



**CONVOCO**

Consulting for Sustainable  
Development

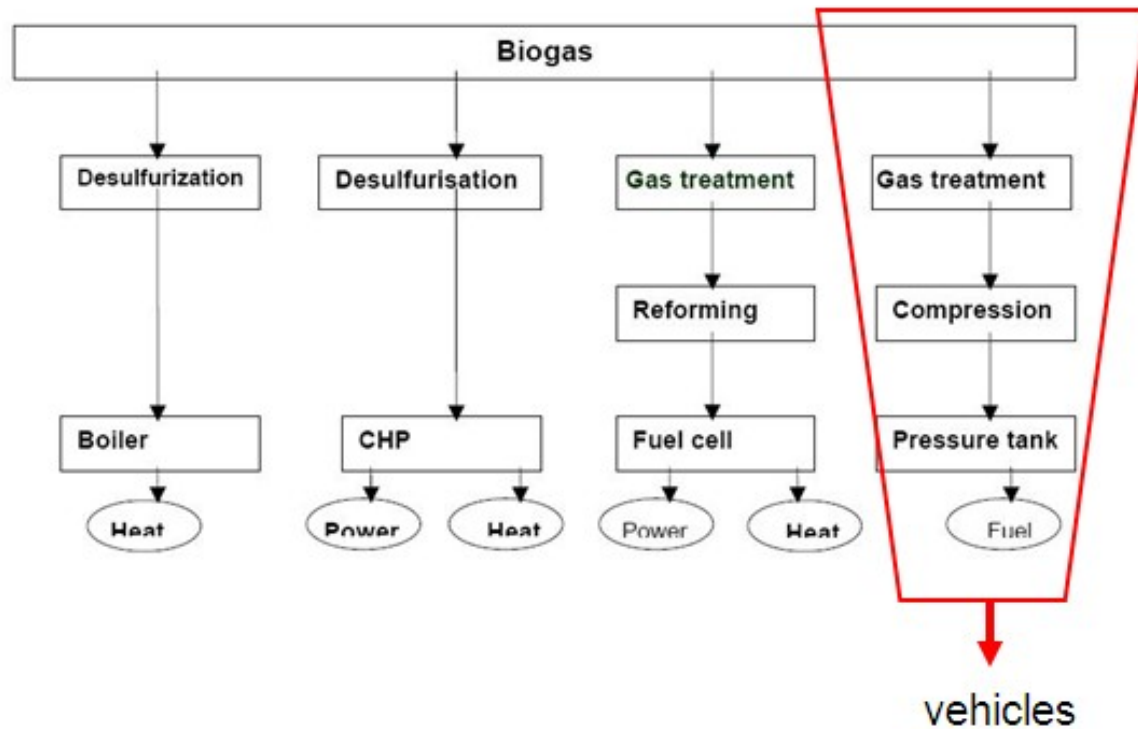
- Biogas as a vehicle fuel
- Bus Rapid Transit

# Fuelling potential of Biogas


1 million m<sup>3</sup> of biogas =

- 18 city buses (annual mileage of 100.000 km)
- 18 Heavy Duty Vehicles (annual mileage of 200.000 km)
- 100 taxi cabs (annual mileage of 100.000 km)
- 900 passengers cars (annual mileage 20.000 km)
- 330 LD vans (annual mileage 30.000 km)

