

# SECOND GENERATION BIOFUELS: A UK PERSPECTIVE

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# DEFINITIONS

Biofuels = replacement of gasoline or diesel,  
or in the longer term kerosene by  
bioresources

# European Union strategies for biorenewables

Heat - Energy for the Future: Resources of Energy

Liquid biofuels - A Strategy for Security of Energy Supply

Whilst not competing for the same feedstocks at present these two markets could compete in the future

# THE UK MARKET FOR VEHICLE FUELS

UK uses approximately 20 million tonnes per annum each of diesel and gasoline

NB The diesel:gasoline split in private motoring in UK and wider EU is quite different from that of North America

## Liquid Biofuels in UK

UK already produces biodiesel from vegetable oils. Operational capacity is <500,000 tpa.

UK will produce bioethanol from simple sugars ( grain; sugar beet) soon.

UK is likely to import some of its biofuel feedstocks or in the case of bioethanol, finished product e.g. From Brazil

## First Generation (Conventional) Biofuels.

Biofuel Type	Specific Names	Biomass Feedstock	Production Process
Bioethanol	Conventional bioethanol	Sugar beet, grains	Hydrolysis & fermentation
Vegetable Oil	Pure plant oil (PPO)	Oil crops (e.g. rape seed)	Cold pressing/ extraction
Biodiesel	Biodiesel from energy crops  Rape seed methyl ester (RME), fatty acid methyl/ethyl ester (FAME/FAEE)	Oil crops (e.g. rape seed)	Cold pressing/ extraction & transesterification
Biodiesel	Biodiesel from waste FAME/FAEE	Waste/cooking/ frying oil/animal fat	
Biogas	Upgraded biogas	(Wet) biomass	
Bio-ETBE		Bioethanol	

# Imports of Biofuels to UK

- Currently primarily from Brazil
- In future:
  - Bioethanol from southern Africa
  - Biodiesel ( from Jatropha) from for example India

