



Shell Climate Change



Emissions Trading and Road Transport

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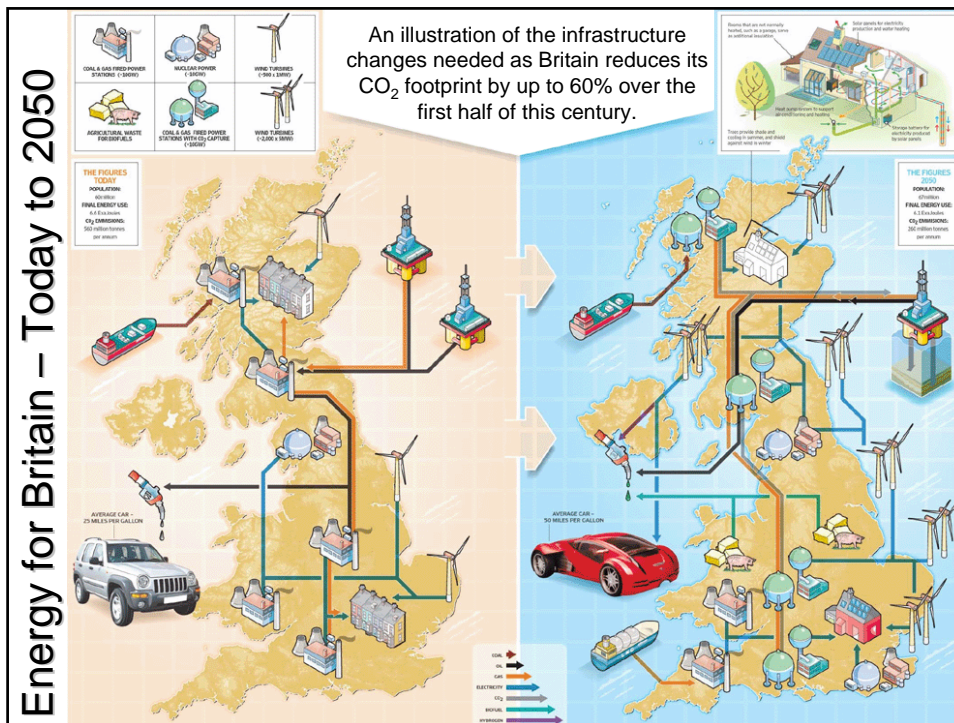


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Some key points to consider

1. The role of transport in meeting the Government 2020 and 2050 targets.
2. The time it takes to change the transport sector.
3. The price signal needed to get a response in the transport sector.
4. The way emissions trading works.






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UK Milestones – what to achieve by 2025

By 2025 we must be well on the way, with technologies proven and energy policy aligned with the objective. For example, we need to have:

- **Carbon capture and storage (CCS)** fully established in power generation, ~ 5 large coal and ~ 5 large gas fired facilities in operation.
- **Energy efficiency** improvement ~2% p.a. (MJ/£ of GDP)
- **Nuclear** programme restarted, older stations replaced, net one new station in operation
- Strong increase in **wind/wave/tidal**, ~ 20 "London Array" (~ 1 GW) projects built and operating
- Starting to shift to **electricity** as final energy, especially in homes and commercial.
- "10 mpg" improvement in on-the-road **vehicle efficiency** vs. 2003.
- **Advanced bio-fuels** (nearly net-zero CO₂ emissions) at one-fifth of the fuel market.
- **Electricity** starting to become a vehicle fuel (e.g. via hydrogen and plug-in hybrids)



A new infrastructure by 2050

By 2050 our energy infrastructure will be very different from today. For example, we need to have:

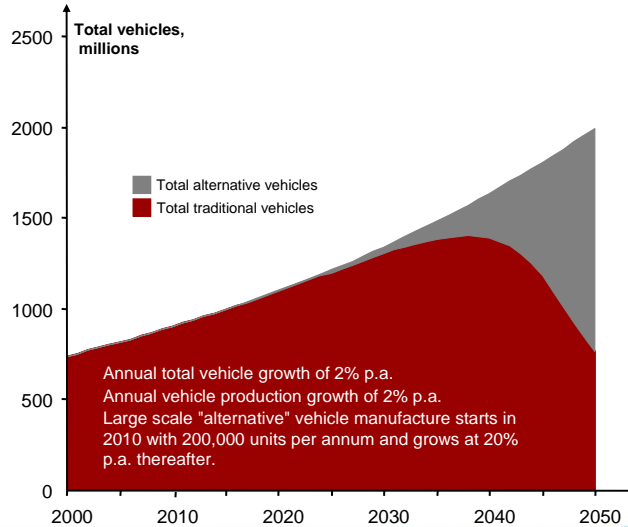
- Most coal fired power generation using CCS, nearly two-thirds of gas plants.
- Energy efficiency improvements continue at 2% p.a.
- Net 6 new nuclear plants built
- ~ 60 "London Array" projects now up and running in wind/wave/tidal.
- Electricity is the dominant final energy in commerce and homes - gas still important for industry.
- Vehicle fuel mix now split between fossil / bio / hydrogen / electricity.
- Vehicle efficiency twice that of 2003



