

SECTION 4. ENERGY

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4.1 General overview of the EU gas market

The European Union started the process of bringing competition to the European natural gas market almost twenty years ago. The organization and coordination of the gas market, as well as the participation of various actors, underwent substantial changes as a result. The restructuring process is still in progress as of mid-2016. There is a prevalent belief that the market requires more development, which leads to the frequent release of new laws, guidelines, and interventions. At first, the market restructuring process's delays were blamed for the issues. The efficient operation of the EU gas market was impeded by producers, wholesale, and retail companies using their market power. In north-west Europe, supplier competition has grown the most, while other regions continue to rely on a single [110]. Simultaneously, significant shifts are evident in the global and European gas and energy markets as well as the environment in which these markets operate. In the first place, the EU has grown geographically, adding new members from central Europe that were previously Warsaw Pact members. In addition, the former Soviet republics have achieved independence and are implementing their own energy and political policies, which may or may not be impacted by internal conflicts. Second, the growing acceptance of global warming as a result of the use of fossil fuels has changed the preferences and priorities of EU member states with regard to energy supply, which has an impact on energy and environmental policy. Thirdly, the availability and transportability of gas resources locally have changed significantly due to the swift advancement of LNG technology and unconventional gas (and oil) production. The latter in particular has contributed to the economic integration of the world's three major continental gas markets—Southwest Asia, Eurasia, and America [111, 112]. Changes in these geopolitical, environmental, and technological determinants have had a significant impact on the development of "reactive" policies in the European Union, both in Brussels and among the Member States, as will be

demonstrated below. The overall goals of the energy and gas market policy are still framed in the EU's unique understanding of how to establish a "well-functioning" market in a sector that at least partially demonstrates the characteristics of a natural monopoly [113]. This begs the intriguing question of how long the current European gas policy can sustain its primary goal of using more or less continuous regulatory intervention to create a "well-functioning" gas market. First, we will go over several essential features of the gas industry below. We will then quickly review the evolution of the European gas market restructuring as it has been reflected in the EU Commission's subsequent directives and interventions. After that, we will quickly go over the structural modifications to the European gas market as well as the overall global energy landscape. We wrap up by talking about how these factors interact and what that means for gas in Europe. There are three primary segments in the natural gas industry. The exploration and production of gas occur upstream. The mid-stream section entails moving the gas to power plants, large-scale industrial users, and local distribution networks. The gas is typically moved across continents using high pressure transmission pipelines. LNG tankers are used to transport the gas overseas. Depleted gas fields and salt caverns are two places where gas can be kept. Small residential and commercial customers receive gas delivery from the local distribution networks downstream. These production, transportation, distribution, and storage systems require sophisticated and dangerous operations for their development, management, and utilization. Firstly, they necessitate substantial investments, with capital expenditure accounting for the majority of the total cost. Second, the assets involved are very specific; once they are built at a certain location, they cannot be moved or repurposed in the event that the supply or demand for gas is interrupted. These expenses have literally "sunk." Thirdly, each party is obligated to a certain extent to be dependent on the other. For producers, dealers, and end users, pipelines, LNG facilities, and storage facilities are vital infrastructure. Therefore, the circumstances surrounding access to these facilities play a crucial role in determining how well supply chains and the economy wellbeing of the parties involved.

Volume and price risk are important in this regard. Only when their assets are used at a fair rate of throughput and at revenues that cover their costs over the long run will gas producers and infrastructure operators be able to turn a profit. They require demand security. Customers demonstrate their commitment to gas use by purchasing particular gas-fired appliances and installations. They require supply security, obviously at a cost that is reasonable considering the cost of substitute energy sources. Because of these factors as well as the economies of scale related to their technical and spatial features, gas systems have typically been regarded as natural monopolies where competition was impractical. [114].

In the past, governments have stepped in and regulated the industry to protect the public interest and the sector's financial stability due to the economic theories of public goods, market imperfections, and market failure. The public interest in resource management in the gas-producing nations served as another justification for government intervention. [115]. Private companies operating in the production, transportation, and retail sectors in the United States were subject to federal and state regulations. [116, 117]. Public coordination in Europe typically took the form of direct government intervention. Municipal gas companies oversaw retail trade and local distribution networks, while joint ventures between gas producers and national and local authorities handled international gas transmission and wholesale trade.

