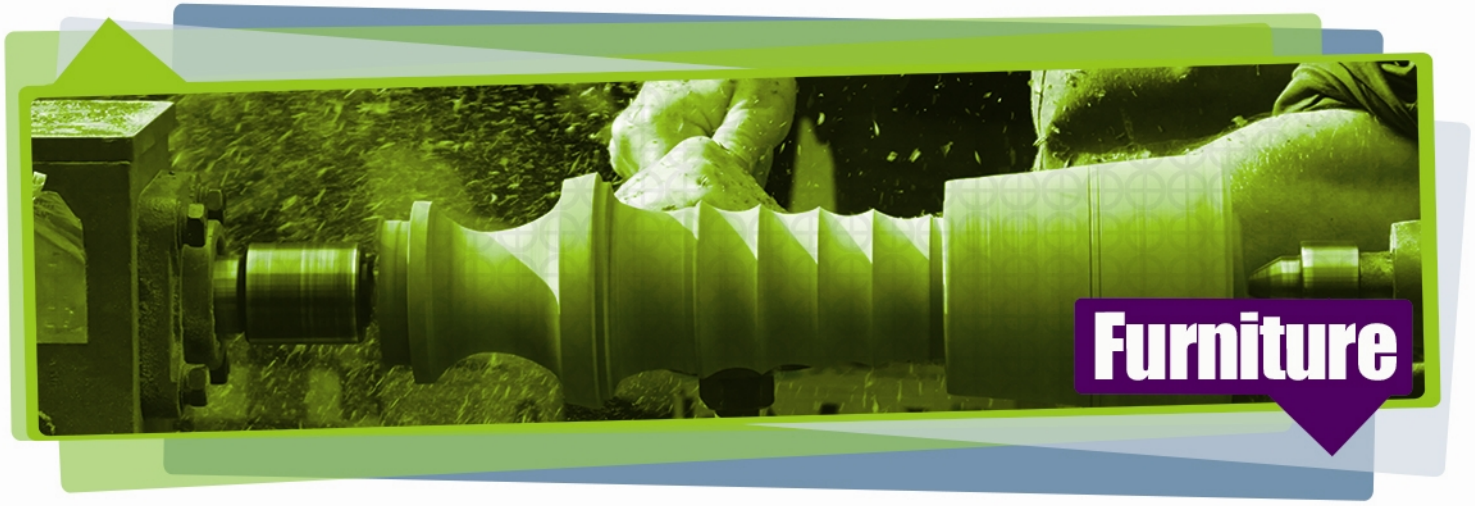
Skills for Sustainability

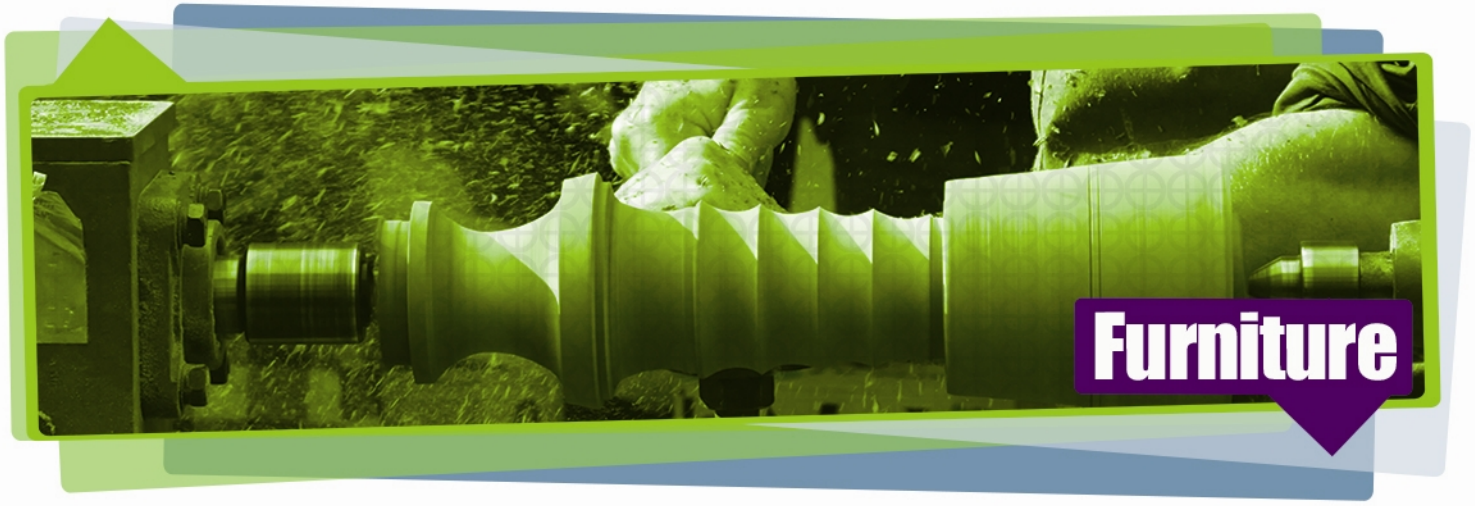
Manufacturing Skills Australia

Sustainability issues in furniture

This project is supported by the Australian Government
through the Clean Sustainable Skills Package



Contents



About the guide

This guide presents an outline of the social, economic and environmental sustainability issues that typically arise in the manufacture of furniture. This is one part within the boarder 'furnishings' sector.

Examples of furniture products covered in this guide include:

- Timber, steel and glass furniture
- Upholstered furniture
- Fitted furniture (e.g. kitchens)
- Commercial furniture (e.g. offices, corporates and hospitality).

