

Electricity Market Reform Consultation - December 2010

**A Joint Response From:-
Orchid Environmental Ltd
Hargreaves Services plc**

Introduction

This is a joint submission to the Department for Energy and Climate Change's consultation into the Electricity Market Reform Consultation.

Orchid Environmental Limited has made substantial investments to construct a waste processing facility to process Municipal, Commercial and Selected Trade Waste. One of the fuels recovered is called Orchid Low Carbon Fuel for use in energy applications. This fuel has also been specifically developed so it can be used as a feedstock for conversion into liquid bio-fuel which will be very suitable for a wide range of energy applications. The immediate focus is to convert the solid Orchid Low Carbon Fuel to a liquid bio-fuel to produce power, but the longer term goal is to upgrade the fuel for use in road transportation.

The Hargreaves Services Group is investing in the UK Renewable Power and Heat sector, via its Rocpower subsidiary and the aim is to develop a number of renewable power and small CHP plants, with the long term strategic aim of operating these plants on initially residue and waste derived liquid bio-fuels and as the production facilities are developed to utilize liquid fuels that have been processed from the solid biomass fraction of Municipal Waste.

Each of the above Companies has made substantial investment in the renewable energy sector and will face considerable market uncertainty should liquid bio-fuels produced from residues and wastes be excluded from the guaranteed support offered to other dedicated biomass solutions.

Executive Summary

The Electricity Market Reform Consultation outlines in the Executive Summary the significant challenges which face the UK Electricity Market, with a decarbonisation benchmark of 100gCO₂/kWh to be achieved by 2030.

DECC's Annual Energy Statement (July 2010) outlines increasing global demand and production costs for fossil fuels, whilst the UK's own resources are falling. The UK is increasingly vulnerable to volatile fossil fuel prices. We have therefore twin goals of increasing energy security whilst still reducing carbon emissions.

Many recent reports have identified low carbon heating, particularly in the form of bio-energy based CHP, as a way to achieve a rapid uptake in renewable heat and reduce pressure on fossil fuel imports. The Government's National Renewable Energy Action Plan proposes a 12 fold increase from 1% to 12% by 2020.

The UK also needs to reduce GHG emissions in transportation. This could be effected through increased use of low-carbon electricity in transport, however there are already stretching targets for renewing the UK generation fleet and increasingly first generation bio-fuels have received poor press due to concerns over sustainability and the food-for-fuel debate.

The use of waste to provide power, CHP solutions and transportation fuels would help achieve DECC's goals and do so without adding to concerns over sustainability issues. The Hargreaves Group and Orchid Environmental efforts to evolve the use of municipal waste derived liquid bio-fuels for power and CHP applications and eventually for the production of transportation fuels, are therefore strongly aligned with DECC's goals and needs.

We envisage future facilities will be mainly small CHP plants which will maximize the thermal efficiency of the conversion process. But also due to the large volumes that will eventually be produced, it is likely that the existing UK large power sector will also utilize this type of liquid bio-fuel. These heat and power related uses will continue until the technical hurdles are resolved and sufficient scale is achieved to develop the process plants that will enable the production of advanced automotive grade bio-fuels to a quality and standard that can be guaranteed.

It is crucial that this incremental strategy is used as it will allow private industry to prove the technology and reduce financial risk. The UK Govt therefore should ensure policies support incremental strategies if it wishes to see solid waste biomass to advanced liquid bio-fuel developments in the UK. These developments will require private finance, banks and investors who are very risk averse. An incremental strategy will establish confidence with the financial community and therefore facilitate private finance in the expansion of solid waste to bio-liquid technologies to either:-

- Expand heat, power and CHP applications and/or
- Form the foundations of waste-to-advanced liquid bio-fuels in support of the UK's targets for bio-fuels use and GHG reductions in the transportation sector.

Supporting the development of an indigenous advanced bio-fuel industry that would also allow the UK to double count these fuels towards volume targets (per the RED) and also gain the benefit of the higher GHG savings these fuels have to offer.

Grandfathering – Liquid Bio-Fuels from Residues and Wastes

1. The Key argument that is presented in this response is that it is crucial the recent decision to Grandfather Dedicated Biomass is also applied to SOME (but not all) liquid bio-fuels in exactly the same manner.
2. It is also recognized that the use of virgin vegetable oils for the production of electricity is a primary concern for DECC due to the associated sustainability issues. We support the aim of excluding virgin oils such as palm; soya and rapeseed oils from power generation.

3. The arguments that explain the separation of all liquid bio-fuels from dedicated biomass is however a serious mistake and the reasoning is fully outlined below.

Liquids Bio-fuels

1. The argument which has previously been used by DECC that *"There is a question as to whether building liquid electricity plant and putting bio-liquids into electricity is the best way of helping us to achieve our renewable energy target, where they may well have greater value in helping achieve our transport target and in decarbonising heat"*. This argument has previously been used to support its view that liquid bio-fuels should not be used in power production, as it believes that liquid bio-fuels should ideally be used in the transport sector. This may be valid for some first generation bio-liquid fuels like palm oil etc, but there are some residues and waste derived bio-liquids for which it is certainly invalid.