Long-term contracts with take-or-pay and destination clauses were used to organize market coordination and commercial transactions. Oil products were the primary gas substitutes, and the price of gas was linked to them. Gas producers were paid based on the net-back principle. According to the net-back principle, after all expenses are covered, producers (as well as the governments) are supposed to receive a residual sum. Public finances and economic coordination were significant factors in this context. There were complex regulations governing tax collection, production, and exploration for gas sales. Gas prices were frequently used as a tool for sectoral and regional economic stimulation [118–121].

Starting from the late 1970s, there was increasing criticism towards forms of public intervention and market coordination, particularly originating in the Anglo-

Saxon world. The concept of 'rolling back the state' as advocated by figures like Margaret Thatcher and Ronald Reagan, alongside the promotion of competition, aimed to enhance the efficiency of providing energy, water, public transport, and other services. In 1985, the European Community adopted the Single European Market strategy, a broad plan for liberalizing the EU economy. This was followed in 1988 by the 'Internal Energy Market' initiative, which sought to restructure energy markets in a similar vein. The primary rationale behind these efforts was to remove barriers to intra-communitarian trade in goods and services, while also reflecting a neoliberal perspective on competition, efficiency, and business interests. Over time, this approach paved the way for the development of a European gas market, where competition would exist among gas producers and suppliers in the upstream segment, as well as among traders in the wholesale and retail segments. The transition from traditional long-term contracts to short-term transactions was envisioned, with market prices being determined by scarcity conditions to balance gas supply and demand. The expectation was that liquid spot markets would emerge at points where different sources of supply intersected with demand. Essential to this vision was granting competing traders access to crucial infrastructure in transportation, distribution, and storage to reach their customers. To facilitate this, three fundamental regulatory principles were adopted in Europe.

The first principle necessitated the separation, or 'unbundling,' of essential facilities from production and trading activities. This separation ensured that operators of such facilities had no commercial stake in manipulating gas flows or leveraging market insights for trading purposes. Over time, increasingly stringent legal and managerial unbundling requirements were imposed on transmission and distribution pipelines. Many networks were separated from former wholesale companies and local gas utilities, and managed as either transmission or distribution system operators (TSO or DSO). Other facilities, such as LNG, storage, and conversion, were subject to different regimes based on their position as potential monopolies in relevant markets, with potential exemptions from third-party access requirements granted on a case-by-case basis.

The second principle centered on providing 'undiscriminating access' to these essential facilities for trading parties. This involved not only access to transportation systems but also to storage, LNG, and quality conversion facilities as needed. Initially, access was arranged through relatively simple 'first come, first served' contracts, allowing traders to reserve a specific amount of capacity for a set time period at a specified tariff. However, over time, a more complex approach evolved. Access to transmission pipelines, in general, adopted an entry-exit model, where gas shippers booked entry and exit rights for specific volumes of gas at specific locations, abstracting from the actual routes taken by gas molecules. This model maximized flexibility for shippers to buy and sell to market parties at any location, with equal entry and exit tariffs for all shippers at specific locations. Distribution networks typically applied postage stamp tariffs, where a seller booked entry in a designated zone at a pre-specified tariff based on the location of their client. Access conditions for other facilities depended on whether they were exempted or not; owners or operators either had to provide access to interested users under pre-specified conditions, or they were allowed to determine their capacity usage themselves.

A crucial aspect of facilitating access, in conjunction with the tariff structure, involves allocating available capacity to interested shippers. Initially employing simple first-come, first-served rules, a complex array of mechanisms was developed to both maximize the utilization of physically limited capacity by accommodating as many shippers as possible, thus reducing contractual congestion, and to efficiently allocate scarce capacity to those shippers who value it the most. Consequently, various procedures for tendering, secondary trading of capacity, and reallocation of unused capacities were established. The overarching goal was to enable shippers to align their commodity transactions in the gas market with appropriate handling arrangements for delivery to their clients or storage facilities. This approach aimed to enhance the functioning of the gas market and facilitate the efficient allocation of gas volumes at market prices, reflecting their value to producers and consumers.

A third principle addressed the realization that the gas infrastructure inherited from the traditional gas industry still bore the imprint of its former natural monopoly

status. Key issues included excessive investment in assets, high operational costs, tariffs that did not align with economically efficient transport costs, and discriminatory practices towards different consumer types and regions. To mitigate infrastructure costs, tariff and/or revenue regulation was necessary to compel Transmission System Operators (TSOs) and Distribution System Operators (DSOs) to enhance operational efficiency and system utilization. This led to the adoption of various regulatory approaches such as price cap, yardstick, or RPI-X regulation. Each Member State was required to establish a National Regulatory Authority (NRA) for the energy sector, tasked with approving and overseeing tariffs (or methodologies) to ensure equitable access to unbundled networks.