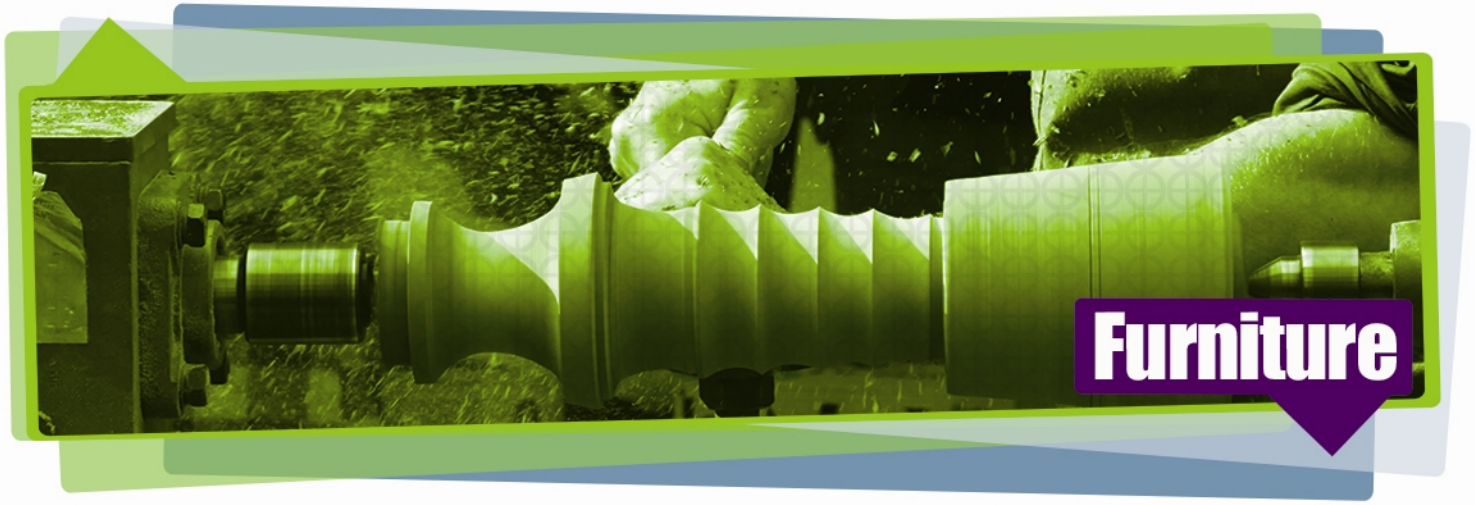
The guide shows some of the processes that are common across the sector and how sustainability issues relate to different parts of the process. These issues will vary depending on the inputs and activities in each process step.

The guide will assist Registered Training Organisations (RTOs) to identify the sustainability issues in a sector and/or business. It provides a high-level snapshot of sustainability in the sector. This can be used as a basis for the RTO to undertake its own research in order to:

- Consult with clients and understand their business and skill needs
- Develop their training and assessment strategy
- Contextualise training and assessment materials and activities.

The guide is not intended as learning material for students, however, it may be useful as part of a suite of information resources. It may also provide a model which an RTO can adapt, expand and/or contextualise for use in its own materials.

The Skills for Sustainability website provides further support for RTOs, including links to more information about this sector and guides to identifying the sustainability issues in five other manufacturing sectors. See http://www.sustainabilityskills.net.au.



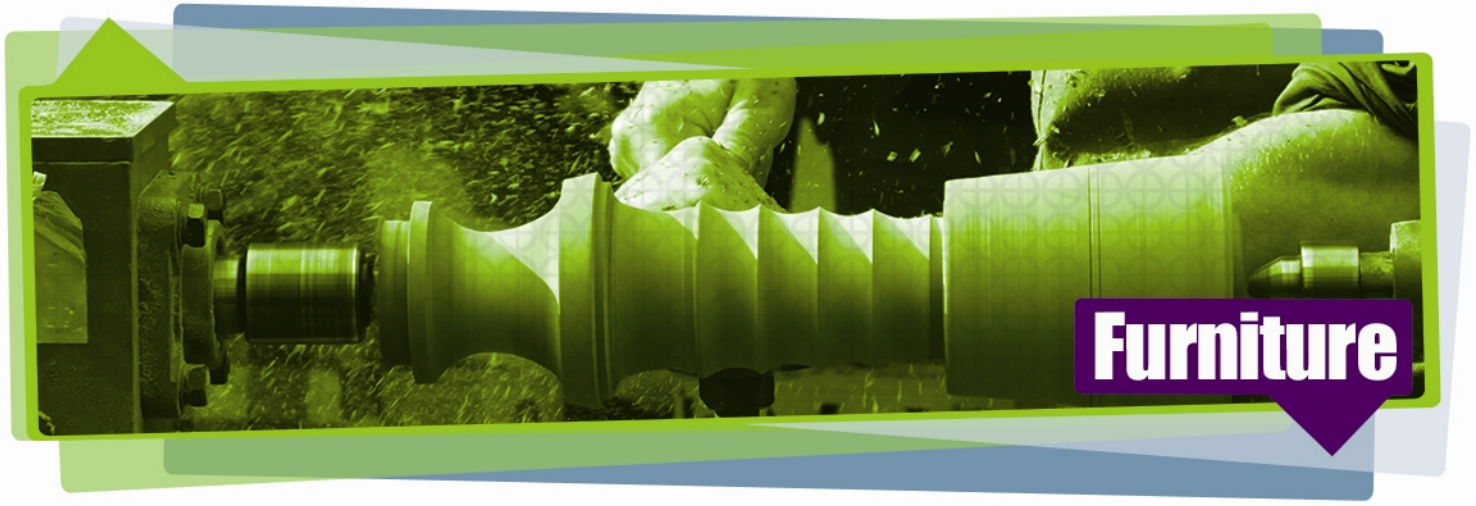
What is in the guide?

