DfT Low Carbon Fuels Strategy – Call for Ideas

Bennamann Ltd Response

About Bennamann Ltd

Bennamann Ltd[1] is an SME company developing, manufacturing, marketing and deploying innovative technology for the commercially viable local production, distribution and use of 'better than zero carbon' biomethane fuel sourced from the fugitive methane emissions of organic waste, including livestock farm manure slurry.

At Bennamann we believe that offering our customers end-to-end solutions is the key to unlocking the power of fugitive methane and the company's innovations include: patented fuel tanks for storage, transport and use of liquid biomethane; equipment to process and liquify biomethane at small-scale locally off-gas-grid and off-power-grid; proprietary engineering for optimised small-scale fugitive methane capture and processing; and satellite enabled technology for optimised methane sourcing as well as Internet of Things (IoT) enabled equipment monitoring, control, diagnosis, metering and customer billing.

When integrated around the 'Bennamann Cycle'[2] [3] and deployed through our innovative business models, our technologies create a circular economy that delivers a wide range of environmental and economic benefits, which add value for our customers and help unlock a local clean energy revolution.

Bennamann is based in Cornwall, United Kingdom.

Response

Chapter 1 – Introduction

i. How can the low carbon fuels strategy best improve certainty about the deployment of low carbon fuels to support the decarbonisation of the transport sector and the growth of this industry in the UK?

The low carbon fuels strategy can best improve certainty about the deployment of low carbon fuels to support the decarbonisation of the transport sector and the growth of the industry by addressing the issue of investor confidence on both the demand and supply side, through making it clear that there is a long-term future for these fuels in the UK. As articulated in our answers to questions iii, iv, viii and ix, the principal risk and key challenge to the demand for, and supply of, low carbon fuels (particularly biomethane) in the short-term is that of low levels of investor confidence due to a perceived risk of the potential for 'stranded' low carbon fuelled vehicle assets and fuel production infrastructure. The result, as discussed in our answers to questions iii and viii will be a slower transition towards net zero in the short term and an unnecessary increase in the difficulty of achieving the net zero target in the longer term.

ii. Are there specific examples or best practices, the government should take into account when drafting the strategy?

A specific example that the government should take into account when drafting the strategy, which also illustrates best practices within the industry, is that of local, rural, livestock manure sourced

[1] Bennamann | Delivering a Local Clean Energy Revolution
[2] Bennamann – Introduction Video – Circular Solution (vimeo.com)
[3] Bennamann – Animation – Circular Solution (vimeo.com)

biomethane production and use as being implemented by companies such as Bennamann, details of which are provided in our answers to questions vii and xvi.

Additionally, a good best practice example of how policy based on the carbon intensity of fuels can drive transport decarbonisation and stimulate production of LCFs is provided in California's Low Carbon Fuels Standard. The latter takes a technology neutral approach that rewards fuels based on their ability to cut emissions and manure sourced biomethane is incentivised via the scheme to deliver 'carbon negative' energy. As a result, the utilisation of livestock manure for low carbon fuel production has rapidly increased in the state, leading to a significant reduction in the emissions of fugitive methane from the agriculture sector. As we articulate in detail in our answer to question xix below, adopting a similar policy in the UK can help unlock the potential of this local rural energy resource, delivering a wide range of environmental and economic benefits as well as helping the UK to meet its obligation to deliver against the Global Methane Pledge target[4].

Chapter 2 - Demand

iii. Does this chapter accurately capture key trends, opportunities and risks in terms of low carbon fuels demand? If no, please expand on any aspects that you think are missing or inaccurate, or require further exploration.

