Treasury Select Committee: Decarbonisation of the UK Economy and Green Finance inquiry

Decarbonised Gas Alliance response

July 2019

About the Decarbonised Gas Alliance

1. The Decarbonised Gas Alliance (DGA) is an alliance of gas producers, transporters, suppliers and users, hydrogen and carbon capture experts, alongside R&D, supply chain, trade union and local government specialists whose knowledge and expertise will be vital in decarbonising the UK's gas system and improving poor air quality.

2. Our aim is to work with all levels of government and with other expert organisations to use the gas system as a whole to help deliver our emission reduction and air quality goals. We believe that decarbonising gas – including biogases and hydrogen from a variety of low-carbon methods – would make best use of our existing infrastructure and lower the overall costs of decarbonisation.

3. The DGA is a broad-based alliance, established in late 2016, and has now expanded to 46 signatory organisations, which are listed in full in the diagram below. The DGA secretariat is managed by DNV GL, a global specialist firm which provides advisory, certification and other technical assurance solutions covering a range of energy sources.

4. We welcome the opportunity to respond to the inquiry and are happy to nominate a spokesperson from one of our signatory organisations to provide oral evidence, if this would be useful for the Select Committee.

Summary: The importance of decarbonised gas to net zero

5. With a 2050 net zero target now in legislation, all sectors will need to make major efforts, and undergo considerable change, to achieve the target in practice. Decarbonising the UK's gas system through biogases, hydrogen and CCUS, alongside a growth of electrification, is critical to this economy-wide effort. Decarbonising the gas system brings benefits to both domestic consumers, who use gas in their homes, and to industry, which uses gas for heat and as a feedstock.

6. The Committee on Climate Change's (CCC) net zero report found that hydrogen use would increase ten-fold to 270 TWh by 2050 and that up to 176 million tonnes of CO_2 would be captured and stored each year from a variety of sectors. Biogases would also play a role, including through bioenergy with carbon capture and storage (BECCS). The report also found that electricity use would double from 300 TWh to around 600 TWh.[1] We agree with the CCC's analysis of the magnitude and pace of change required in both the gas and electricity sectors – the key focus needs to be on how to make this happen in a timely and cost-effective way for both government and consumers.

7. A decarbonised gas system can reach zero emissions through several routes:

    - **Biogases:** Biogases can be produced in a variety of ways, mainly from anaerobic digestion to produce biomethane, or from advanced plasma technology to produce a synthetic natural gas

(SNG) from waste materials. Bio-liquified petroleum gas (LPG) can also be produced from waste sources. Biomethane and bio-SNG can be used as a direct substitute for natural gas, and can also be used to decarbonise buses and trucks. Bio-LPG can be used as a direct substitute for LPG in off-grid and transport applications.

- **Hydrogen:** Hydrogen emits no greenhouse gases when combusted or used in a fuel cell. The range of potential applications is as broad as for natural gas, although existing equipment will need to be replaced with equipment that is compatible with hydrogen. Hydrogen can also be stored seasonally, and blended in the gas grid at low concentrations, without the need to change appliances. Hydrogen can be produced in a low-carbon manner, by employing carbon capture and storage on production from gas, using low carbon electricity for electrolysis of water, or producing hydrogen from biomass sources. Through the Iron Mains Replacement Programme, the UK's gas grid is progressively increasing its readiness to transport hydrogen.
- **Carbon Capture, Usage and Storage (CCUS):** CCUS can be used to capture and permanently store, or utilise, carbon dioxide emissions from a wide variety of sources. These include power generation from gas, hydrogen production from gas, and directly from energy and emission intensive industry, such as ammonia, cement and steel production. When used with biomass sources, CCUS can produce negative emissions, which are critical to achieving any net zero target in practice.

