

Manufacturing as an ecosystem service?

A feasibility study on woodfibre insulation production in Wales



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FEASIBILITY STUDY – INSIGHTS REPORT

This report summarises results from a feasibility study conducted between May - November 2025 using desk-based research, semi-structured interviews, a workshop with industry stakeholders and an online survey. It is complemented by a technical report which contains detailed study results, including further aspects relating to product benefits and applications, market characteristics, commercial opportunity, access to raw material, innovation potential, policy and investment environment, suitability of Wales as a manufacturing hub. The technical report is publicly available.

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With special thanks to Paula Howkins for concept and design of all infographics.



Ariennir gan
Lywodraeth Cymru
Funded by
Welsh Government

Funding

The feasibility study was funded by Welsh Government via the Smart Flexible Innovation Support programme - 2025/SFIS Level 1/188.

KEY FINDINGS

Key insights derived from desk-based research, expert interviews, online survey and workshop with industry stakeholders include:

Market demand & commercial opportunity

There is substantial potential for woodfibre insulation products in a variety of insulation segments in both new build and retrofit markets. Unlocking this market potential will require developing routes to market by working with stakeholders at all levels of the supply chain. There is scope for innovation in production processes and business models.

Raw material supply

There is sufficient fibre supply available to support industrial scale production of woodfibre insulation. There is opportunity and scope for innovation in using new types and sources of feedstock to mitigate risk of competition for fibre.

Business infrastructure

There is a thriving network of existing businesses from the forestry, manufacturing and construction sector to support and benefit from a new manufacturing plant processing woodfibre into low carbon, high performance insulation products. There is good to very good connectivity for transporting fibre to factory and product to market. There are industrial investment zones offering access to local energy and further infrastructure as well as funding opportunities.

Skilled workforce

There is access to skilled workforce for operating machinery, engineering, management, research and development as well as sales and installation. There are programmes in place to support and reward upskilling where required.

Policy environment

There are policy instruments in place to drive net zero carbon construction and increase market demand for building insulation products. However, some of the regulation currently hinders further uptake of natural fibre insulation. There is a timber industrial strategy supporting forest-based industries in Wales. There is strong political will expressed to invest in forestry and woodland creation for timber production in the UK, supported by regulation.

Investment conditions

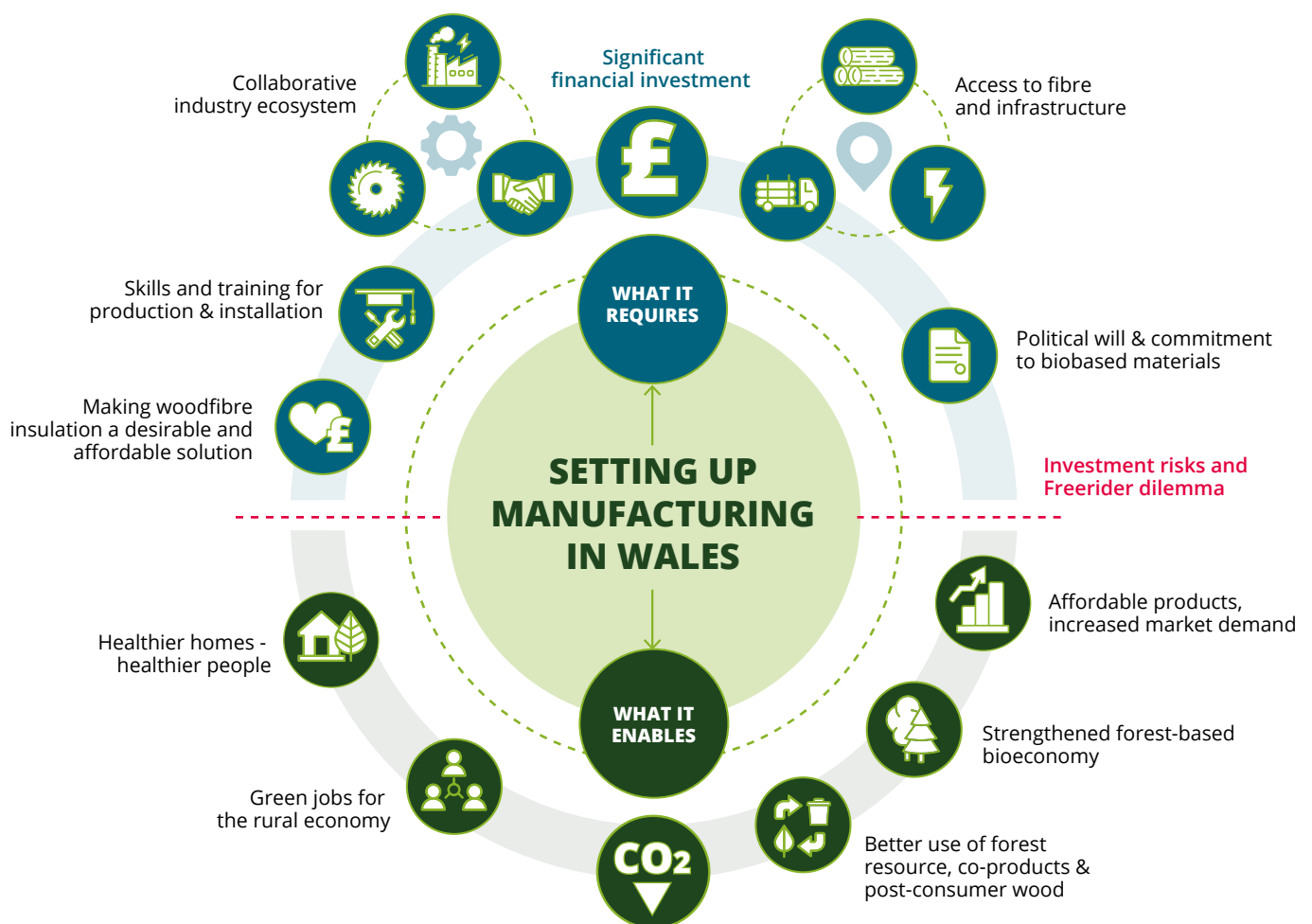
There appears to be limited availability of public funding at present and it remains unclear how to access some of the funding programmes that could support establishing a manufacturing plant. There is good opportunity to access financial support for technical innovation via a range of innovation programmes.

Conclusion

The main requirements for establishing manufacturing in Wales can be fulfilled. The opportunity is there but requires significant investment. In the present market conditions individual businesses struggle to envisage driving category growth on their own. While some see a first mover advantage, others remain more reserved. Overall, appetite for investment post-Brexit appears to remain hampered. Unlocking the opportunity will likely require innovative approaches involving multiple stakeholders.

MANUFACTURING IN WALES: WHAT PURPOSE?

On a purely functional level, the purpose of this study was to determine the feasibility of establishing a manufacturing facility for woodfibre insulation in Wales from a technical and commercial perspective. Looking beyond this narrow focus, what larger purpose would establishing such a facility serve for Wales and for the UK? Why does it merit attention from policymakers, industry stakeholders, public and private investors alike?



MANUFACTURING IN WALES: WHAT PURPOSE?

From an investor's perspective, manufacturing in Wales is the key to unlocking access to new build and retrofit markets for woodfibre insulation by making products more affordable for end customers. The marketing objective is category growth within the larger UK building insulation market.

From a societal and future generations perspective, wider use of woodfibre insulation contributes to more people benefitting from healthier buildings (homes, schools etc) because of its specific properties (see chapter 2). Woodfibre insulation helps store carbon over longer periods of time. It also allows to make best use of those parts of homegrown wood that aren't suitable for structural or joinery application and giving a new lease of life for a broad variety of reclaimed timber, including recycling panel boards and woodfibre insulation. So, wider use of woodfibre insulation contributes to healthier homes and carbon storage as well as a resilient forest-based bioeconomy which offers green jobs, particularly for those in rural locations.

Legislation and regulation play a key role in enabling increased market demand. Market development in continental Europe illustrates how the political will to support biobased materials translated into public procurement and unlocked the potential of natural fibre insulation in public and private buildings with demonstrable category growth. At present, political commitment to support biobased materials in

construction as a means for decarbonisation is significant as is shown in the Timber Industrial Strategy for Wales, the Timber in Construction Roadmap or the Future Homes Standard. The positive impact of these political commitments has yet to materialise in terms of category growth of biobased materials across new build and retrofit projects. Annex I provides an overview of current policy instruments that impact market demand, drive future fibre supply, support innovation, skills and training.

However, political will alone is unlikely to suffice. Too high is the perceived investment risk in the light of the current affordability gap and remaining policy hurdles for a single business entity to step in. As industry experts remain doubtful of a first movers' advantage, the inherent free rider dilemma appears to be the major barrier to overcome. Growing the market category will require industry stakeholders, such as manufacturers, fibre suppliers and government working together towards a shared destination. Could this be an opportunity for innovation around manufacturing plant size and throughput, for new types of fibres as material sources, for new ways of working and making biobased materials commercially viable as the affordable and healthy choice?

