Industry news – June 2008

UK Microgeneration Report

On 2 June, CFCL's UK based director Mr Bob Kennett attended the launch of a report on ***The growth potential for Microgeneration in England, Wales and Scotland*** commissioned by the UK Department for Business, Energy and Regulatory Reform (BERR).

The report considers a range of microgeneration technologies:

- Solar Photovoltaic
- Micro-wind
- Solar Thermal
- Micro combined heat and power (CHP), including fuel cells, Stirling engines and reciprocating engines
- Heat Pumps
- Biomass boilers and pellet stoves
- Micro-Hydro

In the keynote speech Malcolm Wicks, Minister of State for Energy, noted that:

- *"Microgeneration has the potential to make a significant contribution to overall energy use in the UK and, combined with energy efficiency measures, will help towards reducing our carbon emissions. The concerned individual can take an active role in the battle against climate change."*
- The Government is actively evaluating support measures for microgeneration and intends to establish a base policy in the next few months.
- Planning barriers to microgeneration installation had been removed in April.
- The UK renewable obligation will be £1 billion by 2010.
- By 2016 all new UK homes should be zero or low carbon.

Report Highlights

- There are currently about 100,000 microgeneration installations in the UK, up from 82,000 in 2004. Only about 5,000 of these are electricity generating technologies, mostly micro-PV. The remaining 95,000 are heat technologies, mostly solar thermal.
- If no additional policies are implemented, about 500,000 microgeneration units would be installed by 2015 and 2-3 million by 2020. But, with the right incentives, nearly one in five UK buildings would effectively become mini power stations, feeding electricity into the grid, or generating enough power to be largely self-sufficient. Some of the greatest gains would be in combined heat and power (CHP) units.
- With ambitious policy measures, up to 9 million microgeneration systems could be installed by 2020, producing as much energy as 5 nuclear power stations.
- By 2030, microgeneration equipment could be saving thirty million tonnes of CO_2 - an amount equivalent to removing the emissions from all Heavy Goods Vehicles and Buses from UK roads.
- Legally binding government targets for microgeneration, supported by concrete policy measures, would improve the confidence of those investing in the sector.
- A government target of 2-3 million units installed by 2020 could readily be met through a combination of cost-effective measures.

The Report notes:

"Assuming a typical operational life of some 15-20 years then, between now and 2050, most primary heating systems in buildings will need to be replaced at least twice. Demographic trends of rising population and smaller household size suggest the number of UK homes could rise from 25 million today to perhaps 37 million in 2050…As a result, over this period, the market for primary heating and microgeneration systems is indeed immense.

Microgeneration technologies have the potential to make a significant contribution to energy policy goals of tackling climate change, ensuring reliable energy supplies and providing affordable energy. Under the more optimistic scenarios presented in this report, microgeneration technologies contribute up to 30 MtCO2 reduction by 2030, equivalent to a 5% cut in total 2006 UK CO2 emissions."

Forecast volumes

The report forecasts the number and type of microgeneration units deployed under a range of policy scenarios[1]. Some of the report's conclusions are:

- The baseline scenario assumes that existing UK policies continue (excluding the Code for Sustainable Homes and Zero Carbon Homes policies) and there are no new policies to support microgeneration.
- In this scenario:
    - Continuation of supplier obligation policies up to 2020 and a continued low VAT rate for microgeneration help support growth (particularly for micro-CHP).
    - Only fuel cell CHP makes an impact on the domestic heating market.
    - The sales of heating technologies to 2050 are dominated by condensing boilers, whilst most consumers considering microgeneration on their roofs choose not to install any microgeneration technology.
    - Total numbers of **all** microgeneration units installed are:
        - ~ 1 million units (mostly CHP) by 2020.
        - ~ 5.7 million units (mostly fuel cell CHP and solar thermal) by 2050.
    - Numbers of **fuel cell CHP** units installed are:
        - 395,000 units by 2020
        - 1.9 million units by 2030
        - 3.5 million units by 2050.

- Contrasting behaviour is seen for CHP systems of different intrinsic heat:power ratios. Stirling engine CHP (high heat:power) sales are initially higher than those of fuel cell CHP (lower heat:power), mostly in existing houses, however fuel cell CHP sales then overtake Stirling systems. Stirling CHP sales are forecast to be ~50,000 units per year by 2050.

- A relatively low level of support of 5p per kWh is sufficient to drive widespread uptake of CHP. This is because CHP systems, particularly fuel cells, generate much more electricity than a PV system costing a similar amount. 'Deeming' the tariff means that the cost of a CHP system is reduced to the same cost as a condensing gas boiler, since the value of the deemed subsidy for a unit generating 4000kWh per year is £1,600.

