

A man wearing a brown jacket and a grey cap stands in a forest of young, thin trees. He is smiling and has his hands in his pockets. The background is filled with green foliage and tree trunks.

**PROSIECT
CARTREFI O
BREN LLEOL**

**THE
HOME-GROWN
HOMES
PROJECT**

CASE STUDY: FARMER

Farmland timber diversification

GROWING TIMBER FOR REVENUE DIVERSIFICATION ON WELSH FARMLAND

More than ever before, farmers need to build resilience into their business planning, which amongst other things could include woodland creation as part of a revenue diversification strategy

The sustainability of farming businesses in Wales has never been more uncertain. The increasing costs of production coupled with doubts over the nature of future subsidy and the way farmers are expected to respond to the climate crisis is having a negative impact on their wellbeing.

More than ever before, farmers need to build resilience into their business planning, which amongst other things could include woodland creation as part of a revenue diversification strategy. Tree planting has certainly proved to be an effective strategy for one mid Wales farming family.

With the help of a specialist forestry agent, they were able to access grants for planting and maintenance of a new woodland – carefully designed to ensure the choice of tree species suited the site, the soil, the climate and their objectives whilst fitting in the existing landscape. Their investment, on some of the least productive land on the farm has shown real benefits and encouraged them to create more woodland.

KEY PLAYERS



"...people are scared of change, but we've got to do something so we don't go down the pan."

Martin James and his partner Charly, Welsh sheep farmers, Talybont



"The land was valued at approximately £1,500 per acre at the time and in today's market it is closer to £7,500 with a likely increase over the coming years."

Robert South, Managing Director, Bronwin & Abbey



"Forestry agents play a crucial role in taking the pressure off those wishing to pursue the woodland creation schemes."

Anna Dauksta, Forestry & Timber Project Manager for Woodknowledge Wales

BACKGROUND

TYN Y RHOS FARM

Son of a traditional Welsh sheep farmer, Martin James, grew up on an upland family farm Tyn y Rhos, outside Ponterwyd in Ceredigion. Martin and his partner Charly now own and live on a family farm of their own near Talybont, 15 miles from Ponterwyd. Their farm consists of 106-hectares which includes 54 hectares of the original family upland farm (365 metres above sea level) at Tyn y Rhos and Banc y Bont, classed as a Less Favoured Area (LFA)^[1] and the rest of the farmland is near Talybont which is more lowland.

DIVERSIFICATION

Martin has kept up the tradition of sheep farming however, in recent years Charly and Martin have begun diversifying to help secure the future of their family farm. In 2019, with the help of local forestry management firm Bronwin & Abbey, they converted three of the LFA fields amounting to 9.6 hectares at Tyn y Rhos to forestry. In 2023, following the success of this woodland creation at Tyn y Rhos, they planted 10.5 hectares more woodland at Banc y Bont next to Tyn y Rhos. Martin and Charly have created woodland on over 20 hectares of the 54 hectares upland farmland they have. They have also diversified their farming practice and income in other ways to incorporate both a livery yard and a glamping site.

NARRATIVE

WORKING SMARTER, NOT HARDER: SELECTING ENHANCED MIXED WOODLAND FOR A MORE RAPID TIMBER INCOME

By 2019, increased rainfall resulting from the warming climate, meant wetter ground and poorer grazing for the flock at Tyn y Rhos. The changing climate is leading to more heavy rainfall events and making marginal land more difficult to use for agricultural production. Getting fodder to the sheep in the winter was becoming harder and more treacherous year by year. Martin wanted to “work smarter, not harder” and avoid burnout, but the increased workload and stress he was feeling when tending to his flock on this poorer land at Tyn y Rhos did not align with his aim. They decided to bring in Bronwin & Abbey to produce a woodland creation plan on some of the more difficult fields at Tyn y Rhos, using the Welsh Government’s Glastir Woodland Creation (GWC) grant scheme.

Bronwin and Abbey produced a woodland creation plan that reflected the site and Martin and Charly’s objectives.

They wanted to:

- plant trees which would produce an income as soon as possible
- plant trees only on the ground which was most difficult to farm
- have a simple transition to trees with no interference to the farm business
- have less work compared to keeping sheep on that ground
- worry less about soil and water issues in winter months.

As a result, they chose the *Enhanced Mixed Woodland* option – although the overall grant payments would have been higher for a *Native Woodland Carbon* option. They made this decision because this type of woodland will bring in an income from the timber it produces more quickly than the alternatives. The decision aligns with the farm’s objectives, and by integrating trees into farm business planning, the future value of the timber can be factored in as income. The financial support from Welsh Government for planting and maintenance means the option more than pays for itself. Martin feels he’s able to work smarter not harder. The grant support enabled contractors to be employed to plant the woodland and maintain it. Since they first planted trees at Tyn y Rhos in 2019, the payments available have been increased for woodland creation. Such that the Welsh Government grant for the *Enhanced Mixed Woodland* option has increased from £3,600 to £5,146 per hectare and for the *Native Woodland Carbon* option, the rate has increased from £4,500 to £6,170 per hectare^[2]. Martin and Charly are also planning to sell the carbon, that the woodland captures from the atmosphere, using the Woodland Carbon Code^[3] mechanism.

Designed to meet standards for timber, wildlife, and the climate

The woodland was designed and established to fit in with the landscape and meet standards set out in the United Kingdom Forestry Standard (UKFS) which is used to set the basic standard for the Welsh Government woodland creation schemes. The design reinforces existing trees and buffers water courses by planting broadleaved trees, and the woodland is large enough to provide a range of benefits along with the timber. These include carbon sequestration,

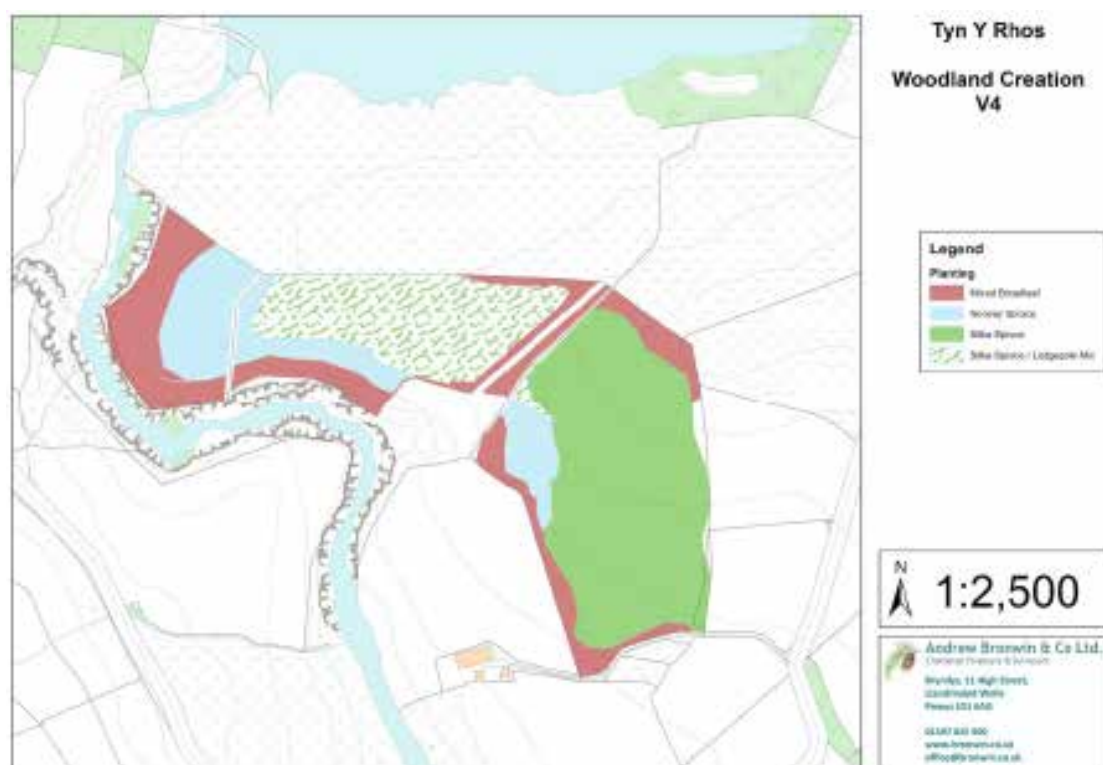


Figure 1 – woodland design map of Tyn y Rhos

increased biodiversity, shelter for adjacent fields and potential to reduce excess water runoff. The 9.6 hectares of new woodland at Tyn y Rhos were planted mainly using conifers with mixed broadleaves and shrubs incorporated to provide areas for biodiversity and habitat. Broadleaved species were also planted to merge with the existing ancient oak woodlands that run alongside the river Rheidol (see Figure 1).

By employing a forestry agent, Martin and Charly have used the agent's knowledge and experience to design a woodland that reflects their objectives and what is required to access the grant funding. Robert South of Bronwin & Abbey carried out all the necessary processes and procedures for the woodland creation allowing Martin and Charly to carry on with running the rest of the farm business. Farmers can rely on forestry agents to fulfil all the requirements for successful woodland creation including support for planning, the tree establishment and the maintenance of the trees. The grant provides annual premium payments in addition to the maintenance payments for the first twelve years after the woodland is planted.

Robert explained that in 2019, when the first planting took place, the grant rate was £3,600. This has since increased substantially to £5,146, covering a significant rise in costs. However, Martin and Charly have established and maintained this woodland without any additional expense or effort for the farm business, while also receiving annual 'premium' payments for 12 years.

Generally, the first opportunity for income from timber comes with the thinning of the conifers – usually at age 15. However, improved breeding and management techniques linked to climate change are reducing this period and it could become as early as age 12. The conifers have grown well at Tyn y Rhos and are showing promise of becoming a valuable timber stock for the future (see Figure 2).

Creating the woodland has resulted in an increase in the value of the land. Robert has estimated the value has increased five-fold and is likely to increase further over the coming years.



Figure 2 – the new woodland includes young conifers, shown here, which are now well established

IMPACT

As well as the financial support, greater productivity and enhanced land value Martin and Charly appreciate the positive impact the woodland has had on the landscape with the changing colours, and the patterns and shapes created by the planted trees (see Figure 3). Martin commented “I love coming up here now and going for a walk through the trees and not having the stress of worrying if something has gone wrong with the sheep – I enjoy it” and “people are scared of change, but we’ve got to do something, so we don’t go down the pan”.

