

# Ghana - An analysis of the natural gas market and the role of LNG

17 September 2021



# Executive summary



- ▲ Ghana's gas market has seen significant evolution since 2000, with new upstream developments and the construction of a pipeline allowing imports from Nigeria. The Ghanaian gas market remains in a state of flux, as a new LNG terminal is being commissioned and significant gas demand increases are expected over the coming years. As such, Ghana makes for a particularly interesting case study of the role of gas in the energy development pathway of an emerging economy.
- ▲ This report summarises the findings of an independent review of the Ghanaian gas market.
- ▲ Baringa's analysis has utilised information in the public domain, with some limited stakeholder engagement with local market participants to validate findings.

## Key findings

- ✔ Gas is expected to play a central role in the Ghanaian energy mix in the 2020s and beyond, as gas demand will increase significantly to support the country's GDP growth, industrialization and electrification. The availability of stable gas supplies is a prerequisite to the unlocking of the benefits of growth for Ghana.
- ✔ With indigenous production too low to meet demand increases without additional volumes being delivered in the medium- to long-term, and against the backdrop of unreliable supply from the WAGP pipeline, the Tema LNG project will become an increasingly important part of meeting Ghana's growing energy needs. The associated supply contract will enable the delivery of a stable and secure gas supply, which will likely be within the merit order of gas supply sources in Ghana, assuming the LNG is competitively priced.
- ✔ Increased availability and diversity of gas supplies is also expected to deliver a range of wider benefits to the country, contributing to Ghana's energy transition away from oil products and potentially positioning Ghana as a regional energy hub.
- ✔ For these reasons, it will be essential to create a policy framework strengthening gas demand and ensuring a fair treatment of imports alongside indigenous sources, including through the adoption of policies and contractual positions ensuring high levels of utilisation of the LNG terminal and limiting fiscal and regulatory charges which may cause adverse price effects on Ghanaian consumers.

# Ghana market background

Ghana is a significant regional energy producer. While a number of challenges remain in the energy sector, the Government has taken measures to promote renewables and address debt issues

## Key players

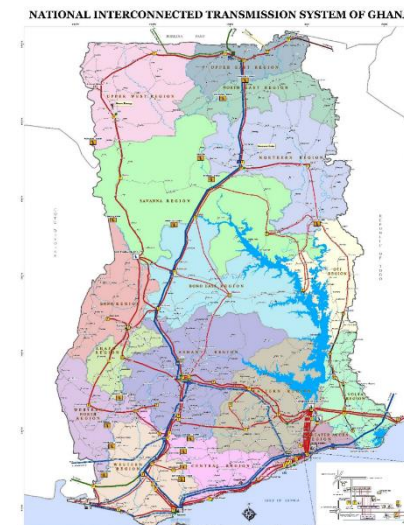
- ▲ Key players in the Ghana energy sectors include:
  - **public actors** – Ministry of Energy, Energy Commission and Public Utility Regulatory commission (PURC).
  - **large players in the oil and gas sector** – Ghana National Petroleum/Gas Company (GPNC and GNGC respectively), West African Gas Pipeline Co (WAPCo, the operator of the WAGP pipeline), Tema (LNG terminal company), and producers and suppliers (Tullow Oil, ENI, Shell)
  - **large electricity players** – Volta River Authority (VRA), GRIDCo (the transmission system operator) and three distribution companies.

## Country strengths

- ▲ Good interconnection with neighbouring countries in electricity and gas
- ▲ High household electricity connection rate
- ▲ Developed wholesale electricity market
- ▲ Large indigenous oil and gas resources, combined with significant import capabilities

## Country challenges

- ▲ Legacy debts in the electricity and gas sector (VRA and ECG in particular)
- ▲ Over-procurement of generation capacity in the electricity sector
- ▲ High transmission and distribution losses
- ▲ Historic unreliability of WAGP gas imports and domestic supplies



