Australian Government

Department of Climate Change, Energy, the Environment and Water

A national framework for recycled content traceability:

Discussion paper

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Acknowledgement of Country

Our department recognises the First Peoples of this nation and their ongoing connection to culture and country. We acknowledge First Nations Peoples as the Traditional Owners, Custodians and Lore Keepers of the world's oldest living culture and pay respects to their Elders past, present and emerging.

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About this paper

This discussion paper proposes key design considerations for developing a national framework for recycled content traceability (the framework). The proposed framework would seek to provide industry with guidance on implementing traceability in recycled content supply chains. This would include minimum requirements for traceability, and minimum data to be collected and shared throughout supply chains, as described further below.

The framework is proposed to be technology-agnostic, outcomes-focused and initially voluntary. It would not include development of a traceability system or platform, or by itself require data to be reported to governments. However, a national framework will support harmonisation by enabling Australian governments to set consistent expectations for recycled content traceability.

The proposed framework would cover all recycled materials in all forms, across the supply chain. This would include:

- all functions in Australian supply chains between the material recovery stage and the sale of goods or completion of construction projects incorporating recycled materials
- recycled materials recovered from waste using mechanical and advanced recycling processes
- pre-consumer and post-consumer materials consistent with ISO 14021:2016. Recycled material incorporated into goods (such as consumer products, and construction materials), would be considered 'recycled content' and be defined based on ISO 14021:2016.

The proposed framework would set the minimum key traceability requirements we would expect supply chain participants (participants) to achieve. These include:

- adherence to global interoperability standards. Standards, such as the GS1 Global Traceability Standard, establish common rules that enable different systems to connect, communicate and share information with each other. These standards set rules to identify, capturing and sharing data about traceable objects, their movements across the supply chain and the parties involved.
- having systems in place to achieve 'one-step forward, one-step back' traceability initially and full supply chain traceability of recycled content by 2028:
  - 'One-step forward, one-step back' traceability means each participant can trace movements of outputs and inputs to their immediate customers and suppliers respectively.
  - Full supply chain traceability means that a participant has visibility of every step of their supply chain and can trace inputs and outputs beyond their immediate trading partners.
- having systems in place to collect and share a minimum set of recycled content information (or 'key data elements'). This would include information about:
  - what is being traced (the recycled material), who has been involved, where did it happen (locations), when did it happen (dates and times), and what happened (the supply chain process or event)
  - recycled content composition

  - recycled content provenance – this would mean tracing recycled content to its source and origin. The source is the supply chain step when traceability of the recycled material begins and is proposed to be the material recovery step. The origin is the geographic location where the recycled material was generated. We propose tracing the origin back to the state or territory for domestic materials, and country of origin for imported materials.
  - recycled content quality – this would address the physical and chemical characteristics of the recycled content (such as the chemical identity and concentration of chemicals and contaminants). It would also include the processing details at each step of the supply chain.
- using any of 4 chain of custody approaches to determine the recycled content of goods. Chain of custody describes the rules for managing recycled materials throughout the supply chain. Based on the international chain of custody standard (ISO 22095:2020) the 4 acceptable approaches are proposed to be: identity preservation, segregation, controlled blending and mass balance.
- alignment with emerging traceability requirements in international jurisdictions. Traceability is increasingly being considered as a requirement to access overseas markets. To help adopters of the framework compete in these markets, we propose to align data elements of the framework with these international traceability requirements, where practicable. We also propose to align with relevant global standards for traceability, chain of custody and verification.
  - As an early leader in this space, a national framework could help Australia influence recycled content traceability globally.
- verifying the accuracy and adequacy of traceability information received, when required. Verification is the process of confirming the truthfulness of claims. It helps to prevent greenwashing. There would be a role under the framework for third-party verification of recycled content information flowing through the supply chain. We would expect third-party verifiers to be accredited to relevant international standards, such as ISO/IEC 17029:2019 on conformity assessment requirements for verification bodies.

Layout of the paper

Section 1 of this paper outlines the context and rationale for developing the framework. It also explains how recycled content traceability can help governments and industry achieve their goals.

Section 2 provides a background on traceability and related concepts, such as chain of custody. This section will help you to learn more about traceability, including the many benefits.

Section 3 provides an overview of the proposed framework and discusses the framework design considerations. These include the framework's proposed approach, objective, scope, guiding principles and success measures. Desirable supply chains capabilities are also discussed, including supply chain interoperability; traceability models; traceability of recycled content composition, provenance and quality; and verification. This section may be of most interest to potential adopters of the proposed framework. It should help you to understand the expectations you would need to meet to implement the framework in your business.

Section 4 of this paper discusses implementation responsibilities and principles. This section outlines the proposed implementation responsibilities for different stakeholders and principles to help guide

traceability decisions. This section also provides some resources that might help with estimating traceability implementation costs for businesses.

Section 5 outlines a high-level monitoring approach for the proposed framework. It discusses the proposed approach to collect performance data, as well as the proposed performance indicators and review period.

Submit your feedback

The Department of Climate Change, Energy, the Environment and Water (the department) is seeking your views to inform development of the proposed framework. We want to hear from businesses involved in recycled content supply chains, including recyclers, material reprocessors, manufacturers, distributors, retailers, consumers and other end-users of recycled content. We also invite feedback from organisations, businesses, local governments, service providers and others who are directly or indirectly involved in the recycled content sector.

While we welcome feedback on any aspect of this paper, there are 65 questions posed in sections 3, 4 and 5 of this paper. All questions are optional, you do not need to respond to all questions to make a submission.

To have your say:

- submit your written feedback through the department's Have Your Say website at https://consult.dcceew.gov.au/developing-a-national-framework-for-recycled-content-traceability. We encourage you to use the provided submission template where possible
- or complete the online survey available on the Have Your Say website at https://consult.dcceew.gov.au/developing-a-national-framework-for-recycled-content-traceability.

Submit your feedback before close of business (AEST) on **Thursday 31 August 2023**.

We will consider all submissions received to inform development of a draft framework for consideration at the next Environment Ministers' Meeting in late 2023.

For further information, please email us at RecycledContentTraceability@dcceew.gov.au

1 Introduction

Australian governments and industry are investing over $1 billion in recycling infrastructure through the Recycling Modernisation Fund. Projects already announced will enable the recycling sector to process over one million tonnes more materials every year (DCCEEW 2022a).

Increasing the use of these recycled materials and keeping them in circulation is an important part of Australia's transition towards a circular economy. It will also deliver on Australia's environment ministers' agreement to work with the private sector to design out waste and pollution, keep materials in use and foster markets to achieve a circular economy by 2030 (DCCEEW 2022b).

Moving towards a circular economy can help Australia become less wasteful and reduce our impact on the climate and environment while creating sustainable jobs and opportunities.

The Department of Climate Change, Energy, the Environment and Water (the department) has heard that manufacturers may hesitate to use recycled content due to uncertainties about its origin, quality and effects on production processes. The recycling sector has told us that they require additional demand for recycled materials. Demand is being held back by a lack of information that would support the use of recycled content in manufacturing and help businesses and consumers verify claims about recycled content.

To improve transparency of information and support increased use of recycled materials, the Australian Government is developing a national framework for recycled content traceability (the framework). On 9 June 2023, Australia's environment ministers agreed to progress development of this framework for consideration at their next meeting, in late 2023 (Environment Ministers Meeting, 2023).

Recycled content traceability is the ability to trace recycled content as it moves through the supply chain. The framework would focus on providing guidance to industry on the type of information about recycled content that should be collected and shared along the supply chain. The framework is expected to increase information on key attributes such as where recycled content has come from and how it has been processed and handled. This information can:

- provide users with certainty on the origin (also known as the provenance) of recycled content and how it has been processed
- provide recyclers with information on where their recovered materials are being used, helping them to tailor the processing and quality of materials, and pursue new markets
- help recyclers, brand owners and retailers build trust and credibility with clients, which can provide access to new markets or premium prices
- enable businesses to better understand their supply chains (especially complex ones), make credible green claims, and help them to identify opportunities to improve efficiencies, reduce risks, and eliminate undesirable practices

- support procurement officers (within governments and business) to meet procurement targets and policies by helping identify and procure recycled content for projects, or products made with recycled content
- support businesses in the supply chain to prove regulatory compliance, such as demonstrating that material previously deemed to be waste has become a resource for productive use
- enable suppliers of goods made from recycled content to show that they meet market access requirements, such as minimum recycled content percentage for plastics packaging exported to the United Kingdom.

The proposed framework would not include development of a traceability system or platform, or by itself require data to be reported to governments. Rather, the framework would provide guidance to industry to encourage greater implementation of recycled content traceability. It also provides an opportunity for governments to harmonise recycled content traceability expectations and requirements for specific products, materials or initiatives.

Traceability is a rapidly emerging requirement for sustainability and the transition to a circular economy. For example, traceability requirements are being considered as part of Australia's packaging regulation reforms (DCCEEW 2023a), and a national regulated product stewardship scheme for electrical and electronic products (DCCEEW 2023b).

The European Union (EU) is considering policies that would drive greater traceability. These include requirements to use digital product passports to collect and share product information across the supply chain (EC 2022a). Globally, several countries including Australia are calling for binding provisions in a new global plastics treaty currently being negotiated. Among these is a proposal to ensure traceability of plastics value chains (HAC 2023). As a member of the High Ambition Coalition to End Plastic Pollution, Australia is committed to being a leader in this area.

As recycled content traceability is in its infancy, a national framework provides a unique opportunity to harmonise traceability requirements across Australia. This would minimise costs for business and avoid other challenges from different requirements emerging across jurisdictions. By working with like-minded countries and the business sector, a national Australian framework could also influence traceability for recycled content globally.

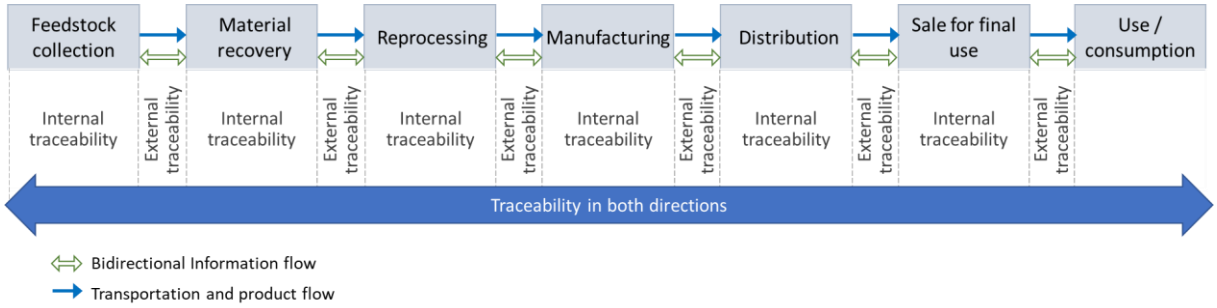
2 What is traceability?

2.1 Key traceability concepts

Traceability is the ability to trace the history, application, location or source of a material or product (backward or forward) throughout its supply chain (ISO 2020).

Recycled content traceability means having the ability to trace recycled material between predetermined entry and exit points. For example, this could be from collection of the feedstock to the sale of a recycled content product (Figure 1). End-to-end (or full) traceability means the entry and exit points cover the entire supply chain from source to final product. Entry and exit points are a key design consideration in this discussion paper.

Figure 1: Traceability concepts



There are 2 types of traceability: internal and external. Internal traceability is the ability of a company to follow the internal movement, management and processing of materials within its operations. Internal traceability generates information that enables traceability when it is shared with other supply chain partners.

Traceability is implemented using a traceability system which provides the ability to capture, share and access documented information about recycled materials. There are 3 main types of traceability systems (Future of Fish 2023):

- Manual or paper-based traceability, which involves using paper records such as bills of lading, purchase orders, invoices and handwritten labels to capture, store and share information.
- Basic electronic traceability involves digital record-keeping. Elements of these systems may include computerised or cloud-based databases and data standards.
- Integrated hardware traceability uses barcodes or QR codes or radio frequency identification (RFID) tags to record and share traceability information. These are often integrated with a company's systems for financial, information and inventory management.

Whatever traceability system is used, it should be supported by an assurance system to verify the recycled content information being transmitted along the supply chain to prevent fraud and maintain confidence. This is most often done through third-party audit and verification services.

2.2 Benefits of traceability

Demand for traceability is growing. Consumers are becoming increasingly connected through communication technologies, educated in environmental issues and demand more detailed and timely information (DAWE 2018). In a global survey of almost 19,000 consumers, 73% indicate that traceability of products is important to them, and of those, 71% would pay a premium for it (IBM 2020).

Strengthening traceability for recycled content has a broad range of benefits for business, governments and broader communities.

Supporting the transition to a more circular economy

Traceability increases understanding of the source, pathway and destination of traced materials. This enables more recycled content to be used, particularly where users are seeking quality assurance. Recycled content traceability can help recyclers and other processors demonstrate the provenance and quality of their material. This could then attract a price premium to capitalise on the growing demand for traceable goods. In Europe, for example, post-consumer recycled Polyethylene terephthalate (PET) flake commanded a higher price in 2019 than virgin PET. This was driven by a tighter supply of good quality recycled material and demand from buyers seeking to maintain recycled supply chains (Brooks, Hays & Milner 2019).

Traceability may yield additional circular economy benefits. For example, it may reveal new opportunities along the supply chain to reduce, reuse, remanufacture or recycle waste. Traceability can also help limit losses and minimise wastage from product recalls by allowing specific batches of products to be identified and recalled.