For example, the conversion of solid fuels recovered from municipal waste into road transport fuel is a multi stage process. Some of the process stages that lead to the production of road transport fuels are still unproven and can lead to the production of a bio-liquid that does not meet a road transportation fuel specification. This multi stage process technology is unlikely to be developed, or even implemented, in the UK, unless a commercial route for out of specification road transportation fuel can be developed.

We feel it would be in the UK Government's interests to support the market in its efforts to meet both immediate needs and move towards the longer term objectives with appropriate legislative mechanisms. The UK strategy should therefore support the commercial development of liquid bio-fuels from residues and wastes for power production in order to encourage the more difficult and financially risky development of road transport fuels.

2. The *UK Renewable Energy Strategy* and *Low Carbon Transition Plan* both recognise that low grade liquid bio-fuels in electricity generation and CHP not only promotes the continuing development of the growing UK liquid bio-fuels industry, but safeguards investment and ongoing research into other clean energy projects. A DECC decision to exclude all liquid bio-fuels from grandfathering is, therefore, inconsistent and counter to this particular strategy. In fact this policy would frustrate DECC's and the DfT's expectation that Advanced Biofuels will help deliver GHG savings in transportation by preventing the interim use of liquid bio-fuel in power generation.
3. The argument is also widely used that vegetable oils are environmentally unacceptable because they encourage or promote de-forestation etc. That may be valid for some 'first generation' vegetable oils – but this argument does not apply to residue and waste-derived liquid bio-fuels. Both EU and UK legislation already recognizes that the sustainability requirements for bio-liquids from wastes and residues are different to the requirements for bio-liquids produced from other feed

stocks. The use of municipal and commercial/industrial waste as a fuel or feedstock is not only free of sustainability concerns but actually brings significant environmental advantages in terms of reducing landfill, greenhouse gas emissions and reducing fossil fuel use.

4. The Draft Sustainability Criteria (OFGEM 10th February 2011) goes into considerable detail to outline the arguments that exempt residues and waste derived bio-liquids from the Land Cover Criteria. Also under Article 3(1), schedule A2 of the Renewables Obligation Order 2011, bio-liquids meet the land criteria if they were made from biomaterial that was produced from a waste or residue. Additionally materials that are wastes or residues are also able to claim zero emissions at the point of collection, for the purposes of calculating GHG emissions.
5. If the ROO excludes bio-fuels or creates an additional category which is separate from dedicated biomass it will create unnecessary complexity and also will distort the market. Therefore the emphasis should be to let the Sustainability Legislation or other Legislation become the primary legislative method for dealing with this complex issue.
6. It is crucial that Liquid Bio-fuels remain banded at the same level as Dedicated Biomass as this will ensure that any high biomass by calorific value fuels that are recovered from Municipal Waste will be processed to the highest standards. If the same banding is maintained for solid and liquid bio-fuels that are recovered from Municipal Waste, this will encourage processors to upgrade the waste biomass feedstock to the best quality, keeping their focus on the waste recycling and recovery hierarchy and reducing environmental impact through decontamination of fuel feedstock. Otherwise it is likely there would be a glut of poor quality RDF flooding the market.
7. Orchid Environmental and The Hargreaves Group foresee that fuels recovered from municipal, commercial and selected trade wastes, when converted into a liquid bio-fuel, have a far wider application for both small and large power generation and also for small distributed CHP. This type of bio-fuel will have few barriers when used as a fuel source for power generation. But the next stage, where the fuel is further refined into an automotive fuel will only occur if the initial stage is allowed to develop supplying the power sector, because a route to market is required for out of specification road transportation fuel. It is crucial to understand that when the development of road transport grade fuel occurs, it will still be important to ensure the power sector is available to take off-spec and residual oils. The logic and impact of these arguments is also explored elsewhere in this submission.
8. An additional benefit to ensuring that the correct driver is in place to encourage the recovery of fuels from Municipal, Commercial and selected Trade Waste is that it will serve to reduce demand for primary vegetable oil products. The unintended (and therefore perverse) impact of reducing or eliminating support for these potential key liquid bio-fuels in power generation will be to create additional demand for primary vegetable oil products, as it will remove municipal waste derived liquid bio-fuels

from the market. In this context it must be remembered that the opportunity for making waste derived liquid bio-fuels is huge in tonnage terms (many millions), and such a prospect should not be cut off unintentionally.

