

SPRINT - Plastics Recycling International Seminar
PLASTVAL and EPRO - 27/11/2008 - Lisbon/Portugal

- Plastics from renewable resources
- Plastics recycling in Latin America
- LCA on plastic bags

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SECRETARIA DE
AGRICULTURA E ABASTECIMENTO



GOVERNO DO ESTADO DE
SÃO PAULO
TRABALHANDO POR VOCÊ

Biopolymers are polymers derived from renewable sources

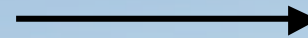
➤ ... extracted directly from biomass

Pulp - Wood ...

Starch - Potato, Corn ...



IBEK
YERİNCİSİZLİKLE GÜÇLÜ



Recyclable ...

Compostable ...



Biopolymers - ... natural and modified (cellophane)



Innovia Films Inc.



Biopolymers - thermoplastic ...

➤ classical chemical synthesis using monomers from renewable source

PLA - Poly (lactic acid) - from lactose from the milk whey ...



PP - from the residual glycerol of the biodiesel production (from the used oil cooking) ...



LLDPE - from the ethanol from the sugar cane ...



Biopolymers - thermoplastic...



Sugar cane



Ethanol
 $\text{CH}_3\text{-CH}_2\text{OH}$



Ethylene
 $\text{CH}_2=\text{CH}_2$



HDPE
 $[\text{CH}_2\text{-CH}_2]$



Products



RECYCLING and
ENERGY RECOVERY



Carbon capture

Braskem



Biopolymers - thermoplastic...

microorganisms or bacteria

PHB: Polihidroxitirato...



© PHB Industrial



Recycling in Latin America



Mexico = 15% PET (2007)