The UK Government's current fuels policy is driven by the Transport Decarbonisation Plan[5], which is primarily focussed on transitioning to electric- or hydrogen-based vehicle technologies, and supporting infrastructure, as they become available in the decades ahead. A fundamental risk of this policy, not captured in Chapter 2, is that it will stifle potential investment in close to market and ready to use vehicle technologies and related infrastructure that can help decarbonise transport in the short-term and lead to an overall lower cost of transitioning to net zero in the longer term. Indeed, this policy sends a signal to the marketplace that will act as a brake on the uptake of such technologies, because of investor perceived risks associated with the Government's current 'backing a winner' approach leading to a fear of future 'stranded' assets, and consequently on demand-side growth of low carbon fuels usage. For example, as a result of the Government's announced phase out dates for the sale of new non-zero (at the tailpipe) emission road vehicles, including those using low carbon fuels, investors will be reluctant to provide funding to vehicles and associated infrastructure assets (ie refuelling facilities, trained maintenance personnel etc) that are liable to become 'stranded' after implementation of these phase out dates[6]. Such an outcome will hinder the transition to net zero in the short term and make achieving the net zero target more difficult than necessary in the longer term. As an illustration of this issue, according to modelling work recently undertaken by Element Energy[7] , rapid deployment of biomethane technologies over the next decade could deliver a 38% reduction in greenhouse gas (GHG) emissions from heavy goods vehicles (HGVs), whereas deferring decarbonisation while focussing on the development of electric and hydrogen technologies will result over the same time period in a 6% reduction.

An additional risk not captured in Chapter 2 is a potential unintended consequence that may result from the Government's announcement of a phase out date for the sale of new non-zero (at the tailpipe) emission vehicles. A potential effect of the policy will be a stimulation of sales of existing non-zero emission technologies (ie diesel vehicles) as the deadline approaches, negatively impacting on the growth of demand for low carbon fuels, followed by a sharp collapse of the market for alternative zero (at the tailpipe) emission vehicles thereafter. For example, witness that in Q3 & Q4 of 2013, the

[4] Homepage | Global Methane Pledge

[5] Transport decarbonisation plan - GOV.UK (www.gov.uk)

[6] ADBA National Conference 2021 | Phasing out sales of non-zero emissions HGVs – a misguided announcement (adbioresources.org)

[7] 20210325-CADENT_HYDROGEN_TRANSPORT_REPORT.pdf (element-energy.co.uk)

sales of Euro V vehicles were at record high levels ahead of the switch to Euro VI and sales of the latter in Q1 &2 of 2014 were extremely low. In the case of the phase out of the sale of new non-zero (at the tailpipe) emission HGVs, such an outcome will create 'lock-in' of a diesel fuelled asset base in the UK at the phase out date, thereby hindering the transition to net zero while these vehicles continue to be utilised well beyond normal replacement cycles in a bid by operators to delay the adoption of unfamiliar technologies and infrastructure. Unless the supporting infrastructure for zero emission HGVs is fully proven, broadly deployed and commercially attractive, and new zero emission HGV technologies are widely proven by early adopters ahead of the phase-out date, fleet operators will keep diesel vehicles running for as long as technically and commercially possible, thereby reducing demand for low carbon fuels, as well as zero (at the tailpipe) emissions technologies, and making it harder for the UK to achieve its net zero target.

iv. In your view, what are the key challenges relating to demand in the future transition of the sector?

The key challenge relating to demand in the future transition of the sector is the risk of low levels of investor confidence due to their perceived risk of the potential for 'stranded' low carbon fuelled vehicle assets and associated infrastructure (ie refuelling facilities, trained maintenance personnel etc), as articulated fully in our answer to question iii above.

v. Apart from developing demand scenarios, are there any other actions the government should consider as part of the strategy development to address uncertainties and identify opportunities on the demand side?

Apart from developing demand scenarios, a key action the government should consider as part of the strategy development to address uncertainties on the demand side is to make it clear that there is a long-term future for low carbon fuels in the UK. As articulated in our answers to questions iii and iv, the principal risk and key challenge to the demand for these fuels in the short-term is that of low levels of investor confidence due to a perceived risk of the potential for stranded low carbon fuelled vehicle assets and associated infrastructure (ie refuelling facilities, trained maintenance personnel etc). This will negatively impact on the growth of demand for low carbon fuels and, consequently, result in a slower transition towards net zero in the short term and an unnecessary increase in the difficulty of achieving the net zero target in the longer term.

