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Global LNG Pricing Dynamics and Impact on Europe

Thierry Bros

8.1 Five Revolutions Are Reshaping the Energy Landscape

8.1.1 Three Revolutions on the Supply Side: US Shale Gas, US Shale Oil and Worldwide Renewable

The US shale gas revolution[1] is only the first (and most documented) of three revolutions that happened since the beginning of this century on the supply side. The world has changed thanks to the US shale revolutions (gas first and then oil)[2] and a global quest for renewable. Those revolutions took over a decade but will shape the twenty-first century. Australia followed producing unconventional gas and is now also exporting it. It should take some time for unconventional oil

T. Bros (✉)
SciencesPo, Paris, France
e-mail: thierry.bros@sciencespo.fr

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and gas production to materialise in other places where the resource is available[3] (Argentina, Canada, China, Mexico, Russia, South Africa, etc.), but the US shale revolutions should be exported to a few other countries.

Renewable policies were first designed in Europe (mostly based on subsidies as renewable then was much more expensive than any other form of energy) from 2001[4] to reduce CO2 emissions, but China is now also investing heavily as it needs clean energy to reduce air pollution in its big cities. The three biggest renewable producers in 2015 were EU, US and China. In 2015, China was the second producer of solar energy behind the EU[5], but it has become the biggest single solar producer (before Germany, the biggest contributor to EU solar energy). Thanks to technological improvements, renewable cost has gone down massively and can now compete with traditional electricity production (fossil fuels or nuclear). It can spread all over the world as it is no longer a fancy idea for only rich countries with an ecological mindset[6]. In the 2005–2015 period, on a worldwide basis, renewable production grew by an astonishing 16%pa when total primary consumption grew only by 2%pa. And 2015 was the first year on record in which additions of renewable power generation capacity were higher than those for thermal capacity.

Even if gas reserves (where 50% of the reserves is shared by only three states: Iran, Russia and Qatar) are more concentrated than oil reserves (where 50% of the reserves is shared by four states: Venezuela, Saudi Arabia, Canada and Iran) on a worldwide basis, liquefied natural gas (LNG) allows, as Churchill pointed out, diversity of supply. Thanks to LNG that represents 10% of the global gas supply, any consuming state can increase diversity of supply and hence its energy security. Australia and the USA are exporting their unconventional gas (under LNG) and oil in the global market, increasing de facto diversification of supply for all consumers. For example, Lithuania and Poland, where Russia provides 100% of their gas supply, have both invested in an LNG regas terminal (respectively in 2014 and 2015) to be able to access waterborne LNG to mitigate the Russian risk that was high on the political agenda for those two European states.

8.1.2 On the Demand Side: Efficiency Gains, an Ongoing Revolution

More energy has always been needed to sustain economic growth. Energy was provided first by slaves in Ancient Egypt, Greece or the Roman Empire, then by coal for steam machines during the Industrial Revolution in Europe and finally by oil during the twentieth century on a worldwide level. But for the first time ever, since 2006 (before the financial crisis), the European economy has been able to grow with less energy. This decoupling between economic and energy demands is now a European reality.

Not only have we seen during the last decade, like in the 70s, a demand destruction in front of higher prices (especially in Europe), but most policies are aimed at improving energy efficiency in the long run to avoid burning fossil fuels that has a negative impact on climate change. Europe is now definitively past its peak energy demand and could be followed by other developed states in the coming decade. This new trend is going to continue in Europe with the 2030 EU climate and energy road map[7]. On top, the outcome of the Paris COP 21 in December 2015 is putting further pressure at the world level on all fossil fuels (and in particular coal) that emit CO2. The secular correlation between economic growth and energy was disrupted in Europe in 2006, and this is going to spread all over the world (from developed to developing countries) in the coming decades. Even China is more energy efficient (it uses less energy per unit of GDP) in the past few years.

8.1.3 Energy Storage: The Next Revolution

We are witnessing an energy system where not only supply is widely available and demand is bound to peak, but also some major technological breakthroughs in energy storage should materialise soon. This could completely alter the energy landscape where major companies were dealing with massive inflexible infrastructures (coal extraction,

hydrocarbon production, nuclear plants, etc.). The future could look like a decentralised smart system where end-users select the kind of local energy they have (wind, hydro, solar), are able to store it and use it when needed. The intermittency of renewables that was a major obstacle in a centralised electricity transmission system should be solved with new batteries and new storage solutions (power-to-gas, molten salts, etc.). This should allow the share of renewable to continue to grow fast.

