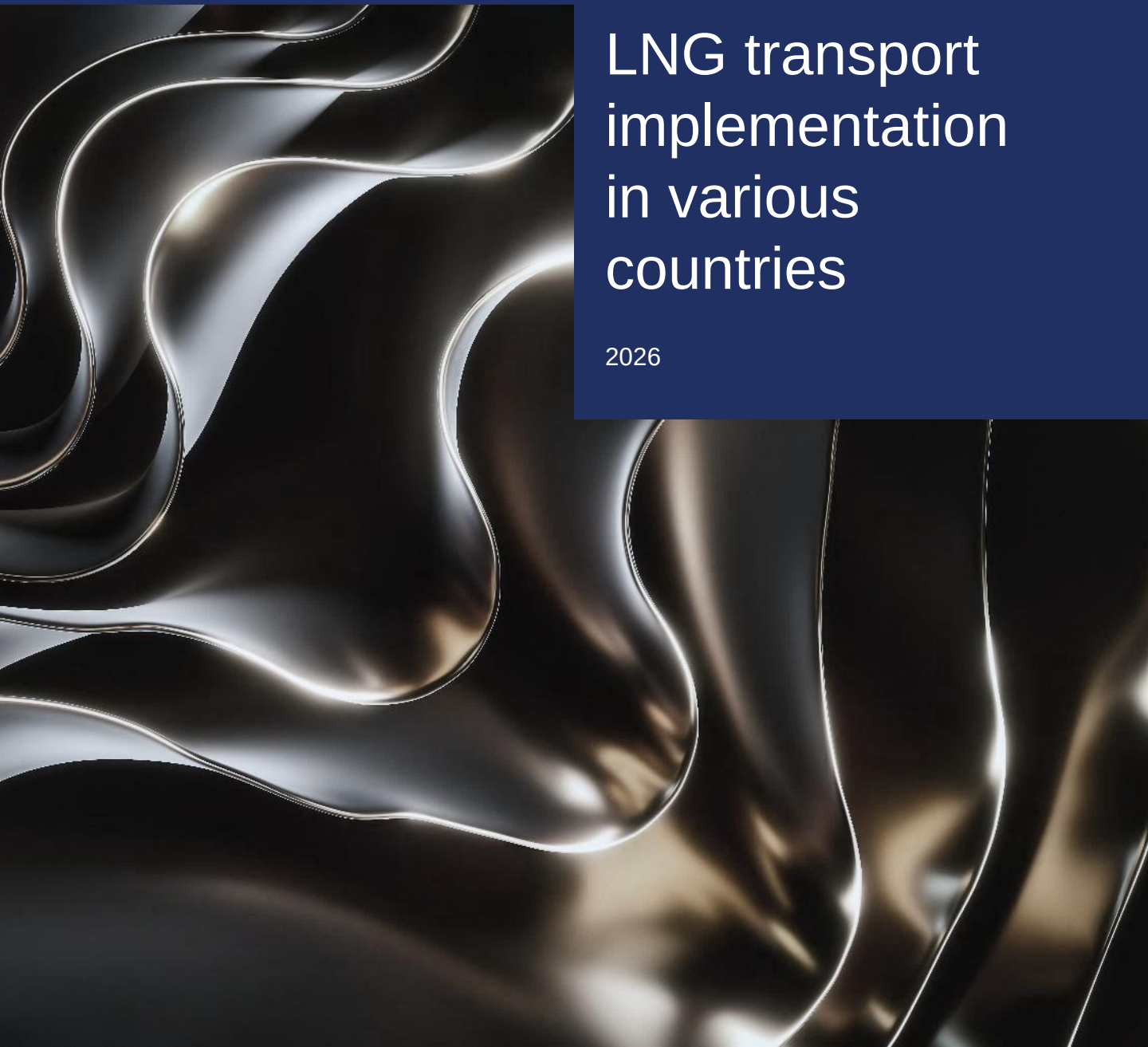


An abstract, high-contrast image of flowing, metallic liquid or smoke in shades of black, white, and gold, creating a sense of movement and depth.

LNG transport implementation in various countries

2026

01

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The transport industry is undergoing a transition, from traditional fuels to new energy sources. These energy sources must meet two key requirements: higher economic efficiency and lower negative environmental impacts.

Vehicles using gas motor fuel (including liquefied natural gas, LNG) and electric vehicles meet these criteria.

We believe that the further use of these energy sources will evolve differently across various types of transport. Electric transport technologies will strengthen their presence in the personal transport segment, while LNG may be the leading technology for public and freight transport, at least in certain countries.

In our study we analysed international experience in introducing and operating LNG transport in various countries, and we observed how promising this type of fuel is. We also highlighted the conditions and support measures that are necessary to expand its use in the transport industry.

Liquefied natural gas is a major promising area in modern transport. The fuel combines economic efficiency and environmental responsibility. Fuel market volatility and rising liquid fuel prices make LNG an increasingly attractive option for vehicles, due to optimised logistical costs and reduced dependence on unstable fuel market segments.

Sergei Ignatushchenko

Director



Key conclusions

01

The tightening of environmental requirements and the need to reduce logistics costs globally contribute to greater demand for alternative fuels.

One promising alternative is LNG: It cuts emissions by ~20% on average and reduces operating costs by around 10-40%, depending on the vehicle type.



