Biofuelwatch's comments in response to "REP7-017" The Applicants responses to issues raised at deadline 6

Response ref 5.1
If the peak concentration is only just within the figure then that suggests that there may be important impacts outside the figures. The Norwegian study found slight declines after 10km, but Drax's emissions can be expected to disperse further because of its higher stack. The "slight decline" after 10km, suggests a considerably larger area than 15km, which only just includes the peak concentration, it should be modelled and shown in order to consider impacts on the wider area, such as near Keadby3.

Response ref 5.2
The applicant has provided no information to support their claim that the potential for emissions of amines from the existing process is very low and is not of environmental concern - particularly in combination with the predicted emissions of amines. A robust risk assessment requires consideration of all in combination effects.

Response ref 5.4
There are significant sources of NOx in the area that will result in a geographical variation in NOx. This NOx level will also vary with height and, at any particular location, also the height and with time. The response says the "modelling is undertaken for each hour of the year" but that does not mean that the modelling has used historical data that reflects the location-specific concentrations at a specific time corresponding with the particular meteorological conditions being modelled. These impacts can be expected to result in a greater variation of nitrosamine formation with higher peak concentrations than if the background NOx level is assumed to be the same over the whole area, for all heights. The applicant has not quantified the uncertainties arising from the very significant approximations that have been used.

Response ref 5.7
The applicant has not provided sufficient data on the background concentrations of amines and nitrosamines to predict environmental concentrations in combinations with background levels.

Response ref 5.8
The applicant has sought to show Predicted Environmental Concentrations (PECs) are below thresholds. This is the approach also taken by the EA in its assessment of permit applications. It is our understanding that the EA typically considers any technique to be "Best Available Techniques" if the applicant can demonstrate that environmental thresholds will be met. It is therefore important for the ExA to determine whether the EA considers the applicant's assessment, which does not provide a worst case estimate of background concentrations of amines and nitrosamines, will be sufficient to ensure the resulting environmental concentrations are acceptable in land use terms.

Response ref 5.10

The applicant has not addressed the concerns of potential long distance impact in light of the remarks in the Imperial College and the Norwegian Institute for Public Health that there can be cumulative impacts at hundreds of kilometres.

Response ref 5.11
Biofuelwatch considers the applicant has not demonstrated that changes in government policies (which could, for example, result in no subsidies for biomass generation) or an accident (such as fire) or very significant new renewable generation could not result in the non-BECCS units ceasing to operate - either permanently or for an extended duration.

Response ref 5.12
The changes that have occurred between different versions of ADMS are largely immaterial. Dispersion modelling software is complex and, like any software, changes can have unexpected consequences. It remains the case that the applicant has not provided any evidence that the version of ADMS software used has been validated - not even by CERC. Biofuelwatch is not making any comments on CERC's quality assurance processes. Our comments relate only to the applicant's use of a software version without being able to provide evidence of its validation - not even by the applicant. Whilst Biofuelwatch does not question that ADMS is an appropriate modelling system, the particular version of software used should be independently validated using scenarios that are not known to the developer when the software was written. For the assessment to be robust, uncertainties must be quantified.

Response ref 5.13
Biofuelwatch considers its concerns about uncertainties, which include the uncertainties inherent in the modelling software system itself, have not been addressed.

Response ref 5.14
The impact of calm conditions are uncertain and should be modelled. They could have a significant impact on annual average levels, especially near the plant, because in calm conditions the pollution will not be dispersed by the wind. Modelling that ignores conditions which may result in high pollution levels near the plant should not be considered adequately robust. Biofuelwatch does not understand why the applicant has not presented results using the capability that ADMS provides to model calm conditions.

Response ref 5.16
Biofuelwatch's concerns remain. We have no further comments to make on this at this time

Response ref 5.17
Biofuelwatch's concerns remain. We have no further comments to make on this at this time

Response ref 5.18
The applicant's response refers to old studies. There is still much that remains unknown about the formation of nitrosamines but a paper published in 2017 by Teeradet Supap, Huancong Shi, Raphael Idem, Don Gelowitz, Colin Campbell, Max Ball, "Nitrosamine Formation Mechanism in

Amine-Based CO2 Capture: Experimental Validation" considers SO2 likely involved in the nitrosating process. The impact of SO2 (and other pollutants) on nitrosamine formation remains largely unknown and this adds to the considerable uncertainties.

In addition the Applicant still does not seem to have grasped the issue regarding sulphur emissions and biomass/lack of a desulphurisation plant *pre-carbon capture.* Quoting from BAT Review for New-Build and Retrofit Post-Combustion Carbon Dioxide Capture Using Amine-Based Technologies for Power and CHP Plants Fuelled by Gas and Biomass and for Post-Combustion Capture Using Amine-Based and Hot Potassium Carbonate Technologies on EfW Plants as Emerging Technologies under the IED for the UK Ver.2.0, December 2022 (including EfW) Prepared by Jon Gibbins and Mathieu Lucquiaud:

3.1.2 Biomass power plants a) Flue gas impurities and emission control systems
Impurities of concern for biomass power plants are NOx, SOx and particulates, with reasonably well understood consequences in terms of HSS formation from SOx, but less accurately predictable impacts on solvent degradation and nitrosamine formation from NOx and particulates. NH3 in the flue gas, including from SCR slip, will also report in the DCC or PCC wash section. Chlorine and other impurities found in biomass may be largely removed in a DCC, but if not will have to be removed by suitable solvent management techniques (e.g. thermal reclaiming) and may cause corrosion and degradation issues if allowed to accumulate. Any aerosol presence, from SO3 if present but perhaps alternatively from fine particulates, would also be of major concern, as it has the potential to cause solvent mist carryover from the absorber and is hard to correct either by subsequent flue gas treatment or by measures at the absorber outlet. Solvent mist formation would be evidenced by increased amine losses measured using iso-kinetic sampling that would capture both amine vapour and fine droplets. Ideally this would not be identified for the first time in full-scale operation though, but would have been observed during pilot trials using the actual amine and flue gas and, importantly, with realistic liquid and gas temperatures along the flue gas path in the pilot plant absorber column. Since serious amounts of aerosols may only occur at certain times, e.g. when firing a fuel with higher S content, extended trials where the full range of potential plant fuels are fired are also important. For NOx and SOx, the LCP BREF gives guidance for emission reduction technologies to be applied to biomass. Selective Non Catalytic Reduction (SNCR) or SCR may have to be considered if lower NOx levels are required. Aerosols, and to some extent all SOx, may be addressed by the use of baghouses, with added absorbent injection if the alkalinity in the fly ash is not sufficient (Beaudry, 2018). Gas/gas rotary air heaters are also reported to be effective in avoiding SO3 mist formation (Mertens, 2015; Reddy, 2017) BAT Review for PCC, V2.0 (including EfW) Page 42 of 126 For all impurities, though, a satisfactory level of flue gas treatment can be verified only by long term testing (pilot trials or actual operation) on the actual plant flue gas. As well as the major role for solvent maintenance methods in determining the response to impurities, actual fuel variations, operational variations etc. will all affect actual outcomes.

The applicant does not appear to have considered this in sufficient detail.

Response ref 5.19
Biofuelwatch considers the applicant has not quantified uncertainties arising from the use of assumptions that are not worst case and does not consider such an assessment to be sufficiently robust to assess the appropriateness of the proposal in land-use terms.

Response ref 5.20
Biofuelwatch notes that the applicant's response does not provide evidence to justify its carbon capture efficiency and amine emissions figures.

Response ref 5.21
The inclusion of volume flow rates and exhaust gas temperatures in returns to the Environment Agency is not sufficient to control the flow rate and temperature to ensure it corresponds to what was modelled. For the modelling predictions to be useful for the assessment of the application in land use terms (including the assessment of ecological impacts), there needs to be confidence that actual environmental concentrations would be unlikely to exceed those predicted by the model. This requires the control of important parameters such as flow rate and temperature (or worst case flow rate and temperature values to be modelled) and uncertainties of any assumptions that are not worst case to be quantified. The applicant has not confirmed the use of worst case flow rate and temperature values in their model and the applicant's response does not confirm that these important parameters will be controlled by the permit.

Response ref 5.22
Biofuelwatch's concerns remain. We have no further comments to make on this at this time

Response ref 5.23
Biofuelwatch's concerns remain. For the public consultation to be meaningful, the information and evidence behind the EALs must be released and available for public scrutiny.

Response ref 5.24
Biofuelwatch's concerns remain.

Response ref 5.25
Biofuelwatch's concerns remain. We have no further comments to make on this at this time

Response ref 5.26
Biofuelwatch's concerns remain. We have no further comments to make on this at this time

Response ref 5.27
Biofuelwatch appreciates the confirmation that hourly varying background values of ozone have been used but considers the potential impact of how ozone varies with location and height should be considered.

Response ref 5.28

Biofuelwatch notes that the applicant has not provided the reaction rate information nor confirmed that the reaction rate determination was independently peer reviewed. There appears to be no way for the ExA and the public to verify the applicant's figures even though these figures greatly impact the ExA assessment and have potentially huge public health and environmental consequences. Biofuelwatch considers this unacceptable.

Response ref 5.29
Biofuelwatch's concerns remain. We have no further comments to make on this at this time.

Response ref 5.30
Biofuelwatch's concerns remain. We have no further comments to make on this at this time.

Response ref 5.31
Biofuelwatch's concerns remain. We have no further comments to make on this at this time.

Response ref 5.32
Biofuelwatch notes that the draft NPS EN-1 also says "the Secretary of State should be satisfied, before consenting any potentially polluting developments, that: ... the effects of existing sources of pollution in and around the site are not such that
the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental quality limits" This requires a robust assessment of the cumulative effects of pollution.

Response ref 5.33
Biofuelwatch's concerns remain. We have no further comments to make on this at this time.

Response ref 5.34
Biofuelwatch's concerns remain. We have no further comments to make on this at this time.

Response ref 5.35
Biofuelwatch's concerns remain. We have no further comments to make on this at this time.

Remaining comments: we have been unable to respond to all of Drax's comments in the time available, but consider that the vast majority of our concerns remain.