CfD: Proposed amendments to the scheme 2020

Consultation Response by Feedback Global

The government wishes to "ensure that the CFD scheme continues to support low carbon electricity generation at the lowest possible cost to consumers". The summary of evidence presented here shows that Anaerobic Digestion rarely delivers this desired outcome. Therefore, Contracts for Difference should not give support to Anaerobic Digestion (AD) plants of any size. Moreover, Feedback strongly recommends against creating a bespoke version of CfD to subsidise smaller scale AD plants than are currently covered by CfD.

Priority should instead be given to renewable electricity sources with higher emissions mitigation potential such as onshore and offshore wind, solar PV and tidal energy – which produce lower emissions and lower cost electricity. A comprehensive study comparing electricity generated from biogas produced by AD with other renewable energy sources, found that when any other feedstock than manure was used, "**biogas systems generate higher greenhouse emissions than any of the renewable option**s" including wind, solar PV and hydro (Fusi *et al.*, 2016). Moreover, a Life Cycle Assessment soon to be published by Feedback and the University of Bangor shows that the emissions mitigation potential of **AD significantly decreases in future decarbonisation scenarios, for all feedstocks including manure** (Styles *et al.*, 2020). Total emissions from AD are usually compared with the current energy mix in a given country, or against fossil fuels – with which AD compares more favourably (Meyer-Aurich *et al.*, 2012; Timonen *et al.*, 2019). However, the current UK energy mix must be rapidly decarbonised and shifted to renewables to avoid climate crisis, and Feedback's study reveals that **as the energy grid progressively shifts to rely more on renewable energy such as wind and solar, the emissions mitigation of AD shrinks significantly** (Styles *et al.*, 2020). It thus makes very little sense to subsidise production of electricity through biogas, since more sustainable and cheaper alternatives readily exist, and by the time additional AD infrastructure is built, AD's emissions mitigation potential will have already significantly declined, and will only continue to decrease.

For instance, whereas -190 kg CO_2e is mitigated per tonne of food waste used for biogas production in the current technology context, this was found to dramatically decline to -66 kg CO_2e Mg^{-1} in a net zero context, with most of the remaining mitigation in the net zero context relying on the assumption of BECCS being applied to AD plants (Styles *et al.*, 2020). Similarly, -154 kg CO_2e is mitigated per tonne of poultry manure used for biogas production in the current technology context, but this was found to dramatically decline to -57 kg CO_2e Mg^{-1} in a net zero context (Styles *et al.*, 2020). The emissions mitigation per tonne of cattle and pig manure used for AD is even lower.

In the case of manure, at best, **AD plants mitigate a fraction of the methane emissions of manure, when shifts to plant-based diets would remove the manure (and other livestock emissions) completely.** There is now scientific consensus on the vital importance of dietary shifts and meat reduction to mitigate climate change. **At worst,** Feedback has found evidence that **AD subsidies can actively incentivise the expansion of intensive farming systems – primarily through bringing down the costs and difficulties of manure disposal, and helping factory farms gain planning permission**, but also through locking in demand for manure into the future to recoup costs (SourceMaterial, 2018; Pig World, 2019). AD plants also usually require large volumes of maize or grass to be co-digested alongside manure to be economically viable (see below).

Feedback recommends that crops like maize and grassland should not be sent to AD, since this diverts valuable agricultural land from food production, afforestation and renewables like solar PV. If

the aim is carbon sequestration, far more renewable energy could be generated by using this land to install solar PV, or afforesting the land instead. **In the current technology context, afforestation of land would achieve 2.6 times (maize) to 11.5 times (grass) more net GHG mitigation than cultivation of crops for AD biogas production on equivalent land area** (Styles *et al.*, 2020). By the **net zero context** modelled in the LCA, crop-based **AD feedstocks become completely ineffective at emissions mitigation, even assuming BECCS is deployed at AD plants**, with maize resulting in only -20 kg CO_2 eq. per tonne, and grass actually resulting in positive emissions of +20 kg CO_2 eq. per tonne of grass sent to AD (Styles *et al.*, 2020). Feedback recommend replacing maize grown for AD with plant-based proteins like legumes for human food consumption, and which can also be grown in rotation with better impact on soils, and using grassland where possible for afforestation or solar PV rather than to grow grass for AD feedstocks.

Electricity from biogas plants is also more expensive – it was found to offer generation costs of 10 to 15 ct/kWh, compared to 4 to 8 ct/kWh for electricity from onshore wind and huge solar systems (Bahrs and Angenendt, 2019), representing worse value for money. Even though some of these forms of energy are more established, the urgency with which the UK needs to upscale these technologies to decarbonise the energy grid and avoid climate crisis necessitates greater government support.

If the government wants to incentivise the use of **AD as a waste management option** where food waste prevention or re-use as animal feed are not possible, Feedback recommends that the best approach is to **increase tax penalties on lower stages in the food use hierarchy such as incineration and landfill, taxing landfill higher than incineration, rather than offering subsidies to AD**. Subsidising AD risks perverse incentives diverting food waste down the food use hierarchy from prevention and use as animal feed. Waitrose admitted to the House of Lords enquiry into food waste that "**there is a clear temptation, on economic grounds, to prioritise energy recovery over redistribution**" (House of Lords EU Committee, 2013, p. 46). The House of Lords report therefore recommended that incentives for anaerobic digestion should not distort the food waste hierarchy and recommends that the UK government investigate incentives for food waste redistribution (House of Lords EU Committee, 2013, p. 48). In 2011, **Defra estimated that food waste prevention saved on average 8 times more emissions than sending food waste to AD** (Defra and Department of Energy and Climate Change, 2011, p. 10). Other studies have found that prevention of food waste was found to save 5 to 25 times the emissions compared with sending food to AD (Moult *et al.*, 2018a), and that using heat-treated food waste in animal feed (wet-feed) was better on 13 out of 14 environmental indicators such as global warming potential and water pollution than sending it to AD (Salemdeeb *et al.*, 2017). Feedback's upcoming LCA found that preventing food waste results in direct emissions savings approximately 9 times higher than sending it to AD – and that if the land used to grow this food is instead afforested, this results in emissions mitigation levels over 44 times higher than sending the same volume of food waste to AD, per tonne food waste (Styles *et al.*, 2020). In the current technology context, sending food waste to animal feed saves over 2 times the emissions as sending it to AD. This assumes that trees are grown on the land that would otherwise be used to grow the animal feed displaced by food waste used instead as feed (Styles *et al.*, 2020).

Less low-emissions alternatives currently exist for natural gas, so **biogas may have some limited role to play in the UK's gas grid. However, subsidies for AD plants producing biogas and biomethane already exist through the Renewable Heat Incentive (RHI). Producing electricity through biogas, by contrast, makes little sense when lower-carbon, lower cost alternatives are available**.

Even in the case of using AD to produce biogas or biomethane, Feedback recommends that the **government should prioritise converting UK heating systems to run primarily on electricity – such**

as through use of heat-pumps – rather than risk locking in expensive biogas infrastructure long into the future, since renewable electricity is a lower carbon alternative. Feedback hence also recommend that the UK government consider reducing RHI payments to AD plants and refocusing support towards electrifying heating infrastructure.

The full life cycle assessment and research report will be published in June 2020 and Feedback would be available to present the findings to BEIS.

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