

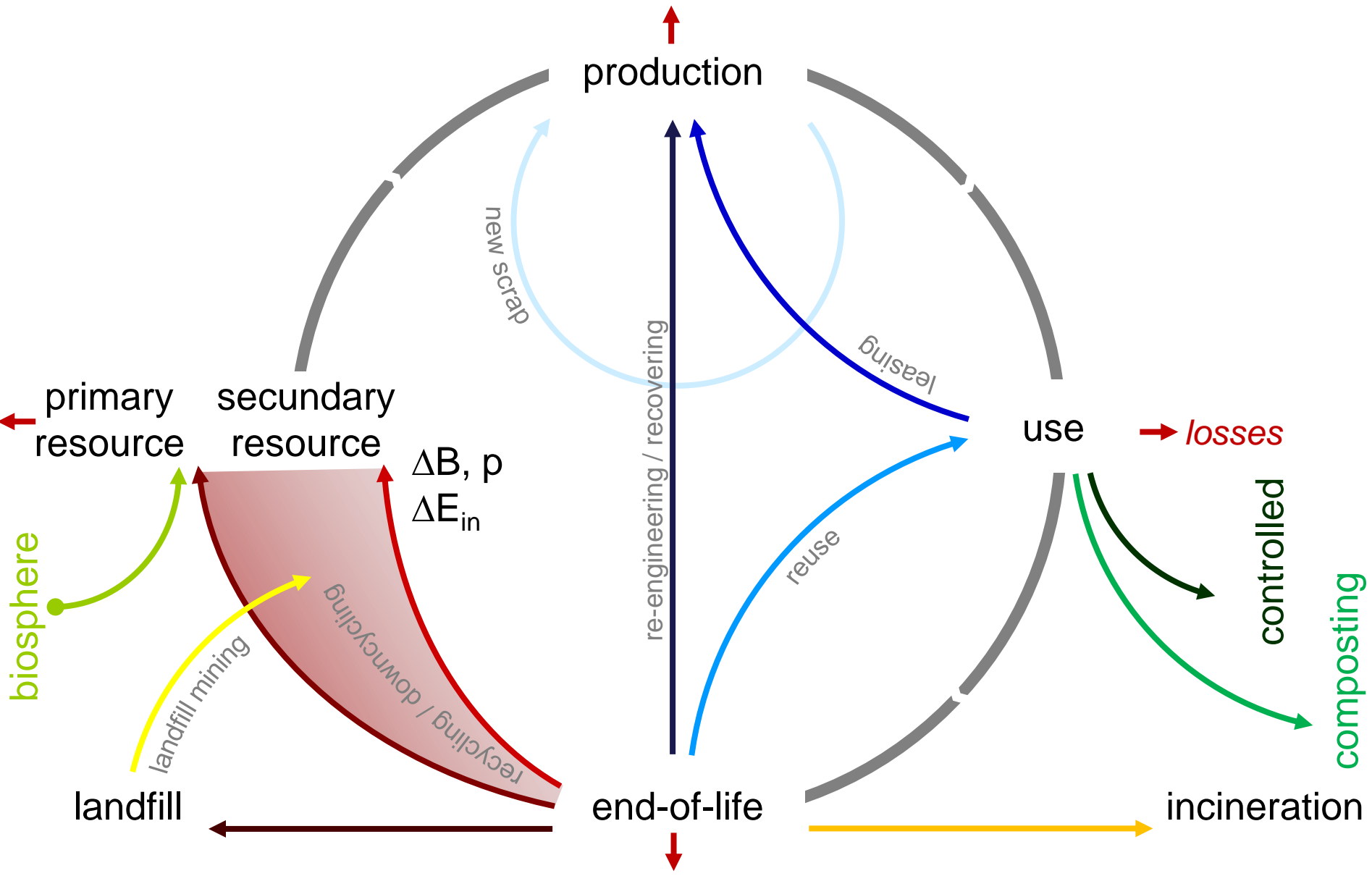


*Session Decoupling, new materials,  
reuse of existing materials*

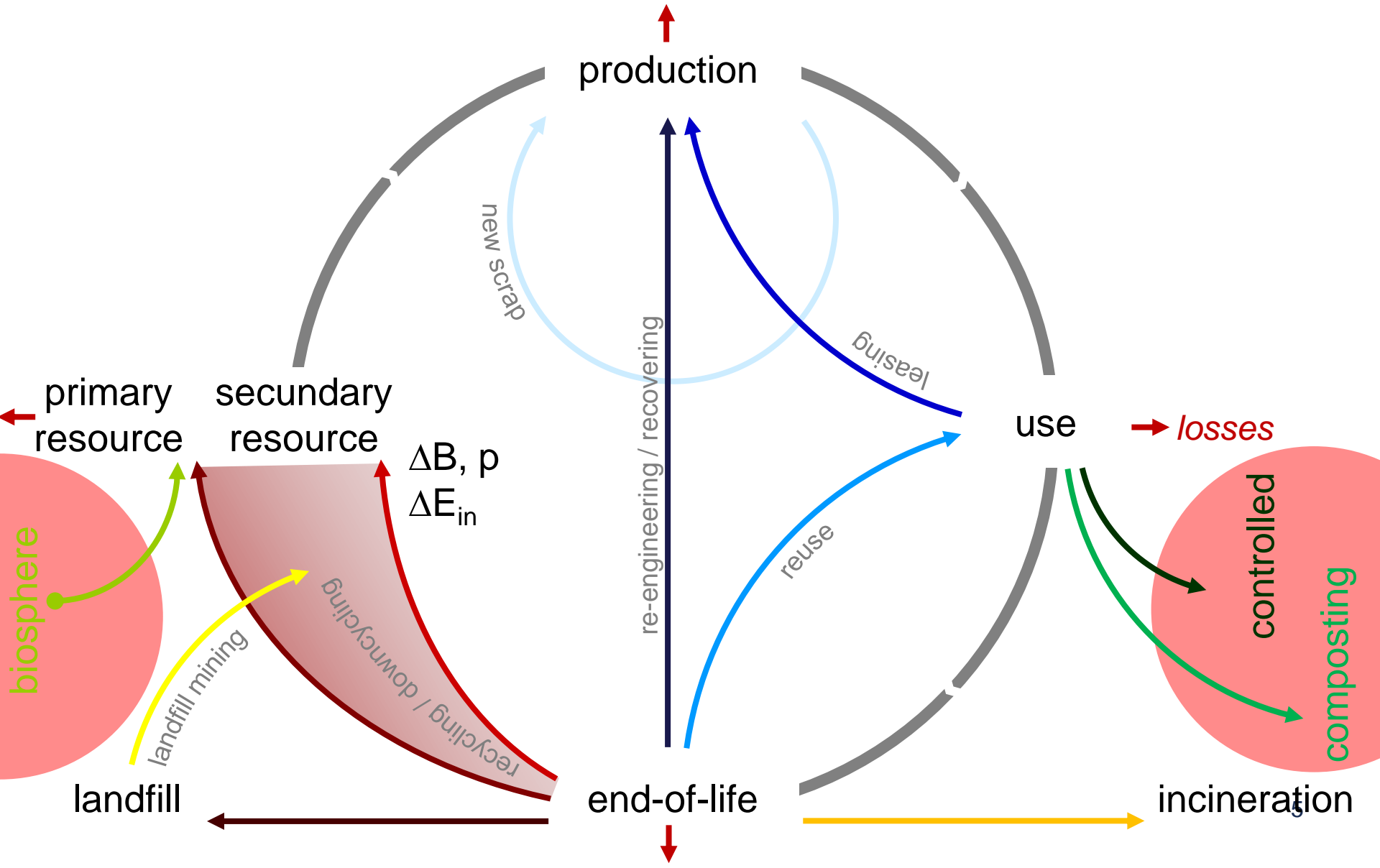
## **Perspective on renewability of materials**

