

Increasing the substitution of virgin plastics in products: the quest of SUEZ

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ready for the resource revolution  **suez**



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Introduction to SUEZ

Key figures 2014

SUEZ ENVIRONNEMENT, GLOBAL LEADER

Dedicated to the
Water and Waste
Management



TURNOVER WATER & WASTE: **14.3 Billion €**

29% OF TURNOVER GENERATED OUTSIDE EUROPE

MAJOR ACTOR IN WASTE AND MATERIAL MANAGEMENT

No. 1 IN FRANCE, **No. 2** IN EUROPE, **No. 3** WORLDWIDE

GLOBAL WASTE TURNOVER: **7.5 Billion €**

15 MILLION TONS RECOVERED WASTE

Waste plastic activities

Recycling

400 kt/y

Plastics waste, flakes and pellets sold and traded in Europe

130 kt/y

Plastics processed in own (or JV) material recycling plants

- PP, PE, PA flakes
- PE-LD pellets (granules) and bags from recycled PE-LD
- PP pellets and agglomerates
- PET food grade pellets and washed flakes
- PVC pellets and micronized

OTHER ACTIVITIES:

Sorting of household packaging waste (>400 kt/y)

Plastic-to-oil in the UK, packaging licensing by BellandVision in Germany

Installation of **PLASTlab®**, a laboratory dedicated to recovering plastics

ONGOING INVESTMENTS :

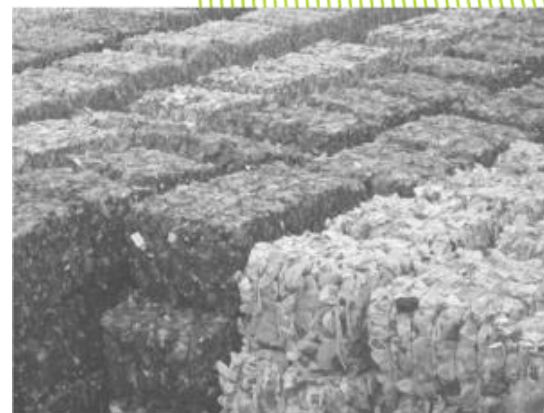
Doubling of sorting capacity Rotterdam plant

Partner in a greenfield PP/PE compounds production plant

(<http://www.qcpolymers.com>)



A quest or mission?



CURRENTLY YEARLY 19 MTONNE PLASTIC WASTE IS LANDFILLED/BURNED

EUROPEAN COMMISSION'S MEASURES*:

