From: ... [redacted]
Sent: 08 November 2018 23:59
To: Drax Re-power
Subject: wr ref. 20011847

Hi there,
unfortunately I ran out of time to write this, it is a bit long, not as it should be, and I didn't manage too sum it up I apologize. If you wish me to work ion it, let me know.
Kind Regards
Julian

Comments

Drax climate assessment - 15.5.6
"Operational Emissions from 2026 to 2050 Following the Government's intended end to unabated coal generation, it is assumed that generation units 5 & 6 will either be decommissioned or adapted to meet the new emission intensity limit of 450 gCO2/kWh; just 54% of the current emissions intensity. In the case that they are decommissioned, it is assumed that equivalent generation capacity will be provided elsewhere on the grid, at the same emissions intensity."

- Is this assumption justified considering it is reaching relatively far into the future, in times of urgent, rapid change and substantial investment in unaerobic digestion and power-to-gas technology as well as the likelihood of emergence of new disruptive tech like low cost fuel cells that could potentially take dispatchable energy demand largely of the grid.
On top of that, the load factor for a coal fired power station, at least till 2025, is not likely to be 100%, generation would be provided elsewhere at better efficiency and lower costs

Written Representation

Looking at the scientific evidence there seems to be no doubt that climate change is a major issue of our time and one that is significantly underestimated in the public eye. 95% of scientists seem to agree that the only questions there stand to debate regard the degree of severity, yet that it isn't far away in time or space that we will see effect of our emissions that would make anybody feel uncomfortable.

Unfortunately I'm running out of time to formulate all this in a nice way, hence here a collection of extracts, mainly from reports by the IPCC, the WHO and the Commission on Climate Change - scientific doom and gloom. I think it important that we open our eyes to the facts at hand as all law and policy is ideally only meant to point towards real, underlying issues, something that the National Policy Statement acknowledges in the evaluation of benefits and impacts (NPS EN-1 1.1.2). This is meant to give a glimps on the impacts that emissions can have, due to time constraints and the complexity of the issue it is not a balanced representation and it might be worthwhile to consult an expert.

We are quite lucky in the UK in the way that the most harm will hit other countries and nations first, here a collection of global issues:

habitats
"[...] multiple lines of evidence indicate that the majority of warmer water coral reefs that exist today (70-90%) will largely disappear when global warming exceeds 1.5°C (very high confidence)." (IPCC sr1.5 ch.3)

Migration
18 Poverty and disadvantage have increased with recent warming (about 1 o C) and are expected to increase in many populations as average global temperatures increase from 1 o C to 1.5°C and beyond (medium confidence). Outmigration in agricultural-dependent communities is positively and statistically significantly associated with global temperature (medium confidence). Our understanding of the linkages of 1.5ºC and 2ºC on human migration are limited and represent an important knowledge gap (IPCC sr1.5 ch.3)

see level rise
"A limited number of processes-based studies are relevant to GMSL [global mean see level] in 1.5ºC and 2ºC worlds. Marzeion et al. (2018) force a global glacier model with temperature-scaled scenarios based on RCP2.6 to investigate the difference between 1.5ºC and 2ºC and find little difference between scenarios in the glacier contribution to GMSL at 2100 (54-97 mm relative to present day for 1.5ºC, and 63-112 mm for 2ºC using a 90% confidence interval)."
"Coastal flooding by the sea is likely to cost thousands on billions of USD annually, with damage costs under 9 constant protection 0.3–5.0% of global GDP in 2100 for a RCP2.6 scenario (Hinkel et al., 2014)." (IPCC sr1.5 ch.3 ch.3)

food security
"Affected areas include Sub-Saharan Africa (West Africa, Southern Africa), South-East Asia, and Central and South America."
"Risks of food shortages are lower in the Sahel, southern Africa, the Mediterranean, central Europe, and the Amazon at 1.5 o C of global warming when compared to 2°C (medium confidence)"
"Fisheries and aquaculture are important to global food security but are already facing increasing risks from ocean warming and acidification (medium confidence), which will increase at 1.5°C global warming." (IPCC sr1.5 ch.3 c3)

health
"All in all, more than 52,000 Europeans died from heat in the summer of 2003 [...] Temperature records were broken in a number of countries in 2003 as Europe experienced its hottest weather in at least 500 years" (Earth Policy Institut - http://www.earth-policy.org/plan_b_updates/2006/update56)