The changes in the landscape and the increased wildlife are additional benefits. These outcomes in part have acted as incentives for Martin and Charly to investigate woodland creation on a larger and more productive scale. However, the key drivers behind the decision to choose trees over the practice of traditional sheep farming on this land were future financial security for Martin and Charly, in order to keep the family farm going.

Farmers like Martin and Charly are leading the way by demonstrating that well-designed tree planting schemes integrated into the farming business are an important

investment opportunity for the future of farming, especially when supported by Woodland Creation grant schemes.

However, it’s a challenge to improve understanding of the economic, environmental, and societal benefits trees can bring people and farming communities across Wales. Woodknowledge Wales’s vision is that of a transformation into a high-value forest nation in Wales delivering public good through afforestation and the decarbonisation of the built environment using home-grown construction timber. There is an opportunity to grow trees that the construction industry needs and to create a circular economy through the cascading use of wood products.

Tyn y Rhos is growing trees which will produce a crop of productive timber which can be used to create valuable timber products. This will earn income for the farm and will be part of the family’s future. It’s a long-term investment for which Martin and Charly have only needed to provide land – and in this case their poorest land that would otherwise have offered little benefit to the farm business.



Figure 3 – the new woodland created on LFA (Less Favoured Area) land at Tyn y Rhos

References

[1] The EU's LFA designation refers to areas where geographic, soil or climatic conditions constrain productivity and make farming more difficult. In Wales this reflects the mountainous terrain, steep slopes on upland farms and high rainfall (Research Senedd Wales, 2022).

[2] See <https://www.gov.wales/woodland-creation-grant-overview>

[3] See <https://www.woodlandcarboncode.org.uk>

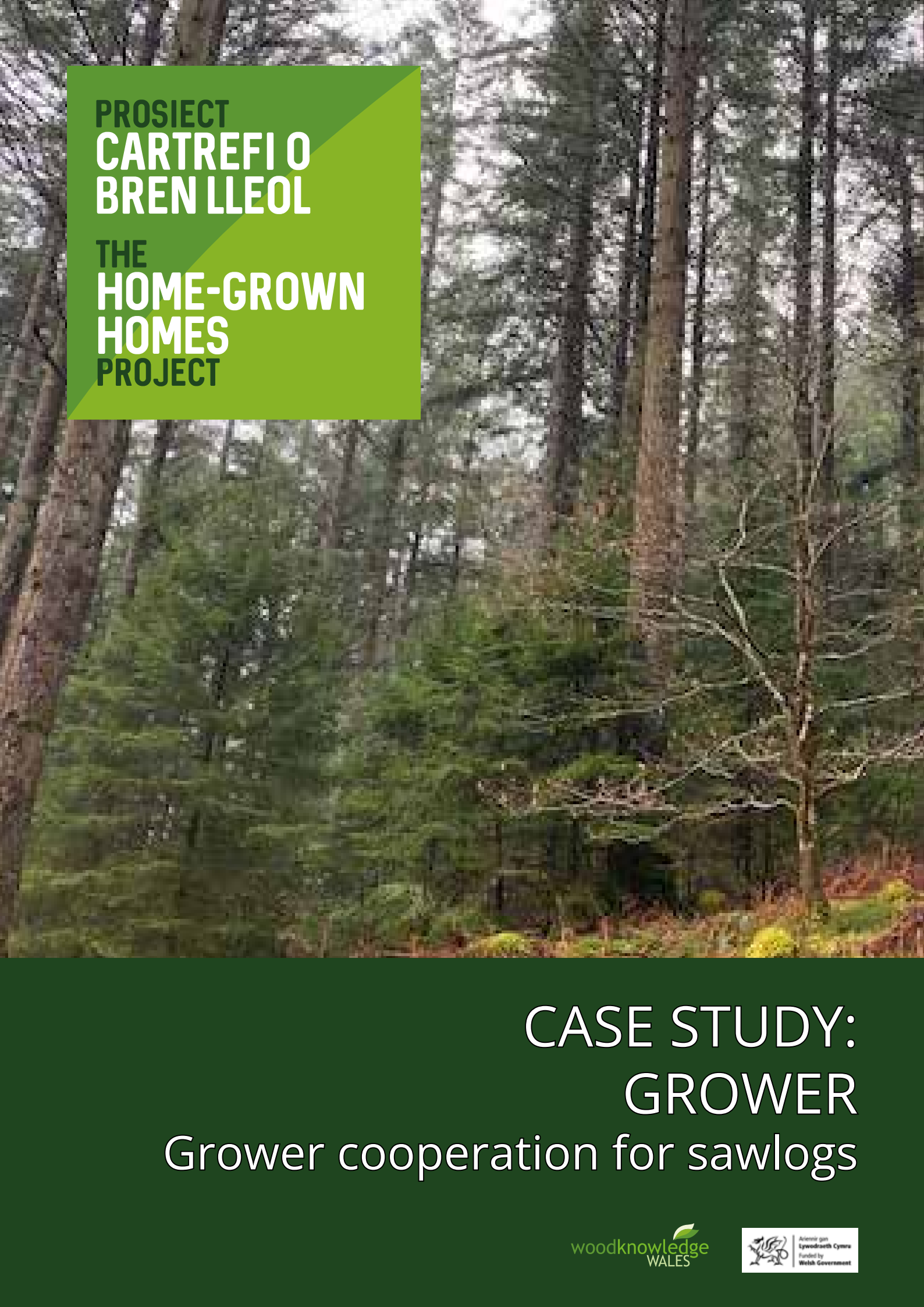
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A photograph of a forest with tall, thin trees and a dense canopy of green leaves. A green rectangular box with a diagonal split is overlaid on the top left corner, containing the project title in white and black text.

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CASE STUDY: GROWER

Grower cooperation for sawlogs

SMALL SAWMILLERS COLLABORATE TO PURCHASE HOME-GROWN TIMBER FROM THE WELSH GOVERNMENT WOODLAND ESTATE

Collective action secured quality sawlogs for local businesses to process into a range of high-value timber products enabling small sawmillers to add value to the timber supply chain in Wales

SUMMARY

In December 2023, a group of small sawmillers in north and mid Wales came together and worked with a haulage contractor to successfully purchase over 200 tonnes of Douglas fir sawlogs from the Welsh Government Woodland Estate (WGWE) in Coed y Brenin. This is the first time these sawmillers have been able to access high-quality timber in the electronic auctions (eSales) from Natural Resources Wales (NRW).

The NRW eSales are very difficult for small businesses to work with for several reasons including extensive pre-bidding paperwork, large lot sizes and the lots are mainly

sold as standing trees which require harvesting rather than sold as logs at roadside.

This purchase which was a small roadside lot, was made possible through collaboration and cooperation whilst working with a haulage contractor who had completed the pre-bidding paperwork and was able to act on the sawmillers' behalf. This collective action secured quality sawlogs for local businesses to process into a range of high-value timber products thereby demonstrating that small sawmillers play a part in adding value to the timber supply chain in Wales.

BACKGROUND

In early 2021, several small sawmills contacted Woodknowledge Wales about the challenge of accessing a regular supply of good quality sawlogs from the WGWE.

As the largest supplier of sawlogs in Wales, NRW, who manage the WGWE on behalf of Welsh Government, use one primary sales mechanism, eSales – an online auction system where pre-harvested (roadside) or standing timber is sold by weight through a bidding system. Large lot sizes are used because they are more efficient to administer.

1. Standing sales – timber is sold while still standing in the forest and the buyer is responsible for harvesting, extracting and transporting the timber.
2. Roadside sales – timber is harvested by NRW and stored at roadside, ready for collection.

This sales mechanism, however, provides a barrier for small sawmillers who are unable to bid individually. Through John Sweeny, (Small Sawmillers' Coordinator) Woodknowledge Wales began exploring the possibility of collaborating to purchase roadside lots and approached NRW to discuss potential solutions.

KEY PLAYERS



Small Sawmillers' Community of Practice

Communities of Practice (CoP) promote an open and collaborative approach which enable the participation of a diverse network of organisations, both across supply chains as well as within trades. Woodknowledge Wales CoPs gather professionals of the same trade or supply chain level around a shared challenge or opportunity. CoPs are centred around practical solutions and capacity building and give members the opportunity to prototype innovative approaches together with others.

"As a one-man band sawmiller, I found it was becoming gradually more difficult to source good quality logs and I was at a loss to understand why. When Woodknowledge Wales got in touch with the idea to act as intermediary by grouping the requirement of a number of small-scale millers together, they lifted a lot of the uncertainty of supply. It's good to have some confidence in the future again."

Richard Reeve, Reeve Timber, Llanon, Ceredigion



The forest owners

NRW manages the WGWE on behalf of the Welsh Government. At 123,000 hectares, the WGWE covers six percent of the land area of Wales and thirty-eight percent of the Welsh forest resource. NRW is the Welsh Government sponsored body responsible for the sustainable management of our natural resources in Wales, including forestry.

NRW is the largest supplier of certified timber in Wales and the sale of timber from the WGWE allows NRW to generate an economic return for reinvestment to support its future work.

"This approach has provided multiple mills with access to high quality FSC®/PEFC certified timber from the WGWE that has generated income for NRW, while supporting rural Welsh businesses in producing sustainable timber products."

Tom Nicholson, Sales & Marketing Officer North, Natural Resources Wales (NRW)

"As processors of predominantly locally sourced timber, the recent purchase of Douglas fir co-ordinated by Woodknowledge Wales has allowed us to source material which can often prove difficult as a smaller buyer. We appreciate the flexibility shown by NRW and we hope to secure further supplies of material like this for our ongoing needs."

Martin Craker, Signs Workshop, Dolgellau, Gwynedd



A Douglas fir sawlog from Coed y Brenin about to be milled at the Signs Workshop



Two cranes lift 12m long Douglas fir sawlogs from Coed y Brenin at Reeve Timber

The sawmillers

Small-scale sawmilling and wood processing businesses typically employ up to 10 people. They are deeply rooted in rural communities, employing local people, utilising local trees and supplying local markets. They primarily supply sawn timber for building, fencing, landscaping and bespoke practices such as furniture making. They have direct links to the forestry industry, and they support other rural businesses such as fuel and machinery suppliers and other service providers. Their work promotes the use of Welsh timber, fostering a greater understanding within communities of how timber grown in Wales can replace carbon-intensive materials such as steel, concrete, and plastics and other non-renewable materials.

