



Bio-methane and the UK Fuels roadmap to 2030

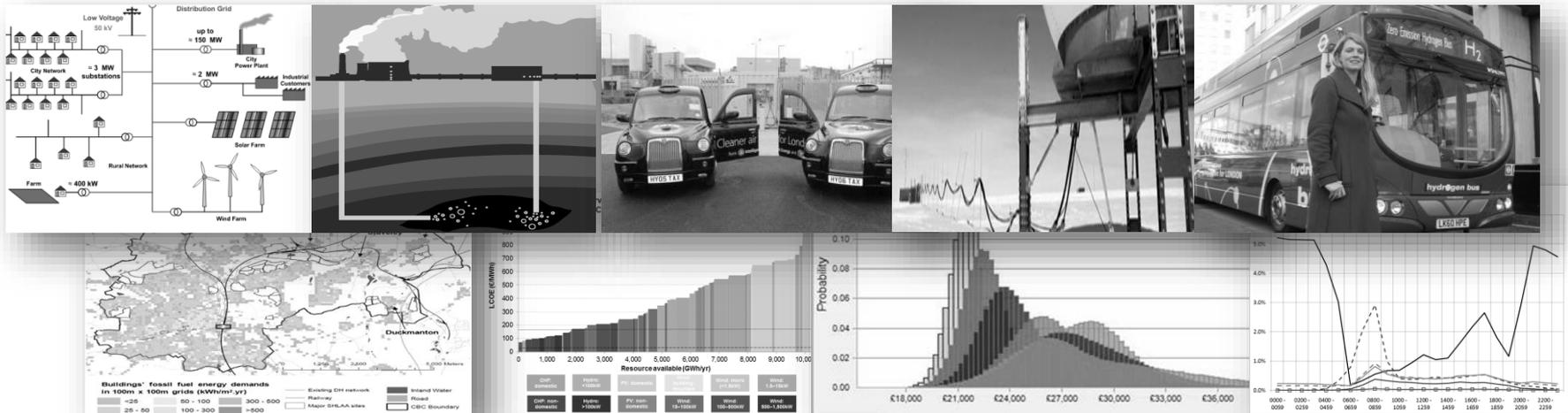
25/06/2014
NGV Day 2014

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Element Energy Limited

Element Energy – a consultancy dedicated to the energy sector

- Element Energy is a specialist energy consultancy, with an excellent reputation for rigorous and insightful analysis.
- We provide consultancy services across a wide range of low carbon energy sectors, including: energy networks, energy storage, carbon capture, renewable energy systems and low carbon vehicles



- We consult on technical and strategic issues – we believe our technical and engineering understanding of the real-world challenges supports the strategic work and vice versa.
- Our dedication to fully addressing clients' needs is often noted as a distinguishing feature of our approach.

Element Energy provides strategic insights on the key issues related to transport for both public and private sector clients



Introduction

- Today's talk based on EE recent work for the Low Carbon Vehicle partnership (LowCVP), published on the 18th June 2014:
 - “Options and recommendations to meet the RED transport target”
 - “Road Transport Fuels Roadmap for the UK ”
- EE's public reports all available at <http://www.element-energy.co.uk/publications/>
- Focus of today's talk:
 - Biomethane in the 2020 context: the RED transport target
 - The role of biomethane and gas beyond 2020 – Gas fuel roadmap



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- Context to 2020: RED target, UK biofuel policy and study findings
 - Beyond 2020: the role of gas in the UK Fuels Roadmap to 2030
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EC level : the Renewable Energy Directive (RED) calls for 10% of renewable energy in transport by 2020

