Whitepaper
Sustainable transport with LNG-trucks

Reducing CO_2 emissions is a hot topic within the transport and logistics industry. Alternative fuels like LNG play an important role in this. Carriers are collaborating with service providers to offer a clean and economically viable alternative to diesel with LNG.

Incredibly tough sustainability standards? Bring it on!

We simplify. Whatever it takes.

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Sustainable transport thanks to LNG

In addition to these measures in the area of efficient transport, sustainable and clean mobility is also a high priority for Vos Logistics. We have been working for years on developing and applying an alternative fuel: LNG. In 2010, we built our first LNG station, and we began driving LNG trucks. Through the years, we have further specialized in national and international transport with LNG trucks.

In this whitepaper, we would like to introduce you to what LNG can contribute to sustainable transport.

What is LNG?

The abbreviation LNG stands for Liquefied Natural Gas. Natural gas has been used for decades as fuel in the transportation industry. Natural gas is the cleanest of the fossil fuels. When natural gas is cooled to -162°C, it becomes liquid (LNG). LNG takes up 600 times less volume than gaseous natural gas. As a result, the gas can be shipped and stored more easily.

Why LNG?

LNG is currently the only sustainable fuel that is suitable as a mature alternative to using diesel for long-distance transport. For shorter distances and less heavy vehicles, use can also be made of CNG (Compressed Natural Gas). CNG is often used in microdistribution and public transportation within cities. The action radius of LNG is larger than that of CNG because LNG in liquid form takes up around 3 to 4 times less volume. Other alternatives for short distances are electric (hybrid) vehicles and hydrogen-powered vehicles. The latter two alternatives are developing quickly, but they currently have only limited use for transport over longer distances.

The advantages of LNG

LNG is suitable in every way for reducing CO_2 emissions. Engines burn cleaner and quieter and transport is ultimately cheaper.

Clean

LNG engines produce significantly less sulphur dioxide (SO_2), nitrogen dioxide (NO^2) and particulate matter (PM) than diesel engines. The emissions of carbon dioxide (CO_2) are also 15% lower. That means that LNG engines more than meet increasingly strict emissions requirements.

Quiet

Environmental requirements do not only concern air pollution but also noise pollution. LNG engines produce 50% less noise than diesel engines, and they thus contribute to a more pleasant environment. LNG trucks in the Netherlands are also Piek certified. This increases the time frames within which vehicles must load and unload in urban areas.

Safe

LNG is not toxic or corrosive, it has a high combustion temperature (650 °C), and when it escapes, it immediately travels upward. The gas is lighter than air. In part because of this, the fuel can be called safe.

Efficient

Compared to diesel, LNG is around 10 to 25% cheaper. In addition, one kilogram of LNG has a higher energy density than one litre of diesel. An LNG truck is more efficient than a diesel truck, and it consumes less fuel.

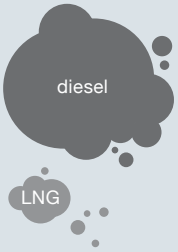
Ready for the future

LNG is a fossil fuel and abundantly available, so that the supply is stable. Currently, there is extensive development ongoing to produce Liquefied Bio Gas (LBG), a renewable fuel, on a large scale in order to bring it to market. This gas is harvested from waste, fertilizer or crops and then liquified. The use of LBG leads to a spectacular decrease in CO_2 emissions: more than 80% less that from current diesel engines. Because LNG engines and tank installations can handle both LNG and LBG, no new investments in equipment will be required upon the introduction of LBG. It is not yet clear when LBG will be available on a large scale and at competitive prices. It is expected that this will take several more years. Most likely, the introduction of LBG will be gradual, via blending with fossil LNG, where the share of LBG will be steadily increased.

LNG versus diesel

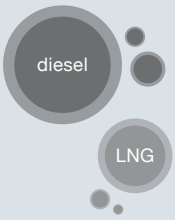
Particulate emissions

-95%



Nitrogen emissions

-35%



CO_2 emissions of LNG

-15%

Noise pollution LNG-truck

-50%

Vos Logistics

Features of an LNG truck

The LNG truck pays for itself. With high production, the price per kilometre is more economical than with a diesel truck.

Power

The total power of the latest generation of LNG trucks lies between 340 and 460 hp. The torque curve (Nm) is also comparable to that of a current diesel engine. In addition to trucks that run exclusively on LNG (monofuel), there are also trucks available that use both diesel and LNG as fuel. These dual-fuel trucks have comparable power output to the monofuel trucks.

