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Workshop Series is a program hosted by European University in which leading energy professionals are invited to present on a specific aspect of their work. These professionals include energy think-tank experts, policy makers, representatives from major energy companies, and ranking members of international organizations. *Workshop Review* is a subsection of *ENERPO Journal* where students relay the content of these presentations and provide commentary.



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Market Capture: China's Energy Relationship with Turkmenistan

—Ryan McKinley

China's energy security has become predicated on its ability to secure cheap hydrocarbon imports. This is because China relies on cheap, reliable fuels to keep its manufacturing sector competitive and the lights on for a staggeringly large population. While domestically produced coal has historically played the largest role in in China's electricity generation and provided a "price ceiling" for electricity prices, imported natural gas has been slowly edging its way into the market. Predictably, China has been looking to its Central Asian neighbors for secure sources of natural gas. To this end, Turkmenistan has become an increasingly important player in China's energy and economic security. This paper seeks to outline China's role in Turkmenistan's burgeoning natural gas sector and explain why the relationship between Ashgabat and Beijing has become so close.

Coal's Diminishing Returns

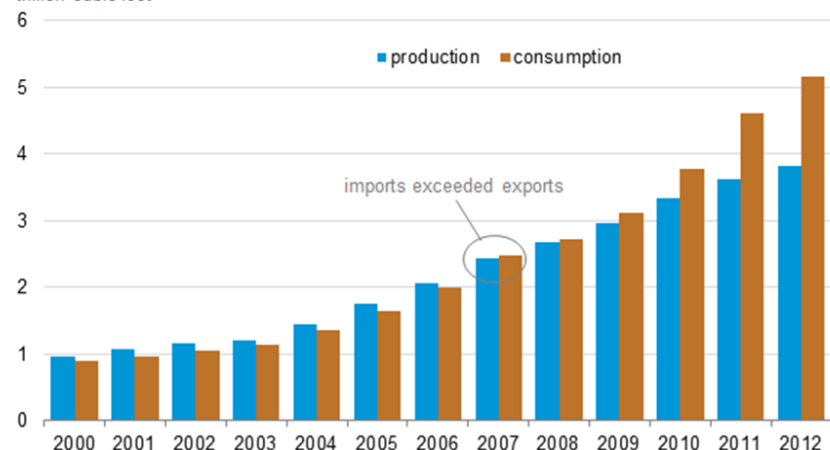
The year 2009 marked an important paradigm shift in the history of China's energy security strategy. It represented the switch from coal self-sufficiency to import-dependency – despite China's incredibly large reserve base. China's need for more imported coal could exert upward pressure on international coal prices and therefore threaten the competitiveness of its manufacturing sector. This poses a significant risk to economic growth. Some estimates predict that the world coal trade would need to increase by 135% over the next 15 years to meet Chi-

na's coal demand, though this figure does not take into account a reduction in coal consumption either due to an economic slowdown or the replacement of coal with natural gas (or renewable resources). Even if the Chinese decrease their energy consumption, domestic coal production simply cannot grow fast enough to keep up with demand.

While coal will still play a large role in China's energy mix for the foreseeable future, natural gas has begun to take up a larger percent in recent years. The closest and arguably most attractive option for China has proven to be Turkmenistan.

China's domestic coal reserves appear to be decreasing. Nearly 2,000 coal mines, with a total capacity of 117.48 million tons, are being closed in 2014 alone due to depletion. If coal is to be replaced, even in part, by natural gas, China will need to develop its

China's natural gas production and consumption, 2000-2012
trillion cubic feet



Source: U.S. Energy Information Administration, *International Energy Statistics*.

China's natural gas production and consumption. US EIA 2013.



domestic resources and secure supplies from reliable exporters. China's close proximity to Central Asian hydrocarbon reserves makes the region an enticing option for Chinese national oil companies (NOCs) for just this reason. According to the EIA, while coal will still play a large role in China's energy mix for the foreseeable future, natural gas has begun to take up a larger percent in recent years. The closest and arguably most attractive option for China has proven to be Turkmenistan. In order to fully understand why, it is necessary to first understand the historical influences of Turkmenistan's natural gas sector.

Niyazov's reliance on natural gas to fund national programs helped generate the high degree of dependency the Central Asian state currently has on natural gas exports.

After gaining independence in 1991, the former Soviet country was under the tight control of Saparmurat Niyazov – who had been in power since 1985. In



Golden Statue of Niyazov. Photo: Robert Preston. *Fineartamerica.com*.

some ways, Turkmenistan's early energy strategy emphasizing centralization was similar to that of China, though much more extreme. Niyazov utilized the country's large hydrocarbon infrastructure and wealth inherited from the Soviet Union to "fashion a highly idiosyncratic, tightly controlled despotism", writes Martha Olcott, a senior associate at the Russian and Eurasia Program, in her 2013 paper entitled "Turkmenistan: Real Energy Giant or Eternal Potential?" The legacy

Turkmenistan's History of Isolation

Turkmenistan holds an estimated 13.4 trillion cubic meters of natural gas, making it the 4th largest in terms of reserves worldwide. Likewise, it is home to several of the largest natural gas fields in the world, which are located primarily in its southern and western regions. Unsurprisingly, these reserves have allowed Turkmenistan to become the leading natural gas exporter among the Caspian and Central Asian countries. While these numbers are impressive, it is important to remember that Turkmenistan's openness to outside actors has been limited.

of Niyazov's strict neutrality and isolationism has had a lasting impact on Turkmenistan's relationship with the outside world.

Niyazov's reliance on natural gas to fund national programs helped generate the high degree of dependency the Central Asian state currently has on natural gas exports. Gurbanguly Berdimukammedov, who is still the president to this day, replaced Niyazov after his death in 2006. Despite the odd, and still quite closed, nature of Turkmenistan's internal politics, Berdimukammedov has made some progress in building legal and civil infrastructure in the country. By opening up the political system

(somewhat) and improving the business environment, he has managed to attract some foreign investors from Russia, China, and the West.

Mr. Berdimukhammedov was able to amend criminal, administrative, and foreign investment laws that were inhibiting the improvement of business climate. Because of these changes, however, clan-politics have become an important factor in Turkmen politics. The government still remains highly centralized, but the current president doesn't maintain a personality cult – unlike his forerunner. While Berdimukhammedov's regime has largely shied away from nepotistic tendencies, his brother-in-law is the head of the agency that oversees oil and gas reserves. For this reason, Dr. Olcott infers that there is "no reason to believe that his control of the country's energy policy is any less complete than that of his predecessor".

Despite the reforms, the current state of Turkmenistan's business climate remains challenging for investors. For starters, the power and capriciousness of local elites has made doing business in the country unpredictable. Compounding this are dubious government data and statistics, the state of national finances, and the lack of clarity for property protection laws.

Even in light of these challenges, investors simply see too much potential in Turkmenistan's hydrocarbon reserves to be dissuaded. Companies seemed to have adapted to these challenges, and "the most successful foreign investors in Turkmenistan... all function not only as business partners of the Turkmen government, but also as 'geopolitical agents' working to advance the country's interests internationally", according to Dr. Olcott. Due to Turkmenistan's distance from the

world's major markets, advancing these interests is extremely important for market access. Other challenges facing the Turkmen energy industry are the lack of technical personnel, domestic investment, and infrastructure. The lack of trained employees makes it difficult to meet growing demand for gas extraction, and the insufficient infrastructure and domestic investments make it difficult to develop new projects and entice foreign investments.

