

**WASTE FEW ULL**

**Waste: Food – Energy – Water Urban Living Labs**

# **BENEFITS OF REDUCED FOOD WASTE: Learnings from the Bristol ULL**

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# Project Goals

This study set out to explore the following questions:

- ▶ What are the **non-market** and socio-environmental benefits of reduced food waste along the food/waste cycle for Bristol?
- ▶ What reductions in energy and other resource usage in food production/transport and waste disposal might be gained from reducing food waste?

# Approach

## RESOURCE COMPONENTS OF FOOD

- Estimated the environmental impacts of food production & retail using Life Cycle Assessment study by Tonini (2018)

## BRISTOL HOUSEHOLD FOOD WASTE

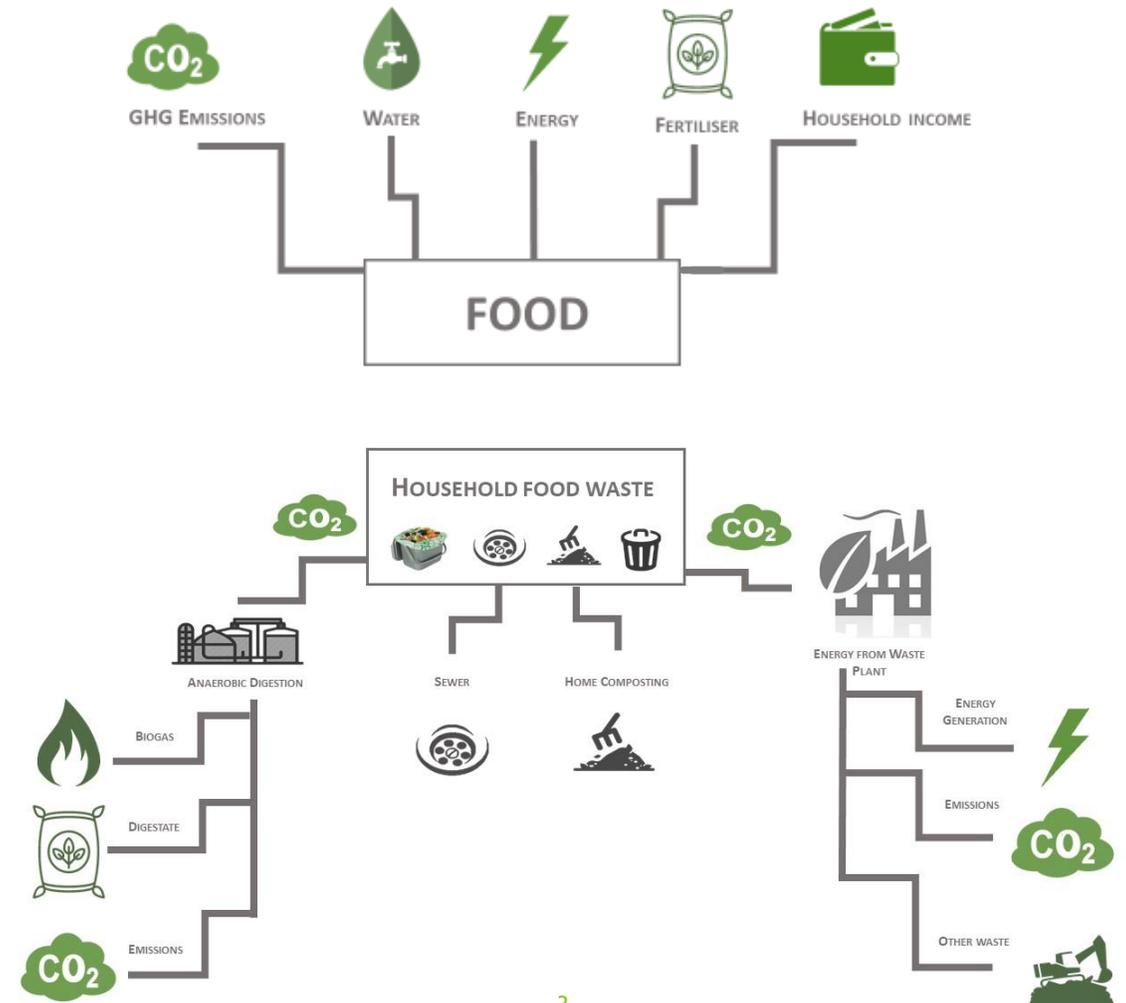
- Mapping quantities of waste using data from Bristol Waste Company
- Proportions of avoidable and non-avoidable food waste from 2019 Bristol Waste Composition Report and WRAP (2018)