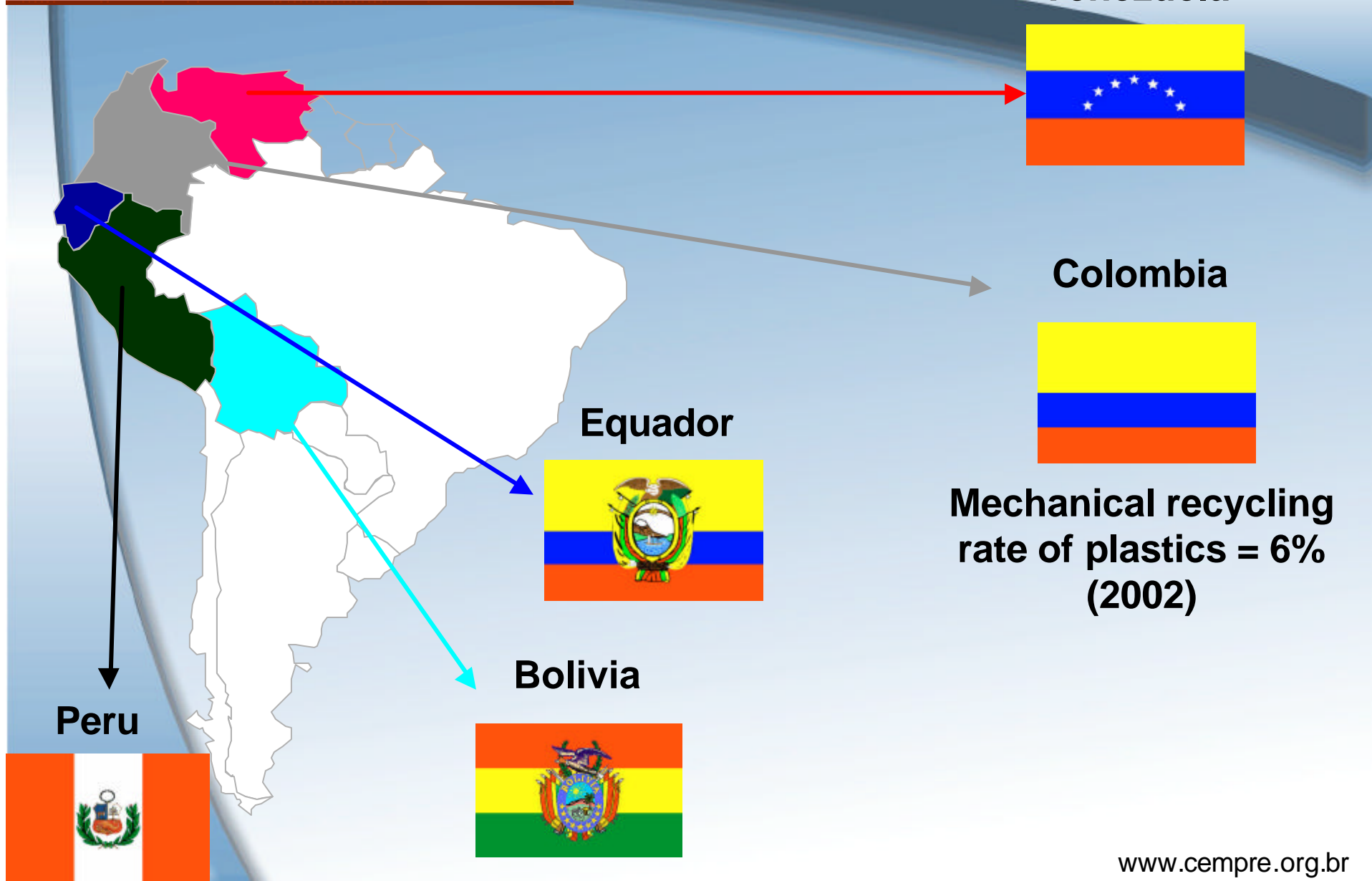


Chile



**Mechanical recycling rate of
plastics < 5% (2002)**





**Mechanical recycling
rate of plastics = 6%
(2002)**



