

King's Comment

The transition to low carbon mobility

Quarterly Bulletin from Professor Sir David King, Senior Scientific Advisor to UBS



As the world seeks to address the current climate and energy crisis a major sector is not receiving the attention that it should. The three biggest consumers of energy are: the built environment, manufacturing and transport. But while governments focus on the first two of these, transport has taken a back seat.

There are several reasons for this. First, while much attention has been placed on the centralised generation of low-carbon electricity and heat, transport depends heavily on the direct use of petroleum and coal. Moreover, governments are obviously most interested in what takes place within national boundaries, meaning that air and ocean transport have fallen between the international cracks.

This needs to change. In a world of globalised markets, facing a global crisis, the transport sector illustrates how we will need to find intelligent, interconnected and often global solutions.

The complexity of the issues facing the decarbonisation of transport can be nicely demonstrated by the case of London's airports. This summer I was asked to chair a meeting at the Institute of Civil Engineers to consider the Mayor's proposal for a new London airport in the Thames estuary. It is an imaginative idea, which could shift the dense tangle of flights paths from their current location above the city to the skies of the unpopulated estuary. If you were designing the London airports from scratch, it would look like an exceptionally good solution. What's more, a simple extrapolation of current demand forward in time shows that by 2030 even a third runway at Heathrow would not be enough to meet passengers' needs. A new airport seems like a shoe-in.

However, looking at the problem more holistically throws up some very different considerations. If our priorities were the same today as they have always been, there would be nothing wrong with using simple extrapolations of past behaviour to plan the infrastructure of the future. But the Europe-wide

“The transport sector illustrates how we will need to find intelligent, interconnected and often global solutions.”

commitment to reducing carbon means that some demand will inevitably need to shift, for example from short-haul flights to high-speed rail networks. There is a high-tech future in getting people around comfortably, quickly and from city centre to city centre, and the potential for investment in high-speed rail has to be fed into the overall equation.

There is also the question of opportunity costs. If the Mayor moves to the next stage and invests £10 million in a full feasibility study, that will immediately put on hold the potential for the Thames estuary to generate energy. Proposals have been mooted for both a wind farm and a barrage, neither of which are likely to be compatible with an airport.

I am not saying that I am either for or against an estuary airport; rather that this case demonstrates how we need to consider all aspects of the transport problem. Making simple extrapolations without taking into account the whole picture can give completely the wrong answer, and could result in massive investment in projects that become expensive stranded assets. If we are to manage our transformation from high to low carbon with minimum risk to our growth, we cannot afford to make such mistakes. We have to be smart.

One argument often made for airport expansion is the additional carbon emissions caused when planes are forced to circle aimlessly overhead through lack of available landing slots. But there are other ways to cut this inefficient stacking. My institution, the Smith School for Enterprise and the Environment in Oxford, has just produced a Roadmap for Transport that was commissioned by Shell. In it, we found that investing in advanced Air Traffic Control systems which create an accurate (time resolved) picture of the traffic in the sky would dramatically reduce the need for stacking even over the busiest airports.

We also found that the aviation industry's recent announcement that it will reduce emissions per passenger mile by 50% by 2050 is entirely realistic. Competition is driving ever greater efficiency in the design of aircraft and within a few decades planes could have changed beyond recognition, for example to the currently mooted "blended wing" design which combines increased passenger numbers per plane with much greater fuel efficiency—and is also very beautiful.

Given the problems with finding alternative low-carbon fuels for air transport, we also need to give priority to planes when looking at possible uses of second generation biofuels. When we find a way to produce transport fuels effectively from cellulosic food byproducts, we should not waste them on cars or trains for which there are other potential low-carbon options.

The same applies to shipping, a sector that has been neglected while air travel has taken most of the transportation heat. I believe that this is the area with the greatest need to focus on both efficiency improvements and new clean fuels. If a transporter vessel uses dirty coal far out at sea, away from national waters, the NOx and SOx contaminants that it belches out still contaminate the atmosphere that we are all using. Out of sight does not mean without consequences, and the shipping industry needs to face up to its responsibilities as the aviation industry is attempting to do.

Biofuels would help reduce the carbon impact on shipping, as would serious efforts to increase the efficiency of transporter vessels. But it is worth noting that the carbon footprint of shipping is relatively efficient. While shipping carries 80% of global trade, it produces 3% of global green house gas emissions. We could all choose to go on holiday within our own countries, and use video conferences instead of face to face meetings. In our globalised economic system where resources, manufacturing capability and food production are often located far from the final users, we will continue to need shipping for transporting goods around the world. The challenge is do to so in a low carbon way.

“The aviation industry’s recent announcement that it will reduce emissions per passenger mile by 50% by 2050 is entirely realistic.”

“The shipping industry needs to face up to its responsibilities as the aviation industry is attempting to do.”

Within national boundaries, more local transportation also illustrates the importance of fully integrated solutions. Though a great deal of attention has been placed on alternative sources of energy, much can also be done by improving efficiency. The new T25 from Gordon Murray is the second best in the world in terms of carbon emissions even though it runs entirely on petrol. It achieves this by a straightforward combination of an efficient engine, a very light weight body and good aerodynamics.

