Permit Number: EPR/EB3100FC/V004

The introduction to this consultations states that the Environment Agency (EA) must issue a permit if "activities meet all the legal requirements, including environmental…..".

The IGas application to produce hydrogen claims "*This offers the potential ……providing the opportunity to reduce CO_2 emissions and the production of combustion by-products (particulates and Nitrogen/Sulphur Oxides) through the displacement of diesel fuels, and so contributing to the UK's target of achieving carbon neutral status by 2050."* [1]

The weald Action Group (WAG) objects to this application on the grounds that the production of "grey", unabated hydrogen at this site will increase emissions rather than reduce them. This is incompatible with the legal requirement to nationally reduce emissions by 78% by 2035[2]. Consequently, the EA should not issue the requested permit.

We would remind the EA that the production of high carbon hydrogen is counter to government policy. The Hydrogen strategy states, "*For hydrogen to play a part in our journey to net zero, all current and future production will need to be low carbon."*[3] The report makes it quite clear that low carbon hydrogen means production using electrolysis or gas with Carbon Capture and Storage (CCS).

The Committee on Climate Change (CCC) in their 2021 Progress report urged on government departments the "*implementation of a 'Net Zero Test' to ensure that all Government policy decisions are compatible with the legislated emissions targets*[4].

WAG consider that this application fails such a test. Put simply, the production of hydrogen will result in an increase in emissions, both CO_2 and possibly NO_x rather than a decrease. Accurate estimates of emissions from steam methane reformation (SMR) are considered difficult to calculate precisely, but a recent research paper by Barratt et al calculate an increase of emissions of about 40% in SMR hydrogen production[5]

Moreover, we question the need to produce hydrogen rather than use the gas directly. There is now a significant need for gas as a result of the Russian invasion of the Ukraine. Using this gas in the UK will help to either reduce our relatively small dependence on Russian gas, or help reduce our requirement for gas from other sources providing a little relief for those European countries more heavily dependent on Russian gas.

This proposal would add considerably to local emissions and cancel out other efforts to reduce emissions locally. We calculate that this proposal would produce in the region of

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[1] P.13. IGas. Non-technical summary

[2] https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf P.8.

[4] https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf

[5] https://www.creds.ac.uk/wp-content/uploads/CREDS-Heating-steam-methane-reformed-hydrogen.pdf (P.23)

10,100 Kg of carbon dioxide **per day**[6]. This is incompatible with Surrey's climate change policies. Surrey has committed to reducing emissions by 46% by 2025 by 67% by 2030 and 80% by 2035[7]. This project, together with those from a similar proposal for Bletchingley that would produce twice this amount, would between them produce in the region of 11,060 tonnes of CO_2, in Surrey, a year[8].

Response to the IGas Non-Technical Summary

Paragraph 6.2.2.1 states "*Whilst the production of hydrogen from the SMR process will increase the localised production of carbon dioxide within the site boundary, it is necessary to consider the use of the produced hydrogen. The hydrogen fuel will be used to replace conventional use of hydrocarbon fuels (such as natural gas and petroleum), thereby offsetting emissions produced by the SMR process.* "

The main argument is that the emissions resulting from the SMR process would be offset by the savings in the emissions from using hydrocarbon fuels conventionally. We question this on a number of grounds. Both the climate emergency and the legally binding emission reduction targets mean that we need to reduce emissions significantly and rapidly. Our Nationally Determined Contributions (NDCs) require a 68% by 2030[9]. Simply replacing one form of emissions with another will not achieve this level of reduction. Moreover, there are alternative forms of hydrogen production that would deliver genuine emission reductions.

