FES: Bridging the gap to net zero

Bio resources workshop, 26 November 2019

FES: Bridging the gap to net zero - what is it?

At the launch of our Future Energy Scenarios in July 2019, we mentioned that we would be undertaking further work later this year to explore the 'so what' of our FES analysis. Whilst the Future Energy Scenarios consider what could happen in the future, this work will seek to collaborate with a wide range of experts from across and beyond the energy industry to look more closely at what *needs to* happen to reach the UK's new net zero target by 2050. To reflect this, we are calling this work *FES: Bridging the gap to net zero.*

There are many areas we could explore, so this year we have chosen to keep our focus on the FES 2019 key messages. We will be taking forward three themes of work in the coming months exploring these key message topics, focussing on bio resources, electric vehicles and peak heat demand. The final output of the *FES: Bridging* programme will be a write up of results in Spring 2020, with some clear recommendations for action. We will be working with Laura Sandys for the whole programme who will be acting as an independent chair and guest editor for our work.

Why bio resources?

Previously, the UK had a target to reduce greenhouse gases by 80% (compared to 1990 levels) by 2050 - meaning that some use of fossil fuels (for example) could remain. Now, meeting a net zero emissions target means considering every area of society and how emissions can be eliminated. This means that bio resources, many of which are low carbon or carbon neutral, become increasingly important in meeting energy needs. By bioenergy, we mean turning organic materials like energy crops into fuels, gases or electricity. Bioenergy with carbon capture and storage (BECCS) also represents one of the few technologies that can offer negative carbon emissions.

However, looking out over the next 30 years there are several questions. How much bio resource might be available for energy purposes - and what are the interactions with other areas of society such as food production or biodiversity? Will a global trade in bio materials develop at scale? If so, how much bio material might the UK be able to import? And how might available bio resources be used - given that there are a number of potential applications in heating, electricity generation, building, road transport, aviation and other sectors? All of these questions mean that the use of bio resources in a net zero world is truly an issue that needs to be considered from a whole system perspective. This topic touches on key messages 1 and 4 from the FES 2019 publication (feasibility of net zero and whole system thinking).

What did we do?

On 26 November, we gathered around 20 stakeholders from across the bioenergy supply chain, plus ESO employees and Laura Sandys, in London to discuss the role of bioenergy in a net zero world.

Richard Millar from the Committee on Climate Change, Sacha Alberici from Navigant and Mark Sommerfield from the Renewable Energy Association started the morning by presenting their recent work on bio resources. This gave us a really useful overview of current research and different perspectives.

We then discussed certainties and uncertainties in the supply and use of bio resources, approaching this discussion by considering feedstock, processing of bio resources and finally the end use of bio energy in turn.

The discussion was wide ranging but some themes emerged in each area:

In considering **feedstock** for bio energy an area of great uncertainty is imports and whether / how a global market for bio resources might develop. There are obviously a lot of factors that play into this, many of which the UK will have little control over.

It's clear that some minimum level of GB wet and dry wastes for bio resource use will remain into the future, as these are by-products of other processes. But it's difficult to say exactly how much in light of other changes - for example, the societal drive to reduce waste in general. The quality and homogeneity of waste will also affect how it can be used for bio energy purposes, and can affect the efficiency of conversion technologies. Broadly, there therefore exists quite a high level of uncertainty about the supply of inputs for bio energy in the future, and due to different perspectives we were unable to narrow the potential range.

When thinking about **processing** of bio resources, many attendees discussed the importance of gasification due to the diverse range of fuels it can create from bio resources - but noted barriers to commercialisation. Others noted the reliance of many (future) processes on Fischer-Tropsch technologies, many of which have challenges in implementation. Similarly, for carbon negative technologies these will rely on carbon capture use and storage, which is not yet widely commercialised.

In considering **end use** of bio resources, we discussed what might constitute 'best use' of limited bio resources in a net zero world. Some noted principles such as prioritising bio resource for areas where it can sequester or displace the most carbon, and / or where no other decarbonisation alternatives exist. Others noted that even if there was an agreed best use for bio resources in [2050], infrastructure, supply chains etc. involved in other uses may need to be supported ahead of this - otherwise these will disappear or not grow at the required rate. It was also noted that bio resources can provide security for other more widespread decarbonisation methods - for example providing additional generation which can help with greater electricification.

A lot of **whole system interactions** were debated, including the need for clear governance across supply chains to ensure real societal and carbon benefits as well as whole system planning so that one part of the supply chain doesn't lag behind whilst others are ready to go. Attendees noted the whole system environmental benefits of bio resources - for example, displacement of fossil fuels, avoidance of methane emissions from food wastes and sewage etc, and the potential improvement of carbon sequestration in soil. It is important to think about these wider benefits in the consideration of bioresourcews.

Attendees also discussed the different definitions of net zero, and how this has led to a lack of clarity. Lastly an ongoing theme across all discussions was the importance of ensuring sustainability right across the supply chain - and the potential role of the UK as a first mover here.

To help guide our discussions, we used the **visual overleaf** to demonstrate different steps in the bio energy supply chain. This won't be completely comprehensive of all possible bio resource uses, and we'd welcome any feedback you may have.

Next steps

We will write up discussions from the day in more detail, alongside potential no regrets next steps, in our *FES: Bridging the gap to net zero* summary report in the Spring. This will include an early view of how we may flex bio resource assumptions in FES 2020, and how our findings may influence other ESO publications.

Look out for our other work streams under the *FES: Bridging* programme looking at the role of EVs in helping to decarbonise power, and managing peak heat demand.

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The bio resource value chain

DRAFT: Subject to discussion