



Microgeneration

The recent launch of London's Climate Change Agency links the Capital with a growing number of major towns and cities worldwide, including Berlin and Toronto, that have already in some cases managed to achieve remarkable reductions in carbon emissions. These are increasingly attributable to the use of off-grid methods of electricity generation, primarily based on combined heat and power (CHP) systems providing heating and air conditioning to buildings, districts and communities. Similar solutions, collectively described as microgeneration (or decentralised energy), are rapidly coming to be seen as amongst the most promising worldwide developments in providing relatively clean, efficient and secure supplies of energy to local communities for the longer-term.



Major capital cities usually attract waves of publicity and high-profile praise for supporting such measures in these increasingly carbon-conscious times. Just as important perhaps for future reductions in emissions however is the fact that off-grid electricity generation can

work equally well within far smaller communities. Within the UK, some pioneering initiatives in CHP, hydrogen fuel cell, wind and solar-powered systems have been introduced by Woking Borough Council, which as a consequence can claim to have reduced CO₂ emissions in council buildings and housing by 77% since 1991. Savings of £1m a year in energy costs have similarly resulted in no energy bill increases for council tenants since 1992. Nor are such advances necessarily restricted to highly-developed urban areas. A commentator on the energy markets in India recently highlighted the construction of a 40kW standalone hydroelectric power station serving a village of 1,100 people.

Microgeneration is defined as any technology, connected to the distribution network (if electric) and with a capacity below 50 -100 kW. Whereas approximately half the energy of the UK centralised grid system, according to the DTI, is lost in generation and transmission, small power generators located close to their primary users, by contrast, are almost 100% efficient. Given that electricity production accounts for about a third of the UK's carbon emissions, the potential for reduction here is significant.

Of equal importance perhaps are the implications for secure power supplies. In the event of prolonged power failures and interruptions due to shortages of essential energy commodities (an increasingly likely scenario) most complex centralised grid systems cannot simply be easily 'switched back on' again. Not

surprisingly, security of energy supply is now a major concern for most developed and developing nations. In these circumstances, large-scale availability of decentralised energy systems and local power generators could assist in becoming a strategic alternative. The arguments supporting microgeneration are increasingly as much about economics as environmental or strategic considerations. A report issued by the DTI in November last year indicated that some local microgeneration technologies are rapidly approaching the threshold of cost effectiveness. Just one of the currently available technologies, combined heat and power (CHP) fuel cells, could with appropriate levels of support, eventually meet 9% of the UK's electricity requirements and reduce domestic sector CO₂ by 3%. It must be stressed that this is a long-term target (2050) and one very much dependent upon favourable treatment from government and energy suppliers alike. Nevertheless, the implications, particularly in the context of widespread concerns about lack of competition within the energy sector across Europe as a whole, remain to be more fully explored.



A significant catalyst (or equally perhaps an inhibitor) to the development of many microgeneration projects is likely to lie in the investment / financing / valuation process. Failure to comprehend these issues - and address their likely requirements in sufficient detail - may not just amount to the difference between



success and failure, but will also determine whether or not many such projects ever see the light of day in the first place. This is a critical agenda, given that project finance for microgeneration does not yet effectively exist – the current minimum investment threshold for most infrastructure projects is around £80 million. Individual project sponsors and investors alike must take account of some fairly unique variables and determinants, particularly vis-a-vis conventional electricity generation. Most of the existing technologies remain heavily dependent for cost-effectiveness upon the availability of Energy Export Equivalence (EEE), where surplus electricity generated is exported back through the centralised grid trading mechanism for the same value as that imported. Significantly, the UK energy regulator Ofgem recently announced its support for removing regulatory and technical barriers to the growth of microgeneration. Similar government-led initiatives should have a corresponding effect on legislative and funding obstacles.

Should microgeneration in fact become much more prevalent, the impact upon developed and emerging economies alike could perhaps be comparable to many of the major historical developments that have changed our lifestyles beyond recognition over the past few Centuries. Just in the same way as much of the growth attributed to the Industrial Revolution was spurred on by railways and canals, and the Internet dramatically accelerated our use of computers and IT, so decentralised energy could facilitate the viability and development of smaller and more self-sufficient communities, particularly in areas currently considered too remote or isolated to wire up using conventional grid-based power lines. If this sounds utopian, it should be borne in mind that a coincidence of fundamental drivers, pressures and circumstances can have an accelerant effect on historical change processes not dissimilar to the concentration of sunlight through a magnifying glass. Concerns over the environment, security of energy supplies, increasing stress on major urban infrastructures and the pace of transformation in developing economies are four such factors that may well speed up the adoption of microgeneration technologies.

It would be misleading to suggest, at least for the moment, that decentralised energy offers anything like a single comprehensive solution to many of the current global concerns relating to carbon emissions and shortages of traditional energy commodities. In contrast, given the diversity and rapid advancement of microgeneration initiatives, it may perhaps be easier to consider this within the overall costs and benefits of a centralised power grid as a means of delivery to energy users and communities in the future.

A national (or at least large-scale) grid structure is considered as essential in most developed economies as a stable method of supporting and planning for the requirements of large-scale manufacturing industry, as well as providing secure power supplies for the population as a whole. In the UK, the Central Electricity Generating Board (CEGB) was the foundation of the industry as we know it today and effectively acted as the point of origin for implementation of national energy policy: the CEGB made investments to keep the grid stable. Now with the bulk retirement of the ageing Magnox nuclear fleet and sizeable investments in renewables, the loads on the system may not be ideally placed for the longer term. Where localised microgeneration systems have already made substantive inroads into the national system, such consequences do not always appear to have been factored into contingency planning. We have already seen the interruption of commercial contracts in the Netherlands due to variations in the local grid and now the British Grid is facing up to the issues of future infrastructure and rising sea levels.

It may therefore be premature to predict the demise of a centralised grid system, given the reality that that even in today's competitive market framework, someone ultimately still has to have "obligation to supply". Within the UK, this role previously rested with the National Grid (now National Grid Transco). However, in the current market framework, overall responsibility for security of supply has become far more nebulous, with the DTI and Ofgem picking up some of the agenda, and NGT remaining in charge of balancing short-term supply and demand across the system.

Perhaps then what has really become obsolete in this first decade of the 21st century is not the centralised grid as such, but instead the whole concept of a self-sufficient nationally-distributed power generation industry. Over the past few decades, any lingering complacency about security of supply has been swept away in the inexorable rush towards a globally-competitive marketplace for energy resources and commodities. Without question, the biggest challenge to the planned balancing process for any grid-based energy supply-and-demand economy is the growing possibility of empty gas pipelines, deserted refineries and LNG terminals where tankers never dock.



Against such an ominously-threatening horizon, the most demanding questions have to be asked. Does microgeneration therefore offer anything more in investment terms than just another relatively small, unknown and relatively unstable thundercloud with (potentially) a silver lining? Realistically at this stage, the concept itself is probably too fragmented to amount to a cogent solution. Photovoltaics, CHP systems, wind turbines and local grass-fired power stations are widely differentiated by factors such as overall environmental footprint, land use, emissions, capital requirements and estimated payback periods. What cannot be in doubt is that in most major economies, the comfortable status quo of a fully-centralised, planned, balanced and self-sufficient energy sector is rapidly becoming unbankable. The only question is how prolonged and painful any readjustment to the new realities of the global economic energy marketplace must be. New initiatives and alternatives under development, however small-scale, can hardly be unwelcome in such circumstances.

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