



Department for  
Business, Energy  
& Industrial Strategy

# Combined Heat and Power: pathway to decarbonisation

Summary of call for evidence responses



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## 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<sup>1</sup>. 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 Energy White Paper<sup>2</sup>, Ten Point Plan<sup>3</sup> and Net Zero Strategy<sup>4</sup> signal the steps needed to achieve the net zero goal. The publication of the Industrial Decarbonisation Strategy<sup>5</sup>, Heat and Buildings Strategy<sup>6</sup> and the Hydrogen Strategy<sup>7</sup> set out more detail on how decarbonisation will be achieved in these key sectors.

Government currently provides support to Combined Heat and Power (CHP) because of the environmental benefits of cogeneration, the technical requirements of plant installation and long-term investment decisions. The CHP Quality Assurance Scheme (CHPQA) is an annual assessment process that ensures 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. Renewable and other low carbon generation now provides an increasing proportion of the national electricity needs, reducing the emission reductions delivered by unabated natural gas 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 gas CHP would begin to displace an increasing proportion of low carbon generation, effectively raising carbon emissions and jeopardising achievement of carbon budget targets. Heating, which accounts for around a third of the UK's greenhouse gas emissions, is still however predominantly from fossil fuels.

We held a call for evidence from 27 September to 20 December 2021 to seek views to support the Government as it considers specific proposals for changes to CHP policy and support, the legislative changes that may be necessary to implement them, and any updates to guidance. This call for evidence was the latest stage of a longer review and we plan to publish a detailed consultation on the future of CHP later this year. The responses summarised below will contribute to the knowledge base and the ongoing development of options and specific changes to CHP policy and support. The CHPQA Standard Issue 8<sup>8</sup> provides guidance and clarification concerning some of the technical aspects that respondents referred to in their responses.

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.

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<sup>1</sup> 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.

<sup>2</sup> <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future/energy-white-paper-powering-our-net-zero-future-accessible-html-version>

<sup>3</sup> <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

<sup>4</sup> <https://www.gov.uk/government/publications/net-zero-strategy>

<sup>5</sup> <https://www.gov.uk/government/publications/industrial-decarbonisation-strategy>

<sup>6</sup> <https://www.gov.uk/government/publications/heat-and-buildings-strategy>

<sup>7</sup> <https://www.gov.uk/government/publications/uk-hydrogen-strategy>

<sup>8</sup> <https://www.gov.uk/government/publications/chpqa-standard>

# 1. Questions With Response Summaries

A total of 69 responses were received to the call for evidence (see table 1). Summaries of the points made from the comments received are listed below each question.

## **Question 1:- Without government financial incentives, would you transition away from natural gas to a low carbon alternative?**

- Strongly agree = 7
- Agree = 9
- Neither agree nor disagree = 14
- **Disagree = 15**
- Strongly disagree = 14
- Not answered/not applicable = 10

Of the 16 respondents who strongly agreed or agreed with this question some of the reasons cited included that they were already committed to shift away from fossil fuels to reach their net zero targets by improving the fabric of their buildings and were looking into constructing carbon neutral premises. Others who agreed explained that to meet their company decarbonisation objectives they had transitioned away from using fossil fuels in their CHP engines and they required incentives to decarbonise heat. Some respondents said a low carbon alternative would have to be financially competitive with a conventional fuel option otherwise incentives would be needed and another explained they were currently investigating options for low carbon alternatives and that financial incentives could accelerate the process. Some respondents explained that they were already transitioning from natural gas to biomethane and considering how to transition away from gas as a fuel in the mid to long term period. A respondent referred to the importance of government support and encouragement to assist CHP owners and operators to make this transition. One respondent highlighted that they would always provide a low carbon alternative first but uptake from end users is dependent on fossil fuel pricing going on to suggest a CfD to ensure cost parity. Finally, one respondent explained they were committed to move to a fully decarbonised future by 2050 but that they would only invest in such technologies with the appropriate market framework.

Of the 14 respondents who neither agreed or disagreed some explained that there was no available cost-effective alternative at present and there was a reluctance to give up the financial savings that CHP delivers. It was highlighted that CHP powered by gas was the only viable technology for some sites heavily dependent on steam and without government incentives the cost of production would increase, affecting viability. One respondent explained that government financial incentives would not make a big difference as most of their sites consisted of dispersed industrial sites which would not have access to hydrogen in the short to medium term. Therefore, a full transition away from natural gas to a low carbon alternative would not be feasible for them. The favourable financial returns of natural gas were mentioned, and the cost associated with any such transition was said to make any switch difficult, economic viability was a cited as a key barrier.