8. The gas system has several key attributes that make its decarbonisation fundamental to achieving net zero, including:

   - **Cost:** Gas is around a quarter the unit price of electricity in the UK. For domestic consumers, the average price of gas is 4.3 pence per kWh, compared with 17.8 pence per kWh for electricity.[2] A household in England is 50% more likely to be in fuel poverty if it does not have a gas grid connection.[3] The same price ratio between gas and electricity also applies to industrial consumers.[4]
   - **Capacity:** The gas system is able to manage peak demands in cold winter mornings and evenings of around 300 GW, around five times higher than peak electricity demand of 50-60 GW.[5]
   - **Carbon dioxide storage:** UK offshore waters have very large CO_2 storage capacity, estimated to be around 78 billion tonnes – the top 15% of this storage capacity would be enough to meet entire UK needs for 100 years.[6]
   - **Integration with renewables:** Decarbonising the gas system can support the growth of renewables. Excess renewable electricity can be used to produce hydrogen via electrolysis, which can then be blended into the gas grid, used directly in transport and industrial applications, or stored to provide power generation when wind speeds or solar radiation are low.
   - **Upgrading:** A range of projects are underway to equip the gas networks to handle a much greater volume of decarbonised gases, including biogases, hydrogen blends and 100% hydrogen.
   - **Industrial Strategy:** Decarbonised gas solutions, including direct CCUS on industrial facilities and fuel switching to hydrogen, are needed to decarbonise industry. The Committee on Climate Change's (CCC) net-zero report found that a major CO_2 transport and storage infrastructure would need to service at least five industrial clusters by 2050, with all major clusters having CO_2 infrastructure by around 2030. Bioenergy could be used in some industrial processes where CCS is available, and widespread deployment of hydrogen and some electrification (potentially together with limited biomethane) would be needed for industrial heat and combustion for those sectors without direct CCS.[7]

9. As we explain in this response, the focus of decarbonisation policies and green finance should not be to pick one sector over another. It should be to enable industrial growth, provide affordable

energy, and deliver the maximum decarbonisation possible, in a cost-effective way, without shifting UK emissions overseas.

The economic opportunity

Q1. What economic costs and benefits does decarbonisation present for the UK?

10. First, the communities in which people live are of vital importance, both in terms of the opportunities from new industries and the benefits of better air quality, and equally the need to avoid the risks of job losses and higher fuel bills.

11. In many parts of the country, energy intensive industries – including iron and steel, cement, chemicals, oil refining, food and drink, pulp and paper and ceramics – are the largest employers in the area and offer high quality jobs that pay above the median wage. These industries are at the heart of communities, and 70% of businesses in these sectors are exporters. Overall, energy intensive industry accounts for £140 billion in economic value added and employs over 1.1 million people.[8]

12. To date, we have seen far too much decarbonisation through offshoring of industry. Between 1997 and 2016, the UK's production of emissions fell by 35%, but the emissions embodied in the goods and services we *consume* in this country only fell by 9%.[9] Over this period, manufacturing fell from 17% to 10% of the UK's economy.[10] To give one example, the closure of Redcar steelworks in late 2015 led to 2,000 job losses, but caused nearly half the fall in industrial emissions in 2016.[11] This is not a sustainable position for the UK, is not compatible with the Clean Growth Strategy, and may actually increase emissions globally as industry in many countries is far more dependent on coal.

13. There are, however, exciting opportunities for UK industry, provided that the right policies are in place to support industrial decarbonisation. These include:

    - Global markets: There are growing global markets that provide export opportunities. The global CCS market could rise to £100 billion a year;[12] the global hydrogen market could reach £1.9 trillion a year by 2050;[13] the EU bio-economy is already worth £1.7 trillion today; and international electrolyser and fuel-cell CHP markets are growing.
    - Manufacturing base: Decarbonising UK industry can help to retain and future-proof the UK's manufacturing base, preparing it to take commercial advantage of global marketplaces where customers will increasingly want to purchase low carbon industrial goods and services.
    - Export revenue: The UK will have an opportunity to earn export revenue from storing CO_2 on behalf of other countries and/or through capturing and storing CO_2 from industrial processes and then exporting the low carbon product.
    - Research: The UK is home to many of the world's leading academic centres of excellence for low carbon technologies, which combined with our ability to conduct full scale research on energy systems containing hydrogen and CCS, at locations such as Spadeadam, gives the UK a global lead in developing low carbon solutions.

14. To give one example, a recent Summit Power report found that developing a network of CCS projects along the East Coast of the UK, capturing 75 million tonnes of CO_2 per year, would provide £163 billion of economic benefits through to 2060, outweighing the £34 billion of cost by a ratio of 5:1. The report also estimated a positive impact on the balance of trade of trade of £9 billion through to 2060.[14]

15. There are also, however, risks to UK industry, which operates in fiercely competitive global markets with small margins. If extra costs are added in this country, without similar moves elsewhere, then it risks making industry uncompetitive, and hence risks the further transfer of economic activity, knowledge – and emissions – overseas.