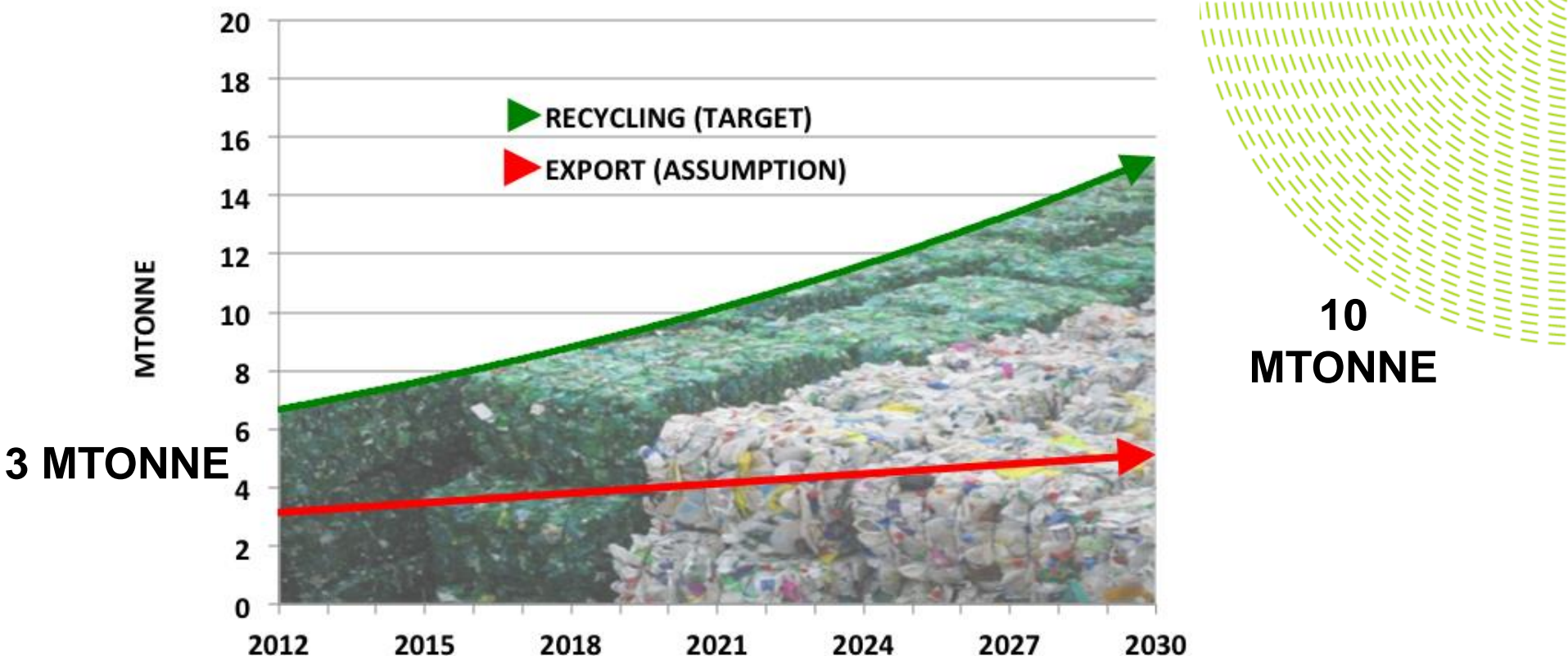
BAN ON LANDFILLING RECYCLABLE PLASTICS BY 2025

OBJECTIVE TO LIMIT INCINERATION TO NON-RECYCABLE MATERIALS

RECYCLING TARGET OF 60% FOR PLASTICS BY 2030

***) THE NEW EUROPEAN COMMISSION'S (EC) CIRCULAR ECONOMY PACKAGE
WILL BE RELEASED ON DECEMBER 2, 2015**

A quest or mission?



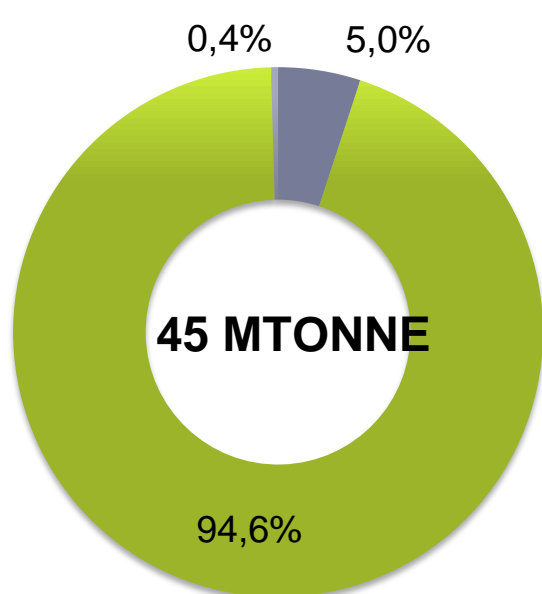
RECYCLING PERCENTAGE SHOULD GROW FROM 26% IN 2012 TO 60% IN 2030

TODAY 6.6 MTONNE OF PLASTIC WASTE COLLECTED FOR RECYCLING

OF WHICH 3.2 MTONNE EXPORTED TO ASIA

⁶Source: European Plastics Recyclers/QCP

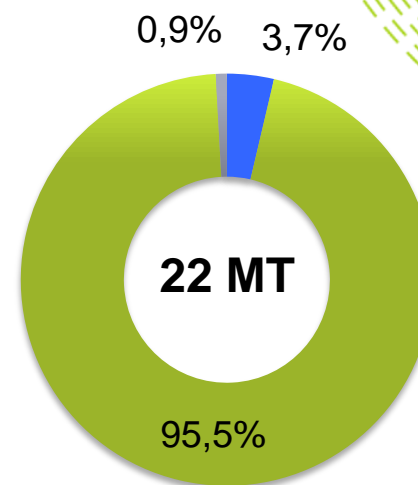
A quest or mission?



