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14 April 2006

Energy Review Team
Department of Trade and Industry
1 Victoria Street
London
SW1H 0ET

Dear Sirs,

**UKPIA'S RESPONSE TO HMG'S CONSULTATION ON
2006 ENERGY REVIEW**

The UK Petroleum Industry Association (UKPIA) represents the oil refining and marketing activities of the main oil companies in the UK. Our member companies supply most of the transport fuels and other oil related products used in the UK. As such we have a major interest in the UK's Energy Review and welcome HMG's consultation on this important issue.

SUMMARY

UKPIA believes that the Energy Review should:-

- Ensure that all aspects of HMG's energy policy and its implementation, including all matters affecting oil products are focussed through one government department. This will ensure the consistent and cohesive legislation required to deliver secure, clean affordable energy for the short, medium and long term.
- Recognise the on-going importance of oil derived fuels and other products to the UK's future supply of energy to 2030 and beyond.
- Recognise that a healthy, robust domestic oil refining industry, capable of processing a diverse range of crude oil, will make an important contribution to the UK's security of supply.
- Establish a bilateral, high level Task Force to examine the role of UK refining, the challenges facing it and how oil's contribution to the Government's target of secure, clean and affordable energy can be delivered in the short, medium and long term.
- Set clear, long-term targets so market can deliver. Targets should be achievable and evidence based
- Emphasis the need for a stable regulatory & fiscal regime

- Trust the market to deliver – don't "pick winners"
- Recognise the need for UK industry, including the oil industry, to compete globally and so avoid "gold plating" EU Directives/ UK regulations
- Recognise consumers strong desire for mobility and enhanced comfort in their homes
- Carry out cross-sector analysis of greenhouse gas reduction options to identify the most cost-effective way of reducing greenhouse gas emissions, check finding with the relevant industry and then implement the most cost-effective options first.
- Develop a strategy to ensure that consumers and the public/commercial sectors play their part in delivering a clean, low carbon economy. Industry cannot deliver a 60% reduction in carbon emissions by 2050 on its own.
- Establish the best use of the UK's renewable and biomass resources – electricity generation and/or transport fuels.

Our responses to the specific questions in the Energy review are given in Annex 2. Annex 1 gives some of the key principles UKPIA believes should be used in developing the UK's Energy Policy.

UKPIA'S RESPONSE TO THE ENERGY REVIEW – OIL SPECIFIC POINTS

UKPIA welcomes the Government's Energy Review and agrees that recent increases to energy prices and future changes to sources of oil and gas make it timely.

UKPIA believes that the Government's objective should be the pursuit of a secure, diverse, sustainable and competitively priced means of meeting our energy needs. Energy policy should be based on all three pillars of sustainability (economic, environmental and social) and not dominated by one of them. We believe that this is consistent with the Government's four policy goals outlined in the Prime Minister's forward to the Energy Review as "reducing carbon emissions, maintaining reliable energy supplies, promoting competitive markets, and making energy affordable for the poorest" and HMG's "wider commitment to sustainable development."

UK welcomes the Energy Review's recognition that oil has a vital role in providing a range of transport fuels and that as people become more prosperous they tend to travel more. We would like to emphasise that, in addition to transport fuels, crude oil also provides a range of other products such as feedstocks for petrochemicals, paints, solvents, bitumen for roads, lubricating oils and greases, coke for electrodes for metal smelters, etc as well as heating oils.

UKPIA believes that the Energy Review needs to recognise that ensuring a reliable supply of **oil products** to consumers, is as vital as ensuring a reliable supply of crude oil and gas to the UK. The Prime Minister's forward to the February 2003 Energy White Paper stated that "we need access to a wide range of energy sources and technologies and a robust infrastructure to bring the energy to where we want to use it". We agree with this view and believe that a robust UK refining industry is critical to energy supply security and welcome this opportunity to recommend ways of ensuring that UK refining plays its part in delivering

secure, clean affordable energy to the UK, whilst Government provides a level playing field for our industry.

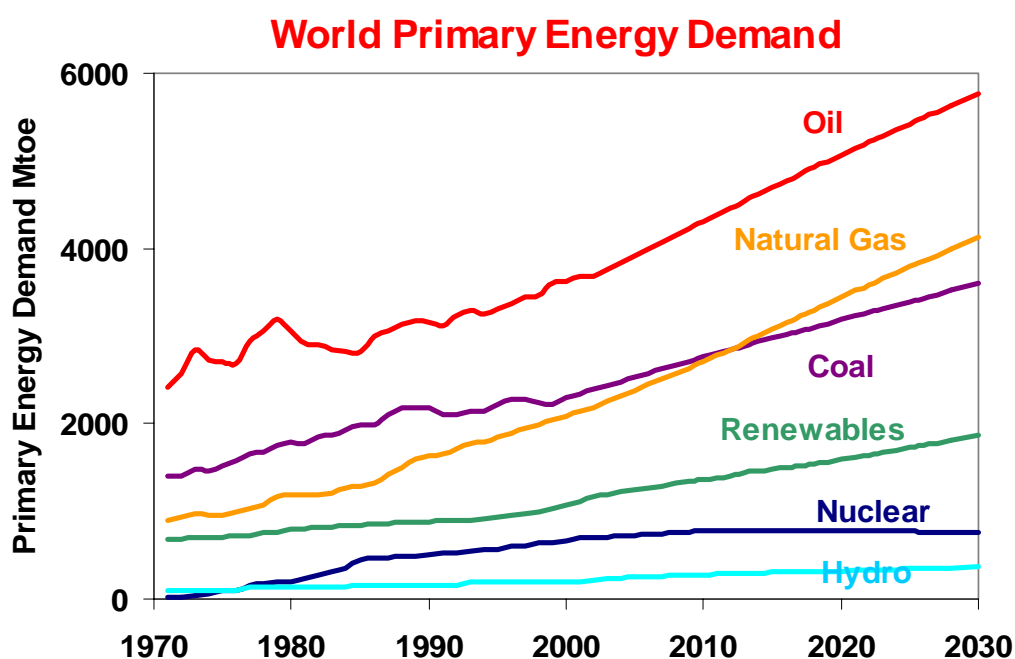
OIL REFINING

In addition as the questions in the energy review are focussed mainly on power generation UKPIA would like to offer the following comments on oil and its future role in UK energy supply.

1. OIL IS NOT RUNNING OUT

➤ Demand for oil will remain strong through 2030 both globally and in the UK

The International Energy Agency (IEA) forecasts that oil will continue to play a major part in meeting energy needs of the world and Europe to 2030 and beyond. The IEA's forecasts also show oil as being the major source of primary energy in the world.



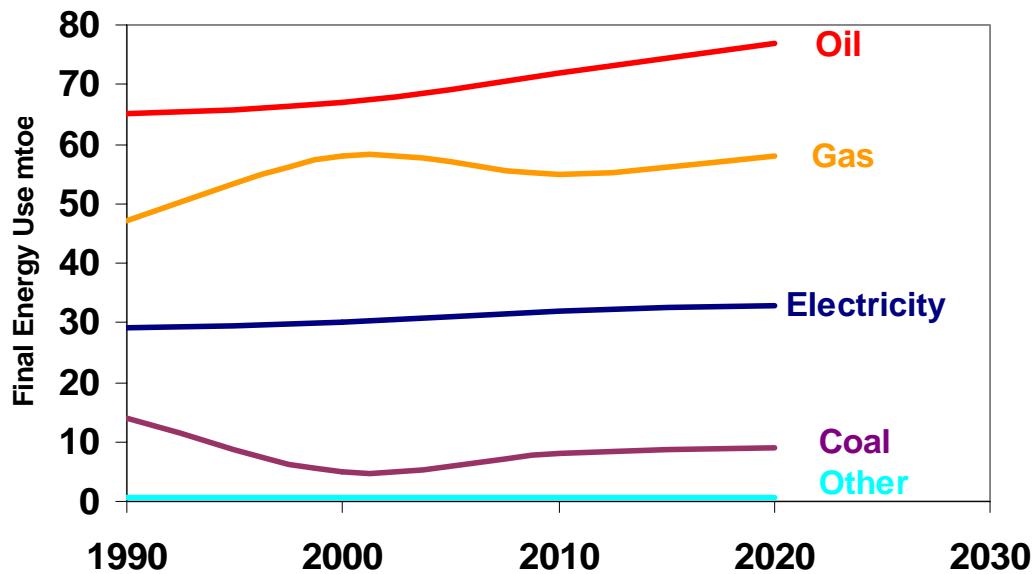
Fossil fuels will continue to dominate the global energy mix, while oil remains the leading fuel

Source IEA World Energy Outlook 2004

For OECD Europe the IEA and DGTREN both predict a 15% rise in oil demand by 2030, with oil forecast to be the largest single source of primary energy. The UK Government (DTI February 2006) forecasts a 13% rise in oil demand over the period 2000 to 2020. This is in line with the IEA forecast. However the oil industry forecasts that demand for oil in Europe will be virtually constant up to 2030. Although other fuels such as renewables will have a role to play, their role will be small in comparison to that of oil for the foreseeable future.

