Dear Sir/Madam,

Re: Planning application ref H18-0723-12 for a biomass gasification plant near Sutton Bridge

I am writing on behalf of Biofuelwatch to object to Energy Park Sutton Bridge Ltd's application to build a biomass gasification plant close to Sutton Bridge. Our grounds of objection relate to 1) sustainability of the development, 2) health and safety risks and 3) local air pollution. We are aware of other serious local concerns, including impacts on traffic, noise and odour, light pollution and floodplain development. We are also aware that residents near existing biomass power stations have reported experiencing such problems. However, as a non-local organisation, thus less familiar with the specific local circumstances, we have decided to limit our own objection to just three points.

Before discussing those specific grounds for objection we would like to make the following general observations about the proposed development: Biomass gasification at the scale proposed is far from a reliable, proven technology. According to the European Commission's current Reference Document for Best Available Techniques for Large Combustion Plants[1], experience with biomass gasification power plants was, at the time the document was published in 2006, limited to a small number of demonstration and pilot plants and further research was needed. It appears highly problematic to us that the Environmental Statement and the planning application make no mention of the fact that a biomass gasifier with more than 40 MW would effectively be an experimental development and that no similar plant exists in the UK and likely not worldwide. The significant technical challenges and risks that apply to such an unprecedented development have not been acknowledged or addressed in any way in the planning documents. Instead, continuous smooth operation is assumed when there is no evidence that this is currently achievable (and when the evidence points to the contrary).

So far, the largest biomass gasifier built in the UK was a 10 MW one commissioned by Arable Biomass Renewable Energy near Eggborough in 2001. It was closed after a mere eight days of operation due to technical as well as economic problems.

There are two medium-sized gasifiers using Municipal Solid Waste operating in the UK: A 2 MW one operated by Waste Gas Technology UK in Newport, Isle of Wight and a gasifier operated by Scotgen at Dargavel, Dumfriesshire which does not appear to have produced any electricity as yet. Both plants have experienced major problems. The, much smaller, gasifier in Newport had to temporarily suspend operations in May 2010 because of serious exceedances of dioxin limits[2]. It re-opened in August and was suspended again, after just one week, until October 2010. Shortly afterwards, another emissions breach was reported. The local authority decided in June 2011 that operations were too unreliable for the Council to continue heavily depending on it for waste removal[3]. The Scotgen gasifier at Dargavel began operations with clean wood in October 2009 and with Municipal Solid Waste in December 2009. It was temporarily closed shortly afterwards because of problems attributed to fouling, corrosion and high temperatures. It was re-commissioned in March 2010. According to the Scottish Environment Protection Agency (SEPA), there were 40 noise complaints, 27 by-pass stack activations, one plant comms failure, four failures of the continuous Emissions Monitoring System and 276 short-term Emissions Limit Values breaches between March 2010 and

[1] http://eippcb.jrc.es/reference/BREF/lcp_bref_0706.pdf
[2] http://www.letsrecycle.com/news/latest-news/waste-management/energos-isle-of-wight-plant-fails-further-emissions-tests
[3] http://www.letsrecycle.com/news/latest-news/councils/isle-of-wight-to-reduce-dependence-on-2018unreliable2019-gasifier

February 2011 alone[4]. The plant was closed again from April 2011 until March 2012 in order to re-design the boilers; however operations had to be suspended again in June 2012 because dioxin emissions limits had been breached again.[5]

In Germany, according to a report commissioned by the German government, around 50 biomass (wood) gasifiers were installed between 2000 and 2010. The authors 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*."[6] A recent industry article in Germany reports that the number of biomass gasifiers in Germany nonetheless keeps growing but that further research is required, that there are no off-the-shelf plans and that technical problems persist, including with processing and cleaning the syngas, which is often too high in tar for safe combustion.[7]

Another German report emphasises that "*the use of gasification technology at all scales discussed is a far from being an unproblematic, everyday technology*." 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.[8]

Worldwide, a small number of biomass gasification plants (almost all of them CHP) are currently operational, including three in Austria and a small number in Sweden, but we have found no record of any existing ones of the scale proposed by Energy Park Sutton Bridge.

