

NatureFlex™

Sustainable
Biodegradable films
for Packaging

Bioplastic films
replacing
conventional
plastic films
packaging
from nature,
packaging
for nature...



Agenda

- Just what do we mean by "*sustainable packaging?*"
- What is the performance target & what are the problems?
- Addressing the weaknesses in order to produce a truly sustainable solution
- The way ahead for Biopackaging
 - In tough economic times
 - In performance terms

Sustainability in Packaging

- Sustainability: “Meeting the needs of the current generation, without compromising the needs of future generations” (Bruntland report)
- But what does that mean for packaging?

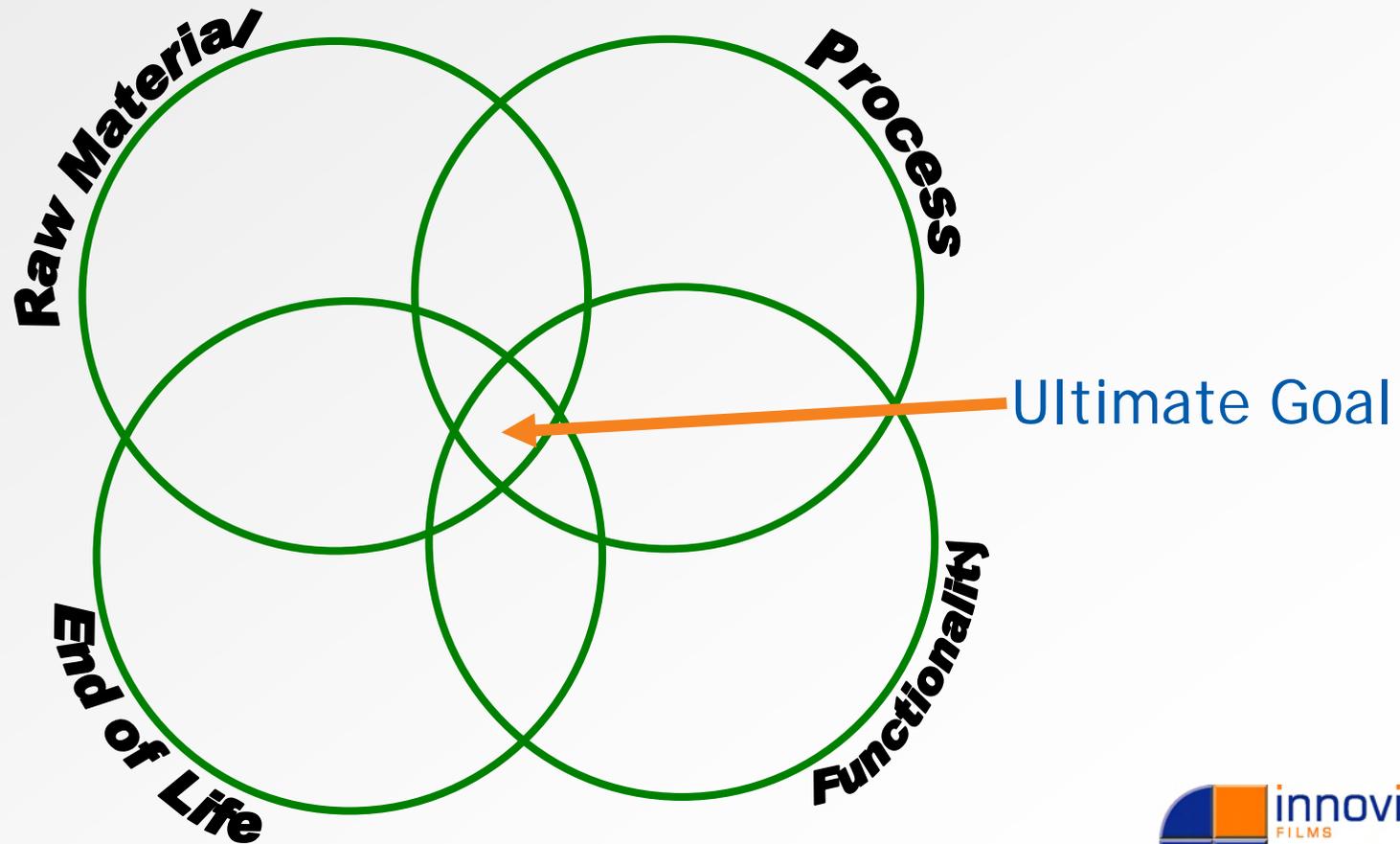
Sustainability in Packaging

- Sustainability is a journey...
- ... In which biomaterials have a role to play
- 4 Key elements for packaging
 - Raw material availability
 - Process efficiency
 - End of life
 - Functional role



Sustainability in Packaging

- 4 Key elements



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What's the target?