The following chapters summarise technical findings from our study. The final chapter sets out who will need to come together and what a shared destination could look like.



Images courtesy of Steico



WOODFIBRE INSULATION: USP & APPLICATION

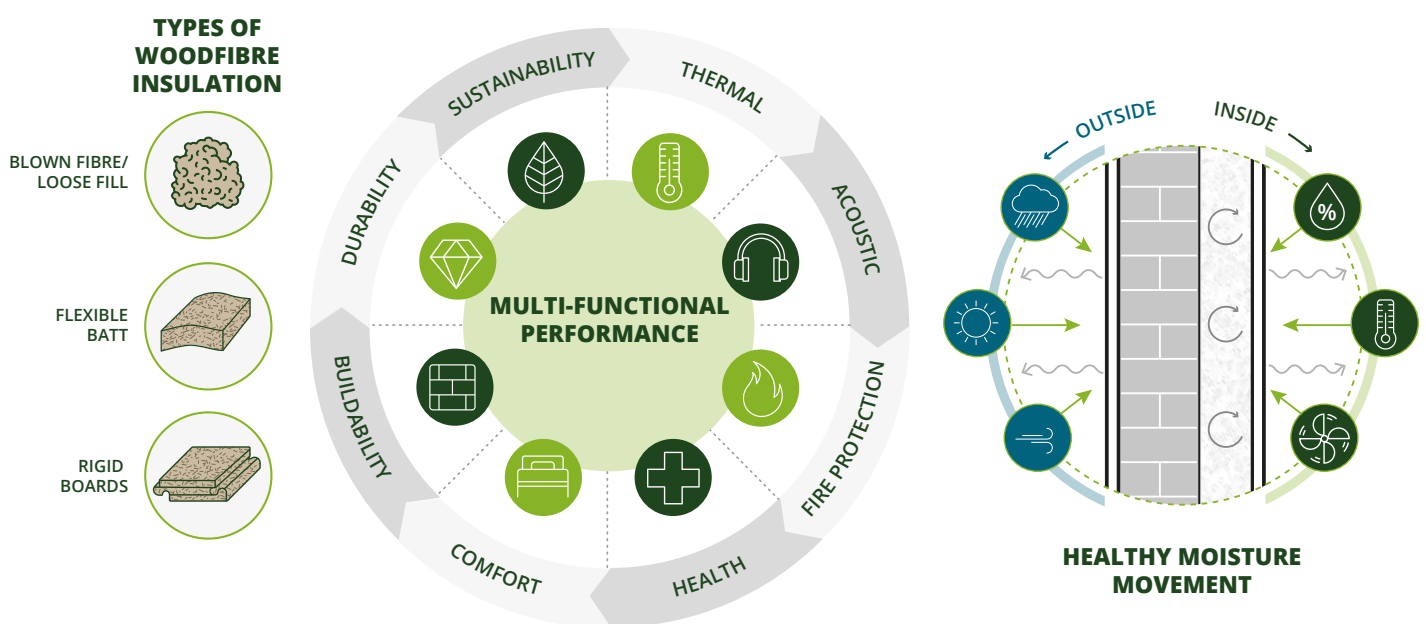
Woodfibre insulation offers thermal and acoustic insulation for building construction. It is suitable for newbuild and retrofit projects. Woodfibre insulation is available in three forms: loose fill, flexible batts and rigid boards. All three forms have competitive thermal properties matching the performance of mineral wool and glass wool insulation systems and offer multi-functional performance (see infographic).

Multi-functional performance

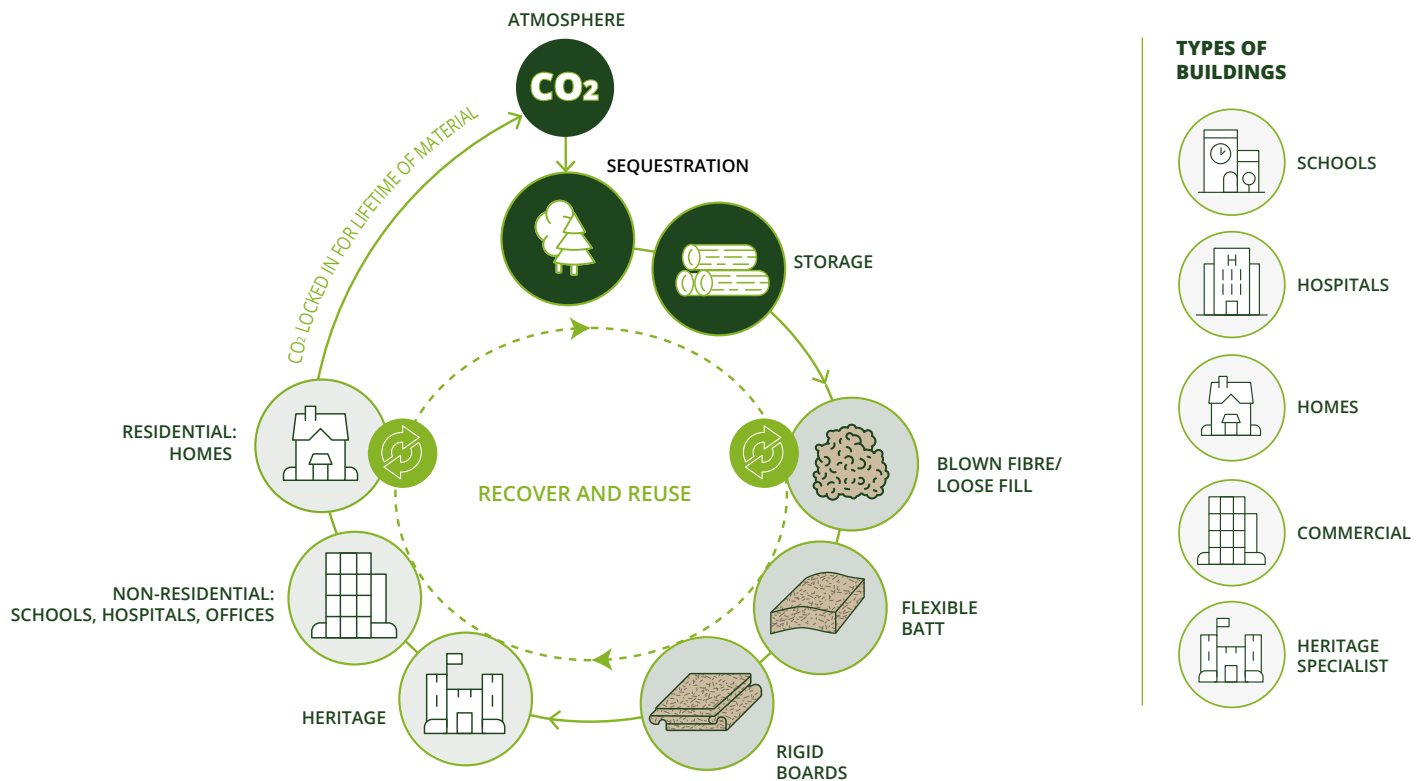
Woodfibre insulation has seen large growth within the thermal insulation market for buildings in Europe and to a lesser extent in the UK. This is mainly due to its specific advantages: its moisture buffering properties and its capacity to store carbon. But these are currently not mainstream considerations. To simplify, manufacturers with the lowest rate of heat flow through the material typically focus on that property, whereas manufacturers with the best fire-rating may choose to focus on non-combustibility. In reality, insulation has multiple functions, as one should expect from a material that makes up a major part of a building's fabric.

Thermal conductivity & comfort

Thermal conductivity (λ) of current woodfibre insulation products ranges from 0.036 to 0.047 W m⁻¹K⁻¹ depending on type of product. A comparison of various woodfibre insulation products and their thermal performance is available in the technical report.



WOODFIBRE INSULATION: USP & APPLICATION



Breathability & health

It is worth noting that a distinction is to be made between vapour permeability which is comparable with mineral insulation products and what is known as moisture buffering properties: Woodfibre insulation helps regulate moisture dynamics and thereby helps to prevent mould development on wall surfaces if installed correctly. Black mould in buildings is an increasing concern for landlords, due to recent legislation requiring rapid remediation of mould occurrence in let properties following the introduction of Awaab's law in England in October 2025.

Sustainability & carbon storage

Woodfibre insulation can be manufactured using virgin fibre from sustainably managed woodlands (typically forest thinnings), wood co-products, e.g. chips and shavings generated during sawmilling, or recycled wood products, such as MDF. This increases the resource efficiency of the whole industry and leads to a favourable carbon footprint of woodfibre insulation products. However, accounting for carbon is complex and values vary widely with manufacturing method and the grid energy mix in the manufacturing nation.