Source: Ghana GridCo

## Energy policy context

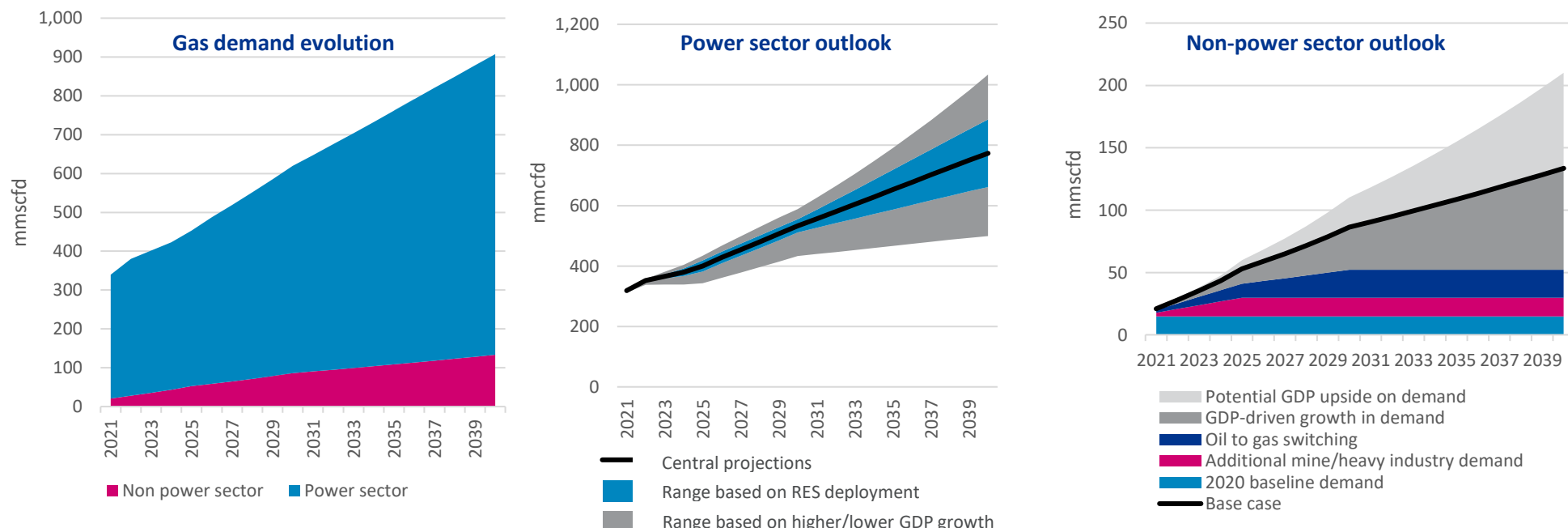
- ▲ **Key policy frameworks: Ghana Strategic National Energy Plan 2006-2020** was introduced to ensure that growing energy demand was met and that the risks of overreliance on imports and biomass, and inefficient energy pricing systems were addressed. Ghana has been successful at balancing the policy to attract foreign investment (in particular upstream and in electricity generation) and being present through national companies along the energy value chain. The government is also targeting universal access to electricity for the population by 2030, which, together with significant forecasted GDP growth, is expected to result in significant electricity demand growth going forward.
- ▲ **Renewable energy policy:** The **Ghana Renewable Energy Master Plan (REMP)** sets a target to 1,363 MW in 2030, a significant increase from 79 MW in 2019. In 2020, a **feed-in-tariff** was introduced to provide revenue support to new projects.
- ▲ **Energy Sector Recovery Program (ESRP):** This program, introduced in 2019 and supported by the World Bank, aims at solving the non-payment of administration's electricity bills; instituting a least-cost electricity procurement strategy; addressing Take-of-Pay (ToP) generation payments; addressing gas oversupply; reducing the gas tariff to the power sector; and increasing electricity tariffs. Since then, several measures have been adopted in this direction and ESRP may, if successful, increase investment in the sector in the medium term.

# Gas demand evolution

Significant gas demand increases are projected over the period 2020-2040 in Ghana, driven primarily by increased demand from the power sector

## Overview – gas demand

- ▲ Gas demand is expected to increase from ~300 mmcf to 900 mmcf over the horizon of this study, driven by **power demand**, which will grow in association with GDP. This is because additional gas-fired generation capacity will need to come online to meet Ghana’s growing electricity needs, even with significant deployment of renewable generation sources.
- ▲ **Non-power demand** may also increase but remains low in proportion of total demand. Such increases are driven by additional embedded generation, switching from oil products, and some GDP-driven demand growth. A number of large projects are currently in planning but still associated with significant uncertainty at this stage and therefore not accounted for in these projections.
- ▲ Opportunities for **exports** to Benin and Togo remain uncertain. However, recent developments indicate growing opportunities for exports to Burkina Faso, as evidenced by the contract signed between Genser and the Bombore mine to use LNG to power 15MW of generation. Our understanding is that further Burkinabe gold mines are considering LNG to power their operations, which could provide significant upside on our projections of non-power gas demand.