Another government action to consider as part of the strategy development is to address uncertainties by encouraging the take up and use of low carbon fuels through providing fiscal incentives linked to well-to-wheel (WTW) carbon savings. For example, currently there is no difference between fuel duty for fossil fuels and for biofuels, whereas it would be relatively straightforward for Government to taper fuel duty based on the carbon footprint of the fuel. In such an approach, for instance, fossil fuels could remain at current duty levels (or higher), whilst biomethane could be incentivised by lower duty based on the CO2 footprint. Analysis that considers the carbon intensity (i.e. gCO2e/MJ) of the energy used in transport vehicles based on a full understanding of WTW GHG emissions incurred from its sourcing, processing, distribution and use should be adopted as the foundation of net zero related UK fuels policy making

vi. For the development of the demand scenarios, are there any key sources of information or data the government should consider?

We recommend that the government should consider key sources of information and data available from Zemo (Zemo Partnership | Accelerating Transport to Zero Emissions), particularly the following reports:

- Decarbonising HDVs using high blend biofuels | Fuels Projects | Zemo Partnership
- LowCVP-WTT_GHG_Emission_Factors-Review_and_recommendations.pdf (bennamann.com)
- Examining Hydrogen Production Pathways and Use in Vehicles | Fuels Projects | Zemo Partnership

vii. For the development of the demand scenarios, are there any specific aspects that government should consider (e.g. niche uses of low carbon fuels, competing demand from other sectors or technology development) and if so, do you have a view on how best to incorporate them?

Although noted briefly in paragraph 39 of the Call for Ideas document, and additionally identified in the table at paragraph 49, the niche uses of low carbon fuels in non-road mobile machinery (NRMM) are not adequately considered. In the development of the demand scenarios, government should consider and incorporate these in detail, specifically in the case of the agricultural machinery sector. For example, CNH Industries, through their New Holland brand, have recently launched a methane gas powered tractor[8] and have also announced the rapid development of a liquid methane fuelled model[9], both of which have the potential to radically transform the demand for biomethane in the agricultural NRMM market.

Chapter 3 – Supply

viii. Does this chapter capture key trends, opportunities, and risks in terms of low carbon fuels supply? If no, please expand on any aspects that you think are missing or require further exploration.

A key opportunity for low carbon fuels that is not captured in Chapter 3 is related to the zero emissions road vehicle infrastructure deficits that will emerge across the UK in the longer term and this requires further exploration. For example, the provision of infrastructure to support the Government's cited technologies for zero emissions vehicles (i.e. Battery Electric; Electric Road Systems; Hydrogen Fuel Cells) will be especially challenging, particularly in terms of technical and commercial viability, beyond the UK's central regions bounded by London, Leeds, Greater Manchester, Birmingham and Bristol - effectively the M1, M62, M6, M5 and M4 corridors with spurs to key ports such as Dover, Southampton and Felixstowe. This is because engineered technical solutions and the commercial business models for long distance rural operation of electric and hydrogen vehicles remain unproven and the investments required to develop and deliver them will be substantial.

As a result, electric and hydrogen vehicle support infrastructure deficits are likely to emerge outside of the UK's most heavily trafficked transport corridors and many zero emission technologies, particularly those for HGVs, will potentially not be viable in rural and less populated areas of the nation. The potential result will be that the North of England, Scotland (other than Glasgow Edinburgh belt), Wales, Eastern England and the South West beyond Bristol will suffer from a lack of acceptable solutions leading to connectivity deficits that (setting aside the barrier this will pose to transport decarbonisation and achieving the UK's net zero target) are fundamentally contrary to the Government's "Levelling Up" agenda. This will present a potential opportunity for low carbon fuels in that, whilst Hydrogen and Electric vehicles will require substantial investment in technology and infrastructure to deliver acceptable levels of national connectivity, there are ready to use technologies and associated infrastructure elements based on low carbon fuels, such as biomethane, that can be deployed today; can use much existing transport infrastructure; and can maintain current connectivity levels into the future whilst delivering the Government's ambitions and targets for transitioning to net zero.

