

# FUTURE-PROOFING NATIONAL GAS GRIDS

in the Gulf Cooperation Council (GCC)



## Introduction

Natural gas, although a transitional fuel, can reduce carbon emissions by 30-50% compared to other fossil fuels such as oil and coal. With certain measures, natural gas infrastructure can also accommodate hydrogen, further decarbonising it. With declining gas consumption in the power sector due to nuclear, renewable, and efficient desalination (reverse osmosis), as well as the development of untapped natural gas reserves, natural gas shall be abundantly available for decarbonising hard-to-abate industrial and transport applications across the GCC region.

Together with enhancements to the gas transmission infrastructure, natural gas is poised to contribute significantly towards the region's energy accessibility, affordability, and sustainability.

## Ongoing Regional Efforts

The regional governments are cognisant of the potential of natural gas and are already taking consolidated actions. For instance, ADNOC's ongoing Estidama project aims to develop a comprehensive natural gas piping network to reduce congestion and ensure the supply of ADNOC gas across the UAE. Across the border, Aramco has awarded contracts worth more than \$25 billion to implement its strategic gas expansion strategy, targeting a growth in gas production of more than 60% by 2030, compared to 2021 levels. Similarly, OQ, the exclusive operator of Oman's natural gas transmission network, inaugurated the Saib Project, a new 208 km gas pipeline to further increase natural gas accessibility to the Dhofar region.

The enhancement of national gas networks is creating momentum for cross-border pipelines or a trans-GCC gas grid. A regional gas grid would reduce costs associated with LNG liquefaction and regasification, displace oil consumption, reduce carbon emissions, and enhance gas trading, improving price setting across the region. These high-pressure gas grids are essentially network industries with significant capital costs and create value through mutually beneficial, shared access to such assets.

## Challenges in Gas Grid Regulation

In the GCC region, such pipelines are owned and operated by different entities, primarily for specific supply sources and end-users. In the absence of regulation of natural gas transmission infrastructure, the utilisation of the assets cannot be maximised or optimised. Third-party access to gas infrastructure is not specifically regulated, and access to pipeline capacity is a complicated ad-hoc process. For international pipelines, full and free access to all en-route domestic markets, as per World Trade Organisation rules, is not always granted.

Different pipelines often operate under different design, maintenance, and operational regimes, resulting in flow complications and availability issues. Transmission charges could be substantial due to multiple transit fees. Most importantly, wholesale gas pricing is a challenge, given that most prices are politically regulated, leading to potential subsidy leakages. Since gas is the marginal power generation technology, gas prices (and inherent subsidies) limit regional power exchanges and the optimal utilisation of the regional power interconnectors.

## Recommendations for future-proofing

Penspen has addressed all aspects of natural gas pipeline infrastructure, including but not limited to planning, designing, deployment, maintenance, operation, safety, and regulation. In our view, at the national level, an independent, centralised gas transmission system operator is ideal for gas dispatching, negotiation and management of interconnection agreements, highlighting marketable capacities, conducting periodic operational and planning studies, applying a common maintenance regime, ensuring asset integrity, optimising the use of storage and line packing for grid flexibility, dispute resolution, advising the government on tariffs, and ensuring compliance with uniform safety regulations.

Such national operators could be created by leasing all gas transmission infrastructure to the national operator under a revenue-sharing arrangement. Overall, this would save costs, maximise capacity utilisation while giving precedence to existing bilateral contracts, and improve the system's reliability and safety.

## Examples from Europe

As an exemplar, the National Control Centre in the UK executes gas trades, balances the overall system, issues marginal notices and demand-side response contracts, ensures a certain level of operating gas reserve, and handles emergencies. The same role is performed by GRTgaz in France and the Snam dispatch centre in Italy.

If centralising gas operations is not possible, common regulatory guidelines could be applied for all natural gas system owners and operators. For instance, following the liberalisation of the UK gas network in 2005, a Uniform Network Code was created to be followed by all relevant parties. The code develops common rules for access to the gas transmission system on a non-discriminatory basis, guarantees system security and safety, ensures pricing reflects the real costs of services, and establishes a robust dispatching system.

## Hydrogen Readiness of Gas Networks

The next frontier for gas networks is their operational readiness for hydrogen and their safety under various blends of hydrogen and natural gas. For instance, Penspen assessed the hydrogen readiness of the existing Portuguese natural gas transmission system based on industrial best practices, safety criteria, and hydrogen-related standards. Further opportunities are on the horizon, with the European Hydrogen Backbone aiming to accelerate Europe's decarbonisation journey by enabling existing and new pipelines to support a competitive, liquid, pan-European renewable and low-carbon hydrogen market.

In conclusion, future-proofing the gas grid involves maximising its utilisation, reliability, availability, affordability, and sustainability, in the mutual interest of all stakeholders.

## About Penspen

Penspen is a global team of engineers who design, maintain, and optimise energy infrastructure to improve access to energy for communities worldwide. We help meet the world's evolving energy needs by providing consulting, project, and engineering solutions across the entire energy asset lifecycle.

For over 70 years, our teams have delivered more than 15,000 projects to in excess of 100 countries. By helping countries access lower carbon fuels and by extending the useful life of existing energy infrastructure, we help to bring cleaner energy to millions of people in thousands of communities across the Middle East, Africa, Asia, Europe, the UK, and the US.

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