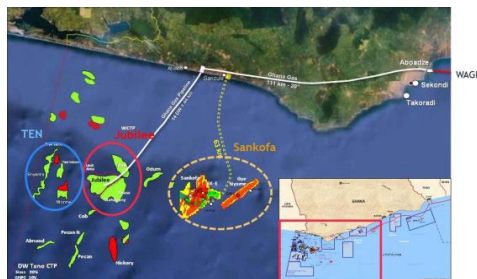


# Gas supply evolution

Indigenous production will continue to play a key role in the supply of gas going forward, and imports – in particular LNG – are also expected to ramp up to meet increasing demand

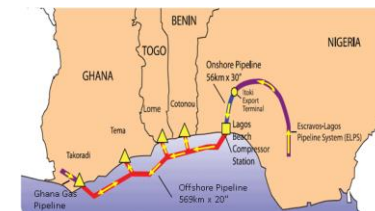
## Indigenous supply overview

- ▲ The **Jubilee** field (Tullow Oil) together with **TEN** (Tullow Oil) and **Sankofa** (Eni), account together for the vast majority of Ghana's upstream activity. Natural gas production commenced at the Jubilee field in 2014, TEN in 2016 and Sankofa in mid-2018.
- ▲ Since Sankofa became operational, **production at Jubilee and TEN has been curtailed/reinjected/flared** to a greater extent than before, due to a ToP agreement between GNPC and Sankofa.
- ▲ Initially, demand at Takoradi was lower than potential production, but **reverse flow** between Takoradi (West Ghana) and Tema (East Ghana) was completed in July 2020, enabling indigenous production to find new offtake sources.
- ▲ It is anticipated that domestic sources will continue to produce significant volumes going forward, at **~250-300 mmcf**d, with Sankofa delivering its ToP volumes and Jubilee and TEN continuing to deliver at relatively high volumes. However, because a share of production by Jubilee and TEN is associated gas, a reduction in oil prices may result in changes to the profile of gas production into the future. Additionally, GNPC's strategy to balance different gas supply sources may lead to variations in Sankofa's production profile. These profile changes may result in some swapping of volumes over time between different sources, but would directionally be as that illustrated by our analysis.
- ▲ A new processing plant may enable increased indigenous production. Similarly, new volumes may be developed from a range of prospects. However, both are currently uncertain and unlikely to be delivered until **the mid- to late-2020s**.



## Gas imports

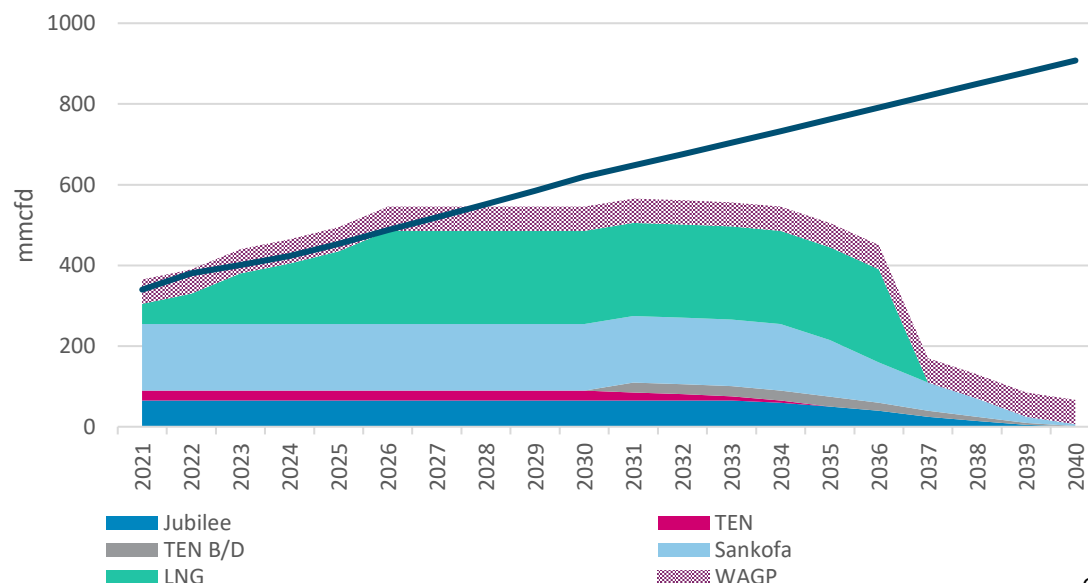
- ▲ **WAGP: The West African Gas Pipeline Project** consists of 678 km gas pipeline from **Nigeria to Benin, Togo and Ghana (Takoradi & TEMA)**. First natural gas supply arrived in Ghana in Dec 2008.
- ▲ WAGP is supposed to supply Ghana with **123 mmcf**d of gas under the contractual obligations. However, gas flows to Ghana from Nigeria have been unreliable and never reached the fully contracted volume: across all years of operation, they have ranged between 11 and 84 mmcf. Key reasons for the historically unstable WAGP supply included growing domestic demand in Nigeria, non-payment of gas by Ghana and vandalism in Nigeria. Going forward, gas available from the pipeline may reach ~60 mmcf, but subject to significant uncertainty and commercial pressures to sell in Nigeria, as local demand is seeing a significant growth and may draw on Nigerian gas supplies.
- ▲ **LNG: The Tema LNG project**, owned by a consortium between Helios, AAMI and Lyndhurst and supplied by Shell, is expecting LNG deliveries to begin in 2021.
  - The Torman floating regasification unit (FRU) arrived in early January.
  - An interim floating storage unit (FSU), the Vasant 1, also arrived and is currently being hooked up to the facility.
- ▲ Gas volumes are contracted under a 17-year ToP Gas Supply Agreement between GNPC and Shell, increasing from 50 mmcf in 2021 to long term volumes of up to 230 mmcf. Deliveries are expected to begin soon.



