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**Concepts for potential NSW regulatory reforms for improved circular economy and climate action in the land and primary industries sector using Biochar**

**Key concepts:**

1. Create circular economies that facilitate regeneration of nature (one of the three critical pillars of [circular economy](#)).
2. Seek outcomes-based regulatory approaches over prescriptive ones, and proportionate risk-based regulation that reflects the scale, type and actual risk of activities, and which considers potential improvement over current management practices.
3. Create circular economies that value feedstocks (resources) over 'wastes' - Adopt the principles of 'End of Waste Codes' and related guidelines/standards to define when a 'waste' becomes a *resource*.

**Recommended Actions:**

- Revise definitions relating to 'waste' in legislation (e.g. NSW POEO Act) to facilitate increased circularity and recovery of *resources*.
- Revise definitions relating to 'thermal treatment' in legislation to **decouple linear** 'single-use' processes (e.g. combustion/incineration for end of life disposal) **from circular and regenerative** processes (e.g. pyrolysis and gasification of biomass).
- Enable production and usage of biochar to be considered a 'higher order use' or 'higher value use' under resource recovery and energy legislation and regulations.
- As an interim measure, amend existing policy frameworks to **enable innovation pathways** that facilitate circular economy and climate-positive outcomes, and which define when 'wastes' become *resources* under the NSW Resource Recovery Order and Exemptions framework (e.g. similar to the *End of Waste Code* approach used in other states).
- Seek opportunities to complement/integrate with new financial disclosure reporting framework requirements for climate and sustainability that are being introduced nationally (e.g. IFRS [S1](#) and [S2](#)).
- Reflect **scale, type and risk** of activities **proportionally** in policies and regulations.
- Clarify allowance of appropriate **biomass cofeeds** with biosolids under the NSW Energy from Waste Policy.
- Include **consideration against current management practices ('business as usual')** in regards to associated environmental, social and economic impacts/benefits when assessing proposals for alternative management (i.e. toward net benefits).

- Support collaborations amongst aligned industries that advocate for similar approaches, such as alignment between the ANZ Biochar Industry Group and the Water Service Association of Australia's [submission to the Circular Economy Ministerial Advisory Group](#) that supports biochar's role in carbon sequestration from water treatment.

#### Supporting information / messaging:

- Traditional waste hierarchies and regulatory approaches (including NSW higher order use considerations under resource recovery orders and exemptions) limit opportunities to address climate change, circular economy, energy, stewardship and sustainability. Other states have started to recognise the need for updated waste hierarchies in their policy frameworks toward positive circular outcomes (e.g. Queensland). Refer **Figure 1** below. Addressing these issues systematically will help deliver against multiple policy objectives simultaneously.
- Regulatory higher order or higher value use considerations, where they exist, are often restrictive in ways that fail to recognise the positive contributions of circular approaches and their ability to deliver against multiple public policy objectives. For example, s.140 of the NSW *Protection of the Environment Operations (General) Regulation 2022* provides an exception to the prohibition on burning native forest bio-material to generate electricity where *'the native forest bio-material does not comprise timber suitable for milling or other higher value use'* (s.140(1)(d)). Under s.140(3), *'higher value use includes the use of timber as mulch or wood chips for the purposes of (a) erosion and sediment control, or (b) landscaping the land from which the timber was obtained'*. Allowing production and usage of biochar to be considered a 'higher value use' under this and similar regulations would enable significantly greater circularity while providing regulatory flexibility and an outcomes-based approach.
- Regulatory approaches should encourage innovation pathways and flexibility of approaches while reducing risks and providing certainty.
- Pilots/trials should enhance the evidence base needed for more effective regulatory and commercial decision-making.
- Improvements in circular economy/resource recovery and climate action have become urgent objectives and require modern adaptive regulatory frameworks that facilitate rapid, positive change. However, regulatory reforms are difficult, time-consuming and must provide the foundation of defensible practices for years, especially when defining key terms. Flexibility and the ability to permit new approaches are needed to allow for evolution of new processes, technologies and feedstocks within established definitions and frameworks as evidence bases improve. Inclusion of wording such as *'unless otherwise approved by the [Regulator / Department]'* and/or innovation pathways subject to specific conditions should be considered to better enable regulatory oversight and approval of emerging approaches.
- Biochar is one of the key Carbon Dioxide Removal (CDR) methods recognised by the UN Intergovernmental Panel on Climate Change (IPCC). Importantly, biochar bioenergy systems have the potential to concurrently provide both clean renewable energy to displace fossil fuels (Emissions Reduction, ER) and sequester existing CO<sub>2</sub> from the atmosphere into soil (and non-soil) applications that are durable in the long term (CDR).