It is interesting to note that two of those revolutions were started in the USA (shale gas and shale oil) and two in Europe (renewable quest and energy efficiency). The ongoing fight to achieve the cheapest and most efficient energy storage is global with high prize at stake as this could be the silver bullet to achieve a completely green energy supply. Companies and states are investing heavily to solve this problem, and already, new products like home batteries[8] are appearing on the market. Like renewable in the early 2000s, batteries will be very costly to start with, but cost should go down thanks to Research & Development. Finally, the manufacturing process should reduce the cost of batteries that would then be disseminated in all houses. With financial markets turning their back on coal that faces strong policy headwinds (for climate change risks) and limiting their exposure to oil,[9] vast sums of money are available for those new technologies. The penetration of this dual technology (renewable and storage) could be as fast as mobile phones that leapfrogged landline phones, especially in developing countries. This next revolution is just around the corner and will disrupt completely the energy landscape.

8.2 Global LNG Pricing Shifting Away from a Quasi-Pipe Business

In the early days, before those revolutions, LNG was viewed as a quasi-pipe business with long-term oil-indexed contracts with destination clauses. Dedicated suppliers and consumers had little options to get out of those deals. Two major changes happened:

- At the turn of the millennium, BG Group (now part of Shell) introduced a new business model based on optionality. LNG was able to flow to the region that had the highest prices and markets to mitigate alone the Fukushima disaster. The re-routing of cargoes was a very lucrative business, until the spreads between markets were reduced to the cost of shipping. It is also important to note that this re-routing that accounted for 7% was done thanks only to market principles (no state intervention).
- Cheniere introduced from 2010 for US LNG a new formula not linked to oil any longer but to the US spot price (Henry Hub). The liquefaction plant became de facto a service provider, not a commodity producer.

Those two major changes have and will continue to have profound impacts on the LNG world. In 2016, Japan's Fair Trade Commission (FTC) launched an investigation to see whether the contract clauses restricting the resale of LNG cargoes impede free competition. In case the FTC of the world's largest LNG importer finds the destination clauses are in violation of the competition laws, the existing LNG contracts would be open for renegotiation. Renegotiations and arbitrations have been a major theme for European (mainly pipe) gas contracts in the last 10 years and have allowed the European gas market to now be mostly spot driven. If Japan starts to renegotiate its LNG contracts, the LNG world price formation that is still, according to International Gas Union's (IGU) wholesale gas survey, 69% oil-indexed in 2015 could like the European gas market face tremendous changes in the next decade.

LNG that used to be a small part of the gas market and that was priced like gas on an oil indexation should evolve into a more fungible market like oil but traded on an LNG spot basis! Flexible LNG will not lead to one single worldwide gas price (as seen in oil) as the cost of transport is material but should link all regional prices. This means that the risks and challenges in this industry will need to be completely reassessed.

8.3 Gas Pricing in Europe Was in the Hands of a Duopoly

8.3.1 "Oil-Derived" Spot Gas Prices in Europe Down but not as Much as Oil Prices

Since the RWE-Gazprom arbitrage back in 2013, we estimate that oil indexation represented less than 50% of wholesale gas in Europe. And this was then a tipping point with only one way forward: more spot indexation. The relatively uncompetitive European gas market is now mostly spot driven. According to IGU, oil indexation represented 78% of total wholesale gas pricing in 2005 but only 30% in 2015, while gas-on-gas competition moved up from 15 to 64%. This move away from oil indexation helped Europe to reduce its total gas bill.

All European buyers now want full spot indexation as can be seen with the latest round of arbitrages/renegotiations. But this also means that Norway and Russia, which control more than 50% of total supply for Europe, now have greater market power than ever. Thanks to this new market power, there is a floor for gas prices in Europe at c. 4$/Mbtu, close to the estimated current full cost of producing and shipping Norwegian and Russian pipe gas to Europe (3.5$/Mbtu) Fig. 8.1.

Over those ten years, Gazprom fiercely defended oil indexation before finally changing its stance and selling some gas at auction in September 2015 (at a price higher than its long-term oil-pegged contract prices). A second gas auction was carried out in March 2016 as after the opening of the regas terminal in Lithuania, the gas landscape in the Baltic states is changing. Russia has now different options to sell gas: via legacy long-term contract, via auctions, via Gazprom Marketing & Trading and via Wingas, a fully owned European utility.

