

# End of Life Solutions

for Kingspan Insulated Panels



*Climate  
for Change*



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# Introduction

This document identifies the options available at end-of-life for Kingspan insulated panels, providing you with detailed information as well as dispelling some of the myths in the market place at the moment with the true facts in relation to the topic.

## Whole Life Cycle

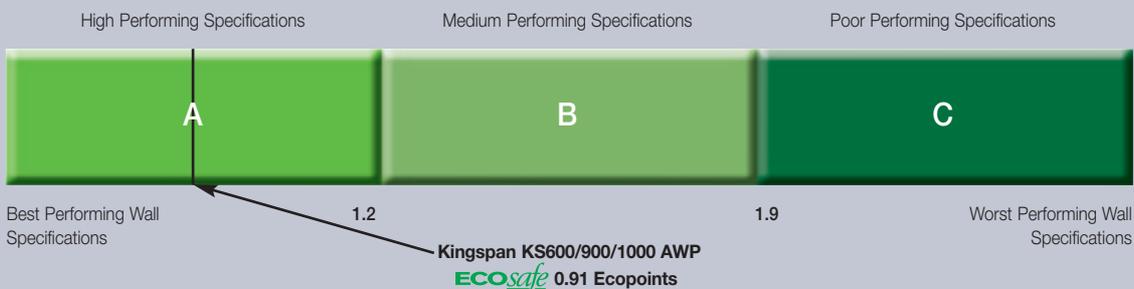
Assessing the whole life cycle of building systems is critically important in addressing their impact. In 2006, Kingspan Insulated Panels began a process with the UK Building Research Establishment (BRE) to identify and assess the environmental effects of Kingspan's key panels from 'cradle to grave'. Panel systems profiled so far have **achieved a Green Guide to Specification 'A' rating which importantly includes end-of-life.**

## Cradle to Grave Diagrams

### Roof Specifications\*



### Wall Specifications†



Kingspan Insulated Panels achieved an outstanding score of 0.82 for the KS1000 RW panel and 0.91 for our Architectural Wall Panel (AWP) and Optimo™. Both are rated as 'A' according to 'Green Guide to Specification' and importantly this certification incorporates cradle to grave.

\*Coated steel insulated composite roofing panels, on steel roof structure

†Coated steel insulated composite cladding panels

Composite insulated panel systems arrive on site as complete, factory prepared units. Specific panel sizes and quantities can be specified and the systems require only a single fix process—all of these attributes contribute to greatly reducing the potential for waste, as well as speeding up construction time. Composite panels also provide extremely thermally effective, airtight and durable building envelope solutions, reducing energy consumption over considerable periods of time.

