Department for
Business, Energy
& Industrial Strategy

CALL FOR EVIDENCE – CONTRACTS FOR DIFFERENCE

A call for evidence on fuelled and geothermal technologies in the Contracts for Difference (CFD scheme)

November 2016

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Any enquiries regarding this publication should be sent to us at BEISContractsForDifference@decc.gsi.gov.uk

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Introduction and General Information

1.1. This call for evidence seeks initial views and evidence on fuelled technologies and geothermal in the Contracts for Difference (CFD) scheme. This will facilitate assessment of whether any further policy proposals are needed. If the Government does decide it is necessary to change the way fuelled or geothermal technologies are treated by the CFD scheme as a result of this call for evidence, then where appropriate, these would be consulted on, and if necessary State Aid approval sought before any such changes were made.

1.2. Written submissions are welcome, but the Department for Business, Energy and Industrial Strategy will also hold workshops in London in which you can provide input. Please send any written responses to BEISContractsForDifference@decc.gsi.gov.uk by 20 December. If you would like to attend a workshop then please contact BEISContractsForDifference@decc.gsi.gov.uk by 18 November. Workshops are expected to run in early December.

1.3. Confidentiality and data protection:

Information provided in response to this call for evidence, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004). If you want information that you provide to be treated as confidential please say so clearly in writing when you send your response to the call for evidence. It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request. We will summarise all responses and place this summary on the GOV.UK website. This summary will include a list of names or organisations that responded but not people's personal names, addresses or other contact details.

Background

Fuelled Technologies and the Contract for Difference (CFD)

2.1. The renewable technologies currently eligible for the CFD can be split into two broad categories: those that extract energy from renewable resources without combustion, such as wave or wind, and those "fuelled technologies" which burn a fuel source derived from biomass. The fuelled technologies currently in the CFD scheme are:

Pot 1 Established Technologies: Sewage Gas, Landfill Gas**,** Energy from Waste with CHP

Pot 2 Less Established Technologies: Advanced Conversion Technologies**,** Anaerobic Digestion**,** Dedicated Biomass with Combined Heat and Power (CHP)

Pot 3 Conversions of coal fuelled generation to Biomass fuelled generation

2.2. In the last Contracts for Difference allocation round in 2014, the budget for Pot 1 (established technologies) was £50m per delivery year for projects commissioning from 2015/16 onwards, and an additional £15m per delivery year (i.e. £65m per year in total) for projects commissioning from 2016/17 to 2020/21. The budget for Pot 2 (less established technologies) was £155m per delivery year for 2016/17 and £235m for 2017/18 to 2020/21. Five fuelled technology projects were successful, offering a total of over 150 MW of capacity in Advanced Conversion Technology and Energy from Waste with CHP. Details of these projects can be found at: https://www.gov.uk/government/statistics/contracts-for-difference-cfd-allocation-round-one-outcome

Why review fuelled technologies now?

2.3. The State Aid approval for the CFD scheme issued by the European Commission in 2014 means that we need to consider the future of biomass conversion at this stage. A question about this technology is set out in section 3.2 below. The European Commission is reviewing the sustainability of bioenergy, and is likely to report on this before the end of the year. On 23 June, the EU referendum took place and the people of the United Kingdom voted to leave the EU. Until exit negotiations are concluded, the UK remains a full member of the EU and all the rights and obligations of EU membership remain in force. During this period the Government will continue to negotiate, implement and apply EU legislation. The outcome of

these negotiations will determine what arrangements apply in relation to EU legislation in future once the UK has left the EU.

2.4. In parallel, the Department is currently looking at how the next allocation CFD rounds planned for this Parliament, which are expected to commit significant amount of consumers' money - up to £730m per year for 15 years - could best deliver low carbon electricity through the 2020s and in the years beyond. We are keen to get your input into this wide ranging and complicated area. Therefore the Department is starting with an open call for evidence on the impact of the current operation and structure of the CFD on fuelled technologies, ahead of any developing any detailed proposals. Key areas for consideration are:

- The future of biomass conversion in the CFD;
- How future cost reduction potential (particularly of more innovative technologies) is affected;
- Cost effective decarbonisation of electricity generation;
- The interactions between heat and electricity; and
- How the scheme supports Advanced Conversion Technologies (ACT).