The Norway–Russia duopoly had three options for managing gas prices in Europe: (1) to achieve a high price (above the cost of US LNG or of new pipe gas) as in 2012–2013 by tightening supply. This option has not been pursued since early 2014 as it prompted final investment decisions to bring additional "new" gas into Europe that is now on its way; (2) to remain in a tunnel between an EU floor and the incentive for new gas by

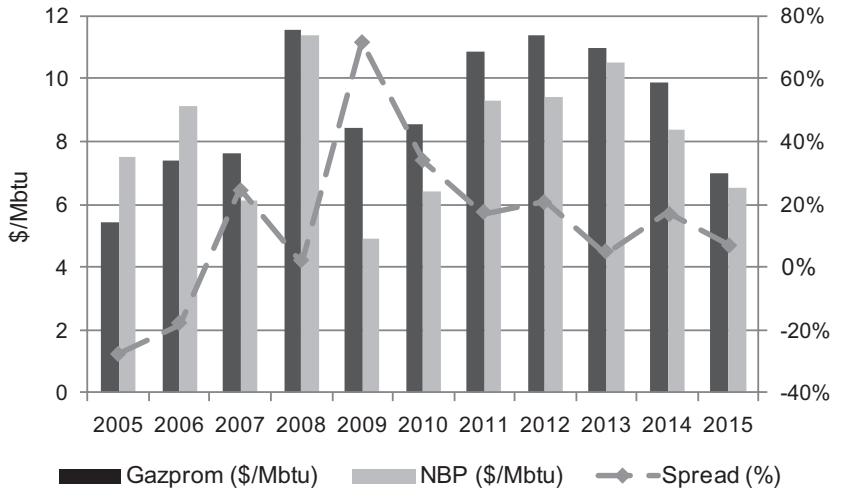

Fig. 8.1 Gazprom realised gas price in Europe vs NBP month ahead. *Source* SG Cross Asset Research/Commodities, Gazprom, Datastream

swinging supply to adjust to demand. This option so far is the best one for long-term rent maximisation; and (3) to engage in a price war by using some of its spare production capacity to shut in US LNG production. This could be an option when/if too much US LNG will be operational.

8.3.2 2015: Poor Supply Growth but More LNG to Europe Thanks to Less Reloads

Worldwide LNG supply in 2015 witnessed another poor growth (+2%). But with NBP and spot LNG in Asia on par, we saw an increase in net LNG berthing in Europe. Europe was, is and will continue to be the "dumping" ground for excess LNG as Asia has contracted enough gas.

The re-export volumes have gone down from 18% of gross imports in 2014 to 9% in 2015. This % should continue to go down in the coming years as re-export is not the best option to arbitrage (in a liquid market, the best way is to send the cargo straight to the location where the margin is the highest). Could this extra LNG pose a threat to the Norway–Russia duopoly?

8.4 Going Forward, the Speed of the LNG Supply Growth…

Europe faces "solidarity cracks" when trying to implement a common gas strategy that should be part of the EU's Energy Union. With Russia being the major gas provider in many Member States, tense EU–Russia relations do not favour gas, even if it is the cleanest fossil fuel. The best example of this "solidarity crack" is the division between the pros and the cons regarding the Nord Stream 2 project Fig. 8.2.

US LNG exports may impact both the pricing in the European gas market, where Norway and Russia control more than 50% of total supply, and the perception of gas. The arrival of this new supply marks the beginning of a new phase of competition. On top of this, LNG from the re-commissioned Angola and new Australian, US and Russian LNGs are set to hit the market in the coming years.

Finally, the abundance of LNG shipping capacity provides a greater connection between all the continents than ever before Fig. 8.3.

By 2020, the USA should have 63 mtpa of liquefaction capacity available, which could translate into an export level of 50 mtpa in 2020 if we assume a load factor of 80%.