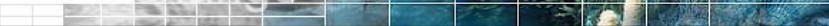
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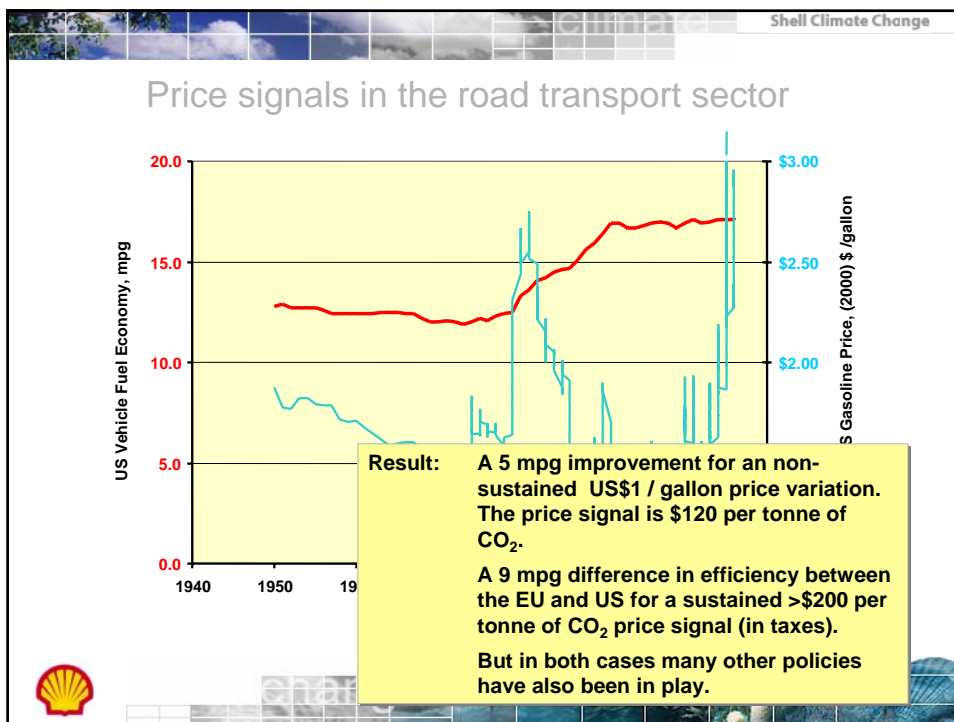
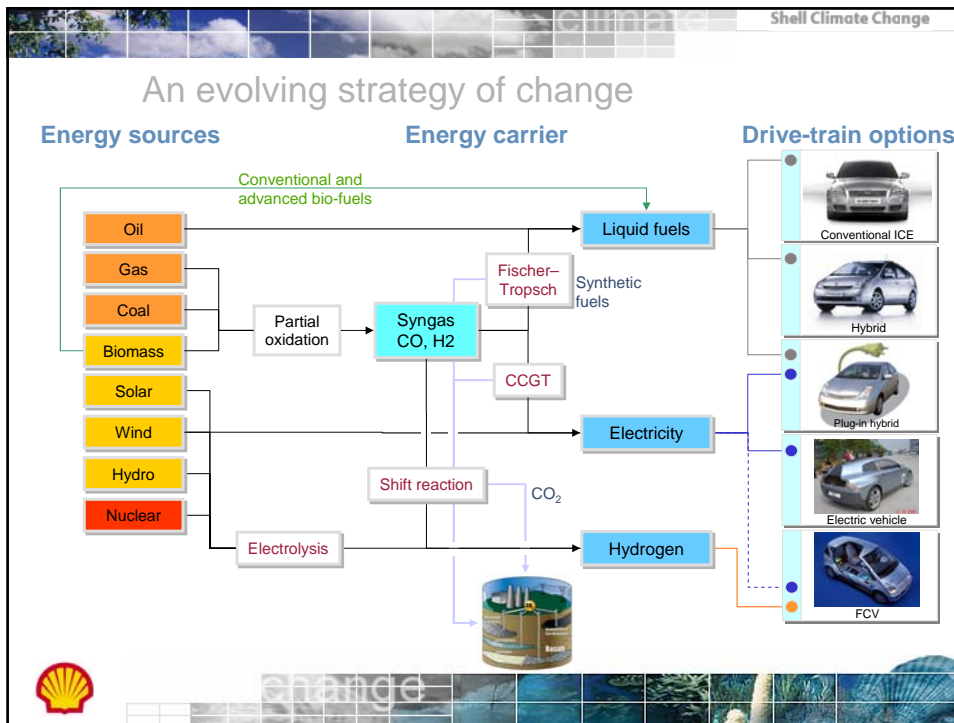