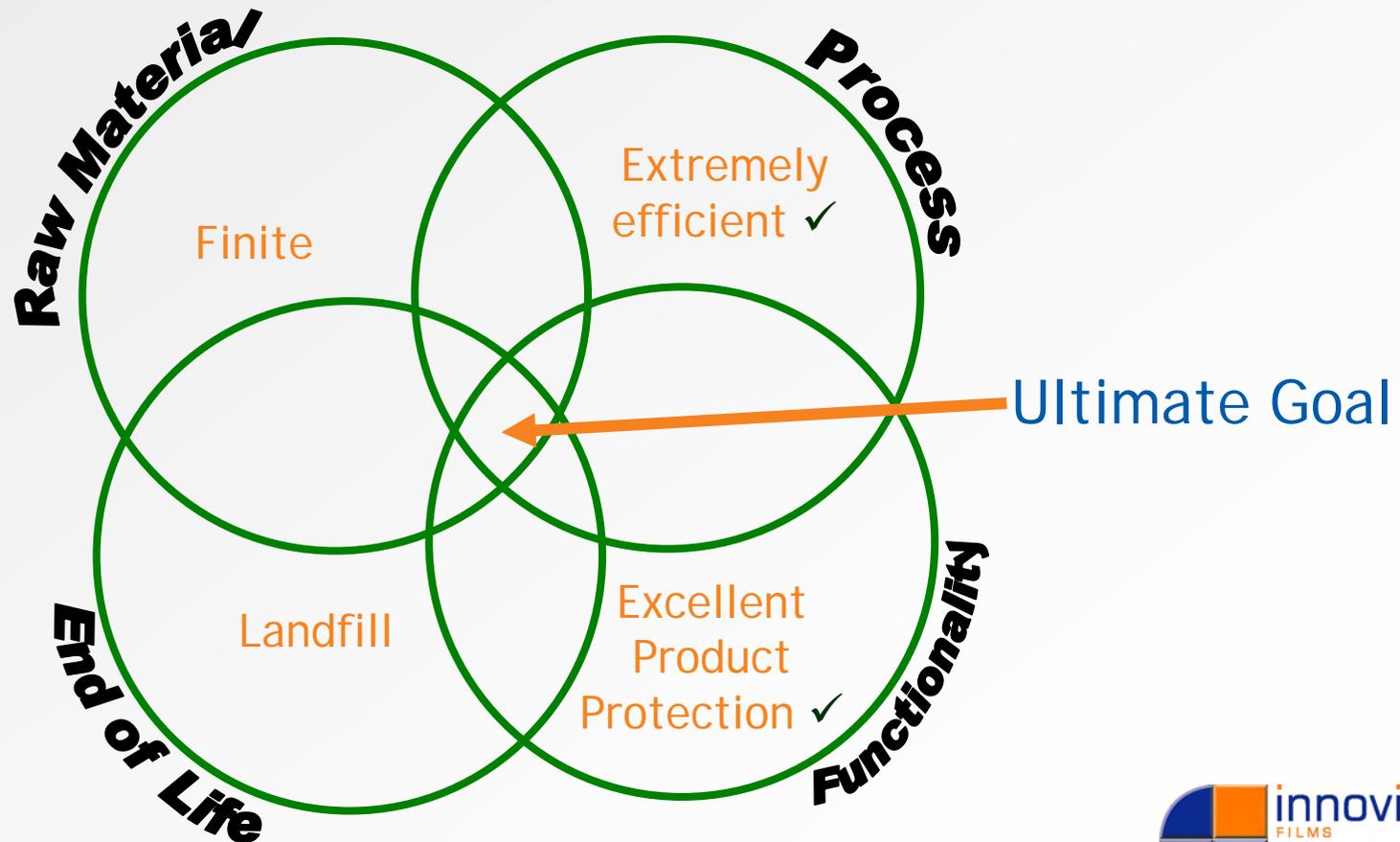
- PET, PVC, PA, OPP...
- Let's take BOPP - The 'workhorse' of flexible packaging (choc bars, crisp bags, bakery etc...)
 - Good transparency
 - Good Gloss
 - Low density (0.9)
 - Good heatseal
 - Good moisture barrier
(Tropical Moisture transmission of ~6)
 - Oxygen transmission ~ 1500
 - Cost-effective

What's the problem?

- Perception is that Bioplastics are
 - Cloudy
 - Dull
 - Heavy
 - Very poor moisture barrier
(Tropical Moisture transmission of >800)
 - Oxygen transmission ????
 - Very expensive!

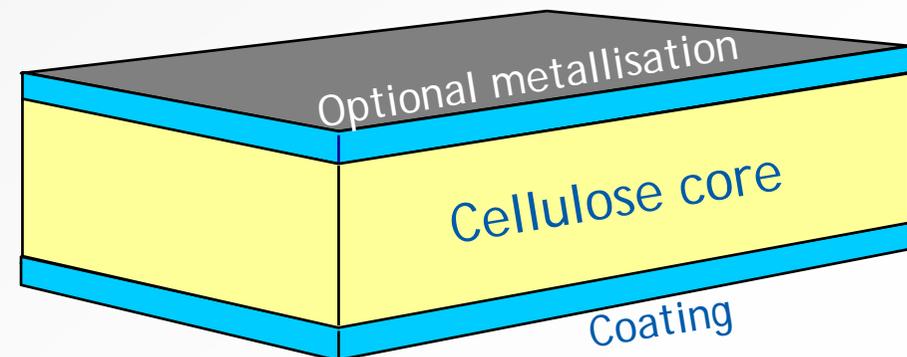
BOPP

- BOPP currently scores 2 out of 4:



NatureFlex

- **What it is:**
- Ultra transparent packaging film
 - Colours & metallised now available too
- Renewable, biodegradable & Compostable
- Able to provide key packaging protection properties:
 - H₂O & O₂ barrier
 - Heatsealability
 - Heat-resistance
 - Print stable
- **What it isn't**
- Thermoplastic
 - No weld-seals
 - No thermoform capability
- A strong & Stretchy (PE-like) material



NatureFlex - Packaging formats



Twist



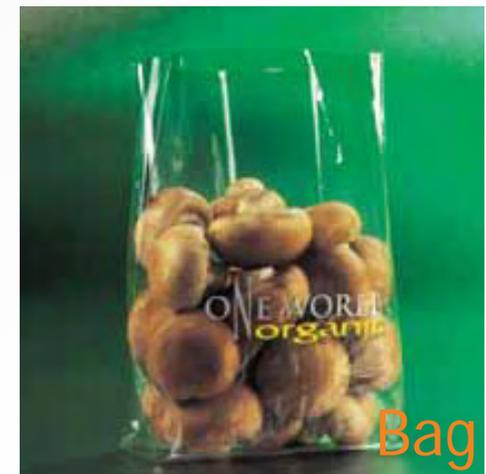
Overwrap



VFFS



HFFS



Bag

NatureFlex™ - from cradle to cradle...



