

# Packaging in the eye of the storm

Packaging Worx - Amsterdam

March 6<sup>th</sup> 2023, Ulphard Thoden van Velzen

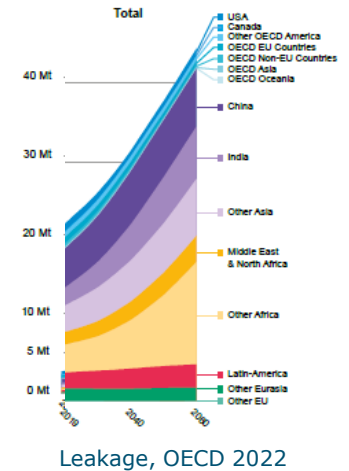
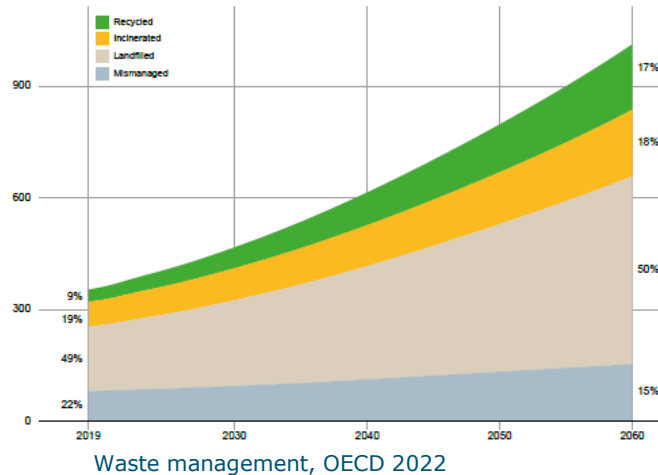
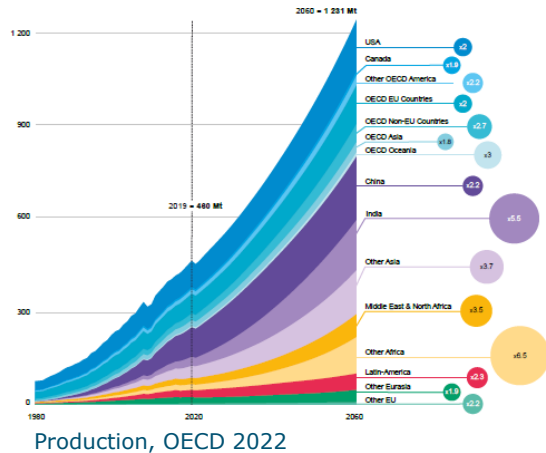


# 3 planetary crises

- Climate change
- Pollution of our planet with persistent chemicals and plastics
- Loss of biodiversity
- We exceed the planetary boundaries
  - Use of fossil resources (energy / materials)
  - Overfishing, land use...
    - Global use and disposal of plastic articles

# Global picture of plastics

- The production growth rate exceeds the growth rate of recycling capacity – *performance of plastics is often unparalleled*
- But plastics are still leaking and we remain dependant of crude oil





Today we will focus on plastic packages



# No quick fixes

- Austerity / rationing doesn't fit in our political and economic system
- Many applications of plastics are useful or even essential
  - Alternatives are often heavier or worse
- Many barriers in improving the plastic system
  - Sustainability has many dimensions that do not run parallel
  - Systemic barriers...

