

Australian Industry Group Forum 29<sup>th</sup> March 2011

Resource Recovery & Recycling from Hazardous Waste



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# Introduction

- Geocycle is a 30 year old waste to energy company owned by Cement Australia
- The Cement industry has for over 50 years safely recovered energy from hazardous and other wastes.
- Geocycle has developed technology to recover hazardous liquid, sludge & solid wastes, while recovering packaging steel.
- Conservation of resources through reduced kiln coal usage and recycling of steel, aligns with EPA Victoria's wish to recognise & realise the resource potential of industrial wastes, including Prescribed Industrial Wastes (PIWs).
- The recovery of PIWs significantly reduces the volumes requiring landfill disposal, supporting the Vic State government's objective of eliminating landfill disposal of Category B PIWs by 2020.



# Geocycle

- First established in early 80s as a solvent recycler
- Today processes mainly industrial wastes in to a liquid fuel to fire cement kilns  
**(AFRs = Alternative Fuels and Raw Materials)**
- Waste received from every State and shipped to kilns in Gladstone, Qld and Railton, Tas
- Wastes include paint (including water based), ink, oil, solvent, resins, equipment washings, agricultural chemicals, sludges, solids
- Wastes are increasingly consist of heavy sludges and solids
- Process in excess of 18,000,000 litres per year



# Geocycle

**Our Final Products are**

**Solvent Based Fuel = SBF**

**High Viscosity Fuel = HVF**



# The Waste Hierarchy

- Most Preferable



- Least Preferable



The Cement Industry

# What Goes into HVF & SBF?

HVF/SBF is made up of a solvent/oil base into which a wide range of wastes from small containers of liquids through to sludges, bulk solid filter cakes and powders are blended