In terms of final energy use DTI forecasts that oil will remain the major energy source to 2020, the limit of their forecast.

UK - oil remains major energy source



Source: UK DTI UEP Feb 2006

➤ By 2030 \$3 trillion investment needed to find, produce, ship and refine the oil.

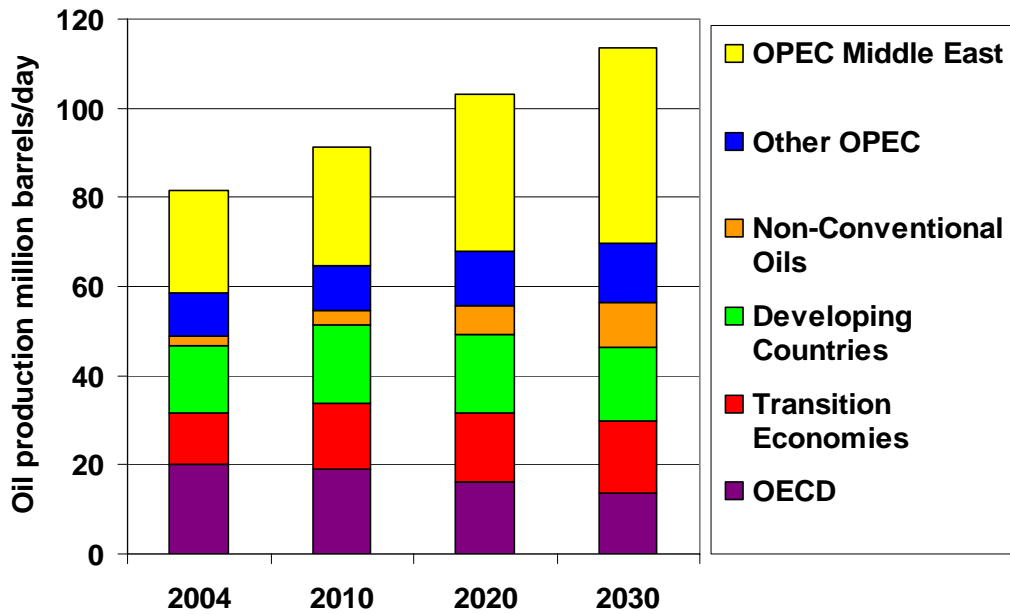
The IEA estimates that meeting its forecast will require around \$3 trillion of global investment in finding, producing, transporting and refining the oil required by 2030. This includes nearly \$500 billion of investment in refining but excludes investment in tighter fuel specifications, which has absorbed most the refinery investment in Europe over the last decade. Despite current high earnings for integrated oil companies, there will be strong global competition as to where these earnings are re-invested. Government needs to recognise that just because the UK has a refining industry, it does not automatically mean that future investment will be made in these UK refineries. Government must ensure that the UK has policies that make the UK a competitive place to invest in.

2. SECURITY OF SUPPLY

The International Energy Agency forecasts that by 2030, there will be fewer oil producing nations than today, and OPEC countries will supply half of the world's oil needs. Consequently inter-regional trade in oil will double to 65 million barrels a day by 2030. Most of that additional trade will have to pass through vital chokepoints, sharply increasing the possibilities of a supply disruption.

The IEA's forecast of where the world oil will come from in the period up to 2030 is given below. This shows that demand for oil from Middle East will grow over time.

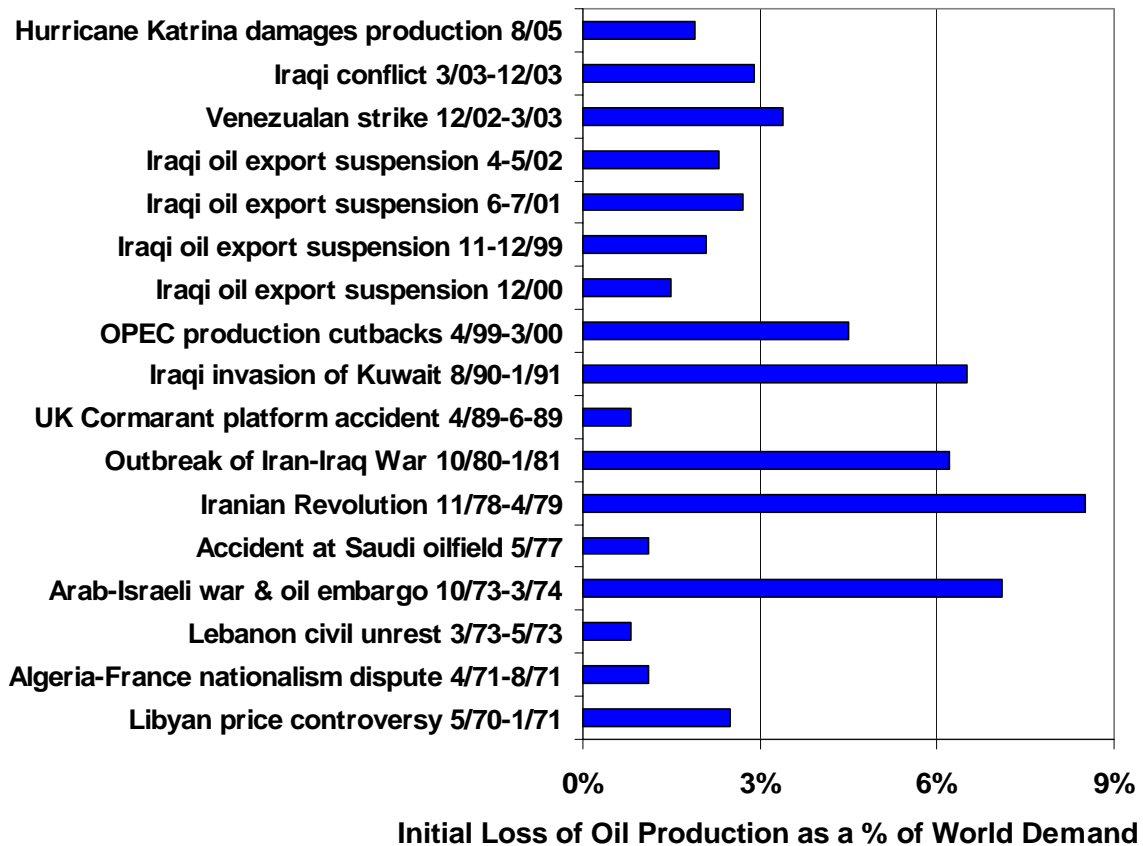
IEA - Demand for OPEC oil grows to 2030



Source: IEA WEO 2005

Crude oil supplies have been disrupted by a number of events over the years including extreme weather, accidents, wars, strikes and political action – see below. The majority of these events are linked to incidents in the Middle East.

Oil Supply disruptions since 1970



Source: IEA

So far all the events have been relatively short in duration and have resulted in the loss of a few percent of global world production. The largest incident, the Iranian Revolution, resulted in an initial loss of 8.5%, of global crude oil production and lasted six months (November 1978 to April 1979).

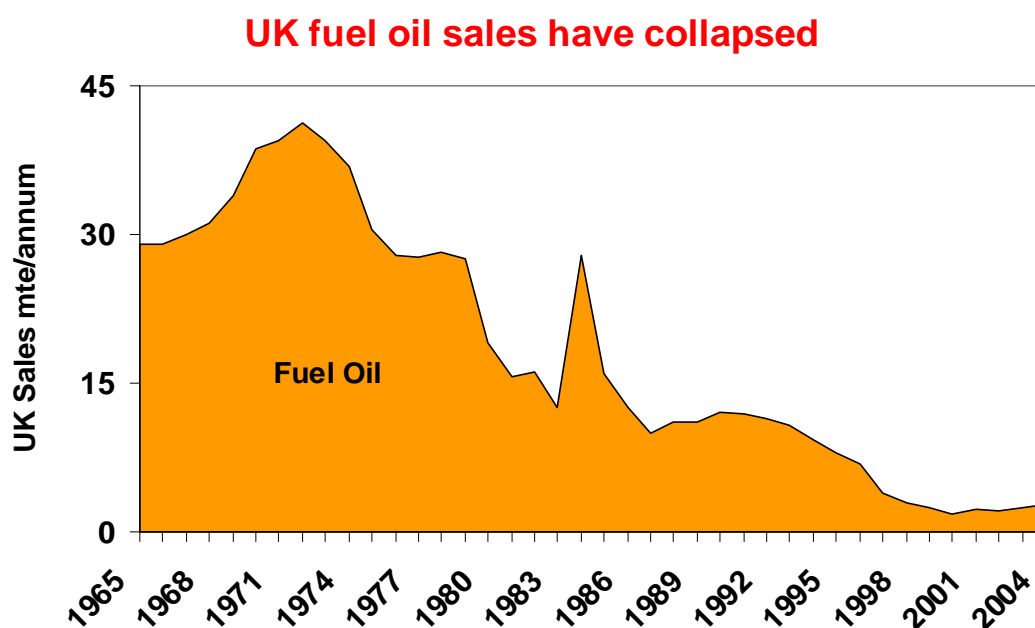
To minimise the impact of a disruption to the supply of crude oil many countries maintain strategic stocks of crude oil and products. In the case of the UK, an oil producing country, these are set at a level equal to 67.5 days consumption. If, under burden sharing, the UK had to carry its share of an 8.5% reduction in crude oil supplies then the UK's strategic stocks would have lasted 800 days or 25 months, which is considerably longer than past crude oil supply interruptions have lasted.

