Department for
Business, Energy
& Industrial Strategy

Combined Heat and Power: pathway to decarbonisation

Call for evidence

Closing date 20th December 2021

September 2021

Any enquiries regarding this publication should be sent to us at: CHPPolicy@beis.gov.uk

Contents

Executive summary

In 2019 the UK became the first major economy to place a commitment to net zero greenhouse gas emissions by 2050 into law. The target requires the UK to bring all greenhouse gas emissions to net zero by 2050, compared to the previous target of at least an 80% reduction from 1990 levels[1]. In addition to our net zero target and as part of the UK's Nationally Determined Contribution (NDC) to the United Nations process, the UK has committed to an ambitious pledge to reduce emissions by at least 68% from 1990 levels by 2030. The 2020 Energy White Paper and Ten Point Plan signal the steps needed to achieve the net zero goal. The recently published Industrial Decarbonisation Strategy and the forthcoming Heat and Buildings Strategy set out more detail on how this rapid decarbonisation will be achieved in these key sectors. The amount of renewable energy in the generation mix of the electricity grid is now over 40% and fossil fuels such as coal are due to be phased out of the generation portfolio by 2024. Natural gas has long been the largest fuel type in UK energy generation, but the associated emissions need to be addressed, and virtually all areas of heat and power demand need to take significant action in order to decarbonise.

Combined heat and power (CHP) is an efficient cogeneration process able to use a wide variety of fuel sources, capturing and utilising the heat that is produced in power generation. By generating heat and power simultaneously from the same fuel, CHP can achieve efficiencies of up to 30% compared to the separate generation of heat through a gas-fired boiler and an electricity power station. Where a demand for both heat and electricity exists in the same location, CHP can reduce energy costs whilst reducing carbon emissions and air pollution.

CHP is technically feasible for many types of thermal generating stations, including energy from waste and biomass with CCUS (BECCS), hydrogen and nuclear, but a significant majority of CHP plants in the UK are currently fuelled by natural gas. CHP generators may export power not used on site acting as dispatchable generation, adjusting exported power output to provide valuable flexibility services to the electricity network. CHP plants are used by a wide variety of sectors, in particular chemicals, food and drink, paper and refining industries. CHP is used in large commercial and civic buildings with high heat demands, such as hospitals, hospitality and leisure facilities, retail outlets and heat networks.

Government currently provides support to CHP because of its relatively long payback period, the environmental benefits of cogeneration and the technical requirements of plant installation. The CHP Quality Assurance Scheme (CHPQA), an annual assessment process, ensures that all CHP plants that benefit from government support meet a minimum level of energy efficiency.

Since the introduction of the CHPQA scheme in 2001, the UK generation mix has changed considerably. Now renewable and low carbon generation provide increasing proportions of the national electricity needs, reducing the emission reductions delivered by CHP electricity generation compared to the average grid emissions. Modelling work on the impact of new natural gas CHP plant on the GB electricity market concluded that from 2032, unabated natural

[1] The Devolved Administrations are able to set their own climate change targets as part of the UK's long-term emission reduction goal. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, which amends the Climate Change (Scotland) Act 2009, sets targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045. The Environment (Wales) Act 2016 sets a legal target of reducing greenhouse gas emissions by a minimum of 80% by 2050, and the Welsh Government has laid regulations to formally commit to net zero emissions by 2050. Northern Ireland contributes towards the UK climate change targets and carbon budgets set out in the Climate Change Act 2008.

gas CHP would begin to displace an increasing proportion of low carbon generation, effectively raising carbon emissions and jeopardising achievement of carbon budget targets.

This latest engagement is part of a longer review and is intended to build on the 2020 call for evidence[2] by seeking views on a variety of potential options for future CHP policy which may help create a pathway to decarbonisation. The call for evidence indicated support for fuel switching and for existing natural gas CHP to act as a bridge whilst transitioning to low carbon alternatives and that amending current incentives to encourage the transition would be welcomed with sufficient clarity required for long term planning. Subject to consideration of the 2020 call for evidence, this current engagement and the development of other policy areas interacting with CHPQA (such as hydrogen, CCUS and biomass), one possible option would be to end support for new unabated gas CHP installations at some point in the short to medium term. The rapidly changing nature of technological development means that specifics concerning timing and in-depth policy details may be subject to change as the landscape evolves requiring further stakeholder engagement in the future.

[2] https://www.gov.uk/government/consultations/combined-heat-and-power-chp-the-route-to-2050-call-for-evidence

General information

Why we are consulting

The Government is seeking to build on the information received from the call for evidence held in 2020 and capture views to inform policy development for a future pathway to decarbonisation.

We recognise the current challenges facing the economy and this consultation is not indicating the removal of support at this time but requesting feedback from all CHP stakeholders to shape the future approach. Nothing in this document creates any basis for any form of expectation or reliance.

Stakeholder Engagement details

Issued: 27/09/2021

Respond by: 20/12/2021

Enquiries to:

Business Energy Use Team
Department for Business, Energy & Industrial Strategy
2nd Floor, Orchard 3
1 Victoria Street
London, SW1H 0ET

Tel: 020 7215 5000
Email: CHPPolicy@beis.gov.uk

Consultation reference: Combined Heat and Power: pathway to decarbonisation

Audiences:

We are keen to hear from CHP operators, Heat network operators, energy companies, network operators, technology suppliers, large businesses, SMEs, financial institutions, Energy Service Companies (ESCOs), Local Enterprise Partnerships, Non-Governmental Organisations, academics and anyone else with an interest in this area.

Territorial extent:

UK

How to respond

Respond online at: https://beisgovuk.citizenspace.com/heat/chp-pathway-decarbonisation-cfe

or

Email to: CHPPolicy@beis.gov.uk

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

We processed your personal data in accordance with all applicable data protection laws. See our privacy policy.

We will summarise all responses and publish this summary on GOV.UK. The summary will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

Quality assurance

This call for evidence was carried out in accordance with the Government's consultation principles.

If you have any complaints about the way this call for evidence was conducted, please email: beis.bru@beis.gov.uk.

1. Introduction

The 2020 Energy White Paper[3] (EWP) set an agenda to bring all greenhouse gas emissions to net zero by 2050. This will require rapid decarbonisation across all sectors with many changes to the ways in which both power and heat is generated and used. The recently published Industrial Decarbonisation Strategy and the forthcoming Heat and Buildings Strategy set out more detail on how this rapid decarbonisation will be achieved in these key sectors.

Combined heat and power (CHP) is an efficient process that captures and utilises the heat that is produced in power generation, this is usually electrical but can in some instances be mechanical. By generating heat and power simultaneously from the same fuel, CHP can achieve efficiencies of up to 30% compared to the separate generation of heat through a gas-fired boiler and an electricity power station. Where a demand for both heat and electricity exists in the same location, CHP can reduce energy costs whilst reducing carbon emissions and air pollution.

CHP installations can encompass a range of different generation technologies and are fuelled by fossil fuels or renewable sources such as biomass. CHP generators may export power not used on site and when acting as dispatchable generation, CHP can adjust its exported power output to provide flexibility services to the electricity network. In 2019, the Good Quality CHP capacity[4] in the UK was an estimated 6050 MWe generating 7.1% of all electricity generated in the UK, and 5.7% of the total heat demand and 20.3% of industrial heat demand[5]. CHP is used significantly by chemicals, food and drink, paper and refining industries in addition to buildings with high heat demands such as hospitals, hotels and leisure centres[6]. CHP has been identified as an important technology for achieving government's targets due to its potential role contributing to decarbonising heating and cooling, achieving industrial energy efficiency savings and the transition to low carbon fuels.

Government currently provides support to improve the commercial case for investing in CHP because of its relatively long payback period, the environmental benefits of cogeneration and technical complexity. The CHP Quality Assurance Scheme (CHPQA) is an annual assessment process that ensures that all CHP plants that benefit from government support meet a minimum level of energy efficiency.