Of the 29 respondents who broadly disagreed some explained that this was down to cost and that government would need to provide financial support. These respondents explained that there was no clear financial-only business case to move to lower carbon technologies as gas was so much cheaper than electricity. Others explained that they would be unable to transition

without government support and may need help to pay back any capital costs. It was explained that alternatives were too expensive because infrastructure changes would be needed which would incur further significant costs and a suggestion was made that exhaust abatement should be applied. One respondent explained that the Government and the energy providers needed to submit a clear decarbonisation strategy detailing the funding available for the transition to low carbon fuels to alleviate unreasonably burdensome costs impacting operators and end consumers. Three respondents cited cost, explaining that they had already invested in a CHP plant and a gas turbine to convert from steam injection to a dry low emission (DLE) core and required a return on their investment before incurring more costs. Other respondents explained that without an alternative fuel widely available where electrification is not a viable route (e.g. high temperature heat) it would not be economically viable to transition to low-carbon CHPs so existing natural gas CHP had a significant role to play in managing the transition to Net Zero due to the inherent efficiencies and security of supply benefits of the technology.

Other respondents who disagreed explained that CHP was the most energy/cost efficient power & heat solution for their business to maintain global competitiveness. It was highlighted that limited alternative fuel options were available for some CHP plants due to their location and that practical alternatives (such as biogas or blended hydrogen) are likely to be expensive and may not result in a reportable reduction in carbon emissions.

10 out of 69 respondents decided not to complete this question directly.

**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?**

Responses made a variety of suggestions in answer to this question with several common themes. It was recognised that allowing carbon intensive industries to continue with little or no change is not consistent with achieving net zero goals and the scheme may need to be adjusted to ensure efficiencies of new fuel sources are recognised correctly, and comparison to non-CHP generation remains up to date as decarbonisation of the wider energy system increases. It was noted that whilst CHPQA criteria is currently viewed as fit for purpose and investment decisions are based on economics at the time, future removal may reduce revenues for critical infrastructure projects and divert funding away from other areas. Additional incentives should be considered for fuel switched CHPs supplying hard to decarbonise industrial sites whilst avoiding complicated bureaucracy.

Several respondents mentioned tightening criteria to raise the threshold for Good Quality CHP and adding a carbon measurement. Other recurring themes included more support for renewables, continuing support for existing projects and ceasing support for new unabated gas CHP installations. Suggestions for gradual and phased reform to allow CHP operators adequate time to plan investment and that CCL exemption should be removed with the revenue used to invest in supporting the use of low carbon technologies, were made. Comments also noted that remaining incentives link to carbon pricing exemptions which will fall away as CHP decarbonises, so it is important that incentives arising from being Good Quality CHP are technology-neutral rather than tied to current exemption from gas taxation benefits.

Comment was made that existing CHPQA beneficiaries should be grandfathered for the asset life and future changes for new entrants designed to reward higher efficiencies. Suggestions included incentivising providers to exceed QI values of 100, including a multiplier for the evidenced use of low carbon fuels, incentivising upgrades to building fabric to reduce demand

and encourage more efficient operation, improving pathways for transition to low-carbon fuel and mandating CHPQA accreditation with different QI for low carbon fuels.

Further suggestions were for tiered benefits to financially incentivise early adopters and reward based on QI score, offering the best incentives to the highest QI score schemes and the need for policy consistency dealing with transitional arrangements to avoid any unintended consequences. Consideration of how frequently fossil based generation contributes to the grid in preference to using average annual carbon emissions factors was suggested. Consideration of differing sector circumstances, tapering of existing support linked to the emergence of available low carbon fuel alternatives and potential penalising of low-quality assets to encourage exploration of low carbon solutions were further steps proposed as being of potential benefit.

Individual responses raised topics such as revision on an Exergy Basis instead of Primary Energy, establishing a high efficiency high flexibility distributed hybrid system, capital subsidy (Like ROCs) paid per MW/hr over 20 years that equals the difference between fossil and renewable energy production to encourage growth in CHP use and the application of CPS to all power generated from CHPs over a 1MW electrical generation threshold. A proposal suggested removing the boundary rule for auxiliary fossil fuel boilers incorporated in CHP boundary and changing boundaries to include delivered CO<sub>2</sub> acknowledging that CO<sub>2</sub> used on site and not emitted to the atmosphere. There was some uncertainty expressed over the future of CPS which might impact the ability for investment decisions to be made, the need for ongoing support, insufficient supply of hydrogen for a viable solution at scale in the timeframes needed for decarbonisation and scoring on ability to handle hydrogen fuels or suitability for a carbon capture retrofit, without reducing the power efficiency of the system.

11 out of 69 respondents decided not to complete this question directly.

### **Question 3:-Over what timescale should any changes be made (subject to constraints of legislative timing)?**

14 respondents indicated that any changes to CHPQA criteria should be made as soon as possible or within the next 3 years. Several answers elaborated on the need for clarity so that long term planning and investment decisions could be made and others cited the importance to act quickly to meet Net Zero obligations.

7 responses indicated changes should be made within the next 5 years to allow business models to be modified and account for minimum return on investment timelines. Some suggested that reform should be co-ordinated around expected changes to the UK ETS and decarbonisation readiness requirements.

17 of the responses favoured a 5 to 10 year timeframe for changes to be made to allow for development of capital programmes under the existing legislation and ensure current asset values. Consideration of timing the removal of existing incentives was also raised and the need to align with equipment replacement planning.