The haulier

Les Hughes & Son Ltd is a Welsh timber haulage company based in Abermule, Powys. The company specialises in timber contracting, timber haulage, and log supply. Currently the business operates a fleet of 12 HGVs, moving timber from the forests of Wales to businesses across the United Kingdom. The company is recognised for its contributions to the timber industry in Wales, providing essential services in timber transportation and HGV vehicle maintenance.

"We are here, and we can help the small-sawmilling sector out if enough timber is brought to market to facilitate what these small businesses want."

Tony Hughes, Director, Les Hughes & Son

"Small-scale sawmills have recently had difficulty sourcing the high-quality sawlogs that are grown here in Wales. The cooperative element of this exercise is an encouraging experience for all those involved. I hope that we can build on this to create a strong sense of community and cooperation from the foresters through to the craftsmen who will create durable legacies from this timber."

John Sweeny, Small Sawmills Co-ordinator, Woodknowledge Wales

The Woodlands for Wales Strategy (2018) ⁽¹⁾ highlights the critical role of Welsh timber in supporting the rural economy and envisions a resurgence of sustainable economic activity in Welsh woodlands whilst providing valuable employment opportunities for local communities.

A 2021 Woodknowledge Wales survey identified forty-seven small sawmills in Wales. They provide an estimated annual

income of £15 million, directly employ approximately 180 people and consume roughly 30,000 tonnes of timber per year. That's two lorry loads of timber every month for a reasonably busy mill. However, the timber supply chain for small sawmillers and processors in Wales is fragmented and unpredictable, relying on private timber sales including irregular sources such as windblow on farm woodland. Five sawmillers took part in this collective purchase.

NARRATIVE

In 2022, Woodknowledge Wales informed the small sawmilling sector of a forthcoming eSales lot of Douglas fir sawlogs. Storm damage had resulted in the felling of the impressive stand of Douglas fir planted by the Forestry Commission in the 1920s. The sawlogs went up for roadside sale via NRW's eSales system ^[2]. Small-scale sawmillers do not have the financial or administrative capacity to purchase timber from the WGWE using NRW's sales mechanisms. This is partly because the lot sizes are mainly too large for smaller enterprises to consider. For NRW, there is the same amount of administration to work through for a small lot as there is for a large lot, therefore Woodknowledge Wales developed the idea of a collective purchase with the small sawmills ahead of the auction. Tony Hughes, of Les Hughes & Sons, one of the larger haulage contractors and log suppliers agreed to bid on their behalf.

There was a high level of interest from the small sawmills, as sawlogs of this standard do not come on the market very often. John worked with Tony to coordinate the project and Tony secured the successful bid using the eSales system. In December 2023, the first of the sawlogs started arriving at small sawmills across north and mid Wales.

The sawlogs arrived in lengths of 12 to 14 metres enabling the sawmills to cut them into the lengths they need to meet orders. The quality of the sawlogs supports the milling of higher grades of timber for joinery stock – timber for use in doors, windows, furniture, and flooring. The longer lengths can also facilitate larger dimension beams for structural use. The sawmills purchased this timber to meet future orders. Woodknowledge Wales encourages the production of higher quality joinery and structural timber for use in buildings. This can lock up the embodied carbon in the timber for the lifetime of the building and beyond if the timber is reused/repurposed.

This project fostered a sense of community amongst participating businesses who make up the Woodknowledge Wales Small Sawmillers' Community of Practice (CoP). John coordinates site visits and on-line discussions to bring the businesses together to develop relationships and provide networking opportunities. Future collaboration between the CoP and others in the Woodknowledge Wales networks, could benefit and help stabilise the supply chain.



*Douglas fir sawlogs,
Coed y Brenin near Dolgellau, Gwynedd*

IMPACT

This case study demonstrates the challenges that small businesses face in purchasing timber from the WGWE. The project enabled small sawmillers to come together as a community and collaborate for their benefit whilst supporting the supply chain and local markets. Collaboration in the sector creates stronger and more resilient businesses and communities, whilst improving practice and knowledge. This project illustrates the collective impact small businesses in rural areas can have in the move to a sustainable future.

Woodknowledge Wales believes that the small sawmilling sector plays an essential role in the transition of Wales to a high-value forest nation through the development of a strong wood culture. These sawmillers can supply local markets and support local employment with locally sourced timber.



A squared section of Douglas fir being processed into boards at the Signs Workshop

WAYS FORWARD

1. Provide support for small-scale sawmillers who wish to purchase roadside lots from eSales to enable achievement of pre-bidding requirements.
2. Increase roadside sales of appropriate sized lots for the small sawmilling sector.
3. Explore the opportunity to sell smaller lots by volume rather than by weight.
4. Encourage innovative approaches such as collaboration between log suppliers and the small-sawmilling sector.
5. Consider developing a role within NRW that supports the future increase in small roadside sales aimed at small-scale sawmillers and communities.

CONCLUSION

This case study demonstrates how collaborative action can result in innovative solutions, whilst highlighting the need for an increased understanding of the small sawmilling sector. Woodknowledge Wales perceive these sawmillers to be agents of cultural change, who are in a good position to promote the use of Welsh timber in their communities, potentially acting as an important conduit for the development of a forestry and wood using culture in Wales. Their relationship with commercial forestry could be key to changing the negative

perceptions around large-scale forestry plantations for timber production. This community of small sawmillers can also facilitate dissemination of information on the Timber Industrial Strategy at a local level.

A more accessible and consistent supply of locally sourced low carbon building materials can help Wales transition to a sustainable future. More work is needed to enable this sector to access a more stable supply of timber from the WGWE.

References

[1] The Woodlands for Wales Strategy (2018)
<https://www.gov.wales/woodlands-wales-strategy>

[2] <https://esales.naturalresources.wales/>

Further references

How the Signs Workshop processes sawlogs into its products (video)
<https://www.youtube.com/watch?v=DXDTxFoURjk>

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CASE STUDY: PROCESSOR

Meets demand for Welsh timber

PONTRILAS SAWMILLS – A CRUCIAL PLAYER IN THE TIMBER SUPPLY CHAIN

Pontrilas is well-positioned to meet the growing demand for Welsh-grown timber in construction and could be instrumental in supporting Wales's first Timber Industrial Strategy

Pontrilas Sawmills, the largest independent sawmills in England and Wales, plays a vital role in the UK timber supply chain. With its cutting-edge technology and commitment to sustainability, the sawmill efficiently processes a wide range of timber products, including construction-grade materials, supporting local industries, carbon sequestration, and economic growth.

As a key player, Pontrilas is well-positioned to meet the growing demand for Welsh-grown timber in construction, contributing to both the local economy and the country's climate goals, and could be instrumental in supporting the implementation of Wales's first Timber Industrial Strategy.



Woodknowledge Wales members on a site visit to the sawmills

BACKGROUND

Bought by the Hickman family in 1947 and located between Abergavenny and Hereford on the England Wales border, Pontrilas Sawmills is part of the Pontrilas Group which also includes Pontrilas Packaging, based near Llanelli and Pontrilas Merchants, a builders' merchant based close to the sawmills. In 2023 the Group purchased Rainbridge Timber, a packaging firm in Alfreton, Derbyshire. It employs over 450 people at its four sites and over a third of them live in Wales.

Sawmill products include strength graded construction timber, sawn timber for flooring and furniture, fencing, and pallets. Construction timber is principally milled from Sitka spruce and Douglas fir. Oak beams are also milled for a range of purposes including specialist heritage products such as, canal gates. The sawmills produce co-products such as wood chip and saw dust which are used to form medium density fibreboard (MDF) as well as chip board for construction, with bark going for horticultural use. Further to this, biomass boilers use co-products to heat the timber drying kilns, offices and parts of the mill. No part of the log is wasted!

The softwood sawmill processes approximately 385,000 tonnes of sawlogs a year, sourced mainly from Wales, the English borders and the West Country (and often as far away as Scotland). By comparison, the hardwood/large-size softwood sawmill processes approximately 35,000 tonnes a year. The Group employs buyers who source the sawlogs for the mills in parcels of between 250 and 30,000 tonnes and between 65 and 80 articulated lorry loads arrive for processing every day. The main softwood saw line can process the same quantity of timber in one hour as the hardwood saw line does in one day.

Pontrilas Sawmills, along with other large-scale sawmills, are crucial players in the timber supply chain. There is a huge opportunity to use Welsh homegrown timber to build high-performance and affordable timber homes while supporting local manufacturers and suppliers.

NARRATIVE

THE SAWMILLS IN ACTION

Hauliers transport logs to Pontrilas. The sawmill's investment into a specialist material handler reduces log unloading times to approximately 4 minutes per truck. Logs are then sorted by length, species and diameter into stacks of same sized logs by a state-of-the-art log sorting line. This highly automated piece of machinery can turn and process approximately 16 individual logs per minute, and sort them into 20 different bins. The logs are debarked before they enter the mill, then 3D scanned and rotated before they are broken down by up to 19 saw blades. The boards from the side of the log are scanned and edged to get the maximum amount of wood from each log. After edging and trimming, these are then graded, planed, (kiln dried depending on the product/customer) and stacked, ready for delivery. Some of the timber is pressure treated, especially material used for fencing and decking.

Grading timber allows customers, timber merchants, and manufacturers to visually identify the strength, and structural properties of the product by means of a code marked on the timber. Though these systems vary internationally, higher grades of timber are generally of higher strength and more valuable. Grading helps to ensure consistency and reliability in the built environment. Home-grown timber in Wales and the UK readily meets grading requirements for use in construction projects and the built environment whilst also effectively mitigating against climate change through the embodied carbon locked up in the timber.

PRODUCTIVITY

It is important to maximise yield in a sawmill, in order to do this a good supply of uniform sawlogs are required. These sawlogs are best supplied from stands of conifers in sustainably managed forests. High yield class forests have faster growth rates and can support more intensive management practices such as clear-felling on rotation. Rotation lengths depend on the tree species, for example, a single species conifer forest (stand) of Sitka spruce has a short rotation length and often a high yield class making it an ideal timber for large-scale sawmills such as Pontrilas which have a high demand for sawlogs.

The softwood saw line at Pontrilas maximises yield through innovative timber scanning technologies meaning a single log can be cut into up to 18 pieces whilst offering greater flexibility to meet customer requirements. This saw line utilises cutting-edge technology and has been designed to efficiently process high volumes of timber whilst producing a range of products not usually associated with high-volume saw lines. The greater the yield, the better, as this means greater volumes of higher value timber, less waste, and greater income from the sale of the timber and its co-products. Land includes young conifers, shown here, which are now well established.



