

# **Supply and utilisation of biogas and natural gas in the regions of LITHUANIA**

*- An overview of the present situation, norms & legislation and available vehicles*

Del 2.2.7



# Summary of the present situation – facts & figures

## Supply

### Biogas plants

- 2 Waste water plants, 30 GWh per year
- 1 food industry waste plants 3,6 – 4,8 GWh per year
- 1 farm plant, 4,5 GWh per year

### Gasification

- No plants for bio methane production in the regions of Lithuania

### Natural gas

- 4- 5 gas companies delivers natural gas in the Lithuanian region from Russia
- Energy value of the gas is 10,33 kWh per Nm<sup>3</sup>
- The total number of costumers in the region is:
  - residential - 536 thousands;
  - industrial companies 5 thousands
- The amount of import of gas in the region is 2884,07 TWh/year

## Treatment and distribution

### Upgrading plants

- no upgrading plants

### Local (biogas) grid

- One local biogas grid about 1,5 km distance

### Regional gas grid

- 1.8 thou. km of gas transmission pipelines, 55 bar;
- 7.2 thou. km of distribution pipelines, 3 bar

### Non Grid Transportation

- 63 gas distribution stations;
- 3 gas metering stations;

- 1 gas compressor station;
- 2 the hand-held gas filling stations

## Utilisation

### Biogas & Natural gas in vehicles

- 1 personal cars in the end of 2007 for natural gas;
- 5 buses

### Biogas for non transport applications

- 0,023 GWh used for heating
- 0,014 GWh used in power generation

### Natural gas for non transport applications

- 1496,28 TWh used for energy sector, including:
- 1136,74 TWh used for power plants;
- 332,44 TWh used for heat plants;
- 25,12 TWh used for other industries.

## LPG

### Utilisation in vehicles

- LPG used as vehicle fuel in the region
- The total quantity filling station for LPG in the Lithuanian region are 658, including for selling LPG only – 127, together with other sort of liquid fuels – 487, and in different owners filling stations – 44.

## Available Vehicles

- 1 FIAT models of personal cars;
- there are more like 120 second hand buses, but they are not in use.



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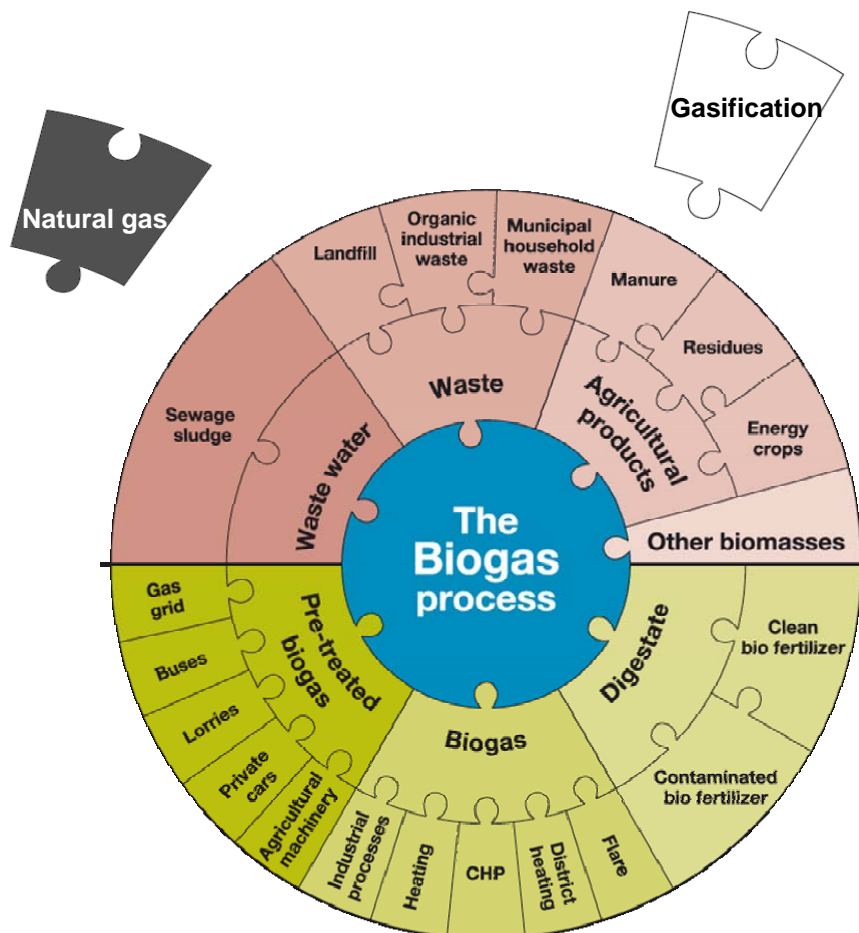
# Introduction

