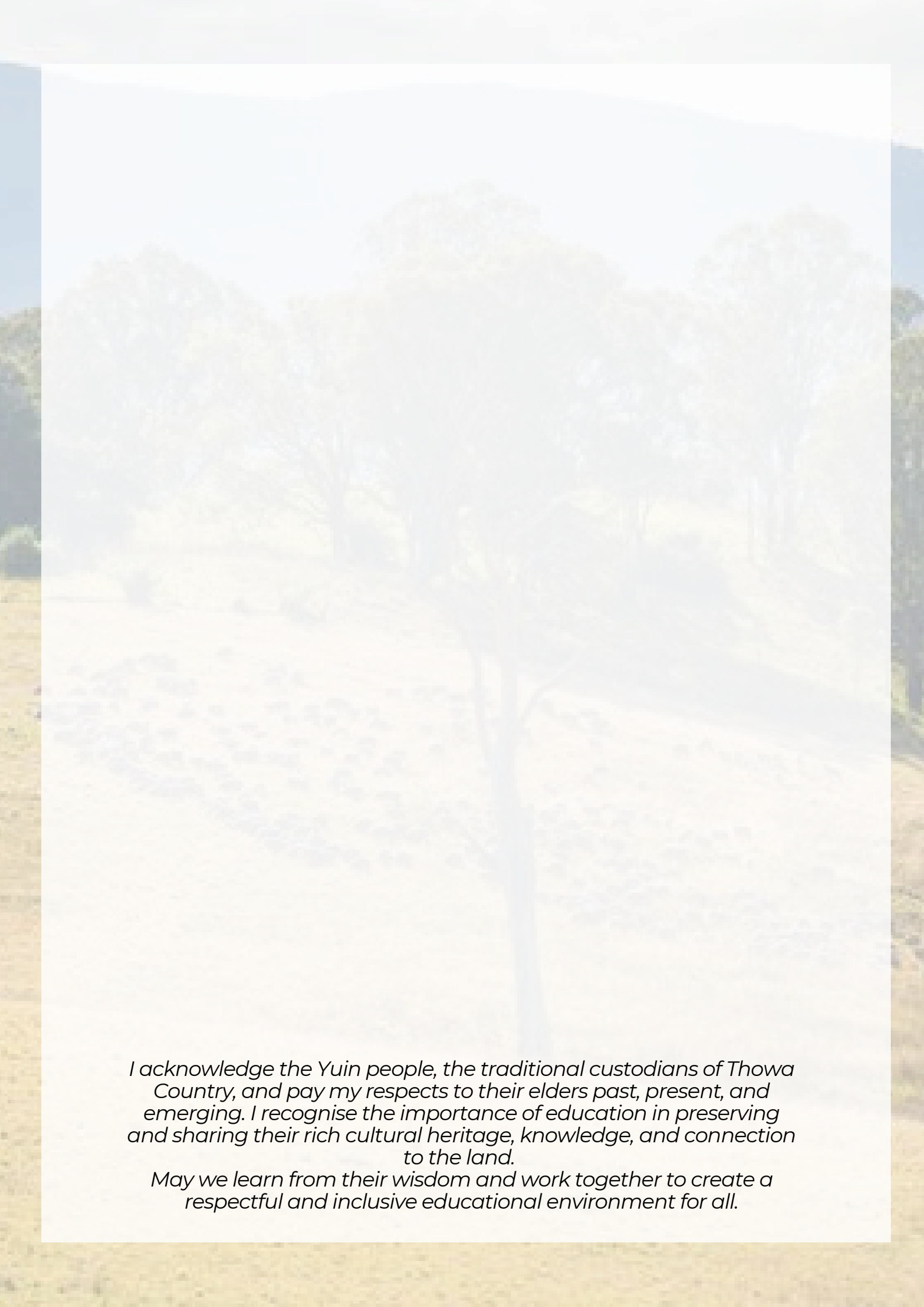


Education for a Sustainable Bega Circular Valley

Prepared for :
Bega Circular Valley Project
Productivity Commission

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A faded background image of a landscape. In the foreground, there is a large, dark tree with a thick trunk and a dense canopy. Behind it, there are several other trees of varying heights and shapes. In the background, a large, rounded hill or mountain rises against a light sky. The overall scene is a natural, outdoor setting.