[8] New Holland Agricultural Tractors T6 METHANE POWER Overview | NHAG
[9] Event_6.pdf (message-asp.com)

Although there is mention in paragraph 74 of the Call for Ideas document that anaerobic digestion (AD) of manure already offers the potential to achieve net zero carbon emissions over the lifecycle of biomethane, and that small-scale production is also emerging (for instance, incorporating its capture or production into farming practices) which could provide additional revenue streams and, in some cases, fuel for local vehicles, this aspect also requires further exploration. In this regard, across the UK, rural communities have within them a considerable untapped resource of low carbon fuel in the form of the biomethane that can be derived from fugitive methane emitted by livestock manures. In many cases these sources of energy are relatively small, being at the small farm scale, but when used on-site and aggregated and distributed locally to meet rural energy demand, they represent a considerable opportunity for the provision of low carbon fuel to decarbonise transport. The challenge is how to access this unused 'better than zero' carbon source of energy (under REDII the biomethane default value for manure is associated with a large methane credit of 206%; this significantly lowers the carbon intensity of biomethane production to -85gCO2e/MJ, which is better than zero) when the rural production site is small-scale; is not served by an injection point to the gas grid; and, as in many cases, suffers power grid connectivity deficits constraining biogas processing.

To meet this challenge and realise the opportunity, Bennamann has been developing and proving a production pathway based on a suite of technical solutions and business models that enable economically viable off-gas and off-power grid utilisation of these local rural energy resources, through the efficient and optimised small-scale capture, processing, storing, aggregation and distribution of fugitive methane in the form of compressed biomethane gas and liquid fuel[10]. For example, the company's £1.22 million "Energy Independent Farming" project, which is part-funded by the European Regional Development Fund (ERDF)[11], demonstrated the use of manure slurry to establish energy independent livestock farming (including self-sufficiency in power, heat and fuel for farm machinery such as tractors[12]) whilst simultaneously generating farm business income through local sales of surplus biomethane[13].

The commercial roll-out of low carbon fuel provision based on fugitive methane locally sourced from livestock manure slurry and processed to biomethane in small-scale upgrading plants, is scalable and viable in the UK. For example, there are circa 35 – 40,000 cattle farms across the UK, of which approximatley 70% (29,000 holdings) have herds with less than 150 cattle. Bennamann's small-scale fugitive methane sourcing, processing, storage and distribution technology could realise this opportunity by enabling these farms to become economically viable better than zero carbon energy producers. This would result in an estimated emissions saving of circa 34 Million tonnes CO2e annually for the UK, or 7.5% of total UK CO2e emissions, just from the mitigation of the manure slurry fugitive emissions, before accounting for the emissions savings that will accrue through the use of the derived biomethane for transport fuel provision.

With regard to risks in terms of low carbon fuel supply not captured in Chapter 3, the principal one missing is the supply-side impact of low levels of investor confidence on the demand side due to their perceived risk of the potential for stranded low carbon fuelled vehicle assets and associated infrastructure (ie refuelling facilities, trained maintenance personnel etc). As articulated in our answer to question iii, this will negatively impact on the growth of demand for low carbon fuels and, consequently, stifle investments in the fuel production and delivery infrastructure required to support them, particularly as these supply side assets typically have a designed operational life of 20 – 25 years. As illustrated in our answer to question iii, modelling evidence from Elemental Energy has shown that

[10] Bennamann – Introduction Video – Circular Solution (vimeo.com)
[11] Energy Independent Farming - Bennamann
[12] Julie Skentelbery - Methane Tractor - Dr Chris Mann - BBC Sounds
[13] Farmers-Weekly-Bennamann.pdf

the result will be a significantly slower transition towards net zero in the short term and an unnecessary increase in the difficulty of achieving the net zero target in the longer term.

ix. In your view, what are the key challenges and opportunities as relates to supply in the future transition of the sector?

