



# Trans-Atlantic LNG Overview

# Introduction

The first decades of the 21<sup>st</sup> century have seen multiple transformations in global natural gas markets. Key and notable drivers behind these changes include the rise of the U.S. shale gas revolution, the fast-paced development of foreign LNG markets, the emergence of trading platforms, as well as the energy-climate nexus. Recently, the COVID-19 pandemic as well as an abnormally warm 2020 winter have cast a bright light upon demand and supply risks in the natural gas market. In this context, market perspective analysis based on previous developments gains particular importance. However, the present paper will avoid making firm predictions. Instead, it will highlight the historical significance of the development of the American market as well as emphasize major trends towards increasing competitiveness of LNG supplies, growing competition between Russian gas suppliers, and a dynamic favorable to gas-carbon price connectiveness.

# America: Development of Natural Gas and LNG Markets

## The Shale Gas Revolution

To firmly master the European and international natural gas markets, it is crucial to understand the humble beginnings of the American natural gas market and its eventual development into the behemoth it is today. As a result of the shale gas revolution, the US turned from an importer of liquefied natural gas (LNG) to its exporter and a contributor towards LNG inflows to Europe. Prior to these developments in the US, some referred to Europe as a 'dead area' for LNG markets. Instead of a surplus, industries [projected](#) scenarios showing a possible deficit by 2020. The US shale gas revolution combined with tremendous progress in LNG markets annihilated earlier worries.

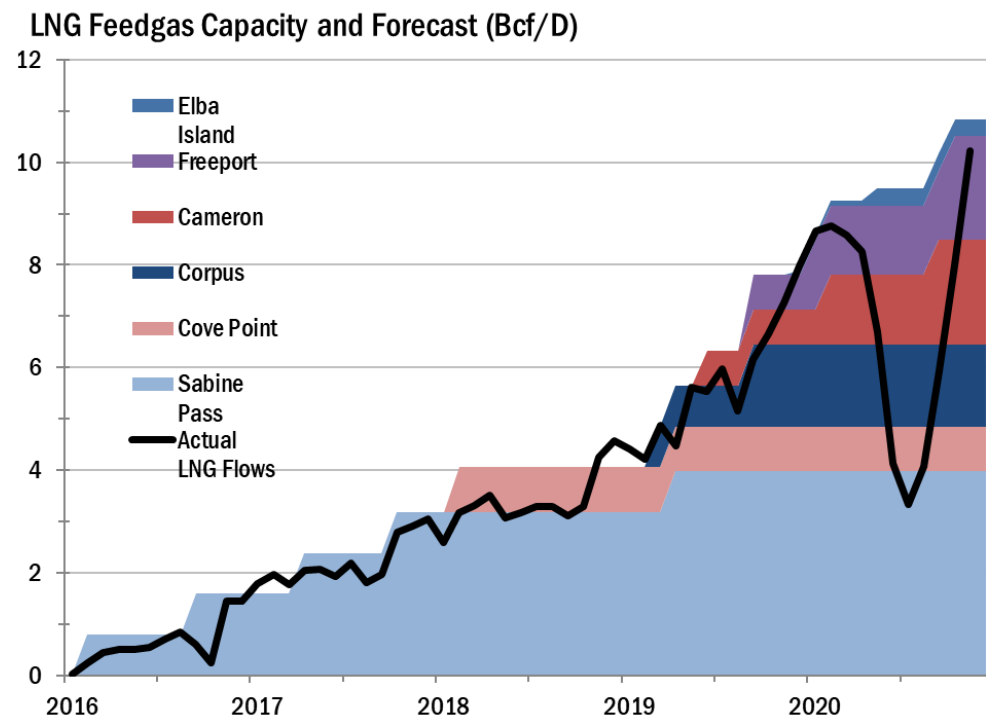
The US shale gas revolution was ushered in by George P. Mitchell, who struggled with hydraulic fracturing in the Barnett Shale of North Texas. In the first decade of the 21st century, technological improvements increased the range of movement for drill bits. This development – commonly known as horizontal drilling – revolutionized the entire drilling industry. Drillers could now opt to not only drill through oil and gas targets, as had previously been done, but also drill alongside them. As a result, plays which were only 50-100 feet thick vertically could now be mercilessly drilled horizontally for up to almost 2 miles. As a result, the range of drilling potential for a single rig dramatically expanded. The combination of hydraulic fracturing with horizontal drilling pried open the outrageous resource potential of a whole class of rock - shale. Shale rock is commonly referred to as mother nature's version of natural gas storage. The wide availability of shale rock in the US transformed global markets – what was once a commodity believed to be in short supply turned to one with a long supply all within a short, five-year window. As a result of their newfound hydrocarbon resources, the US government officially legalized the export of both crude oil and LNG to markets around the world.