I acknowledge the Yuin people, the traditional custodians of Thowa Country, and pay my respects to their elders past, present, and emerging. I recognise the importance of education in preserving and sharing their rich cultural heritage, knowledge, and connection to the land.

May we learn from their wisdom and work together to create a respectful and inclusive educational environment for all.

Lessons from Finland's Circular Economy Roadmap

Cultivating a thriving circular economy in the Bega Valley relies heavily on equipping students from preschool through tertiary education with the knowledge, skills, and mindset to be active participants. Drawing inspiration from Finland's successful Circular Economy Roadmap, the Bega region is poised to leverage its education system as a key driver for generational change and sustainable development.

Curriculum Integration

Finland's roadmap emphasises weaving circular economy concepts into core academic subjects, equipping students with practical knowledge they can apply in their personal and professional lives.

Teacher Training

Empowering educators with the tools and training to confidently teach circular economy principles is critical. Finland has made significant investments in upskilling teachers to become champions of sustainability.

Collaborative Partnerships

Fostering strong partnerships between educational institutions, businesses, and community stakeholders is key. This cross-pollination of ideas and resources accelerates the adoption of circular practices.

The most profound way to promote this transformation is to involve all people through education. Starting in pre-school and continuing all the way to university, education is the best way to enable the transition from a linear economy to a circular economy.

Tiippana-Usvasalo, M., Pajunen, N., & Maria, H. (2023). The role of education in promoting circular economy. International Journal of Sustainable Engineering

Education serves as the bedrock for the propagation of circular thinking. By instilling these values in young minds, educational institutions lay the groundwork for a generation equipped, motivated, and dedicated to navigating our world towards a circular and sustainable future

Circular Economy Alliance. (2023) The Role of Education in Promoting Circular Thinking

Opportunities in the Circular Economy: Education

- **The potential scope to lift Australia's materials productivity and efficiency, and the best metrics to measure this opportunity and improvements made.**

Incorporating education into the strategy for lifting materials productivity and efficiency is essential. By fostering a culture of sustainability, developing critical skills, and creating a workforce equipped to navigate future challenges, education can play a pivotal role in achieving the Productivity Commission's objectives. This holistic approach will not only benefit Australia's economy but also contribute to a more sustainable future.

The scope:

1. Foundation for Sustainable Thinking

Early Awareness: Educating children about sustainability from preschool establishes foundational values around resource use and environmental stewardship. Early exposure to concepts such as recycling and conservation nurtures lifelong habits that support materials efficiency. A plan to consistently evolve education over time as students progress through their schooling developing their understanding and engagement will see high impact teaching delivering content filtered through a variety of curriculum areas. The Centre in Bega will also provide education for school visits based on the NSW and Australian curriculum and visitors.

2. Skill Development

- **Critical Skills:** As students' progress through primary and secondary education, they develop critical thinking, problem-solving, and analytical skills. These are essential for understanding complex systems in materials productivity and efficiency.
- **STEM Focus:** Emphasizing STEM education and other curriculums prepares students to engage with technological innovations that can improve materials efficiency and drive economic growth.

3. Curriculum Relevance

- **Integrating Sustainability:** A curriculum that incorporates sustainability and circular economy principles can better prepare students for future challenges. Subjects such as Science, Economics, and the Technologies can include projects focused on real-world applications of materials efficiency. Students within the Bega Valley must be equipped with the life-long learning to adapt and take advantage of emerging technologies, systems and environments.
- **Hands-On Learning:** Practical projects related to waste reduction, resource management, and sustainable practices engage students and deepen their understanding of these concepts. Projects can be within classes or across schools.

4. Global Context and Local Impact

- **Understanding Global Trends:** Educating students about local and international advancements in circular economies equips them with the knowledge to identify opportunities and risks for Australia. This awareness is crucial for fostering innovation that aligns with global best practices.
- **Local Relevance:** Highlighting local case studies and success stories can inspire students and show them the direct impact of materials productivity improvements on their communities. Students within the Valley must have a connection to the BCV project to ensure its success long term. We aim to have young adults referring to the BCV in tertiary applications and job interviews, ultimately returning to the area as professionals.

