NOVEMBER 2024 — SCIENCE & POLICY

SCIENCE VICTORIA



Priorities in Order?

Analysis of the National Science Statement
— pg 10

Science Without Action

Gaps Between Evidence and Policy
— pg 14

Tell the Truth...

Lies Limiting Environmental Action
— pg 16

Inside

Science, Media, and the Law
Solid Waste in Victoria
Policy Upcycling

ISSN 2981-8664
9 772981 866005 10

In This Issue

SCIENCE & POLICY

Government policies are plans and guidelines that inform and direct actions on topics such as the environment, health, and infrastructure. Effective policies are informed by evidence, after consideration and weighting of relevant data, while also being responsive to new findings. In this edition, we look at the intersection of science & policy, particularly how evidence-based approaches lead to more effective and adaptable decision-making.



ON THE COVER

Photograph: The Climate Reality via Unsplash.



2 From the Editor
3 From the RSV President
6 Snapshots of STEMM

Events & Opportunities

8 Preventing Psychotic Illnesses: Advances, Challenges, and Debates
8 Soil Biodiversity: Monitoring to Manipulating for Improved Soil Health
9 Innovation Synergy Series: Bridging Minds and Markets

Awards & Prizes

9 The Prime Minister's Prizes for Science 2025

Articles

10 Australia's National Science Statement
Clear roadmap or chimera?

14 Science Without Action
The gap between evidence-based research and government policy

16 Saving Australia's Biodiversity Means Ending the Lies
Dispelling common misinformation

20 Science, Media, and the Law
Lessons from the Kathleen Folbigg Case

24 Solid Waste in Victoria
Past, present, and future

28 The Atomisation of Accountability – and Knowledge
The legacy of neoliberal policy failure in Victoria

32 The Art of Policy Upcycling
Remixing ideas into new solutions

From the Archives

34 1875: A River Retrenched

Inspiring Victoria

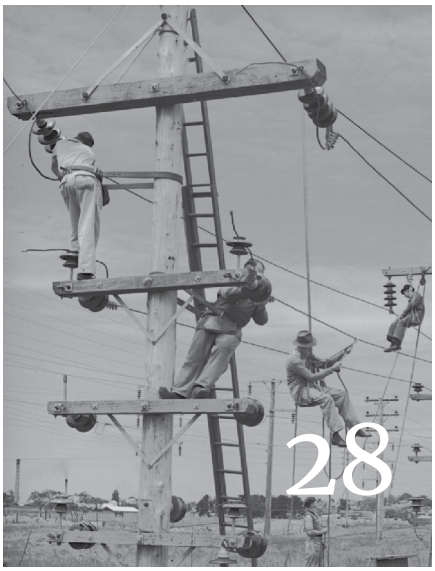
36 Evidence-based Action on Vaping and Tobacco
Report from the Inquiry into Vaping and Tobacco Controls

39 Survived and Thrived
Inspiring Victoria Partner Events from National Science Week 2024



Proceedings of the RSV

40 Call for Scientific Papers
41 Volume 136
The future of the Gippsland Lakes



43 Engage Victoria
44 Guidelines for Authors
46 RSV Facilities & Services
47 Support the RSV
48 RSV Membership

Upcoming Submission Deadlines

For all 2024 editions and deadlines, refer to page 45.

DECEMBER 2024	**DUE DATE**
Science & Business	*5pm, 15 November*
FEBRUARY/MARCH 2024	**DUE DATE**
	5pm, 13 December



The once-familiar landscape of the municipal 'tip.' Photograph: Andromeda stock via Shutterstock

Solid Waste in Victoria

Past, Present, and Future

DR JOE PICKIN
Director, Blue Environment

Waste is an upside-down material transaction. Usually, exchanges of money and materials are in opposite directions – I give you money, you give me stuff. But when you pay a waste company to provide their service, they take both the money and the materials. There are obvious risks with this transaction, which increase significantly with scale.

Price is a key consideration in choosing a provider, but waste transactions might be cheap because the waste will be badly managed or dumped. Poorly constructed landfills can leak, stink, burn, and support pest animals. Promised recycling may not occur.[1] Criminal gangs sometimes hire a warehouse, put out the word of a cheap recycling option, then disappear when the warehouse is full of tyres or demolition waste.[2,3] Naivety or bad luck can also lead to orphaned stockpiles, when markets for recovered products fail, or equipment works worse than promised.

