



# BIO GAS & CONVERSIONS

Well come to see my presentation about bio gas and how it is used in different applications and how you can turn your old car in to environmentally better than electric or your truck more profitable.

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# POWER FROM GAS

GAS = Methane, is a form of an energy like any other carbon based energy and it creates motion by burning with help of the oxygen.

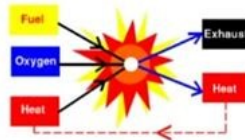
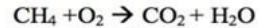
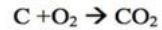
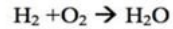
The important thing is how it is produced and used.

## Introduction

**Fuel:** Anything which burn to give heat in presence of oxygen.



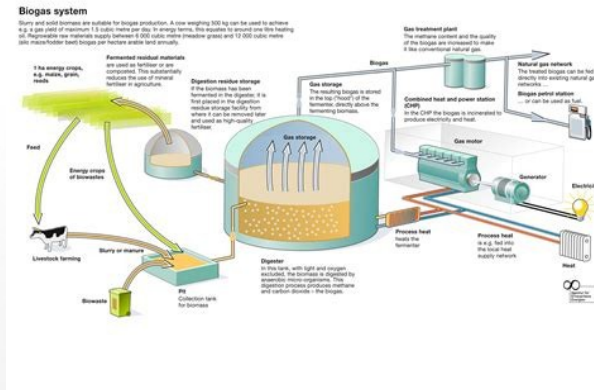
**Combustion:** The process of burning fuel.

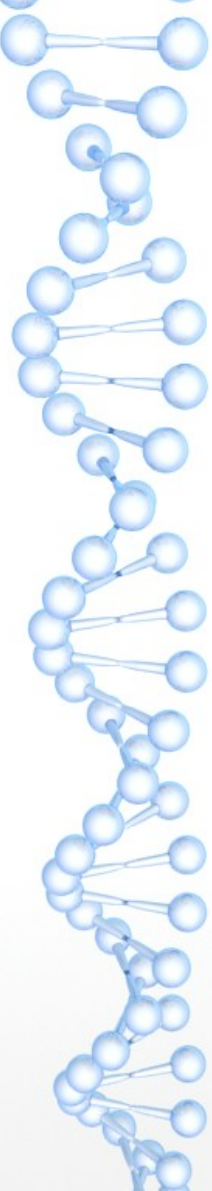


# BIO - OR NATURAL GAS

The difference in Bio and Natural gas is how it's produced.

- Biogas is produced from organic waste and refined.
- Natural gas is pumped from the well, or rather it comes out with its own pressure.
- Chemical mark is the same. CH<sub>4</sub>





As Natural gas is claimed to be a fossil fuel like oil, it burns much cleaner than other fossil fuels. 25% less CO<sub>2</sub> emissions and small particles almost non existent, no need for refining, nor filtering the exhaust gasses.

Bio gas is renewable and can be produced also in smaller scale and used in many applications practically without CO<sub>2</sub> emissions. The price of the production is stable.

In my opinion; NOW at the latest Municipalities and Government should wake up to support not only the big companies but also the smaller ones.

Decentralized energy production is one way to support our welfare in versatile ways.



# DIFFERENT USES

How can we use Bio gas: Practically like Diesel or Gasoline:

Produce heat and electricity; Large scale, Small scale and in between.

Use it in process industry instead of Natural gas.

Energy for Cars and Trucks:

You can buy a new one or make conversion to replace fossil fuels.

Using Bio gas is as clean as wind energy. Lobbying is in its harms way to prevent car industry to develop or to build new clean otto motor cars using gas. Better luck with trucks since the need of the energy is tenses.

The truth is that at the moment there is no singular solution to save the planet.