5. Civic Engagement and Responsibility

- **Empowering Future Leaders:** Education fosters a sense of civic responsibility, encouraging students to become advocates for sustainability within their homes and their communities. Engaging in local initiatives can translate into a broader understanding of materials efficiency and its importance.
- **Community Projects:** Involving students in community-based projects focused on resource efficiency and waste reduction builds a practical understanding of these issues.

6. Career Pathways and Economic Development

- **Future Workforce:** By preparing students for careers in green technologies and sustainable practices, education can contribute to a workforce skilled in materials productivity, ultimately strengthening Australia's economic outcomes.
- **Entrepreneurial Skills:** Encouraging entrepreneurship related to sustainability can lead to innovation and job creation in sectors focused on circular economy principles.

7. Metrics for Improvement

- **Measuring Educational Impact:** Establishing metrics to assess how educational initiatives influence materials productivity and efficiency can provide valuable data. Metrics could include student engagement in sustainability projects, participation rates in relevant programs, and long-term career outcomes in green sectors. Additionally, data can be collected from school initiatives focusing on input and output of resources.

- **Priority circular economy opportunities for Australia, including identification of the sectors, products or supply chain segments:**

Currently just over 3,500 students are enrolled in K-12 schools across the Bega Valley with a projected increase to 4,000 by 2030.

Where Australia has the greatest potential to improve materials productivity/efficiency in ways that can strengthen economic outcomes, such as productivity, economic growth, economic diversity and capability

Importance of School-Level Education:

- **Foundational Knowledge:** Teaching students about materials science, resource management, and sustainability installs a mindset focused on efficiency and productivity. This knowledge can guide future innovations in sectors such as manufacturing, construction, and agriculture, where Australia has significant potential for improvement.
- **Skill Development:** A curriculum that emphasizes STEM education equips students with the skills to engage in sectors that drive economic growth. For example, understanding engineering principles can lead to more efficient product design, reducing material waste and enhancing economic diversity.
- **Entrepreneurial Thinking:** Encouraging entrepreneurship in school programs can inspire students to create businesses focused on materials efficiency. This entrepreneurial spirit is essential for fostering economic capability and resilience across generations.

Where other countries have made the greatest progress towards circularity, and the risks and opportunities associated with these developments in international markets for Australia

Importance of School-Level Education:

- **Global Awareness:** Educating students about international best practices in circular economies, such as those implemented in countries such as Finland, Sweden or the Netherlands, helps them understand the risks and opportunities these models present for Australia.
- **Adaptation and Innovation:** By studying successful circular initiatives abroad, Teachers and students can develop innovative ideas that are tailored to Australia's unique context. This fosters a culture of adaptability and continuous improvement, essential for thriving in international markets.
- **Collaboration and Networking:** Schools can facilitate partnerships with international organisations and businesses, providing students with exposure to global practices and networking opportunities that may lead to future collaborations and advancements in sustainability.

Where cost-efficient emissions reduction could be achieved by improving materials productivity and reducing waste.

Importance of School-Level Education:

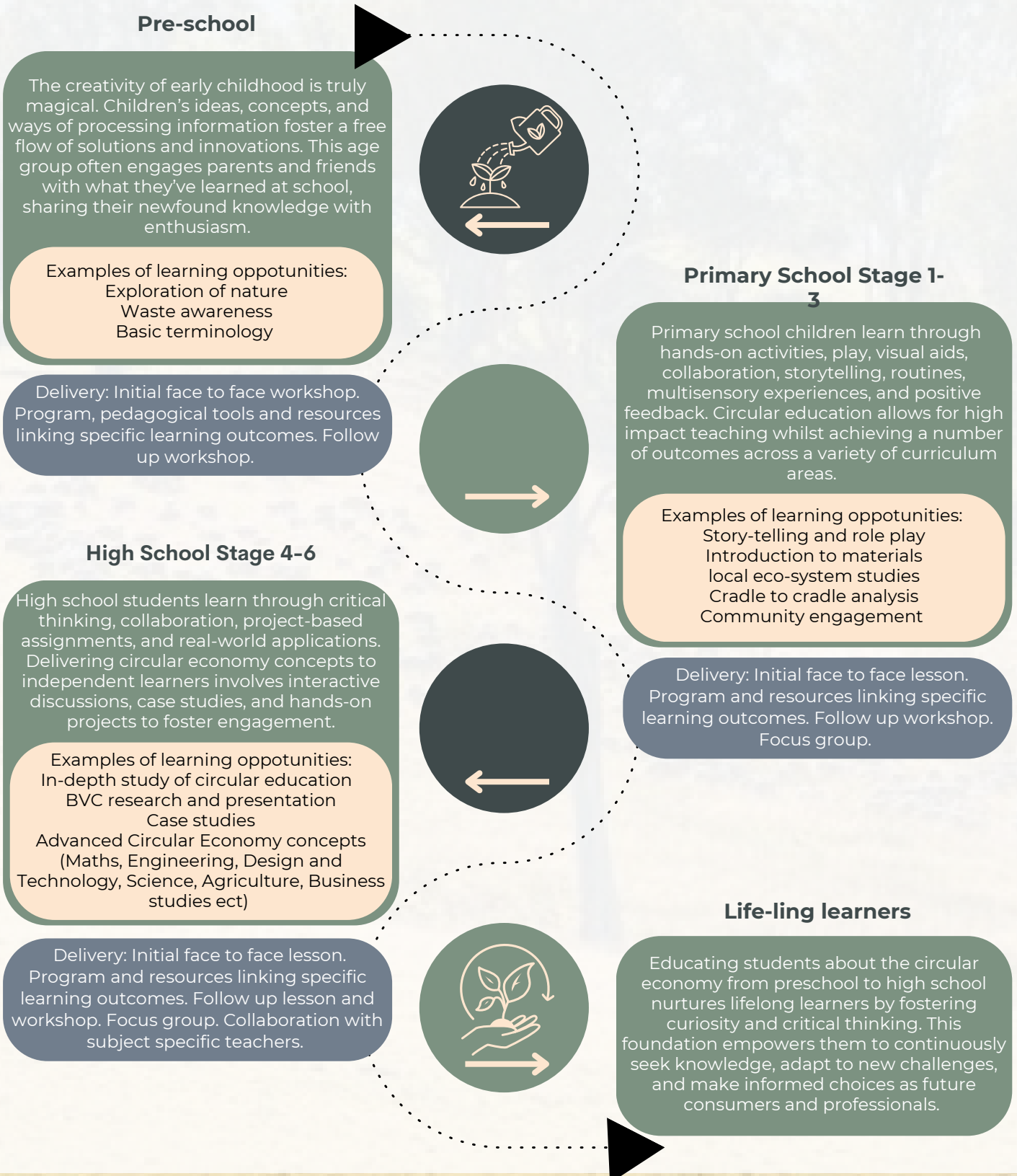
- **Emissions Awareness:** Curriculum focusing on climate science and environmental studies can help students understand the link between materials productivity and emissions reduction. This awareness is crucial for fostering a generation that prioritises sustainability in their personal and professional lives.
- **Practical Solutions:** Through project-based learning, students can engage in real-world challenges, such as developing strategies for reducing waste and improving resource efficiency in local contexts. This hands-on experience cultivates problem-solving skills that are vital for cost-efficient emissions reduction.
- **Empowerment to Act:** By teaching students about the significance of waste reduction and resource management, schools empower them to act in their communities. Initiatives such as recycling programs, energy audits and sustainability clubs can reinforce these lessons and encourage collective efforts toward emissions reduction.

School-level education is pivotal in ensuring the success and sustainability of Australia's materials productivity and circular economy across generations. By instilling foundational knowledge, fostering critical skills, and promoting awareness of global best practices, education equips students to navigate and contribute to a sustainable future. This investment in education not only addresses immediate challenges but also prepares the next generation to embrace opportunities for economic growth, innovation, and environmental stewardship.