The natural gas and biogas are very clean energy resource, when combusted the amount of particles, NO<sub>x</sub>, CO etc are lower than most of other liquid fuels. Biogas is also a renewable energy resource, but it must be upgrading before using as fuel (remove CO<sub>2</sub>). If petrol or diesel is replaced with biogas produced from organic waste or animal manure, the CO<sub>2</sub> emissions can be reduced with up to 180 %. The MADEGASCAR project aims at improving the conditions for a growing market for gas driven cars and light transport vehicles and also increase the supply of biogas and natural gas for these vehicles.

To expand the market for supply and use of gas as a fuel for vehicles it is of high importance to understand the present situation of use and supply of gas. This text sums the present situation of supply, treatment & distribution and the final use of biogas and natural gas in the region.

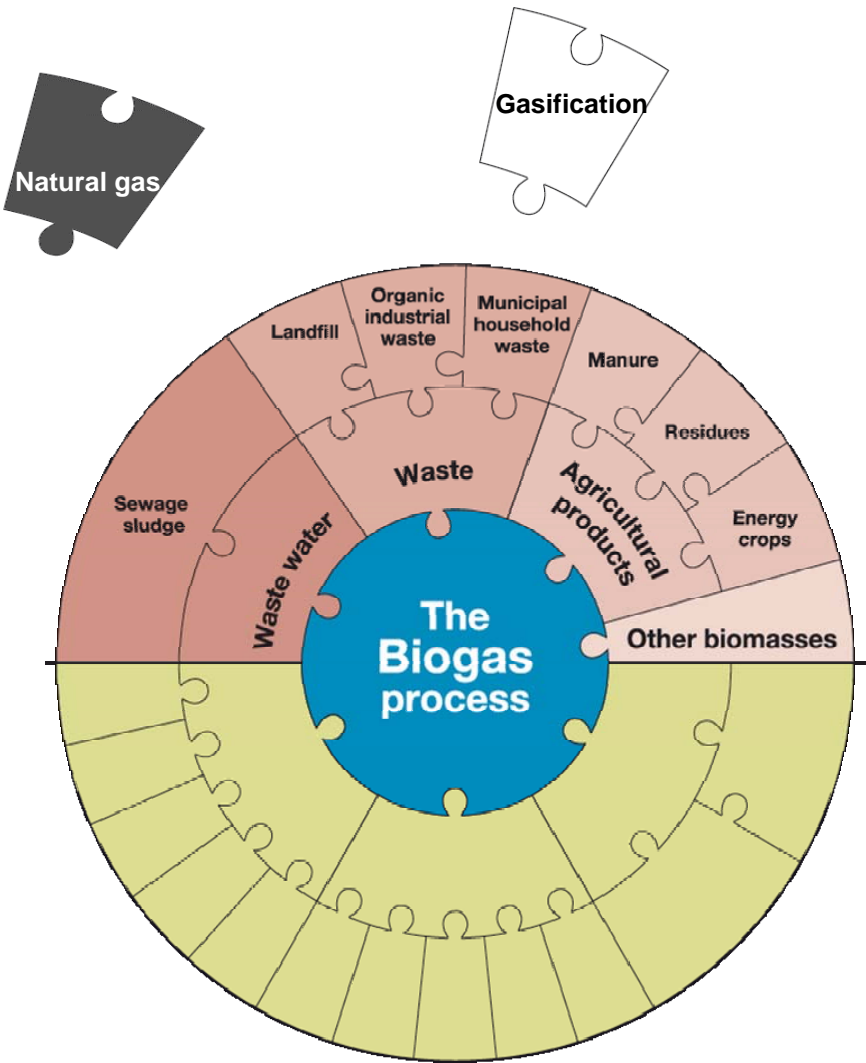
One chapter deals with norms and legislation around biogas production plants, distribution of natural gas and the use of gas in vehicles. The current management control measures that are used in the region to support gas vehicles are also summed in this chapter.