Local problems such as those caused by Hurricane Katrina have been eased by the release of strategic stocks of products from other counties. Potential UK shortages of natural gas in winter have also been eased by switching gas users to oil where possible. Oil, which can be easily stored, therefore delivers excellent security of supply against a wide range of scenarios.

However, UKPIA considers that the current method of funding the UK's oil reserve is totally inconsistent with recognising the importance of a robust UK refining industry. Current Government policy penalises those who invest in refineries and distribution infrastructure and UKPIA strongly recommends changing the structure of oil reserves to one run by an Agency with no differential in obligation between refineries and non-refiners. This system, already used by the majority of EU countries, will provide a level playing field between suppliers and more robustness.

3. CHALLENGES FOR UK OIL REFINING

- **UK refineries were built to produce petrol for cars and fuel oil for power generation**



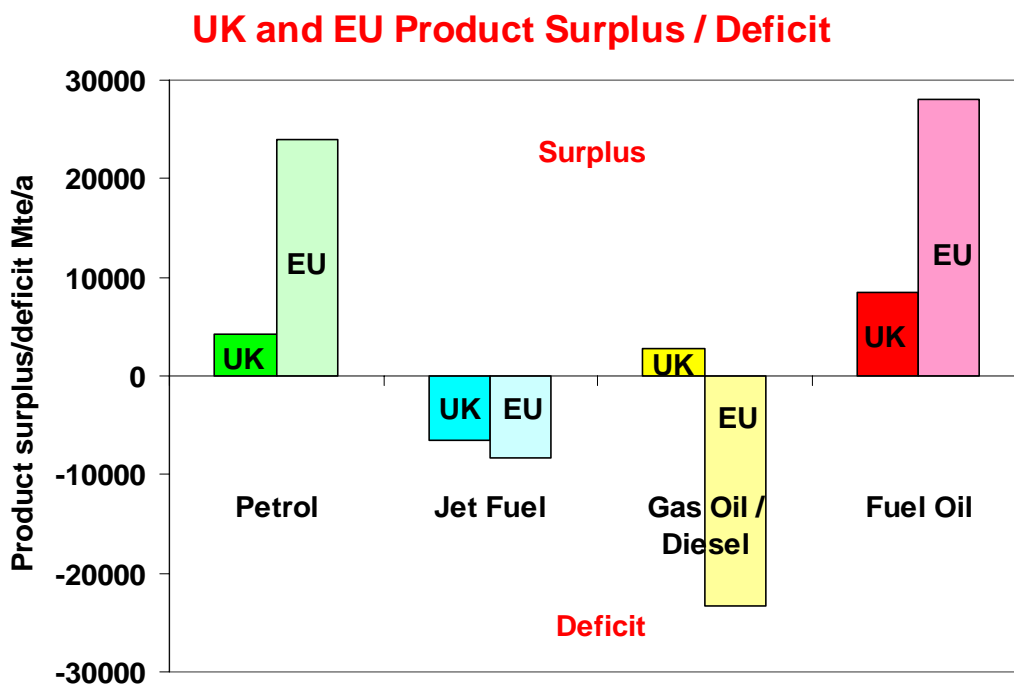
Source DTI

Since 1972 the demand for fuel oil has collapsed from around 40 million tonnes per annum to around 3 million tonnes per annum. The resultant decline in refining economics caused the industry to respond by closing over half the UK refineries and using catalytic crackers to

convert some of the fuel oil into other products in most of the remaining refineries. This made them into ‘petrol production machines’ with petrol forming over 40% of the output from some refineries. However since 1990 Government fiscal policy, which effectively favours diesel due to its better fuel economy and higher density, has caused UK demand for petrol to fall by over a fifth. During this period two more UK refineries closed and one oil major closed its operations in the UK. The use of North Sea crude oil in UK refineries has helped meet the changing market demand as it produces less fuel oil and the fuels produced have reduced sulphur contents so they are easier to desulphurise to the low levels of sulphur now required. However, North Sea production has started to decline and North Sea crude oils are becoming relatively more expensive.

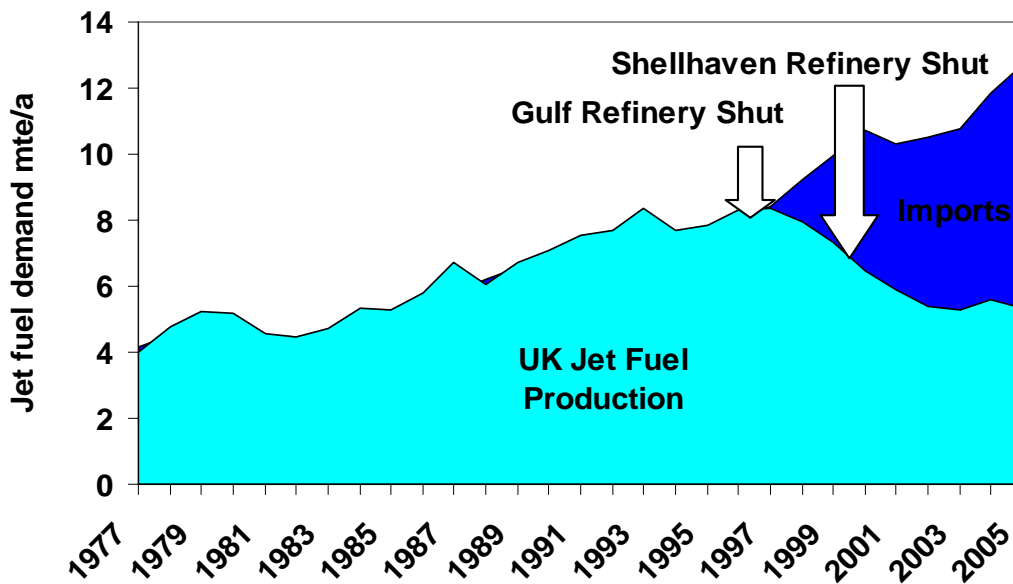
➤ **UK refining production is drifting further out of alignment with market demand**

Compared to current UK demand our domestic refineries produce a surplus of petrol and fuel oil and too little jet fuel. Domestic diesel production is roughly in balance with current UK demand but is expected to move into deficit in the near future as demand rises for both on and off-road applications.



Shortfalls in diesel and jet fuel are covered by imports from Russia and the Middle East, while surpluses of gasoline are exported to the USA. The oil industry operates in a global business and refineries in other countries have ready access to UK markets. The introduction of renewable transport fuels has the potential to directionally decrease diesel deficits (imports) but increase gasoline surpluses (exports). Adding to an already large gasoline surplus will have negative pressures on UK refining margins.

UK sales of jet fuel rising ->18 mte in 2020



Source: DTI

➤ **Product specifications will become tighter over time and require investment**

Meeting tighter product specifications requires refiners either to use more expensive low sulphur crude oil or to invest in new hydrofining units to reduce the sulphur content of products from processing less expensive but higher sulphur crude oils. The units needed are major investments and take several years to plan and build. It is therefore important that Government policy is consistent and is based on sound science with rigorous cost/benefit analyses. Recent policy uncertainty associated with the introduction of sulphur-free fuels must not be repeated.

