Oral Evidence from Just Transition Wakefield.

Interested Party Number: 20032286

On behalf of Just Transition Wakefield, I would like to add detail to three of the sections of our original relevant representation.
Firstly, the role of Drax Power and BECCS technology in combating climate change; secondly, flood risk assessments; thirdly, the impact on biodiversity.

1. The role of Drax Power and BECCS technology in combating Climate Change.
Drax Power is keen for discussion of the climate impacts of biomass to be excluded, but the scientific understanding of the climate impacts of the biomass industry has developed considerably over recent years, and it makes no point to discuss the climate impacts of the plant without including the supply chain. I will also raise evidence specifically about the climate impacts of BECCS technology.

I also note that the Examining Authority has asked for evidence relating to the climate impacts. This is on the agenda.
I will be brief, highlighting the evidence in summary, to expand on later in writing at deadline 2.

I will refer to the EASAC (European Academies Science Advisory Council) publication: Forest bioenergy update: BECCS and its role in integrated assessment models, February 2022; and also *John D Sterman et al 2018 Environmental Research Letters, 13 015007.*

Quoting briefly from the EASAC publication, from the summary on page 2:
"From a climate perspective, the key question in the use of biomass to replace fossil fuels is how long it takes to achieve a net reduction in atmospheric CO2 levels. This is determined by the time taken to offset the increased emissions from biomass (relative to fossil fuels) by reabsorption of CO2 through regrowth of the harvested forest (the carbon payback period). On the basis of the experience of Europe's large-scale conversions from coal to forest biomass, this delay is too long to contribute to meeting Paris Agreement targets.

This publication explains why EASAC take a view against the large scale use of woody biomass, which we endorse and agree with.

Briefly, even assuming that all clear-felled forests are replanted, the carbon emitted from Drax's smokestack will not be re-sequestered until well after 2100, if at all. Therefore, within the timescale of the UK's legally binding net zero targets, the burning of woody biomass cannot be carbon neutral and **as a consequence, BECCS cannot be carbon negative within the same timeframe** (if at all)**.**
Emissions from forest soil, timber drying, pellet manufacture and pellet transport (road, shipping and rail) all need to be added to the smokestack emissions, because they all end up in the atmosphere. Drax claim that their pellet manufacture is carbon neutral because it too is powered by biomass, but this claim also clearly falls based on the above arguments. Further, Drax receives pellets from a number of

manufacturers, including Enviva in the US, and it is on public record that they use methane to dry the wood not biomass.

Further, even if we accept Drax Power's confident assertion that they will successfully and continually capture 95% of CO_2 emissions, there is still considerable uncertainty concerning the permanence of storage in saline aquifers and old oil and gas wells, which is why we believe that this DCO should be considered alongside the Humber Low Carbon Pipeline application and the undersea storage application. They are not only related – Drax Power's dDCO is completely dependent on these two following DCO applications (although they are not dependent on Drax's DCO). Therefore we argue that either the consideration of this dDCO is delayed, or any decision is contingent on permission being granted for BOTH the pipeline AND the undersea storage, and that no work should start until both related permissions are granted. We believe that in seeking licence to start construction, there is a risk that Ministers might be "encouraged" into agreeing the two outstanding DCOs (pipeline and storage) with less than full consideration of the merits and problems

EASAC make the point strongly, and in detail, that the Integrated Assessment Models (IAMs) used by the industry and policy makers are flawed and outdated. Their intention in producing their report is to better inform government policies. Therefore decision making in the absence of up-to-date policy raises the same questions that I submitted in writing for yesterday's Preliminary Meeting. It also leaves Drax open to legal challenge in future as understanding of the science and emissions develops, and as the 1.5^{o}C Paris target recedes further and further from possibility.

Detailed evidence about the payback time for replanted trees to recapture the combustion and other emissions can be found in Sterman et al from 2018. (*John D Sterman et al 2018 Environ. Res. Lett. 13 015007.)*
In this paper, Sterman and colleagues evaluate existing evidence about the emissions from burning wood, making clear that the climate impacts of burning wood to replace coal depends on multiple factors, specifically: "*The climate impact of biofuels therefore depends on CO2 emissions from combustion of biofuels versus fossil fuels, the fate of the harvested land and dynamics of NPP" (Net Primary Production).*

Skipping to their conclusions, Sterman et al draw 7 separate conclusions from their data.
First, yet contrary to the policies of the EU and other nations, biomass used to displace fossil fuels injects CO2 into the atmosphere at the point of combustion and during harvest, processing and transport. Reductions in atmospheric CO2 come only later, and only if the harvested land is allowed to regrow.