02

LNG holds distinct advantages over electricity, which is widely used globally as a source of energy. **The use of LNG offers greater range and cost efficiency in long-haul transport, shorter refuelling times, and resilience to climatic conditions** – with LNG engine performance remaining stable under both high and low temperature extremes.



03

Thanks to the above characteristics **LNG remains in demand primarily for heavy cargo vehicles, river and sea vessels, and it is also used as fuel for buses and rail transport.**



04

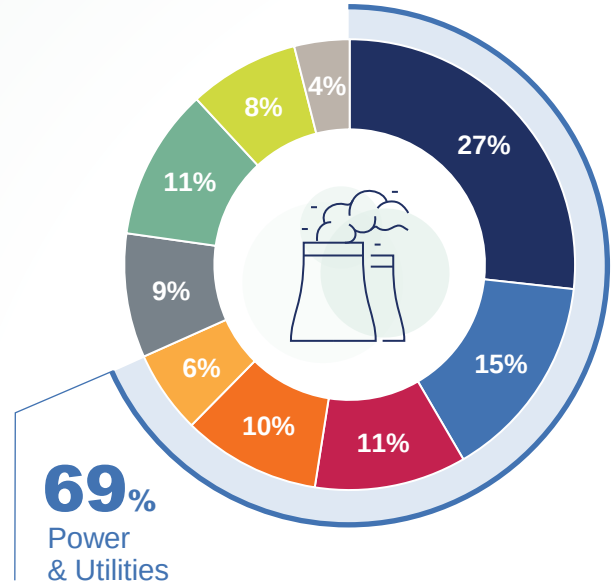
In countries that have achieved significant results in the development of LNG transport, the industry receives comprehensive state support. Key state support measures include subsidies for diesel fleet scrappage and LNG vehicle purchases, tax relief, LNG infrastructure development incentives, restricted diesel access in certain zones, and grants for partial coverage of investment costs related to retrofitting vessels with LNG engines.



New energy framework in the transport sector

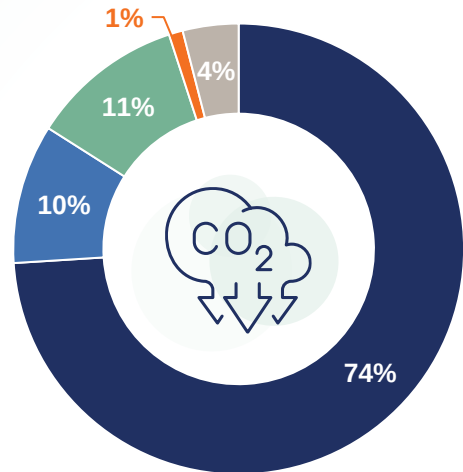
Global GHG emissions by economic sector, 2024, %

- Electricity
- Transport
- Industry
- Fuel production
- Real estate, etc.
- Production processes
- Agriculture
- Changes in land use
- Waste management



Global GHG emissions by mode of transport, 2024, %

- Road transport
- Air transport
- Sea transport
- Rail transport
- Other transport



15%

of global GHG emissions
generated by transport.

+79%
by 1990

From 1990 to 2024, global
GHG emissions in the transport
sector grew by 79%.

The main source of emissions
is road transport — specifically,
passenger vehicles and
heavy-duty trucks.



New energy framework in the transport sector

LNG transport and other alternative fuels have primarily been driven by the development of climate regulation aimed at reducing GHG emissions.

1990s

- The adoption of the Framework Convention on Climate Change, UN FCCC (1992) and the Kyoto Protocol (1997), which set requirements to reduce GHG emissions, facilitated the transition to alternative fuels, including natural gas, in particular in public transport.

2000s

- The first large-scale LNG projects emerge in the heavy freight and maritime transport sectors.
- Rapid growth in the use of biofuels is observed.
- Mass-market hybrids appear in the personal-use transport market.

2010s

- The Paris Agreement (2015) sets the goal of holding global average temperature increase to well below 2°C and pursuing efforts to limit it to 1.5°C above pre-industrial levels. This implies achieving climate neutrality (Net Zero).
- In their national climate plans, countries establish electricity as a primary pathway for the decarbonisation of passenger transport, whereas LNG is frequently described as a transitional solution.

2020s

- The adoption of the International Maritime Organization's (IMO) environmental regulation 2020, mandating that all marine vessels lower the maximum sulphur content of their fuel from 3.5% to 0.5%, has driven increased LNG adoption in the maritime sector.
- Electric passenger vehicles are already in widespread use across the market, with electric light commercial vehicles, passenger transport, trucks, and other segments also emerging.
- LNG retains an important role mainly in heavy transport and shipping.
- The focus is shifting to the use of special sustainable biofuel categories.
- The transport sector sees the development of large-scale hydrogen projects.

Technological advantages of LNG as a transport fuel

The use of electricity as transport fuel is being expanded by the rise in the number of passenger e-cars and e-buses, due to their favourable environmental features and well-developed charging infrastructure in cities.

However, LNG continues to play a prominent role within specific niches – namely, long-haul trucking and maritime shipping – where long-distance savings are achieved, only a small refuelling network is required, and the climate impact is minimal.