➤ **Environmental standards for refineries are becoming more stringent**

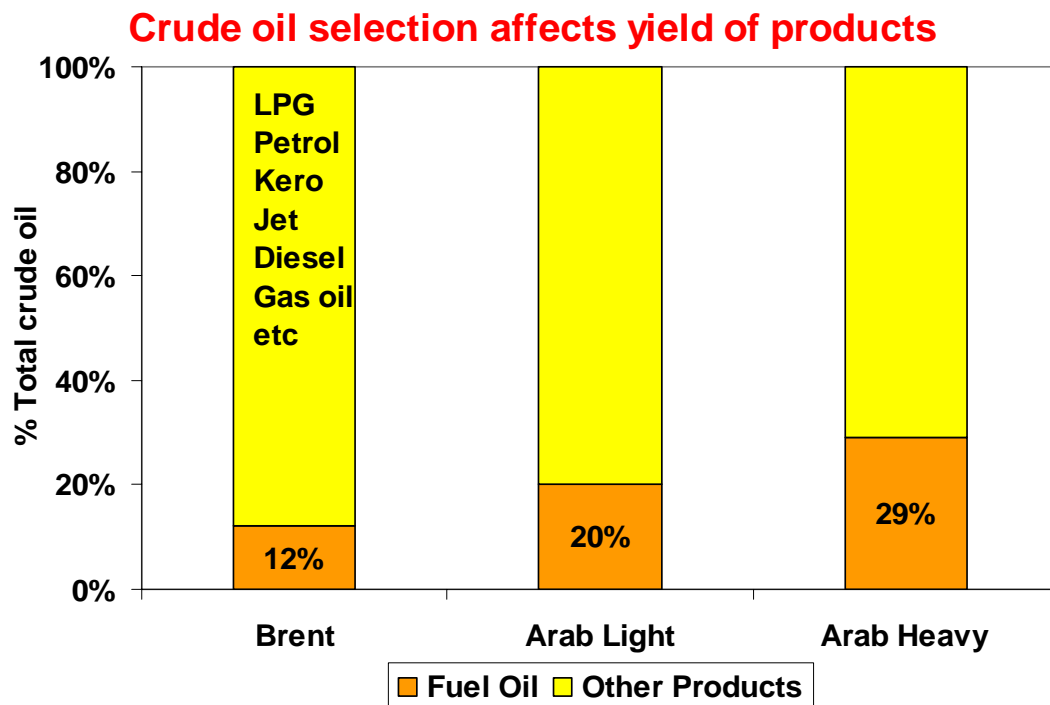
In the UK some local environmental standards are already tighter than elsewhere in Europe which forces UK refineries to use more expensive lower sulphur crude or make large investments that their competitors do not need to make. This places UK refineries at a competitive disadvantage in terms of both operating costs and attractiveness as a place to invest. As we operate in a global marketplace, a lack of a level playing field can cause the UK to be an unattractive place to invest in refineries. Examples of more restrictive and expensive UK legislation are:-

- applying both UK and EU sulphur dioxide air quality standard ie 'double banking' of UK and EU regulations without any cost benefit analysis
- replacing the European Commission's Best Available Technology Reference (BREF) Refinery Technology Note for compliance with the IPPC Directive with an Environmental Agency sector guidance note with tighter emission values - effectively gold plating the EU Directive
- unlike the rest of the EU, applying the Habitats Directive's stricter 'new plant' criteria to 'existing plant' as well as new plant without any cost/benefit analysis.

➤ **The decline in production of North Sea crude oil will impact UK refineries**

As production of low sulphur North Sea oil declines UK refineries will have to process different crude oils. Initially other low sulphur crude may be used but over time the crude oils available will become heavier and sourer (containing more sulphur) and low sulphur crude will carry an even greater premium. Hence UK refineries will have to adapt to processing more challenging crude oils with higher sulphur levels, lower yields of transport fuels and higher yields of fuel oil or even heavier, more viscous crude oils with higher metals contents.

Switching the crude oil processed in UK refineries to say, Middle East crude oil would increase the yield of unwanted fuel oil from around 12% with North Sea crude oil to 20-30% with a consequent reduction in the production of transport fuels.



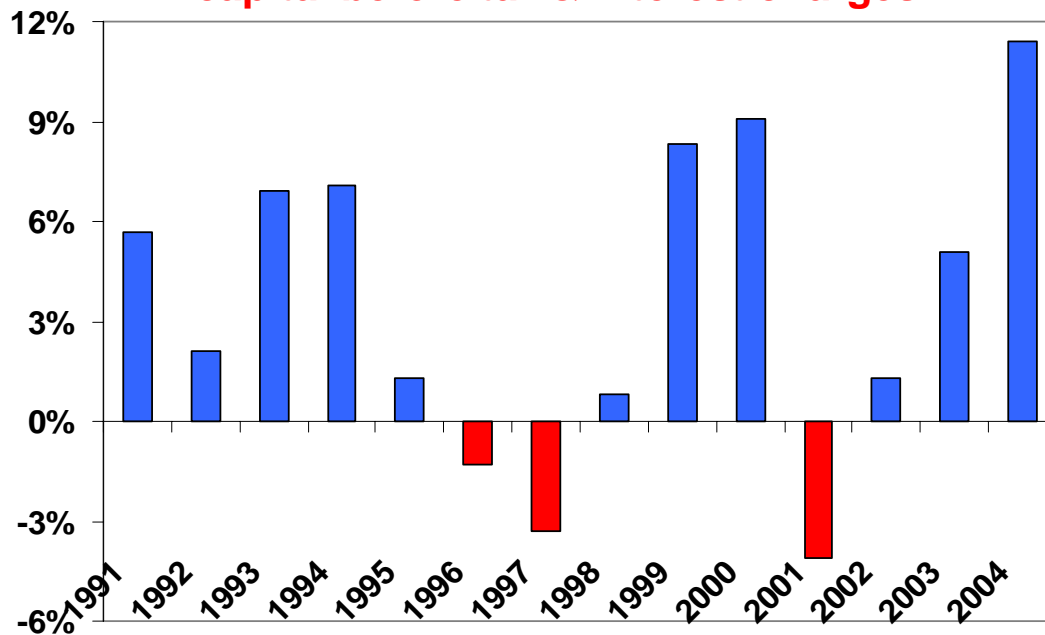
Crude oils that increase the production of fuel oil will either require more crude oil to be processed to give the same volume of transport fuels or investment in expensive processes which convert fuel oil into transport fuels, at around £500 million per refinery. Both these options will increase the use of energy and hence carbon dioxide emissions per unit of products made. In addition the products from refining more sulphurous crude oils will require more desulphurisation to meet EU specifications. Again, this will require more energy and produce more carbon dioxide emissions. HMG has to decide how extra carbon dioxide emissions will be covered under the cap imposed under the EU Emission Trading Scheme (ETS).

The alternative is to process the same amount of crude oil, export the surplus fuel oil and produce less transport fuel. This will not affect the EU ETS cap but will leave the UK more dependent on imported products and will leave the UK Refining industry with uncompetitive plant and equipment.

➤ **Refining margins have historically been poor and have not supported investment**

In refining, financial returns over the past three decades have usually been very low. Between 2000-2004 the profits in the UK's refining and marketing sector have averaged around £350 million (before tax and interest charges) ie a return on capital employed of 4.8%.

UK Refining & Marketing - return on capital before tax & interest charges



Source: UKPIA

The low return on UK refining has made it unattractive to invest in new plants that could correct the UK's product supply imbalance by producing more jet fuel and diesel. The poor returns have also made it uneconomic to invest in upgrading refineries to process different crude oils which will be necessary as North Sea production declines. New plant is a major long-term investment and takes years to plan, build and commission. This exposes companies to the risk that future margins may not cover the investment costs. There is also the risk that Government makes future changes in fiscal incentives for particular products with the result that forecast demand unexpectedly changes. In addition even where refinery investments are judged to be profitable, they have to compete with the funds required in finding and producing more oil and gas, or investing in refineries and chemical plants in other countries. This makes companies examine UK refinery investment carefully.

Companies have to invest to meet changes in legislation. It is therefore important that legislation is based on sound science and supported by thorough cost-benefit analysis. The UK Government can assist in achieving this by strongly advocating this approach in the EU. The UK Government can also have a significant influence on the costs for UK refineries resulting from implementing EU legislation. Unfortunately, the trend for the UK Government to gold plate EU legislation is causing investment funds to be diverted from other uses in refineries. This is not only resulting in a less robust refining system, but it is also opening UK

refineries to competitive attack from other EU refineries who are not encumbered with gold plated legislation.

4. BENEFITS OF UK REFINING

The UK derives a number of significant benefits from having a competitive domestic oil refining industry. These include:

- substantially enhanced security of energy supply, including rapid response in the case of a crude oil supply disruption or natural gas shortage.
- a substantial contribution to the UK economy as a whole, and to regional economies, through exports, employment, skills and technological expertise. The oil refining industry has a net trade surplus of around £1 billion per year on the import and export of oil products. This contributes to the UK balance of payments.
- the supply of petroleum feedstocks to other key industry sectors including plastics, paint, fibres, pharmaceuticals and building materials. The UK petrochemicals industry has a turnover of £50 billion, employs 214,000 people and has a trade surplus of £5 billion.
- early introduction of cleaner fuels eg ultra low sulphur petrol and diesel which improves air quality throughout the UK and allows the use of advanced vehicle technologies.

