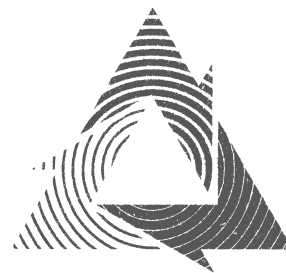

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TRAINING MODULE 8

Recycling Wood Waste



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Wood recycling and reuse

In this module we complete our overview of the journey of timber. We started at the forest and went via the mill to the market. Now we look at what happens to wood when it reaches the waste stream; the point at which the wood recycling industry, including us, gets involved.

In **Section 1** we outline the national wood waste picture, whilst in **Section 2** we look at how waste wood gets recycled and in **Section 3** look at how our form of wood recycling fits in. As usual, we finish with some questions for you to answer.

The learning outcomes of module 8

After successfully completing this module, you will be able to:

- Understand the different wood waste streams
- Understand the difference between community wood recyclers and high volume recyclers
- Understand the various ways of recycling waste wood
- Outline the uses for woodchip

Section 1—The national wood waste picture

According to recent estimates (WRA), there is probably between 4.5 million tonnes (mt) and 5.0 mt of waste wood generated in the UK annually. This waste wood comes from a number of different sources including:

Construction industry

Wood waste is generated on all sorts of building sites, including new builds and refurbishments. This sector generates more waste wood than any other.

Although some sites segregate wood waste, most of it ends up in the skip along with all the other rubbish. The size of skips used typically range from 6 cubic yards (yd³) up to 40 yd³ (called “rolonofs”), but the most common size skip used on building sites is 8 yd³.

The big challenge with construction wood waste is that it is very variable; it consists of all sorts of different wood-type waste, including off-cuts of solid wood, broken pallets, bits of laminated chipboard, plywood, MDF and preservative-treated off-cuts. This makes construction wood waste harder to recycle, because in general, these different kinds of wood wastes have to be recycled differently.



▲ The construction sector; a huge generator of wood waste.

The demolition industry

Each year, demolition also generates huge volumes of wood waste. To their credit, most of the stuff you will find in an architectural salvage yard, the old bricks, big chimney pots, fireplaces and butler sinks, has been rescued by the demolition industry. The demo' game is highly competitive and the price of demolishing a building is usually heavily influenced by the value of the materials that can be salvaged.



▲ High-speed demolition by machine is the norm.

In terms of recycling wood, their working practices are dictated by issues around speed and H&S. Previously, workers would have been happy to clamber up dangerous heights to cut down floor joists with a chainsaw, but nowadays it is very likely that a building will simply be taken down by large excavators with demolition claws and the material loaded straight into rolonofs for some sorting at a waste transfer station.

The result is that less wood is saved; because it is not viable to hand sort it from the other demolished material. Like construction industry wood waste, it is of poor quality because it consists of so many different types of wood—and very likely it will be mixed with plasterboard and other contaminants.

Wood processing, products and furniture manufacture

This includes wood waste from timber mills, joinery shops and from fencing, furniture and other wood products manufacture. This category generates less than that produced by the construction or demolition industries, but still a substantial volume.

The businesses generating relatively small volumes of wood waste will usually have little trouble in finding people to take it away for firewood in winter and will use skips to dispose of the rest. Because this wood waste is relatively clean and unmixed, it is much easier to recycle than construction or demolition wood.

Many larger businesses producing this kind of wood waste reduce their disposal costs by having their own wood-fired heating systems (see below). Often, any sawdust or shavings from untreated wood will end up at a local farm to be used as low quality cattle bedding.

Overall, this sector is generally pretty good at finding their own informal methods to recycle their wood waste, so they are a less important customer of the wood recycling industry.



▲ Offcuts from a joinery workshop.

Wooden packaging and pallets

This includes all the wooden packaging waste - such as crates, boxes and cable reels and a proportion of the estimated 80+ million (2010) pallets in the UK that are broken or just can't be reused.

Pallets are the easiest—and therefore cheapest—of all wood waste to recycle. They are usually 'clean' (untreated) and easy to handle (they can be loaded/unloaded by forklift), so every wood recycling company wants them and often accepts them at low cost or even for free.

