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BERR

Distributed Energy - Initial Proposals for More Flexible Market and Licensing Arrangements

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Target audience: Owners and operators of distributed energy schemes, electricity suppliers, generators, distribution network operators, consumer groups, local authorities, property developers, and manufacturers and suppliers of small-scale renewable generation and CHP plant.

Overview:

This document sets out Ofgem and BERR's initial proposals for introducing greater flexibility to the market, regulatory, and licensing arrangements for distributed low-carbon electricity, as signalled in the Energy White Paper. Our work focuses on medium-sized generation for communities and larger businesses - domestic microgeneration is being considered under a separate programme of work.

This document sets out and assesses the detail of the current industry and regulatory arrangements, and is therefore quite technical in nature. We will produce a separate summary and hold a workshop in early 2008 for non-specialists. We are allowing respondents 12 weeks to respond to this document. We expect to set out a detailed implementation plan in May 2008 once we have received and considered the responses.

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Context

Encouraging sustainable development through reduced carbon emissions is a key policy objective for both Ofgem and the Government. Distributed energy (DE) could make an important contribution to this and other goals, including security of supply and alleviating fuel poverty. The issues facing DE are wide-ranging and touch on many aspects of energy and environmental policy and regulation. Our consultation therefore needs to be seen within a broad context of work that is underway across Ofgem and government, including:

- planning policy, in particular Government's drive towards zero-carbon development
- the EU Emissions Trading Scheme and the price of carbon
- the Heat Project being led by the Office of Climate Change
- Ofgem's review of electricity cash-out arrangements and our work on microgeneration, and
- current work on the electricity network charging regime, including the Transmission Arrangements for Distributed Generation (TADG).

Associated Documents

- Review of Distributed Generation: A Joint Government/Ofgem Report, May 2007
http://www.dti.gov.uk/files/file39025.pdf

- Energy White Paper 2007: Meeting the Energy Challenge, Chapter 3 - Heat and Distributed Generation, May 2007
http://www.berr.gov.uk/files/file39567.pdf

- Supply Licence Review - Final Proposals, Ofgem, June 2007
http://www.ofgem.gov.uk/MARKETS/RETMKTS/COMPL/SLR/Documents1/SLR%20Final%20Proposals%20Decision%20Doc.pdf

- DEWG Discussion Paper 1: Value of Distributed Energy and the Associated Issues with the Regulatory and Market Arrangements, Ofgem, May 2007
http://www.ofgem.gov.uk/Networks/ElecDist/Policy/DistGen/disenwg/Documents1/DG%20paper%201%20050707.pdf

- DEWG Discussion Paper 2: The Nature of Distributed Energy, Ofgem, June 2007
http://www.ofgem.gov.uk/Networks/ElecDist/Policy/DistGen/disenwg/Documents1/DG%20paper%202%20050707.pdf

- DEWG Discussion Paper 3: Supply Licensing and Exemptions, Ofgem, Oct 2007
http://www.ofgem.gov.uk/Networks/ElecDist/Policy/DistGen/disenwg/Documents1/DEWG%20Discussion%20Paper%203.pdf

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Appendix 10 - DE Case Studies

Industrial and Commercial – same site

1. INEOS Chlor

Introduction

INEOS Chlor are one of the major chlor-alkali producers in Europe. Their factory based in Runcorn is the largest electricity consumer in the UK, consuming nearly 1% of national electricity supplies. Part of their electricity needs is supplied from an onsite CHP unit which they are planning to replace with a larger unit.

The scheme and business case

INEOS Chlor have a gas fired CHP installed at their site with a capacity of 38MW. As this scheme is reaching the end of its operational life, they are planning to install a replacement CHP unit with a capacity of approximately 80MWe and 50MWth. The proposed scheme will produce electricity by burning waste derived fuel supplied by the Greater Manchester Waste Disposal Authority (WDA) and other WDA's in the Northwest of England. The Energy from Waste (EfW) CHP scheme could provide up to 20% of the site's energy needs.

The intention of the proposed CHP project is to enable the company to diversity its energy portfolio and mitigate some of the effects of high gas costs in the UK in recent years which have had an adverse impact on their business. In addition to private and equity finance, the EfW CHP scheme would be eligible for ROCs and also supported by gate-fee income from the WDAs.