Prof. Karel Van Acker,  
K.U.Leuven Materials Research Centre

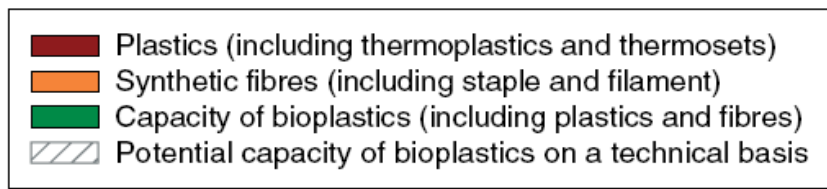
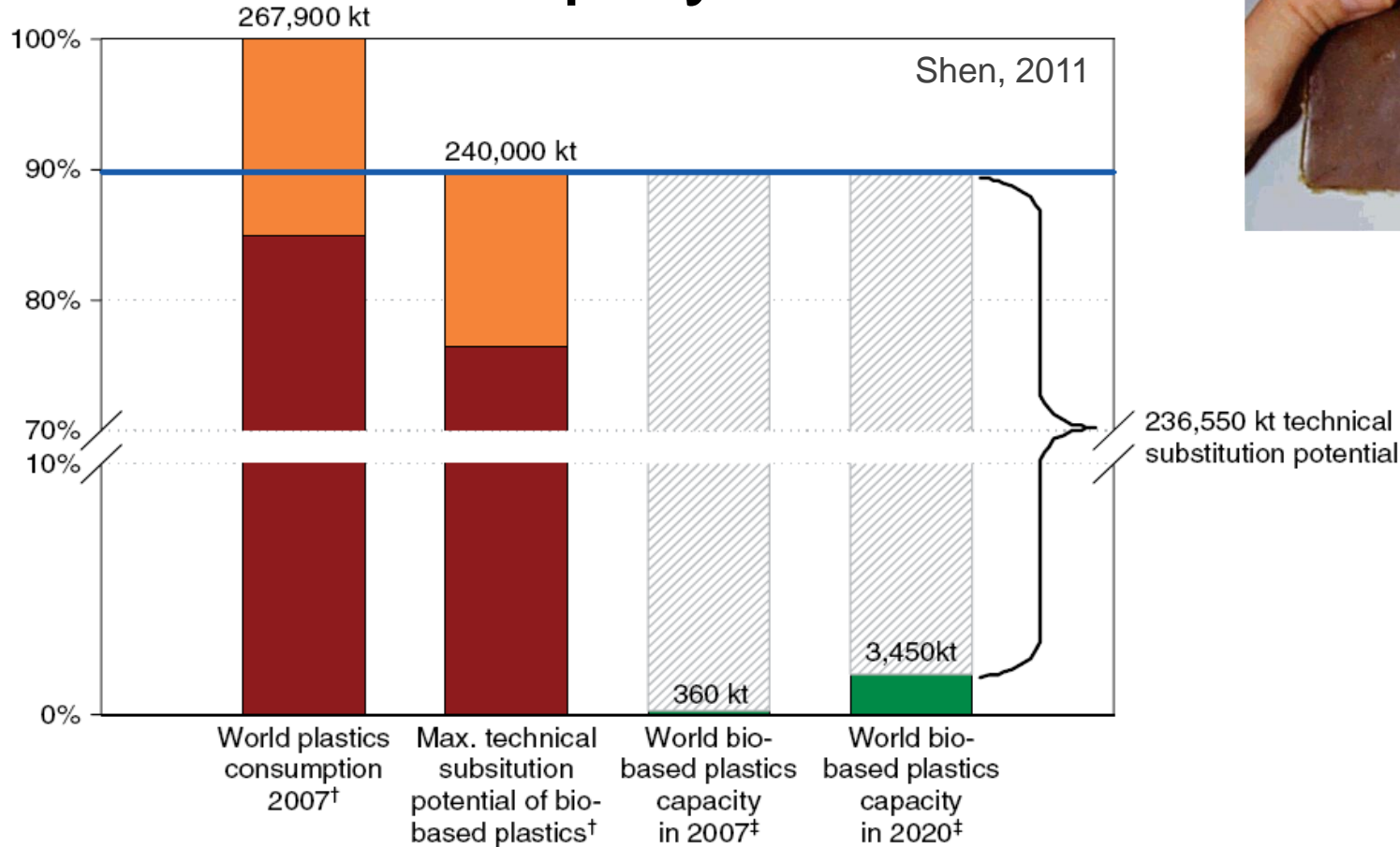
# Closing the loop in many ways