Maintaining these benefits to the UK requires a strong, domestic oil refining base. If investment is not made in UK refineries to keep up with changing consumer demand, the UK can import products in deficit and export products in surplus. However, a growing dependence on imports/exports will result in:-

- reduced security of supply as imported product may be less reliable in times of emergency or crisis
- pressure on the profitability of UK refineries which in future periods of poor refinery margins may lead to UK refinery closures
- the UK balance of payments being adversely affected as the added value of refining will be captured overseas
- cost to the consumer could rise as importing fuels will add to the costs of UK marketers

5. FUTURE GOVERNMENT POLICY

If the UK were to continue to lose some of its refining base or failed to attract the required investment to adapt its refineries to changing patterns of crude oil supply and consumer demand, the impact would be significant in terms of security of supply and consumer prices.

Currently major policy issues that impact the UK Oil Refining Industry are handled by many different Government Departments and they therefore have a high risk of not being 'joined up'. In shaping its future energy policy the Government has to decide what sort of oil refining industry the UK needs and then define its policies to deliver the desired outcome. For example, if HMG wants a strong domestic refining industry in the UK then energy and other policies must not place it at a commercial disadvantage compared to its overseas competitors.

UKPIA and its members believe strongly that a healthy, robust oil refining industry is a vital element of the nation's future **secure supply of competitively priced petroleum products** (transport fuels, chemical feedstocks, heating oils, etc) and wish to work with the Government at a high level to deliver this. A bilateral refining task force to examine the issues in depth and develop the best way forward is our preferred option. The major issues the refining task force could address are:-

- impact of the decline of North Sea oil production on UK refining
- changing demand for oil products and dependence on imports/exports, including the impact of Government legislation on individual product demand
- impact of future EU legislation on environmental controls and oil product specifications, together with how the UK Government should enact this legislation
- applying an appropriate level of regulation to oil industry operations
- developing a strategy for the introduction of alternative fuels
- maintaining a robust, secure distribution system
- maintaining the competitiveness of the UK oil refining industry
- ensuring joined up Government Policy on key issues impacting the UK refining industry
- recognising consumers strong desire for mobility

6. SUMMARY

Oil products are a vital part of modern society. The forecasts by the IEA, the European Commission and the UK Government all agree that oil will remain a major component of the energy used by the UK. The challenge is to ensure that the UK continues to have access to affordable, secure supplies of the required oil products in the coming decades as sources of crude oil and consumer demand both change. The challenge can be met by importing more products (jet fuel and diesel) to meet demand and exporting surplus products (petrol and fuel oil) or investing in local refineries. UKPIA and its member companies believe that the challenge will be best met with a strong domestic oil refining industry with close links to the European and global oil industry.

The oil industry is highly competitive, complex, capital intensive and invests for the long term. Any business decision to further develop UK refineries depends on the UK being perceived as an attractive place to invest in. The UK oil refining industry is willing to work with the UK Government to identify the best way of ensuring oil industry's contribution to the Government's target of "securing clean, affordable energy for the long term" is met.

Thank you for involving the oil industry in the consultation process. If you believe that UKPIA can be of help to you in any way please do not hesitate to contact us.

Yours sincerely

Malcolm Watson

Approach to Setting UK Energy Policy – UKPIA’s Recommended Policy Guidelines

UK Energy Policy should:-

Generally

- be based on all three pillars of sustainable development ie environmental objectives should not necessarily take preference over economic and social objectives.
- aim to meet its objectives in a sustainable manner and at the least cost to the UK.
- have environmental aims consistent with those of other EU members.
- keep all realistic options open, including nuclear, by an outward looking, open-minded approach focussed on co-operation and capable of adjustment to changing circumstances.
- maintain a level playing field between all options by avoiding the use of long term incentives, protected market shares, etc.
- create and maintain an environment where companies are willing to invest in energy infrastructure projects.

In approach

- focus primarily on what the UK needs to do in the next twenty years.
- recognise that for at least conventional hydrocarbon fuels will supply the bulk of the UK’s energy needs beyond 2030, including the transport sector.
- adopt an evolutionary not revolutionary approach to achieving objectives.
- recognise the need to work with other countries to ensure that the investment climate in all countries encourages investment in energy infrastructure and supply.
- recognise the large international market for new technology required by manufacturers.
- emphasise the key importance of improving energy efficiency in all sectors, where economic.
- reflect that new low carbon approaches such as fuel cell powered vehicles need both advances in technology and long lead times.

Regarding Consumers

- they will only voluntarily adopt new technology that gives them sustainable benefits with at least the current level of performance, comfort, etc. Hence aim to provide new technology at affordable cost to both the user and taxpayer.
- Maintain consumer choice

Response to Questions Raised in the Energy Review

Q.1. What more could the government do on the demand or supply side for energy to ensure that the UK's long-term goal of reducing carbon emissions is met?

- **Improving energy efficiency, where it is economic to do so, should be a key component of energy policy**

UKPIA believes that the technical potential for energy efficiency – the improvement to be had from using the most technically efficient technology currently commercially available – is very large. However what matters most for short/medium-term policy is the economic potential – that part of the technical potential which yields energy savings which more than pay for any extra investment cost under standard investment criteria.

It is this economic investment in energy efficiency that needs to be stimulated. UKPIA believes that, if the investment is economically viable, education and publicity are the key ways forward rather than setting arbitrary targets or by taxing energy more. Demonstration projects can also help establish new technology.

The Domestic and Commercial Building sectors are areas where cost effective energy savings measures could be taken, especially in new buildings standards where the UK standards lag behind other countries. For example the Energy Review reports “a further cost-effective carbon saving potential of some 9MtC by 2020” in the residential sector.

This also has potential benefits to UK business as they invest in products to meet these needs, and this may well provide increasing opportunities for such products outside the UK.

Improving vehicle occupancy rates is another way of improving energy efficiency.

- **Education and consumer protection are vital in the residential, business and public sectors**

UKPIA believes that improving energy efficiency is important, However the Energy Review Reports that:-

- users are unaware of the potential savings inherent in energy efficiency
- users are not taking into account the full economic savings available from investments in energy efficiency
- distrust of suppliers and installers

Whilst environmental performance is important to some consumers, for the majority it will not outweigh considerations on price, convenience, reliability, safety and general performance. They will not buy technology that does not meet their aspirations. Carrots can only come from the pockets of taxpayers and they are only acceptable to kick start a market. Permanently cutting duty on new fuels or subsidising the purchase of new technology will reduce Government income by billions of pounds. This would have to be made up by increasing other taxes. This is unlikely to be acceptable to the voter.

Hence the consumer will need to be educated on the desirability of switching to new low carbon technology.

The education programmes need to be backed up by good installation and performance standards for new technology. Consumers will not accept new technology whose installation causes them “hassle” or whose reliability is poor, even if it saves them money.

- **Increasing energy taxes is not the best approach to reducing emissions**

Demand for road fuel is relatively inelastic and hence taxes have only a modest impact on consumption. In addition taxes do not discriminate between urban and rural car use, affluent and poor drivers and the time of day the motor vehicles are used. Taxes have therefore little impact on issues such as congestion and local air quality but do have implications in terms of equality and fuel poverty. High fuel taxes are therefore a very blunt instrument. They can also have knock on effects eg high road fuel prices can affect tourism, cost of food, etc. Where energy is a significant part of an industry's costs, for example in energy intensive industries, there is already a strong incentive to improve energy efficiency. In these cases fuel taxes are just an additional cost on which affects the competitiveness of companies operating in the UK. Promoting viable energy efficiency is a better approach.

- **Bringing Transport Fuels into the EU ETS**

If the aviation sector is to be included in the EU ETS, the obligations should be on the carriers rather than the fuel suppliers as it is the carriers who have control over the emissions from their operations. This is in line with the ethos of the EU ETS, which places the onus on the emitter to control emissions.

In the future if road transport were to be included in the EU ETS, then applying the same ethos would require the obligation to be placed on the motorist not the fuel supplier. It is the motorists who have control over the emissions by deciding whether to use the vehicle or public transport, to drive economically, etc. Applying the obligation to the fuel supplier would force the supplier to buy credits, when necessary, as they have no control over fuel use. The cost of the credits would then be spread over all motorists ie it would effectively act as a tax on road fuels rather than a method of influencing individual actions. UKPIA regards taxes as a very blunt instrument for changing behaviour unless they are applied at a level which is probably currently unacceptable to motorists.