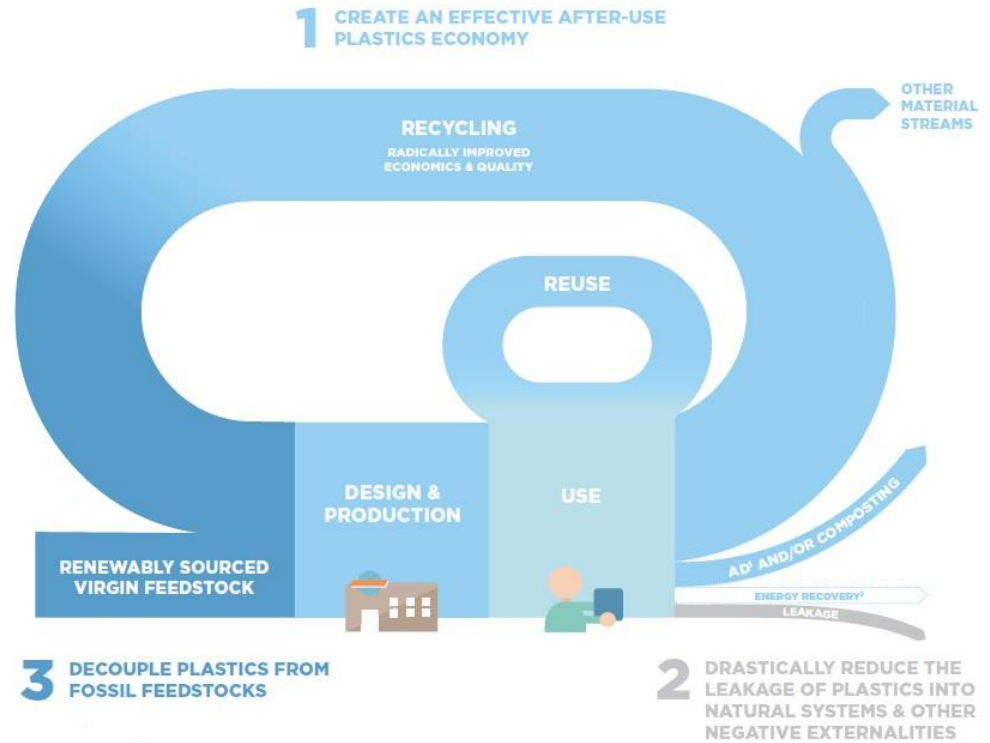
# Circularity as a means to achieve sustainability

2016: EMF,

“New Plastic Economy”

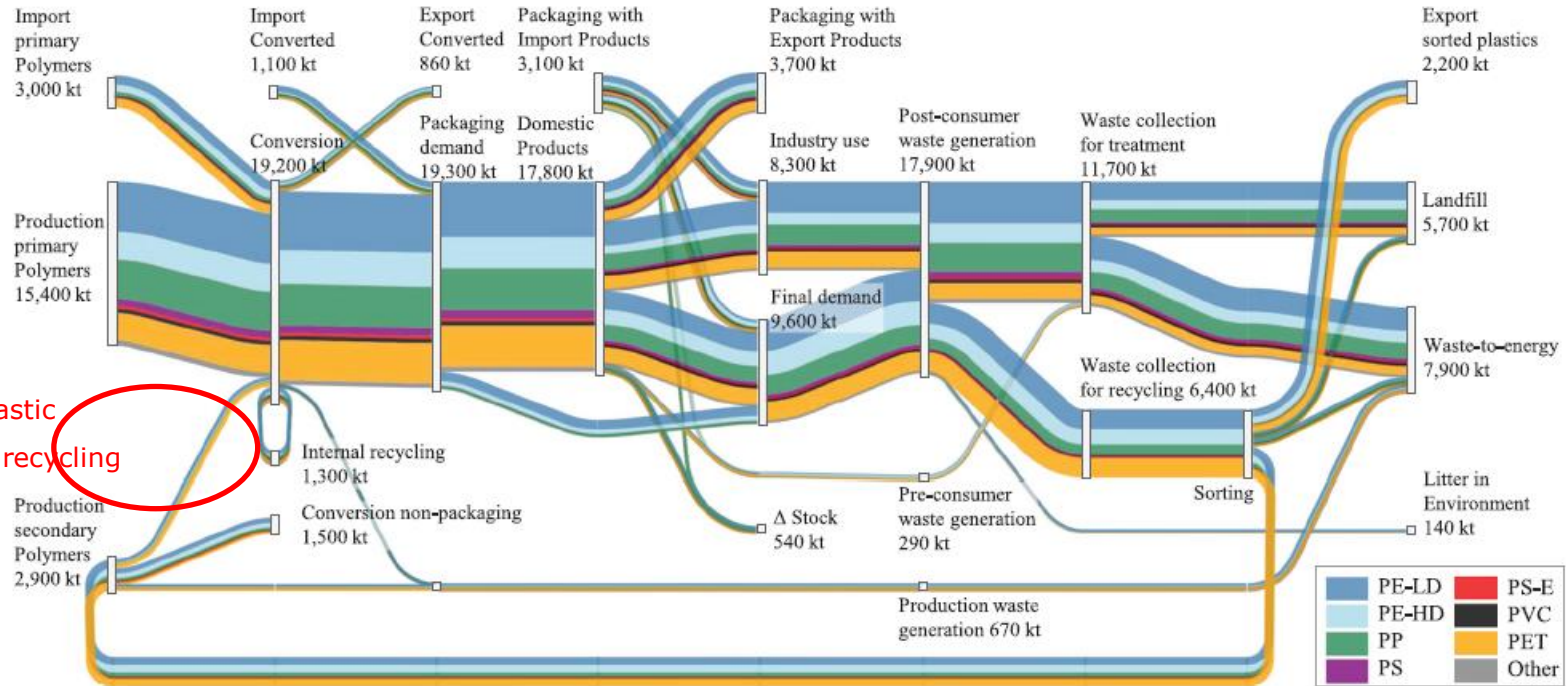
Very attractive &  
deceptively parsimonious

