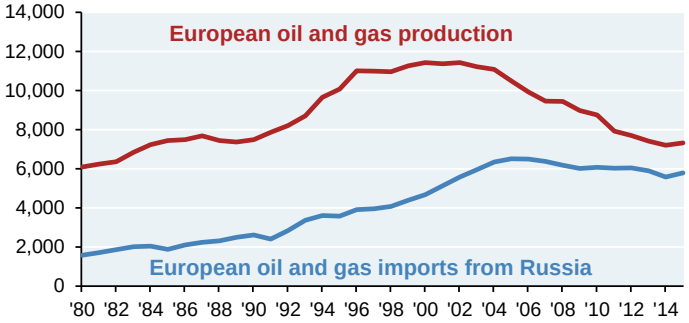
[#3] How much energy-related leverage does Russia have over the rest of the world?

From a de-carbonization perspective, Russia's energy exports should be a welcome development. The country's exports of natural gas and nuclear technology are often replacements for coal, which was *still* in 2016 a greater contributor to global primary energy than natural gas (28% vs 24%).

However, there's some concern about the geopolitical leverage Russia has gained in the process. These concerns may be overstated, but for different reasons. With respect to oil & gas, the West has a growing set of LNG import options (albeit at a higher price). And with respect to nuclear, while Russia has an advantage over nuclear companies in the West, its growing leverage is more in the emerging economies than developed ones; and the nuclear adoption outcomes in the latter are far from certain.

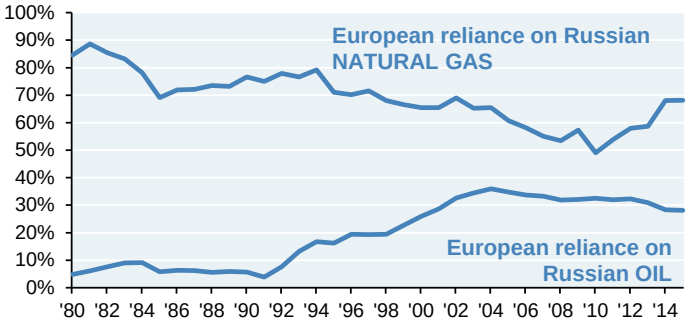
Let's start with **Europe**. The first chart shows European oil and gas production vs European imports from Russia. In the 1980's/1990's, European imports from Russia were one third of its own production. Now these amounts are almost equal, creating apparent leverage for Russia in its dealings with Europe. For example, 6 Baltic and Eastern European countries rely entirely on Russia for their gas supplies; German reliance is 40%. **So, the big question: are there alternatives to Russian oil & gas?** As shown in the second chart, this is mostly a gas story rather than an oil story since ~70% of European gas imports come from Russia, vs 30% for oil. If there's a need to diversify counterparties, finding new gas partners would be the place to start, particularly since domestic gas production in Europe has been stagnant for the last few years.

European production vs European imports from Russia
Thousand barrels a day of oil equivalents



Source: BP Statistical Review of World Energy, Gazprom, Eurostat, Perovic et al, JPMAM calculations. 2015. Europe includes EU, Norway and Turkey.

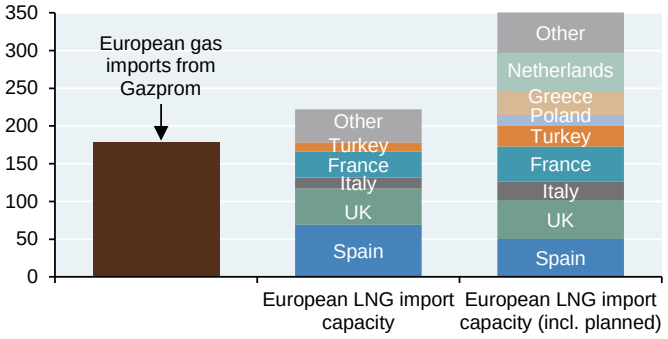
Europe: greater counterparty reliance on Russia for natural gas, percent of total European imports



Source: BP Statistical Review of World Energy, Gazprom, Eurostat, Perovic et al, JPMAM calculations. 2015. Europe includes EU, Norway and Turkey.

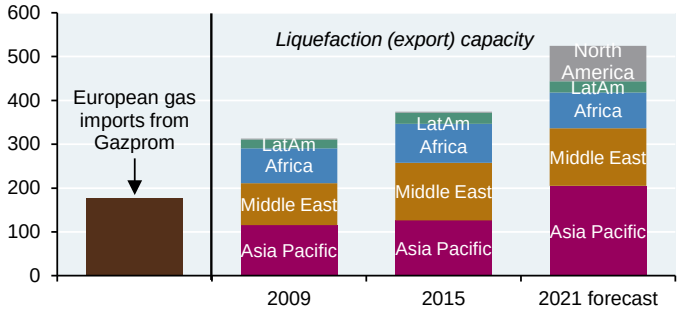
The good news for Europe: after a decade of investment in liquefied natural gas import terminals, Europe's LNG import capacity now exceeds its Russian gas imports (first chart). When including planned projects scheduled to open by 2020, Europe's potential to diversify expands even more. As per the second chart, growing LNG supply indicates ample potential counterparties.

Europe LNG regasification (import) capacity vs Russian pipeline supplies, Billion cubic meters of natural gas per year



Source: Gazprom, Gas LNG Europe. 2016.

