

APSE Scotland – Aviemore 4th -7th May 2010

Biomethane

Waste to Vehicles

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6th May 2010

Scotia Gas Networks



Scotia Gas Networks is the 2nd largest gas distribution company in the UK, serving 5.7M customers having a footprint in Scotland and Southern and South East England .

Owned by SSE, Borealis and Ontario Teachers Pension Fund, the company's prime responsibilities are for the safe and reliable operation of the underground pipeline network and associated equipment.

Climate Change



- Rising awareness and focus
- UK Gov create DECC
- Push towards renewable energy sources
- 15% renewable target by 2020

Climate Change and Sustainability



- Scottish Government
- 70% recycling by 2025
- Landfill tax escalator
- Methane 21 times CO₂
- European Lag
- Air Quality
- Many solutions, MBT, MHT, AD etc

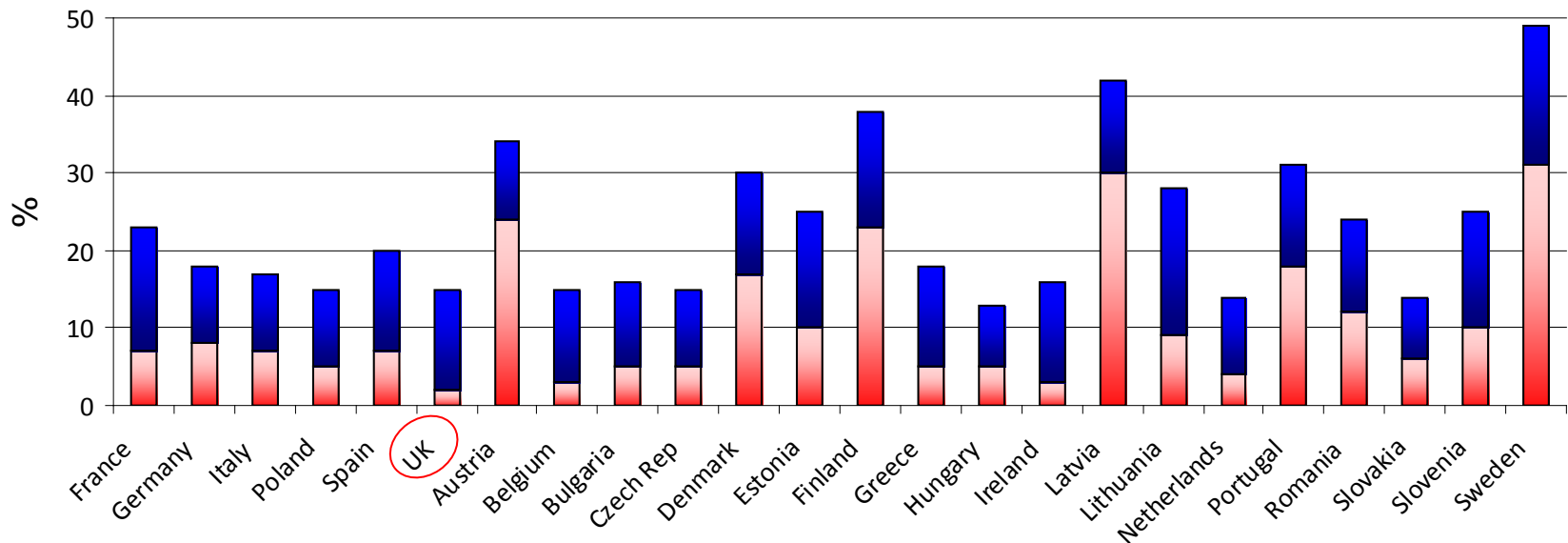
UK's Renewable Performance



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Renewable Energy Level as % of Total Demand

Current Performance 2020 Target

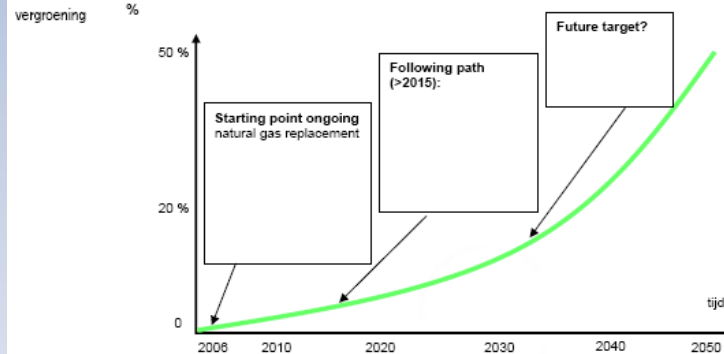


(How to Meet the EU's 2020 Renewable Targets, Centre for European Reform, 2009)