but also often partially  
or falsely understood







# Plastic packaging flows in the EU, 2014



Cimpan, C., et al. (2021). Plastic packaging flows in Europe: A hybrid input-output approach. *J Ind Ecol*, 1-16. <https://doi.org/10.1111/jiec.13175>

# The current quest for more circularity

- With the current technologies and regulations
- Is not a solution for :
  - Climate change 
  - Plastic pollution of the natural environment 
- Growing awareness: recycling ≠ circularity ≠ sustainability



# Why is our plastic system not circular?

- Most packages are currently not yet *designed-for-recycling*
  - Polymer contamination -> opaque, brittle
  - Molecular contamination -> odour, safety
- Lack of effective and cost efficient sorting- and decontamination technology
- Much too conservative interpretation of legislation

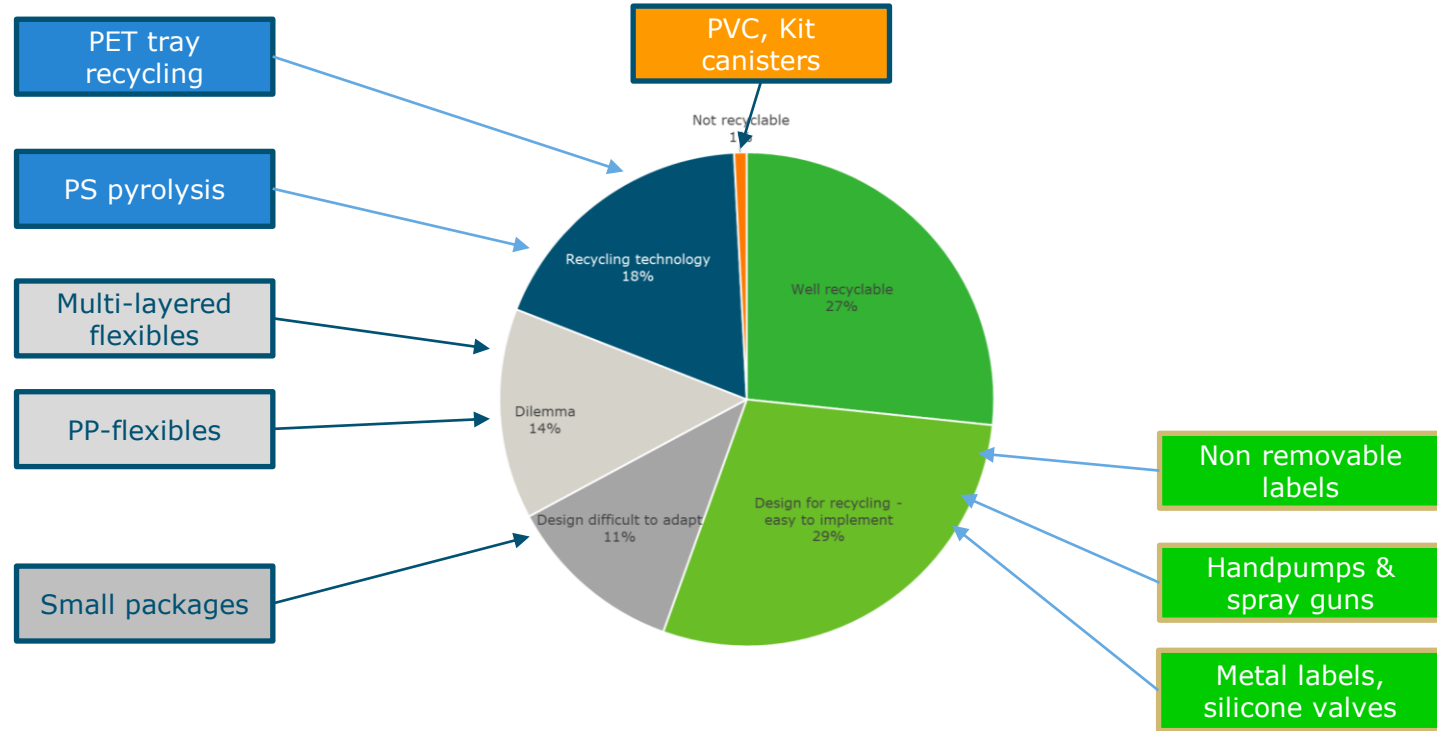
Producers

Recyclers

EFSA

R. Franz, F. Welle. Recycling of post-consumer packaging materials into new food packaging applications – Critical review of the European approach and future perspectives. Sustainability, 2022, 14(2), 824. doi: 10.3390/su14020824

# Status design-for-recycling NL, 2021



Brouwer et al. 2020 Recyclebaarheid van Nederlandse kunststofverpakkingen. doi: 10.18174/546479