Since the introduction of the CHPQA scheme in 2001, the UK generation mix has changed considerably with renewables contribution to low carbon generation providing increasing proportions of the national electricity needs resulting in low carbon generation from renewables and nuclear now accounting for 54.4% of all electricity generated in 2019[7]. As we consider how best to meet the commitment to achieve net zero greenhouse gas emissions by 2050, it is timely for government to consider proposals for a decarbonisation pathway towards 2050.

Under existing policies, CHP plants that meet minimum standards of energy efficiency and environmental performance are estimated to be eligible for over £500M in financial support

[3] https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future
[4] Good Quality CHP denotes schemes that have been certified as being highly efficient through the UK's CHP Quality Assurance (CHPQA) programme.
[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/929571/2020_End_use_tables_-_web_copy.xlsx
[6] Chapter 7, www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2020
[7] Chapter 1, www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2020

through a combination of various tax reliefs, and incentives such as Contracts for Difference and the Renewable Heat Incentive. These policies incentivise CHP deployment which account for lower carbon emissions than the separate generation of heat and power from the same fuel (predominantly natural gas).

However, the need to decarbonise to meet net zero ambitions means we need to examine incentives available for generation and how support for unabated fossil fuel-powered CHP should be reformed in the future to avoid subsidised gas CHP plants displacing lower carbon generation. Development of the policy framework and commercially scalable technologies required to support the switch from natural gas are at an early stage and a portfolio approach will be required as a single alternative solution is not yet in place. We are mindful of the challenges currently facing business and are engaging with UK wide CHP stakeholders to seek further evidence to help shape policy options and the design of a pathway to decarbonisation.

This call for evidence is the latest stage of a longer review. The feedback from this call for evidence will be analysed alongside the 2020 responses to form the basis of further consultations on specific proposals for changes to CHP policy and support, the legislative changes that may be necessary to implement them, and updated guidance.

We are seeking views on topics in the following areas:-

- The need for change in order to effectively decarbonise to meet future carbon budgets.
- Low carbon options that may be adopted to facilitate decarbonisation.
- Potential options forming a pathway to decarbonisation.

We anticipate a Consultation on proposals for CHP and any accompanying legislative changes would be published in 2022.

2. Policy landscape

Recognising the challenge to decarbonise the UK economy, while increasing productivity and minimising energy costs, the Government has developed a policy framework to encourage deployment of highly efficient CHP where this can support decarbonisation of heat and power, particularly in industry, and improve energy efficiency. A full description of the support available via the CHPQA scheme was covered in the 2020 call for evidence[8], but a brief summary is included below.

2.1 Policy support for Good Quality CHP

2.1.1 CHPQA

In 2001 the Government introduced CHP Quality Assurance programme (CHPQA) to monitor, assess and improve the quality of CHP schemes in the UK[9]. On an annual basis the CHPQA programme assesses the energy efficiency and environmental performance of all types and sizes of CHP schemes against the CHPQA Standard to determine whether they meet the criteria for 'Good Quality CHP' certification.

The CHPQA certification acts as a 'passport' to enable certified CHP plants to access government support through several incentives. The incentives are provided to improve the commercial case for investing in and operation of Good Quality CHP due to its relatively long payback period, environmental benefit and technical complexity[10]. The current incentives are predominantly operational incentives, which require the CHP plants to maintain CHPQA Certified status to continue to access the support. However, from 2001 to March 2020 installers of new or refurbished CHPQA certified plants were eligible to claim enhanced capital allowances for the investment in qualifying plant and machinery[11].The operational incentives CHPQA certificated schemes using conventional fuels can access include[12].

- Beneficial treatment under climate change levy (CCL) and fuel duty
- Beneficial treatment under the carbon price support (CPS) rates of tax
- Exemption from Business Rates of Power Generating Plant and Machinery

CHP plants fuelled by eligible renewable sources and certified by the CHPQA programme may also receive support for the electricity and/or heat they produce if they satisfy the accreditation criteria for one of the following schemes:

- Renewables Obligation (generally closed to new schemes in March 2017)
- Feed-in Tariff (closed to new schemes from April 2019)

[8] https://www.gov.uk/government/consultations/combined-heat-and-power-chp-the-route-to-2050-call-for-evidence
[9] www.gov.uk/guidance/combined-heat-power-quality-assurance-programme
[10] www.gov.uk/guidance/combined-heat-and-power-incentives
[11] www.gov.uk/government/publications/ending-enhanced-capital-allowances-for-energy-and-water-efficient-plant-and-machinery/capital-allowances-ending-enhanced-allowances-for-energy-and-water-efficient-plant-and-machinery
[12] www.gov.uk/guidance/combined-heat-and-power-incentives

- Renewable Heat Incentive (closed to new applications from 31st March 2021)
- Contracts for Difference

2.1.2 Climate Change Levy Exemption

The climate change levy (CCL) tax is charged on most non-domestic supplies of energy used as fuel for heating and power. The CCL was introduced in 2001 to encourage greater energy efficiency, lower energy use and help reduce the UK's carbon emissions[13]. CHPQA certified schemes benefit from special treatment under CCL including exemption for direct supplies (supplies used on site and not transmitted over the National Grid), to the extent that CHP that do not meet CHPQA efficiency standards benefits under CCL are proportionately scaled back. Currently, rates to 2024 have been legislated[14].

2.1.3 Carbon Price Support

CPS was introduced in 2013 and applies to fossil fuels used to generate electricity. It is paid by the operators of generating stations. CHPs certified under the CHPQA are only liable for CPS on the proportion of fuel referable to electricity that is "non-qualifying" for CHPQA purposes.

2.1.4 Business Rate Exemption

The business rating exemption applies to specified plant and machinery contained within CHPQA certified schemes. It is difficult to determine how many qualifying schemes claim this exemption and the value this represents to operators of CHP plant.

2.1.5 Support for renewable fuelled CHP

Renewables Obligation

The Renewables Obligation (RO) was introduced to support electricity generation from renewable sources. For renewable fuelled CHP plants accredited under the RO, the power output of the plant is eligible for Renewables Obligation Certificates (ROCs). In certain situations, certified CHP generating stations receive a higher number of ROCs per unit of Good Quality electricity than power only biomass generating stations (ROCs uplift). In order to maintain enhanced CHP support, such generating stations must continue to be certified under the CHPQA and must report against and meet sustainability criteria.

The RO is now closed to new generating capacity. However, CHP plants already accredited under the RO are eligible to continue receiving support for up to 20 years from the date of their accreditation.

Contracts for Difference

Since the closure of the RO to new entrants, Contracts for Difference (CfD) has become the main mechanism for supporting new large-scale low carbon electricity generation. There have been 3 auctions, or allocation rounds, to date[15]. Dedicated biomass and energy from waste schemes are only eligible for CfD support if they are deployed with CHP. Other fuelled

[13] Grid supplied electricity generated by the marginal plant (which in 2001 would likely have been coal fired power stations or CCGT power stations).
[14] https://www.gov.uk/government/publications/changes-to-rates-for-the-climate-change-levy-for-2022-to-2023-and-2023-to-2024
[15] http://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference

technologies including Advanced Conversion Technologies (ACT), are eligible to apply with or without CHP but they do not need to accredit under the CHPQA Standard. A call for evidence seeking views on how to evolve the CfD mechanism for future allocation rounds closed in March 2021 and responses are currently being analysed[16].

Renewable Heat Incentive

The Renewable Heat Incentive (RHI) was launched in November 2011 to provide support to renewable heat technologies in order to increase deployment and aid market development with the aim of reducing cost of installation. Biomass fuel CHP plants commissioned after December 2013 are eligible for support under the RHI if they are certified under the CHPQA and meet the other conditions of accreditation for the RHI scheme, including complying with air quality requirements.