Logs start their journey through the mill

IMPACT



Sawlogs waiting for processing at Pontrilas Sawmills

THE SAWMILLS' ROLE IN THE TIMBER SUPPLY CHAIN

Continued private investment in cutting-edge technology has resulted in the sawmills becoming one of the most advanced and technically automated in the country. The sawmill plays a crucial role in the timber supply chain, efficiently processing raw materials to maximise the value of Welsh timber.

As timber processors, Pontrilas can serve as the vital link between the forest and the manufacturers, who transform the timber into general building practices including frames and panels allowing carbon to be embedded within the built environment.

MEETING THE DEMAND FOR CONSTRUCTION TIMBER

Construction grade timber is supplied to several advanced timber manufacturers across Wales, including SO (Sevenoaks) Modular (Neath) and Williams Homes (Bala). Because the timber is all UK grown and much of it is sourced from forests in Wales this means home-grown Welsh timber can be specifically selected and supplied to meet customer requirements.

The Pontrilas Group, which includes a builders' merchants, has a strong understanding of the challenges and needs of the wider general building and timber sector. In response, they have worked to be flexible and responsive to the requirements of Wales's timber manufacturers.

Woodknowledge Wales has facilitated connections between the Pontrilas Group and key stakeholders, including housing associations such as Tai Tarian and Pobl, as well as local authorities and other industry members. These engagements have included site visits to the sawmills, allowing participants to gain a first-hand understanding of operations and explore opportunities for collaboration.

Several timber manufacturers have worked closely with the sawmill to secure high-quality, locally sourced products tailored to their specifications in terms of size, profile, and grade. While home-grown timber can present certain challenges, such as a higher tendency to twist, ongoing dialogue and process refinements are helping to mitigate these issues.

Local authority, Powys County Council, adopted a Wood Encouragement Policy in 2017 (renewed in 2023) [[insert hyper link to policy page](#)], with the mission to build better, more energy efficient houses, support the local forest industry and to create jobs. The policy sets out that all new council housing projects will look to use wood as the preferred material for both construction and fit-out purposes.

The Pontrilas Group has demonstrated its ability to supply timber sourced from Welsh forests and tracked through the sawmill process for housing associations and local authorities committed to using Welsh-grown timber in construction. This supports local supply chains, carbon sequestration, and economic growth.

HOME-GROWN TIMBER SUPPLY

The Welsh Government is responsible for 40% of Wales's forests in the Welsh Government Woodland Estate (WGWE). According to Natural Resources Wales's (NRW) Timber Sales and Marketing Plan (2021-2026), the WGWE is projected to supply between 735, 000 to 835,000 m3 of timber each year, within that period, directly supporting thousands of jobs and contributing to the Welsh economy. NRW is the largest land manager and the largest supplier of certified timber in Wales. Ensuring the projected volumes are met will ensure more of this timber is processed into construction products which will in turn capture more value in the supply chain. This will also mean that more of the carbon stored by growing trees is stored in the built environment rather than being used in short-life products or burned. Supporting higher-value use of this resource will ensure a greater contribution to Wales's climate change goals, and the decarbonisation of our built environment.

The Pontrilas Group is interested in supporting these outcomes and being involved in a scheme to source logs from the WGWE which could be used for processing as construction material for use in Welsh construction projects.

THE FUTURE

Large-scale sawmills, such as Pontrilas, play a pivotal role in advancing the Timber Industrial Strategy for Wales. Their investments in cutting-edge technologies increase efficiency through enhanced sorting, grading, cutting, and processing capabilities. These investments not only support the sustainable use of Wales's and the UK's timber resources but also foster job creation, stimulate economic growth, and ensure high standards of quality control and product standardisation. Furthermore, their integration with the wider timber supply chain ensures cost efficiency and supports the production of a diverse range of products.

As the use of Welsh-grown timber in Welsh homes to meet housing demands becomes more of a priority, it is essential that stakeholders across the timber value chain adopt a hierarchy of usage that prioritises construction timber and steers away from short-lived timber products. A concerted effort to boost not only Welsh but British timber use in construction will support local industries and also enhance the environmental and economic benefits of timber as a sustainable building material. An increased requirement for timber usage will need to be supported by increased timber production from home-grown sources.

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CASE STUDY:
MANUFACTURER
Partnership-led innovation

TAI TARIAN AND SO MODULAR PARTNERSHIP

Two Neath Port Talbot organisations working in partnership demonstrates how targeted funding from Welsh Government promotes innovation and collaboration

Two Neath Port Talbot organisations are working together to make a significant contribution to advanced manufacturing and the retrofit and new development of social housing in Wales. The partnership demonstrates how targeted funding from Welsh Government promotes innovation and collaboration.

Timber processing and Modern Methods of Construction (MMC) are key to the success of this collaboration.

The partnership between Tai Tarian, one of Wales' largest social housing providers, and advanced timber manufacturer, Sevenoaks (SO) Modular, demonstrates how financial intervention alongside creative thinking can drive change in the construction sector. This level of government support also creates employment opportunities and develops skills across the timber supply chain and construction sector.



SO Modular's investment means improved efficiency



Tai Tarian's County Flats Project – a blend of build types



KEY PLAYERS

Tai Tarian is one of the largest social landlords in Wales. Based in Baglan Energy Park, the company owns and manages over 9,000 homes across Neath Port Talbot. Created by the transfer of Neath Port Talbot's housing stock in 2011, Tai Tarian is actively improving its existing homes to meet the latest standards as well as building new homes and is committed to becoming a carbon neutral organisation by 2030 ensuring its new homes achieve high levels of sustainability.

"Tirnod has been created as a subsidiary of Tai Tarian and enables us to work in partnership with SO Modular across a number of joint aspirations, not least, increasing the number of homes built using modern methods of construction. Our goal is to invest in local communities in a sustainable way and through this partnership we achieve that by supporting the development of local skills and through providing training and work opportunities".

Linda Whittaker, Chief Executive, Tai Tarian



SO Modular was established in 1996 and is based in Neath. It designs, manufactures and erects timber frame, panelised and fully modular housing from timber. It works with its sister company, JG Hale, local authorities and housing associations in the development of commercial, housing and education projects across Wales and the West country. The company has been manufacturing closed panel timber frames for many years and in recent years, has made the move into more innovative forms of manufacturing, producing closed panel wall systems with the external skin of the building incorporated onto the panel, along with volumetric systems. Electrical and plumbing services, kitchens and bathrooms, plaster boarding, painting, windows and doors, as well as external cladding, are all installed and completed in the factory before delivery to site. This focus on off-site manufacturing produces real efficiencies, improves building performance, safety and sustainability, reduces waste and leads to less disruption for communities where projects are being developed.

"We have grown a reputation for providing a premium quality product and we now have the resources, people, machinery and product lines to increase the number and variety of homes we can provide the housing sector, meaning people can now live in warmer and more sustainable homes, built at speed inside our factory."

Charlotte Hale, Director, SO Modular



NARRATIVE

Neath Port Talbot social housing landlord, Tai Tarian, created a wholly owned subsidiary called Tirnod. This enabled them to invest £2.85M of Welsh Government funding into the purchase of timber processing equipment.

SO Modular, based at the iconic 'Metal Box' factory in Neath, leased the equipment to process timber sourced from Pontrilas Sawmills more efficiently. Access to new machinery facilitated the transformation of both product lines and output.

Working together in partnership, Tai Tarian and SO Modular transformed the former's County Flats development in Aberavon. Retrofitting existing homes to a high standard, which included the incorporation of timber framed modular units, enabled Tai Tarian to increase the number of homes available for tenants to rent at the scheme.

WELSH GOVERNMENT SUPPORT IS KEY TO SUSTAINABLE CONSTRUCTION INITIATIVES

Welsh Government has encouraged SO Modular's move to manufacture components for social homes in a factory, a process referred to as Modern Methods of Construction (MMC). Government wants to see the development of more sustainable solutions to decarbonise the economy and the built environment. It also wants to support initiatives and innovation in the circular and foundational economy.

Funding has been directed towards social housing providers willing to adopt MMC and off-site construction of timber components for social housing. As part of its Innovative Housing Programme, Welsh Government wanted to find a way of supporting the SO Modular's investment in the systems, processes and equipment it needed to significantly expand and improve its operation, products and output.

KEY FINANCIAL AGREEMENT SUPPORTS COLLABORATION

In 2020, a dialogue between SO Modular, the Welsh Government and Tai Tarian focused on how financial support could best be secured. Key to that financial agreement was the creation of a new trading subsidiary, Tirnod. The subsidiary was created by Tai Tarian to receive an interest free loan of £2.85M from Welsh Government to enable the purchasing of equipment. SO Modular then leased the equipment they required from Tirnod, on the understanding that most of its output would focus on the provision of social housing related assets acquired by, or for, local authorities and housing associations in Wales. Combined with £954,000 of direct funding from SO Modular, this produced an overall investment of £3.8M in the factory.

This collaborative approach supported an increase in the number of new homes built off-site, as well as local opportunities for training and work. The new relationships also highlighted new opportunities for collaboration between Tai Tarian, SO Modular and other partners (including research organisations) across the local supply chain.

TRANSFORMING TIMBER MANUFACTURING PRODUCT LINES AND OUTPUT

The investment enabled SO Modular to lease and install equipment to process timber more efficiently, transforming its product lines and output.

Equipment included:

- high-performance saws capable of maximising the use of timber,
- a treatment plant to allow for timber to be preservative treated on site,
- cranes capable of lifting the heavy timber components across the factory floor,
- a wood fibre blower to allow for timber frames to have insulation factory-fitted, and
- a wall saw to enable boards to be cut vertically.

Various manufacturing tables and storage racks were installed to enable components to be fixed square, lifted and turned over. This allows workers to access them from both sides. In addition, the factory was fitted with compressors, compressed air equipment and hoses, a dust extraction system, and computer kit to enable digital drawings to be transferred to the saws for rapid and efficient timber processing.

The equipment was commissioned in May 2021. Since then, SO Modular has:

- produced 35% more panelised timber frame systems,
- started the design and manufacture of volumetric modular systems,
- developed three new sustainable panelised systems using natural insulation,
- reduced waste by 15% and in turn reduced the costs of production,
- reduced reportable health and safety incidents to zero,
- improved the build quality and fabric performance of the systems it manufactures, and
- kick-started the development of an offsite training centre.