# Dilemmas for food companies

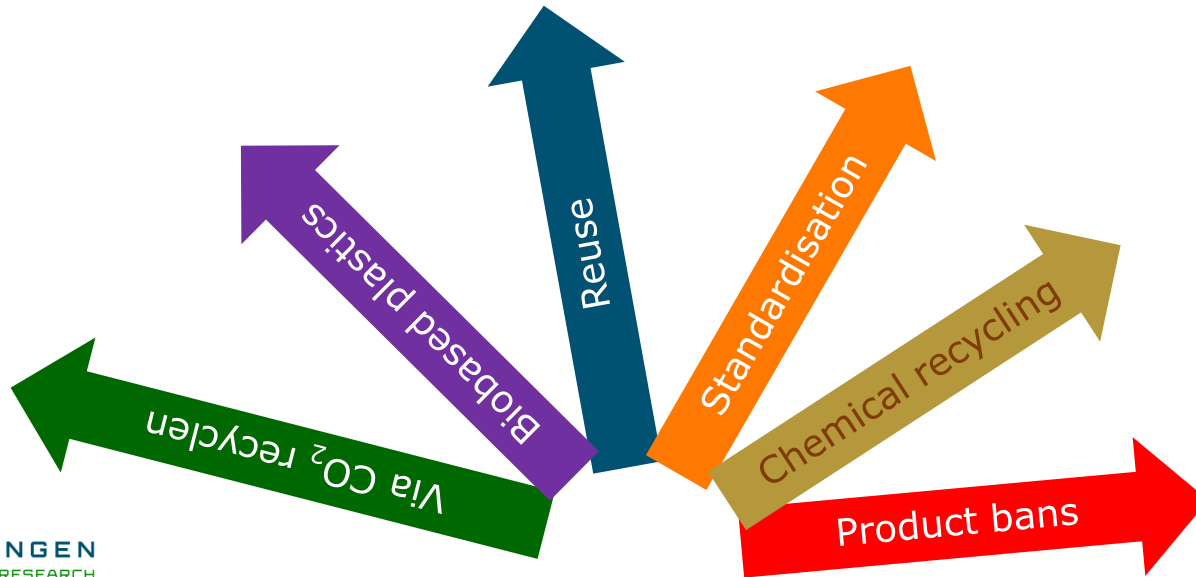
## *Multi-layered flexible packaging films*

- Current flexible film PET/PA/PE
  - Minimal weight
  - 120 d shelf life
  - Hardly any food waste
- **Not recyclable in the current system**
- But recyclable in future via MIX
- Alternative PE/EVOH/PE
  - Difficult to seal reliable
    - Food safety hazard
  - 30 d shelf life
  - More food loss
- **Recyclable in the current system**



# Which direction to take?

- There is no consensus among stakeholders how to proceed. There are multiple options with different barriers and dilemmas



The image features the European Union flag, which consists of twelve yellow stars arranged in a circle on a blue background. In the center of the flag is a large, yellow, multi-pointed starburst shape. Inside this starburst, the text "EC strikes back" is written in blue. Three yellow arrows point from the starburst towards the bottom left and bottom right corners of the image. The arrow pointing to the bottom left is accompanied by the text "2019 / 904 / EC SUP". The arrow pointing to the bottom right is accompanied by the text "Nov 30 2022 New PPWR proposal".