Accredited, participants in receipt of the solid biomass CHP tariff have to continue to be CHPQA certified each year in order to retain this tariff. The solid biomass CHP tariff rate is higher than that paid to heat only biomass installations. The domestic RHI was extended to March 2022 in the Spring Budget 2020 which will be followed by a £270m Green Heat Network Fund[17] supporting low carbon heat networks. The non-domestic RHI closed to new applicants on 31st March 2021[18], existing beneficiaries will continue to receive benefits for 20 years from the date of joining the scheme.

2.1.6 Interaction with Climate Change Agreements

Several CHP schemes are installed on sites covered by a Climate Change Agreement (CCA), a voluntary agreement made by UK industry to reduce energy use and carbon emissions. In return, operators receive a discount on the CCL (92% for electricity and 83% for gas from 1 April 2021) for any eligible energy consumed at the facilities where a CCA is held. A number of CHP schemes serving CCA sites are also certified under the CHPQA. The CCA scheme was open to new entrants (until 30 November 2020) and has been extended by 2 years, with the addition of new targets covering 2021 and 2022, which if participants meet their obligations allow reduced rates of the CCL to March 2025[19].

2.1.7 Interaction with the EU Emissions Trading System and UK Emissions Trading Scheme

The UK left the EU ETS at the end of the transition period on 31 December 2020 and a UK Emissions Trading Scheme (UK ETS) replaced the UK's participation in the EU ETS on 1 January 2021. The 4 governments of the UK have established the scheme to increase the climate ambition of the UK's carbon pricing policy, whilst also protecting the competitiveness of UK businesses. The UK ETS will apply to energy intensive industries, the power generation sector and aviation.

It currently covers activities involving combustion of fuels in installations with a total rated thermal input exceeding 20MW (except in installations for the incineration of hazardous or

[16] https://www.gov.uk/government/consultations/enabling-a-high-renewable-net-zero-electricity-system-call-for-evidence
[17] Green Heat Networks Fund announced in the March 2020 Budget www.gov.uk/government/publications/budget-2020-documents/budget-2020
[18] https://www.ofgem.gov.uk/environmental-programmes/non-domestic-rhi/about-non-domestic-rhi/ndrhi-closure
[19] https://www.gov.uk/government/consultations/climate-change-agreements-scheme-extension-and-reforms-for-any-future-scheme

municipal waste)[20] and may therefore apply to CHP installations. The UK ETS is established through The Greenhouse Gas Emissions Trading Scheme Order 2020. Auctioning continues to be the primary means of introducing allowances into the market. Participants are also able to trade UK ETS emissions allowances on a secondary market.

There is also a Cost Containment Mechanism (CCM) which enables the UK government and devolved administrations to address significant extended price spikes in the market. The UK CCM has lower price and time triggers in the first two years of the UK ETS when compared to the equivalent EU ETS mechanism. This will allow quicker intervention in the early years if appropriate. If the CCM is triggered, a meeting of the UK ETS Authority is called to consider what intervention, if any, to make. If there is no agreement on what action to take, the final decision will be taken by HM Treasury (HMT).

In the UK ETS, there are simplified provisions for small emitting installations and hospitals with emissions lower than 25,000t CO2e per annum and a net-rated thermal capacity below 35MW. These installations are subject to emissions targets instead of trading allowances. Separate simplified provisions are available to installations with emissions lower than 2,500t CO2e per annum.

Question 1
Without government financial incentives, would you transition away from natural gas or other fossil fuels to a low carbon alternative? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

2.2 Business models and market incentives

The range of CHP technologies used in different settings for different outputs mean that there is significant variation in the investment case and business models which underpin the decision to install CHP plants. While many plants will be installed to meet the energy demand of the operating organisation or serve those of other organisations on the same site, the ability to export electricity and/or heat generated to other users allows access to additional revenue streams. This means that the interaction between different user types and the incentives available is complex.

Full decarbonisation of power, heat and transport will require significant levels of system flexibility so that intermittent renewable technologies such as solar and wind generation, can be balanced within the system to ensure that energy supply and demand can be shifted in time or location. As dispatchable generators, CHP operators can provide flexibility to the system, generating electricity during periods of high prices, and potentially accessing revenue from National Grid's balancing mechanism and balancing services markets. There are also some direct and indirect benefits, which some CHP operators can access, depending upon the nature of their business and activities undertaken, which include cost savings from the avoided purchase of more expensive grid electricity, increased security of supply and on-site resilience.

[20] https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets

Changes to network charges were made following the conclusion of the Targeted Charging Review (TCR) in November 2019[21], setting out two areas of reform. The 'residual' element of network charges (approximately half of total network costs) levied a fixed charge for all consumers, instead of being based largely on an individual user's consumption from the grid which raised costs for those with onsite generation. The second area reformed some 'embedded benefits', meaning that smaller distributed generators (including some CHP plants) were no longer paid to reduce suppliers' exposure to balancing services charges. Ofgem announced new regulatory arrangements for the next network price control, RIIO-2, which came into effect in April 2021 for transmission and distribution networks[22].

The GB Capacity Market (CM) auctions were established as part of the Electricity Market Reform (EMR) to ensure security of supply by providing a payment for reliable sources of capacity, alongside their electricity revenues, to ensure they deliver electricity at times of system stress. CHP plants are an eligible generating technology and can enter the auction process, so long as the plant is not in receipt of another form of state aid[23]. Government has recently consulted on proposals as part of the CM policy to refine how emissions from CHP plants should be calculated to align better with CHPQA[24].

[21] www.ofgem.gov.uk/publications-and-updates/targeted-charging-review-decision-and-impact-assessment
[22] www.ofgem.gov.uk/network-regulation-riio-model/network-price-controls-2021-riio-2
[23] www.gov.uk/government/collections/electricity-market-reform-capacity-market
[24] www.gov.uk/government/consultations/capacity-market-proposals-for-future-improvements

3. The need for change

Delivery of net-zero and our future carbon budgets will require virtually all heat and electricity demands to be decarbonised and significant action taken by industrial processes to decarbonise. There are a range of low carbon heat sources that could play a part in this transformational shift and a broad portfolio approach is likely to be required to facilitate change across a range of different industries with varying needs. Decarbonised electricity, low carbon hydrogen and bioenergy have the potential to play a strategic role in long term heat decarbonisation, while technologies such as heat networks could play an important enabling role. This call for evidence is seeking views as part of an initial scoping stage, any proposals will be explored in further detail in a full consultation.

3.1 Impact of increased deployment of low carbon generation

As the level of low carbon electricity generation in the UK has increased, the relative emission savings delivered by CHP electricity generation have been reduced. In 2014, the impact of additional natural gas CHP capacity on the GB electricity market was modelled[25]. The analysis concluded that new natural gas CHP would deliver carbon savings throughout the 2020s, as the electricity produced by additional capacity would primarily displace generation by natural gas fired combined cycle gas turbines (CCGT). However, over a longer period, an increasing proportion of low carbon generation would be displaced so that additional unabated natural gas CHP would increase carbon emissions from 2032 onwards. The analysis suggested that plant installed up until 2023 will deliver net carbon savings over their lifetime but those deployed later would not[26].

Since 2014 there has been a significant increase in the rate at which the electricity generation mix has decarbonised. In 2014, renewable generation accounted for 19.1% of the electricity generation[27], while in 2019, this contribution accounted for 37.1% of all electricity generated. The impact of this means that it is likely that the tipping point at which additional natural gas CHP capacity would increase carbon emissions is likely to be earlier than the 2014 study suggested, and that action should be taken to move away from the unabated burning of conventional fuels in CHP plants to lower carbon solutions.

Figure 1 (below) shows that an additional 0.5GW of CHP capacity from 2018 to 2025 displaces mostly CCGT and the last contributions from coal. From 2025 a small amount of low carbon generation is displaced which increases through to the mid 2040's as the CCGT contribution to the grid reduces.