Renewable Gas

- Gasification
 - Biomass
 - Coal ?
- Anaerobic Digestion
- Landfill Gas
- Coal Seam Gas
- Syngas

Ambition for Green Gas



- Short term target: Replacement of natural gas by upgraded biogas 1-3%
- Midterm target: 8-12% replacement of natural gas in 2020 (4 billion Nm³/y), inclusive SNG production from biomass
- Long term: Upscaling to 50% replacement of natural gas by green gas in het gasgrid

Anaerobic Digestion



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- Various Feedstocks
 - MSW, Food waste
 - Sewage, Animal slurry
- Methane 55-75 %
- Steady flow rate
- Fertiliser output



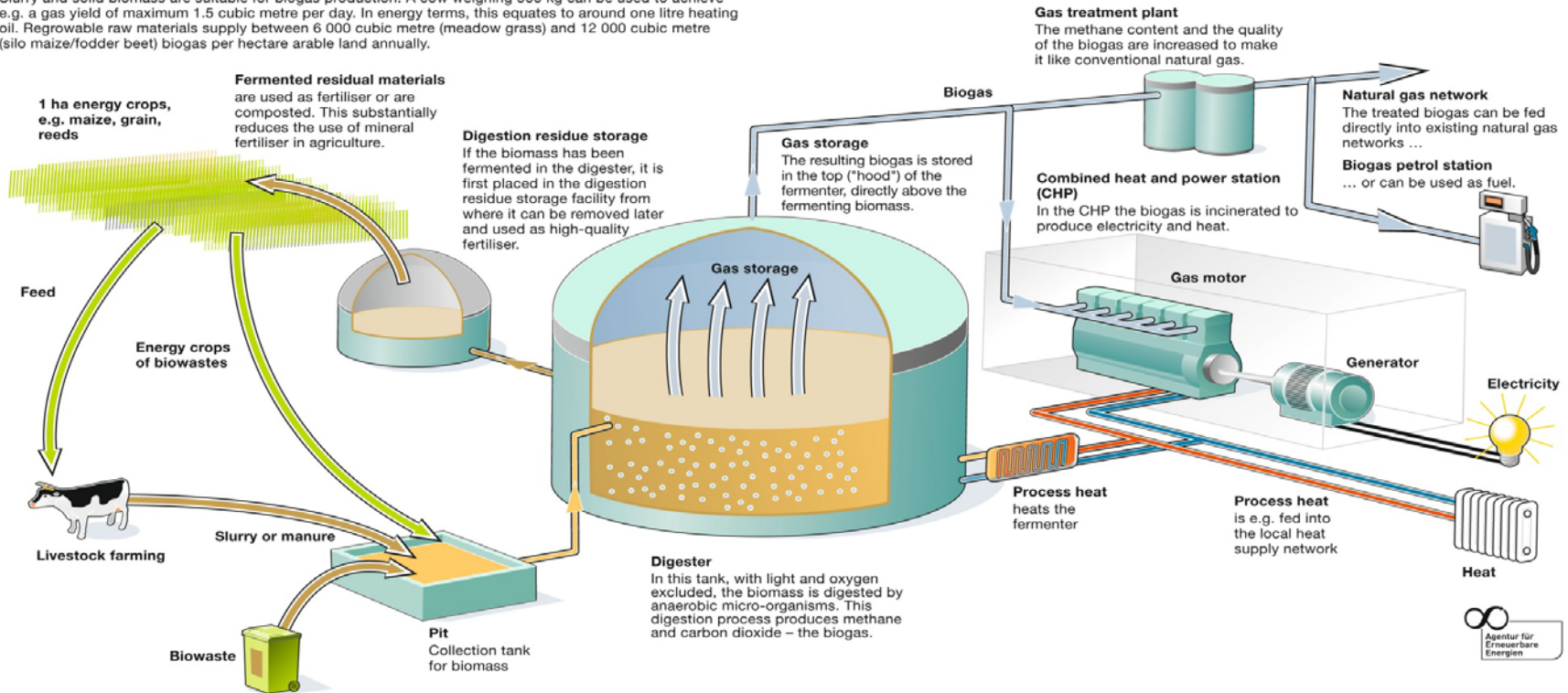
Anaerobic Digesters and Biogas Uses



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Biogas system

Slurry and solid biomass are suitable for biogas production. A cow weighing 500 kg can be used to achieve e.g. a gas yield of maximum 1.5 cubic metre per day. In energy terms, this equates to around one litre heating oil. Regrowable raw materials supply between 6 000 cubic metre (meadow grass) and 12 000 cubic metre (silo maize/fodder beet) biogas per hectare arable land annually.