Waste management is quintessentially collective, and the potential for private benefit at public cost justifies government intervention. Protecting the environment from waste needs laws, regulations, engineering specifications, standards, licences, monitoring, outreach programs, investigators, scientists, and lawyers. State environment protection authorities do much of it.

As well as direct environmental protection, there are strategic aims needed when managing waste flows. The 'waste hierarchy' is the best recognised articulation – it preferences reducing and reusing waste, then recycling and energy recovery, and lastly disposal. The modern policy concept is the 'circular economy', which aims to keep products and materials in circulation and at their highest and best use for as long as possible, with contributions through better design, maintenance, reuse, refurbishment, remanufacture, recycling, and composting.[4] This needs targets, financial incentives, grants, markets, advocacy, innovation, data and public education. Several states – including Victoria – have established separate organisations for this agenda.

This article focuses on the application of this strategic aim, beginning with how Victoria's recent waste history has led to the circular economy has become a guiding principle for our state's waste management.



Waste management is quintessentially collective, and the potential for private benefit at public cost justifies government intervention. Protecting the environment from waste needs laws, regulations, engineering specifications, standards, licences, monitoring, outreach programs, investigators, scientists, and lawyers. State environment protection authorities do much of it.

Waste in Victoria – a history

At the end of the 1960s, most Victorian local governments ran their own tip, typically in an old and unlined quarry, and restricted to locals. This resource was supplemented by backyard and industrial incinerators – quite literally, burn your rubbish at home. There was little control or knowledge of what or how much went where.

During the following decade, the politics of pollution made major inroads. In 1971 Victoria was the second jurisdiction in the world to form an Environment Protection Authority (EPA). *The Environment Protection Act 1970* centralised the regulation of industrial discharges. The waste hierarchy became popularised.

Around this time, beverage companies stopped wanting their empty bottles back to wash and refill them, as it was no longer cost-effective. This went down badly in the community, and there were calls for container deposits. Inquiries followed, and deals were done. Recycling targets were negotiated with paper and packaging companies. Industry pushed for an 'integrated solution' to recycling through local government, and helped set up the first formal municipal recycling collections. Municipal recycling went mainstream in the 1980s, but industry battled against tightened targets and the cost of recycling was increasingly borne by ratepayers. Volatility in prices paid for collected materials was a major challenge, and led to stockpiles and periodic bailouts.

A landfill levy of $3/tonne was imposed on metropolitan commercial waste in 1992. The increased price of the alternative helped make recycling more attractive, and funds could be used for strategic support for recycling. It proved a successful approach, and the rate and the revenue climbed over the subsequent decades. In July 2025, the metropolitan levy will increase to $167.90/tonne.

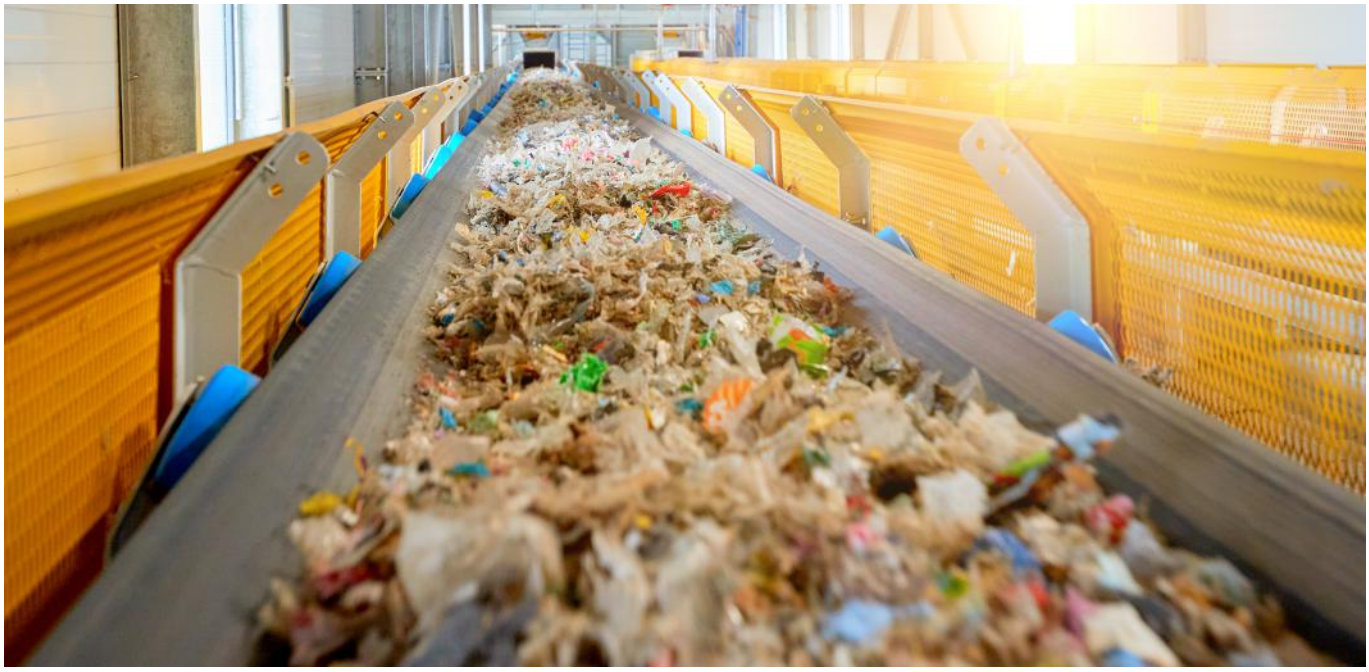
The increasing complexity and demands of waste management saw major changes in its delivery. Local earth-moving contractors mostly withdrew or sold up, and specialist national and international operators became prominent. Local governments also began to withdraw from direct waste management. Most contracted out the collection processes and, in the cities at least, sold their landfills. The big waste companies developed large-scale engineered landfills and invested in recycling. The support from the landfill levy saw construction and demolition waste recycling take off, substituting for quarry materials. Composting grew in size and scope.