Presently, China enjoys a privileged relationship with Ashgabat, and is – writes Dr. Olcott - "the only country to have been granted access to onshore development" in Turkmenistan. Chinese-Turkmen cooperation certainly does not end there, as is evident from the Central Asia-China Pipeline.



Central Asia-China Gas Pipeline, first line completed in 2009, pumps 30 bcm. RFA.org.

Chinese-Turkmen Energy Relations

China has managed to overcome these challenges and strengthened its ties with Turkmenistan. In many



ways, we can see how China has ‘captured’ the Turkmen natural gas market. Presently, China enjoys a privileged relationship with Ashgabat, and is – writes Dr. Olcott - “the only country to have been granted access to onshore development” in Turkmenistan. Chinese-Turkmen cooperation certainly does not end there, as is evident from the Central Asia-China Pipeline.

CNPC is also developing South Yolotan, the 2nd largest gas field in the world, and will operate the gas processing facilities for the project.

Chinese company “CNPC” began the construction of the Central Asia- China pipeline, which gets Turkmen gas to the Chinese market, in 2009. It currently pumps 30 BCM a year to China, and there have been talks of increasing this amount. The pipeline, constructed in only 18 months, was the fastest ever built of its size, according to a paper published by a House Foreign Affairs subcommittee. According to figures from CNPC and Platts energy news, this amount accounts for over half of China’s natural gas imports, and nearly one-sixth of its total consumption. China’s president at the time, Hu Jintao, hailed the pipeline as a model of mutually beneficial cooperation and solidarity. In many ways, it was just the beginning.

[China’s] control and influence over Turkmen elite is “something that neither Russia nor Iran, never mind the European Union, has succeeded in doing”, writes Dr. Slavomir Horak.

In terms of upstream acquisitions, CNPC has reportedly invested \$4 billion in the Bagtyarlym field via a 35-year production sharing agreement with Turkmengaz (Turkmenistan’s national oil company). In addition to supplying China with natural gas from the project, the company also plans to distribute Turkmen gas via pipeline to countries in the surrounding region. CNPC is also developing South Yolotan, the 2nd largest gas field in the world, and will operate the gas processing facilities for the project.

Chinese Loan Influence

As stated earlier, China seeks to get the maximum amount of hydrocarbons at the lowest possible price in an effort to keep manufacturing costs low. In this regard, China’s NOCs benefit greatly from generous loan policies and backing of the Chinese government in Turkmenistan. China has used what is known as a “loan-for-gas” program as leverage for lower prices. In short, this strategy trades loans with generous interest rates for discounted gas. This has given China an advantage in negotiating prices with the Turkmen government. In fact, Dr. Olcott claims that “there are some reports that China is not only balking at paying more than \$200 per 1,000 cubic meters, but is also pressing for offsetting credits as a payment form”. Even though China has tilted the negotiating table in its favor, some Turkmen officials are more optimistic about the relationship than ever, and by granting CNPC permission to operate onshore, they have solidified China as their primary development partner. As such, they expect total gas exports to China to reach 40 BCM in 2016, and to swell to more than 65 BCM by 2020. This optimism likely has a lot to do with the rise in personal incomes for the elite, as well as the stability that this money will generate for the regime. Increasing cooperation from Turkmen elites and low prices means that Turkmenistan could play a key role for Chinese energy security moving forward. It can be inferred that China is able to use its loan repayment terms and loan enforcement policy to



influence Turkmen policymakers. This control and influence over Turkmen elite is “something that neither Russia nor Iran, never mind the European Union, has succeeded in doing”, writes Dr. Slavomir Horak in a paper titled “Turkmenistan’s Shifting Energy Geopolitics in 2009-2011. Despite the loss of autonomy that could come with these loans, the autocratic regime in Turkmenistan prefers them to western loans because they do not “come with any political demands relating to governance and human rights”, explains Dr. Alexandros Petersen in “Russia, China and the geopolitics of energy in Central Asia”. These loans, however, do come with some strings attached. In addition to protecting China’s manufacturing sector from volatile energy markets by accepting repayment in the form of natural gas supply, these loans often stipulate the use of Chinese goods and services, such as construction machinery and civil engineering. This means that Turkmen specialists and machinery cannot compete for a spot on these large projects, and CNPC has assurance that it will get some of the money back that it loaned. Undoubtedly, these attractive loans offered to Turkmenistan have proven to be a double-edged sword.

Russia lost a great deal of influence through a 2009 pipeline dispute (among other reasons), and attempts by western countries to form a PCA (Partnership and Cooperation Agreement) have been frozen for decades due to Turkmenistan’s abysmal human rights record.

Conclusion

In short, the Turkmen government has welcomed further economic engagement with China. In fact,

writes Dr. Olcott, “Ashgabat appears to favor China as an energy development partner... leading one commentator to describe the Chinese as ‘light years ahead’ of the competition”. Chinese investment deals and loan offers have enabled Turkmenistan to avert crisis in the past, and have enabled economic development and growth. The reason this hasn’t worked for Russia or western IOCs has to do with both practical and historical developments. Russia lost a great deal of influence through a 2009 pipeline dispute (among other reasons), and attempts by western countries to form a PCA (Partnership and Cooperation Agreement) have been frozen for decades due to Turkmenistan’s abysmal human rights record. The Chinese, have facilitated the boost needed in Turkmenistan’s energy market. This economic boost, however, has come at a cost. The influence that China now wields over Turkmen elites is substantial, and as a result, future deals or opening up to western IOC onshore operations could be severely limited.

‘Capturing’ Turkmen natural gas resources early on has allowed China unfettered access to a gigantic amount of natural gas – that it will not have to necessarily compete for.

Turkmenistan provides a good illustration of Chinese energy security strategy at work. Although Turkmenistan’s closed, and often corrupt, societal institutions can be difficult for investors, China and its NOCs have nonetheless thrived. The ability to maintain such a close and nearly exclusive relationship with its Central Asian neighbor may prove to be a key component in keeping manufacturing prices low. China has realized that its domestic coal production can only last for so long. ‘Capturing’ Turkmen natural gas resources early on has allowed China unfettered access



to a gigantic amount of natural gas – that it will not have to necessarily compete for.◆

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Stalled Negotiations on South Stream—Addressing Fears of More Russian Gas

—Nicholas Watt

As the European Union heralds in new leadership with Jean-Claude Juncker replacing former Commissioner Jose Barroso, it is an appropriate time to review the considerations from the EU and US that have gone into halting progress of Russia's South Stream pipeline, as well as to highlight developments in Europe's gas market that should allay Western fears of the Russian pipeline's potential implementation.