10 answers identified 10 to 20 years as the preferred timescale to implement fundamental changes and achieve return on investment over the asset life. Other views expressed concern that fuel switching was not likely to be viable until the 2030's, that biogas is not practical for many industrial users and that sudden changes risk CHP being decommissioned and replaced by less efficient solutions. The grandfathering of current incentives for 15 years for all new CHP installed up to the end of 2023, changes to existing arrangements applied only to future

investments and funding retained for the lifetime of the asset in currently operational schemes were raised. A grandfathering timeline of 20 to 25 years from the first CHPQA F4 return or schemes certified to F2 before the legislation was implemented was suggested as was an overall timespan of 20 years from installation after the legislation became operative.

Some respondents did not answer the question directly but made comments that any change should be in line with plant lifecycles, carefully considered, phased over the same period that viable alternatives become commercially available and that reforms to CHPQA should dovetail with other policy mechanisms intended to support industrial fuel-switching such as the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme. It was commented that no feasible alternative fuels are available so no changes should be made to Good Quality CHP criteria until such economic alternatives exist and that any suggested changes based on future assumptions would be impacted by the actual trajectory of grid decarbonation.

13 out of 69 respondents decided not to complete this question directly.

#### **Question 4:- When are you planning to replace or retrofit your current CHP scheme?**

- Less than 5 years = 14
- **5-10 years = 23**
- Over 10 years = 13
- Not answered/not applicable = 19

14 respondents indicated they were planning to replace or retrofit their current CHP scheme in less than 5 years. This included plans to end agreements with customers, upgrade during the next equipment overhaul and encourage clients to move to a net zero strategy within 3 years. Some respondents explained that they were working with experts to replace CHP plants and to switch existing natural gas CHP to lower carbon technology (e.g. heat pumps, geothermal, and/or hydrogen) at the end of their natural replacement cycle.

23 respondents answered are planning to replace or retrofit their current CHP scheme in the next 5 to 10 years. Reasons cited included that their current CHP was still fully functional, and respondents were not willing to commit large finances until a clear decarbonisation strategy exists. Others explained that their current equipment has a design life which ends within the 5 to 10 year period, and that this time frame reflected their current end of life as well as the end of current capacity market contracts, which needed to be honoured.

13 respondents explained they were planning to replace or retrofit their current CHP scheme in over 10 years. This was because their current end of plant life was over 10 years and the CHP plants had not yet been run at full capacity, and therefore it would not make economic sense to retire them in the next 10 years. Some CHP plants had only just been commissioned involving millions of pounds of investment, therefore it would make no sense to retire them. Some respondents said they do not have plans to replace or retrofit their current CHP scheme and asked instead for policy certainty from government.

19 out of 69 respondents decided not to complete this question directly.



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

- Less than 100kW = 4
- 100-999kW = 6
- 1-4.99MW = 12
- 5-20MW = 12
- **Greater than 20MW = 18**
- Not answered/not applicable = 17

18 respondents stated that they have a total capacity of greater than 20MW, mostly energy intensive industries. 12 respondents have a capacity of 5 to 20MW and 1 to 499MW. 6 respondents have a CHP system between 100 to 999kW and 4 respondents are operating at less than 100kW.

17 out of 69 respondents decided not to complete this question directly.

**Question 6:- What is the primary function of your installation?**

- Heat = 26
- **Power = 28**
- Not answered/not applicable = 15

26 respondents confirmed that the primary function of their installation was heat, and 28 respondents said it was power.

15 out of 69 respondents decided not to complete this question directly.

**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 = 22
- **Export excess power to grid = 29**
- Export excess heat to 3<sup>rd</sup> party = 2
- Not answered/not applicable = 16

22 respondents stated that they use all their generation solely on site, 29 respondents export excess power to the grid and 2 respondents export excess heat to third parties.

16 out of 69 respondents decided not to complete this question directly.

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

There was wide variation in the responses reflecting the individual economic circumstances of each site and the requirements for heat and power. Some used all generation solely onsite, but the majority exported some proportion of excess power generated to satisfy heat demand to the grid whilst utilising all of the heat. There were a few cases where heat was supplied to third party customers for use in heat networks or other industrial processes.

19 out of 69 respondents decided not to complete this question directly.

**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)?**

- Yes = 13
- **No = 30**
- Not answered/not applicable = 26

13 respondents confirmed they used certification such as REGO to demonstrate generation meets environmental claims. Whilst some users may be eligible for CHP GOOs, none have been issued since the start of the scheme. 30 respondents answered that they did not use any form of certification to validate environmental performance.

26 out of 69 respondents decided not to complete this question directly.

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

15 responses indicated that they were intending to expand their heat network scheme using currently installed equipment and 8 respondents had no intention of expansion.

44 out of 69 responders decided not to complete this question directly.

**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?**

The major themes of concern that were raised were cost and finance, availability and suitability of alternatives, grid capacity and stability with other comments flagging planning regulations, policy stability and carbon leakage.

Cost and finance were raised most frequently covering concern over both the Capex and Opex implications of implementing new technologies with high upfront costs and the likely high price of low carbon fuels. The need for ongoing support comparable to existing levels was mentioned in addition to clarity over potential future support mechanisms to enable long term investment decisions to be made.