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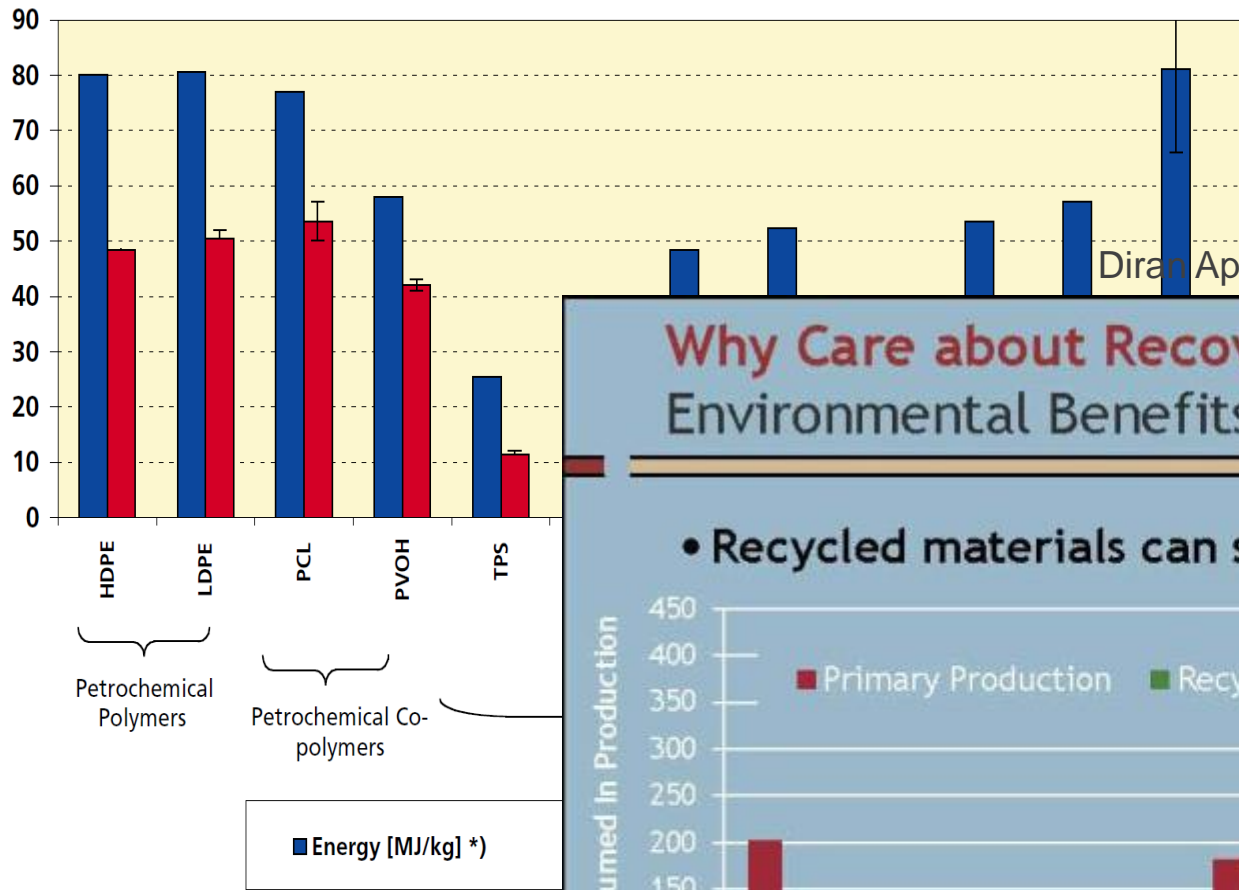
# Bio-based polymers



<sup>†</sup> See data in Table 3 and Table 4. The overall maximum technical substitution potential for plastics and fibres is 89% (the blue line in the graph).

<sup>‡</sup> See data in Figure 3. The projection in 2020 is based on company announcements. The most recent data used for making this graph were received in March 2009; the reported values refer to the capacities at the end of each year.

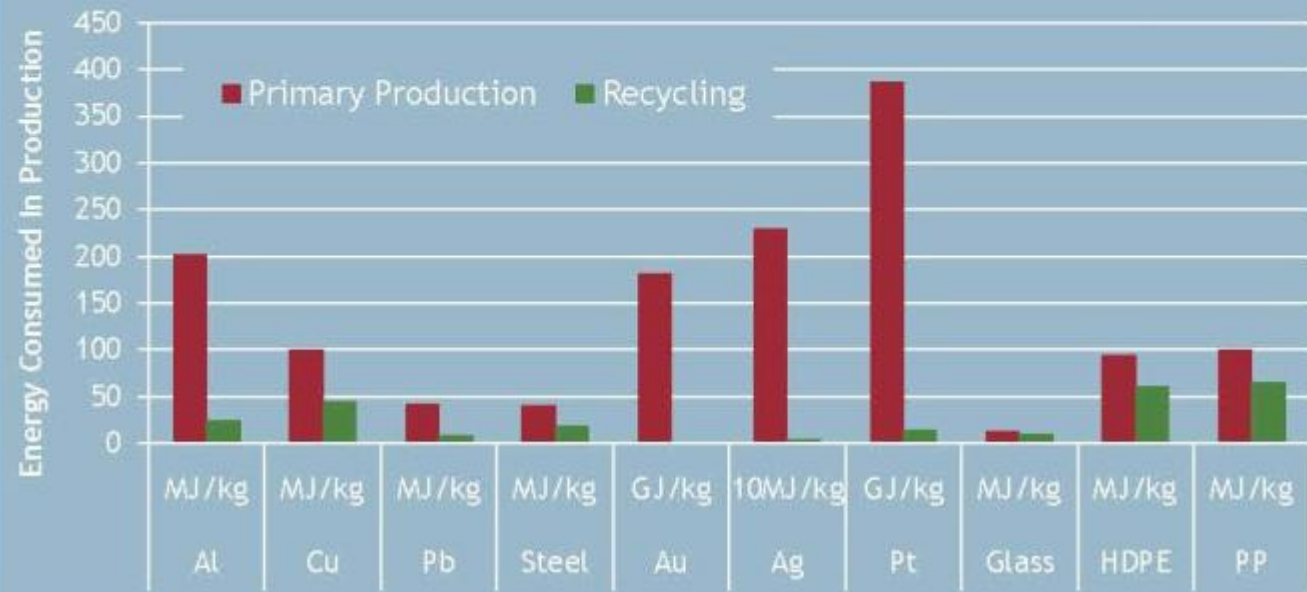
# Bio-based or/and recycled?