Packaging for nature...

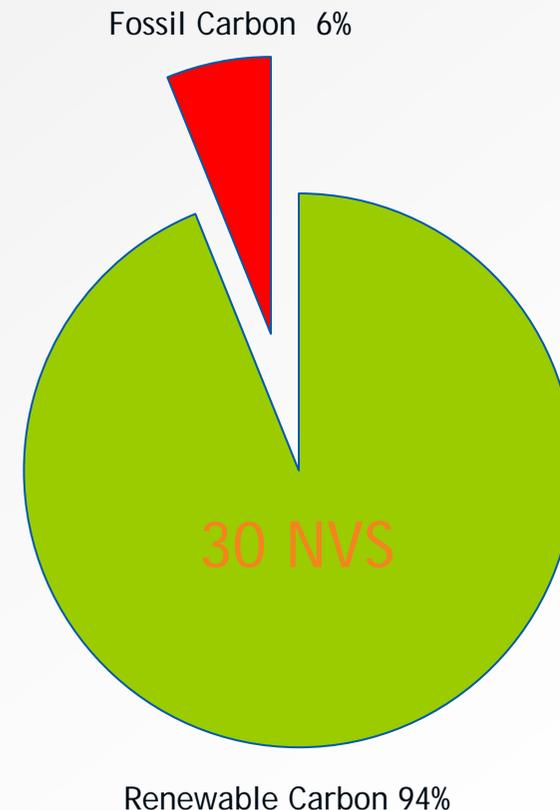


Packaging from nature...



Sustainability in Packaging

- Renewable raw material content
- C₁₄ test (ASTM D6866) confirms % of bio-based content in a material
- Differentiates between 'old' (fossil-based) carbon and 'new' (renewable) carbon
- All NatureFlex films are typically >90% renewable



Certifications

All NatureFlex™ packaging films have been fully tested & certified to the European composting norm EN13432:2000. They can therefore carry the following logos:



**Compostable
Kompostierbar
7H0020**

Dincertco, Germany
Also UK, NL & Pol.



OK Compost, Belgium

Plus in the USA...



BPI, USA



NatureFlex™ - Home Composting

- EN13432 applies to Industrial composting systems. Home composting units do not reach the same temperatures, but Home Compostability can be confirmed via the OK Compost Home Test regime.
- The process essentially repeats the key biodegradation & disintegration elements of EN13432, but at ambient temperature.
- All NatureFlex films are also certified to OK Compost Home.

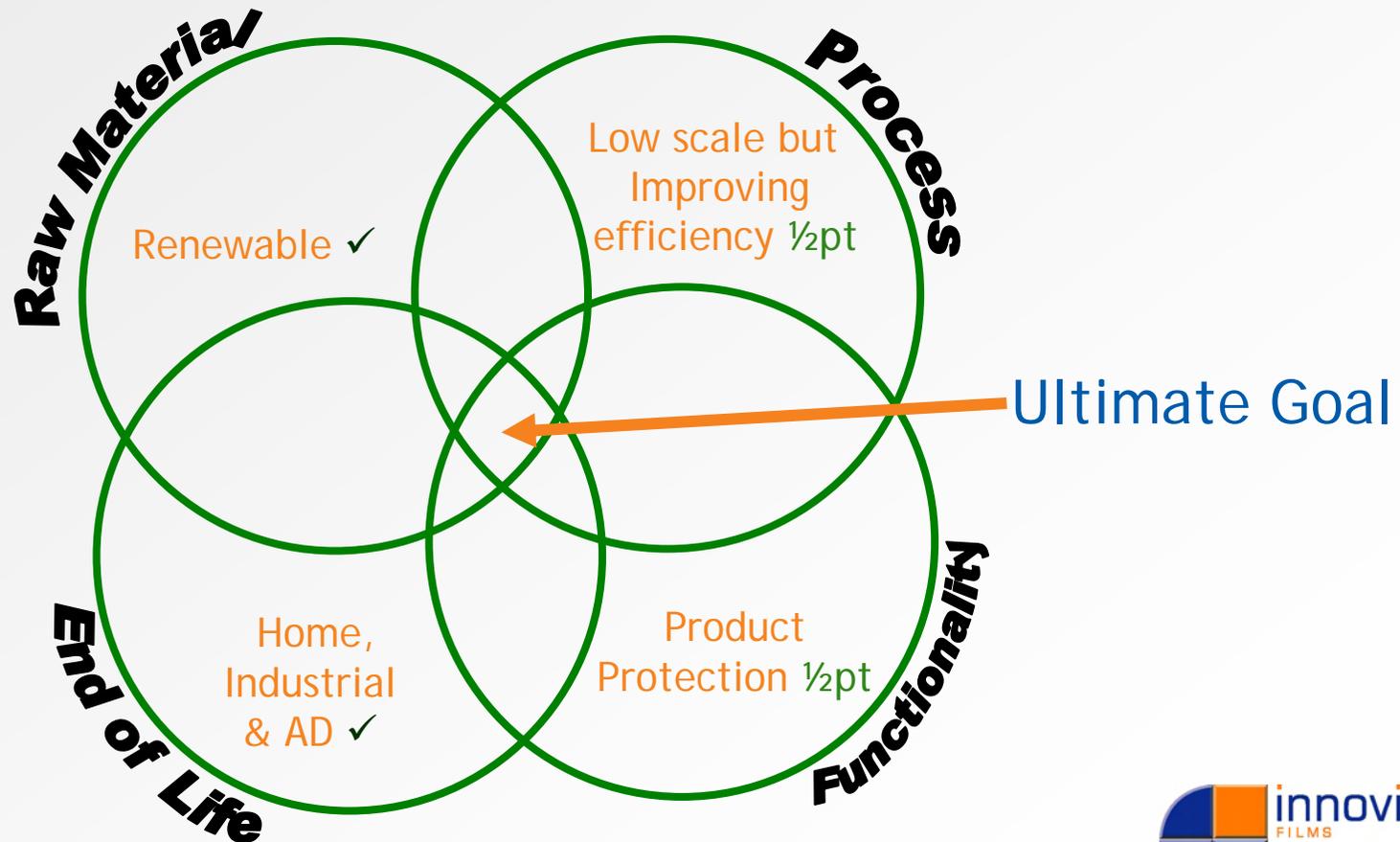


OK Compost Home



NatureFlex™

- At this point NatureFlex scores 3 out 4:

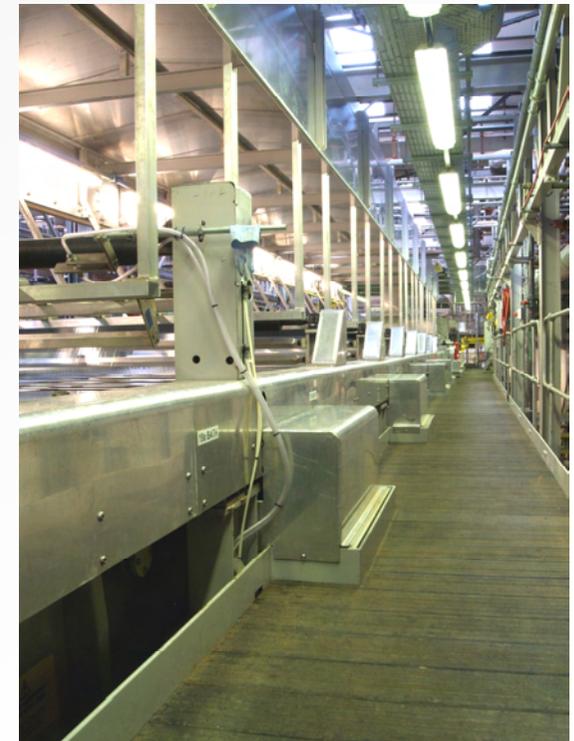


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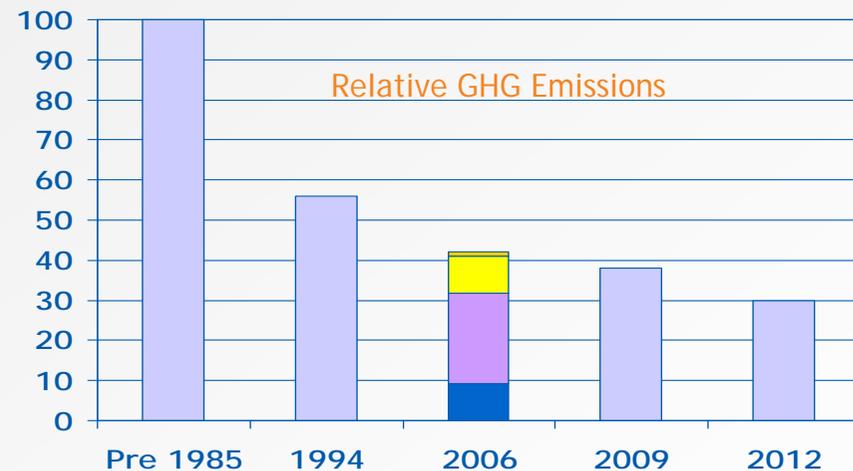
New Cellulose Film Line - Commissioning now

- Line 6 alone will have a greater output than the 2 oldest cellulose lines put together
- In line gas recovery system now across all lines
- Specific technologies for thin film manufacture



Life Cycle Analysis

- All claims regarding environmental improvements are based on a comprehensive LCA conducted 2007, together with external expert-consultants.
- Software and expertise now brought in-house
- Revision of current data anticipated late 2009.
- Carbon footprint data led to adoption of offset schemes to make coated NatureFlex films CarbonZero as of January 2008.



NatureFlex™ Carbon Zero status

- Coated NatureFlex films are now CarbonZero at point of sale
- Offset programmes chosen to reflect our business area, and with both a local and a global perspective.