Kilometres driven and the price of LNG determine the total cost of ownership

Currently, the average price difference between a monofuel LNG truck and a comparable diesel truck is €25,000 to €35,000. The maintenance costs for LNG trucks are typically a bit higher. To earn these costs back, it is essential that the LNG trucks drive as many kilometres as possible. Each kilometre is cheaper with LNG than with diesel, due to the lower fuel cost. The pricing trend of LNG and the number of kilometres driven with an LNG-truck determine the total cost of ownership of an LNG truck.

Fast and safe refuelling

Refuelling with LNG is just as quick and easy as refuelling with diesel. The driver is at the tank station for around 7 minutes, from driving in to leaving the premises. The refuelling itself takes around 4 minutes. During the refuelling, the driver must wear protective goggles and suitable gloves for his safety.

Suitable for both national and international transport

Engines that run on LNG are available in dual-fuel and monofuel versions. That means with or without a combination with diesel. Vos Logistics has chosen monofuel trucks in order to optimally profit from the environmental and pricing benefits of LNG. A monofuel-LNG truck has an action radius of around 650 kilometres, enough for most daily distribution activities. For international transport, a truck can be fitted with double tanks, so that the action radius increases to over 1,000 kilometres.

Large action radius

650 kilometres, can be expanded to over 1,000 kilometres. **Ready for international transport.**

Quick refuelling

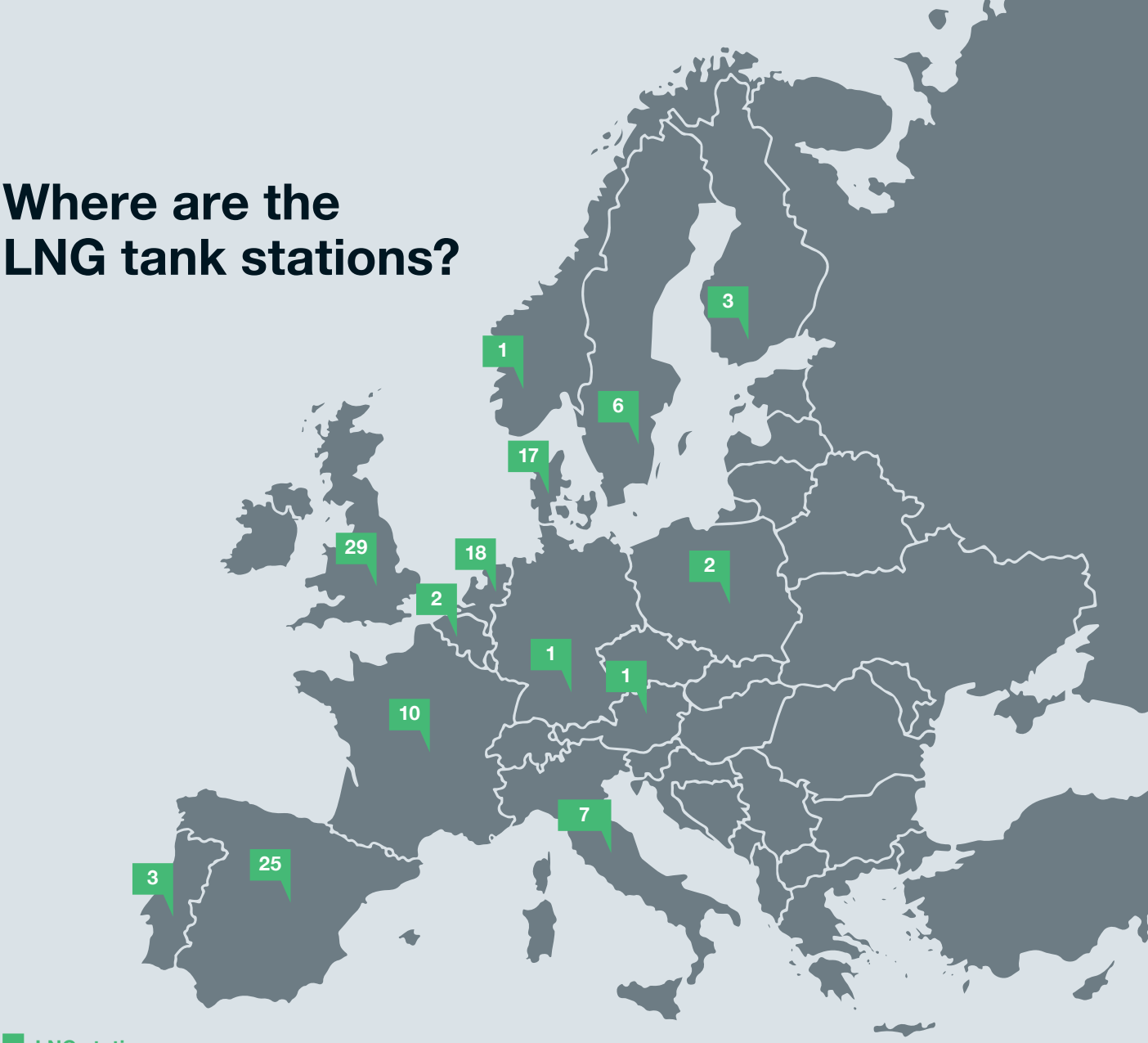
Refuel in 4 minutes.
No lost time.