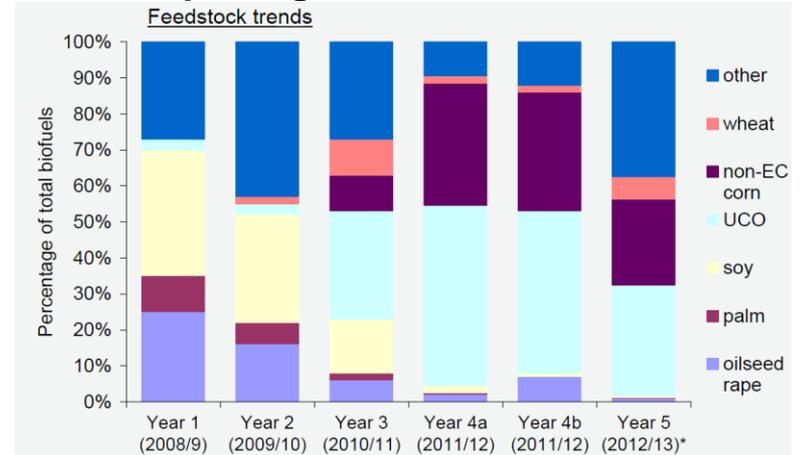
- DIRECTIVE 2009/28/EC, 'the RED'
 - Target of 20% of the EU energy to come from renewable sources by 2020, with a sub-target for the transport sector: **at least 10% of the final energy consumption in transport must come from renewable sources**
 - Describes WTW GHG emissions to be accounted for and set sustainability criteria for eligibility. Criteria changing with years, e.g. 35% GHG WTW emission savings today (compared to fossil fuel), 60% by 2018
 - Double counting of 'advanced fuels', based on feedstock (not on WTW savings nor technology readiness)
 - No inclusion of Indirect Land Use Change (ILUC) factors but reporting proposed for crop-based biofuels
 - A 7% cap on transport energy from crop-based biofuels to be voted on in 2014
- Biomethane case:
 - Biomethane made from crops counts towards the target if it meets the WTW threshold
 - **Biomethane made from waste (e.g. land fill biogas) counts twice towards the target**
i.e. 1TWh of biomethane is counted as 2TWh

At UK level, no defined strategy to reach the 10% RED target. DfT to define a transport biofuels strategy in 2014

- Mechanism to incentive blending of biofuels: RTFO
 - Fuel providers are obligated to blend biofuels
 - Reporting of GHG WTW emissions; successful shift to 'cleaner'; biofuels
 - Double counting for Used Cooking Oil introduced in 2009/10
 - Target set at 4.75% for 2014 **and no increase announced i.e. no pathway to 10%**
- Gallagher review 2008 – highlighted ILUC impact
- Bioenergy Strategy 2012 (DECC/DfT/DEFRA):
 - Suggests bioenergy contribution of 8-11% of UK energy demand in 2020, around 12% by 2050
 - Transport is one of the most cost-effective uses of that biomass

But no implementation plan defined
- 2013-14 Dft call for evidence on biofuels for transport: what fuels should be supported, how 'advanced fuels' should be defined, what support mechanisms, etc.

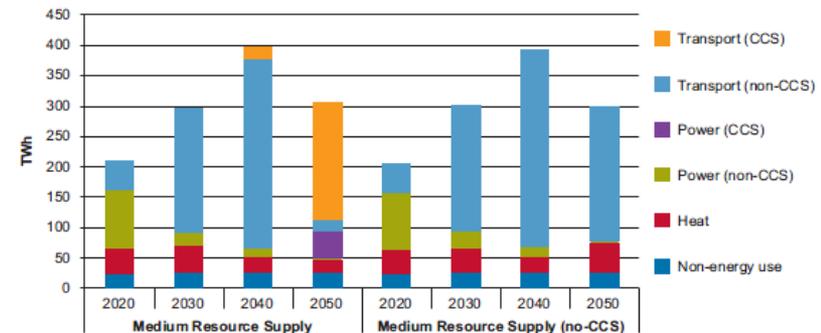
RTFO reporting



UCO: Used Cooking Oil

Cost effective use of biomass

Figure 7: Biomass deployment for primary energy under medium feedstock availability scenario with and without CCS (TWh / year)

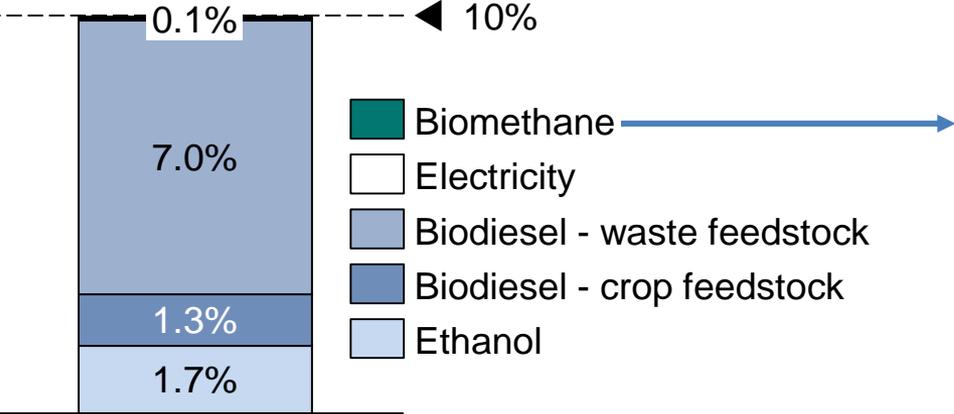


Source: DECC analysis based on Redpoint

CCS: Carbon Capture and Storage

In the recommended RED scenario, biomethane has a small contribution due to limits in production capacities, making up to 1% of the RED target