[25] www.gov.uk/government/publications/bespoke-natural-gas-chp-analysis
[26] www.gov.uk/government/publications/bespoke-natural-gas-chp-analysis
[27] www.gov.uk/government/statistics/digest-of-united-kingdom-energy-statistics-dukes-2015-printed-version

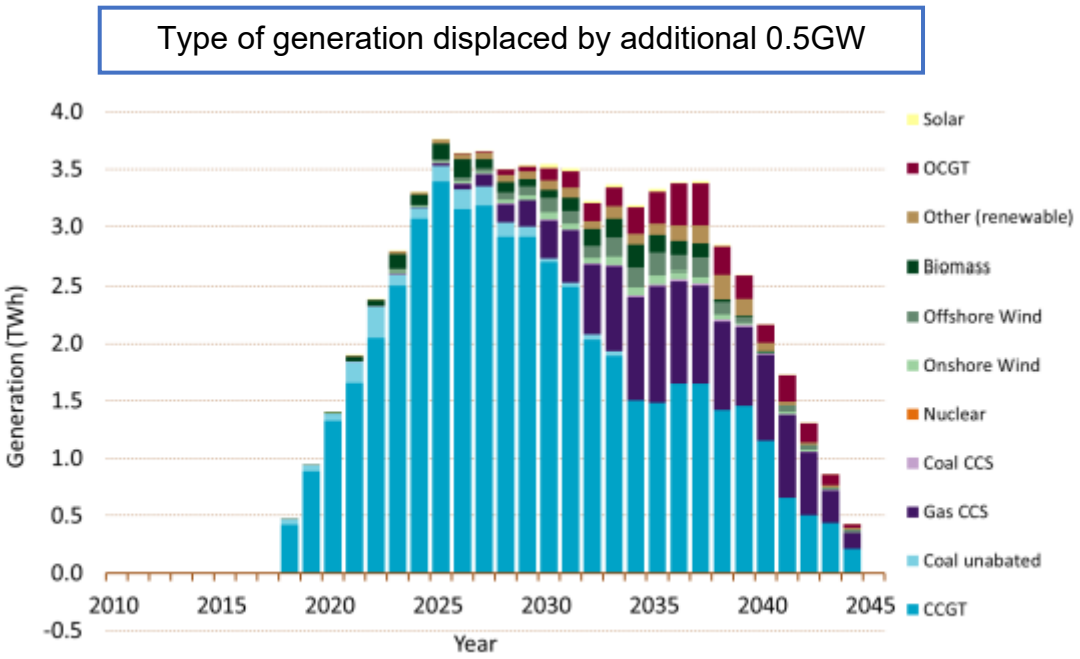

Figure 1:- **Generation displaced by additional Gas CHP capacity, +0.5GW scenario[28]**

The chart in figure 2 (below) illustrates the carbon emissions that are avoided by CHP displacing other generation. Carbon emissions produced by the additional CHP generation less counterfactual boiler emissions is shown by the red line and the bars represent the carbon emissions that are displaced. A net emissions saving is seen up to 2032 and an increase in carbon emissions from 2032 onwards due to an increasing percentage of low carbon renewable generation supplying the grid.

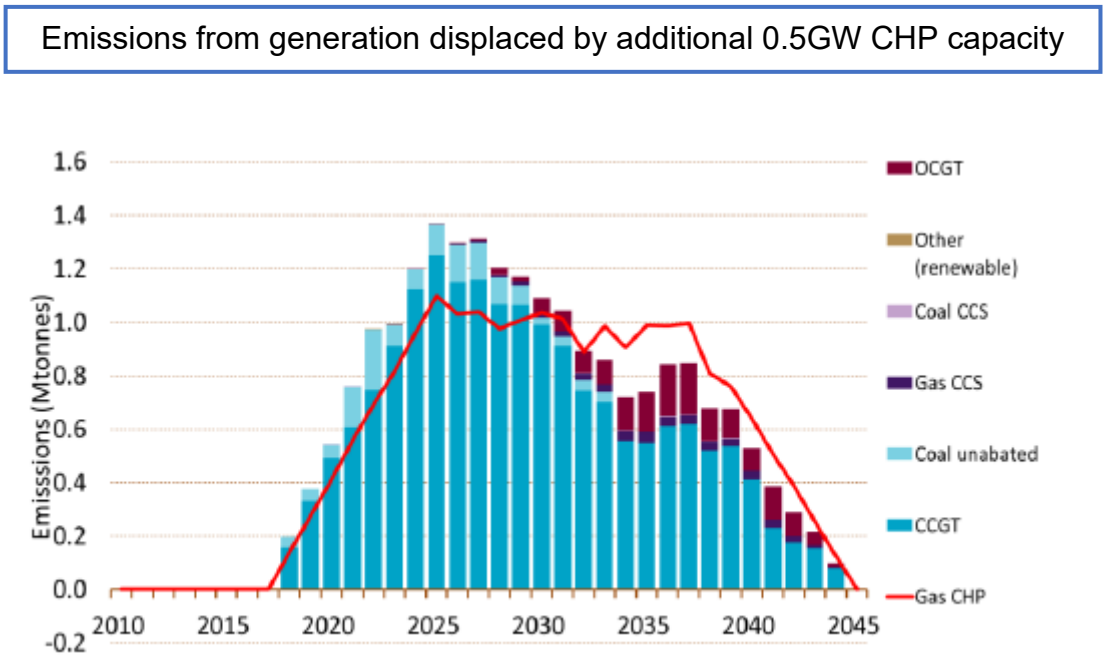

Figure 2:- **CO_2 emissions from the generation displaced by additional Gas CHP capacity, +0.5GW scenario[29]**

[28] https://www.gov.uk/government/publications/bespoke-natural-gas-chp-analysis

[29] https://www.gov.uk/government/publications/bespoke-natural-gas-chp-analysis

3.2 Trajectory towards net zero.

The ambition to reduce short and medium-term emissions has been reinforced by the Ten Point Plan[30], the commitment to reduce economy-wide greenhouse gas emissions by at least 68% by 2030 compared to 1990 levels in the UK Nationally Determined Contribution under the Paris Agreement to the United Nations Framework Convention on Climate Change[31] and more recently in our commitment to reduce carbon emissions by 78% from 1990 levels by 2035 in the 6th Carbon Budget[32]. To align with these developments, it will be necessary to reform CHP policy and establish a framework to encourage decarbonisation so that carbon savings can be made to contribute to the 4th and 5th Carbon Budget targets.

The long-term investment cycles associated with CHP benefit from a degree of certainty and this call for evidence aims to illustrate a variety of options and seek stakeholder views to help to develop a pathway to decarbonisation.

Question 2
In order to meet our net zero carbon emissions targets, what steps would be beneficial to reform the current Good Quality CHP criteria in response to ongoing grid decarbonisation?

Question 3
Over what timescale should any changes be made (subject to constraints of legislative timing)? Please give details to explain your response.

3.3 CHP scale and diversity of applications

CHP is used in a wide variety of settings from large industrial heat intensive processes to commercial buildings such as hospitals and universities. It is also widely used in heat networks providing useful dispatchable heat for housing and light industry. Capacity can range from as little as 10 kWe to in excess of 1.2 GWe. The various sectors where CHP is used are likely to have different criteria and priorities when considering suitable decarbonisation options. Some of the larger sites contribute to peaking capacity operating on a flexible basis by dispatching power to the grid during periods of high load demand. Others may also provide surplus heat to a heat network to fulfil space heating requirements. The complexity, scale and cost of these installations will differ significantly from a small self-contained application that utilises all the generated heat and power purely for onsite needs, to large scale industrial sites with very specific heat quality needs that are hard to decarbonise and may face unique challenges.