Bega Circular Education Map

Circular education must be integrated into the teaching and learning of Bega Valley students from preschool through to the HSC. To achieve desired outcomes a 14-year program should be created that guides students from basic terminology and an understanding of recycling to critical analysis of materials, production processes, and the local circular economy across various curriculum areas.

By creating and forstering this generational knowledge, we will ensure the sustainability of the circular economy project within the Bega Valley and beyond. Every student will have the potential to become a consumer, small business owner, tradesperson, or pursue tertiary education. It is essential that each student is equipped with the tools to educate, engage, and make informed decisions about their lifestyle and business practices and further education ultimately contributing positively to the Valley and the wider Australian community.



Examples of Circular Economy programs that could be delivered

Preschool

Exploration of Nature: Engage children in outdoor activities that highlight local ecosystems and the importance of natural resources. Simple projects like planting a garden can introduce concepts of growth and sustainability.

Waste Awareness: Use creative play to teach about recycling and waste reduction, encouraging children to sort materials during craft activities.

Stage 1

Introduction to Materials: Discuss different materials and their uses. Activities can include collecting items for a recycling project, where students learn about reusing materials.

Storytelling and Role Play: Use stories to illustrate concepts of circularity, such as sharing and reusing. Encourage role-play scenarios that promote sustainable practices.

Stage 2

Local Ecosystem Studies: Explore local environmental issues and how the community practices sustainability. Students can participate in field trips to local farms or recycling centres.

Creative Projects: Implement art and design projects that utilise recycled materials, teaching students the value of reusing and repurposing items.

Stage 3

Cradle-to-Cradle Analysis: Introduce students to the concept of cradle-to-cradle design. They can analyse everyday local products to understand their life cycles and propose more sustainable alternatives.

Community Engagement: Encourage students to develop a project that addresses a local sustainability issue, collaborating with community members to create solutions.

Stage 4

In-Depth Study of the Circular Economy: Explore the principles of the circular economy in detail. Students can investigate how local businesses implement circular practices and the benefits for the community.

Research and Presentation: Assign research projects where students analyse a specific product or industry in the Bega Valley, focusing on inputs, outputs, and sustainability improvements.

Stage 5

Case Studies and Global Context: Examine case studies of successful circular economy initiatives both locally and globally. Students can compare these examples and discuss their implications for the Bega Valley.

Problem-Solving Workshops: Host workshops where students design innovative solutions to local waste management or resource efficiency challenges, encouraging teamwork and critical thinking.

Stage 6

Advanced Circular Economy Concepts: Delve into economic, environmental, and social aspects of the circular economy. Students can analyse policies and frameworks that support circular practices.

Collaborative Projects: Encourage students to undertake projects that propose a sustainable initiative for the Bega Valley. They can present their findings to local stakeholders, fostering real-world engagement.

Delivery of skills and knowledge accross the Bega Valley.

With 3,400 school-age children in the Bega Valley, it is essential to integrate circular education at every stage, from preschool to the Higher School Certificate (HSC). Local teachers must receive explicit professional development to gain the skills, resources, and confidence needed to deliver engaging and impactful lessons and workshops on the Circular Economy.

It's important that the person liaising with the schools understands their operations, processes, and the significance of effective communication and time management. Circular education should be directly linked to specific learning outcomes across various subject areas.

An independent educator should collaborate across all educational sectors, including NSW State, Catholic, and independent schools. A comprehensive 15-year program, spanning from preschool to Stage 6, should be developed to build on students' knowledge across a range of curriculum areas. Case studies should focus on local businesses, and data should be collected on student engagement, ideation, and their eventual career and tertiary paths.

Education is a powerful tool for increasing public awareness and driving social and systemic change throughout the Bega Valley.

Australian Centre for Circularity

The Centre must align with the outcomes and objectives of subject areas within both the Australian and New South Wales curriculums. Teachers planning to visit should be provided with relevant information, resources, and sample units to prepare students, ensuring that their time at the Centre focuses on building knowledge and ideation rather than simply acquiring new concepts.

Programs can be developed that utilise the Circularity Centre alongside local businesses and sites for school visits. Educational programs through the Centre must be inclusive and cater to the needs of all students.