Geothermal and the CFD

2.5. There are some synergies between geothermal facilities and fuelled technologies, for instance geothermal technologies can deliver heat as well as power; projects with CHP are eligible for support under the current CFD and RHI schemes. The Department is seeking more evidence on geothermal project costs in order to inform administrative strike price setting under the CFD.

Call for Evidence

3.1. The particular areas the Department is asking for input on at this stage are set out below.

Support for biomass conversion

3.2. Six conversion projects totalling approximately 4GW have been supported through the Final Investment Decision (FID) enabling for renewables process and the Renewables Obligation (RO) between 2011 and 2015. Biomass conversion technology is currently eligible under the CFD scheme. However the details of the scheme's state aid approval mean it is relevant at this stage to consider pot structure with regards to this technology and its place in future allocation rounds. The Department is interested in your views on the inclusion of biomass conversion technology in the CFD scheme and how the CFD should treat this technology in future.

***Question 1**: How should the CFD scheme treat biomass conversion in future? Please provide evidence supporting your suggestions and set out what you think the impact of these would be.*

The costs of generating electricity through fuelled and geothermal technologies, and cost effective decarbonisation of electricity

3.3. The Department has recently completed a review of levelised cost assumptions for all electricity generation technologies under the CFD, including technologies using biomass[1]. This was accompanied by a report from Arup on the cost and technical assumptions on renewable technologies and a report from NERA Economic Consulting on hurdle rates for technologies[2]. Strike prices for the 2016 allocation round will be published in parallel with this call for evidence. In the March 2016 Budget, the Government also announced a trajectory for offshore wind cost reduction, with that technology aiming to compete at £85/MWh by 2026.

[1]https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016

[2]https://www.gov.uk/government/publications/arup-2016-review-of-renewable-electricity-generation-cost-and-technical-assumptions

3.4. A strike price for geothermal has not been published at this stage as Arup did not secure any robust new evidence on the cost of geothermal on a power-led basis or without CHP. The Department would like to better understand the costs of geothermal and the interdependency with Renewable Heat Incentive (RHI) tariffs for those that will be producing both power and heat, given our understanding from the Arup report is that geothermal projects could have a high heat to power ratio. Independent studies[3] have concluded that the potential for deep geothermal power in the UK is limited to around 3% of electricity demand by 2050 as a best case scenario. However the Department understands that there are potential projects in the pipeline which could consider the CFD as a route to market, that these may be looking at some combination of electricity and heat supply (and hence support), and that the RHI is currently funded to support new geothermal heat applications to 2021.

Question 2: *What are the expected heat vs power outputs for geothermal projects in the UK? Will geothermal projects be developed on a power-led basis? What difference do these factors make to project capital, operating and financing costs and technical parameters?*

For guidance in answering this question, please benchmark your views against the BEIS levelised cost results and underpinning assumptions for geothermal CHP in Annex 1 and Annex 3 respectively of the Generation Costs Report and in chapter 17 of the Arup report.

Any evidence provided will inform the setting of a strike price for geothermal technologies competing in the 2016 Pot 2 allocation round.

3.5. The Department is also keen to develop understanding of how future cost reductions for fuelled technologies may be driven, particularly the cost of fuel over time, sector innovation and improvements in efficiency. We welcome your views on what policy changes would be most effective in supporting cost reduction.

