



PLANTIC®

Changing the nature of plastics



Bio Plastics

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Bio Plastics

Biodegradability

Bio-based

- polymers derived from natural resources
- renewable polymers

Biodegradable polymers

- natural and synthetic options available
- Bio-based \neq biodegradable
- Petroleum-based \neq non biodegradable

Sources of Bio-based Polymers

**1. Directly
extracted from
Biomass**

Polysaccharides

**Starch
Cellulose**

**2. Classically
synthesised from
bio-derived
monomers**

Poly lactate

**Other
Polyesters**

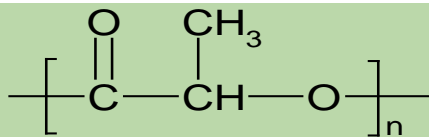
Bio polyethylene

**3. Polymers
produced
directly by
organisms**

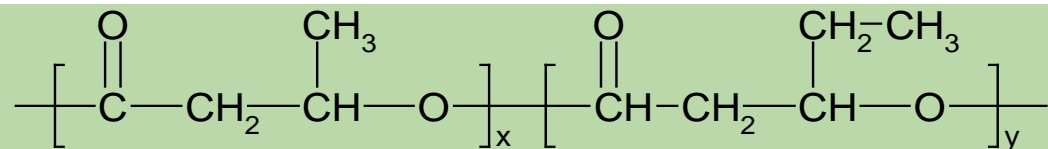
PHA

Technologies

Technology	Description	Manufacturers e.g.
Fermentation	Fermentation of natural sugars and fatty acids to produce monomers (PLA) or use bacteria to produce polyesters or intermediates (PHA)	Nature Works, PURAC Telles, Tianan
Starch / Cellulosic	Modified starches and cellulose produced through reactive extrusion and compounding technology	Plantic, Novamont, Cereplast, Stanelco, Innovia,
Blends	Resins compounded to increase renewable content	Novamont, Cereplast, Stanelco
Synthetics	Biodegradable or partially biobased. Limited renewable content	BASF, DuPont
Bio-based	PO produced from bio derived ethylene	Braskem, Dow-Crystalsev, Solvay



Poly(lactic acid) (PLA)

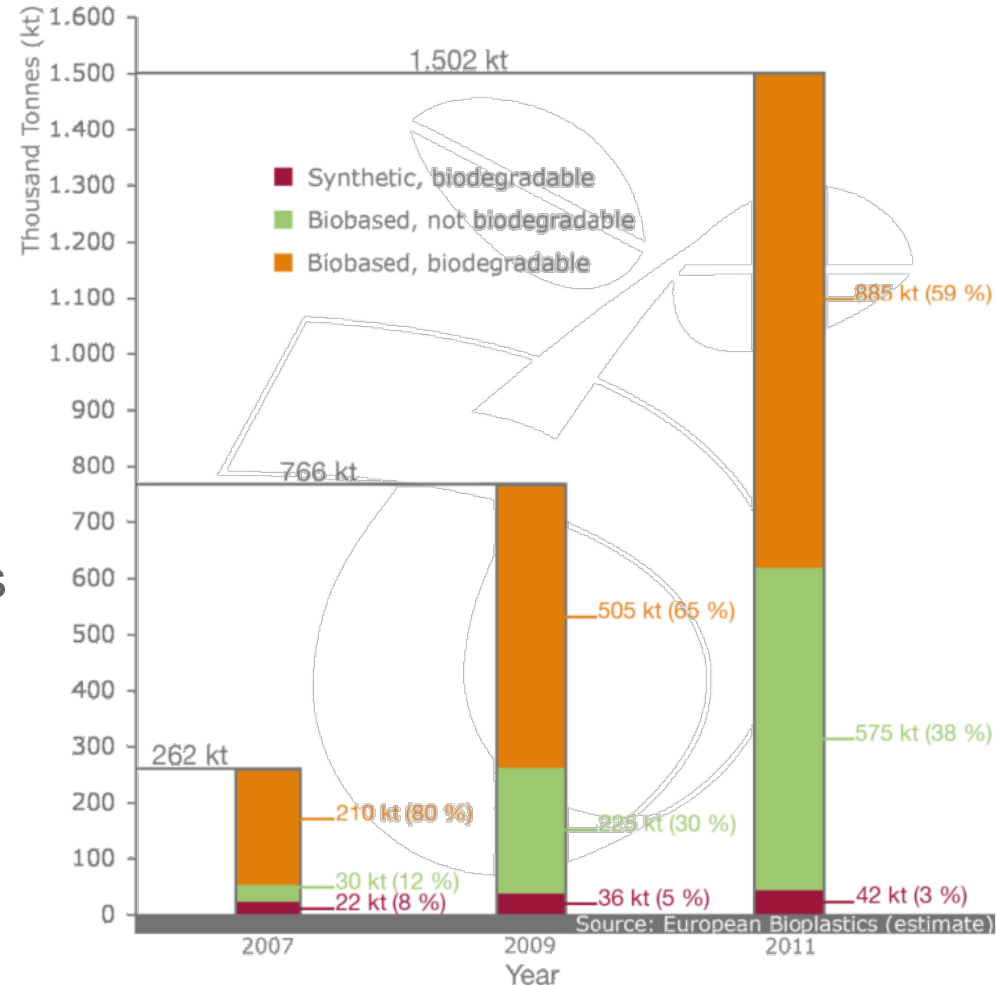


Polyhydroxybutyrate-co-hydroxyvalerate (PHBV)