[30] https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution
[31] https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc
[32] https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035

Geographical location may also be a factor as sites within the six industrial clusters defined in the EWP (Grangemouth, Teesside, Humberside, Merseyside, South Wales and Southampton) may initially benefit by being closer to developing new technologies and infrastructure. This may allow a wider choice in terms of decarbonisation options compared to dispersed sites which are more remote from the clusters.

Industrial clusters outlined in 2020 Energy White Paper

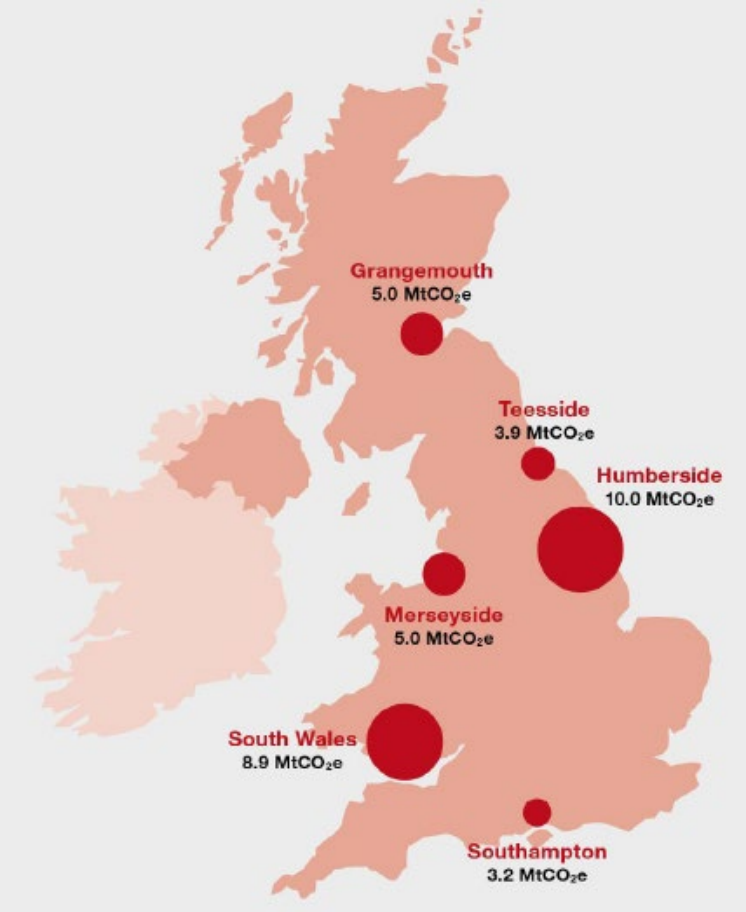

Figure 3:- **Industrial clusters with 2018 emissions data**[33]

[33] https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future

3.4 Guarantee of Origin Certificates

Guarantee of Origin Certificates (GOOs) are the EU equivalent of Renewable Energy Guarantee of Origin (REGO) and CHP Guarantee of Origin certificates. GB and NI currently recognise GOOs for renewable energy or high-efficiency cogeneration (CHP) issued in EU countries, despite the UK having left the EU. This allows electricity suppliers in the UK to continue to use both EU GOOs and those issued in GB and NI to comply with their fuel mix disclosure obligations and ensure that existing supply contracts are not compromised, in so far as these contracts depend upon GOOs. GOOs issued in GB and NI are no longer recognised in the EU. The Government has committed to review this position so that, longer term, domestic recognition of GOOs issued in EU countries will take place only on a reciprocal basis.

Question 4
How soon are you planning to replace or retrofit your current CHP scheme? Please give details.

- **Less than 5 years**
- **5-10 years**
- **Over 10 years**

Question 5
What is the total capacity of the CHP system you are currently operating?

- **Less than 100kW**
- **100kW-999kW**
- **1-4.99MW**
- **5-20MW**
- **Over 20MW**

Question 6
What is the primary function of your installation?

- **Heat**
- **Power**

Question 7
Do you use all generation (both heat or power) solely for on-site purposes or do you export the surplus?

- **Use solely on-site**
- **Export excess power to grid**
- **Export excess heat to heat network or neighbouring site.**

Question 8
Please give details of the nature and percentage split between on-site use and export of both heat and power.

Question 9
Do you use any certification to demonstrate that your generation meets any standards or to verify environmental claims e.g. Renewable Energy Guarantees of Origin (REGOs) or CHP Guarantees of Origin (GOOs)? Please give details.

Question 10
If part of a heat network, do you intend to expand the scheme using your currently installed equipment?

- **Yes**
- **No**
- **Not applicable**

4. Low Carbon Options

The recently published Industrial Decarbonisation Strategy[34] aims to support adoption of required technologies and avoid locking in high carbon production methods. It sets out a plan of low regret actions to build momentum in areas such as fuel switching, low carbon hydrogen, CCUS and harnessing the benefits of greater efficiencies.

4.1 Fuel switching

Natural gas is the fuel used by the majority of currently operational CHP plants, accounting for 68.9% of the total fuel used by CHP plants in 2019 with renewable fuels accounting for 18.8%. While this was the second largest category of fuels used, it is clear that fossil fuels are still the predominant fuel source for CHP plants. The renewable fuels used for CHP plants in 2019 were broken down into gaseous renewable fuels which accounted for 40.7%, solid biomass which accounted for 37.9% and waste fuels 19.8%. Liquid renewable fuels accounted for 1.7% of all renewable fuels used[35].

To achieve our carbon budgets and net zero, the fuel used by CHP will need to move away from reliance on unabated burning of natural gas or other fossil fuels. The potential to expand the existing use of renewable fuels such as biogas, present opportunities for fuel switching for existing natural gas CHP plants and alternatives for new capacity. The 3 phase Industrial Fuel Switching competition allocated funding to stimulate early investment in fuel switching processes and technologies, as these projects conclude they will improve our understanding of the feasibility of using lower carbon fuels in a variety of applications[36].

A Biomass Strategy is expected to be published in 2022 which will review what amount of sustainable biomass could be available to the UK, and how this resource could be best utilised across the economy to help achieve our net zero greenhouse gas emissions target by 2050. As part of the strategy development, a call for evidence on the role of biomass to help achieve net zero was published in April 2021[37], enabling interested stakeholders to contribute their views on biomass. Biomass electricity generation has numerous system benefits from dispatchability to inertia, that may become increasingly valuable as we move to a system with a high percentage of intermittent renewables and bioenergy with carbon capture and storage could deliver negative emissions which may be essential to meeting net zero.

[34] https://www.gov.uk/government/publications/industrial-decarbonisation-strategy
[35] www.gov.uk/government/statistics/combined-heat-and-power-chapter-7-digest-of-united-kingdom-energy-statistics-dukes
[36] www.gov.uk/government/publications/industrial-fuel-switching-to-low-carbon-alternatives#history
[37] https://www.gov.uk/government/consultations/role-of-biomass-in-achieving-net-zero-call-for-evidence

In recent years significant attention has been given to the role of hydrogen could play in decarbonising heat. There are multiple methods for producing and distributing low carbon hydrogen, studies are ongoing into the safety of using higher concentrations of low carbon hydrogen in the current gas system[38]. The prospect of using hydrogen as a fuel for CHP plants also presents opportunities for new CHP technologies, such as fuel cells and hydrogen fuelled reciprocating engine based CHP to play a part of the future technology mix.

Question 11
When planning a route to decarbonisation, a variety of issues may be encountered, please give details of any particular concerns you have identified that are specific to your sector or site?

Question 12
Which of the following do you feel offers the best decarbonisation solution for your situation over the next 10 years?

- **Low carbon fuel switching**
- **Electrification**
- **Undecided**

Please give details.

Question 13
When are you considering switching to a low carbon solution?

