

Case Study: SunCities Solar Villages



PROJECT SUMMARY

This case study provides an overview of an initiative to create several 'solar villages' in the Kirklees district in the north of England, through a European project SunCities. SunCities started in 2000 and aimed to install 3.05MW (megawatts) of solar electricity on 2,000 homes in Germany, the Netherlands and Kirklees in the UK. In Kirklees this includes a total of 350 kWp solar photovoltaic (PV) systems and 63 solar thermal systems. Around 518 households have been involved across Kirklees, including elderly tenants and families with young children. They will benefit from free solar electricity and can expect to save up to £50 a year on their electricity bill. The energy performance of the homes has been improved; EcoHomes ratings of very good and excellent have been awarded by the BRE for the new build homes.

Solar panels have been installed on to 268 council owned homes, two 40-bed residential care homes, four 8-bed care homes and luxury apartments at Titanic Mill. Through SunCities, Kirklees has installed 4.9% of the total solar electricity installed in the UK, making

SunCities the largest domestic solar project in the UK. SunCities has attracted funding of up to £1.8 million to Kirklees and attracted nationwide attention through winning, in 2006, an Ashden Award for Sustainable Energy, a British Renewable Energy Association Award and Green Apple Award.

HOW WAS IT STARTED?

SunCities was started in 2000 with a successful submission for EU Funding from the EU 5th Framework Programme.

PROJECT AIMS

- Reduce tenants' fuel bills.
- Contribute to reaching district renewable energy targets – currently 10% by 2010.
- Increase capacity to deliver large scale renewables initiatives on domestic properties in Kirklees.
- Reduce climate change emissions.
- Support Decent Homes energy efficiency improvements on the existing houses.
- Contribute to achieving an Ecohomes 'Excellent' status at the Primrose Hill project.

- Reduce the cost of PV for the large-scale application of solar PV.
- Demonstrate that PV can be installed in an appealing way.
- To disseminate the results and to reduce risks associated with PV to increase the uptake by the building industry.

FUNDING

Fund	Solar PV	Solar thermal
EU SunCities	283,211	
UK DTi Major PV Programme	970,193	
UK DTi ClearSkies Programme		57,000
Kirklees Council Renewable Energy Fund	351,160	17,000
Kirklees Neighbourhood Housing	110,000	
Yorkshire Housing Limited	75,000	41,500
Kirklees Community Association	30,700	
Lowry Renaissance	100,879	
Single Regeneration Budget		25,000
TOTAL	1,820,264	140,500

WHO HAS BEEN INVOLVED?

SunCities Project Consortium:

- **Netherlands:** Heerhugowaard Municipality
- **Germany:** MeteoControl consultancy
- **UK:** Kirklees Council & ESD Ltd (energy consultancy)

Partners in Kirklees:

- Kirklees Council Environment Unit
- Kirklees Community Association
- Kirklees Neighbourhood Housing
- Yorkshire Housing Group
- Lowry Renaissance Ltd

Installers:

- FilSol Solar Ltd
- Solar Energy Systems
- Sustainable Energy Installations
- SolarCentury

ABOUT THE TECHNOLOGY

Solar photovoltaic (PV)

Solar electricity (photovoltaic) systems capture the energy from the sun's radiation and convert it into electricity. They will work in any weather, as long as there is daylight. Each solar photovoltaic (PV) array is connected via an inverter (d.c. to a.c. converter) to the electricity supply of the house, so that the power generated is used when there is demand, or exported to the grid if the supply exceeds demand.

The solar PV arrays on the SunCities homes were rated between 1 kWp and 1.3 kWp. Each project was tendered separately, so there is a mixture of mono- and poly-crystalline PV and several different PV manufacturers, including Astropower, NAPS and BP Solar. All the inverters were made by Fronius.



Fernside solar village: 100 solar PV panels

Solar hot water (thermal)

Solar thermal systems capture the energy from the sun's radiation and use it to heat water. The hot water can then be used immediately or stored in a cylinder for later use.

OUTCOMES & BENEFITS

Solar PV and solar thermal

A total of 349.45kWp solar PV has been installed on 518 houses, this represents 4.9% of the total solar PV installed in the UK. Solar thermal systems have also been installed on 63 properties.

Project	kWp	No. homes	Integration
Sackville Street: social housing	40	31	Retrofit
Titanic Mill: luxury apartments, hotel, spa	48.45	130	Roof integrated
Fernside Avenue: social housing	108	100	Retrofit
Primrose Hill: social housing	58	58	Retrofit, also includes solar thermal systems
	31	31	Roof integrated, also includes solar thermal systems
	24	48	Roof integrated, apartments
<i>Primrose Hill: Solar Thermal</i>	<i>63 systems</i>	63	<i>Retrofit and roof integrated</i>
Care Homes	20	80	Roof integrated
Sheltered housing	20	40	Roof integrated
TOTAL	349.45	518	

Cost reduction

The overall cost of the programme was £1.8 million, or about £5,200 per kWp installed. Costs were brought down during the lifetime of the project (see table), by local organisations taking over project management, bulk procurement and learning from earlier projects.

PROJECT NAME	Year installed	PROJECT COST £/kWp
Pre-SunCities	1999	£7,330-£16,920
Sackville Street	2003	£6,563
P Hill KNH	2005	£4,706
P Hill YHG Houses	2006	£5,493
P Hill YHG Circus	2006	£4,280
Titanic Mill	2005	£4,902
Fernside	2005	£4,275
Care homes (each)	2006	£7,965
Sheltered housing (each)	2006	£7,965



Solar PV panels installed at Primrose Hill

Energy generation

The monitoring of energy output is not yet completed, but the programme is estimated to generate about 260 MWh of electricity per year, and save about 110 tonnes of CO₂. Some of the homes where PV systems have been installed use electric heating, so the contribution of the PV to their electricity demand is relatively small at about 15%. The value of the electricity generated on individual homes is about £50 per year at current prices, although the owners get the financial benefit only from electricity which is generated at the time they can use it. The residential homes and Titanic Mill have significant electricity demand during the day, so most of the PV electricity is used on site, even in summer.

