

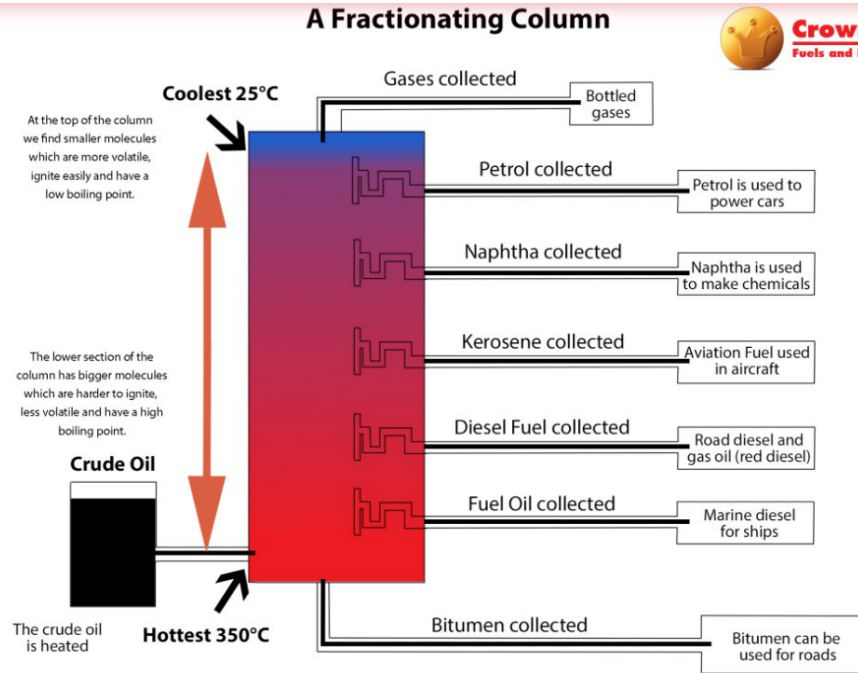


UNIVERSITY OF
LINCOLN

GOING FROM PETROCHEMICAL TO BIODERIVED – A BIO-REFINERY

Dr Con Robert McElroy

Crude oil distillation

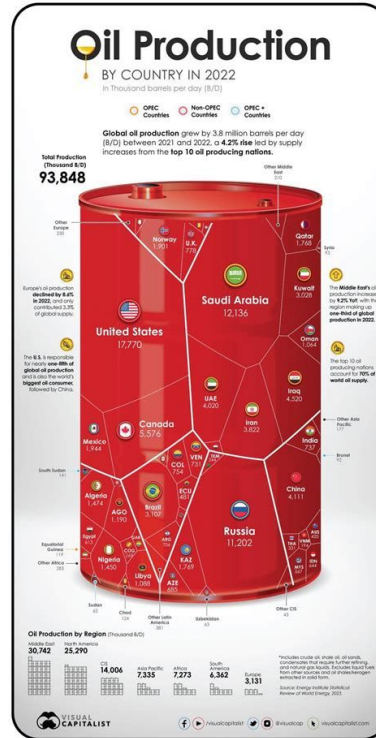


- Refining of oil is done through distillation
- Crude oil is heated up and the different fractions collected
- Separation is based on boiling point