45 MTONNE



EUROPEAN POLYMER DEMAND



22 MT

EUROPEAN POLYOLEFIN DEMAND

- 3.4 MTONNE OF PLASTIC WASTE INPUT RECYCLED IN EUROPE
- CURRENT RECYCLING YIELD IS AROUND 60%
- SALES OF POLYOLEFIN RECYCLATE LESS THAN 1 MTONNE

A quest or mission?

Example Packaging Recycling

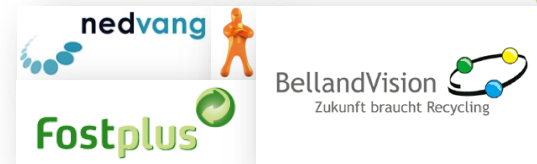
To bring the recycling quota in Europe from 26% (2012) to 60% (2020) it takes...

- ...**50** additional big plastic packaging sorting plants with 80 kt/y capacity
- ...**140** additional plastic recycling plants with 25 kt/y input capacity
- ...**50** new applications for recycled plastics with a demand of 50 kt/y

Collection

What works

- **Extended Producer Responsibility Systems (EPR) with long-term contracts, hampering long-term investments**
- **Next to EPR, free competition should be allowed on the market for collecting and owning recyclable flows**



Branch Collections

- Agricultural films
- PVC windows
- Pipes (construction)
- ...

Municipal Rigid Plastics Collections



Collection

Collect high volume plastics...



PET-bottles
Already collected in
most of the EU
countries



PE-HD (PP) blow moulds

**Collect more
PP and PE!**



PE-LD films & bags



PP pots, tubs & trays

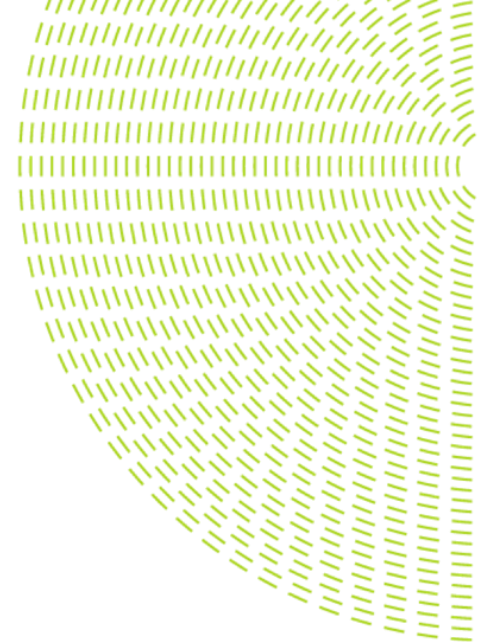


Sorting and recycling

A Modern Light-Weight-Packaging Sorting Plant still has:

- > 50 % Mixed Plastics & Residues
- The mix can be recycled but quality is low
- **For high quality recycling we need sorted plastics**
- Better sorting with sophisticated technologies is needed
=> Investments

