Renewable Electricity Financial Incentive Consultation
Fuel Cells UK Response

1. Introduction

This paper represents the response from Fuel Cells UK to the Government's Renewable Electricity Financial Incentives Consultation, Section 3 Feed-in Tariffs (FITs). Fuel Cells UK is the UK trade association for the fuel cell sector and represents leading UK fuel cell companies as well as organisations from the academic community and other stakeholders with an interest in fuel cell technology and the associated elements of the supply chain.

This response has been produced through consultation with our members and presents the Association's responses to those questions in the consultation of most relevance to our members. Our response is therefore limited to Section 3 Feed-in Tariffs and Section 4 and focused on the aspects of policy with implications for fuel cell electricity only generation up to 5MW, fuel cell CHP up to $5MW_e$ and gas-fired microCHP up to $50kW_e$, as stated in the Energy Act 2008.

Before proceeding to answer the specific questions, it is important to distinguish between the two terms used throughout this response: 'fuel cell' and 'fuel cell microCHP'. Fuel Cells UK defines these as:

Fuel Cell MicroCHP – for installations with the energy output of up to 50kW (standard output of current prototypes does not typically exceed 5kW). These products are not yet available commercially but are expected to enter the market in the next couple of years.

Fuel Cell (CHP and electricity only) – for installations of fuel cell CHP and electricity only systems up to $5MW_e$. Scales ranging from 250 to 400kW provide sufficient output to power hospitals, offices blocks etc., and have been widely deployed across the world. These products are commercially available and there are multiple examples of working installations (for example, at the Transport for London Palestra Building in Southwark). Deployment of these larger systems would accelerate progress down the cost curve for larger as well as for microCHP fuel cells since there are broad similarities at the component and technology level. In addition, deployment of a relatively modest number of larger CHP fuel cells would have a significant impact on carbon emissions.

Fuel Cells UK supports the Industry statement on key design principles put forward in collaboration with the MicroPower Council, Combined Heat and Power Association and the Heating and Hot Water Industry Council.

A list of our members is shown in Annex A. Current developments within the fuel cells sector and the benefits of fuel cell technology are described in Annex B.

2. Fuel Cells UK's response to selected questions

2.1 Section 3 Feed-in Tariffs

Q35. Do you agree that FITs should be structured in order to recognise all generation, rather than just exports?

Fuel Cells UK agrees with the statement that in order for the mechanism to be successful, the entire generated capacity should be eligible for reward under generation tariff.

Q36. Do you agree that the best way of delivering security for the investor is to set a long-term guaranteed price for exports?

Fuel Cells UK supports the statement that generators should be given a one-off opportunity at the time of joining the scheme to competitively participate in the electricity market or to choose a fixed price for the electricity exports. We believe that this will be particularly beneficial for domestic generators.

Fuel Cells UK believes that electricity suppliers should remain neutral to the costs and benefits arising from the introduction of FITs. Otherwise the supplier-generator relationship would be subject to manipulation and there could be negative impacts on competition.

We also consider that all tariff levels and export price for electricity should be adjusted for inflation, by the use of Retail Price Index (RPI). This should be consistent across all technologies.

Q37. Do you agree that FITs generators should also benefit from on-site use of their generation?

Yes. Use of the generated electricity on-site will enable the full benefits of distributed generation to be realised. It will also help to deliver an overall increase in energy efficiency (associated with the minimisation of transmission and distribution losses).

We believe that FITs should, in addition, favour the technologies that secure local supply in the first instance. To illustrate our point, a wind turbine can produce electricity during an off-peak period, when there is no local demand and when the market price for electricity on the grid is low. On the other hand, fuel cell systems are designed to operate to meet demand and deliver electricity and heat to customers when required.

It is worth noting that provision of an incentive to use electricity on site could also lead to increased collaboration between different technologies providers to more effectively meet customers' needs and policy objectives. Fuel cells can work as a buffer for renewable technologies that generate intermittent electricity. Renewable electricity can be converted via electrolysis to produce hydrogen, which can then be used in a fuel cell during the peak demand. Combining electrolysers and fuel cells systems with renewable installations will minimise the effects that erratic generation can have on the grid and maximise efficiency. FITs should support such investments, with payment arising at the point at which the electricity reaches the consumer. This would align with the recommendation above that FITs give priority to technologies which favour local supply.

Q39. Do you agree with the proposed limits of 5MW for renewable technologies and 50kW for gas fired CHP for FITs installations?

Fuel Cells UK does not support the proposed restriction of the 5MW limit to renewable technologies, which is inconsistent with the Energy Act 2008. The Act includes fuel cells in the list of technologies that are eligible for FIT support. We would like to see the limit for fuel cell installations (whether fuelled by fossil or by renewable fuels) set at 5MW to encompass the larger systems which are commercially available today. This would allow larger scale decentralised low carbon generation to benefit from the scheme, contributing to carbon reduction objectives and accelerating progress in reducing the costs of fuel cell installations.