Reforestation programme in Cumbria, UK



Solar Oven programme
in East Africa



The good news about certified compostable packaging

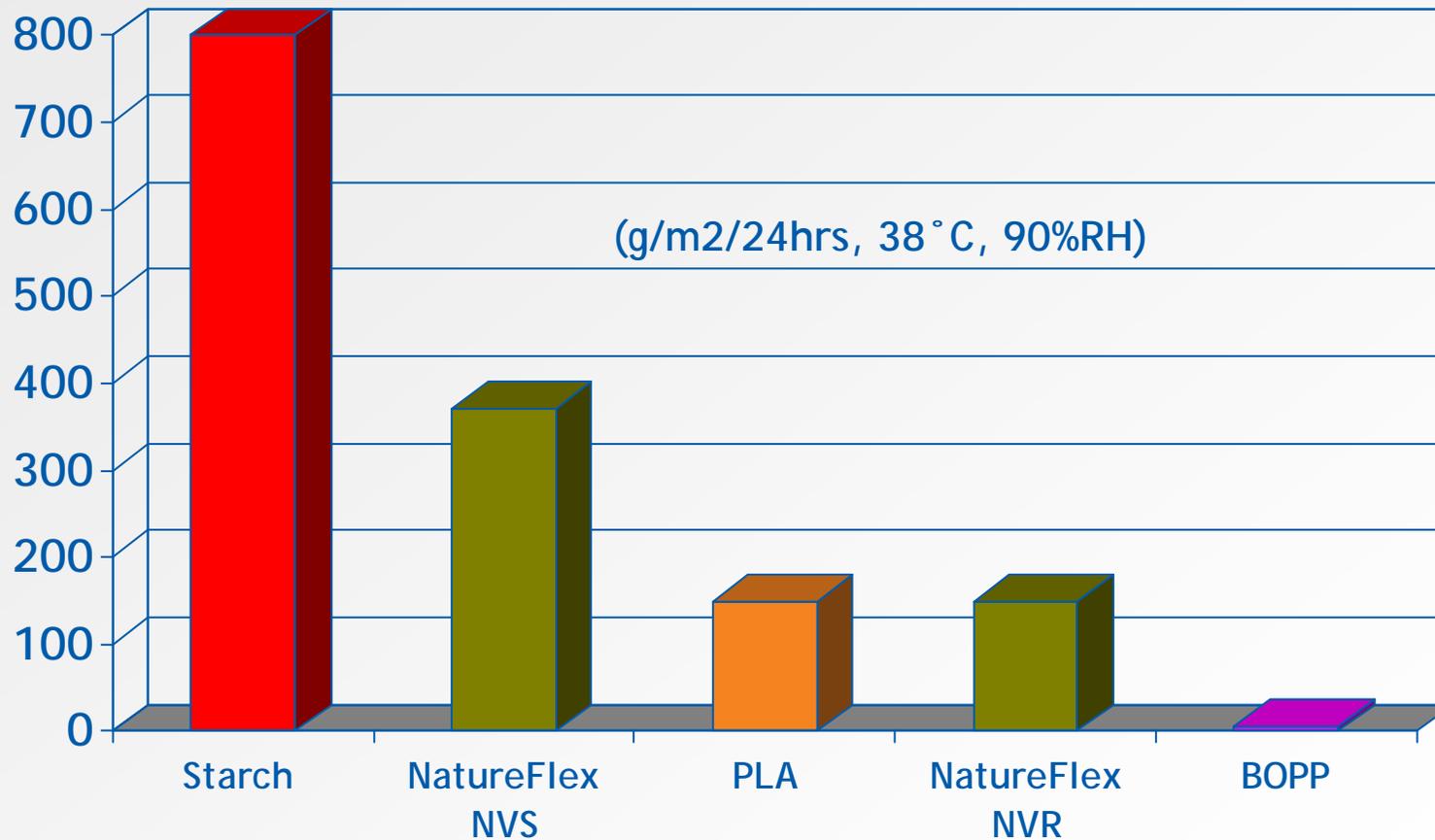
- Full independent substantiation of the claims made
- Proof that the materials are suitable for composting
- Proof that there are no toxicological concerns over the use of the materials in soil & compost
- EN13432 is a harmonised norm: Also confirms customers are meeting their key requirements regarding compliance with the packaging waste directive.

But...

The bad news about EN13432 in packaging

- The early stage of the biodegradation process demands hydrolisation of the material, which facilitates the micro-organism digestion.
- As a result compostable materials tend to be inherently permeable to moisture
 - Where permeability is desirable (e.g. organic waste bags, fresh-produce packaging) this can be an advantage
 - Where moisture barrier is required (dry, hygroscopic foods) this is a key disadvantage

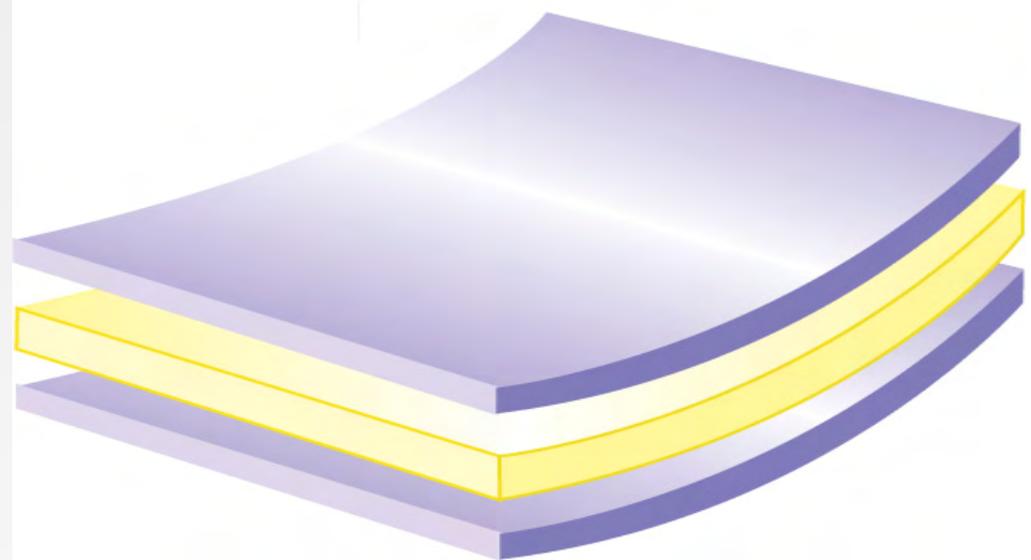
Moisture Vapour Transmission rate



- BOPP Is a key reference material in flexible packaging today
- Biofilms need to be able to come closer to its barrier in order to meet the needs of longer shelf-life foods

NatureFlex™ NK

Moisture barrier sealant layer
Transparent cellulose
Moisture barrier sealant layer



