

Case study: E.ON and Kingspan Insulation Ltd

External wall insulation take back trial

Retro-fitting external wall insulation has the potential to deliver significant carbon savings through improved thermal performance. This case study examines the 'zero waste' benefits of taking back off cut insulation through a trial operated by E.ON and Kingspan Insulation Ltd (Kingspan).

Background

As one of the UK's leading generators and suppliers of gas and electricity, E.ON has obligations under the Community Energy Saving Programme (CESP). The Programme requires obligated parties to treat domestic properties with energy efficiency measures in order to reach an uplifted carbon emissions reduction target of 19.25 million lifetime tonnes of CO₂ by the end of 2012. Retro-fitting external wall insulation (EWI) is a key strand of E.ON's strategy for meeting its obligations under CESP.

This case study focuses on a trial undertaken during a CESP external wall insulation project covering 206 properties at Brierley Hill, Dudley. During the trial, phenolic board off-cuts, which were historically sent to landfill as mixed skip waste, were instead segregated and taken back by the insulation supplier for subsequent use as a fuel replacement in cement kilns.

"By working in partnership on this take-back trial we have been able to jointly demonstrate a cradle-to-grave approach that has the potential to divert 100% of phenolic board waste from landfill".

Kate Grant, Project Manager, E.ON



External wall insulation being applied.

Trial Partners

The trial has been operated in partnership by E.ON, Kingspan Insulation Ltd. and Wetherby Building Systems. Their respective roles have been as follows:

- E.ON New Build & Technology and E.ON Property Services managed the project and carried out the site-based work, including capturing details of the take-back process and on site management of waste.
- Kingspan Insulation Ltd. supplied the phenolic board and managed the take-back and subsequent processing of off-cut waste.
- Wetherby Building Systems provided the insulation system design for the Dudley project. This includes phenolic board, powders, renders and wet pastes.
- Entec UK Ltd. (funded by WRAP) provided technical support to the process, including calculation of performance metrics.

The Dudley trial

Phenolic board off-cuts make up a large volume of the site waste generated during EWI installation programmes. E.ON identified this as a key area for waste reduction. Working with partners, Kingspan, Wetherby and Entec, a concept for phenolic board waste take-back was developed. The Dudley CESP scheme was identified as an opportunity to test the take-back methodology due to the ideal combination of the project's location, its timing and scale. Successful implementation of the trial would significantly reduce volumes of waste being sent to landfill.

Aims

The aims of the trial were to evaluate the efficiency of the waste take-back process, cost / saving implications, reliability of stakeholders and the environmental benefits. The scope of the waste take-back trial was confined to phenolic board and associated packaging.

Approach

The Dudley CESP trial commenced in October 2010 and ran until March 2011. The process of installing the boards on site was managed by E.ON Property Services and involved a combination of in-house and subcontracted fitters.

Due to the scale of the Dudley project (206 homes) phenolic board was delivered directly to site by Kingspan (along with bespoke, branded bulk bags for take-back) from its production facility in Pembridge approximately 45 miles away. Bags of off-cut material collected on site were back-hauled on the same vehicles. Wetherby consolidates other materials and delivers these as mixed loads with no take-back.

Site based activities were as follows:

- Filling of Kingspan bulk bags with off cut material at the point of fitting.
- Transport of bags (via forklift) to a central site storage area at the end of each day.
- Checking of the bag contents, e.g. for mixed waste contaminants was the responsibility of the forklift driver.
- Transfer of full recycling bags to Kingspan at the point of new boards being delivered.



Property subject to EWI fitting.



Bulk bags waiting take back at central storage area.



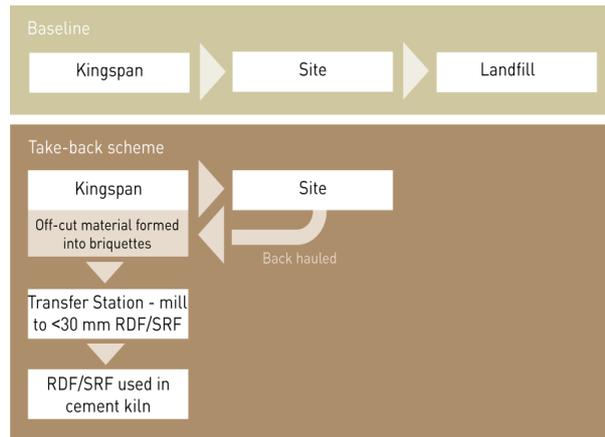
Material loaded on to Kingspan delivery vehicle for take back.

