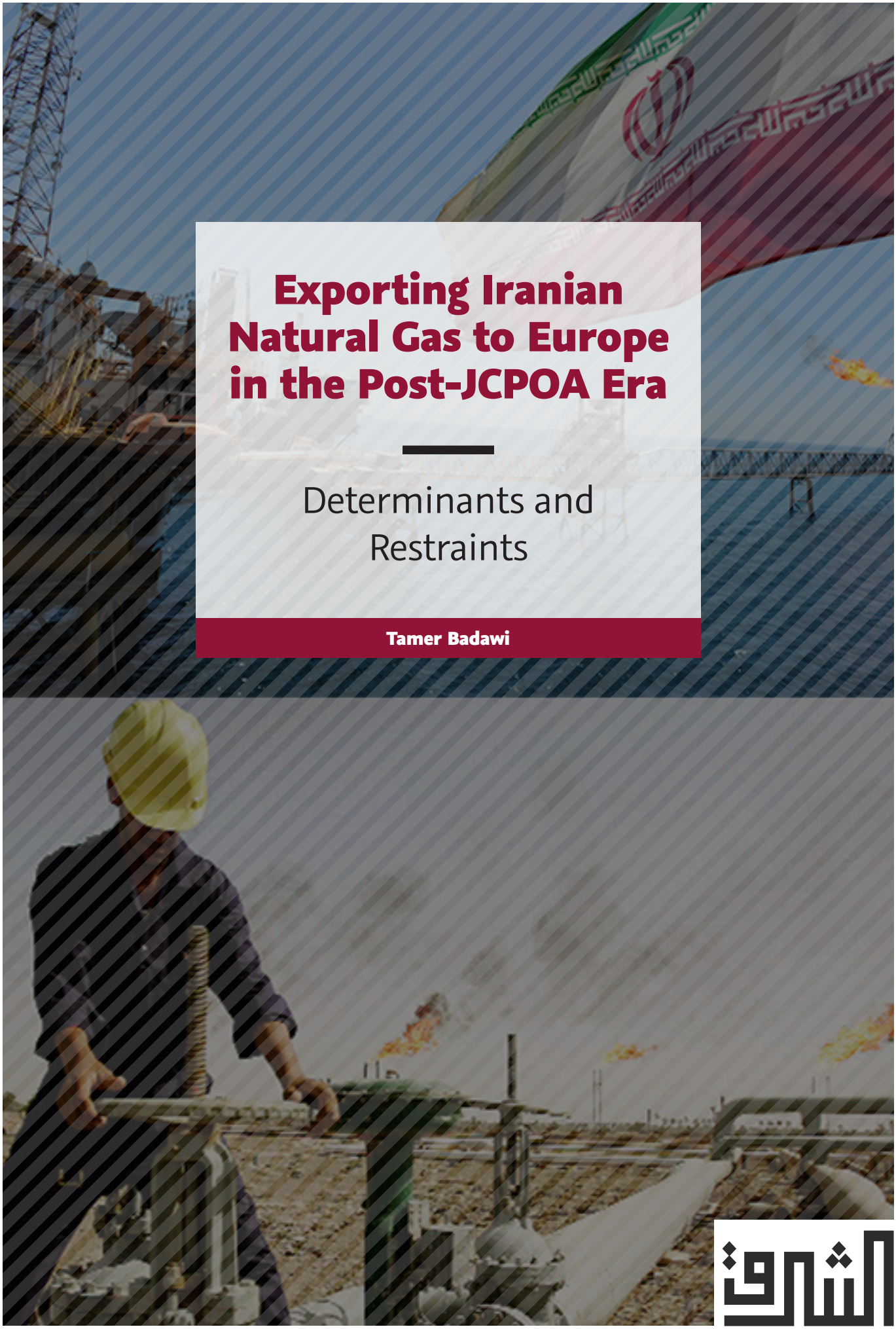

Exporting Iranian Natural Gas to Europe in the Post-JCPOA Era

Determinants and Restraints

Tamer Badawi

ALSHARQ FORUM ANALYSIS SERIES

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Abstract: Amid the European Union's increasing efforts to diversify its natural gas supplies, Iran has emerged as a potential supplier to the bloc following the conclusion of its nuclear accord. Iran has enormous natural gas reserves; more, in fact, than Russia or Qatar. These reserves remain underdeveloped due to suffocating sanctions that hindered the inflow of the necessary foreign capital and investment. While the nuclear accord and sanctions relief removes many of the obstacles that Iran has faced over the course of the last decade, Iran faces significant challenges on the road to becoming a world-class gas exporter.

Rampant consumption and inefficiency on the domestic level absorb much of the gas Iran produces. Geopolitical uncertainty on the regional and global levels are also fueling the securitization of the country's energy sector, as certain segments of the Iranian establishment see the sector as a gateway for Western economic infiltration. Geopolitical shifts on the global level may change Iran's energy calculations in terms of the development of its oil sector and the expansion of natural gas export projects. This analysis assesses the domestic, regional, and global factors that impact the prospects of exporting Iranian natural gas to the EU in the future.

Introduction

In April 2017, Iranian President Hassan Rouhani officially inaugurated 5 phases (17, 18, 19, 20, and 21) of the South Pars field, which is consisted of a total of 24 phases.[1] The Iranian President said that production at the massive gas field had doubled over the past four years. In the near future, Iran is forecasted to out-produce Qatar, which itself owns a share in the same gas field.[2] Iran has also kick-started mega-schemes to develop its oil sector, but it will still be a difficult task to turn its natural gas reserves into a game-changing factor in global energy markets.