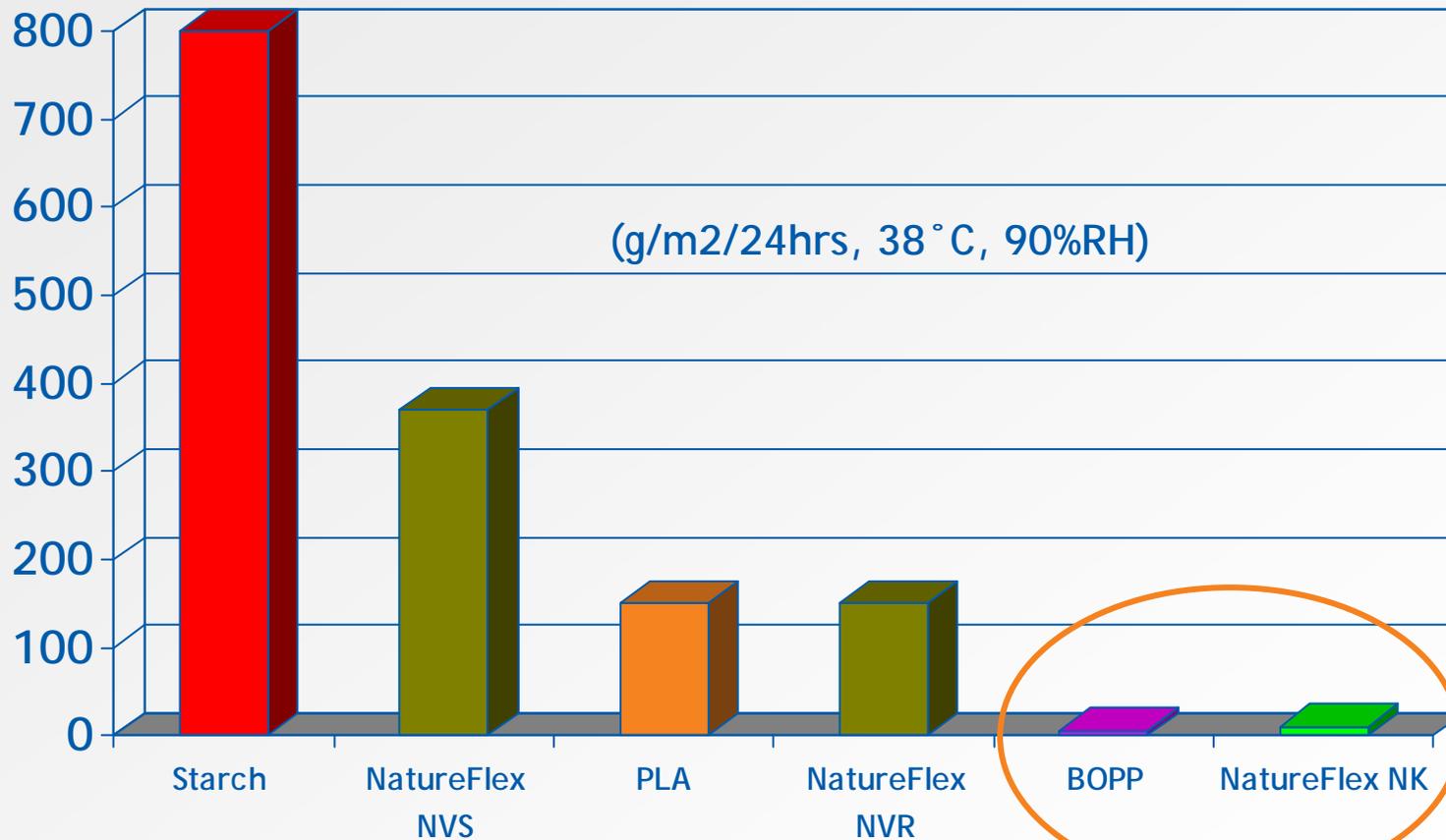
General purpose packaging grade

Potential Applications – dried foods eg. crisps, biscuits, cereals, snack bars etc., confectionery, ream wrap, lamination