The timber SO Modular uses is home-grown and supplied by Pontrilas Sawmills. Both organisations have worked

hard to ensure the regular supply of material best suited to the manufacturing process and to overcome some of the challenges of using material from the Welsh forests.

MEETING HOUSING QUALITY STANDARDS

Tai Tarian and SO Modular are working closely on social housing projects in the Neath and Port Talbot area. Tai Tarian's County Flats Project in Aberavon is seeing the transformation of a series of 1960s-built flats into

accommodation that meets current housing quality standards. Alongside the retrofitting of existing flats, construction teams are erecting timber frames and modular units to extend and increase the number of units available on site. The project is a perfect example of how Welsh Government's financial support has enabled the rapid and innovative regeneration of this area. requirement for timber usage will need to be supported by increased timber production from home-grown sources.

IMPACT

This investment illustrates the effective use of Welsh Government finance to enable timber industry and construction stakeholders to innovate and up-scale their manufacturing process. This level of support has helped transform off-site manufacturing and ultimately delivered more and better-quality social housing.

For Woodknowledge Wales, this case study demonstrates how important it is that public subsidy is used creatively to support industry in line with Government policy. Direct collaboration between a social housing provider and a manufacturer forged

a new kind of supply chain relationship. This relationship brought the design and manufacturing process together, improved collective understanding, and maximised the opportunity for innovation and process and construction efficiencies.



Author: Woodknowledge Wales

This case study was authored as part of the Home-grown Homes project and was funded by Welsh Government



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An aerial photograph of a housing development under construction. The foreground shows several houses with white walls and dark grey roofs. Some houses have a second story clad in light-colored timber. In the center, there are more houses with prominent timber cladding. The background shows a large body of water, likely a bay or estuary, and distant hills under a cloudy sky. A green diagonal banner is overlaid on the top left corner.

**PROSIECT
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**THE
HOME-GROWN
HOMES
PROJECT**

CASE STUDY: HOUSING

Low carbon homes with timber

GWYNFAEN, PENYRHEOL

Featuring a 'timber first' approach, using home-grown timber and timber products manufactured off-site, the Gwynfaen housing project exemplifies low carbon home construction in Wales

The Gwynfaen housing project is being constructed by south Wales based housing association, Pobl, on site in Penyrheol, near Swansea. Featuring a 'timber first' approach, using home-grown timber and timber products manufactured off-site, the project exemplifies low carbon home construction in Wales. The project will achieve 'combustion-free living' through use of passive design, energy efficiency measures, and a high-performance building fabric to reduce overall energy demand.

Pobl has been supported by Woodknowledge Wales (WkW) from the inception of this project. As WkW members, Pobl has benefited from information on sourcing timber and timber products and advice on the design and installation of timber cladding.



Part of the site under construction (© Buffoon Media)

KEY PLAYERS



Pobl is one of Wales' leading housing associations, managing over 17,500 homes and providing care and support to over 9,000 people in Wales. It employs over 2,500 staff from various locations co-ordinated from offices in Newport and Swansea. Its ambition includes a plan to develop 10,000 new homes between 2020 and 2030, to decarbonise its activity to become 'Net Zero' by 2050.

"Gwynfaen will provide 144 new homes and will become the benchmark for low carbon living in Wales, capturing best practice approaches to placemaking, urban greening and fully integrated renewable technologies, as well as low carbon design."

Elfed Roberts, Head of Sustainability & Innovation at Pobl

"Pobl has wanted to demonstrate that it's entirely possible to build exciting and impressive projects at scale and at the same time, drive down carbon using timber in all its forms. Pobl are setting standards. One day all homes will be made this way."

David Hedges, Housing, Woodknowledge Wales

NARRATIVE

Pobl's Gwynfaen development is on the edge of Penyrheol, northwest of Swansea, overlooking the Loughor Estuary and Gower Peninsula. The site will accommodate 144 new homes for rent and to buy. Each new residence is being built to standards that will ensure significant reductions in carbon emissions.

The project will achieve 'combustion-free living' through use of passive design, energy efficiency measures, and a high-performance building fabric to reduce the overall energy demand. This approach will ultimately benefit residents through lower heating and hot water energy use, and the planet through lower carbon emissions.

Gwynfaen is part funded by Welsh Government's Innovative Housing Programme and aims to meet many of the goals in the Well-being of Future Generations Act 2015. The project's contemporary design will use vernacular forms and materials familiar to the existing settlements. Many of these materials will be low in embodied carbon and locally sourced. This includes structural timber sourced from the Welsh forest and home-grown timber cladding.



For Pobl, all new projects consider timber as a primary structural material. Gwynfaen is the first project in development that will meet its Net Zero Carbon Specification. Pobl's approach is to test out more sustainable specifications for its project. The association also supports key stakeholders in the timber procurement and supply chain to gear up for meeting these higher standards.



Gwynfaen

USING TIMBER AND A 'FABRIC FIRST' APPROACH TO SOCIAL HOUSING CONSTRUCTION

Hale Construction is building the project. They are conveniently based just 13 miles from the Gwynfaen site in Neath. Sister company, Sevenoaks (SO) Modular, is manufacturing the highly insulated timber framed wall and roof panels in its factory. These super air-tight panels will reduce any performance gap alongside a focus on waste minimisation.

The biobased insulation SO Modular use replaces more common oil-based polymers with wood-fibre and cellulose (recycled newspaper). The timber frame panel manufacturers use blow-in technology to efficiently fill each timber frame panel while it's still in the factory. Double and triple glazed windows and doors are also factory fitted. SO Modular then deliver these Off-Site panels to site.

Once on site, Hale Construction assemble the timber frame wall and roof panels and finish them with either Welsh larch cladding or local lime render. In addition to the highly insulated building fabric, the new homes incorporate an intelligent energy system. This system manages solar panels which store energy in a home battery, heat recovery ventilation systems, air source heat pumps and hot water tanks. The completed homes also have electric vehicle (EV) charging points.

PROCESSING WELSH TIMBER FOR TIMBER COMPONENTS

Pontrilas Sawmills near Hereford is one of the UK's largest sawmills. They supply structural timber to SO Modular. The sawmill sources logs from Wales and the West Country. They process these sawlogs into a range of construction materials for timber frame manufacturers to use in the production of frames for walls, roof trusses and floor cassettes. The sawmillers cut a mix of spruce, larch and Douglas fir. They then plane, kiln dry and treat each section with preservative if required.

Pontrilas supplies SO Modular with packs of timber machined to different dimensions. At the timber frame panel manufacturer then cuts and nails, or screws, the machined timber into the various frames and wall systems.

SO Modular have worked closely with Pontrilas Sawmills on quality standards the timber they receive must maintain to meet manufacturing requirements for timber frame panelling used in social housing. Sawmills generally optimise production of timber for other markets, such as fencing, decking, carcassing, and pallets. So, sharing an understanding of these specific needs has been important in ensuring the manufacturers receive the right specification of timber consistently.

IMPACT

The Gwynfaen Project represents the ambition and practical application of the Woodknowledge Wales Home-Grown Homes Project. It demonstrates how a new housing development can use timber and timber products to reduce carbon emissions. David Hedges, Head of Housing at Woodknowledge Wales has supported Pobl in working out solutions to design issues, finding ways to source timber and timber products, and how to achieve robust installation details.

For Welsh Government, projects like this emphasise that value of trees for timber is an important consideration in the Timber Industrial Strategy. Using more of the timber we produce in the Welsh forest for building homes is key to capturing and storing some of the carbon emissions we create in Wales. Using the outputs from our national forests for higher value uses such as construction timber gives a better return for timber processors and timber component manufacturers. It also benefits the many housing associations and developers who need to meet new standards. By using more home-grown timber in their projects they can achieve environmental sustainability and net zero goals set out by legislation.



Gwynfaen

References and further reading

[1] For more information on the project, visit <https://poblliving.co.uk/developments/gwynfaen/>

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**THE
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**CASE STUDY:
TAI AR Y CYD**

Social landlord collaboration success

TAI AR Y CYD - DELIVERING NET ZERO (DNZ)

Tai ar y Cyd harnesses the power of 23 Welsh social landlords collaborating to build new zero carbon homes that will unlock wellbeing benefits for families, communities, and local economies

SUMMARY

Tai ar y Cyd harnesses the power of 23 Welsh social landlords collaborating to build new zero carbon homes that will unlock wellbeing benefits for families, communities, and local economies.

The critical project outcome is a standardised next generation pattern book for high performing, timber-based, off-site manufactured homes. A shared performance specification will help these homes target net zero operational carbon and a significant reduction in embodied carbon emissions. This will be invaluable for social landlords, driving the creation of new affordable homes.

Ultimately, the aims of the project are to maximise efficiency; minimise waste through thoughtful material use; protect against the Welsh climate; design maintainable

homes; and consider the availability of materials and components.

Integral to the success of this project is the strategic use of the aggregated demand for these homes to unlock a robust, sustainable, and local supply chain. This strategy will increasingly rely on Welsh timber, nurturing the growth of Welsh SMEs and green skills. This will ensure a strong foundation for quality, whilst enhancing affordability.

A project priority is designing homes with sufficient thermal performance to achieve resilience to energy price fluctuations, safeguard against overheating, and protect against future climate scenarios. The homes will be comfortable, contributing to the holistic well-being of their occupants.

INTRODUCTION

Tai ar y Cyd is a project which aims to support Welsh Government's ambition to decarbonise the housing sector by 2050 as well as support the need for more new homes in Wales. This will be achieved by developing a pattern book of house types delivering on low carbon targets.

Timber based materials will be crucial in delivering this, alongside the development of the supply chain and green skills base to support.

Essential to success of this project is a partnership with 23 Welsh social housing organisations (Local Authority and Housing Associations) supported by the right technical team and wider stakeholders.

Tai ar y Cyd is a social landlord led collaboration that is supported by Welsh Government. The key players are 23 social landlords: both Welsh Local Authorities and Housing Associations. The project is largely self-funding with each of the 23 members making a one-off financial contribution to fund the development of the pattern book and project support staff. Project members have stepped forward to lead on supporting key strands of the project.

Governance of the project is summarised below:



All of these initiatives acted as the catalyst for the Tai ar y Cyd project which has now grown to include 23 social landlords and is reaching across the Welsh supply chain, supported by skills delivery partners to develop the growth required in Green Skills to support this growing industry. A technical design team was commissioned to support the development of the resultant pattern book, which was launched at an event in Swansea on 5 January 2025.