- **Market based policies have succeeded and should be the basis of future action**

The market has already delivered reduced emissions of carbon dioxide in many sectors and will deliver more in the future. Some examples are:-

- the fuel efficiency of cars has improved by 10% since 1997 due to improvements in technology and a switch from petrol to diesel cars and vans.
- the fuel efficiency of aircraft improved in the last decade as movements, kilometres flown, number of passengers, passenger kilometres and cargo all grew by much more than the fuel used.

- carbon dioxide emissions from power stations fell by between 1990 and 2001 despite an increase in the electricity consumed largely as a result of the market switch from coal to natural gas in generation plant.
- more fuel-efficient hybrid cars and buses have been developed and industry (oil, automotive, etc) is now investing heavily (\$1.5 billion/a) in research into fuel cells.

These approaches illustrate the success of the market in delivering reduced emissions. If HMG wants to further reduce emissions it is market based policies that need to be reinforced.

Q.2. With the UK becoming a net energy importer and with big investments to be made over the next twenty years in generating capacity and networks, what further steps, if any, should the government take to develop our market framework for delivering reliable energy supplies? In particular, we invite views on the implications of increased dependence on gas imports.

- **Natural Gas is plentiful and a secure supply can be provided**

On a global scale natural gas will probably be readily available well into the next century. The key determinants for UK energy supply policy will be access to imported gas, the route the gas takes to reach UK and a favourable investment climate in the UK and overseas.

- **HMG should create an investment environment that maximises recovery of oil and gas from the North Sea**

Maximising the recovery of oil and gas from the North Sea in the next decades will reduce security of supply questions as the UK adjusts to being an oil and gas importer. This will require significant investment. Hence it is vital for the UK to create an environment where the necessary investment will be forthcoming so that both the UK (for LNG) and the North Sea are seen as a good place to invest in the competition for funds. The recent change in the tax on UKCS fiscal regime was extremely disappointing, undermined confidence in the UK investment climate and will make companies less keen to invest in the UK.

- **Availability of economic supplies of oil is not a constraint on energy policy**

The industry's current estimates suggest that there are sufficient proven reserves of oil to last well into this century. The figure below illustrates that, despite the predicted decline in crude oil from the North Sea, there will not be a physical shortage of economic oil for a large number of years ie **oil is not running out**. There is therefore no need to rush to substitute conventional petroleum products on supply grounds.

Even when conventional crude oil declines there are vast reserves of heavy oil and natural gas which can be used to provide transport fuels. Companies are already investing in this area in Canada and the Middle East. Improvements in the technology used to exploit these resources will reduce the cost over time.

- **The UK should set up an agency to manage its strategic oil reserves**

Under EU rules the UK, as an oil producer, has to carry 67.5 days of strategic stocks of crude oil and petroleum products. This obligation is transferred to the oil industry with refiners and non-refiners having different mandatory stockholdings placed on them. In other EU countries there is a central Stockholding Agency which manages the obligation. The UK approach makes the stockholding inefficient, more costly than necessary and due to the different targets for refiners and non-refiners more difficult to ensure compliance as hypermarket sales grow.

UKPIA therefore recommends the formation of a Government controlled UK Oil Stockholding Agency with the same obligation on refiners and non-refiners. The industry believes that managing the obligation centrally would reduce the cost of compliance by around £20 million.

Q.3. The Energy White Paper left open the option of nuclear new build. Are there particular considerations that should apply to nuclear as the government re-examines the issues bearing on new build, including long-term liabilities and waste management? If so, what are these, and how should the government address them?

UKPIA does not have the expertise to comment on nuclear issues

Q.4. Are there particular considerations that should apply to carbon abatement and other low-carbon technologies?

- **Petrol/diesel will remain the dominant transport fuels up to 2030 and beyond**

Up to 2030 and beyond petrol, diesel and jet kerosene will remain the dominant fuels for transport. For the UK the key is to be able to utilise the wide variety of crude oils from around the world that will be available in the future. A viable crude oil refining sector will ensure that this can be done in the UK so ensuring transport fuels with the required quality are available without any problems.

- **The best uses of renewable energy and UK produced biomass needs to be established**

Renewable energy (solar, wind, tidal, etc) can be used to generate electricity or to raise heat or to produce transport fuels (hydrogen). From an energy efficiency and environmental perspective renewables (and nuclear) are better suited to electricity generation as this maximises the saving in emissions of carbon dioxide.

Bio-fuels (bio-diesel, bio-ethanol, etc) are more expensive than conventional fuels. The higher cost of producing bio-fuels has prevented their widespread use in the past and will require a substantial on-going subsidy or obligation to ensure their use in the future, unless there is a step change in the technology. In addition, based on current information producing liquid road fuels is not the best use of land in terms of reducing carbon dioxide emissions.

Hence UKPIA believes that the Energy Review should establish the best use for the UK's renewable energy and biomass resources in the short/medium and long term.

Q.5 What further steps should be taken towards meeting the government's goals for ensuring that every home is adequately and affordably heated?

UKPIA believes that improving energy efficiency in the domestic sector is the best way of ensuring that every home is adequately and affordably heated. For some households support from Government will be needed to improve insulation, etc. This can be provided under existing programmes. However we agree with the Energy Review that the improvement may not result in a reduction in emissions of carbon dioxide as many household will choose to take the extra benefit in higher room temperatures.

i. The long term potential of energy efficiency measures in the transport, residential, business and public sectors, and how best to achieve that potential;

• Advanced conventional technology and hybrid vehicles offer lower carbon options

UKPIA fully accepts that improving the efficiency of vehicles and reducing the carbon content of fuels will impact of carbon dioxide emissions from road transport. On a wells-to-wheels basis emissions of carbon dioxide from transport can be reduced significantly over time by a number of options, including:-

- Improved conventional vehicles

The fuel economy of conventional cars is being improved under the ACEA Voluntary Agreement which will reduce emissions of carbon dioxide from the average new cars in the EU to 140 gCO₂/km by 2008 (ACEA) or 2009 (JAMA & KAMA), a reduction of 25% from 1995. A second voluntary agreement is likely for the period post 2008. The target is unknown but the EU's aspiration is for 120 gCO₂/km. Currently the average new UK car is larger than the EU average and emits around 170 gCO₂/km. There is therefore significant technical scope for a further improvement in the fuel economy of conventional cars. However customers have to be willing to buy smaller more fuel efficient cars.

- Conventional vehicles using biofuels

In the short/medium term we agree with the Government that emissions of greenhouse gases from vehicles of 50-60% could be achieved from the use of bioethanol, bioETBE or biodiesel in the UK fleet. However current European fuel standards limit the amount of biodiesel or bioethanol that can be added to petrol and diesel to a maximum of 5% by volume vehicles. The oil industry is already participating in the discussions in the European Standards organisation, CEN, to see if these limits can be increased. However the work is expected to take at least three years.

The ultimate potential of biofuels in the UK is uncertain due to limited land in the UK, competing uses of biomass for heat and power, growing overseas use of biofuels and higher costs. The oil industry is actively working in this area to support the development of new second generation processes. Examples are the conversion of cellulosic material (eg straw) to bio-ethanol and biomass to liquid process

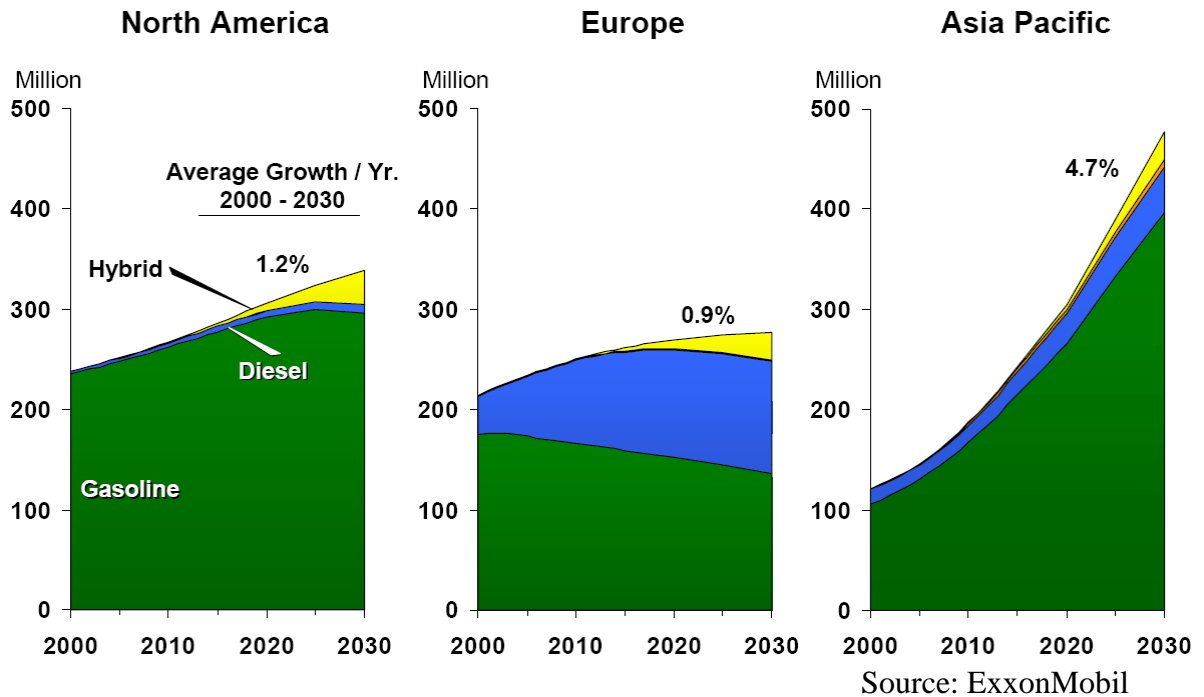
The only factor working against this trend is public expectation of larger more gadget-laden vehicles with at least the same performance. Hence consumer preference may constrain the realisation of efficiency gains.