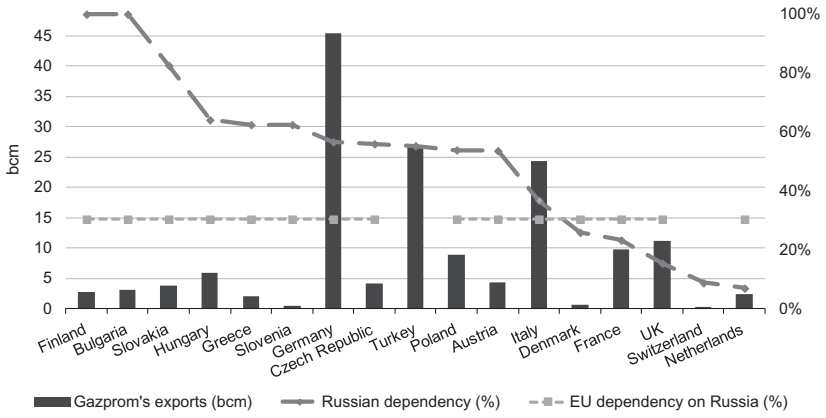

Fig. 8.2 European countries gas dependency on Gazprom

With the commissioning in February 2016 of Cheniere's Sabine Pass train 1, we believe that (1) LNG supply will start to grow by more than 6% pa from 2016e to 2020e Fig. 8.4.

Massive new LNG supply will materialise when the biggest LNG market (Japan) sees demand fall. Now, it is the worst possible timing for this new US LNG as it has no dedicated market. Therefore, Europe

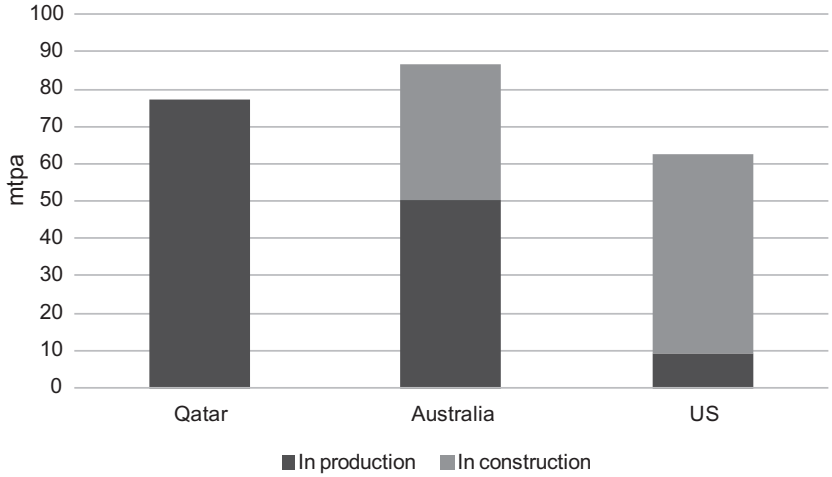

Fig. 8.3 Three major LNG suppliers in 2020e

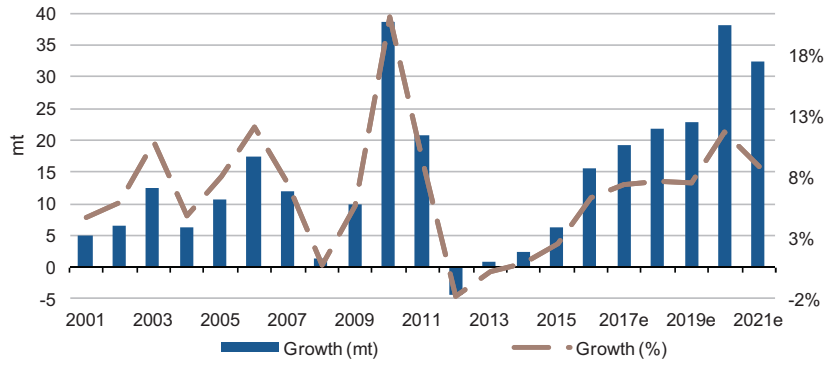

Fig. 8.4 LNG supply growth (Y-o-Y). *Source* SG Cross Asset Research/ Commodities, GIIGNL

will likely be the "dumping" ground for this LNG. Competition always intensifies at the worst possible time Fig. 8.5.

After a 3%pa growth in 2010–2015, we forecast a global supply surge of 8%pa in 2015–2020e. Asia growth will slow down from 6%pa in 2010–2015 to 5%pa in 2015–2020, while Europe after a drop of 10%pa in 2010–2015 will see a resumption of growth (+11%pa). The growth in Latin America and Middle East is also slowing going forward Fig. 8.6.