- **Less than 3 years**
- **3-7 years**
- **7-10 years**
- **Over 10 years**
- **When suitable technology is available**

4.1.1 Low carbon hydrogen and hydrogen blends

As an energy carrier with a range of potential different applications, low carbon hydrogen is expected to play an important role in plans to reduce the UK's carbon emissions and reach net zero by 2050. The Prime Minister's recent Ten Point Plan[39] included a number of commitments to drive the growth of low carbon hydrogen including: working with industry, with the aim of delivering 5GW of installed low carbon hydrogen production capacity by 2030; publication of the UK Hydrogen Strategy[40] and consulting on a Net Zero Hydrogen Fund[41] to provide capital co-investment in early hydrogen production projects. Commitments also include a consultation in 2021 on hydrogen business models and plans to bring forward, next year, further details on the revenue mechanism to support them.

[38] www.gov.uk/government/publications/heat-decarbonisation-overview-of-current-evidence-base
[39] www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution
[40] https://www.gov.uk/government/publications/uk-hydrogen-strategy
[41] https://www.gov.uk/government/consultations/designing-the-net-zero-hydrogen-fund

Currently, hydrogen in the UK is primarily used as a feedstock in certain industrial processes and is not low carbon. In future, hydrogen produced via low carbon technologies has potential for a wide range of additional uses, such as transport, high temperature process heat in industry, heat in buildings, energy storage and electricity generation. In creating a dynamic, subsidy-free market for low carbon hydrogen able to compete with other low carbon energy technologies, various market barriers will be encountered. Overcoming the cost difference between low carbon hydrogen and the higher carbon counterfactual fuel will be critical to address some of these barriers and realise the potential of a future low carbon hydrogen market.

Various low carbon hydrogen deployment proposals are being considered by energy market participants, primarily large scale CCUS-enabled projects as well as standalone electrolytic hydrogen projects. The development of both technologies will be necessary to help establish hydrogen as an alternative low carbon fuel option.

The future potential addition of a percentage of hydrogen to the natural gas fuel source may bring benefits of reduced carbon emissions. For percentages of up to 20% hydrogen blend, there are likely to be minimal modifications required to the CHP prime mover which will help most existing plant to more easily switch to using a lower carbon blended gas.

It is critical that fuel switching to hydrogen in industrial sites is demonstrated in parallel to ramping up low carbon hydrogen production. In the short term, early, low-regret opportunities for conversion to hydrogen include steam boilers and CHP processes in the chemical, refining and paper industries. In the longer term, hydrogen is currently the most promising low carbon option for high temperature direct firing requirements. Further innovation, testing and development is still required to enable the wider adoption of hydrogen as a low carbon alternative to natural gas. Initially availability will be closely linked to production until a suitable transmission system can be developed to other areas. This means that the first opportunities for switching to low carbon hydrogen will be focussed on sites in the designated industrial clusters before being expanded with the transmission system.

4.2 Carbon Capture Usage and Storage

Carbon Capture, Usage and Storage (CCUS) will play an important role in helping the UK meet net zero. The ambition outlined in the 2020 Ten Point Plan[42] is to develop CCUS operational capability within industrial clusters capturing 10 $MtCO_2$ per year by 2030. The Ten Point Plan, Energy White Paper[43] and National Infrastructure Strategy[44] set out the importance of CCUS in reaching net zero. The deployment of CCUS will be a critical component to help achieve low carbon industry and hydrogen production goals.

CCUS in the UK is still at an early stage and there are inherent risks with new technologies which can impact investment decisions. The Government has committed to bring forward CCUS deployment in two industrial clusters by the mid 2020's followed by two more by 2030. Larger scale CHP within industrial clusters may be able to incorporate CCUS as a route to reducing carbon emissions more readily than CHP in other locations. As the technology develops and the infrastructure for CCUS improves it is likely to become a more accessible and economic option for smaller capacity CHP plants.

[42] https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution
[43] https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future
[44] https://www.gov.uk/government/publications/national-infrastructure-strategy

In February this year, BEIS published a consultation seeking input on a potential approach to determine a natural sequence for locations to deploy CCUS in order to meet this commitment. As set out in the consultation, the Cluster Sequencing process will be executed across two phases: In Phase-1, government would receive proposals from cluster organisations, and provisionally sequence those which are most suited to deployment in the mid-2020s onto Track-1, in accordance with government's stated objectives. In Phase-2, government would receive applications from individual projects across capture applications (industry, power, hydrogen and BECCS) to connect to the Track-1 clusters. Through this process, government would select a number of projects to enter into negotiations.

The CCUS Cluster Sequencing Phase-1 Launch Document was published in May 2021[45]. This set out the finalised details of the Cluster Sequencing process and provided guidance and supporting information for cluster organisations seeking to enter the process by submitting an application aligned to their project core concept. Applications have now closed and are being assessed.

4.3 Biomass and BECCS (Bioenergy with Carbon Capture Usage and Storage)

Biomass refers to any material of biological origin (including wastes) which is used as an energy source and considered renewable if derived from sustainable resources. There is likely to be a limited supply of sustainable biomass, therefore it is suggested that its use should be prioritised where it can be combined with CCUS in order to effectively produce negative emissions.

The Industrial Energy Transformation Fund (IETF) currently restricts support for biomass as a decarbonisation measure to industrial applications where there are limited commercial alternatives in the near term. Biomass projects are only supported when they involve switching away from fossil fuels used in high temperature applications (greater than 240 degrees Celsius). Biogas to fuel direct combustion or CHP projects are also supported where the site is based off the gas grid, and injection of the fuel into the grid would not be feasible.

The Green Gas Support Scheme (GGSS) will follow on from support for biomethane under the Non-Domestic Renewable Heat Incentive, which closed to new applicants on 31 March 2021. The scheme will launch in autumn 2021 and will be open to applicants for four years to support only new anaerobic digestion plants rather than conversions of existing plants to biomethane injection. The GGSS will provide tariff payments over a 15-year lifetime and support biomethane produced via anaerobic digestion and injected into the gas grid.

Use of BECCS must be carefully considered and strategically deployed to maximise the potential benefits. There are potential applications in dispersed hard to decarbonise sectors such as cement production that are geographically suitable for the onward transportation of the captured carbon.

[45] https://www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-1-expressions-of-interest

4.4 Heat pumps

Heat pumps are widely used in heat networks which supply heat from a central source to consumers, via a network of underground pipes often carrying hot water. Heat networks can cover a large area or even an entire city, or more local supplying a small cluster of buildings. This avoids the need for individual heating solutions in every building. There are many possible technologies that can provide the primary heat supply to a heat network including large scale heat pumps, energy from waste (EfW) facilities, heat recovery from industrial processes, solar thermal arrays and many more.

Historically, many heat networks have adopted gas CHP as their preferred technology. This is largely due to the low cost and availability of gas. Gas CHP can offer better financial returns than other forms of generation, as additional revenues can be attained via electricity sales and grid/system ancillary services. This work will create additional incentives for investors to move away from this technology, particularly in light of the broad range of low-carbon technology options for networks available. The Government is also aware of issues faced by leaseholders and shared ownership residents, and the Ministry of Housing, Communities and Local Government (MHCLG) is taking steps to increase protection for such residents. Low-carbon options often have high upfront capital costs and may currently have higher net operating costs compared to heat networks that are heated using gas CHP technology.

Our recent consultation on changes to the Standard Assessment Procedure (SAP) proposed new emissions factors[46] for unabated natural-gas CHP. These showed the decline in the carbon emissions benefits of these systems and they will be harder to install under the interim Building Regulations to be implemented from June 2022. In addition, the recently launched Green Heat Network Fund transition scheme and the future full scheme will exclude unabated natural-gas CHP in favour of greater carbon-savings from alternative technologies[47].

