

Real life experiences of bioplastics in the food supply chain

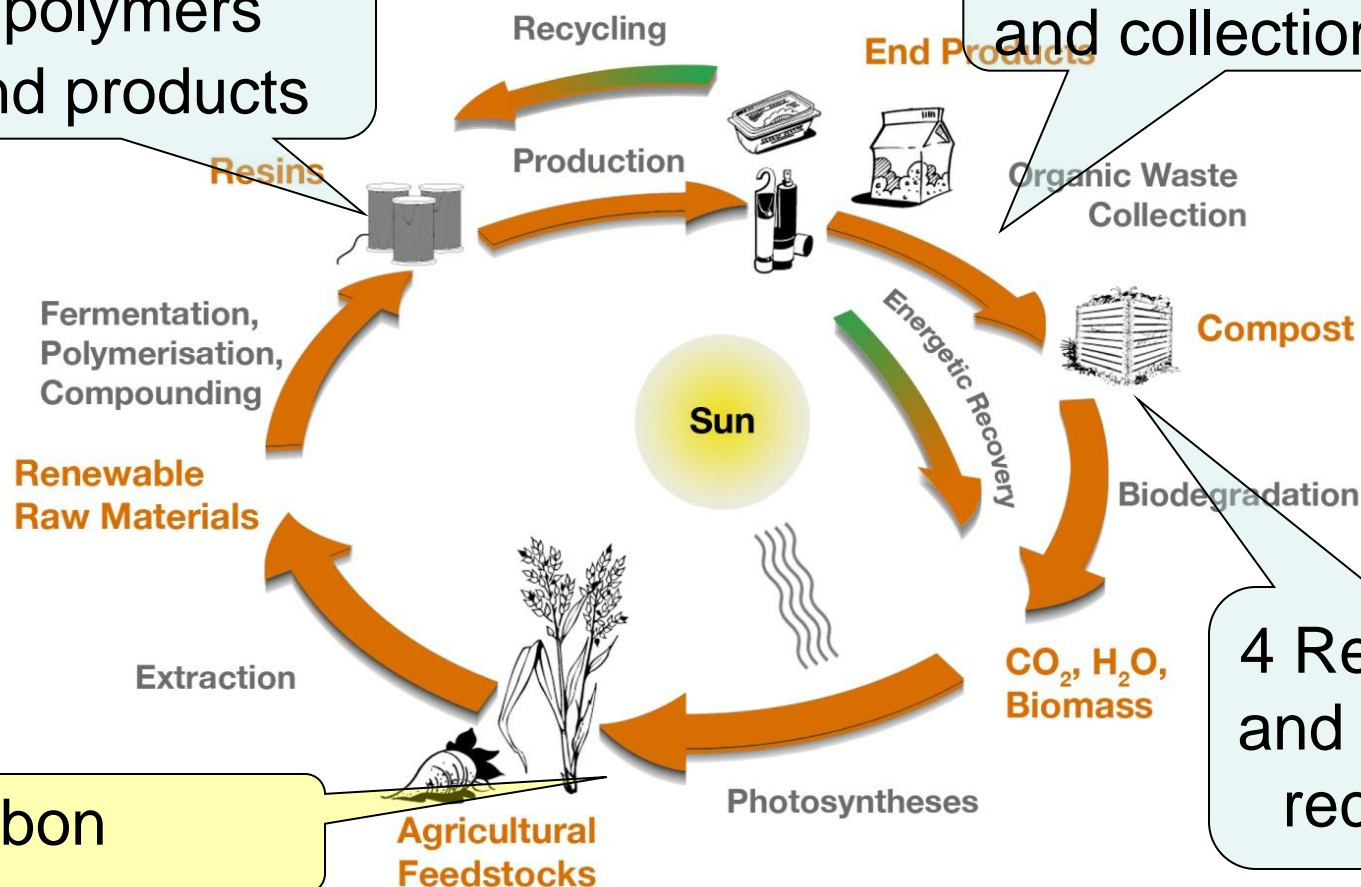
Dr Martin Kay



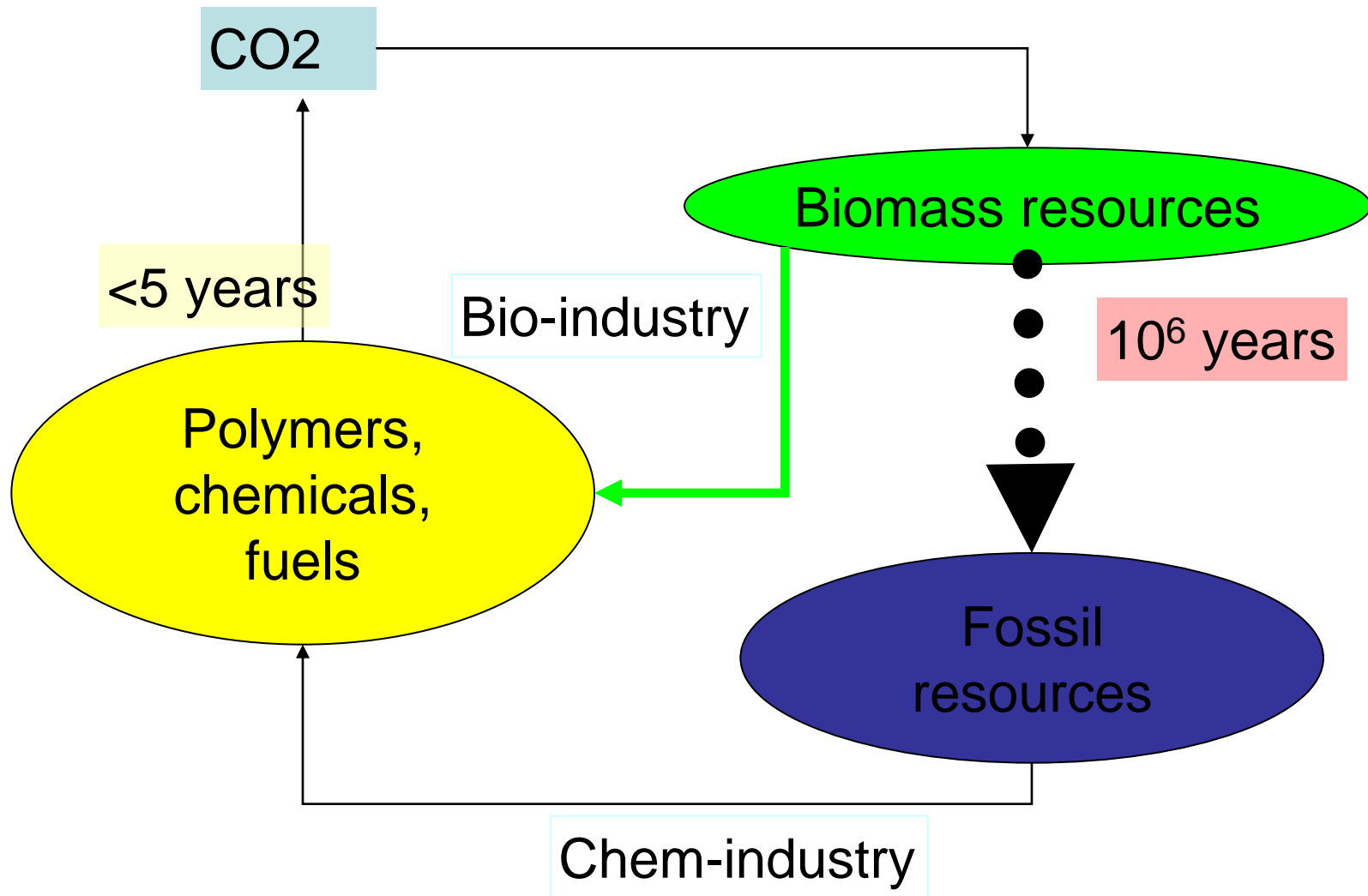
- The case for bioplastics-carbon
- New polymers and end products
- Labelling separation and collection
- Recycling and organic recovery
- 2012 – what does it look like

