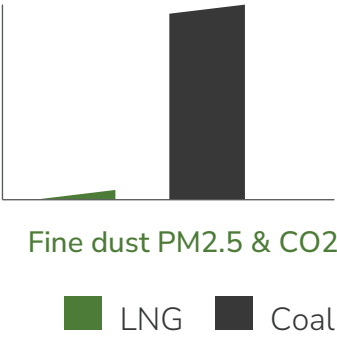


# LNG vs Coal

**Environmental and Health Impact:** Coal is a major contributor to fine particulate matter (PM2.5) and CO2 emissions – two key factors that can lead to environmental inspections and even temporary suspension of expansion under the Environmental Protection Law 2020. LNG is a safe and modern alternative that helps companies achieve green targets without negatively impacting public health.



Criteria	LNG	Coal
Emissions and fine dust	Nearly no fine particulate emissions	High emissions, requires gas and dust treatment
Performance and operation	High automation, easy SCADA integration	Low efficiency, labor-intensive
Scalability	No need for environmental system upgrades	Difficult to scale due to EIA and ESG constraints

**Typical example:** Steel/Metal Company – 400,000 MMBTU per year

- **Fuel Cost:** Reduced from ~2,200 to ~1,580 billion VND over 5 years.
- **Labor Costs:** High automation with LNG, saving 3 workers per shift (~180 million VND/ year).
- **Maintenance Costs:** No wear on combustion systems, saving ~250 million VND/ 5 years
- **Emission & Environmental Costs:** No need for bag filters or cyclone smokestacks, saving ~2 billion VND in initial investment.
- It allows the factory to qualify for expansion without the need for investment in emission treatment systems, as LNG produces no SOx, NOx, or fine particulate emissions. This also facilitates obtaining green building certifications (LEED, LOTUS), enhancing the company's reputation and competitiveness when exporting to environmentally demanding markets such as Australia, New Zealand, and the Middle East.

# Comparison of Common Industrial Fuels

Why Use MMBTU (Million British Thermal Units) to Measure Thermal Efficiency in Production?

**01 Standardized by Energy Output – Independent of Volume or Weight**

- Units like liters, kilograms, or cubic meters measure physical quantity, but they do not accurately reflect the amount of heat produced.
- Each fuel type has a different calorific value (energy content):  
1 kg of LNG produces more energy than 1 kg of LPG  
1 m³ of CNG yields less energy than 1 m³ of LNG

=> *MMBTU accurately measures the actual energy output (heat) – a critical factor in industrial applications such as heating, drying, melting, or powering turbines.*

**02 Enables Cross-Fuel Comparison**

- MMBTU is a universal standard that allows cost comparison across different fuel types:

LNG: VND/MMBTU	Example:
DO (Diesel Oil): VND/MMBTU	1 liter of DO ≈ 36,500 BTU
LPG: VND/MMBTU	1 kg of LNG ≈ 53,000 BTU
Than: VND/MMBTU	1 m³ of CNG ≈ 35,300 BTU

=> *This helps both businesses and suppliers easily evaluate energy efficiency and cost across fuel options.*

If measured in liters or cubic meters, businesses cannot accurately assess the real cost of producing the same amount of heat. MMBTU eliminates discrepancies in efficiency and calorific value.

**In summary: Using MMBTU allows businesses to manage, calculate, and compare energy in a fair, efficient, and transparent way-especially when choosing between multiple fuel options for production.**

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# COMPARISON of Industrial Fuels

A DETAILED COMPARISON BETWEEN LNG & TRADITIONAL FUELS



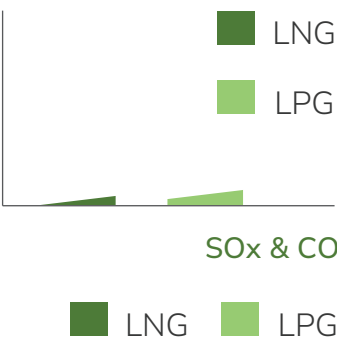
*\*This table not only highlights economic efficiency but also reflects the environmental impact and the effects on the quality of life for workers and surrounding communities. With its clean-burning properties and absence of fine dust and toxic emissions, LNG significantly improves working conditions inside factories and reduces environmental compliance pressure from local authorities.*



# LNG vs LPG

Environmental and Health Impact:

LPG still emits small amounts of SOx and CO, which can affect workers' respiratory health in poorly ventilated environments. In contrast, LNG produces near-zero emissions, contributing to a cleaner working environment and reducing the long-term risk of occupational illnesses.



