Dear Sir/Madam

Re: Application for a biomass gasifier by Plymouth Biomass Ltd/REACT in Ernesettle, Ref 14/01637/FUL

I am writing on behalf of Biofuelwatch to object to Plymouth Biomass Ltd/REACT's application to build a 10.8 MWe gasifier in Ernesettle. Biofuelwatch is a UK/US organisation which has been undertaking research, education and campaigning about the impacts of large-scale industrial bioenergy since 2006.

We are aware of the serious local concerns expressed by residents who have objected to the application, including about the impacts on air quality, traffic and landscape impacts, including on the Tamar Valley AONB. However, while we share those concerns, our objection, given that we are not locally based on Plymouth, focuses on the wider issues of sustainability and compatibility with the waste hierarchy.

Before discussing our detailed grounds for objection, we would first like to comment on the ***nature of the proposed development***.

REACT's proposal is not for a standard biomass combustion plant – it is for a biomass gasifier, one which is to burn Grade C waste wood and which thereby will fall within the remit of the Waste Incineration Directive. Biomass gasification is not a proven technology – it is a technology beset with serious technical/operational challenges which in other places have resulted in serious exceedences of permitted air emissions and in fires and explosions.

So far, not one biomass gasifier above 1 MW has been successfully operated in the UK. The largest one built in the UIK was a 10 MW biomass gasifier near Eggborough in 2001 – this had to be closed after a mere eight days of operation due to technical as well as economic problems. A 3 MW waste wood gasifier in Stoke of Trent was commissioned in 2008 but it was closed down in November 2011 and during the period it was operational, it only ran at 1% of its capacity – clearly an unsuccessful scheme.

The design proposed by REACT is identical to that used by the Canadian company Nexterra (www.nexterra.ca/files/thermal-system-components.php). Unlike REACT, Nexterra have got experience with operating biomass gasifiers, however this experience has been very problematic. One of Nexterra's gasifiers was installed at the University of South Carolina – it exploded: http://missoulian.com/news/local/south-carolina-biomass-explosion-raises-questions-about-safety-of-um/article_5de7a9c6-f793-11e0-9c16-001cc4c03286.html. Another Nexterra gasifier, in Tennessee, had to be closed down because vital parts had corroded in less than 18 months: www.washingtontimes.com/news/2014/aug/25/oak-ridge-biomass-steam-plant-already-closed/0. Those problems are by no means unique to Nexterra's gasifier design.

According to a report commissioned by the German government, around 50 biomass (wood) gasifiers were installed in Germany between 2000 and 2010 (www.gvepinternational.org/sites/default/files/resources/gtz2010-en-small-scale-electricity-generation-from-biomass-part-i.pdf). The authors of the report found that "*some of these plants never worked according to plan. Many have been taken out of operation after some months of trial. Some plants went up in flames and developers went bankrupt. The few plants that achieved more or less continuous operation were operating under special circumstances: They were part of university research programmes or were operated by the developers themselves. Moreover, in almost all cases about one to two years of adaptation were necessary*." A 2012 industry article in Germany reported that the number of biomass gasifiers in Germany nonetheless keeps growing but that further research was required, that there were no off-the-shelf plans and that technical problems persisted, including problems with processing and cleaning

the syngas, which is often too high in tar for safe combustion (http://www.erneuerbareenergien.de/boom-beim-anlagenbau/150/406/54825/).

Another German industry article (www.energy20.net/pi/index.php?StoryID=1392&articleID=167043) emphasises that "*the use of gasification technology at all scales discussed is a far from being an unproblematic, everyday technology*." It points out that small scale gasification tends to have relatively low efficiency, the plants are often not stabile, toxic emissions are usually too high, gas scrubbing is often insufficient, constant supervision is needed in many cases and often a technical service is required. According to the authors, the major challenge is optimising the whole system from combustion to waste disposal while meeting legal requirements, such as emission limits.

Apparent contradictions and omissions in the planning documents:

There appear to be omissions and contradictions in the planning documents regarding the nature of the development. For example, the documents speak about biomass pyrolysis followed by gasification and oxidation. Pyrolysis and gasification are quite different processes: The former requires heating biomass in the absence of oxygen, the latter requires heating it with a controlled level of oxygen. Pyrolysis generally produces an oily substances as well as char and syngas, which is not mentioned. According to the planning documents, both processes are to take places in the same chamber – this claim is puzzling. Particularly worryingly, the planning documents state that the gas obtained during gasification will be cleaned in an oxidiser, yet the diagram does not show any pre-combustion 'cleaning phase'. Indeed, if the gas was cleaned then it would not be necessary for REACT to propose an electrostatic precipitator to clean the flue gas. It therefore seems highly likely to us that the gas that is burned will contain a wide range of pollutants of impurities and that the reference to 'cleaning' in an oxidiser is misleading. Given the low gasification temperature proposed by REACT, those will inevitably include primary and secondary tars.