# Balance of gas supply and demand

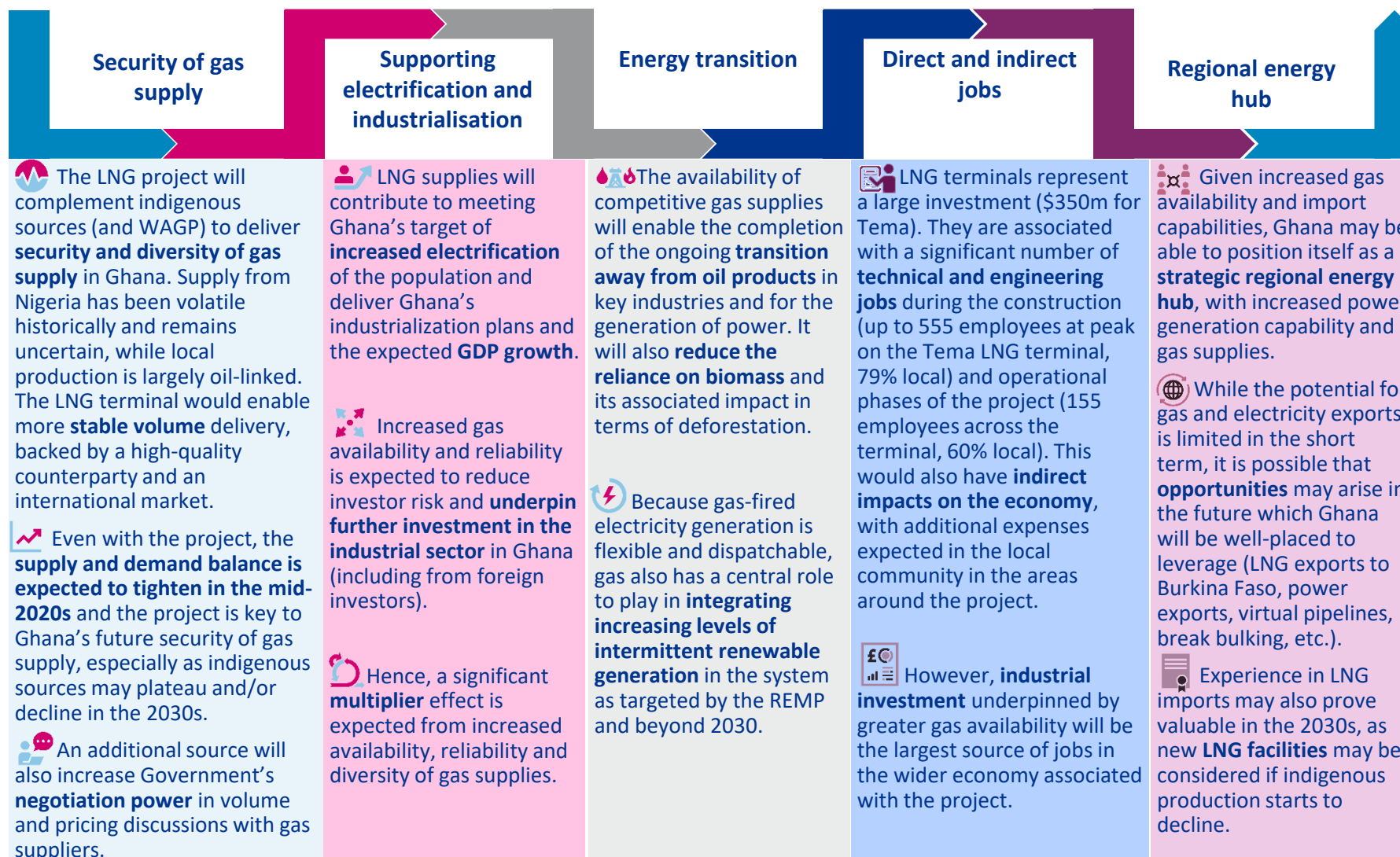
Ghana is likely to need both indigenous supply and gas imports to meet a growing gas demand