The lack of availability of suitable alternatives, and technologies to transition to, was a common theme particularly in relation to availability of hydrogen, biomass, CCUS in the short to medium term and potential limitations dependent on location. Various responses indicated potential sector specific challenges to fuel switching such as particular heat demands, site space restrictions and requirements for supplies of CO<sub>2</sub> for industrial processes which may need to be bought in following decarbonisation.

Some respondents were concerned with the capacity and stability of the grid as larger demands are made of existing infrastructure. Uncertainty around the cost and timeframe to

upgrade the grid distribution infrastructure was raised in several responses. The potential for outages was highlighted by users where reliability and resilience were critical to the business model.

Other comments covered the lack of certainty surrounding planning and permitting regulations affecting project development as well as the need for clear, stable policies to allow medium to long-term investment decisions to be made. Some responses which highlighted concern that the lack of clarity may take investment offshore and lead to carbon leakage.

13 out of 69 respondents decided not to complete this question directly.

### **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 = 25**
- Electrification = 11
- Undecided = 16
- Not answered/not applicable = 17

25 respondents said that low carbon fuel switching was the best decarbonisation solution for them over the next 10 years. Some reasons for this included the attractiveness of low carbon fuels due to the cost of electricity, some respondents also explained that process industries need high temperature heat which is not easily provided by heat pumps and electrification. Therefore, a low carbon fuel source was considered essential, and hydrogen was suggested as offering potential decarbonisation solutions for multiple sectors in the UK.

11 respondents confirmed that electrification was the best decarbonisation solution for them over the next 10 years. This was because some respondents were investing in heat pumps and solar energy as well as the electrification of heat. It was highlighted that the cost of electrification could be prohibitive, but that it was likely to make headway in the next 10 years compared to Hydrogen.

16 respondents were undecided about the best decarbonisation solution for them over the next 10 years. Some respondents explained that both electrification and low carbon fuel switching were appropriate, whilst others explained there was no viable option available to them. Some were considering options including heat pumps, energy from waste and biogas. Some respondents were still unsure about what the best solution for their business would be and felt they may benefit from a wide variety of options.

17 out of 69 respondents decided not to complete this question directly.

### **Question 13:- When are you considering switching to a low carbon solution?**

- Less than 3 years = 6
- 3-7 years = 6
- 7-10 years = 8
- Over 10 years = 8
- **When suitable technology is available = 26**
- Not answered/not applicable = 15

26 of the respondents who answered this question explained that they would switch to a low carbon solution when suitable technology is available. 8 respondents intend to transition over 7 to 10 years and 8 respondents over 10 years' time. 6 respondents said they would switch to a low carbon solution in both 3 to 7 years and in less than 3 years.

15 out of 69 respondents decided not to complete this question directly.

**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 = 9
- **No = 43**
- Not answered/not applicable = 17

9 respondents said that if the technology and financial support was available to transition from natural gas to a low carbon alternative they would choose not to switch. Some explanations included geographical location, investment strategy or space available to retrofit existing installations. It was highlighted that before any commitment or investment was made, alternative fuels or new technologies likely to support decarbonisation would need to be established as proven viable alternatives. 2 respondents explained that they require carbon dioxide for their business or customers and purchasing external pure carbon dioxide costs are increasing.

43 respondents confirmed that if the technology and financial support was available to transition from natural gas to a low carbon alternative, they would have no reason not to switch. Some respondents highlighted that the technology available must be viable and able to meet the different needs of different customers and that the low carbon alternative would have to be appropriate. An example was provided of high-grade steam being required for some industrial processes which would not be met by electrification owing to cost. Some respondents stressed the importance of the switch being cost effective and affordable and having financial support to overcome investment hurdles.

17 respondents chose not to answer this question or responded not applicable but some of the reasons cited here included that extensive local electricity network infrastructure upgrades may be needed for switching to electrification. Technology readiness and financial support for technology that isn't mature was also included. 1 respondent placed importance on regulation to support low carbon switching to ensure there is a level playing field and that those who do not choose to decarbonise are penalised (carbon taxes for all with no exemptions) to remove any economic advantage of not decarbonising in addition to border adjustments to ensure UK manufacturing remains globally competitive.

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

- Switching to alternative fuel CHP = 12
- **Low carbon hydrogen/blended gas = 15**
- Adding CCUS to existing CHP = 3
- BECCS = 0
- Heat pump = 9

- Low carbon grid power = 3
- No suitable technology currently available = 3
- Other = 9
- Not answered/not applicable = 15

15 respondents confirmed the one decarbonisation measure they were most likely to consider was low carbon hydrogen/blended gas. This was because it was the least disruptive option to use with existing assets without requiring significant investment to infrastructure and therefore potentially a low-cost option. 2 respondents flagged that although a blended option with Hydrogen was viable, the switch to a completely alternative fuel was not viable due to the cost and availability of alternative fuels which would also require engine modifications. 12 respondents favoured switching to an alternative fuel CHP and biomethane, green hydrogen and blended hydrogen were suggested as well as biodiesel. 9 respondents favoured heat pumps, 3 respondents favoured adding CCUS to existing CHP and 3 respondents preferred low carbon grid power. 3 respondents stressed that there was no suitable technology currently available and 9 answered other, which included making a broad range of solutions available, making incentives technology agnostic and the use of geothermal CHP.