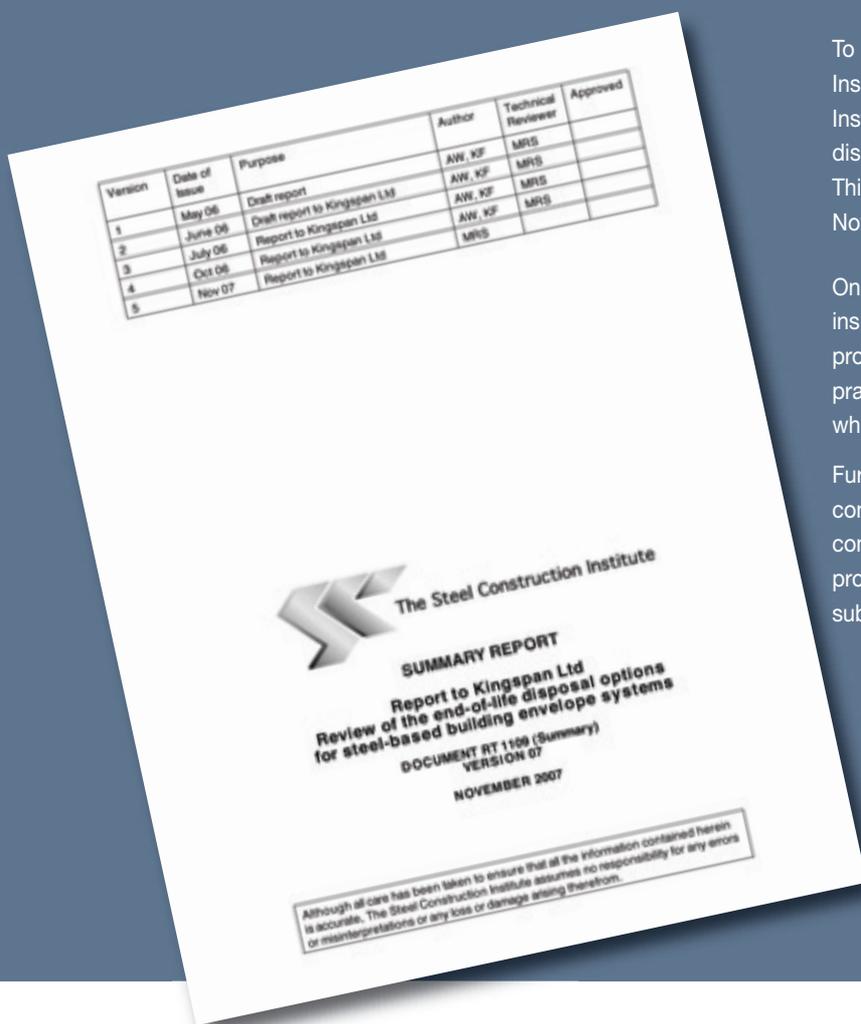
# The Steel Construction Institute Report

The SCI is an independent, member-based organisation. It is probably the world's largest research and technical organisation supporting the use of steel in construction. The objective of The Steel Construction Institute is to develop and promote the effective use of steel in construction.

To ensure high quality, independent research, Kingspan Insulated Panels commissioned the Steel Construction Institute to prepare a report on the review of the end-of-life disposal options for steel-based building envelope systems. This report originally completed in 2006 was updated in November 2007.

One of the key outcomes of the report is that the recycling of insulation core from all types of metal cladding systems is problematic. The research found that current demolition practice is thought to result in the insulation going to landfill – whether it be PUR, PIR, rock fibre or glass fibre.

Further to the SCI report is worth pointing out that metal clad construction can be easier to dismantle and separate into component parts than many traditional building systems. This provides the potential for recycling all elements of the system subject to cost and technical viability.



*This report is available in full on our website at [www.kingspanpanels.com/SCIReport](http://www.kingspanpanels.com/SCIReport)*

# Re-use of Kingspan Insulated Panels

Studies into the re-use of insulated panels have indicated that the potential for re-use from both an economic and technical point of view can be limited by some factors, however, Kingspan Insulated Panels have demonstrated cases where insulated panels have been re-used particularly on buildings where aesthetics are not vitally important.

Re-use of Kingspan panels at end-of-life is always the preferred option and as the two case studies below show it is a viable option. Using insulated panels in this manner at end-of-life has many benefits including significant financial savings for all involved.

Mac-Fab Systems



Clinton Engineering



## Project A - Mac-Fab Systems

Building Type: Industrial  
Location: Co. Monaghan, Ireland  
Kingspan Panel: AWP - KS1000 MR  
Original Panel Use: Retail  
Original Panel Location: Liffey Valley Shopping Centre  
Dublin, Ireland

## Project B - Clinton Engineering

Building Type: Industrial  
Location: Kells, Co. Meath, Ireland  
Kingspan Panel: KS1000 RW  
Original Panel Use: Commercial  
Original Panel Location: UK

# End-of-Life Management - Current Production

**All Kingspan insulated panels produced since 2004 including current production are classed as non-hazardous and do not contain CFCs or HCFCs, i.e. ozone depleting substances (ODS).**

Re-use is always the preferred option but if this is not possible these panels are often suitable for processing through conventional shredder plants once they have reached the end of their useful life.