Piecemeal deals with the packaging and paper industries gave way to the 1999 *National Packaging Covenant*. Signatories were required to develop a public action plan, submit annual reports, and contribute to funding recycling. Business flocked to sign, but in those early days many action plans focused more on reducing their own waste than stewardship of their products. Some simply copied the action plan of their industry association. The $11 million transitional funding from industry was less than 2% of the cost of municipal recycling costs over the initial Covenant period.[5]

Product stewardship of oil was introduced in 2000. This was the first and is still the most successful mandatory product stewardship program – where sellers of a product take a voluntary or mandatory role in its end-of-life management. A levy on oil purchases funds a collection program so that the cheapest option for auto mechanics is collection for re-refining.

Life cycle assessments in the 2000s compared the greenhouse gas emission implications across the whole product chain of "virgin manufacture and discard to landfill" with recycling.[6,7,8] Recycling was shown to be better in almost all cases. The increasing political difficulty in establishing new landfills gave additional force to these arguments.

Victoria's first waste strategy *Towards Zero Waste* foresaw an overall waste recovery rate (defined as (waste recycled + waste to energy recovery)/waste generated) of 75% by mid-2014.[9] It relied on education, industry partnerships, product stewardship, grants, and buy-recycled programs. There was optimism about landfill alternatives – either new generation thermal technologies or factories that separated the recyclables, pulled out the nasties, and composted the remainder. NSW businesses pioneered these approaches, investing $0.5b during the 2000s only for them to perform poorly or fail outright. In Victoria, recycling inched forward without them, and the target wasn't met.



Fuel conveyor: municipal solid waste on its way to a boiler for combustion. Photograph: Martin Mecnarowski via Shutterstock

Landfill prices continued to rise with the levy and increasingly strict engineering requirements. Recycling prices followed. The community slowly got used to much higher costs for waste management.

The global commodification of recycling led to a concentration of demand from China, the global centre of manufacturing. Victorian domestic recyclables were sorted only roughly, then exported for finishing. By 2018, the Chinese government was fed up with the environmental implications of receiving the world's semi-sorted recyclables and imposed bans. Markets for recovered paper and plastic jammed up all over the world. Victoria had a major bankruptcy, large stockpiles, and fires.

The Australian Government intervened. It placed matching bans on exporting waste-derived products unless they were ready for direct use, and co-funded replacement technology. It cemented and expanded its stake in the waste sector by working with the states on a new set of targets, including an 80% recovery rate by 2030. This was matched by Victoria.