Mercosul

Paraguay



Uruguai

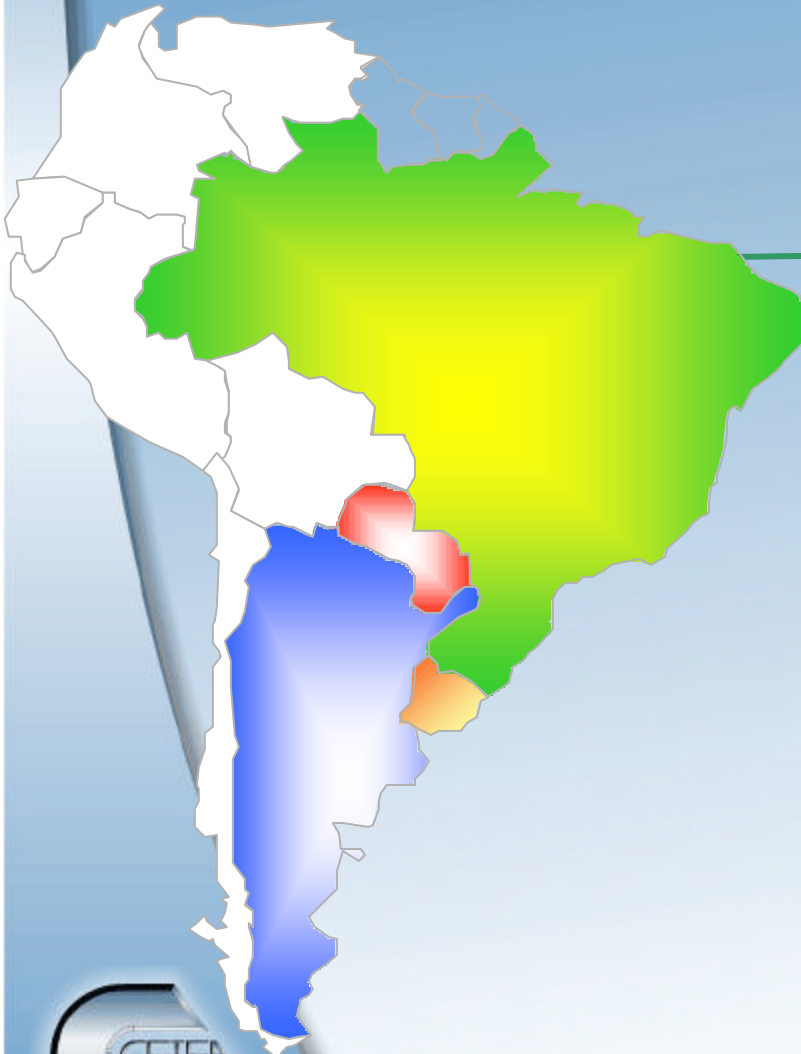


**Mechanical recycling
rate of plastics
= 5% (2002)**

Argentina = 11,6% (27,1% PET - 2006)