# Jatropha species



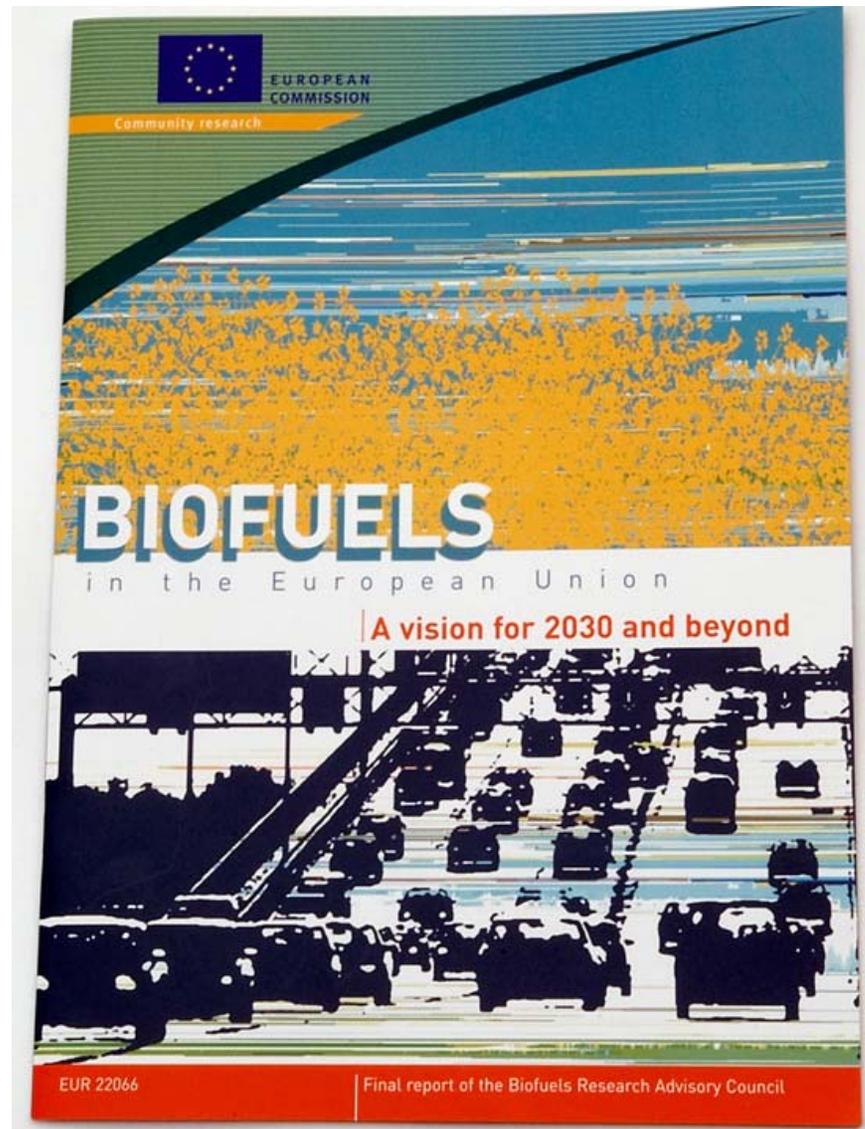
# The UK Arable Cropping Area

UK arable area is relatively small

Reaching EU targets of 10% biofuels for  
2010 will be challenging

The food v. fuel debate is emerging

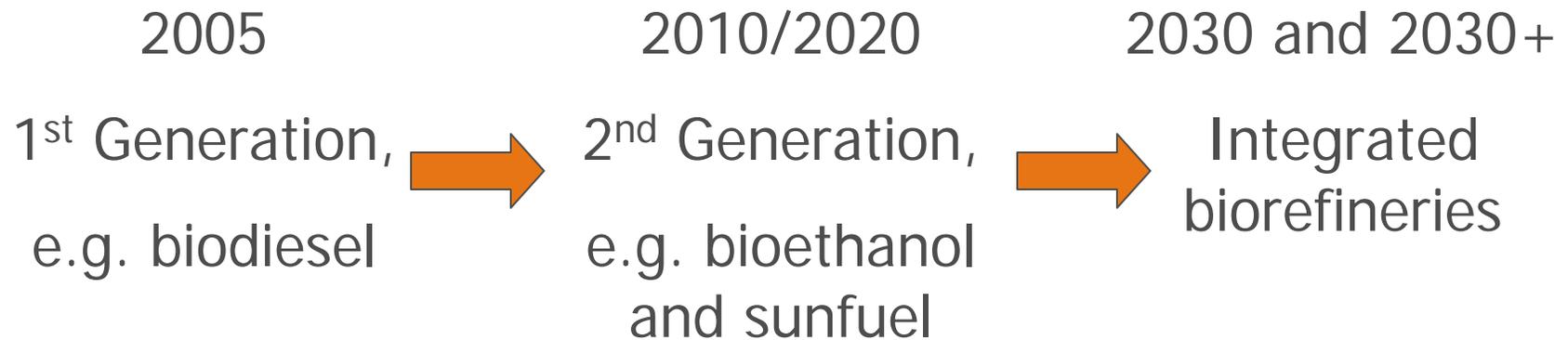
# Biofuel Vision for 2030.



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# Technology roadmap: vision for biofuels for 2030+.

## A European Vision.



## Second Generation Biofuels.

Biofuel Type	Specific Names	Biomass Feedstock	Production Process
Bioethanol	Cellulosic bioethanol	Lignocellulosic material	Advanced hydrolysis & fermentation
Synthetic Biofuels	Biomass-to-liquids (BTL): Fischer-Tropsch (FT) diesel Synthetic (bio)diesel Biomethanol Heavier (mixed) alcohols Biodimethylether (Bio-DME)	Lignocellulosic material	Gasification & synthesis
Biodiesel	Hydro-treated biodiesel	Vegetable oils & animal fat	Hydro-treatment
Biogas	SNG (Synthetic Natural Gas)	Lignocellulosic material	Gasification & synthesis
Biohydrogen		Lignocellulosic material	Gasification & synthesis or biological process

# Trees and Grassland.



# Second Generation Biofuels in UK

- Will not be commercialised until 2020 ?
- Will add value to the rural economy through the use of low level 'wastes'
- Could cause market conflicts with bio-heat
- Will eventually lead to the introduction and commercialisation of fully integrated biorefining

# INDUSTRY IS CHANGING ITS FOCUS

- New power trains which demand synthetic fuels (BtL)
- Biofuel vehicles eg (Ford and Saab E-85)
- Lighter weight (lean) vehicles with lower fuel demands

# SAAB BIO POWER



# THE FUTURE

If our target is to reduce fossil fuel demand  
reduce net CO<sub>2</sub>emissions/environmental  
impact of vehicles, then we must integrate  
our approaches and prioritise demands for  
land use.

# THE FUTURE

- We must look to integrated approaches!!

# Optimising Use of Bio-Resources.



# Current Uses:



Reduced speed = Reduced fuel consumption





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