The "Guideline for Safe and Eco-friendly Biomass Gasification", financed by the European Commission[9] highlight the importance of carrying out detailed individual risk assessments which pay particular attention to the increased risks of biomass gasification: "*During operation of a biomass gasification plant there is an increased hazard potential due to the fact that a potentially explosive, toxic and combustible gas mixture is produced and consumed. The producer gas and residues (ash, liquids, exhaust gases) may cause the following major hazards/risks:*
+ an explosion and/or fire;
+ health damage to humans (poisoning, danger of suffocation, noise, hot surfaces, fire and explosion); and
+ pollution of the environment and plant vicinity."
The report stresses the lack of standardisation both for biomass gasification plants and for risk assessments and the need for carrying out careful individual risk assessments.
It also emphasises the large knowledge gaps related to suitable abatement techniques and emission values which can be achieved with different methods.

Our concerns about the experimental nature of the development not having been acknowledged are further highlighted by the fact that the developer has spoken about a wide range of potential feedstock. According to the planning application, while most of the feedstock would be woodchips,

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[4] http://www.gainscotland.org.uk/Scotgen_Dumfries_Site_Status_Report_-_V5_-_May_2011.PDF
[5] http://www.mrw.co.uk/news/dumfries-gasification-re-starts-after-breaching-emission-limits/8632485.article
[6] https://energypedia.info/images/4/4f/Gtz2010-en-small-scale-electricity-generation-from-biomass-part-I.pdf
[7] www.erneuerbareenergien.de/boom-beim-anlagenbau/150/406/54825/
[8] http://www.energy20.net/pi/index.php?StoryID=1392&articleID=167043
[9] www.gasification-guide.eu/gsg_uploads/documenten/D10_Final-Guideline.pdf

energy crops might also be gasified. Furthermore, the Bridge Watch website reports that Green Energy Parks' director John Dickie has referred to food waste as a potential feedstock, stating that this could be processed through anaerobic digestion.[10] We cannot see how the proposed biomass gasification process could be combined with anaerobic digestion and we can find no record of any company having combined both processes. Nor does the application include an anaerobic digestion plant. While different types of biomass can be gasified, using a range of feedstocks in one plant can pose further technical challenges and risks. According to a report by E4Tech, commissioned by DECC[11], there is very little experience with operating most types of biomass gasifiers on feedstocks other than wood and some types of gasifiers require the same type of feedstock to be used consistently. The planning documents do not indicate which type of gasifier the developer seeks to build.

1) Sustainability

We believe that the proposed development does not constitute a sustainable development as defined by the National Planning Policy Framework. Due to the technical problems of gasifying mixed feedstock and of gasifying feedstock with high moisture content, as well as the fact that a combination of AD and biomass gasification technologies has never been proven, we assume for the purpose of this objection that all of the feedstock will be wood.

The developers have cited different feedstock requirements, with one planning document referring to around 350,000 tonnes of feedstock a year and another document to 420,000 tonnes a year. For biomass combustion plants, the average feedstock requirement is around 10,000 tonnes of wood annually per 1 MWe capacity. Using that figure, the power station would require around 430,000 tonnes of wood a year (for a 43 MW biomass capacity). However, no information about likely efficiency levels has been provided. A Fichtner report looking at advanced thermal gasification of Municipal Solid Waste found: "*In terms of energy efficiency of standalone plants when optimised for power generation, existing gasification and pyrolysis technologies are less efficient than modern combustion technology.*"[12] Lower efficiency levels would translate into higher feedstock requirements.

According to Forest Research, the scientific committee of the Forestry Commission, the total annual availability of virgin wood in the East of England Region will be 261,096 oven dried tonnes a year for the period 2017-2021, which would translate into 522,192 green tonnes of wood.[13] This means that the proposed power station would require more than 82% of all the wood produced annually in the East of England Region – which includes all the wood currently used for purposes other than bioenergy. The same statistics show that regionally available forestry and sawmill residues would not be nearly sufficient to supply the proposed gasification plant. Total sawmill residues in the East of England, for example, are only 24,577 oven dried tonnes a year. This means that the power station will be heavily reliant on wood imported from other UK regions and, very likely from abroad. The developers would be competing regionally for wood with Iceni Energy, whose proposed Snetterton Biomass Plant has been approved, with planning documents stating that woodchips would be part of the feedstock, and potentially with the Mendlesham Biomass Plant proposed by ECO2, whose planning application also includes storage for woodchips. Further north, Drax and Eggborough have announced imminent plans to convert a total of 4,000 MW capacity to biomass, for which they will require pellets from around 40 million tonnes of wood. Eggborough has not stated where that wood is to come from while Drax have indicated that 90% would be imported, which would mean that 2 million tonnes would come from the UK.