The use of LPG as vehicle fuel is also of interest for the MADEGASCAR project because of the possibility to convert these vehicles to propulsion with natural gas and upgraded biogas.



# Supply

This section handles the present supply situation of biogas, natural gas and liquid petrol gas in the region.



## Biogas production plants

### Background

In the Lithuanian region, the two of the biogas plants are placed in connection to waste water treatment plants – in Kaunas and Utena towns. The waste water treatment plants started to digest sewage sludge in the 2004's as a measure to reduce the amount of sludge. The produced biogas is used for internal heating, generation of electricity to the grid and partially for district heating for own purposes.

In the 1993's the first biogas plants that digested organic wastes from alcohol and yeast factory, were built in Panevežys town. Some years ago this factory was failed and biogas plant is not in operates now.

The second one biogas plant in Lithuania was builds in pig farm nearest of Kaunas. The total capacity of this demonstration plant, were was installed two co-generation units, was 185 kW power and approximately 300 kW of heat. At this time this biogas plant is not in operate after fire.

The best cases of biogas production in Lithuania existent in a two waist water treatment plants: one is in Kaunas and second one - in Utena. Again there are one biogas plant at the pig farm and one at cheese factory.

### Present situation

#### Waste Water

- 2 Waste water plants digests the sludge in biogas reactors
- 30 GWh in total production per year

#### Waste

- 1 food industry wastes biogas plant;
- 1 pig manure biogas plant;
- 8,1 – 9,3 GWh in total production per year

### Future perspectives

The techniques around biogas based on waste water sludge are well proven. When it comes to biogas production from wastes there is much to learn/develop regarding the biogas process and collecting of the substrates/wastes. A large amount of the biogas potential is in the agricultural sector. This is also the sector where least of the potential is used. Research, counselling and education are needed to increase the number of farm based biogas plants. In Lithuania there are no centralised or collective pilot (demonstration) biogas plants.



## Bio methane (gasification)

### Background

There are not estimated the total potential for production of bio-methane from thermal gasification in Lithuania.

### Present situation

- The Lithuanian scientists periodically estimated the technical biogas potential;
- The Lithuanian agriculture university has been estimated approximately amounts of biogas potential from agriculture crops and wastes. The total potential from agricultures wastes can be reached about 500 million kWh per years.
- There is not pilot plant.
- The amount of biogas produced in small biogas plants is use in local internal combustion engines for power and heat production for own needs and it is not effective for use as fuel for mobile transport.

### Future perspectives

It will be advisable to install one demonstration centralised biogas plant in Lithuania for dissemination anaerobic technologies for the future. The biggest amount of biogas produced in centralise biogas plant can be use as fuel for transport. In this case will be economically useful to install of biogas upgrading equipments.



# Natural gas

## Background

Natural gas was introduced in Lithuania in 1961 in Vilnius. At this time it is use more widely: about 536.000 residential costumers are connected to the natural gas network. Furthermore, about 5.000 industrial, energy and agriculture companies, small size commercial companies are connected to the gas network. The final consumption of natural gas is to 6632,25 TWh (2006).

## Present situation

- 4-5 Gas companies delivers natural gas in the Lithuanian region (from one resource "Gasprom" Russia;
- Energy value of the gas is 10,33 kWh per Nm<sup>3</sup>;
- The total number of costumers in the region is as follows:  
In the Lithuania about 50% of the natural gas is used by the energy companies, 28% is reduced of fertiliser, 11% is used in industrial companies, 6% - in residential consumers, 4% - residential utility consumers and 1% is use in agriculture companies. Practically the natural gas is no used as fuel for vehicles. This action is on beginning stage.
- The amount of sold/used gas is 1357,8 GWh/year

## Future perspectives

The future perspectives foresee is difficult because the price of the natural gas is on the rise and the real situation will be on particular under the world market circumstances.

