Policy to Support Water Reuse Technologies
Wednesday, October 21st 2020

IWRA International Water Resources Association

UNSW THE UNIVERSITY OF NEW SOUTH WALES

Water recycling in the circular economy

Policy signals and incentives to encourage deployment of water and energy recovery technologies in industrial applications

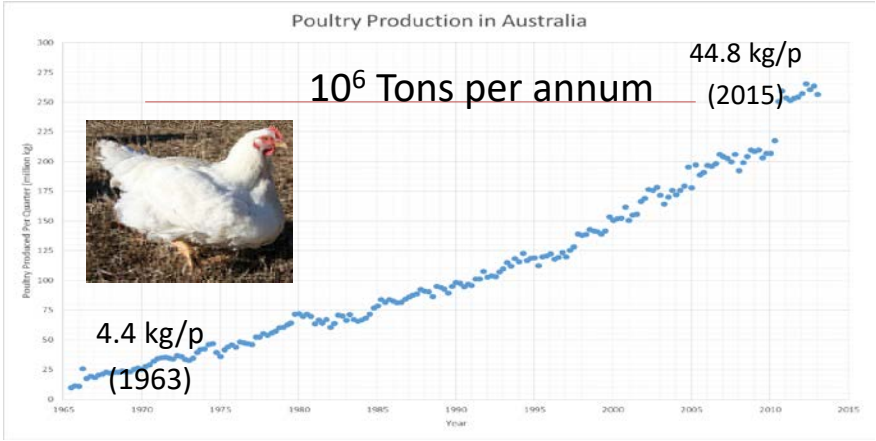
Never Stand Still | Faculty of Engineering | School of Chemical Engineering

Today's question

What policy settings and initiatives should be used to promote industrial water recycling in the context of the circular economy?

If a key objective of the circular economy is to decouple economic growth from the availability of finite resources (Laurent et al., 2019), then the considerations are not technical or unit cost ($/m^3) but rather:

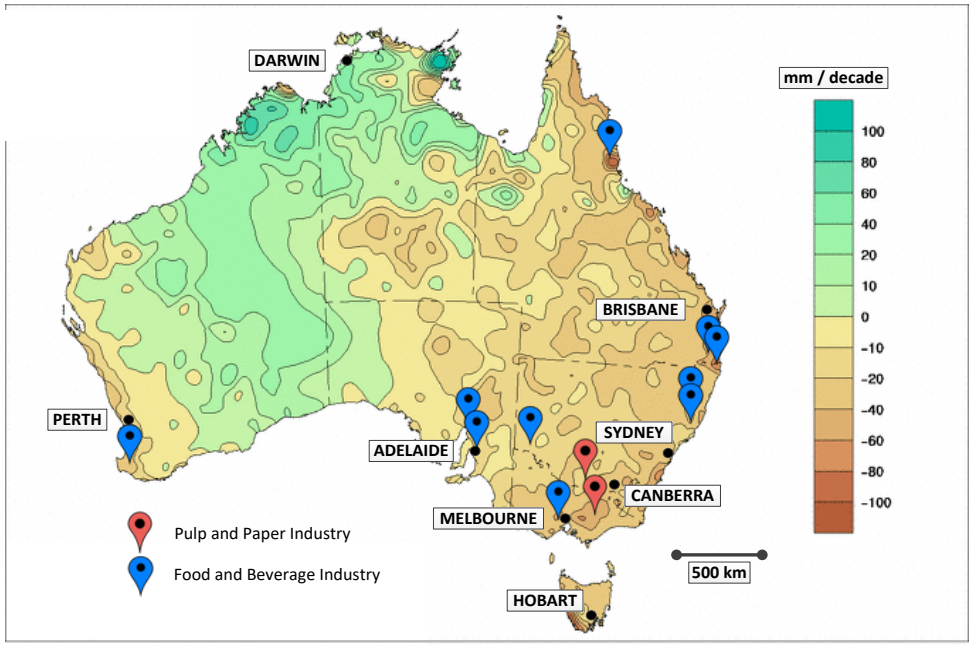
- Development (regional development)
- Employment (Direct and Indirect)
- Availability of alternative water resources
- Climate change (effects & mitigation)
- Flexibility (avoid policy conflicts)