16. It is worth noting areas of policy success. For example, the carbon price support framework has acted to reduce the amount of coal-fired electricity generation in the mix. And offshore wind is a good example of a technology where sustained support for deployment – through Renewable Obligation Certificates (ROCs) and Contracts for Difference (CfDs) – has reduced costs by more than half since 2011,[15] with direct employment in the sector rising to around 10,000.[16]

17. It is, however, vital to consider how representative the system of carbon accounting actually is in practice. Currently, emissions from coal-fired electricity imported through an interconnector, emissions associated with processing and transport of LNG, and emissions from producing imported industrial goods all count as zero in this country. Although the emissions are counted in the country of origin, we don't believe it is credible to count imported emissions as zero in the UK in this way, as it understates the UK's contribution to greenhouse gas emissions. Similarly, emissions from waste exported to other countries should be fully accounted for in the UK.

18. Finally, we are not in favour of the carrying forward of overachievement of earlier carbon budgets against the fourth and fifth carbon budgets, which would only serve to delay necessary action to reduce emissions in the 2020s.

Q2. What benefits can a growth of the Green Finance sector deliver for the UK, and does the UK hold a competitive advantage in this space?

19. First, a growing green finance sector could be a very useful source of project finance, but this depends on there being an investible framework. As we mentioned in our answer to Question 1, with or without a green finance sector, offshore wind would not have developed without ROCs and CfDs, and decarbonised gas solutions will similarly need an investible framework.

20. Second, all forms of decarbonisation should be eligible for green finance. This includes biogases from sustainable bio sources, hydrogen produced using low carbon electricity, hydrogen produced from natural gas with CCUS, and CCUS on industry and power generation. We cannot be picking one or two of these options – all will be needed, including considerable volumes of hydrogen produced from methane reformation.

21. Similarly, there is a range of different companies that are vital to decarbonisation of the gas system, and that should be eligible for green finance for decarbonisation projects, including gas transmission and distribution companies, major multinationals, dynamic SMEs, and the oil and gas sector.

22. Further, if we are to encourage the shift to lower carbon energy solutions in the home, we will also have to provide incentives for consumers to improve insulation and fit low carbon heating devices such as hydrogen boilers, heat pumps, or hybrid heating systems.

23. Third, depending on the outcome of Brexit, a replacement for the European Investment Bank may be needed.

24. Fourth, a UK green finance sector could useful align with European defined criteria for low carbon investment (through the Technical Expert Group on Sustainable Finance), which include biogases, hydrogen from low carbon electricity and from natural gas with CCUS, and CCUS more generally.[17]

25. Fifth, green finance can help to reduce the cost of capital through reducing investment risk. For instance, reducing the weighted average cost of capital (WACC) from 10% to 5% for an offshore wind farm would reduce the levelised cost of energy by 30%.[18]

Q3. How might HMT deliver a regionally balanced and 'just' transition across the UK?

26. There are several elements to delivering a just transition that we would like to highlight. First, we would re-emphasise our response to Question 1, which set out the vital importance of energy intensive industries to communities across the UK, many of which are in less affluent parts of the country. It should be a priority to keep a manufacturing base in this country as we decarbonise – offshoring of industry is not compatible with a just transition, as it would lead to significant job losses in vulnerable communities. And as mentioned in our summary, gas is only a quarter of the price of electricity for industrial users, while many industrial processes are not suitable for electrification.

27. Second, we should keep the impact on consumers at the forefront of our thinking, particularly the need to avoid increasing fuel poverty, which, with 11% of households fuel poor,[19] is already too high. As we also pointed out in our summary, gas is a quarter of the price of electricity for domestic consumers, and households are 50% more likely to be in fuel poverty if they are not on the gas grid. Domestic decarbonisation should make full use of the gas grid, which carriers more energy at much lower cost than the electricity grid. At the same time, there is a limit to the extent to which households should be asked to pay for decarbonisation through their bills. Energy efficiency, through improved thermal insulation and low energy devices, should also be supported by government.