Diran Apelian, CR<sup>3</sup> Presentation, Leuven, 2010

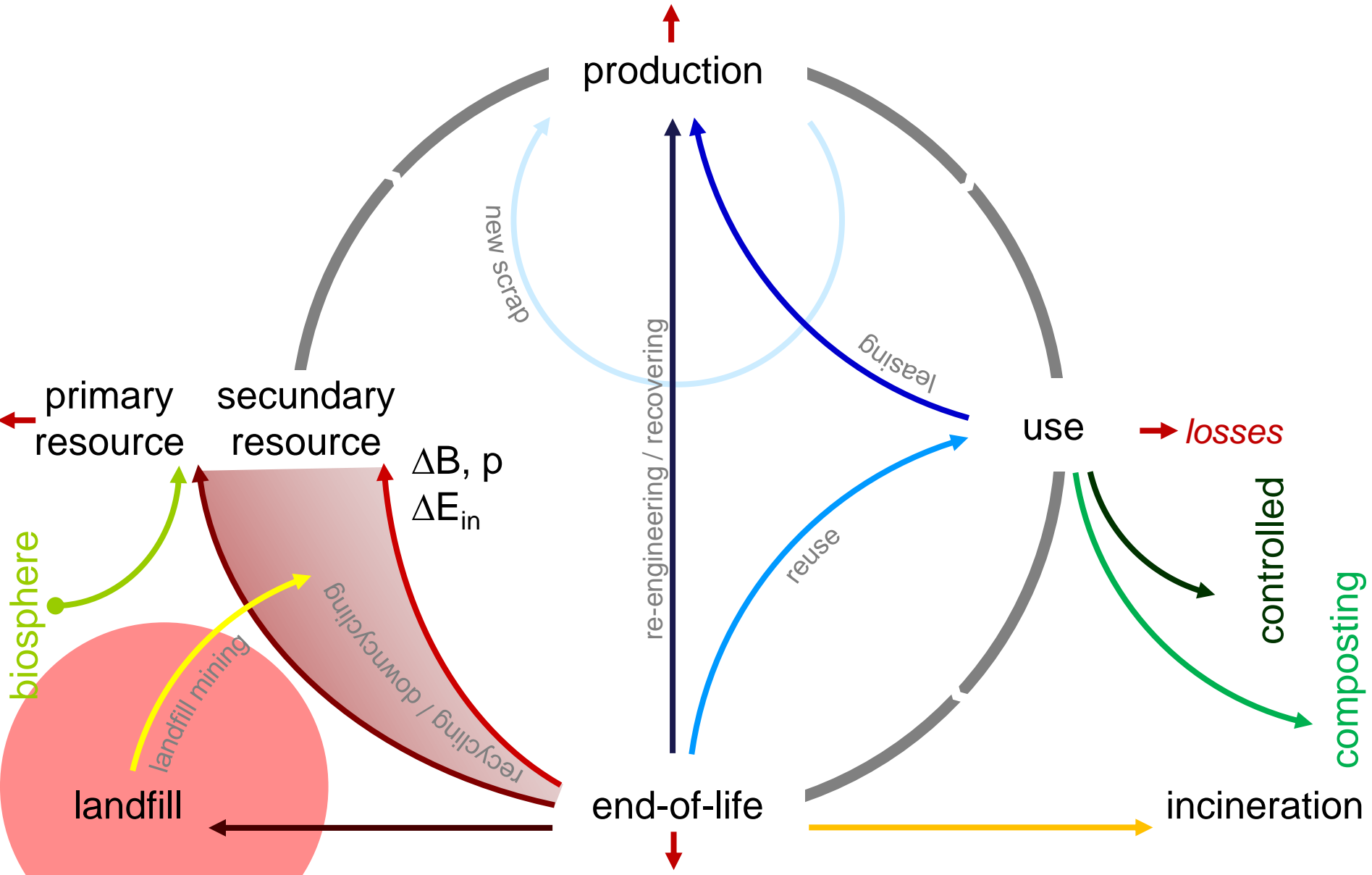
## Why Care about Recovering Materials? Environmental Benefits of Recycling

