

**Sam Greer**  
**Engineering Director**  
**Stagecoach**

**Bio Diesel**

Making buses a better choice

# Stagecoach UK Bus

- Operate 8500 buses and coaches
- Cover 350 million miles a year
- 118 locations 21000 staff
- 660 million passenger trips
- 40 million gallons fuel



# Sustainability



*"To meet the needs of the present without compromising the ability of future generations to meet their own needs."*

- *Environmental, social and economical demands must be fulfilled – at the same time.*
- *Too expensive systems will not be introduced in a scale that has an impact...*
- *...so, don't let the best be the enemy of the good.*



The  
Economist

The Franco-German relationship  
14-17

Italy's 50:50 choice  
18-21

Russia's western borders  
22-25

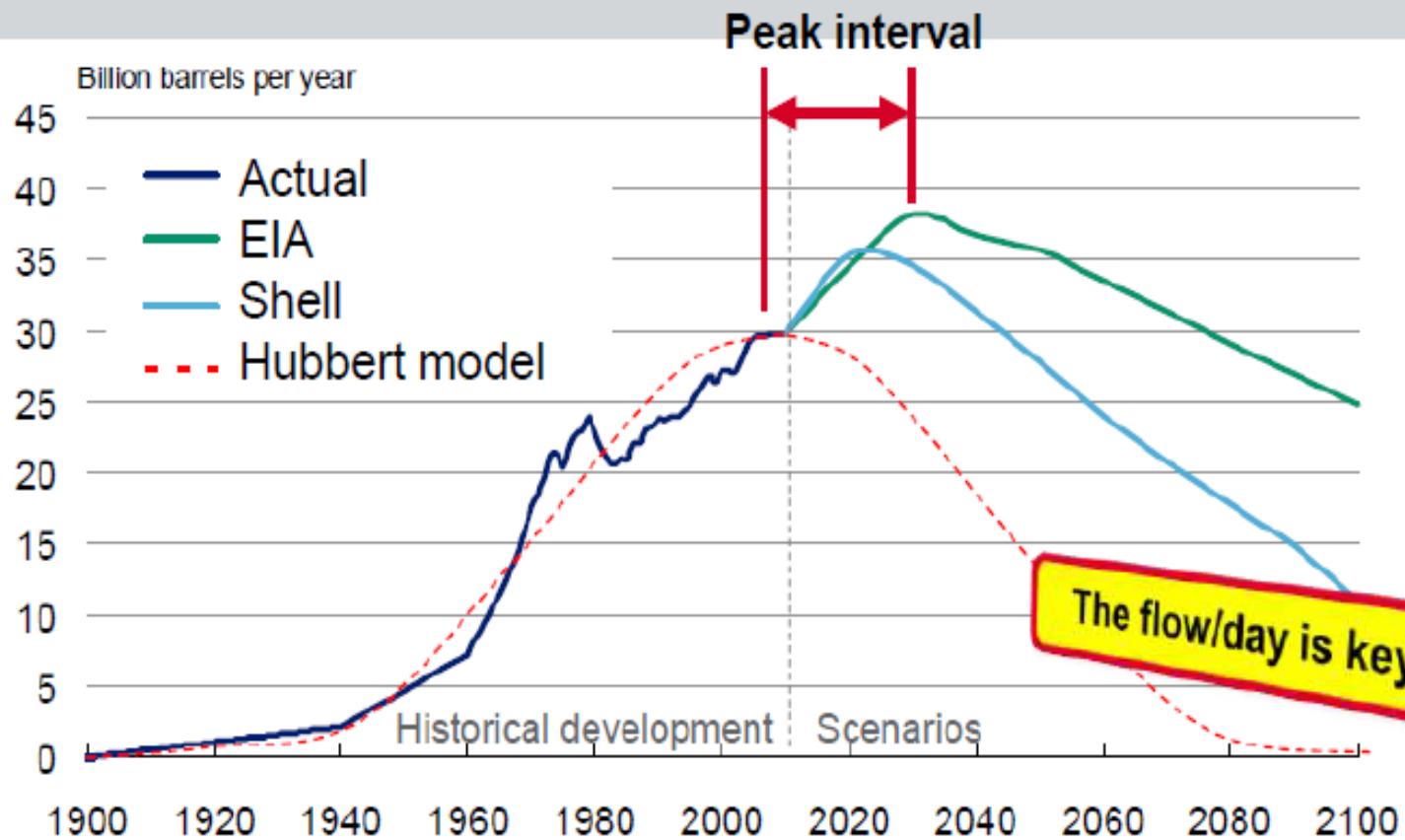
A SURVEY OF CORPORATE LEADERSHIP  
26-31