2 New polymers
and end products

3 Labelling, separation
and collection



Carbon cycle



Walmart Scorecard

	Virgin PET bottle	rPET bottle	PLA bottle
GHG	☹️	☹️	☹️
Material value	☹️	☹️	☹️
Product/pack ratio	☹️	☹️	☹️
Cube utilisation	☹️	☹️	☹️
Transportation	☹️	☹️	☹️
Recycled content	☹️	😊	☹️
Recovery value	😊	😊	☹️
Renewable energy	☹️	☹️	☹️
Innovation	😊	😊	😊

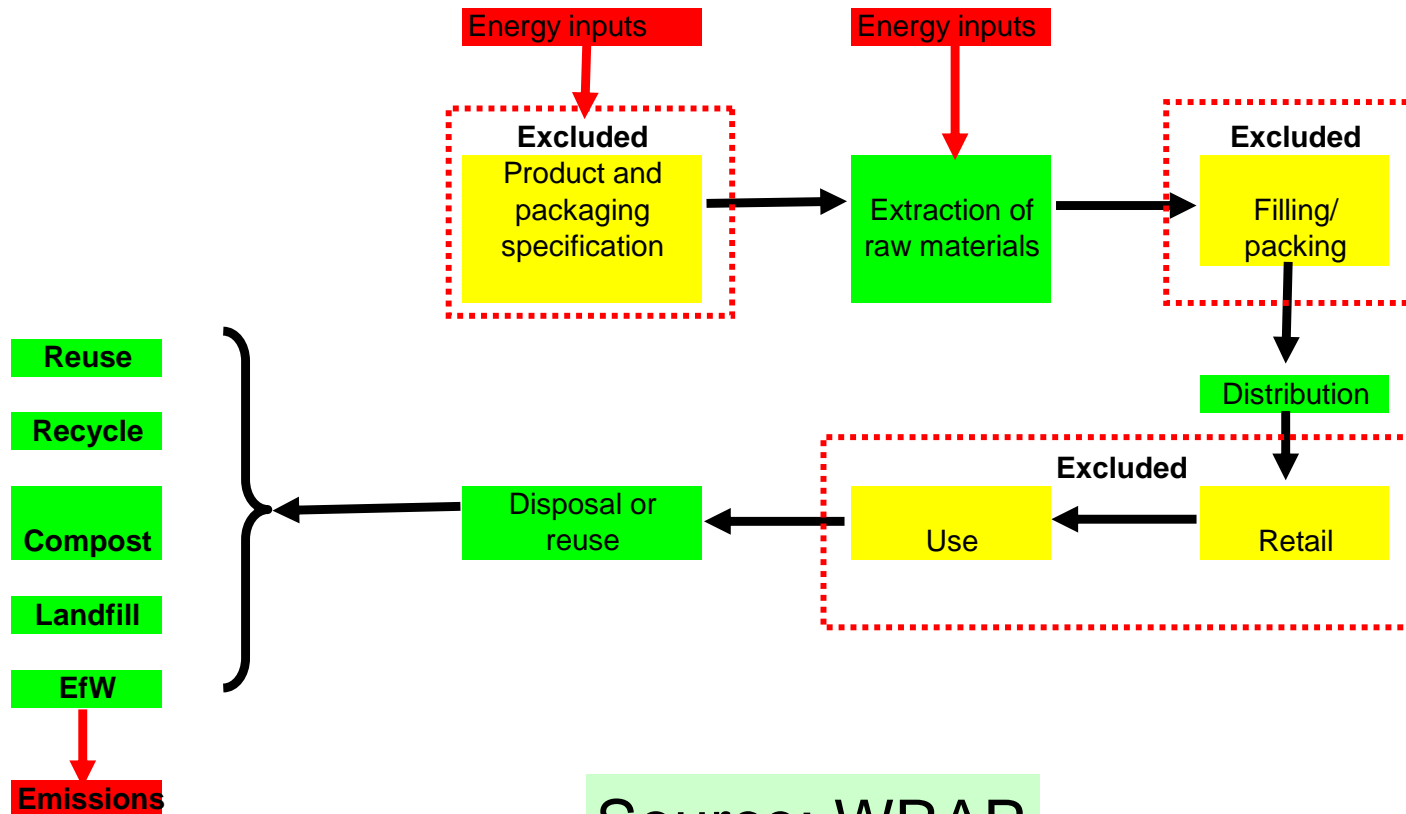
No, its me, I'm
as light as you
but already
contain 25%
recycled content

Its me. I'm lightweight
and made from 30%
plants.
I can be recycled with PET

Hey, I'm best in class –
lightweight & recyclable

I'm not
collected or
recycled-I'm
a
contaminant





Bioplastics – point of differentiation is in material extraction (source) and method of disposal only



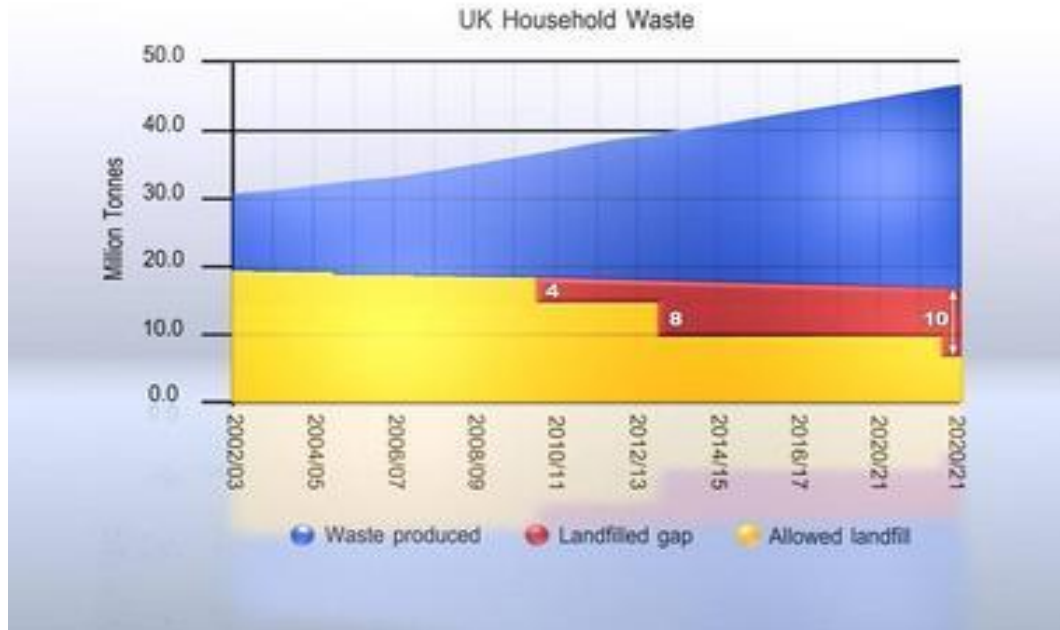
- 6.7 million tonnes of household food waste is disposed of to landfill every year

- 600,000 tonnes of pre-packaged food waste disposed by retailers every year

- ...are bioplastics the solution?