Reduced risks and greater efficiencies

Traceability requires a close look at the supply chain and the route recycled content takes from source to end market. This scrutiny can provide a clearer view of risks and where unsustainable or illegal practices are occurring. It can also reveal effective and ineffective processes and where to prioritise efforts for continuous improvement. The information sharing involved in traceability can also open dialogue between trading partners about process improvements. Ultimately traceability can help achieve operational efficiencies, cost reductions and increased productivity (UN Global Compact & BSR 2014).

Reputational benefits

Australian businesses stand to gain reputational benefits from traceability systems that demonstrate a commitment to sustainability outcomes. When consumers value sustainability and transparency, traceability can lead to consumer confidence, help to build trust and loyalty, and provide a competitive advantage (UN Global Compact & BSR 2014). Importantly, traceability can support companies to make green claims and enable their customers to verify those claims.

Consistency and harmonisation

Recycled content traceability in Australia is an emerging sector. A national traceability framework provides a unique opportunity to harmonise traceability across Australia. This would minimise business costs that might result from working across disparate state and territory frameworks.

Increased demand for recycled materials

Recycled content traceability will increase the availability and flow of recycled content information (such as composition, origin and quality) across supply chains. This will give recycled content users greater confidence to use more of these materials and contribute to growing domestic markets for recycled materials.

Access to key markets

Internationally, we are seeing the emergence of greater requirements for global supply chain transparency, traceability and sustainability for recycled content. By developing the framework to align with international traceability requirements as much as possible, the framework can help position Australian businesses that adopt the framework to also meet relevant international requirements.

2.3 Recycled content traceability in Australia

Traceability has been widely adopted in the food and agricultural sector, driven by the need to regulate food safety and biosecurity risks, address fraud, and for other market access purposes. For example, food traceability requirements are set out in the Australia New Zealand Food Standards Code (FSANZ 2017). The Australian government is also investing significantly in agricultural traceability systems to build on existing strong traceability frameworks (DAFF 2023).

Other sectors are also embracing traceability in response to increasing regulation or demand for ethically and sustainably produced goods (UN Global Compact & BSR 2014). For example, based on the modern slavery register, several businesses are using (or intend to use) traceability to examine where modern slavery may be occurring in their supply chains and implement responses to meet their obligations under the *Modern Slavery Act 2018* (Cth).

We have also heard that companies are pursuing traceability to meet ambitious internal environmental, social and corporate governance goals and to set themselves apart from others. Appendix A (Table A1) provides additional examples of traceability in different sectors.

Australia's recycled content sector is in the early stages of using traceability. In our initial stakeholder engagement, some manufacturers told us they participate in recycled content traceability through various chain of custody certification schemes. These included the Global Recycled Standard, the International Sustainability and Carbon Certification (ISCC PLUS), and the Forestry Stewardship Council Chain of Custody Certification (see Appendix A - Table A2).

The current early state of recycled content traceability in Australia provides an opportunity to set common national principles and guidance through the framework. This would help ensure consistency and interoperability in traceability systems as they mature. Establishing a national framework now, also means we can minimise the challenges of harmonising separate and incompatible systems in the future. We are currently experiencing these challenges in other parts of industry, including in harmonising kerbside collection standards across Australia.

2.4 Recycled content traceability internationally

While there are global traceability standards and certification schemes, there are no international frameworks for recycled content traceability. Several countries or regions have introduced (or are considering) recycled content traceability requirements, including the following.

- The European Commission has adopted a proposed EcoDesign Regulation that would establish a framework for setting eco-design requirements for specific product groups. The requirements include the use of digital product passports to share product data in supply chains, including on recycled content. The product-group-specific requirements would be detailed in further regulation (EC 2022a). The proposal must be passed by the European Parliament to become law.
- In Europe, the Food Contact Materials Regulation (EC 2004) and the Recycled Plastic Food Contact Materials Regulation (EC 2022c) mandate traceability of food contact materials, including for packaging made with recycled content.
- On 1 January 2023, Spain imposed a Plastic Tax on all non-reusable packaging containing plastic, with certain exemptions allowed, such as packaging for medicines and sanitary products. To qualify for exemptions, from 2024 the packaging must be certified to the European Standard EN 15343:2008, which specifies procedures for traceability of recycled plastics (USDA-FAS 2023).
- Under the China Plastic Waste Reduction Project funded by the World Bank, China aims to conceptualise a national traceability management system for plastics by 2028. The system would include production, circulation, consumption and treatment of plastics (World Bank 2023).

Additionally, some international jurisdictions are considering changes that will likely drive greater traceability.

- Canada is proposing to pass a regulatory framework by 2025 that would set recycled content and labelling requirements for plastic products (Government of Canada 2023). While the proposal does not mandate traceability, it requires that compliance with recycled content requirements be verified through third-party certification schemes. These schemes are likely to include chain of custody and/or traceability requirements.
- New York state (USA) has proposed a Fashion Act that would require fashion chains to map their supply chains, disclose social and environmental sustainability information, and set (and meet) targets for reducing social and environmental impacts (NY Senate 2023). Traceability is not currently a requirement of the proposed act. However, it would likely be used as a tool to examine fashion supply chains and support reporting and compliance, similar to modern slavery reporting.

Globally, traceability is being discussed as a potential element of the new global plastics treaty currently being negotiated. Recently, the second Intergovernmental Negotiating Committee meeting for the treaty considered, among other things, options to increase transparency. This included marking (using tracers, for example), product passports and disclosure of information on plastics throughout the supply chain (UNEP 2023).

Drafting of the treaty is expected to be completed by the end of 2024, followed by processes to adopt the treaty and open it for signatures. Traceability requirements arising from the treaty are unlikely to be considered in the framework prior to release but will be considered in future reviews.

2.5 Traceability and chain of custody

Traceability is often used interchangeably with 'chain of custody', but they are different. For recycled content, chain of custody describes the rules for managing recycled materials, to ensure their characteristics remain transparent through the supply chain and can be accounted for in the final recycled-content goods (ISO 2020). This is important for intangible characteristics, such as the recycled content percentage and origin, which may be claimed, but are difficult to determine or validate through testing or other methods.

The International Organization for Standardization (ISO) defines 5 chain of custody models by which inputs and outputs and associated information can be controlled: identity preservation, segregated, controlled blending, mass balance, and book and claim. These models are discussed further in section 3.5.2.

Chain of custody certification

The objective of a chain of custody certification scheme is to validate claims made about the product, process, business or service covered by the scheme (ISEAL 2016). It provides assurance that a certified material or product has been managed and controlled across its supply chain to required standards. To be able to label or promote products as certified, every company in the supply chain that takes ownership of the material or product must be certified.

Each scheme has its own standards and criteria for certifying materials and products, and an audit regime for verifying and assuring compliance, appropriate to its scope and objectives. Independent auditors will typically review and assess records from each supply chain participant and issue a certificate where scheme requirements have been met. The certificate provides assurance to the next supply chain partner that the relevant standards have been met, without the need to share recycled content information. An overview of several schemes is provided in Appendix A (Table A2).

Schemes are not necessarily compatible with each other and there is rarely mutual recognition between them. This means using different schemes in the same supply chain is not always possible. This is a potential cost and administrative burden for small and medium-sized businesses that need to obtain and maintain multiple certifications to trade with manufacturers certified under different schemes.

The proposed framework would accommodate different schemes by stipulating the chain of custody certification information to be captured and shared through the supply chain. This would include information such as the certification body, status and certificate number.

3 The framework

The proposed framework would seek to provide industry with technology-agnostic guidance on implementing traceability in recycled content supply chains. This would include guidance on the recycled content information to collect and share. The proposed framework would also set the minimum traceability capabilities we would expect to see in supply chains. Key considerations for the proposed framework are summarised in Tables 1 and 2 and discussed in further detail in this section.

Table 1: Overview of the proposed national framework for recycled content traceability

Approach	The framework is proposed to be technology-agnostic, outcomes-focused and initially voluntary.
Objective	Industry-led interoperable traceability systems in use across recycled content supply chains providing accessible, accurate and harmonised recycled content data that drives greater use of recycled content in Australia.
Scope	The framework would guide traceability for all recycled materials created or used in Australia, including pre-consumer and post-consumer materials, imported materials and materials recycled using advanced recycling processes.
Supply chain coverage	Material recovery; Reprocessing; Manufacturing; Distribution; and Sale for final use
Key capabilities	• **Interoperability:** Supply chain participants would be expected to collect and share specified key data elements using systems that meet global standards for interoperability. • **Traceability model:** Supply chain participants would be expected to practice 'one step forward, one step back' traceability, strengthening to full traceability by 2028. • **Recycled content composition:** Supply chain participants would be expected to use mass balance and other chain of custody approaches to determine the recycled content of goods. • **Recycled content provenance:** Supply chain participants would be expected to be able to trace recycled content to its geographic origin, and first supply chain source. • **Recycled content quality:** Supply chain participants would be expected to have visibility of the processing history and chemicals of concern for recycled materials. • **Aligning with emerging requirements:** The data elements of the framework should align with international requirements, as much as possible. • **Verification:** Supply chain participants would be expected to independently verify the accuracy and adequacy of traceability information they receive from their suppliers.
Guiding principles	• Governments set harmonised expectations • Industry ownership • Transparency • Information protection and privacy • Full supply chain visibility • Use of existing systems • Harmonisation with existing standards • Risk based approach
Key standards	• ISO 22095:2020 Chain of custody – General terminology and models • GS1 Global Traceability Standard • ISO 14021:2016 Environmental labels and declarations – self declared environmental claims (Type II environmental labelling) • ISO/IEC 17029:2019 General principles and requirements for validation and verification bodies
Success measures	• Number of businesses that are aware of the framework • Number of businesses that have adopted (or are adopting) the framework • Number of businesses with 'one-up-one-down' traceability for recycled content • Number of businesses with end-to-end traceability systems for recycled content • Number of businesses that independently verify recycled content information • Amount of recycled content used in manufacturing resulting from access to traceability data • Access to international markets attributed to traceability
Review period	First review within 3 years

Table 2: Summary of proposed data elements for recycled content traceability

Purpose	Data elements	Data element sharing required (R) or optional (O)	Data element applies (Y/N)				
			Material recovery	Reprocessing	Manufacturing	Distribution	Sale for final use
For basic traceability	Input item identifier	R	Y	Y	Y	Y	Y
	Input item description	R	Y	Y	Y	Y	Y
	Input quantity	R	Y	Y	Y	Y	Y
	Receipt date	R	Y	Y	Y	Y	Y
	Sender identifier	R	Y	Y	Y	Y	Y
	Output item identifier	R	Y	Y	Y	Y	Y
	Output item description	R	Y	Y	Y	Y	Y
	Output item quantity	R	Y	Y	Y	Y	Y
	Ship date	R	Y	Y	Y	Y	Y
	Shipment identifier	R	Y	Y	Y	Y	N
	Receiver identifier	R	Y	Y	Y	Y	N
	Ship from location	R	Y	Y	Y	Y	Y
	Ship to location	R	Y	Y	Y	Y	N
	Transporter	R	Y	Y	Y	Y	N
For recycled content provenance	Origin	R	Y	N	N	N	N
	Feedstock source stream	O	Y	N	N	N	N
	Feedstock category, type and sub-type	O	Y	N	N	N	N
	Feedstock source type	O	Y	N	N	N	N
For recycled content composition	Total recycled content	R	N	Y	Y	N	N
	Pre-consumer recycled content	O	Y	Y	Y	N	N
	Post-consumer recycled content	O	Y	Y	Y	N	N
	Chain of custody approach	O	Y	Y	Y	N	N
For recycled content quality	Analysis details	R	Y	Y	Y	N	N
	Quality certification	R	Y	Y	Y	N	N
	Processing details	R	Y	Y	Y	Y	N
	Work order reference	O	Y	Y	Y	Y	N
	Risk assessment	R	Y	Y	Y	N	N
	Chemical inputs	O	Y	Y	Y	N	N

While we welcome feedback on any aspect of this paper, specific questions are posed below. All questions are optional.

3.1 Approach

The framework is proposed to be technology-agnostic, outcomes-focused and for voluntary uptake by Industry.

To maximise the framework's reach, appeal and ease of implementation, we propose that it is technology-agnostic, outcomes-focused and for voluntary uptake by Industry, at least initially.

Technology-agnostic and outcomes-focused

It is estimated that hundreds of traceability systems and platforms are in use globally and across different sectors (UNECE 2022a). Not all of these would meet interoperability standards and be able to communicate and share data with each other – a key factor for traceability.

The proposed framework would provide outcomes-focused guidance, rather than prescriptive, step-by-step guidance on implementing traceability. It would recommend interoperability standards that can be implemented across supply chains, regardless of the traceability system or technology being used. This would help ensure the framework is accessible to as many businesses as possible.

The framework would not be expected to:

- recommend specific traceability systems for participants to use
- include development of a government traceability system or platform
- require participants to share or report traceability data with Australian governments.

While the framework would require participants to share key information with each other to enable traceability, participants would be able to choose the amount of information and what additional data they share with the supply chain. As Australia's recycled content traceability capacity grows, there may be opportunities for industry and governments collaborate to identify traceability data that can support reporting against relevant national recycling targets.

A voluntary approach

A voluntary framework would recognise that recycled content traceability is still emerging and that there are varying levels of capability and willingness to embrace traceability in recycled content supply chains. A voluntary approach would also enable businesses to implement the framework at a pace and in a manner appropriate to their specific circumstances.

Some stakeholders told us they support a mandatory approach because they consider that a voluntary framework would not drive sufficient uptake of recycled content traceability. Conversely, requiring or mandating traceability for recycled content broadly could perversely encourage greater use of virgin material which would not be subject to such requirements.