Brazil



**Mechanical recycling rate of
plastics = 19,8% (2005)
(53,5% PET - 2007)**

Life Cycle Analysis on Plastic Bags

PROJECT CETEA/PLASTIVIDA

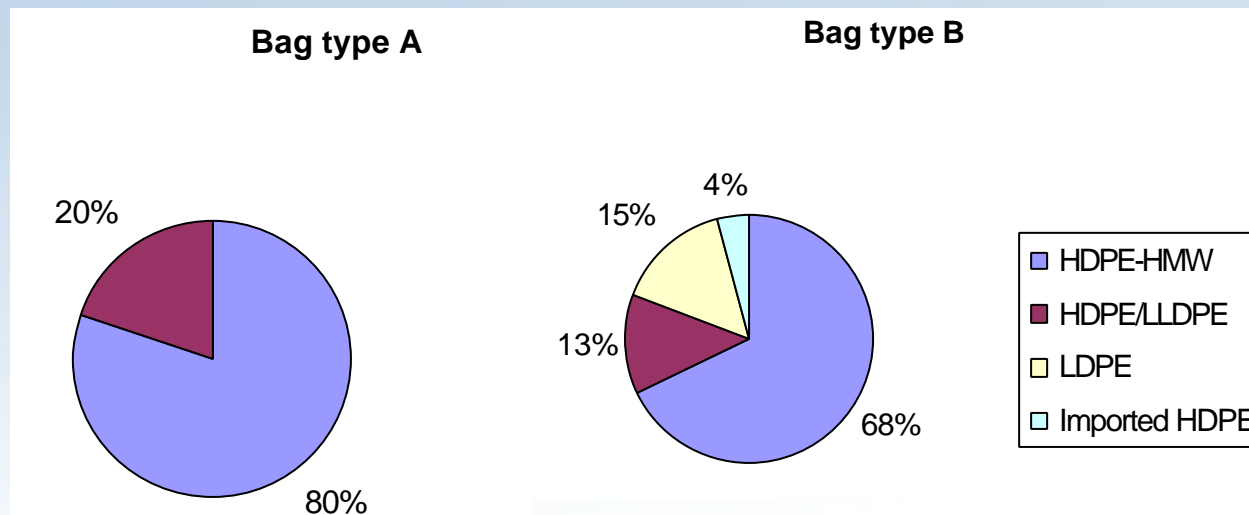
Brazil: base year 2003

61% ethylene production

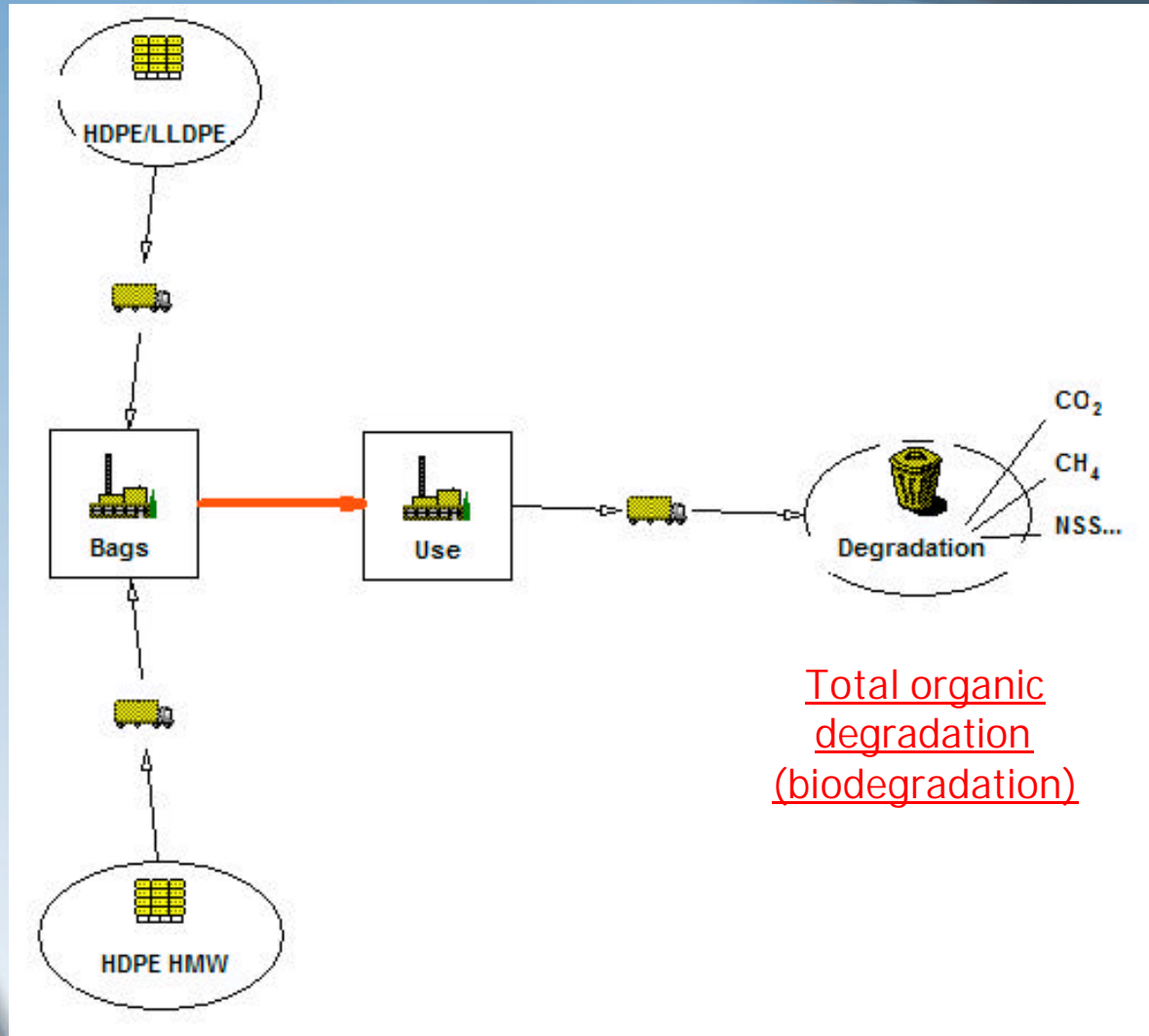
63% LDPE, 78% HDPE/LLDPE e 100% HDPE-HMW production

