1 November 2024

Sara Collard
Assistant Commissioner
Productivity Commission
4 National Circuit
Barton ACT 2600

Submission online:
www.pc.gov.au/inquiries/current/circular-economy/make-submission#lodge

Dear Ms Collard

Re: Productivity Commission on the Opportunities in the Circular Economy – Call for Submissions (September 2024

The Queensland Water Directorate (***qldwater***) is the central advisory and advocacy body, working with our members to provide safe, secure and sustainable urban water to Queensland communities. In providing these essential services, the urban water sector owns and operates sewer lines, water and wastewater treatment plants, pumping stations, dams, reservoirs, and a range of other critical water technologies/infrastructure.

There are 370 water supply schemes and 265 sewage schemes across Queensland. Our members currently service 2,483,140 sewerage and 2,662,366 drinking water connections. These numbers are set to substantially increase with current and projected population growth.

The Queensland sector is comprised of 73 urban water service providers, directly employing approximately 7,000 people. ***qldwater*** represents all 73 urban water providers in Queensland – the 69 local government water service providers, two council-owned statutory authorities in south-east Queensland and the two state-government owned corporations.

We welcome the opportunity to provide a submission to the Productivity Commission on the Opportunities in the Circular Economy – Call for Submissions (September 2024). ***qldwater*** provides this submission without prejudice to any submissions from our members or other urban water service providers.

Background to Submission

qldwater understands that the Australian Government has asked the Productivity Commission (the PC) to undertake an inquiry into Australia's opportunities in the circular economy to improve materials productivity and efficiency in ways that benefit the economy and the environment.

This submission specifically addresses the circular economy opportunities and threats currently impacting Queensland's urban water sector, specifically around biosolids.

Biosolids are treated solids from the sewage treatment process. Biosolids have a high nutrient value and can be used as a soil conditioner on farms. Biosolids can help improve soil quality and crop yields. By reusing biosolids, these nutrients and carbon are returned to local soils reducing the need for additional fertilizers.

The use of biosolids in Queensland is regulated by an End of Waste Code (Biosolids ENEW07359617) developed by Department of Environment, Science and Innovation. The Code stipulates the allowable uses based on the level of treatment. Biosolids treatment processes have been proven to control disease-causing micro-organisms (pathogens), and this forms the basis for the Code. The Code also includes requirements to test biosolids for a range of heavy metals, organic compounds, nutrients, pathogens and odour.

The Queensland Government was the first jurisdiction in Australia to place management requirements on biosolids through the end of waste code. The environmental regulator has also developed a Best Practice Environmental Management Guideline (ESR/2021/5670) and Model Operating Conditions (MOCs) (ESR/2015/1665) for composting activities to address a range of issues, including PFAS contamination in compost. Some biosolids are sent to composting operations. The Queensland Government is also developing an end of waste code for biochar, which will include biosolids-derived biochar. Biosolids-derived biochar may be used as a soil amendment in agriculture.

Beneficial Use of Biosolids for a Circular Economy

According to Australian Water Association[1] the total biosolids production of Australia was 372,000 tonnes of dry solids in 2023, representing about a 6% increase from the 2021. In Australia, nearly 85% of biosolids is beneficially used.

During 2019-2020, 85,664 tonnes of biosolids (DSE) were generated across Queensland, of which 10,828 tonnes went to disposal and 74,836 tonnes were recovered; giving a recovery rate of 87.36%[2].

For the past decade, Queensland's population growth rate has been very consistent ranging from 0.64% to 2.85% adding around 30,000 to 130,000 people each year to the overall population. According to the 2021 Census, there are around 2.19 million households in Queensland, with each household sized at around 2.5 people[3].

The average household sewage leads to the production of between 0.5 and 1 kilogram of biosolids (dry weight) per week. This varies depending on the type and effectiveness of the sewage treatment technologies employed to which a particular household's sewerage system is connected and a number of other factors such as the scale and type of industries connected to the sewerage system.

By 2050, Queensland's population will exceed 8 million, equivalent to around 3.2 million households, expected to produce in excess of 130,000 tonnes of biosolids per annum (subject to sewage treatment technology). Thus, the demand for treatment, recovery, beneficial use and/or disposal of

[1] Australian Water Association. https://www.biosolids.com.au/guidelines/australian-biosolids-statistics/. Accessed 1 November 2024.

[2] Queensland Government. Recycling and Waste in Queensland 2019.

[3] Australian Bureau of Statistics. Quick Stats, Census 2021. 2021 Queensland, Census All persons QuickStats | Australian Bureau of Statistics (abs.gov.au)

biosolids is going to increase. This is a waste/resource stream that is expected to grow over time with little to no changes.