Even electric vehicles can have a greater or lesser benefit depending on the energy system of the country in which they are used. A Tesla Roadster electric car produces 116g carbon dioxide per kilometer if driven in the UK, but only 21g per kilometer in France; this is because widespread use of nuclear power means that French electricity has already been largely decarbonised.

Town planning also plays an important role in emissions from local transportation. The world's major cities can be neatly divided into those that were born before motor cars—which tend to be densely structured—and those that were born after and tend to sprawl. For instance Houston, which is one of the world's least dense cities, also has the longest commuting time and one of the highest carbon footprints from transport. London, by contrast, has a relatively high density, a low average commuting time and a low carbon footprint.

Reconfiguring existing urban environments to reduce public dependence on cars will obviously be crucial. But most importantly, we also need to catch the world's new cities before they are fully formed. Developing countries are making choices today about how to shape the cities of the future. For example, I act as chief scientific advisor to President Kagame of Rwanda, and I have already pointed out to him that the city of Kigali is in danger of becoming dependent on the motor car thanks to a misguided desire among its richest inhabitants to emulate some of the more sprawling, and soulless, cities in the US.

But why should developing countries be condemned to crowded cities? Well, high density doesn't necessarily mean disagreeable. Some of the most highly populated areas of London—Mayfair, Notting Hill—are also among the most desirable and expensive. It's attractive to be able to walk to shops, restaurants, theatres, pubs and the homes of friends. From an urban planning point of view, lowering the carbon footprint from transportation can easily come with a more pleasant lifestyle, and greater wellbeing.

Still, this brings me to another crucial matter regarding the relationship between developing and developed nations. As negotiations intensify leading up to December's UN climate meeting in Copenhagen, less developed countries such as Rwanda are being left out of the picture. Perhaps it is natural for negotiators to focus on the world's current biggest polluters. But as President Kagame pointed out at UN Secretary General Ban Ki Moon's climate meeting in New York last month, less developed nations also need an incentive to keep their carbon emissions low.

The global target for 2050 is that every country in the world must produce less than 2 tonnes of carbon dioxide per person per year. President Kagame suggested in New York that all of the countries that are already below that target could be brought in to cap and trade schemes to trade emissions permits. He estimates that this would divert \$150 billion per year to developing nations, which goes some way towards the amount that both Gordon Brown and the World Bank have said is needed to enable developing countries to adopt a low carbon path and adapt to the changes to come.

I find it extraordinarily encouraging that a spokesman for the African Union is now on record declaring that Africa wants to be part of the solution. But there is also an implied threat in his words that the world would do well to heed. If Africa is

“From an urban planning point of view, lowering the carbon footprint from transportation can easily come with a more pleasant lifestyle, and greater wellbeing.”

“Less developed nations also need an incentive to keep their carbon emissions low.”

“If Africa takes over from China as the high-carbon factory of the world, all of our efforts to tackle the climate problem will be subverted.”

not incentivized to take a low-carbon path, there will be nothing to stop African nations from attracting high carbon manufacturing industries to their shores so their economies can grow the way China's has. And if Africa takes over from China as the high-carbon factory of the world, all of our efforts to tackle the climate problem will be subverted.

In April 2008, UBS announced the appointment of Professor Sir David King as our Senior Scientific Advisor. Formerly the UK Government's Chief Scientific Advisor and Head of the Government Office for Science, Sir David advises UBS on all scientific matters with particular emphasis on global climate change and the challenges it poses to sustainable economic growth. He is also Director of the Smith School of Enterprise and the Environment at the University of Oxford.

'The transition to low carbon mobility' is the fourth issue of 'King's Comment', a quarterly series of science-focused bulletins by Sir David King. Visit www.ubs.com/sirdavidking to learn more.



This material has been prepared by UBS AG, or an affiliate thereof ("UBS"). In certain countries UBS AG is referred to as UBS SA.

The views and opinions expressed in this material are those of the author and are not those of UBS, its subsidiaries or affiliate companies. Accordingly, UBS does not accept any liability over the content of this material or any claims, losses or damages arising from the use or reliance of all or any part thereof.

This material is for distribution only under such circumstances as may be permitted by applicable law. It has no regard to the specific investment objectives, financial situation or particular needs of any recipient. It is published solely for informational purposes and is not to be construed as a solicitation or an offer to buy or sell any securities or related financial instruments. No representation or warranty, either express or implied, is provided in relation to the accuracy, completeness or reliability of the information contained herein, nor is it intended to be a complete statement or summary of the securities, markets or developments referred to in the materials. It should not be regarded by recipients as a substitute for the exercise of their own judgement. Any opinions expressed in this material are subject to change without notice and may differ or be contrary to opinions expressed by other business areas or groups of UBS as a result of using different assumptions and criteria. UBS is under no obligation to update or keep current the information contained herein. UBS, its directors, officers and employees' or clients may have or have had interests or long or short positions in the securities or other financial instruments referred to herein and may at any time make purchases and/or sales in them as principal or agent. UBS may act or have acted as market-maker in the securities or other financial instruments discussed in this material. Furthermore, UBS may have or have had a relationship with or may provide or has provided investment banking, capital markets and/or other financial services to the relevant companies. Neither UBS nor any of its affiliates, nor any of UBS' or any of its affiliates, directors, employees or agents accepts any liability for any loss or damage arising out of the use of all or any part of this material.