Sorting comes with ECO-Design of Packaging



Sorting and recycling

SORTERS AND Recyclers need to innovate IN QUALITY

Product characteristics

Low odor
Colorability
Mechanical properties
Quality consistency

1-2 MT

> 15 MT

Virgin-like recycling market

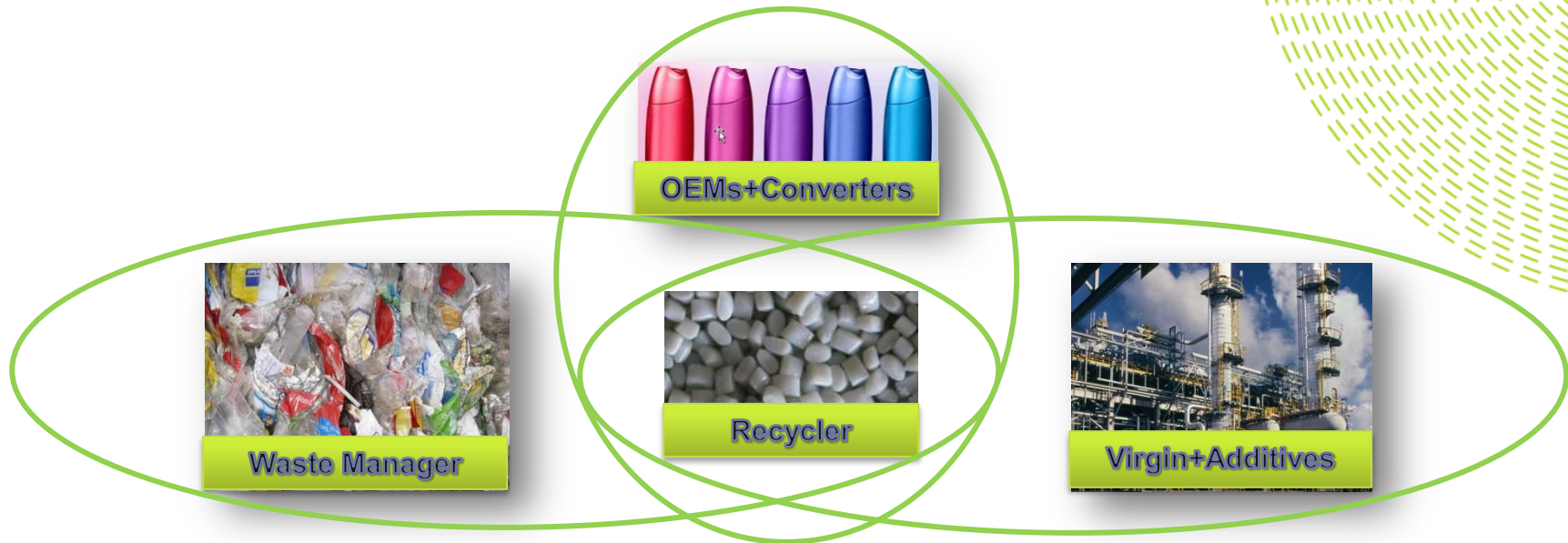
Classical recycling market



Technology & recipes

Sorting and recycling

Sorters AND Recyclers need to innovate IN PARTNERSHIPS



- Recyclers need to build alliances with OEMs, converters, chemical industry (virgin resins, additives) and waste management companies
- Recyclers need to increasingly think in terms of end applications (instead of waste treatment)
- Recyclers need to build up or improve virgin-customer-approach know-how

Converters & OEMS

Help the recyclers!



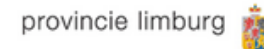
Converters & OEMs

- Eco-design your products!
- Widen your vision: there is more than price!
=> Imagine you would have to make all your products from wood because nobody wants to buy plastic products anymore...
- Design your products to be made from recycled plastics!
- Teach and help recyclers to meet quality requirements!

QCP - QUALITY CIRCULAR POLYMERS

- FOUNDED IN APRIL 2014
- COMBINATION OF STRATEGIC AND REGIONAL PARTNERS
- 100,000 TONNE PE AND PP COMPOUNDS
- FOCUS ON PACKAGING, HOUSEHOLD, E&E, BUILDING AND AUTOMOTIVE
- PARTNERSHIP WITH INNOVATIVE EUROPEAN TECHNOLOGY PROVIDERS
- COMPANY WITH ITS ROOTS IN THE VIRGIN POLYMER INDUSTRY
- STARTUP FIRST MODULE OF 35,000 TONNE IN Q4, 2015

Shareholders



Technology providers a.o.