# Biogas: not only heat and power



# Cost of biogas production from different sources

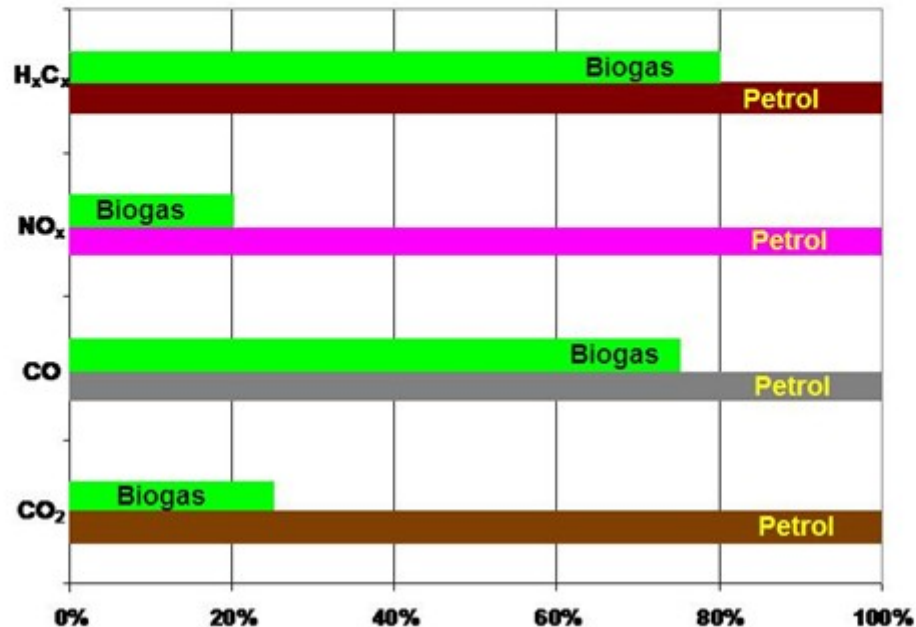
Process	~ Euro / kWh	~ Euro / 1 l of petrol equivalent
 Sewage treatment	0.034	0.30
Slaughterhouse waste	0.045	0.39
Energy crop gas	0.049	0.43

## *Local biogas cycle - from the city perspective*

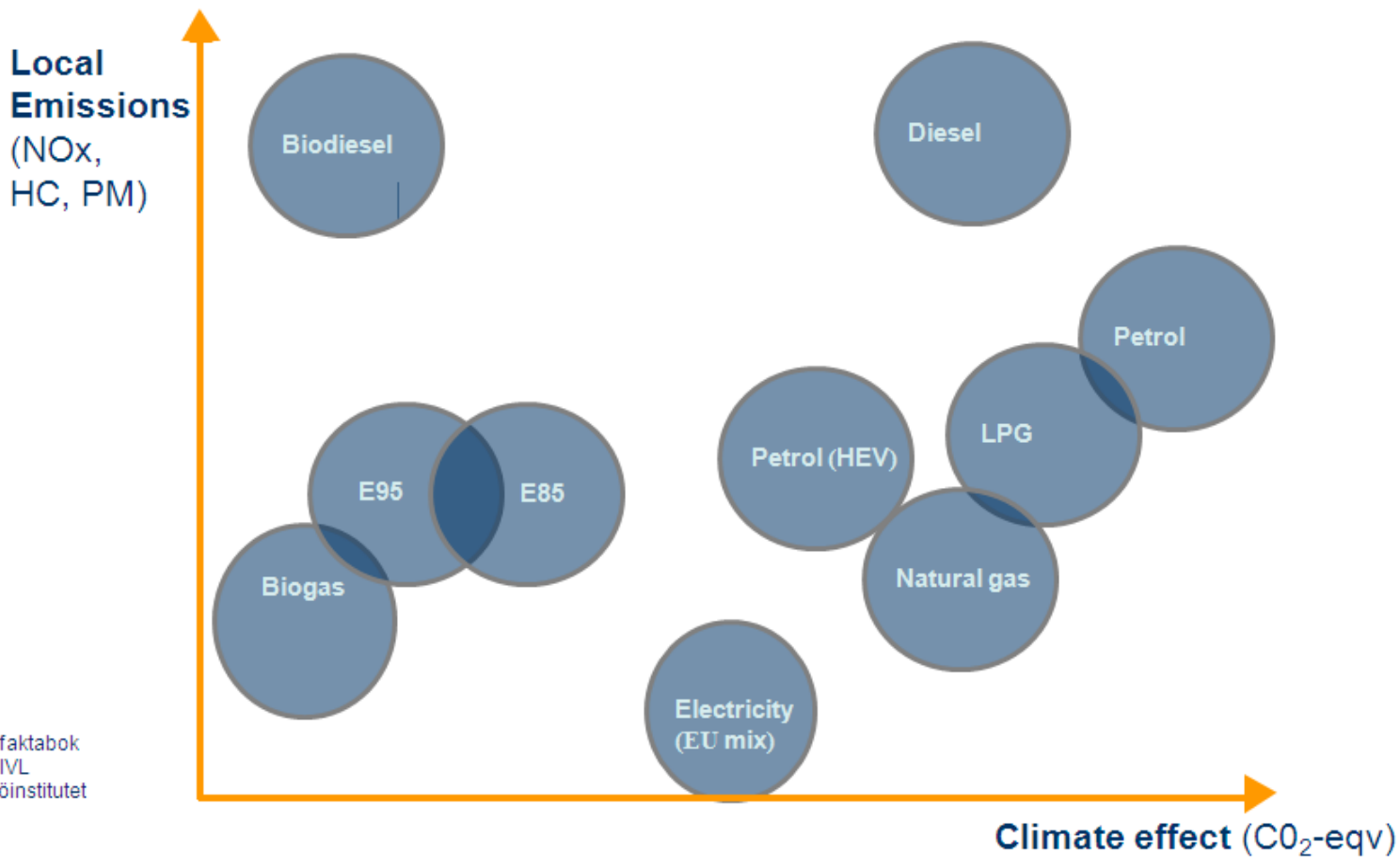
- Stimulation of the local economy:
  - new local enterprise
  - new jobs
- Stability: possible independence of the locally produced biogas from the global market and oil price fluctuations
  - stable supply and demand on the local level
- The spending on fuel will remain in the local or regional economy
- Reduction of waste processing costs
- CO2 tax reduction (zero emission)
- Improvement of air quality in the city