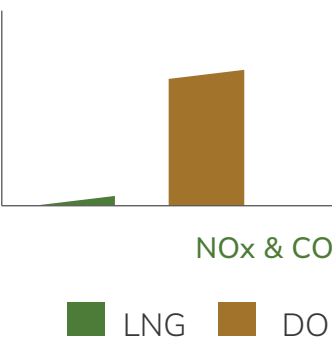
Criteria	LNG	LPG
Stable pricing	Stability (with a preferential import tax of 2%) Therefore, LNG prices are consistently lower than or equal to LPG.	High volatility, 5% import tax
Thermal efficiency	High efficiency, minimal loss, 99.5% clean combustion thanks to impurity removal at the source	Moderate performance, lower efficiency, 85% combustion due to remaining impurities in the gas, leaving residue
ESG & Corporate Branding	Easily meets ISO 14001 standards and international ESG criteria	Difficult to gain an advantage in exports

Typical example: Steel/Metal Company – 400,000 MMBTU per year

- **Fuel Costs:** Reduced from ~3,340 billion VND to ~2,600 billion VND over 5 years.
- **Labor Costs:** Simplified operations compared to LPG, saving ~200 million VND annually with fewer operators.
- **Maintenance Costs:** LNG eliminates soot, saving ~100 million VND annually on heat exchanger maintenance.
- **Emission & Environmental Costs:** No SOx removal investment, saving ~1.5–2 billion VND over 5 years.
- Transitioning to LNG allowed faster ISO 14001 certification and inclusion in green-certified supply chains, a key factor for contracts with major EU and North American corporations.

# LNG vs DO (Diesel)

Environmental and Health Impact: DO emits significant amounts of NOx, CO, and soot, contributing to air pollution in the workshop and potentially causing respiratory diseases for workers. LNG, being a clean fuel, leaves no residue and produces no soot, helping to extend equipment lifespan and improve working conditions.



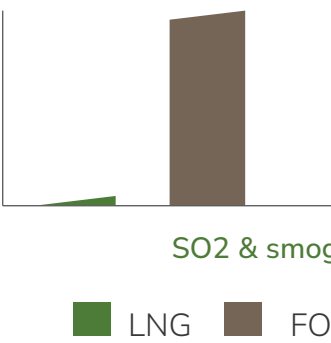
Criteria	LNG	DO
Price volatility	Low, with limited reliance on the global market	High, dependent on global oil prices
Maintenance costs	Low due to minimal soot buildup on equipment	High, requiring regular system maintenance
Environmental compliance	Easily compliant with EIA, prioritized in permitting	Risk of denial in plant expansion

Typical example: Packaging Company – 300,000 MMBTU per year

- **Fuel Costs:** Reduced from ~3,300 to ~2,600 billion VND over 5 years.
- **Labor Costs:** LNG operates semi-automatically, reducing labor dependency and saving ~180 million VND annually.
- **Maintenance Costs:** Less soot buildup, extending boiler life, saving ~150 million VND annually.
- **Emission & Environmental Costs:** No need for NOx or SOx treatment systems, saving ~1.2 billion VND over 5 years.
- At international trade shows, the company can leverage the "carbon-free production" advantage as a competitive factor, while receiving marketing support from national branding programs.

# LNG vs FO (Fuel Oil)

Environmental and Health Impact: FO has a high sulfur content, and its combustion generates SO2 and smoke, significantly affecting air quality at the plant and surrounding residential areas. Using LNG not only makes the plant cleaner but also helps avoid pressure from the local community and provincial authorities during regular environmental inspections.



Criteria	LNG	FO
Emission treatment	No need for SOx and NOx systems	Requires investment in expensive treatment systems
Safety risk	Low, with good control	High, flammable, and pollutive
Product upgrade	Improves quality and stabilizes the process	Difficult to control, impacts quality

Typical example: Glass Company – 500,000 MMBTU per year

- **Fuel Costs:** Reduced from ~VND 5,500 billion to ~VND 4,200 billion over 5 years.
- **Labor Costs:** LNG eliminates preheating, saving 3-4 technical workers per shift (~250 million VND/ year).
- **Maintenance Costs:** No soot buildup, extending cleaning cycles by 30-50%, saving ~300 million VND/ year.
- **Emission & Environmental Costs:** No need for electrostatic dust filters
- saving ~5 billion VND in initial investment.
- Cleaner gas, higher product clarity, suitable for meeting Japan/ EU OEM standards.