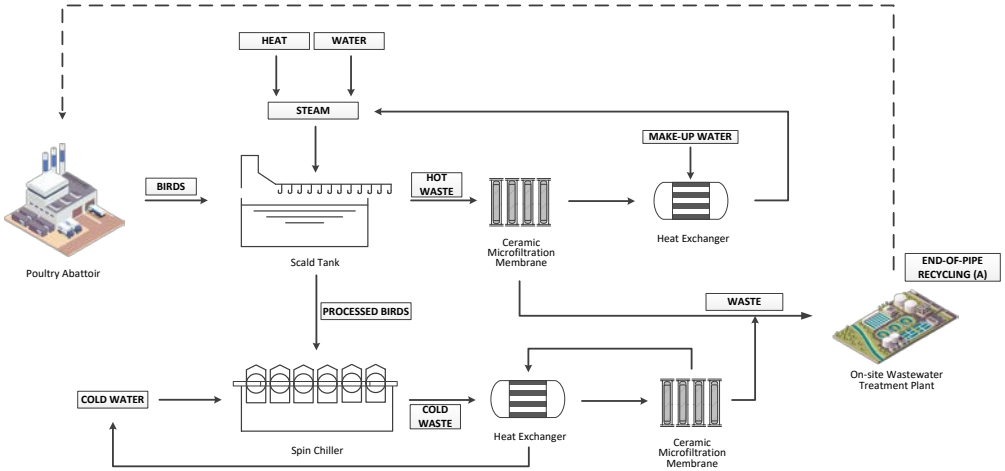
[1] **Source: 7215.0 - Livestock Products, Australia, March 2015, Australian Bureau of Statistics**

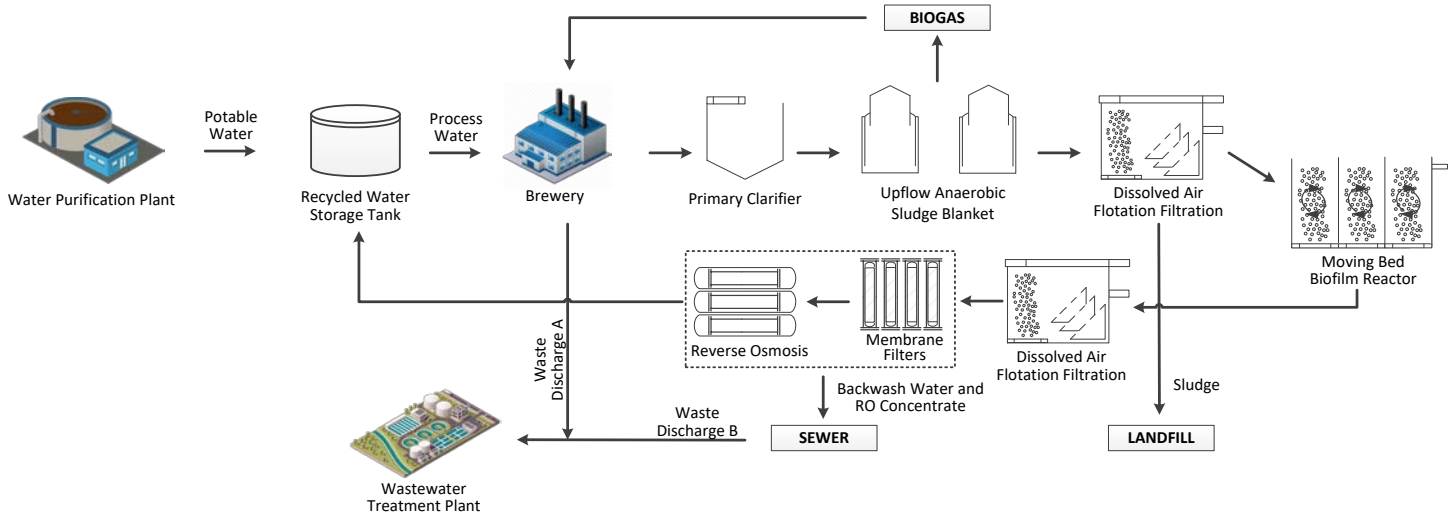
Policy context for the circular economy

Industry	Brewing	Pulp & Paper	Poultry
Market size	$16.5Bn (1.0% GDP)	$3.7Bn (0.25% GDP)	$2.9Bn (0.19% GDP)
Employment			
Production	3 700	12,450	9,000
Total	141,200	60,800	58,000
Water Use			
Total	5.6 GLA	100 GLA	27.7 GLA
Specific Demand	4.0 L/L (Avg)	6 - 40 m^3/tn	22.2 L/Bird