[46] https://www.bregroup.com/sap/sap10/
[47] https://www.gov.uk/government/consultations/green-heat-network-fund-proposals-for-the-scheme-design

4.5 Low carbon grid and gas boiler

As renewable low carbon generation increases in the grid mix, emerging electrification technologies may become a more attractive power option for industry combined with a gas boiler where heat needs are a secondary concern. Currently a considerable barrier to electrification is the large disparity in the price of natural gas and electricity, resulting in high operating costs. Different sectors and sites will face a variety of options on their individual decarbonisation journeys that they will need to prioritise to suit individual requirements taking into account investment cycles and long-term plans.

Question 14
If the technology was available and financial support for a transition from natural gas to a low carbon alternative was adequate, is there any reason you would choose not to switch?

- **Yes**
- **No**

Please give details.

Question 15
Which one decarbonisation measure are you most likely to consider?

- **Switching to alternative fuel CHP**
- **Low carbon hydrogen /blended gas CHP**
- **Adding CCUS to your CHP**
- **BECCS**
- **Heat pump**
- **Low carbon grid power**
- **No suitable technology currently available**
- **Other**

Please give details explaining why.

Question 16
The package of financial support available is the most important factor in making decisions to switch to a low carbon solution? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

Question 17
What are the top three barriers you perceive to retrofitting or upgrading to low carbon solutions?

5. Pathway to decarbonisation

5.1 Aims and objectives

The aim of the decarbonisation pathway is to facilitate the transition of current CHP installations to lower carbon alternatives where possible. Subject to consideration of the 2020 call for evidence, this current engagement and the development of other policy areas interacting with CHPQA (such as hydrogen, CCUS and biomass), one possible option might be to end support for new unabated gas CHP installations in the short-term future. This and other policy proposals will be subject to further consultation expected in 2022. It is important to harness the key advantages of CHP technology as a relevant, flexible, dispatchable, cost effective and efficient use of low carbon fuels during this transition away from burning natural gas.

It is recognised that a degree of certainty is desirable when making long term investment decisions and the decarbonisation pathway would aim to signal a clear end point to support for unabated gas burning CHP in the future. To enable the required changes to achieve decarbonisation, the existing CHPQA programme[48] requires amendment so that it can act as a valid quality assessment and be compatible with new funding incentives that will develop for emerging technologies.

Upgrading plant to incorporate fuel switching technologies is disruptive and costly for energy intensive sites and there is a risk that replacement cycles may not coincide with the availability of suitable low carbon solutions. This is likely to be exacerbated in dispersed sites which do not have the same initial access to the infrastructure or technologies being developed in industrial clusters. It is recognised that flexibility may be required regarding decisions to retire higher carbon equipment early and that certain sectors may face unique challenges on the pathway to decarbonisation.

Energy efficiency measures in less energy intensive sites offers potential to reduce emissions but there will still be a need to switch to low carbon technologies in the future and will also face a variety of challenges and disruptions. The less specific energy needs may allow a wider choice of options for decarbonisation from electrification, hydrogen or bioenergy but may be more constrained by availability of suitable infrastructure in their location.

We will aim to recognise these differences and challenges in any future consideration of options as the decarbonisation pathway is developed following this phase of engagement to seek views that will feed into a full consultation with detailed proposals.

5.2 Potential Changes to CHPQA

The CHPQA provides accreditation for CHP installations that meet defined criteria and allows them access to support as detailed earlier. It was designed to focus on efficiency and delivered the associated benefit of reduced emissions. The rise in renewables contribution to the generation mix of the grid has placed a greater importance on being able to compare the merits of the various energy contributors against each other. The following options may be considered to update the CHPQA criteria and contribute to the pathway to decarbonisation. It

[48] https://www.gov.uk/government/publications/chpqa-standard

is expected that some of the proposed amendments would need to be implemented via regulatory changes to align with the relevant interacting scheme following further consultation on CHPQA's criteria.

5.2.1 Carbon measurement

The current CHPQA Standard sets minimum efficiency criteria for accreditation which drives a secondary benefit in emissions reduction. The scheme could go further in order to achieve decarbonisation objectives and align with wider reporting of carbon emissions.

The widely used unit of grams of carbon dioxide per kilowatt hour (gCO^2/kWh) can be readily calculated using published emissions factors for different fuel stocks and multiplying by the amount of power or heat produced which is already captured as part of CHPQA accreditation. It is then possible to assess this figure for a particular generation source against the emissions of alternative generation methods or the grid.

Such detailed carbon measurement could be incorporated as an additional element alongside the current CHPQA assessment requirements and would show the performance of each CHP against the grid for both heat and power generation.

Question 18
Do you agree that the introduction of a carbon measurement as part of the wider CHPQA would be beneficial to achieving Net Zero goals? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

5.2.2 Future tapering of support under current scheme

Section 3.1 described how modelling has indicated that the ongoing decarbonisation of the grid will result in unabated natural gas CHP causing a net increase in carbon emissions early in the next decade. To avoid a situation where support is being provided to CHP that is emitting more carbon than the grid average, a taper could be used to reduce support in the future running from early-mid 2020's to the end of the decade. The carbon measurement could be benchmarked against the average grid emissions on a yearly basis as part of the CHPQA certification process and linked to the taper which would reduce the percentage of support accessible. Potential regional variations in the speed of development of low carbon solutions may require a longer taper to apply to sites that are located outside the industrial clusters. This is because development of hydrogen infrastructure will be concentrated in these areas initially and allow proximal sites to switch from natural gas to hydrogen earlier than those sites that are more distal.

Moving away from burning natural gas and other fossil fuels in an unbated manner is necessary to achieve decarbonisation. Whilst the Government may wish to remove support for burning unabated natural gas in the future, it is recognised that transition will take time and require significant planning. A taper which is phased with an initial gradual reduction of entitlement to support that becomes greater over time would allow current CHP schemes to continue to operate efficiently until new low carbon solutions became widely available. There are likely to be a variety of potential low carbon technologies which will allow individual sites to evaluate the best option for their individual needs. It is not possible to predict the pace or direction of technological development so there should be flexibility relating to the phasing of any taper so that it can evolve in response to the market. This would allow for reductions in support to be accelerated if viable low carbon alternatives become available quickly but also avoid a situation of a funding cliff edge if solutions are slower to come to fruition. Some solutions may emerge from the industrial clusters and allow rapid adoption by those sites located close to the infrastructure whereas dispersed sites may not be able to benefit as quickly. In addition to possible location factors, the site capacity may also influence both the low carbon options available and also the speed with which change could be implemented. We, however, recognise that having a range of criteria may make the CHPQA scheme overly complex.

Question 19
Do you agree with a phased reduction of natural gas CHP support leading to full cessation rather than ending all support on a specified date? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

Question 20
If necessary, over what period should any taper of support be considered?

- **Less than 5 years**
- **5-10 years**
- **Over 10 years**

Please give details explaining why.

Question 21
Should any taper system offer differentiation on the following elements?

- **Location in industrial cluster/dispersed site**
- **Capacity >or< 1MW**
- **Both**
- **Other**

Please give details.

5.2.3 Closure of CHPQA to new unabated gas installations and new criteria for CHPQA accreditation in the future.

The modelling referred to in section 3.1 also indicated that new unabated natural gas CHP installed after 2023 would not be net carbon saving over their lifetime. The Government is considering the option to close the current CHPQA certification to new applications for unabated natural gas plant in the future to avoid increasing carbon emissions. This option could also apply to significantly refurbished plants. Timing of any such decision would be carefully considered following analysis of the responses to this call for evidence.

To drive further efficiencies and encourage the move to deeper decarbonisation it may be preferable that new technologies installed in, or after, January 2023 should meet certain criteria to obtain CHPQA certification. Potential criteria could include:-

- Prime movers must be hydrogen enabled to allow for switching to the lower carbon fuel source when it becomes available.
- New plant must be monitored via advanced meters to allow for capture of 30 minute run time data.