Food production, distribution, storage, preparation and disposal accounts for 20% of UK greenhouse gas emissions

EU Landfill Directive



	Household waste (million T)	Food waste (million T)	Retailer food waste (million T)	Landfill reduction (biodegradable waste)
2002	30	6.7	0.6	0
2010	35	7.82	0.7	75% of 1995 level
2013	40	8.94	0.8	50% of 1995 level
2020	45	10.05	0.9	35% of 1995 level

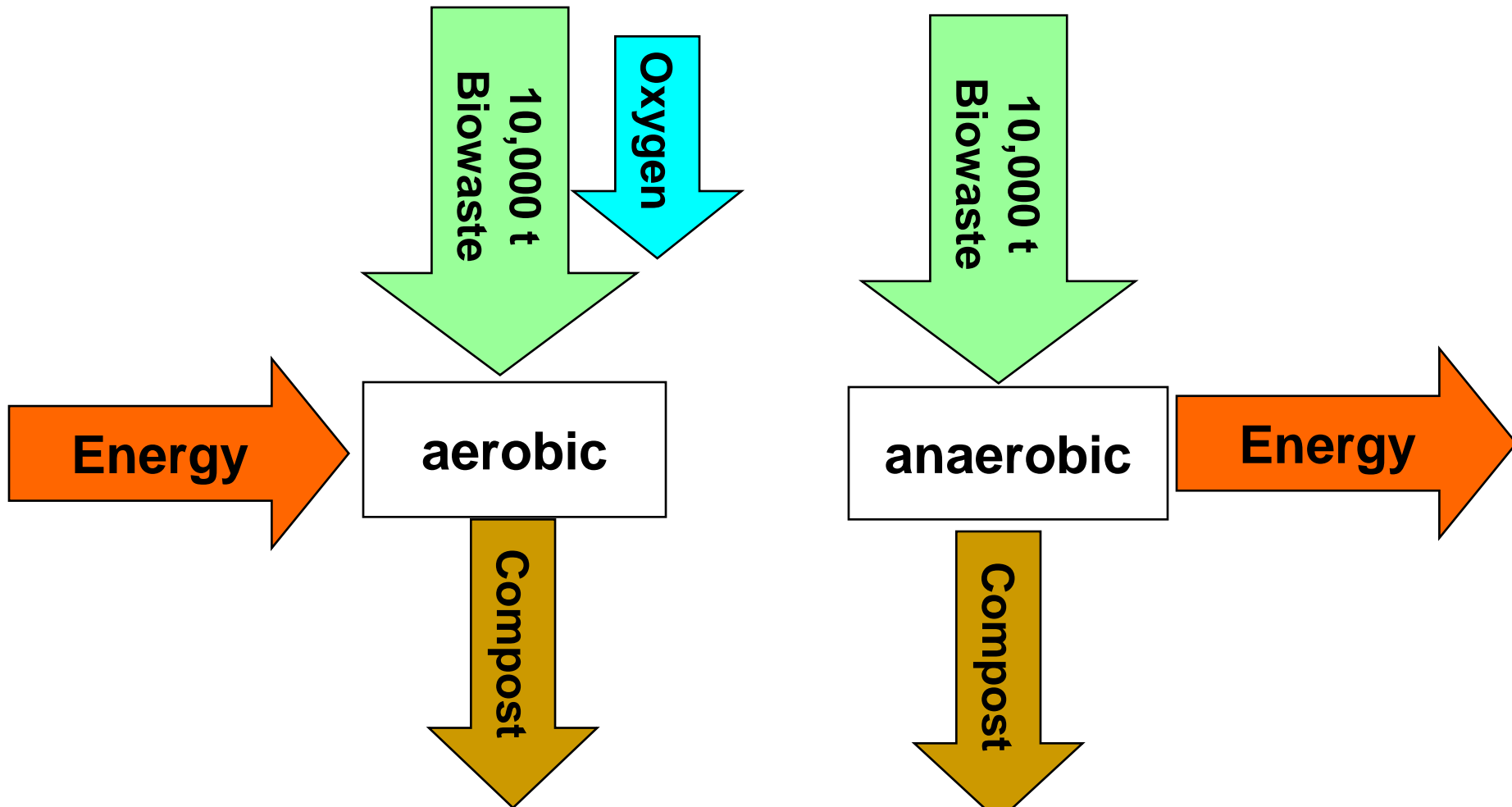
Where is it all going to go?

Hidden potential...?



Could bioplastics allow us to convert 600,000 tonnes of pre-packaged food waste to methane?

Aerobic windrow versus anaerobic systems?



Year	Location	Country	Annual throughput (tpa)	Inputs	Outputs
2008	Montpellier	France	75000+30,000	MSW OF + SSO	E T
2006	Aarberg	Switzerland	18,000	SSO	E T
2006	Ottenbach	Switzerland	26,000	SSO	E T
2006	Langenthal	Switzerland	4,000	SSO	E T
2006	Pratteln	Switzerland	16,500	SSO	CNG
2005	Lenzburg	Switzerland	5,000	SSO	E T
2005	Rioja	Spain	75,000	MSW OF	E T
2005	Martinique	Caribbean	20,000	SSO	E T
2004	Passau	Germany	39,000	SSO	E T
2004	Kyoto	Japan	20,000	SSO	E T
2004	Weissenfels	Germany	20,000	SSO	E T
2001	Braunschweig	Germany	26,000	SSO	E T
2001	Roppen	Austria	10,000	SSO	E T
2001	Oetwil	Switzerland	10,000	SSO	E T
2001	Braunschweig	Germany	26,000	SSO	E T
2001	Volketswil	Switzerland	5,000	SSO	E T
1999	Frankfurt	Germany	30,000	SSO	E T
1999	Alzey-Worms	Germany	26,000	SSO	E T
1999	Kyoto	Japan	1,000	SSO	E T
1998/06	Niederuzwil	Switzerland	8,000	SSO	E T
1997	Hunsrück	Germany	10,000	SSO	E T
1997	Lustenau	Austria	10,000	SSO	E T
1997	München-Erding	Germany	26,000	SSO	E T
1996	Kempten	Germany	10,000	SSO	E T
1995	Otelfingen	Switzerland	12,500	SSO	CNG
1995	Samstagern	Switzerland	10,000	SSO	E T
1994/03	Bachenbülach	Switzerland	14,000	SSO	CNG
1991	Rümlang	Switzerland	8,500	SSO	E T

