



# RECYCLABLE TOOTHPASTE TUBE WEBINAR – LOCAL GOVERNMENT



# AGENDA

- 1 Toothpaste tubes impact
- 2 Monopolymer Technology
- 3 End markets applications
- 4 MRF trials
- 5 Market penetration
- 6 Industry uptake

# TOOTHPASTE TUBES IMPACT

**20 Billion**

Toothpaste  
tubes are sent  
to landfill  
worldwide

- MRF operators claim that some toothpaste tubes end up in the recycling bin
- In smaller MRFs they tend to find their way into the mixed plastic stream
- Currently not recyclable due to composite materials

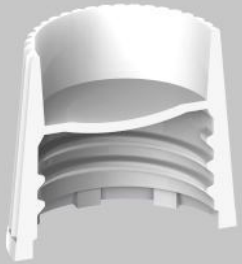


**50+ Million<sup>^</sup>**  
Are discarded in  
Australia

# MONOPOLYMER TECHNOLOGY

REGULAR TUBES

NEW HDPE TUBE



PP

PP

HDPE Caps under development

HDPE High melt flow

HDPE Low melt flow

Aluminium foil +  
LLDPE/LDPE

HDPE

# END MARKET APPLICATIONS

## Recyclability Test

50% Recycled tubes



100% Virgin Plastic



A HDPE bottle can be manufactured with 50% of the recycled tubes without compromising performance :

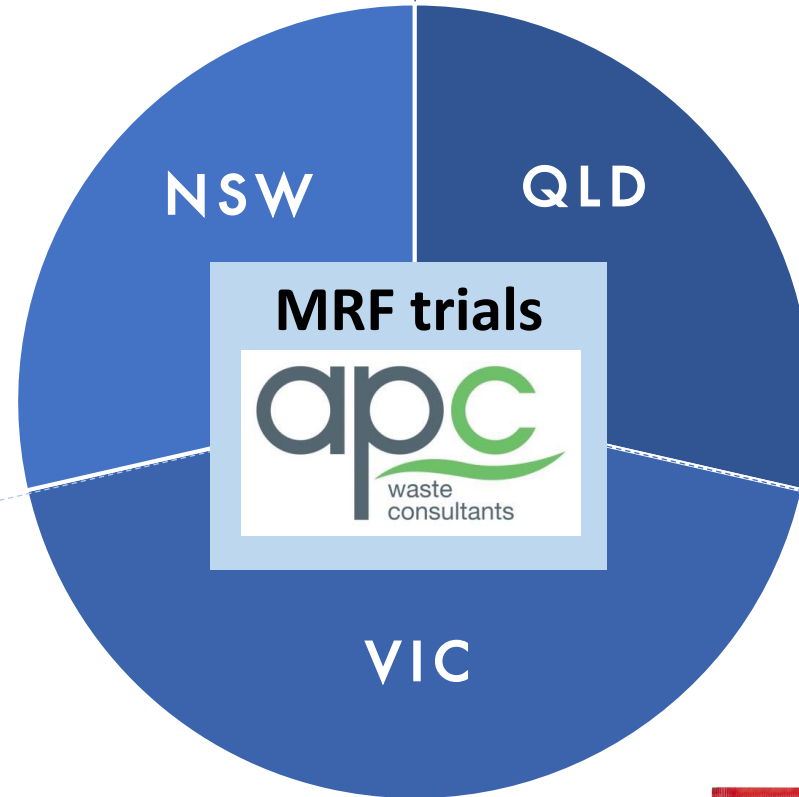
- Bottle making process
- Drop test
- Top Load



25 Years old  
Several retrofits & upgrades



6 Years old  
Alchemy sorting technology



**White Tube:**

H-140cm  
Shoulder Diameter- 3.5cm  
Tube End – 5.7cm



**Red Tube:**

H-185cm  
Shoulder Diameter- 3.8cm  
Tube End – 6cm



2 Years old  
Plastic recovery plant



# MRF TRIALS- Cleanaway

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## QUANTITY

120 toothpaste tubes of mixed sizes were tested

## PROCESS

All tubes were feed onto the conveyor by the MRF operated (post glass-breaker).