LNG has advantages over electricity: high range, fast fuelling, climate resistance



Comparisons between alternative fuels: LNG and electricity

	LNG	Electricity
CO₂ emissions	GHG emissions are reduced by an average of 20% compared to diesel fuel	The reduction in GHG emissions compared to diesel can reach up to 60–90% ²
Driving range	High driving range: a truck can drive 1,000–1,500 km ¹ on a single fill	Average driving range: a truck can travel 300-600 km on a single fill
Filling / charging time	Refuelling time around 5-15 minutes	Charging time around 20-50 minutes
Climate impact	Performance is comparable with diesel fuel, no loss of driving range is observed	The loss of driving range can reach 20-40% at low temperatures (from -15°C), which is due to the less efficient operation of the battery and the use of part of the energy to warm up the cabin. A similar pattern is seen with high air temperatures: according to a 2025 study, electric vehicle driving range falls by 44% at 32-44°C
Promising areas of use	Long-haul heavy trucks, sea and river vessels, rail transport, special-purpose machinery, etc.	Passenger cars, buses, urban logistics, etc.

Note:

¹ The driving range varies depending on the vehicle model, cryogenic tank capacity, cargo weight, type of trip, etc.

² When considering emissions on an isolated cycle basis; when considering full-cycle emissions, the reduction percentage is lower.

Sources: open sources

Technological advantages of LNG as a transport fuel

LNG transport reduces GHG emissions, while increasing economic efficiency

01
Reduced GHG emissions by ~20%

02
Greater engine service life

03
Reduced maintenance costs

04
Low noise level

05
Lower price compared to diesel oil

06
Increased range on single refuelling



Comparison of LNG and diesel heavy trucks¹

Comparison criterion	KAMAZ 54901 NEO (Russia)		FAW Jiefang J6P (China)		Volvo FH (EU)	
	Diesel oil	LNG	Diesel oil	LNG	Diesel oil	LNG
CO₂ combustion, kg CO ₂ / km	0.92	0.76	0.91	0.78	0.72	0.57
Cost of fuel USD/l / 1 kg ²	0.92	0.60	1.13	0.74	1.80	1.42
Fuel consumption with cargo, per 100 km.	33–36 l	25–30 kg	34–37 l	27–29 kg	25–35 l	20–30 kg
Cost of MJ energy, USD/MJ	0.03	0.01	0.03	0.01	0.05	0.03
Energy consumption, per 100 km, MJ	1,180–1,290	1,240–1,490	1,210–1,320	1,340–1,440	890–1,250	990–1,490
Cost per 1 km of mileage, USD	0.30–0.33	0.15–0.18	0.38–0.42	0.20–0.21	0.45–0.63	0.28–0.42

LNG heavy trucks provide lower GHG emissions and operating costs, due to fuel cost savings.

Note:

¹ Cost of fuel as of mid-2026

² The cost is given for Russia, China and EU countries percentage is lower.

Sources: official websites of PJSC KamAZ, FAW, Volvo, open sources

LNG vehicles state support experience

Main categories of state support for LNG transport globally: China and USA case studies

China



USA



01 Direct subsidies for purchase of LNG vehicles or replacing diesel vehicles with LNG transport

Implementation of a programme to subsidise the purchase of new trucks and replace old diesel trucks with new LNG trucks.

Example: A diesel truck scrappage and replacement programme that offered a subsidy of up to USD 19,000 per alternative-fuel vehicle in 2025 (the subsidy amount depends on the truck type and service life).

Grants to transport ministries of US states to upgrade their fleets of buses, trucks, and other alternative fuel vehicles (including LNG) to reduce natural gas emissions.

Example: Congestion Mitigation and Air Quality Improvement programme.

Provision of grants to replace diesel transport with alternative fuel vehicles (including LNG).

Example: Grants under the Diesel Emissions Reduction Act.

02 Tax benefits

Reduced tax burden and accelerated registration of new natural gas-powered vehicles.

Example: A 50% reduction in vehicle and vessel tax for certain LNG vehicles.

Tax deduction on the sale or use of alternative fuels (including LNG).

Example: Alternative fuel excise tax credit of USD 0.50 per gallon of fuel sold or used as motor fuel for vehicles (suspended in 2025).

Tax deduction for the installation of fuelling stations.

Example: Alternative Fuel Infrastructure Tax Credit.

03 Infrastructure development

Expansion of gas infrastructure by large state-owned companies.

Example: Development of the LNG fuelling station network by Sinopec (as at 2026, Sinopec operates 1,150 fuelling stations).

Grants for building LNG fuelling stations.

Example: The Charging and Fuelling Infrastructure Grant Program, which offers funding in two areas: support for the development of infrastructure in residential areas and support for the deployment of fuelling stations on highways.

04 Diesel fuel quotas

Restricting diesel truck access to urban areas.

Example: Low emission zone in Beijing, entry to which is prohibited for freight vehicles that do not comply with the National IV environmental standard.

N/A

International experience in LNG vehicle operations

Approaches to implementing liquefied natural gas (LNG) transport vary across international markets.



China

Successful implementation and scaling to the whole country in mainline freight transport. Simultaneous development of logistics in LNG transport, production of transport and necessary infrastructure with large-scale state support.



Brazil

A positive experience of limited use. Application expansion plans while at the same time developing logistics and necessary infrastructure.



India

Urban LNG transport in the State of Maharashtra. Proven economic efficiency and reduction of greenhouse gas emissions.



Russia

Implementation experience and development plans. However, the current results are limited.



EU&USA

Positive use experience: mainline cargo transport, sea transport, rail transport. No scaling.