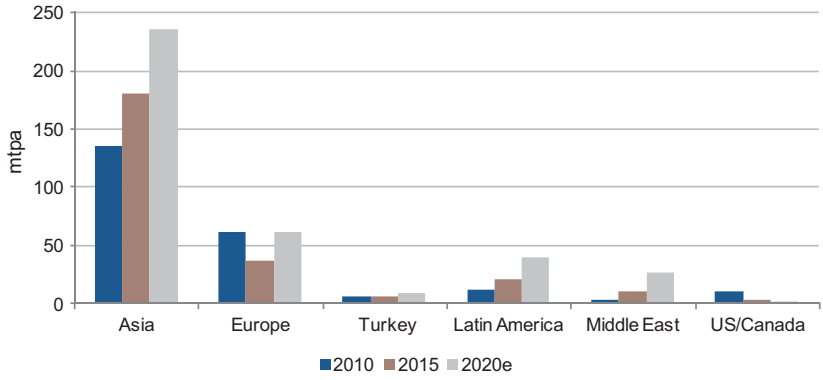

Fig. 8.5 2010–2020e LNG deliveries. *Source* SG Cross Asset Research/ Commodity, HIS for historical

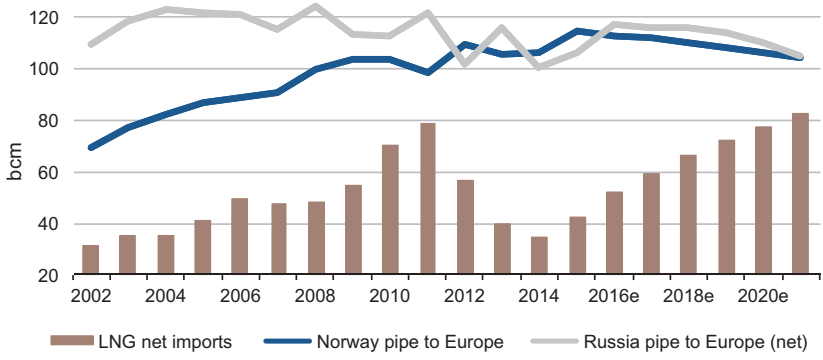

Fig. 8.6 LNG is competing with Russian and Norwegian pipe gas in Europe. *Source* SG Cross Asset Research/Commodities, IEA for historical data

8.5 … and the Rate at Which It Reaches Europe…

The high level of Russian and Norwegian gas in Q1 16 can be explained by the following: (1) oil-indexed contract prices being lower than spot prices; (2) some of this gas being re-exported to Ukraine; and (3) a desire to reduce the need for US LNG in the coming months. Traditional pipe suppliers are trying to flood the European market before the arrival of any US LNG.

8.6 … Will Dictate How Russia Reacts

With the steep capex cuts made in Norway since 2014, we expect gas Norwegian production to already have peaked and to slowly decline in the coming years. Norway has, therefore, very little flexibility left in its ability to swing production to balance demand.

Russia has two remaining options for managing gas prices in Europe:

1. To try to keep prices around $4/Mbtu by swinging supply to adjust to demand.
2. To engage in a price war to stop future US LNG production (around $3/Mbtu) by using some of its spare production capacity (Gazprom alone had 150bcm/y of unused production capacity in 2015).

Gazprom has both market power and a lower supply cost (the rouble devaluation resulting from US sanctions on Russia has had the effect of making Russian gas even more cost competitive).

In 2015, after the opening of the Lithuania regas terminal, Gazprom responded by discounting the price of its gas by 23%. So, cutting prices by 1$/Mbtu (24%) would be an interesting way for Russia to make a point. If it manages to do so, it could show its strength and sell additional volumes in Europe Table 8.1 and Fig. 8.7.

