

State of the Art Report
Biodegradable Polymers / Bioplastics

EU Market Development

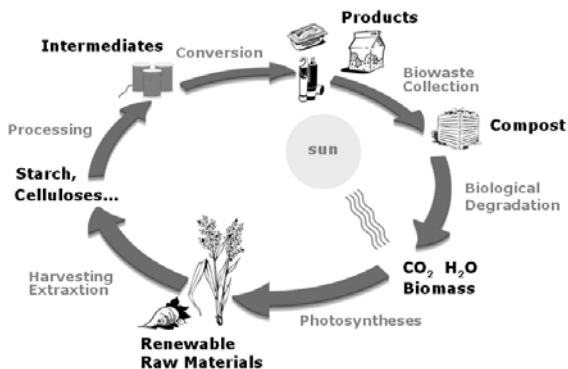
by Dr. Harald Kaeb / IBAW Chairman



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Following Nature's Closed Loop Role Model



- Innovation & Technology for Sustainable Developm.
- Idea based on use of RRM – key issue and driver! Petrochemicals extend product range & enhance competitiveness
- Various options to close the loop (bio-recycling)
- Life-cycle analyses reveal environmental benefits

Back to Nature – Towards Sustainable Development



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Plastics Production in Western Europe

Application	[Million t]	M.Share
Packaging	13,5	36,4%
Construction	7,5	20,2%
Electr(on)ic(al)	3,5	9,4%
Automobile	3	8,1%
Leisure / sport	1	2,7%
Agriculture	0,8	2,2%
Other markets	7,8	21,0%
Total	37	100%

>80 % Polyolefines

Growthrate: 4-5%

2010: 55 Mio. t

BP Market Share:

25,000 t (2000)

Source: APME / EUPC / VKE (2000)

BDP / RRM based polymers with significant potential in sectors: Packaging, Agriculture, Apparel & Specialities



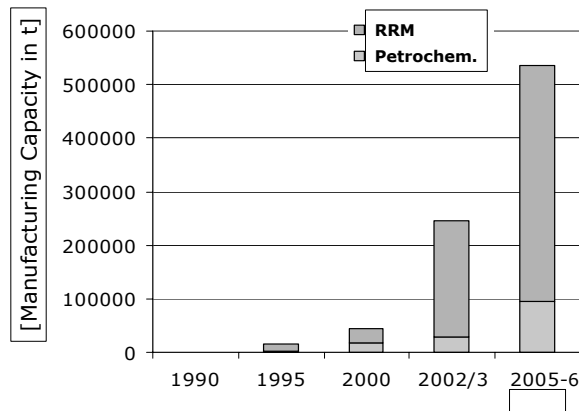
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BP Production Capacity

Renewable Raw Materials (RRM) already took the Leadership !

Source:
IBAW & Private
Announcements (World)



Petro based	100	5.000	18.000	28.000	95.000
RRM based	350	13.200	26.000	226.000	460.000
Total	450	18.200	44.000	254.000	555.000



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BP Market in Start-Up Phase

- **EU Consumption: 25,000 – 30,000 t 2001**
Main applications: organic waste bags, shopping bags, packaging films / trays, loose-fill, mulch film
- **Strong growth in production capacities (worldwide):**
1998 appr. 50,000 t versus 2002: 250,000 t
- **Initial phase of product & market development**
- technical challenges to be faced -
- **Consumer: BP perception very positive !**
Image transfer to involved business, circulators and users
- **Waste management opportunities:**
cost beneficial bio-recycling (& incineration)
- **RRM bonus: closed material cycle – CO₂ neutral**



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BP Products: EU Market Introduction

Type of Product	Austria	Benelux	England	France	Germany	Italy	Scandinavia	Spain	Switzerland
Packaging									
Food		+	+		KS	+			+
LooseFill	+	+	+	+	+	+	+	+	+
Shopping Bags	+	+	+	+	KS/(+)	++	+	+	+
Fruits / Veget.		+	+		KS/(+)	+	+		+
Catering	+	+	+		+	+			+
Others									
Bags Biowaste	+	++	+	+	+	+	+	+	+
Agro-Films		+		+	+	+		+	+
Toys	+				+	+			

(Europe 2001; selected product groups; KS = Kassel Project)

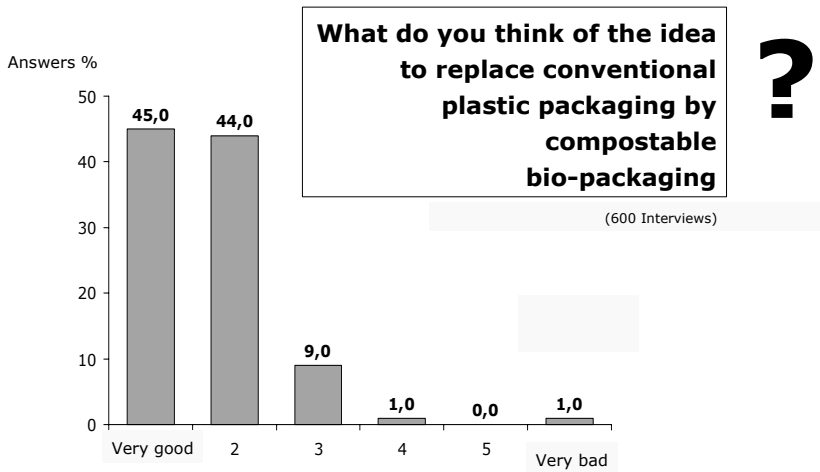


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Driver: Consumers' Acceptance