# Why use biogas as transport fuel?

- The biogas fuel pollution is lower than conventional fuels generated pollution

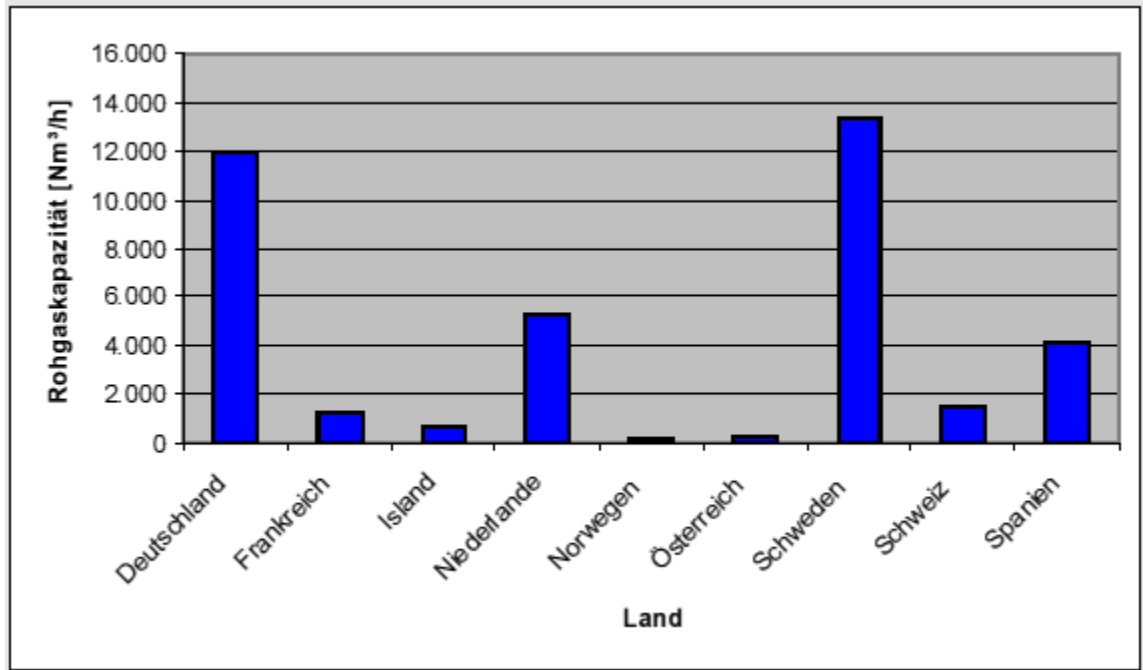


# Why use biogas as transport fuel?



Source: Miljöfaktabok för bränslen, IVL Svenska miljöinstitutet

# Biogas upgrading in Europe



# Using biogas as transport fuel: Göteborg

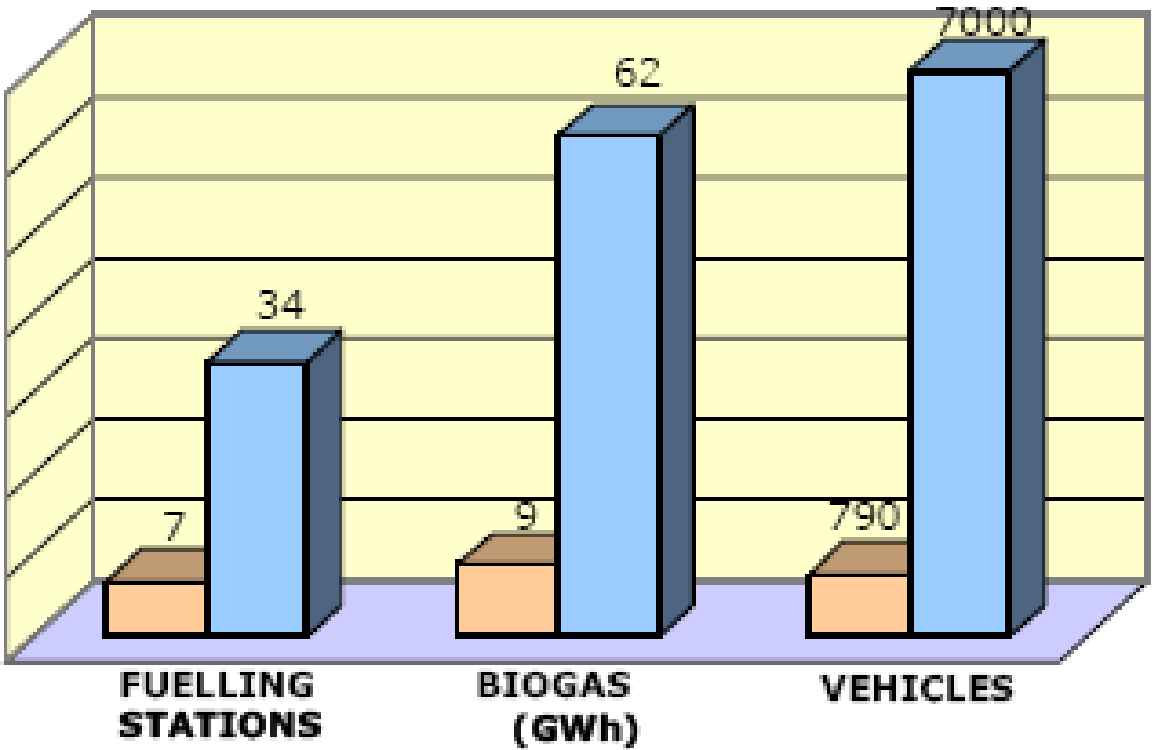


# Using biogas as transport fuel: Göteborg

- 11 filling stations, 3 new ones are planned for 2010,
- Filling stations are supplied with biomethane through natural gas grid,
- 798 km long, located on the West Swedish coast,
- Bio-methane price is 1.29 €/Nm<sup>3</sup>, equivalent to 1.02 €/Nm<sup>3</sup> of gasoline,
- FordonsGas Sverige AB build and run gas filling stations in Sweden.



# Bio-methane development in West Sweden 2001-2007



# Biogas Highway

The aim: to connect Stockholm with Göteborg via biogas fuelling stations along the E20 Highway (500 km)

Fleets of vehicles that run on biogas in these areas enabled to travel between the two cities.



- Since 2006
- Together with partners from Switzerland, Sweden, France and Italy
- The aim: to promote biogas as a vehicle fuel in Europe
- More: [biogasmax.eu](http://biogasmax.eu)



# Bus Rapid Transit



# Bus Rapid Transit

- The need:  
new urban mobility culture in Europe
- Solution:  
creating a European brand  
for high quality bus services

- **It answers the need:**
  - Better flow, greener, smarter, more accessible and safer
- **It works**
  - South America, USA, China, Europe
- **It is NOT BRANDED in Europe**
  - No name product

# A bus revolution?

- a “green” public transport product
- high quality
- based on busses
- fast and frequent
- along dedicated corridors
- with dedicated stops and stations

# What is BRT?

- a “green” public transport product
- high quality
- based on busses
- fast and frequent
- along dedicated corridors
- with dedicated stops and stations

# BRT definitions

“Bus Rapid Transit can best be described as a combination of facility, systems, and vehicle investments that convert conventional bus services into a fixed-facility transit service, greatly increasing their efficiency and effectiveness to the end user.”

*Federal Transit Administration  
Bus Rapid Transit Demonstration Program  
December 2002.*

“A flexible, high performance rapid transit mode that combines a variety of physical, operating and system elements into a permanently integrated system with a quality image and unique identity.”

*Levinson et al.  
Bus Rapid Transit - Implementation Guidelines  
CRP Report 90-Volume II*

“Bus Rapid Transit is a high-quality, customer-orientated transit that delivers fast, comfortable and low-cost urban mobility.”

