

REDUCING CO2 FROM THE TRANSPORT SECTOR WITHOUT INDUSTRIAL BIOFUELS

HOW EU MEMBER STATES COULD MEET THEIR TRANSPORT OBLIGATIONS UNDER THE RENEWABLE ENERGY AND FUEL QUALITY DIRECTIVES AND SAVE GREENHOUSE GASES

Discussion paper, June 2010

INTRODUCTION

The European Union's Renewable Energy Directive (RED) was agreed between the European Council (ie member states), MEPs and the European Commission in late 2008. It sets out a commitment that 10% of land transport fuels must come from renewable sources by 2020. At around the same time, a new EU Fuel Quality Directive (FQD) was introduced. This obliges transport fuel suppliers to reduce carbon emissions from fuel production by 6% by 2020.

Currently, member states are likely to meet most of their 10% targets (and the FQD) using industrial biofuels. However, increasing scientific evidence reveals that industrial biofuels are not a solution to climate change mainly because of increased carbon emissions from land use change. In addition, as more and more food crops are used for industrial biofuels, so biofuels are pushing up the price of staple food crops such as wheat and maize and thus increasing hunger.¹

Clearly other solutions are required if we are to reduce greenhouse gas (GHG) emissions from the transport sector. The quickest and simplest solution is to reduce energy consumption in transport. Reducing consumption is also a requirement of the RED: "*The Community and the member states should strive to reduce total energy consumption in transport*". As part of this solution, alternative and more sustainable transport modes must be prioritised such as public transport, electric vehicles (always assuming that the electricity source is renewable), cycling as well as 'ecodriving'.

The aim of this briefing is to demonstrate how member states could meet their RED and FQD transport obligations – increase renewable energy, reduce GHG emissions and decrease transport fuel consumption – without the use of industrial biofuels. The briefing focuses on the potential for:

- 1) reductions in road transport fuel consumption

But also covers the potential for:

- 2) bioenergy (both biogas and liquid biofuels) from waste streams or by-products (see separate briefing²)
- 3) more sustainable forms of energy for transport such as renewable electricity

It initially focuses on the UK and then demonstrates how similar changes could reduce global transport fuel consumption.

TRANSPORT FUEL CONSUMPTION IN THE UK CAN BE REDUCED WITHOUT BIOFUELS

According to a survey commissioned by the Energy Saving Trust, the UK drives more unnecessary journeys than most other European nations, an extra three billion miles compared to the French.³ A conscious effort could be made by most of us (particularly where other transport options are available) to simply not use road vehicles as much as we do. This would require investment in alternative and more sustainable forms of transport.

Another option is to introduce measures such as greater fuel efficiency in vehicles, eco-driving and reducing speed limits. These measures would not cause major changes in peoples' transport lifestyles.

How might some of these same measures reduce GHG emissions in the UK (and the EU) ?

¹ See ActionAid, 2010. Meals per Gallon

² ActionAid, 2010. Biofuels/bioenergy from 'waste' in developed nations: prospects, opportunities and risks

³ Energy Saving Secrets, <http://www.energysavingssecrets.co.uk/PublicTransportVsPrivateTransportTheDebate.html>

1. Make cars and other vehicles more efficient

Doubling the fuel efficiency of new cars could save 95 million tonnes of carbon dioxide a year by 2020 across the EU (given the number of cars in the UK and the EU, this equates to about 12 million tonnes in the UK). This is the biggest single thing the EU could do to reduce transport emissions.⁴ The UK Government has confirmed that: "If everyone purchasing a brand new car chose the most fuel efficient vehicle within its class and price range, CO2 emissions from new cars could be reduced by 24 per cent."⁵

2. Improve train travel

A conservative shift of 1.5% from car to train travel could save 1 million tonnes of CO2 per year. Traveling by train results in half the CO2 emissions compared to traveling by car.⁶

3. Promote more cycling and walking

If measures were taken to boost the number of journeys taken on foot by 50 per cent (from 24 to 36 per cent) and by bike (from 1.5 to 15 per cent), the UK could save more than 7 million tonnes of carbon dioxide per year.⁷

4. Reduce speed limits

Optimal fuel economy for the average vehicle is approximately 60 MPH. For every 5 MPH interval over your vehicle's optimal speed limit, fuel consumption increases by 5%.⁸ Lowering UK motorway speed limits to 65 MPH and improving speed control measures could reduce UK carbon dioxide emissions by up to 5.4 million tonnes a year (and save lives.)⁹ Similar findings come from the Netherlands: CO2 emissions from road transport could be reduced by 30% if motorway speed limits in the country were set at 80 km/hour.¹⁰ Most are currently at 100-20 km/hour.

