

SABIA
BioGas National Conference 2013



Industrial Development Corporation

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Biogas and Green Transport

Driving Economic Growth

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Green Industries
30 October 2013

USA (3 % of world population) has used 50 % of world petrol

SA population with USA level income uses MORE petrol than same American –cost?

FACT: USA lifestyle NOT sustainable (nor affordable) for planet <http://antwrp.gsfc.nasa.gov>

Ways to Green Transport (& reduce economic impact)

1. Reduce transport distances or travel
2. **Increase occupancy (public transport)**
3. More efficient or lower GHG “vehicles” (Gautrain, NMT, hybrid, elec with Fuel Cells etc)
4. **Greener fuels (biofuels/renewables) in existing & new vehicles**

Commercially available sustainable biofuels



Ethanol

90 % of World’s biofuel
 Local and global fuel
 Sustainable volume
 production
 CO2 reduction 0 – 70 %



Biogas

Local waste to fuel
 Good for local fleets
 Can be combined with CNG
 Expensive infrastructure
 CO2 reduction 95 %



Biodiesel

Many feedstocks
 Similar to diesel
 High and low blends
 CO2 reduction 35 %

lot of energy in organic waste



**1 ton of bio waste = 100 Liter petrol-equivalent
= 1'000 km CO2-neutral car drive**

Baltic Biogas Bus Study 2007-2012



Ranking - the environmental impact

Greenhouse gases CO₂

1. Biogas
2. Ethanol
3. Biodiesel (RME)
4. Diesel

Emissions NO_x

1. Biogas
2. Ethanol
3. Diesel
4. RME

Emissions PM

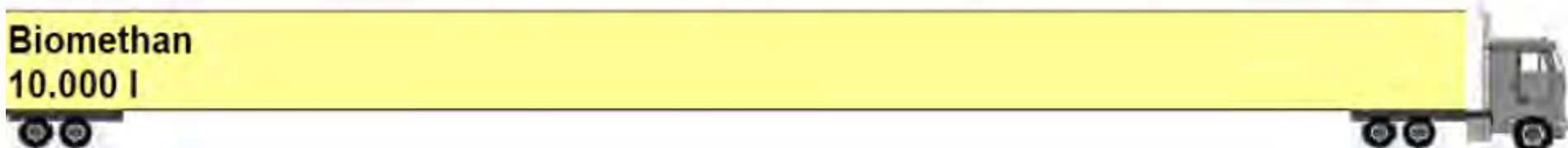
1. Biogas
2. Ethanol
3. RME
4. Diesel

Noise

1. Biogas
2. Ethanol, RME, Diesel



EUROPEAN Study: Biogas top grown transport fuel



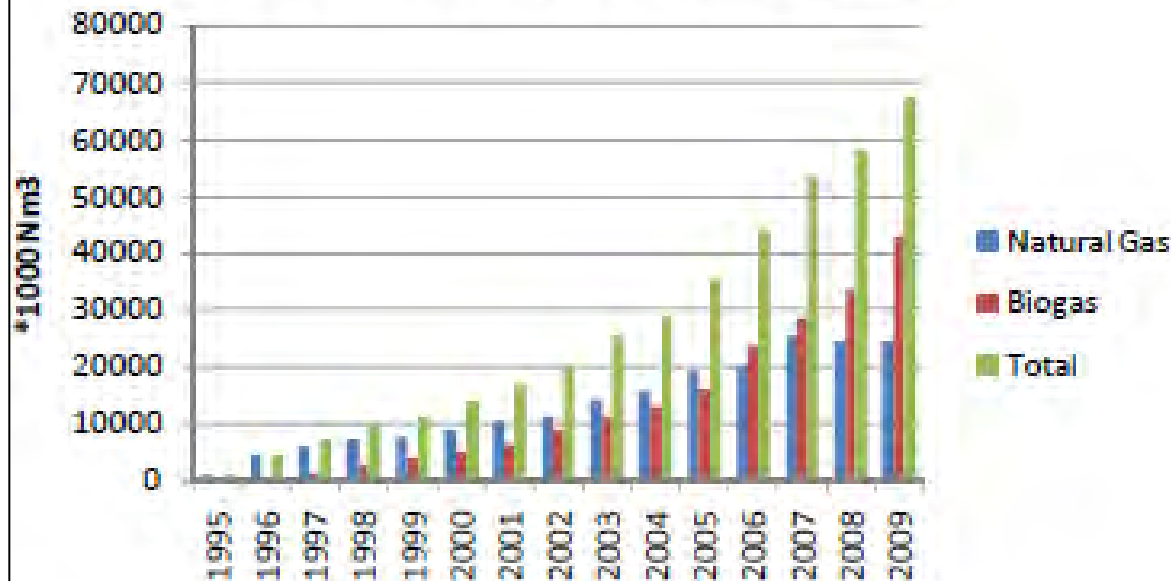
The top position of bio methane results from:

- new, high yielding varieties
- Utilization of the whole crop
- Superior utilization of vegetation period
- High conversion efficiency

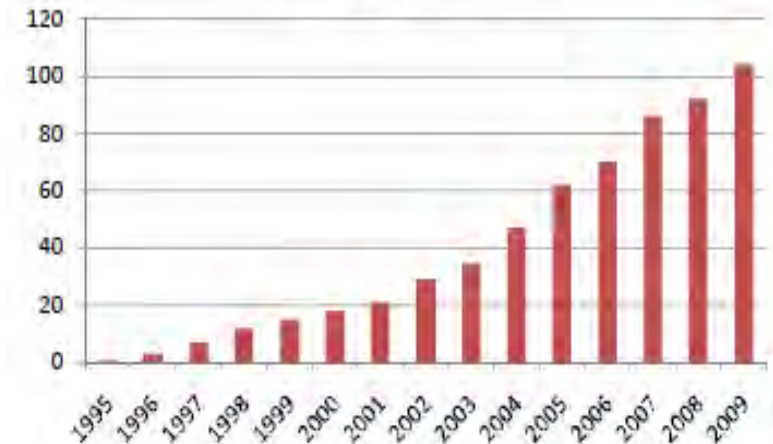
- Diesel equivalents per ha

Sweden: Progress with Gas Vehicles

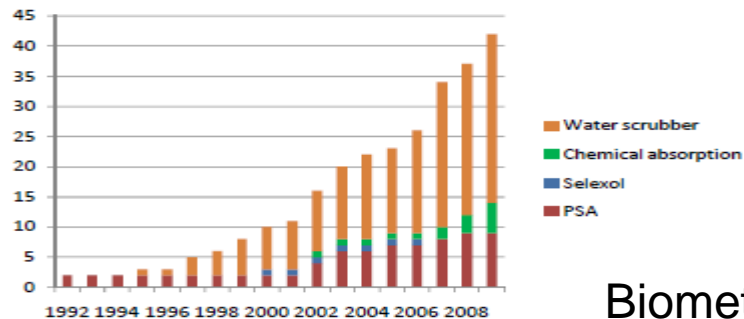
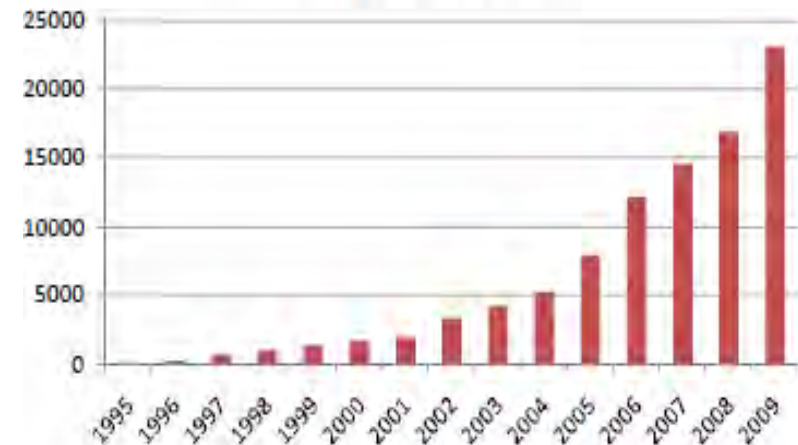
Sold amounts of Vehicle Gas