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[10] www.bridgewatch.org.uk/PREL-response.html

[1111] www.ecolateral.org/Technology/gaseifcation/gasificationnnfc090609.pdf

[12] www.esauk.org/reports_press_releases/esa_reports/thermal_treatment_report.pdf

[13] http://www.eforestry.gov.uk/woodfuel/pages/EngRegMap.jsp

The scale of the required feedstock together with experience from other biomass power stations (for example the Margam Western Bioenergy Plant and E.On's Steven's Croft biomass power station) further suggest that wood from whole trees, i.e. trees felled for this purpose, is likely to account for much of the feedstock for the proposed gasification plant. The proposal should be seen in the context of the UK's total already announced biomass power station plans which, altogether (if implemented in full), will require up to 90 million tonnes of wood a year, 10 times as much as the UK's total annual wood production[14].

Energy Park Sutton Bridge state that they would provide South Holland District Council with annual 'sustainability' reports for all their wood similar to those required by Ofgem, however local authorities have no expertise or resources related to assessing the sustainability of different types of biomass, which would often require detailed scrutiny of complex supply chains of wood from overseas.

We cannot see how the applicant's claim that the power station would result in 140,000 tonnes of CO2 savings a year can be reconciled with the scientific evidence about CO2 emissions from bioenergy, particularly if (as the planning application would allow and as recent experience suggests is highly likely) a significant part of the wood will be from trees felled for this purpose. The UK Government's Bioenergy Strateg[15] lists various emissions which should be taken into account when considering whether a particular biomass development or source is low carbon. It emphasises the importance of taking full account of the greenhouse gas impacts of biomass, including carbon sequestration which would have happened over the next century if trees had not been cut for bioenergy, the indirect impacts of displacement and also the carbon impacts of burning wood which would otherwise have been used for durable products, thus storing rather than releasing the carbon. An analysis of the DECC Bioenergy Strategy by Professor Timothy Searchinger, a worldwide expert in modelling full life-cycle bioenergy carbon impacts, shows that according to DECC's own figures replacing coal with biomass sourced from whole conifer trees will result in a 49% greenhouse gas emissions increase over 40 years (1557g/KWh) and an 80% increase over 20 years (1879g/KWh).[16] Other studies which warn of the potentially very negative climate impacts of bioenergy sourced from whole trees include:

+ "Carbon debt and carbon sequestration parity in forest bioenergy production", Stephen Mitchell et al: A peer-reviewed article which compared CO2 saved from replacing fossil fuels with bioenergy with the carbon which would have been sequestered by forests had trees not been logged for that bioenergy. It concludes: "*Many of our combinations of forest productivity, biomass longevity and harvesting regimes required more than 100 years to achieve C Sequestration Parity, even when the bioenergy conversion factor was set at near maximal level.*"[17] (note that efficiency levels achieved by gasifiers so far tend to be low in the absence of heat capture and supply)

+ "Using ecosystem CO2 measurements to estimate the timing and magnitude of greenhouse gas mitigation potential of forest bioenergy" by Pierre Bernier and David Pare): A peer-reviewed study

[14] Based on constantly updated information available at http://www.biofuelwatch.org.uk/wp-content/maps/uk-biomass.html , also see http://www.scottish.parliament.uk/S4_EconomyEnergyandTourismCommittee/Inquiries/Wood_Panel_Industries_Federation.pdf

[15] www.decc.gov.uk/assets/decc/11/meeting-energy-demand/bio-energy/5142-bioenergy-strategy-.pdf

[16] http://www.rspb.org.uk/Images/Searchinger_comments_on_bioenergy_strategy_SEPT_2012_tcm9-329780.pdf