• Recycled materials can save significant energy

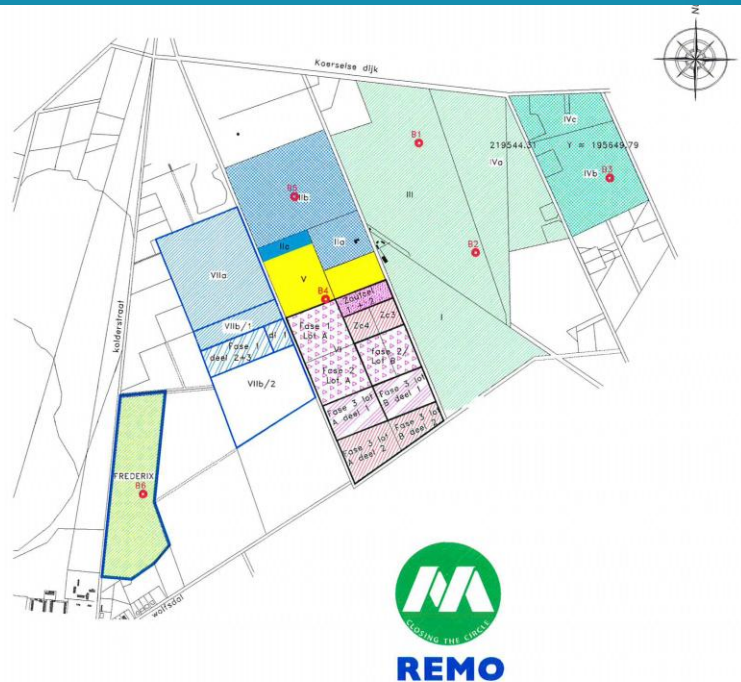


Patel, 2008

# Closing the loop in many ways



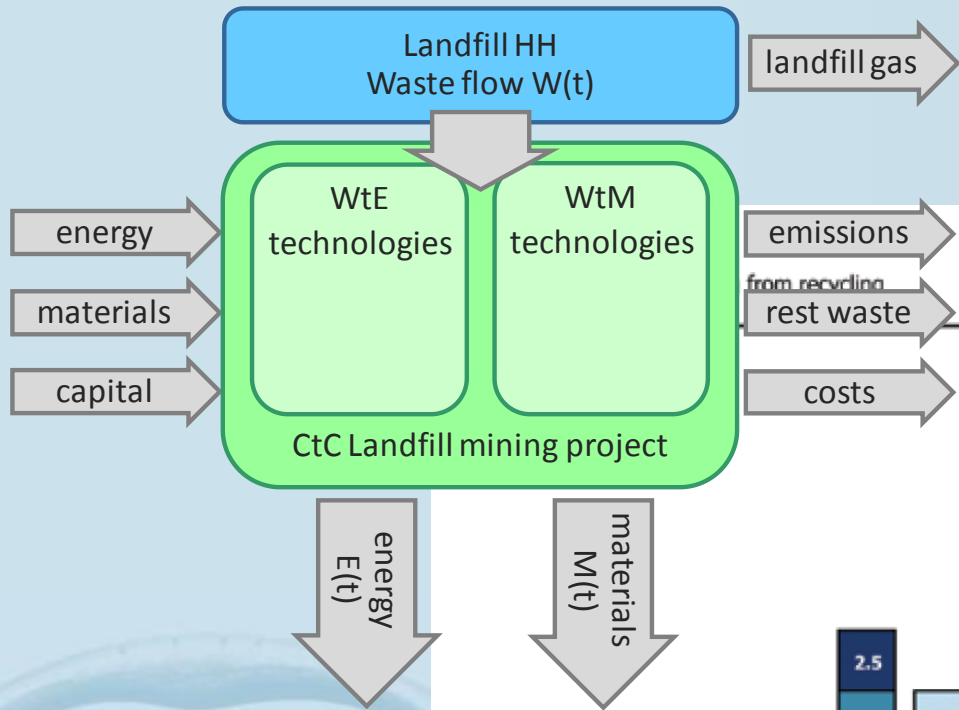
# Landfill mining



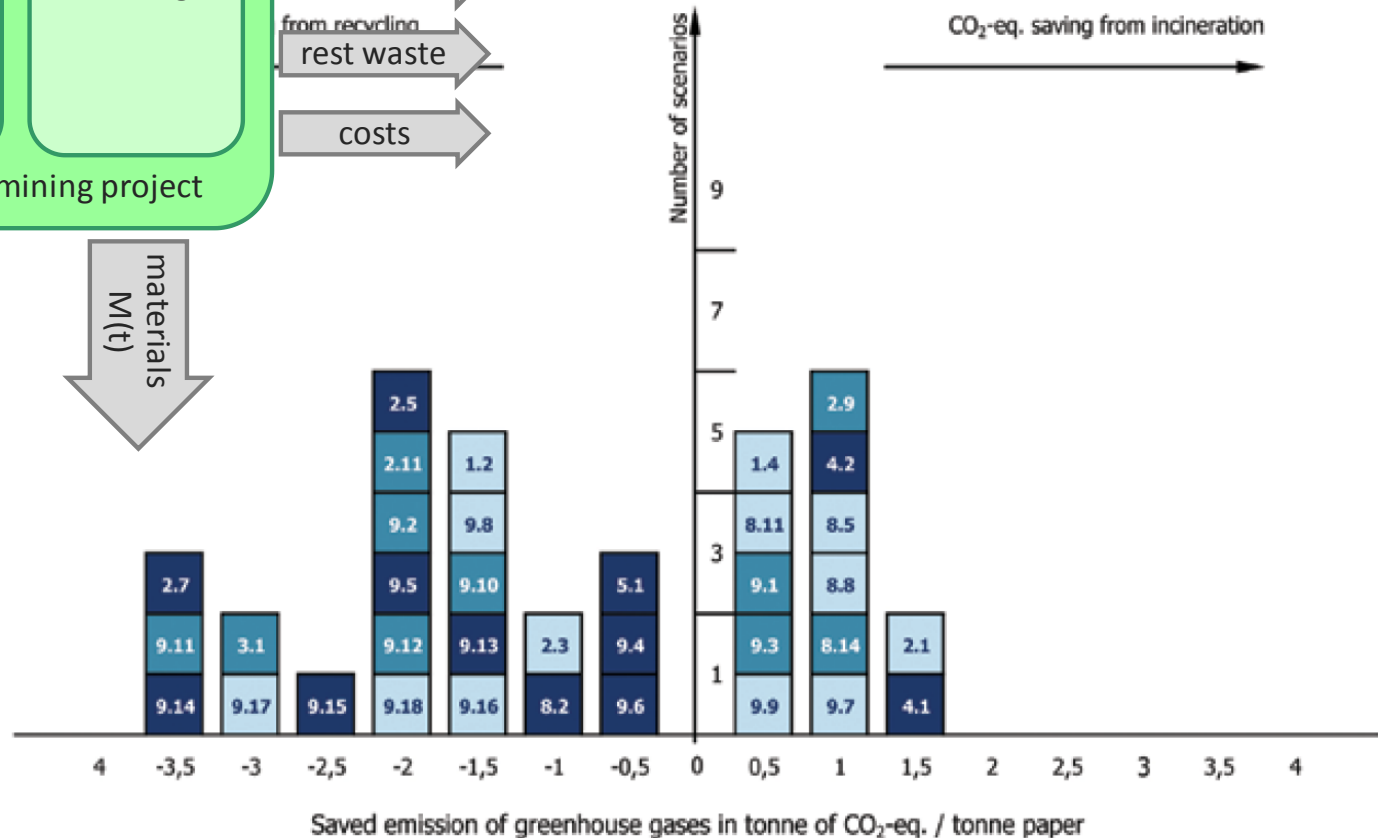
- > 16 Mton material stored
  - 50% MSW & 50% Industrial Waste
  - Data in log book
  - Mining: 20 years
- ELFM = combining:
  - Maximum recycling of materials: WtM: BAT + new technologies
  - Valorisation of energy potential
    - recycling residue
    - 'green' electricity and heat
  - Sequester, use or off-set CO<sub>2</sub> from WtE
- Success depends on:
  - Technological breakthroughs, AND on
  - Surmounting a multitude of socio-economic barriers (i.e. regulations, social acceptance, economic uncertainty, etc.).