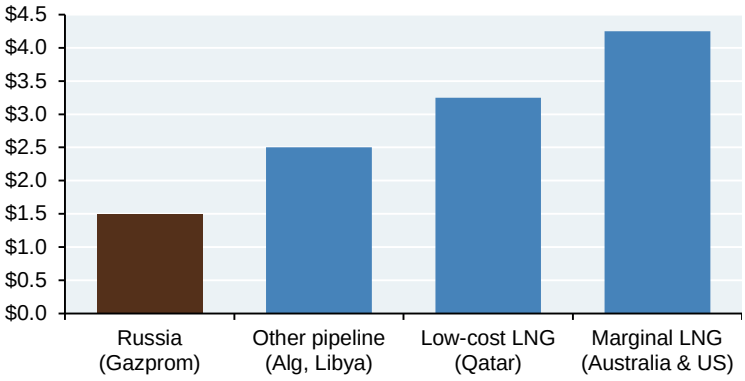
Potential gas counterparties for Europe
Billion cubic meters of natural gas per year



Source: International Gas Union, IHS. 2016. Capacity only refers to existing projects and projects under construction.

However, there are some caveats here. First, European utilities have signed long-term take-or-pay contracts with Gazprom, reducing Europe's ability to immediately change providers. But let's assume that for whatever reason, these contracts were abrogated. The next chart shows how much more Europe might have to pay for gas, either from North African pipelines or from LNG exporters. **In other words, diversification and geopolitical leverage for Europe would come at a price**. Larger volumes are more likely to be available from more expensive LNG sources in Qatar, the US and Australia rather than via pipeline from Algeria and Libya. Another potential cost: more infrastructure investment. When you look at a map of European pipeline infrastructure, you might think there's a seamless ability to route natural gas from LNG import facilities on the Atlantic Coast to destinations in Central and Eastern Europe. However, the interconnectedness of Eastern and Western European pipeline infrastructure needs work, since some pipelines can only carry gas from East to West, and not the reverse.

Gas provider diversification could be costly
Breakeven exporter cost, US$ per million BTU



Source: Goldman Sachs. April 11, 2017.

What about reliance on Russian nuclear power?

As shown in the prior section, many European countries are diversifying their gas counterparties. Some of the most exposed countries, like Lithuania, have added regasification capacity and floating storage, and improved their access to the Western European electricity grid. However, other countries are not. Hungary, for example, relies on Russian gas for 80% of its imports, and has contracted with Russia's Rosatom to expand its nuclear power capacity, after which Russian nuclear will account for 62% of total electricity generation. As shown in the table, 9 other countries are also working with Russia to expand their nuclear power capacity.

Russian nuclear power plants in other countries: operating, under construction and contracted

Country	Plant	Capacity (MW)	Est. cost (US$ bn)	Russia financing	Russia eq. stake	Status*	Russia-supplied nuclear share of total generation
China	Tianwan 1&2	2,120				Operating (1999/2006)	1%
India	Kudankulam 1&2	2,000	3.0			Operating (2002/2013)	2%
Iran	Bushehr 1	1,000				Operating (1975/2011)	9%
Ukraine	Khmelnitski 2 & Rovno 4	1,000				Operating (1983/2004)	5%
Belarus	Ostrovets 1&2	2,400	10.0	90%		Under construction	56%
China	Tianwan 3&4	2,100	4.0	0%		Under construction	1%
Armenia	Metsamor 3	1,060	5.0	50%		Contracted	
Bangladesh	Rooppur 1&2	2,400	4.0	90%		Contracted	31%
Finland	Hanhikivi 1	1,200	6.4	75%	34%	Contracted	14%
Hungary	Paks 5&6	2,400	12.4	80%		Contracted	62%
India	Kudankulam 3&4	2,000	5.8	85%		Contracted	2%
Iran	Bushehr 2&3	2,114		0%		Contracted	9%
Turkey	Akkuyu 1-4	4,800	25.0		100%	Contracted	15%
Vietnam	Ninh Thuan 1, 1&2	2,400	9.0	85%		Contracted	11%

Source: World Nuclear Association, Rosatom. April 2017. Status*: for operating plants, dates shown are for construction start and year of operation

Russia's nuclear pipeline has been boosted by its willingness to provide substantial financing to buyers[21]. As things stand now, Rosatom is the only vendor providing an integrated nuclear solution (the entire range of products and services necessary to generate power, from nuclear fuel to operations to decommissioning). This may be interesting to countries looking to reduce their CO_2 footprint now that Japanese-owned Westinghouse filed for bankruptcy due to cost overruns in the US. France's Areva is also facing financial distress given delays and cost overruns at its facilities in Finland and Normandy.

Right now, only 4 of 61 reactors under construction around the world are being built by Rosatom, so we will have to watch their pipeline. If Rosatom were actually able to build the 80 reactors that it projects by 2030 in its annual report, Russia's nuclear leverage could grow substantially. Russia is making important geopolitical inroads in China, India, Iran and Vietnam, and is in preliminary discussions with Egypt, Jordan and Saudi Arabia.

However, Rosatom's nuclear projections are just projections. Among the real-life constraints that Rosatom might run up against: rule of law issues related to a competitive procurement process. In South Africa, the Constitutional Court ruled that the South African government violated its procurement rules in its dealing with Russia, and moved the discussions back to square one. Furthermore, even if the plants shown above were completed, nuclear power based on Russian support would be less than 10% of total electricity generation in most countries, and in China and India, only 1%-2%. Hungary is more the exception than the rule in terms of its combined nuclear and fossil fuel reliance on Russia.

[21] While Rosatom has financed many projects so far, it may seek to expand use of a "build-own-operate" model that it first used in Turkey.

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