EC  
strikes  
back

2019 / 904 / EC  
SUP

2022 / 1616 / EC  
Food safe recycled plastics

Nov 30 2022  
New PPWR proposal



# 2019/904 SUP-directive

- Ban on several single-use plastic articles (SUP)
- Levies on other SUP
- Reporting obligations for all member states
- Every member state is separately busy to write “guidance documents” on what SUPs are and what not
- Several member states have decision trees that differ in details

# EU directive 2022/1616 – *the good news*

- The mechanical recycling of PET bottles can proceed
- All (>200) combinations of process and resource with a positive opinion of EFSA will get a formal approval of the EC
- Internal recycling of PET material within companies can proceed
- Recycling of crates from closed loops can proceed

# EU directive 2022/1616 – *the bad news*

- All other (new / old) combinations of processes and feedstocks will have to be subjected to the extended assessment
- Collection: only separate collection is allowed
- Sorting: Feedstock has to contain only food packages
- Recycling: Efficiency of the decontamination technique must be proven with challenge tests
- Functional barriers: proof of efficiency needs to be offered again

The risk assessment protocol of EFSA remains 3x conservative

# Expected impact of EU 2022/1616

PET bottle to bottle mechanical recycling

PET tray to opaque tray LQ mechanical recycling

PET tray to tray HQ recycling (enzymatic depolymerisation)

PE / PP LQ to cosmetics, automotive....



PE / PP HQ to food packaging....

D4R, marking, decontamination



PE / PP chemical recycling (pyrolysis) food packaging

EPR policy / calculation method

2023



2033

# Proposed Packaging & Packaging waste regulation

- Packages should be reusable and/or recyclable in 2030
- Use of compounds of high concern should be restricted further
- Recycled content targets in new packages
- Reduction targets for packaging waste on national levels
- Packages should be minimal (empty space minimised)
- Reuse targets for several packaging formats
- Bans for several packaging formats



# Demands with respect to recycling

- Packages must be reusable and/or recyclable in 2030
- Packages are deemed recyclable in case:
  - They fulfil the design-for-recycling criteria (2030)
    - Negative and positive design aspects
  - They are recycled on a large scale (2035)
- Results in: packaging bans -> product bans



# Demands related to recycled content

- From 2030 on
  - 30% in PET CS packages
  - 10% in non-PET CS packages except for single-use beverage bottles
  - 30% in single-use beverage bottles
  - 35% in all other packages
- From 2040 on
  - 50% in CS packages
  - 65% in single-use beverage bottles
  - 65% in all other packages

# Demands related to reuse

Packaging types for products	2030	2040
Beverage cup take away / direct consumption	20%	80%
Take away meal package horeca	10%	40%
Bottles for beer and alcoholic beverages	10%	25%
Bottles for wine	5%	15%
Bottles for water, juice, soda	10%	25%
Transport pallets, pails, crates...	30%	90%
Transport packaging for non-food articles	10%	50%
Pallet wrap, straps, hoods and sleeves	10%	30%
Non cardboard boxes and crates	10%	25%

# Reduction targets per member state

- The amount of packaging waste needs to decrease
  - In 2030 with -5% in comparison to 2018
  - In 2035 with -10%
  - In 2040 with -15%
- Consumption of plastic carriage bags must be reduced to less than 40/person/year by 2026

# Recycling targets per member state

Packaging materials	2025	2030
Plastic	50%	55%
Wood	25%	30%
Steel	70%	80%
Aluminium	50%	60%
Glass	70%	75%
Paper & board	75%	85%
Overall	65%	70%

Take care: national targets are often more strict



# Various

- Deposit-refund obligation for single-use beverage bottles and cans with a volume of less than 3 litre, from 2028 on
- Compostable plastics: only tea bags, fruit labels, coffee capsules, waste collection bags

# First reflection

- 1 Very ambitious
- 2 Major restructuring of the complete supply chain / industry
  - Massive investments required
  - Who will orchestrate this all?
- 3 Can it be executed and enforced at all?
- 4 25% reuse of PET bottles and 65% RC in CS-packages contradicts
- 5 Will it actually result in reduced CO<sub>2</sub> emissions?
- 6 Enormous bureaucracy in each member state

