Materials

Material flows and environmental pressures

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This fact sheet is one of a series, developed from material presented in Victoria's first comprehensive State of the Environment Report. The Report is a major undertaking of the Commissioner for Environmental Sustainability and covers a broad range of environmental issues affecting the State. Its purpose is to improve community understanding of Victoria's environment, and through the use of recommendations, to enhance its condition for present and future generations. The report was released in December 2008 and is available at www.ces.vic.gov.au

Key Findings

- Despite people's increasing disassociation from primary industries, material flows, sourced from the natural environment, still underpin economic growth and social wellbeing.
- Increasing material flows have been recorded from the primary industries, in manufacturing and construction, and most importantly, in the consumption phase of the economy.
- Increasing material flows require significant investments of energy and water: Transporting a kilogram of bananas to Melbourne emits over half a kilogram of CO_2 and the manufacture of approximately half a litre of milk requires 795 litres of water.
- Despite increases in recycling, total waste output of Victoria has increased from 5 million to 10 million tonnes over the last 13 years.

Materials flows are increasing

We depend upon materials for our way of life. Materials are all solid substances that are used to provide the services that enable our wellbeing. Most familiar as materials are everyday items such as plastic, glass, aluminium and paper. But 'materials' also includes food, clothes, computers, vehicles and buildings, in fact everything that we use everyday. Material use and consumption in Victoria is increasing, both in absolute terms and per person.

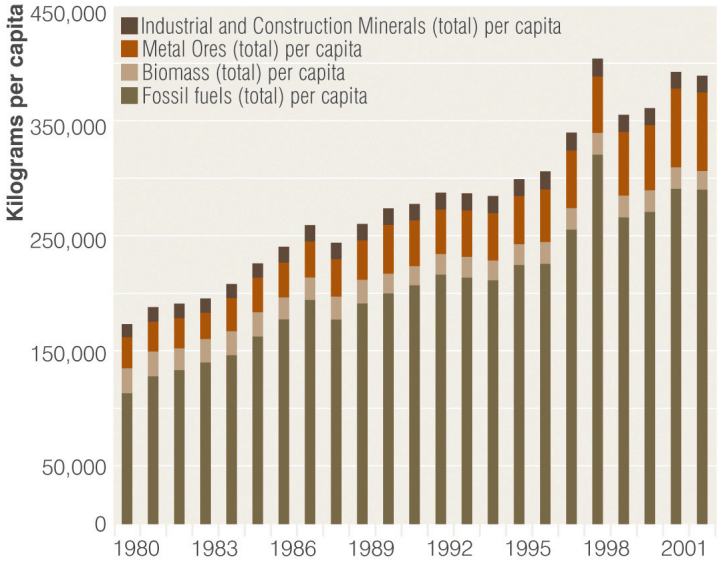

Figure 1: Estimated total domestic material extraction per capita Australia 1980–2002.

All materials are originally sourced from the natural environment, and so increasing materials use has implications for the depletion of natural resources. Similarly, because all material wastes must ultimately be returned to the natural environment, increasing material use also has environmental implications because of the production of harmful wastes.

In the transformation from natural resources to useful products, energy and water is invested 'into' materials. When material products are not used efficiently, the water and energy that is invested, or *embodied*, into them is wasted.

Increasing the efficiency of materials use (for example the increase in recycling) is essential if pressures on the environment are to be reduced.

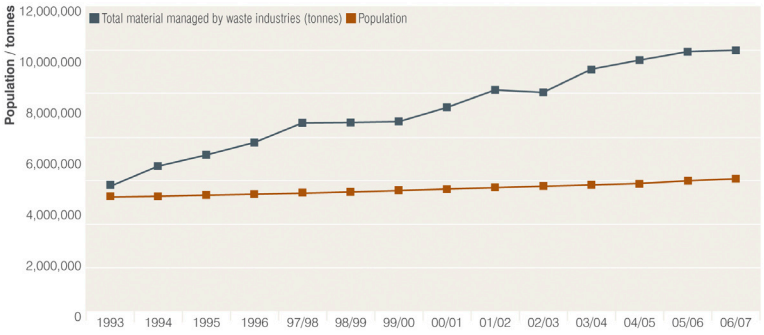

Figure 2: Victorian waste and population.

However, there are many cases where increasing efficiency alone has not been enough to reduce the environmental pressures associated with materials use. In such cases, in order to make a difference, reducing total material demand may be required.

Both the efficiency, and the volume of materials used, effects the environment

There are four main ways that materials use effects the environment. These are; through resource depletion, the impact of wastes and through the demand for water and energy embodied into material products.

1) Resource depletion

Resource depletion occurs when primary industries extract materials from the environment at a rate beyond that which the environment can sustain. One example of a depleted resource is the Western Zone of Victoria's Southern Rock Lobster Fishery.

Historic fishing regimes, themselves the result of increasing consumer demand for rock lobster, have depleted the fishery, such that in late 2007 the population was estimated to be at 20% of the 1950 level. Management plans have now been set that should see this fishery recover.