# Waste-to-energy versus waste-to-materials

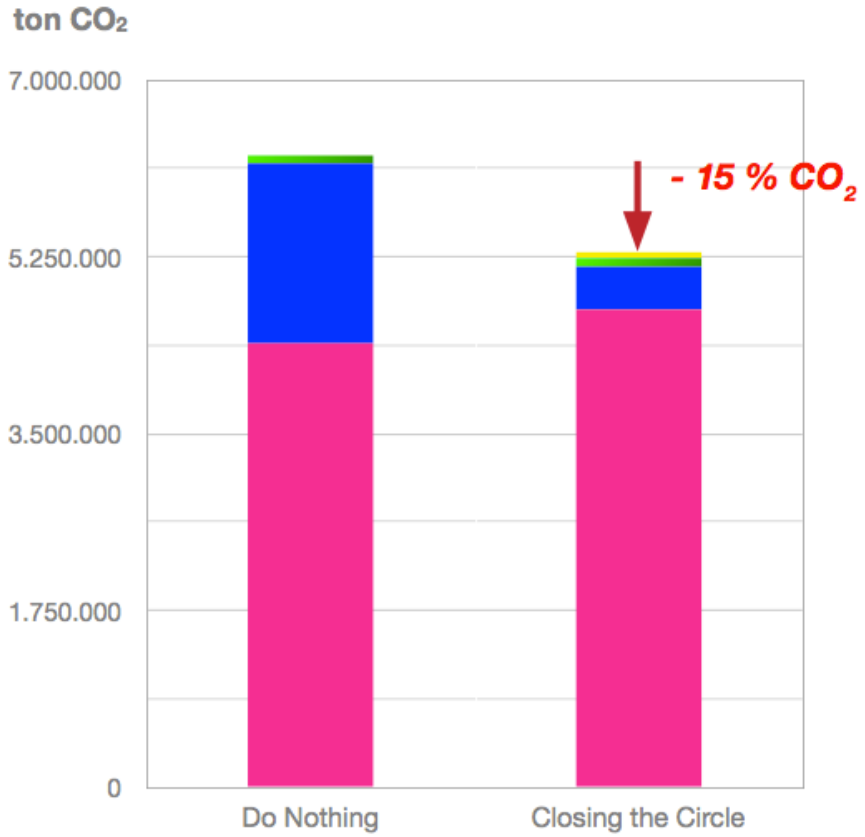


**Recycling Vs. Incineration**



source: Michaud, J., et al., Environmental benefits of recycling, WRAP, 2010

# potential of landfill mining

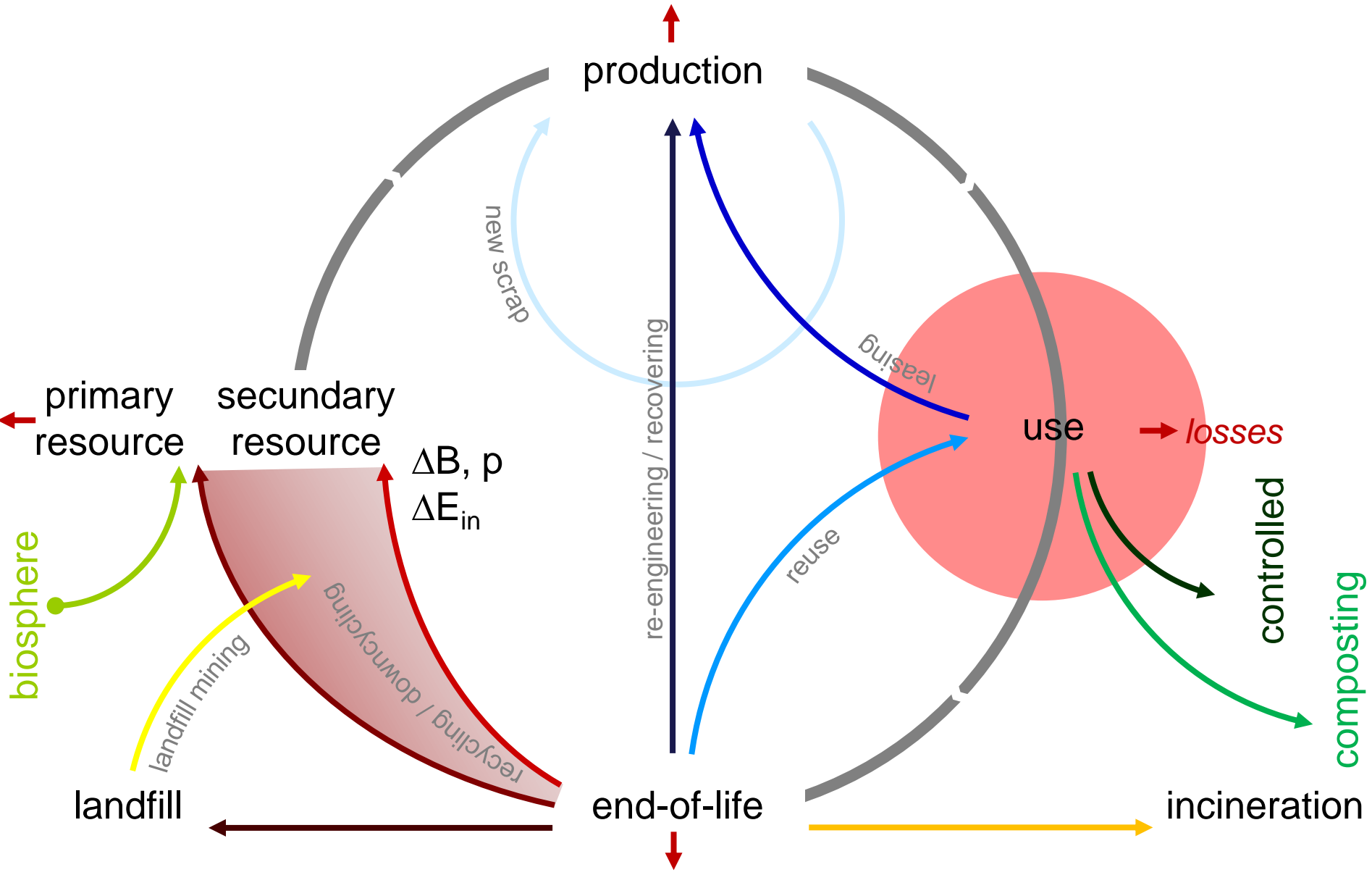


- transport of persons
- freight
- capital assets
- direct waste
- incoming/outgoing materials