Small Containers



Drums of Sludge/Solids



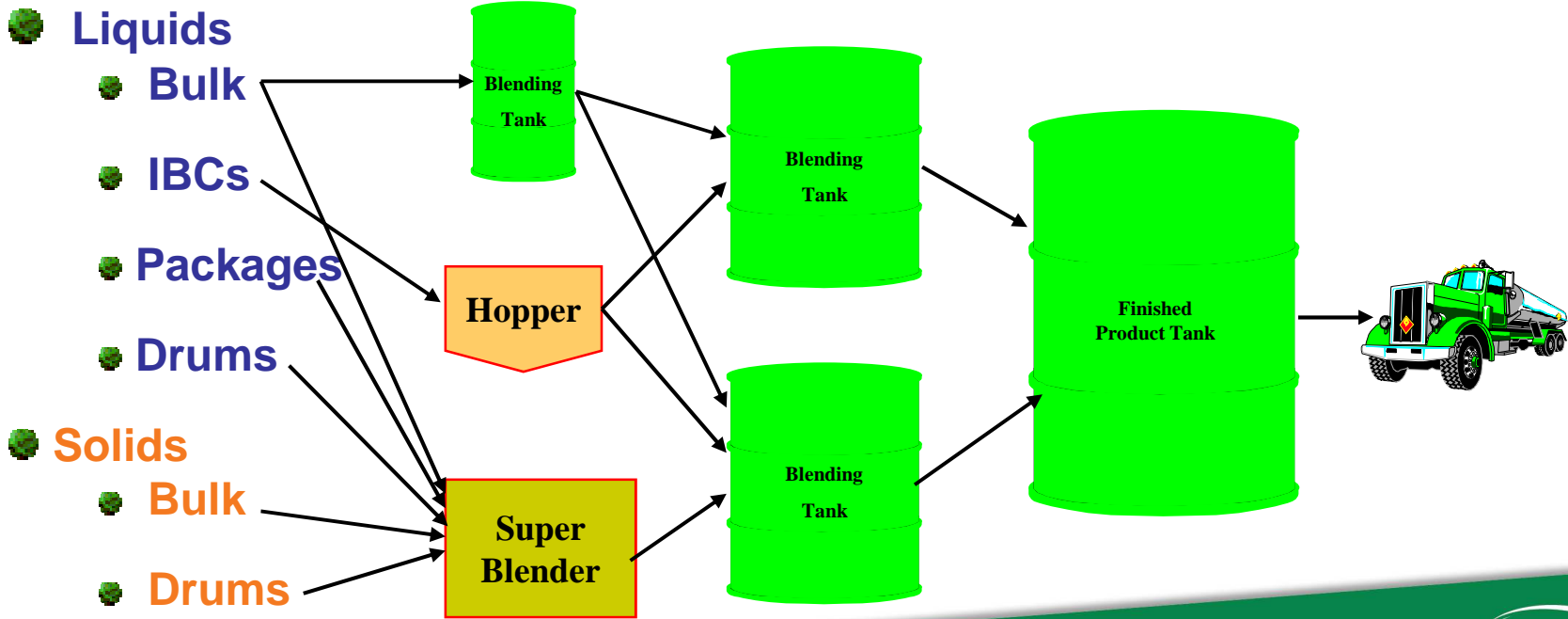
Bags of Powder



Bulk Solids/Filter Cake

# The process

Turning hazardous wastes in to fuels



# The Superblender



## Waste Feeding



**Receiving Hopper**

**Inerting Chamber**

**Main Auger**

**Secondary Auger**

# The Process



Loading Drums into  
Skip lift with Forklift



Drums Being Lifted  
to Shredder



Drums Being Tipped  
into Air-lock Chamber



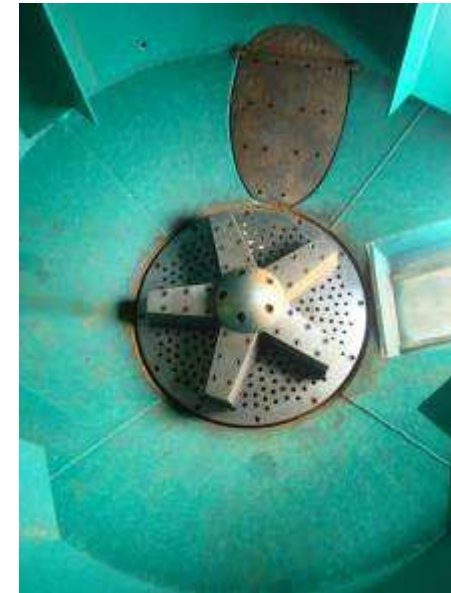
## The Process - Shredding & Metal/Waste Separation



Primary Auger of  
Komar Shredder



Shredded Metal Exiting  
Secondary Auger



Superblender Internals

## The Process – Metal Recycling



Magnet Conveyor &  
Caustic Wash Tank



Metal Rinse &  
Dewatering Screen



Clean Metal

## The Process – Fuel Preparation



Superblender Fuel  
Outlet Magnetic Trap



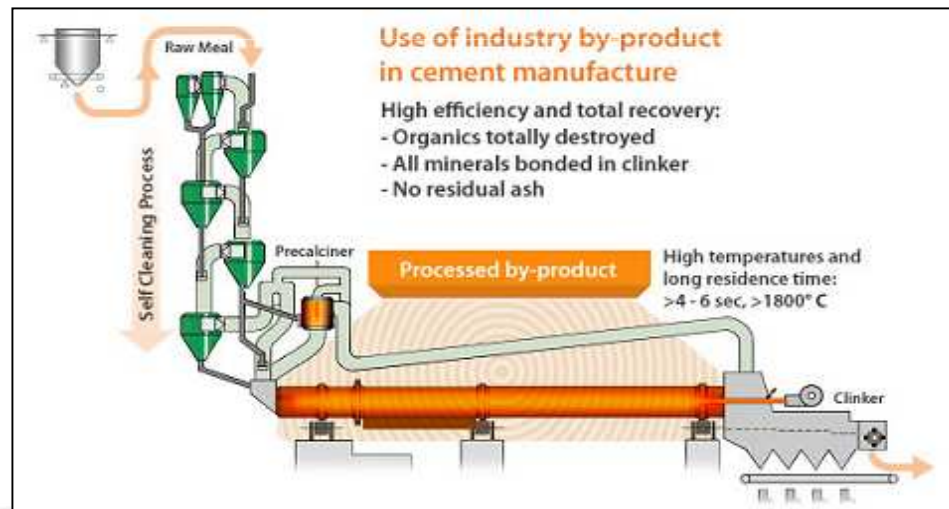
Disc Attrition Mill  
Size Reduction from 20 to 8 mm



45 m3 Fuel Blending Tank

# Waste to Energy Process: Consumption

- The kiln process enables the safe and environmentally sound recovery of both energy and material value. Organic components are completely consumed in providing combustion energy and inorganic ash contributes as a raw material in the formation of cement clinker.
- The use of wastes as alternative fuel reduces the usage of non-renewable fossil fuels such as coal and also reduces the amount of waste that would otherwise go to landfill.



# Environmental Advantages

- **Up to 7,000 tonnes pa of additional Prescribed Waste recovered & diverted from landfill**
- **Reduced Emissions**
  - Closed System
  - No opening of drums, pails, cans, bottles, bags
- **Reduced Energy Consumption per tonne of waste recovered**
- **Reduced Greenhouse Gas Emissions**



# Environmental Benefits

The project is providing significant benefits in increasing resource recovery, reducing landfill of wastes and recycling energy intensive steel:

- Recovery of around 7,000 tpa of PIW has led to 30 % increase in usage of high viscosity kiln fuel, from around 11,000 tpa to over 18,000 tpa, saving 4,500 tpa of coal.
- Significant savings in energy and greenhouse emissions, estimated to reach 198,000 GJ and 16,000 tonne CO<sub>2</sub> by 2012.
- Recovery, cleaning and recycling of up to 1,000 tpa of PIW contaminated scrap steel previously disposed of to landfill.



# Acknowledgements

**Geocycle gratefully acknowledges the significant role that Victorian and Federal government support has played in realising this project.**

- The Victorian Dept of Sustainability supported Marketing and Global Technology searches **(Energy Efficiency Grant)**
- The Australian Government provided co-funding of R&D and capital contribution that enabled the development of innovative technologies which will set a new benchmark in waste reduction. **(APP Grant)**
- The Victorian EPA funded additional innovative elements of the processes **(HazWaste Fund)**