28. For off-grid households, bio-LPG represents a very attractive decarbonisation choice. Replacing an oil-fired heating system with a bio-LPG boiler is more cost-effective than a deep retrofit that would be required for many rural properties to be suitable for a heat pump.

29. Third, we should be thinking about how industry can expand as it transitions to decarbonised solutions, for example, offshore oil and gas companies expanding into CO_2 storage, and gas engineers being trained to work on hydrogen systems as well as natural gas boilers and pipes.

30. Similarly, there are major opportunities for the gas system to integrate better with the electricity system. Renewable electricity can produce hydrogen, which can be used to decarbonise the gas network, and gas-fired generation with CCUS, or hydrogen generation, can be used to provide power when renewable output is lower.

31. Fourth, much of the UK's decarbonisation effort will need to happen outside of London and the South East of England, and consequently, decarbonised gas projects can help to rebalance investment to less affluent parts of the country – for instance, the UK's five largest emitting industrial clusters are all outside the South East, and combined emissions account for over 30 million tonnes of CO_2 each year.[20] HMT can also work with local authorities and city regions across the UK, many of which are strong supporters of industrial and other decarbonisation projects locally.

HMT's strategy

Q4. What is HMT's current strategy, and approach to, UK decarbonisation, and is it fit for purpose?

32. We believe that, overall, HM Treasury's approach is short-term and focused on the next five years, and that a long-term strategy to meet the previous 80% emission reduction target, and the new net zero target, is missing.

33. There are useful lessons from previous HMT actions, both positive and negative, which can serve as a useful guide for future policy development:

    - On the one hand, offshore wind provides a positive example of consistent policy that has delivered large-scale investment, deployment and cost-reduction, through a well-defined and understood financing mechanism (CfDs).
    - On the other hand, the cancellation in 2015 of the CCS competition was hugely damaging to investor sentiment. It was also a classic example of a false economy, given that the Committee on Climate Change has consistently said that the costs of meeting the UK's previous carbon reduction target could be twice as high without CCS,[21] and that "CCS is necessity not an option" for net zero.[22]

34. The experience of investment flows reinforces this point. Money will flow to projects and sectors that offer a stable and predictable return. As we have seen with offshore wind and CCS, policy consistency is critical and policy volatility is highly damaging.

35. We also believe that an approach which emphasises competition above all else is not helpful, especially in relation to industries with burgeoning technologies. A collaborative approach would be better suited, for several reasons:

    - In individual industrial clusters, there is a need for shared infrastructure, with, for example, potentially several factories taking hydrogen from a new pipeline, or transporting CO_2 via a new shared pipeline.
    - Equally, a number of major companies will be involved in decarbonisation projects in more than one cluster.
    - For clusters that do not have nearby offshore CO_2 storage, CO_2 is likely to need to be transported to other clusters which have suitable offshore storage.
    - There are benefits to keeping the IP in the UK and sharing learning between clusters, to facilitate cost-effective decarbonisation and maximise UK export opportunities.

Q5. How does HMT work with the Clean Growth Strategy and government departments to support decarbonisation? Is this working well?

36. The picture is mixed. On the one hand, strategy development has improved within BEIS, starting with the publication of the Clean Growth Strategy in 2017, and followed by the formation of a hydrogen economy team within BEIS in 2018, the publication of the BEIS CCUS Action Plan and Industrial Clusters Mission in late-2018, and the recent HMT Spring Statement announcement on support for low carbon gases in the gas grid. These are all very welcome developments.

37. The strategy development described above has been positive, and is encouraging attractive decarbonised gas projects to come forward, including a number of major industrial decarbonisation schemes in the largest emitting industrial clusters:

- **Scotland:** The Acorn project is a phased full chain carbon capture, transport and offshore storage project to initiate CCS in the UK. It would also see hydrogen blended in the NTS or used for 100% hydrogen applications in NE Scotland.[23]
- **North West:** The HyNet project would capture and store existing CO_2 emissions from industry and then provide hydrogen to heavy industry in the region, saving several million tonnes of CO_2 a year, with residual hydrogen blended up to 20% in the residential gas grid.[24]
- **Teesside:** The Clean Gas Project is an Oil and Gas Climate Initiative-led project to create commercial full-chain CCUS facility in Teesside, combining CO_2 capture from power generation and local industrial emitters.[25]
- **Humberside:** Drax, Equinor and National Grid Ventures are working together to develop bioenergy with carbon capture and storage (BECCS) and hydrogen production, with the aim of delivering the UK's first zero carbon industrial cluster.[26]