Market Research - Kassel Testmarket



Market research data available on: www.Modellprojekt-Kassel.de



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Driver: Consumers' Acceptance

Market Research - Kassel Testmarket

BDP-Packaging suits very well for

Food from organic farming	64 %
Conventional Food	44 %
Hygienic Products	39 %
Cosmetics	28 %
Detergence	23 %

Price

One third would pay more in any case
41% would maybe pay more



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Driver: Recycling of BP Products



- **Organic recycling is a key for BDP market introduction: simple process, widespread technology, cost advantageous**
⇒ **opportunity to realize cost benefits!**
- **In many European countries, composting is used for disposed organic materials. In D/NL a.o. composting is established almost nationwide.**
- **Organic recycling is accepted by the “European Directive on Packaging and Waste Packaging Waste 94/62/EC”. In the current amendment this recycling option must be maintained.**
- **Other options, e.g. anaerobic digestion, thermal conversion, are also possible (regional infrastructure)**



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Driver: EU Sustainable Development Policy

Main threats to sustainable development within the EU:

(Selection from SDS, 2001)

- ⇒ **Emissions of greenhouse gases from human activity are causing global warming**
- ⇒ **Waste volumes have persistently grown faster than GDP**
- ⇒ **Soil loss and declining fertility are eroding the viability of agricultural land**



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EU Council Policy to SD

Council Conclusions on the contribution of enterprise policy to sustainable development

(Industry and Energy Council; 6/7 June 2002)

Sustainable use of natural resources and waste management:

To further encourage the use of Renewable Raw Materials in manufacturing industry, including organic farming products, building on the results of the work on the "Current situation and future prospects of EU Industry using RRM" developed by the Commission in cooperation with the main stakeholders concerned.

⇒ **EU RRM Working Group on Polymers working on implementation strategies**



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EU: Integrated Product Policy

Green Paper on Integrated Product Policy "IPP" (2001)

White Paper in Preparation

Central aim of the IPP Green Paper:

"the products of the future shall use less resources, have lower impacts and risks to the environment and prevent waste at the conception stage "

- ⇒ **A strategy to strengthen and refocus product-related policies**
- ⇒ **A life cycle approach to reducing reliance on resources and environmental impacts – from extraction to final disposal**
- ⇒ **A set of mainly prescriptive instruments:
reduced VAT, eco-taxes/-labels, greening public procurement, etc.**



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Need: Quality Standards (Certification & Labeling)

- **"Compostable": Strictly based on standards:**
EN 13432 (DIN V 54900) / ASTM D 6400
(ISO in preparation)
- **No accumulation of monomers/small pieces acceptable**
- **Strict and low limits for heavy metals**
- **Identification & QM conception:**
Need for similar criteria for labeling worldwide, thus for
a harmonization of logo criteria
⇒ **Co-operation & Memorandum of Understanding**
(IBAW/DIN-Certco – BPS – BPI)



Certification and labeling are basic requirements to maintain compost and soil quality and thus ensure acceptance in waste industries and positive regulations in waste legislation!



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Strategies for Progress

- **Communication: Raise industrial awareness ("business opportunity") and consumer's support**
- **Improve legal framework (waste legislation)**
- **Implement BP bio-recycling / realize cost benefits**
- **Incentives: Introduction of EU-wide market penetration programmes to create more attractive (for users) cost / performance ratios and improve consumer awareness.**
Also: public procurement and tax benefits (reduced rates of VAT on RRM based products)
- **QM: industry to commit itself to voluntary agreements**
- **Maintain and raise trust: environmental benefits need to be approved by recognized test methods**



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Benefits of developing the BP market

- **Development of sustainable technologies**
- **Export opportunities for business**
- **Reduction in CO₂ emissions**
- **Conservation of fossil resources**
- **Reduced dependence on imports of raw materials**
- **Stabilized agro markets: RRM Cultivation - workplaces**
- **Use of leftovers and residues from food production**
- **New solutions for waste management**
- **Biomass against erosion and soil exploitation**

⇒ **Arguments for government intervention!**



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Prospect / Future Perspective

2010

- **Total BDP market EU: 0.5 – 1.0 Million tons**
- **RRM Share :** > 60 % (cost advantage, 90 % starch / shugar)
> 0,2 million hectares
- **Product Types:** films (50 %), foams (20 %), rest 30 % (fibers, functional additives etc.)
- **Segments:** packaging, textiles/nonwovens, horticulture /agricult. toys, functional elements (incl. non-biodegradable) a.o.

2020

- **Total BDP market EU: 3 - 5 Million tons**
(50 % compostable, RRM share: 70 - 80 %, > 1 Million ha)
- **CO₂ Savings (potential): 10 - 30 Millionen Tons (ECCP)**



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IBAW - International BP Association

A non profit association networking with all stakeholders (1993)

- **Framework conditions**
Representation on behalf of this class of materials in legislative matters or technical rules that influence the approval and application of BPs
- **Supporting instruments**
Initiation of measures for supporting market introduction
- **Voluntary commitments**
Creation of industrial standards and objectives, e.g. for quality assurance and labelling of BP products
- **Pilot projects**
Development of projects for practical use and disposal of BDP products, e.g. the Kassel pilot scheme

⇒ **Catalyzing BP Market Development**



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