30th March 2020

Future Energy Scenarios (FES): Bridging the Gap to Net Zero

National Grid Electricity System Operator (ESO)

The project, which was originally launched in November 2019, aimed to provide a detailed and nuanced look at 'Bridging the Gap to Net Zero' and how the UK's collective knowledge on areas could be further developed. This report is the first in the 'Bridging the Gap' programme for National Grid ESO, and aimed to look at the role of bioenergy, electric vehicles and how peak electric heat demand could be managed. Going forward, they will aim to produce a further FES report in July 2020 (with bolstered bioenergy recommendations), as well as a second iteration in Autumn 2020. The aim of these will be to create a shared definition for Net Zero across the whole system.

Mark Sommerfeld, Policy Manager at the REA was active in feeding into the report and presented the REA Bioenergy Strategy at a stakeholders workshop in November last year. We will continue to be active in feeding into later stages, as well as responding to the questions the programme wants to look at going forward.

The REA comment on the report can also be read here. While we welcomed the report, we challenged some of the Reports assertions around bioenergy feedstock availability.

Bioenergy – Key Conclusions

- **The report claims supply of bioenergy feedstocks is uncertain, and influenced by several factors:**
    - Imported feedstock for bioenergy is critical for some net zero pathways but underlying assumptions for this are not well understood or tested. Primary research on feedstock availability is limited and quickly becoming outdated, and a lack of policy incentives add to this uncertainty.
    - Waste for use in bioenergy will continue to be available into the future, but the scale is uncertain
    - Domestic production of bioenergy has the potential to provide higher levels than today. A whole-system approach must be taken to ensure that this increase is sustainable across all sectors.

- **Definitions of "whole system" vary across existing analysis, creating different definitions for net zero.**
    - This creates difficulty in comparing across research and risks inconsistent or incompatible decisions across industry and policy.

- **The report also claims there is no consensus on the "best use" of biomass.**
    - More fundamentally, there is currently no shared view on how to assess 'best' use of biomass across competing options. Some stakeholders have stated a position in this area and factors to consider could include where no decarbonisation alternatives exist, where the greatest amount of carbon can be displaced or captured, and what the counterfactual of any other uses of the biomass might be.

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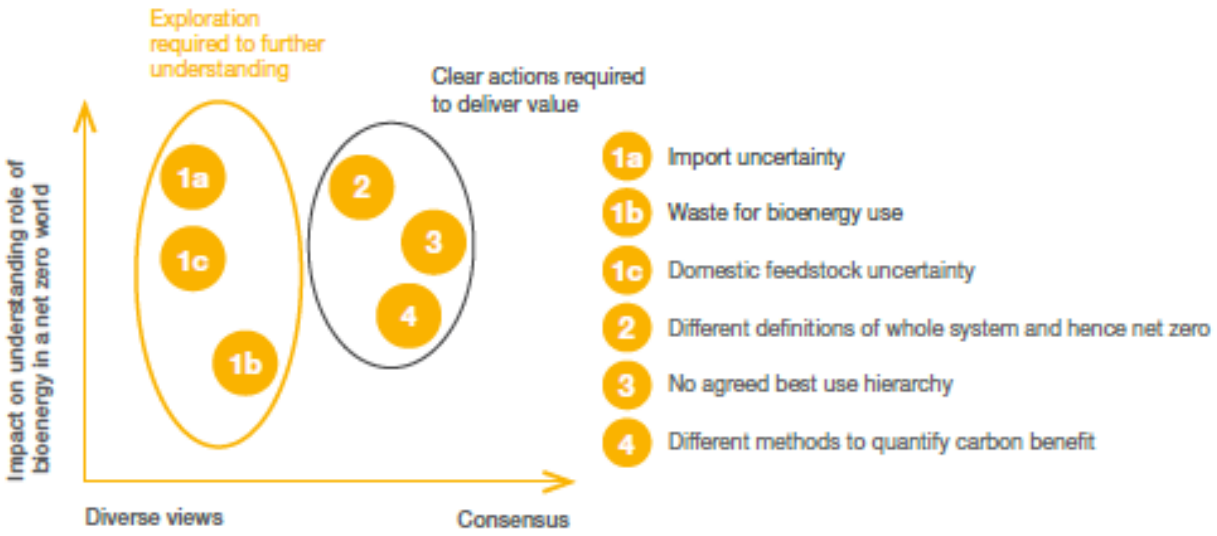
Bioenergy - Exploration Needed for Further Understanding