38. Combined, these projects would save millions of tonnes of CO_2 annually, and ultimately several tens of millions of tonnes. They have the potential to deliver the BEIS Industrial Cluster Mission, which aims for at least one cluster to have low carbon infrastructure by 2030, with multiple factories decarbonising, and one net-zero cluster by 2040. They would also make a major contribution to the Committee on Climate Change's recommendation that all major clusters need to have CO_2 infrastructure by 2030 in order to meet net zero by 2050.

39. On the other hand, the substance behind the strategy has not yet followed. Although the £170 million Industrial Cluster Decarbonisation challenge within the Industrial Strategy Challenge Fund (ISCF) is very welcome, and the prospect of the Industrial Energy Transformation Fund (IETF) including decarbonisation projects equally so, there is not sufficient funding to deliver at-scale demonstration and infrastructure development projects in all the major clusters.

40. At the same time, there are no policies to facilitate large-scale roll out. We do not yet have investible mechanisms for CCUS, hydrogen, a significant ramp-up of biogases, or attractive solutions such as bio-LPG heating in off-gas grid homes and businesses. All of these options have the potential to save millions of tonnes of CO_2 a year (and to deliver negative emissions in the case of bioenergy with CCUS), but none yet have a mechanism to deploy at the scale required.

41. Projects such as those highlighted above need to be fully funded to provide the learning needed for cost-effective large-scale deployment. This learning needs to take place in the 2020s, which means that funding decisions need to be made now. And to leverage private sector investment, policy to provide an investible framework needs to be developed in parallel. In its latest progress report to Parliament, the Committee on Climate Change concluded that industrial hydrogen and CCS clusters need to be operational from the mid-2020s, which requires a start to be made as soon as possible.[27]

42. Just as with other low carbon energy technologies, the first projects will be more expensive, but costs will come down. In the cases where decarbonised gas has had support for deployment, we have seen significant cost reductions. Tariff payments for biomethane injected into the grid have fallen from a flat 8.22 pence per kWh before 2015, to 4.76 pence per kWh in 2019 (with lower rates for injections beyond the first 40 GWh). Although applications have fallen from their peak in 2016, there were 9 applications in 2018, a slight increase on 2017.[28] This demonstrates that biomethane producers have been able to adjust to the lower tariff payments.

Q6. How should HMT's approach evolve to ensure the Government meets the legally binding carbon budgets (and the net-zero targets, if applicable)?

43. The recent HMT letter, that was widely reported, essentially set out what is necessary to meet the net zero target. As the previous Chief Executive of the Committee on Climate Change, Matthew Bell, pointed out, "all the points it raised are also discussed in the CCC's advice".[29] So we believe that HMT understands what is required, but the challenge, as ever, is to deliver in practice.

44. Achieving net zero requires HMT, but also a number of other departments – including BEIS, DfT, DEFRA and MHCLG – to work closely together. We believe that appointing a minister for net zero, who had the authority and independence to work across all relevant departments, could provide significant benefits.

45. Multiple financing tools will also be needed, with a focus on achieving cost reductions to reduce and then eliminate the need for subsidies. There is a difference between high capex, low opex generation, for example wind, and lower capex, higher opex generation, where fuel costs are a factor, for example gas-fired power with CCUS or hydrogen power. Equally, investments to decarbonise the gas grid, to decarbonise industry, or to decarbonise heavy transport, are very different to those needed to provide low-carbon electricity. Financing mechanisms need to encompass all these decarbonisation options.

