The future of transport
Changing your transport fuel choice to Compressed Natural Gas

Natural Gas in Transport
Gas Networks Ireland Commitment

Gas Networks Ireland is committed to responsible business practice, ensuring that environmental, ethical and social principles are at the core of our business decisions and are key to our business strategy.

Gas Networks Ireland is committed to supporting the development and growth of renewable energy in Ireland. Renewable gas, also known as green gas or biogas, can make a significant contribution to meeting Ireland’s renewable energy and greenhouse gas emission targets for 2020 and into the future. The use of natural gas vehicles is a pathway for the use of renewable gas as a transport fuel in an energy system that has gas at the heart of it.

Supply
A diversified supply from:
- European countries
- New domestic sources (Corrib gas fields)
- Indigenous biogas injection facilities

Gas in transport
- To reduce emissions natural gas is pivotal in the future of transport. By 2025 Gas Networks Ireland is targeting 5% of the heavy goods vehicles in order to reduce emissions related to transport.
- With the introduction of biogas into the existing gas network Gas Networks Ireland can provide a 100% indigenous renewable transport fuel.
**Gas & renewables**
- Gas-fired power plants are the most flexible and the best complement to variable renewables.
- The gas and renewables partnership will displace coal from power generation, providing the most efficient way for the EU to reduce its emissions by 2030, while meeting its electricity demand.
- Biogas or renewable gas can be produced from various sources (organic waste, microalgae, biomass) and Gas Networks Ireland is currently planning Ireland's first renewable gas injection facility.

**Infrastructure**
- Moving gas is up to 20 times cheaper than moving the same quantity of energy through electricity.
- Gas infrastructure is already there and requires no fundamental modifications beyond 2050; now let's use it!
- Gas storage offers seasonal and short-term flexibility in a fully functioning European gas market, as well as security of supply.

**Innovation**
- Power-to-Gas converts excess electricity generated from renewables to hydrogen or methane and injects them into the gas grid.
- End-user technologies (heat pumps, fuel cells in heating and cooling, etc) are continuously improved and will make gas use even more efficient in the future.
- CCS should be an important option to reduce CO₂ emissions. The CO₂ captured can either be stored underground or reinjected into the gas system as synthetic methane using Power-to-Gas facilities.
What is Compressed Natural Gas (CNG)?

CNG is a global alternative to diesel or petrol as a transport fuel.

It has similar refuelling and operational characteristics to diesel, providing fast filling and similar travel ranges. It is used as a transport fuel in Natural Gas Vehicles (NGV) and is a proven, reliable technology used in over 19 million vehicles worldwide and 1.9 million vehicles in the developing European market. Natural gas is the same efficient and affordable fuel that is used to generate our electricity, heat our homes and cook our food; it is simply compressed to fit in the fuel tank of a natural gas vehicle.

Why should you choose natural gas in transport?

Natural gas is the most environmentally friendly fossil fuel available. Our continued need for energy and the heightened awareness of our environmental responsibilities has undoubtedly elevated the value of natural gas in our lives.

Additional Benefits:

- Alternative – increases security of energy supply in a geo-politically sensitive oil market
- Renewable – it is a pathway to the use of renewable biomethane gas as a transport fuel
- NGVs experience less vibration and are quieter than equivalent diesel vehicles
- NGV refuelling times are equivalent to that of other fuels such as diesel and petrol
- CNG has been identified in the Department of Energy's White Paper as a key contributor to making Ireland a carbon neutral country by reducing emissions from transport
- Natural gas is always available and never has to be stored or ordered
- Natural gas remains competitively priced compared to other fluctuating fuel prices

Save up to 35% on transport fuel costs
Cleaner

The use of natural gas instead of more polluting fuels like diesel and petrol will result in considerably lower emissions of climate changing greenhouse gases. The chemical properties of CNG compared to diesel contain significantly less polluting and harmful substances as outlined below:
- 22% less CO₂
- 70% less nitrogen oxide
- 80% less sulphur dioxide
- 99% less particulate matter

Cheaper

The fuel cost savings of CNG compared to other fuels range from 17% to 35% making it an extremely attractive alternative fuel source. Government incentives encouraging businesses to invest in less polluting vehicles, and supporting policies such as the recently released Energy White Paper, will further support the adoption of CNG.

Proven

CNG is a proven technology that has been in existence for decades. Worldwide there are 19 million vehicles in use with strong growth in Europe.

<table>
<thead>
<tr>
<th>CO₂ EMISSIONS</th>
<th>AVERAGE PUMP PRICE (2010-2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Types</td>
<td>GHG Emissions (kg CO₂/kWh)</td>
</tr>
<tr>
<td>Diesel</td>
<td>0.264</td>
</tr>
<tr>
<td>CNG</td>
<td>0.206</td>
</tr>
</tbody>
</table>
Natural Gas Vehicles explained

Driving a NGV is comparable to a petrol or diesel vehicle but it is cleaner, more economical to run and better for the environment.

A NGV is a vehicle which uses compressed natural gas to power the vehicle’s engine. There are three different types of engines found in NGVs including dedicated CNG engines, Bi-fuel and Dual-fuel engines.

**CNG specific**

**Dedicated CNG engine:** This engine uses natural gas as its only fuel source. A dedicated CNG engine has the advantage of being optimised to operate on natural gas, thus ensuring maximum efficiency and optimum emissions results.

**Gas or petrol**

**Bi-Fuel:** This engine operates on either petrol or natural gas at any one time. First the petrol is used to preheat the engine. Once the engine is hot, gas is then used as the primary fuel source for the remainder of the journey. Once the gas is depleted the engine will then switch back to petrol.