Filling stations



Vehicles



Biomethane Plants

IDC Gas into Transport Drivers

1. Energy security and reduced fuel costs (FOREX)

- a. use of domestic natural gas (and biogas)
- b. reducing foreign currency expenditure or increasing crude oil exports
 - e.g. Argentina, Brazil, Egypt, Iran, Malaysia, New Zealand, Pakistan, Thailand and Venezuela

2. Reduction of urban pollution (HEALTH) from automobile exhaust emissions

- e.g. China, India, Korea, Malaysia and the US – whose governments have provided significant incentives

3. Reduction of GHG emissions

- e.g. Australia and the EU – notably Germany and Sweden

4. SUSTAINABLE (means economic, enviro and for people/Jobs) – SA Focus

BIOGAS SUPPLY POTENTIAL FOR SA

Country	Biogas Toe pa per mil people		Biogas plants No.			Potential Mil TOE pa	Potential of national liquid fuels %
	2002	2007	LFG	Sewage/Waste	Farms		
<i>Germany*</i>	8	30	182	977	5000	11 (4 ^{**})	7
<i>UK</i>	18	35	365	90	6	2	5
<i>Sweden</i>	16	20	72	134	21	0.8	5
SA		<1	<10			10 (9GWe)	40 ^{***}

**Build ca 1000 new biogas plants per year*

*** Germany has already reached this level in 2013, but mainly supplied as CHP elec*

SA “SUPPLY” potential has not been started to be developed

***** Believe 10 % of liquid fuels in long term is realistic. T/over ca R 25 bil pa**

Jobs from Gas Sources

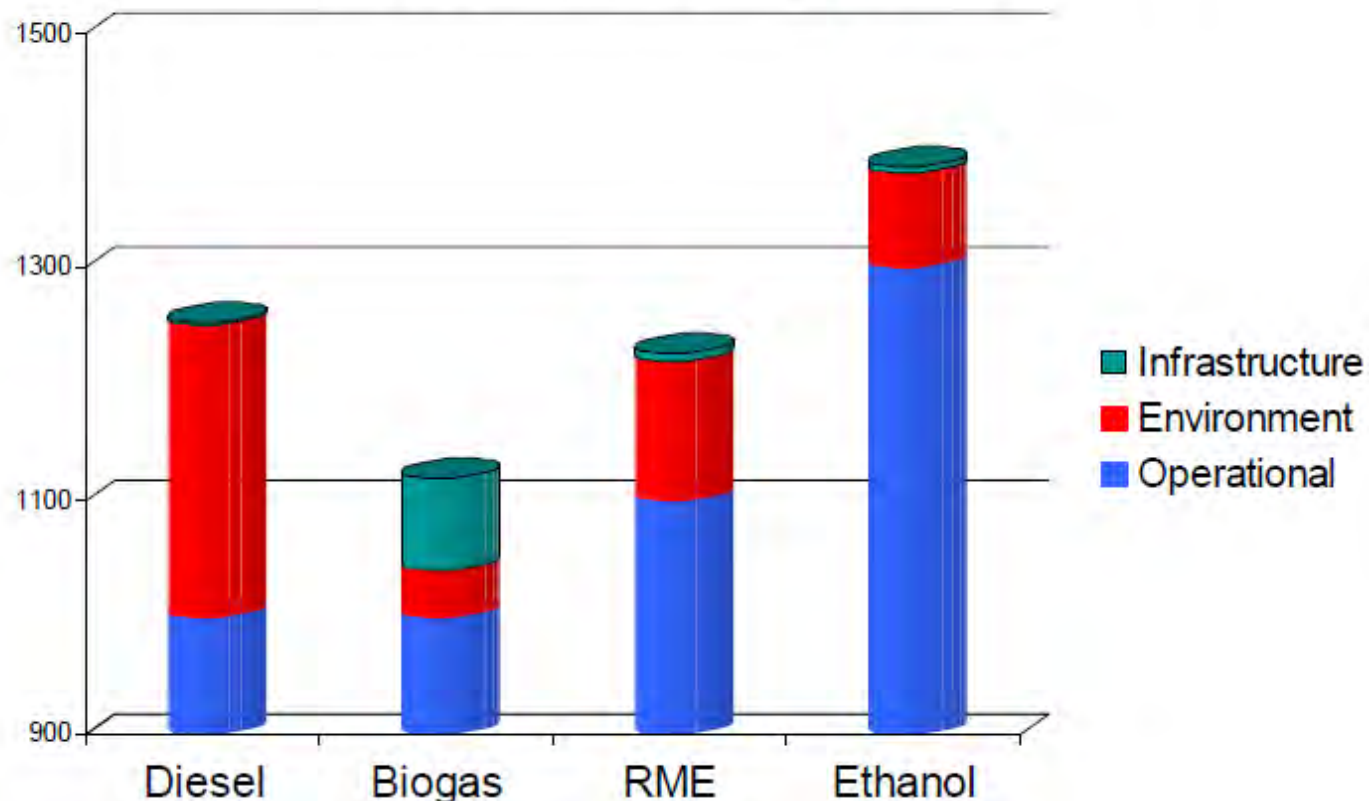
Gas System	Jobs/R million Capex *	Jobs versus crude refining	Jobs per 10 % national fuel volumes
Biogas from Waste	0.3	25x	40 000
Biogas from Crops	2	200x	350 000
Landfill Gas	0.4	20x	25 000
CNG Only	1	14x	14 000