Regulations around "producer responsibility" were introduced in 2005 to force certain companies that generate more than a certain amount of this wood waste to recycle a proportion of it. If a company can't do this (e.g. because there are no local recycling routes), they have to buy 'PRNs' (packaging recovery notes) for the volume they are obliged to recycle. PRNs are issued by the 'end user' of wood waste (such as producers of animal bedding or chipboard - see below) and they can sell them on the open market to any company that needs them. In 2020, the price of PRNs for wood ranged between £1 and £30 per tonne.

Municipal wood waste

This includes all the wood in the domestic waste stream that ends up at local tips (household waste recycling centres) where it is either mixed with the general rubbish and taken to landfill/incineration or separated into rolonoffs and taken to a wood recycler.

Very little re-usable material comes from this waste stream. It consists of items like broken furniture, old kitchen units, old fencing materials and bits of shed, much of which is preservative-treated or painted. Consequently, it is the lowest quality of all the different wood wastes and best avoided by enterprises like ours.

Section 2—How wood is recycled

In 1992, less than 2% of all waste wood was recycled, but about 20 years ago technological improvements in the chipboard industry meant that manufacturers could use a proportion of recycled wood as an ingredient for new chipboard (previously, it was made just from virgin timber). That stimulated the market for recycled woodchip and that's when wood recycling pretty much began in the UK. In recent years other applications for woodchip have been developed.

For ease of understanding, we divide the wood recycling industry into 2 parts; high-volume wood recyclers (that simply chip the wood they get) and us. Community wood recyclers (low-volume) focus hard on reuse; a much better use of the resource! Of course, the high volume industry deals with immeasurably more wood than us, and makes a huge and critical contribution to the diversion of wood waste from the waste stream.

The Wood Recyclers Association (wra.org.uk), a trade body made up of most of these high-volume wood recyclers, estimates that in 2018 around 3.5 mt of all the wood waste generated in the UK was recycled. To help find the most appropriate use for the recycled wood and provide guidance to those wanting to dispose of it, the WRA divides the wood waste that comes into their yards into a number of grades; with each grade usually subject to a different gate fee:

Grade A: "Clean" waste wood—consisting of untreated solid softwood and hardwood; packaging waste and pallets, cable drums and untreated offcuts from joinery and wood products manufacture. The woodchip is used for high-quality animal bedding, equine arenas and is increasing used in wood-fired heating systems—especially in smaller scale installations.

Grade B: This grade is of lower quality, as it will contain up to 40% chipboard, MDF and plywood, along with solid wood furniture. End uses for this grade include manufacture into panelboard and burning in power generation/heating systems that have the appropriate pollution control technology (see below).

Grade C: Fuel grade - this consists of all of the above material plus painted, treated and coated/laminated timber and flat-pack-type furniture. It is the lowest quality stream that we deal with and can also only be burnt in appropriately licensed systems.

Grade D: Hazardous waste - this includes wood that is treated with (now banned) substances such as CCA (copper, chromate, arsenic) or creosote preservatives. Items include old fencing, rail sleepers and telegraph poles. Although in some countries there are energy from waste plants and power stations that are equipped to burn this material, in the UK this grade requires landfilling at hazardous waste-specific landfill sites. Community wood recyclers must stay well clear of such wood.

Generally, the high volume wood recyclers will chip the different grades separately so that they can be used for different applications. Below we outline the main current uses for woodchip.

Chipboard, OSB and MDF

Until recently, the panelboard industry has been the mainstay of wood recycling in the UK, with more than a million tonnes of recycled wood used in the manufacture of chipboard, OSB and MDF each year. There are five panelboard factories in the UK; in Devon, Northumberland, north Wales and two in Scotland. Lots of wood chipping infrastructure has set up relatively near to these facilities to supply them with chip. The industry still uses imported and home-grown virgin timber, but as technology improves the proportion of recycled woodchip used will hopefully increase, growing the market for chip a little more.

To maintain the purity and consistency of their panelboard products and help ensure that the (high tech and very expensive) manufacturing process is reliable, they want the cleanest, most uniform feedstock. Only a small quantity of hardwood, preservative-treated or painted timber, laminated boards or MDF can be used to make new chipboard. And of course, the chip must be free from other contaminants, such as metal, grit, glass, plastic, or plasterboard and of a certain size and moisture content.