Raised community awareness

The enthusiasm of the tenant representatives was instrumental in the project running smoothly. They informed local residents about the scheme and were a focal point for enquiries and feedback. Tenants have taken part in energy information workshops, talked to the media and provided feedback on PV system performance. This project has raised awareness of sustainable energy and its benefits. Some tenants have become keenly interested in how their PV system works and what it supplies and have even competed to see who

has generated the most energy! However a follow-up survey among residents of the first retrofit estate found fairly poor understanding of energy issues, particularly among residents who were not living there when the PV was first installed. This is being addressed during maintenance visits.

Energy efficiency measures

The Kirklees Neighbourhood Housing homes have undergone Decent Homes works, including loft and cavity wall insulation which has improved the homes' energy efficiency. Eco Homes ratings of very good and excellent have been awarded by the BRE for the new build homes at Primrose Hill, developed and managed by Yorkshire Housing.

Local jobs and skills

The solar installation companies were from outside the area, but they recruited local staff to assist with installation. One local boiler fitter has now diversified into installing both PV and solar water heating systems. The housing associations involved in this project are now able to replicate the SunCities project on other parts of their housing stock. Kirklees is assisting other housing associations in the development of new PV projects.

Kirklees is using the SunCities expertise to inform development of other renewable energy projects.



Local installer at Primrose Hill

Communication

A standard project communication strategy for solar energy housing projects was developed and refined using experiences from each project. Communication materials were developed including a basic information sheet for tenants in simple language with information about the PV systems and contact details. The information sheet will be included in a new tenants pack, or affixed permanently inside the home in an appropriate place, to ensure new tenants receive information about their system.

Positive community response



Residents at Fernside solar village

The high visibility of the Kirklees SunCities projects has raised awareness in the community which has resulted in positive feedback from the community regarding solar PV, as demonstrated by the results from the recent TalkBack survey that when asked the question "*Which of the following 'renewable' energy sources should be used more often in Kirklees?*", 83% of respondents replied 'solar panels on public buildings' and 73% of respondents replied solar panels on people's houses.

Partnerships

Partnerships have been forged with European and UK local authorities, housing associations, Kirklees Neighbourhood Housing (the Council's own arms-length housing department), external consultants, private developers

and NGOs such as EnergyWatch, Green Alliance and the Micropower Council.

Visual impact

A key benefit of the programme is to demonstrate how well PV can be integrated in both existing and new buildings. By concentrating the installations on a small number of housing estates, SunCities has provided a good visual impression of how the widespread use of PV would appear. This is a common sight in Germany and the Netherlands, but only just starting in the UK.



LESSONS LEARNED

- Photovoltaics are one of the easiest renewable energy technology to integrate in towns and cities, because they can be installed on roofs and building facades with minimal intrusion, and they have a high level of acceptance by the general public.
- Buying in bulk (e.g. Fernside solar village 100 solar PV systems) can greatly reduce project costs.
- It is currently difficult for households to sell back any surplus electricity (i.e. electricity not used by the building) to a supplier or obtain Renewable Obligation Certificates for the electricity they generate. Therefore households are denied a large proportion (approx 50% of the electricity generated is exported) of income from their solar PV systems.

Kirkless has lobbied to improve the situation for export of electricity, and also easier access to Renewable Obligation Certificates (ROCs) for small generators.

A leaflet outlining in more detail the lessons learned through SunCities, produced by all project partners, is available.

MEASURING SUCCESS

- **Environmental:** the solar photovoltaic installations will save around 115 tonnes of carbon dioxide every year; the solar thermal systems will save an additional 24 tonnes each year.
- **Technical:** the solar photovoltaic systems are being monitored using two methods: data has transmitted to a monitoring expert and tenants have been involved taking direct readings. A typical household system rated at 1 kWp generates about 750 kWh of electricity per year in the UK.
- **Sharing experience:** a mentoring programme and site visits to the solar villages will be held as an opportunity for housing associations and other organisations responsible for housing or delivering medium to large scale renewable energy initiatives to learn more about the SunCities project.

PLANS FOR THE FUTURE

System maintenance

The installers explained the basic operation of the retrofit systems to the tenants when they were working on them. Kirklees Council has prepared simple leaflets explaining about the systems to the tenants. There has been fairly regular follow-up as part of the monitoring programme, but very few problems have occurred. Typically if a system has not been operationally it is due to the inverter tripping out, the isolator switch has been switched off, or houses have had the supply of mains grid electric switched off. This can

happen if a prepayment meter 'runs out', if the property is empty or during a power cut.

Training

The installers have two-year contracts with the two housing associations to maintain the systems on their properties. Kirklees is exploring options to deliver training to council staff to enable maintenance to be carried out in-house and also for the training provision to be extended regionally and nationally.

KMC Mentoring Programme

Kirklees is developing the project **Sustainable Energy – Getting Started**. This project aims to build capacity in the Kirklees district and the wider Yorkshire & Humber region to deliver medium to large scale sustainable energy projects in the housing sector.

This will be achieved through site visits and workshops to share experiences and disseminate lessons learnt.

A more in depth mentoring service will be offered to organisations to support them to develop a sustainable energy project. This project is funded by the Ashden Awards for Sustainable Energy and Government Office for Yorkshire and Humber.

CONTACT DETAILS

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Please also see the SunCities website
www.suncities.nl

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