World wide oil production

2022

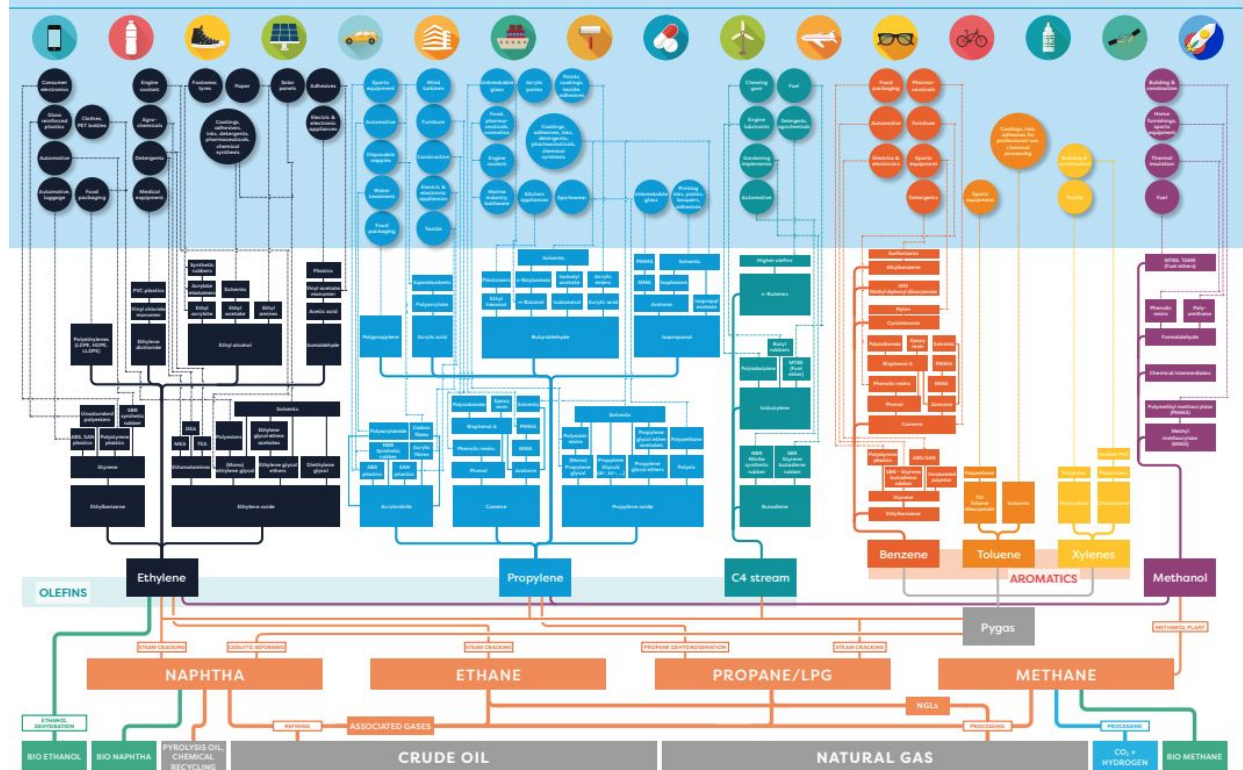
- 93.4 million barrels a day
 - 34,091 million barrels a year
 - 5,420 million tons a year



- Fuel
 - 4,445 million tons
- Tar for asphalt
 - 434 million tons
- Feedstock for chemicals
 - 542 million tons

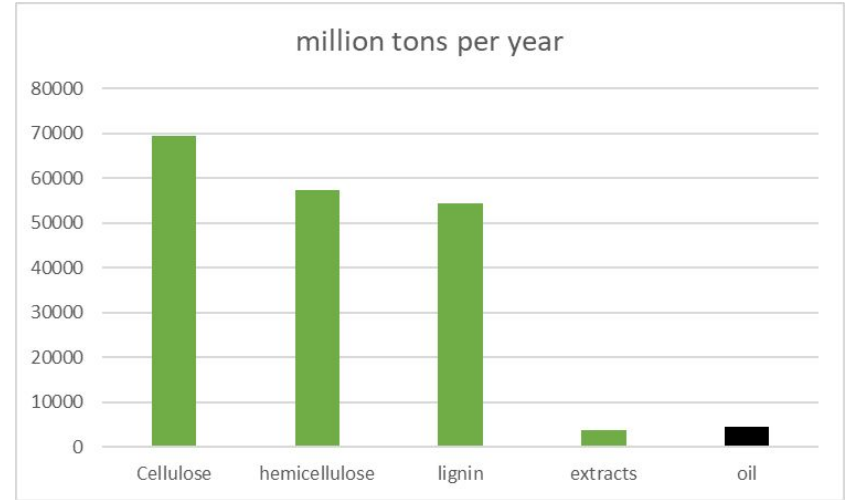
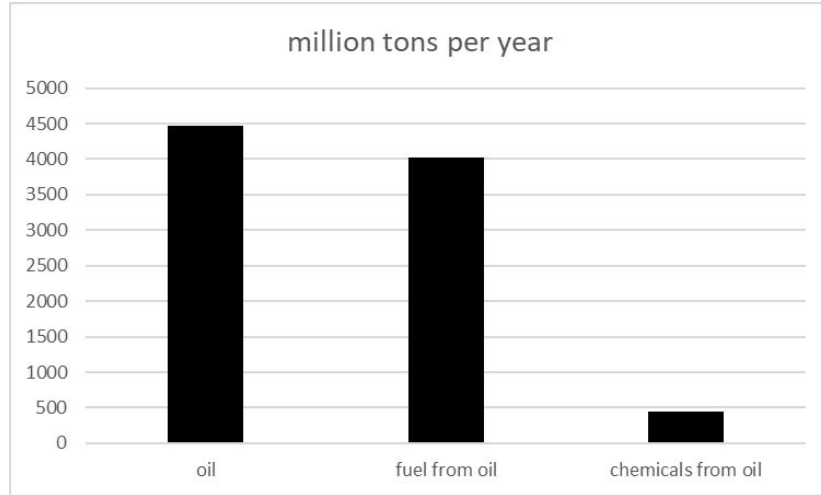
Chemicals from oil

- Only 10% of crude oil is used to make chemicals
- From really simple chemicals, we build up complexity to make stuff