Second, the combustion and processing efficiencies of wood in electricity generation are lower than for coal (supplementary material). Consequently, the first impact of displacing coal with wood is an increase in atmospheric CO2 relative to continued coal use, creating an initial carbon debt.

Third, after the carbon debt is repaid, atmospheric CO2 is lower, showing the potential long-run benefits of bioenergy. However, before breakeven, atmospheric CO2 is higher than it would have been without the use of bioenergy, increasing radiative forcing and global average temperatures, worsening climate change, including potentially irreversible impacts that may arise before the long-run benefits are realized.

Fourth, biofuels are only beneficial in the long run if the harvested land is allowed to regrow to its preharvest biomass and maintained there. Natural forests have high carbon density compared to pasture, cropland, developed land and managed tree plantations. (Our emphasis)

Fifth, counter to intuition, harvesting existing forests and replanting with fast-growing species in managed plantations can worsen the climate impact of wood biofuel. Although managed loblolly pine grows faster than hardwood, speeding the initial recovery of forest biomass, the equilibrium carbon density of managed plantations is lower than unmanaged forest, so carbon sequestered in plantations never offsets the carbon taken from the original forest. This is true even if the managed plantation is never reharvested, and worse if the plantation is periodically reharvested. Further, typical plantations require periodic fertilization, increasing N2O emissions and worsening their climate impact beyond what we report here (Schulze et al 2012).

Sixth, growth in wood harvest for bioenergy causes a steady increase in atmosphericCO2 because the initial carbon debt incurred each year exceeds what is repaid. With the US forest parameters used here, growth in the wood pellet industry to displace coal aggravates global warming at least through the end of this century, even if the industry stops growing by 2050.

Seventh, using wood in electricity generation worsens climate change for decades or more even though many of our assumptions favor wood, including: wood displaces coal (the most carbon intensive fossil fuel); all harvested land is allowed to regrow as forest with no subsequent conversion to pasture, cropland, development or other uses; no subsequent harvest, fire or disease; no increase in coal demand resulting from lower prices induced by the decline in coal use for electric power; no increase in N2O from fertilization of managed plantations; and no increase in CO2 emissions ormethanogenesis from disturbed land. Relaxing any of these assumptions worsens the climate impact of wood bioenergy.

Sterman et al summarise thus:
In sum, although bioenergy from wood can lower long-run CO2 concentrations compared to fossil fuels, its first impact is an increase in CO2, worsening global warming over the critical period through 2100 even if the wood offsets coal, the most carbon-intensive fossil fuel. Declaring that biofuels are carbon neutral as the EU and others have done, erroneously assumes forest regrowth quickly and fully offsets the emissions from biofuel production and combustion. The neutrality assumption is not valid because it ignores the transient, but decades to centuries long, increase in CO2 caused by biofuels.

Returning to the EASAC analysis of Biomass and BECCS... Further into the summary, the authors report:
The deployment of the underlying CCS technology continues to be slow and operational experience limited; thus uncertainties remain over how much CO2 can be captured from combustion gases and the extra energy required (parasitic energy cost). There is a trade-off between the amount of CO2 removed from the stack gases and the energy required in the capture and storage stages, and the latest evidence suggests that performance is currently significantly below that assumed in models. Evidence has also strengthened concerns that the CO2 that leaks into the environment along the long supply chain, combined with the risk of carbon losses from land use change and in the capture and storage stages, can reduce the carbon removal efficiency substantially, thus delaying or even neutralizing any net removals from the atmosphere.

In fact, we have seen evidence that a CO_2 capture rate of 60% is more typical, and to consistently achieve capture rates of 90-95% will cause a significant additional energy debt. This technology is not the silver bullet it is portrayed as, but an unproven distraction from genuine emissions reduction strategies. This will be expanded on in detail in our submission at deadline 2, by which time we will have been able to collate all of the research papers that we have accessed. However, in the meantime, the Examining Authority would be justified in asking Drax to evidence their confidence in their predicted capture rates. This should include clarity over whether 95% is the average capture rate over time, or the peak capture rate when the system is working as planned (meaning that the average will be lower). This is significant in assessing the actual climate impact of the retrofitted CCS unit(s). The ExA would also be justified in asking Drax for detailed figures for the energy penalty through CCS operation, and how that varies with capture rate. Whether this information and data is given in private or public, the ExA needs to be confident of both the accuracy and reliability of this data.