5. Leave the car at home

If UK car commuters were to leave their vehicle at home once a week – perhaps by working at home – this would save 5 million tonnes of CO2 emissions every year.¹¹

6. Increase rail freight

Increasing the share of rail freight from 11.5% to just 20% could remove 7 million lorry journeys from the road, saving some 2.5 million tonnes CO2 per year.¹²

ActionAid calculates that these six measures alone could save over 25% of transport GHG emissions (some 33 million tonnes CO2) by 2020. This would require the motor industry (and governments) to introduce vehicles that emit substantially lower emissions. However, this is probably a very conservative estimate; a report for the Association for European Transport and Contributors concluded: "*that [a] 60% CO2 reduction target in 2030 can be achieved by a combination of strong behavioral change and strong technological innovation*".¹³

Million tonnes/year CO2 saved	UK
Increasing fuel efficiency of cars	12 mtCO ₂
Car commuters/working at home 1 day/week	5 mtCO ₂
1.5% shift car → train	1 mtCO ₂
More cycling/walking	7 mtCO ₂
Reducing speed limits	5.4 mtCO ₂
Increased rail freight (11.5 to 20%)	2.5 mtCO ₂
Total from above measures	32.9 mtCO ₂

⁴ *Putting the brakes on climate change: CO2 limit values for cars*, CPC Berlin, 2007

⁵ DfT, 2008. Annual Report. [webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/about/publications/apr/ar2008/annualreport?page=28](http://www.dft.gov.uk/about/publications/apr/ar2008/annualreport?page=28)

⁶ Association of Train Operating Companies estimates, November 2008

⁷ Department for Transport: *Carbon Pathways Analysis*, July 2008 and Sustrans submission to Committee on Climate Change: *Carbon savings from active travel interventions*, July 2008

⁸ http://mpg50.com/fuel_saving_tips.php

⁹ Sustainable Development Commission: *UK climate change programme review submission*, May 2005 and International Energy Agency, *Saving Oil in a Hurry*, 2005

¹⁰ CE Delft, 2010. Why Slower is Better. http://www.ce.nl/publicatie/why_slower_is_better/948

¹¹ Energy Saving Secrets, <http://www.energysavingsecrets.co.uk/HabitsOfLifetime.html>

¹² UK Transport Select Committee, 2010: <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmtran/38/3805.htm#note50> and Friegthnet, 2009. <http://www.freightnet.com/release/4384.htm>

¹³ Hickman, R. and D Banister, 2006. Looking over the Horizon: Transport and Reduced CO2 Emissions in the UK by 2030. <http://www.etproceedings.org/paper/looking-over-the-horizon-transport-and-reduced-co2-emissions-in-the-uk-by-2030>

For comparison, the Government said in 2008 that the then UK biofuel policy (5% biofuel target by 2010) will save the UK 2.5 million tonnes of CO₂ a year.¹⁴ ActionAid disputes this figure and argues that current policy will probably increase emissions because of the impact of land use change and the (increasing) use of nitrogen fertilizer, which releases nitrous oxide from the soil. Nitrous oxide is 300 times more powerful as a GHG than carbon dioxide.

MORE SUSTAINABLE TRANSPORT BIOFUELS CAN COME FROM WASTE AND BY-PRODUCTS

Various wastes and byproducts offer potential for current use in transport fuels. Used cooking oil is already collected and reused as biodiesel. In the UK, 250 million litres could be sourced from commercial outlets¹⁵ but this would constitute considerably less than 1% of fuel demand in the UK.

The UK generates about 30 million dry tonnes of agricultural manure and food waste each year - capable of producing methane with an energy content equivalent to 6.3m tonnes of oil. This could meet 16% of transport fuel demand. Biogas-fuelled vehicles can reduce carbon emissions by between 75% and 200% compared to fossil fuels.¹⁶ Compressed biogas is becoming widely used in Sweden, Switzerland, and Germany. But there is virtually no refueling infrastructure in Britain compared to say Germany which has installed 800 gas filling stations in the last three years (up to 2008).¹⁷ See a separate briefing on wastes and by-products in transport fuels.¹⁸

BOX 1: SUSTAINABLE BIOFUELS SHOULD BE USED TO GENERATE ELECTRICITY RATHER THAN TO POWER CARS

In terms of any GHG savings, it is likely that liquid and gaseous biofuels will be more 'efficiently' utilized outside the transport sector. "The production and use of biofuels in conventional combustion engines is a highly inefficient use of resources."¹⁹ Typically the efficiency of transforming biofuel energy in movement in an internal combustion engine is 18% for petrol and 23% for diesel. By comparison, an electric motor can achieve 65% efficiency rate.

Given that electricity is a much more efficient means of transforming energy into movement than biofuels, "*the biomass that we have in **sustainable** quantity is therefore much more efficiently used for transport through a stationary combined heat and power (CHP) plant which powers a fleet of battery-operated vehicles than by turning it into a liquid fuel for conventional internal combustion engine vehicles.*"²⁰ [our emphasis] But we need to approach this option with similar caution; if crops for heat and power are also produced unsustainably, the ensuing environmental and developmental issues will be exactly the same as for transport biofuels.