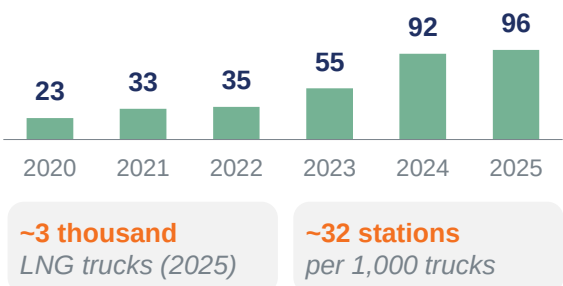
Improved LNG vehicle infrastructure. A well-developed refuelling infrastructure is an important factor for transport companies when deciding on the introduction of LNG transport



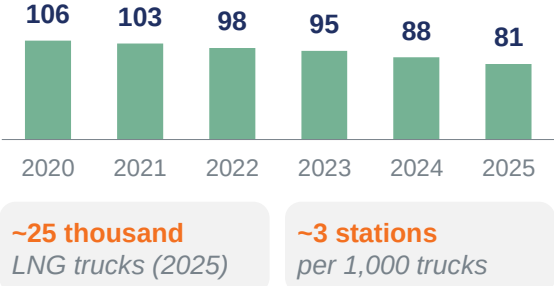
Number of LNG fuelling stations



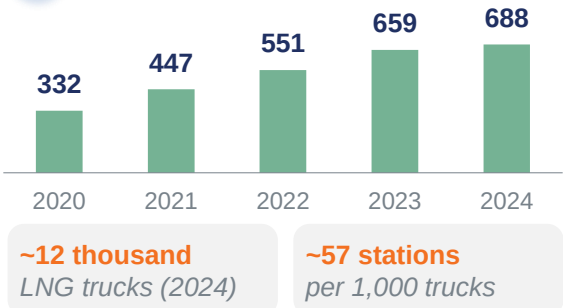
Russia



USA



EU



China

According to estimates, in 2025, China had ~7 thousand LNG fuelling stations



- 01

China is the absolute world leader in the number of LNG trucks and LNG fuelling stations.
- 02

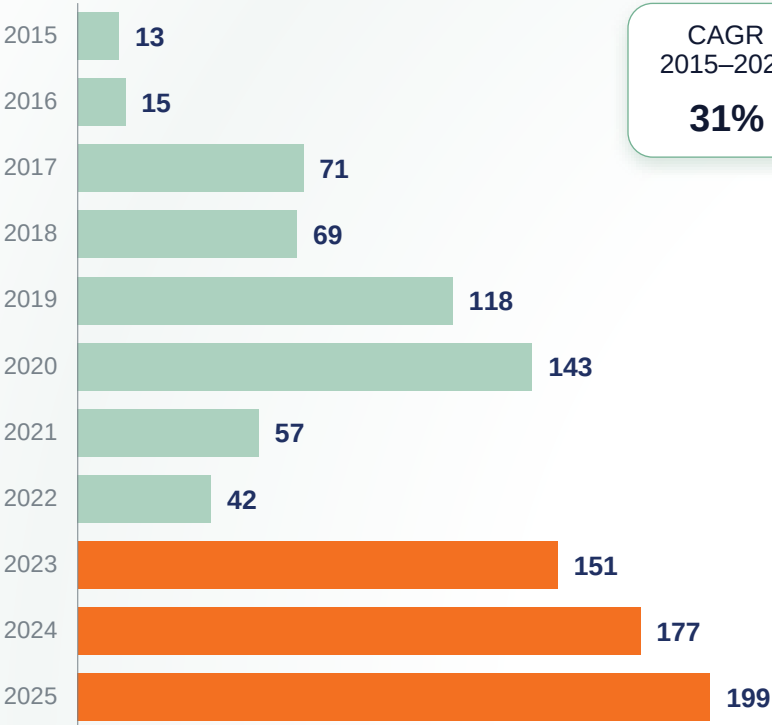
The EU has the highest density of LNG fuelling station infrastructure, largely due to the Alternative Fuels Infrastructure Directive issued in 2014, which envisaged the development of national programmes for the expansion of LNG fuelling stations, the distance between which should not exceed 400 km, along the TEN-T (Trans-European Transport Network) corridors.
- 03

The number of LNG fuelling stations in the USA is shrinking, due to the shift to electricity and CNG.

 China: LNG heavy truck market



Heavy truck sales trends in China,
2015–2025, thousand trucks



CAGR
2015–2025
31%

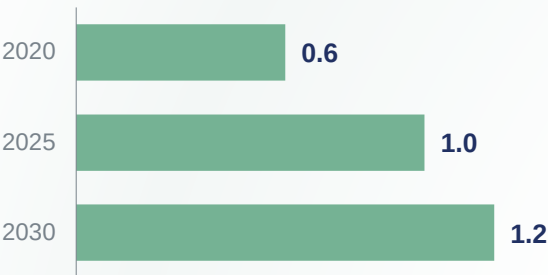
Over the past three years (2023–2025), sales of LNG heavy trucks have grown steadily in China.

The share of LNG truck sales in total heavy truck sales in 2025 was

25%



Number of heavy LNG trucks in China,
2020–2030, million trucks



According to Shell LNG Outlook 2025 estimates, the heavy truck fleet in China reached ~1 million trucks in 2025. It is forecast to expand by 2030, reaching

1.2 million trucks

The share of LNG trucks in the total heavy truck fleet in China is approximately

10%

China: conversion of heavy trucks to LNG in Shenzhen

Goal



The main goal was to reduce GHG emissions.