MIGROL self service

NATURGA
komposas med

RECOLOCK

140

IVECO

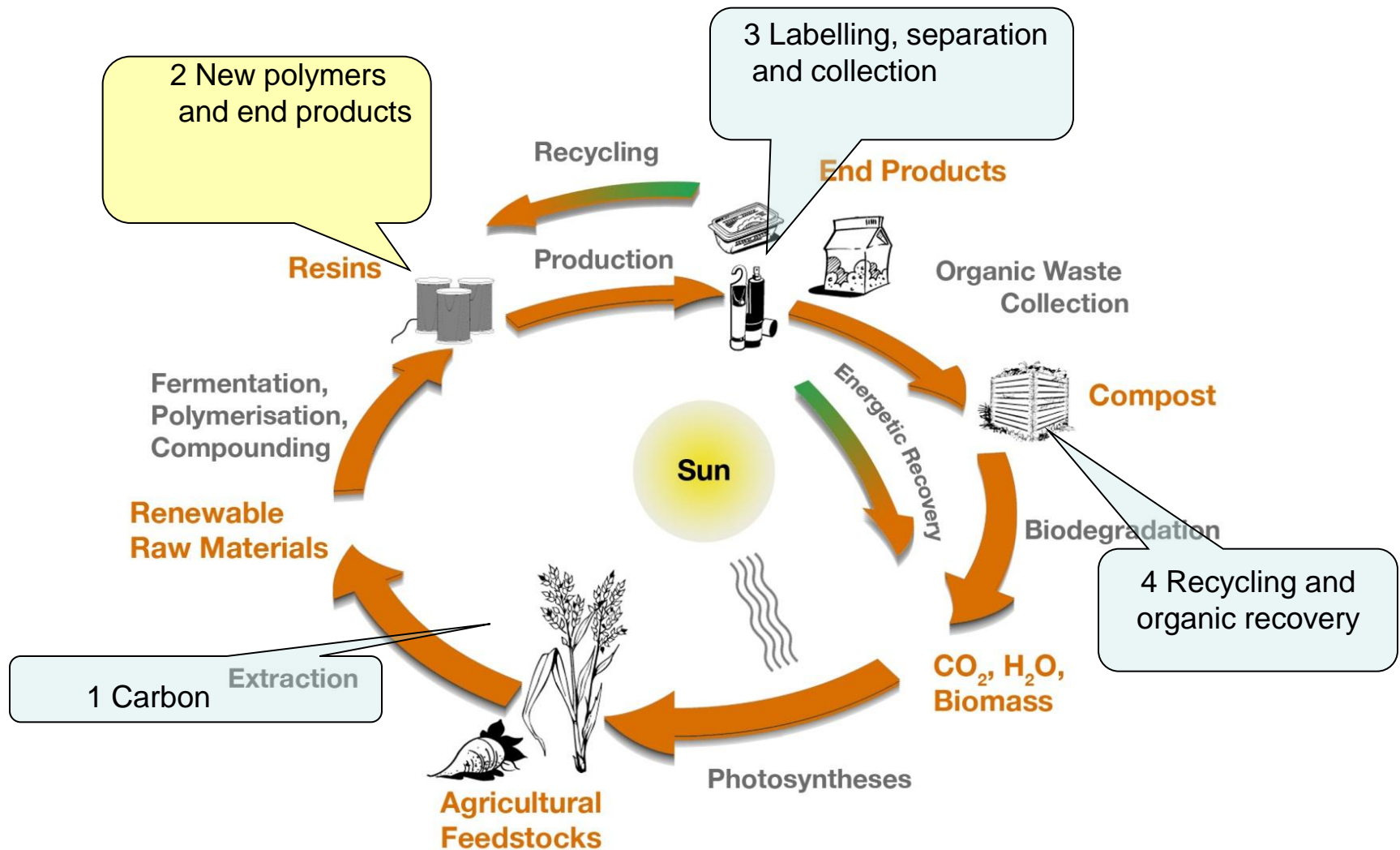
NW 2071



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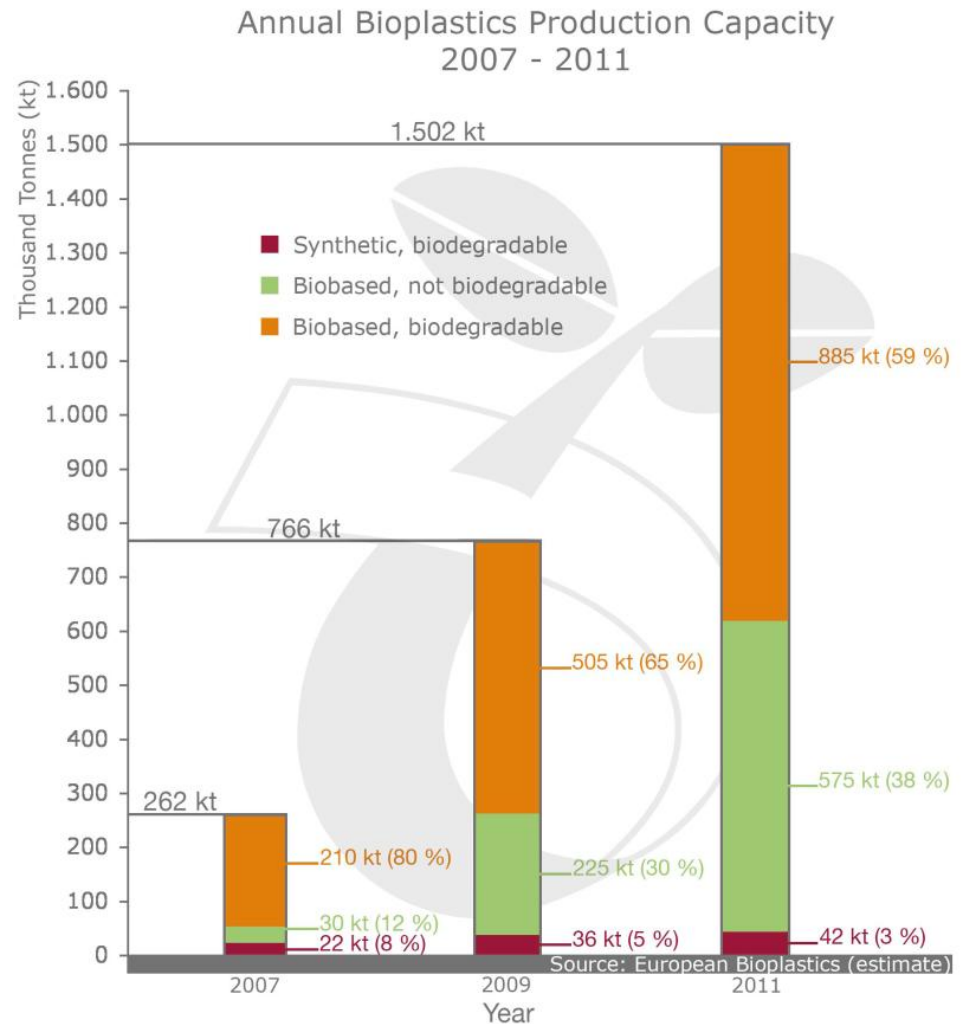
Fish & Sea