Commercial arrangements

INEOS Chlor are generation licence exempt. Although they have a supply licence and are a party to the BSC, they do not perform any of the licensed activities. Both the existing and the proposed CHP schemes are primarily for own-use, however the company has access to the wholesale market through third parties and would be able to sell power through this route if they were to generate surplus.

There is a private wire network around the site, and the CHP plant will be connected into this rather than the nearby public wires. The Company is considering exporting to some of its remote sites, but it would do this over public wires.

Issues raised

The proposed energy from waste CHP scheme would qualify for ROCs. However, INEOS Chlor are aware that the biomass quality variation between different types of waste would influence the actual allocation of ROCs. Their main concern is that the available information is unclear on whether they would be required to measure the biomass content of the waste used and what the procedure would involve. Overall,

both ROCs and LECs arrangements are considered convoluted and difficult to understand. In addition, BSC and MRA codes are also considered overly complex. As a high capital project, the investment has to generate returns over a period of close to 30 years. Regulatory uncertainties such as EU ETS (post 2012), changes to CHPQA rules, and reform of the Renewables Obligation create significant uncertainties and add greatly to the perceived risk, and therefore cost of financing of the project.

2. Mackie's

Introduction

Ice cream manufacturers Mackie's of Scotland are aiming to become the greenest company in Britain by 2009. They have their own energy supply consisting of three wind turbines. Mackie's are additionally planning to add a biogas plant to their green, on-site, generation portfolio.

The scheme and business case

Each of the turbines on site has a capacity to produce 850kW with a total capacity at the farm of around 2.5MW of which only 35% is used on site. The turbines are saving the company an estimated £280k a year in electricity bills.

For this rural business in Aberdeenshire, one of the challenges encountered was network extension to accommodate Mackie's increasing power needs. The local network operator quoted £600k for the required connection. Instead, Mackie's decided to install their own wind turbine named "Mackie's" in 2005. Total capital cost was estimated at around £700k and financial projections indicated sensible payback of 4 to 5 years.

During the first year of operation, Mackie's used 66% of the output on site supplying over 50% of their annual power needs of around 3GWh. Moreover, generated electricity contributed in excess of £200k comprising of onsite electricity substitute savings, exports to the grid, income from ROCs and ROCs recycle payments and LECs.

Following the success of the first turbine, Mackie's decided to install an additional two turbines, "Ice" and "Cream" in 2007 at a total cost of £1.6m. The two turbines commenced generating in May this year. Again, a more optimistic payback is predicted reinforced by performance of "Mackie's" and the fact that these two turbines will be exporting almost 100% of the time.

Commercial arrangements

For the excess electricity they generate, Mackie's have a 5-year fixed contract with Good Energy. In addition to having green credentials, Good Energy offered the best quote for Mackie's exports.

The fixed contract price with Good Energy includes exported units of electricity, applicable embedded and triad benefits and LECs. The price is only varied for the value of ROCs. Since the own use generation is on the customer's load network and does not enter the grid, there is no metering service provided to Mackie's.
Having in mind the intermittent nature of wind schemes, at times, Mackie's do need to import and have had various, mostly annual contacts with Scottish Hydro Electric.

Issues raised

In Mackie's experience, planning permission uncertainty, financial risk in regards to wind projections and uncertainty over the long term ROC benefit are major factors that may influence the investment decision.

3. Slough Heat and Power

Introduction

Slough Heat and Power (SHP) provides utility and environmental services to the Trading Estate in Slough, Berkshire. The scheme was established in the 1920s to ensure that Slough Trading Estate properties could be continuously supplied with steam and electricity, and has been extended over time to supply a greater number of industrial, commercial and domestic properties.

The scheme and business case

The scheme has 100 MWe of generation capacity, including:

- Two fluidised bed boilers, which drive a 35MWe steam turbine. These boilers were converted to wood fuel in 2001.
- One vibrating grate boiler, driving a 12.7 MWe steam turbine fuelled with wood and fibre fuel.

The site uses around 1,200-1,300 tonnes of woodchip each day, requiring around 100 deliveries to the site. This is sourced through informal agreements with suppliers such as sawmills and tree surgeons, mainly based within a 50-mile radius of Slough.

SHP is able to make a modest profit on the generation of electricity.

SHP earns around £1m each month from the sale of the ROCs associated with its generation. This revenue has led the firm to focus on renewables, although the plant is also able to burn other fuels. Prior to the introduction of the RO scheme, SHP had been near bankruptcy after the introduction of NETA, losing up to £11m a year, compared to the small profit it makes now.