Commissioner Environmental Sustainability Victoria

Victoria The Place To Be

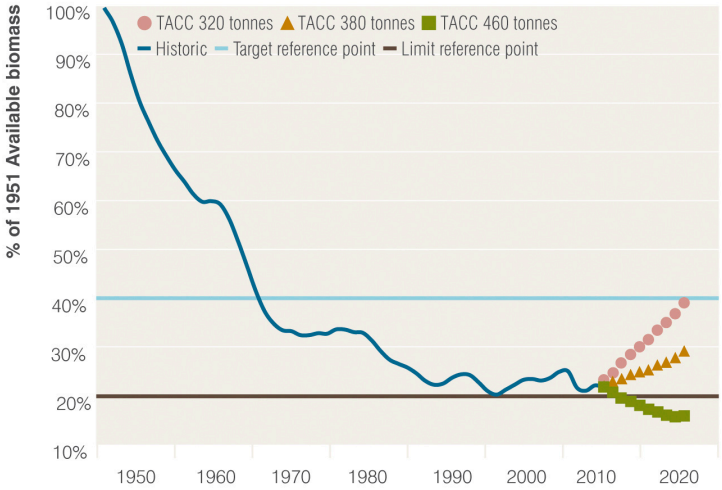

Figure 3. Biomass, reference points and total allowable commercial catch (TACC) limits for the Western Zone of the Southern Rock Lobster Fishery, 1950 – 2020.

2) Waste generation

With increasing materials use comes an increase in the generation of waste. Some wastes are harmful to the environment and can reduce amenity. They are known as *prescribed wastes*.

In Victoria, these are generally well managed with most being treated before disposal. Efficiency programs also encourage businesses to reduce the generation of prescribed wastes.

The recent increase in prescribed waste is actually the result of a tightening of regulations, whereby the environmental standard for managing soil waste was increased.

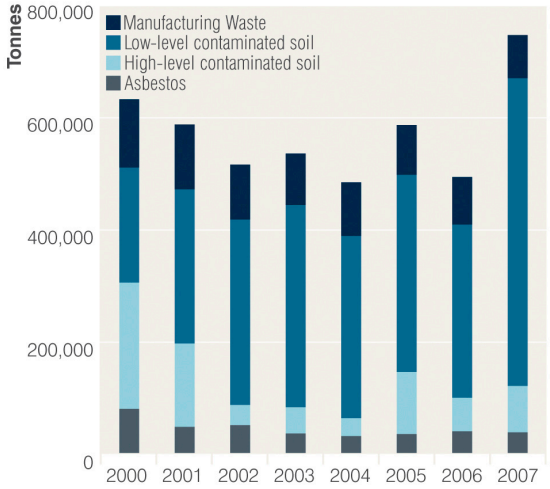

Figure 4. Prescribed waste generation 2000-2007.

3) Embodied water and embodied energy

Investigating materials flows also enables us to use them like a 'lens' through which to look at water and energy. This is because all materials act like vehicles for the water and energy that has been invested into them during production, manufacturing and transportation.

Estimates of the amount of embodied energy or water in material products are difficult because they require that the whole system, from primary production through to final consumption and waste be investigated. Nevertheless, there is value in these investigations, as by knowing how much water and energy are invested into materials, ways of reducing those amounts during production and manufacturing can be proposed.

For example, under current agricultural practices in Victoria, it is estimated that almost 9,000 litres of water have to be invested into every $1 worth of rice, although it should be pointed out that very little rice is grown in Victoria. In comparison, one dollar's worth of vegetables grown in Victoria requires only 200 litres of water to produce on average.

Similarly, over 206 gigajoules of energy is required to refine a tonne of aluminium to the point at which it is ready to be used to make into products such as aluminium cans. If used aluminum products are sent to landfill then all of this energy is effectively wasted. In comparison, recycling aluminium preserves 93% of this energy, using only 14 gigajoules of energy to manufacture a tonne of aluminium.

What is government doing about the environmental impact of materials use?

Victorians, with help from both local and state governments, have become good at recycling. Further ambitious targets have been set for recycling in each of the construction and demolition, commercial and industrial, and residential sectors. Government has also stepped up gate fees for wastes sent to landfill and for prescribed waste.

At the other end of the cycle, government provides incentives for businesses to participate in waste audits and for increasing the materials efficiency of certain manufacturing industries.

Consumers too have an important role in reducing the impacts of waste and government has provided new services, *ByteBack* for computers, *PaintBack* for paint and *FlashBack* for light bulbs, to encourage Victorians to participate in 'product stewardship'.

What the Commissioner says

"Victoria is a world leader in certain aspects of materials efficiency - domestic recycling is a great example. Yet there is much more that needs to be done. Rather than attempting to reduce the impacts of materials at only the waste end of the economy, more 'extended responsibility' programs that target the environmental pressures of materials throughout their lifecycle are vital.

"Increasing the efficiency of materials use is essential, yet if shown not to be sufficient for reducing the absolute impact of materials on the environment, then total consumption should also be reduced.

"Unlike the consumption stages of water and energy systems, where the government and community support demand management (the Save Water *and* Black Balloons *campaigns), materials consumption is still seen as largely sovereign and is unchallenged. This is seen as a major gap in addressing the environmental impacts of material flows."*

What you can do

- Familiarise yourself with and use local recycling programs.
- Practice home composting and prevent up to 50% of your waste being sent to landfill.
- Re-use items and repair those that are broken.
- Choose local and in-season food to reduce the environmental impacts of embodied energy used in transport.
- Stop using plastic shopping bags.
- Start a worm farm for turning kitchen scraps into nutrient-rich fertiliser for your garden.

For more information

- Materials Flow Analysis: The State of the Environment Report http://www.ces.vic.gov.au

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