



Submission to the

## Productivity Commission Inquiry into the Opportunities in the Circular Economy

### ABOUT ARUP AND ITS CIRCULAR ECONOMY WORK

Arup is a global collective of 18,000 designers, engineers and technical experts, engaged in sustainable development across 140 countries. Arup's 3,000 strong workforce in Australasia works with clients and collaborators across Australia, New Zealand, Singapore, Indonesia, and Malaysia to unlock solutions to society's most complex challenges, including facilitating the renewable energy transition, responding to the climate emergency, decarbonising transport systems, planning resilient and inclusive future cities, and protecting and restoring the natural environment.

Arup develops circular economy guidance and comprehensive business strategies for clients worldwide. We work extensively on [built environment](#), transport, business and industrial resource systems circularity. Since 2016, Arup has been knowledge partner for the built environment with the Ellen MacArthur Foundation, an international leader on circular economy.

In Australia, we are currently working with Circular Australia to produce circularity case studies that consider Australia's market creation potential and competitive advantage for industries covering low carbon concrete, textiles, green iron and green steel, lithium-ion batteries, and PET bottling. The findings of this work will be available late 2024 and we have reflected key insights below. We've also looked at the circularity potential of photovoltaics.

Arup's interactions with business and industry tells us successful implementation of circular economy systems and practices is characterised by operational efficiency – lowering costs, reducing carbon footprints and raising sustainability, and creating additional streams of value.

From a productivity perspective, circularity is good economics. The benefits to Australian businesses and industries include:

- Offering economic, material and natural value capture and creation
- Reducing whole of life embodied carbon emissions
- Preserving biodiversity, natural resources and systems

- Saving money, increasing material efficiency and reducing waste (economic, material and natural value)
- Optimising good design, supporting value engineering and increasing innovation
- Mitigating supply chain risks and inefficiencies and creating new local supply chain opportunities.

In our experience, Australian industry is less practiced at extracting additional value and this is, as yet, a mostly untapped area of opportunity. This is also an area where government and market mechanisms act as a barrier to capturing value. Essentially, Australia is still trying to implement circular solutions in a linear economy.

This is Arup's response to the Productivity Commission's call for submissions to its inquiry into Australia's Opportunities in the Circular Economy.

## KEY RECOMMENDATIONS

### **Leadership**

Successful adoption of circular economy systems across the nation requires government leadership in driving circular economy-focused policies, best practices in public sector procurement and infrastructure development, strategic public investment and collaboration.

### **Policy and regulation**

Arup calls for a national policy structure, shaped by the [9R Framework](#) and sector-wide circularity plans, developed under federal government direction, using as a model the Net Zero 2050 sectoral decarbonisation approach, setting statutory minimum standards for circular economy performance in private and public sector activities.

### **Tax reform**

National, state and territory governments must cooperate to formulate consistent, complementary taxation and fiscal policies that are directed specifically to adoption of circularity practices by industry, business and in the consumer economy. Arup supports the principle of taxing what is unwanted and incentivising what is needed; it is the most efficient way of achieving a higher order of circularity.

### **Supply chain collaboration**

Governments should promote industry and sectoral collaboration by active measures in partnership with peak industry organisations, by leadership in their own large-scale procurements and contracting, and by removing regulatory barriers to effective collaboration. Arup believes there should be a dedicated mechanism for promoting collaboration across the supply chain.

# PRIORITY OPPORTUNITIES TO PROGRESS THE CIRCULAR ECONOMY

## Materials and energy

As a major extractor and international supplier of **raw materials**, Australia has many opportunities to onshore, co-locate, or more closely coordinate, higher levels of the value chain by applying circular design to creating local efficiencies and market opportunities.

Those opportunities are especially relevant to **critical minerals, construction materials and clean energy solutions**.

It is critical that Australian **renewable energy** development is held to the standards of circularity and sustainability that are increasingly demanded of other industries. End of life, embodied carbon and circular design are often overlooked in wind and solar generation, battery storage and transmission, because they represent very large investments in fast-implementation projects to deliver the Net-Zero national objective. Energy efficiency, generally, is a productivity issue that receives too little circularity focus.

Australia should take the opportunity to consider end-of-life pathways for solar panels, wind turbines and batteries before they become significant waste issues and a burden to the national economy. The current investment required to address plastic, rubber, glass and textile waste should act as an incentive to all Australian governments in planning for the energy transition.

## The built environment - buildings and infrastructure

Arup's experiences corroborate the Circular Economy Ministerial Advisory Group's conclusion that the **built environment** is primed with circular economy opportunities: extending the life of buildings and infrastructure, minimising materials use, design for deconstruction, and creating markets for reuse, repurposing and re-manufacturing materials and componentry.

Infrastructure Australia's embodied carbon projections estimate that buildings and infrastructure are directly responsible for almost one third of Australia's total carbon emissions, and indirectly responsible for over half of all emissions.