Located in the LOGISTIC AND POLYMER HOTSPOT of Europe



An experienced team



Huub Meessen
CEO



Marc Houtermans
COO



Raf Bemelmans
CSCO



Marcel van Enckevort
Account & Application
Development Manager



François Essers
Innovation Manager

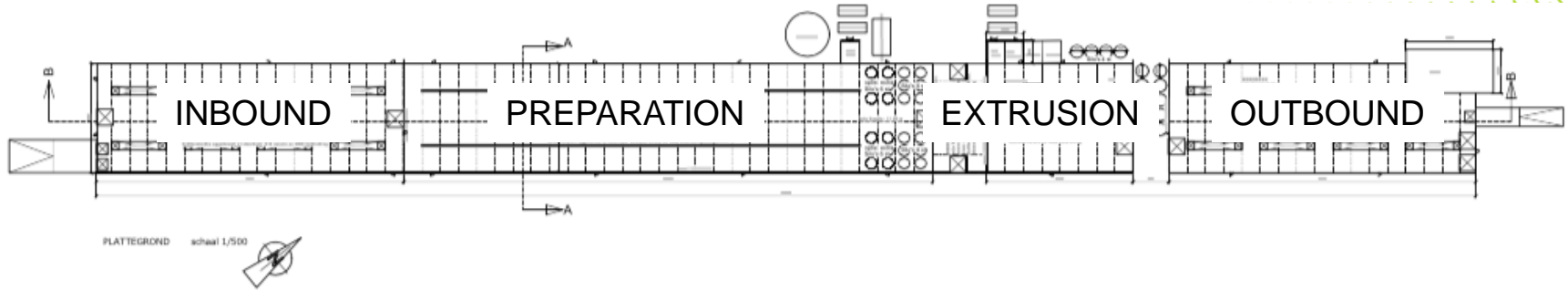


Gilbert Janssen
Finance Manager



John Venerius
Operations Manager

Single integrated plant using leading technology



FULLY INTEGRATED AND AUTOMATED PLANT:

- PREPARATION INCLUDING COLD & HOT WASH
- COLOR SORTING TECHNOLOGY TO ENHANCE COLORABILITY
- INTENSIVE HOMOGENISATION OF INTERMEDIATE PRODUCT (FLAKES)
- COMPOUNDING IN LINE WITH MELT FILTRATION (CASCADE)