The guide includes:

- An overview of sustainability issues
- A simple process flow
- A risk rating table for sustainability issues at various points in the process
- Explanation of the *high impact* issues.

The guide provides a 'map' of where sustainability issues are likely to arise in the manufacturing process, and what their impact might be. The guide uses a risk rating system and explains the potentially *high impact* issues in more detail. Brief and simplified examples are provided, which do not cover all of the possible sustainability issues and variables within the sector.

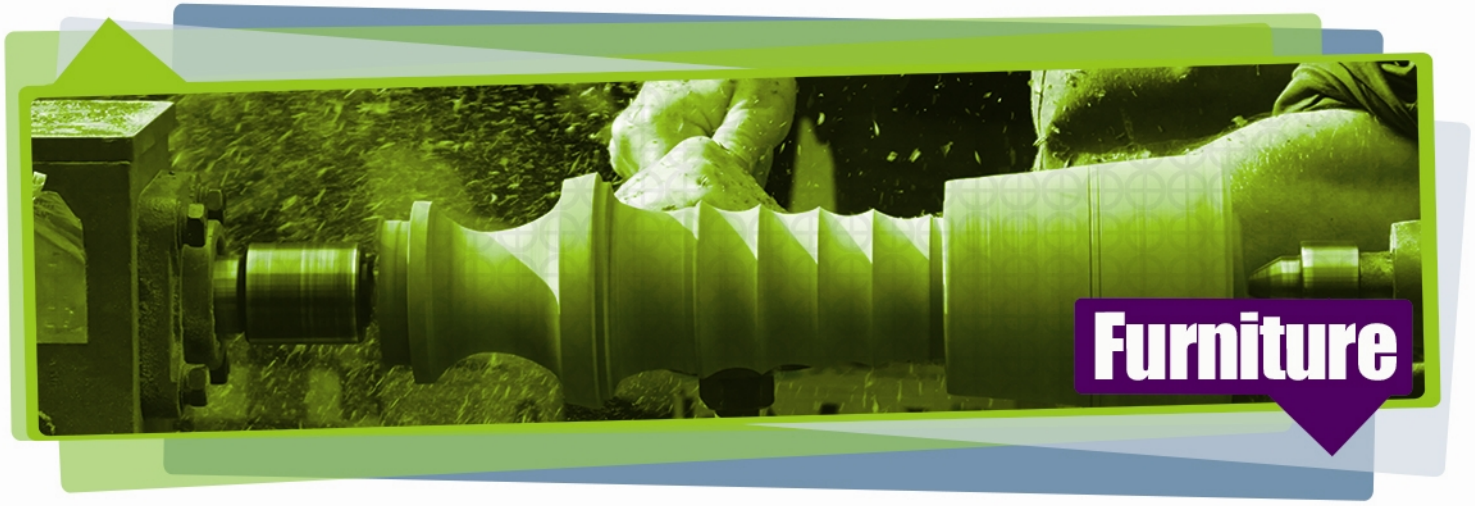
The process steps and sustainability issues in the sector have been identified through discussions with stakeholders and reference sources, including IBIS World Industry Research Reports, International Finance Corporation (IFC) Environmental Health Guidelines, the MSA Environmental Scan 2012 and the National Pollutant Inventory Emission Estimation Technique (EET) Manuals.



Overview of sustainability issues

This section provides an overview of sustainability issues that are likely to affect enterprises in the furniture manufacture sector.

Sustainability issues	
Economic sustainability	• Electricity is an increasing cost and there is some exposure to the Carbon Price. • Labour intensive industry – exposure to high labour costs, 'inefficient' processes, risk of industrial action, need for investment in training and possible redundancies from advances in technology. • Developing countries increasing their market share – this is a significant and growing issue for the sector, with the very low labour costs of Asia (primarily China) allowing extensive expansion into the Australian market. • AUD exchange rate – the strong AUD makes imports cheaper to Australian markets and exports dearer on foreign markets – this limits competitiveness against countries that have lower labour and compliance costs.
Environmental sustainability	• High electricity usage in steel/metal furniture manufacturing – generates significant greenhouse gas (GHG) emissions as most electricity is generated from non-renewable resources (gas and black and brown coal). • High use of fuels in supply and distribution – non-renewable resources. • Use of minerals and ores in raw materials for steel/metal furniture manufacturing – non-renewable resources. • High use of timber and timber products for timber furniture and in frames for upholstered furniture and beds – timber may come from illegal or old growth forests, unless certified as 'sustainably forested' or similar accreditation. • Supply chain activities, such as mining of fuel, coal, minerals and ores, and use of fuels for transport – may damage land and water, affect air quality, and disrupt communities and local flora and fauna. • Toxic chemicals and other substances used or released during production, cleaning and surface treatment processes may release GHGs, volatile organic compounds (VOCs) or other emissions. • Water is used as a cleaner, dust suppressant and for the delivery of chemical treatments and finishes – much of this is potable (drinkable) water. • Solid waste from (e.g. chemicals and treated products) may contaminate air, water, soil; GHGs from products sent to landfill, often after a short lifespan; and non-degradable waste that might include recyclable or re-usable materials.
Social sustainability	• Economic pressures may lead to skill development needs to improve efficiency and/or apply new techniques/technology – there may be risk of redundancies for lower skilled workers who would benefit from a planned transition process. • Workplace health and safety issues given the manual nature of the work and the chemical treatments, paints and polishes applied throughout the manufacturing process. • High risk of impact on local communities – from GHG and particulate emissions, waste, visual amenity, and noise and traffic entering and leaving the site.