Pure power

460 hp at 1,650 RPM.
No problem with heavy transport.

Vos Logistics

Where are the LNG tank stations?



LNG stations

See online how we use LNG efficiently!

Visit **voslogistics.com/simplysustainable**

Network of LNG stations

Currently, there are around 125 LNG tank stations in Europe. This number continues to increase steadily, but to create an international network of stations, many more are needed. A European Directive (2014/94) prescribes that every member state must have an LNG infrastructure along the core roads network in Europe by 2025. This network will be further strengthened because an LNG-tank infrastructure for (inland) ships is being developed simultaneously.

LNG starts with Vos Logistics

In 2010, on the premises of Vos Logistics in Oss, the first LNG station in north-western Europe was built. Since then, we have used LNG trucks daily for our clients, both nationally and internationally. More and more carriers are approaching us because having their goods shipped with LNG trucks contributes to their own sustainability goals. Expansion of our LNG activities fits within the broad framework of our strategy, focused on innovative and sustainable solutions in transport and logistics.

Vos Logistics

A word from a Vos Logistics partner:

“Vos Logistics is the ideal partner for us, thanks to their full-on commitment to sustainability.”

Willem Stas, Director of Operations at Tarkett

“In 2008, we started our Cradle to Cradle® strategy at Tarkett. We are a producer of carpets and carpet tiles, but we want first and foremost to give our customers a healthy and pleasant environment. In 2020, we want all of our products and processes to make a positive contribution to health and to a clean climate, so that includes our transport.”

“In 2011, we came into contact with Vos Logistics, who were pioneers at that time in the use of LNG trucks and the construction of the first LNG tank station in the Netherlands. We very much wanted to support their initiative and to give the LNG infrastructure a boost by also choosing LNG for our internal transport. The LNG trucks are quieter and cleaner, which means a more pleasant environment in the neighbourhoods through which we drive.

The transition to LNG was a first step for us. We look forward to the time when LBG in sufficiently available because this fuel is completely renewable. Vos Logistics showed initiative in this, and they showed with their BREEAM buildings that sustainability is fully integrated in their company. Thanks to their full-on commitment to sustainability, Vos Logistics is the ideal partner for implementing the Cradle to Cradle® principles in our transport and logistics activities.”

Willem Stas
Director of Operations at Tarkett

Tarkett
THE ULTIMATE FLOORING EXPERIENCE

Vos Logistics

Continuing to search for solutions

Aside from the search for alternative fuels, Vos Logistics is also looking at other new sustainable solutions, such as truck platooning. This means that trucks drive in a 'train' at a short distance from each other (less than 1 second/10 to 15 metres), using automated driving technology. This driving method could result in a decrease of 5 to 15% in fuel consumption and CO2 emissions. A great deal of the technical development for this has already been completed, but the legal side is not yet ready. It is expected that truck platooning will be ready for deployment sometime between 2020 and 2025.

In collaboration with various parties, Vos Logistics is a strong advocate for transporting with LNG. We are a member of the Nationaal LNG Platform and NGVA (Natural Gas Vehicle Association) Europe. We also participate in Unilever's Connect2LNG project, which has the goal of stimulating the network of LNG tank stations.

Furthermore, we are participating in various other consultation constructs in the area of LNG, and we regularly speak with governments, shippers, truck manufacturers and LNG suppliers. We thus continue to take the lead in further development of the LNG infrastructure, LNG engines and the introduction of LBG.

"With Connect2LNG, we're working with partners from across the value chain, including logistics companies, infrastructure companies and manufacturers. We're taking a step towards the overall reshaping of the road freight industry in Europe, working towards a sustainable transportation future."

Mark Rickhoff - Logistics Transformation & Innovation Manager at Unilever, from unilever.com

Connect 2LNG

WPEN04202.4

Curious about the possibilities **for making your transport sustainable?**

We are constantly looking for opportunities to further expand LNG transport. We are happy to advise you on sustainable transport with LNG trucks.

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We simplify. Whatever it takes.

Vos Logistics