115 tubes were correctly sorted and 5 went to a conveyor to be rescreened.

## RESULTS

All 120 tubes were screened by the 5 optical sorters and 119 were sent to the HDPE colour line and only 1 to the PP line. The latter was because the optical sorter read the cap/lid and not the tube body. *Note: Direction is now to remove PP cap before placing in kerbside bin (as per APCO TAC direction).*

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## PROCESS

All tubes were feed onto the conveyor by the MRF operated (post glass breaker)  
115 tubes were correctly sorted and 5 went to a conveyor to be rescreened.

# Success in gaining correct recognition at the Plastic Recovery Facility was 99.2%

## RESULTS

All 120 tubes were screened by the 5 optical sorters and 119 were sent to the HDPE colour line and only 1 to the PP line. The latter was because the optical sorter read the cap/lid and not the tube body. *Note: Direction is now to remove PP cap before placing in kerbside bin (as per APCO TAC direction).*



# MRF TRIALS- Re.Group

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**QUANTITY** 48 empty (post-consumer) tubes of Small White toothpaste (35mm x 140mm)

28 empty (post-consumer) tubes of Larger Red Tube (38mm x 185mm)

**PROCESS** 76 (28 Large & 48 Small) were fed at 1.5 metres intervals at Sort Station 2 located before glass impactor

8 large tubes fed directly before the Alchemy optical sorting system but failed to be detected as Alchemy at the time did not have polymer sorting capabilities and had not been programmed to identify the tubes]. *Note: Action plan progress in place to commence potential programming at Re.Group QLD Alchemy equipment in Q4 2022.*

**RESULTS** All but 5 tubes passed through the 50 mm grid/ screen before glass crusher.

No small tubes were observed at the Alchemy optical sorter. All small tubes were found in the glass waste line (5) or paper / waste lines (43). Only 5 large tubes were observed at the Alchemy optical sorter with the remaining 36 located in the paper or waste lines.

As the Alchemy system was not programmed to recognise the tubes this component could not be tested.

There are plans in place to explore the reconfiguration of this MRF by Q4 2022.

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# MRF TRIALS- Re.Group

**QUANTITY** 36 Large Tubes. Empty post consumer Optic White Expert 38mm x185mm

**Success rate in getting past the 50mm initial trommel and 50mm minus screen was 94%.**

**PROCESS** 76 (28 Large & 48 Small) were fed at 1.5 metres intervals at Sort Station 2 located before glass impactor  
8 large tubes fed directly before the Alchemy optical sorting system but failed to be detected as Alchemy had not been programmed to identify the tubes.

**RESULTS** All but 5 tubes passed through the 500 mm finger screen before glass crusher.

**Alchemy confident of tube sort after reconfiguration\***  
No small pieces were observed at the Alchemy optical sorter. All 8 tubes were found in the glass waste line (5) or paper / waste lines (43).

Only 5 large tubes were observed at the Alchemy optical sorter with the remaining 36 located in the paper or waste lines.

**Re.Group happy to support testing\***

As the Alchemy system was not programmed to recognise the tubes this component could not be tested.

This MRF would need to be reconfigured and an additional optical sort equipment installed at after the glass crusher

# MRF RESULTS - Suez

## QUANTITY

45 empty (post-consumer) tubes of Small White toothpaste (35mm x 140mm)

35 empty (post-consumer) tubes of Larger Red Tube (38mm x 185mm)

## PROCESS

The 2 types of tubes were added at the elevated sort station which is positioned prior to the glass breaker screen. Tubes were added 1 at a time over a 5 minute period, so ~1 every 3-4 seconds. The broken glass line was monitored for the presence of these tubes.

## RESULTS

Of the smaller tube, 3 from the 45 fell through the glass breakers. With 42 tubes successfully continuing on their journey, this was a success rate of 93%.

Of the larger tube, zero (0) fell through, so a success rate of 100% was achieved.