Waste in Victoria – the status

The most up-to-date Victorian data puts the recovery rate at 66% in the 2022-23 financial year. The municipal recovery rate lifted to 55%, as separate collection of organic waste, including food, becomes more common. About 84% of construction and demolition waste was recovered, mostly to make road base and other civil engineering materials. Commercial and industrial waste recovery rates have been declining slightly in recent years and sat at 55%.[10]

Compared with other states and developed countries, our recovery rate is not particularly high or low. Victoria's bipartisan effort and success has been matched by others. But while we might recover most waste, CSIRO estimates that only 4% of Australia's material throughput is derived from recovered materials.[11]

Clearly, the journey to circularity will be long.

Waste in Victoria – how do we get (more) circular?

As the financial, regulatory, and other incentives to recycle grow, it is obvious that the easiest materials will be dealt with first. That means that the portion not recovered in 2022-23 will be harder to tackle. So how should we deal with it?

Firstly, it is worth looking up the hierarchy at options to reduce, repair, and reuse. Governments like to push these options, typically by promotion and education. But they battle the tide – over the scale of centuries, the price of 'stuff' relative to the price of labour has fallen strongly.[12] This tends to boost waste as new materials and products outcompete human effort.

> A hundred years ago, a worn shirt would get patched, a blunt saw sharpened, a bottle refilled, a nappy washed, a razor blade changed. Now, prices push us towards disposal and replacement. In addition, for every dollar a government can spend promoting material frugality, advertisers can spend a thousand to convince us to buy more.

Nevertheless, apart from waste generated by major infrastructure developments, the total mass of waste is stabilising, as digitisation replaces print and we learn to make products from lighter materials.[13,14]

There are also a few things in the pipeline to improve recovery of waste materials:

- Victoria's four-bin municipal waste standard will generate clean streams of glass and other recyclables that attract more interest from potential users.
- Diversion of domestic food waste to the organics stream

will reduce the impact of landfills and improve the nutrient value of composts – so long as we can manage awful contamination problems in some areas.

- The Victorian Government has also flagged an interest in requiring diversion of food waste from larger commercial generators such as restaurants, cafes, and institutions such as universities, hospitals, and prisons.
- Waste to energy is on its way, and within 10 years facilities in Laverton, Dandenong, and the Latrobe Valley are likely to be manufacturing electricity and steam from mostly municipal waste.

Collecting and processing materials for recycling is only half the story – unless someone wants to buy the materials, it's a wasted effort. Governments can do a lot more in this area, particularly as they expend more than one in three of every dollar spent in Australia.[15]

But waste management remains a largely marginalised industry, expected to deal with whatever comes its way. That can include:

- lithium ion batteries that set fire to waste infrastructure;
- toxic PFAS (per- and polyfluoroalkyl substances), for which we set maximum levels for compost but not for lipstick;
- packaging that is made from layers of different plastics and capped with another different material;
- electronic goods with multiple different screws and glues that increase the cost of repair and dismantling; or,
- fake 'compostable' materials sold openly in supermarkets.

Governments are getting better at these things – for example, many problematic single-use plastics have been banned – but progress is glacial.

The key to becoming more circular is to strengthen the links between the 'outputs' and 'inputs' to the economy. We need to shape inputs through reference to the outputs. We need to oblige those who sell products into the economy to have some level of financial or logistical responsibility for their end-of-life management.

Ideally, we would have a default trigger that places obligations on any product that cannot be readily managed to a standard acceptable to the community standards using existing waste management processes. This would shape design, reduce end-of-life costs for consumers and improve markets for recovered materials.

But Australia seems to find product stewardship terribly hard. I speculate the following reasons:

- Waste is primarily a state responsibility, and they get all the levy funds, but regulating inputs to the economy requires the Commonwealth.
- There is a general reluctance to regulate. Governments seem happy to give industry years to flounder with voluntary methods before losing patience. Mandatory product stewardship for TVs and computers was held up for years by Commonwealth economists who saw no net benefit in the proposed program, despite enthusiasm from the community and major brands.
- There is a fear of administrative burden. Typically, product stewardship is supported by big brands with sophisticated administration but harder for smaller brands and no-name imports. Big brands won't do much unless their competitors are forced to. This requires the government to navigate the anti-cartel rules, identify all the players, drag them into the fold, educate, make the deal, monitor progress and enforce. There's a 'we're busy already' attitude.
- Regulating inputs will often mean putting a recycling levy on products. There is a reluctance to add to price pressures during a cost-of-living crisis. It is apparently preferable to have local and state government land managers collect 300,000 illegally dumped tyres per year at $22 per tyre rather than impose a purchase levy of $5 per tyre to make recycling the cheapest option.[16]
- It will get easier in the future. The European Union is typically the pioneer in this area. To some extent, we can ride on its coattails.