The cost of processing panels through shredder plants is approximately **cost neutral** with the transport costs from site being covered by the scrap value of the steel. Economics for specific buildings will be dependant on transport distances.

Shredders work by pulverising materials using rapidly flailing hammers with rotor diameters up to 3 metres driven by large motors up to 10000hp. Sophisticated control systems, in conjunction with cyclone technology, ensure clean separation of metal from other materials. Steel is recycled and the insulation goes to landfill.

## Dismantling Panels

Kingspan take on site health and safety very seriously and only provide insulated roof panels for incorporation into a system that is Class B rated in relation to non-fragility according to ACR [M] 001:2005, 'Test for non-fragility of profiled sheeted assemblies.'



As Kingspan insulated panels comprise of pre-fabricated single component units site experience has shown that both roof and wall panels at end of life are relatively easy to safely remove from a building and transport to a recovery centre.

Dismantling site assembled multi component installations may be problematic owing to issues surrounding the fragility of the roof system and it's component parts. Critical to this assessment of the viability of dismantling rather than demolition is information on the structural characteristics of the top sheet, liner sheet and system as a whole.

# Cost Neutral End-of-Life Case Studies

## Project 1

Kingspan insulated panels were recently taken from a site in Hemel Hempstead and sent to a local shredder plant. In total 13,000m<sup>2</sup> of Kingspan Trapezoidal roof panel was disposed of at a cost of £0.18/m<sup>2</sup>.

## Project 2

Kingspan insulated panels were also recently removed from a site in West Bromwich and were disposed of via a shredder plant. In disposing of 2,200m<sup>2</sup> of our Trapezoidal roof panel, there was a net income of £0.10/m<sup>2</sup>.



**Site:** Hemel Hempstead

**Qty m<sup>2</sup>:** 13,000

**Disposal Route:** Shredder

**Value of panels:** £8,504 (£50 per tonne)

**Transport Costs:** £10,785

**Average Cost Per m<sup>2</sup>:** £0.18p

**Site:** West Bromwich

**Qty m<sup>2</sup>:** 2,200

**Disposal Route:** Shredder

**Value of panels:** £218 including transport

**Average Income Per m<sup>2</sup>:** £0.10p

# End-of-Life - ODS Containing Panels

Since January 2004 all Kingspan insulated panels have been manufactured without any Ozone Depleting Substances (ODS). Some panels were manufactured with ODS before 2004 and current legislation governing the recovery of ODS - EC Regulation 2037/2000 - requires recovery of ODS to be carried out 'if practicable'.

Kingspan takes the issue of end-of-life very seriously and has been working with industry experts in waste management and disposal for over two years including European Metal Recycling (EMR), Mayer Environmental, Blue Castle and Caleb Management Services Ltd.



As a result of the excellent long term thermal and structural performance properties offered by insulated panels, there are currently only very small quantities of ODS containing panels entering the waste stream, however as we reach the end of the next decade this will have changed and we need responsible solutions for the end of life disposal of these panels.

This involved extensive research into the disposal of ODS containing insulated panels through the use of existing refrigerator recycling plants, which is our recommended method of disposal, where viable.



## Refrigerator Recycling Plants

A commercial service for dealing responsibly with the legacy of CFC and HCFC containing insulated panels at their end-of-life is now available. Kingspan is aware of a number of projects where panels have been re-processed successfully using refrigerator recycling plants.