4 PE plastic bags companies/technologies

7 PE mechanical recycling companies/technologies



Final Disposal - Degradation



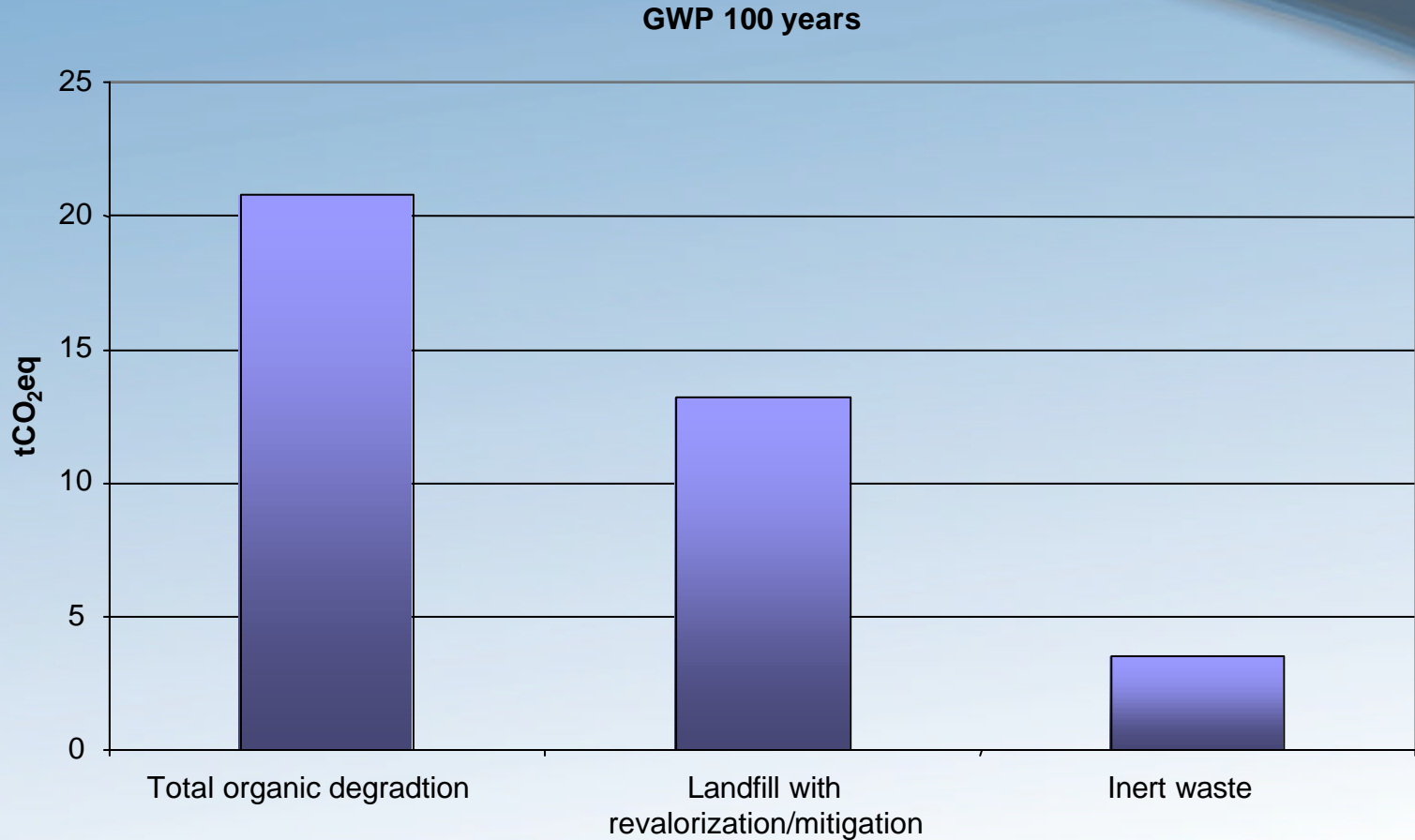
Total organic degradation (biodegradation)