We propose a voluntary framework initially to give business time to implement traceability of recycled content within their supply chains in a way that suits their needs. The framework would provide a common set of guidance and principles to ensure consistency and interoperability as recycled content traceability expands in Australia. It would also enable governments to require or mandate recycled content traceability in a consistent manner where required in specific sectors or to support certain initiatives.

Box 1: Questions on the framework approach

1. Do you currently participate in traceability? If so, please tell us how. If not, how likely are you to adopt or participate in recycled content traceability in the next 2 years?
2. Do you support the framework adopting a technology-agnostic approach? Please tell us the reasons for your answer.
3. Do you support the framework adopting an outcomes-focused approach? Please tell us the reasons for your answer.
4. Should the framework include requirements to share data with government to support reporting, for example progress reporting against national recycling targets? Please tell us the reasons for your answer.
5. What requirements could be included in the framework to support industry and governments to report against such targets? (For example, what type of traceability information could support reporting?)
6. If reporting were to be included in the framework, what conditions should be attached? (For example, what traceability data would be appropriate to provide to government; should such data be de-identified, or only be used in certain circumstances?).
7. Would you adopt a voluntary framework? Please tell us the reasons for your answer.
8. What timeframe would be required for you to implement traceability in your own business?
9. Do you support recycled content traceability being initially voluntary? Please tell us the reasons for your answer.
10. Should recycled content traceability become mandatory for everyone over time? Why/why not?
11. Should recycled content traceability be mandatory only in specific circumstances or sectors? Please tell us why/why not.
12. Do you support governments requiring consistency or alignment with the framework as a requirement for future initiatives, for example grant funding? If not, why not?

3.2 Framework objective

Industry-led interoperable traceability systems in use across recycled content supply chains providing accessible, accurate and harmonised recycled content information that drives greater use of recycled content in Australia.

The proposed objective or long-term outcome of the framework is for industry-led interoperable traceability systems to be in use across recycled content supply chains, providing accessible, accurate and harmonised information that drives greater use of recycled content.

Interoperable traceability systems can connect and communicate with each other to share information. Interoperability means less manual handling of information which speeds up information sharing and makes the traceability process faster and more accurate. Without

interoperability, staff would be forced to manually transfer, update or check information. This may increase costs, reduce efficiency and introduce data errors. This manual process can also hamper investigations during a product tracing or recall event and slow responses to information requests from supply chain partners. Either can harm the reputation of a business.

This proposed objective reflects the importance of industry in continuing to lead implementation of traceability systems. Peak bodies that represent businesses along the supply chain may have a role to play in helping to facilitate alignment, adoption, knowledge exchange and partnerships between actors in the supply chain.

Box 2: Questions on the framework objective

13. Is the proposed objective appropriate for a voluntary approach? If not, what else should be considered?
14. If the proposed framework were mandatory or to become mandatory, would the proposed framework objective still be appropriate? If not, in what way would it be inappropriate?
15. Is the proposed framework sufficient to support collection and sharing of accurate and harmonised recycled content information? If not, what would you like to see from governments to support this?
16. Do you use traceability systems for other parts of your business, for example to trace food or agricultural products? If so, which system do you use?

3.3 Framework scope

The framework would guide traceability for all recycled materials created or used in Australia.

Materials in scope

The framework is proposed to cover all recycled materials, in all forms, across the supply chain. This includes all functions between the material recovery stage and the sale of goods or completion of construction projects incorporating recycled materials (as per Figure 2).

We propose the scope of recycled material would include the material recovered from waste that would otherwise be disposed of or used for energy recovery. This includes materials processed using mechanical recycling and advanced recycling (also known as feedstock or chemical recycling).

Based on ISO 15270:2008 *Plastics – Guidelines for the recovery and recycling of plastics waste*, advanced recycling means changing the chemical structure of a material or substance to produce monomer or new raw materials. This can be done through cracking, gasification or depolymerisation. Advanced recycling does not include energy recovery and incineration.

Consistent with the standard, ISO 14021:2016, recycled materials would include:

- pre-consumer (also known as post-industrial) material – this is material recycled from waste discarded from manufacturing processes. It excludes offcuts which are used again in the same manufacturing process that created them (such as rework, regrind and scrap)

- post-consumer material – this is material recycled from the waste generated by households or other end users when a product has reached end of use.

Once recycled material is incorporated into goods (such as consumer products, and construction materials) it would be considered recycled content. We proposed to define recycled content as the proportion of recycled material in goods, based on ISO 14021:2016.

Geographic scope

Geographically, the proposed framework covers supply chain activities within Australia. We are seeking to align data elements of the framework with international requirements, as far as practicable. This will support companies that operate internationally to trace recycled content through their global supply chains.

Supply chain scope

The framework is proposed to cover the domestic recycled content supply chain functions shown in Figure 2. It considers traceability over one lifecycle – that is, traceability would cease under the proposed framework when the product or material is sold for consumption or final use – but assumes that materials would be picked up again as they re-enter the supply chain.

Out of scope

The proposed framework's scope excludes:

- recycled material exported from Australia (either as a raw material or recycled content in products). The recycled material should be traced up to the point of export in accordance with the framework, noting that exporters are free to share relevant traceability information to satisfy international requirements.
- goods that are destined for reuse, repair or refurbishment.

The traceability of non-recycled materials incorporated along the supply chain (for example additives and virgin materials) is strongly encouraged but does not form part of the framework.

Box 3: Questions on the framework scope

17. Is it appropriate for traceability to begin at the material recovery step in the supply chain? If not, why not and at which step in the supply chain should traceability begin?
18. Does the defined scope of recycled material and recycled content cover all the types of recycled materials that should be traced? If not, what other recycled materials should be in scope?
19. Are the supply chain steps in Figure 2 and descriptions in Table 1 sufficient to capture all types of recycled content supply chains (for example, glass, paper, plastics, metals and construction materials)? If not, what additional steps or descriptions should be included?
20. Should imported recycled materials be within scope of the framework once they enter Australia? If not, why not? If so, should the framework requirements apply in the same way to imported recycled materials? Please tell us the reasons for your answer.

Figure 2: Supply chain scope of the framework

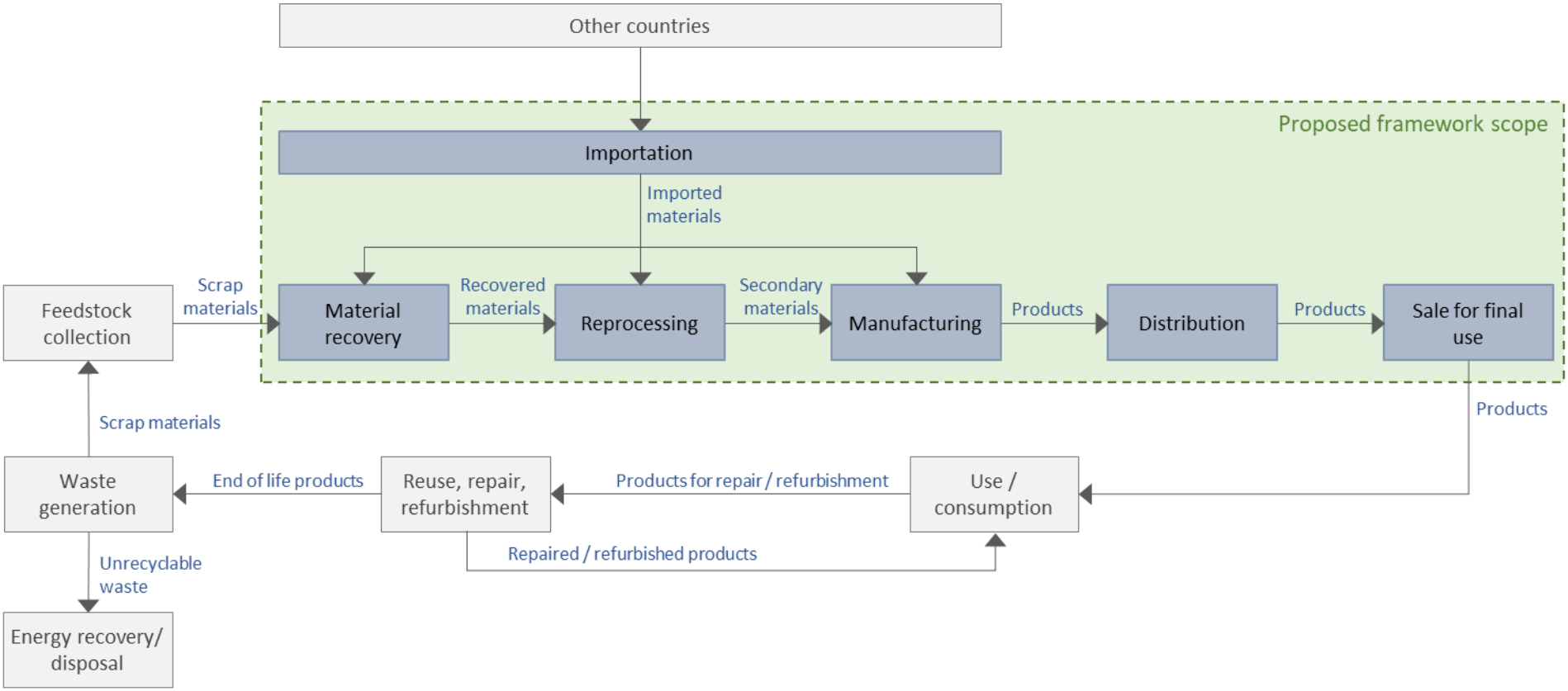


Table 3: Key supply chain stages

	Material recovery	Reprocessing	Manufacturing	Distribution	Sale for final use
Description	Scrap materials are sorted and physically processed (for example, baled, shredded or washed) to produce streams of sorted materials for reprocessing. Non-recycled materials are not typically added.	Recovered materials are converted to secondary materials suitable for direct end use or for remanufacturing using thermal, chemical or biological processes. Virgin materials and other inputs may also be added.	Secondary and other materials and inputs are transformed into recycled content products.	Products are shipped to final point of sale. This may be via a distribution centre where products are stored, until they are picked, packed and shipped to fill a customer order.	Products are sold for final use.
Example: Plastic film packaging supply chain	Sorting and preparation of collected soft plastics to create a processed feedstock.	• Pyrolysis of feedstock to produce pyrolysis oil. • Refining of pyrolysis oil to produce the chemical feedstocks for new polymers. • Production of polymer resin from chemical feedstocks.	• Manufacture of plastic packaging film from polymer. • Manufacture and printing of food wrapper from plastic film. • Filling of food wrapper with food to produce the final saleable product.	• Shipment of product (wrapped food) to a supermarket distribution centre. • Unpacking, storage, picking, packing and shipping of product to final point of sale	Sale of product to a consumer.

3.4 Achieving interoperability

Interoperability refers to the ability of different systems to connect and communicate with each other to share information in a timely manner.

The key enabler for interoperable traceability is establishing a common set of rules for identifying, capturing and sharing data about traceable objects, the parties involved and the movements of those objects across the supply chain.

Interoperability means that recyclers, manufacturers and other actors in the supply chain can:

- identify traceable products and locations using standardised methods
- capture the standardised identification using a common approach (for example using barcodes)
- share the information in a standardised format that is understood by other parties.

This does not require every supply chain actor to use the same traceability system, but their systems must support the standardised data (GS1 2017).

The framework is expected to enable interoperability by first identifying the common set of recycled content information that needs to be captured (see section 3.6), and then by identifying the common rules (standardised methods) that need to be followed.

We do not intend to develop these common rules, but instead propose to use existing rules, such as the GS1 Global Traceability Standard. GS1 is an international not-for-profit organisation that develops and maintains global standards for use in supply chains across multiple sectors. The GS1 Global Traceability Standard provides a framework and ecosystem to assist businesses to design and implement interoperable traceability systems. It identifies technology- and sector-agnostic requirements for capturing and sharing traceability data across supply chains.

While several other traceability standards exist, they are product- or sector-specific and would not provide adequate coverage or be appropriate for all recycled content traceability. These include:

- The United National Centre for Trade Facilitation and Electronic Business (UN/CEFACT) Traceability of Animals and Fish, and the UN/CEFACT Framework on Traceability for Sustainable Trade
- UN/CEFACT standard for traceability and transparency in the textile and leather sector
- Global Dialogue on Seafood Traceability

Box 4: Questions on achieving interoperability

21. Is the GS1 Global Traceability Standard an appropriate basis for guiding interoperability in recycled content supply chains? If not, what approach would you suggest?
22. What other approaches or guidance should be considered for guiding implementation of interoperability in recycled content supply chains?
23. Would you require further guidance from governments to ensure interoperability of recycled content traceability systems is achieved? If so, what additional guidance would be required?

3.5 Traceability model

We've considered 2 models that define how traceability can be achieved. The first is 'one-step forward, one-step' back traceability (also known as one-up-one-down traceability). This is a basic model used widely in the food and agricultural sector. It means a supply chain participant can track movements of their goods one step forward to their customers and trace the associated inputs one step back to the immediate suppliers. A potential exception for recycled content is at the traceability exit point. For example, a retailer would not normally be expected to collect consumer information to enable 'one step forward' traceability.

If every participant in a supply chain achieves one-up-one-down traceability in a consistent and interoperable manner, there will be full traceability along the supply chain. This requires the participation of every actor in the supply chain. To overcome this dependency, each supply chain actor should work to achieve full traceability over time. This means looking beyond their immediate suppliers (tier 1 suppliers) and towards their suppliers' suppliers (tier 2 suppliers), and suppliers of tier 2 suppliers (tier 3 suppliers). This would require mapping of supply chains to identify suppliers, and implementation of a full traceability system.