Achieving Net Zero is simply not possible without the circular economy, as it lowers embodied carbon by looking at the whole life of an asset. This whole-of-systems approach considers operations and maintenance, asset management, materials, data and the supply chain alongside early project phases.

For example, in addition to expanding markets for recycled steel in Australia, there are circular pathways opportunities for the production of green iron and green steel from both hematite and magnetite reserves. Shifting to more circular design strategies in the built environment to reduce overall demand and creating local markets for more reuse, repurposing and remanufacturing steel furthers industry's circularity potential. Similarly, multiple pathways exist for low carbon concrete but to enable this the downstream market for concrete must be decoupled, at least in part, from cement. To drive low carbon circular solutions,

Australia must get serious about investment in low carbon technology, standards reform and supply chain development to meet demand.

- *At Port Kembla, [BlueScope Steel](#) is incorporating circular economy and whole-of-lifecycle principles, both as a manufacturer and marketer of steel products and services. It has created a metallic coating that enhances corrosion resistance and extends product life. Port Kembla is the first Asia Pacific region site to obtain ResponsibleSteel certification, the global industry's multi-stakeholder standards and certification initiative to embody sustainability principles.*
- *BlueScope has also partnered with BHP and Rio Tinto to investigate the utilisation of hematite for green steel. This will require the use of Electric Smelting Furnace (ESF) technology, instead of an Electric Arc Furnaces (EAF), in the DRI process*
- *Arup has worked extensively with partners in Australia to further Low Carbon Concrete. Most recently, we have worked with the NSW Government to produce its Low Carbon Concrete Specifications, which follows and builds on similar work in Victoria. In October we also helped to pioneer Australia's first calcined clay pour, alongside Hanson, BMD and Major Road Projects Victoria.*

### **Driving change through circular design**

A greater focus on circular design is critical to unlocking productive, circular economy markets in Australia.

In partnership with the [Ellen MacArthur Foundation](#), Arup has developed the [Circular Buildings Toolkit](#) to guide designers, constructors and owners towards adopting this sustainable approach to creating, and re-creating, the built environment. The Toolkit demonstrates how to utilise circularity principles beyond construction, across the whole life cycle of buildings. This approach is also directly applicable to infrastructure development, supply and services, and could be adopted across all of Australia's built environment.

- *The Dutch transport agency, Rijkswaterstaat, launched a program to create modular viaducts that are easy to dismantle, reuse, or replace. The viaducts are built with standardised components, allowing for reuse in other projects. This modular approach minimises waste and aligns with the Netherlands' goal of achieving a fully circular economy by 2050.*
- *A similar initiative exists in Finland through the Väylävirasto Circular Bridges Initiative. Bridges are designed to use modular components that can be repurposed or recycled at the end of their lifespan. This approach reduces the environmental impact and ensures flexibility for future updates or replacements.*
- *In Spain, Metro de Madrid, Madrid's metro system adopted a circular approach by recycling track materials like steel and concrete and refurbishing train components instead of replacing them.*
- *Also in the Netherlands, TU Delft is paving the way for bridges, a significant source of embodied carbon, to be designed for second and third lives through disassembly, modular construction and reuse or repurposing at end of life. Bridges are assessed for reuse and assigned a circularity label based on material quality and structural condition.*

In terms of measuring the holistic benefits of a circular economy, Arup and the Ellen Macarthur Foundation have also recently released the report, [Building Prosperity: Unlocking the potential of a nature-positive, circular economy for Europe](#).

The report demonstrates the value of a circular economy that is nature-positive and regenerative by design. It focuses on six key circular economy strategies that could unlock €575 billion of potential annual revenue across the built environment value chain, while delivering €158 billion-worth of wider economic benefits to businesses and citizens. The strategies are grouped under three ambitions:

1. Revitalise land and assets to minimise further pressure on nature, by redeveloping brownfield sites; and converting vacant commercial buildings.
2. Maximise nature in cities to create resilient and vibrant urban landscapes, by increasing tree canopies; and expanding green-blue spaces.
3. Optimise building design and material sourcing to capture economic value, reduce waste, and achieve climate targets by employing material-efficient design; and using low-impact materials.

These principles, supported by case studies and calls to action for key stakeholders, demonstrate the potential for the benefits of a circular economy at scale.

The International Organisation for Standardization this year published new international standards for circular economy transition, covering principles for implementation; guidance on business models, and value networks; and measuring circularity performance. These standards create a common understanding of circular definitions, measurement and implementation for more than 100 countries, including Australia.

## HURDLES AND BARRIERS TO A CIRCULAR ECONOMY

Circular economy participation offers real potential to reduce production costs, build additional value and, increasingly, to obtain financing, but **upfront investment costs** and **disruptive change to business models** are cited as significant barriers. Arup believe achieving effective circularity depends on the quality of input materials and components (quality in = quality out), which often requires higher upfront cost. This is a fact across almost all industries.