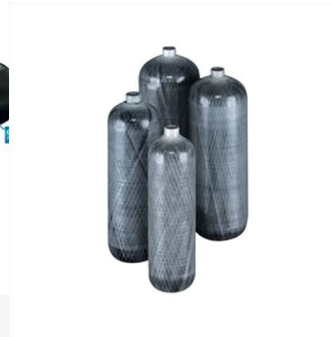
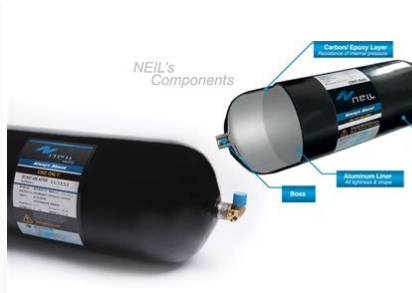
# HOW TO STORE GAS

- CNG / CBG = Compressed natural/bio gas (200 bar)
- LNG / LBG= Liquefied natural/bio gas (-162°C)
- In the pipe lines gas is also in pressure up to 50 bar
- LNG ships and terminals can bring large quantities of gas from gas fields by sea.
- 1m<sup>3</sup> of gas = 1 liter gasoline / approx. 700 grams of gas
- 1kg of gas = approx 1.5 liter gasoline or 1litre diesel
- 1 liter LNG = approx. 450 gram of gas



# LIQUEFIED OR COMPRESSED?

- Compressed gas is stored in cylinders of different types:
  - Type 1 steel cylinder = heavy and cheap, only one that is recyclable
  - Type 2 steel inner lining, composite outer lining, approx 75% of the type 1 weight
  - Type 3 aluminum from the inside and composite outer lining approx 35% of the type 1 weight
  - Type 4 full composite, lightest from cng models, approx 25% of the type 1 weight
  - The lighter the cylinder the higher the price
- LNG is in its own field
  - LNG- Most energy intense and expensive, specially in small scale



# CONVERSIONS

- Most common conversion is to make gasoline car to work with gas, this car can be almost 100% gas car, either methane or LPG. Though in Finland LPG is illegal and getting bio LPG is still non existing.
- Diesel dual fuel conversion is not as common, since the use of diesel and gas is approx 50/50, the gas needs ignition and the diesel fuel acts as ignition for the gas. It is feasible for heavy duty to do conversions. Savings approx 25%, it might be now even more.
- Also new tech straight injection gasoline cars are harder to convert, it needs cooling from gasoline (min25%) and all the models are not sufficient for the conversions even so.





# HOW MUCH IT COSTS TO INSTALL

- Traficom supports with 1 000€ conversion support for normal vehicles
- Regular car costs approx from 3 000€ depending on how big the engine is and the technology used and how many and type of cylinders / gas tanks you need
- Diesel van would cost from 4000€
- Diesel truck will cost from approx 8000€
  - Also available with LNG but the price tag is considerably higher



# PROS AND CONS

- Using gas, even though cleaner has energy tax for the vehicle, whether you use it or not.
  - GAS 0.031€ / 100kg / day. Diesel is 0.052€ for normal car
- Energy price is still considerably lower and you will save at fuel expense
  - At Gasum station vs diesel: CBG € 1.93 / 1.97 /kg - CNG 2.23 / 2.32 /kg
  - Gas vs gasoline: CBG € 1.24 / 1.27 /ltr – CNG 1.44 / 1.49 /ltr
- Still unknown and under valued as a bio fuel
- Lobbying and big company is better syndrome. Time will show that the farmers will need also to be productive in many ways
- Bio gas can be produced also in small scale as well refined and liquefied
- Not available through out Finland quite yet, egg and chicken syndrome
- Safe and easy, very fast to fuel the vehicle
- Follows the fuel prices by law
- Bio gas finally lower price than natural gas
- Bio gas is very much environmental
- Uses are very versatile in different sizes
- Producing and using bio gas is more and more profitable
- Needs experience to be able to work it efficiently and securely
- A lot of know how in Finland and in the world
- Works also with fuel cells and micro turbines
- Is definitely the part of the green future



THANK YOU!

Thank you for your time

Now is time for some questions :)

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