Based on implementation in other sectors (Appendix B), we consider that it would be reasonable to expect participants to achieve full supply chain traceability of recycled content by 2028 – within 4 years of the framework's expected release. We consider this would allow time for participants to map their supply chains, investigate, procure, install and test traceability systems. It would also allow time for re-negotiating supply contracts where necessary to facilitate information sharing.

Box 5: Questions on the traceability model

24. Could your business currently achieve 'one step forward, one step back' traceability? If not, please tell us why.
25. Is it appropriate to start with 'one up, one down' traceability? If not, why is it not appropriate and what other approach should be considered?
26. Would 4 years be enough time for industry to adapt to full traceability? If not, what timeframe should be considered and why?
27. Would the 4-year timeframe be sufficient if the framework were mandatory? If not, why not and what timeframe would you propose?

3.6 Key data elements

Achieving interoperable traceability efficiently and consistently requires collection and sharing of a minimum set of data elements based on global standards for interoperability. Data elements would be collected and shared when the following supply chain events (critical tracking events) occur:

- Receiving event – receiving or accepting the traceable goods from another trading partner in the supply chain.

- Processing event – transforming or packaging traceable goods to create a new traceable asset. Transformation includes for example, aggregation, disaggregation, comingling and manipulation of products; mechanical and chemical recycling; manufacturing; assembly; and repacking.
- Dispatch (or shipping) – sending or shipping the traceable goods to another trading partner in the supply chain.

The data elements proposed to be collected are defined in Table 4 and are intended to cover all recycled content supply chains. These data elements would enable the physical movement of recycled content to be followed (basic traceability). They would also enable traceability of recycled content attributes including provenance, composition and quality. This information can help users of recycled content make informed decisions about using recycled content and support verification of recycled content claims.

Table 4 should be read together with the tables in Appendix C as follows:

- Table C1 identifies which data elements should be collected at specific points in the supply chain depending on the critical tracking event that is occurring. This table also defines the meaning of each critical tracking event at each point in the supply chain.
- Table C2 provides another perspective on the data elements, by identifying the specific data elements that each participant should collect and share with their immediate trading partners. This table is most useful for supply chain participants interested in understanding their specific responsibilities for data collection.

In defining the proposed data elements, we propose to align our terminology with existing data vocabulary standards as much as possible. These include standards developed by GS1, the World Wide Web Consortium and Schema.org (see Appendix F).

Table 4: Proposed minimum key data elements for recycled content traceability

Purpose	Key data element	Description	Example of what to record
For basic traceability	Input item identifier	A unique number, code or descriptor of the goods received. 'Goods' includes recycling feedstock, finished products or materials and everything in between.	• GS1 GTIN (if used) • Batch/lot number • Serial number (if applicable)
	Input item description	Description of the goods received.	Description
	Quantity	Quantity of the goods shipped, received, processed or sold (as appropriate).	Quantity and unit of measure
	Receipt date	Date the goods was received.	Date (YYYYMMDD)
	Sender identifier	A unique number, code or descriptor of the party selling the goods.	• GS1 GLN (if available) • Internal customer number, • Supplier's name, address and ABN
	Output item identifier	A unique number, code or descriptor of the goods dispatched to the next trading partner.	• GTIN (if available) • Batch/lot number • Serial number (if applicable)
	Output item description	Description of the goods supplied.	Description

Purpose	Key data element	Description	Example of what to record
	Ship date	Date goods dispatched to next trading partner or to the final user/consumer	Date (YYYYMMDD)
	Shipment identifier	A unique number, code or descriptor for the goods being shipped, dispatched, or delivered.	Bill of lading number / unique invoice number / purchase order number
	Receiver identifier	A unique number, code or descriptor of the party receiving/purchasing the goods.	• GS1 GLN (if available), • Recipient's name, ABN
	Ship from location	A unique number, code or descriptor of the location from which goods is dispatched.	• GS1 GLN (if available) • Sender's address
	Ship to location	A unique number, code or descriptor of the destination of the shipment.	• GS1 GLN (if available) • Recipient's address
	Transporter	A unique number, code or descriptor of the transporter or carrier.	• GS1 GLN (if available) • Vehicle registration number
For recycled content provenance	Origin	Geographic location in which the traceable goods was first generated or collected.	• State or Territory (if domestic) • Country (if imported)
	Feedstock source stream	Classification based on item 6 of the Australian Standard for Waste and Resource Recovery Data Reporting (DAWE 2021).	MSW, C&I, C&D waste, or marine litter*
	Feedstock category, type and sub-type	Classification based on items 7 & 8 of the Australian Standard for Waste and Resource Recovery Data Reporting (DAWE 2021).	Refer to item 7 of the Australian Standard for Waste and Resource Recovery Data Reporting (DAWE 2021).
	Feedstock source type	A general description of the point in the lifecycle at which the feedstock was collected.	Pre-consumer or post-consumer waste as defined by ISO 14021:2016
For recycled content composition	Total recycled content	The proportion, by weight, of recycled material in the goods as per ISO14021:2016.	Percentage
	Pre-consumer recycled content	The proportion, by weight, of pre-consumer recycled material in the goods.	Percentage
	Post-consumer recycled content	The proportion, by weight, of post-consumer recycled material in the item.	Percentage
	Chain of custody approach	Description of the chain of custody approach used.	Details of the chain of custody approach
For recycled content quality	Analysis details	Details and results of any laboratory tests and analyses performed on the traceable goods.	• Copy of laboratory analysis certificate • Laboratory's accreditation details (such as accreditation organisation and number)
	Quality certification	Any mandatory or voluntary standards, specifications or certifications the traceable item complies with, including eco-labels and chain of custody certifications.	• Name of the standard, specification, or certification • Evidence of certification (if applicable)

Purpose	Key data element	Description	Example of what to record
	Processing details	Specific details of the type of processing performed on the goods, and the processing conditions. Broad types of processes might include, but are not limited to, cleaning, sorting, blending, shredding, crushing, mixing, melting, casting, reacting or refining).	Detailed description of what was done to the goods and the processing conditions
	Chemical inputs	Unique identifiers for each chemical intentionally added to the traceable goods during its handling and processing.	Chemical Abstracts Service (CAS) number and name
	Work order reference	A company's internal (formal) request outlining work to be done in relation to the traceable goods.	Reference number
	Risk assessment	The outcome of a high-level risk assessment to help determine the need to test for chemicals of concern.	Risk assessment result – for example based on the guidance in section 3.9

***C&D** – Construction and demolition waste; **C&I** – Commercial and industrial waste; **GLN** – Global location number; **GTIN** – Global trade identification number; **MSW** – Municipal solid waste.

Some stakeholders we spoke to suggested that the framework cover additional sustainability information such as for embedded carbon, modern slavery, safety, primary materials, imported materials and materials recycled multiple times.

While it could be beneficial to capture a broader set of sustainability information, the proposed framework seeks to improve the availability of recycled content information in the supply chain. As the framework is initially proposed to be voluntary, businesses can choose to include other sustainability data elements in their traceability systems and require the same from their trading partners. In doing so, the guiding principle regarding harmonisation with international standards should be observed to help ensure consistent approaches across the supply chain.

We have heard from stakeholders that some information may be commercially sensitive and businesses may not be willing to share. This includes information that could reveal a business' customers or clients. Traceability does not imply that supply chain actors must share all recycled content information. Rather, they must all be able to internally search and access relevant information and share the required information without infringing the intellectual property of each other.

Box 6: Questions on key data elements

28. Would the key data elements provide enough information and assurance about recycled content to encourage its use over virgin materials? If not, what other information should be collected and shared in the supply chain to increase confidence in recycled content?
29. Is the ISO definition for recycled content (ISO 14021:2016) appropriate to define the data point that is captured once recycled material is used to create a new product?
30. Is the information proposed to be shared across the supply chain (Table 2) commercially sensitive? If so, please identify each specific data element and explain why it would be commercially sensitive.

31. Should the key data elements described in Table 4 also be required for imported recycled materials? Please tell us the reasons for your answer?
32. If you use a traceability system for a reason other than tracing recycled content (such as modern slavery reporting), could it be expanded to include the data elements in Table 4?
33. Is the guidance on key data elements sufficient to support accurate and harmonised recycled content information? If not, what would you like to see from government to support this?
34. If you are an Australian business that uses recycled content, what information would you most want to know about the recycled content you use? (For example, how much recycled content it contains; where it came from; or that the recycled content meets appropriate quality standards)
35. If you are an end-user of recycled-content goods, what information would you most want to know about those goods? (For example, how much recycled content they contain; where the recycled content came from; or that the goods meet appropriate quality standards)

3.7 Tracing recycled content composition

In a 2022 internet sweep of environmental claims by businesses, the Australian Competition and Consumer Commission identified several high-level concerns. These concerns include that a high proportion of vague and unqualified claims and a lack of evidence to support claims (ACCC 2023). The ACCC has made greenwashing and other consumer and fair-trading issues related to environmental claims and sustainability an enforcement priority for 2022-23 (ACCC 2022).

The Australian Senate is also inquiring into greenwashing. The inquiry is looking at claims made by companies, the impact of these claims on consumers, regulatory examples, advertising standards, and legislative options to protect consumers. The Senate Environment and Communications References Committee is conducting the inquiry (Parliament of Australia 2023).

To support appropriate recycled content claims, avoid greenwashing, and assure consumers and recycled content users, it is important to be able to determine and verify the recycled content composition in materials and products as they move through the supply chain.

As there are no known commercial tests to determine the percentage of recycled content in a material or product, chain of custody provides the best approach. To adopt the proposed framework, supply chain participants that produce recycled-content goods would need to adopt a suitable chain of custody approach.

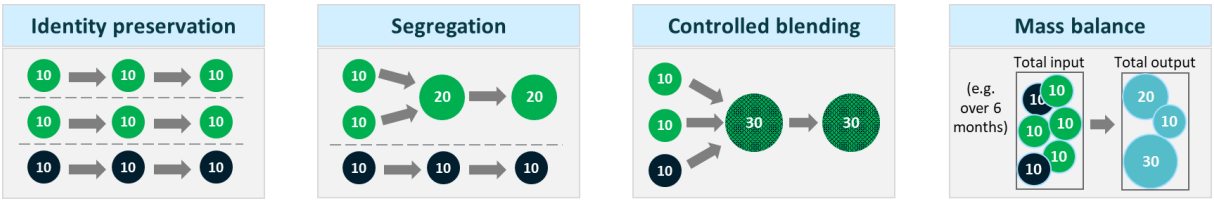
Chain of custody approaches

Figure 3 describes 4 suitable chain of custody approaches that can provide information on the recycled content composition in a final product or output. These are:

- Identity preservation – recycled materials from different sources (for example, a business) are kept separate and never mixed with virgin materials as they move through the supply chain. Each final product/output will contain 100% recycled content from a known source. This approach provides the highest degree of physical traceability.

- Segregation – recycled materials from different sources, but with identical characteristics are combined but are never mixed with virgin materials as they move through the supply chain. Each final product or output will contain 100% recycled content from 2 or more known sources.
- Controlled blending – recycled materials and virgin materials are combined at a specific point in the supply chain and in specific ratios, resulting in a known percentage of recycled content in each output or product.
- Mass balance – recycled materials and virgin materials are combined at any point in the supply chain over a defined period (for example 6 months). The total amount of recycled materials incorporated into outputs must not exceed the total input amount after accounting for system losses. The percentage of recycled content in individual products or outputs is not known, but the average content for all the products or outputs produced during the defined period can be calculated.

Figure 3: Chain of custody models



Under the proposed framework, any of these approaches would be acceptable to establish recycled content composition. Mass balance provides less physical traceability of the recycled content. However, it is the most accessible method for existing businesses because it does not require systems to physically segregate recycled materials and virgin materials. It is also a common requirement under existing chain of custody certification schemes such as International Sustainability and Carbon Certification PLUS, Global Recycled Standard (GRS), and Responsible Wood.

The ISO defines a fifth chain of custody model, the book and claim model, in which the physical flow of recycled content in the supply chain is not connected to the administrative record flow. Rather, credits are created for each unit of recycled material placed on the market. These credits can then be purchased and attributed to products, which do not have to contain recycled content themselves. In this model, recycled content claims cannot be made about the recycled material that was the source of the credits when placed on the market.

The complete decoupling of the physical flow of recycled content from recycled content claims makes the book and claim model unsuitable for establishing the recycled content composition of materials or products. As such, it is not considered appropriate to be included in the proposed framework.

The mass balance approach

A mass balance approach is appropriate for supply chains where it is impractical to segregate or track recycled materials. For example, advanced recycling processes convert hard-to-recycle waste plastics into the molecular building blocks for manufacturing new products. To be cost effective, these

processes need to feed into existing chemical infrastructure, which involves mixing recycled flows with virgin and other raw materials (Ellen MacArthur Foundation 2019).

Several concepts in the mass balance approach are summarised in Appendix D, including mass balance accounting period, allocation of attributes, and credit units. Different chain of custody certification schemes may define these concepts differently with different settings. We do not propose to define settings for these concepts under the framework. Doing so may make some schemes non-compliant by default. Rather, participants could choose (or continue) to use any certification scheme that meets their needs and share this information across the supply chain.

Chain of custody approaches to managing recycled materials should be conducted in line with established guidance and standards to ensure consistency and common understanding in supply chains. We do not propose to develop new or replicate existing chain of custody approaches. Rather, the framework would require that recycled content supply chains follow the international chain of custody standard, ISO 22095:2020, which defines a consistent generic approach to the design, implementation and management of chains of custody to enhance the transparency of material and product claims.

The ISO is also developing another standard (ISO/AWI 13662 *Chain of Custody – Mass Balance – Requirements and guidelines*), which aims to standardise chain of custody for products and associated processes to ensure reliability of associated claims. The ISO standard may not be finalised in time to be considered under the proposed framework; in which case it would be considered during a future review. In the meantime, supply chain participants would be able to use the standard in accordance with the proposed guiding principle relating to 'harmonisation with standards' (see Section 4.1.2).