# Reflection on reusable bottles

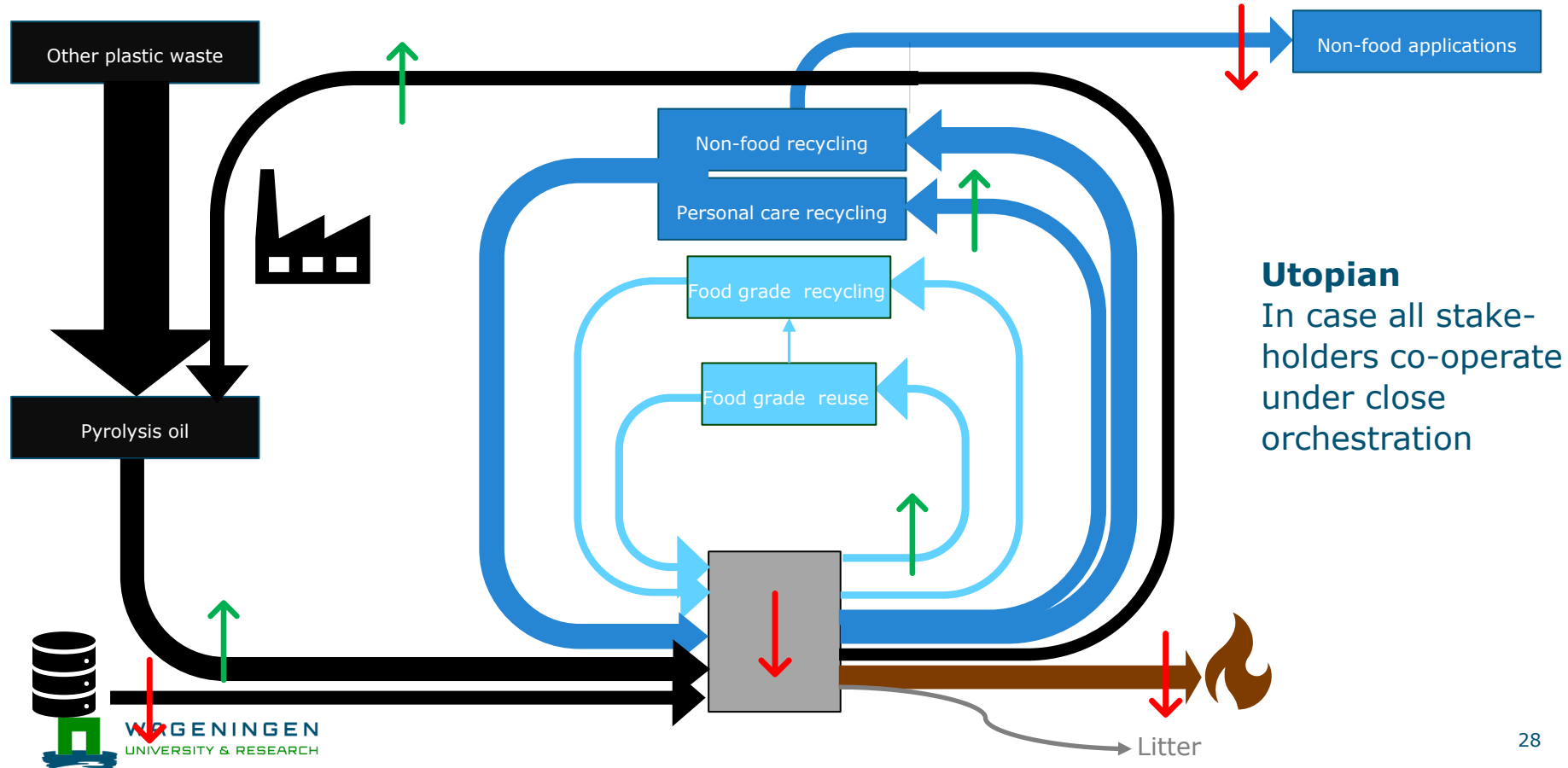
- Well-organised reuse systems for glass bottles can operate successfully in case a list of conditions is met
  - Efficient collection systems with DRS
  - Standardised bottles in a shared pool
  - Maximal transport distance of 150 km ↔
  - Large scale central bottle washing plants ...
- If these conditions are not met, the carbon footprint will be larger instead of smaller....