Following initial attempts in the early 1990s, the liberal concept for a gas market was gradually implemented through several stages. The European Commission issued three consecutive Gas Directives, which provided increasingly explicit and stringent rules for Member States to implement. The 2009 Directive, known as the Third Package, was particularly significant as it aimed to harmonize disparate national approaches. This response followed a 'Sector Enquiry' conducted by the Commission's Directorate-General Competition, which identified barriers to a well-functioning gas market such as limited infrastructure access and the dominance of a few companies.

Another key outcome of the Third Package was enhanced EU-wide cooperation. In 2009, the Commission established the Agency for the Cooperation of National Energy Regulators (ACER). Prior to this, regulators had been cooperating voluntarily since March 2000 within the Council of European Energy Regulators (CEER), alongside the European Regulators Group for Electricity and Gas (ERGEG) established by the Commission. ACER was tasked with filling the regulatory void in cross-border situations and facilitating EU-wide regulatory coordination to align national market and network operation rules and promote investment in trans-European infrastructure.

Furthermore, in 2009, unbundled national Transmission System Operators (TSOs) began EU-wide cooperation through the European Network of Transmission System Operators for Gas (ENTSOG). Their collaboration aimed to boost cross-border

gas trade and develop the European transmission network, including the provision of a 10-year gas network development plan.

Enhanced EU-wide cooperation led to further progress in achieving seamless cross-border gas trade through initiatives like the gas target model (GTM). The GTM aims to establish cross-border connections between national or regional entry/exit areas, where instantaneous supply and demand determine gas prices, akin to a virtual spot market. Long-term contracted gas volumes are delivered at entry/exit area borders, shaping the market price, which may also be influenced by occasional short-term purchases of inter-area volumes.

In the early 2000s, concerns regarding the security of gas supply became prominent. In 2004, Directive 2004/67/EC was adopted with the aim of establishing a unified framework for Member States' security-of-supply policies, aligning them with the requirements of a single gas market. Disputes between Russia and Ukraine in 2006 and 2009 resulted in supply disruptions in central and southeastern Europe, prompting the adoption of Regulation 994/2010. This regulation aimed to standardize national measures and introduce common minimum standards for preparedness, fostering solidarity among states during crises.

As tensions persisted between Russia, Ukraine, and the EU, a stress test was conducted in 2014 to assess security of gas supply. Subsequently, in 2016, a draft proposal for an extensive security of supply regulation was published. This draft assigns industry and Member States, organized into specific regions, the responsibility for ensuring supply to protected customers, with the European Commission overseeing general coordination and consistency.

The draft emphasizes enhanced cooperation in regional preventive action plans and emergency plans, while also proposing an infrastructure standard to ensure gas supply even in the absence of major infrastructure. Additionally, it advocates for permanent bidirectional transmission capacity to be maintained.

In February 2015, the Commission introduced its Energy Union policy, outlining a significant overhaul of Europe's energy system. Aligned with ambitious EU climate objectives, the policy aims to ensure that EU consumers have access to secure,

sustainable, competitive, and affordable energy. The key components of this policy include:

1. Energy security, solidarity, and trust.
2. The establishment of a fully integrated European energy market.
3. Promotion of energy efficiency to moderate demand.
4. Decarbonization of the economy.
5. Emphasis on research, innovation, and competitiveness.

The EU aims to transition away from a fossil fuel-driven economy and move towards a decentralized, demand-side approach, utilizing modern technologies and business models [110–111].

Regarding the role of gas, the Energy Union policy primarily addresses energy security, solidarity, and trust. It emphasizes the necessity of diversifying energy sources, suppliers, and transport routes. Key elements of this strategy include:

1. Developing the Southern Gas Corridor to enable gas delivery from central Asian countries to Europe.
2. Establishing liquid gas hubs with multiple suppliers in various regions, including northern, central, and eastern Europe, as well as the Mediterranean area.
3. Investing in additional transport infrastructure with support from community funding instruments and European financial institutions.
4. Formulating an LNG strategy to provide backup during crisis situations, including the construction of gas storage facilities in Europe and improving the transport infrastructure connecting LNG access points.
5. Encouraging domestic energy production to reduce import dependence, with a focus on renewables for decarbonization, alongside conventional and, for Member States opting for it, unconventional oil and gas, provided that public acceptance and environmental impact issues are adequately addressed [110-114]

Developments in the Gas Market

Parallel to the enactment of successive gas directives, significant economic and political shifts have occurred in both the supply and demand dynamics of the European

gas market and the global gas market since the turn of the century. These developments have substantially altered the operating context of the European gas market.