Several third-party chain of custody certification schemes are available to businesses, each with its own set of rules, requirements and criteria for certification, including for the mass balance concepts described in Appendix D. Some of these schemes are specific to particular sectors. Where these certification schemes are used for recycled content, relevant information such as the scheme name and valid certificates should form part of the traceability record.

Box 7: Questions on tracing recycled content composition

36. If you are an Australian business that uses recycled materials, how do you determine the recycled content in products made with recycled materials?
37. Are the four proposed chain of custody approaches appropriate to determine the recycled content in goods? If not, why not and what approaches would you suggest?
38. What other approaches could be considered to determine the recycled content of goods?
39. Should the framework define the mass balance accounting period, allocation of attributes, credit units and other mass balance requirements? If so, what should be the minimum requirements?
40. Could the framework help to harmonise existing chain of custody certification schemes? If so, please tell us how?

3.8 Tracing recycled content provenance

Product provenance, or place of origin, is increasingly becoming a consideration for consumers. In a survey of almost 19,000 international consumers, 73% say that product traceability is important to them, and of those, 71% would pay a premium for it (IBM 2020).

Product provenance is also becoming the focus of environmental and supply chain regulation. For example, the EU is considering a Corporate Sustainability Due Diligence Directive. This directive would oblige large EU companies and non-EU companies with significant EU activity to identify, prevent, mitigate and account for adverse human rights and environmental impacts in their own operations and their value chains (European Commission 2022). To meet this obligation, Australian recycled content businesses caught up in the Directive's scope would need to understand the provenance of materials, including recycled content, along their supply chains. Similarly, businesses reporting against modern slavery obligations under the *Modern Slavery Act 2018* (Cth) are embracing traceability to demonstrate compliance with these requirements.

It is important for supply chains to be able to trace recycled content back to its source and origin. For the framework, the source of recycled content refers to the point in the supply chain at which traceability begins. This is proposed to be the material recovery stage, such as a material recovery facility (see Figure 2). Conversely, tracing the recycled content's origin means tracing back to the geographic location where the recycled content feedstock was generated.

We would expect participants to be able to trace the source of recycled content back to the material recovery step of the supply chain.

There are different levels of precision for tracing the origin of recycled content (for example, country, jurisdiction, local government or suburb of origin – see Table 3). Under the framework, we propose businesses trace recycled content to the jurisdictional level (level 2) at a minimum. This would provide enough visibility of recycled content to support states and territories in their goals to prioritise local recycled content. It would also help manufacturers understand where recycled content has come from.

Tracing both the origin and source of recycled content would enable manufacturers to understand where in Australia and from which facilities recycled content originates. Consumers and other users of recycled-content goods would also have access to this information, to the extent that it is provided, for example, on consumer products or through a product information sheet.

If imported recycled content were to be included in the framework, we propose traceability to at least level 1 (country of origin). National requirements for country of origin labelling for food and complementary medicines for example requires that only the country of origin be identified (DISR 2023).

These settings do not prevent supply chain participants from collecting and sharing data to trace recycled content back to the local government area or suburb of origin where possible. This may be the case as part of a product stewardship approach, in closed loop systems, or for a locally focused business or social enterprise using only recycled content from local areas.

From our initial engagement, most supply chain and government stakeholders support tracing the origin of domestic recycled content to level 2. A few suggested the need to go levels 3 and 4 to support broader sustainability initiatives, such as carbon foot-printing of recycled materials. At the same time, a concern was raised that tracing domestic recycled content beyond level 1 could undermine the inter-jurisdictional trade in recycled materials.

Table 5: Levels of precision for tracing recycled content origin

Recycled content origin levels	Considerations
Level 1 – Country of origin	• Simple and easy to verify.
Level 2 – Jurisdiction of origin	• Relatively simple and easy to verify. • Supports state and territory policies to prioritise local recycled content.
Level 3 – Local government area of origin	• Supports 'buy local' policies of local governments. • Supports measurement of material circularity and carbon footprinting. • Consolidation and blending of materials from various councils would dilute the importance and meaning of the data.
Level 4 – Suburb of origin	• Provides the greatest level of provenance detail to support 'buy local' policies at the state/territory and local government levels. • Supports measurement of material circularity and carbon footprinting. • Difficult to implement and track data for recycling collection systems that aggregate feedstock over multiple suburbs. • Consolidation and blending of materials from various suburbs (at material recovery facilities and reprocessing plants, for example) would dilute the importance of the data (for example, if the recycled content into a final product comes from more than 2 or 3 sources).

Box 8: Questions on tracing recycled content provenance

41. Is it sufficient to trace the origin of domestic recycled content to the jurisdiction of origin? If not, why not and what level of origin should be traced?
42. Is it sufficient to trace imported recycled content back to the country of origin? If not, why not and how far back should imported recycled content be traced?
43. What challenges might be involved in tracing imported recycled content further than the country of origin? (For example, to the city of origin?)
44. How else could the origin of imported recycled content be traced?

3.9 Tracing recycled content quality

A barrier to recycled material use is the lack of information about its quality. Manufacturers can hesitate to use recycled materials because they cannot find out about any contaminants and other characteristics of the material that might negatively affect their manufacturing processes and the quality of resulting products.

It is important for supply chains participants to be able to determine and verify the quality of recycled content. In practice, this means understanding the physical and chemical characteristics of

the recycled content (such as the chemical identity and concentration of chemicals and contaminants) and how it has been processed at each step of the supply chain.

Processing history

The processing history of recycled content is an important factor in determining the material quality and consequently, the product quality. With plastics, for example, the quality (such as appearance, strength and toughness) of a product is dependent on the raw material and other inputs, its manufacturing process as well as its processing history (Hinton et al 2022; Bucknall 2020).

Knowing how a recycled material has been processed (e.g. sorted, washed and flaked) and its physical and chemical characteristics enable users to source desired materials with confidence. It would also enable each processor and manufacturer in the supply chain to tailor their processing to achieve the final desired characteristics.

Chemicals of concern

A key issue in recycled content quality is the potential presence of chemicals that may cause harm to human health or the environment, or both. While many of the chemicals added to materials and products during manufacture are useful and safe, some are chemicals of concern. These chemicals can be persistent in the environment; some can build up in animals, and some are toxic (DCCEEW 2021).

It is difficult to specify an exhaustive list of chemicals that might harm human health and the environment. Whether a chemical might cause such harm would depend on its identity, hazards, and the exposure to that chemical. Exposure to the chemical together with its hazard would determine the chemical's risk of harming human health and the environment. The exposure will depend on many factors, including the concentration of the chemical, the matrix in which it is present (e.g. aluminium, polypropylene, polystyrene), and the process used for recycling.

As a starting point, chemicals of concern could include chemicals:

- which exhibit risk characteristics of chemicals in schedules 5 to 7 of the Industrial Chemicals Environmental Management Standard (IChEMS). IChEMS provides nationally consistent standards for managing the environmental risks involved in the import, manufacture, use and disposal of industrial chemicals (DCCEEW 2022).
- listed under the Stockholm Convention (2019) on Persistent Organic Pollutants. This convention aims to protect human health and the environment from persistent organic pollutants and obliges its parties to take measures to eliminate or reduce environmental releases of these pollutants.
- present in waste streams listed under Annex I of the Basel Convention (2014) on Transboundary Movements of Hazardous Wastes and their Disposal that have hazardous characteristics listed in Annex III. This convention regulates the transboundary movements of hazardous and other wastes and obliges its parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.
- regulated under the Minamata Convention on Mercury (2019). This convention seeks to protect human health and the environment from human-caused emissions and releases of mercury and mercury compounds.

- in consumer products managed under the Australian Competition and Consumer Commission's product safety system (ACCC n.d.). This includes DEHP (diethylhexyl phthalate), a chemical used to make plastic items soft and flexible.

Recycling products containing chemicals of concern can result in the contamination of recycled materials and may pose a risk to humans and the environment in some cases. This may undermine consumer confidence in recycled content products and pose a barrier to achieving material circularity.

The proposed framework is not intended to set or override end-user requirements or specifications for recycled material quality. Nor is it intended to regulate the chemicals risks and hazards already addressed through other frameworks, including:

- IChEMS
- Australian Consumer Law, which makes suppliers responsible for the safety of their products
- state and territory frameworks for managing waste-to-resources or end of waste.

We propose to provide high-level guidance on testing for chemicals of concern, based on factors such as feedstock source, the recycling method used, and the intended end use (Table 6). We would expect the guidance to be used in situations where there is no other obligation or requirement to test and analyse recycled materials.

Table 6: High-level risk considerations for recycled content testing

Risk factors	High risk scenarios for presence of chemicals of concern. Laboratory testing is strongly advised – seek technical advice	Low risk scenarios for presence of chemicals of concern. Laboratory testing may not be necessary – seek technical advice if in doubt
Feedstock	The feedstock or recycled material is: • of unknown origin and composition • includes legacy, clean-up or mixed wastes • imported and its provenance and quality cannot be independently verified.	The feedstock or recycled material is: • traceable to a single low-risk source and remains segregated through the supply chain or is recycled in a closed loop system • certified under a recognised Australian or global certification scheme that includes chemicals of concern requirements • certified to an appropriate industry standard • imported and its source and quality can be independently verified to be low risk.
Processing	The feedstock with characteristics above: • undergoes only primary processing (such as chipping, blending, shredding or dismantling) • is mechanically recycled to produce the manufacturing inputs • is processed with new chemicals intentionally added.	The feedstock with characteristics above undergoes an advanced recycling process that produces the building blocks for new chemicals
Regulatory environment	The recycled material or its end use market: • is not subject to regulatory control • involves end uses with direct exposure to humans in sensitive applications such as products for use in hospitals, schools and playgrounds, food contact materials and children's toys/products.	The recycled material or its end use market: • is subject to national or state/territory regulatory control with specified limits and requirements for chemicals of concern • involves low-risk end uses (such as fence posts and wheelie bins).

To support transparency and understanding of information on recycled content quality, we propose that various steps in the supply chain record the following information as key data elements (refer to section 3.6):

- specific details of how goods have been processed
- any chemicals intentionally added to the recycled content (including records of unique identifiers, Chemical Abstracts Service Registry Numbers (CAS RNs), systematic chemical names and synonyms)
- the outcome of any risk analysis conducted on the recycled-content goods
- the analysis results or certificate for any laboratory testing conducted to establish the quality of the recycled content. This would provide detailed data on the specific properties of the recycled content to help processors and manufacturers tailor further processing
- any relevant quality certification or standard that the recycled content meets.

Box 9: Questions on tracing recycled content quality

45. If you are an Australian business involved in processing or using recycled materials, how do you determine the quality of materials you receive and supply?
46. Does the proposed definition of 'chemicals of concern' include or exclude substances it shouldn't? If so, what other definitions of 'chemicals of concern' could be considered?
47. Does the proposed guidance contradict or duplicate existing practices, such as industry guidance, or state, territory or international requirements? If so, please tell us how.

3.10 Aligning with emerging traceability requirements

We are seeing the emergence of increasing requirements for traceability across global supply chains. This could impact Australian businesses competing in international markets. Aligning the data elements of the framework with international requirements as much as practicable, it can help to prepare users of the framework to meet those requirements.

As more countries adopt recycled content traceability requirements, markets for non-traceable recycled materials will shrink. This could increase the supply of these untraceable materials to countries that do not have the same requirements. Aligning with international requirements would signal the importance Australia places on increasing recycled content traceability.

A summary of existing and emerging traceability requirements in international jurisdictions is provided in Table 7. We propose to align the framework's key data elements with these requirements as summarised in Appendix E.

Table 7: Current and emerging traceability requirements in international jurisdictions

Jurisdiction	Framework	Overview and requirements
Current / in force		
European Union	Regulation (EU) 2022/1616 on recycled plastic materials and articles intended to come into contact with foods	This regulation sets out requirements to ensure the safety of food contact materials made of recycled plastic. From 10 July 2023, only recycled plastic materials manufactured with a suitable recycling technology or notified novel technology can be placed on the market and must be accompanied by a declaration of compliance. We propose to align the framework's data elements with relevant declaration of compliance requirements.
	Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) framework	This is the EU's framework for managing the manufacture and importation of chemical substances, including chemicals in articles such as clothes, furniture, and electrical appliances. It establishes procedures for collecting and assessing information on the properties and hazards of chemical substances. Australian businesses supplying relevant recycled chemical substances into the EU are not bound by REACH but may need to provide information to EU businesses that have REACH obligations. We propose to consider how the framework could support relevant information requirements.
	Restriction of Hazardous Substances (1 and 2) - RoHS. Directive 2002/95/EC and Directive 2011/65/EU	RoHS restricts the use of specific hazardous materials in electrical products and equipment. All applicable products in the EU market must pass RoHS compliance. All RoHS restricted substances are also on the REACH restricted list. Any business that sells or distributes applicable electrical and electronic products, sub-assemblies, components, or cables directly to EU countries, or sells to resellers, distributors or integrators that in turn sell products to EU countries, is impacted if they use any of the restricted materials.
Emerging		
European Union	Draft EcoDesign for Sustainable Products Regulation	Expected to be passed in mid-2023, this regulation establishes a framework for setting the rules to improve the circularity, environmental sustainability, and energy performance of products placed on the EU market. It also establishes the use of digital product passports to capture and share relevant product information along the supply chain. Specific requirements for a product or group of products would be stipulated in delegated acts.
European Union	Proposed Corporate Sustainability Due Diligence Directive	This directive aims to foster sustainable and responsible corporate behaviour throughout global value chains. Companies in scope will be required to identify, prevent, end or mitigate adverse impacts of their activities on human rights and the environment. The proposed rules would apply to companies with more than 500 employees and worldwide net turnover of €150 million or more, and companies in defined high impact sectors, such as mining and textiles manufacturing, with more than 250 employees and worldwide net turnover of €40 million or more.
Canada	Proposed recycled content and labelling rules for plastics	Canada is proposing to develop regulations to set minimum recycled content requirements for certain plastic manufactured items. The proposal includes allowing the use of a mass balance chain of custody model to measure and report on recycled content usage.
USA	Proposed New York Fashion Sustainability and Social Accountability Act (Fashion Act)	The Fashion Act, if passed, will place sustainability requirements on large fashion companies doing business in New York. Obligations on fashion retailers and manufacturers would include mapping at least 50% of their supply chains across all production tiers; and disclosing actual and potential negative environmental and social impacts including volume of production replaced with recycled materials.