The Shenzhen government adopted the Shenzhen Air Quality Improvement Plan (2017–2020), which set a goal of replacing heavy-duty trucks running on traditional fuels with new environmentally friendly vehicles.



State regulation

To stimulate the transition to LNG trucks the Shenzhen Commission on Development and Reforms provided a subsidy of RMB 20,000 for each heavy LNG cargo vehicle purchased after July 2018.

With national and regional government subsidies¹ taken into account, in 2018 the total subsidy was up to USD 6,200 per vehicle, covering almost half of the cost differential between an LNG and diesel vehicle of the same specification.



Economic effectiveness

Although the cost of buying an LNG heavy freight vehicle is higher than a diesel fuel one, operating costs, which include maintenance and the cost of fuel, are lower for LNG trucks.

Thus, Shenzhen showed that total costs related to operating LNG trucks over the entire period were 10-17% lower than for diesel vehicles. The gap in the cost of buying LNG and diesel heavy trucks could be offset by 1/3 of the service life of the vehicles excluding subsidies. Including subsidies, the economic case strengthened considerably: the purchase cost gap could be made up in as little as one-sixth of the vehicles' useful life.



Vehicles used

Heavy trucks were classified into container carriers, dump trucks, concrete mixers, and other logistics-sector trucks.

China: development of LNG vessels in China's inland waters

Goal



The main goal is to reduce GHG emissions (it is estimated that CO₂ emissions will be reduced by ~20-30%).

China is also pursuing modernising the industry and decommissioning inefficient diesel-powered barges.



State regulation

In 2024, the Ministry of Transport of China issued a document governing subsidies for the disposal and renewal of the fleet. According to the document, the subsidy consists of two parts: a scrappage subsidy (the amount of which depends on the gross tonnage and age of the vessel) and a subsidy for the construction of LNG ships. The subsidy applies to coastal or inland water transport.



Economic effectiveness

A study on Yangtze River shipping estimates that initial investment in LNG water transport is 35% higher than for diesel-powered water transport. However, the operating expenses of LNG vessels are 30-40% lower. It is estimated that the most cost-effective option is the use of LNG on vessels with a deadweight of 3,000-5,000 t on long routes (over 1,000 km).



Vehicles used

China is significantly increasing the number of LNG vessels in inland waters. At the end of 2024, there were more than 600 LNG-powered vessels in China's inland waters. According to the Yangtze River Maritime Security Department, at the end of 2025, 417 LNG vessels were under construction. LNG is mainly used on dry cargo and container ships intended for medium and long routes along main Yangtze River waterways.

India: converting diesel buses to LNG in Maharashtra

Goal



India is developing the LNG bus market.
The main goal was to reduce GHG emissions.
The transition to LNG is projected to reduce CO₂ emissions from diesel fuel by ~30%.



State regulation

In 2024 the Government of Maharashtra allocated ~USD 100 million to Maharashtra State Road Transport Corporation (MSRTC) to convert 5,000 diesel buses to LNG. Funds are used for bus re-equipment, infrastructure construction, maintenance. The funds are allocated in phases: in 2024 USD 4 million, in 2025 USD 21 million, in 2026–2027 and 2027–2028 USD 38 million.



Economic effectiveness

According to MSRTC estimates, after the diesel buses have been converted to LNG, operational cost savings of ~USD 25 million per year are expected, since fuel costs account for ~34% of MSRTC total bus transport expenses. It is also noted that LNG buses can travel ~600-1,000 km on a single fill, while CNG buses need to refuel on average every ~200 km.



Vehicles used

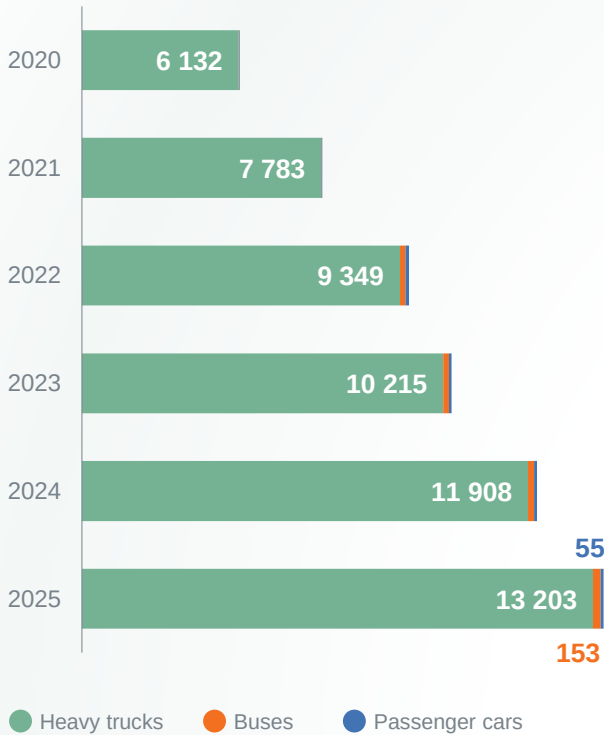
The transition to LNG is carried out for a third of the MSRTC bus fleet, mainly for long intercity trips throughout the state (for routes that lack a well-developed network of charging stations for electric buses).

90 fuelling stations for LNG buses are also being built as part of the project.

EU: LNG heavy truck market



Number of LNG heavy trucks in EU, 2020–2025, trucks



LNG is one of the three most popular alternative fuels used by the heavy truck segment in the EU (after CNG and electric power).