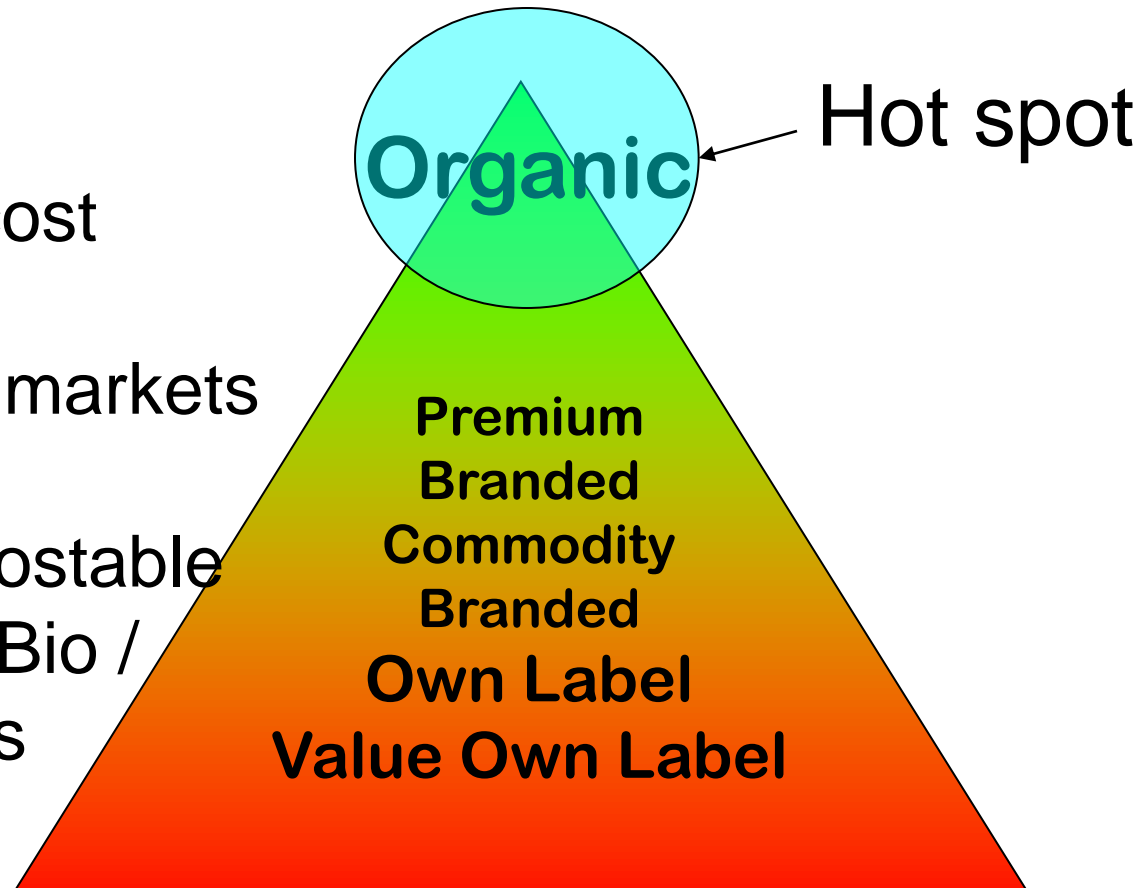
Production capacity – view from 2007

- 2007 210kt tonnes of total 48 million European plastic market (0.4%)
- Market potential 5-10% (or ~ 5 million tonnes by 2020)
- Global production ~ rising to 885kt tonnes by 2011
- Annual growth is > 20%



Target area for Renewables

- Renewables – new technology, high on-cost
- Limits to high value markets
- Renewable & compostable packaging is aligned Bio / Organic brand values



Source : **AMCOR** NaturePlus

Starch-Mater-bi

- Tough and strong
- Highly water permeable
- Low oxygen barrier
- Heat sealable
- Use: Fruit and vegetables, crusty bread, vertical form-fill seal



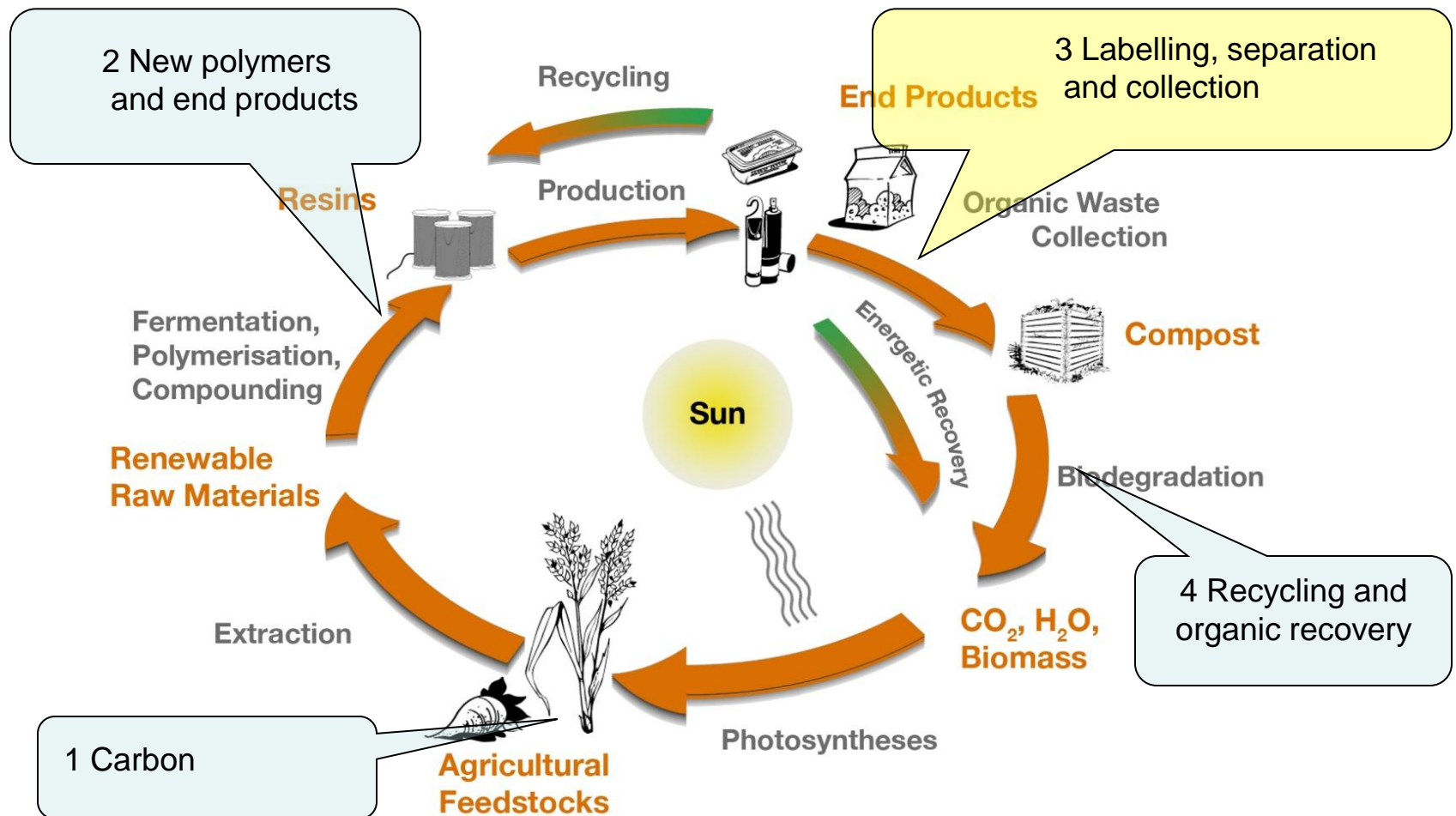


- Vertical and horizontal form-fill seal
- Heat-sealable
- Dimensional stability, even with water
- Low O₂ barrier
- Outstanding clarity and crisp feel
- Used for whole and prepared foods, dry goods and bakery

