

Net Zero Energy Policy Update Sherburn Site - October 2014





What is Net-Zero Energy?

“Net Zero Energy, as defined for our own purposes, is that our sites, over a year, on a net energy balance will be powered by renewable energy“

Target for Kingspan Group estate to achieve Net Zero Energy by 2020 with an interim target of 50% in 2016.

Kingspan Group NZE Progression



Net Zero Energy Progression

	Renewable GWH*	% Total Use
2009A	5	2
2011A	16	5
2013A	60	18
2016P	170	52

*Renewable power either generated on site, or bought in (A: actual; P: plan)



Sherburn Energy Efficiency Measures

- In 2014 we are spending £925,516 on energy efficiency measures at Sherburn. Grand total of energy savings amounts to 2,527,653 kWh.

Energy Efficiency Measure	kWh Saving Electricity	kWh Saving Fuel Oil	kWh Saving LPG	Carbon Dioxide Savings (Tonnes)
Lighting - Factory	1,124,000			612.6
Lighting - offices	176,313			96.1
Automatic monitoring / targeting	249,573	388,278	123,900	267.2
Building Management System		230,733		61.4
Compressed Air System	234,857			128
Totals	1,784,742	619,011	123,900	1165



Sherburn Energy Consumption Profile

	2012*	2013*	2014**	2015***
Electricity	5,888,186	5,850,607	5,650,000	4,500,000
Fuel Oil	9,668,461	8,934,926	8,415,000	8,000,000
LPG	1,714,216	1,714,055	1,690,000	1,600,000
TOTAL	17,270,863	16,499,588	15,755,000	14,100,000

* Actual kWh

** Predicted kWh with partial impact of energy efficiency measures

*** Predicted kWh with full impact of energy efficiency measures including business growth provision.



Net-Zero Energy Achievement

▪ Electricity

A 5.5MWp Rooftop Solar PV system will generate 4,500,000 kWh. This will cover the total electricity use predicted in 2015.

▪ Heat

Detailed feasibility study is being finalised for biomass / AD to potentially replace current fuel oil / LPG use.



Potential Electrical Energy Consumption Profile in 2015

	2016*** Predicted (kWh)	Non- renewable energy use (kWh)	Renewable Energy Generation (kWh)	Net non- renewable energy (kWh)
Electricity	4,500,000	0	4,500,000 (PV)	0

Solar rooftop PV system will generate 100% of site electricity demand (net).



Summary

- A 5.5MWp Rooftop Solar PV system is essential to cover our electricity requirements on site.
- Biomass possibly in conjunction with anaerobic digestion (AD) offers a potential solution to cover the site heat demand. Further work is ongoing to develop a finalised proposal.
- **Rooftop solar PV plus biomass / AD has potential to deliver renewable energy to cover 100% of total site energy demand in 2016 – helping to deliver a world-leading sustainable net zero energy manufacturing facility.**

**Kingspan
Sherburn**



Protecting Investment, Growth, Jobs

Kingspan Sherburn 2013 Data



1.0 Sherburn Economics

- Skilled & Fulltime Employees – 330 (plus a further 220No. Severfield employees located on site as Kingspan tenants, site total = 550)
- | | £million PA |
|--------------------|-------------|
| ■ Turnover | 96.0 |
| ■ Export Sales | 20.8 |
| ■ Rates | 0.4 |
| ■ NI Contributions | 0.8 |
| ■ Corporation Tax | 2.6 |

1.1 Sherburn Environmental

- | | |
|---------------------------------------|-------|
| ■ Electricity (MWh) | 5,851 |
| ■ Fuel Oil generated heat (MWh) | 8,935 |
| ■ LPG generated heat (MWh) | 1,714 |
| ■ Weight of Waste - Landfill (Tonnes) | zero |
| ■ Weight of Waste - Recycled (Tonnes) | 4,000 |

2.0 Kingspan Group – UK economy growth & jobs contribution

- 2,500 Employees
- £260 million per annum Tax – VAT – Salaries
- £200 million per annum Exports
- 17No. UK Locations



Deep Renovation Project Measures



- 1.0 Replace 55 year old end-of-life uninsulated asbestos roofs with a **high-performance energy efficient insulated metal panel roof system** to comply with 2014 building codes. The new roof system will incorporate high technology advanced natural daylighting panels to optimise light transmission at working space level.
- 2.0 Install a **5.5MW output 52,000² rooftop solar PV array** onto the new roof system across the site. Generation from the rooftop solar PV system is predicted to be equal to our site electricity demand in 2015.
- 3.0 In 2014 Kingspan has invested over £925,000 in energy efficiency measures at Sherburn to save over 2.6 GWh of energy. This measures include a full **Kingspan Smart-Lite LED lighting system** which yields an energy saving of 87.5% compared to the original lighting system. Also included are improvements to the compressed air system, sub-metering, building management systems and an automated targeting and energy monitoring system.