## The Rise of US LNG

In the aftermath of the shale gas revolution, Louisiana-based [Henry Hub](#) prices halved from \$13/MMBtu in the winter of 2005 to ~\$6/MMBtu in the summer of 2006. As the U.S. continued to capitalize upon its shale resources and improved drilling technological improvement, prices would continue to decrease. By 2012, prices had collapsed well below \$2/MMBtu. Low U.S. gas prices ultimately inspired US producers to consider the idea of exporting their cheap gas abroad to higher-priced, higher demand markets. As a result, US producers began to develop a wave of liquefaction projects that would reinforce LNG export capacities in an effort to reach more profitable markets. An Asian market with an increasing thirst for gas, particularly in China, provided an obvious outlet for these volumes. Similarly, a primarily pipeline-dependent Europe was also fresh for the taking as costly gas imports from Algeria, Norway, and Russia dominated the scene there. Higher gas prices in both of these major demand regions provided a lucrative initiative to export out cheap U.S. gas.

The foundation of the US LNG industry was built in Sabine Pass on the coast of the Gulf of Mexico. Since the construction of Sabine Pass LNG, this LNG facility has constituted the largest percentage of all US LNG exports. Sabine Pass carried the U.S. LNG market by itself for nearly 2 years from 2016 until Cove Point

came online in 2018. Overseas appetite for U.S. LNG ensured that capacity utilization rates at individual LNG facilities remained high – as a result, LNG flows to U.S. export facilities nearly always matched the upper range of U.S. export capacity, as shown in the Figure 1 below. Rising international demand coupled with the success of ventures like Sabine Pass encouraged additional advancement into the LNG export space. As a result, a number of FIDs eventually turned into healthy projects that saw U.S. LNG feedgas capacity expand to nearly 9 Bcf/D by 2020.