- energy use/production

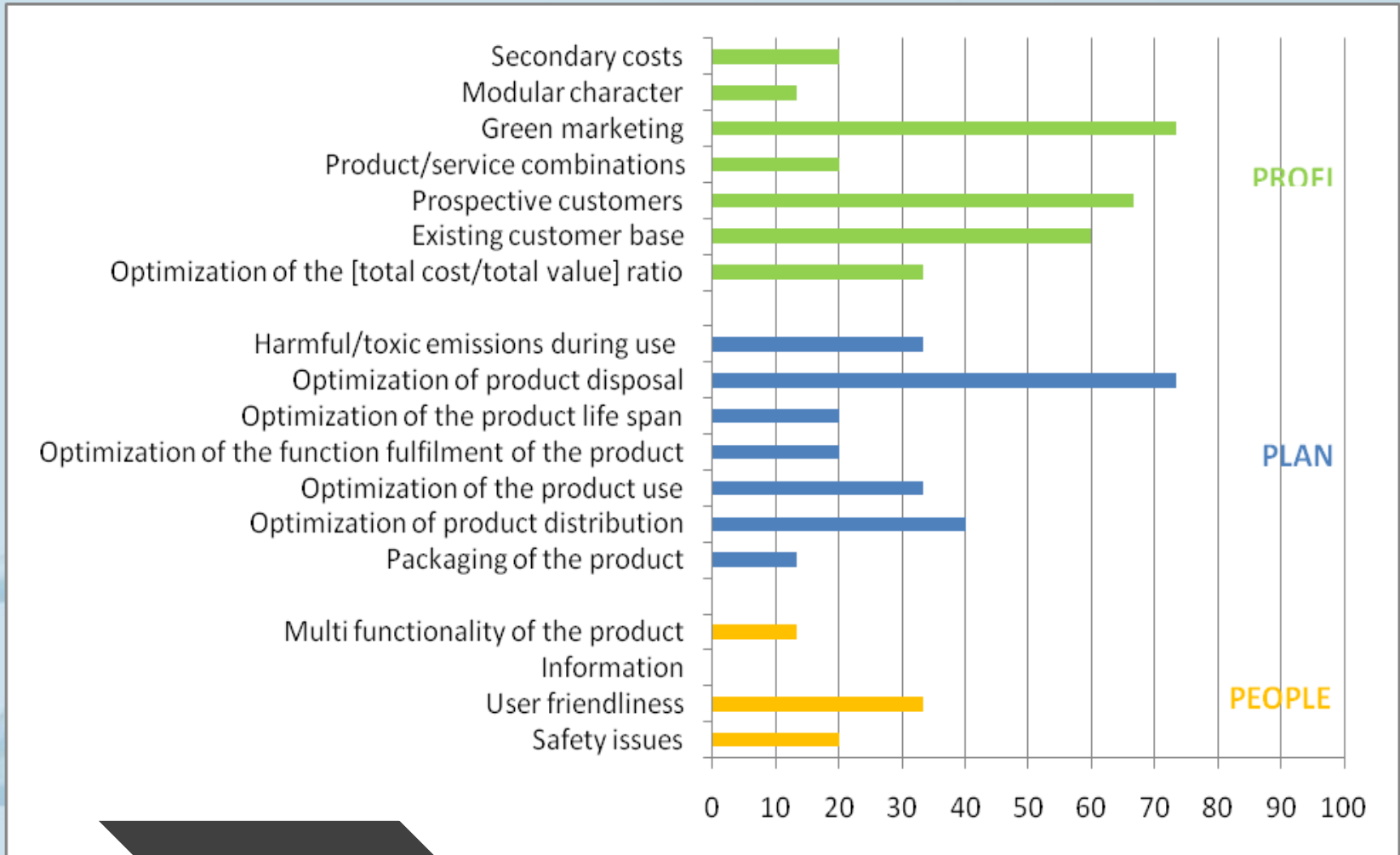
- MSW in Flanders (numbers 2007):
  - 3,4 Mtons (555 kg/inhabitant)
  - 72% recycled, reused, composted
  - **0,112 Mtons** landfilled
- Industrial waste: **2,15 Mtons** landfilled
- landfill heritage
  - 1618 (known) landfills
  - 54,95 km<sup>2</sup> = 0,45 % of total surface (theoretical volume of ~400 Mtonnes)