On the supply side, indigenous gas reserves in Europe, notably in the Netherlands, the UK, Germany, France, and Italy, are gradually declining. In the Netherlands, gas production-induced earthquakes in the Groningen field have prompted the government to restrict annual production. Apart from Norway, there is minimal potential for supply expansion within the EU. The role of unconventional gas in Europe is limited due to public resistance and regulatory hurdles. Current European gas imports primarily come from Russia, Norway, Algeria, and Libya via traditional long-term contracts, although renegotiations occur to maintain competitiveness. Expanding supply capacity and bringing new reserves online require substantial investments in production and transport infrastructure, especially in remote and costly areas such as Russia and offshore Norway.

New potential gas suppliers are situated to the southeast of Europe, including Turkmenistan, Kurdistan, Iran, Azerbaijan, and the East Mediterranean region involving Cyprus, Israel, and Egypt. However, political complexities and transit issues, particularly concerning Turkey, hinder pipeline construction in the Southern corridor.

The evolving global LNG market is often seen as the 'ideal' solution to Europe's energy and gas dependency. The LNG supply potential has grown significantly, driven by traditional and new reserves, particularly following the US shale gas revolution. LNG could be imported into the EU market via re-gasification capacity along European shores.

On the demand side, the situation has also evolved. Initially, gas usage in Europe was gradually increasing in countries where it was a traditional energy source, while in other countries like Spain, it was gaining market share rapidly due to environmental, comfort, and economic advantages. However, the post-2008 economic downturn led to an overall decline in gas usage. Additionally, public perception of natural gas has weakened, influenced by policies promoting wind and solar power and concerns about its environmental impact. Gas is increasingly viewed as a 'dirty' fossil fuel, undermining its role as a bridge towards sustainability. Local resistance to shale gas

and fracking, as well as the availability of low-cost coal due to US shale gas extraction, have further affected the position of gas in the EU power sector.

The aforementioned changes have significant implications and influence the prevailing notion of what constitutes a 'well-functioning' EU gas market. There is a continuous push towards establishing a competitive gas market through sector regulation, focusing on increasingly unbundled pipeline, storage, and LNG infrastructure, as well as competition policy, addressing the dominant positions of major suppliers and traders in the industry. This suggests that investments in new supply infrastructures hinge heavily on investor and Transmission System Operator (TSO) expectations regarding their usability in light of future gas flows, as well as regulatory decision-making.

Considering the substantial demands for transport, storage, and LNG infrastructure stemming from the objectives outlined in the Energy Union plan to secure gas supply internally and connect liquid market areas, it seems unlikely that private entities will willingly make the necessary investments. On the supply side, the interest of producers and traders in supplying gas to the EU market is heavily influenced by both demand and price expectations. However, uncertainty persists regarding future gas usage due to ambitious objectives to move away from fossil fuels, the stable state of the European economy, and the current disadvantage of gas in power generation compared to zero-marginal cost renewables and low-cost coal.

Apart from traditional suppliers like Russia and Norway, there are limited alternatives for pipeline supplies due to political instability in many potential producing countries and transit issues. Indigenous supply is depleting, leaving LNG as the primary option for future supply, either through reliable long-term contracts or spot cargoes at world market prices. However, long-term contracts require demand certainty to justify investments and willingness to pay, which are challenging to fulfill in the current context. Spot contracts entail risks, as the current oversupplied gas market may lead to low prices, though this could change.

Overall, the overarching insight from this long-term perspective on the evolution of European natural gas policy is that a strongly regulated version of a 'well-

functioning' gas market remains a highly politicized and unstable experiment. The values attributed to natural gas as an energy source in the European economy are constantly shifting between economics, security of supply, and sustainability. Additionally, the significance of these values and their implementation varies across different parts of Europe. Consequently, the creation of a 'well-functioning' gas market will persist as a highly politicized and ongoing endeavor.