Following the conclusion of the Joint Comprehensive Plan of Action (JCPOA) between Iran and the P5+1 countries (the UN Security Council's five permanent members plus Germany) and the implementation of sanctions-relief, Iran became seen as a potential major natural gas player in global energy markets, thanks to holding the world's largest natural gas reserves (18.2 percent of the world's natural gas reserves according to BP's 2016 statistical review).[3]

The slow inflow of foreign capital and expertise into the country's oil sector means that becoming a pivotal natural gas player might take a long time, which will have implications for major consumer regions such as Europe.

But since the removal of nuclear-related sanctions, Iran has been grappling with the relatively slow inflow of foreign investments into its oil sector, in part due to the unfavorable buyback contracts previously designed by Tehran to limit the participatory rights of international oil corporations (IOCs) in Iranian oil and gas fields. But the political uncertainties that continue to characterize Iran's ties with the US are even more discouraging for many IOCs. The financial complexities created by the *de facto* isolation of Iran's banking system even after sanctions ended can be added to the factors mentioned above.

As geopolitical tensions between the EU and Russia are on the rise, Iran is seen by policymakers in the EU as a future player that can potentially contribute to the diversification of EU's natural gas imports away from Russia.

The slow inflow of foreign capital and expertise into the country's oil sector means that becoming a pivotal natural gas player might take a long time, which will have implications for major consumer regions such as Europe. While the share of natural gas is projected to represent 23 percent of the EU's primary demand and supply in 2020, the share of gas is projected to increase to 24 percent by 2030.[4] The dependency of EU countries on external energy suppliers is projected to increase from 55.9 percent in 2015 to 56.7 percent by 2025, according to the European Commission.[5]

As geopolitical tensions between the EU and Russia are on the rise, Iran is seen by policymakers in the EU as a future player that can potentially contribute to the diversification of EU's natural gas imports away from Russia. However, the EU is keen on expanding energy ties with Iran beyond natural gas. In mid-April 2017, the EU inked an agreement with Iran on nuclear safety.[6] In the same month, the EU's energy commissioner inaugurated the first Iran-EU Business Forum on Sustainable Energy.[7] The forum aimed to bring companies from the EU to develop Iran's power sector and invest in clean energy. These developments show how Iran is seen by the EU as a potential partner able to make a strategic contribution to the bloc's energy security in the future.

While Iran is seen as a potential player in

Europe's energy market in the future, an array of factors, from the domestic to the regional and global, will determine the extent to which Iran will be able to become a proactive player on the European energy scene. The challenges of exporting Iranian natural gas mostly come from the domestic level, where limited foreign investment and expertise is added to high consumption levels. However, the challenges that Iran faces on the domestic level are attributable in part to political uncertainty on the global level.

This analysis seeks to examine the prospects for exporting Iranian natural gas to Europe following the the nuclear accord. The second section of this paper discusses the challenges that Iran faces on the domestic level. In this section, gas consumption trends and their influence on the prospects of creating gas surpluses for export is discussed. The determinants of scaling up natural gas production in relation to attracting foreign investment and expertise are also discussed in this section.

The third section of the paper addresses Iran's export schemes on the regional level in the Middle East (and the wider region) and their potential impacts on future exports to Europe. The fourth section explains the available options that Iran has for exporting its natural gas to Europe and the potential challenges it may face in each case. The fifth section addresses the internal dynamics of the European gas market and how changing competition patterns may impact Iran. The last section brings together all the previously addressed challenges and connects the dots.

Domestic Determinants for Exporting Natural Gas

Changing natural gas demand patterns on the domestic level have an enormous influence on Iran's export policy and will largely determine the future prospects for exporting natural gas to Europe. Demand patterns are largely associated with two factors: **1)** Household consumption **2)** Plans to revitalize gas-intensive industries following the end of sanctions.

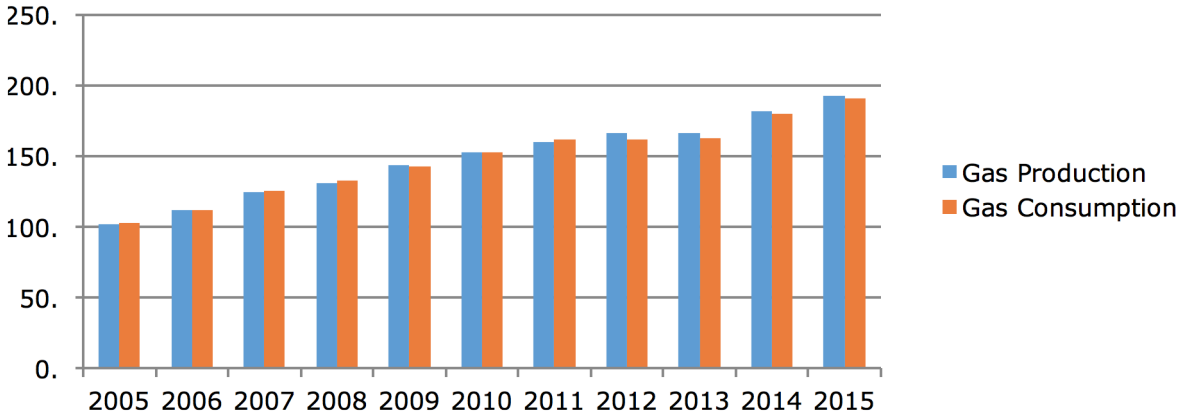
Changing natural gas demand patterns on the domestic level have an enormous influence on Iran's export policy and will largely determine the future prospects for exporting natural gas to Europe.

A) Gas Consumption Trends in Iran

In the first half of FY 2016/2017, gross domestic production in Iran grew by 7.4 percent, marking a remarkable recovery compared to the year before.[8] [9] However, growth in this period was largely driven by increased crude oil exports rather than non-oil economic activity.[10] Despite depressed consumption and weak credit, gas consumption is rampant, thanks to inefficiency in usage and the disruptive effect of energy subsidies.