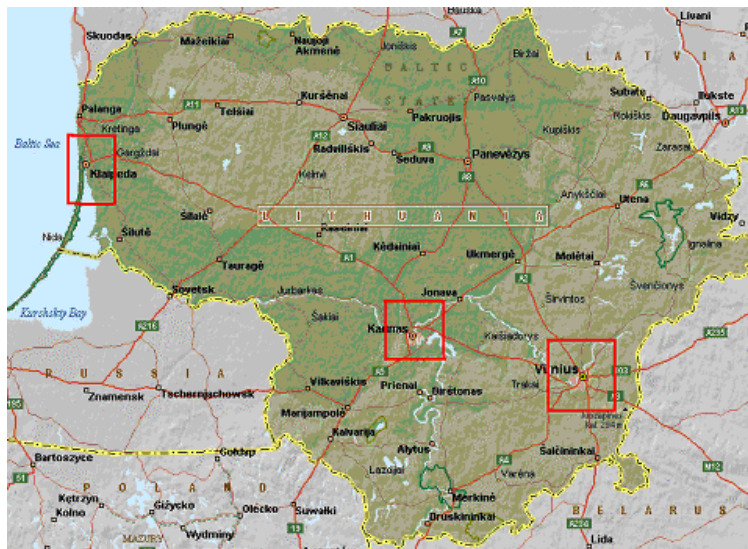


## Treatment and distribution

There are presented the natural gas supply and distribution networks in the Lithuanian region.



And there are remarked the selection regions which are participate in the project



Vilnius, Kaunas and Klaipėda regions (from right to left).

## **Treatment of biogas (upgrading)**

### **Background**

In Lithuanian regions are not existing biogas upgrading plants. As concerns small amount of biogas production and expensive biogas upgrading technology.

### **Present situation**

There are no biogas upgrading plants

### **Future perspectives**

LEI search institution or companies for transfer and developing anaerobic technologies for building pilot (demonstration) centralised biogas plant for biogas production from organic wastes. In that case will be possible to implement one biogas upgrading plant.

# Gas grid

## Background

In Lithuania is enough good developed the natural gas supply and distributing network.

## Present situation

### Local Biogas grid

- There is one local biogas grid about 1,5 km distance

### Large (regional) natural gas grid



The infrastructure operated by LD	Gas transmission pipelines	Gas distribution pipelines	Gas distribution stations	Gas metering stations	Gas compressor station
	1.8 thou km	7.2 thou km	63	3	1

- 1,8 thou km of gas transmission pipelines, 55 bar;
- 7,2 thou km of gas distribution pipelines, 3 - 4 bar
- for household purposes the natural gas is supply under pressure 30 -40 mbar

## Future perspectives

Due the favourable network situation for natural gas distribution across the region there are purposeful more widely introduce the natural gas as fuel for vehicle in all country.



## Non grid transportation

### Background

The method to solve the supply of LPG in Lithuania has been to transport it on the lorry platforms.

### Present situation

- There are no biogas filling station for transport

### Future perspectives

- There are enough good developed LNG delivery systems (transport, loading terminal and fuelling station).
- It is plane to give an estimate for building costs of international terminal for compressed natural gas (CNG) import systems (transport, loading terminal and fuelling station).

## Gas filling stations

### Background

- LPG is widely used as vehicle fuel in the region
- The LPG filling stations are installed on the same places as other sort of fuels.

### Present situation

- LPG used as vehicle fuel in the region
- The total quantity filling station for LPG in the Lithuanian region are 658, including for selling LPG only - 127, together with other sort of liquid fuels - 487, and in different owners filling stations - 44.
- There are not filling station provides with biogas