"Any increase in global warming (e.g., +0.5 o C) will affect human health (high confidence). Risks will be lower at 1.5°C than at 2°C for heat-related morbidity and mortality (very high confidence), particularly in urban areas because of urban heat islands (high confidence). Risks also will be greater for ozone-related mortality if the emissions needed for the formation of ozone remain the same (high confidence), and for undernutrition (medium confidence). Risks are projected to change for some vector borne diseases such as malaria

and dengue fever (high confidence), with positive or negative trends depending on the disease, region, and extent of change (high confidence). "

"Measuring the health effects from climate change can only be very approximate. Nevertheless, a WHO assessment, taking into account only a subset of the possible health impacts, and assuming continued economic growth and health progress, concluded that climate change is expected to cause approximately 250 000 additional deaths per year between 2030 and 2050; 38 000 due to heat exposure in elderly people, 48 000 due to diarrhoea, 60 000 due to malaria, and 95 000 due to childhood undernutrition." (WHO report on climate change)
That make 685 per day 2030-2050, a person dying every 5.25 seconds

Inflict suffering on other people, no matter where they are on planet is morally wrong, if the evaluation of benefits and impacts has to consider solely the effects of climate change on the UK, the 'UK Climate Change Risk Assessment 2017' by the Committee on Climate Change is a wealth of information, below are some extracts. What is important to consider is that the connection between Drax using gas as bridge fuel without measures to reduce emissions and these effects should be given, as several reports including the WEC Gas Report ('World Energy Perspectives, Natural Gas Perspective', World Energy Council, p.5, key findings 4; Commission on Climate Change?, O need to look this up) state that a reliance on fossil fuel gas as bridge fuel at given policy will mean that we fail to meet the climate targets of 1.5 and 2 degrees of global warming.

Effects on the UK

flooding
"Today, 520,000 properties in England, including 370,000 homes, are located in areas at risk of damage from coastal flooding and 8,900 properties are in areas at risk of being lost through coastal erosion. Damages from flooding and erosion are over £260million on average each year.
By the 2080s, up to 1.5million properties, including 1.2 million homes, may be in areas at significant level of flood risk and over 100,000 properties may be in areas at risk from coastal erosion. In addition, 1,600km of major roads, 650km of railway line, 92 railway stations and 55 historic landfill sites are at risk of coastal flooding or erosion by 2100.
Implementing current policies to protect England's coast would cost £18-30 billion
Ambitious actions to reduce greenhouse gas emissions and adapt to the effects of climate change could reduce the risk for 400,000-500,000 people in England by 2100. However, the risks of harmful coastal flooding and erosion cannot be eliminated altogether."
("Managing the coast in a changing climate", by the CCC's Adaptation Committee)

water scarcity (including for farming)
"Climate change is projected to reduce the amount of water in the environment that can be sustainably withdrawn whilst increasing the demand for irrigation during the driest months. At the same time the growing population will create additional demands on already stretched resources in some parts of the country,
Even low population growth and modest climate change scenarios suggest severe water supply deficits, and with high population growth and more severe climate change these

deficits deepen and by the 2050s extend across the UK." (UK Climate Change Risk Assessment 2017, Committee on Climate Change p.4)

heat waves
"However, heat-related mortality, which is currently around 2,000 premature deaths per year, is projected to increase steeply in the UK throughout the 21st century, from around a 70% increase in the 2020s to around 540% in the 2080s (in the absence of any physiological or behavioural adaptation of the population to higher temperatures). (UK Climate Change Risk Assessment 2017, CCC)

biodiversity
Across non-NERC priority species under the B1 scenario, 27.0 % of species were regarded as being at medium or high risk from climate change, whilst 54.3 % are likely to have a medium or high opportunity. These figures change to 27.8 % and 54.1 % under the A1B projection. Of the NERC priority species, a slightly higher proportion of species were regarded as being at medium or high risk of climate change under both the B1 (30.3%) or A1B (31.6%) scenario, with a lower proportion of species thought to face opportunity (50.3% across both scenarios) than across all species. (NECR175, Natural England p.17)
Birds at high risk to decline: "Cuckoo , curlew, lesser redpoll, red grouse, ring ouzel, tree pipit, twite, wood warbler" mocking jay
(NECR175, Natural England p.21)