Commercial arrangements

SHP is an exempt supplier, selling 370GWh of electricity to its customers each year. It directly supplies all the businesses on Slough Trading Estate as well as around 2,500 domestic customers in the immediate area. SHP also carries out the metering

and billing for these properties. Currently, the scheme has a net balance position for electricity, although this may not be the case in the future if growth in the energy-intensive data centres on the estate continues.

Meters are not registered on the national metering system, and customers are not able to change to a different supplier. Electricity prices are regularly reviewed to ensure that they are competitive with the best prices available elsewhere. Electricity is transmitted via a private wire system of underground cables which pre-dates the scheme's connection to the National Grid in the 1980s.

SHP also supplies 90GWh of steam and hot water to around 50 customers north of the railway line, creating revenue of around £2.7m each year.

Even though they are supply licence exempt, SHP are licensed to trade electricity, and do this through an arrangement with Merrill Lynch, buying and selling electricity through them on a daily basis. As all electricity generated is used on-site, they use this arrangement to balance supply and demand.

Issues raised

Income from ROCs is uncertain due to fluctuations in the contamination level of the raw materials used on the site. SHP also feel that the ROC arrangements are too complicated in terms of administration and qualifying, making it difficult for schemes to obtain funding unless they are privately owned or have a wealthy parent company. They also believe that the RO banding system is unfair as the schemes established in the future may be able to claim more ROCs than similar schemes set up before banding was introduced.

SHP find that volatility in gas, electricity and carbon prices makes it difficult to predict future revenue streams accurately and therefore difficult for firms to obtain funding to set up schemes.

Industrial and Commercial – multiple sites

1. Leicester City Council

Introduction

The City of Leicester set an ambitious environmental target aiming to reduce its carbon emissions and energy consumption to half their 1990 emission levels by 2025. The city is aiming to achieve this through both technical and behavioural changes. One of the main ways of accomplishing this is by introducing CHP schemes and extending the city's existing schemes to cover the entire city.

The scheme and business case

In the lead up to a citywide CHP scheme, the Council has been installing smaller gas-fired units in its leisure centres and district heating schemes. The total installed capacity between the four CHP units is 700kWe serving approximately 4,000 dwellings. Other organisations within the city have also installed CHP units (e.g. health service, schools) and there is potential to link these together as part of a future citywide CHP scheme.

Efficiency of CHP schemes and consequent carbon reductions as well as on site electricity supply were the main reasons for choosing the CHP option. The scheme was funded by the Council, external funding where a private partnership including NHS, University and prison service was established, and through grants.

Commercial arrangements

The district heating mains take up all the available heat from the CHP units whilst the excess electricity is transmitted through the local distribution network to 17 nominated sites owned by the Council.

The Council is generation and supply licence exempt. It tenders for supplier services through Eastern Shires Purchasing Organisation where all six major suppliers are on the procurement framework. The Council requires tenderers to provide a 'netting off' or equivalent arrangement on a two year contract basis.

EoN were the most successful bidder in the past and provide the Council with a 'netting off' agreement allowing them to offset all metered generation from their CHP plants. The value of this output is credited back to the Council at the individual credit rates reduced by DUoS charges. EoN provide the top-up services to these sites as well.

Issues raised

The Council are considering installing private networks as part of connecting the existing sites into a citywide system but recognise that, apart from closely located sites, this may not be economic.

2. Woking Borough Council[1]

Introduction

Woking Borough Council supply customers with heat and electricity on a mixture of public (virtual private wire) and private wire networks, within the existing exempt licensing regime. This approach was first established in 1992. In 1999 the original small scale system was expanded by setting up an Energy and Environmental Service Company (EESCO), Thameswey Ltd. The initial interest of the Council in

[1] More information on the scheme and council's climate change strategy can be found on http://www.woking.gov.uk/

energy services came about from a desire to achieve cost savings through energy efficiency and, later, from a wider concern for the environment.

However in addition to this, fuel poverty, variable electricity prices and local security of supply were later seen as problems that the scheme could address. The financing scheme for climate change initiatives employs the 'recycled funding' approach, where financial savings achieved by energy and water efficiency projects are reinvested back into the fund creating an ongoing capital fund. All profits from the Thameswey group of companies are used within the Borough of Woking for climate adaptation and mitigation strategies.