15 out of 69 respondents decided not to complete this question directly.

**Question 16:- The package of financial support available is the most important factor in making decisions to switch to a low carbon solution?**

- Strongly agree = 18
- **Agree = 20**
- Neither agree nor disagree = 12
- Disagree = 4
- Strongly disagree = 4
- Not answered/not applicable = 11

The majority of respondents (38) either strongly agreed or agreed that the package of financial support available is the most important factor in making decisions to switch to a low carbon solution. Reasons cited included the importance of government incentives to increase investor confidence and the role of financial support to accelerate the transition. The need to ensure UK manufacturing remained cost competitive and avoided carbon leakage was stressed in some responses. Profitability was mentioned as CHP plants require major investment with relatively long payback periods, therefore financial support was essential and without this fossil fuels would remain cheaper. Some respondents suggested that technology maturity and supply chain availability are important.

8 respondents either strongly disagreed or disagreed giving reasons including additional administration work or skills needed for any switch which may not be included in financial support. Capacity, infrastructure constraints, government assurance and powers and resources to implement any switch were mentioned. The need for a high degree of confidence that the alternative technology available is sufficiently reliable to provide the rateable supply of energy necessary to support the industrial activity as well as long-term confidence in the support mechanisms and policy landscape being put in place to incentivise such investment was commented on.

12 respondents neither agreed or disagreed with this question and whilst they recognised that financial support was important, they acknowledged that technological changes and skills requirements, planning, corporate social responsibility (CSR), and innovation were important in

addition to competitiveness and a level playing field with the rest of the world to avoid carbon leakage.

11 out of 69 respondents decided not to complete this question directly.

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

The biggest perceived barrier mentioned by the majority of respondents is the costs involved and suitable support mechanisms to help facilitate decarbonisation. Another common is the lack of availability of suitable alternatives and the long-term reliability they may provide. There was more variety in responses identifying a third barrier after cost and availability issues. Policy clarity and stability, logistic and infrastructure concerns around the need for grid capacity upgrades and planning issues were all mentioned by several respondents as significant barriers to retrofitting or upgrading to low carbon solutions.

14 out of 69 respondents decided not to complete this question directly.

**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?**

- Strongly agree = 10
- **Agree = 25**
- Neither agree nor disagree = 14
- Disagree = 7
- Strongly disagree = 4
- Not answered/not applicable = 9

The majority (35) of responses signalled either strong agreement or agreement with the introduction of a carbon measurement to the CHPQA scheme. Comments highlighted the need for the procedure not to be too complicated and that calculations should align with the Capacity Market mechanisms. 1 respondent suggested benefits would be marginal as CHPQA is based on efficiency and therefore, by extension, lowest use of carbon. Other comments mentioned the choice of carbon factor would be critical and that different sectors have different decarbonisation descent paths based on available alternatives. Another point made was that an initial high level of efficiency limit should gradually ramp down to zero without undue impacts that may disincentivise early hydrogen projects.

11 respondents disagreed or strongly disagreed. Varied reasons were given, including, the additional administrative burden and that QI index effectively encompasses carbon intensity, reform should focus on fuel agnostic measures and that CHP used for baseload is not influenced by electricity market signals.

14 comments were neither agree nor disagree. Issues raised were potential clash with UK ETS, the need for a carbon measure to be used alongside other low carbon fuel incentives, the ability for CHPQA to drive decarbonisation in isolation and that without alternatives, a carbon measure could be unfair. It was raised that any new changes should not apply retrospectively as existing plants had made investments in good faith in line with existing policy incentives and that both heat and power should be considered, rather than just power g/kWh.

9 respondents declined to answer the multiple choice question but additional comments included that UK ETS already monitored carbon effectively and also that policy consistency, tiered abatement and funding certainty would be required.

**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?**

- Strongly agree = 9
- **Agree = 19**
- Neither agree nor disagree = 14
- Disagree = 9
- Strongly disagree = 9
- Not answered/not applicable = 9

28 answers strongly agreed or agreed with a phased reduction of support for natural gas because it provides time for industry to react. It was noted that the transition would need to be carefully tapered in conjunction with the availability of viable alternatives and continued support for existing gas units would be required.

Of the 18 who disagreed or strongly disagreed, carbon leakage was flagged as a potential risk as was the need for continued gas support and the fact that a phased reduction would not necessarily support fuel switching. A potential risk to investment was cited and the potential for a fuel agnostic incentive approach which may benefit hydrogen rollout was suggested as an alternative to a taper.

Neither agree nor disagree was selected in 14 respondents with additional input stating reducing support may close schemes and lead to an increase in emissions and that natural gas was a necessary transition fuel for those with no economic alternative.