Gazprom's roughly \$40 billion dollar project involves a pipeline that will cross Turkey's section of the Black Sea and provide gas to Bulgaria, Serbia, Hungary, Slovenia, and Austria, where it will terminate at this country's Baumgarten gas hub. Though construction officially started in late 2012, little actual pipeline building has occurred. The project's resumption is based on the adherence to bilateral agreements between Russia and those four countries that (with the exemption of that with Serbia, which is not yet in the EU) the Commission has deemed illegal, as the project does not conform to a piece of EU legislation called the Third Energy Package. Direct negotiation between Russia and the EU on this issue has since been halted as a result of Russia's involvement in Ukraine. "In the current situation, with civil war-like conditions in eastern Ukraine and without Moscow's recognition of the government Kiev, we will certainly not arrive at a political conclusion of our negotiations [on South Stream]," Gunther Oettinger, the EU's energy commissioner, said during an interview in June 2014 to a Frankfurt newspaper. Bulgaria, the EU country where South Stream is planned to come onshore, stopped work on the pipeline following a meeting between the country's leadership and US senators, including John McCain, who declared bluntly after

the meeting, "We want less Russian involvement in South Stream." This admission reveals a broader truth, which is that the EU Commission, with pressure from the US, does not want South Stream to go forward because they think its success will enhance Russia's ability to use gas as a weapon – either by completely shutting off supplies to Russia's perceived adversaries or by adjusting prices to squeeze political concessions out of them. Moreover, in the event of the pipeline's implementation, its success would be portrayed in the Western media (and by opportunistic politicians) as another in a long line of continued European dependence on Russian gas and that by allowing this pipeline to be built, Europe is making itself more vulnerable to perceived Russian aggression, as Europe's room for maneuvering would be handicapped by an even higher energy dependence on Russia. However, such a portrayal would be misleading.

The faulty premise is that Gazprom holds a monopoly in Europe and that South Stream will reinforce it.

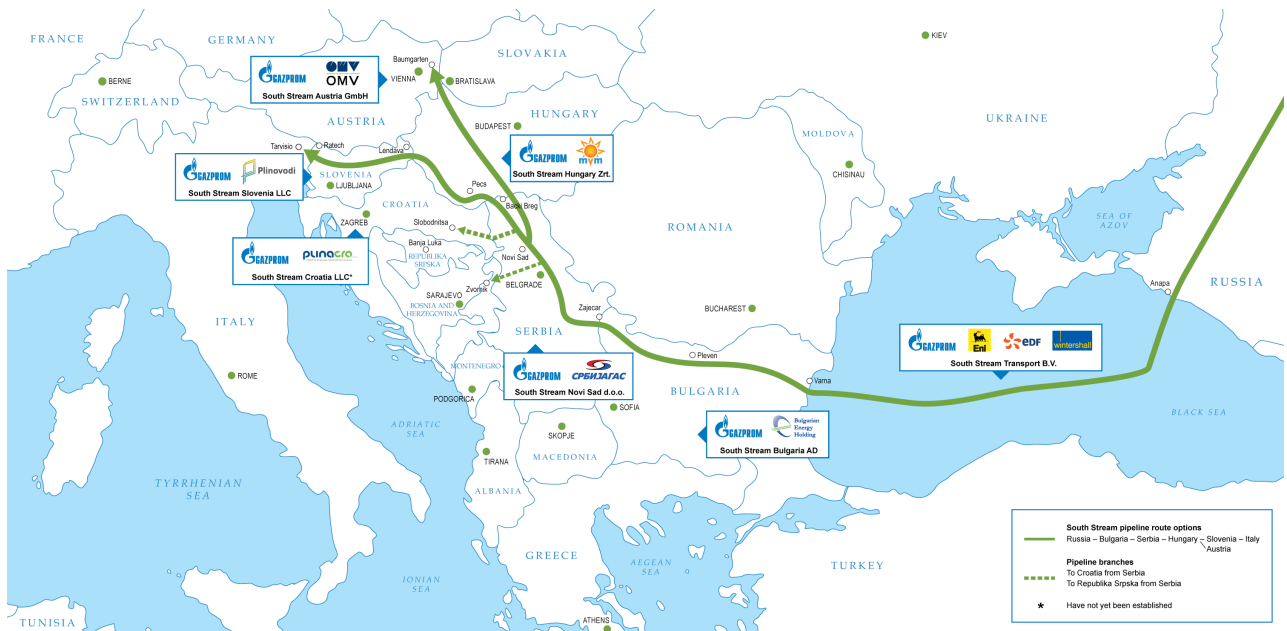
Addressing Concerns of Those Afraid of Russian Gas

Putin deciding to shut off the gas to the EU because of the conflict in Ukraine is an unlikely scenario. The idea is that this drastic measure would be taken against the EU because of its support of Ukraine's central leadership – much as the Arab countries in the Middle East did with oil against Western supporters of Israel during the Yom Kippur war in 1973. Indeed, Gazprom stopped selling to Ukraine in June of 2014, but has used the quite compelling argument that Ukraine hadn't paid its \$5 billion debt for gas already consumed. If Gazprom were to cut the gas to all of its EU customers over the Ukraine conflict, then the EU would surely suffer – but cope – by having to turn to limited stored gas and imports from other sources such as LNG, and by reverting to coal for

power generation. In the longer term, a gas war would accelerate its efforts to diversify away from Russian gas, thus depriving the Russian state of future revenues upon which its solvency depends. Moreover, if such a drastic measure were taken by the Russian side, the West would likely counter with an embargo of Russian oil that would devastate the Russian economy even more than the loss of gas revenues would. Putin, as the primary decision-maker of the Russian state, would not take such a gamble. And the implementation of South Stream would not change the variables enough to make such a gamble more reasonable from the Russian side.

Agreement in late 2013, a decision which sparked protests that led to the former Ukrainian president's ousting. This pricing adjustment was the latest in a long history dating back to the breakup of the Soviet Union of price reductions for Ukrainian political concessions. So, countries dependent on Russian gas do have some reason to be wary.

Western fears that South Stream would facilitate the Kremlin's tactic of using gas prices to squeeze political concessions out of European countries are slightly more justified than the fear of the full use of the "gas weapon", but are still overblown. This is not because the Russian state is above such a policy – it has used



South Stream route: Turkey's EEZ, Bulgaria, Serbia, Hungary, Austria, and possible offshoots. *South-stream.info* 2014.

The increasingly competitive [European gas] market will force Gazprom to continue to make pricing concessions.

The most obvious example of gas prices being used to achieve political ends is in Ukraine, where Russia's gas discounts persuaded former president Yanukovich to opt out of the EU Association

it (quite unsuccessfully with Ukraine) – but because it overstates the position of Gazprom on European gas markets. The faulty premise is that Gazprom holds a monopoly in Europe and that South Stream will reinforce it. And, the reasoning goes, the absence of competition allows Gazprom to set the price so high that the European gas importers, generally state-owned companies, are obliged to seek a price cut, which Gazprom, under Putin's direction, will only grant in exchange for political concessions. But the problem with this is that there is a coming gas glut in



Europe that will prevent Gazprom from acting in this way. The increasingly competitive market will force Gazprom to continue to make pricing concessions, as it has done in some cases already.