Process flow

This section is a simple process flow of some common steps in furniture manufacture (Figure 1). It gives a broad indication of the inputs (such as materials, energy, labour and equipment) and outputs (such as greenhouse gas (GHG) emissions, particulates, waste materials and products). This defines a focus area so that specific sustainability interactions can be identified.

Process flows could also be developed for individual products or for other parts of the furnishings sector, such as glass and glazing, kitchen and bathroom fit outs or interior design.

This would affect the mix of sustainability issues that are identified. For example, the mattress manufacturing processes will have different sustainability issues to timber outdoor furniture. A process flow could be even more focussed to be on one type of furniture (wood, upholstered, glass, steel, home, office or hospitality).

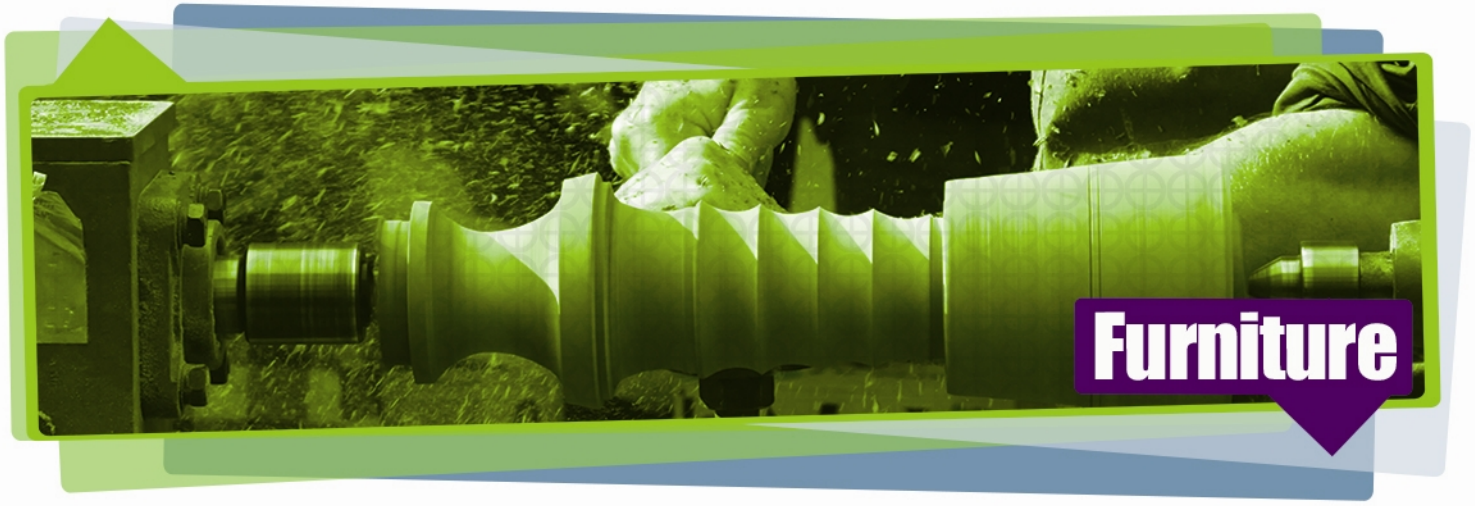
Value chain issues

This process flow focuses on a 'gate to gate' section of furniture manufacture.

While they are not the focus of this process flow, the supply of raw materials and distribution of products can contribute significant sustainability impacts to the value chain and businesses can have some influence over them. For example, many enterprises include environmental and social sustainability criteria in tenders and contracts.

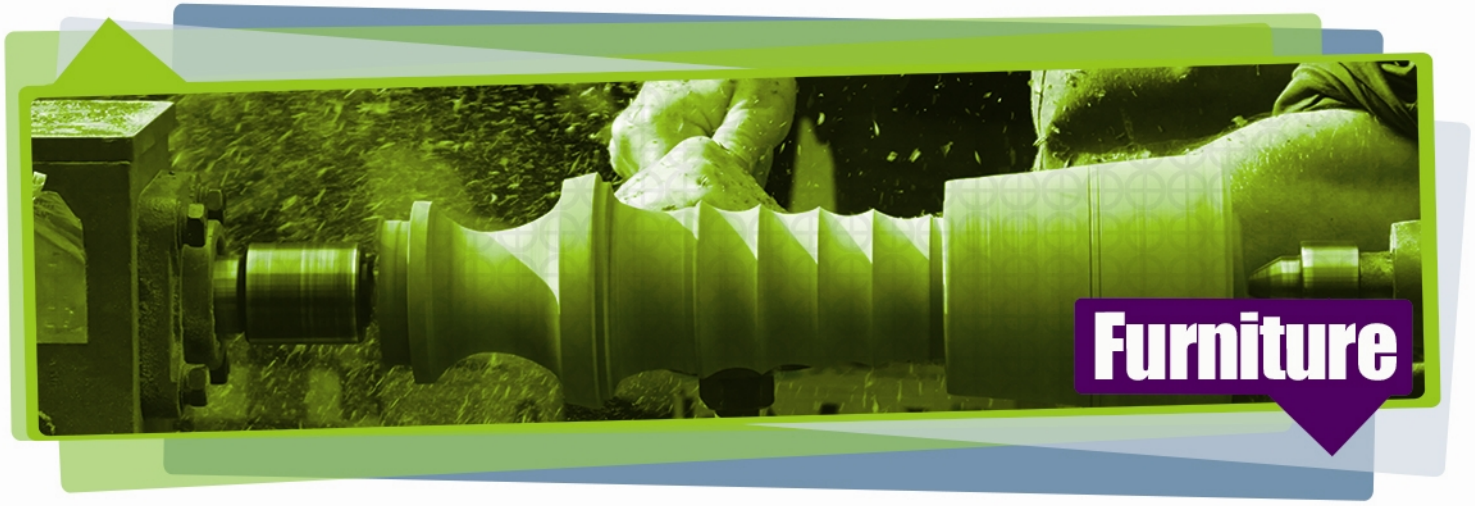
In this sector a process flow showing material sourcing and supply chain steps would highlight sustainability issues such as illegal logging of timber, unsustainable sources of timber and exploitation of workers and children in some supplier countries.

