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APSE Big Energy Summit

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Day 2, 09:30

Workshop (A) Overcoming grid issues and the potential for electricity storage

- **Warwickshire County Council's approach to renewable energy and solar PV**
- **Issues relating to grid connection and capacity in the county**



Background



5 Districts – North Warwickshire BC, Nuneaton & Bedworth BC, Rugby BC, Warwick DC, Stratford DC

Population 0.53 million, (ONS mid 2007 estimates)

197,855 hectares
266 persons / km²

1,534 persons / km² in Nuneaton & Bedworth

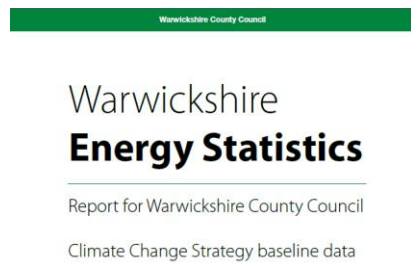
121 persons// km² in Stratford-on-Avon

2001 - WCC Energy Policy for Properties

The aim was to control energy consumption in WCC properties in order to:

| Policy | Long Terms Objectives |
|---|--|
| <ul style="list-style-type: none"> Avoid unnecessary expenditure | <ul style="list-style-type: none"> Buy fuels at the most economic cost Support the use of BREEAM for all new build and refurbishment projects to provide lowest commercial life cost options |
| <ul style="list-style-type: none"> Improve cost-effectiveness and working conditions | <ul style="list-style-type: none"> Consume fuels as efficiently as is practicable |
| <ul style="list-style-type: none"> Protect the environment | <ul style="list-style-type: none"> Encourage the use of sustainable energy technologies to reduce the amount of pollution, particularly CO₂ emissions caused by our energy consumption Establish appropriate environmental targets for future energy use Develop appropriate indicators through which to measure and publish progress towards achievement of environmental targets Encourage developments with minimal energy requirements Promote the use of locally sourced and recycled materials |
| <ul style="list-style-type: none"> Prolong the useful life of fossil fuels | <ul style="list-style-type: none"> Reduce, wherever possible, our dependence on fossil fuels through the use of ambient and renewable energy |
| <ul style="list-style-type: none"> Increase public support for sustainable energy technologies | <ul style="list-style-type: none"> Support the provision of information for businesses and the general public to raise awareness of energy efficiency, renewable energy and environmental issues |

2003 – Warwickshire Energy Statistics



Renewables

- Renewables capacity in the county is 17.4MW per annum and is virtually all landfill gas.
- The output is equivalent to 3% of the county's electrical demand which is higher than the national average.
- In the long term it is likely that the amount of landfill gas available and hence the electricity which can be generated from it will decline.



Combined Heat and Power (CHP)

- There is only 2MW in total and there are no large schemes (known) working in the county.
- The known schemes are relatively old and small, which means that they may well not be running.
- The status (and nature) of a Scottish and Southern large scale CHP scheme (mentioned in the National Grid 7 year statement) is not known. If this 115MW scheme is operating it will more than achieve the Warwickshire share (90MW) of the national target for CHP.

2005– First Building Integrated PV – EPIC 105 kWp



Eliot Park Innovation Centre, Nuneaton,



2006 – Warwickshire Climate Change Strategy



Energy
Transport
Resource Efficiency
Adaptation
Communication & Education

Plus

Community Engagement
Biodiversity
Sustainable Construction
Agriculture / Horticulture

Objective: To reduce greenhouse gas emissions through improving energy efficiency, minimising waste and **increasing the use of renewable sources of energy.**

Early Actions

- ❖ Through the planning system promote on-site renewable energy generation of at least 10% in all new developments.
- ❖ Through the planning system actively assist in the delivery of regional (Energy Strategy for the West Midlands) and national renewable energy generation targets.
- ❖ Support the development of a thriving renewable energy sector by purchasing electricity produced from renewable resources wherever possible.
- ❖ Commit to ensuring that all new public buildings achieve BREEAM 'excellent' rating by 2010.
- ❖ Implement measures to tackle fuel poverty and halve the number of households in fuel poverty by 2010.

2006 – Warwickshire 10% Scenarios Report

This report was produced to guide strategy and policy debates. It modelled how to meet 10% of

- Electricity consumed by households and industry in the county to be from renewable sources
 - Heat delivered to homeowners and industry in the county to be from renewable fuels
- and
- What 90MW of installed Combined Heat and Power (CHP) could look like.