Although we're rubbish at it, product stewardship is where we need to go to improve our waste management and improve the circularity of the economy. It is most likely where we will go, at a slow and lurching pace.

- *Dr Joe Pickin is a director of Blue Environment strategic environmental consultants. He has 25 years of experience as a waste and resource recovery specialist and a PhD on the environmental economics of waste. He has particular expertise on data, modelling and greenhouse issues in relation to waste. Joe was the primary author of the Australian Government's biennial National Waste Reports from 2016 to 2024 and an advisor to the ABC's* War on Waste *series.*

REFERENCES:

1. Jaeger, C. (2022, June 30). After three years and $71m, Lara's mountain of rubbish is no more. The Age. theage.com.au/national/victoria/after-three-years-and-71m-lara-s-mountain-of-rubbish-is-no-more-20220629-p5axj8.html

2. Mannix, L., et al.. (2017, August 6). The tipping point: Illegal dumping swamps the waste industry. The Age. theage.com.au/national/victoria/the-tipping-point-illegal-dumping-swamps-the-waste-industry-20170806-gxq8m0.html

3. EPA Victoria. (2023, August 23). Fine for warehouse waste dumper. EPA Victoria. www.epa.vic.gov.au/about-epa/news-media-and-updates/media-releases-and-news/fine-for-warehouse-waste-dumper

4. Ellen MacArthur Foundation. (2017). Circular Economy Introduction. Ellen MacArthur Foundation; Ellen MacArthur Foundation. www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

5. Nolan-ITU. (2004). Evaluation of the Covenant, prepared for the National Packaging Covenant Council, Canberra. www.academia.edu/100130287/Volume_I_executive_summary

6. Nolan-ITU, SKM Economics, & Envirosris. (2001). Independent Assessment of Kerbside Recycling in Australia, prepared for the National Packaging Covenant Council, Melbourne.

7. Smith, A., et al. (2001). European Commission Waste management options and climate change, prepared for the European Commission DG Environment. ec.europa.eu/environment/pdf/waste/studies/climate_change.pdf

8. EPA. (2002). Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks,. EPA USA. archive.epa.gov/epawaste/conserve/tools/warm/pdfs/chapter1.pdf

9. EcoRecycle Victoria. (2005). Sustainability in Action: Towards Zero Waste Strategy, EcoRecycle Victoria, Melbourne.

10. Victoria's waste projection model dashboard. (2024, June 11). Recycling Victoria. www.vic.gov.au/victorias-waste-projection-model-dashboard

11. Miatto, A. (2024, March 5). Material flow analysis to progress to a circular economy. Circular Economy - CSIRO. research.csiro.au/circulareconomy/material-flow-report

12. Barnett, H. J. (1977). Scarcity and growth, revisited. In K. Smith (Ed.), Scarcity and Growth Reconsidered (pp. 163–217). Johns Hopkins University Press for Resources for the Future.

13. Hoornweg, D., et al. (2013). Environment: Waste production must peak this century. Nature, 502(7473), 615–617. doi.org/10.1038/502615a.

14. Blue Environment. (2022). National Waste Report 2022. DCCEEW. www.dcceew.gov.au/environment/protection/waste/national-waste-reports/2022

15. Statista. (2024). Australia: Ratio of government expenditure to gross domestic product (GDP) from 2019 to 2029. www.statista.com/statistics/260547/australias-ratio-of-government-expenditure-to-gross-domestic-product

16. Blue Environment. (2024, September 3). Stockpiling and illegal dumping of tyres: cost to local governments and others. Tyre Stewardship Australia. www.tyrestewardship.org.au/reports-facts-figures/stockpiling-and-illegal-dumping-of-tyres-cost-to-local-governments-and-others



Science Victoria
The Royal Society of Victoria
Wurundjeri Country
8 La Trobe Street, Melbourne, VIC 3000

View the Digital Edition
Scan the QR Code or go to:
rsv.org.au/news/science-victoria

Science Victoria is printed by Complete Colour who are ISO14001 EMS, ISO9000 QMS, & FSC certified, using Monza Satin FSC 100% recycled paper. Monza Recycled contains 100% recycled fibre and is FSC® Mix Certified, which ensures that pulp is derived from well-managed forests and recycled wood fibre. Monza Recycled is manufactured by an ISO 14001 certified mill.