Costs		
Total	eur	12.779.680.000
Benefits		
Total WtM	eur	1.534.382.080
Total WtE	eur	9.937.782.556
Landfill Reclamation	eur	1.368.000.000
Reduced Carbon Footprint compared to Do Nothing scenario	eur	256.650.240
<b>Total</b>	<b>eur</b>	<b>317.134.876</b>

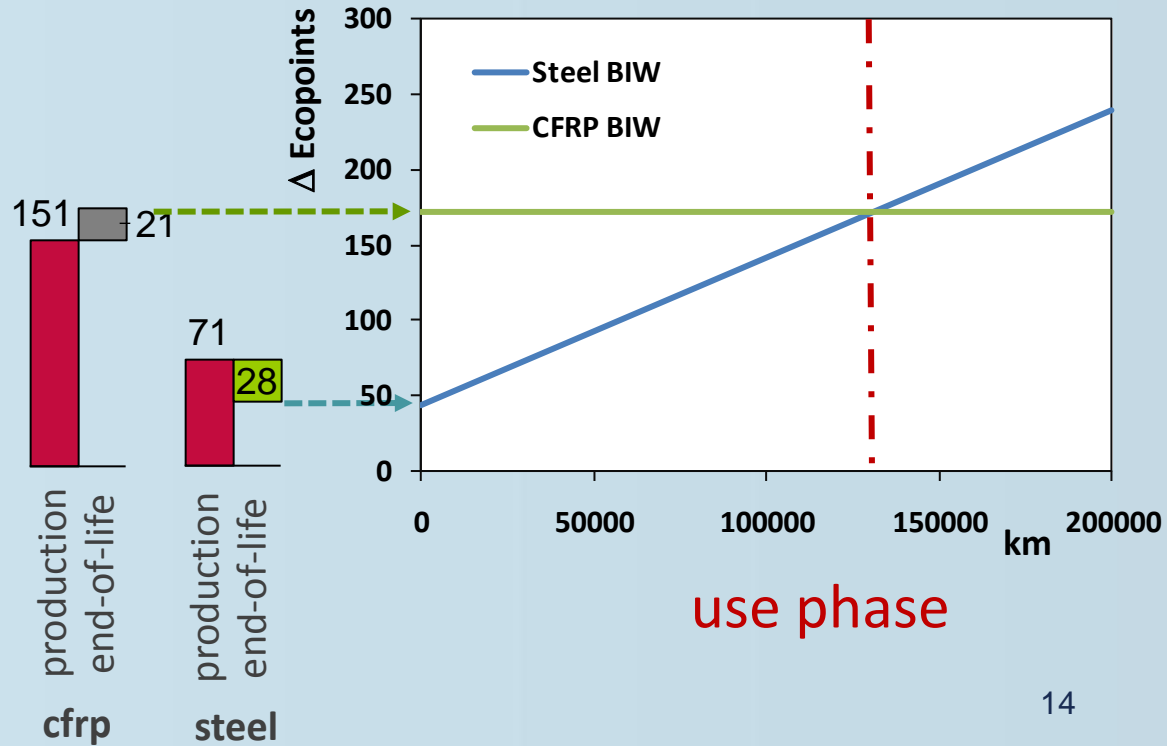
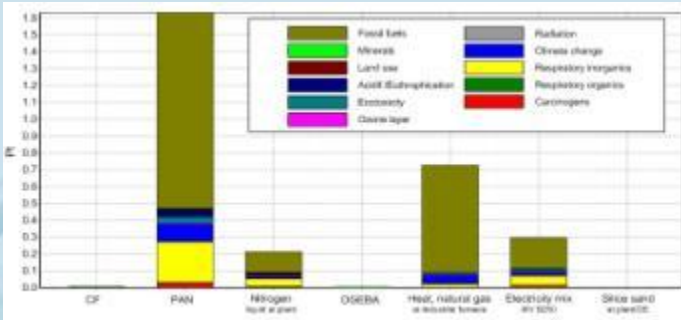
# Closing the loop in many ways



# Focus still on “end-of-life”



# Importance of use phase in life cycle



# Conclusion

- Incremental improvement no longer suffices
- **Renewability** of materials, dematerialisation is part of the transition towards sustainable materials management
- but an **intelligent combination of measures** is crucial
  - ❖ *need for indicators*
  - ❖ *high degree of knowledge level*
  - ❖ *design of the entire cycle*
  - ❖ *new consumer awareness, new business models*
- **integral innovation in a network of actors = transition management**



# Meer weten?

Materiaalonderzoek aan de K.U.Leuven

⇒ [www.leuvenmrc.be](http://www.leuvenmrc.be)

Vlaams Transitienetwerk duurzaam materialenbeheer

⇒ [www.plan-c.eu](http://www.plan-c.eu)

SMaRT-Pro<sup>2</sup> kennisplatform (valorisatie hoge T residuen)

⇒ <http://smartpro2.eu/>

CR<sup>2</sup> Center for Resource Recycling and Recovery

⇒ <http://www.wpi.edu/academics/Research/CR3/index.html>

Materialenbibliotheek

⇒ [www.materio.be](http://www.materio.be)

EFRO project opportuniteitsscan duurzame materiaalinnovaties

⇒ [www.openraam.eu](http://www.openraam.eu)



**contact: [www.leuvenmrc.be](http://www.leuvenmrc.be)**

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