



Department
for Transport

DfT Science Advisory Council

Annual Report January 2014 – February 2015

February 2015

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1. Foreword by DfT Chief Scientific Adviser



My role as the Chief Scientific Advisor (CSA) is to ensure that the Department's scientific and engineering activities are well directed and that DfT's policies are based on sound evidence. This means providing challenge to the scientific content and quality of the policies, at a strategic level, to ensure that both the right research is commissioned and that high quality scientific and engineering evidence is used in policy development. The CSA is also a key adviser to Ministers and senior officials and the Science Advisory Council helps me deliver both of these important functions.

This is the first year of the DfT Council, having been formed in January 2014. It is made up of a small number of eminent academics and experts from business that spans a broad range of expertise, bringing a wealth of knowledge and experience. Council members act as critical friends to the Department, provide strategic level advice to challenge and support the Department on science and engineering issues, and helps strengthen the Department's relationship with the wider academic and industry communities.

In its first year, the Council has commented on a range of major transport issues (such as autonomous vehicles, energy in transport and data analytics) by providing timely advice to policy colleagues. This is one of the Council's key functions and I look forward to further challenge from them in the next year, both to address key policy challenges as we look forward to a new Government and to help DfT identify new STEM challenges that need to be part of DfT's agenda.

As we move into the second year, I would like to thank the members of the Council, and in particular, the Chair, Professor Robert Mair, for their time and contribution in what was a challenging first year. The coming months will inevitably present new challenges, not least with upcoming election and a likely Comprehensive Spending Review. We will aim to build on the impact already achieved, and further promote the Council's role within the Department, and more widely across our agencies.

2. Foreword by Chair of the Council



The DfT Science Advisory Council was formed a little over a year ago and tasked with ensuring the Council had a shared understanding of the evidence needs required to support policy across a broad portfolio.

Our primary role is to provide strategic independent advice and challenge to the Department on key Science, Technology, Engineering and Mathematics (STEM) issues. The Council supports the Chief Scientific Advisor (CSA) in ensuring that policy development takes account of broader academic engagement and that scientific evidence underpinning policy is robust. Constructive challenge from the

Council has also helped highlight uncertainties and provided strategic steer on a range of very important topics.

To date, we have covered a range of topics that span the broad spectrum of science and engineering issues associated with transport. To help understand the importance attached to a number of issues, we have engaged with senior officials within the Department including the Permanent Secretary, Philip Rutnam, and a range of Director Generals and Directors. This level of engagement recognises the significance of scientific evidence in policy development and their attendance at meetings has been a key feature of the Council's operation.

It is important that the Council maintains independence and can initiate as well as respond to the challenging needs of the Department. Our first year has included discussions on Autonomous Vehicles, Resilience, Energy and Data Analytics. We now look forward to bringing further challenge to the Department on broader issues in transport, as well as reviewing the Department's evidence and research strategies.

Finally, I have had the pleasure of acting as Chair of the Council and would like to acknowledge the commitment, contribution and enthusiasm shown by my fellow members. I believe we have strengthened the Department's relationship with the wider academic and scientific communities and look forward to continuing to work with the Department's CSA to support and challenge the DfT on its use of science and engineering evidence.

3. Introduction to the Council and this report

This is the first annual report of the Department for Transport's Science Advisory Council (SAC). It covers the Council's activities from its formation in January 2014 until January 2015. This report is being published to meet the Government's requirements of openness and transparency as promoted by the Civil Service Reform for open policy making¹.

This report is a review of the Council, which aims to evaluate and assess the impact of the Council's activities over the past year. The report discusses the model and structure of the way the Council operates and its interaction with the Department, to identify good practice and further improve the impact of the Council.

The DfT Council was established with the objective of providing strategic advice and challenge to the Department for Transport on key Science, Technology, Engineering and Mathematics (STEM) issues.

The Council is formed of eminent academics and experts from business and supports the Chief Scientific Advisor (CSA) in both ensuring DfT key policies (and service delivery) are underpinned by the best STEM evidence, and strengthening the Department's relationship with the wider academic community.

¹ <http://www.civilservice.gov.uk/wp-content/uploads/2012/06/Civil-Service-Reform-Plan-acc-final.pdf>

4. Summary of the Council's achievements in 2014

In 2014, the Council provided advice and challenge on a wide range of issues, covering autonomous vehicles, energy, resilience and data analytics. There has been clear impact of the Council on the policy areas explicitly discussed, such as in the design of the Autonomous Vehicle competition and the Government response to the Brown review.

The Council has reviewed and helped shape transport-related project specifications, such as the Energy Research Partnership project on "Energy Options for Transport" and the DfT and Transport Systems Catapult project on "Data and its Application to Road Works". Our on-going horizon scanning activities have also benefitted from the Council's contribution in helping refine the monthly and quarterly technology watch bulletins as well as helping to shape the DfT response to a cross- Government initiative to identify the Departmental significance of a number of emerging technologies.