For more information about sustainability in practice and sustainable supply chain see http://www.sustainabilityskills.net.au.



Pre-production	Materials preparation	Treatments	Assemby	Finishing
•INPUTS •Concept •Sample testing •Materials choice and estimation •Materials •Transport and fuel **•OUTPUTS** •Design and engineering 'signed off' for production •Pre-production planning completed •Materials sourced and stored onsite •GHG emissions •Pollution from vehicles	**•INPUTS** •Materials, such as timber, upholstery fabrics, steel, glass, fillers, innersprings and webbing •Energy for materials preparation (e.g. cutting, sawing, shaping, cleaning and drying) •Chemicals and other initial treatments •Labour (mostly skilled) **•OUTPUTS** •Component pieces ready for assembly and/or finishing •Wastewater •Waste chemicals •GHG emissions (if heat or drying is used) •Dust •Pre-consumer waste (e.g. off-cuts)	**•INPUTS** •Cut or shaped materials prior to assembly •Chemicals and/or heat •Water (possibly) •Labour **•OUTPUTS** •Cut or shaped materials are treated as required by specifications (e.g. anti-fungal agents and fire retardants) •Wastewater •Chemical waste •Emissions to air (e.g. VOCs and GHG, if heat used)	**•INPUTS** •Cut or shaped materials •Labour (skilled and unskilled) •Energy for machining and tools **•OUTPUTS** •Assembled furniture •Dust •Pre-consumer waste (e.g. off-cuts) •GHG emissions	**•INPUTS** •Assembled furniture •Cleaning agents, paint, polish, stain resistors and waxes •Water •Energy (e.g. for polishing and drying) •Labour (skilled and unskilled) •Packaging materials **•OUTPUTS** •Finshed product •Final assembly, if required •Packaged product •Dust •GHG and other emissions from treatments and/or finishes (e.g. VOCs) •Packaging waste

Figure 1: Furniture process flow



Risk rating of sustainability issues in the process flow

This section looks at each step in the metal fabrication process flow. Typically, each step in a process will apply different techniques, use a range of equipment and require various inputs. These can result in very different sustainability issues at each step. This risk assessment investigates the risk of a particular sustainability issue occurring at each step and estimates the level of impact should it occur.

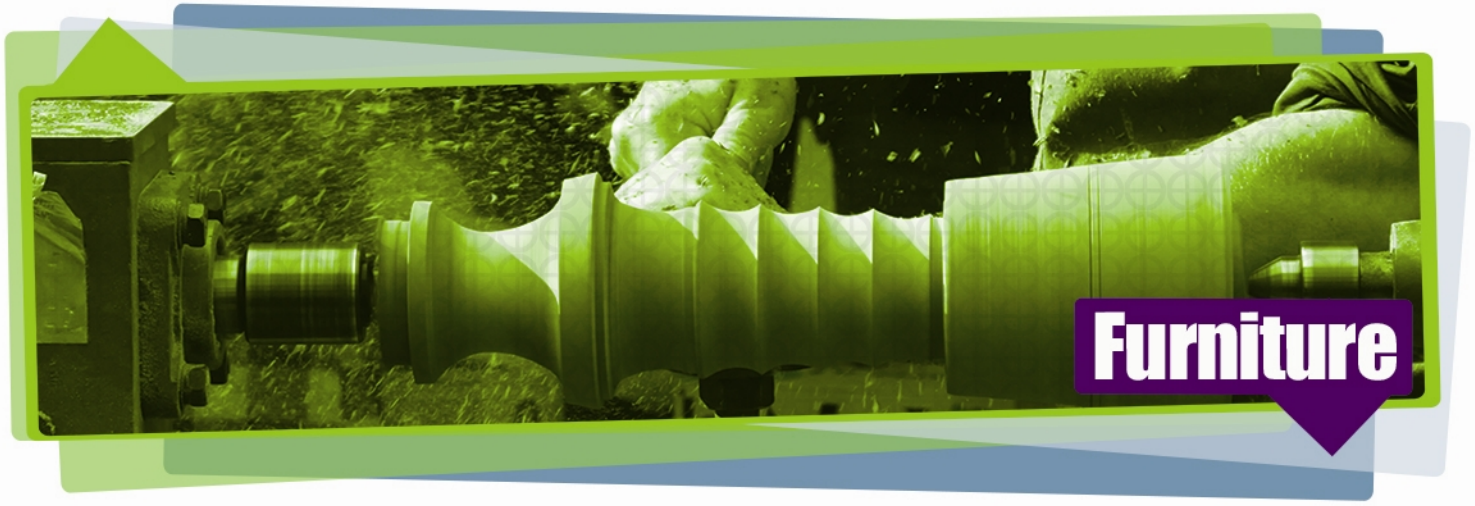
Risk assessments are subjective and require interpretation of information. In this instance the risk assessment will also depend on local and enterprise variables, for example, physical location, management systems, the economy, the skill level of the workforce, external events and available technologies.

