

Environment and Energy

Resource Efficiency – Starting Now!

Isabelle Gabas

Principal Adviser – Environment and Energy



'Value' of waste

- Parts manufacturing facility
 - ~ 500 t/year of general solid waste
 - ~ **\$75,000** /year to dispose
- Carbon fibre
 - ~ 5% of total waste to landfill
 - Disposal cost ~ \$4,000 /year
 - Equivalent raw material costs ~ **\$1,350,000** /year



'True' cost of waste

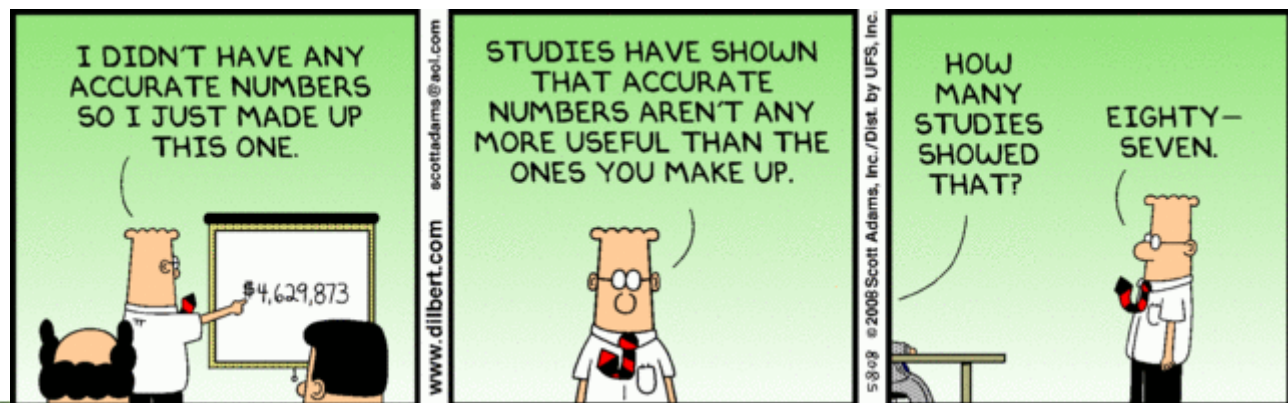
- Disposal costs
 - Treatment costs
 - Rising landfill levies and gate fees
- Generation costs
 - Labour
 - Materials
 - Energy
 - Water
 - Plant capacity



Applying resource efficiency principles

Step 1

- What is the problem?
 - Be specific
- What is the objective?
- What is the target?



Applying resource efficiency principles

Step 2

- Understand how resources are used and wastes are generated
 - (Manage) and analyse the data
 - Talk to staff and conduct walk-throughs
 - Process mapping
 - Mass and energy balances
 - Benchmarking



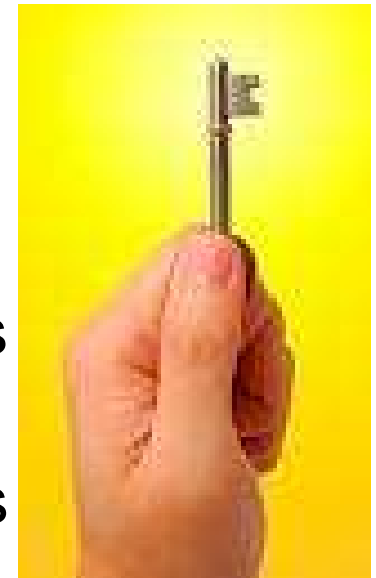
Understanding how resources are used and waste is generated

- Milk manufacturing site looking to identify opportunities to reduce TDS in trade waste
- Study initially focussed on the CIP systems
 - Could only account for 50% of TDS in trade waste
- Developing a total mass balance showed that the other 50% was actually from milk losses
- Milk losses contributed
 - ~\$800k/year in trade waste quality charges
 - ~ \$3m/year in raw material input costs

Applying resource efficiency principles

Step 3

- Identify opportunities
 - Question how you do things
 - Talk to staff
 - Talk to suppliers
 - Site observations
 - Root cause analysis (RCA)
 - Design it out
 - ‘Research’
 - Internet searches
 - Case studies
 - Published papers