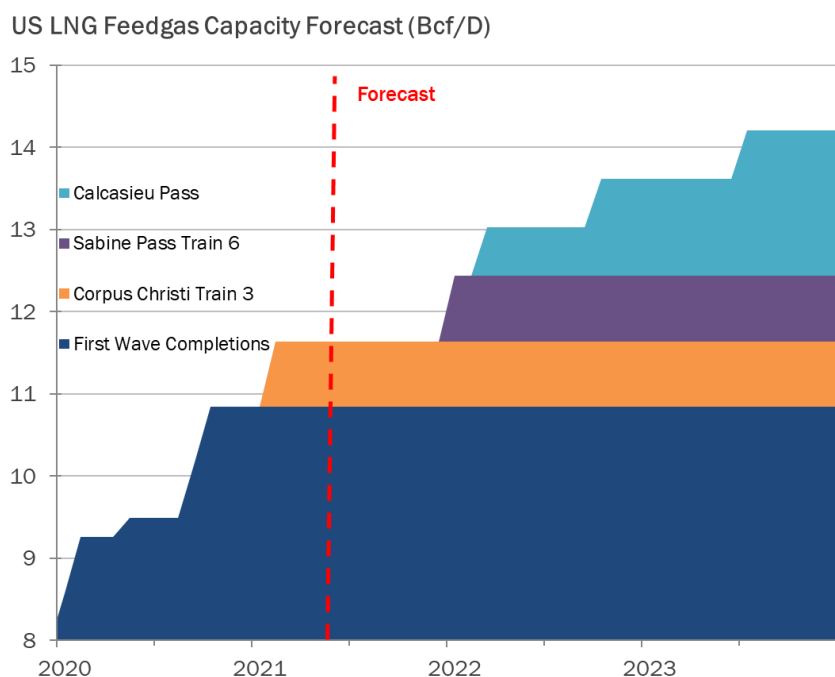
**Figure 1: U.S. LNG Feedgas Capacity**

The commodity price crisis of 2015-16 largely unveiled gas [over-supply concerns](#) as prices collapsed worldwide. If oil prices were to rebound quickly following OPEC+ agreements, gas markets would theoretically be ‘late to the party’ of price rebound partly due to the overwhelming downward pressure of the massive gas supply surplus. As soon as the OPEC+ deal in the second half of 2016 pushed oil prices upwards from their lows, Asian gas prices—linked largely to oil—decoupled on the upside from global gas supply-demand fundamentals. LNG supply helped de-couple oil prices from gas prices.

If we look back at the prospects of LNG markets made in 2015-16, analysis reveals a continuous glut in the markets. McKinsey’s Global Gas & LNG Outlook to 2030 pointed out that LNG oversupply will continue at least till 2021-2022 as a result of significant over-investments into liquefaction capacity that had occurred across the world in not the only the U.S.A, but also Qatar and Australia during the decade of the 2010s. McKinsey’s projection would have been still correct if the COVID-19 pandemic hadn’t occurred. Indeed, in 2020, demand destruction caused by the pandemic destabilized the entire market, resulting in the cancellation of nearly 200 U.S. LNG cargoes. As shown in Figure 1, LNG flows to U.S. export facilities dropped to nearly 3 Bcf/D from a high of 9 Bcf/D. Hence, LNG supplies significantly [tightened](#). LNG inflows only naturally resumed once cold Asian winters and \$20+ prices in Japan and South Korea prompted a quick resurgence in the U.S., as exporters leapt over each other in an attempt to take advantage of the

available. U.S. – Asia arbitrage opportunity. LNG exports in the U.S. grew exponentially to record 11 Bcf/D levels, where we currently lie.

The revitalization of the LNG industry during the winter season provided many second wave LNG facilities a second chance, after many were marred with delays in the summer of 2020. Oncoming projects within the next five years are displayed in Figure 2 below. Calcasieu Pass, the first of many anticipated projects by Venture Global, is ahead of schedule. Operation on Calcasieu Pass is expected by 2022. Venture Global also expects to expand this facility with the addition of another terminal as part of its CP2 LNG project. Venture Global recently started to file for the CP2 on January 21st. The first train of Golden Pass is expected to be completed by the end of 2025, with additional capacity coming in years beyond that. It is expected that export capacity will exceed 15 Bcf/D at a minimum by 2025 given the completion of these projects. Other potential expansion projects not listed in Figure 2 below include Freeport Train 4 and the Cameron Expansion. New projects that are still undergoing investment decisions include Driftwood, Plaquemines, Port Arthur, and the Lake Charles project.



**Figure 2: Future US LNG Feedgas Capacity Forecast**

Development of the American LNG market also led to changes in the types of contracts predominantly utilized in the industry. Prior to the shale gas revolution, most LNG sales were fixed to destination clauses, which ultimately placed onward restrictions to re-trade purchased gas. By 2019, destination clauses were present in only 10% of the LNG contracts. In fact, given the wealth of supply in the LNG market, suppliers were unable to bind consumers to rules against re-trading the commodity. As a result, flexible destination clauses became prevalent in the industry, eventually allowing European companies to purchase uncommitted LNG. The emergence of US gas exports may provide new opportunities for intercontinental swap agreements, such as the joint venture between ExxonMobil, Qatargas and ConocoPhillips at Golden

Pass LNG - an opportunity for markets where physical volumes can be contracted in the US even without being shipped to remote points.

Looking towards the future, the U.S. LNG industry is poised to continue to expand, capitalizing on its cheap gas production. Despite the fact that U.S. production is currently still recovering from pandemic-driven demand destruction, Gelber & Associates (G&A), using its internal forecasting systems, foresees that natural gas production will recover in the latter half of 2021 and surpass previous all-time highs of ~96 Bf/D by mid-2022. As a result, in the long-term, increasing production will be able to support LNG infrastructure improvement along the U.S. Gulf Coast. Although it remains difficult to estimate further market evolution, current market trends reveal that U.S. LNG development will continue to grow, stimulating the transatlantic trade, market surplus, and market competitiveness.