Hot-washed versus cold-washed



- USING A HOT-WASH REACTOR IMPROVES THE CLEANLINESS OF FLAKES
- IMPROVING MECHANICAL PROPERTIES, BASE COLOR AND SMELL

Improving Colorability

INPUT FRACTION



LIGHT FRACTION

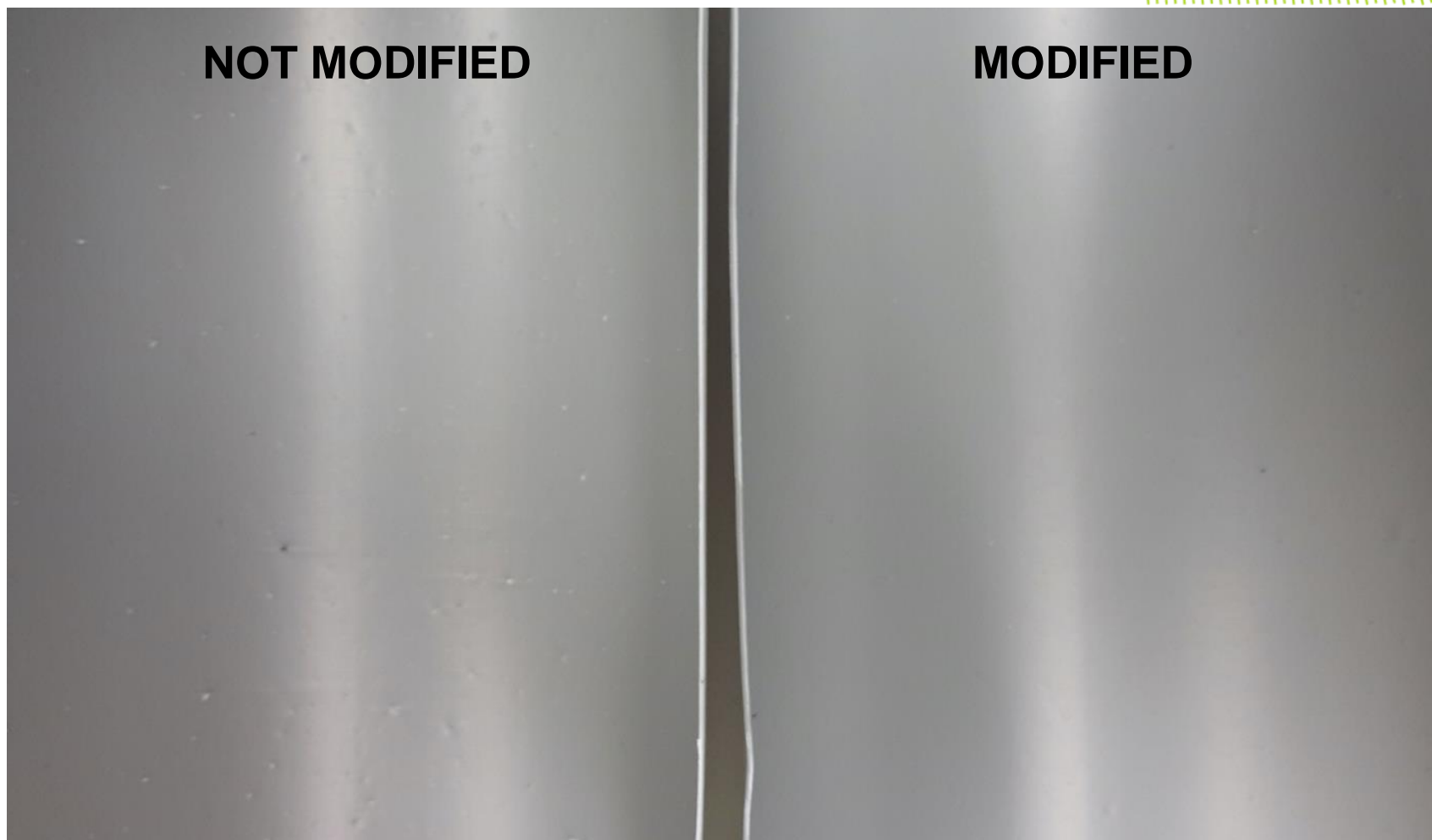


DARK FRACTION



- COLOR SORTING TO ENHANCE COLORABILITY
- LIGHT FRACTION FOR LIGHT COLORS AND DARK FRACTION FOR DARK COLORS

In-line compounding to improve properties



PHOTOS TAKEN OF THE INSIDE OF A 1 LITRE HDPE BOTTLE

Products to replace virgin resins

- DEVELOPMENT ON INPUT OF BRAND OWNERS AND MOLDERS
- PRODUCTS BASED ON POST CONSUMER (AND POST INDUSTRIAL) WASTE
- NON-FOOD APPLICATIONS DUE TO USE OF POST CONSUMER WASTE
- SPECIFIED COMPOUNDS
- HDPE FOR BLOW MOULDING AND PIPE APPLICATION
- PP FOR INJECTION MOULDING APPLICATIONS (MFR 10 AND HIGHER)



QCP - QUALITY CIRCULAR POLYMERS



- INTEGRATED/AUTOMATED PLANT
 - CAPACITY OF 100,000 TONNE
 - BACKWARD INTEGRATED (SUEZ)
 - SPECIFIED PP/PE COMPOUNDS
 - INTENSIVE CLEANING
 - VACUUM DEGASSING
 - COLOR SORTING
- ▶ COST COMPETITIVE
 - ▶ CERTAINTY OF SUPPLY
 - ▶ MEETING CUSTOMER REQUIREMENTS
 - ▶ IMPROVED COLOR & SMELL
 - ▶ IMPROVED COLORABILITY

Summary

- Focus on improving household packaging recycling => highest volume impact
- Extend separate collections of plastics
- Improve sorting quality => sort into material fractions (PP, HDPE,...)
- Adapt legislation to stimulate investments in sophisticated sorting and high-quality recycling technologies
- Recyclers to improve virgin-customer-approach know-how and quality
- Converters/OEMs to use more recycled plastics in their products