We note the statement above includes the conventional use of natural gas. This is, of course, inaccurate. As stated above, the SMR process increases emissions by about 40% over conventional combustion of natural gas. We also noted that in the previous paragraph the uses for the produced hydrogen included "*availability to the open market".* Both these statements imply that there is no guarantee that the hydrogen produced at this site will be used solely for *"public vehicles, HGVs, or mass-transport vehicles".*

This would seem to undermine the justification for the acknowledged increase in emissions at the point of production. If the hydrogen were to be used for purposes other than transport, then it could still add to harmful emissions and add to climate change. Hydrogen used in fuel cells uses a chemical process rather than combustion, and this is why it produces no $CO_{2\,eq}$. However, if hydrogen is combusted, for instance when blended into heating gas, it produces NO_x with a warming potential even greater than methane[10]. If the hydrogen were to be used this way, it would add even further to the additional greenhouse gas (GHG) emissions arising from this proposal.

However, our main concern is the claim that the hydrogen produced would reduce overall emissions in bus transport. Table 6.1 show that hydrogen used in buses would release no CO_2 e and state, misleadingly, that this would save the emissions produced by the other

[6] Based on the specifications from Bayo Tech in Appendix 2
[7] https://www.surreycc.gov.uk/__data/assets/pdf_file/0003/225615/Surreys-Climate-Change-Strategy-2020.pdf
[8] Based on the emission figures
[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943618/uk-2030-ndc.pdf
[10] https://www.cleanegroup.org/hydrogen-hype-in-the-air/

fuels listed in the table. Note “a” states that the emissions produced in the production of the various fuels are not taken into account. In fact, the emissions from the production of the hydrogen are particularly significant and must be taken into account.

Information in Appendix 2 of the Gas Management Plan show that for every Kg of hydrogen produce there will be 10.1 Kg of CO_2. Therefore, the proposed production of up to 1000Kg of hydrogen per day would result in **10,100 Kg of CO_2 a day**, that is **over 10 tonnes** every day. **This amounts to 3686.5 tonnes a year**, which is nearly 1000 tonnes more than the 2769 tonnes of savings from diesel emissions that the IGas document estimates, (although this does not, of course, include the emissions from the production of diesel).

Response to the IGas Gas Management Plan

Paragraph 5. We note that gas is produced from Alb-1 well and that gas is used to generate electricity and that a pipeline exists to export the remaining gas. It seems logical, especially in the present circumstances, to continue to use all the gas produced directly, particularly as the delivery infrastructure already exists. We assume the electricity generation mentioned is for the use at the site. We understand that permission was granted previously to use the gas to generate electricity to export to the grid, but this has not been implemented.

Paragraph 5.2. It is proposed that the hydrogen production would be in parallel with gas exportation. We are not clear whether this proposal intends to produce additional gas to service the hydrogen production, or if they intend to split the current rate of production between the two processes. In the light of our calculation that emissions from hydrogen production alone could exceed 10 tonnes per day, what would be the total emissions from these parallel processes? Would these exceed EA or national limits?

We note that the hydrogen will be compressed at the site and then transported. We assume the energy required for compression and transport, and the consequent emissions, have not been included in the Biotech specifications listed above and in Appendix 2. These would increase the emissions from this hydrogen production even further.

Paragraph 5.3. Although our main concern is the hydrogen production proposed, we do find it worrying that the NOx emission limit of 95mg/m^3 is being exceeded and that a bespoke permit is now required

Paragraph 6.1.2. We agree that using electrolysis to produce hydrogen at this site would be inefficient. However, the most efficient use of the gas would be to export it for direct use. Using the gas to produce hydrogen means there is a considerable level of energy loss.

Paragraph 6.1.3. This application does not seem to give a figure for the amount of water that would be needed. In the light of concerns about water stress in the region and the requirement of water neutrality measures in new housing developments, how much additional water demand would this proposal require and how easily could this be met?

Paragraph 6.2. This refers to a Leak detection and repair Plan on all IGas sites. We have concerns about how effective these are. A recent survey by the Clean Air task Force (CATF)

showed significant leaks at a number of sites, including IGas sites at Horndean in Hampshire and Singleton in West Sussex[11]. The IGas document frequently refers to the small scale of the site and seems to use this to minimise the effect of emissions at the site. We have already highlighted the significant level of CO_2 emissions that would be produced, and we do not consider these as "*negligible*". We would ask the EA to question more closely the levels of NO_x and VOCs that would be produced and evaluate how negligible they would really be.