Natureflex NE30



- Amcor's NaturePlus
(Awarded 'Best
Bioplastics Application –
Packaging' 2008)
- Uses NatureFlex
NE30 extrusion coated
with an alternative
biopolymer in order to
enhance seal strength
& integrity & increase
moisture resistance



US and EU 25 packaging flows

- US~76.7 million tons
 - Glass-14.2%
 - Paper & board-50.8%
 - Plastics-17.9%
 - Metals-5.6%
 - Wood-11.2%
 - Other-0.3%
 - Bioplastics ~ 0.021%
- EU~76.3 million tonnes
 - Glass-21%
 - Paper and board-39%
 - Plastics-17%
 - Metals-6.3%
 - Wood-15.6%
 - Other-0.28%
 - Bioplastics ~ 0.025%

Source: US Environmental
Protection Agency Oct 2008

Source: European Environment
Agency 2008

Waste management has evolved to cater for the major material flows-it is difficult to justify the collection of bioplastics!

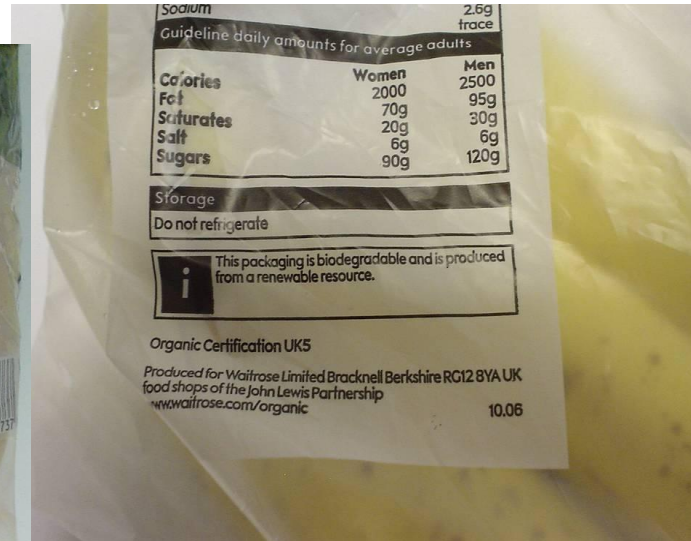
What are the certification schemes?

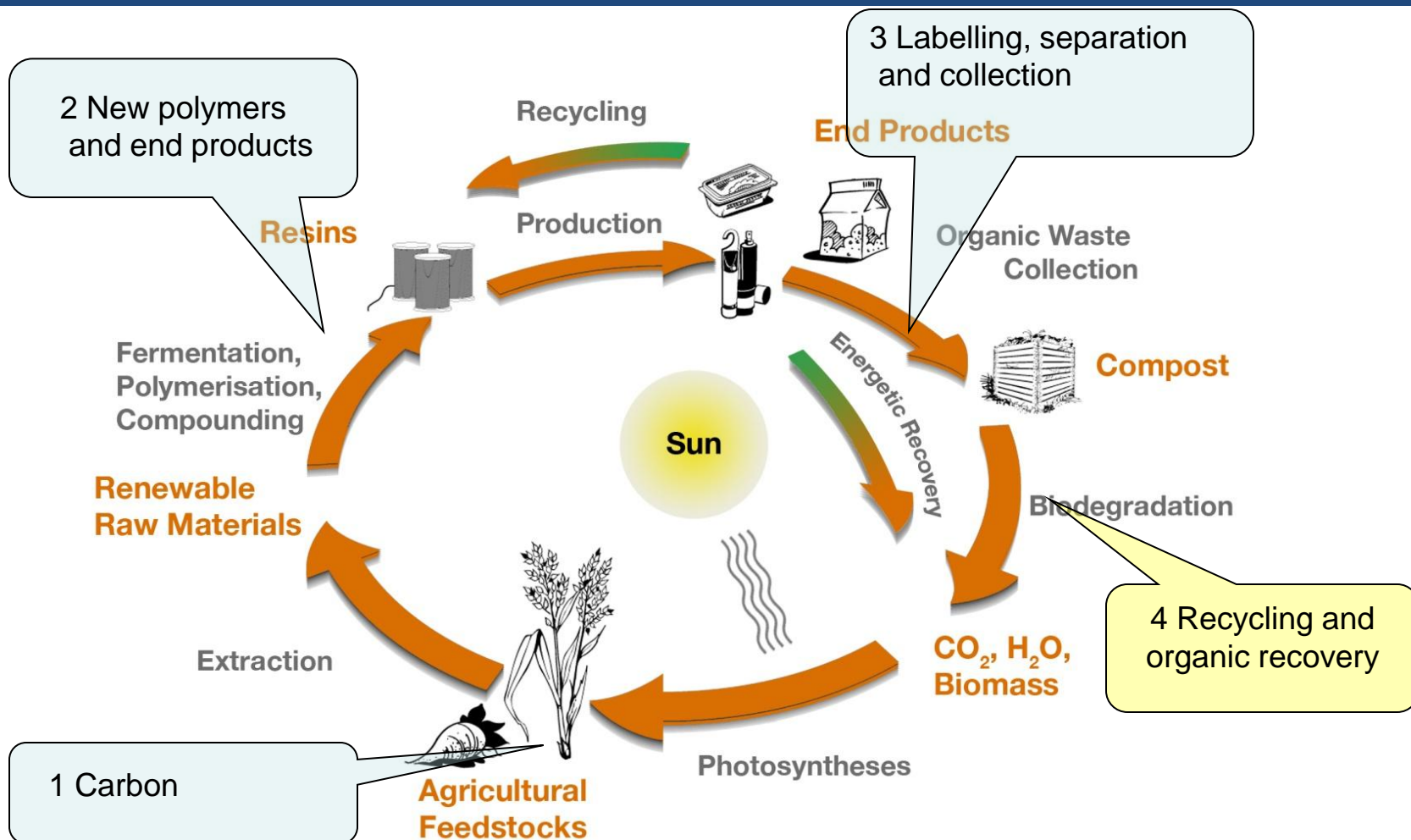


compostable



Retailer examples... confusion!