Given that natural gas constitutes more than 70 percent of Iran's energy mix, with a significant amount of the extracted natural gas goes to domestic consumption, notably household consumption.[11] According to BP, from 2005 to 2015, natural gas production increased from 102.3 to 192.5 bcm per year in Iran.[12] During the same period, annual gross domestic natural gas consumption in Iran almost doubled, increasing from 102.7 to 191 billion cubic meters (see figure 1).[13] These figures reflect how domestic production is struggling to accommodate surging natural gas consumption.

Figure 1: Natural Gas Production and Consumption in Iran (Per financial year)

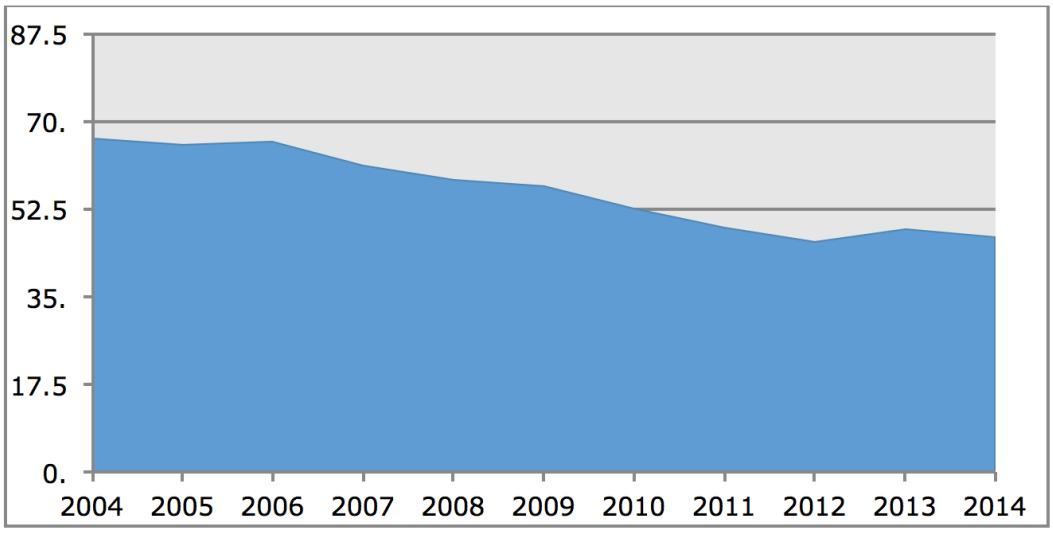


Source: BP's Statistical Review of World Energy (2016)

In mid-2016, Iran produced approximately 700 million cubic meters of gas per day. At the beginning of 2017, Hamid Reza Iraqi, the Executive Director of the National Iranian Gas Company (NIGC), stated that households consumed 530 mcm of this amount, which constituted 75 percent of daily production.[14] However, one expert sees the previous estimation of household consumption in Iran as exaggerated.[15] According to Iran's Energy Ministry's statistics, household and commercial annual consumption of natural gas in the 2014/2015 FY constituted 47 percent of total consumption. Almost a decade earlier, in the 2004/2005 FY, household and commercial consumption was 67 percent of total consumption (see figure 2).

In terms of the demographic distribution of the natural gas supply, while 97 percent of Iran's urban population has access to Iran's gas transmission system, only 67 percent of the rural population has access to the system.[16] In this context, President Hassan Rouhani connected more inhabited areas to the national grid in his first term in office. In the last financial year, more than 8900 villages (around 18 percent of villages in Iran) were connected to the national grid.[17] More inhabited areas are expected to be connected to the grid in the near future. Despite the possible exaggerations of NIGC's executive director, consumption remains high even though there are areas that are still not connected to the national grid.

Figure 2: The Share (%) of Household and Commercial Consumption of Natural Gas in Iran (Per financial year)



Source: Iran's Energy Ministry Statistics

Power generation is another large consumer of natural gas, feeding households, commercial units, and industries. Thermal plants nearly constitute 80 percent of power production in the country.[18] Currently, 90 percent of thermal plants in Iran use natural gas to produce electricity.[19] In terms of the share of gas-reliant power generators in the country, nearly 37 of power comes from combined cycle gas turbine plants and 26 percent comes from gas-fired plants.[20] The share of gas in power production is continually increasing vis-à-vis refined fossil fuels like fuel oil and diesel.[21] However, as Iran had to employ low-cost infrastructure under the sanctions regime, electricity production has been highly inefficient, leading to the drainage of immense amounts of gas.[22] To optimize electricity production, Tehran is embarking on plans to replace old turbines with newer ones.[23] But experts say this is not enough, as increasing the efficiency of the country's power grid itself remains a necessity.[24]

B) Industrial Consumption

The magnitude of household energy consumption is not the only factor affecting the expansion of natural gas exports in the near future. While the annual share of household consumption has decreased compared to the last decade, the share of industrial consumption of natural gas of total consumption has been on the rise. According to Iran's Energy Ministry's statistics, in FY 2004/2005, the share of industrial consumption of natural gas of total consumption was almost 26 percent. In FY 2014/2015, however, the sector's consumption rate increased to almost 35 percent (see figure 3). Further industrial development over the course of the last decade probably led to higher consumption of the resource.

It is anticipated that the industrial consumption of natural gas will increase in the future. The Iranian government has set plans to reinvigorate the country's non-oil industries to lessen the economy's reliance on oil revenues. Petrochemicals and steel are two vital gas-intensive industries that Iran is keen to attract foreign capital and expertise to in order to expand its non-oil sector growth. As the second largest petrochemicals producer in the Middle East, Iran is eager to increase its output to competitively challenge Saudi Arabia in global markets.