*Getting our carbon from bioderived sources
rather than petrochemical*

2019 data – lots more lignocellulose than oil





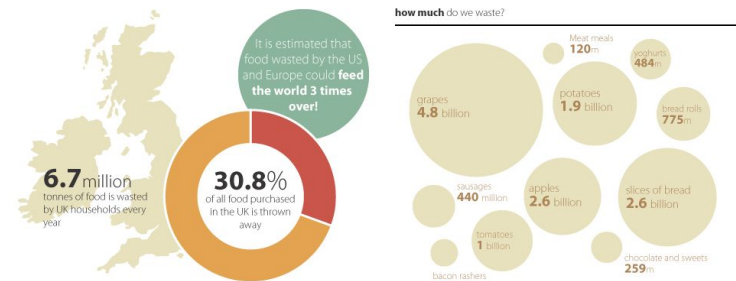
- We want to leave most of the lignocellulose where it is

UK farming figures

- Lots of farm waste available to use as feedstocks
- 2/3 of straw not needed by the farmers
 - Harder to use to make chemicals
- Bigger mass of food
 - Easier to use as feedstock
- Problem with making chemicals from something we could eat

Crop	Mton of food	Straw/non edible portion	
		Mton straw grown	Mton available
wheat	14.84	6.38	3.83
barley	7.17	3.08	1.85
oats	0.88	0.41	0.25
oil seed rape	2.17	0.76	0.38
maize	3.05	1.53	0.92
peas	0.14	0.06	0.03
field beans	0.97	0.39	0.23
Total	29.21	12.60	7.48
Forestry waste			1.34

food waste in the UK



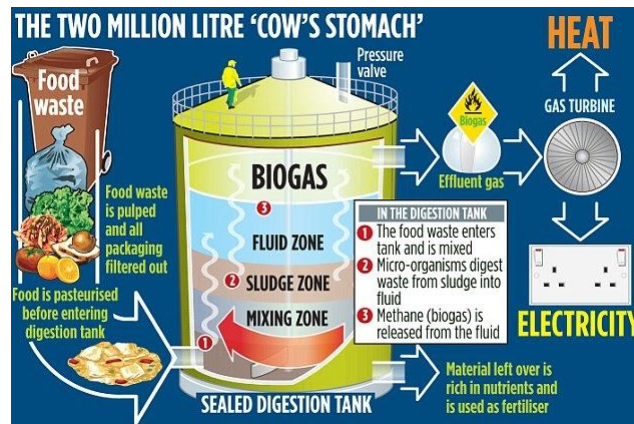
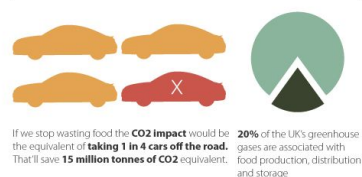
how much is it costing the UK?



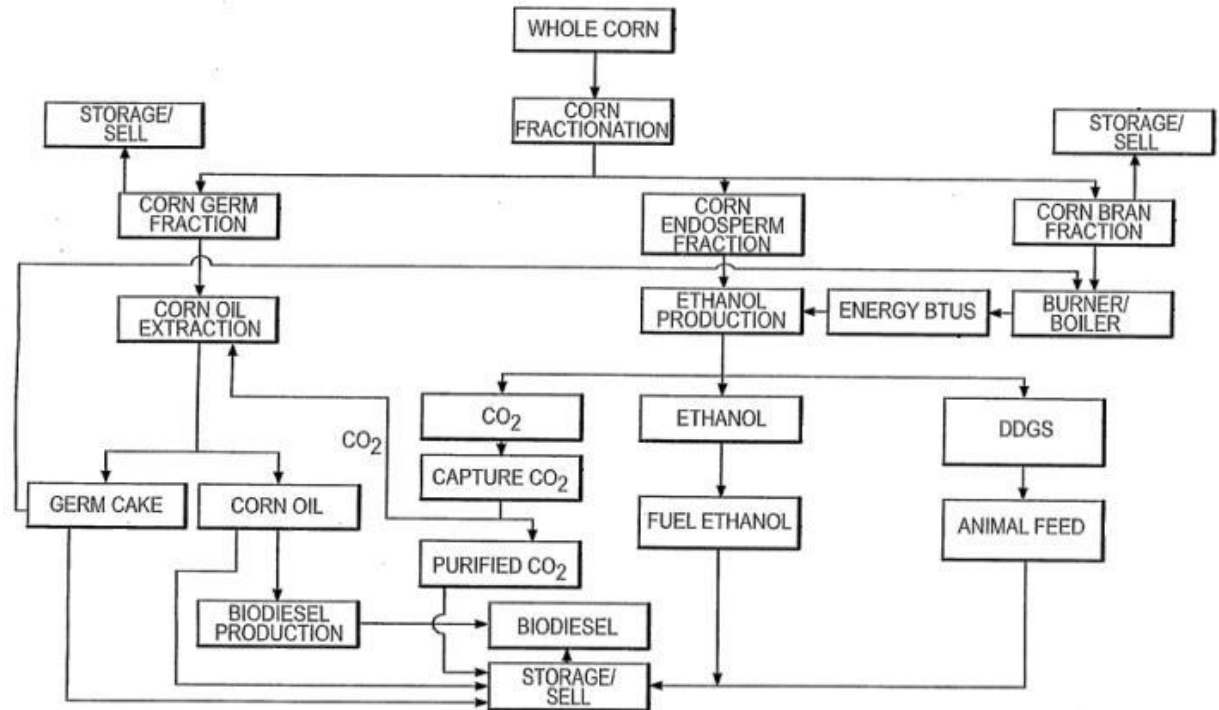
the most common foods we waste and their equivalent weights