WOODFIBRE INSULATION: USP & APPLICATION

Fire protection

UK Building Regulations (Part B) require a fire resistance of ≥ 60 minutes.

Wall build-up: For construction projects, the total design of the wall determines the fire rating. Various designs for systems using wood fibre insulation products have been demonstrated to comply with Part B requirements.

Insulation product: Untreated woodfibre insulation typically achieves Euroclass E rating. Treated woodfibre insulation can achieve Euroclass D or C rating.

Current and future application

Woodfibre insulation is applicable to a range of building types, including residential, non-residential and heritage buildings. Different building types may present different commercial opportunities due to different incentives for energy efficiency, inclusion of biobased materials or requirements for low embodied carbon. Loose fibre, semi-flexible batt and rigid panels have different technical advantages which make them suitable for different applications.

Within the UK residential market, products are currently applied as follows:

New build: blown fibre, flexible batt or rigid panel as part of timber frame systems. In some designs a combination of products is used, for example rigid

boards combined with flexible batts of different thicknesses to offer a combined thermal insulation effect. In the future, use of woodfibre insulation in masonry buildings could be considered as a new market.

Retrofit: Rigid panel as internal or external wall insulation and flexible rolls as loft insulation (for ease of access to confined spaces). In the future, blown fibre could potentially be considered for cavity wall retrofit. However, this goes against current practice.

The following chapter takes a closer look into technical advantages and market opportunities. Further information on manufacturing technologies, multi-functional product performance, product application and all sources of information can be found in the technical report.



Image courtesy of Steico



An aerial photograph of a city, likely Oxford, showing a dense cluster of historic buildings with red-tiled roofs and stone walls. A large green semi-transparent rectangle is overlaid on the top half of the image, containing white text.

Woodfibre insulation is applicable to a range of building types, including residential, non-residential and heritage buildings.



VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

The UK building insulation market is expected to expand from £1,064 million in 2022 to £1,530 million in 2027. The UK market share of natural fibre insulation is estimated at around 0.5%, which translates to a market value of £5-7 million. This is considerably lower than in countries such as France or Germany, where the market share is reported at 5-10%. The expected growth in the UK insulation market is associated with new standards and regulations responding to decarbonisation targets, such as the Future Homes Standard, and the shift to heat pumps requiring well insulated properties.

Future Homes Standard

Due to be introduced in 2025, the standard brings a dramatic shift in performance requirements for newbuild homes and existing dwelling. As a result, industry has adopted a fabric first approach recognising the importance of optimising insulation and maximising airtightness, along with eliminating thermal bridging.

Existing homes are targeted to reach EPC band C by 2035. This is partially driven by regulations for landlords. Insulation companies supplying the retrofit sector are expected to see an increase in demand via refurbishment projects.

Approximately 28 million homes across the UK require decarbonisation. The National Home Decarbonisation Group, consisting of Tier 1 retrofit contractors and energy providers, offers a forum for good practice and supports technical and operational skills via the Retrofit Academy.

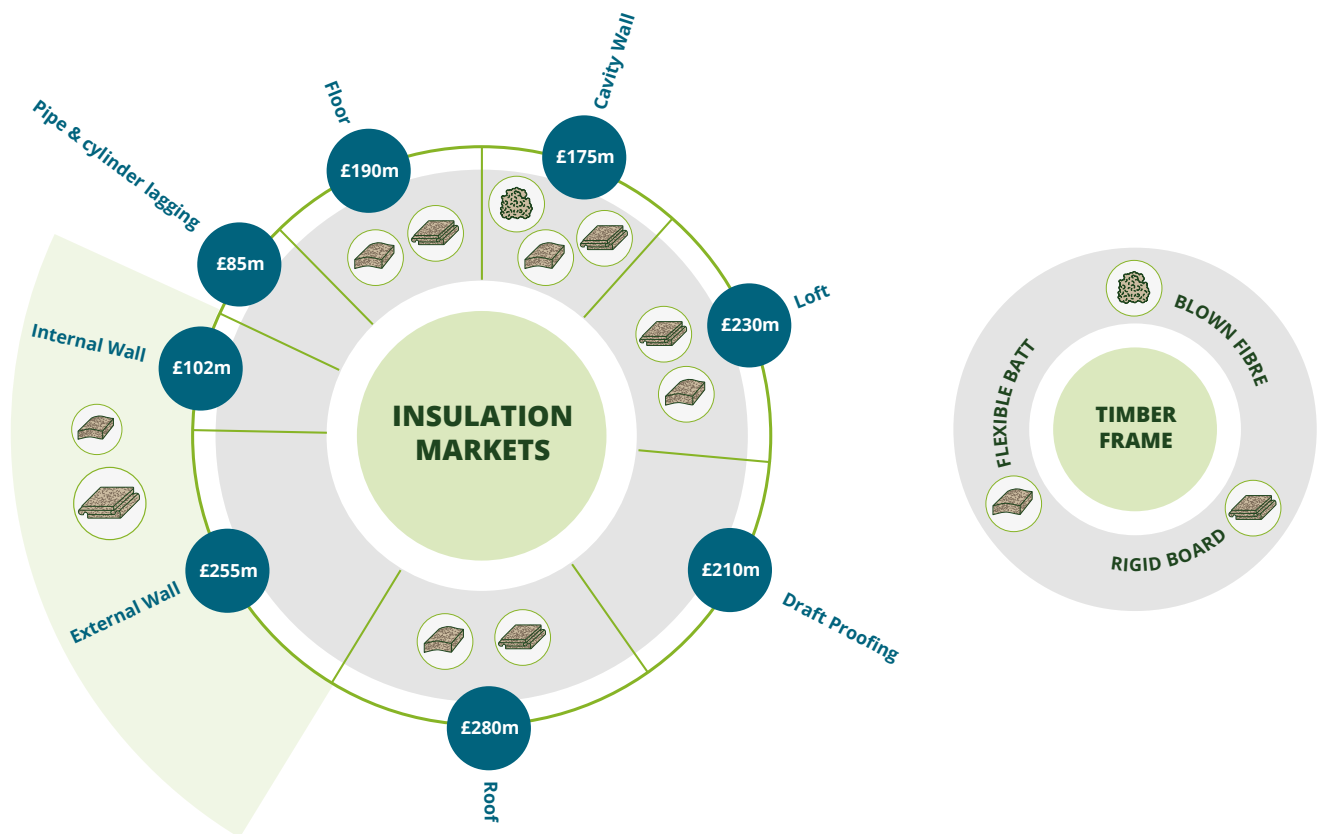


VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

Market segments and insulation type

The building insulation market is made up of different segments relating to the different parts of a building: cavity walls, loft insulation, roof insulation, solid wall insulation, under floor insulation, draft proofing, pipe & cylinder lagging. All segments have seen significant growth compared to 2020 data, except pipe and cylinder lagging.

The graphic shows the expected size of market segments in 2027 and illustrates which segments provide potential opportunity for blown fibre, flexible batt or rigid board woodfibre insulation products. Some segments refer to the retrofit market only, others include numbers for retrofit and newbuild markets.



Blown fibre has an underexplored potential as cavity wall insulation and will likely benefit from the growth in closed panel timber frame systems.

Flexible batt is closely associated with the growth in timber frame construction. It is very suitable for loft insulation but faces strong competition with mineral and glass wool products. It also has potential in roof insulation and the floor insulation segment offers scope for development. As the retrofit market expands flexible batt products are expected to benefit from some opportunity in solid wall insulation.

Rigid board will benefit from expected growth in timber frame construction. As retrofit markets expand, there is a big opportunity in solid wall insulation predicted. There is opportunity for room-in-roof conversions, where woodfibre competes with PUR and PIR products. There may be opportunity in non-residential roof insulation. There is scope for development in the floor insulation segment.

VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

Retrofit market: decarbonisation policy as opportunity to unlock

Retrofit markets provide a significant opportunity for woodfibre insulation. Internal and external wall insulation alone are predicted to amount to around £355 million in 2027. Loft and roof insulation make for another £510 million, though part of this number is attributable to newbuild as is the case for numbers relating to cavity wall and floor insulation.

Opportunities in building retrofit

Cavity wall: Standard building method from 1930s. In 2022 over two thirds of these homes had been insulated. Of the remaining five million uninsulated homes not all are suitable for cavity wall insulation due to building methods in the 1930s. This market may be nearing saturation within the next decade.

Solid wall: Properties from the 1920s and earlier. In 2022 in around 91% of all homes with solid walls (7.7 million) these were still uninsulated. Cost for insulating these buildings are high and can be prohibitive to private households. There is a correlation between fuel poverty and households with uninsulated solid wall homes.