This risk assessment is against a number of issues within economic, social and environmental sustainability. This list of issues is not exhaustive and there are many different ways that sustainability issues can be described and categorised. This list draws on a number of sources, including the Global Reporting Initiative (GRI), ISO 14001 Environmental management systems, ISO 26000 Guidance on social responsibility and the Skills for Sustainability website.

The risks have been rated using a scale for **likelihood** (probability) and **impact** (consequence).

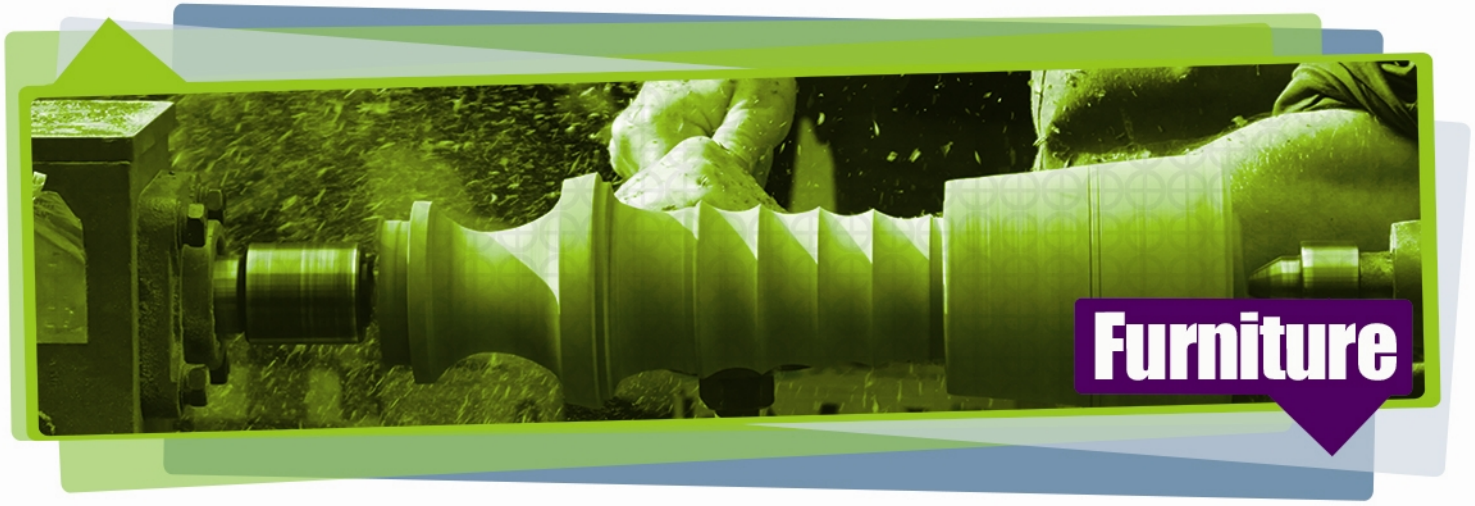
Likelihood – the probability of occurrence	Impact – the consequences of occurrence
H = highly likely	H = high impact
M= might happen	M = moderate impact
L = less likely	L = limited impact

In the following table the probability is listed first followed by the likely level of impact. So ‘H/M’ would be highly likely to happen and, if it did happen, would be expected to have moderate impact. *High impact* risks are discussed in further detail, as an example. However, this does not imply that other risks do not need to be considered in analysing the sector or in delivering training and assessment.