Table 8.1 Gazprom's options on a FY basis

	Vol (bcm)	Price ($/Mbtu)	Revenue ($bn)
Swing in supply to try to mitigate falling prices	116	4.1	16.8
Price war to shut in US LNG	122	3.1	13.4

Source SG Cross Asset Research

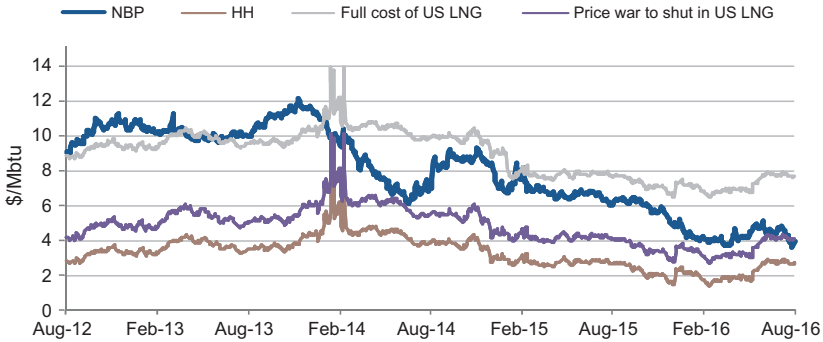

Fig. 8.7 How likely is a price war? *Source* SG Cross Asset Research/ Commodities, Datastream

To assess the full cost of US LNG in Europe, we added the liquefaction tolling (3$/Mbtu), the shipping cost (1.5$/Mbtu), the regas (0.5$/Mbtu) and the historical margin of trading LNG (1$/Mbtu), i.e. a proxy of HH + 6$/Mbtu. With lower shipping rates for LNG, we have reduced the cost of US LNG from HH + 6$/Mbtu to HH + 5$/Mbtu since 2015.

With the full cost below or at the level of NBP, it made sense back in 2011–2013 to FID liquefaction trains in the USA. But as seen on this graph, since 2014, curves have moved and the theoretical shipping of US LNG to Europe will entail a loss. But will US LNG come to Europe? In April 2016, the first shipment of American LNG from Cheniere's Sabine Pass reached Europe. We only expect few distressed cargos to reach Europe in 2016e.

A price war would cost Gazprom $3.4bn in revenue (on a FY basis) but would stop US LNG being produced. A price war would also

impact the Energy Union strategy as it would reveal the real cost of diversification of supply. To implement this hypothesis, Gazprom would need to decide to use some of its spare production capacity to push more volumes on the spot/hub markets in Europe on top of its contracted gas.

Sporadically, a price war could take place in the 2017–2020e period as in front of no growth in European gas demand, pipe and LNG supply are available with a level of spare capacity never reached before. But risks remain mostly on the Ukrainian transit side.

8.7 Increase Security of Supply Thanks to LNG

LNG could not only provide lower prices, marginally reducing our dependency on Gazprom, but most importantly improve the perception of gas in civil society and at government level. With the opening of new regas terminals, even the Eastern part of Europe could be interested in using more gas to achieve a faster cost-effective energy transition.

EU–Russia–Ukraine is an unstable *ménage à trois*. According to the Ukrainian Energy and Coal Minister, Ukraine wants to hike the tariff for shipping Russian gas and to introduce a ship-or-pay clause. Gazprom is unlikely to agree to this, if the cost is above the alternative option (Nord Stream). Hence, 2020 will be a notable year as Russia is unlikely to renew the Ukrainian transit contract. As less supply would be available from Russia, US LNG would provide diversification and extra security of supply.

Notes

1. By combining two technologies (fracking and horizontal drilling), US producers have been able, since 2005, to unlock shale gas reserves that before could not be produced on a commercial basis.
2. The shale oil revolution tilted the pricing power away from OPEC as the USA was becoming the biggest worldwide oil (and gas) producer.
3. https://www.eia.gov/analysis/studies/worldshalegas/.

4. Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market.
5. BP Statistical Review—June 2016.
6. In 2015, in Denmark, renewable accounted for 25% of the total primary energy consumption vs. 2% in China (BP Statistical Review—June 2016).
7. http://ec.europa.eu/energy/en/topics/energy-strategy/2030-energy-strategy2030.
8. For example https://www.teslamotors.com/powerwall or http://www.bollore.com/en-us/activities/electricity-storage-and-solutions.
9. Some International Oil Companies like Shell or Total are claiming that they are now more gas orientated than oil.

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Author Biography

Thierry Bros is a senior research fellow of The Oxford Institute for Energy Studies, a member of the EU-Russia Gas Advisory Council, an advisor to the World Energy Council - Global Gas Centre and a visiting professor at SciencesPo. In 2016, he founded thierrybros.com to provide independent research, advice, training & expertise on energy markets after 25 years in the energy field, from the policy side to trading floors. Thierry is highly regarded by the energy community, notably accredited as the best European gas analyst for five years in a row (2013-2017).