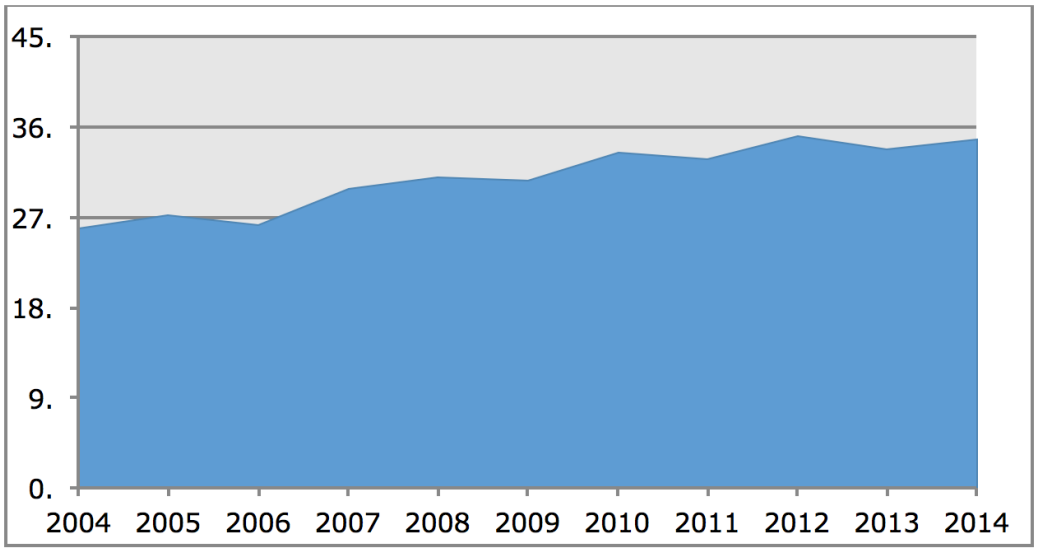
However, as Iran had to employ low-cost infrastructure under the sanctions regime, electricity production has been highly inefficient, leading to the drainage of immense amounts of gas.

In FY 2015/2016, the amount of gas supplied to the petrochemicals industry increased to 42.5 mcm from 35.6 mcm in FY 2014/2015, representing a 20 percent increase.[25] The amount of gas injections into the industry are projected to increase as well, as Iran is planning to build more production units over the course of the next five years to double the country's nominal production capacity by 2021.[26] Over the next couple of years, this expansion will require increased natural gas supplies to industry in order to produce ethylene, an important input material that is used to produce a wide range of petrochemical products. *(Figure. 3 Next Page)*

C) Natural Gas Production and Foreign Investment

Following the nuclear accord, Iranian authorities set plans to attract $200bn worth of foreign investments to the oil sector over the course of the following five years.[27] Around $40bn was to be allocated for the development of natural gas production.[28] This capital will most likely be allocated to projects in the South Pars field, which contains almost 40 percent of Iran's natural gas reserves.[29]

Figure 3: The Share (%) of Industrial Consumption of Natural Gas in Iran (Per financial year)



Source: Iran's Energy Ministry's Statistics

After the inauguration of 5 phases of the South Pars field in April 2017, Iran's total natural gas production capacity surged to 885 mcm per day from 700 mcm in mid-2016.[30] According to Iran's oil minister, Bijan Namdar Zanganeh, production from the South Pars is planned to increase to 630 mcm per day by the end of FY 2017/2018.[31] If this increase happens, Iran's total production capacity of natural gas (from the South Pars field and other fields) will increase to more than 900 mcm per day. By 2020, Iran is planning to raise its natural gas production capacity to 1.2 bcm per day.[32]

Foreign capital and expertise will largely help Iran to ramp up its natural gas production to accommodate rising domestic consumption and expand natural gas export projects. However, according to experts, surging domestic consumption is not the only challenge to increasing the country's natural gas export capacity. Iran's South Pars gas field is projected to reach a dew point by 2023, making it increasingly difficult to extract natural gas using the existing infrastructure.[33] Experts claim that Iran will need to use more powerful platforms and multiple compressors to extract gas from the field after this point.[34] As production from the South Pars may decrease even after enhancing extractive capabilities, Tehran will need to explore natural gas in other fields to compensate for the projected drop and to increase the total levels of its natural gas production.[35]

Therefore, the prospects of raising natural gas production capacity over the course of the upcoming decade depends on whether Tehran will be able to bring in enough foreign capital and expertise or not (especially from the Western hemisphere). While major world-class energy corporations such as BP have backed out from entering the Iranian market, other more risk-taking corporations have embarked on investments in the country. In January 2017, the National Iranian Oil Company announced a list of 29 oil and gas companies that were eligible to take part in upcoming oil and gas tenders.[36] Among the approved firms, 11 were Western (the list included prominent Western firms like Shell, Total, Eni, Schlumberger, and Maersk).

Foreign capital and expertise will largely help Iran to ramp up its natural gas production to accommodate rising domestic consumption and expand natural gas export projects.

Regional Gas Schemes and Power Projection

The prospects for exporting natural gas to Europe do not depend solely on Iran's domestic factors but also on Iran's plans to export gas to the Middle East, where it seeks to project its influence via several means.

Geopolitically, exporting natural gas to neighboring countries might mean greater energy dependence on Iran, potentially granting the latter political leverage over regional customers.