Loft: Rapid payback periods, ease of access and DIY potential make loft insulation a primary focus for homeowners. In addition to homes with uninsulated lofts from previous building periods, existing homes from the 1980s-2000s have considerable scope for topping up or replacing insulation systems.

Roof: Predominantly industrial and commercial buildings. Some roof insulation in homes is driven by loft conversions, or 'roof in roof' alterations. This has favoured rigid boards or rigid foam panels, meaning there is scope for wood fibre insulation.

Floor: Until the 1990s, many properties were built without insulating floors. An estimated eight million homes in the UK have suspended timber floors, the majority of which are uninsulated. Retrofit floor insulation is low but expected to increase once other insulation measures are completed.

While this certainly is a lucrative market to focus on, it's not a quick win. Recent developments in retrofit include the Retrofit Standards Framework (see annex I). Its aim is to assure quality in retrofit. However, PAS 2030 and 2035 requirements for certification and warranties of products and installers present a barrier to using woodfibre insulation in government funded retrofit projects, such as social housing. Removing existing barriers will be crucial for unlocking this market potential. This will require coordinated action from policymakers, retrofit organisations (e.g. national retrofit hub), and industry.

VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

New build market: decarbonisation policy as primary market driver

Housing starts for Great Britain were 126,920 in 2024. With decarbonisation policies coming into force and the continued drive for modern methods of construction (MMC) the new build market presents a large opportunity for woodfibre insulation. This would work with masonry, timber or other MMC systems. The UK new build market is dominated by a small number of large housebuilding companies. In recent years, seven out of the ten largest housebuilders have moved

to using timber frame in at least part of their portfolio. Several have invested in their own timber frame manufacturing. The Structural Timber Association STA estimates that 22% of newbuild homes in 2024 were timber frame. The table below indicates quantities of woodfibre insulation for an average house with 91m² floor area using examples of timber frame wall make ups (A, B, C, D). More detailed calculations for other structural systems can be found in the technical report.

	Thickness (mm)		Volume (m ³)			Weight (kg)		
	Flexible between studs	Sheathing (rigid)	Volume flexible (m ³)	Volume rigid (m ³)	Total (m ³)	Weight flexible	Weight rigid	Total (kg)
A	220 mm	80 mm	22	8	30	1100	1200	2300
B	140	160	14	16	30	700	2400	3100
C	140	100	14	10	24	700	1500	2200
D	140	140	14	14	28	700	2100	2800

While woodfibre insulation offers a low carbon and healthy insulation material, and can meet fire performance requirements, it lacks competitive pricing. In addition to costs, woodfibre insulation is not included in the current edition of the STA pattern book for certified wall buildups making it a non-standard insulation material in the industry. Work is underway to change this in the short to medium term future.



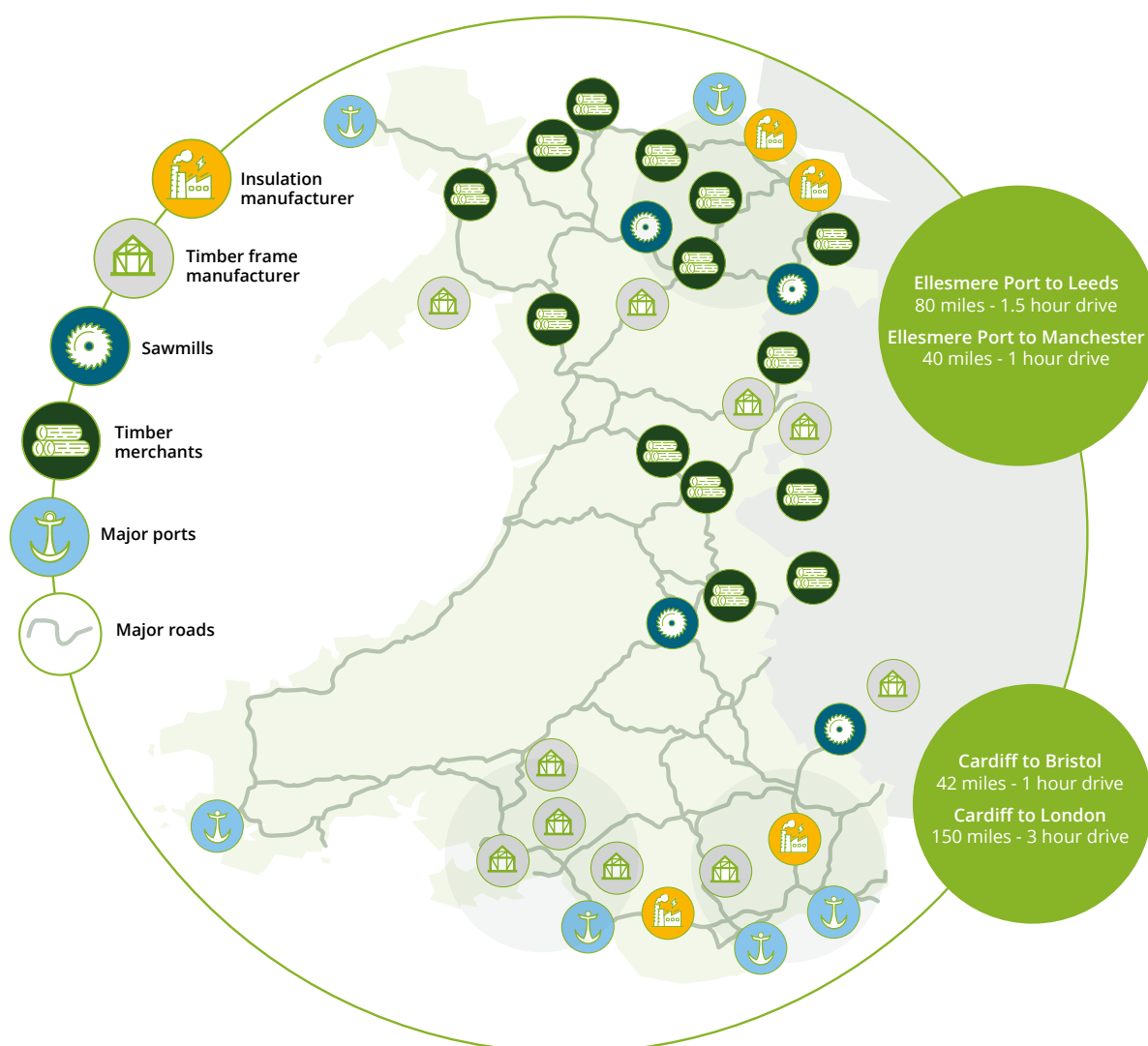
VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

Competition

Several large companies dominate the building insulation sector, including Saint Gobain (Isover), Knauf, Rockwool, Kingspan and Superglass. Some of these have invested in the natural fibre insulation segment through purchase or merger with existing companies such as Pavatex and Steico. The UK market is currently supplied with woodfibre insulation products from manufacturing plants in France, Germany and Poland. As a result of this investment existing woodfibre brands may access greater marketing and mainstream distribution networks, which could support category growth.

Business infrastructure

Wales recognises the importance of forest-based industries and has launched its first Timber Industrial Strategy, co-developed with stakeholders across the wood value chain over a period of two years, in July 2025. A supportive business infrastructure is core to delivering the strategy objectives. It impacts access to market as well as raw material supply and has cost implications for manufacturing and product affordability. The graphic below gives an overview of the existing infrastructure.



VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

Supply & demand ecosystem

Wales has a strong forestry and timber sector that can support a woodfibre insulation plant. Major sawmills like BSW and Pontrilas generate large volumes of co-products ideal for insulation feedstock, while Kronospan illustrates the region's capacity for large-scale wood processing. Medium sawmills and specifically timber frame manufacturers could also provide partnership opportunities supplying co-products and using woodfibre insulation materials in their own systems. In 2026 W. Howard's new factory in Newtown is expected to transform waste MDF from the furniture, retail and construction sector into loose fill insulation to serve the growing timber frame market. The production capacity of the factory is designed to process 750 kg per hour and to supply 6,000 t of woodfibre insulation per year (+/-10%). In the future, this could also feed into manufacturing of flexible batt or rigid board insulation.

On the demand side, there is a strong commitment in social housing to use biobased construction materials in an effort to decarbonise housing. This is supported via government grants and regulation. A host of supporting guidance on the use of timber systems, timber-based building elements, low carbon construction and building performance has been issued as part of the Home-Grown Homes Project. Tai ar y Cyd, an initiative of 25 social landlords in Wales, has developed a pattern book to facilitate cost efficient procurement of high-performance timber homes. A number of peer-based communities of practice, hosted by Woodknowledge Wales, are enabling personal connections, open conversations, knowledge exchange and collective learning on an ongoing basis. These are underpinned by cross-sector events, such as the annual WoodBUILD conference & expo, that bring together stakeholders across the whole value chain, including industry, policymakers, research and education.

