

Opportunities for High Blend Liquid and Gaseous Biofuels in the UK

Bus Working Group

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Study Scope & purpose

□ Scope:

- To investigate the opportunities for high blend liquid and gaseous biofuel penetration in the UK
- Recommend appropriate mechanisms to stimulate take-up

□ Report includes:

- Sector assessment – segmented by vehicle type
- Barriers, drivers and potential support mechanisms
- Options assessment TCO_{2e} saved; & £/TCO_{2e}
- Conclusions and recommendations

□ Recommendations to LowCVP

- LowCVP Members to consider appropriate response



72 fuel and vehicle combinations considered

		HGV Artic / rigid Large / small	MGV	LGV	Bus	Car
Biodiesel	B5 / B30 / B50 / B100 / BTL / HVO					
Pure plant oil						
Ethanol	E85					
	ED95					
Biomethane	Dedicated					
	Dual-fuel					
Compressed & liquefied	Bi-fuel					

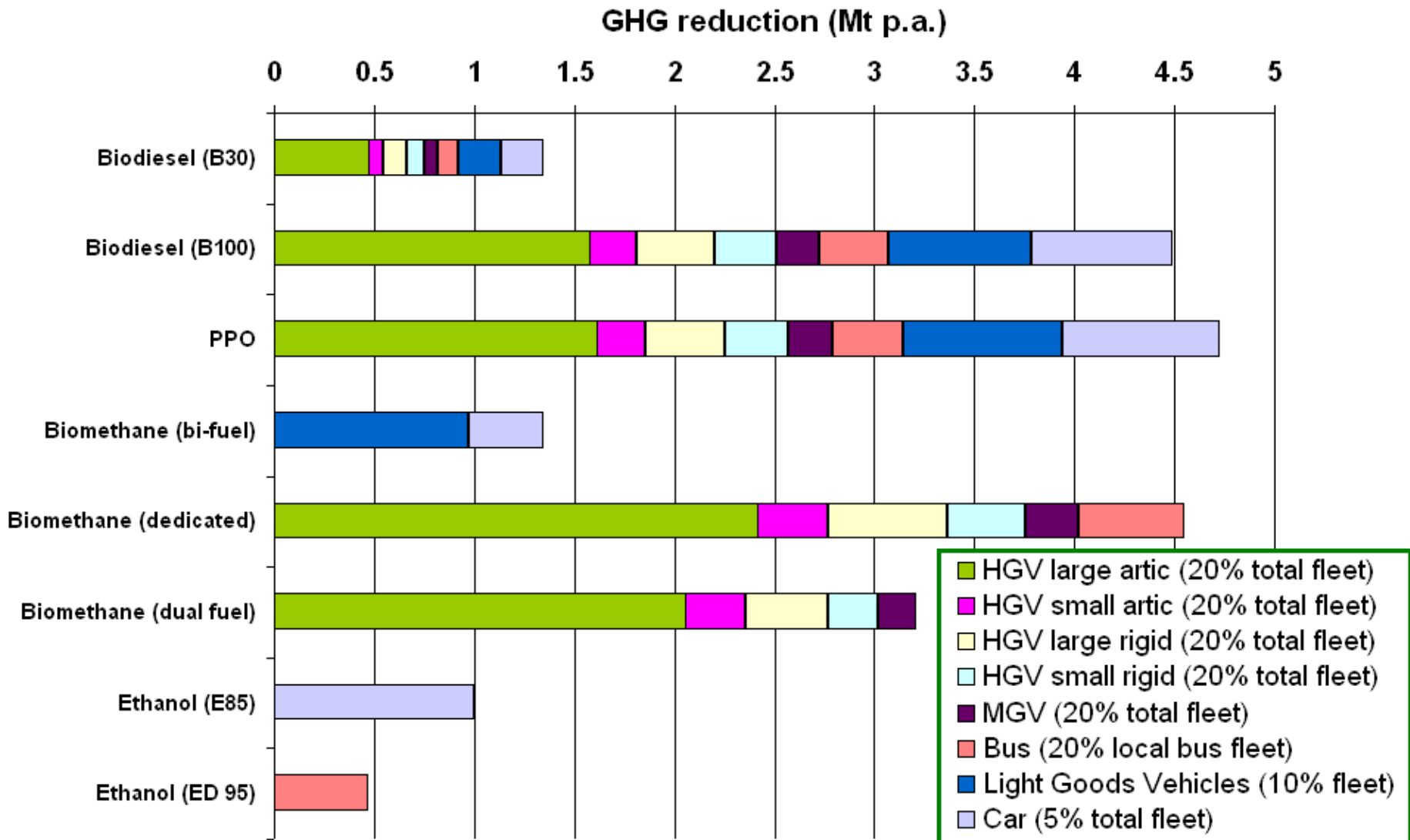
- ❑ Study did not consider:
- Hydrogen – liquid or gaseous
 - E-diesel
 - Biobutanol