Especially since the \$40 billion South Stream is so expensive, Gazprom will need to remain competitive in the gas markets the pipeline will feed in order to recoup its investment. Building a pipeline, as opposed to expanding LNG export capacity, carries its own particular risk in that the seller is confined to marketing its gas along that pipeline infrastructure, and this requires maintaining market share.

It is helpful to refer to Gazprom's recent behavior to find clues of what may happen in the future. All across Europe, including Ukraine, Russian gas prices were rising in 2011, despite weak demand. This increase in the Russian price was not a tactic meant to squeeze political concessions out of European countries, but the result of Gazprom's contracts being tied to the price of oil, which from 2011 until recently remained over \$100 a barrel. Because of the disparity between Gazprom's prices and European spot prices, Gazprom was compelled to provide billions of dollars in rebates and discounts to some of its largest customers in Poland's PGNiG and RWE in the Czech Republic. This was not the behavior of a company that is trying to use gas prices for political concessions, but rather that of a company striving to retain its share of an increas-

ingly competitive, but still lucrative, market. It is important to keep in mind too that Gazprom acting in its commercial interests serves Putin's political goals as well – the Russian state needs the money. This case of Gazprom's discounts was a signal of its diminishing dominance on the European market, and what is more, it established an important precedent that Gazprom will be loath to copy, but will be required to as gas competition tightens further.

Gazprom needs to retain market share because it is a company on which the Kremlin, which is arguably even more dependent on Gazprom's customers than the other way around, is increasingly reliant. And especially since the \$40 billion South Stream is so expensive, Gazprom will need to remain competitive in the gas markets the pipeline will feed in order to recoup its investment. Building a pipeline, as opposed to expanding LNG export capacity, carries its own particular risk in that the seller is confined to marketing its gas along that pipeline infrastructure, and this requires maintaining market share. If the prices were to remain unreasonably high for gas, then many of these countries would continue to switch to the use of coal, instead of gas, in electricity production, or raise imports from other sources. Gazprom, from a commercial point of view, will want to maintain market share because the massive investment in South Stream needs recouping. What this means is Gazprom will need to adopt a more flexible pricing policy toward its customers in the short-term if it wants to remain competitive long-term, when it is literally banking on higher gas demand, and European gas revenues. In this way, one could reasonably argue that South Stream represents a greater risk for Russia than for the EU.

Southeastern Europe's Gas Infrastructure and Prospects for Diversification

I have been referring to a future European gas glut, which is correct in that there will be more gas in Europe, but it will not be uniformly distributed. Unlike the oil market, the gas market is not mature, at least



in Europe. The EU's Third Energy Package is a piece of legislation that is meant to speed up this process, a process which others – such as Gazprom – argue should happen naturally, almost ironically, by market forces. While oil is priced based on two benchmarks that follow each other closely, gas prices are currently based on various kinds of benchmarks and models. What this also means is that prices vary significantly from region to region, which also reflects the multiplicity of stages of gas infrastructure development. In Bulgaria, Serbia, Hungary, and Austria, an understanding of the current state of these gas markets is necessary, in particular the gas projects that will allow for more consumption of non-Russian gas, to understand the extent to which South Stream will make them vulnerable to Russian influence.

Like Bulgaria, Serbia consumes around 3bcm and takes almost all of its gas from Russia (80%), but will benefit from a planned 5bcm per year Croatian LNG import terminal, which Angela Merkel announced could be co-financed by the Commission, due to be operational in 2019, given the interconnector between the two countries is built as planned.

The first major relevant gas infrastructure project in the region is the TAP pipeline, which will take gas from Azerbaijan through southeastern Europe to Italy. Bulgaria, which currently takes 90% of its 3bcm annual gas demand from a Russian pipe that transits Ukraine, is contracted to receive 1bcm per year from the TAP pipeline via a planned intercon-

connector with Greece. Moreover, Greece is poised to become a gas hub, with already one operational LNG import facility, Revythousa LNG (planned to have 7bcm capacity by 2016), and another planned for the Greek city of Kavala. As long as the interconnector between Greece and Bulgaria is built, this additional capacity would put downward pressure on Russian gas prices in Bulgaria.

The main reason the EU Commission has stopped negotiating approval of the pipeline is not necessarily because of the Ukrainian crisis, as it has stated, but because some of these infrastructure projects are still hypotheticals.

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Hungary is similarly dependent on Russian gas (60%), but has a much higher gas demand, roughly 10bcm per year, and has significant gas storage capacity. The country already has interconnectors with Romania and Austria, and has one with Croatia, whose planned LNG could potentially flow to Hungary, just as it could to Serbia. Important too, is a link with Hungary's northern neighbor Slovakia, which would conceivably allow Hungary to receive gas from Poland's LNG terminal, which will be completed next year. Austria, where South Stream will terminate, is already a major gas hub, and thus multiple gas supply options. With an interconnector with Italy, Austria could make use of its southern neighbor's LNG import terminals.



The main reason the EU Commission has stopped negotiating approval of the pipeline is not necessarily because of the Ukrainian crisis, as it has stated, but because some of these infrastructure projects are still hypotheticals. The Commission has offered to co-finance the LNG project in Croatia, understanding it as strategically important vis-à-vis Russian dependence. The EU faces the problem of incentivizing investment in these interconnectors that will link non-Russian gas to the markets that need it. These interconnectors are not cheap and the economic return may not be justified, so private investors are understandably hesitant. However, the Commission itself, it seems, will contribute funds to these interconnectors. A note from the Commission in July 2014 declared that 38 billion euro would be available for “low-carbon economy investments under the European Structural and Investment Funds from 2014-2020.” Given the strategic importance placed on diversifying away from Russian gas, a sizeable portion of available funds from the Commission will likely be used to subsidize interconnectors.

What should the EU do? First, it should somehow secure a guarantee that some of these key gas projects in southeastern Europe will go forward.

Another question is where will the LNG come from? The market is relatively tight right now, as usual producers Qatar, Norway (mostly piped gas), and Algeria are producing at capacity, but in five or so years, there will be more suppliers, with likely exports from the US, Canada, Australia, Mozambique, Iran, and the eastern Mediterranean region. And there is also the possibility of some European shale gas reaching markets in a few years.

Conclusion: EU Commission Should Be More Willing to Use South Stream as Bargaining Chip

Finally, South Stream should not be considered a major security risk for the EU. Though its implementation would be seen as a major “coup” for the Russian state, such a perception would not reflect the reality. Truly, South Stream’s implementation would perpetuate Gazprom’s delusory image of itself as a mighty gas monopoly able to set gas prices at will, but why should the EU (and the US) be concerned with Gazprom’s inflated self-confidence when an increasingly competitive European gas market, which will be achieved by the political resolve of the Commission, paints a more realistic picture? If Gazprom wants to make a dubious \$40 billion investment (which will benefit EU member states and the primarily Russian firms contracted for construction), why should the EU be particularly worried in light of these gas infrastructure developments? What is more, South Stream will have the positive effect of eliminating the risk that Ukraine poses, a result that is in everyone’s interest except Ukraine’s. If the Commission delays too long and the Ukrainian risk, which South Stream is meant to eliminate, becomes a reality and alternate non-Russian sources of gas are not in place, then those most afflicted – Bulgaria, Serbia, and Hungary – would have more reason to blame the Commission than Gazprom.