A Developing Market



Annual Bioplastics Production Capacity
2007 - 2011



Source: PRO-BIP 2009

- Biopolymers were forecasted to grow from ~0.3Mt in 2007, to 2.3Mt by 2013 (37%) , and ~3.5 Mt by 2020 (6%)
- Petrochemical based plastics ~ 250 Mt (2008)
- Growth rate of petrochemical plastics <5% p.a.
- Major bio-based polymer segments (2020)
 - Starch-based (1.3 Mt)
 - PLA (0.8 Mt)
 - BioPE (0.6 Mt)
 - PHA (0.4 Mt)

Certification and Standards

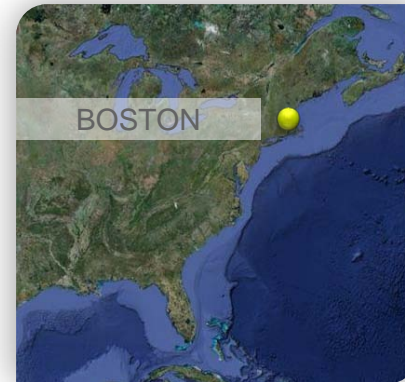
Organis- ation	DinCertco	Vinçotte	BPI	Australasian Bioplastics Association
Location	Germany	Belgium	USA	Australia, NZ
Logo				
Standard	EN13432 ASTM D6400	EN13432	ASTM D6400	EN13432 or AS4736

Headline Drivers for Growth

- Consumer awareness and pull
- Brand owners and retailers demand for “green” products
- Future proofing against rising oil and plastic prices
- Functional performance



Plantic Technologies Ltd. Overview

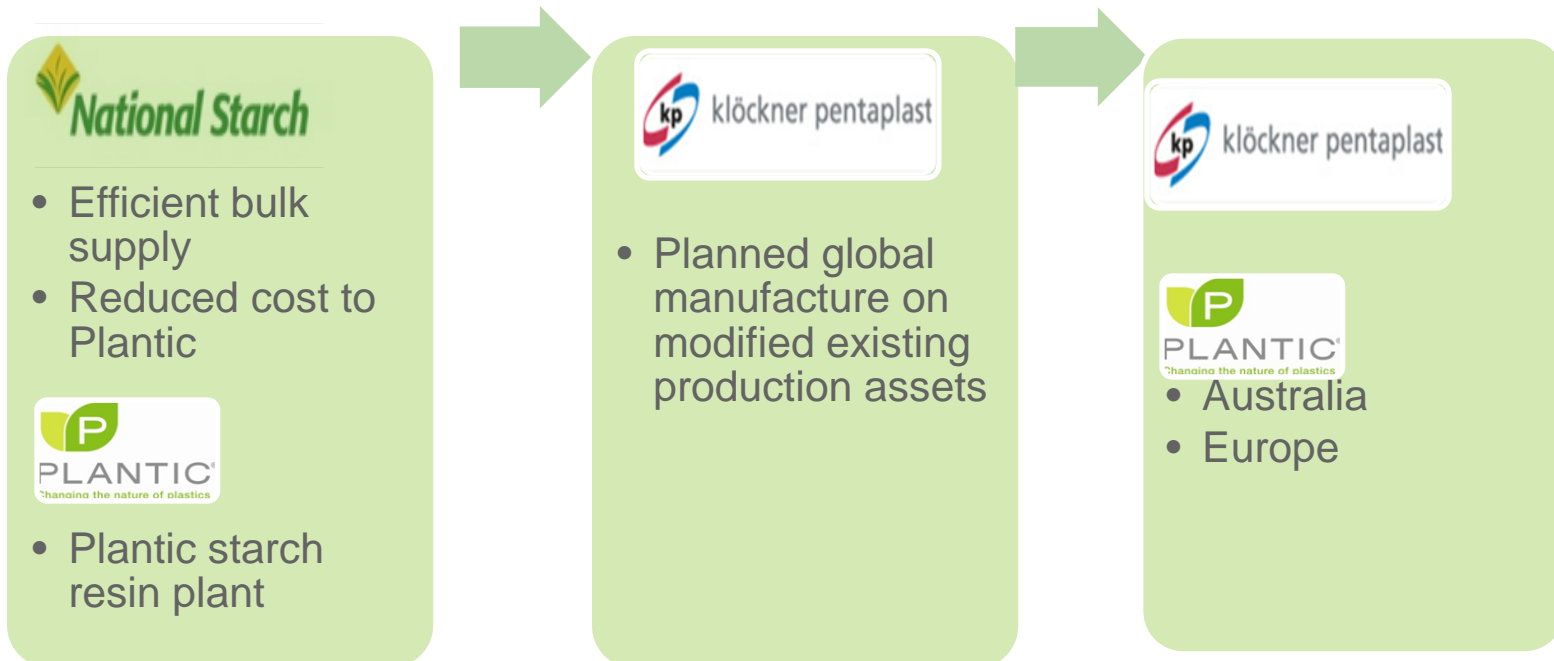


- Operational in 2003 to commercialise technology in starch-based biodegradable products
- Cornerstone customers
- Established distribution and a pipeline of new products
- A family of 13 global patents
- Name plate production capacity: 7,500 MT per annum (sheet & resin)