Distribution network

Various options exist for distribution of woodfibre insulation products. This includes omnichannel distribution services with multiple product brands under the same roof. This option reflects a general trend in the industry. Some specialist distribution companies are targeting the green building and retrofit sector specifically. Another consideration could be a franchise network for distribution.

A number of companies have grouped together to form the Independent Insulation Distribution Association (IIDA). This includes a centralised purchasing facility, allowing smaller distributors to obtain bulk discounts, ensuring competitive prices from the manufacturers.

Research & development community

Strong expertise exists in wood science and fibre-based manufacturing technologies at the BioComposites Centre in North Wales as well as in the team at MDF Recovery. This is complemented by strong expertise in ai and machine learning as well as advanced manufacturing process engineering at the High Value Manufacturing Group at Cardiff School of Engineering and the Astute Centre of Excellence in South Wales as well as the Advanced Manufacturing Research Centre AMRC Cymru in North Wales. There are testing facilities available for full wall build-up testing.

Connectivity to markets

Wales benefits from strong transport links that support both fibre supply and product distribution. The M4 and A55 connect Wales to major UK markets, while the South Wales Main Line and North Wales Coast Line offer efficient rail freight options. Ports such as Newport, Cardiff, and Port Talbot add capacity and connectivity, strengthening Wales' position for woodfibre insulation manufacturing. A full appraisal of transport links via rail, road or sea can be found in the technical report.

VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

Industrial investment zones

Wales offers several industrial investment zones that align with logistical requirements for a woodfibre insulation plant and offer financial incentives to help minimise investment risk and maximise future development. The most relevant are Deeside Industrial Park in North Wales, and Port Talbot, Newport, and Cardiff in South Wales.

Deeside Industrial Park, Flintshire, North Wales

One of the UK's largest and most advanced industrial estates.

- ✓ Strong transport links to major UK markets and fibre supply: immediate access to the A55, linking into the M56 and M6, rail and port infrastructure nearby, including access to the Port of Mostyn and Holyhead for Irish and international trade.
- ✓ Investment access: part of the Flintshire and Wrexham Investment Zone, a £160 million initiative expected to create up to 6,000 jobs across the region through targeted infrastructure investment, business rate reductions, and tax reliefs.
- ✓ Ready-to-develop location for large-scale manufacturing at the Northern Gateway site benefitting from over £10 million infrastructure investment.
- ✓ Energy supply security: Parc Adfer processes up to 232,000 tonnes of non-recycled household, commercial, and industrial waste into electricity and energy. Its generating capacity of ca. 21 MW (gross) could provide reliable local electricity supply, strengthen low-carbon credential and operational efficiency.

Port Talbot Industrial Area, Swansea Bay, South Wales

- ✓ Strong transport links to major UK markets and fibre supply: excellent connectivity via the M4 and major rail lines.
- ✓ Investment access: The region benefits from funding and regeneration schemes, e.g. £1.3 billion Swansea City deal package, aiming to boost regional economic growth, advanced manufacturing, and energy transition, £11.7 million to support local businesses in the area via Tata Steel / Port Talbot Transition Board, further investment into local road infrastructure to link industrial estates and harbour.
- ✓ Energy supply security: Margam Green Energy plant and other bioenergy activities create potential synergies but also competition around local energy supply, raw material supply and industrial zoning. The wood-fired biomass power station has supply capacity for 75,000 homes, offsetting 270,000 tonnes CO₂ a year.

VIABILITY: MARKET OPPORTUNITIES & CONSTRAINTS

Newport and Cardiff Industrial Areas, South Wales

- ✓ Strong transport links to major UK markets and fibre supply: excellent connectivity via the M4, the ABP port network and major rail freight terminals.
- ✓ Investment access: £160 million in government funding over a ten-year period via Cardiff and Newport investment zone to position the region as a hub for industrial growth, focusing on advanced manufacturing, research and development, and infrastructure improvements. Targeted smaller-scale grants available for green innovation in Cardiff and decarbonisation and innovation incentives via local council led programmes in Newport.

A full appraisal of these and further industrial investment zones in Wales is available in the technical report.

Availability of skilled workforce

A **skilled installer network** is a key consideration for product rollout in existing buildings. Some further education colleges in Wales can deliver the Retrofit Academy syllabus allowing local training for skilled contractors to install insulation products in the expanding retrofit market.

The existence of a strong timber frame sector in Wales allows employees from a wide range of training backgrounds to rapidly be skilled up and deployed to deliver modular construction solutions. This is beneficial to surrounding businesses, which rely on assembly skills in a factory environment. This could offer access to a workforce with **transferable skills** for a woodfibre manufacturing plant.

A wide range of apprenticeships and courses exist for trainee engineers, mechanics and other skills relevant to manufacturing of woodfibre insulation: **operation of machinery** such as a disaggregator or refiner or **designing and maintaining systems** for sorting, cleaning and handling large volumes of feedstock material.

Support for green skills includes the removal of the eligibility salary cap for those upskilling or reskilling in the sectors of construction, engineering and manufacturing. Welsh Government has made an additional investment of £2 million into green Personal Learning Accounts. These fully funded flexible learning courses allow students to train around new responsibilities and can enable retraining to change career. Further information can be found via the [Carbon Hwb](#). Further information and sources can be found in the technical report.



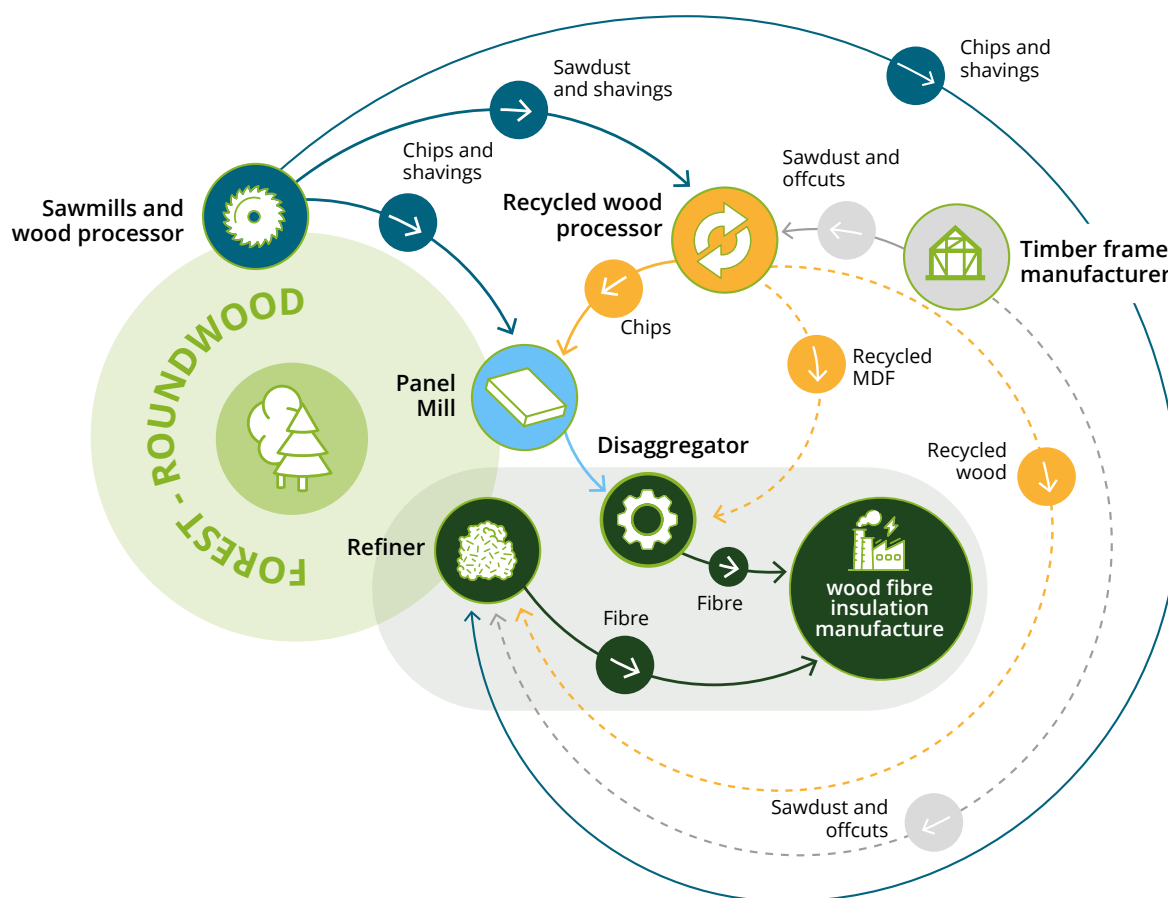
There appears to be sufficient fibre supply available to support industrial scale manufacturing of woodfibre insulation in Wales.