Initial availability: 20, 23, 30 & 45μ

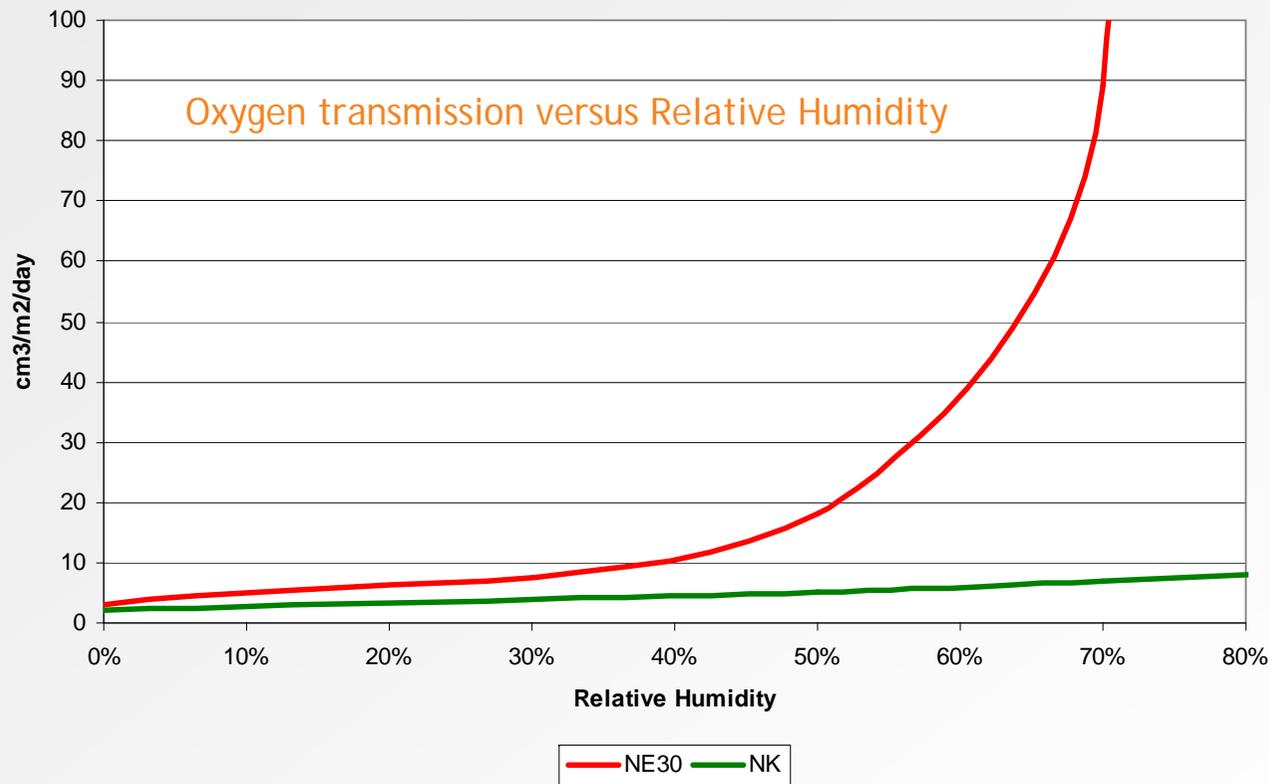


Moisture Vapour Transmission rate



- NatureFlex NK is the first 'off the shelf' biofilm to offer BOPP like barrier properties
- The packing of longer shelf life products now becomes possible

Oxygen Barrier

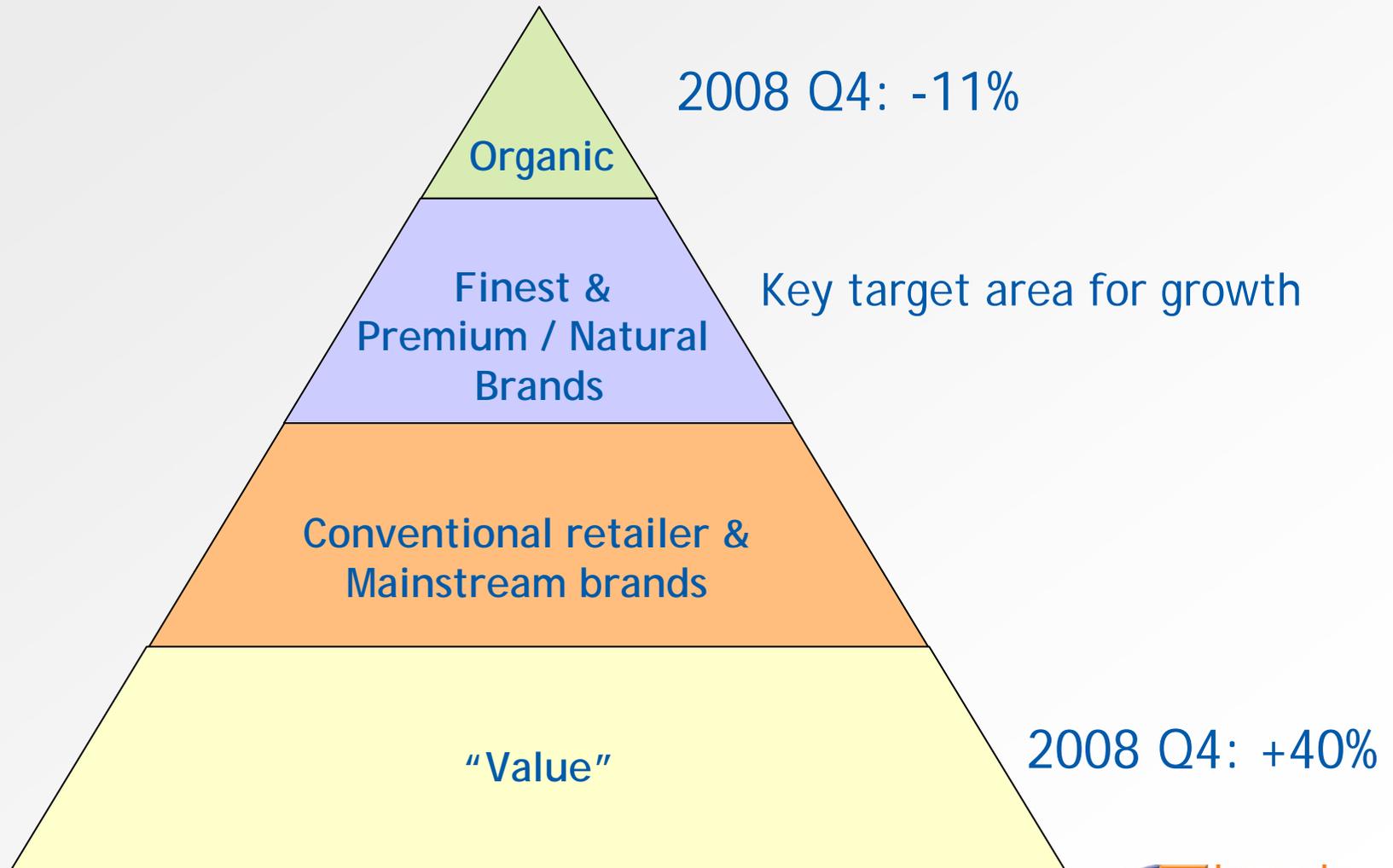


- Sensitive foods often require barrier to gases & odours. Transmission of gases, odours typically increases as humidity increases.
- NK provides gas barrier properties that are much less affected by increases in humidity.