* Includes vehicle conversions distribution & filling station capex

Baltic Biogas Bus Study findings



Total cost, operational and environmental cost (marginal cost kr incl infrastructure) per 100 km



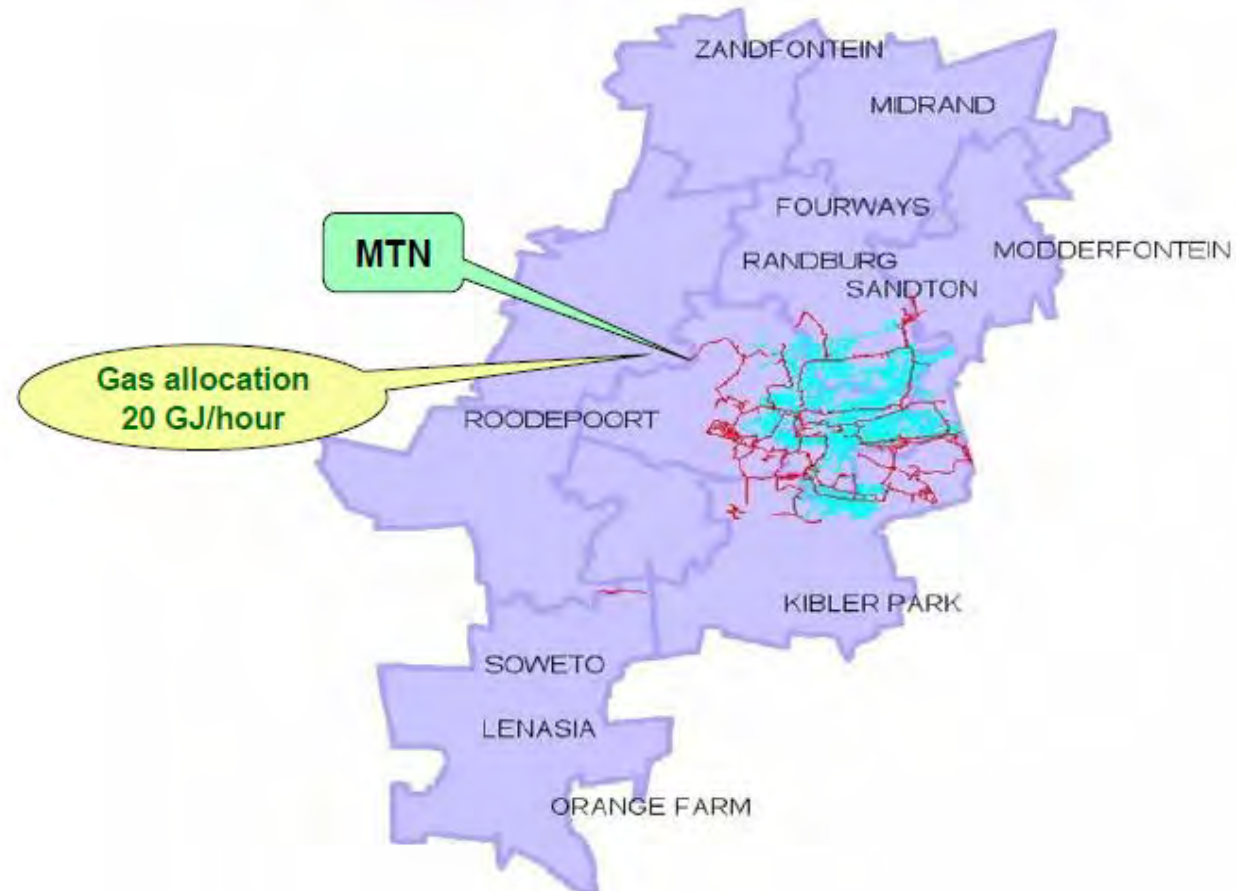
IDC Diesel dual fuel Commuter Bus trial

- **Generated accurate fuel consumption & operating cost data**
- **Operating conditions evaluated mainly mix of urban stop-start and highway driving during peak traffic periods, on relatively congested highway**
 - diesel substitution with gas 71%
- **Fuel operating cost saving : 76c per km (19.2%) on 71% diesel substitution**
- **Gives payback of between 3- 9 years (Minibus Taxis less than 2 years)**
- **Diesel dual fuel operation has no negative effect on engine durability and cost of maintaining vehicle compared to standard (diesel-only) operation**
 - Oil drain interval could be extended by as much as 100%
 - Fuel operating cost saving is only portion of life cycle cost saving achievable from diesel dual fuel operation

Baltic Biogas Study Core Messages

- Almost 100 per cent renewable
- Very efficient as fuel
- Improves urban air quality
- Reduces Global Warming
- Produced locally
- Improves energy autonomy
- Creates jobs
- *Stable and secure biogas supply is key, or link to natural gas*

Egoli gas network



Support for Green Energy in South Africa

	c/kWh ¹	R/GJ	R/litre petrol eq.	Comments
<u>ELECTRICITY USAGE</u>				Locally produced
<i>Wind</i>	50	140	4.40	Unreliable, low jobs