The nature of climate change itself
Thing I didn't manage to research anymore:
-The latency effect of the CO2 that is already in the atmosphere
-Positive feedback loops

scenarios
"Most least-cost mitigation pathways to limit peak or end-of-century warming to 1.5°C make use of Carbon Dioxide Removal (CDR), predominantly employing significant levels of Bioenergy with Carbon Capture and Storage (BECCS) and/or Afforestation and Reforestation (AR) in their portfolio of mitigation measures (robust evidence, high agreement)" IPCC sr1.5 ch.3 29

We are no longer just talking about how long we can keep emitting CO2 from fossil fuels, we are in fact facing the question of how to capture it and take it out of the atmosphere again later I'm the century.

reports
All these reports show a strong emphasis on method and scientific accuracy which means that they present their data with a certain level of doubt and they are inherently conservative as they mainly consider consensus among peer reviewed studies. New research takes time to become established. Nevertheless the IPCC stated this in there latest report:

"The implications of overshooting [1.5 degree] are large for risks to natural and human systems, especially if the temperature at peak warming is high, because some risks may be long-lasting and irreversible, such as the loss of many ecosystems. In addition, for several

types of risks, the rate of change may be of most relevance with thus potentially large risks in case of a rapid rise to overshooting temperatures, even if a decrease to 1.5°C may be achieved at the end of the 21st century or later. If overshoot is to be minimized, the remaining equivalent CO2 budget available for emissions has to be very small, which implies **that large, immediate, and unprecedented global efforts to mitigate GHGs are required.**

The time frame to initiate major mitigation measures is essential in order to reach a 1.5°C (or even a 2°C) global stabilization of climate warming [...]. If mitigation pathways are not rapidly activated, much more expensive and complex adaptation measures would have to be taken to avoid the impacts of higher global warming on the Earth system." (IPCC SR 1.5 ch.3 p.171 30ff.)

precautionary principle
Generally in science we are talking about risks and levels of confidence. To consider the amounts of deaths per year and level of destruction we are willig to accept relative to comfort and wealth in our privileged and sheltered society, I find is a sad thing, particularly because we are effectively only putting change off for a little longer. When it comes to running the risk of entering positive feedback loops however, that are able to destabilize the whole climate system towards an eight degree hotter planet earth, involving the worst effects of global warming and making it uncontrollable and detached from human emissions, the consequences are so severe that in my mind there is no way but to adhering to the precautionary principle and to do what it takes to avert the harm - We are effectively sitting on train track discussing, or even having a cup of tea; yet a train is coming, we don't see it yet, but we know the time will come that it will pass trough and role on... There is only one appropriate thing to do.

possible solutions
In this case that should translated into a commitment and reasonable steps towards decarbonizing the power station from begin on, CCS, if it works, anaerobic digestion (biogas) and/or power-to-gas (P2G) seem to be thhhe options. To my knowledge CCS hasn't been used at scale and there were doubts whether the captured carbon could be stored without leaking back into the atmosphere in the long-term. On top of that it isn't 100% efficient. Hence hence the zcb report states that using biogas and synthetic gas shouuld be the longterm goal, and it should be possible to put biogas in the mix, as it is produced with technology well established on smaller scale for instance in countries like Germany (2000 biogas projects, 6TWh). Regarding P2G 'European Power-to-Gas' stated:
"From a technological perspective, power-to-gas is ready for commercial exploitation. However, the challenge is to quickly reach an industrial scale that is economically exploitable. [...] Significant cost reductions and efficiency improvements are required to enable its deployment on commercial scale." ('Power-to-Gas in a decarbonized European energy system based on renewable energy sources', European Power to Gas, p.4)
According to 'Renewable Energy Limitations' using conventional power stations for grid stabilizing purposes negates a lot of the emissions benefits of renewable energy sources, as power stations would often be on hot standby or powering up or down.
"Water electrolysers are able to respond quickly to power load changes, even on a sub-second level for some recent technologies. [...] Electricity network operators could therefore use electrolysers to balance supply and demand, and hence keep electrical networks stable." (p.10)
Using a certain percentage of synthetic gas from surplus renewable energy, as and when curtailing of wind gets increasingly common, could in this way at some point in the future,

besides providing fuel, drastically reduce emissions of the power station (or increase efficiency of use) and create multiple other benefits like the potentially reduced need to upscale the grid (p.10).

Although I do agree that building gas fired power station seems at present a sensible solution to overcome seasonal shortcomings of an intermittent renewable energy supply, it strikes me that the magnitude of the risks and unavoidable consequences we are taking with climate change make it immoral to do anything but pay the true price of dispatchable power and to ensure truly carbon neutral operations as soon as possible.