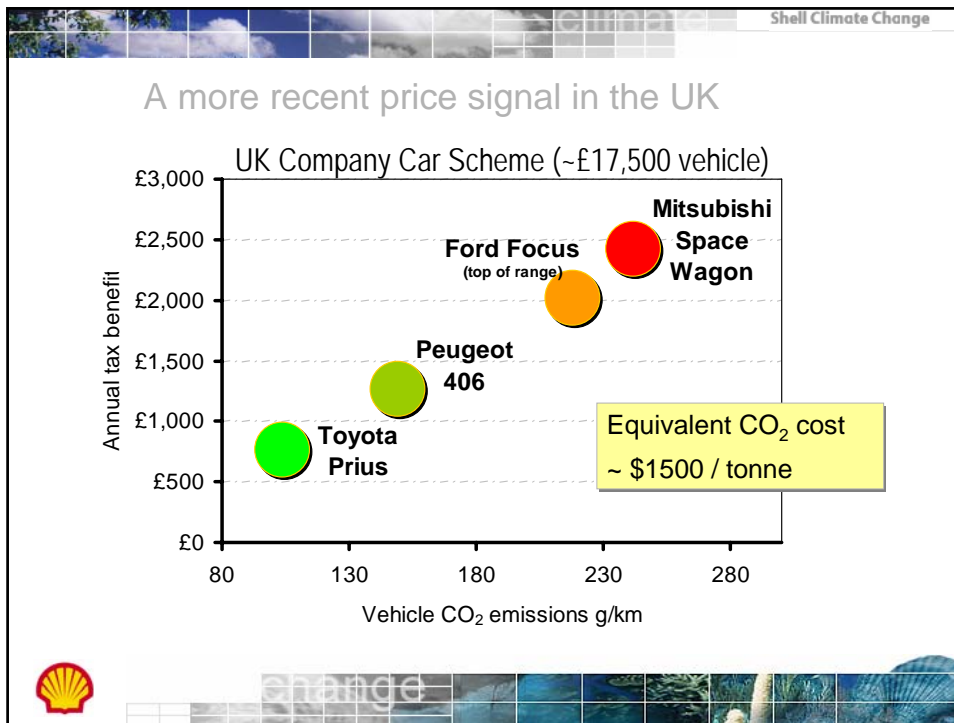
Changes in road transport will take time



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Cost of Carbon in Different Sectors