- Hybrid vehicles using fossil fuels

A study for DfT by Ricardo identified a series of technology steps that could result in a diesel hybrid car emitting around 80 gCO₂/km in 2020. Currently the Prius hybrid emits just over 100 gCO₂/km in the European test cycle.

An oil industry forecast suggests that hybrid sales will not take off until the next decade but will be significant by 2030.

Light Duty Fleet



In the above oil industry forecast the light duty vehicle fleet consists of passenger cars and light duty trucks. The chart reflects the number of vehicles in different regions over time. There are signs of vehicle saturation in most developed countries in North America and Europe with annual growth rates in the 1 percent range. In Asia Pacific, however, the fleet is expected to nearly quadruple.

By 2030, the forecast predicts that hybrids (yellow) comprising approximately 10 percent of the car parc in North America, with hybrids approaching 30 percent of all new vehicles sold in the United States and Canada. European hybrids form a smaller a slightly smaller proportion of the car parc and supplement the growing high share of diesel vehicles (blue). Hybrids in Asia Pacific are mainly in the OECD countries (Japan, the Republic of Korea, Australia and New Zealand).

- **Hydrogen from renewables has several major hurdles to overcome**

For hydrogen fuel cells to significantly reduce emissions of carbon dioxide the hydrogen has to be generated from a renewable source, a fossil fuel with carbon sequestration or nuclear. UKPIA believes that the widespread use of hydrogen in fuel cells will be post 2030. This is due to the time required to overcome the significant technical obstacles with a fuel cell system that remain to be solved, including:-

- hydrogen storage needs to be improved.
- hydrogen distribution and refuelling infrastructure has to be developed.
- safe handle procedures to be established and proven.

- technology to reduce the cost of fuel cells.
- customer acceptance.

In the meantime the oil industry is actively involved in the development of hydrogen fuel cells and has already built a number of hydrogen filling stations.

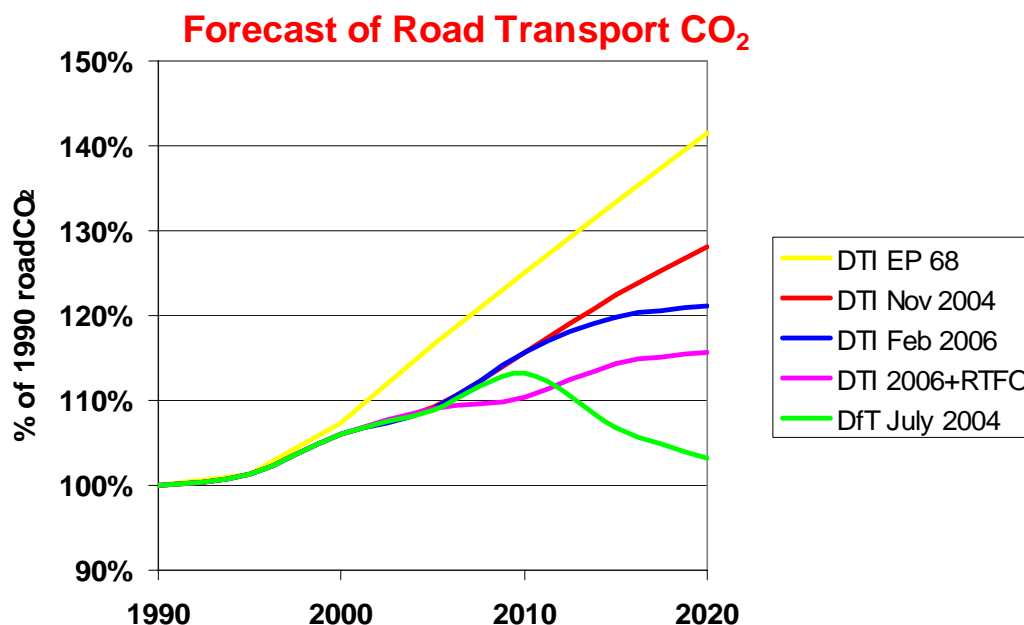
Honda claims that their FCX fuel cell vehicle is commercially available but it is reported to cost \$2 million to build each car (Daily Telegraph 15 April 2006).

- **Consumers also have a part to play**

In addition to technical measures more emphasis needs to be given to consumer action in terms of information on vehicle choice, vehicle maintenance and eco-driving. All of which could have a significant impact. For example, according to the U.S. Department of Energy, drivers can improve their miles per gallon by about 3 percent by keeping tires inflated to the proper pressure.

- **DTI forecasts may over-estimate the future carbon emissions from road transport**

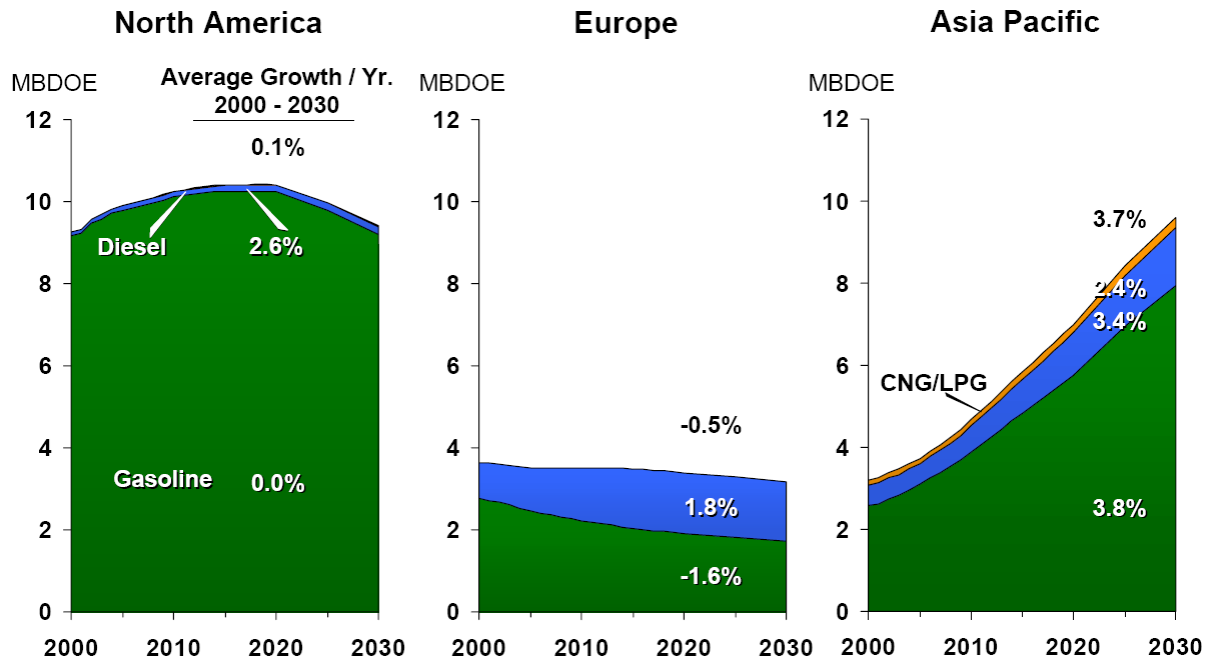
Over time the DTI forecasts of future emissions of carbon dioxide from road transport have tended to fall. The latest forecast (blue line) predicts a rise of 6% by 2010 and 11% by 2020. The forecast makes no allowance for the Renewable Transport Fuels Obligation (RTFO) which DTI estimate will reduce emissions of carbon from road transport by -1.6mtC/a. The impact of other policies not yet agreed, eg an extension to the ACEA voluntary agreement, are also not included. This combined with the use of long term trends (30 years) tends to result in an overestimate.