**Gas and diesel mix**

**Dual-fuel:** This engine utilises a mixture of natural gas and diesel, with the natural gas/air mixture ignited by a diesel pilot. In this process the diesel is injected directly into the combustion chamber, while gas is introduced into the air intake by carburation or by gas injection.

NGVs are comparable to diesel and petrol vehicles operationally – with the advantage of being cleaner and cheaper.

Vehicle applications: Truck and bus options
How CNG technology works

In a NGV natural gas is compressed and enters the vehicle through the natural gas dispenser or fill post and then flows into high-pressure cylinders that are located on the vehicle.

The natural gas flows from the on-board storage cylinder, passes through the high-pressure fuel line and enters the engine compartment. Gas then enters the regulator, which reduces pressure from 200 bar to the operating pressure of the engine's fuel-management system, and the natural gas solenoid valve allows natural gas to pass from the regulator into the gas mixer or fuel injectors.

Natural gas then mixes with air and flows down through the carburettor or fuel injection system and enters the engine's combustion chambers.

Compressed Natural Gas Vehicle applications

As a fuel CNG is particularly suitable for use in commercial vehicles including trucks, buses and vans. CNG provides the greatest benefits for operators/owners of these vehicles through the reduction of harmful emissions and generation of considerable fuel cost savings.

Gas Networks Ireland has conducted detailed on the ground trials with a large number of commercial truck, bus and van fleet customers in key industry segments resulting in positive experiences of the vehicle and its performance. As a result Gas Networks Ireland is currently working closely with industry stakeholders in order to establish a network of CNG stations in Ireland.
Get your business connected

There are two types of CNG station currently being installed in Ireland where it is possible for your vehicle to be fuelled with CNG:

1. **Private Stations**
   Dedicated private refuelling station where a customer can refuel a fleet or fleets of vehicles

2. **Public Stations**
   Typically located at an existing fuel forecourt where anyone with a natural gas vehicle may refuel

In order to establish a new CNG station, a connection to the natural gas network is required; this is provided by Gas Networks Ireland. This gas connection will typically be a low pressure connection, but depending on the station requirements and location it may be necessary to provide a high pressure connection.

CNG stations can be supplied with natural gas from the current gas network infrastructure and will allow for the introduction of biomethane (biogas) to NGVs without further conversion, thus providing the transport sector with a completely renewable indigenous fuel source.

**Gas Networks Ireland** is supporting the establishment of CNG in Ireland with early adopters in this emerging market rewarded.

**Business Options:**

1. Gas Networks Ireland has the capability to install, operate and maintain the CNG Compressor station while the customer will be responsible for the CNG Dispenser.

2. Alternatively a commercial third party may provide this service with Gas Networks Ireland providing the required connection to the gas network. Whatever your business is and whatever your business needs please contact us to discuss the best solution for you and your business.

**How to get connected to CNG**

- **Contact Gas Networks Ireland**

  - Gas Networks Ireland checks the network map in your area. Are you on or near the gas network?
  - Yes
  - No

  - Gas connection required?
    - Yes
    - No

  - Quotation and connection from Gas Networks Ireland
    - Installation of CNG equipment

  - Sign up with gas supplier

  - You’re connected!
What does the current market for CNG look like?

Over the past 10 years there has been significant growth in NGVs worldwide, with on average 30% annual growth reported.

Globally, there are approximately 19 million NGVs with over 1.9 million in Europe, with countries like Italy, Germany, Sweden and Spain leading the market. Ireland lags behind the European and global trends in NGV development largely due to a lack of infrastructure to serve these vehicles.

Gas Networks Ireland is currently addressing this gap in the market by planning to install 70 new public and private refuelling stations nationwide, supporting numerous vehicle trials and providing businesses with information needed to make the switch to a cleaner, more competitive fuel. Gas Networks Ireland is working closely with industry stakeholders in order to establish the CNG network; with the first publicly accessible refill locations opening in Ireland in 2016.

NGVA European map of CNG stations

<table>
<thead>
<tr>
<th>Country</th>
<th>CNG Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>175</td>
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<tr>
<td>Belgium</td>
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<td>U.K.</td>
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Support for CNG

The European Deployment of the Alternative Fuels Infrastructure Directive requires that Ireland establishes a refuelling infrastructure for CNG every 150km by 2025. This will ensure vehicle operators using CNG across Europe security of supply of fuel.

The Irish Government’s Finance Bill 2015 confirmed that a set excise duty of €9.36 per megawatt hour will be applied to CNG for the next 8 years. This represents a significant reduction in the excise applied to diesel or petrol and reflects the Government’s commitment to providing alternatives for Ireland’s future transport energy needs. There are tax incentives for CNG relative to diesel: the mineral oil excise duty applied to diesel (€0.479 per litre) is higher than that applied to CNG (€0.053 per litre).

In December 2015 the Department of Communications, Energy and Natural Resources published its Energy White Paper which outlines a number of areas through which Government intends to support the deployment and use of CNG as a transport fuel. Below are examples of this support.

“To support energy efficient and renewable transport, we will:

- Continue to support the adoption of zero and low carbon tail pipe emission vehicles such as electric vehicles and gas vehicles, using natural gas and biogas, through grants and/or tax relief
- Establish a green bus fund to support the purchase of cleaner and greener public transport vehicles in the period to 2020
- Develop a national policy framework to underpin and support the deployment of infrastructure for the use of alternative transport fuels, including compressed natural gas (CNG), liquefied petroleum gas (LPG), liquefied natural gas (LNG) and electricity.”
Gas Networks Ireland offers support to businesses seeking to trial CNG or transition to CNG. To find out more about CNG or to apply for support please contact us.

Please note - the number of projects we can support is limited so contact us as soon as possible!

Email: cng@gasnetworks.ie
Phone: 1850 411 511
Web: www.gasnetworks.ie/gasintransport