So what should the EU do? First, it should somehow secure a guarantee that some of these key gas projects in southeastern Europe will go forward. Once this happens, since South Stream will only slightly increase Russian political influence in Europe, and since it is Gazprom taking on the bulk of the financial risk, the Commission should gradually (and very quietly) make some concessions on the issue of South Stream’s legality; such an agreement could have the effect of making Putin more willing to compromise in Ukraine. Perhaps a deal could be struck such that the



Commission approves a version of South Stream that may not be 100% compliant with the Third Energy Package, but closer, in exchange for something that it wants the Russian state to do (or not do) in Ukraine.

Perhaps a deal could be struck such that the Commission approves a version of South Stream that may not be 100% compliant with the Third Energy Package, but closer, in exchange for something that it wants the Russian state to do (or not do) in Ukraine.

Putin has been supporting South Stream since the idea's inception in 2006, and has been the pipeline's most powerful cheerleader. As the project lagged, Putin constantly called for work to be hastened, thus the "ahead of schedule" 2012 construction launch. The reason he did this was not necessarily because he wanted South Stream built, but because he wanted to put pressure on Ukraine to give up its pipeline system to Russia. The trick was to make South Stream seem like it would be built. Continuing to transit Russian gas through Ukraine to the countries that South Stream would supply was (and still is) by far the more economical decision, and was thus favorable to the Russian state. As South Stream appeared closer to realization, the pressure on Ukraine (which would be deprived of sizeable transit revenue in the billions of dollars per year) would rise for the former Soviet state to relinquish its major moneymaker and powerful political bargaining chip. Though South Stream was successful in causing its rival Nabucco to flounder, it has been highly unsuccessful in achieving its goals vis-à-vis

Ukraine, which still controls the massive gas transit system. Now, as the state of the Russian economy grows more precarious and Gazprom's financial resources become increasingly focused on the Power of Siberia and potentially another gas pipeline to China (the so-called "western route"), Putin's national champion is left with an arguably superfluous \$40 billion pipeline project. So what should the new EU commissioner Jean-Claude Juncker do? He should understand this dynamic, and gradually and quietly allow South Stream to go forward, with the knowledge that it is a greater risk for Russia, in exchange for a concession from the Russian state. Ironically, one could say that giving South Stream the green light could have the same effect as the sanctions have had – weakening the Russian economy. ♦

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End of the Fracking Dream

—Fabio Herrero

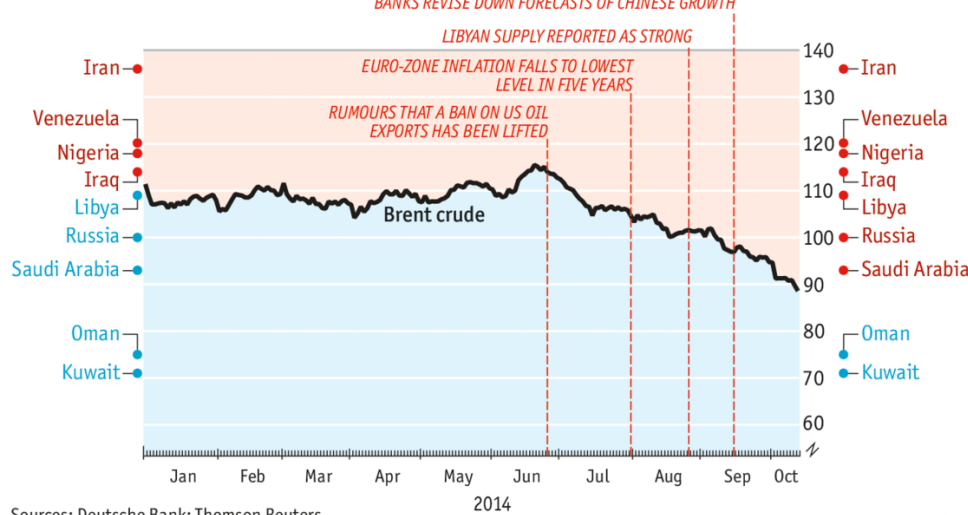
In a previous article entitled, “US Natural Gas Export: A Sensible Move?” dated September 2014, I wrote about the nonsense surrounding the US gas export meme and debunked the frack gas miracle. Many arguments used for my case, which was that the gas boom was not a long lasting one and that the US should not export gas, hold true for the shale and tight oil industry as well. This updated and expanded article will describe how the fracked wells are not like the “old school” wells that we knew, and will add three more arguments about the

sidered as oil in mmbtu terms without being the same in dollar terms. Before concluding, I will explore how the Federal Reserve’s accommodating monetary policy has created this massive bubble.

This updated and expanded article will describe how the fracked wells are not like the “old school” wells that we knew, and will add three more arguments about the frack oil industry in the US.

Breakeven prices

Oil price at which national budget breaks even from income and taxes
\$ per barrel



Economist.com/graphicdetail

Breakeven prices (for state budget) for major oil exporters. *Economist* 2014.

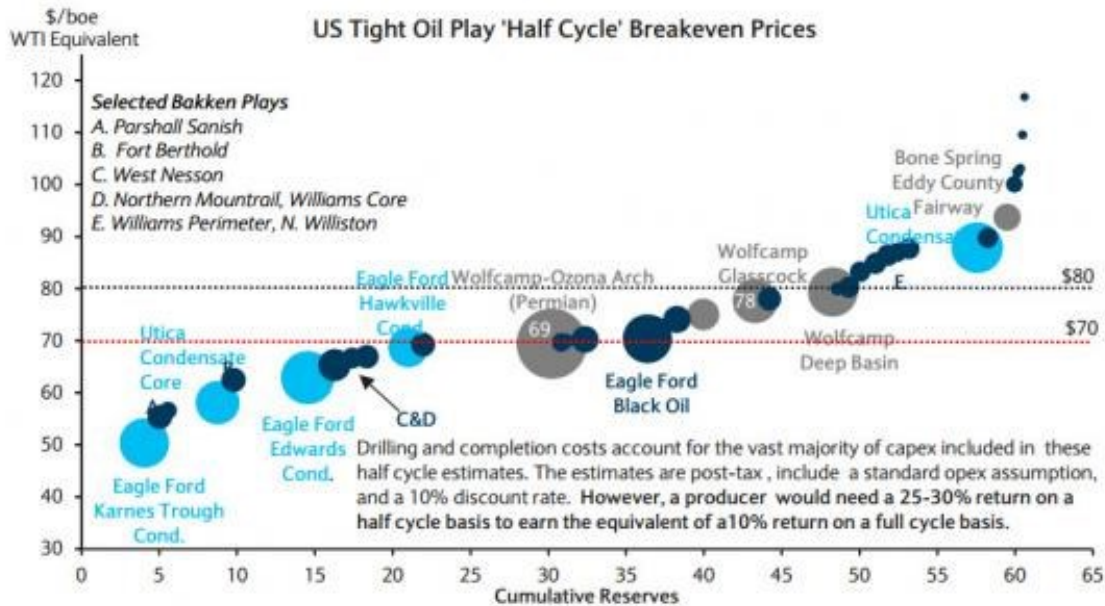
frack oil industry in the US. First, the figures – the ones in the graph “Selling the Shale Boom” – reported by the US Securities and Exchange Commission, the SEC, and those from investors are very different; the investors’ are massively inflated. Second, the breakeven cost of non-plateau oil assets deteriorated dramatically in the US, and if WTI Oil drops under \$75/barrel the whole industry will go belly up. The third one is what I call the BOE, barrel of oil equivalent, deception, in which gas is con-

