



National Non-Food Crops Centre

Biomass and Energy

The Commercialisation Issues

-Peter Lillford

Supply Chains

**Regulations /
Controls**

Market Drivers

Opportunities

Threats



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Environmental issues are finally becoming major drivers:

- Renewable alternatives to fossil fuels
- Solid waste is an energy source
- We waste energy- (up to 50-75%!)

BUT

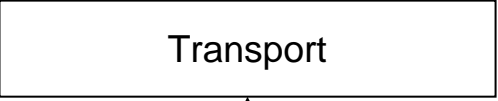
- Performance characteristics must be met
- Agricultural scale must meet demand

- UK is well behind N America and continental Europe



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Lubricants

Fuel

Energy

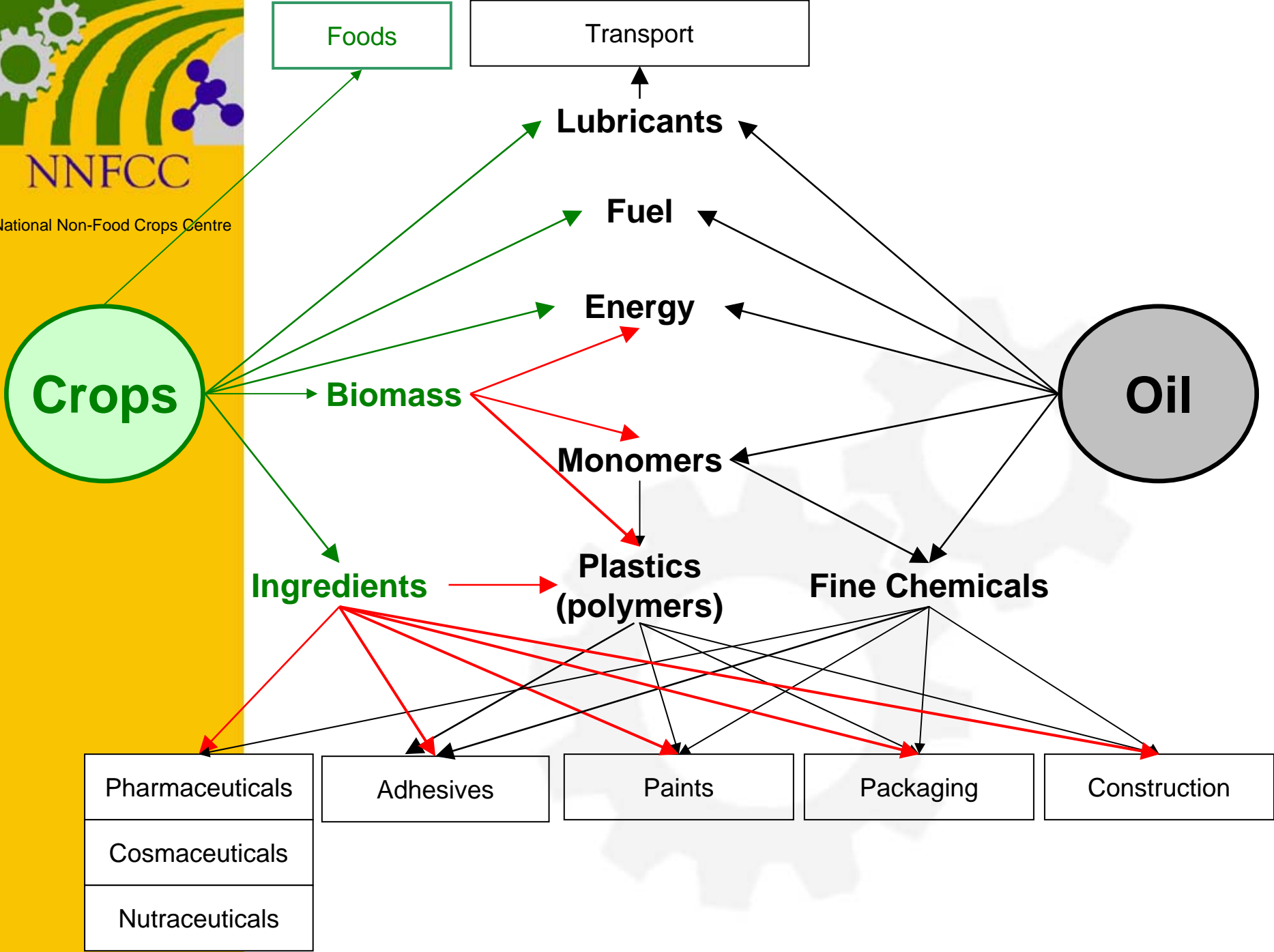
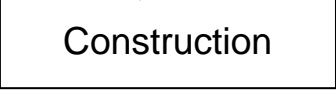
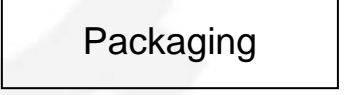
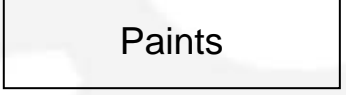
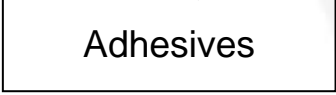
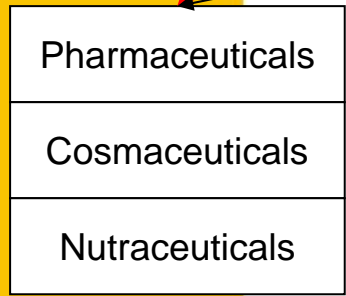
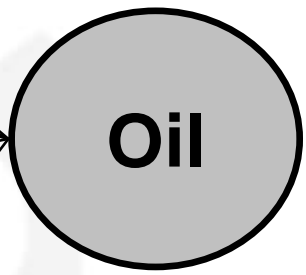
Biomass