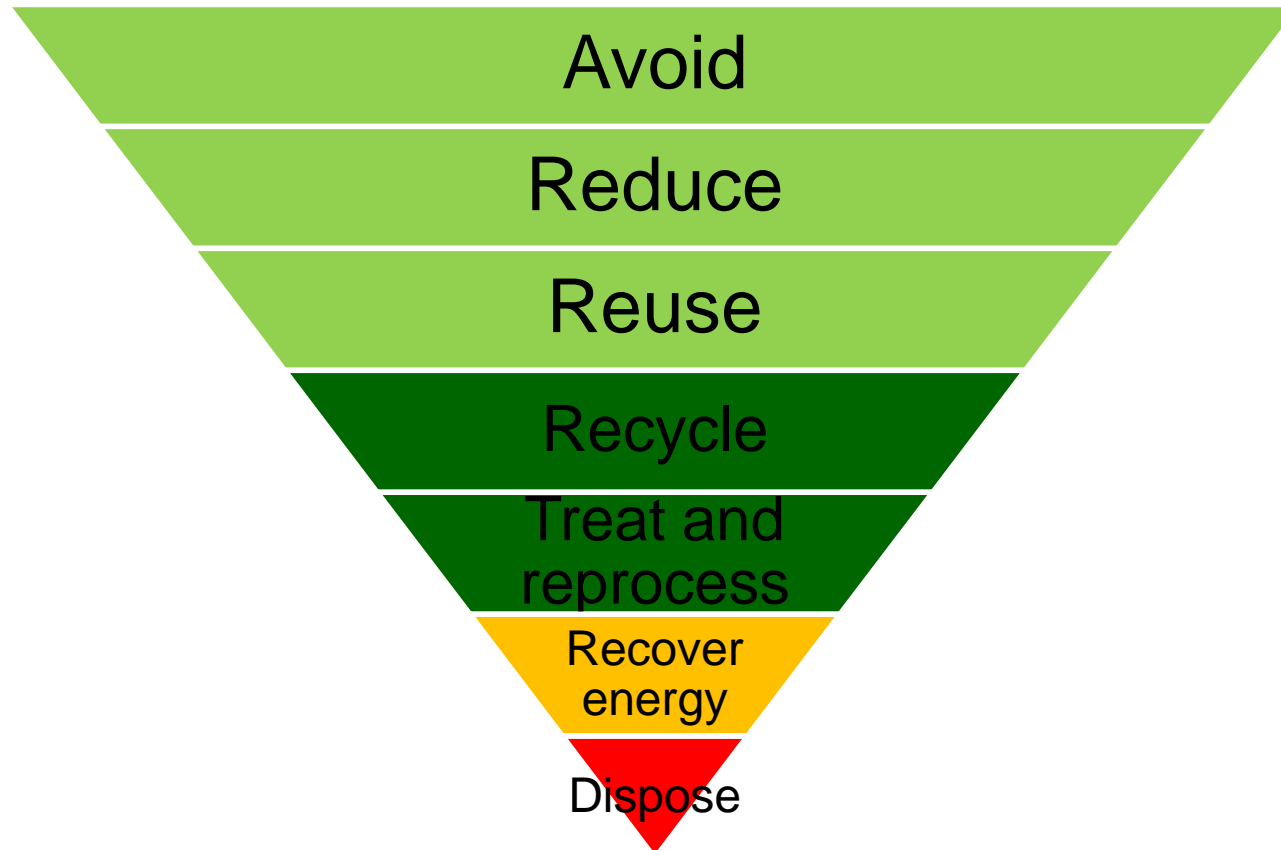
Basic elements of root cause

- **Materials**
 - Defective raw material
 - Wrong type for job
- **Systems**
 - No or poor management involvement
 - No or poor procedures
 - Practices are not the same as written procedures
 - Poor employee involvement
 - Poor communication
- **Man Power**
 - Inadequate capability
 - Lack of Knowledge/Skill
 - Stress
 - Improper motivation
 - Inattention to task
- **Machine / Equipment**
 - Incorrect tool selection
 - Poor maintenance or design
 - Defective equipment or tool

RCA – Polymer product manufacturer

- Uses a caustic scrubber to remove materials from vent streams prior to discharge
 - ~ 600 kL/year of spent caustic solution sent to a waste treater
 - kL of waste/ t of polymer much higher than other sites
- Started ‘focus’ teams to work on waste issues
 - Brainstormed reasons for higher caustic waste generation
- Installed a differential pressure indicator on scrubber
 - Identified certain products that resulted in pressure spikes
 - Reduced batch sizes for these products
- Achieved a 20% reduction in waste generation and improved yield
- Now looking to reuse the remaining ‘waste’ caustic in their wastewater treatment plant

Waste hierarchy



Start at the top and work your way down

- Cheaper and easier to avoid and reduce
- Increasing number of reuse, recycling and recovery options

Some waste reduction tips

- **Avoid / reduce**

- Design it out
- Reduce stops and starts
 - Eliminate changeovers and bottlenecks
- Ensure procedures drive efficiency and consistency
- Work with purchasing to minimise waste entering the site



- **Reuse / recycling**

- Waste exchange database - <http://www.wasteexchange.net.au/>
- Segregate streams to enable reuse/recycling
- Contamination and mixed materials limit recycling



- **Energy recovery**

- Does your 'waste' have a calorific value?
 - Reduce moisture content
- Anaerobic digestion \Rightarrow biogas \Rightarrow natural gas replacement

Assess the opportunities

Step 4

- Estimate the impact on:
 - Waste disposal
 - Raw material purchasing costs
 - Production efficiencies and labour costs
 - Greenhouse gas emissions (Scope 1, 2 and 3)
 - Energy and water costs
 - OH&S
 - Staff engagement and morale
- Determine the payback period and the business risk
- Prioritise options and develop an action plan
 - Assign responsibilities and time frames



Behaviour and waste

- Why do we generate waste?
 - “because its easier ”
 - “because its quicker”
 - “because that was how I was shown”
 - “because the process is inconsistent and the quality system encourages me to be conservative”
 - “because I don’t understand the link between my actions and the cost of waste to the business”
 - “because there is no incentive for me to reduce waste”



Waste and culture change

- Elements of changing a 'waste' culture:
 - Set a goal, objective or target
 - Nominate a champion
 - Education and awareness training
 - Team work
 - Dedication – from the top and the bottom
 - Rewarding the good, admonishing the bad
 - Progress reporting
 - Constant communication



Questions



Thank you



Contact Ai Group's energy and sustainable
business help desk

1300 733 752

or sustainablebusiness@aigroup.asn.au

Isabelle Gabas
Principal Adviser – Environment and Energy
Contact: 07 3244 1504 or
isabelle.gabas@aigroup.asn.au

Environment and Energy

 AUSTRALIAN INDUSTRY GROUP