VITALITY: FIBRES, PROCESSING & INNOVATION POTENTIAL

There appears to be sufficient fibre supply available to support industrial scale manufacturing of woodfibre insulation in Wales. This conclusion was corroborated by representatives from the woodfibre insulation industry during a stakeholder workshop in October 2025. Industrial pressurized refiners typically have high throughput. Refiner capacity varies with installation and company business model. Production capacity of existing plants in continental Europe ranges from 4.8 to 10 tonnes per hour. Spare capacity in the European infrastructure is currently estimated at approx. 50% of capacity. For Wales, an investment could require between 20 and 85 thousand tonnes of wood (dry weight) per year, depending on machine size, shift system and percent capacity operated.

The graphic below illustrates possible sources of virgin fibre, chips and shavings, sawdust and offcuts as well as recycled fibre from reclaimed MDF within the existing business ecosystem.



VITALITY: FIBRES, PROCESSING & INNOVATION POTENTIAL

Fibres for manufacturing

Fibre supply and manufacturing technologies are linked. Different technologies require different types of fibre and are suitable for different types of insulation products. Various technologies exist for separating wood into its fibres for further processing into blown fibre, flexible batt or rigid board. The main technologies are summarised below. A full explanation of these technologies is provided in the technical report.

Thermomechanical pulping (TMP) – dry process

Primarily used in the MDF panel industry.

Technology: pressurized high temperature refiner

Yield of fibre per wood input: high.

Wood input: very clean wood required to avoid damaging refiner plates.

Products: 'Dry process' boards.

Thermomechanical pulping (TMP) – wet process

Primarily used in the softboard industry

Technology: lower temperature refiner

Yield of fibre per wood input: high, but fibre length may be too short for some insulation products.

Wood input: very clean wood required to avoid damaging refiner plates.

Products: 'Wet process' softboards.

Chemical pulping

Primarily used in the paper industry

Technology: dissolution by concentrated chemical solutions. Unlikely for insulation products due to costs, energy and chemical waste recycling requirements.

Significance: defines properties of recycled paper to be aware of when considering blended products.

Forest resource

It is likely that spruce would form the bulk of the feedstock for pressurized refining, with various other conifer species being acceptable as a substitute or minor component. The mid-range density of spruce (450-500 kg/m³) makes it an ideal feedstock for fibre production.

Wales has 312,000 hectares of woodland (15% of the land area), 48% of which are certified by either FSC, PEFC or Grown in Britain schemes. 45% of woodlands are coniferous with Sitka spruce being the dominant species. Dominant species in mixed broadleaf woodlands include oak, ash and beech.

The average yield of softwood forest in Wales is 16m³/ha/year, with some varieties of Sitka spruce reaching yields up to 40m³/ha/year. Just over half a million green tonnes of softwood timber was removed in Wales in 2023. Some regions of the UK have higher potential availability of wood than Wales. The central belt of Scotland is one example with good transport connections to Wales as evidenced by regular deliveries to Kronospan at Chirk (see also infographic in previous chapter).

VITALITY: FIBRES, PROCESSING & INNOVATION POTENTIAL

Future softwood fibre supply

Woodland creation for timber production is priority 1 in the Welsh Timber Industrial Strategy “Making Wood Work For Wales”. Demand for roundwood and logs will increase in the years 2024 to 2026 but remain approximately equal to potential availability for a period towards 2030. Availability of softwood from England and Wales is then predicted to decrease slowly up to 2039, whereas Scottish supply is forecast to diminish later, up to 2046. These forecasts are based on forest data and assumptions about the age at which material may be presented to the market. It does not equate directly to actual availability or roundwood production figures. There has been a renewed commitment to woodland creation including productive forests by governments in recent years at UK level as well as in the devolved nations.

Co-products

Residues entering the forest products industry (wood based panels) are expected to increase from 1.8 million to 2.3 million tonnes by 2046.

Availability of sawmill co-products relates to the size of the sawmilling industry in a region and the proximity to industries such as wood-based panels who consume such residues. Transport and logistics form a crucial connection between sawmill and purchaser of residues. This is dominated by a few specialist companies, such as AW Jenkinsons, and Stobart. Large mills in the Welsh borders include BSW (Binderholz), Pontrilas Sawmills and fencing producer Clifford Jones Timber. A number of small and medium sized sawmills are also located in the region. Competition for sawmill residues will include large panel mills (e.g. Kronospan, Egger, West Frazer), biomass energy or electricity, and small users (e.g. equestrian surfaces, animal bedding).

Residues from secondary manufacturers, such as joinery manufacturers (e.g. mouldings and profile manufacturers, window and door companies), furniture manufacturers and small wood working enterprises may produce high quality wood shavings (i.e. clean, untreated) but may be of a wider range of species, or include a quantity of panel products shavings or millings (e.g. MDF). A full appraisal of these options is provided in the technical report.

Recycled fibre recovery

Using post-consumer wood in woodfibre insulation production requires significant investment into sorting, screening and high-quality control of feedstock, potentially using inline scanning technologies such as hyperspectral imaging. Given these technical requirements, category C wood is unlikely to be a suitable source of fibre.

Recycled MDF fibres provide a more recent viable source of fibre. Two technologies have emerged during the past 5 years to recover fibres from reclaimed MDF. The reclaimed fibre retains the size and shape prior to board manufacture and can easily be used in new panels or in insulation materials. Global availability of end-of-life MDF was estimated at approx. 60 million tonnes in 2024. This could expand steadily over coming decades. In Wales, MDF manufacturer W.Howard is investing into blown fibre insulation production from recovered MDF under the Pillo brand. Depending on site scale, such installations can be configured to handle 2 tonnes or 5 tonnes of MDF waste per hour.

VITALITY: FIBRES, PROCESSING & INNOVATION POTENTIAL

Innovation potential

Potential for woodfibre insulation manufacturing exists in innovation for process efficiency and resilience, cost efficiency and product performance.

Innovation for process efficiency and resilience

Optimisation options exist in fibre refining. Fibres with longer average length and higher content of oversize fibres could enable adjusting refiner settings to slightly less energy consuming levels than required for panels manufacture. Differences in energy requirement also occur between wet process and dry process systems. The clearest difference can be found between recycled (low energy) and primary fibre production (high energy).

Significant potential exists in optimising processes to ensure viability of smaller throughput to match market demand levels and production capacity. A Welsh manufacturing plant could be a test pilot for this type of innovation.

Innovation potential hardwood fibre

Studies in the UK have shown promising results for various hardwood species, including willow, birch, beech, alder, sycamore, poplar and oak as potential feedstock for woodfibre insulation, including in combination with reclaimed softwood. German researchers have also considered beech and oak fibre for woodfibre insulation, while French studies have considered beech and birch.

Further options include annual biomass crops, such as miscanthus or wheat straw, although fibre quality and fibre processing may require more adjustment for these materials.

Innovation for cost efficiency

Scope for cost efficiencies exist in heat recovery and in feedstock sourcing and processing. Colocation with other industries who are waste heat generators or waste heat users could offer cost efficiencies for energy in addition to internally identifying waste heat for recovery from one process into the next. A wide range of technology options exist for designing in heat recovery systems when commissioning a plant. Emerging feedstocks based on wood grades that are less sought by other wood users, such as hardwoods, or short rotation coppice could be worth investigating. Cleaning, screening and sorting technologies to allow confident use of category B or C recycled wood fibre could lead to cost savings in the long run. Machine vision systems and spectroscopic based systems to enable this have advanced considerably.

Innovation for product performance

Technical product properties offer some scope for innovation, such as moisture control, fire performance or the use of biobased binders. Possibilities include enhancing moisture resistance for longer service life in spaces at risk of condensation or increasing fire rating to Euroclass C or B through innovative treatment solutions. The use of innovative binder systems, including biobased and low VOC products, are other possibilities. Such systems have been developed or trialled in the BioComposites Tech Transfer Centre in Wales.

Further information and sources can be found in the technical report.

Product affordability is one of the biggest barriers to category growth in the UK market.



COMMITMENT: MITIGATING INVESTMENT RISKS

Investing in manufacturing in a new market is a commitment that goes beyond the purely financial risk of any entity involved. It includes organisational, relational and reputational commitment and hence risk to the entrepreneurial individual within their organisation. It is a strategic decision that requires long-term market vision and significant financial resource.

Financial commitment

The financial commitment for the customer purchasing woodfibre insulation is notably higher than for mineral or synthetic insulation products. Product affordability is one of the biggest barriers to category growth in the UK market.

Product & manufacturing choices

Success of a woodfibre insulation manufacturing plant will mostly depend on the ability to grow the category for natural fibre insulation within the UK insulation market. Within this market, strategic choices will need to be made between types of products: Loose fill / blown fibre, flexible batt or rigid board. Each of these comes with their own performance and technical advantages, investment and production capacity requirements and therefore specific market focus.

