Eliminating plastics

the potential trade-offs

with fighting climate change

An LCA perspective on the case of Southwest England

*Episode 2: The Glass Empire Strikes back?* 

#### **Exeter Multidisciplinary Plastics Research hub: ExeMPLaR**



Product lifetime distributions for the eight industrial use sectors plotted as log-normal probability distribution functions (PDF)





Cumulative plastic waste generation and disposal (in million metric tons). Solid lines show historical data from 1950 to 2015; dashed lines show projections of historical trends to 2050.

#### Polyethylene Terephthalate - PET



# Everybody silently agrees and accepts potentially unsubstantiated claims



#### Data acquisition

- Cornwall Council Data for:
  - the mass of the recycled
  - the mass of residual waste for all 212 parishes in Cornwall
  - the average distance from the HWRCs
- Literature review identified reports information about:
  - the share of plastic bottles in residual waste
  - PET share in the total amount of plastic bottles
  - the share of the recyclable plastic bottles collected
  - the shares of the glass bottles that are recycled
- Estimated the amount of PET and glass that is going to be incinerated as residual waste or recycled
- For the distances, we used the closest PET recycling centre
  - (Leicester is 422 km away from HWRCs on average)
  - Portuguese Harbour (Leixo is 1093 km away)

#### What to keep



#### What to change



## What else we got

Information for Production and Recycling:

- PET
  - Maximum 35% Recycled PET
  - Extra Injection moulding of PET
  - Extra Stretch blowing of PET into a bottle
  - Incineration again on/Incineration against off (?)
  - Restricted number of recycling rounds (maximum 5)
- Glass
  - Ratio of recycled material depends on glass colour, type, country more complicated work required
  - Max 61.5% for UK
  - Shaping into bottle part of glass packaging production
  - Incineration gain smaller because of higher rate of recycling
  - Theoretical infinite recycling

### **Global Warming Potential results**



## Life cycle assessment results for handling



#### **Indicative preliminary** results for full LCA of PET and equivalent glass



#### Conclusions

- Glass post consumer handling so far yields higher impacts in all categories
- Substitution of PET bottles with glass ones under the current management practices could lead to significant increases in the GWP and hinder efforts to tackle climate change
- To design a new circular economy with less plastics, it is necessary to identify and address the **specific needs of the region** and use science-based tools
- Results more or less the same
- Preliminary full LCA shows that <u>under specific circumstances</u>, potential improvements might be achieved by keeping the recycling activities within the county geographic boundaries and by making glass bottles lighter, in other words:
- The Return of the Glass may not be impossible...

Thank you very much! I would be happy to answer your questions.

For more information: v.kouloumpis@exeter.ac.uk