Up to 50 percent of domestic waste is organic materials with other organic wastes including sewage sludge, food wastes and industrial food processing wastes. Biosolids are generated at the sewage treatment plant from the sewage treatment process, with production estimated anywhere between 30-50kg dry solids per equivalent person per day (equivalent to 150kg of dry cake per annum). The biosolids are produced as either a thickened slurry or a dewater cake and, more recently, pellets. And contain useful quantities of organic matter, and nutrients such as nitrogen (N), phosphorus (P) and potassium (K), and lead to improvements in soil characteristics such as improved microbial activities and oxygen consumption.

Beneficial use is now a prerequisite for disposal of biosolids in many developed countries which has necessitated formulation of guidelines to prevent environmental contamination with heavy metals and pesticides, and infection of human and animal populations with pathogenic organisms; resulting in different classifications (such as Grades A to E) to control the end uses for the material. While it is commonly accepted that the utilisation of nutrients in biosolids at or below agronomic loading rates are highly beneficial, there is increasing concern related to contamination of biosolids from both known and new sources; and how the concentrations or leaching potential of these new contaminants will be impacted through further pre-treatment (such as pelletisation to improve handling and reduce the amount of water being transported) or co-composting (to value-add to lower nutrient organic waste streams such as green waste).

Over 85 percent of the total biosolids in Queensland are produced and processed within 50km of Brisbane[2].

Table 1: Biosolids processed by organic processors in 2019-2020 by regional (tonnes)

	SEQ	Darling Downs Maranoa	Wide Bay	Fitzroy	Mackay	Townsville	Cairns	Remote QLD
Biosolids DSE	57,465	4,629	1,601	379	1,687	1,705	8,407	32

These biosolids are utilised primarily in the production of fibre to the west of Brisbane and to build the resilience of pasture, as the application of biosolids to food crops or grazing land is strictly controlled. There are strict restrictions on the surface application of biosolids to pasture for grazing and the promotion of the immediate incorporation into the soil reduces the likelihood of any organic contaminant accumulation by grazing animals.

Contaminants of Concern

Annually thousands of new contaminants enter the market in common consumer products and are washed down our drains, ending up in drinking water, the marine environment and in the resulting waste-water sludges. These contaminants are comprised of lawfully produced and retailed chemicals and pharmaceuticals through to illicit drugs, and more recently, high profile contaminants such as microbeads which are used as exfoliating and smoothing agents in hundreds of personal care products.

Contaminants from everyday products like shampoos, toothpaste and makeup are almost impossible to manage once used by the householder; while new organic contaminants arising from manufacturing and processing practices all end up down the drain, where the burden of dealing with them falls onto the wastewater systems.

The perceived impact of these physical contaminants and chemical compounds, particularly those which persist in the environment, bioaccumulate in both humans and the environment (particularly as they become concentrated in higher quantities and move up the food chain), and/or there is evidence of ecotoxicity, is growing. This is especially the case for the Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), due to regulatory action in Europe and the United States.

The Commonwealth has implemented the Industrial Chemicals Environmental Management Standard (IChEMS) to set nationally consistent standards for the importation, manufacture, use and disposal of industrial chemicals. In 2023 the PFAS compounds PFOA, PFOS and PFHxS (and their precursor chemicals) were listed on Schedule 7 of the IChEMS register, which restricts the importation of articles and chemicals containing these compounds. However, the limits for unintentional contamination for each of these chemicals in imports is set at 25 µg/kg, which is substantially higher than guideline maximum contaminant levels in biosolids as described in the Draft PFAS NEMP 3.0 and trigger values under the Queensland End of Waste Code for Biosolids. Furthermore, this regulation does not appear to cover articles containing PFAS that would technically be covered by other regulations e.g. Therapeutic Goods Administration for medicines (including the packaging of those medicines); Australian Consumer Law which governs ingredients for personal care products, cosmetics; Australian Pesticides and Veterinary Medicines Authority for veterinary medicines and pesticides.

Research from Australia[4] shows that much of the PFAS in wastewater is derived from domestic rather than industrial sources, especially for the diPAP classes of PFAS precursor compounds which are metabolised to PFAA (which include PFOS and PFOA). The diPAP group are widely used in food packaging materials, pharmaceuticals and personal care products, and are currently not regulated through IChEMS.

Nevertheless, the prevalence of certain PFAS in the Australian population as demonstrated by blood concentrations[5] is declining, which can be attributed to the introduction of bans in the early 2000s. This is good evidence of the success of source control measures, and the timeframes over which they can be expected to be effective. Improved source control measures for PFAS, managed at the national level, are necessary to prevent the importation of PFAS in articles that will then be used in people's homes and contact with their food and bodies, and then make their way to wastewater.

Without these measures, the potential for longer term beneficial reuse of biosolids will be limited by the presence of these Contaminants of Concern.