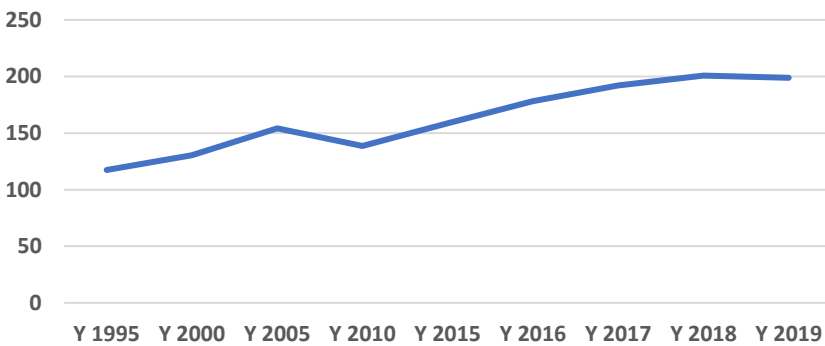
## Europe: A Market on the Turn of Change

### Between piped gas and LNG

In the early European markets, gas sources were extremely limited - more than 90% of European gas imports were transported through pipelines. Today, pipelines in Europe still continue to play an important role in natural gas markets despite the increasing availability of LNG. Pipelines are essential in transporting gas from production zones to in-land, undersupplied regions of Europe. The TAP (Trans Adriatic Pipeline) is a great example of this – in 2020, it was finally completed, transporting gas from Azerbaijan to South East Europe. However, as a result of the TAP, LNG demand in Southeast Europe has been forced to migrate elsewhere as the market is too small to absorb gas from both pipelines and LNG.

Increasing competitiveness between LNG and pipeline routes raise important questions for the future of both. Gazprom – Europe's largest piped gas importer, maintained dominant control of the gas market in the early 90's. During extreme gas gluts, Gazprom could artificially choose to reduce export volumes in order to balance prices for European consumers. As the market developed, Gazprom lost portions of its once wide-spread grip on the market; despite this, it remains the largest single gas importer to the EU to date. Gazprom export rates to Europe that constantly rose from 1995 – 2005 would be significantly reduced from 2005-2010 given demand stagnation at the time. Gazprom exports would continue to grow even after the commodity crisis of 2015-16; however, its annual growth rate would stagnate after 2018. In fact, the Russian pipeline export monopoly actually saw negative growth rates between 2019 and 2020. Reduced gas flows beyond 2020 were partially a result of repairs needed on the Nord Strom pipeline. In a year where underground storage had excess capacity, and summer injection rates were minimal, increased market competitiveness to supply an oversaturated supply base led Gazprom to have the worst financial year since 1999.