## Case Study: Warehouse Building, Stafford

**Quantity Kingspan Panels:** 7000m<sup>2</sup> KS1000 RW

**Disposal Route:** Fridge Recycling Plant (Panels containing ODS)

**Cost Disposal:** £4.63/m<sup>2</sup>

**Transport Cost:** £0.68/m<sup>2</sup>

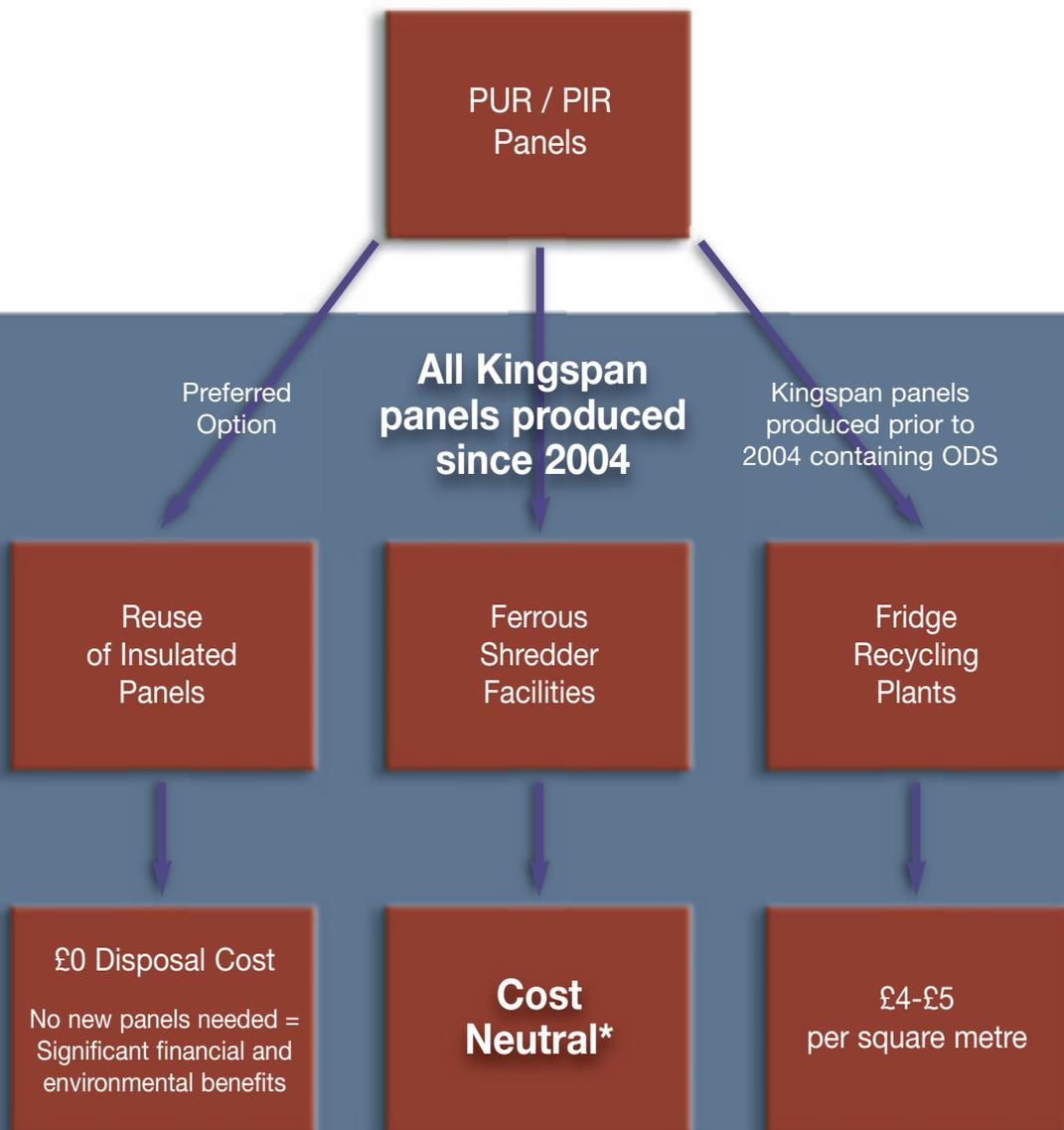


A major advantage of fridge recycling plants is that the recovered insulation is clean and dry – in the ideal form for recycling / reprocessing, although current economics determine that most goes to landfill.