EASAC also forecasts that as demand for biomass grows in an expanding industry, and as demand for other bio-economy applications (bio-plastics, building timber, wood pulp) grow, biomass costs will rise. This will have serious land use implications as well as cost implications.
The accumulated evidence on whole system emissions therefore suggests that any sales of Carbon Credits from BECCS will also be open to legal challenge.

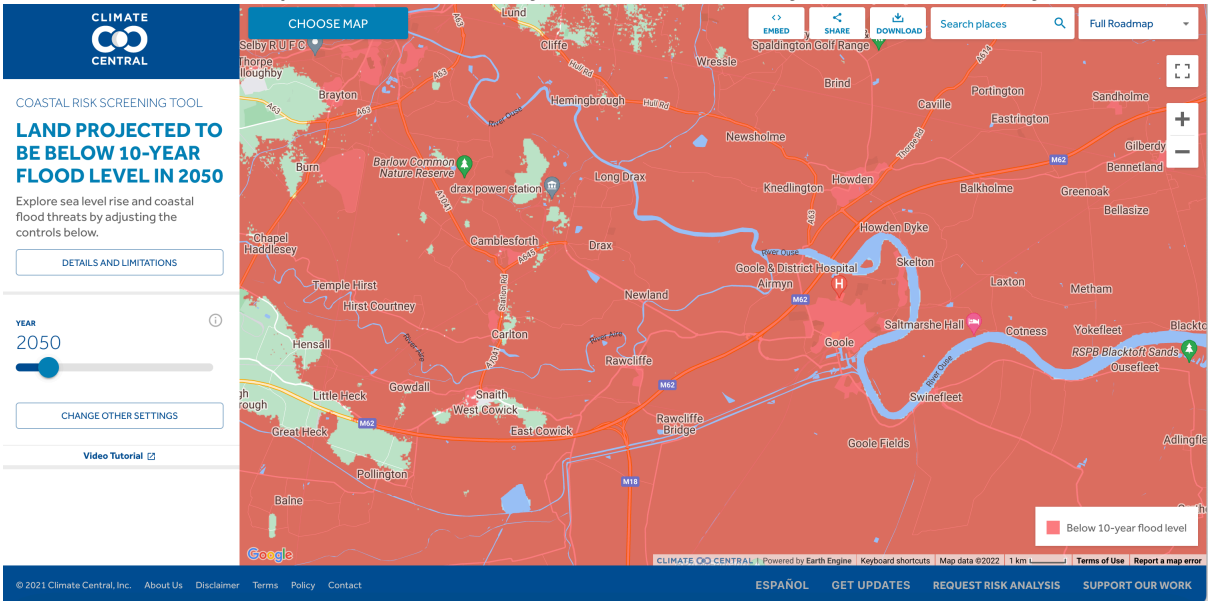
2. Flood Risk.
Irrespective of the historic flood patterns around Drax and the surrounding villages and farmland, the 2022 Climate Change Risk Assessment (CCRA 2022.3) advises that climate change adaptation needs to be integrated effectively into all new infrastructure, and to prepare for warming up to 4^{o}C. The dDCO predates this advice, and so we contend that the flood risk assessments must be re-modelled in accordance with CCRA 2022.3.

Using the available open-source coastal flooding projection tools available at Climate Central.org it is clear that the Drax site is at serious risk of future flooding.