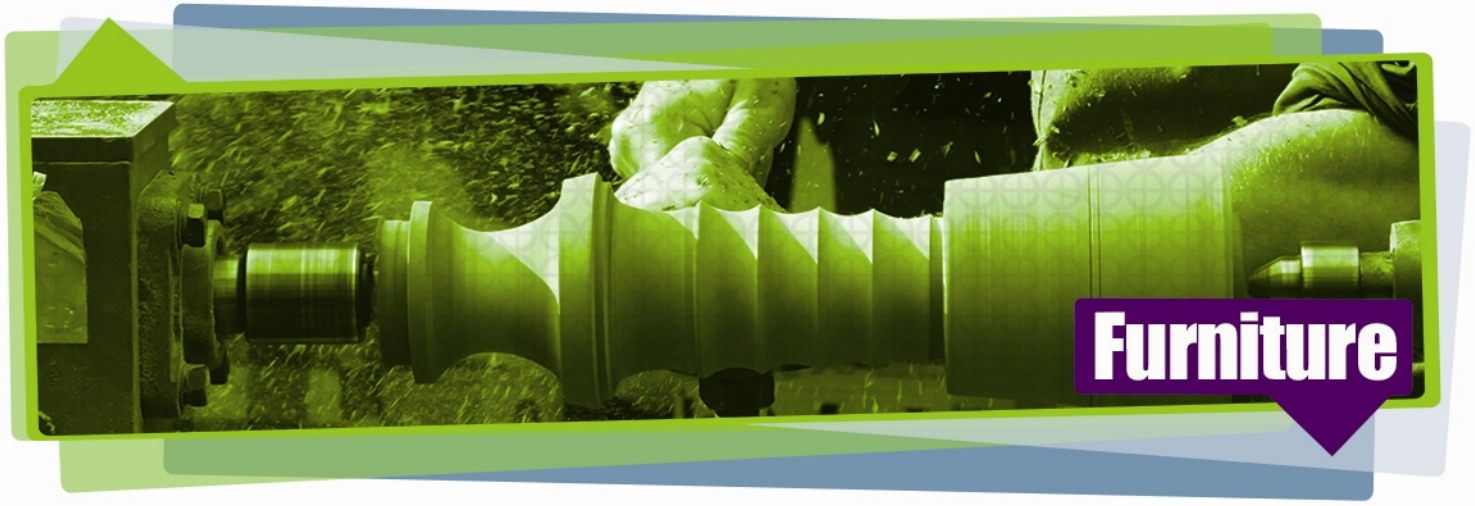


Furniture risk rating table

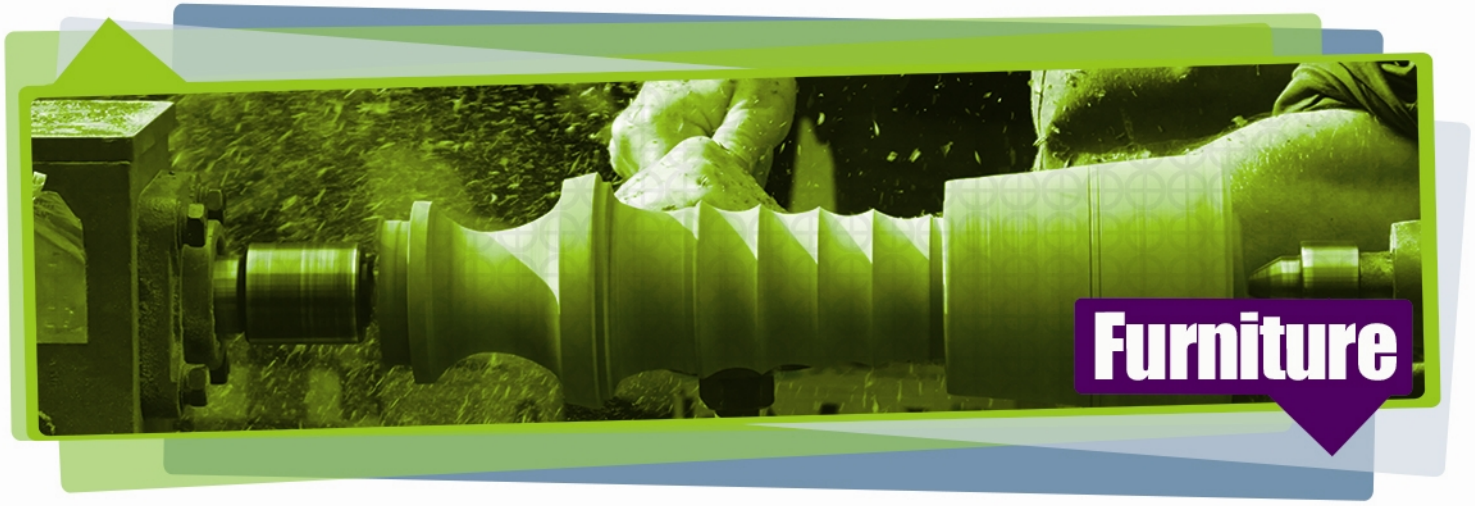
Sustainability issues	**Process flow elements and sustainability risks** (Furniture)				
Economic	**Pre-production**	**Materials preparation**	**Treatments**	**Assembly**	**Finishing**
Political/economic • AUD (exchange rate) • Cost of capital and taxes (including Carbon Price) • Competition with developing countries	**H/H** • Variable cost of raw materials (e.g. steel) in the supply chain, due to fluctuating commodity markets. • The impact of the Carbon Price on mining in the supply chain will flow through to materials costs; electricity costs also increasing. • Variable AUD exchange rate affects the cost of imports and exports, impacting competitiveness within domestic and global markets. • Increasing competition from developing country suppliers – with lower cost labour, fewer compliance requirements and lower taxation.				
Markets • Global and local	**H/H**	L/L			
	• Demand for furniture is affected by residential and commercial building growth, higher levels of disposable income and natural disasters, such as floods and fires, which require homes and furniture to be replaced. • Export of furniture is low with New Zealand the only significant market.				
Value • Costs and financial risks • Value add and intellectual property • Efficiency	**H/H** • High labour costs relative to developing country competitors. • Energy and labour efficiency is required to compete with developing countries. • High costs relative to developing country competitors reduce profit margins and limit investment in new technology.				