Wood for energy

Trees absorb carbon dioxide whilst they grow, so burning wood for energy is considered 'carbon neutral'. Over the last decade, some power stations in the UK designed to burn coal have been adapted to burn wood and around 20 new power stations have been built specifically to burn biomass (especially recycled wood) or to burn both fossil fuels and biomass. In addition, there are several new biomass power plants under construction or in the planning stage and demand for waste wood feedstock is growing quickly. In 2020, around 2.5mt of wood chip from waste wood was burnt in UK power stations.

Realising the potential economic and environmental benefits of producing power from wood waste, these large-scale generation schemes were supported with a financial subsidy from the Government, called Renewable Obligation Certificates (ROCs). Although the scheme has been withdrawn to new entrants, ROCs certainly stimulated the fast growth of generating electricity by burning biomass.

As more schemes become operational in coming years, this will doubtless increase demand for wood waste (and will hopefully lower the gate fees paid to dispose of waste timber). In fact the industry predicts that if all the planned biomass facilities fire up, there will not be sufficient waste wood to supply them.

These new power stations are equipped with technology that can remove potential pollutants before they are released into the atmosphere, so they can burn a wider range of chip, including chipboard (that contains formaldehyde glue), painted and even preservative-treated timber. The older power stations and smaller wood-fired boilers are not fitted with such equipment, so they should only burn chips made from clean wood.

Because of these technical limitations and lack of other large-scale uses of woodchip, around 320,000 tonnes of waste wood was exported to Europe in 2018 where wood-burning power stations are equipped with superior pollution control technology.

To encourage the installation of smaller scale waste-wood fired heating systems, in 2014 a further subsidy for smaller installations, called the Renewable Heat Incentive was introduced and a growing number of schools, public, industrial and commercial buildings - and even homes - have installed wood-fired heating systems. As the cost of fossil fuels continues to climb, and environmental laws get tougher, it is expected that using wood to heat buildings will become ever more popular.

To ensure that pollution from burning is minimised, all new systems must now meet a standard laid down by the EU called the 'Industrial Emissions Directive' and be 'Chapter IV compliant' if they want to burn anything other than Grade A woodchip.

Animal/poultry bedding

This ranges from low-grade coarse woodchip (made from B or even C grade chip) for cattle stalls and trackways to very high quality dust-free chips suitable for chickens or sensitive, very expensive racehorses.

Poultry bedding should be made only from clean softwood chips. So the best feedstock is grade A; pallets and packaging waste. It should not contain sheet materials, painted or treated timber, as these could poison animals if ingested.

Producing ultra-clean, dust and bacteria free chips for a demanding market like the poultry industry is a high-tech and expensive business, but as a much higher value product, the income per tonne is better than all other bulk markets for chip.



▲ Low grade chip to spread over muddy areas.



▲ Higher grade chip for chick bedding.

Mulches and compost and covering



▲ Coloured mulch; a soft surface on play areas.

Some recycled woodchip is used as garden and landscaping mulch. Used to suppress weeds and help the soil retain moisture, it is drier and therefore does not rot down as quickly as mulches made from tree bark or virgin woodchip. Coloured mulches are also becoming more popular.

Wood recyclers will probably make mulches using the lowest quality of wood waste they can get away with, and mulches invariably contain at least a small amount of sheet materials and preservative-treated wood.

Clean woodchip is also added to green waste compost. Leaves contain mostly nitrogen, whereas wood is mainly

carbon. Adding woodchip improves the carbon/nitrogen balance that is essential for good compost. Much of this relatively low-grade compost is used as a 'soil improver'. Some is conveniently bagged up for sale to households, thereby "closing the loop" (customers buying back their own waste). Higher volumes are spread on to farmland. The lowest grade chip is used as a cover for landfill sites.

Paths, rides and arena surfaces

Woodchip is used for paths and tracks on rural land and in countryside car parks.

It can be used for forest paths and rides and for horse gallops and arenas. The chip used in these applications is generally clean, but will doubtless contain some lower-grade wood waste. It must be free from metal, glass or grit, which could be dangerous to horse and rider. Only a relatively small proportion of wood waste chip is used in these ways.