Multiple factors influence fuel suitability; with a range of barriers to increased use

- ❑ Multiple factors influence the suitability to use high blend and gaseous biofuels:
 - Type of ownership and size of the fleet
 - Fuelling profile and availability of fuels
 - Vehicle warranty / availability
 - Vehicle usage and range
 - Operator priorities
 - Geography

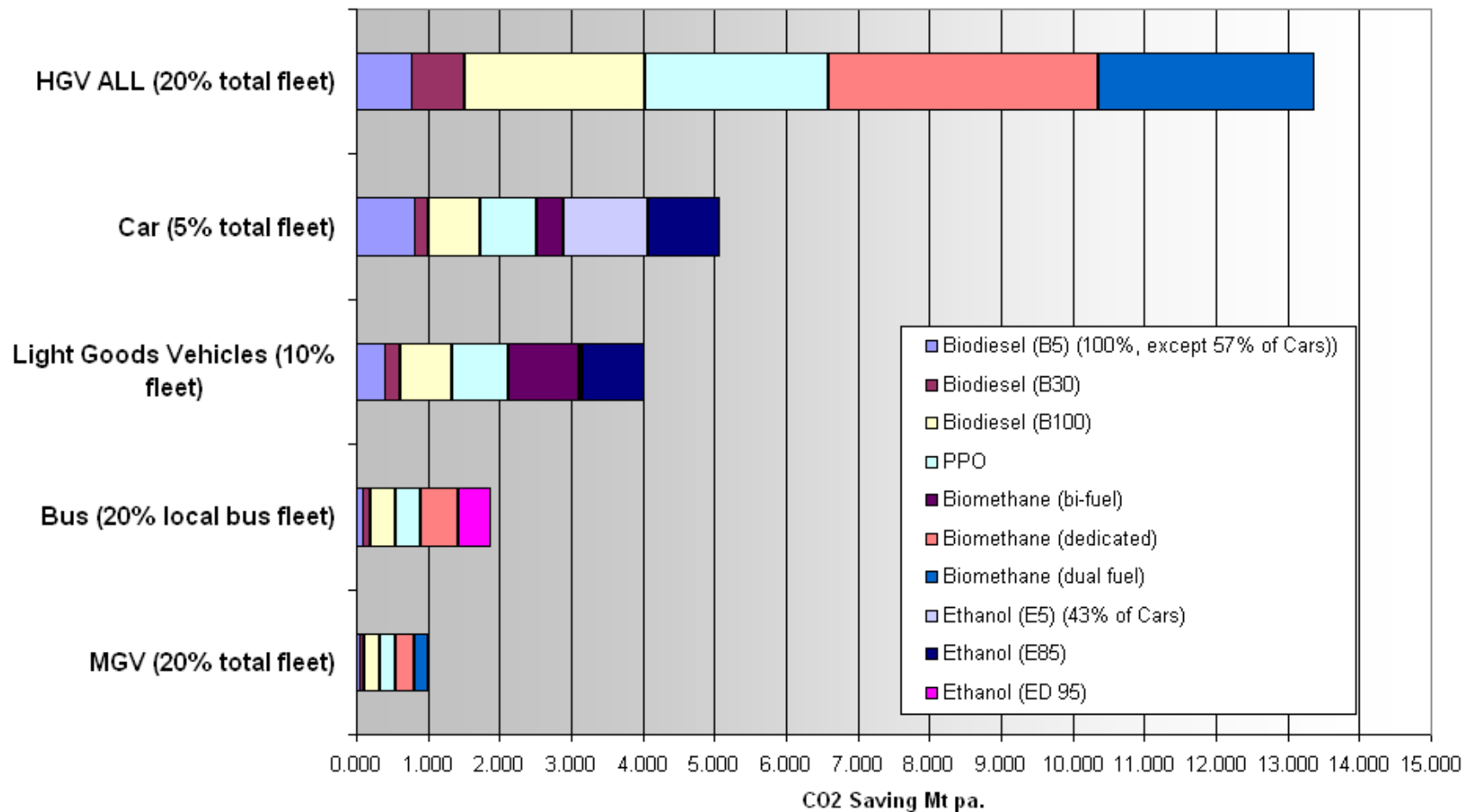
- ❑ Barriers to the increased use:
 - Fuel availability
 - Fuel quality
 - Sustainability
 - Vehicle availability
 - Long-term policy
 - Long-term incentives
 - Public perception / media image