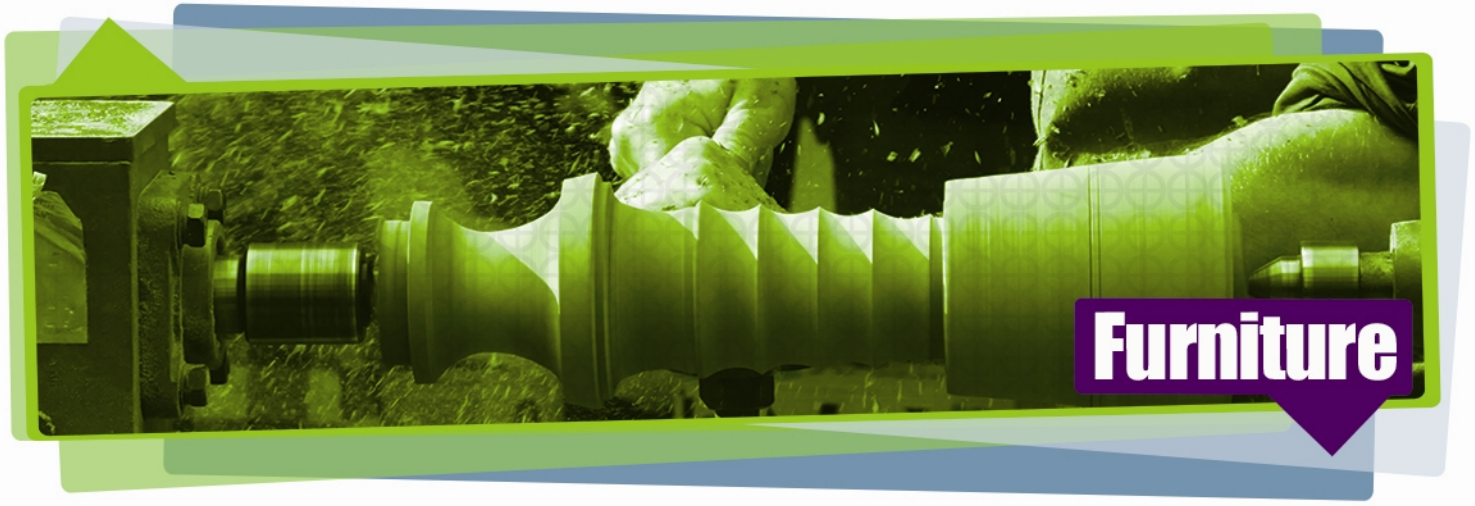
Sustainability issues	Process flow elements and sustainability risks (Furniture)				
Environmental	**Pre-production**	**Materials preparation**	**Treatments**	**Assembly**	**Finishing**
Materials (and packaging) • Consumption/reduction • Source – recycled/renewable	**H/H**	M/M			
	• Use of non-renewable resources (minerals and ores) in the supply chain. • Sourcing of timber from non-sustainable sources or illegally. • Packaging of materials from suppliers can be a significant source of waste, cost and delay. • Packaging of finished products can be a significant source of waste, cost and delay.				
Energy and fuels • Consumption/reduction • Source – renewable/non-renewable	**M/H**				
	• Petrol and diesel are used extensively in the transport of goods in the supply chain and during distribution. These are non-renewable resources. • Dryers and other machinery are powered by gas or electricity; electricity is primarily generated by fossil fuels with significant carbon emissions.				
Water • Consumption/reduction • Source – captured, recycled and potable • Impact on local waterways	L/L	**M/H**		L/M	
	• Wastewater may be contaminated with toxic chemicals. • Impact of water run-off to local waterways and other environments, with contaminants.				



Sustainability issues	Process flow elements and sustainability risks (Furniture)				
Environmental	**Pre-production**	**Materials preparation**	**Treatments**	**Assembly**	**Finishing**
Emissions, effluent and waste • GHG and ozone depleting emissions • Trade and solid waste • Toxins and hazardous substances	**H/H** • Toxic chemicals and substances used or released during production (e.g. VOCs, dyes, treatments, finishes and other chemical residues in water) may affect workers, community neighbours, land, air and water quality. • Supply chain, distribution network and worker transport to and from sites release GHG emissions and pollution which may impact surrounding environments and air quality. • Non-degradable waste from production processes (e.g. chemical, plastic, metals and other off-cuts) may contaminate land, water and air. • GHG emissions associated with operation of dryers.				
Habitat • Risk management and mitigation • Vulnerable area impacts	L/M • These issues are likely to arise in the supply chain (e.g. farming or logging practices) which impact local habitats; mining of fuel and coal which may damage land and water, affect air quality, and disrupt communities and local flora and fauna.				



Sustainability issues	Process flow elements and sustainability risks (Furniture)				
Social	**Pre-production**	**Materials preparation**	**Treatments**	**Assembly**	**Finishing**
Worker health and safety • Operation of heavy machinery • Handling of heavy, hot or hazardous materials • Safety training, equipment handling and drills	M/M	**M/H**			
	• Worker exposure to heat, noise, dust, chemicals, paint and pollutants may cause serious health issues. • Operation of machinery requires specialised training and monitoring. • Handling of potentially hazardous materials requires specialised training and monitoring.				
Workplace culture and workforce development • Worker engagement, job design and working conditions • Diversity and equal opportunity • Training and development	M/M				
	• Furniture manufacturing is a labour intensive sector, with relatively inefficient processes (compared with businesses with advanced technology).				
Heritage and amenity • Cultural heritage • Visual amenity, noise and pollution from plant/site • Impact on pedestrian movement and resident privacy • Traffic entering and leaving the plant (noise, pollution and hazards)	M/M				
	• The delivery of supplies or the distribution of finished product may generate traffic and associated pollution and emissions. This can have a detrimental effect on community amenity and lead to complaints and poor profile in the local community. • Noise and dust might be within 'legal' limits but still generate complaints from locals.				
Community • Engagement • Local programs • Complaints	M/M				
	• A poor reputation in the community may lead to complaints and negative media coverage that in total are costly, time-consuming and threaten the 'social license to operate' of the business.				



Sustainability issues	Process flow elements and sustainability risks (Furniture)				
Social	**Pre-production**	**Materials preparation**	**Treatments**	**Assembly**	**Finishing**
Ethical practice • Governance and compliance • Management of contracts and transactions • Treatment of workers, suppliers, customers, competitors, locals and Indigenous persons	**M/H**	M/M		L/L	
	• The risk of collusion or unethical practice in supply chain contracts, which may cost the business through fines and/or negative media coverage. • Poor practices in the supply chain may generate negative media coverage which can impact a well known customer of the supplier more than a lesser known supplier.				
Product responsibility • Safety and sustainability of products • Labelling, stewardship and transparency • Ethical marketing	**M/H**				
	• Increased subcontracting may make product safety and stewardship harder to manage. • Product safety and end-of-product life disposal issues due to toxic and hazardous chemicals used in manufacturing process. • Design and testing of products to minimise hazards and maximise lifespan. • Labelling of products – chemicals used, sources of timber, maintenance to extend product life, safe use and disposal.				