# The end of the Oil Age



# Drivers for sustainable transport

Local energy security and the end of cheap oil..?



## Climate Change and CO<sub>2</sub>

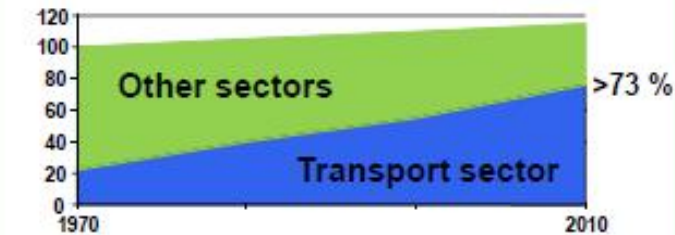


## Air Quality & Congestion



Are you part of the **problem**?  
Or part of the **solution**?

### Oil use in OECD



1970: Index 100

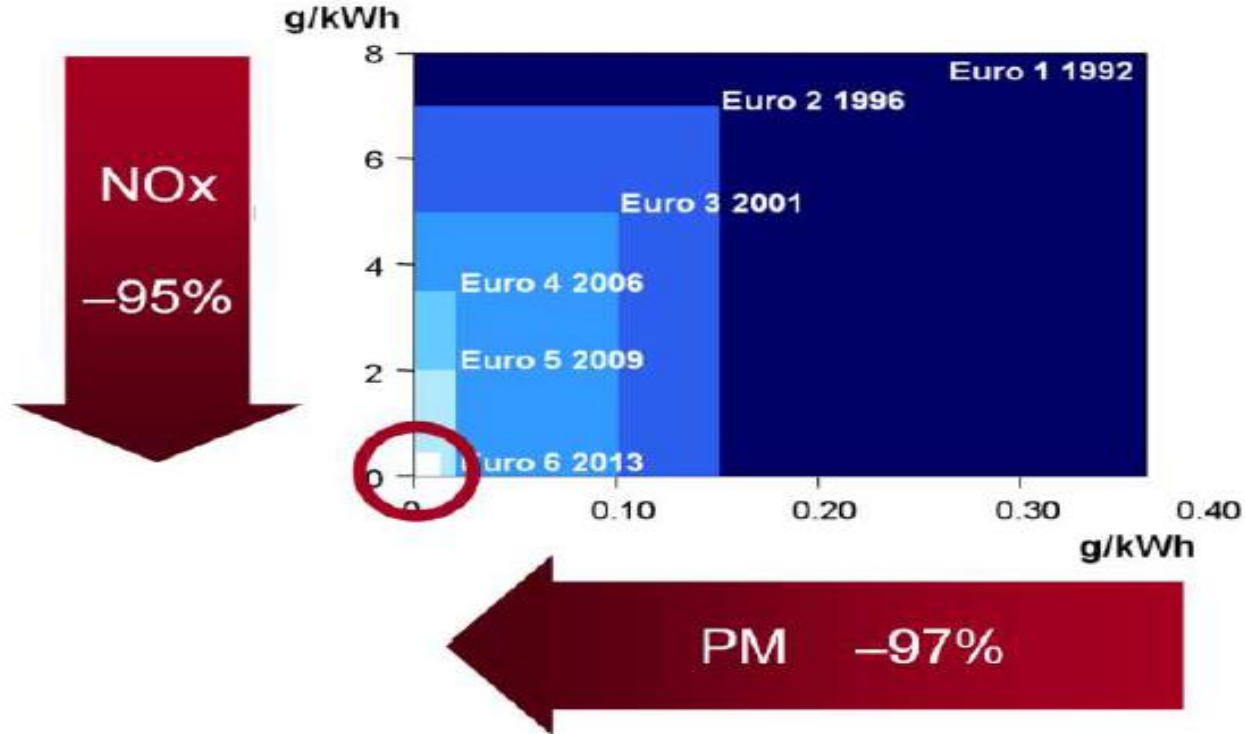


Source of data: EM-DAT - The OECD/CREDES International Disaster Database.  
Http://www.em-dat.net, UCL - Brussels, Belgium