Alignment with global standards

It is also important to align the proposed framework with relevant global standards. This would help to ensure users of the framework are interoperable with jurisdictions that also follow these standards, making it easier to participate in global supply chains. Table 8 lists the key international standards that we propose to consider in the framework.

Table 8: International standards relevant to traceability

Theme	International standards/guidance	Description	How the framework may align with the standards
Traceability	GS1 Global Traceability Standard	Provides a framework and ecosystem to assist businesses to design and implement interoperable traceability systems. It identifies technology-agnostic requirements for capturing and sharing traceability data across supply chains.	Activities to identify, collect, and share traceability data may need to be conducted in accordance with one or more of these standards.
	• UN/CEFACT Framework on Traceability for Sustainable Trade • Traceability for sustainable value chains – Textile and Leather Sector	Provides a framework for designing traceability systems to facilitate efficient cross-border trade, but is primarily aimed at supply chains for animals, plants and their products. More recently, specific guidance has been developed for circular garment and footwear products and processes.	
Chain of custody	ISO 22095:2020 Chain of custody – General terminology and models	Defines a consistent generic approach to the design, implementation and management of chains of custody to enhance the transparency of material and product claims, but it cannot be used on its own to make or verify such claims.	Chain of custody approaches (to determine recycled content percentage, for example) may need to be consistent with this standard.
Certification and verification	ISO/IEC 17029:2019 Conformity assessment – General principles and requirements for validation and verification bodies	Provides general principles and requirements for the competence, consistent operation and impartiality of bodies that perform validation or verification as conformity assessment activities.	Supply chain participants seeking to verify traceability data may need to use an entity certified to this standard.
	ISO 14024:2018 Environmental labels and declarations — Type I environmental labelling — Principles and procedures	Establishes principles and procedures for developing and awarding Type I environmental labelling programs, which award their label to products meeting predetermined requirements.	Supply chain participants adopting the framework and using traceability data to make environmental claims may need to consider aligning with these standards, where relevant.
	ISO 14021:2016 Environmental labels and declarations – self declared environmental claims (Type II environmental labelling)	Specifies requirements for self-declared environmental claims. It also describes a general evaluation and verification methodology for such claims, and specific evaluation and verification methods for selected claims.	
	ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures	Establishes principles and procedures for developing Type III environmental declaration programs and Type III environmental declarations, which provide quantified and independently verified information on the life cycle of a product.	

There are other standards relevant to traceability currently under development. We propose to consider the suitability of these standards if they are finalised and published prior to finalisation of the framework, otherwise they would be considered during the future review of the framework. These standards are:

- ISO/AWI 13662 Chain of Custody – Mass Balance – Requirements and guidelines (ISO n.d.)
- ISO/CD 59014 Secondary materials – Principles, sustainability and traceability requirements (ISO n.d.).

Box 10: Questions on aligning with emerging traceability requirements

48. Are the standards identified in Table 8 sufficient to guide implementation of recycled content traceability? If so, how should they be used in the proposed framework? If not, why not?
49. Which of the standards in Table 8 do you use in your business?
50. How could we align the proposed framework with the standards to provide helpful guidance?
51. What other international traceability requirements or standards should be considered under the proposed framework?

3.11 Verification

Verification is the process of confirming the truthfulness of claims. This is done by assessing evidence about the claim obtained through inspections, audits or other means. Verification is a critical part of the traceability process to avoid greenwashing and assure industry and consumers of recycled content claims.

A key objective of the proposed framework is to ensure sufficient information is available in participating supply chains to enable users to verify the source, origin and quality of recycled content. This would ultimately support greater uptake of and demand for Australian recycled content.

As a matter of best practice, supply chain participants receiving traceability information would be expected to verify its accuracy and adequacy to facilitate backward traceability. We therefore expect there would be an ongoing role for third-party verification of information that would be collected and shared across supply chains through implementing the framework.

The international standard relating to verification is ISO/IEC 17029:2019 *Conformity assessment – general principles and requirements for validation and verification bodies*. This standard provides general principles and requirements for the competence, consistent operation and impartiality of entities that validate or verify the reliability of information declared in claims. We would expect users of the proposed framework to engage verifiers that meet this standard, when needed.

Appendix F lists other Australian and international standards that outline requirements for various entities involved in assessing the conformity of other entities, products, processes and services to relevant standards.

Box 11: Questions on verification

52. Do you currently verify domestic recycled content information you receive through the supply chain? If so, please tell us how you verify the information.
53. Do you currently verify imported recycled content information you receive through the supply chain? If so, please tell us how you verify the information.
54. Is it sufficient for verifiers to meet the ISO standard relating to verification bodies (ISO/IEC 17029:2019)? If not, what other requirements should be considered for verifiers?
55. What other approaches could be used to provide assurance of recycled content information?

4 Implementing the framework

4.1.1 Responsibilities

All stakeholders would have a role to play in progressing national traceability for recycled content to drive greater use of recycled content. Table 7 sets out the key responsibilities of the major stakeholder groups we expect would be involved in implementing the proposed framework.

Table 9: Stakeholder responsibilities in implementing the proposed framework

Stakeholder	Key responsibilities
All Australian governments	• Set out traceability guidance and expectations for industry, consistent with the framework. • Adopt the framework and align government programs and initiatives (such as grant programs, and sustainable procurement) to support uptake and use of the framework.
Commonwealth	• In addition to the responsibilities for all Australian governments above, we expect to integrate traceability requirements consistent with the framework into key initiatives such as: – national reforms of the regulation of packaging by 2025 – efforts to regulate solar panels and electrical equipment – funding to address hard-to-recycle plastic waste under the Recycling Modernisation Fund Plastics Technology Stream.
Material recoverers, recyclers and reprocessors	• Adopt traceability consistent with framework (for example, by ensuring traceability data is accurate, timely and available when required).
Manufacturers and other users of recycled content	• Adopt traceability consistent with framework. • Prioritise use of traceable recycled content in manufacturing and other end markets. • Make as much traceability information publicly available as practicable to help end users choose recycled-content goods. • Ensure traceability data is accurate, timely and available when required.
Retailers	• Set and implement environmental, social and corporate governance goals and policies that support traceable recycled-content goods.
Peak bodies	• Facilitate conversations and knowledge exchange between supply chain partners. • Collaborate to harness the buying power of members to help achieve economies of scale, for example with respect to traceability systems and certification services.
Certifiers and other service providers	Certifiers are organisations that independently certify the conformance of supply chain participants to a specified standard. • Consider the framework in any review or update of certification schemes or traceability services • Provide clients with information on how schemes or services align with the framework.

Box 12: Questions on roles and responsibilities

56. What additional stakeholder responsibilities should be considered?
57. What opportunities are available or could be considered to encourage stakeholders along the recycled content supply chain to use the proposed framework?
58. Would any additional stakeholders have a role in implementing the proposed framework? If so, please provide details.

4.1.2 Guiding principles

The guiding principles outlined below would help drive decision-making when implementing the proposed framework and encourage the desired behaviours in all stakeholders. The proposed guiding principles include:

- **Governments set harmonised expectations:** Australian governments shall set out traceability guidance and expectations for industry (consistent with the framework) and, where relevant, use government programs and initiatives to support uptake and use of the framework.
- **Industry ownership:** Industry shall retain responsibility for developing and implementing approaches and systems for recycled content traceability to meet expectations and shall not be constrained in harnessing opportunities presented by new and emerging traceability technologies and platforms.
- **Transparency:** Traceability activities shall be conducted in an open and transparent manner that facilitates supply chain, consumer and community trust.
- **Information protection and privacy:** Businesses will have the flexibility to choose traceability systems that best meet their information and privacy needs, including for commercially sensitive information.
- **Full supply chain visibility:** Tracing of recycled content shall be supported across the supply chain.
- **Use of existing systems:** Traceability shall leverage and build on existing systems, processes and technologies to reduce cost and duplication and improve uptake.
- **Harmonisation with standards:** The framework will adopt, or align with, relevant international and domestic standards to the greatest extent possible.
- **Risk based approach:** Participants shall adjust traceability practices to match relevant risks for recycled materials (such as contamination or the potential presence of chemicals of concerns) in order to apply more transparent and effective measures (such as greater testing and information sharing) in higher risk cases.

Box 13: Questions on the guiding principles

59. Would the proposed guiding principles provide sufficient guidance to support implementation of the proposed framework? If not, what other principles should be considered?

4.1.3 Implementation costs and timeframe

There is a lack of public data on the costs of scoping, implementing, and operating traceability systems in the recycled content sector. These costs may depend on factors such as the size and turnover of the business, and the type of traceability system implemented. The costs of subscribing to global standards – for example, the GS1 data standards that facilitate interoperable traceability – also need to be considered.

A growing body of research indicates that good traceability can improve financial performance and may more than offset the investment cost. For example, Planet Tracker (2022) has reported that investments in traceability, transparency and sustainability could:

- improve return on equity in fashion firms by 3-4% for transparency and traceability
- lower costs of capital, reduce interest rates and increase net profits by 1–1.5% for brands and 1.5–2.5% for suppliers
- increase net profit of clothing companies by 3–7%.

The types of costs that might be incurred in implementing a digital traceability solution are outlined in Table 10. This information is drawn from an online guide published by the Future of Fish (2020a), a non-profit organisation based in the USA aiming to end overfishing. The online guide includes sample cost ranges (financial or time/effort), which may be good start to understand the magnitude of costs involved.

The following tools may also help with understanding traceability implementation costs, noting that they have been developed or tailored for sectors other than recycled content.

- The traceability cost-benefit analysis tool is published by Agriculture Victoria and helps agricultural businesses calculate whether a traceability system would benefit their business, the expected return on investment and a breakdown of the costs and benefits (Agriculture Victoria n.d.).
- The traceability return on investment (ROI) model is published by the Future of Fish (2020a) to help seafood businesses estimate the likely costs and benefits of traceability systems.

Another important implementation consideration is the time it may take to implement traceability consistent with the framework. Across a few sectors, the timeframe for adopting sector-wide traceability has been reported as anywhere from 3 to 10 years, with 3–5 years being most common (see Appendix B). As discussed in section 3.5, we consider that full supply chain traceability of recycled content would be achievable by 2028 – within 4 years of the framework's proposed release.

Table 10: Types of costs involved in traceability technology implementation

Cost category	Description / inclusions
System selection and initial scoping	• Initial research • Meetings with potential vendors • Preliminary scoping • Project consultant • IT partnership development (if integrating traceability solution with multiple existing or new technologies)
Software adoption and installation	• Initial software purchase or licensing • Software programming and installation • Software customisation
Hardware adoption and installation	• Hardware purchase • Hardware installation and setup • Infrastructure changes or additions (such as local server, local area network or Wi-Fi)
Pre-implementation preparedness and process development	• Data transfer and conversion, new workflow plans • Creating user manual and training curriculum • Development of business processes • Consumables
System implementation	• Staff training and education • Reduced productivity • Troubleshooting and modifications

Cost category	Description / inclusions
	• User errors and mistakes
Ongoing costs	• Software subscription • Standards/scheme fees • Tracking technologies if used (such as RFID tags) • Data entry staff • Traceability system management • Information management or data analysis • Verification • Communication with suppliers
System servicing and modification	• Servicing and troubleshooting • Modifications • Testing

Source: Future of Fish (2020b).

Box 14: Questions on traceability implementation costs

60. Do you think the benefits of traceability outweigh the costs of implementation for your business? Please tell us the reasons for your answer.

61. What additional guidance would you require from governments to support your implementation of the framework?

5 Measuring the framework's success

While the framework is proposed to be voluntary, it would be important to monitor and measure how well it achieves the desired objectives. This would include whether the framework is being broadly adopted or is causing any unintended consequences. This section outlines the matters we propose to consider in developing a monitoring and evaluation scheme for the framework.

Collecting data on framework performance

Since the framework is not expected to require traceability data reporting to the Commonwealth, other means of collection data to assess the framework's performance would be considered. This includes conducting regular surveys on business' awareness and adoption of the framework. We would seek to collaborate with states and territories, and peak bodies that represent companies along recycled content supply chains to develop and implement the surveys.

Indicators of performance

Collecting information to monitor the trends across the following indicators over time would provide valuable insights into the performance of the framework:

- Number of businesses that are aware of the framework
- Number of businesses that have adopted (or are adopting) the framework
- Number of businesses with one-up-one-down traceability for recycled content
- Number of businesses with end-to-end traceability systems for recycled content
- Number of businesses that independently verify recycled content information
- Amount of recycled content used in manufacturing resulting from access to traceability data
- Access to international markets attributed to traceability

Framework review

It is important that the framework remains current and relevant to reflect any changes in the domestic and international policy landscape as Australia transitions towards a circular economy.