Potential GHG-savings range from 2 - 6Mt CO₂ from limited penetration of fuels into a range of fleets
- Current RTFO saves c3MT



High carbon saving potential in HGV fleets and LGVs

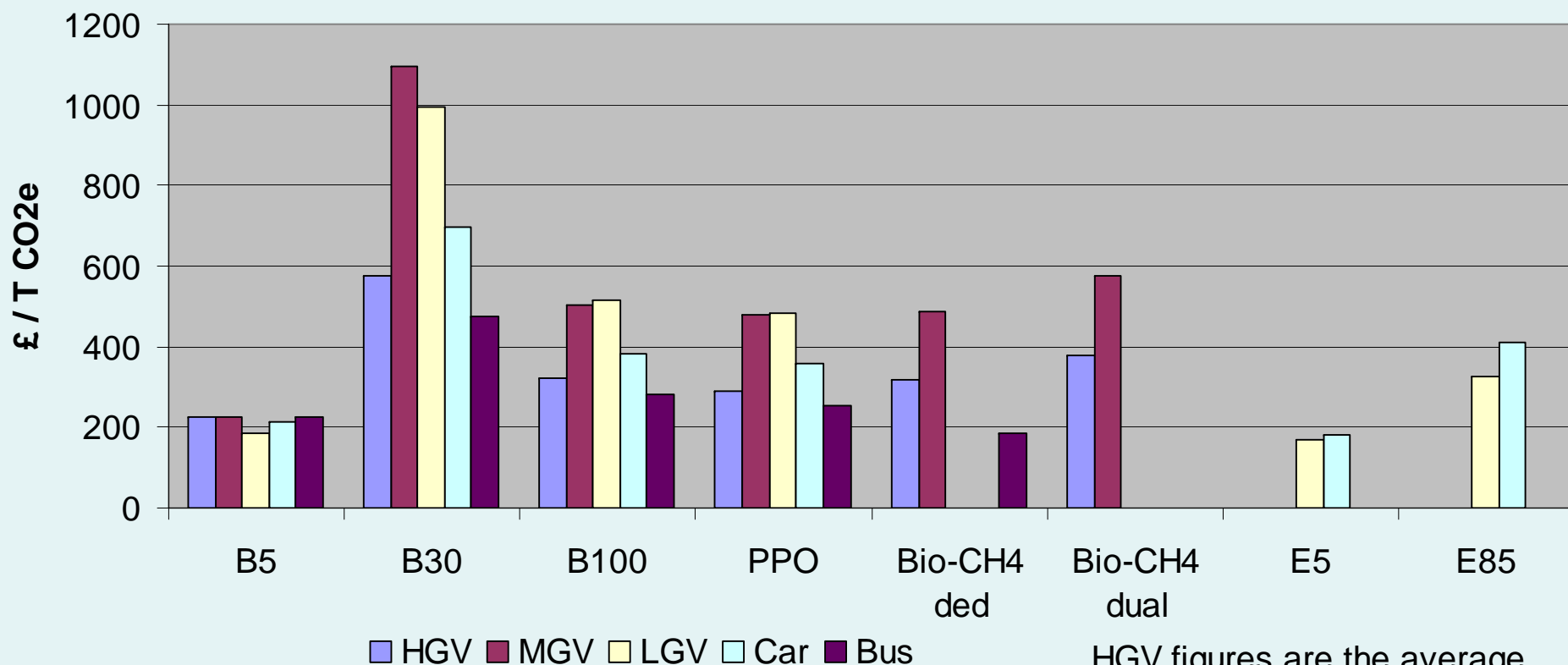
Carbon Saving Potential