The scheme and business case

The system serves Woking civic offices and several other industrial and commercial sites. It includes 1.46MWe of conventional CHP, 163m3 of thermal storage and 1.4MW of absorption cooling, supplied to the clients by separate heat and chilled water pipes and both HV and LV private networks. The project was financed with shareholding capital where the Council provided 19% and the rest was loan financed. Thameswey charges the Council for its power, heat and services and returns 8% on shareholder capital investments by the Council within Woking, 12% internal rate of return on initiatives outside the Borough.

Following legal advice, the Council formed its wholly owned EESCO, Thameswey Ltd.

Thameswey Ltd then set up an unregulated public/private joint venture, Thameswey Energy Limited. The joint venture brought together the local authority with a Danish energy and environmental foundation Hedeselskabet Miljo og Energi A.S via another Danish company, ESCO International A/S. The council owned 19% and the Danish company owned 81% of this private company.

Subsequent ownership changes have resulted in the Council owning 90% of Thameswey Energy Limited and a wholly owned subsidiary of Xergi A/S (a Danish environmental engineering company), Xergi Ltd, owning 10%.

Commercial arrangements

The Borough wide scheme exports surplus power from individual generating sites over the public wires to sheltered housing residents and other local authority buildings. This is achieved via an enabling agreement for exempt supplier operation. In order to operate as an exempt supplier, Thameswey built a relationship with a licensed supplier to perform the competitive market and trading functions and operate a 'mini-settlement' system on its behalf.

Thameswey's pricing for electricity is cost-neutral to commercial customers (based on comparable commercial offerings) and 5% below the prevailing retail price for domestic (determined relative to a basket of available dual fuel prices).

Thameswey is now diversifying outside the Borough of Woking and is the energy services provider for the centre of Milton Keynes in partnership with English

Partnerships (the landowner). It is also leading one of the 3 short-listed consortia for similar work in the London Borough of Southwark.

Issues raised

Woking are concerned that the current exemption limit for supply to domestic customers is set too low to allow an efficient size of scheme. The Council would consider being licensed but are of the view that the current licensing framework should be simplified for DE schemes. This is particularly the case for suppliers operating private networks that are largely self-balancing and thus do not participate in the central trading system.
The scheme has encountered difficulties with connections, for example; the fact that all buildings in the DE area need an individual connection for back-up supply from the DNO reflecting maximum load, whereas the maximum for the group of buildings as a whole may be only be two-thirds of this.

Community Schemes

1. Aberdeen City Council

Introduction

The local authority initiated the scheme in order to improve the heating system in the existing housing stock and assist in reducing fuel costs for tenants thus mitigating fuel poverty and additionally reducing CO2 emissions. The Council is achieving its goals through CHP schemes managing to reduce the tenant's heating bills by 50%.

The scheme and business case

A feasibility study using the life cycle costing technique concluded that a CHP model would be the most efficient way to achieve the council's goals. Three CHP schemes (210kW, 300kW and 1MW) operating in an isolated, 'island' mode were installed over the last three years. The Council is planning to link the schemes in the future through expansion to other closely related sites into a citywide scheme.

The scheme was funded through grants, including Community Energy Programme, CEEF[2] and EEC, capital contributions from the Council and favourably obtained bank loans.

Commercial arrangements

The Council did not procure the scheme directly and an arm's length company, Aberdeen Heat and Power (AHP), was set up. AHP, effectively acting as an ESCO on the heat side, is under the obligation to supply heat to the Council that they in turn

[2] The Public Sector Central Energy Efficiency Fund (CEEF) was launched to fund implementation of energy efficiency measures across the public sector in Scotland.

supply with rent to tenants. A non-for profit ESCO model was chosen so that any savings achieved by the project could be reinvested in further extension of the scheme or alternatively used to lower fuel bills.

AHP sell 100% of electricity output through a consolidation service. Community Energy Services (CES), who act as an ESCO on the electricity side (maintenance and operation of the scheme) and Green Energy, who perform all the administrative services in regards to sale of exports (registration of MPANs, billing, LECs administration) bring together the generator and customers through a licensed supplier. OPUS Energy, the small licensed supplier who owns the supply agreements, in turn supplies the Council's customers.

Issues raised

In the Council's experience, there is a disincentive for AH&P to supply its customer base directly due to the complexities and transaction costs involved in performing this role. Similarly, CES were interested in supplying the customers however believe that significant capacity is necessary to perform this function.