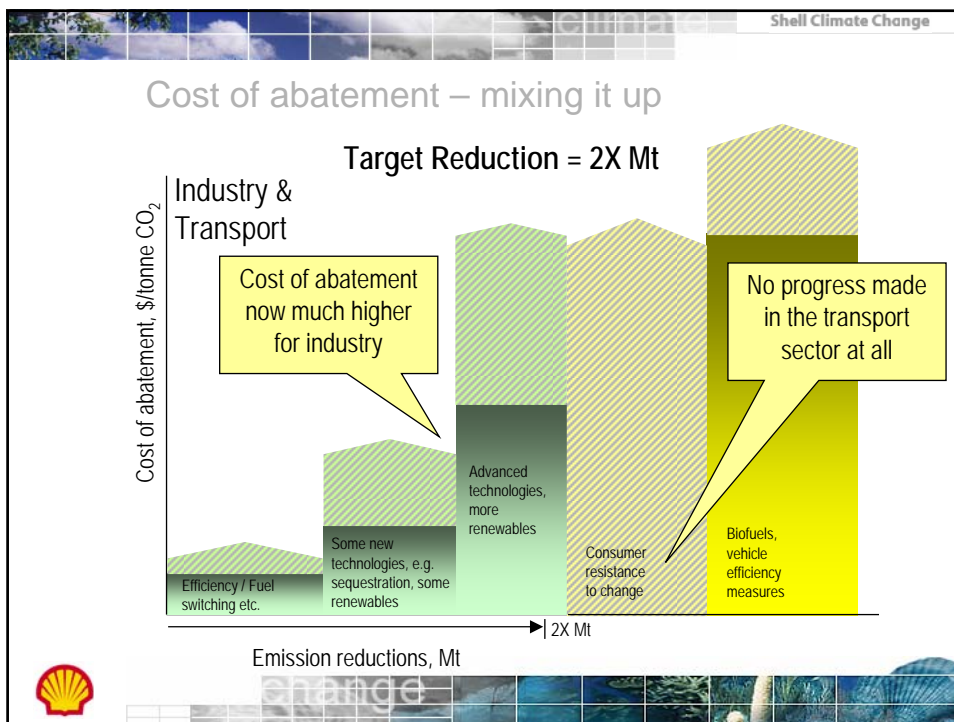
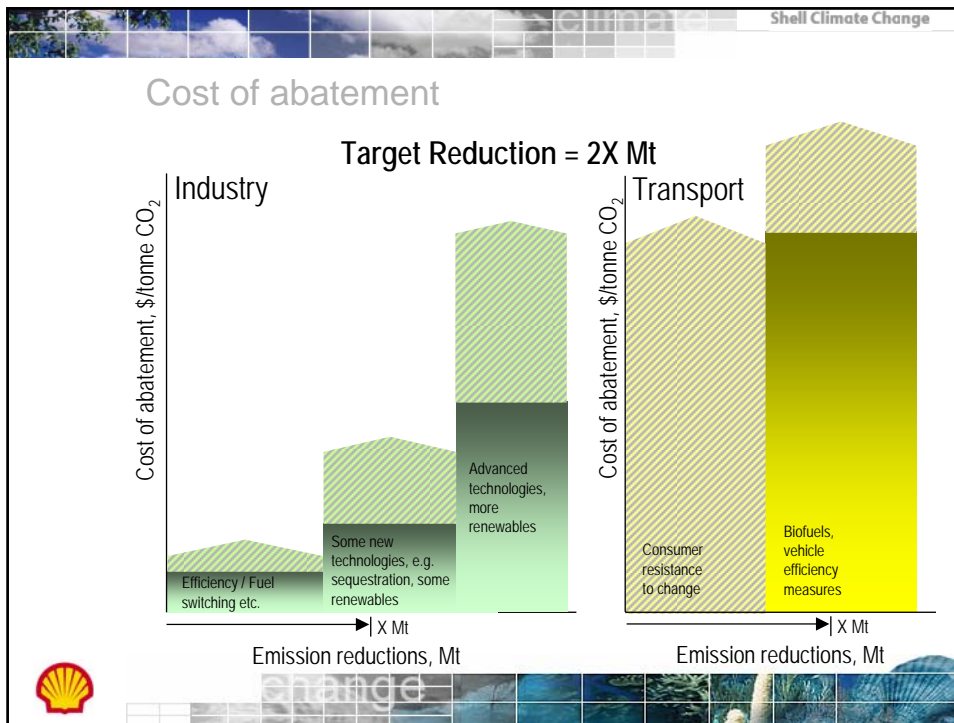
Large Industrial Emitters