Low blends are (generally) more cost effective than other options

HGVs & buses are generally the lowest cost sectors

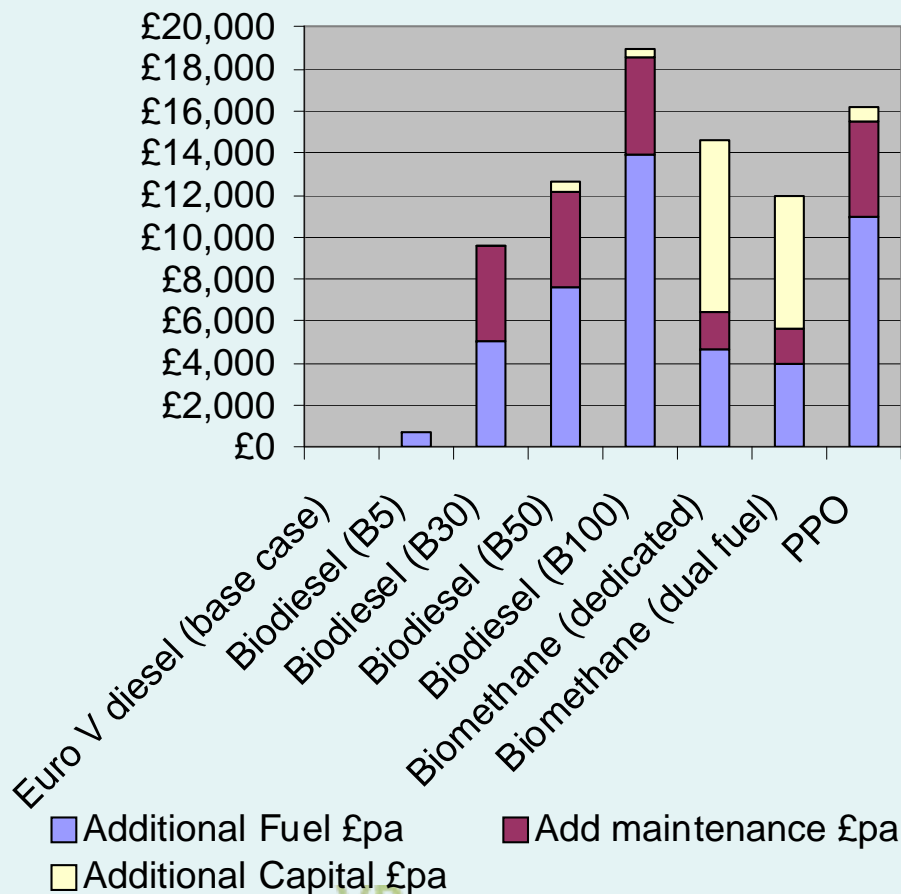
Cost effectiveness of alternative options



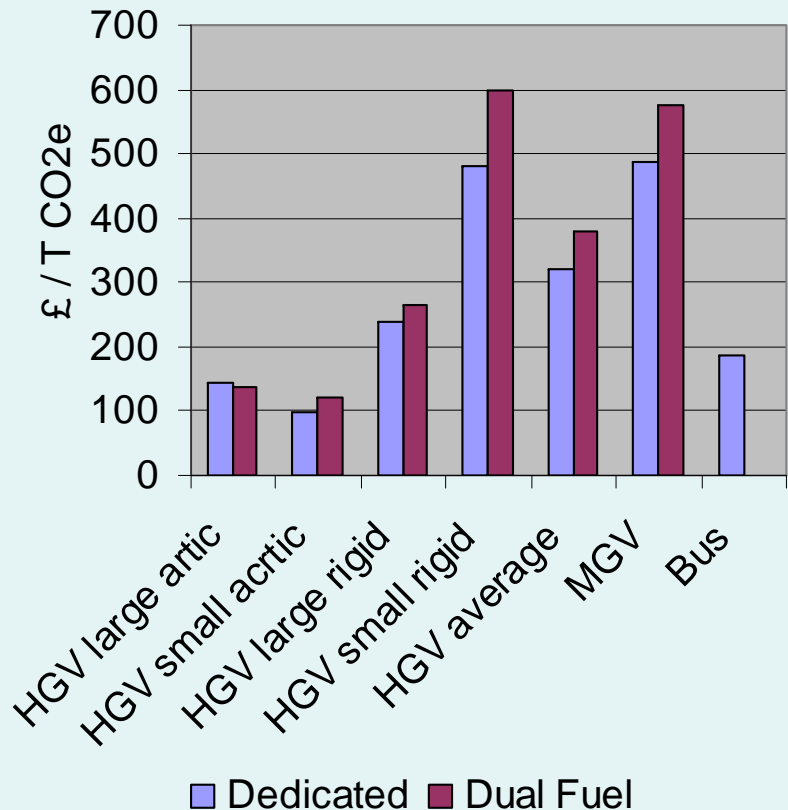
HGV figures are the average across all sub-sectors