9 respondents did not answer this question directly, additional comments included financial benefits and regulations to be in place to ensure gas fired CHP remains a better financial alternative to gas boilers and imported electricity and the importance of government balancing continued support for CHP investment with establishing new incentive mechanisms, particularly heat networks. The point was also made that reductions should be gradual with no cliff edge.

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

- Less than 5 years = 11
- 5-10 years = 17
- **Greater than 10 years = 22**
- Not answered/not applicable = 19

11 respondents indicated less than 5 years with one respondent stating any taper should be swift.

17 respondents said a 5 to 10 year taper should be considered and 1 respondent said the taper would only be effective if there is a viable fuel switching alternative. The taper should be long enough to enable customers to switch, however if there is no viable alternative, then a taper of greater than 10 years should be considered.

22 respondents said that any taper of support should be considered greater than 10 years. The main reason given was that the taper of support should be delayed until there was greater certainty around the true decarbonisation trajectory. It was suggested that a phased reduction was important allowing enough time for a hydrogen blend to be developed before full conversion to 100% hydrogen otherwise excessive compensation may be necessary. 1 response disagreed with removing or diluting the CHPQA support scheme for existing CHP plants whose investments were made in good faith and stressed that any changes should not be applied retrospectively. 1 respondent explained the importance of keeping gas as a back-up as new technologies are trialled to mitigate risks of poor reliability.

19 respondents did not answer this question directly. Comments added included 1 respondent who didn't agree that tapering of support was a viable solution, and another stating that any changes should only apply to future investments. It was suggested that the duration of any taper should be determined by how widely available, and the cost effectiveness of low carbon solutions and it should be both variable and based on a 20 year life from the commissioning date.

### **Question 21:- Should any taper system offer differentiation on the following elements?**

- Location in industrial cluster/dispersed site = 6
- Capacity >or< 1MW = 6
- Both = 14
- **Other = 21**
- Not answered/not applicable = 22

6 respondents said the tapering system should differentiate by location, particularly sites with access to hydrogen and those without. Some respondents asked for larger industrial CHP sites using steam to be given more time for a slower transition compared to smaller units as this would impact international competitiveness, supply chain and job creation and retention.

6 respondents suggested differentiation by capacity stating support should be biased towards larger capacity systems and that capacity would target the greatest carbon emitters. Another said that hybrid (blended low carbon gas) solutions should be excluded from any tapering system.

14 respondents suggested that the taper system should differentiate by both location and capacity, some of these respondents favoured a case by case system. It was suggested that end user domestic consumers and small businesses were deterred by high upfront costs of innovative technologies, and that phase in support would be necessary for the use of renewable gases. The point was made that dispersed sites with smaller installations should be given more flexibility.

21 respondents answered other with suggestions including giving sites covered by the UK ETS a longer taper due to increasing costs, some disagreed with having any differentiation due to distortions this may cause to the market, suggestions that all forms of CHP will require revenue support (to transition) and that differentiation by capacity was not the answer. However, 1 respondent explained that smaller sites with low temperature processes could have a higher taper whilst dispersed high temperature process sites would need a lower taper.

22 respondents did not answer this question but explained that any approach to tapering should consider the nature and application of the CHP technology, that tapering should only be used if other viable low carbon options were available and if any tapering approach was taken,



sites in industrial clusters without access to local CO<sub>2</sub> sequestration should be differentiated compared to CHP plants in other industrial clusters.

**Question 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?**

13 responses disagreed with the proposal making comments that no changes should be made until alternative support mechanisms are available for alternative technologies. 3 responses also suggested that CHPQA should be fundamentally changed to become a fuel agnostic scheme.

17 responses supported the proposal suggesting that changes should be made in the short term. A further 8 comments indicated that a longer timeframe would need to apply due to the scale of investment decisions and the lifecycle of equipment.

The benefits of primary fuel savings CHP technology can provide were noted in several responses as were the potential risks of damage to investor confidence that may arise from closure of the scheme to new applicants in the near term. Conflicting messaging in relation to the approach of planning authorities regarding CHP use in district energy networks was highlighted and that the CHPQA system was sub-optimal for rewarding heat networks.

20 out of 69 respondents decided not to complete this question directly.

**Question 23:-What form should any future support take?**

- Continue existing support/exemptions = 13
- Grants/loans to facilitate replacement, retrofit or modification = 14
- CAPEX vs OPEX support = 10
- **Other = 16**
- Not answered/not applicable = 16

13 respondents supported continuation of the existing support and exemptions. Grants/loans to facilitate replacement, retrofit or modification was preferred in 14 responses, with 1 respondent explaining that grants encourage early adoption and provide certainty compared to potential degradation of Opex (RHI/FIT).

Capex vs Opex was cited by 10 respondents with the majority suggesting a balance of both would be required for effective transition but that ongoing operational support to provide certainty influenced investment decisions. It was suggested that incentives could be awarded based on a definition of hydrogen readiness or based on a £/MW metric using PES and QI values to be truly fuel agnostic.