By 2020, waste and by-product streams in the UK are unlikely to make up more than 2% of all transport fuels. The RED provides a special incentive for fuels derived from these sources and counts double towards the target; in other words, if the UK uses 2% waste and by-products, this will count as 4% of the 10% target.

THE USE OF RENEWABLE ELECTRICITY IN TRANSPORT

Alternative forms of vehicle transport could also help reduce emissions. One example is electric vehicles (cars, trains etc). This technology exists but in the UK at least, the infrastructure for electric cars is simply not available. If electric vehicles are to help reduce emissions, the electricity they run on also needs to be renewable.

In the UK, there are differing views as to the extent to which electric vehicles (particularly cars) will be taken-up by 2020, let-alone the extent to which they are powered by renewable electricity. The Renewable Energy Association, citing work carried out for the UK Government in 2008, suggests that the take-up of electric vehicles will be only 0.1% of the vehicle market by 2020.²¹ On the other hand, the UK Committee on Climate

¹⁴ DfT, 2008. Op cit.

¹⁵ UK House of Commons, 2009. <http://www.publications.parliament.uk/pa/cm200809/cmhansrd/cm091027/halltext/91027h0001.htm>

¹⁶ Slavin, T, 2008. Digesting the Problem. <http://www.guardian.co.uk/environment/2008/jul/30/biofuels.waste>

¹⁷ ibid

¹⁸ ActionAid, 2010. Biofuels/bioenergy from 'waste' in developed nations: prospects, opportunities and risks

¹⁹ WBGU, 2008. Sustainable Biomass Production and Bioenergy Deployment: A Synthesis. Page 213

²⁰ EEB/T&E, 2009. How to prepare for a soft landing for biofuels in the implementation of the new RED.

²¹ REA, 2009. Position Paper on the UK's Implementation of the renewable Transport elements of the RED and FQD.

Change suggests that with the right level of government support, this could encourage 1.7 million electric cars and plug-in hybrids onto UK roads by 2020.²²

By 2020, renewable electricity in the UK is unlikely to make up more than 1% of all transport fuels. The RED provides a special incentive for fuels derived from these sources and counts 2.5 times towards the target; should it reach 1%, this equates to 2.5% of the 10% target.

However, like biofuels they are not a magic technological fix. Reducing driving and fuel use are far more immediate and efficient ways to reduce CO2 and other GHGs. In addition, while vehicles running on renewable electricity are more sustainable, issues such as battery potential and disposal, particularly for cars, need to be resolved.

In conclusion for the UK

Because the RED incentivizes both waste and byproducts streams (counts double) as well as renewable electricity (counts 2.5 times), by 2020 the UK could possibly supply 6-7% (4% + 2.5%) of the 10% transport target. If these amounts can be increased, then the UK will get close to its 10% obligation. More importantly, GHG emissions can be more effectively reduced by decreasing consumption, thereby further negating the need for industrial biofuels.

TRANSPORT FUEL REDUCTION AT A GLOBAL LEVEL

The same measures could be applied by other rich countries. The International Energy Agency (IEA) has identified potential fuel savings from a number of measures. These are outlined below in Table 1.

These measures could provide potential savings of greater than 3.5 million barrels/day. In addition, if all cars in the 28 IEA countries (which are all rich countries) were to double their car fuel efficiency from say 150g CO2/km to 80g CO2/km, this potentially could save another 2-4 million barrels/day. In total this is some 12-17% of global transport fuel demand (45 million barrels a day). These savings should fall – rightly – in rich nations who consume the bulk of transport fuel.

Table 1: Oil saving measures and cost-effectiveness²³

Potential oil savings in IEA countries	Measure	Cost of implementation based on per barrel saved
>1 million barrels/day	Large car pooling programme	Very low
>500,000 barrels/day	Speed limits to 55 mph	Low
>500,000 barrels/day	Telecommuting	Very low – High
>500,000 barrels/day	Compressed work week	Very low
>500,000 barrels/day	Leaving car at home (1 in 10 days)	Low
>500,000 barrels/day	Ecodriving (or more efficient driving)	Very low
>100,000 barrels/day	50% public transport fare reduction	High
>100,000 barrels/day	Public transport service increase	High
< 100,000 barrels/day	Bus priority	Moderate

IN CONCLUSION

Industrial biofuels are likely to exacerbate both hunger and climate change and thus should not be part of the renewable energy mix for transport fuels. That said, biofuels from waste streams and by-products and renewable electricity offer potential but are unlikely to make a substantial contribution to UK transport fuels by 2020. The quickest and simplest option to reduce GHG emissions from the transport sector is to consume less fuel.

²² Committee on Climate Change, 2009. 1st Progress Report. <http://www.theccc.org.uk/reports/progress-reports/1st-progress-report>

²³ OECD/IEA, 2005. Saving oil in Hurry. <http://www.iea.org/textbase/nppdf/free/2005/SavingOil.pdf>