Paragraph 6.3.4. This refers to the measures taken to reduce solid and liquid emissions. It does not include effusive gas emissions. The CATF films show this could be significant. A recent report by the International Energy Agency states that effusive methane emissions can be 70% higher than official figures. A recent study on hydrogen production with Carbon Capture and Storage[12] (CCS) also show that effusive methane emissions are a greater problem than was previously recognised. While the Albury project does not include CCS it still provides a number of opportunities for effusive emissions.

Another concern is fugitive hydrogen emissions. Hydrogen is the smallest molecule and escapes even more easily than methane. A recent report for the Department for Business, Energy and Industrial Strategy[13] (BEIS) states that the indirect effect of hydrogen emissions on climate change can have a warming potential eleven times more than CO_2 over 100 years. The effect in the next 20 years will be even greater.

The table below, from the BEIS report shows the predicted emissions levels from the various steps in hydrogen production can be significant as they would be in additions to fugitive methane emissions in the production process.. We note that figures from the production of "grey" hydrogen is absent. This reflects the fact that all government proposals for a hydrogen economy specifically exclude high carbon "grey" hydrogen from their plans.

[11] https://www.youtube.com/watch?v=V2CUGDIJFIs&list=PLKH65C8nX1i9h0kDoOKLNvjtu278jUzfo&index=8
https://www.youtube.com/watch?v=c0ExIf0t6PA&list=PLKH65C8nX1i9h0kDoOKLNvjtu278jUzfo&index=9
https://www.youtube.com/watch?v=TPAYGssgfAU&list=PLKH65C8nX1i9h0kDoOKLNvjtu278jUzfo&index=11
[12] https://onlinelibrary.wiley.com/doi/epdf/10.1002/ese3.956
[13] https://www.gov.uk/government/publications/fugitive-hydrogen-emissions-in-a-future-hydrogen-economy

Sector	Specific Area		Predicted Emission Confidence level	
			50 %	99 %
Production	Electrolytic	With venting and purging	3.32 %	9.20 %
		With full recombination of hydrogen from purging and crossover venting	0.24 %	0.52 %
	CCUS-enabled		0.25 %	0.50 %
Transport and Storage	National Transmission System		0.04 %	0.48 %
	Distribution Network		0.26 %	0.53 %
	Underground Storage		0.02 %	0.06 %
	Above Ground Storage (gas)		2.77 %	6.52 %
	Road Trailering (gas)		0.30 %	0.66 %
	Road Trailering (liquid)		3.76 %	13.20 %
End-uses	Residential		0.30 %	0.69 %
	Gas Turbines		0.01 %	0.01 %
	Refuelling Stations		0.25 %	0.89 %
	Fuel Cells	With venting and purging	1.36 %	2.64 %
		With full recombination of hydrogen from purging and crossover venting	0.56 %	1.02 %
	Combustion Engines		0.30 %	0.66 %
	Process Industry		0.25 %	0.50 %

Paragraph 6.3.7.

This states that emissions monitoring will take place and monitored periodically. We consider this far too vague and unsatisfactory. The CATC state that monthly monitoring can reduce leaks by 90%[14] and we consider that this should be required should a permit be granted. We also consider a requirement to fix leaks within a short time limit such as 5 days should be stipulated. We are also concerned that the stringent cuts that the EA has suffered in recent years will make it difficult to monitor the site and ensure that the company complies.

Finally, we would refer the EA to the latest CCC Progress Report[15]. Included in its many criticisms of the plans for delivery of the UK commitment and targets on climate change. This includes the need for "*effective accountability mechanisms*" and we consider this application a case in point. The application makes claims that the project is in line with the

[14] https://www.catf.us/2021/08/smart-methane-policy-europe-eu/#LDAR
[15] https://www.theccc.org.uk/publication/2022-progress-report-to-parliament/

governments commitments on climate change and this is clearly not the case. It is our view that permits should be refused