Deep Renovation Project Energy Savings



4.0 Energy and CO₂ emission savings summary of measures 1.0 to 3.0 inclusive are:

■ Rooftop Solar PV Array	
Energy Generation PA	4.5 GWH
Energy Generation 25 years	101.6 GWH
CO ₂ Emission Savings PA	2,345 te CO₂
CO ₂ Emission Savings 25 years	52,430 te CO₂
■ Energy Efficiency Measures	
Energy Savings PA	2.5GWh
Energy Savings 25 years	62.5 GWh
CO ₂ Emission Savings PA	1,165 te CO₂
CO ₂ Emission Savings 25 years	29,125 te CO₂

5.0 Combined energy and carbon dioxide emission impact:

■ Combined Energy Generation and Savings PA	7 GWh
■ Combined Energy Generation and Savings 25 years	175 Gwh
■ CO ₂ Emission savings PA	3,510 te = 702 houses
■ CO ₂ Emission Savings 25 years	87,750 te = 17,550 houses



Addressing The Issues

- **Stipulation that PV modules need to be black cells and black framed.**

This will adversely impact the commercial viability of the project and make it non-viable as it will add 15% onto £6mio PV system investment.

Blue polycrystalline silver framed product is what is used country-wide on commercial industrial buildings in areas much more populated and visible than the Sherburn factory.



Addressing The Issues

- **Stipulation that PV modules need to be in plane on the North face as opposed to tilted East-West.**

Critically, if we place modules in plane on North face it will have a detrimental impact to output that will deem the whole project commercially non-viable.



Addressing The Issues



BRE NATIONAL SOLAR CENTRE

Glint and Glare related to standard Crystalline Solar Modules

Crystalline Solar Modules comprise of a laminate made up of glass, solar cells and a rear back sheet bonded together with EVA and mounted in an anodised aluminium frame.

In order to maximise the generation of electricity from the Solar Cells the glass used is a non reflective stippled surface low iron white glass. This glass, unlike normal glass used in buildings or greenhouses, is designed to absorb light and not reflect light.

Solar modules have been used, for over 15 years, at various Airports across the World mounted on the Roofs of terminal buildings / hangers or directly alongside the runways and cause no disturbance to the operation of the air traffic.

In order to give modules the necessary structural strength, the laminate is framed in an anodised aluminium frame. The frame is around 45mm in depth, for strength reasons but only overlaps the glass by around 6mm. the visible front face of the frame is less than 10mm wide. When mounted on roofs that framed modules are mounted side by side with only the top edge of the aluminium ever visible.

Experience shows that little or no glare comes from the frame and as it weathers it tarnishes and has even less reflective properties.

Non Crystalline Solar Technology and BIPV generally use reflective glass and need to be assessed on a site by site basis.

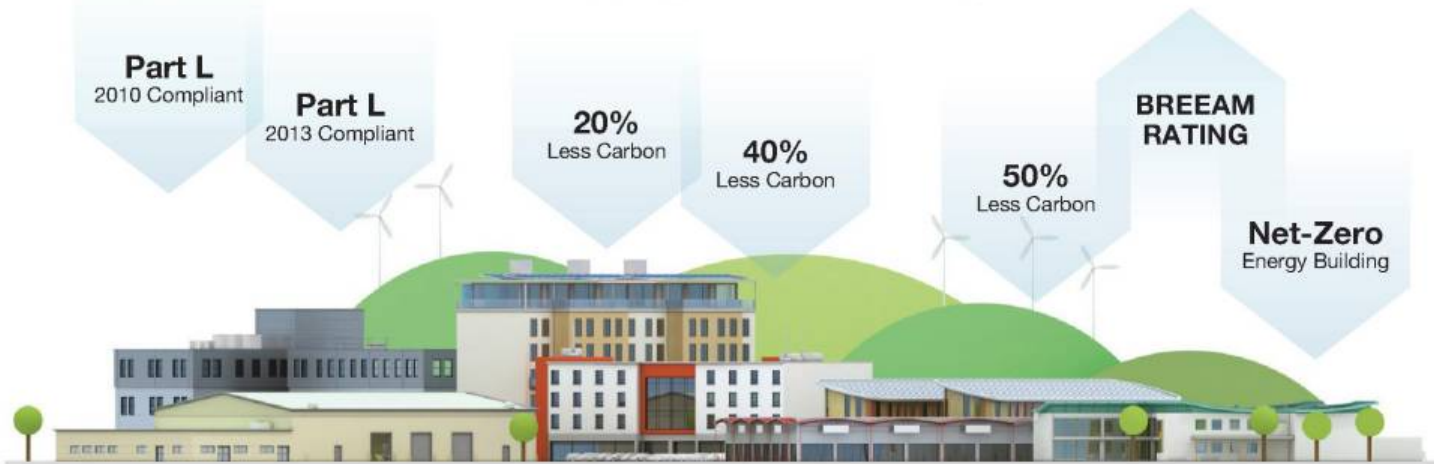
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- Technical Adviser to DECC & Cabinet Office**



Route to Net-Zero Energy Buildings



2020 Target for Sherburn site to achieve Net-Zero Energy - 50 % to be achieved by 2016



*BREEM UK New Construction 2011 Method.



Kingspan
The Energy Saver



EFFICIENCY
IT'S IN THE CORE

126,600 million kWh per year

TOTAL ENERGY SAVED BY KINGSPAN'S INSULATION SYSTEMS

EQUIVALENT TO...



saving
£3.64bn
in energy
costs



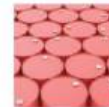
saving
25m
tonnes
per year



the annual
output of
90
gas-fired and
23 coal-fired
power stations



a car driven
4.375m
times around the
world



over
74m
barrels
of oil



up to
3 times
the annual energy
consumption of
Greater London