1000kg plastic bag – type A



Life Cycle Inventories: LCI for different final disposal scenarios

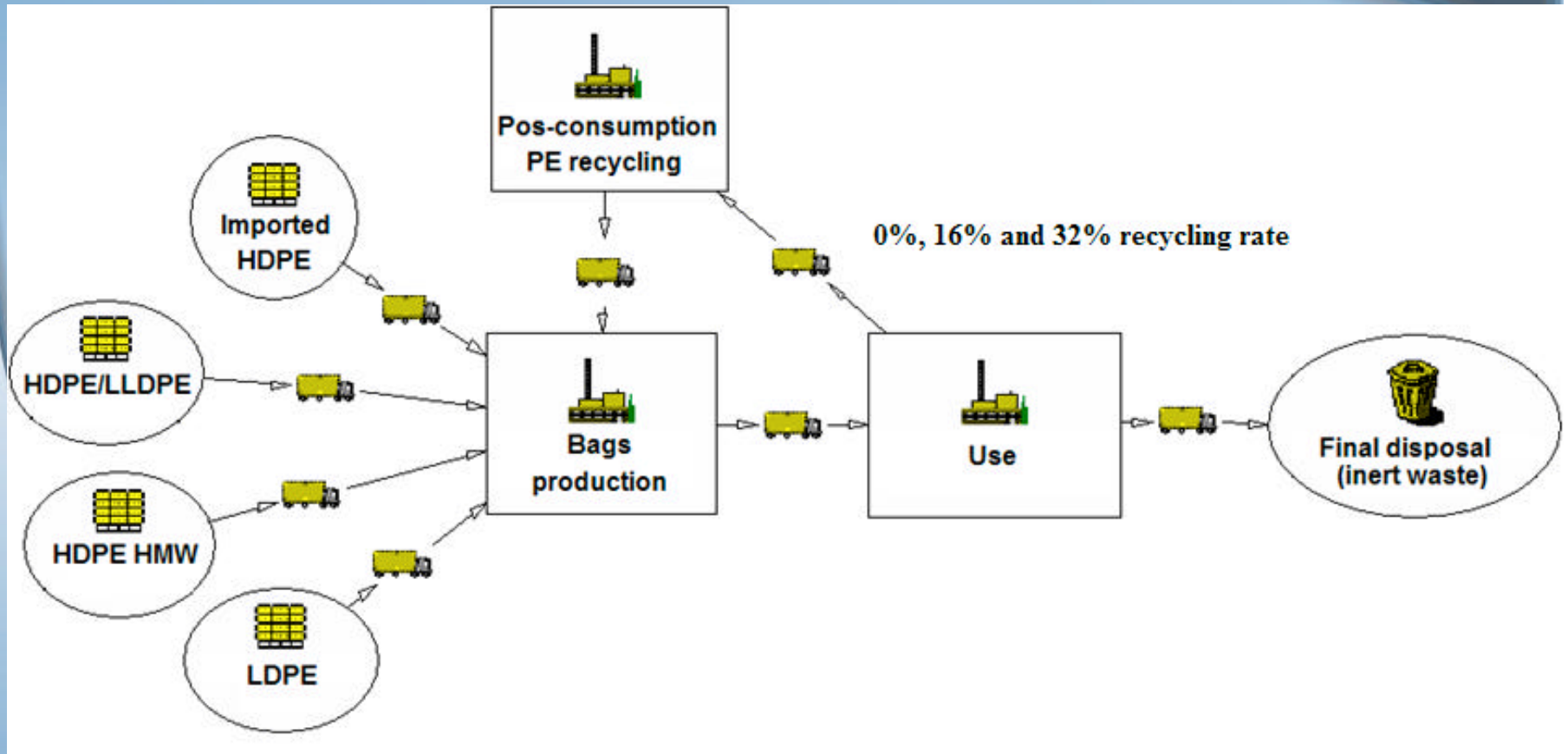
Carbon footprint (cradle to grave LCI)