16 respondents indicated other, with several commenting that a range or combination of options would be beneficial. An incentive using £/MWh based on PES/QI was suggested by some answers. Easing the administrative burden was mentioned as was support continuing for existing projects, where investment was made based on prevailing conditions at the time, balanced with encouraging development of low carbon heat networks.

16 respondents did not answer this multiple-choice question with some supplying further comments supporting PES/QI incentive, support for Capex funding and removal of CCL exemptions.

**Question 24:- Would you change your dispatch/run time to reduce displacing lower carbon generation if incentives were available?**

- Strongly agree = 11
- **Agree = 23**
- Neither agree nor disagree = 10
- Disagree = 6
- Strongly disagree = 4
- Not answered/not applicable = 15

34 respondents either agreed or strongly agreed with changing their dispatch/run time to reduce displacing lower carbon generation if incentives were available. Some explanations included this would only be done if it reduced carbon footprint and it was financially beneficial with client requirements still being correctly agreed and met. It was suggested that incentives are needed to change to lower carbon fuel supply and to reduce the cost of import power to allow the switch to an electric heat pump. Some respondents who agreed highlighted that this would not be applicable due to their CHPs having a 24hr baseload operation, meaning any reduction would be problematic for continuous large scale plant operation.

10 respondents either disagreed or strongly disagreed as their CHPs were needed to run to supply the site with business needs dictating constant running, with sporadic use increasing maintenance costs and intermittent renewables precluding specific operating hours. It was pointed out that reducing generation during periods of excess renewables could impact the overall business plan so sites were unlikely to alter operation and 1 respondent stressed the importance of running the assets for heat and CO<sub>2</sub> during certain times of the day. It was mentioned that incentives available should cover the cost of pure CO<sub>2</sub> that customers may need to buy elsewhere.

10 respondents neither agreed or disagreed stating their site was already running hourly and that it was unclear what the incentives were and how this would work commercially. 1 respondent explained that CHP heat would be needed but that CHP power would be turned down if excess solar power was available.

15 out of 69 respondents did not answer this question and commented that flexible operation for CHP engines would impact the revenues and operating economics.

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

- Increase = 1
- Decrease = 22
- **No difference = 25**
- Not answered/not applicable = 21

The largest number of respondents (25) felt that incentives would make no difference to their current run time regimes. 22 answers said run times would decrease to reduce displacing lower carbon generation if incentives were available and 1 respondent stated that changes would increase run times.

21 out of 69 respondents decided not to complete this question directly.

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

- **No = 26**
- Yes = 18
- Not answered/not applicable = 25

26 respondents answered that switching to a low carbon solution would not encourage them to increase run times and export to the grid stating that CHP was not sized with export in mind.

18 respondents answered yes, if incentives were available to encourage export and that low carbon solutions increased the merit order for CHP.

25 did not answer the question directly but commented that if incentives encouraged increased run time and it was compatible with the overall business model then they would consider increasing run time and export to the grid.

**Question 27:- If you are considering changes to your site, do you know what support is available for your proposed new set up?**

9 responses were aware of support schemes that would support their future plans. 16 were unaware of what support was available and mentioned that more clarity was required. The lack of new funding for renewable CHP was commented on with the view that uncertainty and a lack of clear future funding plans were delaying investment decisions.

29 out of 69 respondents decided not to complete this question directly.

**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 agree = 7
- **Agree = 21**
- Neither agree nor disagree = 16
- Disagree = 5
- Strongly disagree = 3
- Not answered/not applicable = 17

28 responses agreed or strongly agreed that CHPQA certification would remain beneficial if 1 or more of the reform options were implemented. Additional comments made supported the introduction of a carbon measurement and that certification ensures efficient operation.

8 responses disagreed or strongly disagreed with further comments on a lack of relevance as they were already considering removing CHP. 1 reply disagreed with the closure of the scheme to new unabated gas plant as they were in the process of upgrading their current CHP and another stated the proposals did not fully account for the issues faced by dispersed sites with high grade heat demands.

17 chose not to answer or make any further comment in response to this question.

**Question 29:- What incentives are preferable?**

- **New support/exemptions for low carbon fuels = 18**
- Grants/loans to facilitate upgrades and modification = 15

- Incentives linked to a direct carbon measurement = 6
- Other = 12
- Not answered/not applicable = 18

New support/exemptions for low carbon fuels was favoured by 18 respondents with further comments suggesting re-opening of RO with a CHPQA uplift, PES/QI based incentives, policy uncertainty affecting large district heating projects and the need to encourage hydrogen CHP.

15 chose grants/loans to facilitate upgrades and modification with concern over the potential costs. Support for a subsidised hydrogen price and incentives linked to direct carbon measurement were expressed and it was raised that linking support to carbon could be overly bureaucratic and harm raising capital.

6 responses would prefer an incentive linked to a carbon measure included in the CHPQA to improve payback models for carbon neutral projects.

Other was chosen in 12 replies with 1 respondent indicating all of the above options and a range of the combinations also suggested. 1 answer flagged that no support for low carbon fuels may be needed given the benefits of avoided carbon costs and another raised setting up support for a national heat network structure.

