societal aspects of shale oil and gas development. The book which has been published in French in November 2014 has been received very positively.

Has the social resistance in Europe towards fracturing activity remained as strong as it was two or three years ago? What have been the main evolutions in the last years?

Since 2011, the situation has not globally changed. The public opinion has been soaked by hasty judgments, emotional accounts, shocking images, alarmist declarations, misleading claims and incomplete information. It has generated an irrational perception far removed from the actual facts[1]. In short the public opinion remains globally against shale development in Europe.

However the perceived risks have changed. Four years ago the attention was focused on subsurface risks in particular pollution of aquifers by gas and fracturing fluids and earthquakes. Today the fear has been displaced to surface risks in particular health problems that could be induced by manipulation of proppant (sand inhaled by site workers and close residents), flowback water which contains radio elements in small proportions as well as potential fugitive emissions of natural gas at the well head and in the flow lines. Again these risks have to be weighted and compared with domestic analogies. For instance, the radio exposition around a well in the Barnett is in the range of 0,1 MilliSivert/year. By comparison, a body X^{ray} (10 Msv) is equivalent to...living hundred years in the Barnett.

We are however still very far from acceptability in Europe. When a company wants to start drilling a well, local communities and NGOs mobilize immediately. It is the case in Denmark but also in UK and in Romania in spite of clear government support. It is sometimes difficult to understand the reasons and to discriminate real fears from political manipulation. For instance in Algeria, a country where contestation is not really anchored in the culture, there is a hard opposition against shale gas development.

Again open and transparent pedagogy with correct orders of magnitude and relevant analogies appear as the keys to change the perception of the public opinion. In terms of transparency, the oil and gas industry has for instance decided to disclose openly the composition of fracturing fluids on a public website www.fracfocus.com. The data of 95000 wells have been disclosed.

Some experts think that there is no hope to see shale gas/oil development in the next 20 years or ever in Europe. They consider that it will not happen or only marginally in countries such as the UK or some Eastern European countries. Is that also your view? What could be a game changer, if any?

The American revolution relies on four main pillars : a good knowledge of the subsurface based on millions of wells drilled, a century oil & gas culture backed by unfailing political support, the presence of a strong oilfield services industry in an open and competitive market and mineral rights favorable to land owners. Thanks to these four pillars the US oil & gas industry has reached impressive drilling performances and low well costs making economic development in spite of very low gas prices (3$/MBTU). None of these four pillars exist today in Europe. Developing shale oil & gas in Europe is conditioned by knocking down at least three major barriers.

The first is geological. Only when a significant number of pilot projects, each including a few dozen wells, have been launched, will it be possible to estimate the actual state of the resources.

The second is economic. The viability of projects will depend on our capacity to develop at acceptable costs. At a gas price of 10 US$/MBTU wells must be drilled and operated at integrated cost of somewhere 13 MUS$. Since oil services are currently not competitive enough in Europe (few drilling rigs, almost no fracturing fleets, monopoly of a few major international Service Companies) the minimum integrated cost of a well can be estimated at around 20 MUS$. Making such developments profitable will require to encourage the emergence of a local competitive oil services market, especially in the drilling and fracturing sectors. Yet this requires first and foremost determined political backing including a national exploration plan, and possibly a development plan.

The third covers all the societal and cultural issues already discussed in the previous questions. In North America, the population has been used to living near drilling rigs, fracturing equipment and production facilities for decades unlike the population of the “old continent”, which has barely any oil culture. In a densely populated, urban Europe, shale developments are seen as a battery of threats by certain stakeholders. Change this perception will take more than scientific reasoning. To be accepted, the game must be win/win so that there is something in it for the majority of stakeholders in the long term. Mining rules which are essentially favorable to the national governments of all Member States, is obviously not a factor that will encourage local authorities and local communities to be proactive. An improvement in the way in which income is distributed, in particular to local communities, would be a real step in the right direction.

Do you think Europe needs new stricter environmental regulations for shale gas/oil industry to take off, so that people can be reassured about the environmental risks and accept at least the exploration activity?

European Union is submitted to many strict regulations and directives. But over the last 15 months very good signals were issued from EU. For instance in January 2014, a very constructive recommendation (2014/70/EU) has been published to differentiate low and high volume Hydraulic Fracturing. Oil & gas industry applies the REACH regulation to fracturing chemicals. An exposure scenario specifically dedicated to HF is currently developed by EU in collaboration with IOGP. Each EU member has also his own regulation and is free to follow or not the EU recommendation. Remember that hydraulic fracturing for oil & gas extraction is today banned in France and Bulgaria.

But when speaking about regulations it is also important to mention those extremely strict applied by IOCs in the scope of their operations. Safety and environment performances are today major reputation components as important as operational and financial performances. An IOC that neglects its safety and environmental responsibilities would be quickly sanctioned not only by the public opinion and the media but also by the rating agencies with detrimental effects on its financial performances. From good HSE performances result good operational and financial performances. People do not work efficiently when safety is not guaranteed.