Contribution to RED target in 2020 – recommended scenario (% renewable energy in road transport)



Contribution of biomethane to RED target

Contribution of biomethane depends on the eligibility of grid-injected gas but is overall small:

- Liquid biomethane only
Supply assumed: 4,600t → 0.25% of target
- Liquid + gas biomethane eligible
Supply assumed: 18,600t → 1% of target

Assumptions for dedicated gas vehicle uptake

	Buses	HGVs
% fleet	1%	1.3%
Number of vehicles	1,650	6,520

Share of biomethane in gas vehicles

C. 8,200 dedicated gas vehicles could be on the road by 2020, representing a demand of 110kt of gas (1.4TWh):

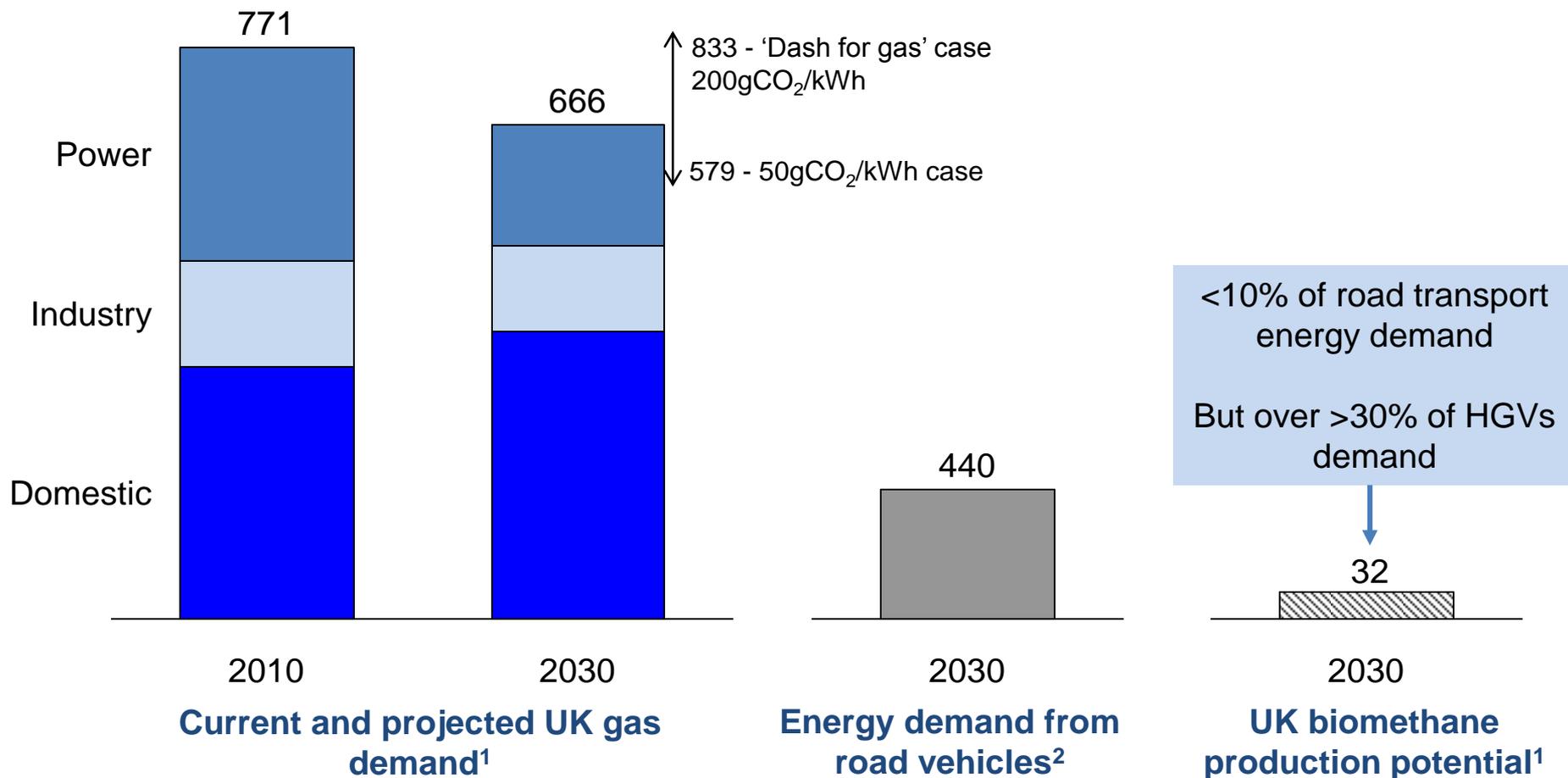
- 4,600t of biomethane → 4% of transport gas demand
- 18,600t of biomethane → 17% of transport gas demand

Source: Options and recommendations to meet the RED transport target, Element Energy for the LowCVP, 2014
Vehicles in scope: cars, vans, HGVs, buses, NRMM

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As for the 2020 horizon, supply potential of biomethane limits its overall contribution to meeting the overall transport demand...