Fuel cell microCHP will, in addition, fall under the category of natural gas-fired CHP under 50kW.

Q42. Do you agree with the selection of technologies for which we will be providing tariffs from April 2010?

Fuel Cells UK believes that fuel cells should be included in the FIT system from April 2010. Fuel cells are an eligible technology specified in the Energy Act 2008 and are commercially available today. To give one example, several hundred fuel cell systems in the range 200-500kW$_e$ have

been installed to date worldwide, accumulating several million operating hours of experience. The lack of support in the UK has limited installations here to date.

Fuel cell CHP systems, both large and small, have been shown to offer significant improvements in terms of energy efficiency when compared to current technologies. Wider deployment of fuel cells in the UK from 2010 is feasible and will ensure that associated carbon emission reduction (see Annex B) is achieved as early as possible.

Furthermore, as well as delivering carbon reductions, improving the efficiency of the energy system will, in effect, make it easier for the UK to realise its EU renewable energy targets, since the same amount of renewable energy will make up a larger proportion of the UK's energy consumption.

Fuel Cells UK strongly advocates that fossil fuelled (as well as biogas and anaerobic digester gas fuelled) fuel cell CHP installations up to the limit set in the Energy Act 2008 (i.e. 5MW) are included in the FIT from April 2010. This would allow the UK to use all available approaches to achieving the Government's carbon reduction budgets and the long term target of 80% carbon emissions reductions by 2050, and would be alongside the development of strong renewable energy capacity to meet the 2020 renewables target.

Q46. Do you agree with our approach not to offer up-front capitalisation to schemes as part of the FITs? If not, what alternative approach do you propose and why?

Fuel Cells UK agrees with the proposed approach.

Q48. Do you agree with the proposed model for registration and accreditation of plant claiming FITs discussed in the Accreditation, Registration and Connection section?

Fuel Cells UK agrees in principle with the registration and accreditation of plant claiming feed-in tariff. We support the use of appropriate certification to ensure that only professional, efficient technologies are installed and supported by the feed-in tariff.

The model proposed will, however, not be initially available to certain devices such as fuel cell microCHP and other CHP devices. We recommend that the Microgeneration Certification Scheme for microCHP technologies is developed based on existing standards such as Gas Safe, relevant CE marking requirements and Energy Using Product Directive (2005/32/EC).

In the interim (before dedicated certification is developed specifically for fuel cells), participation in the FITs scheme should be allowed on the basis of installation which complies with standard Gas Safe and international codes and standards currently available. This will ensure that fuel cells microCHP installations are eligible for FITs from April 2010.

We recognise the need for further dialogue between the fuel cell industry, DECC and MCS to develop adequate certification for fuel cell CHP.

Q49. Do you agree with the principle that all generation should be metered to qualify for FITs? Do you foresee any issues with that approach?

We support the position of members of Micropower Council, Combined Heat and Power Association and Heating and Hot Water Industry Council that the reward for generation must be calculated on an individual site basis using a generation meter, and that mechanisms for settlement of export reward should be introduced alongside SMART meters or, at the discretion of the generator, through installation of an export meter. In cases where the exported electricity is of relatively little value, the costs of a meter and its installation may exceed the potential gains from receiving export tariff payments. Once the smart meters are widely installed, this could be reviewed.

Q50. What are your views on regulating which suppliers should be required to offer FITs, and in what circumstances?

To simplify the design of the policy we would like to see the same suppliers purchasing the exports and providing FITs payments.

Q51. Do you agree with the tariff levels, lifetimes and degression rates we have set out for the chosen technologies? If not, what evidence do you have for choosing alternatives?

Tariff Levels

Fuel Cells UK does not agree with suggested tariffs. The proposed levels favour technologies with low efficiencies and high capital cost. We strongly believe that the core principle behind the introduction of a feed-in tariff should be to stimulate investment and innovation in developing low cost, energy efficient technologies and assist with bringing them to market. The current proposals do not align with this.

With respect to microCHP, we support the position of the Micropower Council, Combined Heat and Power Association and the Heating and Hot Water Industry Council that tariff levels for all types of microCHP installations should be set at minimum 15p/kWh at the start of the scheme.

We believe that the value of CO_2 savings may be an appropriate basis for determining tariffs for all technologies in the long term. Whilst rate of return is a dominant consideration for investments by utilities (e.g. in wind farms and other renewables), it is not the driver for many CHP customers (non-utility organisations and individuals). The timescale of changing to carbon emissions reduction methodology for fuel cell CHP would depend on how the market for this technology will develop and future FIT reviews.