Options, derivative products and futures are not suitable for all investors, and trading in these instruments is considered risky. Past performance is not necessarily indicative of future results. Foreign currency rates of exchange may adversely affect the value, price or income of any security or related instrument mentioned in this presentation. Prior to entering into a transaction you should consult with your own legal, regulatory, tax, financial and accounting advisors to the extent you deem necessary to make your own investment, hedging and trading decisions. Any transaction between you and UBS will be subject to the detailed provisions of the term sheet, confirmation or electronic matching systems relating to that transaction. Clients wishing to effect transactions should contact their local sales representative. Additional information will be made available upon request.

For financial instruments admitted to trading on an EU regulated market: UBS AG, its affiliates or subsidiaries (excluding UBS Securities LLC and/or UBS Capital Markets LP) acts as a market maker or liquidity provider (in accordance with the interpretation of these terms in the UK) in the financial instruments of the issuer save that where the activity of liquidity provider is carried out in accordance with the definition given to it by the laws and regulations of any other EU jurisdictions, such information is separately disclosed in this material.

United Kingdom and the rest of Europe: Except as otherwise specified herein, this material is communicated by UBS Limited, a subsidiary of UBS AG, to persons who are eligible counterparties or professional clients (as detailed in the FSA Rules) and is only available to such persons. The information contained herein does not apply to, and should not be relied upon by retail clients. UBS Limited is regulated by the FSA. **France:** Prepared by UBS Limited and distributed by UBS Limited and UBS Securities France S.A. UBS Securities France S.A. is regulated by the Autorité des Marchés Financiers (AMF). Where an analyst of UBS Securities France S.A. has contributed to this material, the material is also deemed to have been prepared by UBS Securities France S.A. **Germany:** Prepared by UBS Limited and distributed by UBS Limited and UBS Deutschland AG. UBS Deutschland AG is regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin). **Spain:** Prepared by UBS Limited and distributed by UBS Limited and UBS Securities España SV, SA. UBS Securities España SV, SA is regulated by the Comisión Nacional del Mercado de Valores (CNMV). **Turkey:** Prepared by UBS Menkul Degerler AS on behalf of and distributed by UBS Limited. **Russia:** Prepared and distributed by ZAO UBS Securities. **Switzerland:** These materials are distributed in Switzerland by UBS AG to persons who are institutional investors only. **Italy:** Prepared by UBS Limited and distributed by UBS Limited and UBS Italia Sim S.p.A.. UBS Italia Sim S.p.A. is regulated by the Bank of Italy and by the Commissione Nazionale per le Società e la Borsa (CONSOB). Where an analyst of UBS Italia Sim S.p.A. has contributed to this material, the material is also deemed to have been prepared by UBS Italia Sim S.p.A.. **South Africa:** UBS South Africa (Pty) Limited (Registration No. 1995/011140/07) is a member of the JSE Limited, the South African Futures Exchange and the Bond Exchange of South Africa. UBS South Africa (Pty) Limited is an authorised Financial Services Provider. **United States:** These materials are distributed by UBS Securities LLC or UBS Financial Services Inc., subsidiaries of UBS AG, or solely to US institutional investors by UBS AG or a subsidiary or affiliate thereof that is not registered as a US broker-dealer (a "non-US affiliate"). Transactions resulting from materials distributed by a non-US affiliate must be effected through UBS Securities LLC or UBS Financial Services Inc. **Canada:** These materials are being distributed in Canada by UBS Securities Canada Inc., a subsidiary of UBS AG and a member of the principal Canadian stock exchanges & CIPF. **Hong Kong:** The materials relating to equities and other securities business, and related research, are being distributed in Hong Kong by UBS Securities Asia Limited. The material relating to corporate finance, foreign exchange, fixed income products and other banking business, and related research, are being distributed in Hong Kong by UBS AG, Hong Kong Branch. **Singapore:** Distributed by UBS Securities Pte. Ltd or UBS AG, Singapore Branch. **Japan:** The materials relating to equities, fixed income products, corporate finance and other securities business, and related research, are distributed in Japan by UBS Securities Japan Ltd. The materials relating to foreign exchange and other banking business, and related research, are distributed in Japan by UBS AG, Tokyo Branch. **Australia:** These materials are distributed in Australia by UBS AG (Holder of Australian Financial Services Licence No. 231087) and UBS Securities Australia Ltd (Holder of Australian Financial services Licence No. 231098). **New Zealand:** These materials are distributed in New Zealand by UBS New Zealand Ltd.

© UBS 2009. The key symbol and UBS are among the registered and unregistered trademarks of UBS. All rights reserved.



UBS Investment
Bank

UBS Investment Bank
1–2 Finsbury Avenue
London EC2M 2PP
United Kingdom
Tel: +44-20-7567 8000
Fax: +44-20-7568 4800

www.ubs.com/investmentbank