

# The Logical Mechanism and Realization Path of Digital Economy to Promote High Quality Development of Natural Gas Industry

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**Abstract:** With the rapid development of the digital economy, the speed of industrial digitization has been boosted, digital industrialization has been deeply promoted, and new growth poles to promote the high-quality development of the natural gas industry have gradually been formed. However, there are still some realistic dilemmas for digital economy to empower the high-quality development of natural gas industry. Therefore, the logical mechanism of industrial digitization, digital industrialization, data valorization and collaborative innovation should be used to explore the path of digital economy-enabled high-quality development of natural gas industry.

**Keywords:** Digital Economy, Natural Gas Industry, High-quality Development

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## 1. Introduction

Natural gas has low-carbon, green and clean, high-quality and efficient, flexible and easy to store, safe and reliable and other low-carbon characteristics, with a strong foundation for development and great potential for development. China's existing energy structure is still dominated by coal and oil, which together account for more than 74% of primary energy consumption. Although natural gas is a fossil energy source, its carbon emission is about 45% less than that of coal under the same calorific value, and the development scale of non-fossil energy sources is still insufficient to meet the huge domestic energy demand due to the limitation of peaking capacity, application scope and other factors, and it is difficult to realize the goal of carbon neutrality by relying on non-fossil energy sources in the short and medium term. Natural gas power generation has the advantages of stable resource supply and mature technology. Therefore, promoting the high-quality development of the natural gas industry is a realistic choice for guaranteeing energy security and energy structure transformation in the near future, and will play a bridging and supporting role in energy transformation.

## 2. logical mechanism

### 2.1 The digital economy promotes green production of natural gas.

The digital economy helps to “control the increment” of carbon emissions compared with the traditional industrial model. It takes data as its core element, which is characterized by non-consumption, non-scarcity, sharing and non-exclusivity. In the natural gas sector, the advantages of a grid-based transportation pipeline network with wide coverage and flexible response can improve the efficiency of energy supply, significantly reduce production costs and minimize environmental damage. According to the Global Digital Sustainability Initiative, digital technology can help China reduce carbon dioxide emissions by 1.4 billion tons per year. In other words, the digital economy prompts the vertical upstream and downstream systems of various industries to synergize and increase efficiency, and transitions the traditional linear value chain to a circular value chain, making the entire industrial chain more connected, more intelligently responsive, and more efficient as a whole, thus significantly reducing material and energy consumption. The digital economy improves the efficiency of natural gas production and management by means of joint digitization and intelligent technologies.

### 2.2 Digital economy optimizes the matching of natural gas supply and demand

The use of data elements, digital technology, digital labor and digital capital can improve the efficiency of enterprise production; the processing of massive data, such as transaction records, helps enterprises make precise plans for what, how much and how to produce. Digital infrastructure such as communication pipe networks, wireless base stations and other hardware facilities, 5G networks, fiber optic communi-

cations, new generation of information technology and other software facilities require large investments; cross-border e-commerce, banking Internet cross-border payments, etc. shorten the geographic distance, reduce the costs and thresholds of international trade, and facilitate trade between upstream and downstream of the natural gas; the digital economy can be realized through the networked synergies between enterprises, consumers and between enterprises and consumers through networked collaboration, strengthening the feedback between the supply side and the demand side, and optimizing the structure and degree of matching between supply and demand.

### **2.3 The digital economy improves the natural gas trading market**

Data is a new factor of production that can innovatively drive higher-quality economic growth by empowering the digital economy with strong vitality through, among other things, accelerating information interaction. In terms of creating benefits, the development of the digital economy represented by the Internet, cloud computing, big data and other emerging technologies can inspire enterprises to use digital smart equipment more efficiently in the natural gas production process, providing an optimized path for matching market information. From the viewpoint of cost reduction, the wide application of digital economy can effectively promote the rapid development of digital logistics and transportation, effectively reduce the cost of various production and service sectors, improve the efficiency of economic operation, and promote the development of natural gas industry with higher quality. From the perspective of spillover benefits, with the continuous proliferation of the digital economy and the in-depth penetration of all aspects of the natural gas industry, the huge spillover dividends brought about by the development of the industry can directly promote employment, boost consumption and enhance the quality of economic development.

## **3. Recommendations for countermeasures**

### **3.1 Improve the policy mechanism and promote the healthy development of the industry**

Government departments should be committed to playing the role of guiding and promoting the policy mechanism, establishing and optimizing land use, sea use, safety and environmental protection policies that are compatible with domestic natural gas exploration and development, and continuing the financial subsidies and tax incentives for unconventional natural gas. Include the peaking cost in the system cost, improve the peaking gas price reflecting the peaking cost as soon as possible, and promote the construction and layout of gas storage and gas peaking power station through the two-way force of policy and market. Strengthen the incentives for “gas instead of oil” in the transportation sector and “coal to gas” in the industrial and gas sectors. Adjusting the natural gas price formation mechanism, encouraging industrial parks and direct gas supply policies for large users, and significantly reducing the price of gas used in the industrial and power generation sectors.

### **3.2 Establish a big data center and build a modern energy system**

Build an Internet of Things platform to realize the data connectivity of the whole industry chain. Through the sensor collection of pipe pressure, pipeline network scheduling and other online inspection data, real-time perception of the operating status of the urban natural gas system, the use of visualization and integration of natural gas management, facilities, through the Internet of Things platform for the lower end of the equipment aggregation, control, and joint various types of business application systems based on the platform, to achieve the design, planning and construction of the complex pipeline network, and efficient coordination of the operating personnel, machines, equipment, tools, materials and infrastructure to achieve more effective coordination management and control. It is a prerequisite to build a platform for the integration of IoT technology and IoT, and to promote the digital revolution in the natural gas industry, such as intelligent refining, intelligent pipeline, and intelligent sales.

### **3.3 Multi-party synergistic governance and strengthening of smart regulatory capacity**

Improve and strengthen the coordinated regulation of the natural gas industry, establish an efficient and transparent energy regulatory mechanism with upward and downward linkage and horizontal synergy, strengthen the function of regional regulatory coordination, enhance the integration and coordination of the geographical regulatory work, and form a working pattern of same-direction force and collaboration and interaction; further pressurize the main responsibility of natural gas production and energy-using enterprises in the area of cleaner and

more efficient use of energy, and strengthen the consumption of energy and coal consumption, emission management, implement binding assessment on energy saving and consumption reduction, and build a closed-loop supervision mechanism for the whole process; regularly announce the monitoring situation, expose illegal energy-using units and behaviors, increase the punishment for illegal behaviors, and implement a punitive compensation system for those who violate the laws and regulations on intentionally polluting the environment and destroying the ecology, which causes serious consequences, and strictly investigate the criminal responsibility, so as to build up the authority of the natural gas supervision. authority.

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