We propose to conduct the first review of the proposed framework within 3 years of its release. This should allow time for socialising the framework with businesses, and for early adopters to begin implementing traceability. It would also allow for the requirements that are emerging domestically and internationally to resolve so they can be considered during the review.

Box 15: Questions on measuring success of the framework

62. Are the proposed indicators of performance appropriate? If not, what other indicators should be considered?
63. How could the Commonwealth collect data to monitor and evaluate the proposed framework?
64. Would 3 years of framework implementation provide sufficient information to support the first review of the proposed framework? If not, what timeframe would be appropriate?
65. Do you anticipate any changes to the operating or business environment that might have a substantial impact on implementation and review of the proposed framework? Please explain.

6 Glossary

Term	Definition
Blockchain	A digital ledger that enables transactional data between supply chain actors to be recorded and distributed, but not edited. The transactional data is recorded, validated and added as a 'block' to the blockchain with a computer-generated alphanumeric hash code that incorporates the unique hash of the block before it. Changing the information in a previously validated block changes its unique hash, but not the hash in blocks that follow, thus allowing any tampered records to stand out. Blockchain data can be linked to the physical material using bar codes, tags or other 'internet of things' applications such as radio frequency identification (RFID) tags.
Book and claim	Consistent with ISO 22095:2020, book and claim is a chain of custody model in which the physical flow of recycled content in the supply chain is not connected to the administrative record flow. For each unit of recycled material placed on the market, credits are created, which can be bought and attributed to products which may not physically contain any recycled content.
Chain of custody	Consistent with ISO 22095:2020, chain of custody describes the rules for managing recycled materials, to ensure their characteristics remain transparent through the supply chain and can be accounted for in the final recycled-content goods.
Controlled blending	Consistent with ISO 22095:2020, controlled blending is a chain of custody model in which recycled and virgin materials with different characteristics are mixed in specific ratios resulting in a known percentage of recycled materials in each output/product.
Entry point	The stage in the supply chain where traceability begins.
Exit point	The stage in the supply chain where traceability ends.
End-to-end traceability	See 'full traceability'.
Full traceability	The ability of each supply chain participant to trace a material or product through every step of the supply chain.
Goods	Any item, material or product that is traded along the supply chain.
Identity preservation	Consistent with ISO 22095:2020, identity preservation is a chain of custody model in which recycled materials from different sources are kept separate and never mixed with each other or with virgin materials as they move through the supply chain.
Interoperability	The ability of systems to connect and communicate with each other to share information.
Mass balance	Consistent with ISO 22095:2020, mass balance is a chain of custody approach in which recycled materials and virgin materials are combined at any point in the supply chain over a defined period. The total amount of recycled materials incorporated into outputs must not exceed the total input amount after accounting for system losses. The percentage of recycled content in individual products or outputs is not known, but the average content for all the products or outputs produced during the defined period can be calculated.
Material circularity	Using a material efficiently and keeping it in use for as long as possible, before recovering it to make new materials.
One step forward, one step back traceability	The ability of a supply chain participant to track movements of their goods one step forward to their customers and trace the associated inputs one step back to the immediate suppliers
One-up-one-down traceability	See 'one step forward, one step back traceability'.
Post-consumer recycled content	Consistent with ISO 14021:2016, post-consumer recycled content is the material recycled from the waste generated by households or other end users when a product has reached end-of-use.
Pre-consumer recycled content	Consistent with ISO 14021:2016, pre-consumer recycled content is the material recycled from the waste discarded from manufacturing processes, excluding offcuts which are

Term	Definition
	used again in the same manufacturing processes that created them (such as rework, regrind and scrap).
Participant	A business or entity involved in moving recycled content along the supply chain.
Recycled content	Consistent with ISO 14021:2016, recycled content is the proportion by weight of recycled content in goods.
Segregation	Consistent with ISO 22095:2020, segregation is a chain of custody model in which recycled materials with identical characteristics from different sources are combined, but are never combined with virgin materials, as they move through the supply chain.
Supply chain	People and businesses involved in the movement of recycled materials along the supply chain from material recovery to sale of recycled content goods to the final end-user.
Traceability	Consistent with ISO 22095:2020, traceability is the ability to trace the history, application, location or source of a material or product (backward or forward) throughout its supply chain.
Traceability system	A system to capture, share and access documented information.
Verification	Consistent with ISO 22095:2020, verification is the process of confirming the truthfulness of claims.

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Appendix A: Traceability and chain of custody certification schemes in different sectors

Table A1: Traceability examples in different sectors

Category	Sector	Description
National Livestock Identification System	Agriculture	Ear tags attached to animals to track and trace their movement along the supply chain.
EggTrace		Traceability tool for egg farms.
Responsible Wood	Forestry and wood products	Certification and traceability of wood and wood products to sustainably managed forests.
Forestry Stewardship Council		
Marine Stewardship Council	Aquaculture	Certification and traceability of seafood to sustainable fisheries.
Woolmark	Textiles	Certification and traceability for wool and wool products.
AWARE		Blockchain-based traceability using patented, scannable 'AWARE' tracer particles embedded into yarns/fibres.
FibreTrace		Blockchain-based traceability using a patented, scannable luminescent pigment embedded into raw fibre (such as cotton).
CirCloLink RFiD THREADS®		Based on a radio frequency tag sewn into textile products to capture data as they move through the supply chain.
CircularChain	Biosolids	Blockchain-based traceability solution used by in France to trace biosolids from production to final use such as spreading on soil.
RecyClass Recycled Plastics Traceability Audit Scheme	Plastics	Traceability scheme for recycled plastics.
RecycleGO		Blockchain-based traceability using QR codes on plastic bottles.
Circularise Plastics		European blockchain-based traceability for plastics.
SteelTrace	Steel	A platform that gathers quality-related data of steel products in real time for the end-user to see.

Table A2: Chain of custody certification schemes

Voluntary certification Scheme	Geographic coverage	Description
International Sustainability and Carbon Certification (ISCC) PLUS	Global	Certifies sustainable, deforestation-free and traceable supply chains for bio-based, renewable, waste and residue raw materials. Generally permits mass balancing over 3 months.
Roundtable on Sustainable Biomaterials (RSB) Standard for Advanced Products	Global	Certification for non-energy products (such as plastics, textiles, and packaging) made from bio-based or recycled materials in segregated supply chains, and products made in combination with virgin fossil feedstock.
Global Recycled Standard (GRS)	Global	Verifies recycled content, chain of custody (from recycler to last business-to-business transaction), social and environmental practices and chemical restrictions for products containing at least 20% recycled material.
Aluminium Stewardship Initiative Chain of Custody certification	Global	Certifies the chain of custody of aluminium (including recycled aluminium) across the value chain. Certification is based on a chain of custody standard that requires the use of a mass balance approach.
Recycled Claim Standard (RCS)	Global	Certifies recycled input and chain of custody for products containing at least 5% recycled material. Permits segregation and controlled blending chain of custody approaches.
Forestry Stewardship Council Chain of Custody Certification	Global	Verifies that forest-based materials are produced and used along the supply chain according to specified standards. Certification is based on a mass balance chain of custody with at risk materials required to use a segregation method.
Responsible Wood certification	Global	Verifies that certified forest-based materials contained in a product originates from sustainably managed forests. Certification includes each step in the supply chain from the forest to the retailer. Materials can be managed using segregation, controlled blending, or mass balance approaches.
DNV Chain of Custody Standard for plastics retrieved from the hydrosphere	Global	Certifies that the plastic in a product comes from oceans, rivers, lakes and other bodies of surface water. Permits only identity preservation and segregated models of chain of custody.
VinylCycle	Australia	Verifies recycled PVC content claims. Requires internal traceability for the manufacturer. Encourages traceability of recycled PVC back to source. Permits segregation, controlled blending and mass balancing over a 6-month period.
EuCertPlast certification	Europe	Certifies the traceability of pre-consumer and post-consumer recycled plastic materials within all steps of the supply chain, and the recycled content quality in the end-product.
RecyClass Recycled Plastics Traceability Certification	Europe	Verifies the traceability of recycled plastics within all steps of the value chain, and the percentage of pre- and post-consumer recycled plastic content in products. Permits a controlled blending chain of custody approach.
GreenBlue Recycled Material Standard (RMS)	North America	Certifies products and packaging that contain or support pre-consumer or post-consumer recycled content. Permits segregation and mass balance chain of custody approaches.
UL 2809 Environmental Claim Validation Procedure (ECVP) for Recycled Content	Global	Validates the post-consumer, pre-consumer (post-industrial), closed-loop, or total recycled content of products, including recycled content from ocean-bound plastics, and ocean-sourced plastics.
SCS Recycled Content Standard	Global	Certifies the pre-consumer and post-consumer recycled content of products. Requires manufacturers to be able to trace products back to the source of input materials.

Appendix B: Traceability adoption timeframes

Table B1: Timeframes for adopting traceability in different jurisdictions and sectors

Sector (country)	Description	Timeframe
Food (USA)	The Food Traceability Rule establishes traceability recordkeeping requirements for entities along the supply chain of foods at high risk for foodborne illness outbreaks (such as leafy greens). The Rule expands on the previous one-up-one-down traceability recordkeeping requirements. The Rule entered into force in January 2023 and compliance is required by January 2026.	3 years (Jan 2023 – Jan 2026)
Cotton (Global)	The Better Cotton Initiative, a global cotton sustainability program, is aiming to implement full traceability for cotton within 4 years. The traceability journey began in 2021 with planning and design work. They expect to procure a digital solution and begin rolling out to the Better Cotton community in 2023 and into 2024 (Better Cotton 2023).	4 years 2021 – 2024)
Medical devices (Europe)	The Medical Devices Regulation (Regulation 2017/745) establishes the regulatory framework for medical devices to protect the health of patients and users. Among other things, the regulation requires the traceability of medical devices starting at the manufacturer and sets out a robust system of conformity assessment to ensure the quality, safety, and performance of devices placed on the EU market. The regulation entered into force in May 2017 and became applicable (enforceable) in May 2021.	4 years (May 2017 – May 2021)
Pharmaceuticals (Nigeria)	The Nigerian Government announced its intention to implement a traceability system for pharmaceutical products within 5 years, by the end of 2024.	5 years (2019 – 2024)
Cigarettes (EU)	The Tobacco Products Directive (2014/40/EU) introduced tracking and tracing system for cigarettes and roll-your-own tobacco products. These products must have a unique identification marking and be traced to the first retail outlet. The directive entered into force in May 2014, and compliance has been required since May 2019.	5 years (May 2014 – May 2019)
Prescription drugs (USA)	The Drug Supply Chain Act was signed into law in November 2013 and outlines critical steps to achieve electronic, interoperable traceability of prescription drugs in the United States by 2023.	10 years (Nov 2013 – Nov 2023)

Appendix C: Key traceability data elements

Table C1: Key data elements to be collected along the supply chain

	Key data elements to be collected when each critical tracking event (CTE) occurs		
Supply chain function	**CTE: Receipt**	**CTE: Processing**	**CTE: Dispatch/Shipping**
Material recovery	Receipt of domestic or imported unprocessed waste materials	Processing of feedstocks (for example, sorting, shredding, flaking and baling)	Dispatch of recovered materials to another facility for further processing
	• Input item identification (if possible) • Input item description • Quantity • Receipt date • Sender identification • Source stream • Feedstock source stream • Feedstock source type • Origin • Feedstock category, type and sub-type • Risk assessment	• Input item identification • Quantity • Processing details • Work order reference	• Output item identification • Output item description • Quantity • Ship date • Shipment identification • Sender identification • Receiver identification • Ship from location • Ship to location • Analysis details • Quality certification • Transporter
Reprocessing	Receipt of domestic or imported recovered materials	Conversion of recovered materials into secondary materials suitable for remanufacturing	Dispatch of secondary materials to a manufacturer
	• Input item identification • Input item description • Quantity • Receipt date • Sender identification • Origin • Feedstock source type • Analysis details • Quality certification • Risk assessment	• Input item identification • Quantity • Processing details • Total recycled content % • Pre-consumer recycled content % • Post-consumer recycled content % • Analysis details • Quality certification • Chemical inputs • Work order reference	• Output item identification • Output item description • Quantity • Ship date • Shipment identification • Sender identification • Receiver identification • Ship from location • Ship to location • Analysis details • Quality certification • Transporter

	Key data elements to be collected when each critical tracking event (CTE) occurs		
Supply chain function	**CTE: Receipt**	**CTE: Processing**	**CTE: Dispatch/Shipping**
Manufacturing	Receipt of domestic or imported secondary materials	Processing secondary materials (alone or with virgin materials) to make new products	Dispatch of manufactured products
	• Input item identification • Input item description • Quantity • Receipt date • Sender identification • Origin • Feedstock source type • Analysis details • Quality certification • Risk assessment	• Input item identification • Quantity • Processing details • Total recycled content • Pre-consumer recycled content • Post-consumer recycled content • Chemical inputs • Work order reference	• Output item identification • Output item description • Quantity • Ship date • Shipment identification • Sender identification • Receiver identification • Ship from location • Ship to location • Transporter
Distribution	Receipt of finished products	N/A	Dispatch of finished products to retail or final point of sale
	• Input item identification • Input item description • Quantity • Receipt date • Sender identification	N/A	• Output item identification • Output item description • Quantity • Ship date • Shipment identification • Sender identification • Receiver identification • Ship from location • Ship to location • Transporter
Sale for final use	Receipt of finished products	N/A	Sale of products for final use/consumption
	• Input item identification • Input item description • Quantity • Receipt date • Sender identification		• Output item identification • Output item description • Quantity • Ship date (date of sale))