Government funding tools

Companies locating in Wales can access funding through the Development Bank of Wales and the Investment Fund for Wales which is part of British Business Bank.

The Development Bank of Wales provides loans and equity finance options up to £10 million and is backed by Welsh Government. This can be direct investment or private sector co-investment.

The Investment Fund for Wales offers small loans up to £100,000, debt finance up to £2 million and equity finance up to £5 million. There is a commitment to provide £130 million through this programme.

Locating in one of the industrial investment zones in Wales provides access to further funding opportunities via regional or local investment programmes. Further support can be made available by negotiation with Welsh Government and local authorities.

Other routes worth exploring are net zero investment opportunities (see text box).

UK Net Zero Investment Opportunities

A specific programme for net zero technologies. Government partnership models for investment include blended finance solutions that combine public with private capital. Public finance can support all stages of technology readiness via UKRI and Innovate UK funding, British Business Bank, Great British Energy and National Wealth Fund. An overview of these options can be found in the [UK Net Zero Transition investor prospectus](#).

COMMITMENT: MITIGATING INVESTMENT RISKS

Political commitment

Political commitment exists regarding future fibre supply from forest resource. There is a strong commitment towards decarbonising the built environment and increasing the quality of retrofit delivery. Despite this intention, regulatory barriers exist that restrict or prevent the wider adoption of natural fibre insulation, including woodfibre. In addition, systemic issues such as land value and housing costs negatively purchasing power including within traditional customer segments for biobased insulation.

The significant growth of woodfibre insulation in countries such as France or Germany has been driven by a combination of decarbonisation regulation and a political commitment to using biobased materials in public buildings. Enabling public procurement in favour of biobased materials provides a significant baseline for a new manufacturing plant and instigates investment into distribution networks, specification and installation skills.

As a sector, natural fibre insulation suppliers to the UK construction market are advised to engage with policymakers to work on overcoming current barriers to using their products, particularly in the government supported housing retrofit market.

Industry commitment

Investing into market development and category growth requires working with **decision makers** at all levels of the supply chain, in particular:

- Working with building control to enable risk assessment and management
- Working with national distributors
- Working with installer organisations or developing their own installer network to assure quality of installation and prevent reputational damage

This is better done as a sector than as an individual company or brand.

Investing in manufacturing requires certainty of suitable fibre supply at the right volume. Commitment of fibre suppliers and insulation manufacturers to conclude and honour agreements that ensure **reliable fibre supply for production** supports the viability of such an investment. Similarly, inclusion of woodfibre insulation in the STA pattern book would enable the wider use of woodfibre products in timber systems.

Investing in production means **investing in people** and their development. With this comes a commitment to evolve products and processes over time for increased resilience in changing market conditions.

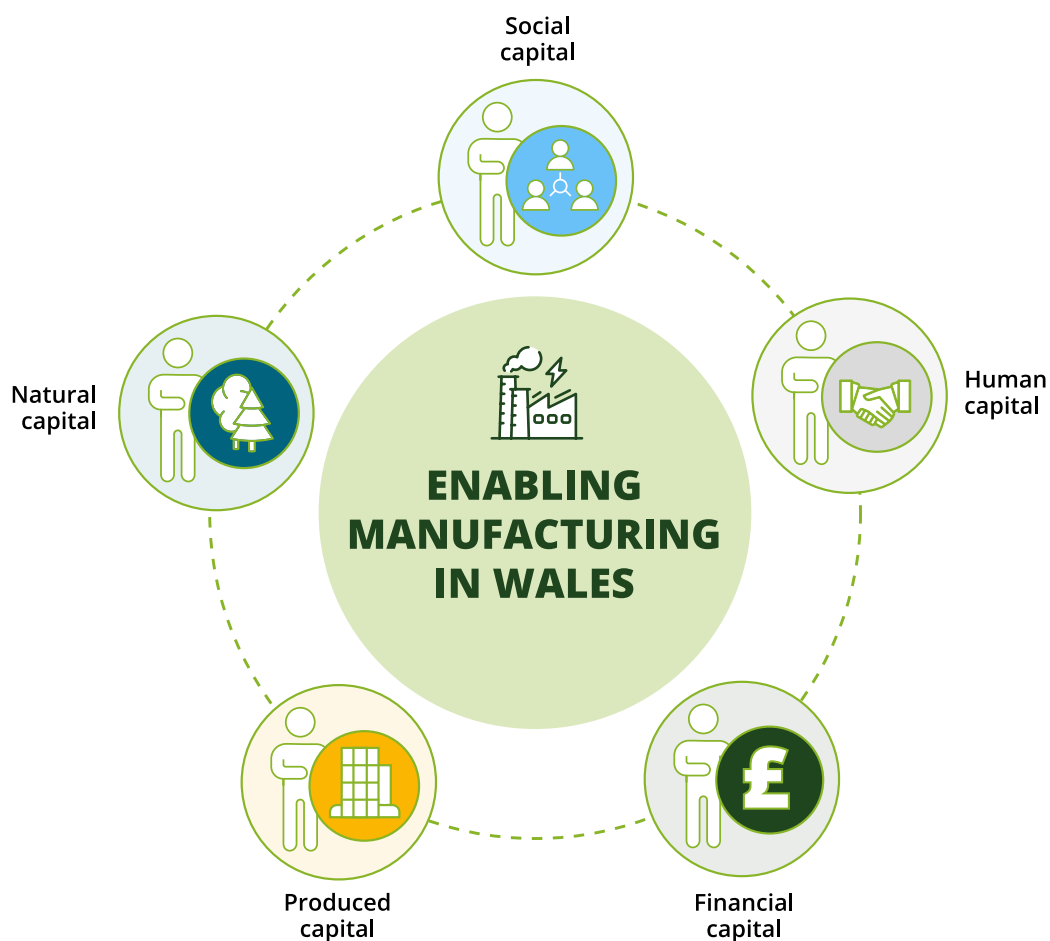
Appetite for investment

Despite the market opportunity there appears to be little appetite for investing in the UK among European companies. The current economic downturn across the European construction sectors is further contributing to the reluctance to invest. Potential investors are looking for a return on investment within 10-15 years. Financial risk mitigation opportunities would need to be illustrated via case studies and examples to give potential investors a sense of certainty what to expect.

Further information and sources can be found in the technical report.

MANUFACTURING AS AN ECOSYSTEM SERVICE

Wider use of woodfibre insulation would contribute to healthier homes, more carbon storage and a resilient, circular forest-based bioeconomy offering green jobs for people in rural locations. Setting up manufacturing could be the key to unlocking wider adoption of woodfibre insulation in the UK. A manufacturing plant in Wales would be part of a growing ecosystem of forest-based industries delivering for social good as well as for company profit. Existing woodfibre insulation brands targeting the UK market are signalling interest in growing the category. However, in the current economic climate investment risks can only be overcome through collective action by a group of committed stakeholders.



MANUFACTURING AS AN ECOSYSTEM SERVICE

Such a stakeholder guild would need to bring five essential elements to the table:



Social capital:

Who could help develop the relationships and provide connections to the existing ecosystem? Who brings political will and can work on the building culture? Stakeholders in this area could include Woodknowledge Wales, Welsh Government, UK Government, Structural Timber Association and others.



Financial capital:

Who could contribute financial capacity for the investment in setting up a manufacturing plant and developing the market? Could this be through a type of public-private partnership between Welsh Government and/or UK Government and forest industries, e.g. a group of manufacturers and/or sawmills?



Natural capital:

Who could provide access to forest resources to supply fibre at sufficient volume and viable cost? Who could supply fibre from other resources (including recycled feedstock)? Could Natural Resources Wales play a role, a consortium of private landowners, some of the larger sawmills, timber frame manufacturers or W. Howard's Pillo factory?



Produced capital:

Who could offer the right site conditions or existing buildings to set up production in Wales? How could stakeholders such as Deeside Industrial Park, Port Talbot Industrial Area or Cardiff and Newport Industrial Area support setting up a manufacturing plant?



Human capital:

Who could contribute skills, knowledge, know-how and expertise to run the factory, operate the machinery, develop solutions for identified areas with scope for innovation? Stakeholders in this area could include BioCompositesCentre, CWIC, High Value Manufacturing (HVM), Astute, AMRC Cymru, the Retrofit Academy, regional skills partnerships and others.

Third party manufacturing – a wild card?

How could we create conditions in which manufacturing is possible without one single business exposing itself to the risks alone? What type of collective action could unlock this situation?

In continental Europe we can find examples of third-party manufacturing of woodfibre and production through licensing schemes. What opportunities exist to develop such an approach for manufacturing woodfibre insulation in Wales? Would there be merit in exploring public-private partnerships or other types of risk mitigating joint ventures?

