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NEW DEPLOYMENT MODELS FOR MICRO-GENERATION: ECONOMIC, REGULATORY AND POLICY ISSUES FOR THE UK

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Overview

Electricity generation by individual households (known as micro-generation) is attracting increasing interest in the UK and other countries. A variety of drivers have been identified for the expected growth in micro-generation technologies including environmental concerns (particularly the need to reduce carbon emissions), worries about the insecurity of energy supplies, the development of new energy service companies and programmes to tackle fuel poverty[1]. Whilst several studies have projected that micro-generation could supply a significant proportion of energy in UK households (e.g. Energy Saving Trust, 2005), deployment to date has been slow. It is not yet clear whether micro-generation will fulfil this potential, and questions remain about its attractiveness to consumers and energy suppliers. The eventual outcome will depend on a number of technical, economic, behavioural and institutional factors. This paper will draw on work in progress within the "Unlocking the Power House" project funded by the UK's Economic and Social Research Council (ESRC). The project is investigating the economic and wider implications of domestic micro-generation technologies in the UK. The paper will analyse three possible models for the deployment of domestic micro-generation technologies including solar PV, micro-wind and micro-combined heat and power (micro-CHP). These models include 'traditional' householder investment, investment by incumbent energy companies and community-driven investment by a local energy service company (Watson, 2004; Sauter and Watson, 2006). The economics of the three different deployment models will be tested and implications for regulatory and policy changes in the UK will be explored.

Methods

The paper will draw on research conducted using two main approaches. First, it will analyse the economics of micro-generation using a spreadsheet tool. Second, it will discuss initial results from a series of qualitative interviews to explore policy and regulatory implications.

The economic analysis will calculate payback times for micro-generation investments under each of the different deployment models discussed above. The calculations will also test the impact of changes in policy, fiscal incentives and other regulations. The calculations are based on range of domestic electricity and heat demand profiles and measured PV output data from field trials in the UK. Due to the novelty of micro wind and micro CHP, new modelling results will be used to simulate half-hourly electricity generation from these technologies. A micro wind model developed within the project using real UK wind data and considering wind conditions in the built environment provides micro wind output data (Myers et al,

[1] In the UK "a household is defined as being in fuel poverty where it would need to spend more than 10 per cent of its income on energy to maintain a satisfactorily warm home" (Ofgem, 2005).

forthcoming). Furthermore a thermal building model will be used to simulate electrical output from a micro-CHP unit. Different building types and standards and their thermal loads will be compared. These half-hourly consumption and output data will allow the calculation of different import and export profiles, and hence, economic payback times.

Within the project, the results of this economic analysis are being used to structure a series of interviews with a range of relevant actors that have a direct interest in micro-generation in the UK. These include representatives from industry, government institutions and trade associations. The paper will discuss some initial observations drawn from these interviews that focus on the policy and regulatory implications of micro-generation.

Results

The results presented in the paper will explore the economic attractiveness of micro-generation technologies under each deployment model. They will also show the possible impact of changes in policies and regulations. Drawing on both the quantitative economic analysis and the interviews, the results will focus on three sets of issues.

First, they will look at how the economics of micro-generation are affected by technology specific issues. For example, solar PV is an expensive technology that might be more attractive if the government offers grants to pay part of the up-front cost. Micro-wind and micro-CHP are less expensive, but they are relatively unproven. The attractiveness of these two technologies might be increased by measures to increase consumer confidence such as installer training.

Second, the results will consider how economics are dependent on the level and pattern of domestic energy consumption. High levels of electricity consumption mean that more micro-generated electricity will be consumed on-site. If rewards for electricity exports are low (as they are in the UK), micro-generation will be more attractive to consumers with high demand. In addition, micro-CHP requires a minimum thermal demand to guarantee enough electricity output to pay back the additional up-front costs. Certain building types are therefore not suitable for micro CHP.

Third, the analysis will examine the extent to which each deployment model has different policy and/or regulatory implications. For example, within the consumer-led deployment model, there may be a particular need to guarantee a fair reward for electricity exported to the grid. The regulatory reforms to allow this may be less important if most micro-generation is to be installed and owned by major energy companies.

Conclusions

The conclusion will summarise the main points of the paper. It will emphasise how different deployment models can increase the attractiveness of domestic micro-generation in different ways. Some models are particularly important for ‘active’ consumers that wish to be more involved in generating and managing their own energy in the home. Others are important for companies wishing to develop new micro-generation products and services to offer to consumers. Changes to current policies and regulations have the potential to make these different models more or less attractive as a vehicle for micro-generation deployment. A final section of the paper will briefly consider some wider implications of the options available. It will focus in particular on the extent to which changes in economic incentives will be sufficient to foster widespread micro-generation deployment. It is likely that successful policies will also have to take into account broader issues such as planning restrictions, installer training and - perhaps most important of all - consumer behaviour.