*The Institute for Transportation and Development Policy*

# BRT system characteristics

- Stations
- Vehicles
- Services
- Corridors
- Route structure
- Fare collection
- Supporting technologies

# BRT Major Elements - Stations

- Level boarding and alighting
- “Branded,” consistent with appearance of BRT vehicles
- High-quality, attractive, functional amenities

# BRT Major Elements - Vehicles

- Easy-to-board (level with platform)
- Multiple-door boarding and alighting
- “Branded” exteriors that are distinctive and consistent with appearance of stations
- High capacity
- Pleasant interior conveniences
- Quiet
- Low or zero emissions

# BRT Major Elements - Services

- Frequent all-day service
- Short headways (10 minutes or better)
- Wide station stop spacing

# BRT Major Elements -Corridors

- Dedicated corridors, exclusive bus lanes
- Distinctive pavement treatment

# BRT Major Elements - Route structures

- Simple route layout
- Convenient transfers
- Station locations coordinated with land-use plans
- Service to major activity centers

# BRT Major Elements - Fare collection

- Off-vehicle fare collection
- Emphasis on prepaid fares

# BRT Major Elements - ITS and Technology

- ITS technologies (for example, real-time “next bus” arrival information signs at stations, “next stop” signs on board buses, smart fare payment media and technology, traffic signal prioritization, and traffic management)
- Automated guidance features for precision operations and docking

# History - examples from Europe

- BRT implemented or discussed in:
  - Lyon, Rouen and Nantes (FR)
  - Eindhoven (Netherlands)
  - Madrid (Spain)
  - Leeds, Edinburgh and Manchester (UK)

# History - examples from Europe

## Nantes

- BRT (named BusWay) implemented December 2006.
- Buses runs every 5 min during peak hours.
- Operated by specific branded buses.
- Ticketing machines are located at each station.
- The patronage was averaging 19 000 per day by December 2006.



The Nantes BRT bus stops have been equipped with modern design that attracts passengers from the less environmentally friendly modes of transports

## Rouen

- 3 BRT lines (named TEOR, Transport Est Ouest Rouennais) in operation since 2001.
- TEOR consists of 16 miles and 41 stops.
- In 2004, TEOR travelled more than one million miles and made 7.2 million trips, carrying 30,000 passengers to their daily destinations.
- The buses are equipped with an optical guidance system.
- All buses have low floors and clean diesel engines fitted with catalytic converters using desulphurised diesel fuel.
- The busses have an on-board system to give priority at traffic lights.
- Buses operate either in separate lanes, bus lanes or in mixed traffic.
- There are specific video and audio information and ticket vending machines at all stops.



# History - examples - Curitiba, Brazil

Curitiba's implementation is one of the most successful, award-winning, and extensive BRT systems in the world.

One of the keys to the success was the early establishment of a master plan for growth and its strict implementation over the years.

The resulting BRT system is characterized by:

- Integrated planning
- Exclusive bus lanes
- Signal priority for buses
- Preboard fare collection

Easy boarding (raised platforms, multidoor buses, tube stations)  
Free transfers and discounted or free fares for the disadvantaged, elderly, etc.

Large-capacity, wide-door buses (up to 270 passengers per bus)  
An overlapping system of bus services

The Curitiba urban area with its 2.2 million population enjoys congestion-free streets and pollution-free air where 1.3 million passengers ride the system daily.



# History - examples - Beijing

During its first pilot year 2005 the Beijing BRT was 5.5km long and carried <1,500 passengers daily. With only left-side doors the fleet of BRT busses could not be used outside the BRT corridor.



Station



Exclusive right of way



South gate of Tiananmen

The first corridor is now 16km and in January 2006 several competing bus lines have been closed the ridership has increased to around 75,000 passenger boardings per weekday in March 2006, and on some days has reportedly exceeded 100,000 passengers.

# History - United States

1960s: Before it even had the name, BRT first got major backing in the United States with the rise of federal funding for urban mass transportation during the 1960s.

1973: The first exclusive busway the El Monte Busway, an exclusive bus lane between El Monte and Los Angeles, California.

Today, American BRT initiatives receive a great deal of support from the Federal Transit Administration (FTA). Planned BRT lines are now eligible to be included in the FTA's New Starts program, which was formerly reserved only for rail projects.



Boston MBTA Silverline today

**Thank you for your attention**

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