### Gazprom Exports to EU and Turkey (Bcm)

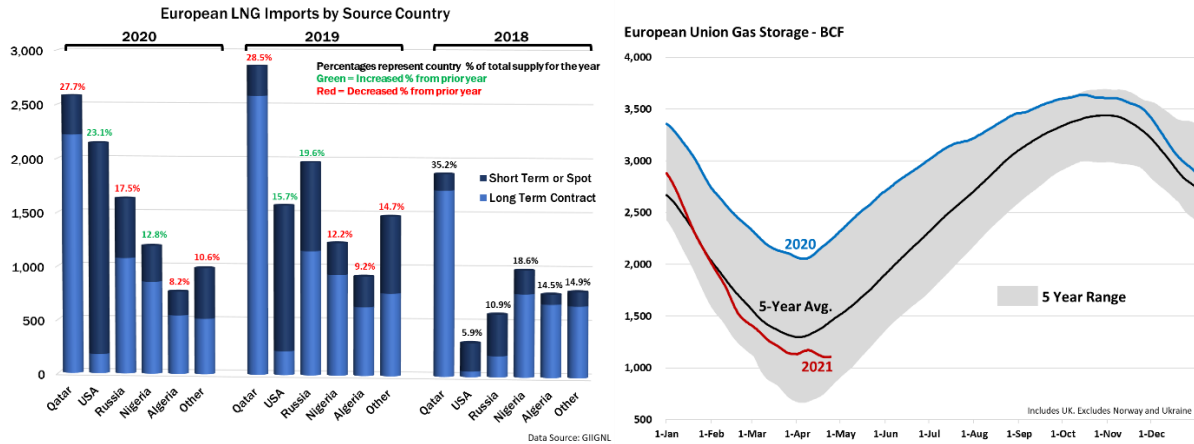


**Figure 3: Gazprom Exports to EU and Turkey**

The competition between piped gas and LNG has benefited another Russian gas company – an independent LNG producer by the name of Novatek. Novatek primarily focuses on LNG exports from [Russia](#). Currently, Novatek’s LNG capacity is 17 MTPA (2.24 Bcf/D); however, the company plans to expand capacity by another 19.8 MTPA (2.61 Bcf/D) by [2023](#). The company is also expected to increase production capabilities as it has recently obtained state license for the North-Gydanskiy gas fields in the Arctic region. In addition to expansion on the Yamal Peninsula, the company has a smaller terminal on the Baltic coast in Vysotsk, and it plans to install a new transshipment terminal in Murmansk, next to Finland. As a result of LNG, Gazprom has lost its mega-monopoly position in Russia’s gas production as well as over European imports. The disappearance of this mega-monopoly has resulted in the success of many smaller, independent LNG producers. As we enter the next major decade, the Russian company is set on a collision course with not only these smaller European exporters, but also rising US inflows into Europe. As a result, Gazprom’s piped gas will find itself increasingly in competition with other gas sources in its yearly race to supply European reserves.

#### On the pathway to competitiveness

Inter-continental trade LNG flows play an increasingly important role in price making. Recently, [Timera Energy](#) showed that supplies of uncommitted LNG from the US to Europe (as displayed in Figure 4) constituted the main driver of LNG spot prices since the end of 2018. Timera’s observation coincides with our earlier statement that in recent years LNG markets gained additional flexibility, and spare – or uncommitted - supplies have been available to European companies. As at the start of the pandemic, Asian LNG demand collapsed, uncommitted LNG inflows to Europe accelerated and finally European gas hubs fell to their record lows in April 2020. In the aftermath of the Asian demand recovery, European prices began to recover to their normal \$6-7/MMBtu ranges. Traditional gas suppliers to Europe, namely Algeria, Norway, and Russia, increased their exports to the bloc. Given that European storage is at record lows, well under the 5-year average as shown in Figure 5, it can further be expected that US LNG exports would be necessary to help Europe overcome its current supply gap.