## WASTE DISPOSAL & MANAGEMENT

- We mapped how waste is disposed of and how it is collected and managed in Bristol using information from stakeholders

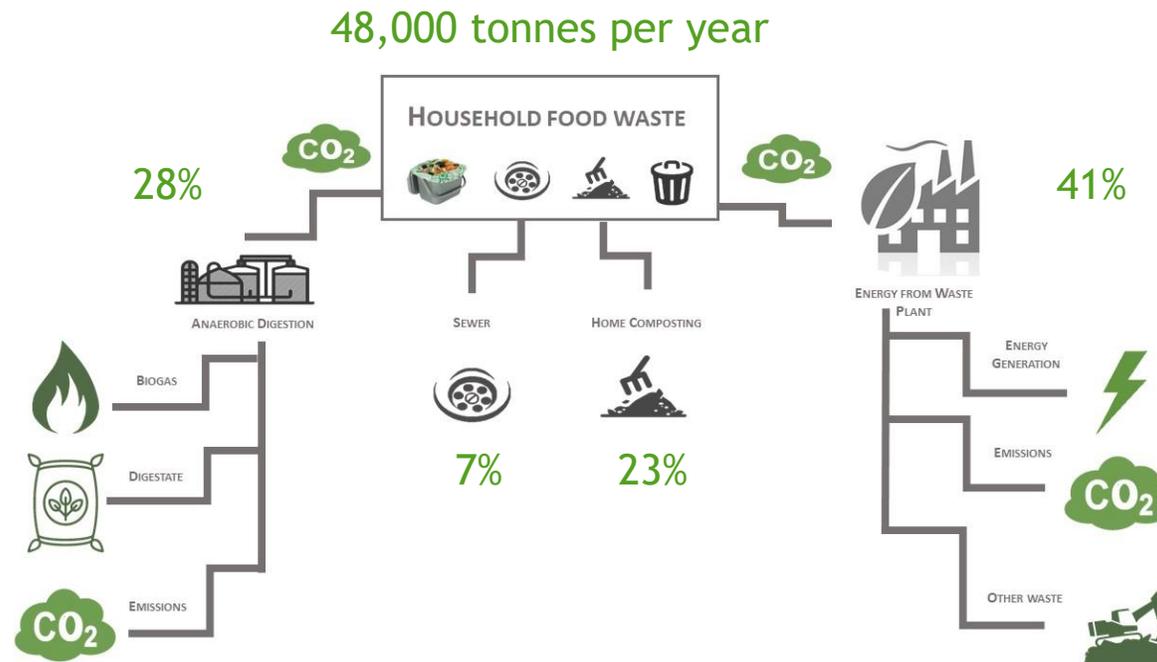
## NON-MARKET IMPACTS OF WASTE MANAGEMENT

- We estimated the environmental/ social impacts of waste and waste management using Slorach (2019) and WRAP (2011)
- We estimated the value of these impacts by monetising these results using published evidence on the societal cost of environmental impacts



