"FOOD FUELS" – produced directly from food crops e.g. BIOETHANOL from Corn	
FEEDSTOCK	Corn cobs, grown in fields
PREPARATION	Corn is milled & mashed then broken down to sugar with the help of enzymes.
PRODUCTION	Microbes (yeast) converts the sugar into bioethanol. This is called fermentation.
PRODUCTS	Bioethanol is usually mixed with petrol to form gasohol for use in cars. It cannot be used as jet fuel
ADVANTAGES	Reduce reliance on fossil fuels. Produce less GHG than fossil fuels.
PROBLEMS	Use food which could be eaten by humans. Intensive farming causes habitat loss.
FACT	Most common biofuel world-wide especially in US and Brazil. UK pump petrol contains use a 5% bioethanol.

FUEL FACT CARD

FOOD FUELS

"FIBRE FUELS" – produced from fibrous food crop waste e.g. BIOBUTANOL from Rice Straw	
FEEDSTOCK	Rice straw; the waste stalks after harvesting rice from paddy fields
PREPARATION	Straw is washed & chopped then broken down to sugar (hydrolysis) with the help of enzymes
PRODUCTION	Microbes (bacteria) convert the sugar into biobutanol. This is called fermentation.
PRODUCTS	Biobutanol can be used as a fuel in cars and as jet fuel.
ADVANTAGES	Use cheap plentiful waste. Reduce pollution by preventing straw burning.
PROBLEMS	Currently uneconomic, as much of the sugar stays locked in the fibres. Research continues.
FACT	SBRC Nottingham has partnership with India improving fuel production from rice straw – "Ricefuel"

FUEL FACT CARD

FIBRE FUELS

“ALGAL FUELS” – produced from algae (seaweed family) e.g. BIODIESEL from Microalgae	
FEEDSTOCK	Microalgae are grown in photobioreactors (like big glass radiators) with access to light, warmth and water
PREPARATION	Microalgae are separated from water using filters and dried with heat
PRODUCTION	The oily part of the microalgae is extracted to produce “algal oil” and converted into biodiesel by a chemical process.
PRODUCTS	Biodiesel, petrol and jet fuel
ADVANTAGES	Algae can be grown using land and water unsuitable for food. They produce more energy per acre than conventional biofuel crops.
PROBLEMS	Currently uneconomic, due to high demand for water and difficult oil extraction process. Research continues.
FACT	Algal products can also be converted into commercial chemicals e.g. plastics and cosmetics

FUEL FACT CARD

ALGAL FUELS

“WASTE GAS FUEL” – produced from waste carbon gases e.g. JET FUEL	
FEEDSTOCK	Waste gases – carbon dioxide, carbon monoxide, methane & hydrogen from rubbish tips and factories e.g steel mills
PREPARATION	Waste gas is cooled and cleaned to remove toxins
PRODUCTION	The gases are injected into a bioreactor where they are converted by “gas eating” microbes (bacteria) into useful chemicals. This is called “gas fermentation”.
PRODUCTS	Ethanol, diesel, petrol, jet fuel and commercial chemicals e.g. plastics and cosmetics
ADVANTAGES	Uses cheap, plentiful, polluting waste gases. Does not compete with food for land. No overall production of GHG (GHG used = GHG produced)
PROBLEMS	The yield is currently uneconomic. Research continues.
FACT	SBRC Nottingham has partnerships with China and the USA improving fuel production from Steel Mill “Off Gas”

FUEL FACT CARD

WASTE GAS FUELS