To support the process, waste management tool box talks and handling guidance was provided on site, backed up by a process flow sheet and monitoring spreadsheets held by the E.ON Project Manager.

Kingspan provided regular data on the quantities of waste returned throughout the trial, supported by waste transfer notes. This data was collated on a spreadsheet from which the avoided landfill tonnages and other trial metrics could be calculated.

Once received at Kingspan's production facility, the off-cut board is shredded and compacted into

briquettes. It is then transferred via a regional waste transfer station to a cement kiln for burning as Solid Recovered Fuel (SRF).



Simplified supply chain diagram of take back material management.

Lessons learnt

As the first trial of its kind on this scale a number of lessons were learnt, including:

- Initial and sustained education of fitters and delivery drivers is the key in the first few weeks to drive home the importance of the waste take back process and the need to use the bespoke take back bags for cut off board.
- The importance of ensuring sufficient quantity of bulk bags are in circulation throughout the project. The first few weeks are critical in imbedding behaviour change and good practice so all practical barriers to this being achieved must be removed from day one.
- Awareness (and uptake) of the option to also take-back packaging associated with the board, comprising polystyrene bearers and plastic wrap in this case, was low at the start of the trial. This was addressed through updated tool-box talks.
- The need to provide a dedicated storage area for bulk bags ready for collection that is accessible to drivers.
- Consideration of the above in the context of overall waste security at sites, in order to avoid vandalism, risk of fires etc.
- The value of having a Project Manager driving the process, collating data and communicating with stakeholders.

Key findings

Avoided disposal

Across the trial period (October 2010 – January 2011) 4.36 tonnes of phenolic board were taken back by Kingspan and used for energy recovery. As a high volume, low weight material this weight of phenolic board equates to approximately 21 skip loads of avoided disposal. Based on removal charges (at the time of the trial) of £125 per skip this represents avoided waste management costs of £2,625 over the course of the trial. There is a charge levied by Kingspan for managing the take-back of the material, this being £150 per tonne. Therefore, the net saving in phenolic board disposal costs over the trial was £1,971. On a 'per tonne' basis the results indicate that the take-back operation delivers a 75% cost saving over landfill (based on 2010/11 prices).

Applying the above results to the industry-wide projection of 1.5million additional homes being treated with EWI by the end of 2020, the potential cost saving would be approximately £14.35million at 2010/11 prices.

Avoided carbon

An assessment was undertaken to determine the differential carbon emissions associated with local landfill compared to take-back and use as SRF. Four main activities were included in this assessment:

- Transportation of off-cut phenolic board from site to its end-use comprising legs from site – Kingspan, Kingspan – Waste Transfer Station and finally to the cement kiln.
- Preparation of the phenolic board material for its end-use (shredding and compacting).
- End use.
- Abated fossil fuel (coal) energy calculated from assumed energy provision of SRF.

The assessment demonstrated that the take-back trial produced a net saving of 9.9 tonnes of CO₂ when compared to landfill, the majority of this being due to the abatement of CO₂ through energy provision. Based on the industry-wide projection of 1.5million additional homes being treated with EWI by the end of 2020, the potential benefit of managing the phenolic board via the take-back process would be a saving of approximately 72,500 tonnes of CO₂.

Metrics for future solid wall insulation projects

The following parameters have been derived from the Dudley trial which can be used to inform planning requirements for future take-back schemes:

- The average quantity of off-cut phenolic board per property fitted = 21.2kg. This broadly equates to 1 – 1.5 bulk bags (of dimensions 90cm x 90cm x 90cm).
- Under normal operating conditions a semi-detached house will typically take a 2-man crew 2 days to fit with phenolic board.
- Approximately 10 bulk bags of off-cut material can be fitted into a 15m³ skip.

Further material

For more information, visit

www.wrap.org.uk/construction. You can access:

- a range of other exemplar and cost benefit case studies;
- procurement guidance and model wording;
- the Net Waste Tool (free online tool for assessing waste arisings on construction projects);
- WRAP's Site Waste Management Plan Template; and
- guidance on Designing out Waste.

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