

Background paper: Sustainable energy

Introduction

In late 2006, Oxford City Council commissioned a three-stage study in order to investigate the potential for a sustainable energy scheme in the West End. This background paper summarises the results of the ARUP study to date.

It is worth noting that SEEDA (one of the three key partners alongside the City and County Councils in the West End project), have shown considerable support for schemes such as this (with high sustainability credentials). One of the key themes of the Regional Economic Strategy 2006-2016(RES) is Sustainable Prosperity – supporting the quality of life through reducing carbon dioxide (CO₂) emissions.

Background Information

With climate change appearing as a more and more important item on the local, national and international agendas, it is vital to address its effects at all levels.

One way of doing this is through a community energy scheme. Such schemes utilise low carbon and renewable energy technologies to reduce overall emissions of CO₂ and other climate change gases. It is a true example of thinking globally while acting locally. Electricity and heat are generated locally from renewable sources thus reducing the national and international problem of climate change.

Community energy schemes are proven to use fuel more efficiently, significantly reducing CO₂ emissions and creating the opportunity for lower energy costs. In fact, in the longer term there would certainly be lower operational costs. In effect the scheme would pay for itself. A community energy scheme in the West End would also provide 'affordable warmth' for its customers in the form of lower costs for heating and power. With the additional external pressure of the current climate of increased international fuel uncertainty, community energy can provide increased security through localised control and flexibility of fuels.

Aside from the savings (both financial and energy) there are also educational benefits from a community energy scheme informing the local residents of the benefits of the scheme, and other methods to reduce energy use.

A community energy scheme, if provided in the West End, would certainly be a positive addition. It would be cost saving, energy saving, educational and involving.

Initial dialogue with potential developers has been very positive. All who were spoken to expressed an interest in participating in the scheme. It is important to have this developer backing for a Community energy scheme to be truly viable.

Energy Generation and Distribution

The Stage 1 and 2 Reports concluded that there were two options to take forward for more detailed consideration. These options were a decentralised energy strategy consisting of 2 or 3 small energy centres each on plots that would be a maximum of 400m²; and a distributed energy strategy (a number of much smaller energy centres attached to buildings).

Figure 1 shows an illustrative map of what a de-centralised energy strategy could look like in the West End. This particular example consists of three medium scale energy generation centres, however a de-centralised energy strategy simply consists of a number of strategically positioned energy centres at various points across an area.

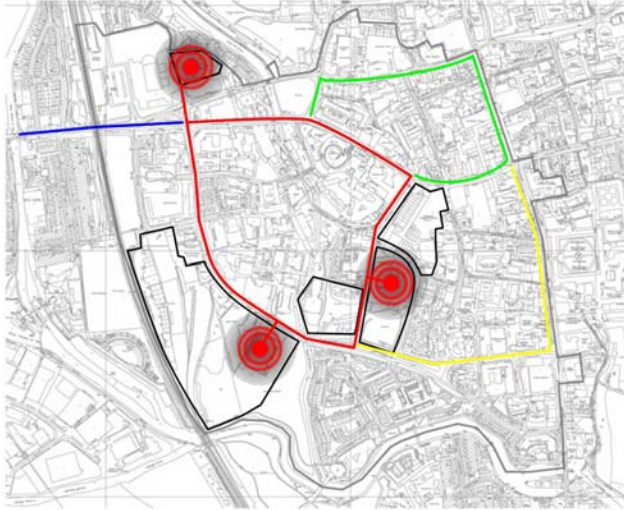


Figure 1: De-centralised Energy Centre Strategy for the West End

Figure 2 shows an illustrative map of what a distributed energy strategy could look like in the West End. Essentially, a distributed energy centre strategy consists of a large number of 'small scale' energy generation centres located within key buildings.

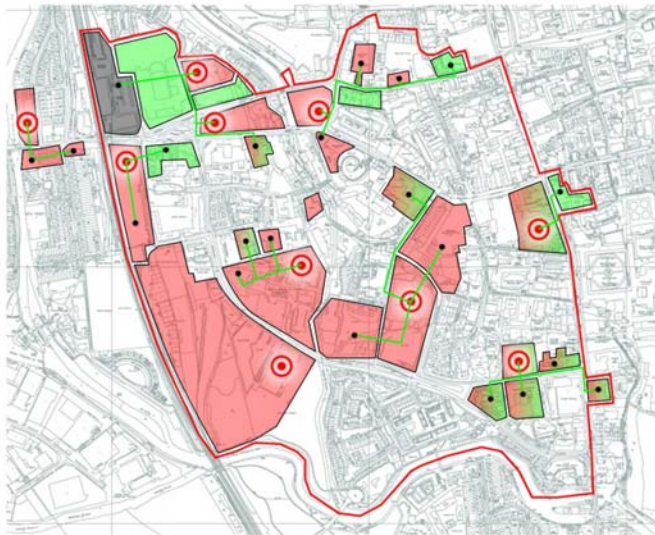


Figure 2: Distributed Energy Centre Strategy

Technology Options

The ARUP report suggested moving forward with a suite of options including gas-fired Combined Heat and Power (CHP) and biomass.