I. Fracked wells are not like the old wells you are acquainted with

The sharp increase in production brought on by fracking has certainly been remarkable. However, even in their best-case scenario, high and climbing oil prices, US shale producers will be pushed to maintain the high level of output they have achieved in re-

cent years. This is because a shale well has a limited lifespan of around seven or eight years. According to Pete Stark, a geologist and analyst at IHS, the output of shale wells drops faster than conventional ones, falling by 50-80% after the first year, and one well, stated an article on Oilprice.com, in the Bakken fields dropped 69% in its first year. Traditional wells, according to a 2014 article in Bloomberg, take two years to fall by about 55% before flattening out. This forces companies to keep drilling new wells to make

Zooming in further, though it appears most US tight oil proven and probable recoverable reserves break even from \$60-80/bbl (WTI), full cycle economics would require a higher oil price. WTI may discount further than the 5.5% that WoodMac assumes. Cost improvements and infrastructure build-out should mitigate these effects.



Source: WoodMackenzie, Barclays Research. Wood Mackenzie assumes a roughly 5.5% discount for WTI.

US Tight Oil Play "half cycle" Breakeven Prices. Wood/Mackenzie, Barclays Research / Zerohedge.com 2014.

up for lost productivity. A conventional oil field produces crude at a level that wanes slowly over the course of decades. Saudi Arabia's massive Ghawar field (biggest field ever), for example, began production in 1951 and is still pumping out around five million barrels a day. This is a well-known fact.

2. Discrepancies between SEC reported and investor reported reserves and resources

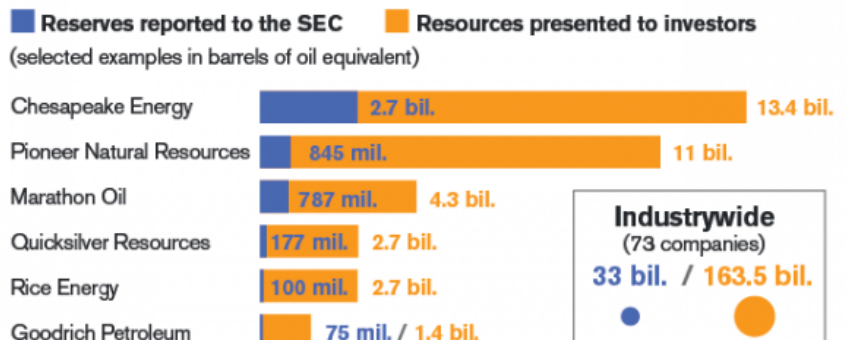
It is not the purpose of this article to dissect the nuances about reserve, resources etc., let's just be reminded that a mineral resource is an occurrence of material of intrinsic economic interest in such form, quality, and quantity that there are reasonable prospects for eventual economic extraction and a mineral reserve is a resource known to be economically feasible for extraction. What is

important to understand is that reserves are more "real", resources are just potential. It is mainly a function of price and technology.

One aspect not covered in my previous article were the massive discrepancies between the figures told to investors and the proved reserves reported to feder-

Selling the Shale Boom

An analysis of 73 shale drillers found that almost all reported higher oil and gas prospects to investors than to the Securities and Exchange Commission (SEC). These six companies illustrate the range of estimates within the industry.



Source: Company presentations and SEC filings

Bloomberg Visual Data

Disparity between reported and presented resources. Bloomberg 2014.



al regulators. To illustrate this point, here is an excerpt from an article published in Bloomberg. “Lee Tillman, CEO of Marathon Oil Corp., told investors in September 2014 that the company was potentially sitting on the equivalent of 4.3 billion barrels in its U.S. shale acreage. That number was 5.5 times higher than the proved reserves Marathon reported to federal regulators, according to another 2014 Bloomberg Article. Such discrepancies are rife in the U.S. shale industry. Drillers use bigger forecasts to sell the hydraulic fracturing boom to investors and to persuade lawmakers to lift the 39-year-old ban on crude exports. 62 of 73 US shale drillers reported one estimate in mandatory filings with the SEC while citing higher potential figures to the public, according to data compiled by Bloomberg. Pioneer Natural Resources (PXD) Co.’s estimate was 13 times higher. Goodrich Petroleum Corp.’s was 19 times. For Rice Energy Inc., it was almost 27 times more (Bloomberg 2014b).”

“Drillers use bigger forecasts to sell the hydraulic fracturing boom to investors and to persuade lawmakers to lift the 39-year-old ban on crude exports.”

As a further example we have the case of “California’s Monterey Shale, which the U.S. Energy Information Agency thought contained 13.7 billion barrels of oil in 2011. Closer examination revealed the formation to be much more broken up underground than previously thought, so much so that only around 600 million barrels may ultimately be recovered with current technology.” This is highlighted in an article in zero-hedge entitled “Fracked Up: Don’t Be-

lieve in Miracles”. “That’s a 96% downgrade, and there is no guarantee that other predictions of shale oil riches both in the U.S. and elsewhere won’t have similar outcomes,” the article concludes.

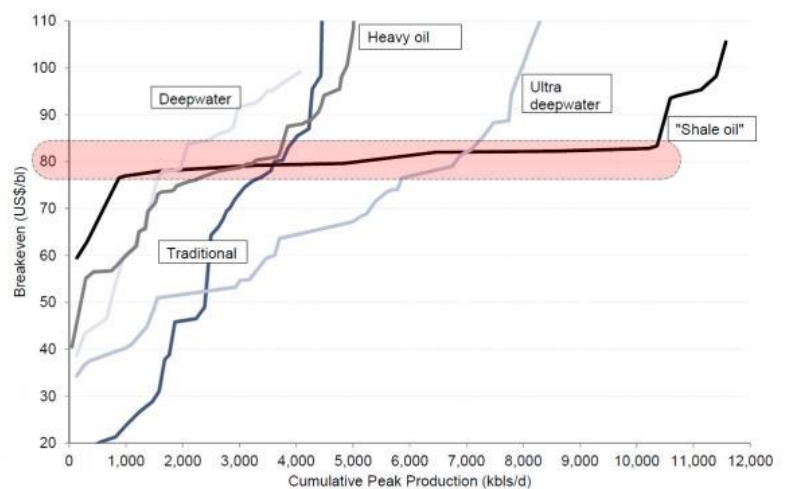
3. The break-even cost of non-plateau oil assets in the US is now \$75/bl

An article submitted to zero-hedge.com in October of 2014, entitled “If The Oil Plunge Continues, Now May be a Time to Panic for US Shale Companies”, summarizes the US shale boom and its associated costs:

“Over the past five years, the shale industry, fabricated or real reserves notwithstanding, has been a significant boon to the US economy for four main reasons: it has been the target of billions of dollars in fixed investment and CapEx spending, it has resulted in tens of thousands of high-paying jobs, its output has been a major tailwind for the US trade deficit, and has generally been a significant contributor to GDP (not to mention Warren Buffett controlled railway Co.’s). Most importantly, the cost curve of US shale is horizontal, with a massive ten million barrels

Shale oil substitutes the need for projects with US\$85/bl+ breakeven

Top 400 breakeven of non-producing oil assets by category



Source: Company data, Goldman Sachs Global Investment Research.

