

## 5. India's Gas Supply Challenges - Economy

The ongoing conflict in West Asia and disruptions at the Strait of Hormuz have exposed India's heavy reliance on imported gas. With shortages hitting major cities, understanding the differences between LPG, LNG, PNG, and CNG is crucial. The Strait of Hormuz, through which more than 20% of global energy supplies pass, has become a critical chokepoint. The Centre invoked the Essential Commodities Act, 1955 to reallocate gas supplies. Priority has been given to households and hospitals to ensure uninterrupted supply.

### 1. Introduction

1. Clean gaseous fuels such as LPG, CNG, PNG, and LNG play a critical role in India's energy transition towards a low-carbon and sustainable economy.
2. These fuels help reduce dependence on solid fuels, improve air quality, and enhance energy efficiency across sectors.
3. Their expanding use reflects India's strategy to balance energy security, environmental sustainability, and economic growth.

### 2. Liquefied Petroleum Gas (LPG)

#### Nature and Composition

1. LPG is a mixture of hydrocarbons, mainly propane and butane, derived from crude oil refining and natural gas processing.
2. It is stored in liquid form under moderate pressure, making it portable and easy to transport.

#### Usage and Importance

1. LPG is primarily used as a domestic cooking fuel in households across India.
2. It is considered a clean and efficient alternative to traditional biomass fuels such as firewood and cow dung.
3. The Pradhan Mantri Ujjwala Yojana significantly expanded LPG access among low-income households, improving health and reducing indoor air pollution.

#### Energy Security Aspect

1. India produces LPG domestically but relies heavily on imports to meet growing demand.
2. This dependence makes LPG supply sensitive to global price fluctuations.

### 3. Compressed Natural Gas (CNG)

#### Nature and Storage

1. CNG consists mainly of methane and is stored in compressed gaseous form at high pressure of around 200–250 kg/cm<sup>2</sup>.
2. Unlike LPG, it does not liquefy under normal conditions.

#### Usage in Transport Sector

1. CNG is widely used as an automotive fuel, particularly in public transport systems such as buses, taxis, and auto-rickshaws.
2. It is promoted as a cleaner alternative to petrol and diesel.

#### Environmental Benefits

1. CNG produces lower carbon dioxide emissions and negligible particulate matter compared to conventional fuels.
2. It plays a crucial role in reducing urban air pollution and greenhouse gas emissions.

## 4.Piped Natural Gas (PNG)

### **Nature and Distribution**

1. PNG consists mainly of methane and is supplied directly to consumers through a network of pipelines.
2. It is delivered continuously without the need for storage in cylinders.

### **Usage Across Sectors**

1. PNG is used in households for cooking, in commercial establishments such as hotels and restaurants, and in industries.
2. It ensures convenience, safety, and uninterrupted fuel supply.

### **Environmental and Efficiency Advantages**

1. Methane has the lowest carbon-to-hydrogen ratio among fossil fuels, resulting in cleaner combustion.
2. PNG reduces emissions and improves energy efficiency compared to traditional fuels.

## 5.Liquefied Natural Gas (LNG)

### **Nature and Processing**

1. LNG is natural gas cooled to approximately minus 160 degrees Celsius to convert it into liquid form for efficient storage and transport.
2. Liquefaction reduces the volume of gas significantly, enabling long-distance transportation.

### **Import and Supply Chain**

1. India imports a substantial portion of its LNG requirements, with Qatar being a major supplier, along with countries like the United States, Australia, and Russia.
2. LNG is transported via specialized cryogenic tankers and stored in insulated terminals.

### **Usage in the Economy**

1. After regasification, LNG is used in power generation, fertilizer production, industrial processes, and city gas distribution.
2. It supports multiple sectors and contributes to the diversification of energy sources.

### **Energy Security Concerns**

1. Limited LNG storage capacity in India makes it vulnerable to supply disruptions and global price volatility.
2. Expanding storage and regasification infrastructure is essential for energy resilience.

## 6.Comparative Perspective and Significance

### **Form and Storage Differences**

1. LPG and LNG are stored in liquid form, while CNG and PNG are used in gaseous form.
2. LPG is stored in cylinders, CNG in high-pressure tanks, PNG through pipelines, and LNG in cryogenic tanks.

### **Sectoral Applications**

1. LPG is primarily used in households.
2. CNG is mainly used in transportation.
3. PNG is used across households, commercial, and industrial sectors.
4. LNG supports large-scale industrial and energy applications.

### **Role in Clean Energy Transition**

1. All these fuels emit fewer pollutants compared to coal and traditional biomass.

2. They support India's commitment to reducing emissions and improving air quality.
3. Natural gas-based fuels act as a transition fuel toward a low-carbon economy.

### Conclusion

1. LPG, CNG, PNG, and LNG collectively form the backbone of India's clean fuel strategy.
2. Their expanding adoption enhances energy access, reduces environmental impact, and supports economic growth.
3. Strengthening infrastructure, reducing import dependence, and promoting efficient usage are essential for achieving long-term energy security and sustainability.

Source- <https://www.dnaindia.com/analysis/report-us-iran-war-liquified-petroleum-gas-lpg-png-lng-rng-cng-3203672>