46. Any mechanisms to support wider roll-out of low-carbon energy infrastructure need to ensure that:

- Any framework is simple and clear.
- Industrial competitiveness is maintained.
- Cost is kept to a minimum with a clear exit path, making sure that any framework is funding a transition rather than becoming a permanent feature.
- A just transition is supported, without putting too much burden on bill-payers

47. There are several options that are worthy of further consideration, including:

- Tax credit: A tax credit for emissions reduced, whether through CCUS or other means, would ensure that industrial competitiveness is not negatively affected. It would also avoid additional knock-on costs on smaller consumers. The 45Q tax credit in the US is an interesting example. To provide an example, the US 45Q tax credit is increasing to $50 a tonne for CO_2 storage, which is around £38 per tonne at current exchange rates. A tax credit at the same level would cost £380 million to reduce emissions by 10 million tonnes.
- Contracts for difference (CfD): The CfD framework in the UK is well-understood, and providing an auction mechanism incentivises cost reduction. The Levy Control Framework allows for new levies to be raised only if the total burden of levies (Renewables Obligation, Feed-in Tariff and CfDs), which now mainly relate to existing contracts, is falling. The Treasury anticipates this to be in 2025.[30] If this is the case, then new CfDs for decarbonised gas projects could be offered in the mid-2020s. And to meet net zero, the Levy Control Framework may need to be raised.
- Carbon pricing: Dependent on the Brexit outcome, the UK may remain part of the EU ETS, which is only now starting to deliver a higher carbon price, albeit one that is still too low to achieve major change on its own. The UK could resume a gradual increase to the carbon price, and potentially extend it to all emissions rather than just ETS emissions. However, this risks making industry uncompetitive against other countries with a lower carbon price, and hence the transfer of economic activity overseas, which is not a desirable outcome. It is worth noting that the Energy Transitions Commission recommended that carbon prices should be differentiated by

sector, depending on the costs of abatement in different industries, and levied on domestically-traded products such as cement, rather than internationally-traded products such as steel.[31]

- Iron Mains Risk Reduction Programme: The Iron Mains Risk Reduction Programme is set to be completed in 2032. Between 2032 and 2052, there will be increasing levels of network savings, adding up to 7% of the bill by 2052.[32] This could allow, instead, for a continuation of the Iron Mains Risk Reduction Programme funding for roll-out of decarbonised gas across the gas network, with less noticeable impact on bills.

48. The extent of risk-sharing between government and industry also needs to be determined. Similar to nuclear waste or offshore oil and gas decommissioning, long-term CO_2 storage liabilities need to sit with Government. The industry should be strongly regulated, and, if necessary, required to provide financial security to ensure that projects are completed in the event of insolvency – as per the offshore oil and gas industry for decommissioning – but liabilities decades or hundreds of years out need to be borne by Government (in line with the EU Storage Directive).

49. There also needs to be co-ordination between government and regulator/s. For example:

    - Co-ordination between Ofgem's gas and electricity units can help to support sector coupling and power-to-gas.
    - Ofgem's RIIO2 framework for gas and electricity networks needs to be consistent with BEIS decarbonisation plans and financing mechanisms.

50. Finally, we believe that HMT needs to be more accepting of risk for earlier-stage technologies. It is only by deploying, and learning, that we will progress the decarbonisation of the harder-to-decarbonise sectors such as industry and domestic heat, that are critical to meeting the forthcoming carbon budgets. For instance, heat currently represents around a third of the UK's total greenhouse gas emissions, and over 80% of the UK's 26 million homes use gas for heat.

Q7. What role should the 2019 Comprehensive Spending Review play in UK decarbonisation? What projects or measures should receive additional funds through this process?

51. As we set out in the summary, and as the Committee on Climate Change showed in their net zero report, decarbonised gas is essential to meeting net zero, and the foundations need to be laid now. The 2019 Comprehensive Spending Review therefore needs to prioritise the development of the sector.

52. The first priority is to continue to support low-regrets actions that will reduce emissions in the short-term and provide options for the longer-term, without prejudice to future decisions on, for example, heat decarbonisation. This includes the continued incentivisation of biomethane connections to the gas grid along with the introduction of low carbon hydrogen, the latter accompanied by a regional or general increase in permitted hydrogen volumes in the gas grid to 2-3%. This would continue the good track record of biomethane development and provide a mechanism for power-to-gas to make better use of the UK's growing share of renewables.

53. The Renewable Transport Fuel Obligation (RTFO) should also be extended to permit any form of low-carbon hydrogen, therefore ensuring that hydrogen produced from renewable electricity, other low-carbon electricity, gas reforming with CCUS and any other low-carbon methods can compete on fair terms.

54. We are encouraged by the commitment in the Spring Statement to increase the proportion of green gas in the grid, and the announcement of a consultation on the appropriate mechanism to be held later this year.[33] We would urge that all forms of decarbonised gas are included – biogases, hydrogen from electrolysis using low-carbon electricity, and hydrogen from methane with CCUS.