Shale oil substitutes need for projects with \$85/bl+ breakeven. Goldman Sachs / Zerohedge.com 2014.

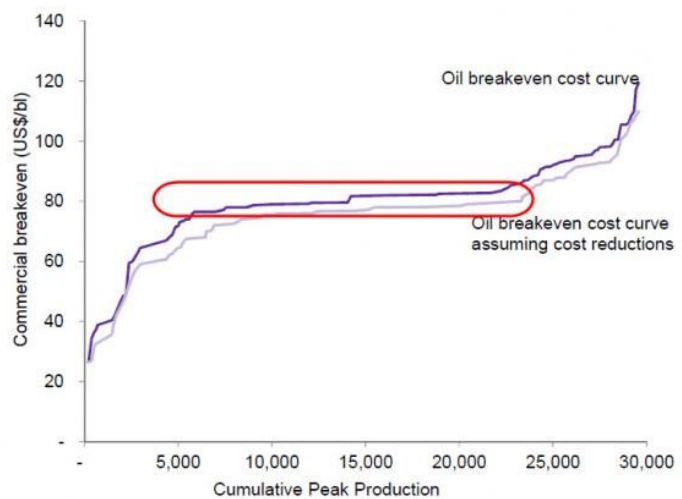
per day available within dollars of \$85/bl. In a recent report by Goldman Sachs in 2014, the investment bank states that the vast reserves that have been opened for development through shale oil in the US have flattened the cost curve meaningfully, at around a \$85/bl Brent oil price. Goldman's analysts estimate shale reserves from the top three fields in the US onshore (the Permian, Bakken and Eagle Ford) at around 91bn boe, which to put it in context, is equivalent to roughly one third of Saudi Arabia's current stated reserves (the Saudi Arabian number "may" be vastly overstated, but this is completely another story. For more about the overstating of Saudi reserves see: "Twilight in the Desert" by Matthew Simmons). Most of this resource has become available in the past five years, with few barriers to exploiting the reserves. Production in the US, as a result, is growing strongly at a yearly rate of more than one million barrels per day currently, and we expect this pace of growth to continue over the coming three years as capital continues to be drawn into these developments. The consequence is that costs of production and E&P CapEx/bl should stabilize as the marginal cost of production remains stable. Goldman Sachs (2014) believes that shale oil has become effectively the marginal source of supply, providing the bulk of non-OPEC production growth...With US shale oil profitable only above its virtually horizontal cost curve, it means that eleven million barrels per day are available as long as Brent is above \$85, a clear "red line" for most OPEC producers. The red line is conveniently shown on the chart [on the previous page]:"

What is obvious to me is that if we combine the knowledge derived from these charts and the known fact that at any time the best marginal fields are used first, leaving the less productive and expensive for the future, we (as a civilized society) are on a collision crash course. But how about cost

reductions? If the oil price goes down, and the oil industry reduces CapEx "at a time of material expansion of oil service capacity, it could lead to a potential 5-15% cost deflation across oil developments, after a decade of 10% inflation," according to an article published on zerohedge.com in October 2014 entitled "Why '75' Is The Most Important Number for US Economic Hope." It is a reasonable scenario.

Let's look at the chart with \$5-10/bl of cost reduction:

Exhibit 14: Cost deflation can lower the oil cost curve by \$5-10/bll



Source: Goldman Sachs Global Investment Research.

Cost deflation can lower the oil cost curve. Goldman Sachs / Zerohedge.com 2014.

Looking at this data, we can assess that the shale oil boom would be severely damaged if the oil price falls and stays under \$75/bl. If we look at these numbers from a financial point of view, and incorporate some cost reductions as Goldman Sachs (2014) did in this next chart, it would appear evident that only some fields provide some meaningful return, the others needing a much higher oil price.

The Barrels of Oil equivalents deceitful practice

Marin Katusa, an energy investment strategist at Casey Research, exposed the deception US energy companies use to enhance their value in an article



called “Three Energy-Sector Investment Traps.”:

“The BOE is a unit of energy, defined as the amount of energy released when one barrel of crude oil is consumed. Most oil wells produce some natural gas and most natural gas wells produce some oil, so energy companies generally produce both kinds of fuel. Producers have long lumped

$$5,800 \text{ cubic feet natural gas per barrel} \times \frac{US\$3.50}{1,000 \text{ cubic feet natural gas}} = US\$20.30 \text{ per barrel}$$

quantities of the two into one calculation in order to simplify reporting: the “barrel of oil equivalent” (BOE). Since different grades of oil burn at different rates, the value is an approximation, set at 5.8×10^6 BTU or 6.12×10^9 joules. The BOE concept then lets us combine different fuels according to energy equivalence. Barrels of oil equivalent are most commonly used to combine oil and natural gas: one barrel of oil is equivalent to 5,800 cubic feet of natural gas because both produce approximately the same amount of energy on combustion. The problem is that details are lost during the conversion, important details. One barrel of oil is equivalent to 5,800 cubic feet of natural gas in terms of energy, but the difference in value is very significant, and that is the trap.”

Marin Katusa provides us with this handy calculation to understand the matter:

“Using an oil price of \$80 per barrel and a natural gas price of \$3.50 per thousand cubic feet we can calculate the value of a BOE of natural gas priced as gas: \$20.30. However, a barrel of oil is not worth \$20.30, but rather is currently worth more than \$75 per barrel. Yet a BOE with 100% gas is worth only \$20.30. The barrel of oil is actually worth almost four times more than the supposedly equivalent “barrel” of natural gas. Certain companies purposely use this concept because they want to value

their gas reserves at more than seven times their actual value.

Another aspect impacting this issue and something the mainstream media are totally missing is the glut, or oversupply, of so-called “wet” gas the industry in North America is currently experiencing. Gas is called wet when natural gas liquids, or NGLs, and condensates can be separated from the natural gas. NGLs are ethane (C2), propane (C3), and butane (C4). Condensates are pentanes plus (C5 and higher).”

“There’s such a glut of ethane that we now see ethane rejection, where the companies leave the ethane in the gas stream and sell it as natural gas. They don’t even bother separating it. It’s like flaring the gas at the oil well, it’s not worth the hassle right now.”

Some firms separate the NGLs by category and break down the pricing. But the majority is less transparent, explains Casey. “Since wet gas was worth so much more than dry gas, the exploration and production (E&P) sector has focused on wet gas formations, and now there is a glut of NGLs in North America. In fact, there’s such a glut of ethane that we now see ethane rejection, where the companies leave the ethane in the gas stream and sell it as natural gas. They don’t even bother separating it. It’s like flaring the gas at the oil well, it’s not worth the hassle right now.”