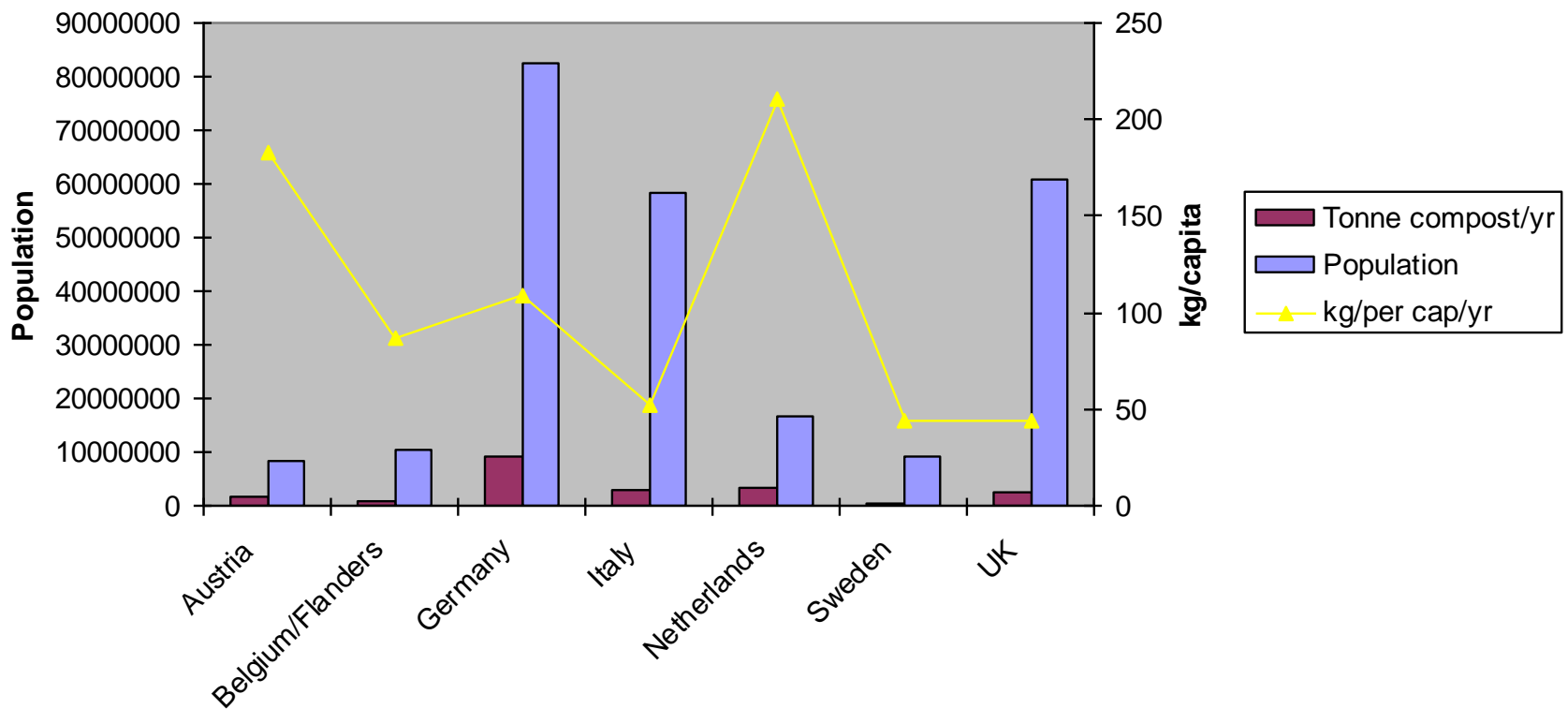
European Composting capacity

	Million tonnes compost/yr	Population	kg/per cap/yr
Austria	1.5	8205533	182.8034815
Belgium/Flanders	0.9	10403951	86.50559773
Germany	9.0	82369548	109.2636808
Italy	3.0	58145321	51.59486522
Netherlands	3.5	16645313	210.2694014
Sweden	0.4	9045389	44.22142597
UK	2.7	60943912	44.30303063

Netherlands (210 kg/cap/yr) is the lead performer followed by Austria (182kg/cap/yr) and Germany (109 kg/cap/yr).

Netherlands >5 x composting/capita/yr of UK !

Composting rates by country



Acceptance of compostable packaging in composting plants

Belgium/Flanders	0.9mT	<u>Good for segregated mono streams</u> . Biopolymers need to meet EN13432 and are only accepted as a separate monostream eg festival waste.
Italy	3mT	<u>Good for certified compostable bags</u> . All sites accept compostable liners for kitchen caddys
Netherlands	3.5mT	<u>Good</u> , packaging needs to be certified to EN 13432 and carry seedling logo. For biobags-seedling logo must be visible on the outside
UK	2.5mT	<u>Good for compostable bags</u> . Plastics complying with EN13432 accepted. 50 municipalities operate separate food waste collection with 80% use certified compostable bags. Oxi-degradable plastics not accepted

Acceptance of compostable packaging in composting plants

Country	Compost capacity	Accepts compostable packaging ?
Austria	1.5 mT	<u>Very poor</u> . Compost Ordinance specifies between 95 -100% plant biomass only
Germany	9mT	<u>Poor</u> for bioplastics from households. Biowaste Ordinance lists biopolymers as accepted but plants decide in the end
Sweden	0.4mT	<u>Very poor</u> - not accepted.

2012 – where are the bioplastics?



2012 – retailers and brand owners

I wouldn't be surprised at all if retailers were becoming disillusioned with the materials. They need to be home compostable, clarity often important, keep functionality and protect the food (barrier properties important). They have a place - but its niche, and until the materials step change in performance I cannot see this changing !

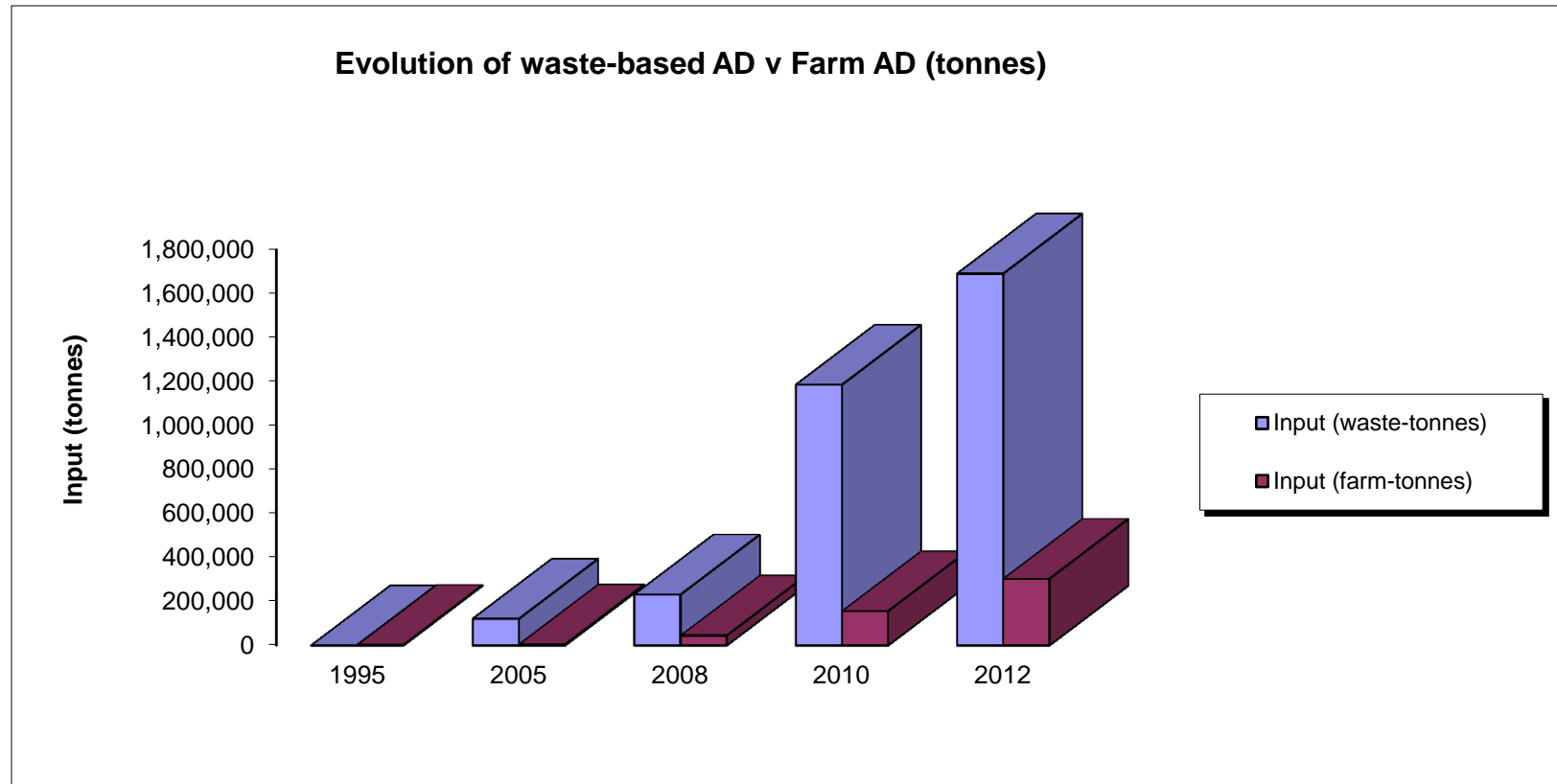
More emphasis seems to be being placed on 'petroleum-free' bio-derived plastics (such as the Coca Cola plant bottle) which replicates the functionality of the existing pack and can be recycled easily by existing systems.