The use of fridge plant processing has future potential to go a long way towards establishing a 'closed-loop' resources flow, thus avoiding landfill.



# The Facts About End-of-Life Management of PUR / PIR Panels



\*Net income of approximately £50 per tonne, subject to value of steel at time of disposal, for panels whilst also taking into account transport costs (see page 7)



**Kingspan Insulated Panels has successfully completed production trials enabling the recycling of non-ODS containing waste PIR back into the manufacturing process.**

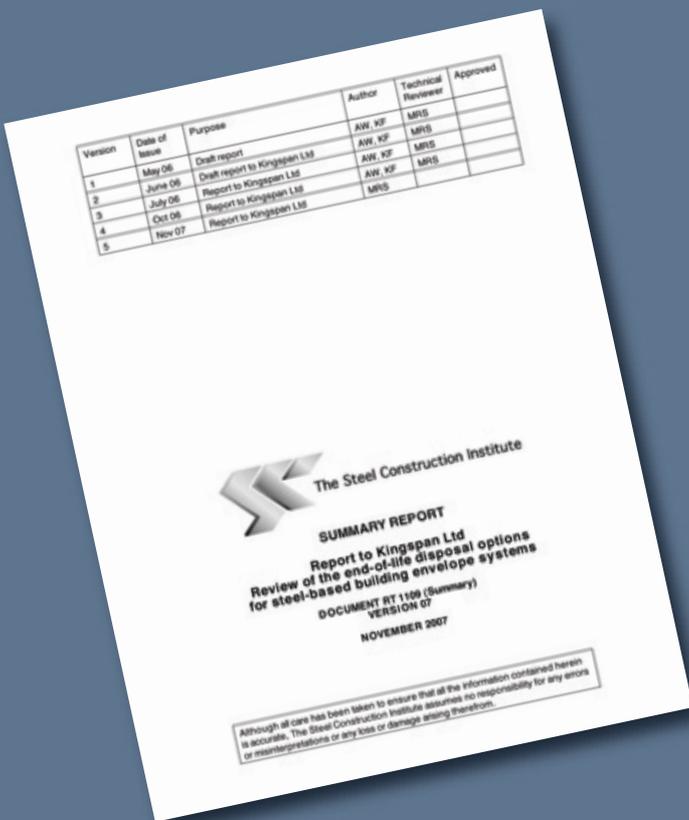
# Conclusion

A key summary from the SCI report was that current demolition practice generally results in the insulation going to landfill – whether it be PUR/PIR, rock fibre or glass fibre.

Kingspan Insulated Panels has successfully completed production trials enabling the recycling of non-ODS containing waste PIR back into the manufacturing process and this is currently being implemented on a commercial scale for factory

production waste. This process has the potential to be used in the future to allow Kingspan PIR insulation at end of life to go back into the manufacturing process.

Kingspan insulated panel systems profiled so far through the BRE have achieved a Green Guide to Specification 'A' rating which importantly includes end-of-life.



Re-use of Kingspan panels at end-of-life is always the preferred option and Kingspan Insulated Panels are aware of a number of projects where panels have been reused. Using insulated panels in this manner at end-of-life has many benefits including significant financial savings for all involved.

All Kingspan insulated panels produced since 2004 including current production are classed as non-hazardous and do not contain CFCs or HCFCs. The cost of processing panels through shredder plants is approximately cost neutral with the transport costs from site being covered by the scrap value of the steel.

A commercial service for dealing responsibly with insulated panels prior to 2004 containing CFC and HCFC at their end-of-life is now available. Kingspan is aware of a number of projects where panels have been re-processed successfully using refrigerator recycling plants.



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