The collaboration understands that, to deploy the innovative pattern book designs across all member landlords requires new approaches to engage main contractors and supply chain – especially timber frame manufacturers.

The pattern book was therefore co designed with timber frame manufacturers to bring on board their experience and learning – especially from delivering pilot projects commissioned through the Innovative Housing Programme.

This early engagement is opening opportunities to explore what optimum procurement relationships will be needed in the future to unlock supply chain potential for mutual benefit. These conversations will be informed by collaborative approaches being developed in other part of the UK – particularly Edinburgh Homes Demonstrator, Build Better, OSHA and Kit of Parts.



A forest canopy

NARRATIVE

TAI AR Y CYD

As part of Welsh Government's ambitions to make the transition to Net Zero, all housing associations and social landlords are tasked with building the next generation of net zero carbon homes. That's a big challenge because the way we build most homes in Wales has not changed much over decades. To ask social landlords to do so on their own is a big ask, so the Tai ar y Cyd project is looking to maximise the benefits of collaboration and travel that journey in partnership. Tai ar y Cyd is also harnessing the power of social landlords who are working in collaboration to build new zero carbon homes in ways that will help unlock

wellbeing benefits for families, communities, and local economies.

The aim is to develop a standardised specification for the next generation of homes. The designs will be tested and prototyped and achieve a system warranty, so the landlords can be confident that they can raise finance and get insurance on them. Guided by assured performance specification these homes will aim to achieve net zero operational carbon, and a significant reduction in embodied carbon emissions. Crucially these pattern books will serve as a tool for social landlords, propelling the creation of new affordable homes.

In designing these homes, the aim is to prioritise resilience against future energy price fluctuations, with sufficient thermal performance. The homes will be designed to safeguard against overheating, in alignment with anticipated future climate scenarios. The programme seeks to achieve multiple outcomes and create comfortable, happy homes which support the well-being of future occupants.

TIMBER

Integral to the vision is the strategic use of an aggregated pipeline of demand for these homes, unlocking a robust, sustainable, and local supply chain. This supply chain will increasingly rely on timber, fostering the growth of Welsh SMEs and nurturing development of green skills. The use of timber products as building materials will be central to the Tai ar y Cyd house building programme. If the Welsh Government's proposed Timber Industrial Strategy (TIS) aims to ensure the use of more timber products that are grown (e.g. timber studs) and manufactured (e.g. timber frame, windows, and doors) in Wales, then the Tai ar y Cyd programme provides some important context to understand the types of timber products needed, where timber products will be used, quantities, and product requirements to meet specifications.

Tai ar y Cyd will support the development of demand-led growth in the use of sustainable timber products. The project, with the help of the second phase of the Home-Grown Homes (HGH2) project team has mapped the supply-chain in Wales, particularly in terms of timber-frame manufacturers. These are not a heterogeneous group, with each manufacturer supplying variations in timber frame products. This is a challenge for the Tai ar y Cyd team but is being met by aiming to develop a specification that can be delivered via different timber frame solutions. How this

aligns with the call for a standardised approach to timber frame manufacture and construction (and the benefits that come from this) has yet to be tested.

The Tai ar y Cyd project aims to use more Welsh grown timber products. This is a significant challenge that is being addressed in the HGH2 project. These products include sawn wood, boards, and insulation material. Sawn wood refers to timber that has been processed by sawing logs into standardised shapes and dimensions. The sawing process involves cutting the logs lengthwise along their grain to create pieces of wood with flat surfaces and uniform thickness. Sawn wood in timber frame use is usually derived from specific tree species – mostly Sitka spruce – and comes in a variety of grades, and sizes to suit different needs and preferences. Sawn wood also undergoes further processing, such as planing, sanding, or treating, depending on its intended use and desired finish. Currently (March 2024), the timber frame sector in Wales use sawn wood that is imported from Scandinavia or the Baltic States. This timber is fit-for-purpose in terms of price; strength; delivery and payment terms; and dimensional stability. If timber frame manufacturers supplying the Tai ar y Cyd project are to use Welsh-grown sawn wood, then they require a product that is viable in use particularly in terms of stability and price. The HGH2 project is exploring ways of achieving this by working with the supply chain and testing new approaches. The Tai ar y Cyd project will be pressing the case to be involved in piloting alternative ways for Natural Resources Wales to sell their timber with the aim of increased usage in social housing. It is hoped that the first round of affordable schemes that deploy the pattern book will have the opportunity to proactively test the use of alternative timber sales methods to understand challenges and opportunities and help ensure more Welsh timber finds its way into higher value, longer life applications.



Timber for timber frame construction

IMPACT

The Woodknowledge Wales mission is the purposeful development of Wales's forest industries, from tree to product to benefit the economy, the environment and the people of Wales. A forest industry that delivers public good.

The forest and wood supply chain in Wales is under-developed, fragmented, lacks strategic focus and is poorly aligned to deliver public good outcomes. The Tai ar y Cyd project could support a substantial increase in the quantity, value, and purposeful use of home-grown timber. This would also support a greater ambition to create a renewed wood culture in Wales. Tai ar y Cyd will contribute significantly to this mission, creating sustainable demand for a renewable and sustainable construction material.

The study outcomes will provide a guide through which Welsh Government and social landlords in Wales can deliver the building of 20,000 new low carbon, high quality social homes for rent. Delivery through wide-ranging social housing partners, across the geography of Wales, will enable the delivery of good quality sustainable homes supporting supply chain, jobs and skills development

opportunities across the country. They will also contribute positively to achieving Welsh Government's Well Being Goals.

The study will help define the role of social landlords in providing stable demand for and demonstrating good practice in the use of timber as a key product in decarbonising the construction industry. It will also help develop priority markets for Welsh timber in construction. This in turn will help define the supply chain's role in supporting these aims. Involvement of partners across the social housing sector combined with technical advisers, skills advisers and industry bodies will support innovation and drive demand.

The study outcomes will inform the next generation of good, sustainable and efficient homes in Wales providing high quality environments and homes that are a joy to live in. Development of the supply chain will provide skills demand and jobs for many years to come for people in Wales.

CONCLUSIONS

Solutions are required to enable the delivery of high quality, affordable and low carbon housing solutions to reduce carbon emissions whilst providing warm, comfortable and efficient homes for people in Wales. We have witnessed the impact of energy insecurity upon increasing levels of fuel poverty. At the same time levels of homelessness are at an all-time high in Wales. The Tai ar y Cyd study will support the delivery of multiple objectives shared by Welsh

Government, local authorities, housing associations, trade bodies, skills delivery bodies and the timber industry. The resultant pattern book specifications will be available to guide the delivery of low embodied carbon and energy efficient comfortable homes, alleviating housing pressures and delivering net zero targets, housebuilding targets and fundamentally good quality wonderful places for people to live.

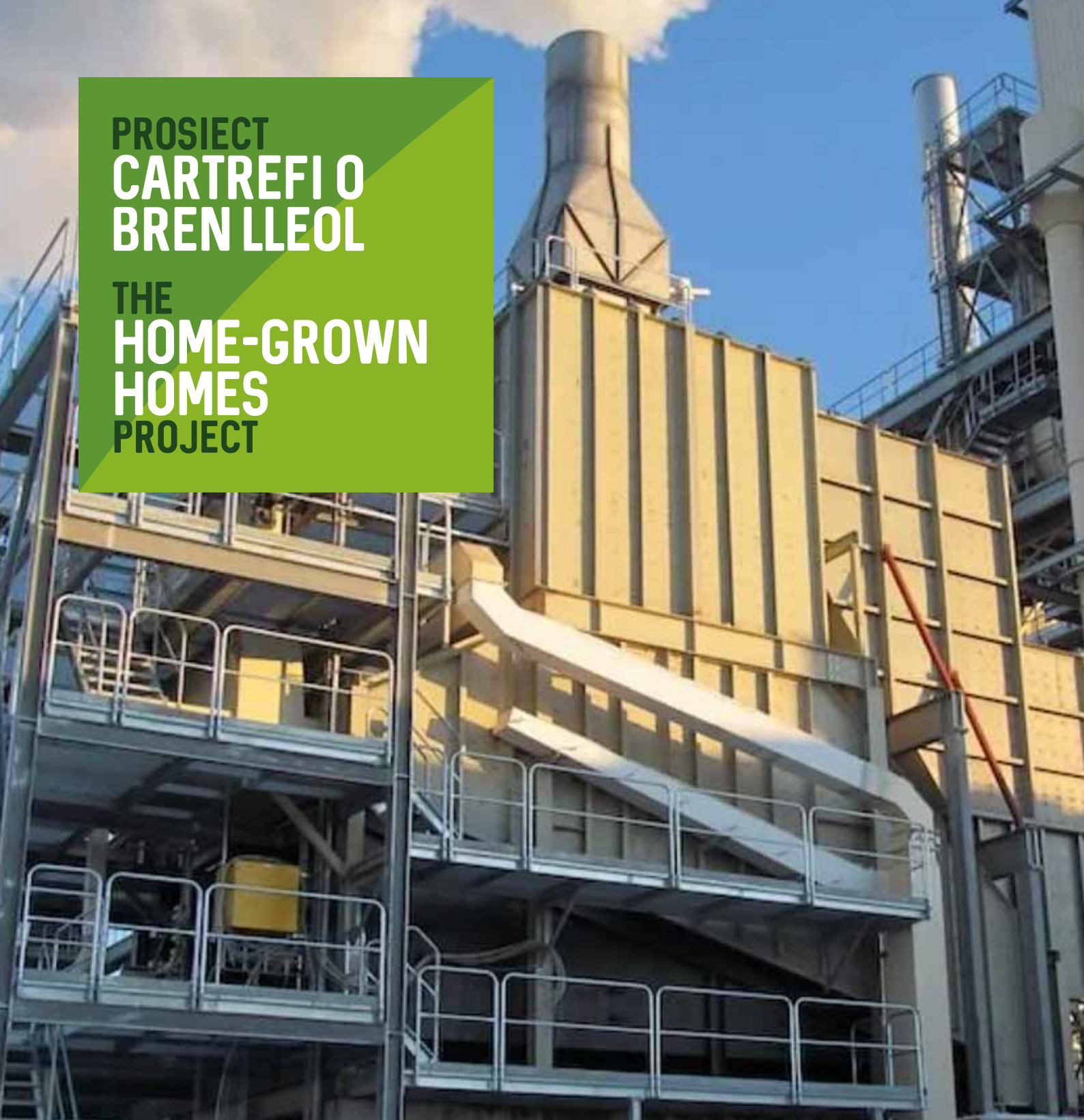
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THE
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CASE STUDY: CIRCULAR ECONOMY 1

Circular approach to panel production

KRONOSPAN

The UK's longest established manufacturer of wood-based panel products is adopting the three principles of resource circularity – reduce, reuse and recycle – at its north Wales manufacturing plant

INTRODUCTION

The UK's longest established manufacturer of wood-based panel products is adopting the three principles of resource circularity – reduce, reuse and recycle – at its north Wales manufacturing plant.