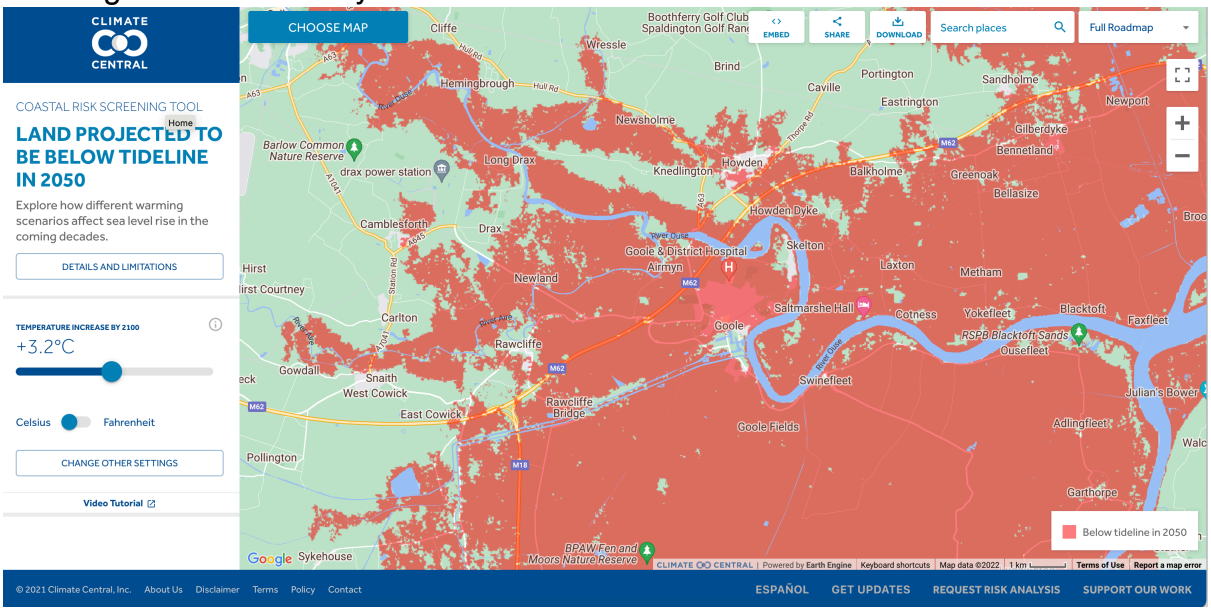
By altering the parameters to assume a mid-range temperature rise of 3.2°C by 2100, it is anticipated that the power station site may well be below the 10 year flood level by 2050 and below the tideline by 2050.

The models also predict that even if global heating is constrained to 1.5°C, which seems increasingly unlikely, Drax Power Station is likely to be permanently below sea level in the long term (this would be well into the next century).

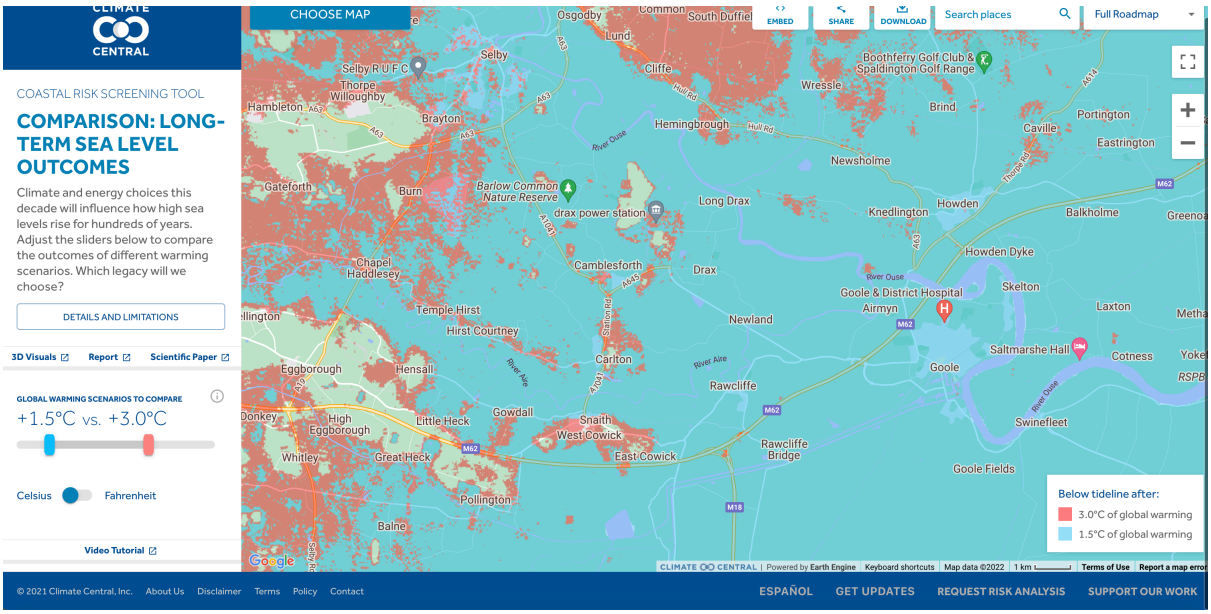
Evidence that Drax power Station may be below the 10 year flood level by 2050



Evidence that Drax is likely to be below the tideline by 2050, on a not unrealistic warming rate of +3.2°C by 2100



Evidence that Drax Power Station may be permanently below sea level in the long term, even if we succeed in holding global temperature rises to 1.5°C.



