



## **Consultation on proposals for the levels of banded support under the Renewables Obligation for the period 2013-17 and the Renewables Obligation Order 2012**

### **Waste2Tricity's Responses**

The stated objective of the Banding change, set out in Section 12.1, to encourage the use of more complex innovative technologies, rather than simply use Rankin steam cycle, is entirely understood and supported. We are concerned however that the proposal within 12.20 to limit the advanced ACT band to electricity generated by an internal combustion engine appears to be drawn so tightly as to exclude innovative technologies other than those based on combustion. This will have the unintended consequence of limiting improvements in efficiency for ACT.

For example, a number of companies within the sector, including W2T Ltd are currently proposing low cost fuel cells combined with ACT. In our case these are developed by AFC Energy PLC [and for further information on this particular technology see <http://www.afcenergy.com/>]. This proven technology is being engineered within the UK, to offer generation costs directly comparable to internal combustion engines, but at an electrical efficiency of around 60%. Field trials are currently underway in Germany, with commercial scale, multi-megawatt, production fully commissioned by 2014.

We would suggest that if Government wishes to differentially support the more efficient energy recovery technologies, then a more fundamental thermodynamic parameter is used. Although not strictly correct in the engineering sense, there is already embedded within UK legislation an efficiency factor (ref. the revised Waste Framework Directive). Whilst this so called R1 Formula is used to differentiate between disposal and recovery within municipal waste incineration schemes, applying it to differentiate between an efficient and less efficient ACT technology would be easy, consistent with some existing legislation/regulation, and be independent of the technology used for the energy conversion. This would then avoid placing limitations on the use of specific technologies (which Government should avoid at all costs).

A further issue is 12.21, the suggestion that whilst electricity generated from waste heat from internal combustion engines will qualify for 2 ROCs no such concession is being offered for the use of the surplus syngas in a plant using ACT – the nature of gasification of a variable feedstock means syngas volume will vary. Internal combustion engines however require a steady supply of fuel for efficient running. Sound engineering practice is satisfied, and best energy output only gained, by the generating capacity of the internal combustion engines being specified at a level where fuel can be constantly supplied and the varying additional syngas utilised by a technology capable of responding to changes – such as steam raising. Early projects utilising fuel cells will require a similar mechanism for stabilising fuel flow until sufficient experience of the effects of cycling on cell life can be gained.

In summary, Government must be very careful in writing these regulations that they do not cut off and prevent the development of an even better technology than the one they have in mind – especially when that technology is being developed within the UK and has significant export potential.

This fuel cell technology, when combined with an ACT and using standard industrial methods to convert syngas to hydrogen offers four benefits in line with the scope of the consultation.

- 1 Meeting of air emission standards; by eliminating combustion the use of fuel cells eliminates the need for discharge to atmosphere of exhaust gasses.
- 2 Carbon capture is inherent in the process of converting the CO fraction of the syngas to hydrogen to feed the cells - the water gas shift reacts H<sub>2</sub>O and CO, releasing H<sub>2</sub> and CO<sub>2</sub> within the plant. This makes fuel cells a carbon storage ready technology.
- 3 Alkaline fuel cells are a modular technology based on an 10kW module, this makes them equally efficient and suitable for local distributed energy as for multi Mega Watt regional projects.
- 4 At around 60% the level of electrical efficiency exceeds any other single technology and at least equals any combined technology and so maximises the electricity to grid from a given volume of feedstock. The process also generates low grade heat, industrial grade pure water and oxygen depleted air – all potentially useful, depending on the specific site.

## **Recommendation**

W2T would suggest that the objective of encouraging the development and use of innovative generating technologies would be better met by redefining the Advanced Band in such a way as to include innovative and efficient non combustion generating technologies by using basic engineering parameters and not specific technologies – e.g. *includes electricity generated by an internal combustion engine or non combustion conversion technology offering at least equivalent electrical efficiency as an internal combustion engine of similar scale [an Advanced Generating Technology]*

Secondly, that 12.21 recognises the practicalities of running an ACT e.g. *In addition we propose that the advanced ACT band would cover all electricity generated by plants principally using an Advance Conversion Technology; for example using the waste heat captured from an internal combustion engine or syngas surplus to the steady state requirements of the Advanced Conversion Technology.*