The key challenge relating to supply in the future transition of the sector is the risk of low levels of investor confidence on the demand side due to a perceived risk of the potential for stranded low carbon fuelled vehicle assets and associated infrastructure (see our answers to questions iii, iv and viii). As articulated in our answers to question iii and viii above, this will negatively impact on the growth of demand for low carbon fuels and, consequently, stifle investments in the fuel production and delivery infrastructure required on the supply side to support them. The result will be a slower transition towards net zero in the short term and an unnecessary increase in the difficulty of achieving the net zero target in the longer term.

x. Are there any other actions the government should consider as part of the strategy development to address uncertainties and identify opportunities on the supply side?

A key action the government should consider as part of the strategy development to address uncertainties on the supply side is to make it clear that there is a long-term future for low carbon fuels in the UK. As articulated in our answers to questions iii, iv, viii and ix, the principal risk and key challenge to the supply side for these fuels in the short-term is that of low levels of investor confidence on the demand side due to a perceived risk of the potential for stranded low carbon fuelled vehicle assets and associated infrastructure (ie refuelling facilities, trained maintenance personnel etc). This will negatively impact on the growth of demand for low carbon fuels and, consequently, stifle investments in the fuel production and delivery infrastructure required on the supply side to support them. The result will be a slower transition towards net zero in the short term and an unnecessary increase in the difficulty of achieving the net zero target in the longer term.

xi. Are there particular actions the government should prioritise as part of the strategy development?

The primary action the government should prioritise as part of the strategy development is providing long-term certainty to the demand side of the market so as to give investors in the supply side the confidence to invest in fuel production and delivery infrastructure that typically has a design operational life of 20 – 25 years. The demand and supply sides of the sector are intimately linked in dependency and need to work simultaneously in parallel - investment in supply will not occur without demand and demand will not materialise without supply.

xii. Do you have any views on how to best capture interdependencies with the global supply chain?

No comment.

Chapter 4 – Industry

xiii. Does this chapter capture key trends, opportunities, and risks in terms of UK industry? If no, please expand on any aspects that you think are missing or require further exploration.

Please refer to our answers to questions iii and viii where we present the key opportunities and risks in terms of the demand and supply side of the UK industry that require further exploration.

xiv. In your view, what are the key challenges and opportunities for the UK industry in the lead up to 2050?

The key challenge for the UK industry in the lead up to 2050 is investor confidence on the demand-side and its impact on investment in the supply side. As articulated in our answers to questions iii, iv, viii and ix, the principal challenge to the supply of low carbon fuels in the short-term is that of low levels of investor confidence on the demand side due to a perceived risk of the potential for stranded low carbon fuelled vehicle assets and associated infrastructure (ie refuelling facilities, trained maintenance personnel etc). This demand side concern will negatively impact on the growth of demand for low carbon fuels and, consequently, stifle investments in the fuel production and delivery infrastructure required on the supply side to support them, particularly as such infrastructure assets typically have an operational design life of 20 – 25 years. The demand and supply sides are intimately linked in dependency and need to work simultaneously in parallel - investment in supply will not occur without demand and demand will not materialise without supply.

xv. What are key actions the government should consider as part of the strategy development to address uncertainties and identify opportunities for UK industry?

The key action the government should consider as part of the strategy development is providing long-term certainty to UK industry of the demand side of the market so as to give investors in the supply side the confidence to invest in fuel production and delivery infrastructure which typically has an operational design life of 20 – 25 years. The demand and supply sides are intimately linked in dependency and need to work simultaneously in parallel - investment in supply will not occur without demand and demand will not materialise without supply.

xvi. Are there any production pathways or adaptations to production pathways and infrastructure that are most likely to benefit the UK economy?

As described in our answer to question viii, across the UK rural communities have within them a considerable untapped energy resource in the form of the biomethane that can be derived from fugitive methane emitted by livestock manures. In many cases these sources of energy are relatively small, being at the small farm scale, but when used on-site and aggregated and distributed locally to meet rural energy demand, they represent a considerable economic opportunity for the UK in the provision of low carbon fuels to decarbonise transport. The challenge is how to access this unused better than zero carbon source of energy when the rural production site is small-scale; is not served by an injection point to the gas grid; and, as in many cases, suffers power grid connectivity deficits constraining biogas processing.