Overall, the Science Advisory Council has made good progress in its first year of operation and provides a valuable resource of strategic S&T advice. Important lessons have been learned in how best to make use of the Council and these will be applied in the coming year.

5. Review of the Council

5.1 Membership

The Council is formed of seven members drawn from a wide range of transport and non-transport sectors. It has initially been established on an *ad-hoc* basis to enable the Department to determine if there is a long term need for such an advisory body. It is expected that the Council would continue as an *ad-hoc* body for a maximum of three years before a more formal process in accordance with the Nolan principles is applied. The current Council membership is listed in **Table 1**. Current members were chosen in consultation between the Council Chair and the DfT Chief Scientific Advisor, and were approved by Ministers. Biographies of members can be found at **Annex A**.

Member	Institution
Professor Robert Mair (Chair)	Sir Kirby Laing Professor of Civil Engineering, Cambridge University
Mr Paul Stein	Chief Scientific Officer at Rolls Royce
Professor Paul Newman	Professor of Information Engineering at the University of Oxford
Ms Sue Duncan	Independent research consultant & Visiting Professor of Policy Studies at the University of Lincoln
Professor Barry Clarke	Professor of Geotechnical Engineering Leeds University
Professor Ricardo Martinez-Botas	Professor of Turbo-machinery, Imperial College London
Professor Peter Jones	Professor of Transport and Sustainable Development, UCL

Table 1: Membership of the Council.

The members of the Council have committed to a fixed term of two years, and agreed to the initial Terms of Reference (ToR), **Annex B**. While the Council has been set-up on an *ad-hoc* basis, the Department has followed Nolan Committee principles wherever possible. All members are responsible for ensuring independence, objectivity and impartiality and have declared any conflicts of interest with the remit of the Council.

The Council contains a mixture of senior academics and industry representatives. The Department was keen to ensure a balance of academic and industry perspectives on the Council to ensure input, and a strong relationship, with both of these key sectors. Council members were chosen from individuals eminent in their field who have the ability to constructively challenge the Department across its full policy portfolio.

The Council membership covers the broad landscape of the scientific, engineering and social science. However, the balance of skills, experience and expertise remains under review and will be more fully specified prior to formalisation of the Council taking into account changes in Departmental needs and priorities. The current membership of the Council meets the needs and objectives set out in the Science Advisory Council ToRs. However, further representation in Risk and Data Analytics have been highlighted as areas that would strengthen the Council's areas of expertise.

There is an option to supplement the expertise of the Council through temporary appointment of experts on relevant subjects on an *ad-hoc* basis. This flexibility will provide access to a wider pool of expertise, provide an efficient route to specialist external advice, and ensure the Department's scientific and engineering evidence base is being developed through effective external engagement.

5.2 Governance

The Science Advisory Council (SAC) reports to the DfT CSA via the Chair. This report provides a review of the Council's activities for its first year of operation. The main audience for this report are Senior Officials within DfT and Ministers.

The Council operates within the Government Office for Science's Code of Practice on Scientific Advisory Committees² and the principles of Scientific Advice to Government³. These set out the rules of engagement between government and those providing independent scientific and engineering advice.

The activities of the Council aim to be as transparent and open as possible. To this end, the SAC secretariat maintains a record of minutes for every Council meeting, which can be made available upon request. The SAC secretariat also make available appropriate information regarding the Council to the Government Office for Science

5.3 Format of Meetings

The Council is supported by a secretariat of DfT staff who assist the Chair and members of the Council in their role and promote the Council within the Department.

The inaugural meeting was held in January 2014 with subsequent SAC meetings taking place on a quarterly basis. Alternate meetings generally incorporate a working dinner. Meetings are attended by policy colleagues, with an interest in the main discussion topic on the agenda, and external speakers from other Government Departments and external organisations.

Discussions have been structured around one or more main topics with the subject(s) for future meetings generally decided upon in the preceding meeting with input from the Council and steer from senior officials in DfT. This enables the Council to consider a range of longer term strategic issues and to be flexible to shorter term policy needs.

The focus of the main topics are issues identified as priorities for the DfT by policy colleagues. The discussion is informed by a paper produced by the lead policy team, which provides background information and poses key policy questions. The discussion is led by the policy lead and often supported by relevant external stakeholders. In addition to the policy officials, some meetings have been attended by the Director General who owns that policy area.

² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/278498/11-1382-code-of-practice-scientific-advisory-committees.pdf

³ <https://www.gov.uk/government/publications/scientific-advice-to-government-principles/principles-of-scientific-advice-to-government>

Details of the main topics discussed are highlighted below.

5.4 Council Discussion Topics

Each SAC meeting has focussed on a main subject driven by Departmental priorities. These have, to date, been tabled by the Department as important issues with clear and pressing implications for key policy areas. The Council provided valuable advice and challenge on these topics, as outlined below. More information on each discussion can be found in the minutes of the relevant meeting. The topics discussed so far, have included: autonomous vehicles; infrastructure resilience; energy; and data.