2007 – Warwickshire Energy Statistics Second Report

Warwickshire County Council

Warwickshire Energy Statistics 2007

Climate Change Strategy Update

Second Report for Warwickshire County Council



Renewables

- Renewable electricity capacity as of 2007 in the county is 20,693 kWe (20.7 MWe), almost exclusively from landfill and sewage gas.
- Compared with the 2005 report, renewable capacity has increased by 19% or 3,280 kWe.
- The output from this capacity in 2006/07 was 75,844 MWh (76 GWh). This is equivalent to 2.5% of the county's total electricity demand in 2005. This compares with 81,382 MWh in 2005 (though it is suspected that there were errors in the 2005 data which inflated the output).
- The annual consumption of renewable electricity in Warwickshire needs to increase to 154 GWh per year by 2010 to meet the county's share of the 5% West Midlands regional target.
- In the long term it is likely that the amount of landfill gas available and hence the electricity which can be generated from it will decline.
- A number of planning permission's have been submitted for new renewable energy schemes in the county and to date three schemes are awaiting construction. A planning permission application for a wind energy scheme near Stratford on Avon was withdrawn in 2005.

Combined Heat and Power (CHP)

- No data is available from Ofgem to enable an update of the combined heat and power capacity in Warwickshire. We are assuming that the 2005 report total of 2MWe remains true (though many of the schemes are old and may well have ceased to operate). This data should be available by the end of the year (according to Ofgem's contractors). For Warwickshire to meet its share of the national UK CHP target, the county's CHP capacity should reach 80 MW by 2010.

2010 – Renewable and Low Carbon Energy Resource Assessment and Feasibility Study

Renewable and Low Carbon Energy Resource Assessment and Feasibility Study



PPS1 and PPS22 Evidence Base - Steps

1. Determine current and projected future energy consumption and carbon emissions.
2. Identify existing low and zero carbon (LZC) energy generation capacity.
3. Review relevant low carbon policies and targets at national, regional and local levels and market mechanisms intended to support low and zero carbon technologies.
4. Assess the potential for local renewable energy and decentralised generation (both heat and electricity).
5. Develop minimum and maximum targets.
6. Recommendations - provide additional support for the achievement of low and zero carbon standards.

2015 - WCC Energy Policy for Properties

The WCC Corporate energy targets are:

- To achieve at least an average annual 2.5% reduction in Carbon Dioxide (CO₂) emissions from the corporate estate per £m gross revenue expenditure.
- Improve the operational energy performance across the corporate estate thereby reducing the number of properties with a Display Energy Certificate (DEC) rated at E, F and G to less than 30.6% of the total number of DECs rated A-G.
- Continued implementation of an independently certified Environmental Management System which complies with the requirements of the ISO 14001:2015 environmental management standard.
- To establish a 2020 target [and identify resource requirements] for low carbon electricity generation by the end of March 2015.

Policy Commitments

1. WCC will maintain an accurate and robust energy, cost and CO₂ reporting system for the WCC estate to assess actions and progress towards meeting targets.
2. WCC will implement effective energy management practices and monitor & report on energy performance to maximise behavioural change, budget management and investment decisions.
3. WCC will maintain legal compliance with all relevant energy and climate change legislation and agreed codes of practice to minimise reputational and financial risks and demonstrate commitment to continuous improvement in environmental performance.
4. WCC will ensure resources are in place (financial and people) to enable on-going investment in new energy saving projects and achieve effective carbon reduction.
5. WCC will maximise efficiency of operation of existing plant and equipment and encourage resource efficient behaviour amongst staff whilst at work to avoid unnecessary expenditure on energy and carbon emissions.

6. **WCC will enable the growth of low carbon energy generation** on the corporate estate to support long term financial management, improve energy security and resilience to future energy price fluctuations.

Difficulties Experienced in Delivering Renewable Energy Projects

WCC have completed a range of feasibility studies:

- ❖ Wind power (but politically too difficult at the time)
- ❖ 100kW of on-farm AD (but on-hold due to tenancy arrangements that need to change)
- ❖ Several biomass boilers feasibility studies
- ❖ WCC have also explored the 'Economics of Growing our own Wood Fuel Supply' – on the assumption that biomass would take off and chip prices would rise.

We have installed two or three biomass boilers (wood chip and pellet) – but low gas prices make it difficult – and integration with our internal re-boiling processes are a challenge as Engineers insist that each property has had to have a gas boiler system that could meet the properties heating demands as well as any biomass boiler – and gas is easier to turn on and run than biomass when so many sites no longer have a traditional caretaker.

M&E colleagues are fully busy with their day jobs and as fee earners there is no funding for additional staff to take forward projects any quicker. It has taken two years to go out to tender for the metering needed for claiming the RHI because staff who were dealing with this have left and no one has the time to take on other people's work.

PV has proved to be the easiest to deliver but even procurement for non-domestic systems has not been straight forward.

Using another LA's framework supplier main contractor for PV having concentrated on delivery of domestic PV not being anywhere near ready to doing installations on commercial properties (no CAD design experience, lack of skilled staff and time pre-delivery), but the sub-contractors actually did a good job of finally installing the PV systems.