# Step Change Euro 6

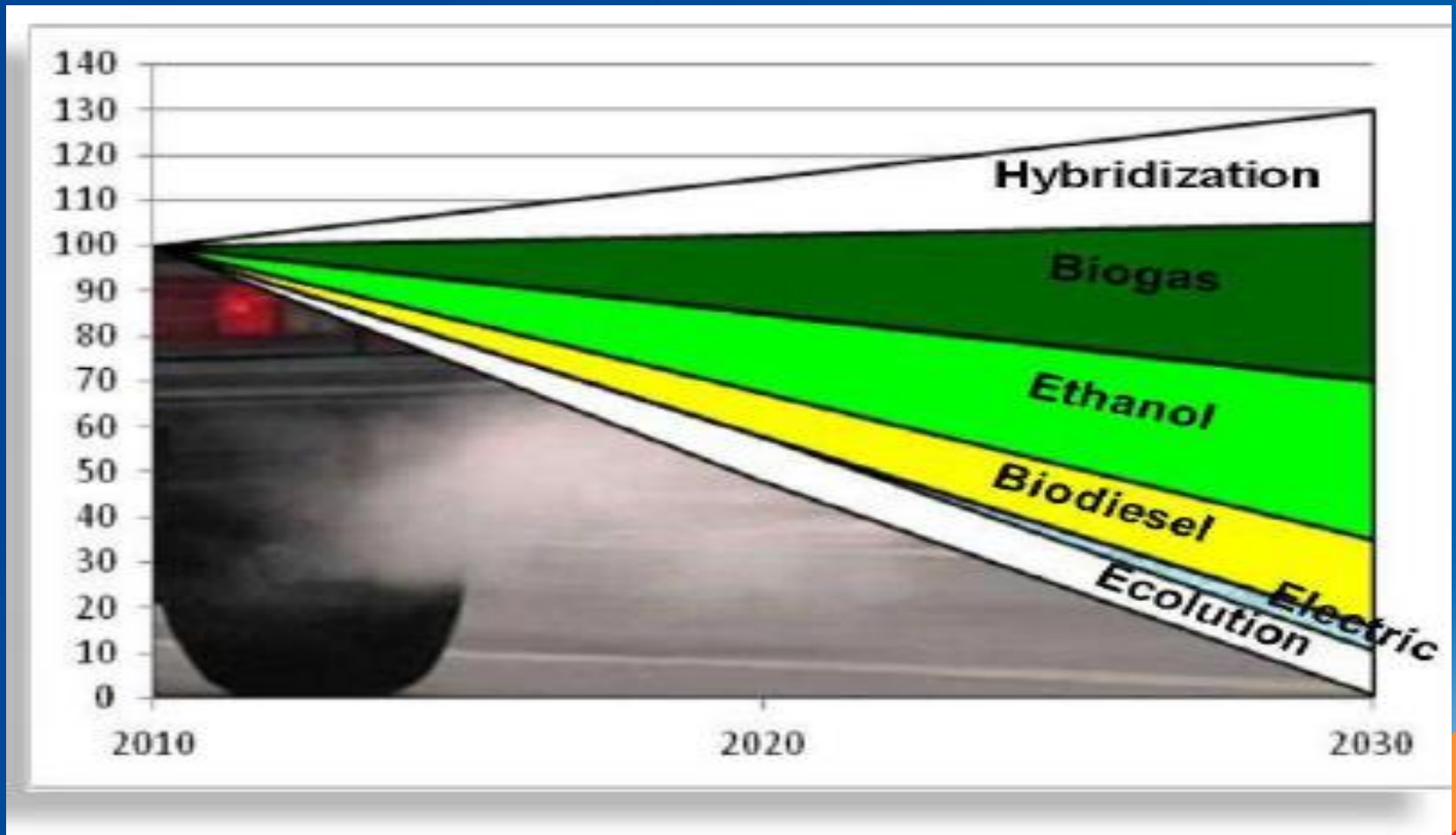
## Local emissions

By implementing stricter emission regulations





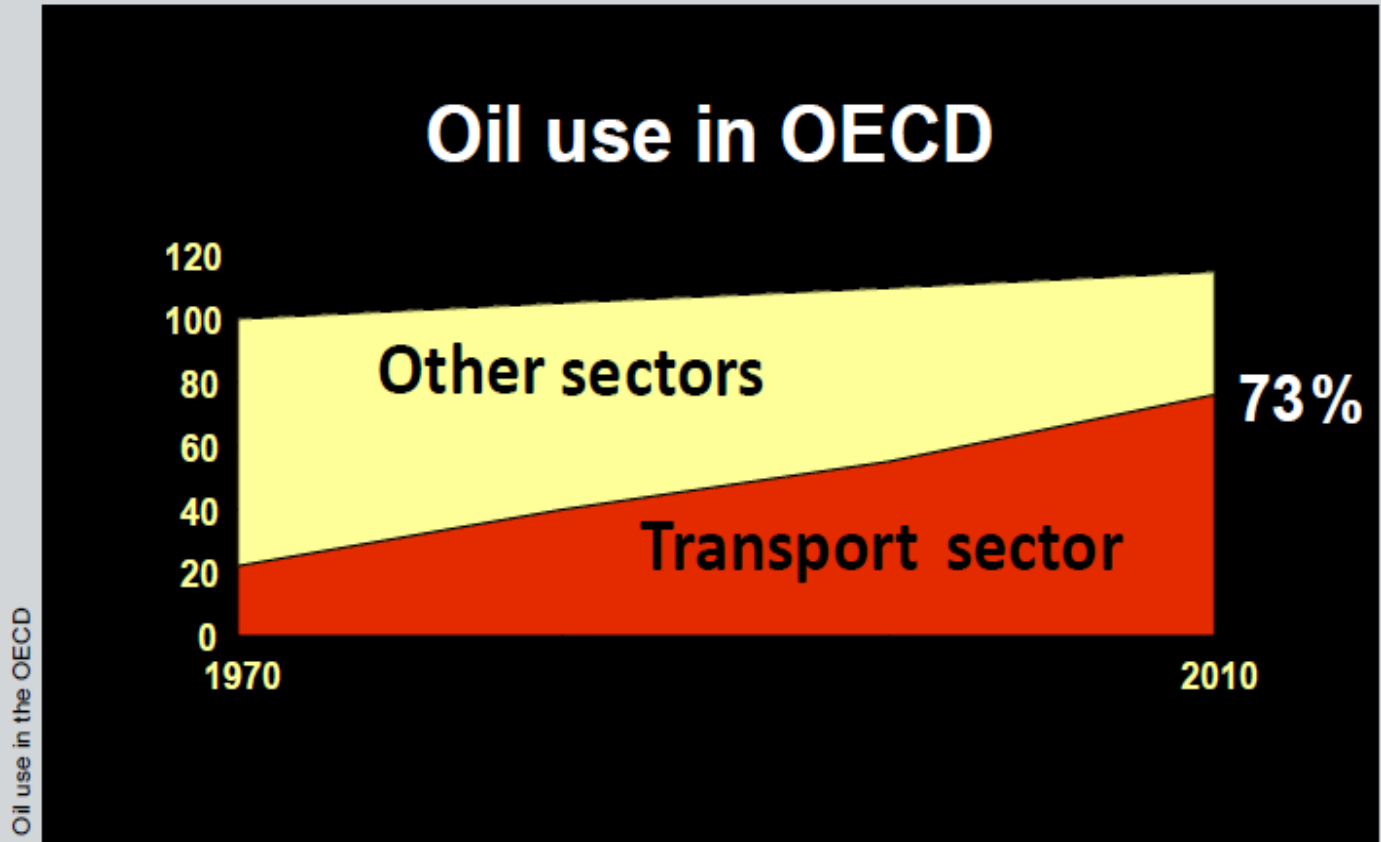
# Technology Blind





# Who will feel the oil pressure?

And how to replace oil and reduce CO<sub>2</sub> simultaneously?



Transport sector to 96% dependent on oil

# Biobus – October 2007



# Bio Diesel

- 7500 vehicles across UK