Kronospan's Chirk plant near Wrexham now has manufacturing processes which enable products to be made with 90% recycled content. Diverting wood-based material like unwanted furniture and pallets from landfill, enables it to be reused in another product, extending its life, ensuring the carbon captured by the growing tree and stored in the material isn't released into the atmosphere.

Kronospan's range of construction products is increasingly made from this recycled material supplemented by its onsite sawmill residue. Recent investment in processing equipment allows the raw recycled wood chip to be cleaned and separated so even higher proportions of recycled material can be used in its panel products. As a result, its

end users are helping to contribute to the circular economy. And it means more homes and buildings in Wales are using home-made structural construction materials – materials manufactured closer to their end use, reducing the impact of transportation.



THE PLAYERS

The family owned Kronospan business started life in Austria and now has 40 plants in the UK, Europe and around the world. The Chirk plant was the very first overseas investment for the family and remains one of its flagship branches. Built in 1970, the multi-million-pound manufacturing facility with its new automated technology remains the only timber cleaning centre of its kind in the UK, processing 'post-consumer' waste (which contains plastic and metal in addition to timber) before recycling it in its products.

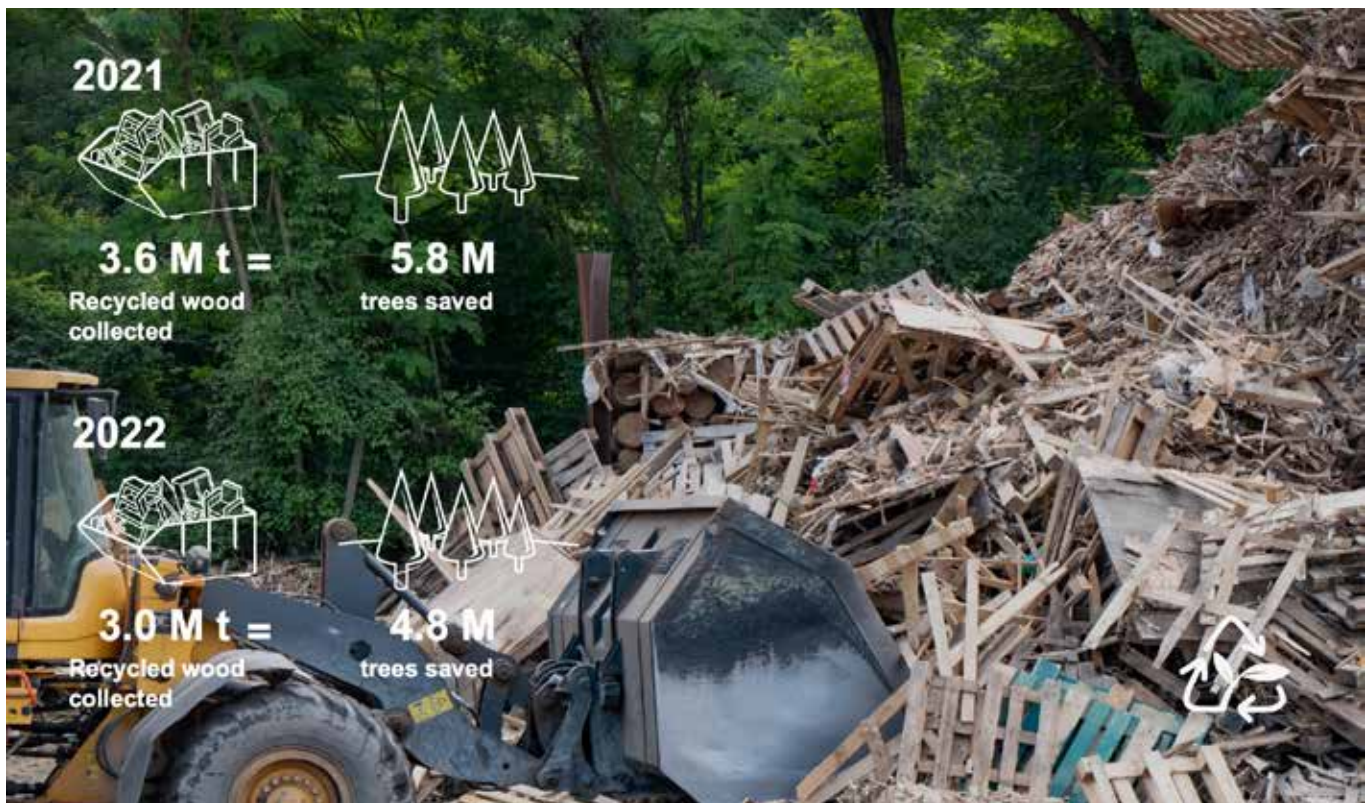
The company employs 650 staff, the majority locally, and manages 100 contractors on site every day. At the Chirk plant Kronospan manufactures particleboard and fibreboard, tongue and groove (T&G) flooring, laminate flooring and worktops. It also makes the resins for its wood-based panels. The plant incorporates a sawmill, resin manufacturing plant,

pre-production and recycled timber processing, fibreboard and particleboard lines, melamine facing lines, storage capacity, biomass boilers and engines.



The company has increased the proportion of post-consumer waste it uses, from 60% in 2016 to 90%. Its post-consumer waste collection centre in Chesterfield carries out the first clean of the waste before delivery to Chirk. Here Kronospan clean it further to produce reusable material for its products.

NARRATIVE



Kronospan, a family-owned manufacturer in Wrexham, has three priorities when sourcing wood for its products. Its first choice is recycled wood, second choice is sawmill residue, and the third choice is sustainable forestry wood. The factory converts wood residues unsuitable for recycling (they may be too small, too large, or contaminated) to heat and power which is used both internally and for the benefit of the local community where possible.

Particleboard is a panel product increasingly made from recycled wood such as old furniture and supplemented by sawmill residue. By opting to use recycled materials in products, manufacturers contribute to the circular economy.

The Kronospan team use otherwise unusable, recycled wood to manufacture P5 particleboard, a load-bearing panel for use in dry and humid conditions. Made from 100% recycled material sourced from local authority collection sites across the UK, these boards are first sent to the manufacturer's primary cleaning facility in Chesterfield before arriving onsite at the Chirk plant. The newly installed, state of the art, processing equipment at Chirk then cleans the recycled material for a second time and separates it into materials suitable for panel manufacture. This second cleaning process removes over and undersized particles, metal, stones, laminate particles and other contaminants. Grading then sorts clean woodchip into the different sized materials used for making different layers in the finished board.

Wales, like the rest of the UK, needs to divert materials away from landfill. Taking wood-based materials and recycling them back into other products helps to make the most of our valuable resources (wood). It also keeps the carbon in that wood locked up for longer over the lifetime of these new products.

RECYCLING HOUSING ASSOCIATION WASTE TIMBER

A North Wales-based housing association approached Kronospan to recycle the wood-based materials removed from the association's homes. Instead of being burned, wooden furniture, kitchen units, skirting boards, doors and windows can all be recycled into products that could be used in new social homes. Currently collected by a recycling organisation, there is no oversight for the housing association around the end of life of these materials. By working with Kronospan directly, the association will have more control over what happens to its waste and improve its own end-to-end sustainability efforts. If Kronospan can work directly with more Welsh housing associations this will help lock-in carbon for longer in buildings. By minimising the need for timber imports from other parts of the UK or Europe, recycling will also reduce the number of raw material transportation miles.

Recycling and remanufacturing locally contribute to the circular economy and support local companies and local employment within the green economy.

ORIENTATED STRAND BOARD (OSB)

Originally developed as an alternative to plywood, Orientated Strand Board (OSB) was traditionally made in Europe from large diameter hardwood logs. Now, OSB can be made from smaller diameter softwood logs, similar to the species typically grown in the UK. These smaller diameter logs are not large enough for use as sawlogs. OSB provides an alternative market for this material to avoid its use in short-lived products that release the carbon back into the atmosphere relatively quickly – such as animal bedding, garden mulch or biofuel. UK manufacturers typically make OSB from small, thin flakes of Sitka spruce, Scots pine and lodgepole pine. Careful orientation of these flakes, then bonded together using a formaldehyde-based or PMDI resin, improves directional properties. OSB is important to the construction industry who use it for load bearing applications.

Currently, the UK construction industry sources OSB from Scotland, Ireland, or Europe and Kronospan imports OSB from its manufacturing plants in Latvia and Luxembourg. The five-layer OSB imported from Luxembourg employs a proprietary method to incorporate a proportion of recycled material in the core layer. Kronospan would like to manufacture this five-layer OSB at its Chirk plant. However, the construction of a new OSB line relies on installation of new power lines to the site.

First, the Chirk team must have a high voltage power line laid from the plant to the nearest source of high voltage grid capacity, which is ten miles away. This major infrastructure project will enable the plant to replace its current gas-fuelled engines and turbines with a biobased combined heat and power plant. Plans include investment in solar PVs which will enable the plant to export renewable energy to the grid. The company's plant in Luxembourg already benefits from a similar system which generates more energy from renewable raw materials than it consumes. It is, therefore, the first CO₂ negative company in Luxembourg.



IMPACT

Kronospan's Chirk plant now manufactures construction products made with 90% recycled content. Recent investment enables the plant to clean and separate even more post-consumer waste. Diverting wood-based material from being buried in or incinerated, enables it to be reused in other products, extending its life and ensuring the stored carbon it contains isn't released into the atmosphere. These products are themselves capable of being recycled, retaining the carbon through several cycles of use and reuse.

Kronospan is manufacturing more home-made structural construction material close to the end-use construction locations in Wales. Local manufacture reduces the need to import new materials and the environmental impact of transportation.

The company's major infrastructure investment will improve access to locally manufactured construction products. This will further reduce carbon emissions and waste production, while increasing and extending carbon capture.