Carbon emissions from road transport have risen by 2% in the last eight years (1997-2005). This makes DTI's predicted rise of 6% in the next 5 years seem unlikely. In practice the introduction of the RTFO and recent trends in small annual rises emissions, from improved efficiency and more diesels, is likely to result in carbon emissions from road transport falling between 2005 and 2010 not increasing.

For the longer term the oil industry forecast below predicts a small annual decline in road fuel consumption in Europe from a significant improvement in the basic efficiency of new cars, as well as growth in the numbers of hybrid and diesel vehicles, which will reduce the impact that a larger number of vehicles will have on fuel demand.

Light Duty Fuels



Source ExxonMobil

ii. **Implications in the medium and long term for the transmission and distribution networks of significant new build in gas and electricity generation infrastructure;**

UKPIA does not have expertise in this area.

iii. **Opportunities for more joint working with other countries on our energy policy goals;**

- **UK Energy Policy should reflect the importance of the EU and other countries in achieving shared energy policy objectives**

UKPIA strongly supports the need for the UK to integrate its energy policy with that of our neighbours in Europe and other countries. This will bring benefits from liberalisation of the EU gas markets in terms of security of supply. However it will also ensure that manufacturers have an adequate market for their products eg more fuel-efficient or fuel cell powered vehicles. It will also enable joint research programmes to develop new technology.

iv. **Potential measures to help bring forward technologies to replace fossil fuels in transport and heat generation in the medium and long term.**

Government needs to:-

- encourage industry to develop competitive, new technology. The Government should not try to pick the potential winners in advance by tilting the playing field.
- establish the benefits of new technology by demonstration projects.
- focus R&D where UK industry has a realistic chance of achieving a competitive advantage rather than duplicating other countries well established programmes.

- **Competitive innovative solutions need to be stimulated**

Innovative solutions will only help UK industry and the economy if they are competitive economically. It is therefore essential for the UK to aim to achieve its environmental objectives in a manner that is both least cost and sustainable. This will stimulate innovative solutions which do not depend on long-term subsidies and as such are likely to provide export opportunities. It will also ensure that environmental objectives are reached in a way that minimises the impact on the UK taxpayer, consumer and industry.

- **HMG should avoid picking winners and keep a level playing field**

Being “a first mover” is not a guarantee of success or necessarily a benefit to UK industry. Neither is a policy of technology forcing such as California’s zero emissions vehicles mandate which has completely failed to deliver large numbers of zero emitting vehicles. The reasons behind the lack of long-term success vary from case to case (technical problems, consumer choice, etc) but show the dangers of trying to “pick a winner”. Hence the UK should concentrate on keeping its options open until the various technologies have developed to the point where any necessary decisions can be made on a firm basis.

This does not of course mean that nothing will be done. Industry is investing in new products against future markets (eg fuel cells, hybrid vehicles, on-board reformers for hydrogen production, ethanol production from woody waste, etc). It is also investing in demonstration projects (eg London hydrogen buses) to gain expertise.

- **R&D should be aimed at areas when the UK has good chance of developing competitive technology rather than playing catch-up**

In terms of R&D there are a number of areas where the UK is behind and unlikely to catch up as industry is already supporting research elsewhere. Hence the UK should focus its R&D on areas where other countries do not have a lead in developing competitive technology or where the results will help understand how the roadblocks to the future deployment of options are likely to be overcome eg:-

- developing a new, method for **hydrogen storage** for fuel cells but not the development of fuel cells themselves because of the lead and funding in fuel cell development enjoyed by other countries.
- **carbon sequestration.** A successful means of sequestration would open up options for future energy policy. Actively collecting information from overseas would also be an important contribution.

- **There are a number of different options for a zero carbon transport system**

On a wells-to-wheels basis a near “zero” carbon transport system could be achieved by a number of different approaches eg:-

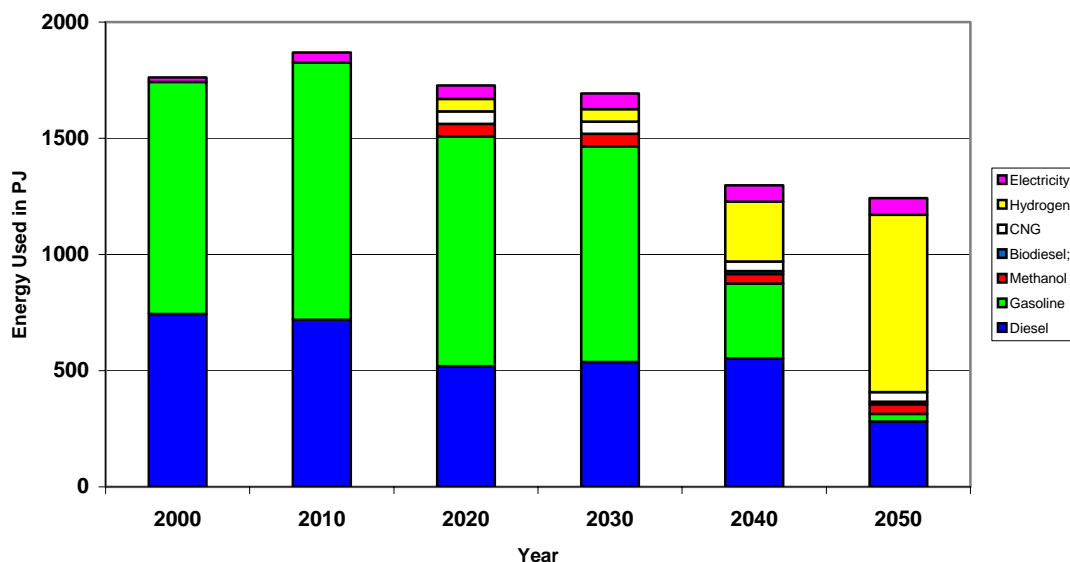
- Fuel cells using hydrogen from renewables or nuclear or fossil fuels with sequestration.
- Batteries using power from renewables or nuclear or fossil fuels using sequestration.
- Bio-ethanol from woody biomass using enzyme type technology.

Advances in technology/infrastructure are required by all the above options (eg \$1.5 billion/a on fuel cell research now) so it too early to say which of these options will be the winner. In addition, as discussed above, independent modelling for DTI/DEFRA suggests that the technologies are not required for some time yet.

A change to any of the above options will be slow due to the:-

- inertia from turning over the existing fleet.
- need for new infrastructure.
- high cost of new infrastructure.
- time to build a new infrastructure
- need to retain EU / UK competitiveness.
- need to act with other EU countries to generate the market.
- need to learn to handle hydrogen safely.
- customers’ resistance to change without a large incentive.

MARKAL model: transport fuels under BaU Scenario with 60% reduction in CO₂



Source AEA Technology Report ED 50099/1 February 2002

The issue of timing of the introduction of new technology was addressed in the MARKAL model, an independent model run for DTI/DEFRA by AEA Technology, which predicts that:-

- Petrol use only drops significantly post 2030. The drop in petrol between 2020 and 2030 reflects the use of 3% each of CNG, methanol and hydrogen in cars with ICE engines under a duty break for the use of these fuels up to a level of 3%.
- Fuel cells (hydrogen powered) are not selected until post 2030 and then only in cars.
- Diesel hybrids are the chosen technology for buses from 2020.

Different assumptions in the model could change the above timing for example under the Global Sustainable scenario, which is “based on a predominance of social and ecological values”, fuel cell powered cars do not appear until post 2040 - 10 years later.

The lack of significant changes before 2030 suggests that the UK could adopt an evolutionary approach to the choice of future fuels. The UK does therefore not need to “pick winners” or be a “first mover”. In the meantime possible key future technologies such as carbon sequestration can be developed so keeping options open for the future.

- **UKPIA view of future transport fuels and technology**

UKPIA’s overall view of future transport fuels and technology can be summarised as:-

Short term to 2010

- Conventional petrol and diesel
- Gasoline Direct Injection, Common Rail Diesel
- Hybrids being introduced

Medium Term to 2020

- Petrol and diesel still supply bulk of road transport fuels
- Greater use of hybrids
- Limited penetration by new technology (biomass, CNG, hydrogen, methanol, LPG, electricity)
- Technology advances in some or all of Fuel Cells, Batteries, Biofuels and Renewables – impossible to predict when and where breakthroughs
- Gas to Liquids and Heavy Oil Conversion Technology improved
- Second generation biofuels processes proved

Long Term

- Diesel and Petrol still in use from crude oil, gas to liquids and heavy oil
- Wider range of transport fuels in use
- Hydrogen seems front runner today but in reality no clear winner yet