- Waste derived sustainable biodiesel
- Blend of UCOME and TME
- 80-85% carbon reduction RED
- High value blends (B20)





# Bio Diesel

- Purchase bio blended from Argent & Prax

- Made from waste and residues  
EN14214

- Argent manufacture 153million litres yr





# Bio Diesel

Last 12 months  
purchased 43million  
litres

We take approx 21% of  
Argent production

Fleet emissions reduced  
by 92000 tonnes



## Most biofuels are sustainable today

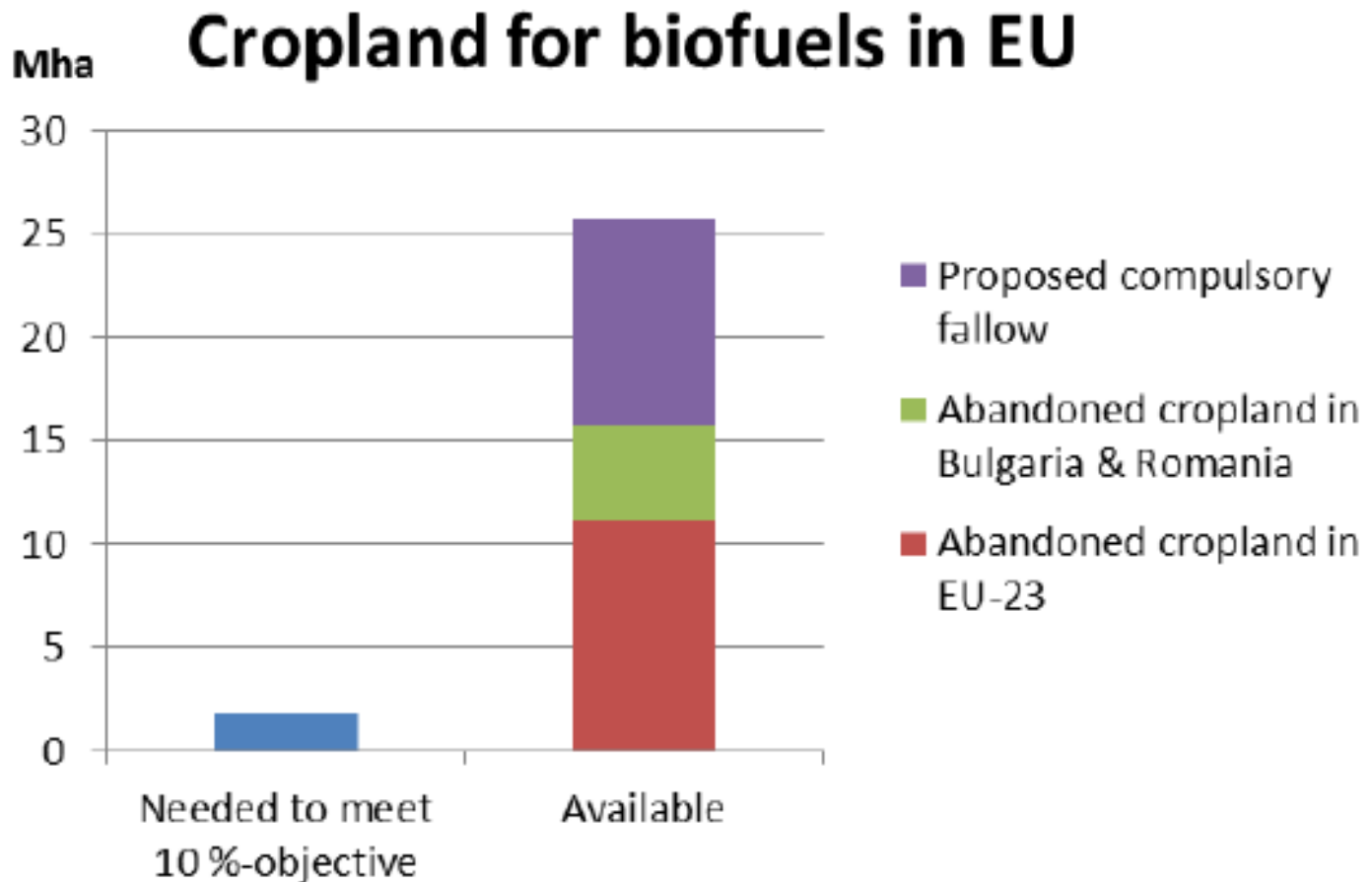
- There are both good and bad biofuels
- But today the market is strongly regulated by sustainability standards
  - EU regulation toughest
- Most biofuels are therefore sustainable today
- But oil is also becoming more and more unsustainable
  - Tar sand, deep sea, fracking...