Examples of environmental focused tasks being taught within a high school in the Bega Valley.



Stage 5
Recycled HDPE bottle caps collected from local Cafe and Primary School are used to make coasters and other products.



Stage 5
Students design an off-grid micro village and Passive design homes.



Stage 6
Students are encouraged to solve local problems with positive environmental impacts for Major Design Projects



Stage 4/5
Built Environments Biomimicry challenge.

54 Technology
55 Engineering
55 Design and Technology

Lesson outline:
Students will learn about the innovations in the building industry that have been inspired by nature

Resources:
<https://youtu.be/5E2j9yGzGk>

Workbooks
Students are to create a mind map with each innovation, off each innovation students are to list the positive impacts on the environment and society the innovation is having. You will need to pause after each example discussed.

Once completed ask students to work in groups of 2-3 to do one of the following

- Select a prominent local building and redesign it using some of the biomimicry inspired ideas
- Redesign an outdoor area of the school using some of the biomimicry inspired ideas.

Each design concept must have a sketch and positive impact on the environment and society. The new environment will need to be both functional and aesthetically pleasing.

Present their new concept to their peers.

Circular Economy

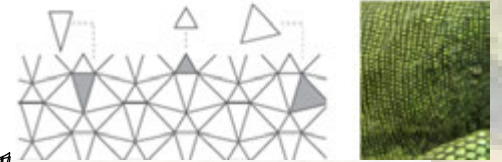


Stage 4
Students are introduced to the Bega Circular Valley, where they explore the inputs and outputs of their school. They then brainstorm solutions and conduct a cradle-to-cradle analysis

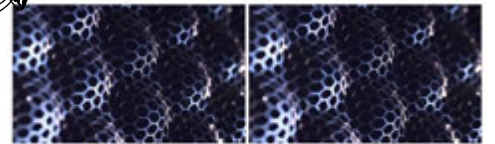
A circular economy is a system where resources are reused, repaired, and recycled instead of being thrown away, which helps reduce waste and pollution. In Bega Circular Valley, businesses, communities, and schools work together to find ways to keep materials in use for as long as possible. They turn waste into new products, share resources, and support local jobs, making the area more sustainable and less dependent on new materials. This approach helps protect the environment and builds a stronger, more resilient community.

School Input	School output

Stage 5
Nature inspired graphic design task using Ai.



Stage 6
Nature inspired structures: 3D printing task and strength challenge



Bionic Vaulted Structures: Nature's own resource efficiency model

1. Watch <https://youtu.be/N6GjWSTNxc>
2. Done: Bionic Vaulted structure

BIOMIMICRY HAS 3 MAIN CONCEPTS
MODEL - MEASURE - MENTOR

1. Nature as a model
Biomimicry is a new science that studies nature's model and then imitates or takes inspiration from these designs and processes to solve human problems. e.g. Solar cell inspired leaf.

2. Nature as a measure
Biomimicry uses an ecological standard to judge the "rightness" of our innovations. After 3.5 billion years of evolution, nature has learned what works, what is appropriate, what lasts.

3. Nature as a mentor
Biomimicry is a new way of thinking and valuing nature. It introduces an era based not on what we can extract from the natural world, but what we can learn from it. (Brene Brown: It all Spins out)

How can this be used in the classroom?

- The beauty of Biomimicry is that there is not one specific age when you can start learning from nature.
- Biomimicry can be linked to all subjects that fall under the TAD umbrella.
- Today I will focus on Technology Mandatory, Engineering and Design and Technology.

TECHNOLOGY MANDATORY
STAGE 4

STAGE 5
INDUSTRIAL TECHNOLOGY - DESIGN AND TECHNOLOGY


Engineering

Design and Technology

FINDING A PLACE ON STAGE 4

TECHNICAL SKILLS

- Textiles
- Built environments & architecture
- Furniture design
- Jewellery design
- Product design
- Graphic design
- Systems
- Smart materials



This Report has be prepared by:

Ms Kathryn Mamone

For:

Bega Circular Valley Project
and the
Productivity Commission

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