Fuel Cells UK suggests that the tariff levels for microCHP should be banded by broad technology size, with the lowest size of the installation, being a domestic user, receiving the highest payments.

Fuel Cells UK suggests that the tariff levels for larger fuel cell CHP installations should be set such that they provide the same level of support per ton of carbon removed as is the case with renewable technologies at the same level of development.

Lifetimes

We agree with the 20 years lifetime of the policy. This approach will help to ensure certainty for investors, consumers and shareholders.

Degression rates

We believe that FITs are most effective when they are introduced at a relatively high level initially and reduced progressively over time as experience and scale effects deliver economies. Annual reductions in tariff levels encourage innovation and cost cutting in the energy sector.

International experience shows that more aggressive degression rates can be applied once the industry infrastructure is in place and the scheme has been successfully operating for sufficient period of time. For example, in Germany, degression rates initially ranging between 1 and 6.5% annually (depending on the technology) were introduced into the policy 9 years after its initial implementation.

Feed-in tariff structures should recognise the state of development of a particular technology (and its potential for future carbon reductions rather than those delivered today) and different levels of support be provided accordingly.

Degression rates, as well as the tariffs, should be Retail Price Indexed to protect the value of payments from varying with inflation.

In the light of fuel cell microCHP's earlier stage of development, degression rates for such installations should be set at zero percent until the first review in 2013.

Q52. Do you agree with our proposed guaranteed minimum price for the exported electricity? If not, what price would you propose and what is your proposal based on?

Fuel Cells UK agrees with the proposed 5p/kWh minimum price for exported electricity.

Q54. Do you have any initial views on the relationship between FITs and those in fuel poverty or on low incomes?

The priority should be to keep the system as simple as possible, with minimal regulatory burden. Differentiating between economic social groups, such as those in fuel poverty, is likely to add complication to the system and detract from its ability to deliver cost effective energy solutions. Fuel Cells UK supports the view that fuel poverty should be addressed by other governmental policies and kept outside the design of the FITs scheme.

3. Other Issues

This section outlines the issues that have not been addresses by the Government in the Consultation document but are of high relevance to the fuel cells industry.

In its consultation, the Government highlighted that the differences between natural gas fired low carbon devices and renewable energy generation technologies prohibit the use of a common methodology. Whilst we agree that methodologies may need to be different we believe that they should be normalised such that a tonne of CO_2 saved through operation of the low carbon technologies specified in the Energy Act 2008 is valued at the same level as a tonne of CO_2 from a wholly renewable technology at a similar stage of development. Larger scale fuel cell CHP that is at an early stage of commercial deployment also requires fiscal support and should be rewarded under the FIT scheme.

Benefiting from wider deployment of fuel cell CHP

Fuel cell microCHP has not entered the commercial market in volume yet, and costs remain a challenge. However, once the products enter the market, costs are expected to fall dramatically. This is in contrast to some of the renewable technologies, where costs remain high and the scope for further cost reduction is small.

Larger scale fuel cell CHP is much closer to market with some systems commercially available today at low quantities. At the component level, cost reductions that are achieved as a result of scale and experience effects in these applications are directly applicable to the corresponding microCHP technology. Deployment support for larger scale CHP would markedly accelerate the uptake of systems and, in so doing, accelerate the introduction of microCHP as well as delivering significant carbon reductions in the short term. Based on 5.6 million homes having microCHP installed by 2020, the CO_2 saved would be equivalent to the emissions from eight new 750MW Combined Cycle Gas Turbine power stations. Also, constantly operating 6,000 CHP units rated at 400kWe (sufficient to power a supermarket or

school) would be able to provide similar CO_2 reductions to the proposed Cardiff- Weston installation of Severn Barrage[1] at more than 3 times lower cost[2].

It is important that this key feature of fuel cell CHP and its potential to deliver policy objectives as it becomes mainstream, is reflected in the support it receives, including eligibility for FITs.

[1] Calculation compares the total power output from a 400kWe rated CHP fuel cell unit, operating at 80% efficiency, with 40% electrical efficiency, assuming a 40% efficiency saving over fossil fuel grid power. Cardiff- Weston crossing of the Severn Barrage is estimated at 17TWh, as determined by Parsons and Brinckerhoff and DECC, see http://www.pbworld.co.uk/index.php?doc=627

[2] Assumes installed cost of single 400 kWe fuel cell CHP unit at $1 million (currency exchange rate adopted at 1$ = 0.62676 GBP, as on 09.10.2009 www.xe.com) and Severn Barrage costs at £15 billion.