Another key barrier is the lack of consistent and commensurate waste policy and regulation across Australian states and territories which can result in the **unintended consequences of increased landfill** when the entry point to resource recovery is too high. An approach to have commensurate landfill levy rates and consistency in waste and resource recovery regulation will prevent valuable materials being leaked and wasted through the system.

One barrier to effective circular design is the emphasis on upfront, embodied carbon, rather than **whole-of-lifecycle decarbonisation**. When planning around lifecycle carbon, there is a need to move beyond upfront carbon and Scope 1 & 2 emissions to also consider Scope 3 emissions in supply chains and input services. Carbon is a critical factor when considering impact but it also must be put into context against other important factors such as virgin

resource extraction, waste generation, and whole-of-life nature impacts. One way to overcome this would be clear policy leadership and direction around circular design and circular end-of-life recovery. Circular design and material tracing in the form of material passports are key enablers of this.

## GOVERNMENTS' ROLE IN THE CIRCULAR ECONOMY

Government policy and mandates drive supply and demand by enabling reliable investment decisions and long-term business planning. They can also drive collaboration across industry and sectoral value chains. Across the board, value- and supply-chain collaboration is considered the key to increased circularity.

- *Victoria's [ecologiQ](#) program and Recycled First Policy is an example of policy, mandate and on ground delivery action making a significant, material change in circularity adoption. Through ecologiQ, the state government has embedded reuse, recycling and repurposing of waste materials into its \$100bn Big Build transport infrastructure program. By benchmarking suppliers and contractors against Recycled First procurement principles, ecologiQ has significantly advanced the circularity of Victoria's transport infrastructure supply chain.*
- *The European Union's (EU) Green Deal serves as the overarching policy framework to make Europe's economy sustainable and climate-neutral by 2050. It includes specific commitments to the circular economy, increased resource efficiency and reduced waste.*
- *The EU's Circular Economy Action Plan (CEAP), launched in 2020, outlines a roadmap to make sustainable products the norm, reduce waste, and boost recycling.*
- *France's "right to repair" initiative is one of the most advanced efforts in Europe to promote repairability and extend the lifespan of consumer products.*

Arup advocates for governments to lead circular economy development by creating a **national policy structure** with enforceable minimum standards shaped by the 9R Framework and sector-wide circularity plans – using the Net Zero 2050 sectoral decarbonisation approach as a model.

Federal and state government investment in areas such as transport infrastructure and residential development should be guided by circular economy principles. This will (a) support scaling of private sector circularity models, (b) promote – and where necessary broker – sectoral and industry-wide collaboration, and (c) methodically shift circularity practices to higher levels of 9Rs Framework. (France's [Reparability Index](#) is a strong driver of circularity enhancement and an example of working mechanisms that can be adapted to Australian conditions.)

Government should identify and directly invest in sustainable advanced manufacturing, processing and recycling that enable and embody circular economy principles.

[Fiscal reform](#), particularly in the area of taxation, should also be deployed by national and state governments specifically to promote circularity practices in the private sector and the consumer economy. For example, increasing the gate fee for disposal to landfill creates greater incentive for the source separation and recycling of materials, particularly when large volumes are generated during construction and demolition. Higher landfill fees provide the opportunity window for investment in resource recovery infrastructure by incentivising contractors to adopt selective demolition techniques to avoid waste, which involves carefully dismantling structures and sorting materials at the source. Arup also believes that consideration of removal of taxation on repair services and sale of secondary materials should be considered.

Arup believes state and local governments, and regional development organisations, have a particular role to play – as incubator developers to generate and lead circular economy activity in their regions.

- *Supported by state government start-up grants, Bega Valley Shire, in southern NSW, has established [Bega Circular Valley](#). This collaboration of the specially created Regional Circularity Cooperative, technology innovators, local and national businesses, university researchers and development corporations is building a model regional circular economy with projects engaging all significant economic activities in the Bega Valley. This ambitious project is being closely studied by regional development and local government organisations throughout the country. Some of the key Bega initiatives include partnerships with local farms, businesses and residents to collect and compost organic waste, develop local biogas facilities and materials recovery. Bega Circular Valley hosts the Circular Innovation Hub to incubate circular projects and support extended product responsibility, community education and engagement and local food system resilience.*
- *[Southern Sydney Regional Organisation of Councils \(SSROC\)](#) works collaboratively across its member councils to promote a circular economy through initiatives in procurement, waste reduction, and resource recovery. By implementing a Sustainable Procurement Roadmap and partnering with local businesses, SSROC helps councils prioritise products that are durable, repairable, and recyclable. Their work includes advocating for supportive policies, developing programs and projects for recycling and construction waste recovery, and running public education initiatives to encourage responsible consumption. This approach supports efficient resource use and waste management and offers a pragmatic model for regional action toward sustainability. The collaborative advocacy and bargaining power of SSROC makes its sustainability approach a policy stand-out.*