

# PHOTOVOLTAICS IN BUILDINGS

## DOMESTIC FIELD TRIAL

### Newbiggin Hall Estate, Newcastle upon Tyne

*This is an example of photovoltaic (PV) installations in a social housing refurbishment in Westerhope. Here the PV installation of arrays was combined with other improvement work including an upgrade of insulation, fire-stopping and an extensive overhaul of the external fabric.*



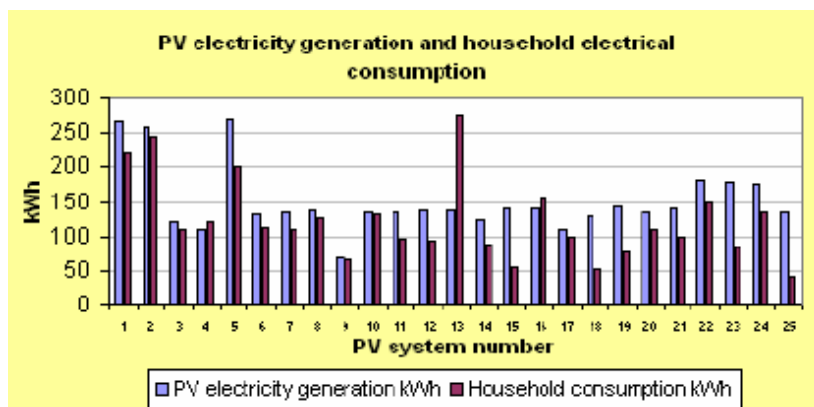
- **38.25 kWp installed capacity**
- **BP 585 Laminates, roof mounted**
- **25 systems on social housing block**
- **Average annual yield – 688 kWh/kWp**
- **Average annual savings 11.3 tonnes CO<sub>2</sub>**
- **Average Performance Ratio – 72%**

#### Project Team

Newcastle County Council  
 PV Contractor – PV Systems Ltd.  
 Monitoring – ESD Ltd.

#### Site Description

The 25 flats in this mid-rise block provide social housing within Westerhope. Newcastle County Council (NCC) initiated a programme of refurbishment, which included re-roofing. This posed an ideal opportunity to integrate PV systems at the same time. The PV arrays were installed as a roof-integrated system, with a total installed capacity of 38.25kWp. The overall system comprises 450 BP Solar 85Wp laminates mounted in four sub-arrays onto separate roofs above the flats and over 290 m<sup>2</sup> nominal gross area. The systems are divided into 25 separate systems, one for each flat. NCC made the decision to manage the project in order to gain hands-on experience with PV in view of applying this sustainable technology in other developments.



*Overall performance of all the systems has been very good. The graph shows electricity generated by the PV system in June 2005 and household electricity consumption*

#### Installation & Commissioning

The programme of re-roofing was carried out by NCC City Build, who stripped the tiles and fitted the boarding, felting and battening. PV Systems then followed this with the installation of the RIS aluminium PV frames. These were assembled on site and a hoist was provided by NCC to lift up panels to the roof to conform with health and safety lifting requirements. The frames were secured to the battens using screwed clips clamping the vertical rail section.

Laminates were fitted into each frame as work progressed to ensure that the frames were square to the roofline and adjacent frames. They were sealed using a perimeter rubber gasket and fixed with

aluminium capping strips riveted into place. Once the arrays were completed and tested NCC City Build completed the roof work, i.e. replacing the tiles, flashings, etc.



*Series connection of a laminate*



*The completed PV array*

It was possible to use existing trunking to route the AC cables which saved on installation time, materials and kept disruption of tenants to a minimum. Connections to individual supply points to flats were made within centralised meter cupboards located in the hallway of each block. Again this avoided having to access flats therefore minimising disruption to tenants and avoiding having to lay additional cabling. The local DNO (NEDL) were present on the commissioning day and approved the system.

### **System Costs**

There were great concerns about security at the site and 7 day out of hours security was provided. Provision of on site washing, toilet facilities, temporary power supplies and keeping tenants informed also has cost implications. This added significant costs to NCC, which is reflected in the average electricity cost for the site which was calculated to be about a third higher than similar projects within the DFT. The average electricity cost was calculated over a predicted 25 year lifetime and came to 30.5p per kWh. Any costs associated with the re-roofing, project team management and monitoring specific to the DFT have been excluded here. Newcastle County Council are currently looking into green tariffs and options for being paid for any exported electricity.

### **Lessons Learnt**

Even though the installation itself went smoothly, a number of project management issues were encountered during the lead up time. The timescales of general refurbishment work and PVDFT requirements did not match, which unfortunately resulted in the PV and roofing work being completed separately. Also it is important to find a roofing company which allows retrospective PV integration while honouring the roof's guarantee period. Furthermore the PV contractor needed to make sure that their Health & Safety policy and training provisions met the requirements of the NCC approved contractor list. Contractual arrangements need to be in place when obtaining planning permission as detailed design plans will need to be provided. Overall the project team needs to be flexible enough to provide solutions to changing circumstances. This was achieved here and one major adoption resulted in locating the consumer displays (showing PV output) and export/import meters within the meter cupboard on the ground floor instead of inside each flat. They are now visible to anybody entering that block of flats, having minimised disruption to tenants as well as limiting installation time by being able to install all the metering in one go.

### **Further information**

- [www.pv-uk.org.uk](http://www.pv-uk.org.uk)
- Publications available from DTI website: Photovoltaics in Buildings – Guide to the installation of PV systems, Good Practice Guide Part 1 – Project Management and Installation Issues

### **Project team contacts:**

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