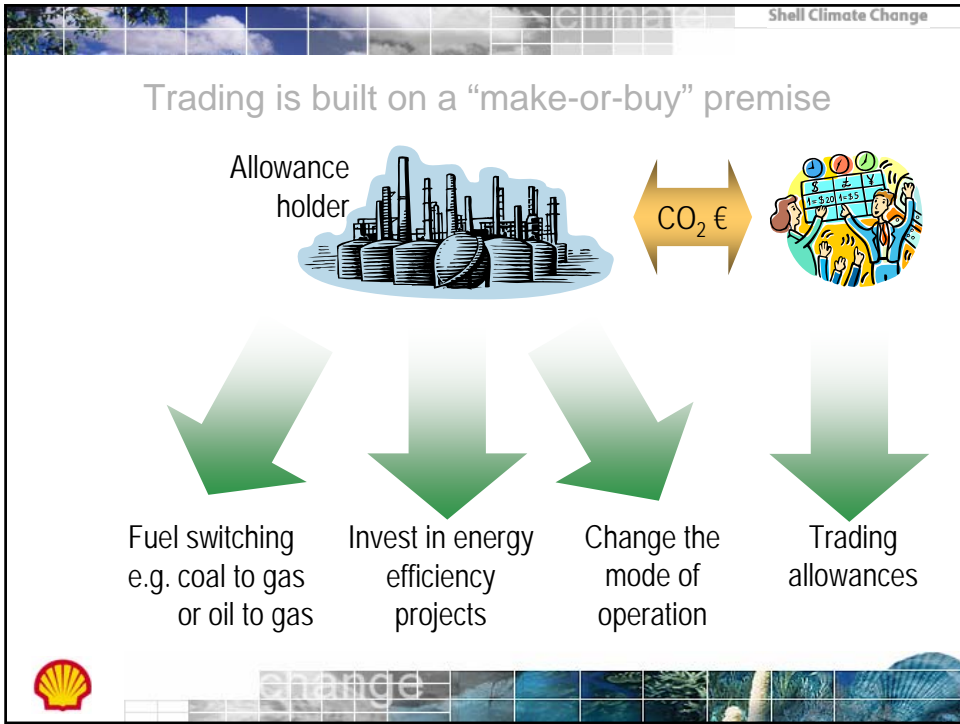
- ~ \$30 - \$80 per tonne of CO₂
 - Energy efficiency programmes
 - Fuel switching (e.g. coal to gas in power stations)
 - Carbon sequestration (future, but in this price range)

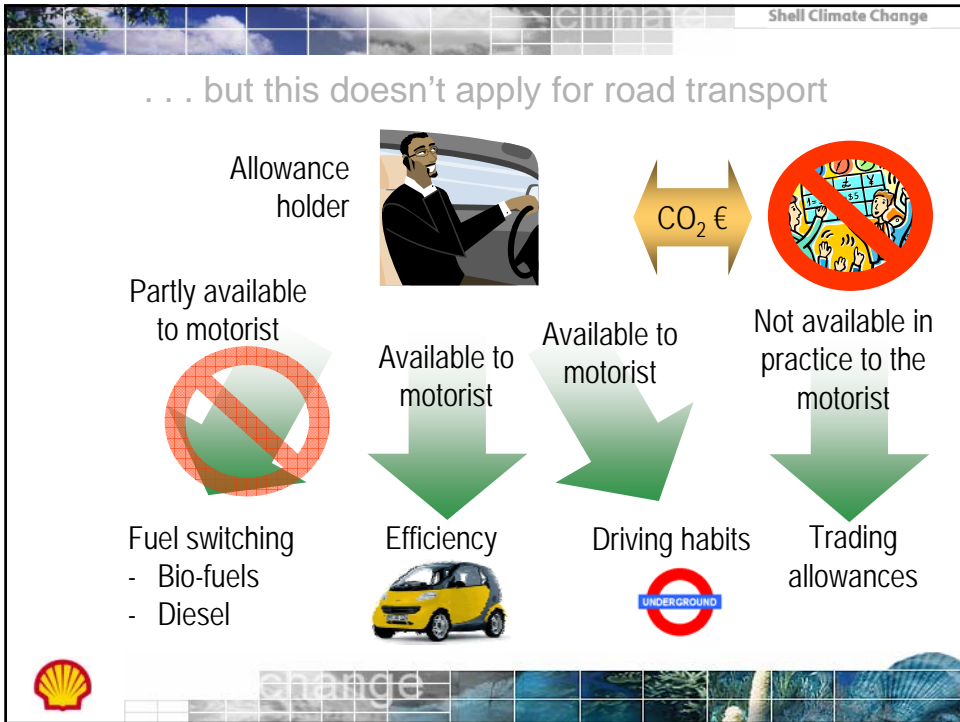
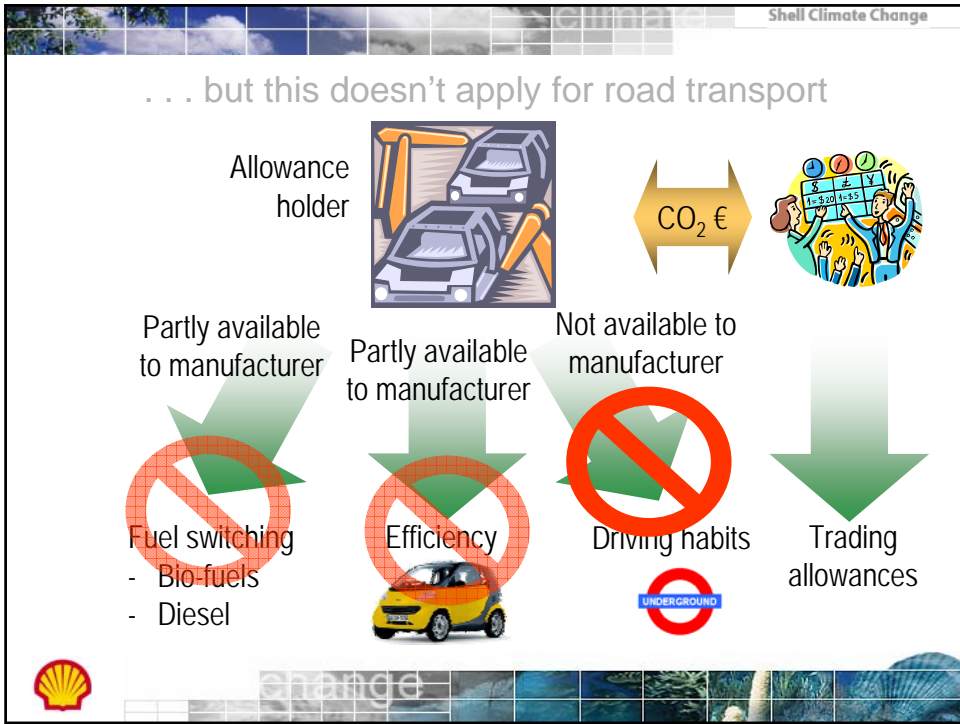
Transport Sector