What it means is that the value of NGL is also going down, reducing even more the overall profitability of



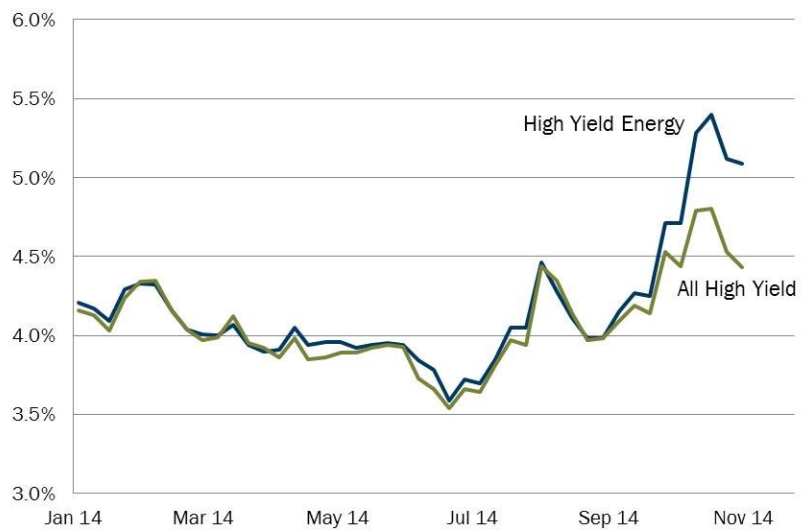
the BOE.

The impact of the FED's low rates policy on the oil economy.

The oil and gas sector is capital intensive. As discussed in my previous article, the “fracking miracle” may not be all that it is believed to be due to fast production decline rates and massive amounts of leverage. The energy sector is the largest single industry component of the USD DM HY index. Drillers have borrowed huge amounts of capital to acquire leases, drill wells, and install processing equipment and infrastructure. Even as debt piled up, the decline rates of fracked wells forced drillers to drill new wells to make up for the dropping production from old ones (remember, the decline can be as high as 70% after just one year), and to drill even more to show some kind of growth. All this was funded in part by High Yield debt, called junk debt. Wolf Richter wrote in October 2014 in “Wolf Street”, a blog about business and finance, that “junk bond issuance has been soaring as the FED repressed interest rates and caused yield-hungry investors to take on more risk” to earn some meaningful return. “Demand for junk debt soared and pushed down yields further....The proportion issued by oil and gas companies jumped from 9.7% at the end of 2007 to 15% now, an all-time record.” An article in Bloomberg explained further: “Shale debt has almost doubled over the last four years while revenue has gained just 5.6%, according to an analysis of 61 shale drillers published in Bloomberg. A dozen of the surveyed companies are spending at least 10% of their sales on interest compared with Exxon Mobil Corp.’s 0.1%.” (Bloomberg 2014c) “Interest expenses are rising,” Virendra Chauhan, an oil analyst with Energy Aspects in London, was quoted as saying in Bloomberg. “The risk

for shale producers is that because of the production decline rates, you constantly have elevated capital expenditures.” In a world of falling interest rates, the newcomers have a competitive advantage over the old ones, paying less and less for capital, and having less debt to pay on.

The Risk Premium on High-Yield Energy Bonds Has Increased Spreads Over Comparable Government Bonds



Through October 31, 2014
 Source: Bank of America Merrill Lynch
 High Yield Energy: BofA Merrill High Yield Energy Index. All High Yield: BofA Merrill High Yield Master Index.
 Spreads are shown as spread to worst (a measure which adjusts for call options.)

Risk Premium on High-Yield Energy Bonds. Bank of America Merrill Lynch / Forbes 2014.

Below, I have included sections from an article published in November of 2014 on zero hedge.com entitled “If WTI Drops to \$60, It Will Trigger a Broader HY Market Default Cycle, says Deutsche.” What impact should we expect from the move in oil price so far and where is the true tipping point for the sector? Analysts at Deutsche Bank have calculated a scenario with WTI at \$60 for the single-B/CCC segment. “At the moment, average debt/enterprise (D/EV) value metric is 55%, up from 43% in late June, before the 26% move lower in oil. About 28% of energy B/CCC names are trading at 65%+ D/EV, implying an 8.5% default rate among them, assuming historical 1/3rd default probability holds. This would translate into a 4.3% default rate for the overall US HY energy sector



(including BBs), and 0.7% across the US HY bond market.”

A November 2014 article in Forbes weighs in, “Within energy, the oil exploration and production (E&P) and the oilfield services companies have been hit particularly hard. The median spread of bonds in those industries is currently in the 5.5% to 6.5% range.”

“A 25% drop in oil price so far has pushed D/EV valuations among US energy B/CCC names to a point suggesting 8.5% future default probability, while their bonds are pricing in a 9.5% default probability.” Deutsche Bank's stress-test shows “that a further 20% drop in WTI to \$60/bbl is likely to push the whole sector into distress, a scenario where average B/CCC energy name will start trading at 65% D/EV, implying a 30% default rate for the whole segment. A shock of that magnitude could be sufficient to trigger a broader HY market default cycle, if materialized.” (ZeroHedge/Deutsche Bank 2014).

Clearly the shale O&G revolution is a major misallocation of capital, and this is without accounting for the massive investments in LNG export plants. Low US gas prices have hindered the development of renewable energy sources, directly by making them more uneconomic, and indirectly, giving the impression that the US is sitting on a sea of cheap and infinitely abundant gas.

And remember that in during the 2007-8 “subprime” crisis prices of oil went in the \$30s they didn't stop at \$60. We can only imagine what the consequences for the shale oil sector would be if this happens.

Conclusion

While Saudi Arabia's strategy of dumping oil in the market and lowering the price is not completely clear and beyond the scope of this article, “very

soon there will be a very vocal, very insolvent, and very domestic shale community”, as is written in zeroHedge, “demanding answers from the Obama administration”, as once again “hope” and “change” will have trumped far-sighted statesmanship.

An article in zeroHedge “Houston, We have a Fracking Problem” sums up the situation well: “With oil prices and demand falling at a time when production is strongly rising, the risk of a supply/demand imbalance has significantly increased. This puts the prices and valuations of energy companies, particularly drillers and service suppliers, at risk as well.” The whole ecosystem will be under stress. As the Danish Physicist Niels Bohr once said, “Prediction is very difficult, especially about the future”, so I will not predict a catastrophic end for the shale industry in the next years. However, the survival of the frack industry is a function of high Oil&Gas prices, and nobody knows what these prices will be one month or five years down the road or what the real floor price for the survival of the frack industry as we know it today is. Hitherto we know that the sector didn't make profits in the last years of relatively elevated prices and minimal regulation. Also during this period it used the best fields available. In the meantime it accumulated enormous debts in an environment with the lowest interest rates in recorded history. Will the frack industry survive a possible less favourable future?

It seems we are at Peak Shale right now. The very best of the best wells are being drilled, and they are new and at peak production, interest rates are near zero, they can't go lower. So shale is in its golden age. It can only go down from today UNLESS oil prices spike again. In that case, even shale could last for decades. It demands a high price, though, to keep going. ♦

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