[17] http://ncfp.files.wordpress.com/2012/05/carbon-debt-paper.pdf);

which, focussing on wood sourced from Canada, concludes: "*Forest bioenergy opportunities may be hindered by a long greenhouse gas (GHG) payback time*"[18];

+ "Large-scale bioenergy from additional harvest of forest biomass is neither sustainable nor greenhouse gas neutral", Ernst Detlef Schulze et al[19]: Another peer-reviewed study which concludes: "*Large-scale production of bioenergy from forest biomass is neither sustainable nor GHG neutral*";

+ Biomass Supply and Carbon Accounting for Southeastern Forests, Southern Environmental Law Center in partnership with Biomass Energy Resource Center, Forest Guild and National Wildlife Federation[20]: This report relates to biomass sourced from the Southeastern US, i.e. from one of the main sourcing regions for pellets for the UK. It finds that the carbon payback time from burning wood sourced from that region will be 35-50 years for electricity generation (50 years for lower efficiency levels – and Tilbury's projected 37% efficiency will be low).

+ Opinion of the European Environment Agency Scientific Committee on Greenhouse Gas Accounting in Relation to Bioenergy[21]: This opinion includes a critique of many of the claims made by RWE. For example, it states:
"*Clearing or cutting forests for bioenergy crops releases large stores of carbon into the atmosphere and may reduce ongoing carbon sequestration if the forest would otherwise continue to grow. Regrowing forests or planting bioenergy crops will absorb carbon that offsets the emissions from their combustion over time, but it may take decades for this carbon absorption to reach the level of the lost carbon storage and foregone carbon sequestration of the forest…Merely keeping carbon stocks stable ignores the additional carbon sequestration that would occur in the absence of wood harvest for bioenergy (the counterfactual) and therefore does not make bioenergy carbon neutral.7 For this reason, sustainable forestry in the traditional sense does not necessarily mean that bioenergy produced from a forest is carbon neutral*".

Furthermore, there would be significant CO2 emissions from biomass transport given that, as we have seen, most of the wood would need to be transported long-distance, possibly from abroad. If imported biomass was used, then it would need to be transported long-distance by road from one of the UK ports with biomass deliveries and storage, such as Hull or Immingham.

2) Health and safety

As discussed above, there are significant risks associated with biomass gasification as a new and largely experimental technology. We are alarmed by the fact that no risk assessment appears to have been carried out by the developer and that there are no indications as to how the risks of explosions and fires would be addressed. According to the biomass gasification Guidelines cited above: "*The most critical safety issues during the operation and/or maintenance of gasifier plants are related to:*
+ Asphyxiation/toxic issues like unplanned release of potentially hazardous gas and liquids;
+ Explosion / deflagration hazards;
+ Fire hazards;
+ Operator failures."
According to the Guidelines, explosions could be gas explosions (with particular risks during plant start-up and shutdown and during any uncontrolled air intake, for example due to leakages),

[18] http://onlinelibrary.wiley.com/doi/10.1111/j.1757-1707.2012.01197.x/abstract;jsessionid=9FC6009664EEB6337DB3688B268AC1CF.d02t04
[19] http://onlinelibrary.wiley.com/doi/10.1111/j.1757-1707.2012.01169.x/abstract
[20] www.southernenvironment.org/uploads/fck/file/biomass/biomass-carbon-study-021412-FINAL.pdf
[21] www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues

explosions of combustible vapour clouds after spillage of flammable liquids, dust explosions from small biomass particles and explosions of a combination of flammable gas and dust. Fires can be caused by explosions, by spontaneous self-combustion of stored biomass, by sparks from hot work, allowable temperatures being exceeded, sparks from hot work, removal of hot ashes, errors in ignition timing, failure of the anti-backfiring system or spillage of flammable liquids. Toxic gas escapes could happen as a result of leakages and excessive pressure, particularly during plant shut-down.