Additional costs are incurred in capital, servicing and fuel
Biomethane cost-effectiveness in HGVs varies widely

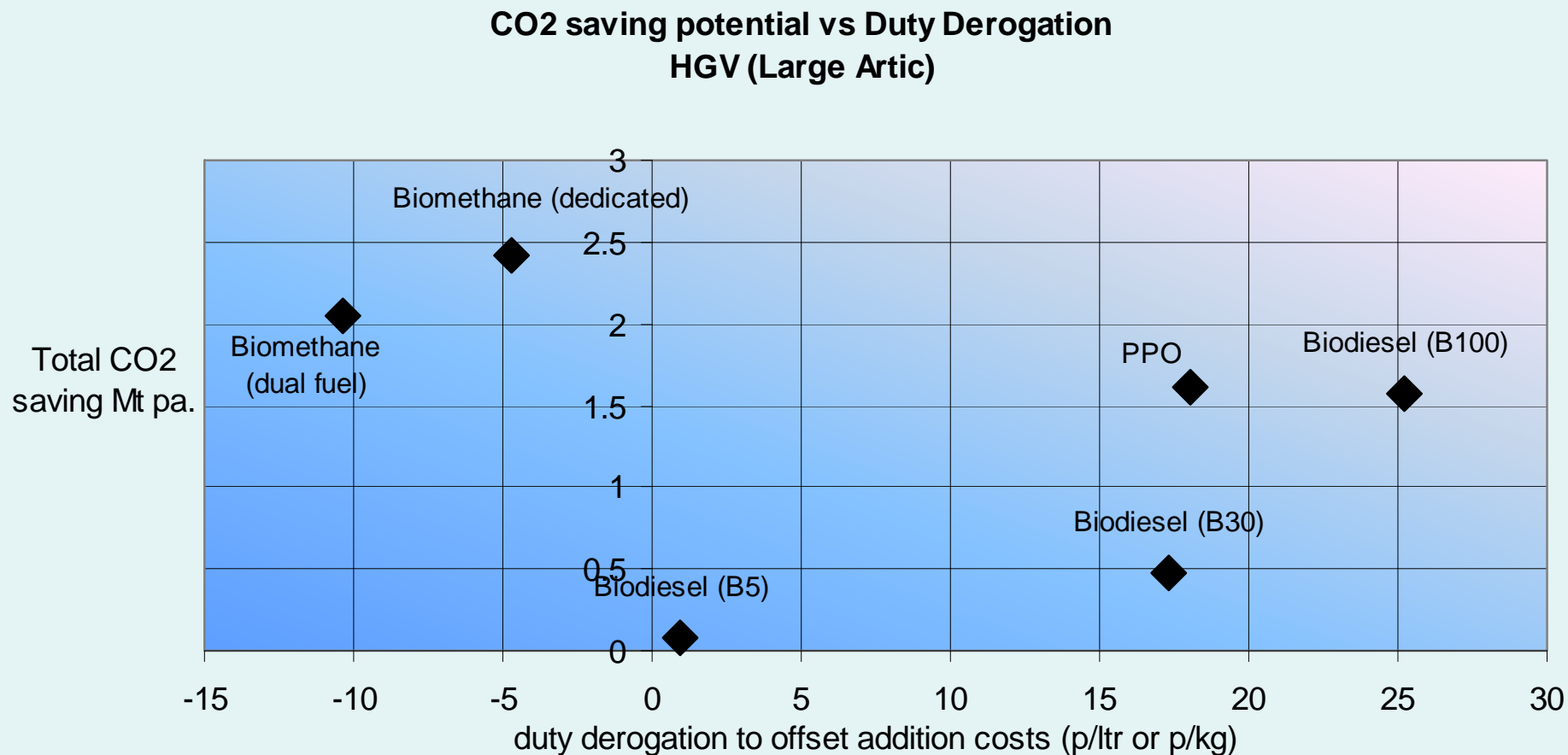
**Additional Costs Incurred by Biofuel Operation
(HGV Large Artic)**