Tehran prioritizes exporting natural gas to neighboring customers over cross-regional schemes. For Iran, it is probably wiser in geopolitical and economic terms to prioritize customers in the Middle East over other projects in adjacent regions. Geopolitically, exporting natural gas to neighboring countries might mean greater energy dependence on Iran, potentially granting the latter political leverage over regional customers. Moreover, geopolitically, sending natural gas to neighboring countries will not lead to Iranian reliance on infrastructure owned by competitors which may give them leverage over Tehran. Economically, under the existing conditions, engaging in energy schemes with neighboring countries is likely to be more profitable in the short term compared to mega trans-regional schemes. For all these reasons, Iran will probably prioritize natural gas exports to three neighboring countries in particular:

Iraq: In 2009, Iran and Iraq inked an agreement to extend a pipeline to Iraq to export natural gas from Iran's South Pars gas field. According to the agreement, Iranian natural gas was planned to be delivered in 2013, but due to security problems the project was delayed.[37] Based on the agreement, Iran should export up to 35 mcm of natural gas to Iraq's Al-Mansoura and Al-Sadr electricity generators.[38] In the second half of 2015, both parties agreed to increase the quantity of exports to 40 mcm per day to feed a third electricity generator in the city of Basra.[39]

In April 2017, Iran's oil minister, Bijan Namdar Zanganeh, said that Iran would export 50 mcm to Iraq once the latter prepares a letter of credit to finance the purchase.[40] This amount of natural gas to be imported from Iran is expected to produce around 3,500 megawatts (constituting nearly 27 percent of Iraq's electricity production in 2016).[41] During the summer of 2016, electricity demand was around 21,000 megawatts in Iraq. According to one expert, exporting natural gas to Iraq is expected to start either in 2017 or 2018.[42]

Oman: In 2013, Iran and Oman clinched a deal to extend an undersea pipeline to supply Muscat with Iranian natural gas.[43] Based on the agreement, Iran will export 1.5 bcm per day of natural gas to Muscat via a pipeline that will cost around $1.2bn.[44] The deal, under which Iran will export natural gas for 25 years, is valued at $60bn.[45] The flowing natural gas will also go to liquefied natural gas (LNG) plants in Oman that will enable Iran to export its resource to global markets.[46] The project is expected to be accomplished within 3 or 4 years from the date construction commences.[47] However, experts expect Oman's own production of natural gas to also increase in the upcoming decade.[48] If less Iranian natural gas is needed in the future, further amounts might be re-exported via Oman's LNG facilities. Nevertheless, the share of the capacity that Iran will be able to use is yet unknown.

Turkey: While Iran currently exports its natural gas to Azerbaijan and Armenia in very small quantities, Turkey is Iran's largest importer of natural gas. Iran is Turkey's second biggest source of natural gas exports after Russia (16.2 percent of imports come from Iran). In 1996, Iran and Turkey concluded a deal to export natural gas over a period of 23

years.[49] After the construction of the Tabriz–Ankara pipeline, exports began in 2001.[50] Exports started with small amounts of about 4 bcm and were planned to be increased to 10 bcm by 2007, but natural gas exports never exceeded 6 bcm.[51] Currently, Turkey's gas imports from Iran stand at 9.6 bcm per year.[52] The current long-term contract between Turkey and Iran will expire in 2026.[53]

Turkey will probably reduce its natural gas imports from Iran; therefore, more Iranian natural gas can be transited by Turkey to Europe in the future.

Turkey's demand for natural gas is declining as the government's energy vision for 2023 aims to increase the share of locally extracted resources and renewables in power generation.[54] Demand for natural gas has been decreasing consistently since mid-2014.[55] In 2016, natural gas consumption decreased by 4 percent compared to the previous year.[56] In terms of the share of natural gas in Turkey's energy mix, it decreased from 33 percent in 2014 to 30 percent in 2015 and 26 percent in 2016.[57] If the current demand/consumption trends continue over the upcoming decade, Turkey will probably reduce its natural gas imports from Iran; therefore, more Iranian natural gas can be transited by Turkey to Europe in the future.

Iran's Options for Exporting its Gas to Europe

There are two options available for exporting Iranian natural gas to Europe. The first option is using pipelines and the second is using LNG facilities.

A) The Pipeline Option

1- A Historical Background

Iran's actual plans to become a regional energy hub for exporting natural gas to Europe date back to August 1994, when Tehran proposed a pipeline that would carry Turkmen natural gas via Northern Iran to Turkey and the European market. While the pipeline was inaugurated in 1997, the project failed to deliver the needed amounts for re-exportation.[58] Other plans proposed in the late 1990s to export Turkmen natural gas to Bulgaria and then Western Europe foundered due to political complexities as U.S. sanctions imposed on Iran became an obstacle to embarking on such a massive project.[59]

In 2008, a non-binding agreement was signed to build a pipeline connecting Iran and Europe via Turkey (known as the ITE pipeline) but the project faltered due to political and economic uncertainties.[60] In the same year in which Iran and Turkey signed the aforementioned agreement, a gas pipeline between Iran and Armenia was inaugurated. There were plans to export Iranian natural gas to Europe via the Black Sea through Armenia and Georgia. The prevailing wisdom circulating in the media and foreign policy think-tank communities was that the plan was geopolitically unviable given Russia's dominant position in Armenia's energy sector, and that it would not allow Iran to carry out such a project.