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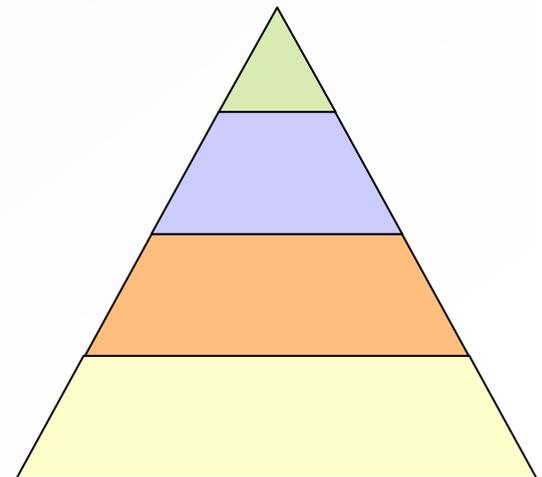
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The Retail Triangle - A tougher year



The way ahead - in tough times

- Sustainability & waste management as issues have not suddenly disappeared because of the recession
- Brands have to fight harder in order to attract a smaller customer base
- Differentiation is therefore at least as important, perhaps more so, than it was before
- Communication is key
 - Biopackaging can help sell the product
 - When the product is right for it



Premium Brands: Adoption & Communication



Extract of text on side of box

'In producing this pack we have looked for ways to reduce our environmental impact.... The wrap protecting the teabags inside this carton is made from wood pulp from sustainable sources and is fully biodegradable. It will break down naturally in a home composting unit...'

Extract of text on side of tin

'You can put the coloured outer wrappers with your compost, where they'll decompose. This is a much greener way of getting rid of them and it'll help your plants grow strong.'



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The way ahead in terms of Performance

- Its not NatureFlex v PLA v Starch-based v CoPET v PBS v PHA....
- Its 'horses for courses' Choose the best one based on target technical properties
- ...And then 'mix and match' those properties
- E.g. In laminates;
 - NatureFlex as the external print web for heat-resistance, barrier and transparency
 - Another biofilm on the inside for greater seal-strength, integrity and pack-strength

The way ahead in terms of Performance

- “Mix & Match” examples



Italian Packaging show concept
(Sponsored by Novamont, Innovia, Cavanna, Sacchital)
Inner Ply: Mater Bi Film
Outer ply: NatureFlex NK barrier film



Amcor for Sainsburys
Inner Layer: Biopolymer coat
Outer ply: NatureFlex NE30

Alcan for Jordans Cereals
Inner ply: White Mater Bi Film
Outer ply: NatureFlex NE30



Performance: Horses for courses...

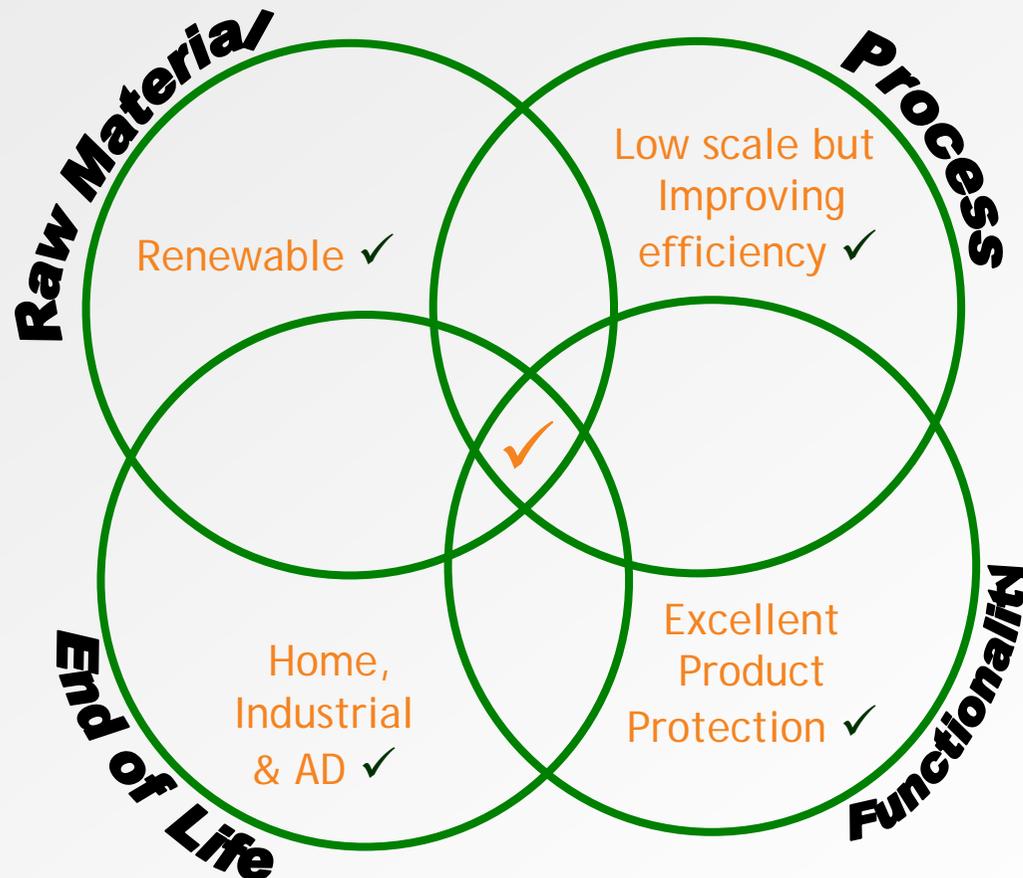
Pack type	Conventional solution	Bio solution
Carrier bag	HDPE	TPS
Flow-wrap	BOPP	NatureFlex
VFFS lightweight	BOPP	NatureFlex
VFFS heavyweight	BOPP//PE or PET//PE	NatureFlex//TPS
Thick box windows	PET	Clarifoil or PLA
Box overwrap	BOPP	NatureFlex
Mailshots	PE	TPS or similar

An example, not an exhaustive list!!



NatureFlex™

- Now its 4 out of 4, and perhaps a bonus point for the marketability of the packaging!!:



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- www.natureflex.com