- There is a need for primary, up to date research to explore the drivers of feedstock availability over time, with a focus on how imports of international biomass feedstocks might change to 2050. This should also include analysis of drivers of supply, with a focus on physical and policy factors.
- A common definition for "net zero across the whole system" must be applied to ensure that decisions across industry and policy are being made using consistent foundations.
- A best use hierarchy for bioenergy must be developed. This is a resource with wide ranging interactions across many sectors, and government and industry must collaboratively develop criteria for assessing its "best use".
- Clarity of carbon accounting standards, including consideration of whole supply chain emissions. All increases in biomass use (not just those receiving subsidy) should be accompanied by consideration of carbon emissions across the supply chain and beyond the energy sector, with certification schemes to guarantee sustainable provenance. For bioenergy imports, consideration needs to be given not only to whether a country implements a regulation, but also how well this is enforced and audited, ideally by a third party.

REA Analysis on Bioenergy Conclusions

- While the report is generally positive about bioenergy, it is disappointing that National Grid ESO has taken an overall pessimistic view of biomass availability. We shall be encouraging the NG ESO team to consider availability with a greater focus on market dynamics. Biomass feedstock supply is responsive to market demand and, as identified by the Committee on Climate Change within their land use report, there is opportunity to significantly increase domestic supply. There is also already a fair amount of research around drivers on global biomass feedstock availability. As such we would like to

see the focus move to consolidating what we already know and looking to drive increases in biomass availability through market mechanisms, which in turn, is good for the bioeconomy and jobs.

- Equally, while it is fine to talk about 'best use' for biomass this must be done in reference to our already established bioenergy market which will ultimately provide the pathway to the future best use scenarios. This means building up our existing biomass heat, AD or biomass power sectors in order to deliver the skills, supply chain and expertise to deliver future innovation. Today's industries must not be forgotten. This is particularly well explored in the REA Bioenergy Strategy (see box page 39 - 40).

Electric Vehicles – Key Conclusions

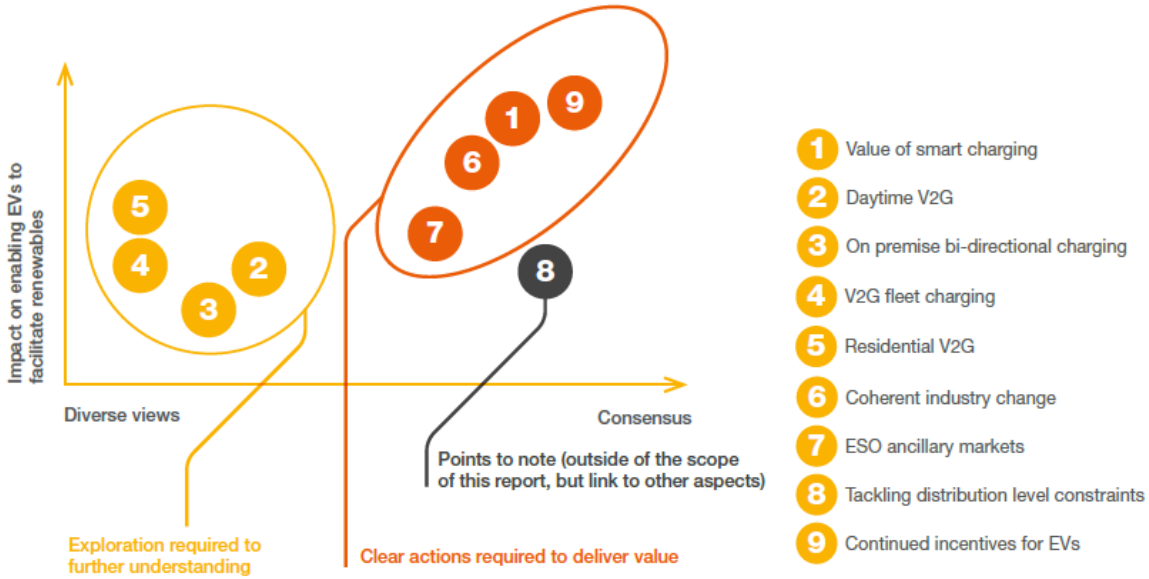
- **The report identifies Smart Charging is the "low-hanging fruit"**
  - It can provide much of the flexibility required to support more renewable generation on the electricity system as demand and renewable generation grow. It must be in place for EVs to scale without system challenge.