the environmental impact of wasting food

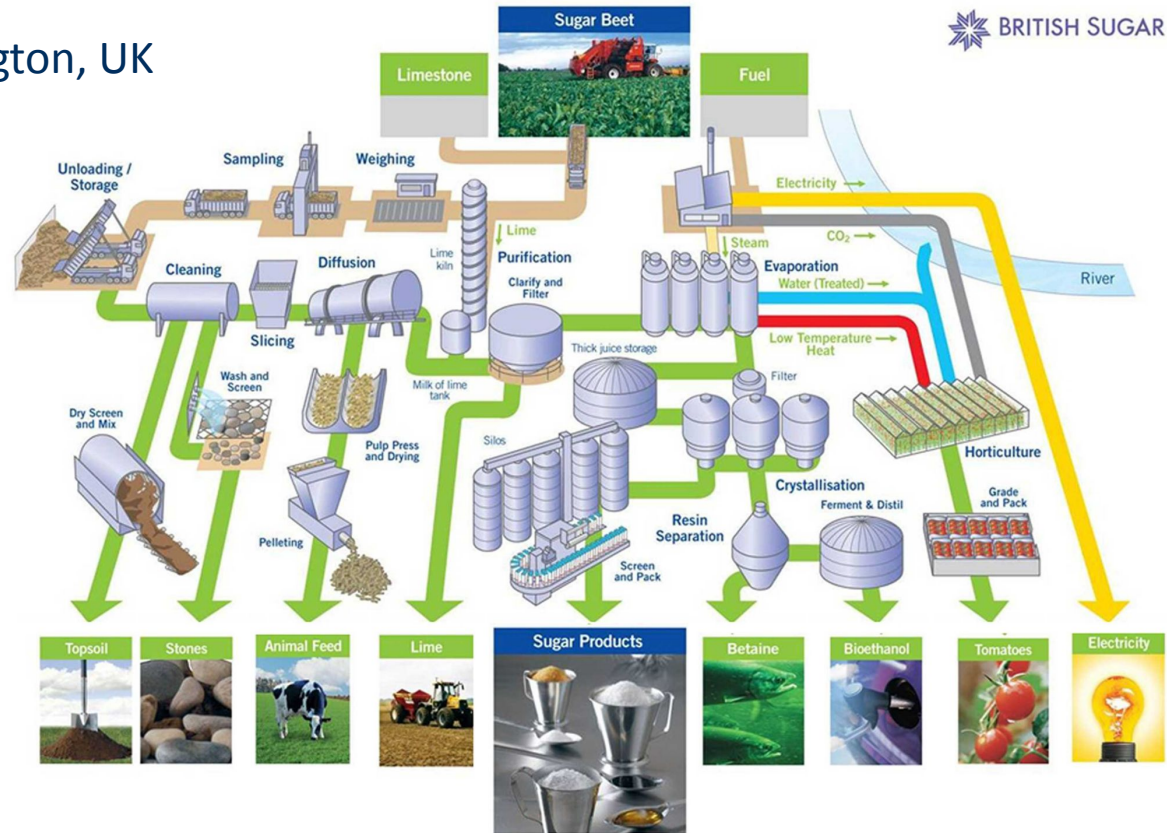


- Can make lots of different products from corn (maize)
- No waste
- Problem that we can eat the corn and the oil



C6 sugar platform – Wissington, UK

- Like the Bazancourt Pomacle Biorefinery that it is based on sugar beet
- Still produces sugar as food but makes many other products
- No waste, even soil and heat is reused



- Bazancourt Pomacle Biorefinery processes sugar beet, like British Sugar there is no waste
- Also the site for many other companies who take outputs and add complexity – higher value product
- Like petrochemical route but using bio-carbon



Development of Bio-refineries