To meet this challenge, Bennamann has been developing and proving a production pathway based on a suite of technical solutions and business models that enable economically viable off-gas and off-power grid utilisation of these local rural energy resources, through the efficient and optimised small-scale capture, processing, storing, aggregation and distribution of fugitive methane in the form of compressed biomethane gas and liquid fuel[14]. The commercial roll-out of this low carbon fuel production pathway is scalable and viable in the UK. For example, as noted in our answer to question viii, there are circa 35 – 40,000 cattle farms across the UK, of which approximatley 70% (29,000 holdings) have herds with less than 150 cattle. Bennamann's small-scale fugitive methane sourcing, processing, storage and distribution technology could potentially enable these farms to become energy independent, economically viable better than zero carbon energy suppliers.

[14] Bennamann – Introduction Video – Circular Solution (vimeo.com)

By supporting the deployment of this type of local approach to low carbon fuels production, the UK Government can not only contribute to decarbonising UK transport and meeting the nation's legally binding net zero targets, but also create economic green growth and skilled jobs that help maintain the viability of farms and rural communities, whilst simultaneously helping to increase their energy security and resilience and contribute to delivering a circular economy model for livestock agriculture.

xvii. If applicable, how does your organisation plan to adapt to the expected changes in low carbon fuel demand and supply?

No comment.

Chapter 5 – Policy framework

xviii. Does this chapter capture key trends, opportunities, and risks in terms of policy framework? If no, please expand on any aspects that you think are missing or require further exploration.

As noted in our answer to question iii, the UK Government's current fuel policy framework is driven by the Transport Decarbonisation Plan and primarily focussed on transitioning to future electric or hydrogen-based vehicle technologies, and supporting infrastructure, as they become available. There are two fundamental issues with this framework. Firstly, that through application of the framework the Government is not 'technology neutral' in its regulation and assessment of low carbon fuels, and secondly, that it has negative impacts in the low carbon fuels sector on investment, research, development and production. In the short term, this potentially risks slowing, or even stopping, the uptake of ready to use low carbon fuelled vehicle technologies and supporting infrastructure that can have significant positive impacts on the overall effectiveness and cost of decarbonisation in the longer term.

The Government's current approach to fuels does not allow for competitive low carbon, zero carbon or 'better-than-zero' carbon technologies and innovative commercial developments that are close to market or deployable today. The recently published Physical Science findings of the IPCC's Sixth Assessment Report[15] highlights the need for immediate action on climate change mitigation through GHG emissions reduction. Such action requires the maximum use of existing proven technologies and business models in the current decade through to 2030, as well as the achievement of net zero GHG emissions by 2050. Supporting the take up of these technologies and their associated infrastructure at scale in the short term potentially represents better value in the longer term with regard to overall costs, sustainability and achieving net zero[16] [17]. Government constraining of innovation and the marketplace by effectively 'backing a winner' does not make economic or policy sense and creates unnecessary risks not covered adequately in Chapter 5. Please refer to our answers to questions iii, iv, viii and ix where we articulate fully the potential risks and challenges of the Government's policy framework on both demand-side and supply-side investment.

Another key risk of the policy framework (and a potential opportunity for low carbon fuels) that is not captured in Chapter 5, and requires further exploration, was articulated in our answer to question viii and is related to the zero emissions (at the tailpipe) road vehicle infrastructure deficits that will emerge across the UK in the longer term. As noted in our viii answer, the provision of infrastructure to support the Government's cited technologies for zero emissions vehicles will be especially challenging, particularly in terms of technical and commercial viability, beyond the UK's central regions bounded by London, Leeds, Greater Manchester, Birmingham and Bristol - effectively the M1, M62, M6, M5 and M4 corridors with spurs to key ports such as Dover, Southampton and Felixstowe. This is