| Biofuel production pathway        | Average GHG emission saving |
|-----------------------------------|-----------------------------|
| Sugar beet ethanol                | 52%                         |
| Wheat ethanol, NG as process fuel | 47%                         |
| Wheat ethanol, straw as fuel      | 69%                         |
| Sugar cane ethanol                | 71%                         |
| RME (Biodiesel)                   | 38%                         |
| Waste oil FAME (Biodiesel)        | 83%                         |
| Biogas from organic waste         | 73%                         |

**Sustainability verifications**

[From Annex V of the EU RED directive]

# .....is it sustainable



It has its challenges







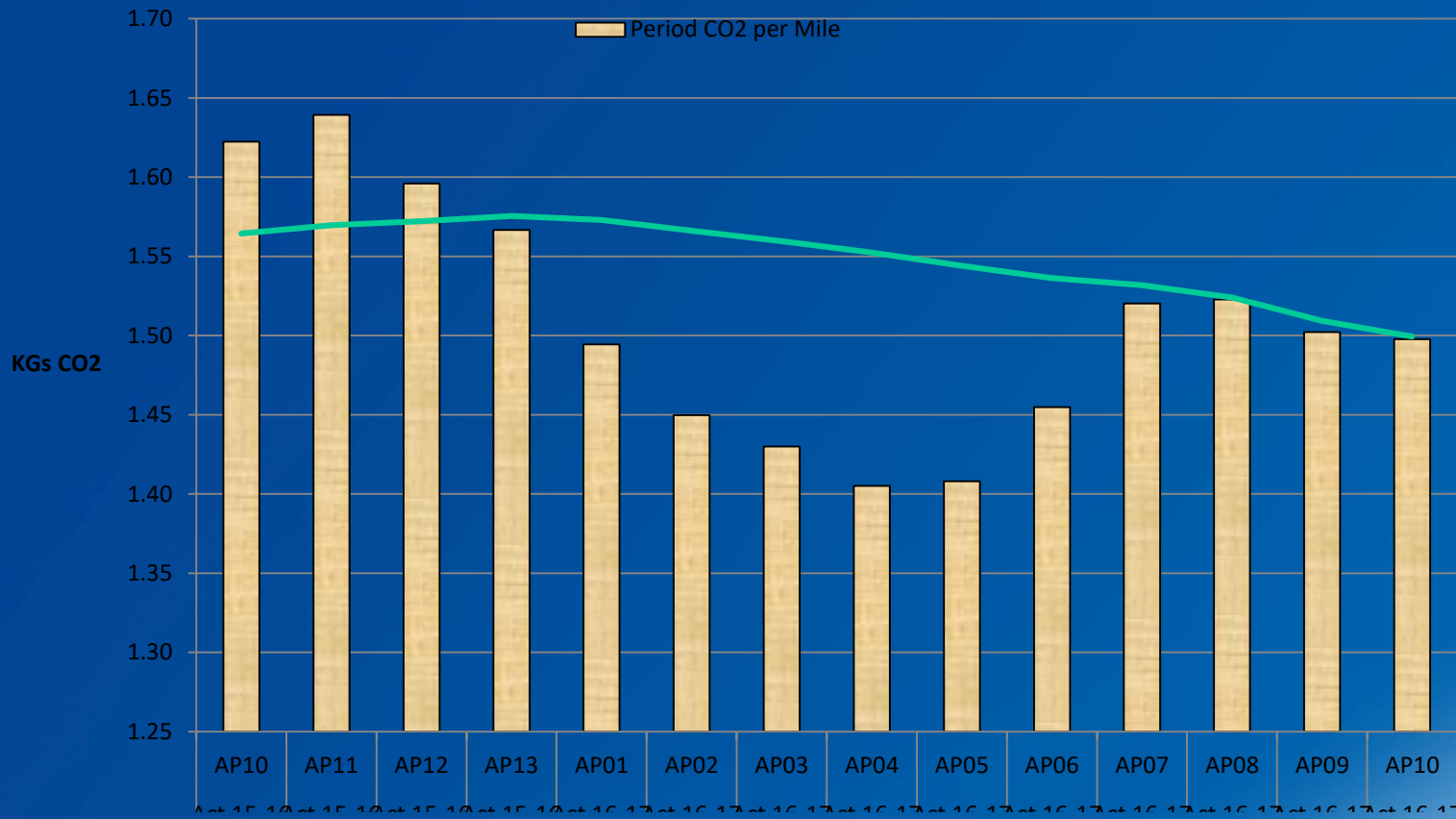
# .....you need to work at it

- Winter can be challenging
- Annual bulk tank cleaning
- Increased filtration and pump maintenance
- More stringent water separator replacement
- Engine manufacturers dont like it

# ...and if you do

- Commercial sense
- Carbon tax and CRT. EST certified
- Greater levels of sustainability
- Significant GHG reduction

# Regulated and Unregulated Emissions





# Challenges for cities

More people die from air pollution  
than from traffic accidents



# GREENHOUSE GAS EMISSIONS BY TRANSPORT MODE

## UK DOMESTIC TRANSPORT GHG EMISSIONS

Percentage of total

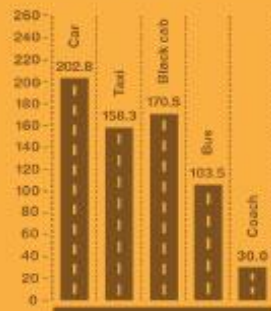


Source: National Atmospheric Emissions Inventory (IPCC categories) 2007. Other includes HGVs, vans, domestic shipping, mopeds and motor cycles.