As one scientific article[i] explains:

"*Tars in particular can cause major system failures due to blockages and fouling of process equipment. The main challenge is to develop a gas cleaning system that strongly reduces tar levels without compromising on the syngas quality*."

This suggests that, with no gas cleaning proposed prior to combustion, the risk of technical problems will be considerable. And technical problems with gasifiers are, as mentioned above, linked to serious environmental impacts (such as raised air emissions, including mitigation systems having to be bypassed to relieve pressure) as well as with health and safety risks.

Low efficiency and sustainability:

REACT has not identified any heat customer and, they admit that they do not know whether the heat they could, in theory, supply, would be compatible with the needs of any nearby company, such as Plymouth Karting. Furthermore, they have not undertaken to invest in the infrastructure necessary for delivering any heat. In our experience, it is very rare that a power station designed around electricity generation is subsequently turned into a combined heat and power plant. We also note that the amount of heat which REACT claims to, theoretically, be able to provide is very small (3 MWth compared to 10.8 MWe electricity) and would raise the plants efficiency only slightly – it would certainly not allow it to be classified as 'good quality CHP' by Ofgem, nor as CHP by the EU Combined Heat and Power Directive: Both require a minimum level of 35% overall efficiency for a plant this size. Genuinely efficient combined heat and power plants are always designed around a heat customer.

As an electricity-only power station, the plant will achieve a mere 20% efficiency – wasting 80% of the energy contained in the wood. Virtually all standard biomass combustion plants are more efficient than this. Burning municipal solid waste with such low efficiency would not appear to qualify as 'energy recovery' but merely as waste disposal, using the R1 energy efficiency formula contained in Annex II of the EU Waste Framework Directive. Although Annex II of the Waste Framework Directive does not cover waste wood, this nonetheless highlights just how low the plant's efficiency would be.

Such very low efficiency means that the plant's use of resources and environmental impacts will be disproportionally large compared to the amount of energy produced. For this reason alone, we believe that it should not be regarded as a 'sustainable development' under the National Planning Policy Framework.

No convincing evidence that the proposal is compatible with the waste hierarchy and the proximity principle:

REACT claims that all of the 100,000 tonnes of wood a year they seek to burn would otherwise be going to landfill and that there is no viable alternative use for Grade C wood other than use for bioenergy.

In fact, Grade C waste wood includes Grade A and Grade B waste wood, i.e. it includes waste wood suitable for industrial use, such as panel board manufacture[ii]. The Wood Panel Industry Federation has warned that their industry's jobs – over 10,000 in the UK – are at serious risk from competition for suitable wood from biomass power plants.[iii] They have also pointed out that panel board manufacturing plants depend on sourcing wood from within a 150-200 mile radius. Plymouth is just 84 miles from one of the six panel board plants in the UK – Norbord's plant in South Molton. This suggests that, far from reducing landfill, the proposed plant could very well compete with existing industries' use of waste wood and thus have adverse economic impacts. This would contradict the waste hierarchy principle – which should be applied because the plant would be permitted under the Waste Incineration Directive. It also raises additional concerns over the sustainability of the development.

According to Defra, just 20,000 tonnes of segregated waste wood have been landfilled across the UK every year since 2009. The vast majority of waste wood that ends up in landfill – up to 700,000 tonnes a year, though possibly a lot less – does so because of a lack of waste segregation[iv]. This suggests that diverting wood currently going to landfill would require additional infrastructure related to waste wood segregation. Simply increasing the demand for waste wood, on the other hand, would appear to more likely divert it from other existing uses than from landfill. This underlines our concerns about the proposal's compatibility with the waste hierarchy.

Best regards,

Almuth Ernsting
Co-Director, Biofuelwatch

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[i] https://lirias.kuleuven.be/bitstream/123456789/417096/2/ABosmans_ELFM2013_final.pdf

[ii] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82571/consult-wood-waste-researchreview-20120731.pdf

[iii] http://www.makewoodwork.co.uk/GalleryEntries/Manifesto_and_Reports/Documents/WPIF_Response_to_Further_CfD_Allocation_Consultation__June_2014.pdf

[iv] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/120749/wood-waste-analysis-20130213.pdf