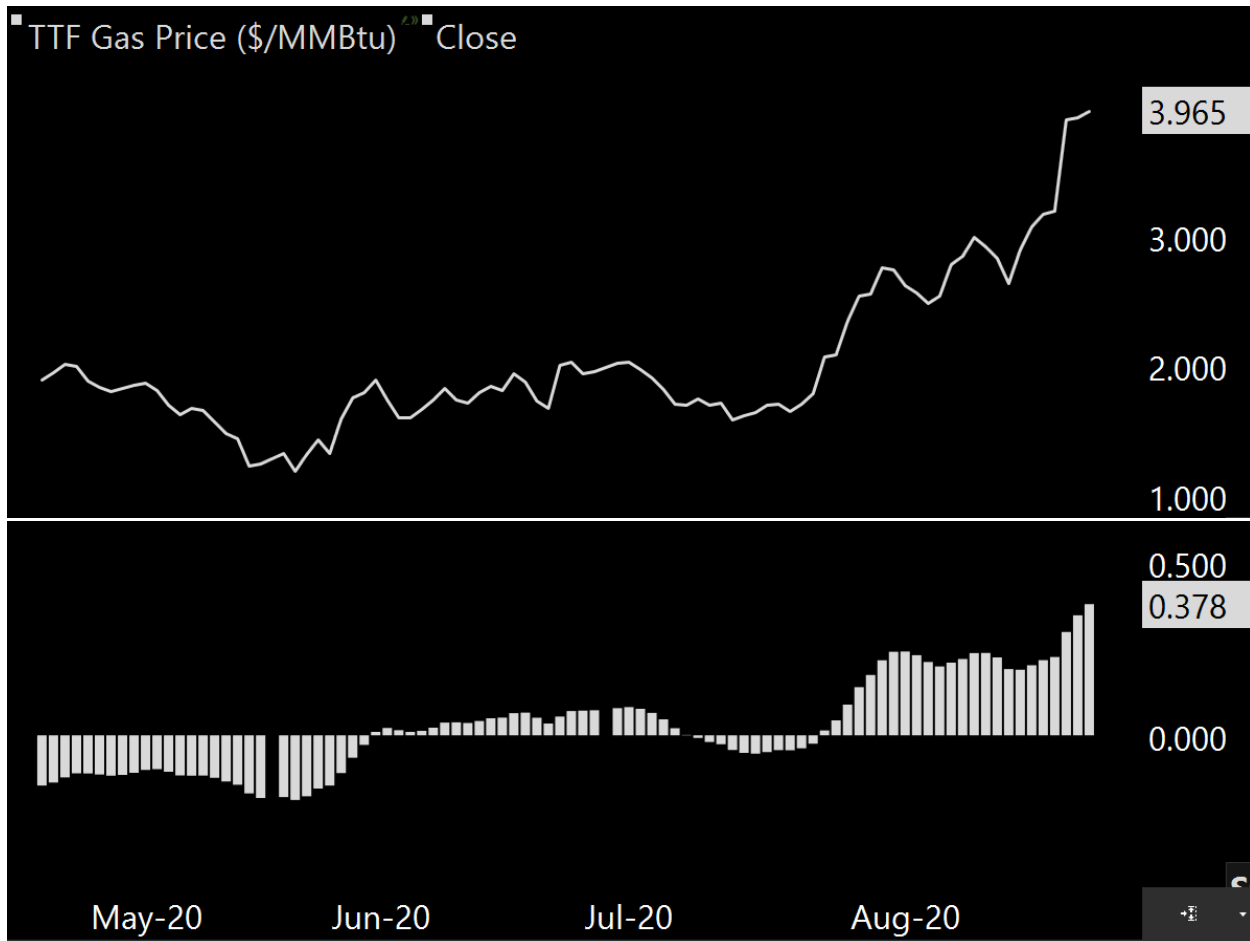
**Figure 4 and 5: European LNG Imports by Source, European Union Gas Storage**

When the pandemic commenced in Europe, gas prices decreased to as far as 1 €/MMBtu, as a result of weak demand. European markets are familiar with demand declines as the [IEA](#) reported gas demand declines in 2019-2020. This ultimately shows that gas demand in Europe declined even before the pandemic. For example, in November 2019 Arturo Gallego from Centrica (UK) told [Bloomberg](#) ‘this winter and next year are going to be complicated unless demand awakens.’

However, demand did indeed recover in spite of the pandemic. The first half of the winter of 2020/2021 was cold in Europe and cold in Asia. Moreover, even when weather moderated during the second half of the winter, prices did not drop back down to previous levels. Traders rightfully had expectations for a quick demand recovery back toward some semblance of normalcy once vaccines were administered and quarantines were lifted. The stochastic indicator in Figure 6 below shows this well. During the summer of 2020, daily TTF prices (the white line) increased impressively from early July to the end of August 2020. At the same time, stochastic momentum indicators launched up just as violently – demonstrating traders’ enthusiasm for the anticipated and continued price increases before those price increases had occurred<sup>1</sup>. If long-term high and low-price episodes are stimulated by market fundamentals, shorter term trade dynamics would then be influenced by mass, coordinated trades as well as the reactions of traders to the underlying market fundamentals. In short, gas traders (not unlike stock market traders) were active in front running the anticipated demand increases in the post pandemic world and as can sometimes happen, price leads the market fundamentals leaving the supply-demand picture to catch back up. This is the proverbial putting the cart before the horse phenomenon.

<sup>1</sup> Stochastic oscillators indicate short term trade movements driven by subjective traders' expectations and short-term information flows surrounding the markets.