Question 3: *What factors will affect cost reduction potential for the fuelled technologies from 2020-2030? Please provide evidence to support your*

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/251943/Deep_Geothermal_Review_Study_Final_Report_Final.pdf

assessment.[4] *Please describe any barriers to these cost reductions taking effect and be specific about the technology and fuel type you are referring to.*

3.6. The Department is also interested in whether the CFD scheme could more effectively drive down the cost of decarbonisation of electricity generation. The 2012 bioenergy strategy describes carbon cost effectiveness in more detail[5]. There are already sustainability criteria[6] for biomass generation under the CFD and BEIS has undertaken work on the sustainability of biomass[7]. The European Commission is also considering sustainability of bioenergy through their consultation on Preparation of a sustainable bioenergy policy for the period after 2020[8]. Until EU exit negotiations are concluded, the UK remains a full member of the EU, and the outcome of these negotiations will determine what arrangements apply in future once the UK has left the EU.

Question 4: *What changes could be made to the CFD scheme to drive more cost effective decarbonisation of electricity generation or improve its 'carbon cost effectiveness'? Please provide any evidence you have on how the different fuelled technologies compare (with each other and with other renewables) in this respect.*

CfD scheme and support for decarbonisation of heat

3.7. Support is not available under the CFD for new dedicated biomass plant, as it does not offer cost effective carbon savings or good resource efficiency compared to other technologies[9]. However biomass CHP is currently supported under the scheme. This is because the energy transfer from biomass to heat is more efficient compared to the energy transfer to electricity, so using biomass for heat production represents a more efficient use of resources. Biomass CHP also offers a means to decarbonise heat intensive processes in the industrial sector where there are uncertainties with most alternatives.

[4] Where appropriate, please benchmark your views against the levelised cost trends and hurdle rate assumptions presented in the DECC (Annex 1 and Annex 3 respectively) and Arup reports. Furthermore please note if certain levels of deployment are necessary to achieve any cost reductions you suggest.
[5] https://www.gov.uk/government/publications/uk-bioenergy-strategy
[6] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/231102/RO_Biomass_Sustainability_consultation_-_Government_Response_22_August_2013.pdf
[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/349024/BEAC_Report_290814.pdf
[8] https://ec.europa.eu/energy/en/consultations/preparation-sustainable-bioenergy-policy-period-after-2020
[9] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268221/181213_2013_EMR_Delivery_Plan_FINAL.pdf

3.8. The Department recognises that a long term plan for heat will be needed in order to enable us to meet our renewable and carbon emissions reduction targets. There are several technologies which have significant potential, such as district heating, biogas, hydrogen and heat pumps (with CHP having a role within this) but it is not yet clear which, or which combination of technologies, will be able to deliver the scale of transformation needed in the UK. There has been some indication from stakeholders that heat incentives (RHI) and electricity incentives (CFD) do not work together as effectively as they could for CHP. The RHI currently has funding up to 2020, whilst through the following CFD allocation rounds this Parliament, funding will be committed under the CFD scheme to projects which commission from 2021 onwards.

3.9. Some CHP stakeholders have also suggested the CFD is un-bankable due to risks associated with plants potentially losing their heat off taker. The Department is interested in stakeholders' views on whether the CFD could be structured more effectively in this respect. Views and evidence on whether the current CFD structure is incentivising the creation of new uses of heat or the development of *electricity-led* CHP, rather than incentivising decarbonisation of existing heat demand, are also sought.

Question 5: *What factors do you think Government should take into account in considering the interaction between the CFD scheme and support for decarbonisation of heat?*

CfD Scheme and Advanced Conversion Technologies (ACT)

3.10. Support for Advanced Conversion Technologies (ACT) through the CFD has been aimed at allowing early demonstration of innovative technologies, recognising that ACT have the potential to produce syngas which could be used in industrial heat, transport fuel, or higher value applications including the manufacture of chemicals. Both these types of outputs would be a valuable contribution to the circular economy[10] through the use of waste as a fuel[11]. Three ACT projects were successful in the 2014 CFD allocation round.

3.11. Evidence indicates that a significant proportion of ACT capacity currently in the planning system would not help to meet these wider objectives as set out in

[10] European Commission Definition of Circular Economy: http://europa.eu/rapid/press-release_MEMO-15-6204_en.htm

[11] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310272/competitive_allocation_government_response.pdf

paragraph 3.11 as its only output would be electricity, rather than a high quality syngas suitable for other applications. The Department is therefore considering if CFD is the right support mechanism, or if it has the right definitions of ACT in place to help Government achieve its objectives.