55. The current cap on biomethane spending is around £400 million a year, within an overall Renewable Heat Incentive (RHI) pot of around £1 billion a year. In order to meet the ambition to increase the proportion of decarbonised gas in the grid in a meaningful way, we would recommend that £1 billion a year is invested overall. As we explain above, tariff rates for biomethane injection have roughly halved since 2014, and there is no reason why other decarbonised gases cannot follow suit.

56. Second, the existing ISCF and IETF programmes, while welcome, do not go far enough. Each could fund the first phase of a larger industrial decarbonisation project in one cluster, or be spread across small projects. There are five key clusters, and if the ISCF and IETF can fund one cluster each, three of these largest clusters would need to find alternative mechanisms. And subsequent phases of major projects will also need to be funded.

57. We therefore think that at a minimum, a further £250 million should be made available in the upcoming Spending Review period to part-fund two further large-scale industrial decarbonisation projects, provided that these projects offer material emissions savings in phase 1 (hundreds of thousands of tonnes) and can be expanded in subsequent phases (to several million tonnes). This would not be sufficient to cover every cluster, but with industry match-funding, this would allow for the investment of a further £500 million and allow more of these vital large-scale projects to be developed in different parts of the country.

58. Third, further field trials will need to be funded, potentially including the following:

- Bio-LPG: Bio-LPG boilers in off-grid properties, which offer a potentially cost-effective deep decarbonisation, without the need for wider retrofits that heat pumps may require. At present, there is insufficient consideration of bio-LPG for off-grid.
- Hybrid solutions: Following on from the Freedom Project,[34] further trials of hybrid solutions may be useful, including with bio-LPG boilers in off-grid properties.
- 100% hydrogen: The H100 project in Scotland, to test 100% hydrogen in a small new build area and the community trials that would follow-on from the Hy4Heat programme.
- Efficient gas-based appliances: The move to condensing gas boilers has been a great success over the last 15 years, but gas-based appliances could be more efficient still. Gas-driven heat pumps and micro-CHP units could be developed to run on the existing gas grid, reducing emissions and consumer bills in the short term, and then be adapted to run on hydrogen blends or 100% hydrogen in the future. Given the 4:1 cost ratio between electricity and gas, more efficient gas-based appliances should be given further consideration.
- Transport: In addition to the RTFO change, further support should be given to fleet operators to switch to biomethane or hydrogen. Successful large-scale trials would provide further comfort to others considering a similar switch. This should include funding for additional compressed natural gas (CNG) and hydrogen refuelling stations.
- Shipping: The maritime sector is a large contributor to greenhouse gas emissions and air pollution. The recent publication of the Clean Maritime Plan is a welcome step, but demonstrations of clean shipping technologies will be necessary.

59. We estimate that proper, comprehensive field trials would cost around £50 million each. Given the number of field trials that may be needed, we recommend the investment of £50 million a year in

field trials for the Spending Review period. This would be in addition to the Ofgem network innovation funding recommendation below.