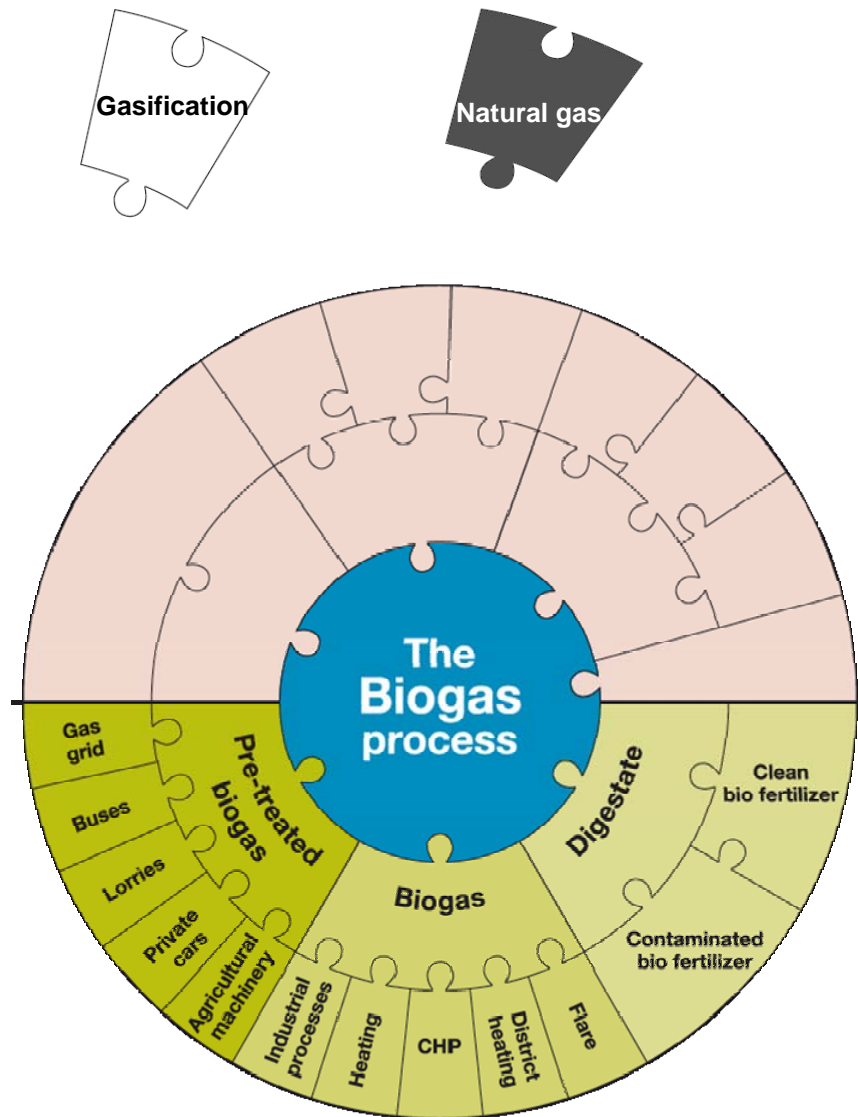
### Future perspectives

Last year the price of liquid fuels is drastically rise up. In this case it seems that will be more widely use alternative fuels - compressed natural gas, liquid petrol gas and biogas.



## Utilisation of biogas and natural gas

This section sums the use of natural gas and LPG in the region. The focus lays on use of gas for vehicles, but the use in fixed applications as heating and CHP will also be ventilated to get a better overview of the entire gas market.



## Utilisation of upgraded biogas and natural gas in vehicles

### Background

- There are no upgraded biogas productions for vehicles;
- The 120 of second-hand buses are in preparing stage for run on natural gas

### Present situation

- 1 personal car in 2006, 2007, 2008 for dual fuels: petrol and natural gas is use in Vilnius;
- 5 second - hand buses are tests to run on natural gas;
- a two gas filling stations are in process of construction.

### Future perspectives

In the near future 100 buses will be running on natural gas in Vilnius, 20 or more – in Klaipėda and approximately 20 buses are planed to prepare for natural gas in Kaunas. Foe this purposes should be constructed three filling stations for compressed of natural gas.

## Biogas for non transport applications

### Background

All amount of biogas produced in regions biogas plants is use for non transport applications.

### Present situation

The biogas is use for power and heat production for local own purposes.

Heating –is produces in cogeneration unit and use for technological purposes and for local heating;

Power generation – power is produce in the same cogeneration units and supply to the electricity network;

District heating – the biogas is no use for district heating.