▲ Woodchip used on a gallop.

The challenges of wood recycling



▲ A high volume wood chipping machine.

High volume wood recycling is expensive; a chipper can cost around £250,000. Then, to take out the ferrous (screws, nails, bolts etc.) and non-ferrous metal (hinges, door furniture etc.) expensive magnets and eddy-current separators will be needed, along with a screen to ‘size’ the woodchip correctly for each of the above uses. Obtaining suitable premises, licensing, additional equipment, insurances and other costs mean that wood recycling is a highly capital-intensive business.

As the chipboard, wood-for-fuel, and most bedding markets only pay around £40–£80 per tonne for woodchip, to make their businesses viable, wood

recyclers need to process huge quantities of wood waste. To get these volumes and to keep costs as low as possible, they focus on servicing organisations that are high-volume generators of wood waste such as skip and pallet companies, distribution companies and large furniture or wood products manufacturers. They don’t really want lots of small loads arriving in builders’ skips, so they don’t usually service the building industry directly. So they are not in direct competition with us community wood recyclers.

Rather than going direct to a wood recycler, the relatively small skip loads from building sites are far more likely to be taken to a waste transfer station.

That’s where we come in.

Section 3—The community model of wood recycling

Our model of wood recycling is everything that the above high volume wood recyclers are not. We are *low*-volume, *low* capital-intensive and *highly* labour-intensive. Unlike the high volume wood recyclers that chip everything, our mission is to push as much as possible of what we collect up the waste hierarchy into re-use.

Our niche

Our model of wood recycling does not compete with the high-volume wood recyclers; we work alongside them. While they want huge volumes of waste wood, our niche is to collect from customers that would otherwise use relatively small skips (generally 8yd3, to 12yd3) to dispose of their waste. We find it very difficult to compete on price with large skips (rolonoffs for example), but thankfully, the construction sector still mainly uses 8yd3 and 12yd3 skips.

If wood stays in a skip, it will at best, be ‘downcycled’ into woodchip; whereas we focus on finding the most and environmentally beneficial use for the timber we collect.

And of course we create jobs and training and volunteering opportunities for local people—especially those who are marginalised from the labour market. So not are we providing the best option environmentally, but socially too.

Even our collection methodology is superior. Rather than collecting skips in lorries that have 6 litre engines and weigh 16 tonnes, we operate Transit-sized pick-ups with cages on that have 2.5 litre engines and, even when fully loaded only weigh 3.5 tonnes. So our vehicles use far less fuel and emit far less pollution than the skip alternative. And of course we can take 12yd³ each loads, rather than just an 8yd³ skip—so we are much better for the environment.



▲ Lighter vehicles are more efficient for wood collection than skip lorries

We then sort the timber and aim to push it as far up the waste hierarchy as possible.

We generate our income in two ways; through the charges we make for collecting waste wood and from selling wood for DIY and by making and selling wood products, both 'off the shelf' and bespoke.

Grades

The key to our model is to sort out the collected wood and try to find the very best environmental outcome for it. To help us do that, we developed a simple classification system that consists of three overlapping grades.

These grades are not the same as the 'high-grade reuse', 'low grade reuse' and 'recycling' categories that we put on to our WTNs and report to our customers, but they are useful to indicate what we can **potentially** do with the wood theoretically.

Grade 1

This is timber good enough to sell back to the community for DIY/building. Grade 1 wood is anything around 1.5 metres or more in length, relatively sound, free from bad splits and relatively free from other contaminants. It is also sheet materials including ply and chipboard, hardboard and MDF, more than 1 metre square; doors in good condition; pieces of hardwood; most pieces of 'old pine' and anything we consider 'interesting' and saleable. We know that even though some of the wood we collect might look dirty and full of blemishes, it is perfectly adequate for many DIY/building or craft uses.



▲ Grade 1 wood—whole pieces ready to use

As a nation of DIY-ers, using recycled wood is becoming more and more popular because it is often of higher quality than new wood and as a result, retail sales at community wood recycling enterprises should be very strong.