<i>PV/CSP</i>	90	250	8	Day time, low jobs
<i>Biomass</i>	56	157	5	Reliable
<i>Land fill gas</i>	40	110	3.70	Flexible (can peak)
<i>Biogas</i>	30	84	2.6	Jobs, flexible (can peak)
<u>LIQUID/TRANSPORT FUELS</u>				Imported at margin
<i>Biogas</i>	?	?	?	Jobs – high for grown biomass
<i>Bio- ethanol/diesel²</i>	28	77	2.50	High jobs (ca R20kpa/job)

1. REIPP tender less Eskom cost of generation (base load 50 c/kWh); Eskom peaking is 10x!
2. In development (indicative) and Fuel tax issues eg. none now for LPG, CNG/Biogas

Biogas: EU Findings on Major Challenges & Needs

- **Political willingness to act eg. City Councils made decisions in EU as driving force**
- **Knowledge and information among population and decision makers**
- **Multi-sector policy (landscape) – local, regional, national (international)**
- **Economic structure - taxes, incentives**
- **Composition of energy mix and local energy markets**
- **Different resources have different ownership structures**
- **Resource of biogas are disperse**

KEY: Match SUPPLY (Production & Distribution) with MARKET (Transport Sector)

- **Regulatory (tax etc) to forbid, restrict or give advantage – a MUST ex National Govt.**
- **Availability of waste (biogas sources) and of fleets (buses) at scale**
- **Funding of infrastructure, production and fleet renewals**
- **Natural gas as enabler (transitional bridge and back-up) - use synergies**



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THANK YOU