The average annual growth rate of LNG trucks for the period from 2020 to 2025 was 17%. However, the share of LNG trucks in the total freight fleet in the EU is less than 1% (~0.2%).

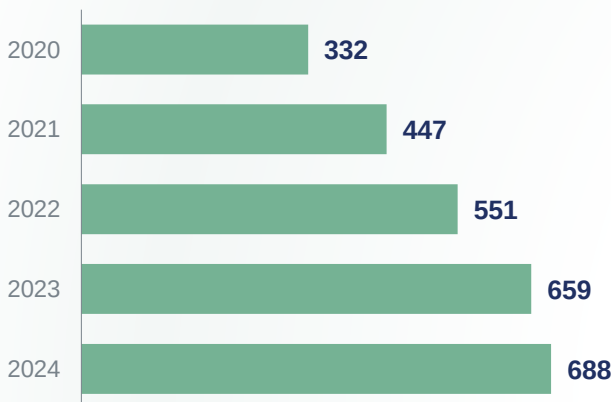
The largest number of LNG trucks is observed in Italy, Spain, Sweden, the Netherlands, and Germany.

At the same time, LNG is hardly used as a fuel for passenger cars: as of 2025, there were only 55 LNG cars, versus 8 million LPG vehicles, 8 million EVs, and 5 million hybrids; or for buses, where there were just 153 LNG buses, compared with 30,000 CNG buses and 30,000 electric buses.

The EU uses other types of gas as fuel for vehicles (LPG, CNG), mainly due to the established infrastructure.