### Future perspectives

The reliable position for biogas use in the future - it will be use for power and heat production in local cogeneration units. The heat energy will be use for technologies purposes and heating; the power energy, as usually, must be connected to power grid.



## Natural gas for non transport applications

### Background

The all amount of natural gas in Lithuania is used for non transport applications. The two leading companies are supply the main amount of natural gas to region from Russia.

The 2- 3 small gas company delivers natural gas for owned purposes: for industry, for fertiliser production, for households etc.

### Present situation

The total number of costumers in the region is:

residential - 536 thousands;

industrial companies 5 thousands

The amount of import of gas in the region is 2884,07 TWh/year

### CHP - Heating

332,44 TWh is used for heat production.

### Power generation

1136,74 TWh is used for power generation;

### District heating

In Lithuanian towns is widely used the district heating, but its pipes are not in satisfied conditions and there are a lot of heat energy loses.

### Future perspectives

The most of the network of heat supply should be renovated.



# LPG

## Background

LPG is widely used as fuel for vehicle in the region of Lithuania.  
There are not filling station provides with biogas

## Supply of LPG

The total quantity filling station for LPG in the Lithuanian region are 658, including for selling LPG only - 127, together with other sort of liquid fuels - 487, and in different owners filling stations - 44. The total fuel filling station in Lithuania consist about 873 (July 2007).

## Utilisation of LPG

We have not dates about LPG running vehicles, but it seems that it is enough more.

## Future perspectives

The future perspectives depend from world liquid fuels and natural gas prices.



## **Norms and Legislation**

### **Gas norms**

**The public law Nr. VIII-1973, accepted in 2000.10.10**

*In this low are describe all instruction for the natural gas safety storage, supply, distribution etc. Natural gas is classified as explosive goods...*

### **Supply**

**The public law Nr. VIII-1973, accepted in 2000.10.10**

**The public law for renewable energy Nr.IX-884, accepted in 2002.05.16**

*The legislation around biogas production and other sorts of renewable energy*

### **Treatment and distribution**

*There are no the legislation around distribution systems for the flammable methane gas, and the legislation for upgrading facilities for biogas.*

### **Utilisation of biogas and natural gas**

*There are no the legislation about gas as and biogas as vehicle fuel, but there are some study about it witch are not a piece of legislation.*

### **Management control measures**

*There are no any control measures that are used to enhance any of the parts of the gas or biogas market /the use of methane gas as vehicle fuel.*

### **Supply**

*There are no public control measures that are used to enhance the supply of biogas and natural gas for transport.*

### **Treatment and distribution**

*There are no any control measures that are used to enhance biogas upgrading, and distribution of biogas and natural gas.*

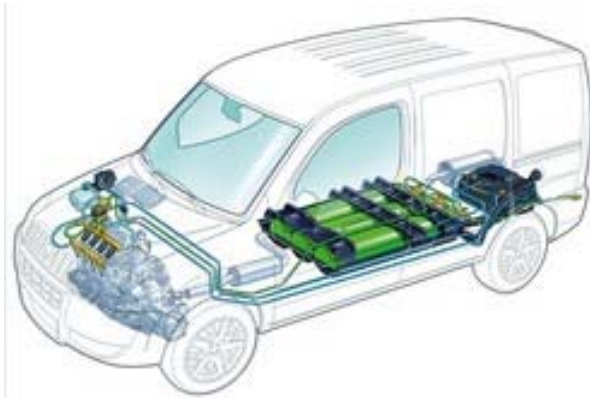
### **Utilisation of biogas and natural gas**

*There are no any control measures that are used to enhance the utilisation of biogas and natural gas for vehicles*



## Available vehicles

Personal car „Fiat Multipla Bipower”



The placing of capacity for natural gas fuel

## MADEGASCAR

MADEGASCAR - market development of gas driven cars, is a project which aims at developing the market for gas driven vehicles – natural gas and biogas fuelled vehicles. Strengthening the supply and distribution infrastructure of biogas and natural gas to fuel vehicles is also a goal for the project.

## Intelligent Energy - Europe

Intelligent Energy - Europe is the EU's tool for funding action to improve the conditions for energy saving and the use of renewable energy sources in Europe

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