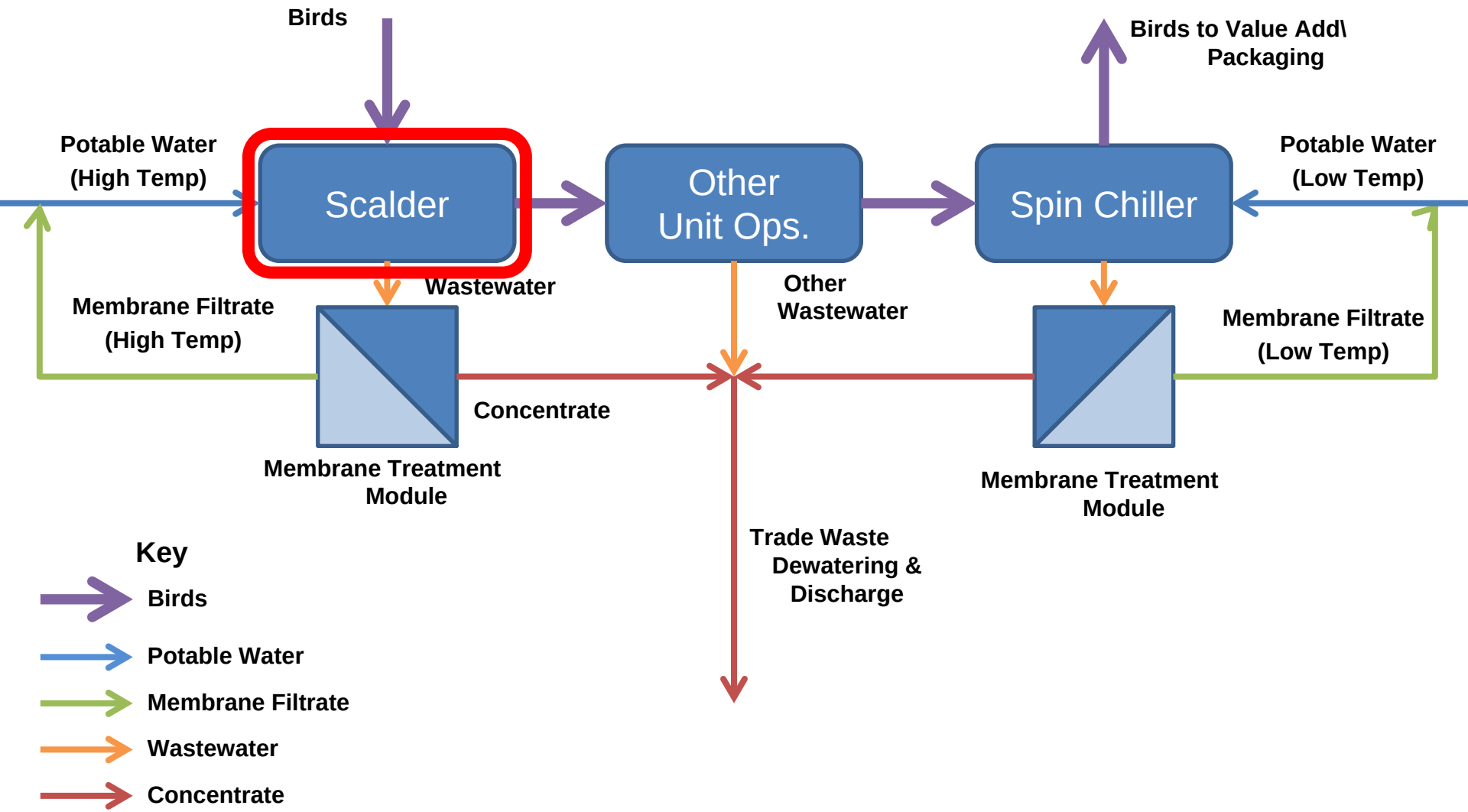


Technical approach: External (End of Pipe)