Monomers

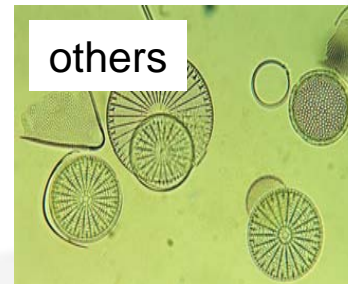
Ingredients

**Plastics
(polymers)**

Fine Chemicals



Renewable Feedstocks



Global Biomass produced annually = 170×10^9 tonnes

- Valuable source of carbohydrate for energy, fuel and chemicals
- Currently 6×10^9 tonnes utilised (3% of which are non-food uses)

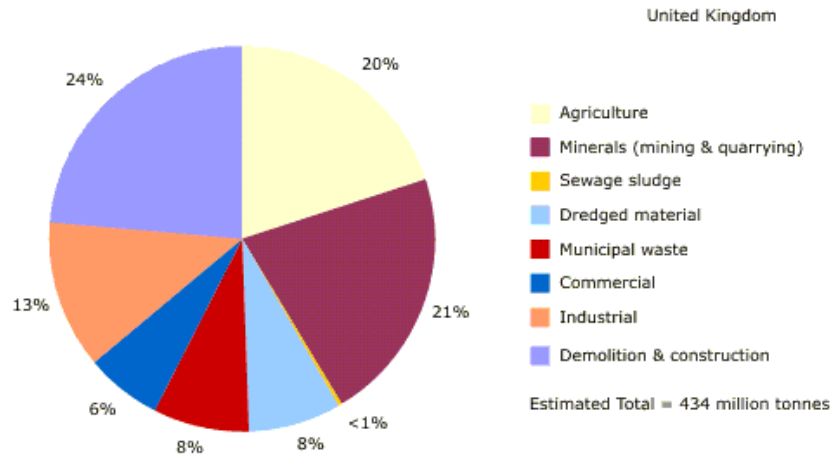


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UK Waste: A rich source of biomass

Figure 2: Estimated total annual waste arisings by sector



Source: Department for Environment, Food and Rural Affairs; Environment Agency; Water UK