The primary purpose of our overwrap (as we call it) is to provide a moisture barrier to stop the product drying out (i.e. to keep the moisture in); we use BOPP as this is the only material that provides us with the necessary barrier performance. We have looked at a number of other new materials but they typically they don't give us the necessary properties; Natureflex doesn't offer the barrier properties required.

Ultimately the business would love an alternative to BOPP but A) there isn't one that meets our performance requirements and B) when looked at on a full life cycle analysis basis none of them stack up either.

Firstly introducing any new material is met with resistance by the factories as we have such a highly optimised manufacturing process and any changes require some serious business requirement. .. Also, we carry out a full business assessment which includes a full life cycle analysis on all our materials (and manufacturing locations) so using any material that isn't mature (i.e. virtually all bioplastics) becomes problematic as they currently use more energy and water etc etc than PP-- a bit of a chicken and egg situation !

2012 - recycling and organic recovery



Bioplastics have an identity problem !

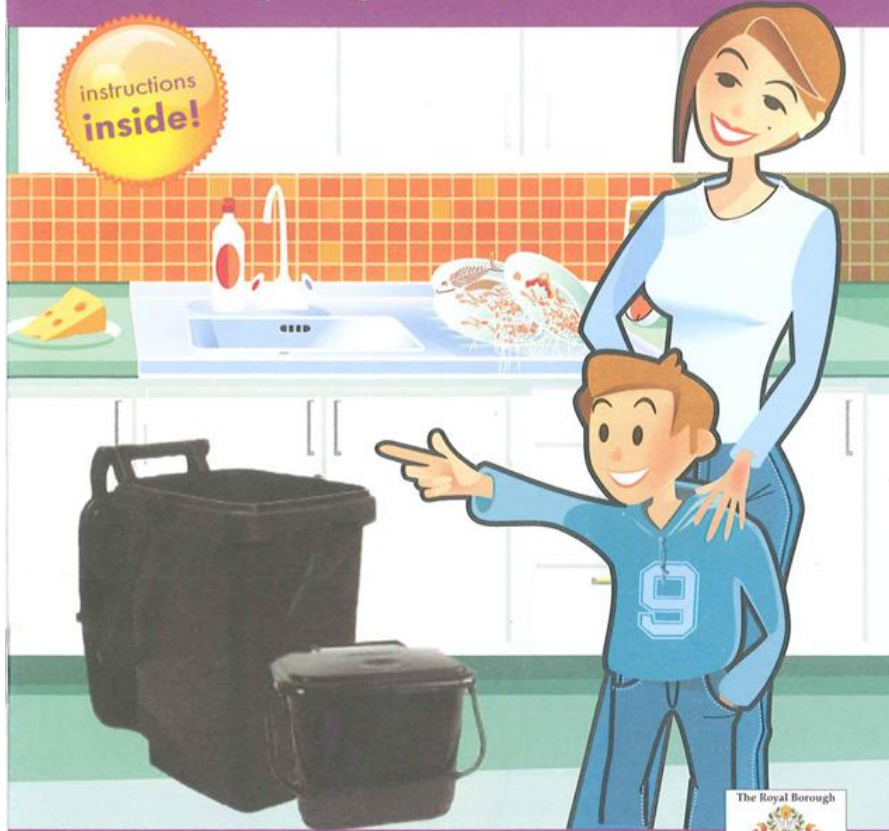


2012 - bioplastics have an identity problem !

Food Waste Recycling

Your new weekly food waste collection starts from week beginning Monday 8 October 2012

instructions
inside!



Putting Residents First

 **recycle**
for Windsor and Maidenhead



3

What can I put in my caddies?

All leftover food and cooking scraps can be placed in your caddies but please **DO NOT** use plastic bags.

Here is a handy guide:

- ✓ Food, cooked and uncooked, including bones
- ✓ Meat, fish and dairy produce
- ✓ Fruit and vegetables
- ✓ Bread, cakes and pastry
- ✓ Rice, pasta and beans
- ✓ Pet food
- ✓ Coffee grounds and tea bags



No Thanks

Please do not put any of these materials in your caddies

- ✗ Plastic or plastic bags
- ✗ Household waste
- ✗ Glass
- ✗ Animal faeces
- ✗ Nappies
- ✗ Metals

IF IN DOUBT
CONTACT US &
FIND OUT

If you already compost at home please keep composting your uncooked vegetable and fruit peelings in your compost bin or heap. For more information on how to start composting at home have a look at the back page of this leaflet.



- Trend – I think it is going to be an evolution where we will continuously reduce environmental impact and find more energy efficient processes. But I really see the trend going in the direction of conventional plastics made from renewable resources (Dr Anne Roulin, Nestle. European Plastics News 26th July 2011)

Summary - biocompostable plastics

Strengths & Opportunities

- Ideal for 'caddy sacks' for food waste only
- Single answer to 600,000 tpa of pre-packaged food waste & possible conversion to green energy - NO
- Home composting advantage ?
- New functionalities ?

Weakness & Threats

- Expensive, functionality has not really improved
- No clear 'end of life'
- Surpassed by bio-derived resins which can be recycled with value-add polymers (PET etc)
- Identity problem – plastics not wanted in food caddy waste.
- Retailers and brand owners have shifted strategy to capture embedded value
- Savvy brand owners invested in bio-derived resins

Thank you
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