No direct answer was given by 18 responses with supporting comments indicating in one case that a combination would be preferred as current EII exemptions and the TCR disincentivise a low carbon transition. Another raised grants, Capex and Opex as necessary, though not the only enabler required particularly in relation to SAP and Building Regulations.

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

Most respondents chose to leave this section blank but there were several comments covering a variety of topics.

It was suggested that high efficiency, high flexibility enhanced CHP systems could provide support at all electricity delivery timescales from immediate to commitment and facilitate further deployment of variable renewables. Electro thermal energy storage could also be employed to provide flexibility of heat storage at different temperatures.

Further efforts from large energy companies to encourage trialling of new technologies and support the transition to low carbon supplies was mentioned as being of benefit as was incorporating emissions levels into the CHPQA criteria and creating a single resource for information regarding support that was available to industry.

The need for policy clarity was mentioned in several responses. Comment was made that companies will not want to invest heavily until there is a viable established alternative fuel and that loans should be made available and paid back over an agreed timescale rather than having a tax relief type of incentive. It was suggested that if the CHPQA scheme adopts a carbon measure (gCO<sub>2</sub>/kWh), then operators who are in the CHPQA scheme should be exempted from the UK ETS scheme as both schemes are then measuring the same thing. The impact of TCR and the EII exemption mechanism creating a negative business case in the UK for CHPs was raised and that this position would not change unless the regulatory and fiscal landscape is greatly altered.

Several views expressed concern that early notification of proposed future regulations was needed to avoid discouraging long term investment and risk of potential carbon leakage. Comment was made in relation to the need for consistency of approach for the construction industry and decisions over CHP in district heating. 2 key barriers were highlighted in terms of capital costs of investment and confidence in future operating costs.

The rationale for tapering, or potentially removing, the funding currently available to gas-fired CHP was recognised but it was felt that funding committed to date should be honoured. It was felt that a hard stop for support would not synchronise well with developing decarbonisation pathways and may lead to an increased risk of stranded assets. Merit was found in changing government support for new gas CHP installations coinciding with the implementation of a ban on the installation of gas boilers in new build homes from 2025, giving sufficient notice to the market of proposed changes to funding arrangements. Some respondents felt that there should be no differential treatment over location of sites and that it was unlikely that a single support scheme would cater for both large and small sites effectively. Some responses questioned whether UK ETS and Carbon Price Support are overly complicated and place too high a burden on organisations when formulating future plans, and it was suggested that the proposed Decarbonisation Readiness requirements may be a simpler and more suitable policy lever for driving considerations around decarbonising CHP.

There were several views expressed regarding the future of emerging low carbon technologies and solutions. Hydrogen, biomass, CCUS and BECCS were all cited as key policy areas that needed detailed proposals supporting operational use of these alternatives to be made clear to permit future investment. The possibility of CHPQA only supporting 100% hydrogen enabled installations in the future was brought up as was the potential to include an air quality indicator within the certification criteria.

There were also individual responses that highlighted the need to focus effort on non-combustion alternatives such as wind, solar and tidal power generation. Locations suitable for harnessing geothermal energy were also suggested as options for consideration. Policy review of onshore wind generation was mentioned with the need to balance wider impact on the local environment with generation requirements. The point that most retrofit technologies have a 15 year plus lifetime so any support should match technical life expectancy was re-iterated by several respondents.

## 2. Responders

**Table 1: Number of respondents per sector.**

<b>Agriculture</b>	<b>3</b>
<b>Chemical &amp; Pharmaceutical</b>	<b>4</b>
<b>Consultancy</b>	<b>6</b>
<b>Energy consultancy</b>	<b>10</b>
<b>Energy supplier</b>	<b>3</b>
<b>Engineering</b>	<b>2</b>
<b>Food and Drink</b>	<b>1</b>
<b>Government Department</b>	<b>1</b>
<b>Health</b>	<b>4</b>
<b>Higher Education</b>	<b>2</b>
<b>Horticulture</b>	<b>1</b>
<b>Individual</b>	<b>1</b>
<b>Industrial - Chemicals</b>	<b>2</b>
<b>Investment &amp; financial</b>	<b>2</b>
<b>Local authority network organisation</b>	<b>5</b>
<b>Manufacturer</b>	<b>3</b>
<b>Member Association</b>	<b>5</b>
<b>N/A</b>	<b>2</b>
<b>Oil refinery</b>	<b>1</b>
<b>Paper manufacturer</b>	<b>1</b>
<b>Power Generator</b>	<b>5</b>
<b>Retail &amp; Leisure</b>	<b>1</b>
<b>Utilities &amp; Waste</b>	<b>4</b>
	<b>69</b>

## 3. Next Steps

We intend to use the information supplied in the call for evidence responses to help shape future policy options for CHP. It is our intention to publish a further CHP consultation detailing potential future options for CHPQA reform later in 2022.

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

The previous 2020 call for evidence and summary of responses is available from: <https://www.gov.uk/government/consultations/combined-heat-and-power-chp-the-route-to-2050-call-for-evidence>

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