UK Waste = 434MT

Growth rate = 3-4% pa

UK has very high landfill rates

- Food industry by-products = 30MT
- Agricultural Waste 80MT
- Municipal Waste streams 25MT*
- Timber & wood waste 2.8MT
- Brewers spent grain 0.5MT

* Data for England only



Biomass --Combined heat and Power

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Biomass in Construction Industry

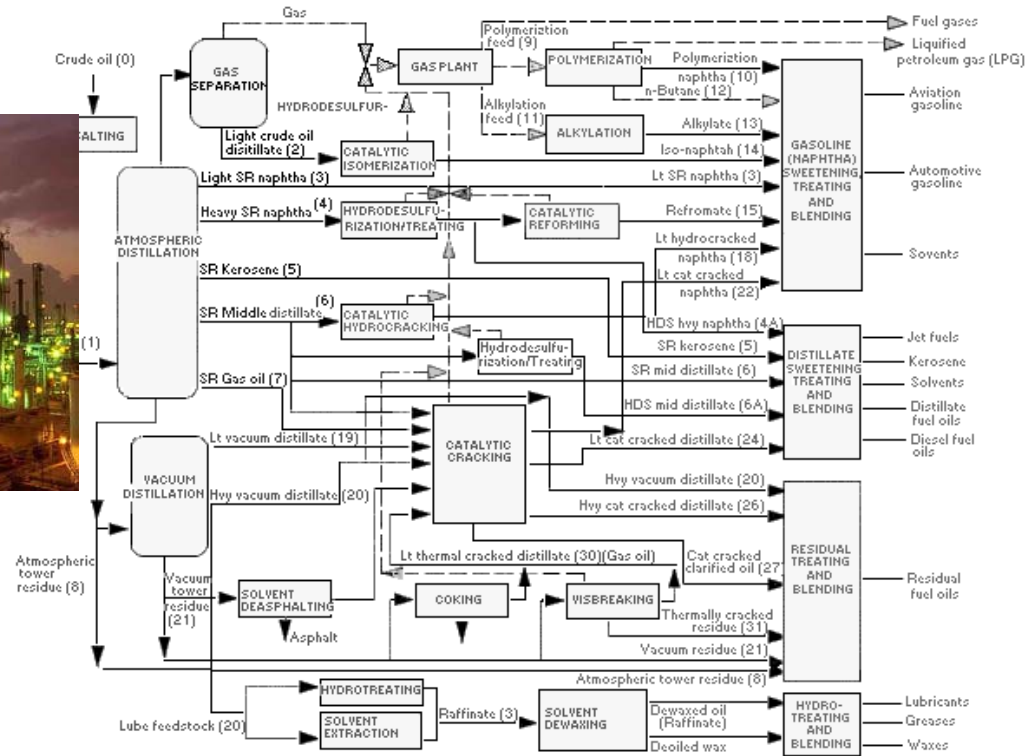




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Modern Oil Refinery-where the money is!