- ~ \$120-\$200+ per tonne of CO₂
 - 5-10 mpg vehicle efficiency improvements over 15-20 years, but other policies in place as well.
- ~ \$200-\$400++ per tonne of CO₂
 - Further hybrids, fuel switching (bio-fuels)
 - Change in consumer behaviour

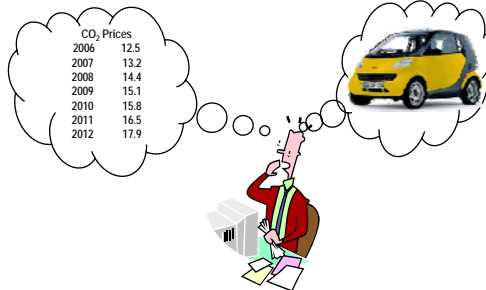
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Breaking the “make or buy” link



The individual decisions to make reductions and / or buy / sell allowances sets the market price and provides the liquidity.

In a transport scheme, who will make this decision?

Not the motorist, as he will probably not be holding the allowances.

Not the supplier either, as he has only limited means to implement reductions. The motorist is best placed to implement reductions by changing driving habits, using public transport or changing vehicles.



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Need to break down the problem

$$\text{CO}_2 \text{ emissions} = \frac{\text{CO}_2}{\text{Energy}} * \frac{\text{Energy}}{\text{Distance}} * \text{Distance}$$

$\frac{\text{CO}_2}{\text{Energy}}$ Encouraging fuel diversification
e.g. California fuel standard

$\frac{\text{Energy}}{\text{Distance}}$ Vehicle efficiency standards
Consumer choice in vehicles

Distance Consumer behaviour



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Observations on the transport sector

- Transport greenhouse gas emissions remain a problematic area to tackle.
- Lead times for new fuels and vehicle technologies are considerable, as is the time to see significant change in the global vehicle fleet.
- Single system (e.g. ETS) approaches which tackle road transport emissions together with industrial emissions are probably not viable.
 - ✓ A greater burden could be placed on industrial facilities.
 - ✓ Little progress may be made in the transport sector – resulting in a lost opportunity.
 - ✓ Not clear on how it should be structured (i.e. point of regulation) .
- Road transport requires an integrated approach, encouraging both vehicle and fuel development and seeking a change in attitude (and behaviour) from the consumer.
- Therefore, addressing road transport CO₂ emissions means;
 - ✓ Expanding access to bio-fuels and introducing advanced bio-fuels (ligno-cellulose ethanol).
 - ✓ Aggressive vehicle efficiency standards.
 - ✓ A call on certain fuels to promote vehicle efficiency (e.g. diesel)
 - ✓ Changing consumer behaviour – both type and use of vehicles.
 - ✓ The ongoing development of long-term options (e.g. plug-in hybrids, hydrogen).



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