The advantage of CHP over other sources of energy generation is that it is more efficient. CHP is a fuel-efficient energy technology that, unlike conventional forms of power generation, puts to use the by-product heat that is normally wasted to the environment. CHP can increase the overall efficiency of fuel use to more than 75%, compared with around 50% from conventional electricity generation. Furthermore, because it often supplies electricity locally, CHP can also avoid transmission and distribution losses. (DEFRA, 2007). Some CHP plants have achieved 90% energy efficiency, but generally speaking the range is between 70%-90%.

Other advantages include: cost effectiveness - because the scheme is more efficient, customers can pay less for their energy; increased energy security; and flexibility to adapt to new technologies as and when they arise (also known as 'future-proofing').

Energy Services Company (ESCo)

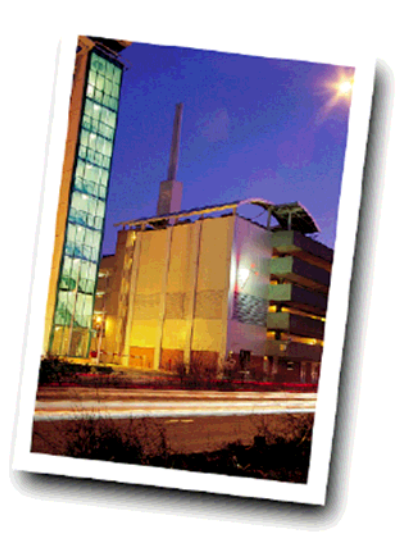
In order for a sustainable energy scheme such as the one proposed in the West End to be realised, it is usual for an Energy Services Company (ESCo) to be established. An ESCo is effectively a mini, custom-built Energy Company. ESCos are established in order to design, build, finance, operate and manage energy infrastructure for a particular development, developments or community.

An ESCo is not necessarily an independent company. They can be partnerships between public and private organisations or even a solely public organisation. The exact ESCo business model is yet to be determined for the West End. It is considered that Public/ Private ESCos have been shown to reduce the financial exposure of a council by around 15-20%.

It is quite common for an ESCo to finance a scheme in whole or in part and thus take ownership of the energy infrastructure. As such it is possible for the ESCo to receive a revenue generated from the sale of power, heating and cooling to the consumers connected to the scheme. The extent to which an opportunity offers commercial viability and thus is considered commercially 'attractive' for an ESCo partnership, depends on numerous factors. However a key factor not to be underestimated is the demand certainty presented and associated level of risk associated with installation of such infrastructure. The more certainty of demand provided to an ESCo via the guarantee of consumer connection, the more commercially attractive a scheme becomes. Vice versa, by bringing a delivery company on board with the attraction of demand certainty, this demonstrates increased security of supply to consumers in waiting.

Community Energy Examples

Woking Borough Council



Over the past 15 years, Woking Borough Council has implemented a series of sustainable energy projects, creating a network of distributed energy centres. These include the introduction of district heating and private wire networks, as well as the country's first small scale CHP heating and heat driven absorption cooling system providing heat and power to an adjacent leisure centre.

Since the implementation of its energy efficiency policies in 1990/91 energy savings have been over 50%. Current annual savings from the scheme are over £1,000,000 per year.

Southampton Geothermal Community Energy



Southampton has developed the first geothermal energy and CHP district heating and chilling scheme in the UK. The district scheme serves more than 40 commercial and public sector customers and hundreds of households. Hot brine from the geothermal well now provides 18% of the total district heating mix. Fuel oil (10%) and natural gas (70%) account for the remainder.

Carbon emissions have already been reduced by 10,000 tonnes annually. The council's share in the ESCo generates revenue of £10-15,000 per year. At the same time customer household bills have been reduced by up to 25%.

Conclusions

In conclusion of the West End site appraisal, energy assessment, stakeholder feedback and the relevant political and market drivers, it is considered appropriate from a technical, economic, and social point of view to adopt a community energy approach within the West End. The predicted growth of energy consumption within the West End due to a significant amount of new development and anticipated refurbishment schemes provides clear justification for a community energy infrastructure approach. Furthermore, the timing of these new developments and the anticipated scale, diversity and nature of energy demand within the West End has the potential to be viewed as commercially attractive by 3rd party investors.

The project brief for the Stage 3 report includes the following:

- A drawn-up design of a scheme;
- A recommendation of potential locations / sites for any infrastructure;
- Provision of details of the recommended scheme including all of the following:
 - Requirements in terms of number and type of users;
 - Potential output;
 - Land-take requirements and recommended site/s;
 - Broad indication of capital costs; and
 - Broad indication of running costs and life expectancy.

Stage 3 of the project was completed in January 2008.