Number of LNG fuelling station in EU, 2020–2024

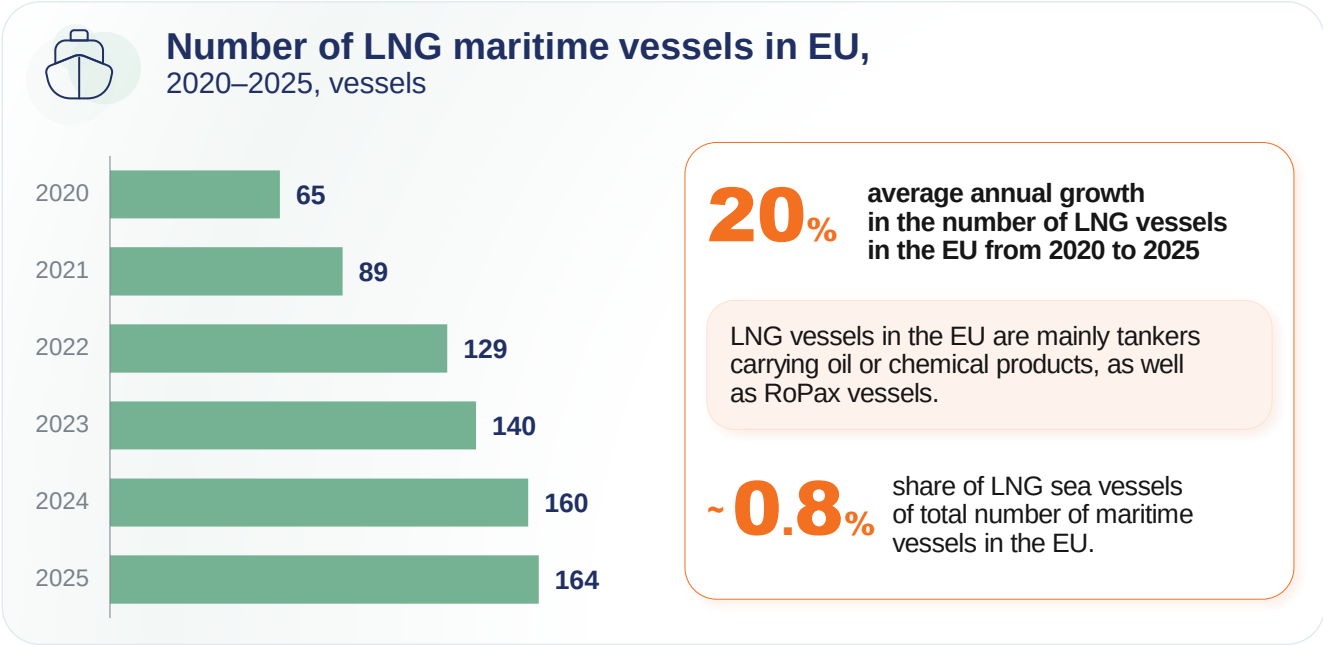


The number of LNG fuelling stations in the EU roughly doubled from 2020 to 2024

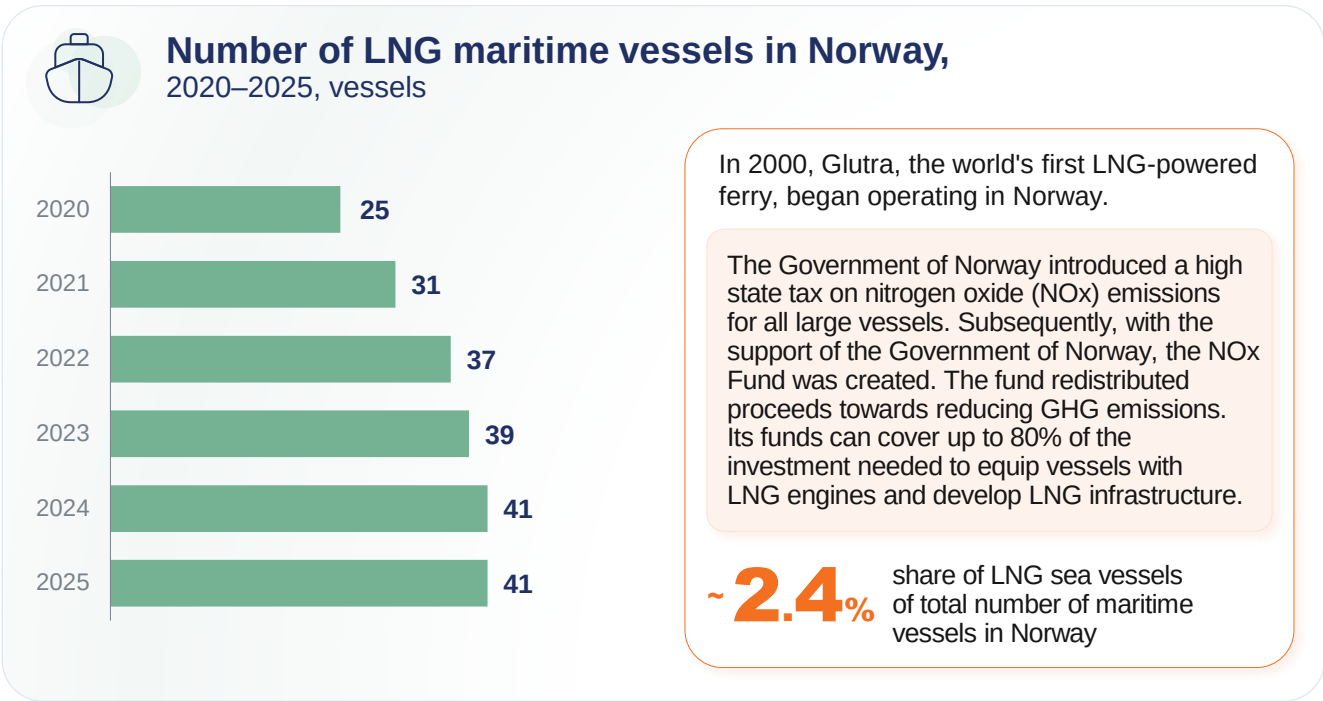
LNG stations account for ~0.6% of the total number of fuelling stations.

The number of LPG fuelling stations is 28,000, CNG stations 4,000, and charging points 1.1 million.

EU: development of LNG-powered maritime shipping



Norway: pioneers in LNG shipping



USA: the conversion of Florida's locomotive fleet to LNG

Goal



The main goal was to reduce GHG emissions.

It is estimated that the transition to LNG will reduce CO₂ emissions from diesel fuel by ~25%, and sulphur oxide emissions by ~40%.



Players, vehicles, and infrastructure involved

At the end of 2017 the Florida East Coast Railway became the first North American rail company to convert its mainline locomotive fleet to LNG.

The fleet consists of 24 locomotives equipped with a dual-fuel mechanism: up to 80% of energy is generated by LNG; diesel fuel is used primarily for ignition.

The LNG locomotive fleet is operated solely on the Jacksonville–Miami main line, which makes refuelling easier. In addition, FEC owns the LNG plant in Titusville near rail tracks, which reduces fuel delivery costs and eliminates logistics-related GHG emissions.



Economic effectiveness

According to FEC estimates, LNG reduces operating costs by USD 2 million a year compared with diesel fuel, largely due to lower fuel costs.

Brazil: development of delivery by LNG-powered trucks

Goal



The main goal was to reduce GHG emissions.

According to Eneva, the transition to LNG helps reduce CO₂ emissions from diesel fuel by ~20%.



Players, vehicles, and infrastructure involved

In 2024 Eneva (LNG producer), Scania (LNG truck manufacturer) and Virtu GNL (logistics company) entered into a partnership agreement to decarbonise road transport in Brazil.

The project goal is to develop the delivery of goods by LNG trucks. The companies have contracts with Vale (mining) and Suzano (pulp and paper) to transport products along the route through the states of Maranhão, Tocantins, Piauí, and Bahia. The contract provides for the delivery of 180 LNG-powered Scania trucks at a cost of around USD 200,000 each (the total purchase price of the trucks is USD ~3 million). Eneva is responsible for gas production, and Virtu for delivery of the final product.

Virtu has ambitious plans to increase the number of LNG trucks to ~ 5,000 and build 35 large-scale fuelling stations in the early 2030s. According to Virtu estimates, total investment will be ~ USD 1.1 billion. In 2025 Brazil's National Agency of Petroleum, Natural Gas, and Biofuels approved Virtu's plan to create LNG fuelling stations for heavy trucks. The plan will serve as a basis for developing the regulatory framework in this area.



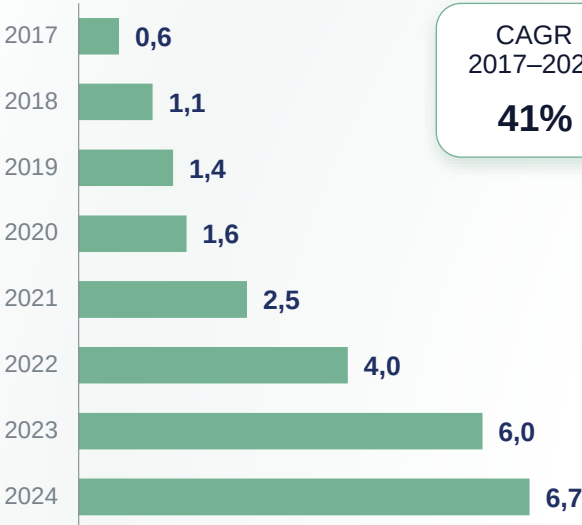
Economic effectiveness

According to Virtu's estimates, fuel costs are significantly lower per kilometre travelled, which is particularly important for heavy-duty long-haul transport. Furthermore, long-term gas supply contracts with Eneva provide for a transparent pricing formula, letting large corporations plan their logistics spending.