Dust explosions and self-ignition of biomass are health and safety risks of biomass power stations in general, with a growing number of serious fires and explosions having been reported in recent years, for example at Tilbury B in February this year, a major explosion at the Dutch Gelderland Power Station (co-firing wood pellets with coal, with the explosion linked to wood pellets) and fires at two large coal plus biomass power stations in Copenhagen, both attributed to wood pellets. However, the other explosions risks and those of toxic gas escapes listed in the above Guidelines apply specifically to gasification and not to standard combustion technologies. Worryingly, visitors to the Dargavel Energy from Waste gasifier were told that a significant number of the emission limit breaches at that have plant happened because pressure had built up and the only way of preventing an explosion was to disengage the stack filters and vent exhaust gases directly into the air.[22]

3) Air pollution:

The Air Quality Assessment submitted by the developer claims: "*The Energy Park at Sutton Bridge has been designed in line with the requirements of Best Available Techniques which will ensure that local residents are not exposed to unacceptable levels of pollutants associated with emissions from the five biomass gasification units*". Unlike for ordinary biomass combustion plants, there appears to be no consensus what constitutes Best Available Techniques for biomass gasifiers in terms of emissions control. As referred to above, European Commission's current Reference Document for Best Available Techniques for Large Combustion Plants describes biomass gasification as a technology at the pilot and demonstration stages only and points to the limited experience with it. It also highlights potential technical problems: "*The reducing atmosphere inside the gasifier further decreases the softening temperature of ash. This limits the gasification temperature from above. From below, the gasification temperature is limited because of incomplete gasification, i.e. the increase in tar compounds in the product gas. Tar is harmful to scrubbers when it condenses there. Tar can generate coke in the filters if high temperature dust removal is adopted.*" The Environment Agency's own BAT documents similarly do not appear to include any clear standards for biomass gasification and indeed make little reference to it. We would therefore question the claim that the plant could have been designed in line with BAT requirements, when there is a lack of clarity and knowledge about what those are. We further note that the information given by the developers about the technologies they intend to use is very sparse – not even the type of gasifiers is specified and the vital questions as to how they would clean the syngas and minimise and remove tar have not been addressed.

As discussed above, the Environmental Statement is based on the assumption that the gasification plant would run continuously and smoothly, yet experience with existing biomass and waste gasifiers in Europe shows that this cannot be expected and that technical problems are currently the norm. Furthermore, the experience with the Dargavel gasifier in Scotland suggests that emissions breaches – i.e. the inactivation of flue gas treatment – may be impossible to avoid if pressure builds up, i.e. a de-facto 'mitigation' strategy for health and safety risks.

[22] http://www.gainscotland.org.uk/news_110309_dumfries.shtml

According to data by the US Environmental Protection Agency, a biomass power station burning clean virgin wood only emits 79 different pollutants, including NOx, PM2.5, PM10, dioxins and furans, heavy metals and Volatile Organic Compounds[23]. There is evidence that biomass combustion commonly results in higher levels of PM2.5 and VOC emissions and similar levels of NOx and PM10 ones as coal combustion. We have found no evidence anywhere that biomass gasifiers can currently achieve lower air emissions than biomass combustion plants, even without incidents of malfunctioning.

Employment claims:

According to the planning documents, 85 full-time jobs could be created directly as well as over 150 additional indirect jobs such as drivers security and ground staff.
Since no biomass gasifier of this size exists anywhere in the UK, and possibly worldwide, we cannot there are no existing employment figures to compare those claims with. Job figures cited by companies seeking to build biomass combustion plants are commonly far lower than those cited by Energy Park Sutton Bridge Ltd. Given that gasification is not a proven 'off the shelf' technology but an incipient one beset with significant technical problems, a gasification plant would require additional staff with expertise in technical maintenance. Those, however, would require very specialist technical knowledge and technical support might well have to be recruited from outside the area (e.g. from the company which is to supply the gasifier). We note that a different company proposing an even larger (50MW) waste gasifier near Billingham speaks of a total of 'more than 50 permanent jobs' being created[24] – far less than the total of 235 suggested by Energy Park Sutton Bridge.

Please can you confirm that this objection has been received and will be recorded. Many thanks.

Best regards,

Almuth Ernsting
Co-Director, Biofuelwatch

[23] http://planethazard.com/phmapenv.aspx?mode=topten&area=state&state=VT
[24] http://www.theengineer.co.uk/sectors/energy-nd-environment/news/worlds-largest-gasification-efw-plant-set-to-be-built-in-uk/1013449.article