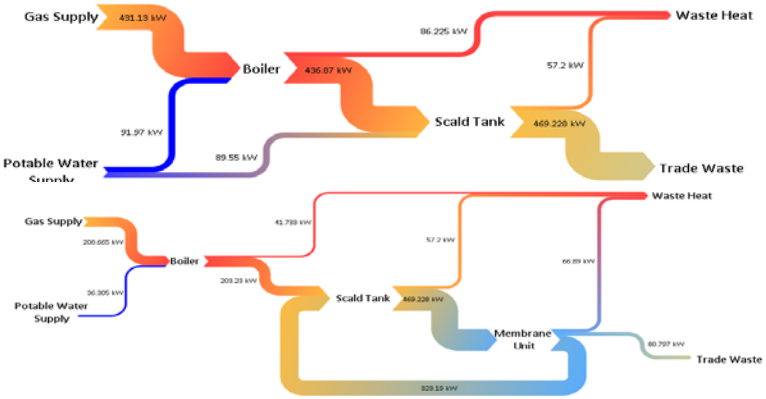


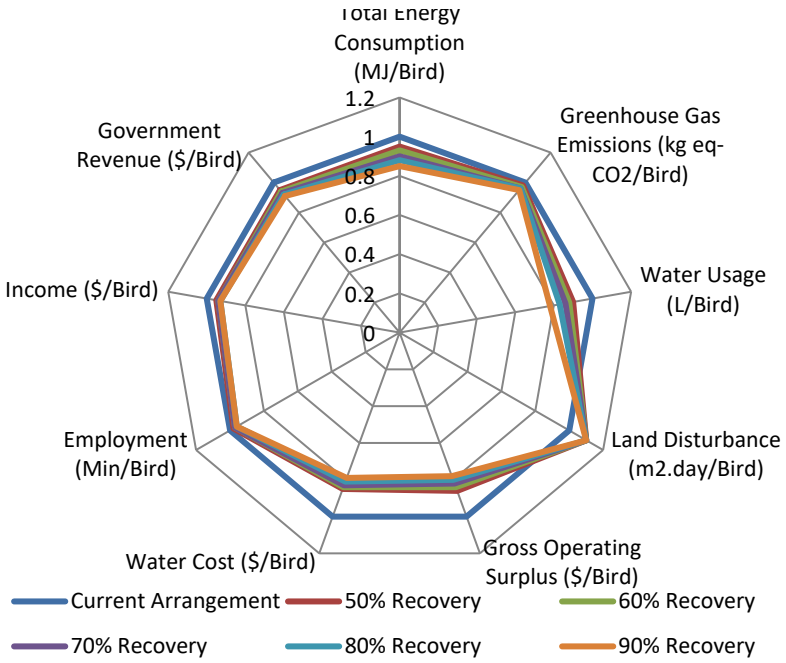
Internal: Point of use treatment and reuse

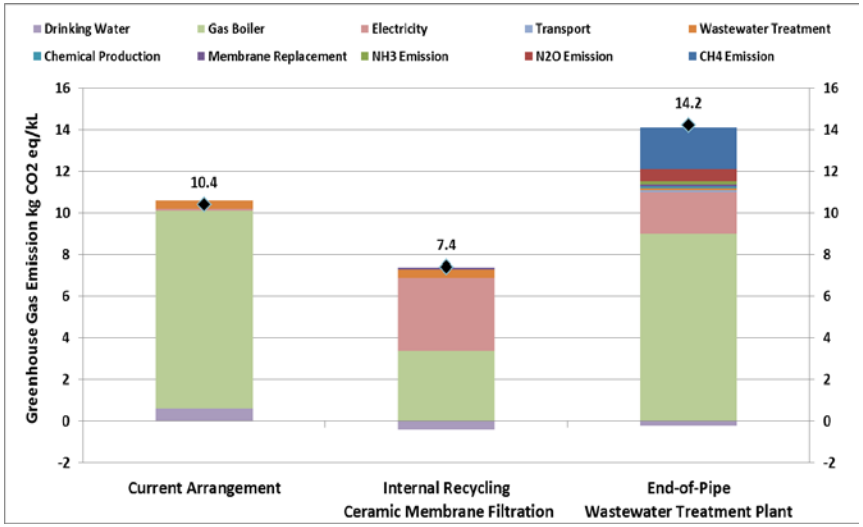


Evaluation techniques: Sankey, MCA & LCA

- Power input in abattoir with centralised treatment a factor of 2.15 higher than system with internal scald tank recovery







50% reduction in GHG based on CO_2 equivalent

Policy conflicts

What policy policy conflicts are preventing water recycling initiatives or making existing water recycling schemes less efficient?

- Federated governance structure;
  - State based legislation (Food Safety) requiring different levels of treatment complicate standardisation of production
- National governance policy
  - Use of recycled water prohibited in red meat industry due to export focused market (high priority for issues such as BSE “mad cow disease”)
- Mandated targets on other recycled material inputs
  - Minimum content of recycled fibre (RCF) n packaging, newsprint & paper
    - Increase in salt and silica content decreases efficiency of membrane processes (Reverse osmosis).
    - Increasing RCF from 0 to 40% results in 60% increase in $kgCO_2/m^3$ of water recovered.

Conclusions

- Increased control over water and wastewater costs and eliminate dependencies on external water supplies.
- The unit cost ($/m^3) of industrial water recycling can exceed the cost of water supply by a factor of 1.5 to 2, however, Multi Criteria (MCA) and Life Cycle Assessment (LCA) techniques which account for project externalities.
- Optimising inputs in circular economy in paper production is important. Eg recycled paper content in the feed stock results in higher cost of water recycling
- Lack of national guidelines for water quality and compliance, industrial water recycling is regulated at a state level. In addition, barriers to water recycling exist in food processing for export markets, particularly red meat exports