# How do we get 65% RC in CS packages?

- Maximise PET bottle collection and recycling
  - But the obliged reuse system will limit this
- Develop PET tray recycling to produce transparent food grade rPET
- Mechanical recycled PE and PP to personal care and cosmetics packages
- Chemical recycled plastic waste to food-grade PE and PP
  - We will need a lot of plastic waste to produce sufficient amounts of food-grade PE and PP

# A glance of the new intended system...





# Will such a new system solve the issues?

- Climate change
  - A small reduction in emissions is feasible, but so is a steep increase
- Limit leakage
  - No, plastics will remain to leak into the natural environment
- Decouple fossil oil
  - Dependency of crude oil will be reduced slightly
  - We will become dependant of the import of plastic waste
  - We miss biobased plastics

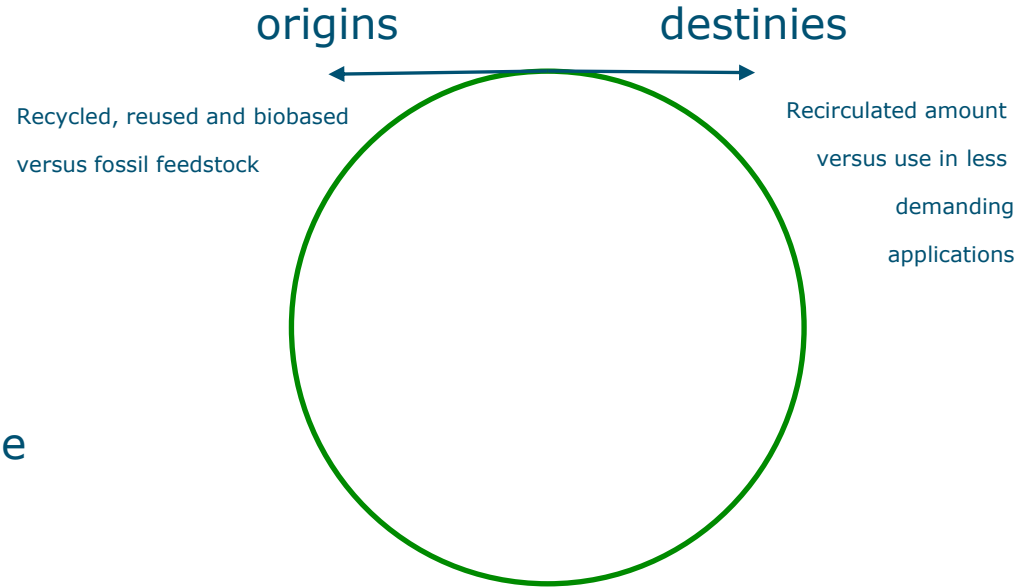
# The execution of the EU legislation

- Will require **enormous efforts**
  - Inspection, enforcement and reporting
  - Retail, FMCG industry, sorting companies, recyclers
- Can limit but not solve the environmental issues
- Piling of legislation will result in dilemmas & issues

# Setting priorities

- Sustainability: lowering CO<sub>2</sub> emissions is top-priority
- Circularity should only be pursued in case the CO<sub>2</sub> emissions are reduced
  - Looping strategies also cause CO<sub>2</sub> emissions!

## Circularity is inherently complex



# Scientific perspective I

- We need **orchestration**
- We need **science** to find the fine balance between looping strategies and global warming
- When looping strategies prevail we need
  - **coercion** to achieve design-for-recycling
  - new **improved sorting systems** to achieve grade-selective sorting to enable closed recycling loops & inclusion of biobased materials
  - new recycling and **decontamination** technologies

...

# Scientific perspective II

- Limit leakage
- Articles that still end up in the natural environment will have to be bio-degradable.
- Bio-degradable plastics will have to be integrated in the newly developed sorting- and recycling system
- Decouple from crude oil
- Integrate biobased plastics
- Food-to-Food recycling is essential
  - Risk assessment by EFSA should be less conservative and more realistic

# We are in for a rocky ride

Political opportunism will force us in simple circles that might not be sustainable

The food & beverage industry should take the lead in a roadmap towards carbon neutrality and litter minimisation