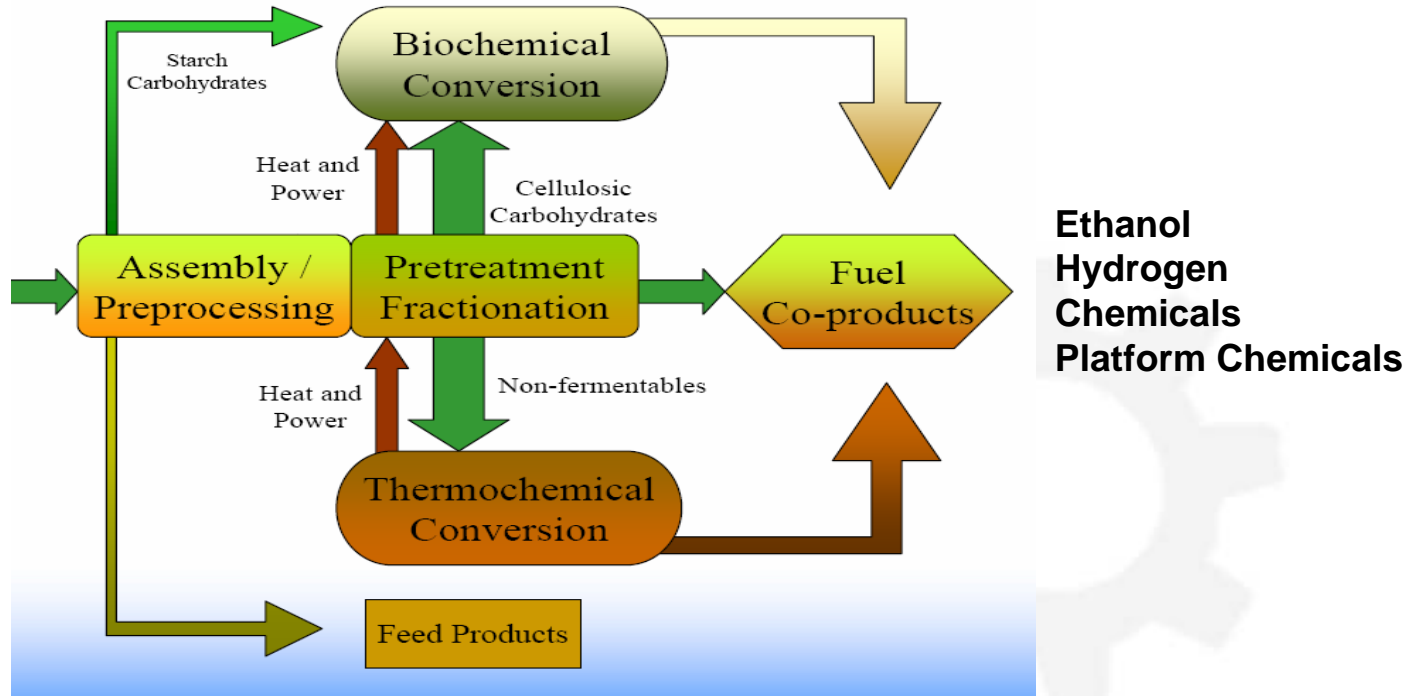
- Highly integrated
- Fuels, chemicals, power, materials
- Large volume markets
- Numerous thermal & catalytic processes
- Whole crude oil feedstock utilisation
- Evolved over 150 years
- Originally one product: kerosene lamp oil



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Biorefinery Concept—New money?



- ❖ Whole crop utilisation
- ❖ Diverse products/markets
- ❖ Diverse processing: Biochemical & Chemical
- ❖ Difference: Diverse feedstock, biochemical processing
- ❖ BUT
- ❖ **What is the scale?—Oil refineries or local processing?**



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What's Happening in the UK?

- Biomass for Burning and CHP
 - Short rotation willow and wheat
- Bio Fuels
 - Bio-Diesel already being manufactured & sold
 - First bioethanol plant in construction
- Bio-Plastics / biocomposites
 - Innovations in building materials, insulation and packaging, but a long way to go.
- Oleochemicals / lubricants
 - Well established industry, still innovating.
- Pharmaceuticals/Nutraceuticals
 - A return to plants as factories?



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Non-Food Crops

Examples of positive drivers

UK CO₂ Targets

***Energy Crops
Scheme***

***Tax reductions on
liquid biofuels***

***Co-firing
initiatives***

CAP Reform

R&D Funding

***Government
Procurement***

NFC's on set-aside

***Regional
development***



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Summary

- As demonstrated across the EU and the US, biomass is already a realistic industrial raw material - **technology is NOT the major issue. Capital investment is required.**

- A number of important issues need to be addressed
 1. Commercial scale pilot plant to demonstrate product performance, process viability and market acceptance
 2. Robust feedstock supply at full commercial scale
 3. Restructure regulatory framework to increase the benefit of renewables and decrease waste.
 4. Government to incentivise industry to adopt renewables as mainstream raw materials – cannot simply rely on market forces.



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Marketing to Processors & End-Users

Can you provide a solution?

Change your mindset

Understand the Regulations

Develop partnerships

Recruit expertise and support

Compete on issues of concern

...but control costs

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Thank You



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