- ▲ The role of gas in Ghana’s energy mix has increased steadily recently and **demand for gas is expected to grow significantly in the 2020s**, with material increases, especially in the power sector. **Ensuring continued security of gas supply** is a prerequisite to enable increased energy market stability, reduced risk and greater levels of investment into the country, and **will be key to unlock the benefits of growth for Ghana**.
- ▲ **Indigenous resources** are expected to continue playing a central role in meeting gas demand in Ghana. With the addition of the reverse flow capability on WAGP, excess Sankofa volumes will also be used to serve the East of the Country (Tema). However, **indigenous gas supply may be too low** to cover the planned increases in gas demand without new volumes being delivered and additional imports. Furthermore, the end of the ‘free’ volumes from Jubilee is expected to result in an increase in the price of local supply in the coming years.
- ▲ Supply through **WAGP** has historically been very variable and unreliable. While there has been improvements in reliability, increasing amounts of Nigerian gas may be sold locally (rather than exported) due to high local demand and high transportation fee to Ghana. Additionally, the ToP agreement between Ghana and WAGP may have become non-binding given the lack of consistent deliveries in the initial years of operation. For these reasons, **WAGP is expected to be the source of gas supply which may be curtailed** in case of excess supply in the short term.
- ▲ The **Tema LNG terminal** will be a key gas supply source to meet increasing demand, in the East of Ghana in particular. In its initial years of operation, the ramp up profile matches expected increases in demand until the terminal reaches its sustained level of operation. The **ToP agreement** with the facility guarantees increased gas availability, providing **security of supply and the stability** needed to enable the industrialisation of the country. Additionally, LNG pricing is expected to be competitive, as Shell is able to access a global market and multiple supply sources.



# Wider benefits of LNG

Through increased security of supply, LNG will support Ghana's industrialisation and energy transition, positioning the country as a key regional energy player and generating positive impacts on the economy



# Implications

To unlock Ghana's potential, a policy framework will need to be introduced which recognises the contribution of gas to the country's energy development and provides a favourable environment for all supply sources

- ▲ Gas has a central role to play in Ghana's energy mix going forward. Given increasing levels of demand from the power and industrial sectors, the **Tema LNG project will complement indigenous gas supplies and act as a cornerstone of Ghana's industrial development.**
- ▲ The availability of reliable gas supplies into the country, likely priced based on a global competitive market, will facilitate greater levels of **investment and job creation** in Ghana's economy and allow Ghana to position itself as a strategic regional player in the energy sector. It will also facilitate the **energy transition** from oil to gas and renewable energy integration.
- ▲ To ensure the delivery of this potential, it will be essential to create a **policy framework** which recognises the positive externalities associated with increased use of gas in Ghana and ensures a fair treatment of LNG imports, including through ensuring **high levels of utilisation** of the terminal.



**On the demand side**, such policy framework would recognise and deliver the advantages of natural gas, in particular its contributions to system security, decarbonisation and renewables integration. A number of projects fuelled by gas are also under consideration which could have a significant positive impact on the economy – to materialise, such projects will need clear political support and focus over the coming years.



**On the supply side**, policies and regulatory frameworks would need to be adopted which ensure a fair treatment of LNG imports alongside indigenous sources, maximising the utilisation of the terminal infrastructure to ensure adequate levels of supply, while limiting fiscal and regulatory charges which would adversely impact price for Ghanaian consumers and any future exports in the region.





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