[15] AR6 Climate Change 2021: The Physical Science Basis — IPCC

[16] ADBA-Biomethane-to-transport-report-June-2021-FINAL.pdf (bennamann.com)

[17] Potential-of-biomethane-in-the-transport-sector.pdf (bennamann.com)

because engineered technical solutions and the commercial business models for long distance rural operation of electric and hydrogen vehicles remain unproven and the investments required to develop and deliver them will be substantial. As a result, associated infrastructure deficits are likely to emerge outside of the UK's most heavily trafficked transport corridors and many zero emission technologies, particularly those for HGVs, will potentially not be viable in rural and less populated areas of the nation. This would lead to connectivity deficits that (setting aside the barrier this will pose to transport decarbonisation and achieving the UK's net zero target) are fundamentally contrary to the Government's "Levelling Up" agenda. (Such an outcome will present a potential opportunity for low carbon fuels in that, whilst hydrogen and electric vehicles will require substantial investment in technology and infrastructure to deliver acceptable levels of national connectivity, there are ready to use technologies and associated infrastructure elements based on low carbon fuels, such as biomethane, that can be deployed today; can use much existing transport infrastructure; and can maintain current connectivity levels into the future whilst delivering the Government's ambitions and targets for transitioning to net zero.)

xix. In your view, how should the government best deliver its aims of using LCFs to maximise environmental and economic benefits and are there specific measures the government should take to support the sector's transition?

Biomethane already makes an important contribution to decarbonising transport vehicles through ready to use technologies and can continue to help maximise the environmental and economic benefits of using LCFs by providing a cost effective, commercially attractive solution for reducing carbon emissions, both in the short and long term. Indeed, many studies have shown that biomethane is a proven, effective, and immediately available low carbon fuel currently being adopted by many flagship HGV fleet operators in the UK and has the potential for substantial scale-up of production and use in the very near term[18] [19] [20] [21] [22] , thereby offering a significant pathway to meeting short term decarbonisation goals as well as helping the nation meet its legally binding net zero by 2050 target. Biomethane can be used as a drop in replacement fuel for natural (fossil) gas vehicles, both Compressed Natural Gas (CNG) and Liquified Natural Gas (LNG), and its use for HGVs is growing in the UK freight sector. Fleet operators with biomethane vehicles and commitments include John Lewis Partnership, Sainsbury's, Asda, Howard Tenens, DHL, Ocado, Hermes, DPD, Veolia, and a range of Local Authorities including the urban examples of Islington Borough and Camden Borough as well as the rural unitary authority of Cornwall Council[23]. It is estimated that well over a 1,000 HGVs currently operate on biomethane in the UK.

Natural (fossil) gas vehicles will operate with methane derived from any primary source and when the fuel utilised is biomethane obtained from agricultural manures it results in a better than net zero carbon footprint[24] (as noted in our answer to questions viii, under REDII the biomethane default value for manure is associated with a large methane credit of 206%; which significantly lowers the carbon intensity of biomethane production to -85gCO2e/MJ). This is because fugitive methane is released to the atmosphere when manure is stored in the open environment (typically as slurry in open surface pits, tanks or lagoons) and its capture for fuel use prevents this damaging GHG entering the atmosphere. Methane is greater than 80 times more powerful as a greenhouse gas than carbon dioxide over a 20-year period and because of this the recently published Physical Science findings of

[18] ADBA-Biomethane-to-transport-report-June-2021-FINAL.pdf (bennamann.com)
[19] Market_opportunities_decarb_HDVs using HBRF_2021.pdf (bennamann.com)
[20] RenewableFuelsGuide_March2020.pdf (bennamann.com)
[21] Intro-to-Biofuels.pdf (cenex.co.uk)
[22] 20210325-CADENT_HYDROGEN_TRANSPORT_REPORT.pdf (element-energy.co.uk)
[23] RenewableFuelsGuide_March2020.pdf (bennamann.com)
[24] LowCVP-WTT_GHG_Emission_Factors-Review_and_recommendations.pdf (bennamann.com)

the IPCC's Sixth Assessment Report[25] emphasised the urgency in tackling fugitive methane emissions from sources such as agricultural manures.