# Scenarios for reduced food waste

## S1: More recycling



## S2: Less food waste at source



# Results: annual impact of Bristol's food waste

Global Warming: equivalent to **110,000 tonnes of CO<sub>2</sub>**

Photochemical Ozone Formation: **300 tonnes of NMVOCs**

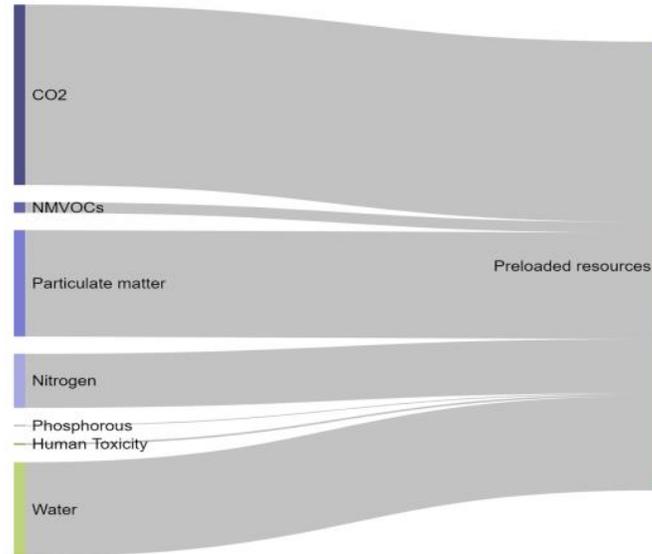
Particulate matter: equivalent to **100 tonnes of PM<sub>2.5</sub>**

Marine Eutrophication: equivalent to **600 tonnes (N)**

Freshwater Eutrophication: equivalent to **20 tonnes (P)**

Human Toxicity: equivalent to **2 cases of cancer**

Water Use: **41 million M<sup>3</sup> water**

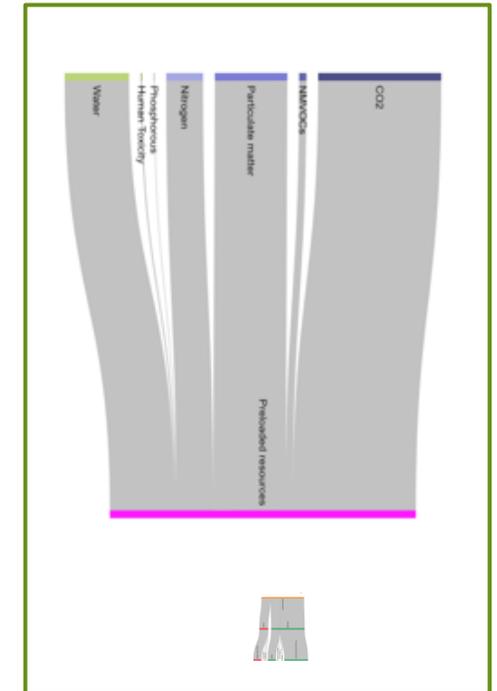
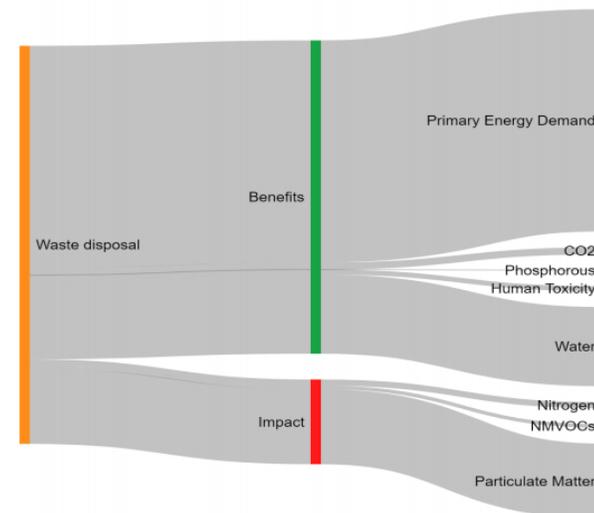