- Currently, all thermal treatment technologies are similarly assessed (particularly for emissions requirements) **regardless of scale, type and risk of activity** (which affects total load/impact). i.e. *disproportionate* regulation with respect to scale and risk using similar rules for both small and large systems. Refer **Figure 2** below.
- Whilst municipal biosolids is not currently listed as an *eligible waste fuel* feedstock in NSW, it was provided with an ‘exemption’ clause under the NSW Energy from Waste Policy framework. The use of biomass **co-feeds** combined with biosolids can provide significantly improved technical and economic performance (mass and energy balance), product quality and climate benefits (ER and CDR), helping water utilities and councils in NSW better manage multiple wasted resources concurrently (including problematic FOGO being diverted from landfill which can also be challenged with PFAS ‘forever chemicals’). Clarity for allowance of appropriate co-feeds along biosolids is required.
- Mechanisms such as “End of Waste Codes” to define when a ‘waste’ becomes a resource can assist regulatory pathways as Australia transitions to a more circular economy.
- Decouple **circular and regenerative** thermal treatment processes (e.g. pyrolysis and gasification that produce biochar, biofuels etc) from **linear** energy from waste via combustion/incineration (‘one-off’ use).
- Consideration of the potential for improved outcomes by altering current practices (‘business as usual’) to provide a net benefit to the community and environment should also be included in assessments. For example, open burning of vegetation in rural areas (including agricultural residues) and hazard reduction burns for fuel load management and forestry residues (e.g. slash piles) is currently legal and is not required to meet the same emissions performance as alternative thermal treatment technologies such as biochar systems. Even small mobile flame-capped biochar kilns (see Figure 2) are not seen more positively than open burning. Subsequently, impacts to the environment [and health](#) of the community occur from open burning (including to the elderly) which could be reduced through improved policy. Alternatively, making biochar could upcycle these otherwise wasted resources to a valuable product which concurrently helps to improve health and climate outcomes when compared to conventional combustion, potentially *halving* CO<sub>2</sub> emissions via up to half the carbon remaining within the biochar. The US Department of Agriculture (USDA) released [a report in July 2024](#) confirming significantly improved emissions via mobile biochar production methods.
- Regenerating nature is a third key pillar of circular economy that is often overlooked. Eliminating waste and pollution, circulating products and materials (at their highest value), and regenerating nature are the three core principles of [circular economy](#) espoused by the Ellen Macarthur Foundation. Biochar has an important role to play in rehabilitating degraded land and helping transition degraded land back into productive uses, including food production.

**Figure 1:** Modern approaches for improved recovery of resources could separate circular thermal treatments (from linear combustion/disposal) and consider critical issues challenging the modern world including climate change and related sustainability factors.

## Modern approaches to efficient recovery of resources...

- Higher value recovery via solid products such as Biochar should also be included in policies such as this (*not just liquid fuels*).
- **Climate change, Water and other Sustainability** aspects should be integrated into higher order use assessments alongside (updated) waste hierarchy.

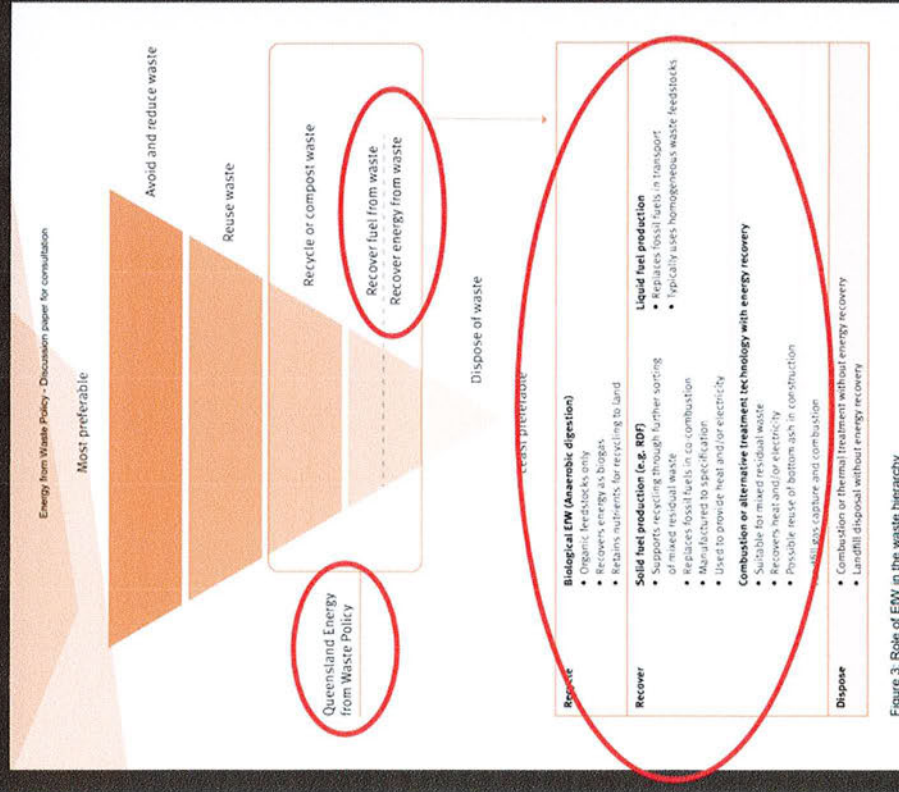


Figure 3. Role of EW in the waste hierarchy



**Figure 2:** The need for 'Horses for Courses' - Proportionate assessment of scale, type and risk (e.g. small 2m<sup>3</sup> mobile batch kiln to treat biomass (worth \$5k-\$25k) versus very large scale (>500,000 tonnes/yr) incinerator to treat Municipal Solid Waste (worth >\$600,000,000))

## Example Challenges & Hurdles: (Dis)Proportionate Assessment of Scale/Activity and Risk

In many states the same/similar assessment & controls applies to all scales & types of 'thermal treatment'



Examples\* of Advanced Centralised & Decentralised Commercial & Industrial Plants  
(*examples only, many more suppliers nationally*)

Example Very Small Scale  
(Flame-capped kilns)



Example Mobile/Relocatable Commercial\*



\* Also provide larger commercial systems

Very Large Scale / Cost  
Conventional Incinerators  
(>>\$600M facilities)