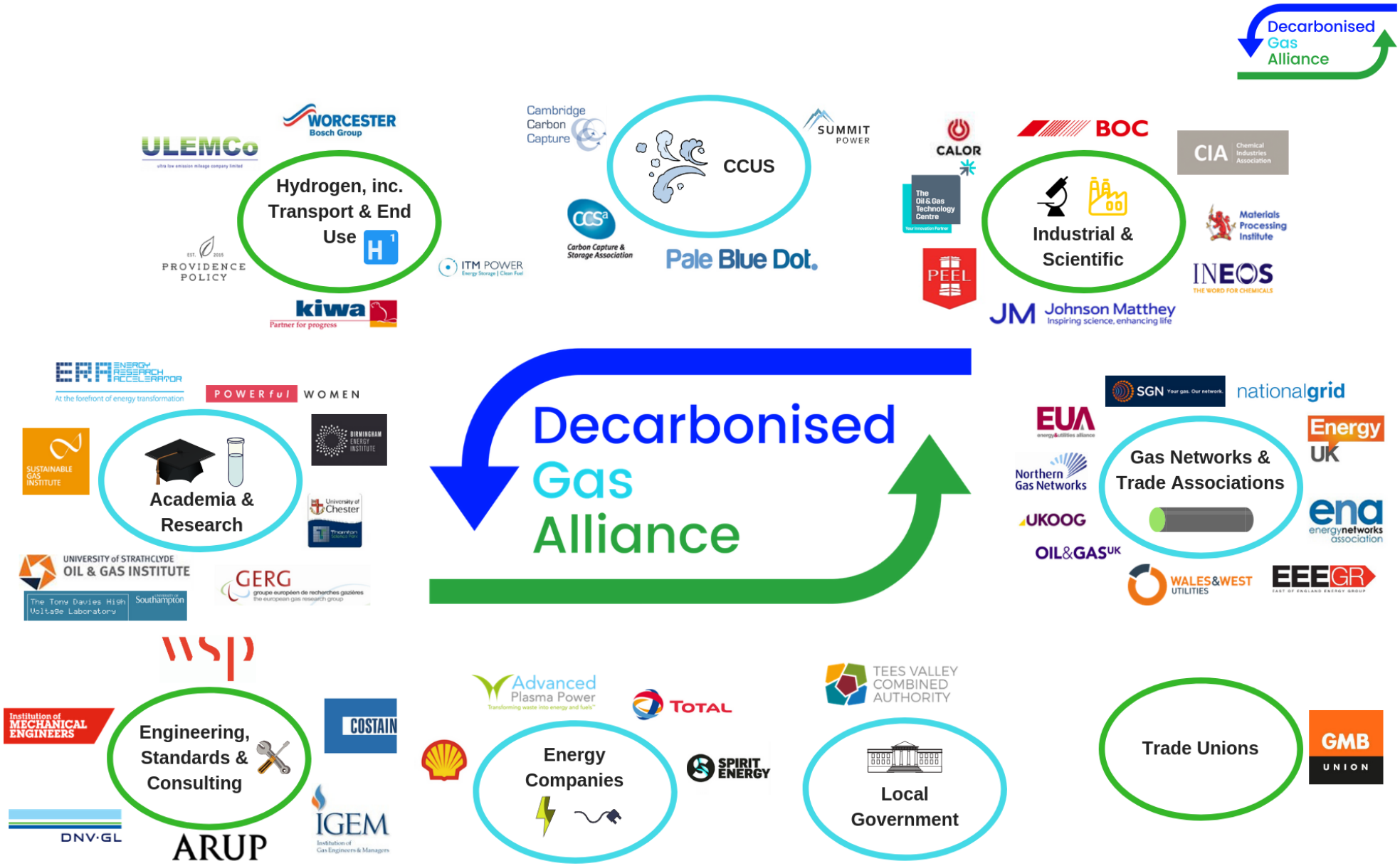
60. Fourth, while this does not directly concern the Spending Review, the position of government and the regulator needs to be better co-ordinated. The Ofgem network innovation funding has been very successful so far, but there is a large discrepancy in funding for electricity network innovation (£70 million) and gas network innovation (£20 million) in the annual Network Innovation Competitions. This is not consistent with the Government's position that both gas and electricity based low carbon heating solutions are viable options.

61. Equality of funding for network innovation, through raising the level of gas network innovation to £70 million a year, is needed to realise opportunities around decarbonising gas, and a broad approach to encouraging innovation across the supply chain will be needed for comprehensive field trials to take place. We therefore suggest that a further £50 million a year be made available to gas network innovation through the Ofgem network innovation funding. This could help to fund some of the field trials mentioned above.

Green Finance

62. For this section, we would like to emphasise our response to Question 2. Green finance will be needed in all sectors covering different projects and levels of deployment. Without broad financing mechanisms for decarbonisation, the UK will not achieve net zero.

63. In reality, "green finance" should be thought of as "decarbonised finance", as the goal is to deliver the maximum emissions reductions possible, in a cost-effective way, without shifting UK emissions overseas. It needs to cover all forms of decarbonisation and all sectors and organisations which can deliver it, taking a broad outcome-based approach.


Decarbonised Gas Alliance
Hydrogen, inc. Transport & End Use
CCUS
Industrial & Scientific
Academia & Research
Gas Networks & Trade Associations
Engineering, Standards & Consulting
Energy Companies
Local Government
Trade Unions
Decarbonised
Gas
Alliance

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