## HOW GREEN IS YOUR JOURNEY?

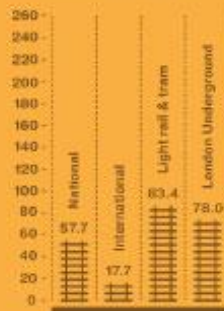
### Road

(gCO<sub>2</sub> per passenger km)



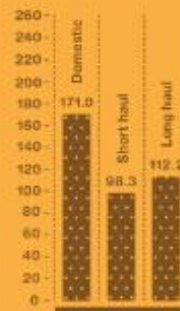
### Rail

(gCO<sub>2</sub> per passenger km)



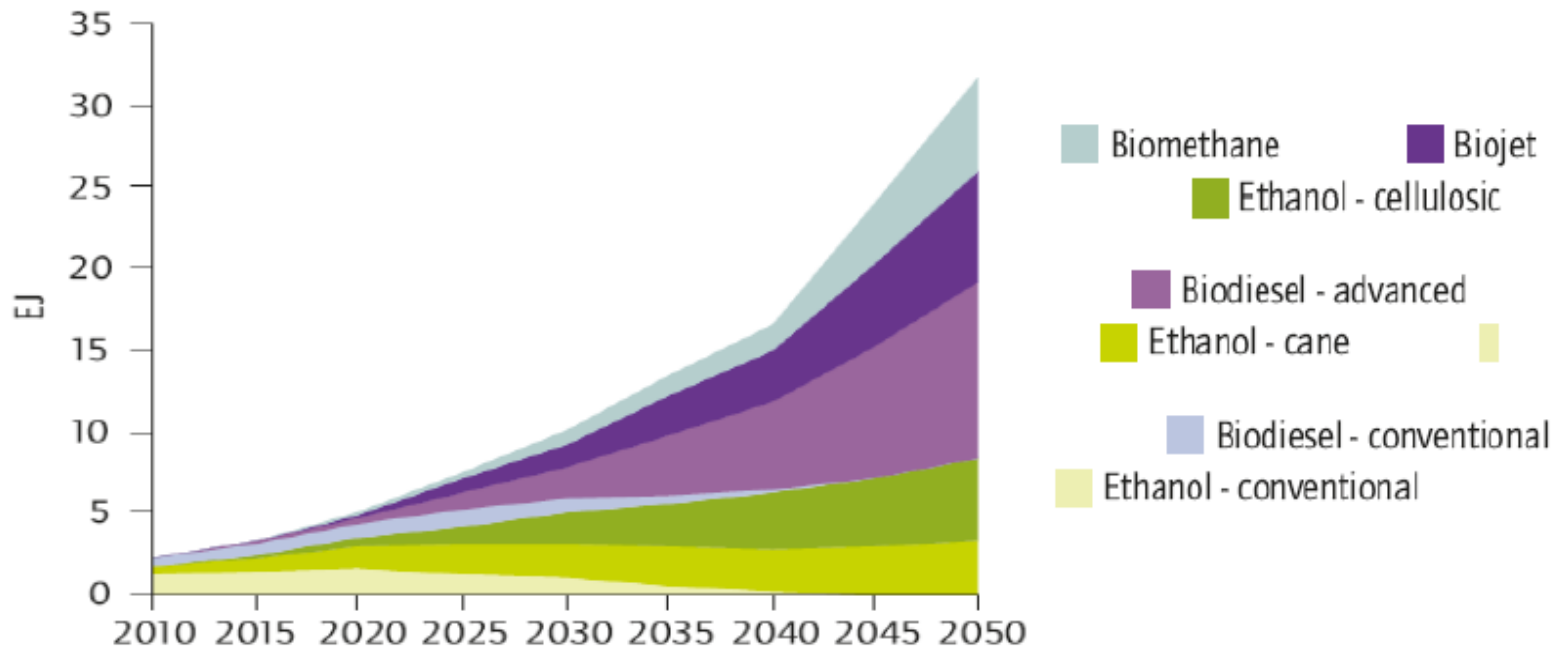
### Aviation

(gCO<sub>2</sub> per passenger km)



Source: 2009 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting: Methodology Paper for Emission Factors (October 2009).

## ...and in the future



**Global biofuel supply grows from 2.5 EJ today to 32 EJ in 2050**

- Biofuels share in total transport fuel increases from 2% today, to 27% in 2050
- Diesel/kerosene-type biofuels key to decarbonise heavy transport modes



# BEFORE CLEAN VEHICLES





# AFTER CLEAN VEHICLES



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