Food  
production

## Effects of disposal

Less Primary Energy Demand: **-45,000 GJ**  
 Less Global Warming Potential: **-700 tonnes CO<sub>2</sub> equiv**  
 Less Freshwater Eutrophication: **-0.12 tonnes P equiv**  
 Less Human Toxicity: **-300 t 1,4-DB equiv**  
 Less Water Use: **-6 million tonnes water**

More Marine Eutrophication: **12 tonnes N equiv**  
 More VOCs: **18 tonnes NMVOCs**  
 More Particulate matter: **17 tonnes PM10 equiv**



# Comparing the impact of more recycling versus less consumption

S1: More recycling of 1 tonne of food



S2: Reduction of 1 tonne of food



This is the net value of changes including disposal and the burden of food production compared.

NB the value of primary energy demand (PED) burden of food production not known so this element is incomplete

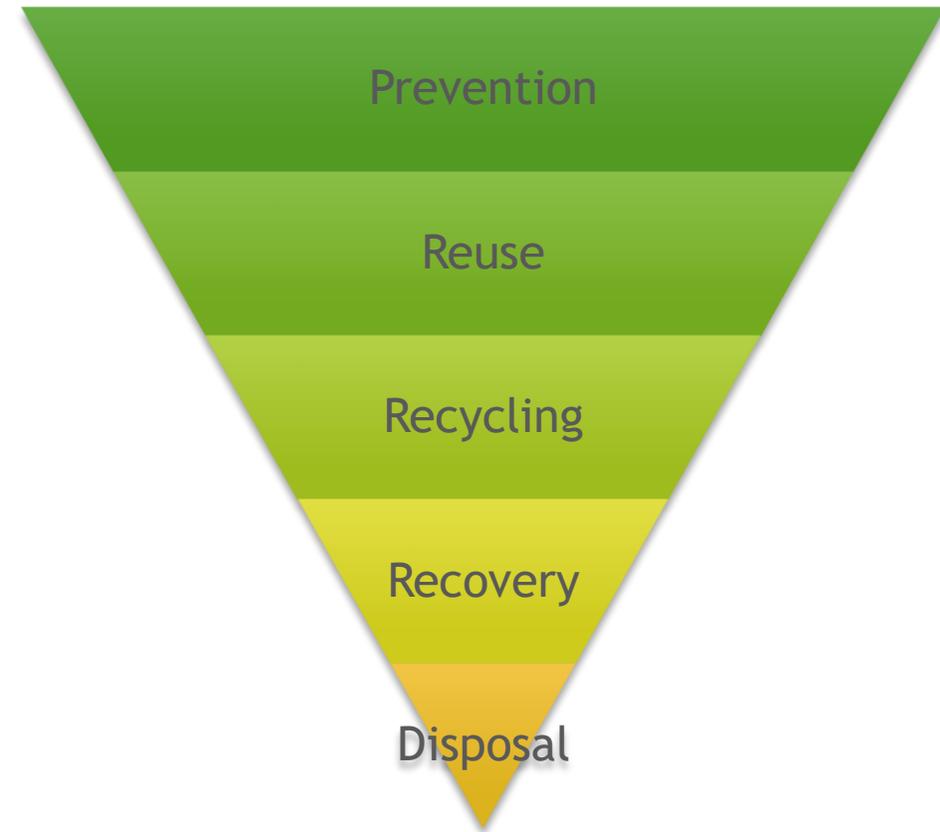
# Reinforcing the waste hierarchy

Our calculations reinforce the principal that it is always better to reduce food waste at source.

However, 30% of wasted food is not edible, and this should be disposed of in the most efficient way possible.

Compared to Incineration or Landfill, Anaerobic Digestion has the most positive outcomes, although some methods can increase particulate matter pollution.

Therefore it is still valuable to move any unavoidable food waste from residual (black bins) to recycling, as this has many significant environmental benefits for Bristol.



# Next steps

- ▶ Illustration of just one node of the whole food-energy-water nexus
- ▶ Input into macro-economic modelling work
- ▶ Bristol Going for Gold campaign