Table C2: Key data elements for each supply chain participant

Supply chain step / trading partner	Data to collect from self	Data to collect from previous trading partner	Data to collect from next trading partner	Data to share with previous trading partner	Data to share with next trading partner
Material recovery [1]	Inputs • Receipt date • Analysis details • Quality certification • Risk assessment Outputs • Quantity • Processing details • Work order reference • Quality certification	• Input item identifier • Input item description • Quantity • Sender identifier • Source stream • Feedstock source stream • Feedstock source type • Origin • Feedstock category, type & sub-type • Analysis details	• Receiver identifier • Ship to location	• Ship to location	• Output item identifier • Output item description • Quantity • Ship date • Shipment identifier • Sender identifier • Ship from location • Quality certification
Reprocessing	Inputs • Receipt date • Risk assessment Outputs • Quantity • Processing details • Total recycled content • Pre-consumer recycled content • Post-consumer recycled content • Analysis details • Quality certification • Chemical inputs • Work order reference	• Input item identifier • Input item description • Quantity • Sender identifier • Processing details • Total recycled content • Pre-consumer recycled content • Post-consumer recycled content • Analysis details • Quality certification • Chemical inputs • Risk assessment	• Receiver identifier • Ship to location	• Ship to location	• Output item identifier • Output item description • Quantity • Ship date • Shipment identifier • Sender identifier • Ship from location • Analysis details • Quality certification • Transporter
Manufacturing	Inputs • Receipt date • Risk assessment Outputs • Quantity • Processing details • Total recycled content	• Input item identifier • Input item description • Quantity • Sender identifier • Processing details • Total recycled content • Pre-consumer recycled content • Post-consumer recycled content	• Receiver identifier • Ship to location	• Ship to location	• Output item identifier • Output item description • Quantity • Ship date • Shipment identifier • Sender identifier • Ship from location • Quality certification

Supply chain step / trading partner	Data to collect from self	Data to collect from previous trading partner	Data to collect from next trading partner	Data to share with previous trading partner	Data to share with next trading partner
	• Pre-consumer recycled content • Post-consumer recycled content • Analysis details • Quality certification • Chemical inputs • Work order reference	• Analysis details • Quality certification • Chemical inputs • Risk assessment			• Transporter
Distribution	<u>Inputs</u> • Receipt date <u>Outputs</u> • Quantity	• Input item identifier • Input item description • Quantity • Sender identifier	• Receiver identifier • Ship to location	• Ship to location	• Output item identifier • Output item description • Quantity • Ship date • Shipment identifier • Sender identifier • Ship from location • Transporter
Sale for final use [2]	<u>Inputs</u> • Receipt date <u>Outputs</u> • Quantity	• Input item identifier • Input item description • Quantity • Sender identifier	• Nil	• Ship to location	• Output item identifier • Output item description • Quantity • Ship date (i.e. sold date) • Sender identifier • Ship from location (*This would be information typically provided on a sales invoice*)

Note: [1] The previous trading partner for the material recovery step would be the supplier of the recycled material feedstock, such as a waste collector or a business. [2] The next trading partner for the 'sale for final use' step would be the client or customer purchasing the recycled content goods.

Appendix D: Mass balance concepts

Important concepts in the mass balance approach include:

- Credit units – when materials enter the mass balance system, the mass of material must be transformed into a single type of credit unit using a stated unit conversion. Credit unit examples include tonnes, net calorific value (or lower heating value), and number of carbon equivalents.
  - The choice of credit unit may be influenced by the nature of the materials entering the system. For example, the Ellen MacArthur Foundation (2019) proposes using chemical value-related properties (such as the net calorific value) rather than mass as the basis for mass balance calculations in chemical recycling systems where the raw materials are of variable composition and of different value to the chemical process.
- Allocation – mass balance allocation determines the proportion of inputs assigned to specific outputs. In other words, it describes how to account for the assignment of chain of custody claims to outputs. In general, there are 4 allocation methods (Beers et al 2022), which are mainly applicable to chemical recycling processes:
  - Proportional allocation: this method assumes that the recycled inputs and non-recycled inputs in a production process flow in the same way and have the same distribution among outputs. The input credits are split according to the yield. For example, if 10% of the total inputs consist of recycled materials, then 10% of each output stream is considered to have recycled content.
  - Non-proportional (or free) allocation: the input credit units can be freely assigned to any output. For example, one output can be allocated 100% of the recycled content claims, and the other outputs have no claims.
  - Free (fuel exempt) allocation: this is used in schemes that do not recognise a fuel product or by-product as a recycled material. Credits assigned to fuel products are lost from the system. The remaining credits can be freely assigned to the other outputs, which means these outputs can carry recycled content claims.
  - Free (polymers only) allocation: in this method, credits can be freely allocated but only to outputs directly linked to polymer production. For example, in a process that uses recycled materials to produce 3 outputs – fuel, feedstock for non-polymer chemical products, and feedstock for polymer products – only the feedstock for polymer products can carry recycled content claims.
- Accounting period – this period also referred to as the reconciliation or balancing period is the time over which the total recycled content leaving the production system in outputs must match the recycled content entering and used in production. Mass balancing periods in some chain of custody certification schemes vary from 1, 3 and 12 months, with 3 months being most common (Beers 2022).

Appendix E: Emerging traceability data requirements

Table 11: Proposed framework alignment with emerging traceability data requirements

Framework	Relevant data requirements or obligations. This may not be definitive or exhaustive. Refer to the source for complete information	Corresponding data element under the framework (see Table 4)
Proposed Ecodesign for Sustainable Products Regulation [1]	Unique product identifier (unique string of characters for the identification of products that also enables a web link to the product passport)	Input/output item identifier
	Global Trade Identification Number as provided for in standard ISO/IEC 15459:2015	Input/output item identifier
	Relevant commodity codes, such as a TARIC code as defined in Council Regulation (EEC) No 2658/871	Nil
	Compliance documentation such as the declaration of conformity, technical documentation or conformity certificates (relating to compliance with the regulation requirements)	Quality certification
	Unique identifiers for operators, compliant with ISO/IEC 15459:2015	• Sender identifier • Receiver identifier • Transporter
	Other manufacturer information	Nil
	Unique facility identifiers (unique string of characters for the identification of locations or buildings involved in the value chain of a product or used by actors involved in the value chain of a product)	• Ship to location • Ship from location
	Importer information, including name, registered trade name or trade mark, postal address, and email	Sender identifier (for importer)
	Information to enable the tracking of all substances of concern throughout the life cycle of products, including: • the name of the substances of concern present in the product	• Analysis details • Chemical inputs
	• the location of the substances of concern within the product	Nil
	• the concentration, maximum concentration or concentration range of the substances of concern, at the level of the product, its main components, or spare parts	Analysis details
	• relevant instructions for the safe use of the product	Not in scope
	• information relevant for disassembly.	Not in scope
	Information on the performance of the product across a range of product parameters (as listed in Annex I), including use or content of recycled materials	Recycled content *Note: other product parameters are not in scope of the framework,*

Framework	Relevant data requirements or obligations. This may not be definitive or exhaustive. Refer to the source for complete information	Corresponding data element under the framework (see Table 4)
	Information for users on how to install, use, maintain, repair, return or dispose of the product	Not in scope
	Information for treatment facilities on disassembly, recycling or disposal	Not in scope
	User manuals, instructions, warnings or safety information, as required under applicable EU law	Not in scope
	Information on specific voluntary labels applicable to the product, including whether an EU Ecolabel has been awarded	Quality certification
	Other notable requirements: • Information must be based on open standards, developed in an interoperable format and be machine readable, structured and searchable • Consumers, supply chain participants and others shall have free access to the product passport based on access rights to be set out in future implementing legislation • Data authentication, reliability and integrity must be ensured. • Product passports must be designed and operated to ensure a high level of security and privacy and avoid fraud	These requirements are broadly reflected in the framework's guiding principles
Regulation (EU) 2022/1616 on recycled plastic materials and articles intended to come into contact with foods, and repealing Regulation (EC) No 282/2008	Unique identification of individual batches of recycled plastic materials and articles	Input/output item identifier
	Batch level records of quality of recycled plastic materials/ articles, and name of the manufacturing stage from which they originate	• Analysis details • Quality certification • Processing details
	Declaration of compliance to: • establish the identity of the recycler	Sender/receiver identifier
	• establish the recycled origin of the plastic	Feedstock source stream
	• provide instructions to the converters and final users regarding the use of the recycled plastic (includes maximum recycled content, present recycled content, list of added substances with migration limits)	• Total recycled content • Chemical inputs
	Collection and pre-processing requirements include: • the plastic waste originates only from MSW, or from food retail or other food businesses	Feedstock source stream
	• the plastic waste originates only from plastic materials and articles made in accordance with this Regulation or the Food Contact Plastics Regulation	Quality certification
	• the plastic waste is subject to separate collection for recycling	Feedstock category, type and sub-type
	• contaminants (including caps, labels and adhesives, are reduced to a level specified by the receiving recycler and which shall not compromise the achieved level of decontamination	Analysis details
	• quality assurance systems are in place to ensure conditions above are met and traceability of each batch up	N/A

Framework	Relevant data requirements or obligations. This may not be definitive or exhaustive. Refer to the source for complete information	Corresponding data element under the framework (see Table 4)
	to the point of the first sorting of collected plastic waste. Systems shall be certified by an independent third party	
Canada's proposed recycled content and labelling rules for plastics	Report annually on the amount of total plastic and the amount of recycled content used in each packaging (rigid and flexible) and product category in the previous calendar year	Not in scope
	Keep records on the use of recycled content in all product categories	Recycled content
	Keep records on the use of reusable packaging	Not in scope
	Keep records that demonstrate any reported recycled content is post-consumer resin	Post-consumer recycled content Feedstock source stream
	Keep records that demonstrate compliance with the provisions for chemically recycled resin, that is, any recycled content that comes from a recycling process that uses mass balance allocation only allocates recycled content to the outputs that are used in the production of plastic products	Chain of custody approach
	Keep records that demonstrate that no recycled content reported is representative of credits generated through a book and claim chain of custody model	Chain of custody approach
Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) framework	The supplier of an article containing an SVHC in a concentration above 0.1% by weight must provide the recipient with sufficient available information, to allow safe use of the article including, as a minimum, the name of that substance. *Note: Substances of very high concern (SVHCs) are substances that are carcinogenic, mutagenic, reprotoxic, persistent, and bioaccumulative*	Chemical inputs Analysis details
	On request by a consumer, any supplier of an article containing an SVHC in a concentration above 0.1% by weight must provide the consumer with sufficient available information, to allow safe use of the article including, as a minimum, the name of that substance	Chemical inputs Analysis details
	Each supply chain actor must communicate to the next actor, new information on hazardous properties, regardless of the uses concerned	Chemical inputs Analysis details
	Each supply chain actor must communicate to the next actor, any other information that might call into question the appropriateness of the risk management measures identified in a safety data sheet supplied to him, which shall be communicated only for identified uses	Nil
	Each manufacturer, importer, downstream user and distributor must keep records required to meet their obligations for at least 10 years after the last manufacture, import, supply or use of the substance or preparation	Nil
Restriction of Hazardous Substance 1 & 2 (Directive 2002/95/EC and Directive 2011/65/EU, respectively)	Electrical and electronic equipment (EEE) placed on the market must not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), polybrominated dipheyl ethers (PBDE) in concentrations greater than 0.1% by weight	Chemical inputs
	Manufacturers and importers must keep a register of non-conforming EEE and product recalls, and keep distributors informed of them	Nil

Framework	Relevant data requirements or obligations. This may not be definitive or exhaustive. Refer to the source for complete information	Corresponding data element under the framework (see Table 4)
	Manufacturers must ensure their EEE, its packaging or accompanying documentation carries an identification number such as type, batch or serial number	Item identification
	Importers must ensure an appropriate conformity assessment procedure has been carried out by the manufacturer on the EEE	Nil
	Portable RoHS analysers, also known as X-ray fluorescence or XRF metal analysers, are used for screening and verification of the restricted metals	Analysis details
	Each supply chain actor (manufacturer, importer, or distributor) placing the product on the EU market should maintain records to show compliance	Nil
	RoHS2 requires recordkeeping from everyone in the supply chain (minimum of 10 years) to demonstrate compliance	Chain of custody approach

Note: Future product-specific legislation (called 'delegated acts') would be expected to specify the information to be included in product passports for particular product groups.

Appendix F: Standards

The following standards would be considered in developing the framework.

Traceability

- AS/NZS 5377:2013 Collection, storage, transport and treatment of end-of-life electrical and electronic equipment
- ISO/CD 59014 Secondary materials – Principles, sustainability and traceability requirements (under development)
- GS1 Global Traceability Standard

Chain of custody

- ISO/AWI 13662 Chain of Custody – Mass Balance – Requirements and guidelines (under development)

Verification

- ISO/IEC 17029:2019 Conformity assessment – general principles and requirements for validation and verification bodies
- AS ISO/IEC 17011:2018 Conformity assessment – requirements for accreditation bodies accrediting conformity assessment bodies
- AS/NZS /IEC ISO 17021.1:2015 Conformity assessment – requirements for bodies providing audit and certification management systems, Part 1: Requirements
- AS/NZS ISO/IEC 17024:2013 Conformity assessment – general requirements for bodies operating certification of persons
- AS/NZS ISO/IEC 17065 Conformity assessment – requirements for bodies certifying products, processes and services

Recycled content

- ISO 14021:2016 Environmental labels and declarations – self declared environmental claims (Type II environmental labelling)

Supply chain

- GS1 system of standards

Others

- ISEAL Codes of Good Practice (practices for effective and credible sustainability systems)
- ISO 10377:2013 Consumer product safety - Guidelines for suppliers