Scrubbing Technologies



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- Removes H_2S & CO_2
- Removes Siloxanes
- Different technologies
- Proven in Europe
- Demonstration Project
- Modular



Biomethane to Grid



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BtG Plant comprises the following

- Propane storage and injection
- Odorant storage and injection
- Gas Quality Monitoring
- Gas CV Measurement
- Gas Flow Measurement
- Pressure Control
- Telemetry



Value of Biogas



- Biogas from AD attracts 2 x ROC's
- DECC have proposed a premium of 117p per therm for biomethane to grid , not enough
- Consultation closes 26th april
- DECC acknowledge did not incl BtG costs
- RTFO - £3.5m grant available in England
- EU renewable energy directive – should collect 2 x RTFO

Biomethane Road Fuels

- CNG, LNG, CBM
- Carbon Neutral on CBM
- Increased filling stations
- Domestic cars
- Short haul commercials
- HGV developments



VW Caddy Eco Fuel

- Best selling CNG van in Germany, launched mid 2006
 - Built to run on CNG rather than a petrol conversion
 - Right hand drive is type approved for sale in UK
 - Also available at Caddy Maxi Car – 7 seats
 - We are working with a number of companies who make home refuelling devices that can fill with CNG overnight
 - Good financial savings, good eco outcome



MB Sprinter NGT

- Mercedes Benz
 - Sprinter CNG in UK in Q2 2009
 - First time MB have designed a CNG Sprinter from 'first principles' (rather than petrol conversion):
 - Very low emissions
 - 25% less CO₂ than petrol on grid gas
 - Carbon neutral on bio-methane
 - Also has petrol tank
 - Total range of 1100 km
 - Ideal for supermarket home delivery, quiet, clean, long range, fast refuelling



Econic RCV

•Refuse Trucks

- MB Econic (see below in Malmo, running on bio-methane)
- Also Leeds, Lille



Significant interest in the UK, initially on fossil CNG but migrating to CBM as ADs are developed. It has to make sense!

Dennis Eagle Dual Fuel RCV [Leeds]

Substitution Rate %	CO2 reduction%
50%	13.7%
55%	15.1%
60%	16.4%
65%	17.8%
70%	19.2%
75%	20.6%



Vehicle can still run on diesel –
good savings on ‘fossil CNG’ –
more than 50% CO2 reduction
on CBM

Volvo Trucks Methane/Diesel, CNG/LNG



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- UK and Sweden
- 2007 demo
- 2010 field tests
- 2012 production
- 13lt LNG engine
- 7lt CNG engines
- Existing Euro 5
- 25% fuel saving
- Increased range

**From concept to reality
– in just three years**



Volvo Trucks
Environmental Affairs
14 2010-01-13



Volvo Trucks

Methane/Diesel, CNG/LNG



Scotia
Gas Networks

Methane gas + diesel – technical solution

- A standard Euro V diesel engine with 45% energy efficiency
- 50-80% of the diesel can be substituted by methane gas
- Can run on only diesel if out of gas



The Way Forward

- DfT in England announce £3.5M for pilot projects
- Consultation on RHI closed 26th April to DECC
- Biomethane to get at least 2 x RTFO if made from waste
- Think Waste as a commodity
- Innovate
- Lobby !, Lobby !, Lobby !



Acknowledgement



This presentation has only been possible with the help of CNG Services Ltd, an innovating partner of SGN providing :-

- Clean-up of biogas to make biomethane and its injection into the gas grid
- Use of biomethane as a vehicle fuel
- Design and build of new CNG filling stations
- Use of trailers to act as 'virtual pipelines' to move natural gas where no pipelines area available
- Use of gas pressure to generate electricity (design and build of expander-CHP plants)
- Design and project management services in relation to gas pipelines