Plans to collaborate with local housing associations will help localise the source of waste wood products for recycling by the manufacturer. A fully circular economy will enable the construction and retrofit of local homes from recycled timber products made from locally sourced timber waste. It will also minimise the demands on newly harvested timber. Continued investment in manufacturing construction products to maximise their recycled content is a necessary driver if Wales is to decarbonise the construction and refurbishment of its existing and new buildings.



Author: Woodknowledge Wales

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**PROSIECT
CARTREFI O
BREN LLEOL**

**THE
HOME-GROWN
HOMES
PROJECT**

CASE STUDY: CIRCULAR ECONOMY 2 Recycling MDF into new fibre

MDF RECOVERY (MDFR)

With its sights on creating the world's first circular economy for high-quality recovered wood fibres from waste, MDF Recovery has developed a process to recycle medium density fibreboard (MDF)

INTRODUCTION

With its sights on creating the world's first circular economy for high-quality recovered wood fibres from waste, MDF Recovery has developed an innovative and effective process to recycle medium density fibreboard (MDF). Key industry partnerships helped evolve this bench-scale innovation into a fully functional 'end-to-end' recycling solution for the MDF panel board industry.

Fibreboard is made entirely of virgin wood. Some of this comes in the form of logs which are debarked and chipped onsite, the rest is purchased in chip form e.g. sawmill residues. Virgin wood supplies are under pressure

worldwide as demand escalates. The wood processing sector faces formidable challenges due to rising prices, supply uncertainties, and growing demands to preserve forests. In response, recycled fibre (rMDF) derived from waste MDF presents an innovative, energy-efficient, and dependable source of raw material for MDF manufacturers and various high-value applications, such as thermal insulation. end users are helping to contribute to the circular economy. And it means more homes and buildings in Wales are using home-made structural construction materials – materials manufactured closer to their end use, reducing the impact of transportation.

KEY PLAYERS



MDF Recovery

MDF Recovery Ltd has developed an innovative and effective process to recover fibre from waste MDF. Virgin wood supplies are under pressure worldwide as demand escalates and supplies are stretched. Rising prices and uncertainty of supply, combined with increasing pressures to maintain standing forests are challenging every element of the wood processing sector.

"The help I have had from The BioComposites Centre over the years has been invaluable. The pilot scale MDF line allowed me to demonstrate that recovered MDF fibres can successfully be reincorporated not just at lab scale but at pilot scale into new panels. This is the sort of scale that you need demonstrate to potential customers to show that your idea is not just theoretical but potentially commercially viable."

Craig Bartlett, MD, MDR



BioComposites Centre, Bangor University

The BioComposites Centre (BC) is recognised as a European Centre of Excellence in the forest products sector. BC has a track record in assisting companies to develop new technologies and products for over 30 years. BC and MDR have been collaborating for over ten years as Research and Development partners. Current activity focuses on the identification and analysis of new potential markets for recycled MDF fibres.

"We worked with Craig in the very early stages when he was setting up his company. A key to this long-term involvement is our technical knowledge on wood-based materials and the capacity we have with both our lab and pilot scale equipment. Access to this knowledge and equipment has helped Craig demonstrate his method for fibre recovery and has shown potential investors what other applications can be developed with his recycled fibres."

Dr Rob Elias, BioComposites Centre



IMAL PAL

PAL Group is a global technology supplier and developer, specialising in the design of technological solutions, machinery and complete production lines for four principal business areas: wood-based panels, pressed wood packaging, pellets and energy and wood recycling and waste treatment.

The partnership between PAL and MDR provides PAL with exclusive rights to integrate the MDR process with its own market leading wood cleaning and recycling technologies. For the first time, customers in the panel board industry will be able to specify a complete 'end to end' recycling solution for this challenging waste stream.

"We are delighted to be able to offer our customers around the world the integration of MDR's unique process with PAL's market leading recycling technology. PAL has a record of providing the wood panel industry with continual innovation. The partnership with MDR provides new and existing customers with a cost-effective and important answer to material, engineering, financial and market issues that are impacting their businesses."

Antonio Dal Ben, PAL's Vice President and CEO.



Woodknowledge Wales

Both MDF Recovery and W Howard are members of Woodknowledge Wales. We aim to bring together stakeholders across the timber supply chain. Through facilitated events and community visits, we encourage our stakeholders to share knowledge and progress around innovative developments. Offering the opportunity to meet and establish key partnerships can help take innovation to the next level.



W Howard Ltd

W Howard Limited are manufacturers of MDF mouldings with three manufacturing plants in England, Wales & Ireland. Products include skirtings, architraves, window boards, wall panelling, door casings and door linings. The product range consists of over 160 profiles and sizes and finishes in white primed, veneered and laminated. As well as a vast core range offering W Howard also manufacture bespoke products.

"W Howard's commitment and investment in the first production plant using our technology is a significant step forward for MDF Recovery. The market, governments and consumers are all keen to encourage re-use of materials and the circular economy. Waste MDF – either during processing or at end of life – is no longer a problem that has to be dealt with, but a valuable resource of high-quality wood fibres. We look forward to seeing W Howard's loose fill insulation product meeting the needs of house builders and the construction industry across the UK and Ireland."

Craig Bartlett, MD, MDF Recovery

"This is a very exciting collaboration between two Woodknowledge Wales members. Making better use of waste wood is just as important as growing more trees. Added to that, the UK desperately needs domestic production of wood fibre insulation. I'm delighted that this ground-breaking project is combining both insulation production and the upcycling of waste wood and is happening in Wales." **Gary Newman, CEO, Woodknowledge Wales**

NARRATIVE

Craig Bartlett established MDF Recovery (MDFR) to address the growing problem of how to recycle MDF (medium density fibreboard). The building sector uses MDF widely in interior applications such as shop fittings, furniture, and kitchens. However, there has previously been no process to recycle MDF at end of life.

With its sights on creating the world's first circular economy for high-quality recovered wood fibres from waste, MDRF has recently completed a £2.3m fund raise to support the scale-up and deployment of its technology through OEM partnership. The company is applying innovative approaches to develop an energy-efficient and environmentally friendly alternative to landfill and incineration for waste MDF.

THE MDF WASTE STREAM

Furniture and fitting manufacturers generate significant volumes of waste as they convert new MDF boards into products. MDF manufacturing typically creates up to 5% scrap. Then, further material enters the waste stream as these products reach their end of life. Until the advent of a cost-effective MDF recovery technology, manufacturers incinerated or sent far too much of this waste to landfill.

Each year, global production generates around 75 million tonnes of MDF, with around one million tonnes produced in the UK. The vast majority, if not all, of the wood used in production is UK sourced. Overseas sourcing only occurs in exceptional circumstances when it is cost effective. To meet demand, MDF panel production continues to increase by approximately 4.5% annually. As there has been no way to recycle this legacy material, there is already over 40 years' worth of MDF embedded in products and buildings.

RECOVERING MDF

MDF Recovery's proprietary MDF recycling process uses electrical heating technology to effectively separate the fibres from the resin in offcut and other waste MDF panels. The technology provides a closed loop solution which recovers greater value from waste and improves production efficiency in the manufacture of recycled content MDF panels and/or other fibre-based products.

Independent studies have confirmed that the recovered fibres are of the same high quality as virgin wood fibre and are perfectly suited for reintegration back into the MDF production process and as a feedstock to manufacturers of insulation products, peat-replacement products, and formable packing materials.

The technology offers an effective recycling solution for the waste processing industry. It recovers high quality wood fibre from waste MDF. Partner manufacturers will soon be turning these fibres into new MDF and other construction materials such as thermal insulation. These secondary insulation materials offer an eco-friendly alternative to mineral wool, glass fibre and plastics for thermal insulation materials.

By re-integrating recycled fibres into MDF panel production processes, manufacturers can ensure the circularity of renewable sources and reduce their dependence on the supply of virgin fibres. By doing so, they can also offset both the cost of raw product and significantly reduce levels of outgoing waste.





Recycled MDF panel fibres ready for reuse in new MDF panels or wood fibre products such as insulation. Source: MDF Recovery

FROM BENCH TO COMMERCIAL SCALE MDF RECOVERY

Progress from bench scale, through laboratory scale research and development and proof of concept at 150kg/hr, to a fully functional prototype manufacturing plant has been steady and has relied on key collaborative relationships.

MDFR has benefitted from a successful and ongoing relationship with The BioComposites Centre (BC) at Bangor University, and the Technology Transfer Centre run by BC at Mona Industrial Park on Anglesey. Then, in September 2023, MDFR formed a global partnership with PAL, part of the Italian multi-national equipment manufacturer IMAL PAL. This partnership will now industrialise the MDFR technology and integrate it into PAL's wood cleaning and recycling technologies to create a complete end-to-end system for fibre recovery from waste MDF. Relocating to new facilities in Wythenshawe, Manchester provided the company with an opportunity to enhance and modernise critical equipment and procedures. In doing so, it was able to reduce energy consumption and improve processing efficiency.

Research and development are progressing rapidly. Current emphasis is on sorting technology for waste and end-of-life MDF, optimisation of feedstock delivery systems, and scaling up production to 2.5t/hour and beyond. The

MDF team also continue to investigate advancements in drying technology, and ongoing enhancements to process efficiency. As the company's innovation and development efforts persist, so does its extensive portfolio of patents.

Construction is underway for the UK's inaugural commercial-scale MDF recycling facility, marking a significant milestone. Discussions are currently underway for MDFR to license its technology globally. This technology will enable customers in the panel board industry to specify a complete 'end to end' recycling solution for the MDF waste stream.

REUSING FIBRES TO PRODUCE LOOSE-FILL WOOD FIBRE INSULATION

Natural insulation is one of the fastest growing market sectors in Europe. In a growing market for natural construction materials, wood fibre has many benefits including ease of use, thermal mass, breathability, and appeal to increasingly CO2 conscious house builders and consumers.

In October 2023, W Howard Ltd secured a multi-year license to use the MDFR recycling technology to produce wood fibre insulation in both the UK and Irish markets. A new facility in Newtown Powys will begin production in 2025.

"MDF Recovery's technology is unique, and we are delighted to have obtained the exclusive licence for the production of loose fill insulation in the UK and Ireland. As a company, we are always seeking new and innovative products that fit in our vision of 'products in every home'. The demand for natural building materials is only going to increase and the addition of a recycled wood fibre insulation is an exciting addition to our product portfolio."

Jonathan Grant, Group Chief Executive, W Howard

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