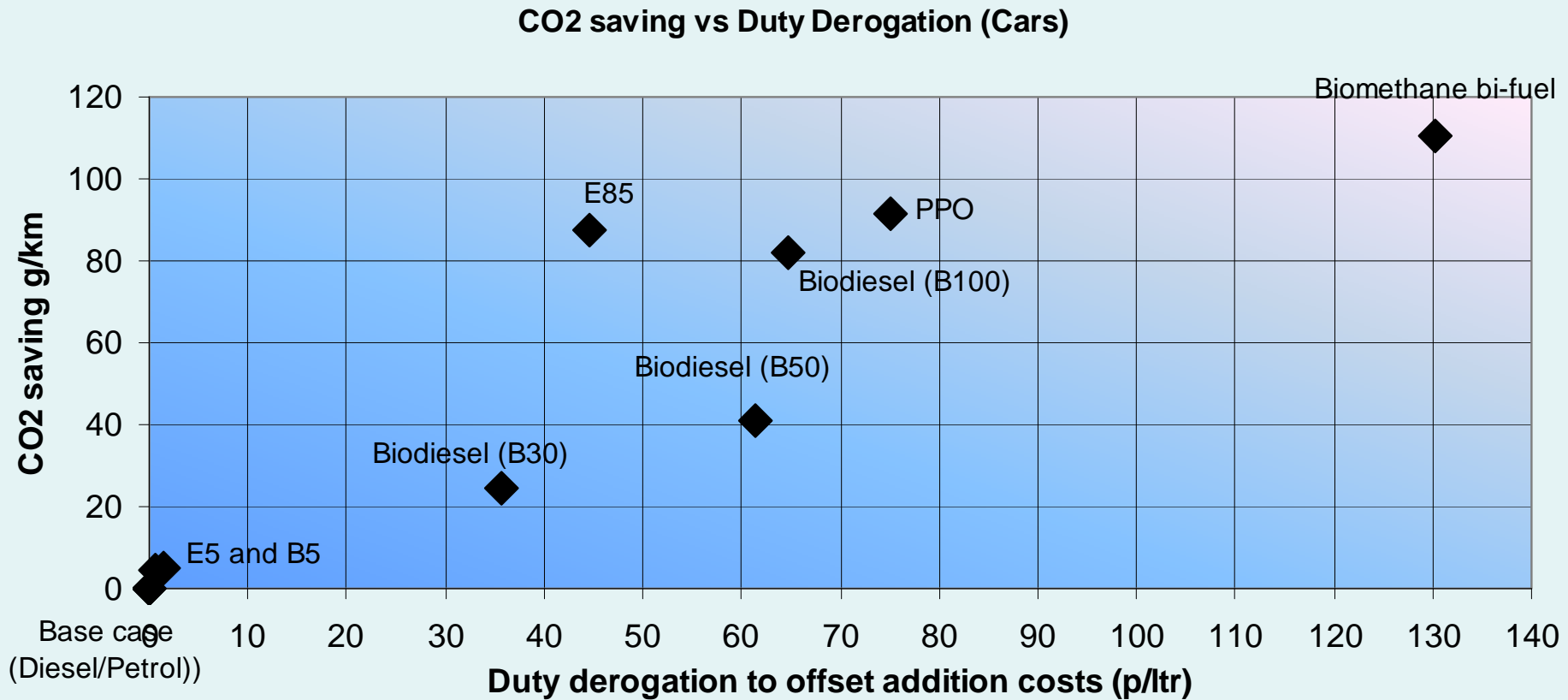
Biomethane cost effectiveness



Duty incentives are essential to support high blend markets in the short-term



Breakeven duty incentives for cars are much higher than for HGVs



Barriers to Adoption

1) Political commitment and support

- ❑ For high blend liquid biofuels, the removal of the duty differential for biofuels in 2010
- ❑ Commercial penalty for early adopters of high by the higher capital and operating costs
- ❑ Delayed costs reductions and economies of scale

2) Fuel production, distribution and supply

- ❑ Lack of a stable and long-term policy environment is dissuasive to investors in new production capital
- ❑ No present certification of biomethane as a low-carbon transport fuel directly or for injection of biomethane into the existing gas supply network.