- **Vehicle to Grid (V2G) is nuanced, and more uncertain**
  - Large scale V2G operations which have vehicles connected throughout the day - such as airport and urban parking lots, but not commercial fleets – could be well placed to offer system services.
  - Bi-directional charging of EVs on-premise (but not exporting power to the grid) could provide valuable demand shifting or reduction for the customer and system, with lower barriers to entry than offering system services.
  - V2G fleet charging is more likely than residential models, due to scale, but there is some question whether vehicles will be available for (dis)charging at the time of day when flexible assets are most scarce.

- **Market change required to support flexibility from EVs**
  - Coherent change across the whole electricity system is essential to ensure that clear price signals reflect system needs, and to allow the flexibility available from EVs to be utilised positively.
  - ESO ancillary service markets must evolve to support the fundamental attributes of EVs, such as the scale, dynamic location and availability of EVs.
  - EV access to distribution network markets is seen as providing significant potential value to manage local constraints and hence could be a valuable revenue stream for EVs

- **Incentives for the adoption of EVs need to continue**
  - This will allow them to scale at a rate that facilitates increased renewable generation and optimises network costs for consumers. The potential bringing forward of a planned ban on conventional vehicle sales would accelerate adoption.

Electric Vehicles - Exploration Needed for Further Understanding



- Coherent industry change: All industry change programmes should review any recommendations which risk dampening electricity market price signals, as clear price signals will enable the greatest level of flexibility to be harnessed from smart charging.
- ESO ancillary markets: GB electricity flexibility markets should evolve to enable participation of small-scale flexible assets which will not be consistently connected to the electricity system and which may not always connect at the same network location.
- Smart charging: Given industry alignment in the area of smart charging, it is imperative that identified actions to support this continue to be progressed. As National Grid ESO we advocated for the inclusion of mandatory smart charging capability in the Automated and Electric Vehicles Act, and add our support to the further actions outlined in the EV Taskforce report to support the growth of smart charging.
- Innovation and commercial ventures should continue to explore the viability, consumer appetite for, and future likely behaviour of distinct V2G business models, including:
    - On-premise (i.e. "behind-the-meter") optimisation and demand shifting that include EVs with other flexible on-premise assets such as batteries and appliances.
    - Different scales of V2G provision of system services. For example, residential vs commercial fleets.
    - Different commercial models for large scale V2G (e.g. fleet, airport parking, railway parking etc.) and impact on potential system services offered.

Peak Electric Heat Demand & Heat Pumps

- **The report identifies that there is a huge variety of housing stock across the UK and no one technology solution is best suited to decarbonise the heating of every household.**
    - Existing natural gas boilers must be replaced, and a range of technologies will be available, including heat pumps, biogases, hydrogen, district heating, and combinations of these such as hybrid heat pumps.

- There is a need to coordinate heat decarbonisation research and decision-making with a "whole system" lens to ensure that decisions balance direct consumer benefit (e.g. heat technology or service provision) and indirect benefit (e.g. lower system costs via consumers' bills).

- **Barriers remain to widespread heat pump use:**
  - Consumers can't easily assess whether their home is suitable for a heat pump. Heat pumps are suited to better insulated, more thermally efficient homes, but their performance across the diverse range of UK housing stock, thermal efficiency ratings, and climates is not well understood.
  - Consumer investment decisions (and any policy support for these) need to be able to understand different heating options, such as choosing between a heat pump and complementary investment (e.g. significant insulation) or a hydrogen boiler with relatively less insulation.
  - The consumer experience will fundamentally change as heat is electrified, due to the characteristics of how heat pumps provide heat at a lower and steadier rate than natural gas boilers. This will have implications for services, markets, and regulations across the sector.