The self-financing route can also be difficult to deliver as you have to persuade someone to sign up to a loan agreement to access the Prudential borrowing and we'd have to recharge for the electricity generated that was consumed on site at 50% of import costs – currently 5p/kWh.

There have also been sites where roofs were not strong enough to take PV.

12 Other Building Integrated PV Installations

- ❖ PV on Barrack Street roof, Warwick, 47 kWp
- ❖ PV on Saltisford Buildings 1 & 2 roofs, Warwick, 15 kWp and 40 kWp
- ❖ PV on Frank Whittle Business Centre roof, Rugby, 15 kWp
- ❖ PV on Barack Street Offices, Warwick, 47 kWp
- ❖ PV on three small-holdings / farms, 10 kWp, 20 kWp and 45 kWp

- ❖ PV on Northgate House Conference Centre, 2 kWp
- ❖ PV on three separate buildings on a household waste site, 4 kWp, 15 kWp and 19 kWp

Why are WCC interested in larger scale renewable energy generation / GMS?

The installation of building integrated PV was good background work for WCC.

The real issue now is larger scale embedded generation, especially Ground Mounted Solar (GMS).

WCC have started to investigate the potential at some parts of its estate such as landfill sites and smallholdings, being careful to ignore anything in the green belt or in an AONB. The intention right from the start is to develop a programme of works to make best use of all the learning that will be needed to develop the first GMS project.

If the private sector can make it work then WCC should be able to as well. WCC expect to be able to make a significant income from larger scale renewables to put back into service delivery.

Recently there has been a planning application submitted for a 50 MW GMS installation on an agricultural research station outside Stratford upon Avon – where BSE infected animals were kept – so no crops are allowed to be grown for human consumption.

WCC GMS Progress to Date

Revenue funds for investigations have been allocated at risk.

- ❖ Possible sites identified - 20 to 25
- ❖ Initial screening reduced this down to 8 – 10 sites (the long short list). There could have been more but for grid connection issues.
 - At one former closed waste site (hidden from every dwelling in the area) that could have had space on the ground for a 3 MW system – there was no grid capacity at all.
 - At another site that could have taken 30 kW, the cables in the road can only accommodate 12 kW.
 - Two other farms did not have any grid capacity at all
- ❖ A formal approach has been made to Western Power and WCC should have their written formal views on grid capacity at each of these sites on the long short list (Mark Wynne, Asset utilities).

We need to get to a short, short list of four sites for planning.

Reading Agricultural Consultants have done desk top assessments of land classification for food production – because you want to keep off the most productive

land. There are 5 grades of land. 1 is the best. 5 is the worst. Grade 3A is too good – you want to avoid this for GMS. Grade 3B is moderate / ok to put GMS on.

Ecological surveys will be carried out in March to assess the current status of the land and determine if any specialist survey work is needed – e.g. newt surveys have to be undertaken in March.

If and when Members give the go ahead Planning Consultants would need to complete the feasibility studies and do a range of pre-planning application consultations prior to submitting planning applications.

Community Projects

The maximum under FiT from 1/4/2015 is 5 MW, 20,000 panels, 25- 30 acres. DECC say that for the same connection point you can have 5MW + 5 MW with two different developers.

1 MW = 5-6 acres
250 kW = 1.5 acres

WCC would be interested in finding out if there are any 10 MW sites and then finding out if there are any community energy groups wanting to develop their own half.

Grid Connection Costs

All connections are expensive. 33 kV and 66 kV connections are very expensive. There are three elements to the cost.

1. Cable to the nearest sub-station
2. Upgrading the substation and switchgear
3. Contribution to the cost of upgrading the distribution network across the whole geographical area.

e.g. at Priors Marston the cost of connecting 5 MW would be £450,000 because of the cost of reinforcement needed from the primary sub-station. Somewhere else it could be around £100,000.

Western Power Distribution are now doing major investment in their network as there are so many large new developments planned such as at the Rugby Mast Site and Gallows Hill in Warwick.

Grid Connections – Skills

WCC is risking doing something new + outside its comfort zones in both skills and finance. We've had to develop financial modelling tools to take into account all the various factors of income, costs, selling electricity, FiT income, interest rates, O&M costs etc.

WCC does not have the staff with the right skill set to ask all the good questions. WPD answer questions straight forwardly with no creativity or innovation on what to do if they say no. Asset Utilities have been employed to come up with those

questions we need answers to and to advise on solutions to overcome all the obstacles to enable delivery.

Where next?

WCC officers have spent a lot of time developing plain English arguments for Members about why GMS should be supported. We've needed to buy in the expertise required to give decision makers the confidence to support delivery.

Now WCC's Corporate Board has approved the first capital spending on GMS subject to Member ratification. With as yet no specific schemes identified a briefing paper will go to the controlling party then a report seeking in-principle support is expected to go to Cabinet & Corporate Board in March then Cabinet and Full Council in April.