Question 6*: How can the Government use the CFD scheme to promote the development of innovative ACT projects which will help develop a circular economy using waste as a fuel? Please provide evidence for or against making changes to the support of ACT and set out what you think the impact of making these changes would be.*

Glossary

Advanced Conversion Technology (ACT) There are a number of technological options available to make use of a wide variety of biomass types, including wastes. Conversion technologies may release the energy directly, in the form of heat or electricity, or may convert it to another form, such as liquid biofuel or combustible gas.

Advanced Conversion Technologies are the subject of current research, with some demonstration plants in operation, however are not widely deployed. Examples include cellulosic ethanol production, Fischer-Tropsch synthesis, gasification and pyrolysis.

Anaerobic Digestion (AD) A process in which micro-organisms break down biodegradable material, particularly animal slurry and food waste, in the absence of oxygen. It produces a methane-rich biogas that can be combusted to generate heat or electricity. Alternatively, the biogas can be cleaned and upgraded to biomethane for injection into the gas distribution network as a replacement for natural gas, or for use as a transport fuel.

Bioenergy Energy generated by combusting solid, liquid or gas fuels made from biomass feedstocks which may or may not have undergone some form of conversion process.

Biofuel
A fuel produced from biomass feedstocks.

Biogas Biogas is a mixture of gases produced by Anaerobic Digestion. Its major constituents are methane at about 60% and carbon dioxide at around 40% with other gases in trace amounts (mostly hydrogen sulphide and ammonia). The composition of the biogas depends on the type of feedstock and the type of AD. Biogas can be ‘upgraded’ to more than 97% methane, called biomethane, by removing the other gases.

Biomass Biological material that can be used as fuel or for industrial production. It includes solid biomass such as wood, plant & animal products, gases and liquids derived from biomass, and the biodegradable element of commercial and industrial wastes and municipal wastes.

Biomethane Methane of biological origin (effectively renewable natural gas), generally produced either by cleaning up the biogas that results from anaerobic digestion or via a ‘methanation’ process to produce methane from the synthesis gas resulting from

biomass gasification. Biomethane can be injected into the gas distribution network as a replacement for natural gas, or it can be used as a transport fuel.

Combined Heat and Power (CHP) Combined heat and power is a process that captures and utilises the heat that is a product of the electricity generation process, so increasing efficiency of fuel use**.** By generating heat and power simultaneously, CHP can reduce carbon emissions by up to 30% compared to the separate means of conventional generation via a boiler and power station. Also known as co-generation.

Gasification Gasification is the heating of organic material at high temperatures with a reduced amount of oxygen and/or steam. This produces a 'synthesis gas' (often called syngas), which typically contains a mixture of hydrogen, carbon monoxide, carbon dioxide and various other hydrocarbons. This gas can be combusted to generate electricity and/or heat. It can also be used to produce other fuels such as biomethane, biodiesel (via the Fischer-Tropsch process) or pure hydrogen.

Pyrolysis Pyrolysis is the thermal decomposition of organic material at high temperatures, in the absence of oxygen. It produces gas and oil and leaves a solid residue (sometimes called biocoal) which is richer in carbon content than the original feedstock; the oil can be potentially used directly in ships or upgraded for a variety of transport applications, while the gas can be used in a similar way to the products of gasification.

Syngas Syngas is the abbreviation for Synthesis gas. It is typically a mixture of hydrogen, carbon monoxide, carbon dioxide and various other hydrocarbons including methane. Syngas is produced from the gasification of organic material. It can be combusted to generate electricity and/or heat. It can also be purified to produce other fuels such as biomethane or pure hydrogen, or transformed into biodiesel or other hydrocarbons used in the manufacture of products such as plastics. It's also the name for the chemically equivalent gas produced from the gasification of coal.