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[4] T.C. Moodie et al. 2021, Legacy and emerging per- and polyfluoroalkyl substances (PFASs) in Australian biosolids. https://doi.org/10.1016/j.chemosphere.2020.129143.
H.T. Nguyen, et al. 2022, Background release and potential point sources of per- and polyfluoroalkyl substances to municipal wastewater treatment plants across Australia, https://doi.org/10.1016/j.chemosphere.2022.133657.

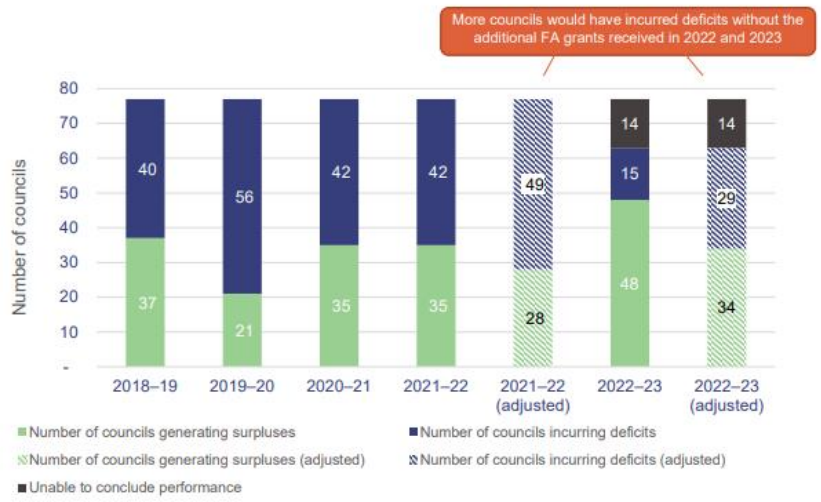
[5] L.M. L. Toms et al. (2019) Per- and polyfluoroalkyl substances (PFAS) in Australia: Current levels and estimated population reference values for selected compounds https://doi.org/10.1016/j.ijheh.2019.03.004
G. Taucare et al. (2024). Temporal trends of per- and polyfluoroalkyl substances concentrations: Insights from Australian human biomonitoring 2002–2021 and the U.S. NHANES programs 2003–2018. https://doi.org/10.1016/j.envres.2024.119777

Ability to Fund Additional Barrier Technologies and Infrastructure Upgrades

To manage the growing threat and regulation associated with Contaminants of Concern, wastewater treatment facilities will need to implement new barrier technologies. These technologies are expensive while many are unable to definitively treat the emerging contaminants. The operation of some of these technologies also requires additional qualifications for operational personnel.

In Queensland, most urban water providers (69 out of 73) are local councils. Queensland's local governments are already financially strained, with 29 Queensland councils incurring a deficit in the 2022-23 financial year (refer to Figure 5G[6]). It is ***qldwater's*** view that any additional financial strain placed on local governments will see the councils needing to further cut essential services (urban water) funding and/or further increase rates, thereby exacerbating the cost-of-living crisis.

Figure 5G
Number of councils generating operating surpluses and incurring deficits, and the effect of advance FA grants received each year – 2018–19 to 2022–23



Note: adjusted for 2021–22 and 2022–23 indicates operational results if councils received the same proportion of their FA grants as in 2020–21 and before.

Source: Compiled by the Queensland Audit Office from councils' certified financial statements available on 31 October 2023.

Where funding for new infrastructure is unavailable, biosolids may no longer meet new regulations for beneficial reuse and will have to be sent to landfill. In Queensland, biosolids are considered a regulated waste and attract a high level of levy on top of the disposal fee. Moreover, very few landfills are either licenced or engineered to accept biosolids. New technologies for biosolids treatment are emerging (for example biochar production technologies) however, they are expensive and require a degree of scalability.

qldwater's concern is that we are heading to a *perfect storm* where biosolids production is increasing (due to growing populations), the opportunities for their (beneficial) use in the circular economy is being diminished due to emerging contaminants and increasing regulation, and there are no opportunities for disposal. Long-term storage is not an option.

[6] Queensland Audit Office, 2024, 'Financial Audit Report: Local Government 2023 (Report 8: 2023-24)', p. 34, <https://www.qao.qld.gov.au/sites/default/files/2024-01/Local%20government%202023%20%28Report%208%E2%80%93%202023%E2%80%9324%29_0.pdf>.

To manage the emerging risks, the Australian Government in association with the Queensland Government must consider immediate funding for local councils delivering urban water services. New infrastructure will take time to design and construct, while new regulations and public concerns are progressing quickly.

If you require any further information, please do not hesitate to contact Dr Louise Reeves at LReeves@qldwater.com.au.

Yours sincerely

Dr Georgina Davis
Chief Executive Officer