Furthermore, AH&P operate private wires in a couple of small areas where they believe savings were achieved. In one case, it was economic to install private wires as it was a new building. In the second case, the wires were installed over a relatively small distance. Overall, the Council believe that it is inefficient to duplicate the existing public wires, however they consider that it may be economic to lease the wires from a DNO rather then paying the use of system charges.

2. Ashton Hayes

Introduction

Ashton Hayes is a small village in Cheshire which is aiming to become Britain's first carbon-neutral community. The focus of the scheme has so far been on behavioural change, but they are now considering generating their own electricity too. The primary objective of this scheme would be to further reduce the village's carbon use.

The scheme and business case

A suitable point on the local distribution network has been identified where a generator could link in. Two different schemes are currently being considered:

- Installation of a wood-chip CHP unit based in the village. The Woodland Trust has offered to provide free fuel for the unit. However, there are concerns that this type of technology may not be reliable enough.
- An alternative proposal is being developed in conjunction with United Utilities. This scheme would use food waste to provide power for the village.
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The proposed scheme would generate enough electricity to power the whole village with population of approximately 1,000. A local heat network is also proposed, which

would comprise various publicly-owned buildings including the school, church and village hall.

Costs for the project are likely to be in the region of £32,000 for design and £500,000 for the building of the CHP plant. Options for financing include raising funds from an investment bank from an 'ethical fund', or selling shares to the village residents.

Commercial arrangements

The intention is to have an agreement with a supplier to provide back-up power, and also to purchase any excess electricity generated, although the scheme is not primarily designed to generate income.

The scheme is currently receiving assistance from Good Energy, who may also purchase electricity generated in the future.

Issues raised

The proposers of the scheme have experienced difficulty in setting up an agreement with Scottish Power (the incumbent supplier for the area) to purchase exported electricity. They also tried to set up negotiations with other suppliers, with little success, although they have subsequently received a more positive response from Good Energy.

3. Pimlico District Heating

Introduction

The PDHU scheme was originally established in the 1950s to reduce pollution from Battersea Power Station by taking some of the heat created by generation, and transferring it to the newly-constructed Churchill Gardens Estate nearby. When the power station closed in the 1980s, the source of heat was replaced with coal-fired boilers, later converted to gas, before a recent redevelopment reintroduced CHP to the scheme.

The scheme and business case

The recent redevelopment of the scheme, completed in April 2007, put in place three new boilers (8MWe each), and two CHP plants (2MWe each). The primary aim of the scheme is to provide heat to the buildings on the site, with the economic rationale for reintroducing CHP being to use the revenue from exporting electricity to feed back into the heating budget, lowering heating costs, and helping to alleviate fuel poverty.

The heating network has been extended over time and currently covers over 4000 domestic properties (mainly local-authority owned) and 50 commercial properties, including schools, shops and offices.

Currently, very little of the electricity generated is used onsite – only 250KW of a total capacity of 3MW. However, there are plans to supply a local primary school with electricity in the next few years. This is likely to be via a private wire, due to difficulties with the arrangements for using the local distribution network (discussed further below). Power from the CHP units may also be used for communal areas of the buildings and lifts, although there are no plans to provide electricity to domestic customers due to metering costs and the risk of bad debt.

The recent redevelopment of the scheme cost around £6m - significantly more than the £4.8m which had originally been anticipated. The majority of the cost was met by a loan from Westminster City Council, with a grant of £1.2m also being sourced from the Community Energy Programme, and £380,000 from Energy Efficiency Commitment (EEC) funding.

The existing community scheme meant that a network of heating pipes was already in place at the time of the upgrade. Therefore the costs of introducing a new CHP scheme were a lot less than for a site where this would need to be retrofitted. The alternative of fitting individual gas boilers to each property would have been much more costly.

Commercial arrangements

Bids for the exported electricity were invited from the main suppliers, with four showing an interest, and SSE chosen as being the most competitive. This is initially for a one year contract, paying £69.80/MWh (including payment for LECs) in December and January, £64.40/MWh in November and February, and £39.80/MWh for the rest of the year.

Issues raised

PDHU have to call EDF networks each morning before switching on their CHP units in order to advise them of the increased generation that they will be placing on the local distribution system. This means generation is not maximised as they are unable to run the system on a timer to come on earlier in the morning.

Difficulties are also being encountered with plans to supply Pimlico School with electricity from the CHP units via the public network. EDF claim that it will be too difficult to ensure that all the electricity being used by the school is being supplied by the CHP unit. PDHU are looking into introducing a private wire network instead, although their preference would be to use the public network.