To best deliver its aims of using LCFs to maximise environmental and economic benefits, as well as meet the UK's short-term and long-term transport decarbonisation targets, the government should support UK biomethane suppliers who want to invest in scaling up the production of biomethane fuel sourced from agricultural manures by providing long-term certainty to UK industry. Specifically, to the demand side of the biomethane market so as to give investors in the supply side the confidence to invest in fuel production and delivery infrastructure which typically has an operational design life of 20-25 years. As noted in our answer to questions xi, xiv and xv, the demand and supply sides are intimately linked in dependency and need to work simultaneously in parallel - investment in supply will not occur without demand and demand will not materialise without supply.

The successful incentivisation of biomethane sourced from livestock manure as a low carbon fuel will not only help the Government realise transport decarbonisation to net zero, but also best deliver its aims of using LCFs to maximise environmental and economic benefits through realising as range of benefits including:

- decarbonisation of the difficult to tackle agriculture sector, in the quest to achieve the UK's legally binding net zero target by 2050 as well as meet the nation's Paris Agreement commitments;

- meeting the targets of the Global Methane Pledge that aims to deliver at least a 30% reduction in fugitive methane emissions by 2030 on a 2020 baseline[26];

- climate emergency and net zero carbon aspirations of rural local authorities nationwide, while simultaneously delivering distributed local energy, improved local energy security and rural resilience;

- green recovery led local growth, rural economic development, and delivering the Levelling Up agenda, through creating sustainable low carbon farming and local clean energy sector related jobs that improve rural livelihoods and drive post-pandemic economic regeneration.

- reductions of ammonia emissions from livestock farming;

- sustainable and regenerative low carbon farming that enhances biodiversity, delivers environmental growth, and creates a circular economy model for livestock agriculture.

xx. In view of the different challenges and opportunities, are there specific policy measures the government should prioritise and why?

Specific policy measures the government should prioritise include undertaking a review of the 2032 date for the RTFO and gas to diesel fuel duty differential as well as review fuel duty based on a WTW CO2 approach. Care needs to be taken to ensure that reductions in diesel and petrol use do not lead to excess supplies of biofuels which would cause the value of RTFCs to drop. The RTFO should be set at levels which ensure supply and demand are matched. In addition, we would recommend that government revisits their policy on the phase out of non-zero emission HGVs, including a review of the definition of 'non-zero' so as to differentiate between non-zero emissions at the tailpipe and non-zero emissions of greenhouse gases on a WTW basis. These measures are needed to instil confidence in demand side and supply side investors, thereby addressing the principal risks and challenges

[25] AR6 Climate Change 2021: The Physical Science Basis — IPCC
[26] Homepage | Global Methane Pledge

highlighted in our answers to questions iii, iv, viii and ix, and thereby drive as much action as possible in the short term to reduce the challenge as we approach the longer term 2050 targets.

xxi. Are there any key actions the Government should consider as part of the strategy development to identify policy gaps and opportunities?

No comment.

Chapter 6 - Interdependencies

xxii. Does this chapter capture key interdependencies and interactions with other policy areas or markets? If no, please expand on any aspects that you think are missing or require further exploration.

A key interdependency and interaction with other policy areas missing in Chapter 6 is that the commercially viable production of low carbon fuel (ie biomethane) from livestock agriculture manure will result in reductions in fugitive methane emissions, thereby responding to the IPCC's recommendation to urgently tackle this source of GHG emissions[27] and helping the UK achieve its Global Methane Pledge commitments[28].

xxiii. In your view, are there any specific actions the government needs to take as part of the strategy development to address these interactions? If yes, what would those be?

The principal specific action that government needs to take to address the interactions is to work together more closely and effectively across departments (DfT, BEIS, Defra, DLUHC, etc) to develop a common integrated and optimised, efficient and effective strategy, The Biomass Strategy offers an unique opportunity to deliver such a 'joined-up' approach and we recommend that its development is prioritised and not under resourced.

(Ends.)

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