- One policy scenario assumes that regulation excludes conventional heating systems (condensing gas oil and LPG boilers and direct electric heating) from 2016, leaving only heat pumps, biomass, and microCHP heating systems available for installations in both retrofit and new build. This is akin to the regulations mandating high boiler efficiencies, which have driven the uptake of condensing boilers. In this scenario, the number of fuel cell CHP units jumps to 3.9 million in 2020, 16 million in 2030 and 25 million in 2050.

[1] See section 12.3, from page 96 of the Report.

Costs

The study forecasts future costs for various microgeneration technologies. The forecast cost for a 1kW fuel cell CHP system is £6,844 (€8,700) in 2011, dropping to £4,753 (€6,100) in 2015 and £3,881 (€5,000) in 2020. The model assumes an annual maintenance cost of £110 (€141).

> *CFCL Comment: These forecasts are consistent with other industry estimates for the target price of a 1kW volume-manufactured commercial product, of €5-8,000 or £4,000 - £6,300.*

mCHP Deployment

The report usefully distinguishes between microgeneration technologies that are *discretionary* (wind, solar PV, solar thermal) and those that are always needed (including fuel cell mCHP) – because *heating is not an optional extra*.

The Report surveyed consumers on attitudes to microgeneration technologies, and noted the following (with emphasis added):

- "*A minority of boiler purchases are truly distressed – 22% of respondents claimed that they changed their boiler or heating system because their systems had broken down and needed to be replaced immediately. However the majority replace their boilers as they get old and unreliable (31%), upgrade to better systems (25%) or as part of house refurbishment (16%)…For these potential consumers, adequate time ought to be available to consider Microgeneration*."
- "*Reactions to alternative energy systems were largely more negative than towards conventional systems.* ***The only system seen as acceptable on most essential factors was the CHP***."
- The key consumer driver for purchasing microgeneration would be **reduction in energy bills**.
- Consumers strongly dislike maintenance costs, and especially additional maintenance costs, and strongly dislike inconvenience.
- Consumers evaluate ongoing costs and benefits over a short time period.
- "*Consumers place a very low value on ongoing energy costs compared with up-front capital costs. This presents a considerable barrier for microgeneration technologies which are characterised by high up-front costs with low on-going costs. This contrasts with conventional energy equipment purchasers (e.g.* ***the Utilities****) who make rational economic calculations before a purchase, which involve much* ***longer time horizons***."

The study models the impact of CHP units being deployed via an 'energy service contracting' (**ESCo**) model – where the household effectively 'leases' the unit over a fixed contact period. There are many variations of this model. The study assumes that consumers pay the cost of a condensing gas boiler and in return receive a discount of 10% on their gas and electricity bills, as well as a maintenance contract for the device. The energy supplier receives the majority of the revenue from the electricity produced, which is used to cover the cost of the fuel cell module.

The study concludes that an ESCo-based on fuel cell CHP could be "***an important route to market*** *for the technology. The benefits to the consumer in terms of reducing the capital cost to that of a condensing boiler, as well as reductions in fuel bills and maintenance costs, are sufficient to offset the penalty associated with a 4 year contract*." In this scenario over 1.3 million microgeneration units are installed by 2020, with 4 million installed by 2030.

CFCL Comment: These findings endorse CFCL's consistent and focused commercial strategy of deploying mCHP units through energy utilities. CFCL believes that utilities can aggregate and generate the most 'value' from high electrical efficiency distributed generation units.

mCHP = Fuel Cell + a Boiler

The Report notes (with emphasis added): "*To minimise cycling, domestic fuel cell CHP units will require a hot water tank. Therefore, high run hours can be achieved for fuel cell CHP if the system is sized to meet hot water demand. This would require that an additional gas boiler must also be present to match demand for space heating. For the purposes of modelling, it is assumed that fuel cell CHP units* ***are fully integrated with condensing gas boilers*** *to meet peak loads*."

CFCL Comment: This validates CFCL's approach of developing a mCHP unit with leading boiler manufacturers, comprising a CFCL fuel cell module integrated with a condensing boiler, rather than attempting to develop a fuel cell CHP unit without any additional boiler.

Government Policies

The report suggests the Government should set targets of having 500,000 microgeneration units installed by 2015, and 2-3 million units by 2020.