1000kg plastic bag - type A



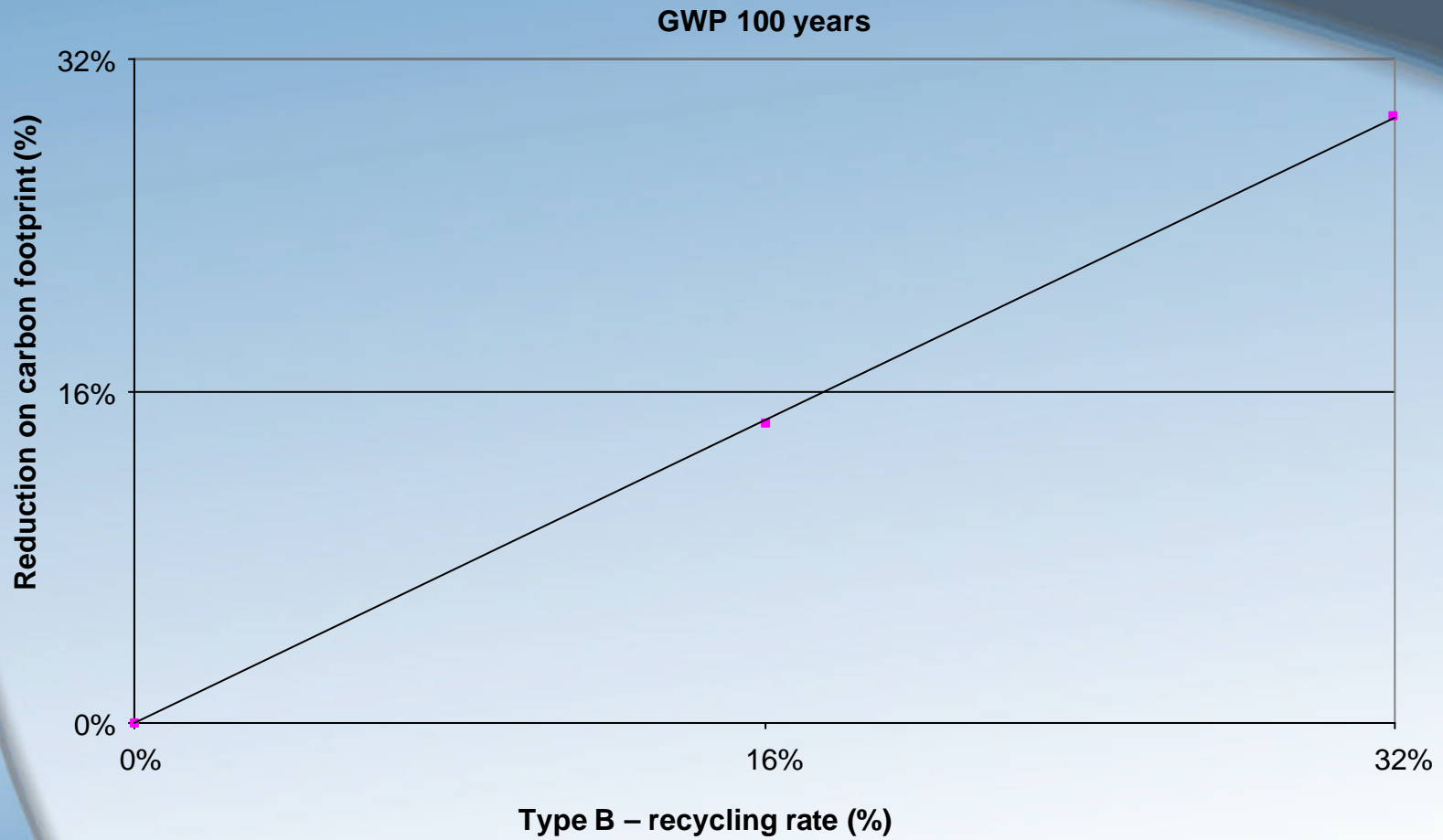
Mechanical Recycling



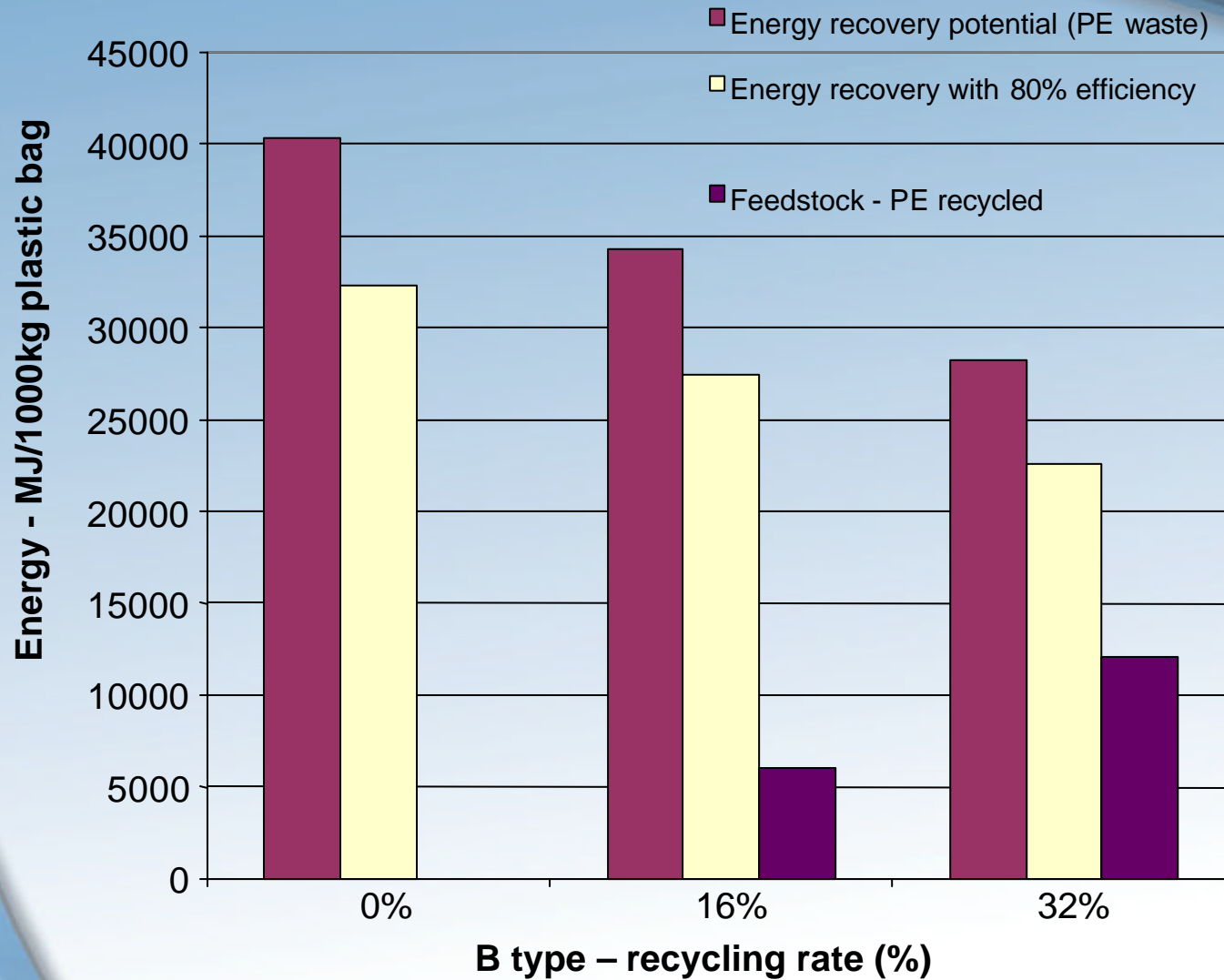
1000kg plastic bag – type B



Mechanical Recycling



Energy recovery potential

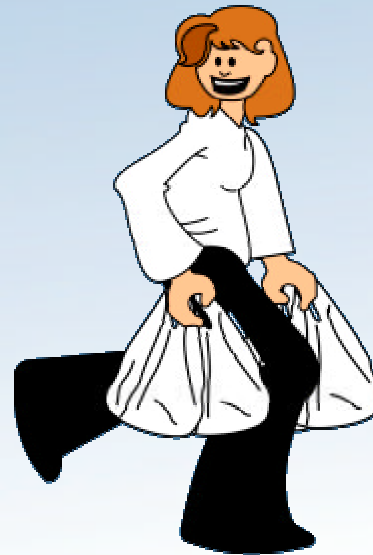


1000kg plastic bag

- 10 g / bag
- Packaging and transportation - 500 tonnes of products...



=



4 bags = 20 kg products

Reuse

- Reusable bag - 30 g
- at least 3 trips \cong environmental impact (and it should be RECYCLABLE at the end of its useful life...)



=



1 reusable bag = several trips...



Sustainable Consumption

Consumer, Industry, Government

Reduction

Durable:

not degradable,
noble use of oil,
carbon bunker...

Reuse

Energy recovery

Recycling