9. It is recognized and also accepted that the most significant and largest developing UK renewable fuel source is the recovered biomass component from Municipal, Commercial and selected Trade Waste. Currently most operators are focusing on how to use RDF/SRF as a solid fuel. Most schemes are difficult to implement because the current ROO rules require the use of a +90% biomass content for straight energy conversion and any schemes that require >50% biomass need to be CHP schemes. CHP schemes are inherently difficult to achieve for a solid fuel as the economic size is invariably too large for most available sites. Conversely, the 2020 target for road transportation fuel is 10% bio-energy content, in principal this target is much easier to achieve with fuels recovered from municipal, commercial and selected trade waste.
10. Some sectors of the waste industry have recognized the above complexity and are currently evaluating and looking into converting the biomass component of Municipal Waste into a liquid bio-fuel. RDF/SRF converted into a liquid bio-fuel would most likely have a strong case for losing its waste status after the intensive conversion process, becoming an ideal Fuel Oil substitute. It could then be used for both large and small scale bio-fuel electricity generation. It would be particularly suitable for use in small CHP schemes, i.e. 0.5MWe + 1.5MWth, which are small enough to have a wide spread of application.
11. The above conversion processes are currently being intensively developed worldwide. The ROO, RHI and Landfill legislation are very important fiscal drivers that will kick-start the UK to develop and widely implement this type of second generation bio-fuel technology and enable the UK to become competitive in these future technologies. Other key competitive countries that are providing heavy internal support in this regard, via an array of mechanisms, include the USA (e.g. USDA has recently announced \$11m for lab-scale upgrading of bio-oils to transport fuels), Canada (e.g. Dynamotive/IFP and Ensyn/UOP development investments), China (e.g. 10 plants for pyrolysis of 900,000tes biomass to Bio-liquid fuel), Norway (government investment in BERG – some being spent in a UK University!) and there are many other examples. UK policy must not actively discourage, in effect, the nation's ability to compete in this globally important sector.
12. A thriving liquid bio-fuel industry based upon liquid bio-fuels and other bio-oils made from second generation feed-stocks, especially from the biogenic fraction of municipal, commercial and selected trade wastes would be a pre-requisite to the pursuit of other DECC-supported strategic objectives. One example would be as intermediates in the production of sustainable feed-stocks for the petrochemicals industry (i.e. to make plastics from non-fossil oils). Another would be as sustainable feedstock into fuel cells. Thus, removing these bio-fuels from the list of supported materials would, again, appear to threaten DECC's broader strategy.

13. The most practical low carbon energy solution for the public and private sector is the utilization of small CHP projects fuelled by bio-liquids. Under the current DECC proposals it will become commercially unviable for producers to maintain or develop successful small-scale CHP projects using liquid bio-fuel as fuel if they are not given the same support offered to other biomass energy solutions under the Renewables Obligation.
14. Liquid bio-fuels are also very important fuels in off-grid systems such as remote rural areas, where electricity connection is not viable, so conversion of fuels recovered from municipal waste to liquid bio-fuel is important here too. Furthermore there are concerns that current renewable power generation, mostly wind, cannot be despatched and there is therefore a need for despatchable renewable energy.
15. It is therefore important that changes to the ROO legislation, the introduction of the RHI and the EMR Consultation fully recognize the above opportunities and developments. And these should not inadvertently introduce legislation or changes that could either prevent or restrict the use of liquid fuels derived from the biomass content of Municipal, Commercial and selected Trade Waste, being used for electricity generation, or for use in small CHP schemes. It is important that flexibility should be built into ROO/RHI/RTFO to allow sustainable liquid bio-fuels to be supported/developed/used in many sectors and it should be a commercial decision as to where bio-fuels are used and not a decision governed by DECC.
16. The Hargreaves Group and Orchid Environmental Limited are evolving the use of municipal waste derived liquid bio-fuel for power and CHP applications. We envisage future facilities will be mainly small CHP plants which will maximize the thermal efficiency of the conversion process. But also due to the large volumes that will eventually be produced, it is likely that the existing UK large power sector will also utilize this type of liquid bio-fuel until the technical hurdles are resolved and sufficient scale is achieved to enable the production of higher quality automotive grade road transport fuels.
17. The uncertainty introduced by changes in current legislation acts as a barrier to investment. What is currently needed is support and stability and DECC must be encouraged to ensure that any changes to the ROO Legislation do not inadvertently create barriers or stop the UK development of liquid bio-fuels from the biomass component of Municipal, Commercial and selected Trade Waste.

If Waste-derived liquid bio-fuels were dealt with differently from Solid Biomass it will most likely stop any further UK development of the solid to bio-liquid conversion technologies. This would seem to run counter to delivering UK policies/strategies such as GHG reductions, the production of advanced bio-fuels and development of exportable solutions.

Specific Questions in Electricity Market Reform Consultation

1. Question 36: Accreditation options
 - a. All new electricity schemes should accredit under the ROO until 2017, as this will provide market certainty and allow developers time to become accustomed to the FIT scheme.
2. Question 37: Technologies not currently grandfathered
 - a. Due to the current Regulatory uncertainty the amount of liquid bio-fuel schemes that have been constructed is very small. It is also very unlikely that this will increase unless grandfathering is granted.
 - b. It is very unlikely that the municipal waste to road transport fuel supply chain will develop without grandfathering support for bio-fuel residues and wastes.
3. Question 38: Options for the calculation of the Obligation post 2017
 - a. Fix the price of the ROC for existing and new generation.

In conclusion

We believe the approach we are developing is closely aligned with DECC's own objectives and it is important that bio-liquids produced from residues and wastes should receive ongoing grandfathered support under both the existing ROO and developing FIT mechanisms. In addition we must stress that it is crucial that the forthcoming banding review grants the same support levels for solid and liquid biomass.