Industry groups such as the MicroPower Council have summarised the report as indicating the need for a range of policies, including:

- A long lasting and consumer-friendly financial incentives scheme to stimulate substantial uptake (eg 5p/kWh for microCHP).
- Flexibility for consumers to choose to receive these incentives up-front or spread out over a long period to help with the high initial costs of equipment and installation.
- Adhering to the policy of zero carbon new build housing from 2016 and all buildings in 2019, with clarity over the extent to which developers are allowed to offset their consumption using offsite electricity generation.
- Large scale field trials or an early public procurement scheme to support technologies that are not yet ready for full-scale commercial production.
- Continued consumer campaigns to improve consumer accounting for energy-based decisions, focused on lengthening consumer time horizons when considering energy purchase.

CFCL General Comments:

This report follows the UK Carbon Trust 'Micro-CHP Accelerator' Interim Report, which analysed a range of micro CHP technologies and concluded that fuel cell mCHP products, with high electrical efficiency, could offer significant carbon savings.

The BERR report is another sign that UK policy makers recognise the significant potential of microgeneration technologies.

Even with no additional policy support, there is a strong future market for fuel cell mCHP units in the UK.

The report includes detailed modelling work which will help policy makers and product developers.

Several aspects of the report validate CFCL's commercialisation approach, particularly the recognition that fuel cells are best combined with a condensing boiler to create a mCHP product, which can then be deployed into homes through utilities offering a 'bundled contract' or 'leasing' model.

The BERR report does not focus on the electrical efficiencies of different microgeneration technologies, or on the many wider benefits of distributed generation (such as reducing pressure on the transmission network).

The Carbon Trust report highlights the importance of maximising electrical efficiency in order to create value and reduce emissions.

CFCL's internal modelling indicates that widespread deployment of fuel cell mCHP units can create significant value for utilities, appliance partners and homeowners.

The main reason is simple: highly efficient fuel cell mCHP units can create power and heat (mainly power) more efficiently than the current mix of generating technologies. It costs utilities less to generate the same amount of power using far less fuel. The utilities can then share this value with the homeowner through discounted power or heat, no up-front costs, 'free' maintenance, carbon credits etc.

The business case for utilities to deploy CFCL's units does not rely on subsidies – but of course any additional incentives are helpful to kick start deployment.

CFCL is continuing to work with industry groups such as the UK Combined Heat and Power Association and Fuel Cells UK to follow up the Report's recommendations with policy makers.

The full Report is available at www.berr.gov.uk (click here).

EU News

European Parliament ratifies Fuel Cell and Hydrogen Funding

In late May the European Parliament endorsed the Fuel Cells and Hydrogen (FCH) Joint Technology Initiative.

Between 2008 and 2017, the FCH JTI will have a budget of EUR 1 billion. The investment will be shared by the European Commission and the 'European Fuel Cell and Hydrogen Joint Technology Initiative Industry Grouping', a non-profit organisation uniting the sector's key players. Ceramic Fuel Cells Limited, and its partners EWE, Gaz de France and FZ Jülich, are members of the JTI Industry Grouping.

The Joint Technology Initiative aims to facilitate and accelerate the development and deployment of cost-competitive European hydrogen and fuel cell based energy systems and component technologies for applications in transport, stationary and portable power.

The new Joint Technology Initiative will build on the work of the industry-led European Hydrogen and Fuel Cell Technology Platform (HFP), with a special focus on its implementation plan.

References:
https://www.hfpeurope.org/
http://www.europarl.europa.eu/
http://cordis.europa.eu/search/index.cfm?fuseaction=news.document&N_RCN=29469

General News

IEA Report

On 6 June the International Energy Agency released its Energy Technology Perspectives 2008 study, which estimates the shifts in the world's energy system required to reduce CO2 emissions substantially.

"*The world faces the daunting combination of surging energy demand, rising greenhouse gas emissions and tightening resources. A global energy technology revolution is both necessary and achievable; but it will be a tough challenge*", said Nobuo Tanaka, Executive Director of the International Energy Agency (IEA).

The IEA's report responds to the G8 call for guidance on how to achieve a clean, clever and competitive energy future. The book is built around three sets of global energy technology scenarios. These are a Baseline (business-as-usual Scenario), a range of ACT Scenarios showing how CO2 emissions could be brought back to current levels by 2050, and a set of BLUE Scenarios outlining how they could be reduced to 50% below current levels. ETP 2008 also contains global roadmaps showing how each of 17 key advanced energy technologies would need to be developed and deployed to deliver the ACT or the BLUE outcomes.