Late 2022 has seen a series of reports about ice sheet and glacier melting, all indicating that this is happening faster than previously predicted and that sea level rises will further accelerate as a result. Therefore, it is clear that the Climate Change Risk Assessment advice to plan for a 4°C temperature rise is timely.
Whilst it is not the fault of Drax Power that their flood risk assessment has been overtaken by disturbing new evidence, it is within the power of the ExA to ask for new and independent analyses of flood risks over the operation and dismantling phases of the plant at Drax, using a variety of scenarios to adequately assess actual risk.

This is particularly important because, as outlined previously, continued operations at Drax will further accelerate global heating and therefore sea level rise.

3. Biodiversity

There has been increasing scrutiny of the biomass industry throughout 2022, including documentaries in both the UK and Canada about biodiversity losses from logging and wood pellet operations in British Columbia.

There is also intense scrutiny on the biomass industry in the Southern US where Drax Power sources much of its wood pellet from, and in Estonia.

The debate on this matter highlights the gap between Drax's assertion that its operations and purchases are legally compliant and licenced, which I am sure is the case, and the actual impact on naturalised, biodiverse forests.

The think tank, Ember, has reported that it believes that some imported pellets from Estonia are in breach of UK sustainability criteria through:

- *logging in protected areas (including those protected under Estonian law and those designated as Natura 2000 reserves);*
- *damage to watersheds around rivers and streams;*

- *damage to carbon-rich peat soils;*
- *logging in ways that harm biodiversity (including clearcutting and other types of harmful logging in habitat for species protected under EU and/or Estonian law due to their imperilled status); and logging culturally significant trees.*

It is clear from evidence on the ground that whether or not wood pellet production uses whole trees or waste, much of the timber provided to wood pellet manufacturers, including Drax itself, is derived from clear felling and from mature, biodiverse forest, not monoculture plantations.

There are recorded concerns in all supplying nations about risks to specific protected species including Caribou in Canada. The South Eastern coastal forests of the US have in excess of 1500 endemic species that are under increasing pressure as natural swamp forests are cleared as being of "no commercial value", completely discounting their biodiversity value. These examples could all fall foul of UK sustainability regulation.

This is at a time when it is recognised that biodiversity is collapsing globally, threatening human life to at least the same extent as global heating. As awareness increases, and following COP15 in December, it is highly likely that the regulatory framework for harvesting biomass from biodiverse forests will tighten incrementally over coming years, alongside international agreements on deforestation. This will threaten the global supply of "affordable" wood pellet and undermines the business case for an expanding biomass industry.

It may be that the narrowness of UK Planning Law puts these overseas biodiversity considerations outside of the planning process, but there is emerging evidence that biomass sourcing is NOT aligned with the UK sustainability regulation, which we believe justifies raising the questions here. This in itself could make such a project non-viable.

Summary and Context

Just Transition Wakefield is a campaign group as well as a community action group, with concerns both local and global.

Our starting point is that we are in a twin emergency of the breakdown of our climate system and the collapse of nature. As a species, as a civilisation, we are utterly dependent on both nature and climate, so we, Just Transition Wakefield, have a moral responsibility to defend both.

The underlying issue is that industrial scale harvesting of woody biomass destroys forest biodiversity and creates carbon debts that the biosphere simply cannot afford. Therefore at this time when a global average temperature rise of 1.5^{o}C is fast approaching, when we are already seeing crop yields falling, when we are seeing an explosion of drought, flood and wildfire globally: we are clear that both climate and biodiversity should be held in all our consciences and consciousness whilst considering this application.

Finally, we are not "anti Drax" as an organisation. We will very happily support the company to transition to genuine renewables and grid storage, which will still

guarantee a future for the workforce and an income stream with strong margins for Drax – a just transition.

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