Barriers to Adoption

3) Standardisation of fuel quality

- ❑ Large variations in quality, particularly blends, due to advanced blending techniques, additive packs and feedstock source,
- ❑ Degradation of fuels such as B5 during storage and distribution further contribute to the variance

4) Availability of vehicles

- ❑ Warranty terms difficult to obtain and understand by operators.
- ❑ No coordinated route for major vehicle purchasers to lobby OEMs to provide vehicles to meet their requirements - higher blends than the 7% currently covered by the FQD

Recommendations

- ❑ Maintain a duty incentive to support the adoption of biofuels in the transport sector and, though linking duty incentives with GHG savings of fuels, provide market stimulus to consider high blends
- ❑ Integrate high blend biofuels into the Alternative Fuels Framework in recognition of their high GHG saving potential
- ❑ Work with vehicle manufacturers to identify and agree warranted use of high blend fuels in their vehicles, and to coordinate new vehicle compatibility with proposed higher blend fuels
- ❑ Coordinate certification of biomethane for injection into the existing gas supply network and its use as a transport fuel.
- ❑ Expand the types of biofuels eligible for support under the Low Carbon Emission Bus (LCEB) fund
- ❑ Draw commercial interest back to the biofuels sector by establishing, promoting and maintaining a stable and committed political environment

Key Findings

- ❑ 3 credible reasons for developing a market for high blend liquid and gaseous biofuels:
 - RED 10% target cannot presently be met from supply of low blends into the vehicle parc
 - Potential pathway to ultra-low carbon vehicles
 - Relatively cost-effective mechanism for additional GHG-reductions in transport
- ❑ Substantial GHG-emissions can be achieved by use of:
 - High blend biodiesel (>B30), bioethanol (E85) and PPO in a range of vehicles
 - Biomethane in HGVs and buses
- ❑ Considerable barriers to market adoption
- ❑ In terms of cost effectiveness (£/ tCO₂ avoided):
 - High blend liquid fuels are generally at least twice as expensive as low blends
 - B30 is twice as expensive as B100 & PPO
 - Biomethane in large arctic and rigid HGVs (50% of HGVs) is more cost-effective than low blends (<£200/t CO₂)
 - High blends in large HGVs & buses are more cost effective than small HGVs, LGVs and cars
- ❑ Current duty for natural gas is sufficient to encourage large HGVs to a shift away from diesel to biomethane – if other market barriers are addressed
- ❑ For breakeven costs:
 - Large HGVs require 25ppl with B100
 - Cars require 65ppl for B100, 45ppl E85

LowCVP Position Paper

The future role of high blend biofuels and biomethane.

In preparation

The future role of high blend biofuels and biomethane

Introduction

The benefits, challenges and options of using liquid and gaseous biofuels with blends, that is blends with greater than 10% by volume; in the UK have been studied by LowCVP. The study is based on viable estimations of potential penetration into the UK fuel mix for a broad range of vehicles classes, from passenger cars and light goods to buses and HGV. It has considered not only the availability of vehicles and infrastructure but also operational, commercial impacts and potential environmental benefits.

Use of high blend biofuels and biomethane potentially offers benefits of:

- **Marked GHG saving.** At present the RTFO is estimated to save 3Mt CO₂. High blend fuels from limited penetration could each achieve savings of between 2MtCO₂ and 6MtCO₂. The use of biomethane in dedicated, dual and bi-fuel vehicles could realise savings totalling over 10 MtCO₂e, 80% of this saving coming from use in goods and service vehicles.
- **Security of Supply.** The use of higher blends will increase supply and demand for biofuels in general and accelerate the transition from fossil-fuel resources
- **Contribution to RED.** Current vehicle specifications only enable around 6.5% of the RED target to be achieved. High blend liquid and gaseous biofuels create potential pathways to achieving the 10% target.
- **Interim measure to the address the "blending gap".** From 2016/17 LowCVP predicts that an increasing void will appear between the target demands of the RED and the practicality of the parc to achieve this target with low blend fuels.

However there are challenges that must be addressed if the UK is to gain benefits from the opportunity of use of high blends. Barriers to high blend biofuels are:

- Cost penalty to operators using liquid biofuels in the absence of a duty break
- Public acceptability of biofuels as a sustainable option
- The availability of vehicles specified or warranted to operate on high blend fuels
- Present, highly limited refuelling infrastructure available for commercial operators
- Limited incentives for biofuel producers under the RTFO and RED, subsequently offering diminished commercial incentives to fuel purchasers
- Market awareness of the opportunities

It is noted that, fundamentally, biofuels used for high blend must be sustainable and to achieve this only biofuels meeting the RED sustainability criteria are assumed to be used.