# MRF RESULTS -Suez

## QUANTITY

45 empty (post-consumer) tubes of Smile toothpaste (35mm x 140mm)

**Success rate at the glass-breakers was 96.25%.**

## PROCESS

The 2 types of tubes were added at the elevated sort station which is positioned prior to the glass breaker screen. Tubes were added 1 at a time over a 5 minute period, so say 1 every 3-4 seconds. The broken glass line was monitored for the presence of these tubes.

**Suez uses the same Tomra branded equipment as Cleanaway.**

## RESULTS

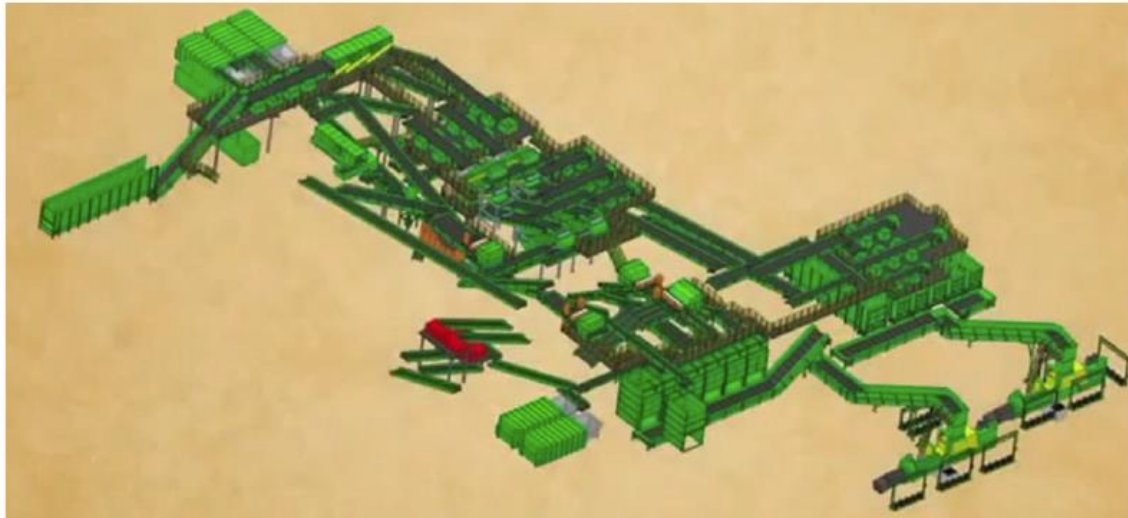
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# MRF TRIALS - USA

## MRF Sortability Testing for Package Shape

MRF Facility Overview



- **Purpose:** Ensure 2D/3D resulting in majority sorting to container stream
- **Technology:** Optical sorters for PET, HDPE (natural and color); Robotics for contamination (negative sort)



Sorted Color HDPE Stream



Tubes in Colored HDPE Stream

# AUSTRALIAN PLASTIC REPROCESSORS

As part of independent research, various types of reprocessors were consulted regarding accepting the HDPE tube.

Traditional Plastics re-manufacturer that flakes and pelletises plastic types.

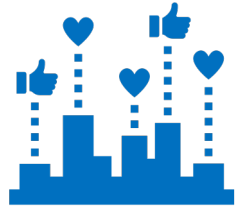
- Can process the tube with residual toothpaste in the tube

Manufacturer that processes the plastic chemically, returning it to its base component (oil).

- New process in Australia but would gladly accept the tube into their program.

Location, Collection	Company	Comment
SA, National	Recycling Plastics Australia (RPA)	Wholly supportive
NSW, National	All Product Recycling (APR)	Wholly supportive
NSW, National	IQ Renew	Wholly supportive

# INDUSTRY UPTAKE



Sharing the technology and approach with all interested parties to build critical mass of recyclable tubes in-market.



Main toothpaste brands have adopted the recyclable toothpaste technology and aim to transition their packaging to a recyclable design by 2025.

# QUESTION TIME