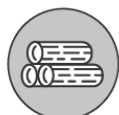
If we are serious about setting up manufacturing in Wales to unlock the (market) potential of woodfibre insulation, then we need to investigate the central question: Who is willing to be part of the stakeholder guild that ensures vitality and viability of such a project? For social good and for company profit.

ANNEX I – POLICY INSTRUMENTS

This section provides an overview of the current policy framework. It is organised according to area of application, i.e. UK-wide and devolved nations, and indicates the impact on the following aspects.



Market demand



Raw material
supply



Innovation



Funding



Skills & training



**Area: United Kingdom**

Policy instruments with UK-wide application. These include the Climate Change Act, timber procurement policy, retrofit standards and recent developments to support whole life carbon measurement in buildings.

Policy instrument	Impact
The Climate Change Act - Reduction of greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050. Legal commitment to meet the target of 78% reduction in emissions by 2035. Whole Life Carbon measurement - Future Homes Hub's Embodied and Whole Life Carbon: 2023 to 2025 Implementation plan for the homebuilding industry. Update to the Royal Institute of Chartered Surveyors (RICS) Professional Statement for assessing whole life carbon in the built environment. Development of the Built Environment Carbon Database. The Construction Playbook. UK Net Zero Carbon Buildings Standard - Voluntary standard applicable across new build, existing buildings and retrofits, developed through collaboration of UK built environment industry and backed by building data and science-led modelling. Retrofit standards - PAS developed by the BSI together with industry to assure quality in retrofit. PAS 2035 Standard for retrofitting dwellings for improved energy efficiency - Current requirements hinder use of biobased materials in government funded housing retrofit projects such as social housing. PAS 2038 Retrofitting non-domestic buildings for improved energy efficiency. PAS 2030 Specification for the installation of energy efficiency measures (EEM) in existing buildings.	
Fire Safety regulations - How to demonstrate compliance in the UK.	
UK Timber Procurement Policy - Has implications on importing timber, wood products and woodfibre into the UK.	 
UKRI and Innovate UK funding programmes - Provide grants, investment and support to UK innovators at different TRL levels.	 
UK Net Zero Investment Opportunities - Funding support at different TRL levels.	
Retrofit Academy - Programme for skills development via further education providers. Delivery partner of the National Home Decarbonisation Group.	



Market demand



Raw material supply



Innovation



Funding



Skills & training



Area: England

Policy instruments with application in England. These include the Future Homes Standard, a major driver for the insulation market, a timber in construction roadmap and afforestation policies.

Policy instrument	Impact
Future Homes Standard - From 2025, reduction in carbon emissions of 70-80% required in England. All new homes to be 'zero carbon ready'. Relates to Building Regulations Part L & F. See also Future Homes Roadmap for the homebuilding industry.	
Timber in construction roadmap 2025 - Based on statutory tree and woodland cover target of increasing the tree canopy and woodland cover in England to 16.5% by 2050, a UK government commitment to make best use of timber in construction as a means to deliver on decarbonisation and housing targets.	 
Circular economy taskforce - Independent expert advisory group established in November 2024 to support the government in creating a circular economy strategy for England.	 
National wood strategy sets statutory tree and woodland cover target which commits to increasing the tree canopy and woodland cover in England to 16.5% by 2050.	
Thriving for the Future - Forestry Commission strategy.	
England Woodland Creation Offer EWCO	



Market demand



Raw material supply



Innovation



Funding



Skills & training



Area: Wales

Policy instruments with application in Wales. These include the Timber Industrial Strategy, afforestation laws, regulations for decarbonisation of the built environment and Wales specific innovation programmes.

Policy instrument	Impact
Well-being of Future Generations Act (2015) - Legal obligation to improve social, cultural, environmental and economic well-being. Public bodies in Wales must take account of the long-term impact of their decisions. Timber Industrial Strategy - Increases fiscal and non-fiscal value of the forest resource. Considers resource efficiency and circular economy. Highlights the importance of wood in housing and the built environment, including woodfibre insulation. Considers how to instil confidence in demand and develop sector capacity, including skills and expanding capability.	    
Environment (Wales) Act (2016) - Enables planning and management of Wales' natural resources such as forestry and timber for a low carbon, green economy, ready to adapt to the impacts of climate change. Sustainable Farming Scheme - Government grants to encourage landowners to grow trees. Welsh woodland creation scheme. Government grants to encourage landowners to grow trees. Welsh woodland creation scheme - Government grants to encourage landowners to grow trees.	
Beyond Recycling Strategy - Green recovery by taking actions which support a zero waste, net zero carbon Wales that uses its fair share of resources.	 
Building Regulations - Part L & F All new homes to be 'zero carbon ready'.	
Social House Building Strategy - Encouraging use of advanced timber frame systems and supporting investment in the sector predominantly through loan finance. Welsh Housing Quality Standard - The updated standard improves the quality of people's homes and sets new targets to address decarbonisation and water efficiency. Optimised Retrofit Programme for Social Housing - Supports approaches to decarbonising homes and enables wider infrastructure such as skills development, procurement, finance models, material selections and the foundational economy to be considered and developed.	  
Tai ar y Cyd - A collaboration between social landlords, government, and industry experts taking action to tackle housing and climate challenges in Wales.	 



Market demand



Raw material supply



Innovation



Funding



Skills & training



Area: Wales

Policy instruments with application in Wales. These include the Timber Industrial Strategy, afforestation laws, regulations for decarbonisation of the built environment and Wales specific innovation programmes.

Policy instrument	Impact
Welsh Zero Carbon Hwb - Established by Welsh Government as an all-Wales agency to help developers, residential social landlords, housing associations and owners reduce the amount of energy and carbon in building and running homes. Supports Social Landlords and Local Authorities in the use of net zero carbon design and technologies in new and existing homes.	
SMART Flexible Innovation Support (FIS) - Supports Research, Development and Innovation (RD&I) by accessing; technology to get a new idea off the ground; help with a project with potential; specialist know-how for an international edge by opening up new markets.	
Vinnovate - Part of the EU Vanguard Initiative. Offers access to finance for projects at TRL 6-8. Requires collaboration with at least 1 EU region that is part of the Vanguard initiative.	
Agile Cymru - Offers access to finance across all phases of R&D from initial feasibility and industrial research through to experimental development and exploitation within Wales based businesses. Requires collaboration with at least 1 EU region.	
Regional skills partnerships - Provide insight and recommendations on a regional and sub-regional level informing policy development and the design of programmes and deployment of skills funding. Support City Deal and Growth Deals across Wales, acting as strategic partnerships on all matters relating to employability and skills. Further skills and training offers • CITB: Skills and Training fund • CIOB: CIOB Academy Home • Construction Wales Innovation Centre (CWIC) student programme • Degree Apprenticeships Careers Wales • Local skills funding CYFLE • CYMBROGI skills programme in schools • Down to Earth: construction training for young adults • CoAction: Passivhaus training • Centre for Alternative Technology • North Wales Skills Portal	



Market demand



Raw material supply



Innovation



Funding



Skills & training



Area: Scotland

Policy instruments with application in Scotland. Of particular interest are afforestation policies to complement and ensure future fibre supply: Afforestation policies Scotland



Area: Ireland (Northern Ireland & Republic of Ireland)

Policy instruments with application in Northern Ireland and the Republic of Ireland. The Republic of Ireland's 'Housing for All' plan is set to build 300,000 new homes by 2030. Timber demand will be supported by efforts to decarbonise construction, and the trend towards offsite construction. Future fibre supply could be enhanced through Northern Ireland's Afforestation policies .

Details on all aspects

Woodfibre Insulation Production in Wales – A feasibility study. Technical Report - 2025/SFIS Level 1/188.
Woodknowledge Wales & BioComposites Centre 2025

Product properties & specification

An Introduction to Natural Fibre Insulation. ASBP. <https://asbp.org.uk/guide/intro-to-nfi>
Woodfibre insulation specification guidance. Woodknowledge Wales <https://woodknowledge.wales/wood-fibre-insulation>

Business infrastructure

Making wood work for Wales. Timber industrial strategy 2025.
Welsh Government www.gov.wales/timber-industrial-strategy
Tai ar y Cyd <https://taiarycyd.cymru/the-project>

Availability of skilled workforce

Zero Carbon Hwb zerocarbonhwb.cymru/training-resources

Sources of fibre

The Wood Fibre Availability report
www.confor.org.uk/resources/publications/confor-publications/wood-fibre-potential-availability-demand
The lifespans of products made with MDF. Irle M., Lebreton F. and Kutter M. (2023). Bulletin of the Transilvania University of Brasov. Series II: Forestry, Wood Industry, Agricultural Food Engineering 16(65):141-148

Investment tools

UK Net Zero Investment Opportunities
www.gov.uk/government/publications/uk-net-zero-transition-investment-opportunities/investor-prospectus-accessible-webpage