Our current path is not sustainable
If governments around the world continue with policies in place to date – the underlying premise in the ETP Baseline scenario to 2050 – CO2 emissions will rise by 130% and oil demand will rise by 70%. This expansion in oil equals five times today's production of Saudi Arabia. In the Baseline scenario, the power generation sector accounts for 44% of total global emissions in 2050, followed by industry, transport, the fuel transformation sector and buildings.

Step one into a brave new world
"*ETP 2008 demonstrates the extent of the challenge to reverse these trends. To bring CO2 emissions back to current levels in 2050, all options are needed at a cost of up to USD 50/t*

CO_2", Mr. Tanaka said. No single form of energy or technology can provide the full solution. **Improving energy efficiency** is the first step and is very attractive as it results in immediate cost savings. Significantly **reducing emissions from power generation** is also a key component of emissions stabilisation.

Step two: weaning the world off oil
The BLUE Scenarios would provide even deeper cuts. "*Emissions halving implies that all options up to a cost of USD 200/t CO_2 will be needed. This is based on a set of optimistic assumptions for technology development. Under less optimistic assumptions, options that would cost up to USD 500/t CO_2 may be needed. Total additional investment needs in technology and deployment between now and 2050 would amount to USD 45 trillion, or 1.1% of average annual global GDP over the period*", Mr. Tanaka stressed.
We would need a **virtual decarbonisation of the power sector**.

Reference:
http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=263

Japan - IEA Report

On 9 June the International Energy Agency (IEA) released a report on "Energy Policies of IEA Countries – Japan 2008 Review".

"*Japan deserves significant praise for its technology leadership – which is helping drive enhanced energy security and climate change mitigation throughout the globe. The government continues to raise the profile of energy technology, including international collaboration and transfer, and has placed energy, climate change and sustainability at the top of its agenda for the G8 meetings it is hosting*", said Nobuo Tanaka, Executive Director of the IEA.

The Japanese government continues to devote significant resources to funding basic and applied energy R&D and, under its Cool Earth Promotion Programme and has committed to injecting about USD 30 billion into environmental and energy sectors over the next five years.

The report includes a table of Japanese government targets, which reiterates the target of **2.2GW of fuel cell generation in 2010**, along with 4.9GW of combined heat and power (CHP). To put this into context, if the fuel cell target of 2.2GW was all deployed in 1kW home fuel cell units, this would equal 2.2 million units.

The Report is available for purchase from the IEA website.

Industry Reports

The US$41 Billion Energy Storage Market: The Next Big Energy Investment

On 29 May, Lux Research released an industry report entitled ***Alternative Power and Energy Storage State of the Market Q2 2008: Making Sense of the Next Big Thing***.

Report highlights include:

- Energy storage is poised as the next big energy investment field: Venture capital in the field grew 74% to US$709 million in 2007. But a complex market with many competing technologies will challenge firms that seek simple routes to success.

- "Fuel cells will return from the dead. Commercial sales will rise from US$92 million in 2007 to US$1.8 billion in 2012, driven almost entirely by new applications in **residential combined heat and power systems and distributed generation** deployments – not transportation or consumer electronics. Adoption of both polymer electrolyte membrane fuel cells (PEMFCs) and solid oxide fuel cells (SOFCs) will drive growth for leaders like Ballard Power Systems and **Ceramic Fuel Cells**.**"**

- "The energy storage landscape will change over the next five years as new technologies enter in earnest from 2011 onward. Flywheels will branch out from datacenter backup power to grid frequency regulation; **fuel cells will finally achieve scale in stationary applications**; and new battery types including zinc-bromide and vanadium redox flow batteries, silver-zinc batteries, and zinc-air rechargeables will stake out valuable niches. Opportunities abound for investors to take a portfolio approach to the market and for corporations to partner with start-ups for market development, system integration, and large-scale manufacturing."

The report is available for a fee from Lux Research (john.schwartz@luxresearchinc.com or phone +1 646 649-9582).

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Ceramic Fuel Cells Limited is a world leader in developing solid oxide fuel cell (SOFC) technology to provide reliable, highly efficient and low-emission electricity from widely available natural gas and renewable fuels. CFCL is developing SOFC products for micro combined heat and power (m-CHP) and distributed generation units that generate electricity and heat for homes.

CFCL is developing m-CHP products with leading appliance partners and utility customers in Germany, France, the United Kingdom, Holland, and Japan. CFCL is listed on the London Stock Exchange AIM market and the Australian Securities Exchange (code CFU). www.cfcl.com.au