Annex A

Our members include:

Acal Energy
Alstom
Bac 2
Linde Group / BOC
Calor Gas
Cenex
Ceramic Fuel Cells
Ceres Power
City University
Diverse Energy
Flexitallic
The Centre for Process Innovation
Intelligent Energy
Johnson Matthey
LOGAN Energy
QinetiQ
Rolls-Royce Fuel Cells Systems
UCM Group
University of Birmingham
Valeswood

Annex B

Current Development within Fuel Cells Technology

The information below highlights the benefits of deployment fuel cells in micro- CHP applications and shows how fuel cells can contribute to economic growth, energy security and carbon reduction objectives. The data illustrate how experience to date can, with the incentives, be converted into tangible benefits for the UK in the future.

B1. Fuel cells' contribution to economic growth

Creation of new "green collar" jobs
Recent reports indicate that the fuel cell sector is expanding rapidly, with a 22% gain in fuel cell specific employment in 2006, building on a 12% increase in 2005[3].

Growth of intellectual property within the UK
Strong research and development activity means that the UK is the second most successful country in the EU (behind Germany) at securing new fuel cell related patents. There are fears however that with the lack of significant financial and political support supplied by the UK Government to fuel cells industry, the IP will be transferred overseas where the policies are more favourable for fuel cells developers.

Improved competitiveness on the emerging energy markets globally
The UK represents one of the strongest global markets for fuel cell investment. In 2008, there were 10 times as many companies listed on the AIM market as on the NASDAQ. These developments ensure that the UK is able to compete globally and continue attracting investors and creating wealth.

B2. Energy and climate change benefits of fuel cells in stationary applications

Several medium scale (200-1000kWe) fuel cell technologies are coming to the market, offering the potential to deliver clean, quiet heat and power at efficiencies (electricity and heat) in the 80-90% range, whilst high efficiency power only generation fuel cell systems provide equally impressive benefits (this compares with an efficiency of 35% for conventional power generation). Whilst individual solutions are at different stages of development, costs are already starting to become competitive with central generation for some, and are forecast to drop significantly with even modest increases in volume.

The adoption of fuel cell microgeneration technologies would allow a step change in the carbon footprint of the existing residential sector. A recent study by Element Energy concluded that within

[3] http://www.usfcc.com/resources/2007worldwide_survey_final_low.pdf

the microgeneration sector alone fuel cells fuelled by natural gas could cut CO_2 emissions by 5% and meet 18% of the UK's energy needs. This is significantly more than contributions from the other technologies modelled, including micro-wind, biomass and solar PV

Improved grid resilience: The inherent reliability and fundamental resilience of a distributed energy model would help deliver increased capacity and reliability at a lower load on the national grid network.

B3. The contribution of fuel cells to improved management of renewables

The need for changes to the current market regime will be minimised through the adoption of energy storage technologies to operate alongside new large scale renewable generators. Fuel cell systems coupled with other storage systems can address two important issues here - the specific ability to store energy (to cope with intermittent production) and the ability to manage and deliver power (both to help overcome grid constraints and to control power output to prevent power generators dropping offline or overloading the grid infrastructure)

Energy Storage: Fuel cells, in partnership with electrolysers and hydrogen storage systems, can help to address situations when electricity production from renewables exceeds demand, using excess electricity to produce hydrogen, which can be stored and then used in a fuel cell to meet demand for either stationary power or motive power for a fuel cell powered vehicle.

Storage, in combination with fuel cells, can also be used to assist with peak shaving when demand is high and renewable electricity production is insufficient to meet demand. In addition to increasing the reliability of supply, this negates the need for traditional spinning or standing reserve, which tend to be either open gas turbine generators, or fossil fuel power plants that are used as back-up to provide emergency power at peak times. This traditional approach has negative implications both in terms of carbon emissions and the renewable energy challenge.

Power Management: Power outputs and loads associated with some renewable energy projects, particularly those based on wind, can create problems for the grid since they can create significant fluctuations in frequency, either overloading the system if frequencies are too high or dropping off the grid if frequencies are too low. Managing this output with a fuel cell / battery hybrid system will smooth power outputs, reducing thermal loads, voltage variation, frequency variation and fault currents, so allowing the same cables to carry more power without the need to upgrade. Such combined fuel cell and storage systems would be particularly attractive in a distributed generation scenario where power demand can fluctuate substantially.

An example of a working fuel cell installation in this type of application is the PURE Project on Unst in the Shetland Islands. The system consists of two 15kW wind turbines, a high pressure hydrogen electrolyser, high pressure hydrogen storage device and a fuel cell. An inverter is used to convert the DC output from the fuel cell into AC which provides power and heating for five businesses on the island. The stored hydrogen is also used to power fuel cell / battery hybrid vehicles.

B4. Fuel cells' contribution to energy security

Fuel cells offer an excellent contribution to the reliability of energy supplies, as they can be run on a wide and growing range of fuels. They support the development of distributed power generation and can help to provide a buffer for fluctuating renewable power. Without the introduction of fuel cells in the UK, the impacts of falling indigenous supplies are likely to be significantly greater.