Russia: development of LNG vehicles and vessels



Number of LNG vehicles in Russia, 2017–2024, thousand vehicles



CAGR
2017–2024
41%

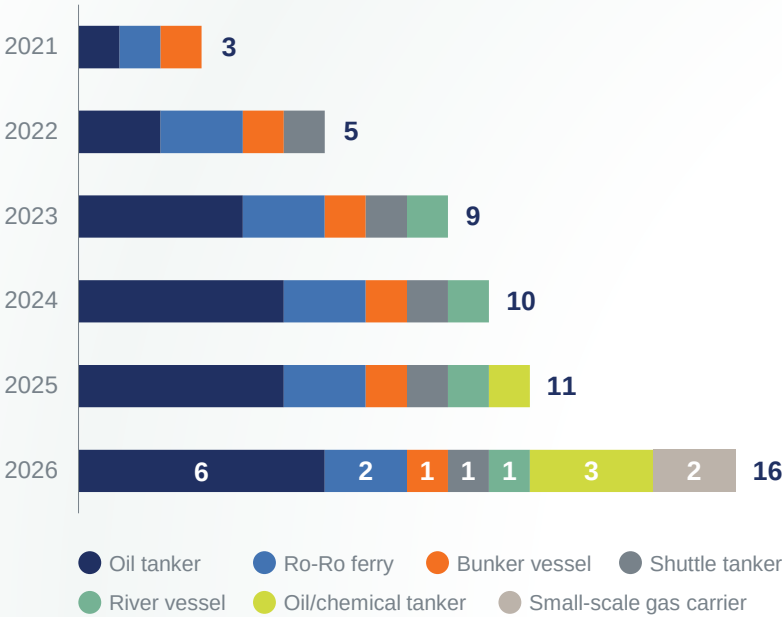
41% Average annual growth in LNG-powered vehicles in Russia from 2017 to 2024.

The share of LNG vehicles in total number of natural gas vehicles is ~2%. The main type of gas motor fuel is CNG (in 2024 Russia had 318 thousand CNG-vehicles). CNG is mainly used as a fuel for passenger and light commercial vehicles.

LNG is split roughly evenly between freight vehicles and buses.



LNG vessels, 2021–2026, vessels



By 2027 Russia's LNG fleet is set to reach 16 vessels.

Currently the vessels' operating geography is defined by oil transport in the Baltic and services linking Ust-Luga and Kaliningrad.

 Russia: LNG cargo vehicles in Far North



Environmental performance

Using LNG as a fuel in freight vehicles **reduces GHG emissions by** **~ 20%**



Cost efficiency

LNG is cheaper than diesel in the operation of freight vehicles

Comparative table of Ural equipment costs in 2025 (average values):

Indicator	Diesel	LNG
Unit cost of fuel*	0.90 USD/l	0.54 USD/kg
Operating fuel costs per 100 km	32 l	36 kg
Fuel savings for the period (2025)	33%	

* Based on RUB/USD average exchange rate in 2025 – RUB 83.21
Sources: experts and open source data, SW Tenet analysis.



Russia: development of Chaika LNG river passenger excursion vessel



Environmental performance

Using technology to neutralise harmful substances in exhaust gases fully eliminates sulphur dioxide emissions and reduces nitrogen dioxide emissions by 90%. **Direct CO₂ emissions are reduced by**

30%



Cost efficiency

LNG reduces the cost of operating a vessel compared to low-sulphur types of traditional fuels, while increasing the resource capacity of engines.

LNG consumption indicators in 2025:

LNG consumed

129.4 t

diesel fuel consumption equivalent

138.1 t

Cost comparison table (average values)*:

Indicator	Diesel	LNG
Unit cost of fuel	0.87 USD/l	0.54 USD/kg
Operating fuel costs	USD 121,000	USD 68,000
Fuel savings in the navigation period	USD 53,000	

* Based on RUB/USD average exchange rate in 2025 – RUB 83.21
Sources: experts and open source data, SW Tenet analysis.

 Russia: development of the passenger LNG-powered fleet



The vehicles used

Currently, LNG buses are widely operating in three constituent entities of the Russian Federation:

St. Petersburg

2,500 buses

Volgograd Region

255 buses

Krasnoyarsk Region

205 buses



Cost efficiency

One of the participants is a company participating in the new transport service model in St. Petersburg, which operates 400 MAZ-203 LNG-powered buses.

Comparative table of economic performance of MAZ-203 LNG buses compared to diesel buses operated by this company: NEFAZ-5299*:

Indicator	Diesel	LNG
Average annual mileage	90,000 km	
Unit cost of fuel	0.87 USD/l	0.54 USD/kg
Fuel consumption per 100 km	45 l	45 kg
Fuel savings for the period (2025)	USD 5.3 million	

* Based on RUB/USD average exchange rate in 2025 – RUB 83.21
Sources: experts and open source data, SW Tenet analysis.

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