2- Existing Plans

Iran's previous schemes to turn the country into an energy hub carrying natural gas to Europe proved unrealistic due to the immense political uncertainties, as well as economic complexities. The country's existing plans to connect itself to Europe relied on pipelines projects aimed at sending Azerbaijani natural gas to Europe via Turkey—namely the Trans-Anatolian gas pipeline (TANAP) and the Trans-Adriatic Pipeline (TAP). Relying on both pipelines, Azerbaijan will export 6 bcm per year of natural gas to Turkey and another 10 bcm per year to European buyers from the Shah Deniz field.[61] TANAP will be inaugurated by 2018 and TAP will be inaugurated by the early 2020s (see figure 4).[62]

Figure 4: The Trans-Anatolian and Trans-Adriatic Twin Pipelines (TANAP-TAP)

Source: The Trans-Adriatic Pipeline's Official Website

In April 2015, TAP stakeholders said that the project was open to new stakeholders, including Iran.[63] In the following month, Iran's ambassador to Azerbaijan expressed his country's interest in joining the TANAP pipeline.[64] But despite Iran's initial interest in using the infrastructure, no practical steps were taken at that time. In July 2016, a senior figure in Iran's National Iranian Gas Export Company expressed his country's' interest in using TANAP, but he also mentioned that Tehran had not engaged in any negotiations with the pipeline's stakeholders.[65]

TAP's capacity to transit natural gas to the European continent will be 10 bcm per year, with the potential to double the pipeline's capacity to 20 bcm year in a second phase by adding more compressors.[66] While there might not be enough spare capacity for third party suppliers to send significant amounts of natural gas to European buyers in the short-term, senior TAP executives have said that the pipeline has the capacity to receive natural gas from third party suppliers via the so-called "open seasons" system.[67] On this basis, Iran might start sending relatively small quantities of natural gas to Europe via the TANAP-TAP twin by the beginning of the 2020s and increase these quantities gradually over the course of the decade based on the availability of further idle capacity and Iran's ability to pump more gas from its fields. Therefore, the prospects of sending Iranian natural gas to Europe via the twin pipelines partially depend on the two following factors:

- Iran's Compression Capabilities: The existing infrastructure carrying Iran's natural gas to Turkey has a limited capacity. In order to send significant amounts of gas to Europe, a 1,900 kilometer pipeline (IGAT-9) worth $7bn needs to be built.[68] Alongside the pipeline, Iran will need 17 compressors to pump more gas from its South Pars gas fields to its north western borders via the envisaged pipeline.[69]

- Azerbaijan's Gas Outlook: Given increased domestic consumption of natural gas over the past years and the decline of natural gas production from old fields, some reports raise doubts over Baku's ability to fully meet its future commitments to its Turkish and European customers. If unplanned shortages of supply take place, more spare capacity could be made available in the TANAP-TAP twin pipelines, pushing Azerbaijan to bring relatively large quantities of gas from Iran and other suppliers in order to sustain the economic viability of the pipeline in the medium term.

Iran's previous schemes to make the country into an energy hub carrying natural gas to Europe proved unrealistic due to the immense political uncertainties, as well as economic complexities.

B) The LNG Option

1- A Historical Background

Iran's has planned to join the proto-global LNG market since the 1970s.[70] Following the Iranian revolution, Tehran sought to move forward with its LNG plans, but its war with Iraq, coupled with existing geopolitical uncertainties, led to the suspension of these plans. But the contours of Iran's LNG projects have mostly emerged after the 2010s. Iran has begun a handful of LNG projects (Iran, Pars, Persian, Golshan, Lavan, North Pars, and Qeshm).

2- *Existing Plans*

In 2012, Iran suspended the development of six of its projects, keeping the Iran LNG project, which was at a more advanced stage than the other six projects.[71] While Iran reportedly made substantial advancements in the project, the liquefaction section, which is the most essential part, remained underdeveloped due to sanctions imposed on the country's oil sector, hindering the acquisition of the Western technology needed to progress with the project.[72] According to Reuters, the project is envisioned to produce 10.8 million-tonnes-per-annum.[73]

Following the nuclear accord and the end of the sanctions, Iran has been able to take steps towards developing its LNG projects. Moving ahead of its peers in the Iranian market, in February 2017 French company Total expressed its interest in acquiring a stake in the Iran LNG project.[74] According to Reuters, Total is planning to develop the 11th phase of the South Pars field, which could be used to feed the project.[75] The Iran LNG project will probably need between 4 to 5 years to come online.[76]

The EU's Energy Market Dynamics

The changing security perceptions of energy threats and the developing dynamics of the EU's energy market have shaped the prospects of exporting Iranian natural gas to bloc members and partners. Understanding the internal energy dynamics of the EU will shed light on the challenges that Iran will face and shape its infrastructural choices.

A) Patterns of Demand and Energy Security in Europe

Historically, natural gas has played an important role in diversifying the energy supply of European countries away from crude oil. As the cleanest fossil fuel, EU's member states' willingness to decrease carbon dioxide emissions was a key driver in increasing the share of natural gas in the bloc's energy mix. According to the International Energy Agency (IEA), the share of gas consumption in total energy consumption increased from 9.8 percent in 1973 to 16 percent in 1990 and 25 percent in 2009.[77] Between 1995 and 2005, the usage of gas in the EU increased by 50 percent.[78] In the power sector's energy mix, the share of natural gas expanded from around 7 percent in 1990 to 16 percent in 2000 and more than 20 percent in 2005.[79]

European consumption of the resource grew rigorously up until the mid-2000s.[80] Natural gas consumption growth began to slow in the second half of the decade for several reasons, of which the global financial crisis and the subsequent recession was an important one. The global economic crisis had a prolongedly negative impact on gas demand in Europe, where 2013's demand levels were 10 percent lower than the pre-2008 financial crisis demand level.[81] Apparently, the mounting economic pressures triggered by the crisis accelerated innovation in the energy sector of the EU and directed more capital towards developing low-cost and clean sources of energy.

In the pre-2014 period, oil-indexed natural gas prices were high in line with crude oil, pushing capital towards renewable energy production and cheaper energy sources.[82] The usage of renewables in the energy mix of

the power sector (the main driver of energy consumption in Europe) increased in OECD Europe, pushing back the share of gas in the sector's energy mix from 23 percent in 2010 to 17 percent in 2015.[83]

Albeit geopolitically complicated, bringing in diverse gas supplies to the EU has been a prioritized target since the 2000s (e.g. from the Caspian region and later from the East Mediterranean region) to ensure that no single market player is exerting geopolitical leverage over the bloc's member states.

