

**1**

## Orange



### Orange

In Brazil the price of oranges has fallen dramatically (60% between the years 2007 and 2013). This makes it difficult for orange farmers to stay in business.

#### raw material

**2**

## Orange



### Orange juice

Brazil is the largest exporter of orange juice in the world. In 2013 they produced 1.12 million tonnes of orange juice.

#### product

**3**

## Orange



### Orange peel

Brazil produces over 7 million tonnes of orange peel a year. This is expensive to dispose of.

#### waste problem

**4**

## Orange



### Limonene

Limonene is a chemical with many uses. It can be used to flavour food and add scent to cleaning products. It can be used instead of chemicals made from oil.

#### green solution

**1**

## Potato



### Potato

Over 5 million tonnes of potatoes were grown in the UK in 2013. 52% of these in the East of England and Yorkshire.

#### raw material

**2**

## Potato



### Chips, roasted, mashed...

In the UK we eat an average of 100kg of potatoes per person per year!

#### product

**3**

## Potato



### Potato peel

In the UK 359,000 tonnes of potato is wasted every year. This includes potato peel left over from making chips.

#### waste problem

**4**

## Potato



### Plastic

'Bio plastic' takes less energy and fossil fuel to make than traditional plastic. The process also produces less greenhouse gasses.

#### green solution



**1**

## Coffee beans



### Coffee beans

Coffee is grown in countries near to the equator. The coffee berries have to be picked by hand and the beans roasted before they are ready to use.

## raw material

**2**

## Coffee beans



### Coffee

Coffee is one of the most popular drinks in the world. The flavour of the drink can be affected by the variety of bean used and for how long it has been roasted.

## product

**3**

## Coffee beans



### Coffee grounds

The UK produces 500,000 tonnes of coffee grounds per year. If alternative uses are not found for them this would lead to a lot of waste in landfill sites.

## waste problem

**4**

## Coffee beans



### Oils

The oils made from spent coffee ground can be used to make fuels and soap. This is an important alternative to palm oil and so can help protect the rain forest.

## green solution

**1**

## Food crops



### Food crops

We use a wide range of crops in this country, both grown and raised here and imported from around the world.

## raw material

**2**

## Food crops



### Food

We eat both unprocessed materials (such as apples) and foods that have been made following a range of processes such as cooking or fermentation.

## product

**3**

## Food crops



### Food waste

In Britain the average family throws out the equivalent of 24 meals a month. 4.2 million tonnes of food is wasted in this country every year. This includes food that is mouldy and vegetable peel.

## waste problem

**4**

## Food crops



### Fuels and fertiliser

Some companies specialise in recovering as much of this waste as possible. Some of it is used to enrich the soil and the rest is burned to create energy.

## green solution

**1**

## Peas



### Pea plants

Peas grow in pods on climbing plants which can grow to over a meter in height. The UK are the largest producer of peas for freezing.

### raw material

**2**

## Peas



### Peas

Peas are used in both animal and human feed and are a good source of protein. They can be served as a side vegetable, in stews or as mushy peas.

### product

**3**

## Peas



### Pea vines

Peas are an annual plant, so once the peas have been harvested the vine on which they have been growing dies. The vine represents nearly half of the total weight of the crop.

### waste problem

**4**

## Peas



### Thickening agent

The pea vines can be processed to extract a substance which adds valuable nutrition to food as well as thickening sauces and soups to make them more appetising.

### green solution

**3**

## Fossil fuel



### Fossil fuel

Unlike the other raw materials described here fossil fuels such as coal and oil, cannot be replaced. Whatever scientists do their production inevitably leads to pollution.

### waste problem

## Science Solutions Card Games for 9-11 year olds

These games highlight the problem of waste during food production, and the innovative and exciting solutions generated by scientists to turn this waste into useful products.

Download the game details from the **Potatoes to Plastics** home page using QR code below. To purchase further sets of cards please contact [ciec@york.ac.uk](mailto:ciec@york.ac.uk).



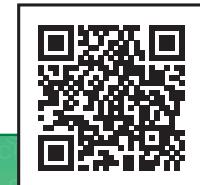
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## Science Solutions Playing Cards

Three card games linked to the CIEC publication **Potatoes to Plastics**. These games highlight problems caused by environmental waste and how science is being used to find solutions.

For more information, please visit the CIEC website by clicking on the QR code.



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