These options, following the necessary consultation, would enable the latest technology to be installed to bring decarbonisation improvements coinciding with planned upgrades and provide clarity when considering investment decisions.

Question 22
What are your views on proposals to close CHPQA certification to new applications for unabated natural gas CHP plant in the short term? What date would you propose and why?

Question 23
What form should any future support take?

- **Continue existing support/exemptions**
- **Grants/loans to facilitate replacement, retrofit or modification**
- **CAPEX vs OPEX support**
- **Other**

Please give details.

5.2.4 30-minute run time analysis

Dispatchable CHP installations currently utilise advanced metering which records run times in 30-minute blocks. When combined with a carbon measurement in the CHPQA it would be possible to monitor and evaluate if the exported power displaced lower carbon generation.

As the technology and monitoring capabilities evolve it would be possible for sites to make dispatch decisions based on real time data to ensure only higher carbon generation was being displaced. Smart metering could also be incorporated into smaller schemes during routine upgrade of plant, providing a powerful tool to assist with optimising run times.

Question 24
Would you change your dispatch/run time to reduce displacing lower carbon generation if incentives were available? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

Question 25
What effect will this have on your run times?

- **Increase**
- **No difference**
- **Decrease**

Question 26
Will switching to a low carbon solution allow and encourage you to increase run time and export to the grid?

- **Yes**
- **No**

Please give details.

5.3 Portfolio system approach

The Industrial Decarbonisation Strategy[49] , published in March 2021, acknowledges that the adoption of low carbon solutions will be influenced by access to technology, infrastructure and wider system changes. This may lead to a future requirement for a portfolio system approach to decarbonisation based on sites within industrial cluster areas and sites that are more dispersed as they will have different needs to address in their decision making. The recently closed CCUS Cluster Sequencing Consultation[50] sought views on how CCUS technology could best be developed within industrial clusters and a similar approach may be suitable when considering future options for CHP policy reform. Hydrogen or CCUS may be a more viable

[49] www.gov.uk/government/publications/industrial-decarbonisation-strategy
[50] https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-market-engagement-on-cluster-sequencing

option to sites within industrial clusters at an early stage whereas adoption of heat pumps could be more suitable for dispersed sites with lower quality heat needs.

Wider decisions regarding the suitability and viability of hydrogen for heating are expected in the mid 2020's following extensive trials which could see the existing gas grid converted for hydrogen use. This could rapidly accelerate the potential for dispersed CHP to switch to a lower carbon fuel as supply and infrastructure is expanded.

Question 27
If you are considering changes to your site, do you know what support is available for your proposed new set up? Please give details.

Question 28
Do you feel the CHPQA certification would remain beneficial for your situation if one or more of the reform options mentioned were implemented?

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

Please give details.

Question 29
What incentives are preferable?

- **New support/exemptions for low carbon fuels**
- **Grants/loans to facilitate upgrades and modification**
- **Incentives linked to a direct carbon measurement**
- **Other**

Please give details.

Question 30
Please provide any further comments you wish to make that have not been specifically covered by this range of questions.

6. Next steps

A summary of responses will be published once the Government has analysed all of the data collected in this Call for Evidence.

7. Full list of questions

1. **Without government financial incentives, would you transition away from natural gas to a low carbon alternative? Please give details.**

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

2. **In order to meet our net zero carbon emissions targets, what steps would be beneficial to reform the current Good Quality CHP criteria in response to ongoing grid decarbonisation?**

3. **Over what timescale should any changes be made (subject to constraints of legislative timing)? Please give details to explain your response.**

4. **When are you planning to replace or retrofit your current CHP scheme? Please give details.**

- **Less than 5 years**
- **5-10 years**
- **Over 10 years**

5. **What is the total capacity of the CHP system you are currently operating?**

- **Less than 100KW**
- **100KW-999KW**
- **1-4.99MW**
- **5-20MW**
- **Greater than 20MW**

6. **What is the primary function of your installation?**

- **Heat**
- **Power**

7. **Do you use all generation (both heat or power) solely for on-site purposes or do you export the surplus?**

- **Use solely on-site**
- **Export excess power to grid**
- **Export excess heat to heat network or neighbouring site**

8. **Please give details of the nature and percentage split between on-site use and export of both heat and power.**

9. **Do you use any certification to demonstrate that your generation meets any standards or to verify environmental claims e.g. Renewable Energy Guarantees of Origin (REGOs) or CHP Guarantees of Origin (GOOs)? Please give details.**

10. **If part of a heat network, do you intend to expand the scheme using your currently installed equipment?**

- **Yes**
- **No**
- **Not applicable**

11. **When planning a route to decarbonisation, a variety of issues may be encountered, please give details of any particular concerns you have identified that are specific to your sector or site?**

12. **Which of the following do you feel offers the best decarbonisation solution for your situation over the next 10 years?**

- **Low carbon fuel switching**
- **Electrification**
- **Undecided**

Please give details.

13. **When are you considering switching to a low carbon solution?**

- **Less than 3 years**
- **3-7 years**
- **7-10 years**
- **Over 10 years**
- **When suitable technology is available**

14. If the technology was available and financial support for a transition from natural gas to a low carbon alternative was adequate, is there any reason you would choose not to switch?

- **Yes**
- **No**

Please give details.

15. Which one decarbonisation measure are you most likely to consider?

- **Switching to alternative fuel CHP**
- **Low carbon hydrogen /blended gas CHP**
- **Adding CCUS to your CHP**
- **BECCS**
- **Heat pump**
- **Low carbon grid power**
- **No suitable technology currently available**
- **Other**

Please give details explaining why.

16. The package of financial support available is the most important factor in making decisions to switch to a low carbon solution? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

17. What are the top three barriers you perceive to retrofitting or upgrading to low carbon solutions?

18. Do you agree that the introduction of a carbon measurement as part of the wider CHPQA would be beneficial to achieving Net Zero goals? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

19. Do you agree with a phased reduction of natural gas CHP support leading to full cessation rather than ending all support on a specified date? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

20. If necessary, over what period should any taper of support be considered?

- **Less than 5 years**
- **5-10 years**
- **Over 10 years**

Please give details explaining why.

21. Should any taper system offer differentiation on the following elements?

- **Location in industrial cluster/dispersed site**
- **Capacity >or< 1MW**
- **Both**
- **Other**

Please give details.

22. What are your views on proposals to close the CHPQA certification to new unabated natural gas CHP in the short term? What date would you propose and why?

23. What form should any future support take?

- **Continue existing support/exemptions**
- **Grants/loans to facilitate replacement, retrofit or modification**
- **CAPEX vs OPEX support**
- **Other**

Please give details.

24. Would you change your dispatch/run time to reduce displacing lower carbon generation if incentives were available? Please give details.

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

25. What effect will this have on your run times?

- **Increase**
- **No difference**
- **Decrease**

26. Will switching to a low carbon solution allow and encourage you to increase run time and export to the grid?

- **Yes**
- **No**

Please give details.

27. If you are considering changes to your site, do you know what support is available for your proposed new set up? Please give details.

28. Do you feel the CHPQA certification would remain beneficial for your situation if one or more of the reform options mentioned were implemented?

- **Strongly disagree**
- **Disagree**
- **Neither agree nor disagree**
- **Agree**
- **Strongly agree**

Please give details.

29. What incentives are preferable?

- **New support/exemptions for low carbon fuels**
- **Grants/loans to facilitate upgrades and modification**
- **Incentives linked to a direct carbon measurement**
- **Other**

Please give details.

30. Please provide any further comments you wish to make that have not been specifically covered by this range of questions.

This consultation is available from: www.gov.uk/government/consultations/combined-heat-and-power-pathway-to-decarbonisation-call-for-evidence

If you need a version of this document in a more accessible format, please email enquiries@beis.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.