Despite the deceleration of natural gas demand growth, Europe's energy (and more specifically natural gas) dependency on external suppliers is increasing due to sliding domestic gas production within the EU and partner countries such as Norway. This critical problem keeps the EU continuously striving for new solutions that would increase the bloc's energy security (of supply) vis-à-vis suppliers that are perceived as traditionally manipulative like Russia.

Albeit geopolitically complicated, bringing in diverse gas supplies to the EU has been a prioritized target since the 2000s (e.g. from the Caspian region and later from the East Mediterranean region) to ensure that no single market player is exerting geopolitical leverage over the bloc's member states. The Southern Corridor initiative was launched in 2008 by the European Commission to bring natural gas supplies from the Middle East and the Caspian region (mainly from Azerbaijan).

However, the expansion of LNG production and trade, coupled with the unconventional gas revolution in North America, gradually re-configured European gas trade away from the traditional pipeline trade. While not necessarily more economic, the increased LNG supply in global markets started to provide the EU more back-up, although limited, against Russian actions (even if its imports from the latter continued to grow). To be able to absorb more LNG supplies, the EU is keen on increasing the number of re-gasification terminals. But most importantly, increasing interconnections is a key strategy for carrying out energy integration between the member countries of the EU.

B) Institutional Developments in the EU's Energy Market

Increased threats to the security of energy supply, diversification towards new supply sources, increased environmental concerns, and the need to further liberalize and integrate sub-regional energy markets led the EU towards developing its market institutions in order to handle these complex developments. The maturation of the EU's institutional development will formulate the patterns of market competition that Iran is expected to face if it chooses to send its natural gas in substantial quantities to member states in the future.

1- The Institutional Foundations of Europe's Energy Market Integration

As the EU passed the Single European Act in 1987 to prepare for the establishment of a single European market, the initial contours of an integrated gas market began to emerge.[84] A number of directives were designed to establish a gas market as part of an envisioned integrated energy market. In 1991, the EU adopted the Gas Transit Directive.[85] In 1998 and later in 2003, it adopted the First and then the Second Gas Directive.[86] A directive aiming at safeguarding the security of energy supply was adopted in 2004 and another directive on gas regulation was adopted in 2005.[87]

The EU's efforts aimed at establishing a fully liberalized and integrated gas and electricity market culminated in 2009, when the so-called Third Energy Package was adopted and put into action. The full implementation

of the package was envisioned for 2014. The package aims to guarantee the security of gas supply and electricity through the de-monopolization of the market by breaking vertical ownership structures and unbundling the ownership of transmission infrastructures.[88] An important driver for designing the package were the systematic attempts of Russian publicly-owned company Gazprom to monopolize some segments of the European market (in Central and South Eastern countries) through acquisitions. The results of the introduced package became quickly visible in terms of the EU's energy ties with Russia. The Russian South Stream gas pipeline project was cancelled by the EU in 2014 as a result of its non-compliance with the package's regulations.

2- The Politics of Gas Pricing

With Europe's gas market moving towards further integration and liberalization, pricing mechanisms in the EU have also been changing. Historically, the dominating pricing model that Russia, the region's largest supplier, sought to maintain was oil-indexation (in which the price of crude oil determines the level of the natural gas price). In times of skyrocketing crude oil prices in global markets, Russia's customers (especially in the East) had to pay high prices for the natural gas they were importing (with discounts being made by Moscow as part of political arrangements).

Institutional changes in the EU have put pressure on the dominant pricing model. In 2005, oil-indexed gas contracts constituted 80 percent of gas sold while only 15 percent of gas was sold according to market prices in trade hubs.[89] By 2013, oil-indexed transaction dropped to 40 percent of traded natural gas in the region and hub prices dominated 50 percent of the gas trade.[90] The institutional developments mentioned above have had an impact on pushing for more market-based prices, but the share of oil-indexed contracts remains relatively significant.

While hub-priced gas has been more attractive than Russian oil-indexed prices at times of high crude oil prices, the slump of crude oil prices that commenced in 2014 gave impetus to Russian natural gas in Europe. In 2016, Russia's gas supplies to Europe (and Turkey) increased by 12.5 percent, raising its share in the European gas market to 34 percent.[91] This development took place thanks to the competitive prices offered by Moscow and the improved macroeconomic performance of European economies. According to observers, the anti-trust investigation of Gazprom launched by the EU in 2012 (later settled) contributed to the price flexibility showed by the company.[92] Nevertheless, geopolitical schemes underlie Moscow's price cuts as well.[93]

With Russia keen on maintaining its market share and even increasing it in Europe, new conventional gas suppliers from outside the EU like Iran will face fierce competition from Moscow.

With Russia keen on maintaining its market share and even increasing it in Europe, new conventional gas suppliers from outside the EU like Iran will face fierce competition from Moscow. If the global LNG supply glut continues, increased LNG supplies to the EU in the short-to medium-term will probably further enhance hub pricing vis-à-vis oil-indexation and increase competition in the bloc's regional market.

Conclusion

Political uncertainty in the EU generated by Euroscepticism has a direct impact on the bloc's energy security, as discords damage energy solidarity between member states. After Brexit comes to fruition, the EU is anticipated to become slightly more energy dependent on external energy suppliers.[94] Thus, amid emerging political uncertainty

within the bloc, the issues of diversification of supplies and partnering with potential suppliers is gaining more prominence in Brussels.