At the end of your book, you question about the “speculative bubble” and the illusion that there are plenty of reserves, while in reality the industry constantly needs to drill new wells to find new reservoirs thus increasing costs significantly. In addition, many analysts forecast that cheap oil (which ironically has been provoked by oversupply due to US shale oil production) is the new reality, making the development of shale oil an unprofitable business.

Now, with the speculative bubble and with cheap oil and gas prices in mind, is shale oil and gas industry can still be globally sustainable?

While conventional wells are seeing their annual production decline at rates of between 3% and 6% for oil and between 15% and 20% for gas, shale oil and gas wells were posting rates of decline of 30% to 40% over the first few years. The development method requires therefore fracturing new wells in order to compensate for the decline in existing wells. Some experts consider that such an approach would not be viable in the medium term and would lead to a speculative bubble. The gas then oil prices collapse would put a stop to investments (i.e. decrease strongly the number of wells put on stream) and would trigger a quick and significant drop in production.

If the drilling activities have been strongly reduced in the US over the last six months (from 1500 drilling rigs for shale oil in October 2014 to less than 900 today), this "catastrophic scenario" cannot occur in the medium term for at least two reasons.

The first is the resilience of a large portfolio of wells compared to that of a single well. The well-by-well analysis turns out to be misleading given the impressive number of wells drilled, fractured and put into production in recent years. At the end of 2014, North America (US and Canada) had a "portfolio" of around 125,000 wells of varying maturity. Despite the swift individual decline, this well portfolio plays a considerable "shock absorber" role that helps limit the global decline without having to drill and fracture at a sustained rate. For example, the significant slowdown in drilling and fracturing activities that was started on Barnett at the beginning of 2009 did not lead to a collapse in production, far from it, in fact. In 2015 in spite of the significant decrease in drilling activities the gas and oil production will still increase. If the oil and gas stay at their current prices, a slow decrease of the US production will occur not before mid 2016.

Secondly, only a low proportion (5% of resources for oil and 7% for gas) of the huge potential of the American fields has been produced today. The declines on Barnett and Haynesville were largely compensated by the spectacular growth of the giant and more economic Marcellus play. Likewise, the huge resources of Wolfcamp Permein are ready to take over from Bakken and Eagle Ford when the latter start to decline.

By contrast to highly capitalistic projects such as those in ultra-deep waters or Arctic regions the unconventional sector can adapt itself easily to a "stop and go" strategy. The huge American fleet of drilling rigs (2,000 out of the 2,400 units available across the globe) can be swiftly mothballed then remobilized when prices make it possible. The collapse in prices could therefore turn into an opportunity for unconventional.

Recently, former UK environment agency chief, Lord Smith, said he was very skeptical about shale oil fracturing in the UK, arguing that shale oil was much more adverse to develop and much less environmentally friendly than shale gas, with far greater carbon footprint when extracted. Do you share his opinion?

Shale oil and shale gas use the same development scheme namely long horizontal wells multi-fractured wells and so the environmental issues (water, chemicals, waste, footprint, microseisms...) are very similar. What is quite different is the recovery rate insofar as for shale gas it is in the range of 15% whereas for shale oil recovery it rarely exceed 7%. There is also a difference in the extraction method as shale oil need to be artificially lifted (using beam pumps) whereas gas is generally produced naturally.

LR

Philippe CHARLEZ is a graduate Mining Engineer from the Ecole Polytechnique de Mons (Belgium) and has a PhD from the Institut de Physique du Globe de Paris. He joined Total in 1982 where he worked as a Rock Mechanics Expert for 15 years. He went on to occupy a series of operational functions abroad as Drilling Manager (Scotland), Asset Manager (Angola) and, more recently, Director of External Affairs and Stakeholder Relations (Kazakhstan). Currently working in the Unconventional resources Development group, Philippe Charlez has authored several works on Rock Mechanics and written over 50 scientific

articles. In 2014, his most recent work entitled "Our energy future is not set in stone" was published by Editions Technip.

You can find the link for Philippe Charlez' blog here: www.philippecharlez.com

Pascal BAYLOCQ co-writer of the book, is an Engineer with a PhD in Mechanics and holds a degree in economic sciences. He began his career at Total in 1995 as a Drilling Engineer. After several years spent abroad (Argentina, United Arab Emirates and the UK), he joined the Finance Division as an internal auditor. Having set in motion the deployment of internet technologies in the Exploration &

Production Branch, he took on responsibility for an offshore oil complex in the United Arab Emirates in 2005. In 2007, he joined Geostock as Executive Vice President, a position he still holds. Since 2011, he has been the President of the CLAR think tank 'Hydrocarbon source rocks' in the GEP-AFTP.

---

[1] For instance, after completing more than hundred thousand wells in the US, there is no example of water pollution by the uncontrolled migration of a hydraulic fracture