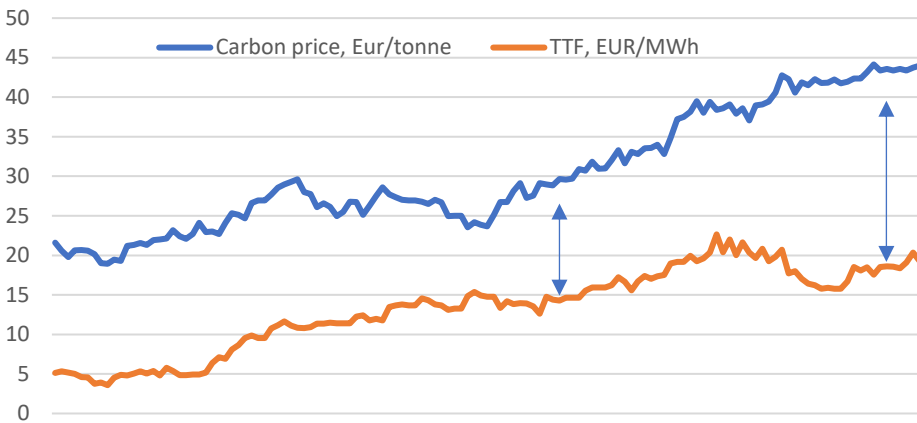




**Figure 6: TTF Price (Top) and Smooth Oscillator Indicator (Bottom) in Summer 2020**

In fact, because of rising carbon price within the European Trading Scheme (ETS), a switch from coal to gas in power sector has been stimulated and reinforced. Carbon price almost doubled from April 2020 to April 2021 and interestingly followed the dynamic observed on the gas markets over the last twelve months (shown in Figure 7). The trend positively affects the air quality in coal-dominated Poland and south-east Europe, both areas with a weak penetration of renewable energies. However, this forces the Poles to make other choices besides burning coal, their most inexpensive and reliable source of thermal energy. Thus, ETS and a transition from coal-to-gas in these areas only positively affects the EU emissions dynamics while likely negatively impacting the economic recovery in regions in transition.

## Gas and Carbon Price Dynamics



April 2020

April 2021

**Figure 7: TTF for gas prices (spot) and Ember for ETS carbon price**

Here, the future becomes hard to predict, since rising ETS favors a shift from coal, whereas rising gas price does not. If there is one thing that is certain, competitive gas markets coupled with the energy transition will stimulate penetration of natural gas in the power sector, particularly in coal dominated countries, such as Poland and South-East European states.

Following recent policy discussions in Europe, it is likely that the ETS will be expanded to include the transport sector. In this case, LNG gains a new opportunity to further replace marine fuel. It might be worth to note that LNG does not need to be re-gasified to be used in the maritime transport. The traditional market for compressed natural gas in transport has been dominated by compressed natural gas, but LNG solutions are considered better because cryogenic fuels consist of purified gas. A switch from marine oil to cryogenic fuel in maritime transport has the potential to save up to 40% of emission, making it extremely relevant to decarbonization efforts.

## Conclusions

The shale gas revolution in America allowed the United States to transform from an importer to an exporter. Furthermore, international pricing dynamics that favored low-cost American natural gas eventually fostered the development of export facilities along the Gulf Coast. As a result, a barren LNG landscape in 2016 was transformed into a far-reaching, sophisticated industry that currently exports over 11 Bcf/D of LNG abroad. Oversupply in the American gas market allowed the regional, monopolistic European gas markets of the early 2000s room to consolidate and create a unified, single European gas market. Changing contract structures as well as increasing competitiveness between gas sources like pipelines and LNG imports have freed the market and created an environment where companies like Novatek are able to compete with older, well-established companies like Gazprom. European markets have become well-diversified with the option to receive gas from many different nations and companies. Though Europe has a multitude of gas sources, it now relies heavily on short-term LNG contracts from America to adequately shore up gas supply gaps. Thanks to global interactions and the general abundance of LNG, both the European and American markets have developed into fast-paced, price-responsive, liquid markets. Their continued growth will rely heavily on LNG's ability to prove environmental reliability in light of the era of decarbonization. In the next few years, heavy emphasis on shifting away from coal will benefit both markets, as efforts like the ETS provide additional opportunities for the reach of LNG to grow and expand.

## Additional Information

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