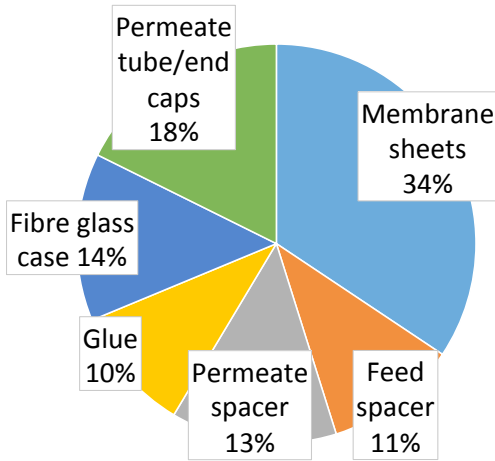
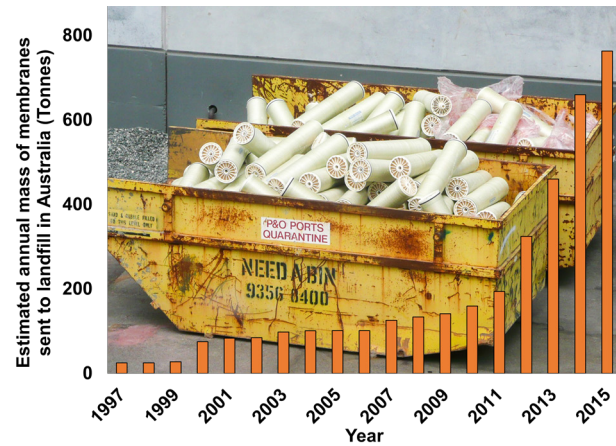


The membrane waste challenge



Average composition of a standard 8" reverse osmosis membrane

- Reverse osmosis plants use thousands of 14 kg elements that need to be replaced every 5-10 years.
- In many parts of the world, landfill is currently the only option for disposal.
- Over 12,000 tonnes of membranes per year to be disposed globally by 2015.
- Many reuse and recycle options are available for this valuable commodity.



Alternative options for end-of-life reverse osmosis membranes

Direct reuse

- Used membranes have been shown to be suitable for direct reuse after testing and characterisation.
- Direct reuse has been shown to be the most environmentally friendly option.
- Membranes used for over a year can be transported to any plant in Australia while remaining favourable to landfill.

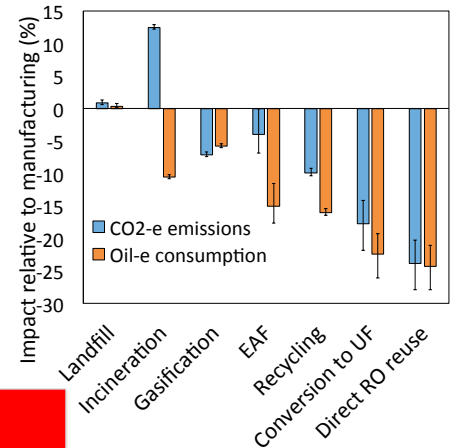
Conversion to UF

- Treatment of RO membranes with sodium hypochlorite (NaOCl) has been shown to effectively remove the dense polyamide active layer, leaving intact polysulfone barrier which behaves similar to 10kDa commercially available UF membrane.
- Converted membranes show promising performance for a wide range of applications.

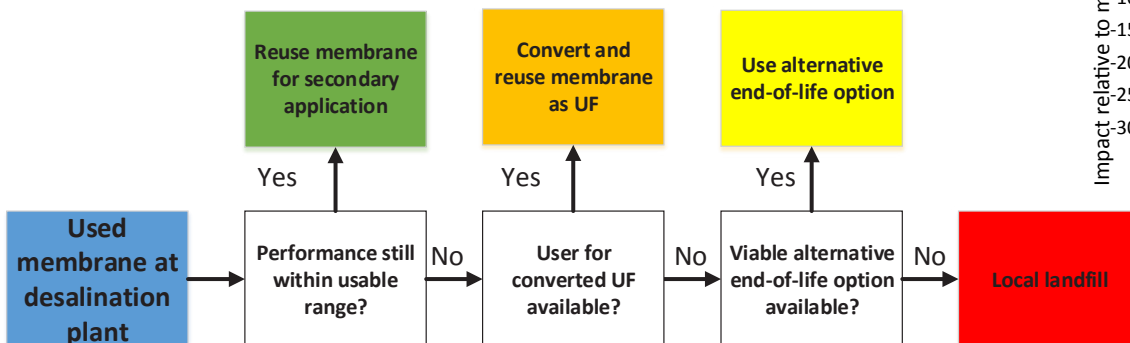
Disposal options

- A number of options for technical viability and environmental impact.
- Membrane disassembly shown to be a significant challenge.
- Recycling possible for 40% of the module.

Environmental impact of end-of-life options:



Decision making tool for end-of-life membranes



Project outcomes

- Technical feasibility assessment for a range of end-of-life options
- Environmental impact assessment of membrane manufacturing and end-of-life options
- Provides critical information and a tool for users considering the fate of their end-of-life membranes.

Further Reading

- Lawler et al. (2013) Production and characterisation of UF membranes by chemical conversion of used RO membranes. *Journal of Membrane Science*.
- Lawler et al. (2012) Towards new opportunities for reuse, recycling and disposal of used reverse osmosis membranes. *Desalination*.