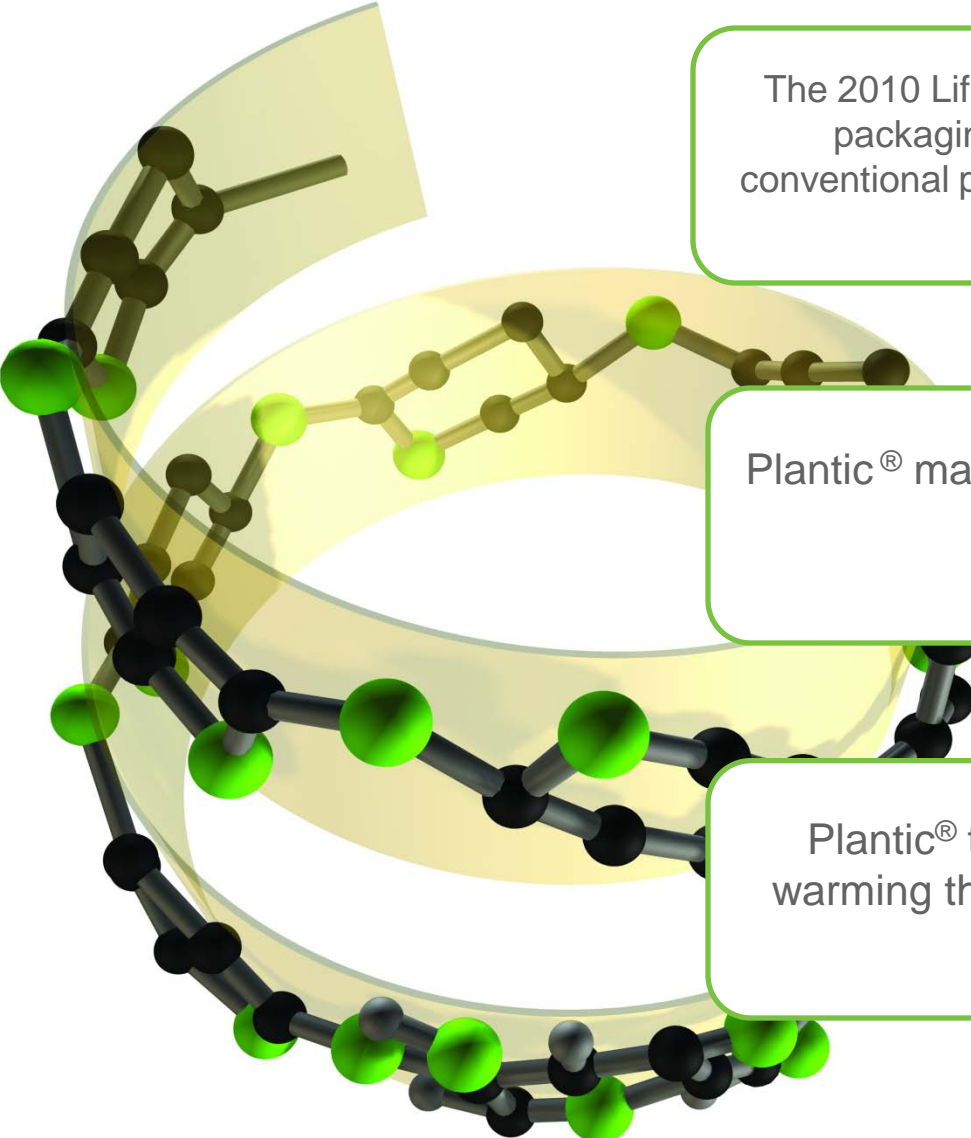
Wide Commercial Use



Business Model Rigid



Plantic's Rigid Sheet LCA



The 2010 Life Cycle Assessment for Plantic® biodegradable packaging system indicates that when compared to conventional polymers used in similar tray applications, Plantic uses a third less total energy.

Plantic® materials generate 5% to 40% less solid waste than competitive materials

Plantic® trays have 40-70% less impact on global warming than various petrochemical-based polymers

When disposed of in an industrial compost or a home compost

Summary

- Bioplastics represent an important and growing area of the global plastics industry
- Cover a range of polymers (biodegradable / biobased) and give a wide range of products and applications
- SME's and large companies are active in the area of bioplastics
- Market introduction has been successful (performance driven)
- Collaborative relationships and partnerships ensure products have market application.
- Significant potential for bioplastics mid-long term