PYROCAL
PTY LTD

Opportunities in the Circular Economy – Interim Report

11th April 2025

Australian Government Productivity Commission
Inquiry into opportunities in the circular economy
Via online portal: www.pc.gov.au/inquiries/current/circular-economy/make-submission#lodge

Pyrocal is an Australian-owned and operated engineering company designing and manufacturing industrial-scale carbonisation systems using Continuous Carbonisation Technology (CCT). Pyrocal has invested heavily in research and development over the past ten years to optimize the system to produce biochar and recover energy from biosolids and biomass.

Pyrocal's technology and experience was instrumental in the design, manufacture, installation, commissioning and operational support of Australia's first biosolids gasification facility at Logan Water in 2022. Pyrocal partnered with Downer, WSP, Stantec and the client, Logan Water to deliver this project. This project has been recognised locally and globally for its innovation, winning a number of water industry innovation and engineering awards.

Pyrocal has taken a leading role in the development of the biochar market with the appointment of a dedicated Biochar Product and Market Development Manager. The role is focused on identifying potential customers, applications and product needs for both biomass and biosolids derived biochar.

Biochar is a well-known soil amendment and a developing component for construction materials. The historical lack and continuity of supply has however, been a barrier to developing commercial applications. Pyrocal has not only invested in resources but has also invested in equipment to develop biochar formulations in a granule form for ease of handling and application which will be a key requirement to adoption in the broader soil application markets.

Pyrocal has extensive experience in agricultural markets and is confident in the future of biochar based products with sales and collaborations in co-composting, growing media, retail formulations, animal supplements and fertilizer products.

Pyrocal has co-funded research with the University of Southern Queensland and CSIRO into the effects of biosolids biochar application to soil. The research has been conducted to support the beneficial use of biosolids biochar for land application and the published results are available on request.

Construction materials are an alternate use which is developing and Pyrocal is engaged with a range of product developers using biochar as a component.

As part of the market development, Pyrocal is an active member of a number of different industry organisations, supporting knowledge transfer and contributing to research.

- Australian Macadamia Society
- WEF - Water Environment Federation (USA)
- AWA - Australian Water Association

- ANZBP - Australia New Zealand Biosolids Partnership
- QldWater - Queensland Water Directorate
- ANZBIG - Australia New Zealand Biochar Industry Group

Information request 5.3

Regulatory clarity – Carbonisation technology adoption for the transformation of organic waste (agricultural residues and sewage sludge) is currently hindered by the lack of regulatory clarity in the treatment of air emissions and biochar application. State based regulation is inconsistent and does not currently deal specifically with carbonization or Advanced Thermal Treatment. The uncertainty in the regulatory treatment of carbonization technology has resulted in the avoidance or delay of investment in this new technology from a broad range of prospective customers until clear regulation is known.

Conversion of waste to resource – An example of the impact of delays in regulation is Logan Water commissioned Australia's first biosolids gasification project in early 2022 with planning and approval to operate being achieved prior to commissioning, we are now in early 2025 and yet to have a regulation that allows biosolids derived biochar to be land applied as biochar and realise the financial benefit of a $28M investment. This is an example from Queensland, the treatment of biosolids biochar in other states is unknown at this time and a major impediment to investment and the advancement of the circular economy for organic waste streams.

Compliance cost – Queensland End of Waste Code – Biochar Final Draft requires an extensive testing regime for PFAS amongst other properties. The proposed testing cost is in the order of $130,000 per annum and does not recognize the low presence of PFAs relative to other PFAS containing wastes (biosolids, compost) and the relative testing requirements. The proposed testing burden is another disincentive to investment.

Financial incentives and water utility funding models – Waste levies are insufficient to incentivize investment in alternate technology. In addition, water utilities and Councils typically have to agree Capital expenditure (CAPEX) and Operational Expenditure (OPEX) in advance of the work. In a number of states this is submitted to a regulator (ESC in Vic or IPART in NSW) and is locked in on near terms cycles, such as 4-5 years. This constrains the financial agility of a Council or Water Authority to adopt emerging technology, especially when it may be an OPEX v CAPEX decision or incorporated nonregulated revenue from Biochar or CO_2 removal certificates. If authorities are truly to have the flexibility to adopt emerging technology, advance circular economy outcomes and balance longer term OPEX and CAPEX decisions in a business case then the model for funding needs to be looked at as it is a current constraint.

Knowledge on technology maturity – Carbonisation technology has been around for a few years but has only recently started to be more widely adopted. We would consider Pyrocal technology to be TRL (technology readiness level) 9, essentially suitable for full-scale commercial deployment with well understood performance. Some sectors of the industry who are developing their own technology are much further behind. This is confusing clients and making them nervous to adopt the technology because for some it is emerging and for others it is becoming business as usual. This is a barrier to adoption.

PYROCAL
PTY LTD

In summary, carbonization provides significant opportunities to advance the Circular Economy along with the associated carbon abatement, destruction of contaminants of emerging concern such as PFAS and microplastics, volume reduction, landfill avoidance all to the benefit of the economy, environment and society. Currently the disincentives as a result of slow/delayed regulatory frameworks combined with the lack of financial incentives result in delays/avoidance of the adoption of this valuable technology.

Yours faithfully,

Barry Croker
CEO