Waste to Plastics

W2Plastics: Turning Plastic Waste into Value for the Benefit of Society

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Recycling Potential in EU

- **100 bn €**
- **1.5 Mt**
- **3 Mt**

**Plastics in EU, 2011**

- **98 bn € 68 Mt** Virgin
- **2 bn € 1.5 Mt** Recycled
- **25 Mt** Waste
- **4 bn € 3 Mt**

25 Mt

3 Mt
Our Oceans Are Turning Into Plastic... Are We?
1 kg plastic = 2 kg oil

280 Mt* Plastics

3.8 bnt* Oil

15%

*Worldwide Plastics and Oil Production 2011
The solution
Current recycling methods

• **Sources of polyolefins**
  - Gray bags (incinerated or landfilled)
  - Separately collected (recycled)

• **Sorting methods for polyolefins**
  - NIR (Near Infrared)
    • Needs large pieces (e.g. bottles)
    • 95-97% product quality
    • Low recovery (60%)
  - Ordinary sink-float
    • Density separation (flake)
    • Expensive
    • Complex process
    • Limited separation flexibility
MDS Principle

Light Plastics

Heavier Plastics

Heavies Plastics

Magnet

Ferrofluid Weighs less

Ferrofluid weighs more
Magnetic Density Separation ("MDS")
Magnetic Density Separation feed and products

Input material

PP: 880-920 kg/m²

PE: 920-960 kg/m³

PE: 950-980 kg/m³

PE: 970-990 kg/m³
Magnetic Density Separation Pilot Plant

Capacity: 0.4 t/h plastics

- Scalable: can easily be scaled up to 1.5 t/h.
- Flexible: can easily be used to recycle metals from complex wastes.
Our effective total solution

Plastic Packaging waste

100%

State-of-the-art separation plant
(windsifting, NIR separators, handsorting, cutting & washing)

- Sorting residue: 23%
- Plastic mix (contaminated): 38%
- Film and foils: 16%
- Rigid plastics (PP/HDPE/PET): 23%

39% recovery of valuable polymers

Plastic Packaging waste

100%

MDS based separation plant
(handsorting, coarse cutting, windsifting, cutting & washing, MDS)

- Waste: 10%
- Plastic mix: 13%
- Film and foils: 32%
- Rigid plastics (PP/LDPE/HDPE/PS/PET): 45%

77% recovery of valuable polymers

factor 2

positive market value

negative market value
Think big, act small

Status of our development:

- Product quality from pilot tests ✓
- Assessment of processing cost ✓
- Feed back from market in the Netherlands ✓

Short term focus on getting our first process line up and running:

- Q4 2014 - Samples to potential customers
- Q1 2015 - Complete engineering
- Deal closing with operational partners
- Q2 2015 - Start plant construction (annual capacity 30,000 t)
- Q4 2015 - Ramp up of operation

Approach for the coming 5 years:

- JV’s with local recycling companies in EU and USA
- Team up with end users
- R&D to further upgrade product quality

EU polymer consumption 100 bn €
Recovered: only 2 bn €
Going to market

Our goal for the next 5 years:
• To build and operate 1 million tonnes of recycling capacity
• To produce high grade recycle polymers

Requiring:
• 30 process lines based on the MDS principle
• A total investment volume of 130 mio dollar

Avoiding:
• 2-3 million tonnes of oil consumption per year
  (equals oil consumption of a country like UK for 1 week)

Bringing:
• A turnover from plastic sales of 500 mio dollar
• 1500 - 2000 jobs extra jobs in EU/USA
• A driving force for improved collection of packaging waste instead of disposal/incineration

Further development in 5 -10 years:
• Expand capacity to 3 million tonnes
• Teaming up with multinational waste treatment companies
• Improve product quality enabling “packaging to packaging”
Who are we?

Business Development Company, based in the Netherlands

Research Group: Resource and Recycling

activities

Online quality control

Fine materials and moisture

Different particle shape

Recycling of petrochemical catalyst

Recycling of bottom ash from WTE plants

Recycling of pickling sludges

Recycling of metallurgical slags

Recycling of WEEE
A team with a proven track record

- The key team members have worked together for many years
- Former joint success: e.g. the ADR technology for recycling of bottom ash of Waste to Energy facilities (see: www.inashco.com)

2007: Invention of the ADR principle
2008: start up of Inashco BV
2010: first industrial installation
2014: - 3 million t recycling capacity
   - Active in EU, USA, Singapore
   - global nr 1 bottom ash recycler
How we would use the 100,000 $ award?

- **Limit of the MDS:** particles should have a thickness of at least 0.3 mm (0.01 in)

- **Challenge:**
  - Foils are thinner and represent 35% of the waste
  - Turbulence in the system prevents proper separation of foils

- **Research:**
  - Building a transparent set-up and study of fluid dynamics

- **Result:**
  - Lowered turbulence enabling foil sorting
  - Foil product quality will improve dramatically
  - Product value per ton packaging waste will increase with another 20%

*This award would help us getting even closer to our final goal:*

*To convert all plastic waste to high-quality products!*

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Key Drivers helping our case

Political influence
- governmental subsidies and legislation to reduce emissions and secure supply.

Global Warming
- To reduce CO₂ emissions, plastics recycling rate must increase.

Oil price
- The demand for recycled plastics will increase when oil price increase.

Emerging markets and Population Growth
- Plastics demand in Asia is growing

Geo-political issues
- Increasing concern towards the dependency of Western economy on raw materials import from potentially unstable countries.

Economic issue
- Wastes are increasingly seen as an untapped resource to be valorized
Many opportunities ahead

MDS technology can also be used for:

- Recycling E-Waste
- Separating mixed metals
- Improving the quality of seeds
- Replacing Mercury in gold mining
- Etc...