In March 1999, the Brighton & Hove Wood Recycling Project opened The Woodstore - Britain's first outlet selling nothing but wood 'waste'. Opening a dedicated retail outlet enabled it to trial this concept with the community; would they buy a waste product?

Fortunately, very quickly, this pioneering approach to

the use of waste material caught on and created the model that other community wood recyclers to follow to this day.

Selling timber back to the community is the core of the business model and should generate the highest proportion of an enterprise's income. Most community wood recyclers stock a whole range of items for DIY, building and gardening purposes, making wood products, sculpting, carving and many other uses.

Not only are we saving resources, we are providing low-cost timber to the community and showing that *recycled* is not synonymous with poor quality—so we are helping to educate people in the value of resources and around sustainability generally.

Grade 2

This is also good wood but too short or small to be easily sold for DIY. It can, however, be used to make wood products—ranging from compost bins, bookshelves, art and craft items right through to high-quality furniture (you might be involved in making things already). Making and selling such items is a good way of generating cash and raising awareness of the potential of recycled material.

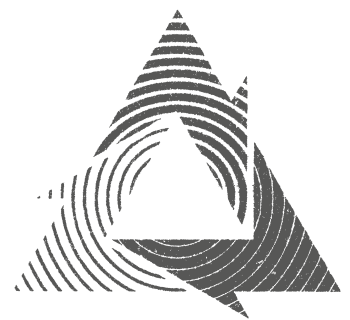
Throughout our network of community wood recyclers, scores of well-made and useful wood products are sold every week significantly adding to enterprises' income and providing the potential for people to develop wood working skills.

The recycled wood marque

To make the identification and promotion of wood products made from recycled wood easier; we have developed the Recycled Wood Marque—which we hope will become widely adopted.

By choosing products showing the Marque, consumers will be helping to stimulate the use of recycled materials in crafts and manufacturing. The NCWRP promotes the use of the Marque and it can only be used on products made from at least 50% recycled wood.

We invariably collect more grade 2 wood than we turn into products, so what we can't use in products just gets treated as grade 3.



▲ The recycled wood marque

Grade 3

This grade represents around 50–80% of what we collect and in terms of re-use it is the biggest challenge. It consists of everything from rotten fence posts and broken pallets to off cuts and everything else that doesn't fit into grades 1 or 2.

Community wood recyclers turn a lot into firewood and kindling. The remainder is passed on to the high-volume wood recyclers, for which we will pay a gate fee. These fees go up and down with the demand for woodchip, but over the last few years have mostly been rising.



▲ Grade 3 wood—difficult-to-use scrap



▲ Kindling, ready for winter

We don't collect anything that can't be either reused or recycled, so our customers know that nothing we take from them will be returned to the waste stream.

All this activity to sort the collected wood is highly labour-intensive and so gives us the opportunity to fulfil our aim of creating jobs, training and volunteering opportunities, especially for disadvantaged people.

For every tonne of waste wood we get reused, we save more than half a tonne of CO₂ from entering the atmosphere, so our activities are helping to mitigate climate change.

The more wood we collect and sort and reuse, the greater the contribution we are making to a sustainable society.

4—Trainee Exercises and Questions

There is an exercise for you to complete on the following page.

Remember: don't hesitate to ask for help from your Trainer.

Module 8: Exercise 1

1. What are the 5 wood waste streams?	
2. Approximately how much wood waste is generated in the UK?	
3. What are the most common sizes of skip on a building site?	
4. What are the 2 types of wood recycler?	
5. Making what product stimulated growth in wood recycling around 20 years ago?	
6. Why is it more difficult to recycle construction wood waste than pallets?	
7. In 1992 what % of wood waste was recycled?	
8. Approximately how much waste wood is used by the panelboard industry?	
9. Where are the 5 chipboard factories in the UK located?	
10. What kind of feedstock is used for poultry bedding?	
11. Why is woodchip useful for compost?	
12. Explain some of the challenges of setting up a high-volume wood recycling operation.	
13. Why do high-volume wood recyclers not want to service building sites?	
14. Give a brief description of wood grades 1, 2 and 3.	Grade 1:
	Grade 2:
	Grade 3:

Office use only		Number of correct answers required to pass Module 8: 11		
Passed:		Retake:		Date:
		Trainer's signature:		