Gas demand /supply and transport energy demand, TWh

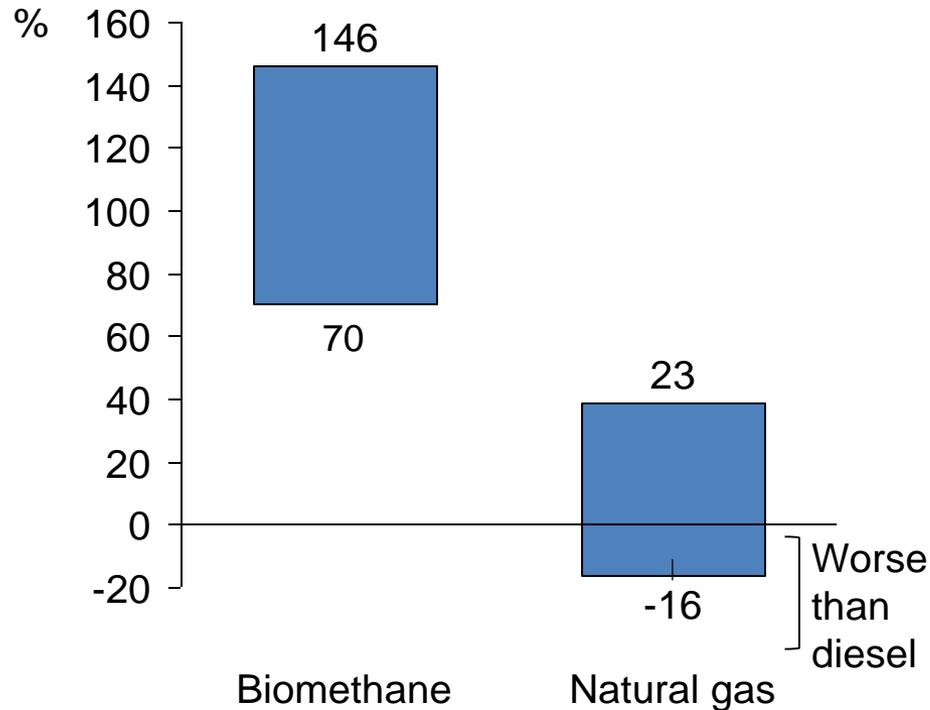


1 – EU funded Green Gas Grid project, 2013 and DECC analysis (2012) for power demand range

2 – EE road transport model

...but biomethane offers excellent WTW emission savings, at least three times better than using natural gas

WTW benefits over diesel (based on buses)¹



Ranges represent different engine technologies (variable efficiencies) and variable Well To Tank emissions (variable production pathways)

Emissions considerations

- Clear advantage of biomethane over diesel and over natural gas in terms of WTW Greenhouse Gas emissions
- Gas vehicles also offer air pollution benefits: decrease PM, NOx (and CO in the case of dedicated vehicles)
- Opportunities to reduce Natural Gas WTW emissions:
 - Reduction of transport distance, e.g. if increase of domestic production
 - Use of 6,000 km Local Transmission System, instead of low pressure distribution system, reducing compression needs (and thus electricity needs, up to -80%); this might require investment to increase capacity

Gas roadmap and conclusions – the deployment of gas vehicles requires a dedicated gas pathway strategy to ensure WTW emission benefits

- The gas fuel roadmap implies:
 - A certification procedure for gas fuel vehicles and a gas specification (e.g. energy content and sulphur content) is agreed at EC level
 - The UK defines a strategy to incentive the uptake of gas vehicles (commercial vehicles and buses) as well as incentivise the best gas pathway in terms of WTW emission reductions, consistency with Carbon budgets and feedstock/gas supply potential
 - Supply of gas vehicles to the UK market is improved as OEMs develop Euro 6 vehicles
- Despite its limited contribution to the 2020 RED target, biomethane should already be supported as it presents very interesting emission savings and will play a role in the transport decarbonisation challenge to 2030 and beyond

Roadmap for the deployment of gas vehicles in the UK