The EU's attempts to cooperate with Iran to increase the efficiency of its energy sector support the bloc's long-term energy security strategies.

The EU's attempts to cooperate with Iran to increase the efficiency of its energy sector support the bloc's long-term energy security strategies. The introduction of more efficient infrastructure to the Iranian energy sector and the incorporation of more renewables in the country's energy mix will create natural gas surpluses that can be exported to the EU in the future. The rampant growth of natural gas consumption in Iran was recently seen as jeopardizing for the country's export projects and even the country's energy security if not managed effectively. In 2014, a senior Iranian energy official stated that Iran is on course to become the world's largest importer of natural gas by 2025.[95]

The future of Iran's population growth is a crucial factor that will affect consumption trends in the medium to-long-term. Iran's population growth is gradually slowing and might continue to slow if the Iranian government is unsuccessful at reversing the current demographic trends in the country.[96] Continued decline in population growth probably means less domestic consumption of gas in the future and more surpluses for exports. In the short-term, increased technological innovation will play a considerable role in improving efficient consumption of gas in Iran; therefore, generating surpluses of natural gas for export.

Iran has succeeded in attracting a handful of reputable IOCs to develop its oil sector but the pace of bringing in capital is relatively slow and the prospect of carrying on in the same vein reckons on the future of ties between Iran and the US. Powerful conservative constituencies within the Iranian establishment continue to securitize foreign investment in strategic sectors as a potential threat to national security. In the beginning of April 2017, it was reported that the so-called Iran Petroleum Contract was being reviewed by the country's Supreme Security Council to replace the old buyback contracts.[97] While these new oil contracts aim to expand the participatory rights of IOCs, the highly politicized and securitized approaches of influential conservative constituencies could harm the sustainability of foreign investment in the medium-to long-term.

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Foreign expertise and investment is needed to overcome internal challenges within the oil sector that affect the outlook of natural gas consumption and export in the country. Iran ranks as the third country globally in flaring significant amounts of associated petroleum gases (APGs) in the extractive processes.[98] These amounts could be converted into petroleum products, used in electricity production, and injected into oil fields as part of the Enhanced Oil Recovery processes.[99] Therefore, the prospects of increasing enough natural gas quantities to turn Iran into a major exporter may rely on part on the efficient exploitation of APGs.

The efficient usage of natural gas and APGs in power generation could help Iran also export excess electricity to Europe. With the appropriate infrastructure, Iran can

transform itself into a regional electricity hub connecting Central Asia, the Caucasus, and the Gulf region to Europe, according to one expert.[100] But two factors may hinder expanding electricity exports. Firstly, there is a price disparity between electricity exports and natural gas exports in the favour of the second due to the current state of infrastructural inefficiency (but exporting electricity at a relatively low price is geopolitically significant for Iran).[101] Secondly, exporting natural gas has more uses than just electricity production, making it more valuable. Consequently, exporting natural gas will be prioritized over electricity.

While Iran has the capacity to emerge as a key natural gas exporter in global markets thanks to its rich resources, the persistent securitization of the country's energy sector harms the prospects of consistent policymaking in the medium-to long-term unless political reform is undertaken.

If Iran is successful at creating gas surpluses for exports to the EU, it will face fierce competition from other gas newcomers (not to mention well-positioned market players like Russia). Israel is envisioned to become a key gas supplier to the EU, with undersea pipelines planned to connect its gas facilities in the Eastern Mediterranean to Southern Europe. Moreover, Egypt is forecast to become self-sufficient of natural gas in the near future (by the end of 2018).[102] After the recent exploration of gigantic offshore natural gas fields, there will be no need to import gas from Tel Aviv in the near future, therefore, larger quantities of gas could be exported to the EU by Israel in the future. However, geopolitical uncertainty in the East Mediterranean region in light of the Syrian conflict may cast its shadow over the security of gas supply from the region in the future, even after the cessation of hostilities.

LNG offers the EU an opportunity to lessen its reliance on natural gas imported through pipelines, but global LNG supply cannot cover the bloc's entire demand for natural gas. Due to the nature of competition for LNG in global markets, the availability of LNG cargoes for Europe relies on the outlook of LNG demand in Asia.[103] According to experts, high Asian demand scenario for LNG in the upcoming decade would mean less available LNG for European customers. A low demand scenario in Asia may mean increased availability of LNG supplies for Europe. On these bases, diversifying natural gas imports via pipelines from producers like Iran will remain strategic as potential shifts in global LNG markets (combined with potential geopolitical risks in producing and consuming regions) could impact future LNG supplies to the EU's member countries.

While Iran has the capacity to emerge as a key natural gas exporter in global markets thanks to its rich resources, the persistent securitization of the country's energy sector harms the prospects of consistent policymaking in the medium- to long term unless political reform is undertaken. In the Middle East, Iran has been entangling itself in political alliances with Russia, a major stakeholder in global gas markets. While the prospects of prolonged strategic cooperation between Tehran and Moscow in the Middle East are unclear yet, Tehran's future energy plans in the EU could feel the impact. These factors may cast doubts on Iran's ability to prove itself as a reliable and consistent gas supplier to the EU in the long-term.

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Exporting Iranian Natural Gas to Europe in the Post-JCPOA Era: Determinants and Restraints

Amid the European Union's increasing efforts to diversify its natural gas supplies, Iran has emerged as a potential supplier to the bloc following the conclusion of its nuclear accord. Iran has enormous natural gas reserves; more, in fact, than Russia or Qatar. These reserves remain underdeveloped due to suffocating sanctions that hindered the inflow of the necessary foreign capital and investment. While the nuclear accord and sanctions relief removes many of the obstacles that Iran has faced over the course of the last decade, Iran faces significant challenges on the road to becoming a world-class gas exporter.

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