Going forward, it has been suggested and agreed by members that future topics of discussion will include the Highways Agency/Highways England; synergies across transport modes and the Department's evidence and research agenda. A further topic to be included in a future meeting will be lessons that can be learnt from international comparisons.

Autonomous Vehicles 20th January 2014

(Senior attendance: Philip Rutnam, Permanent Secretary)

Autonomous vehicles have the potential to improve road safety, increase fuel efficiency and reduce congestion and have received widespread coverage in the media. However, there are many technological and policy barriers that need to be addressed before they are ready for widespread use.

The Council provided advice on a number of key issues to International Vehicle Standards (IVS) in preparation for their Regulation review and trial design. In particular the issue of liability was raised. In the event of an incident involving a driverless vehicle, it was recommended that the Department should have prepared lines to take when the first major accident happens as initial public response to this inevitable event could adversely affect take-up of these technologies. The development of autonomous cars can also be taken as an opportunity to design vehicles to more accurately reflect their needs. Broader social factors were also highlighted as an area where the Department should focus, which is forming a significant part of the recently agreed trials.

It was highlighted that the UK is well placed to be a world leader in autonomous technology as it has an excellent talent pool of programmers and engineers. The Council also advised on the £10 million (later increased to £19m) prize fund for a demonstration project on driverless cars to contribute to DfT policy objectives, stressing the need to ensure that the fund is accessible to UK SMEs and innovators and not be dominated by bigger international companies.

Infrastructure Resilience 30th April 2014

(Senior attendance: Jonathan Moor, Director General, Resources and Strategy)

This was the main topic of discussion for the second SAC meeting and focussed on the Resilience Review undertaken by the Department in

response to the severe storms and flooding of winter 2013/2014. The aim of the review was to identify practical measures to improve resilience of the transport network to severe weather events, in the short term, and to consider the longer-term resilience of transport infrastructure.

The Review team, led by Richard Brown, presented the aims of the review to the Council and asked for advice specifically on technology options and stakeholders they should consult.

The Council made a number of observations and suggestions to the review team include around technology, particularly in respect of the potential for new and emerging sensing technology to aid asset assessment, failure prediction and management during an extreme weather event. The specific recommendation was made that the review consider an approach to infrastructure investment based on the 'disruption index' used in the aviation sector. This provides a tried and tested method to prioritise resource expenditure on those parts of the network most vulnerable to failure and likely to cause the most disruption.

Council members provided contacts to the Review team with Japanese industries that had experience of dealing with significant natural hazards as well as UK experts on sea defences, which was expected to be a focus of part of the review.

The infrastructure resilience review was published on 22nd July 2014, with the Government response published on 27th November 2014. The Council fed into the Government response, raising some of the technology issues that they considered had not fully been addressed in the review's recommendations.

Energy 2nd July 2014

(Senior attendance: Steve Gooding, Director General, Roads, Traffic & Local)

There are clearly strong links between transport and energy. The use, make-up and availability of the UK energy capacity has potential to have a major impact on the Department's policies. The increased uptake of electric road vehicles, electrification of the rail network, regulations on the use of bio-fuels and the emergence of new energy vectors together with the challenges of air quality and the ongoing goal of reducing greenhouse gas emissions mean that the links between transport and energy policy are only going to increase.

This SAC meeting focussed on a research proposal from the Energy Research Partnership (ERP)⁴, developed jointly by the DfT, DECC and the office of the Government's Chief Scientific Advisor (funded by GO-Science and ERP). The ERP specifically requested input from the Council in shaping the scope of a transport energy project as this was the first time ERP had looked at transport/energy interface issues.

⁴ <http://erpuk.org/>

The Council provided feedback to the ERP review team and Departmental colleagues on the focus of the review, highlighting the need to consider the broader public acceptability issues in parallel to the technology challenges and recommended focussing on plausible future scenarios, including international case studies, rather than purely technical issues, using novel approaches, such as gaming exercises, to test future scenarios.

This SAC meeting also provided advice on the scope of a short “deep dive” study looking at the future of advanced fuels. The review was completed 2nd November 2014 and has been provided to DfT policy colleagues, DECC and ERP.

Data and Data Analytics 21st October 2014

(Senior attendance [evening dinner discussion]: Philip Rutnam, Permanent Secretary)

The UK is a world leader in open data and there is a strong focus within Government on the exploitation of the rapid increase in data and analytics. Transport is at the forefront of this revolution with the potential for data to provide significantly smarter, more efficient transport systems, facilitate smart asset management and improve public services. There remain challenges particularly around governance, security and privacy.

A presentation was provided by the Government Office for Science (GO-Science) on the Data Science in Government programme that highlighted a number of examples in using data to aid and improve Government action, focusing on visualisation. The project highlighted tools using real time data in secure environments and showed demonstrator projects. Resilience Direct Plus was used to show visualisation of currently available data.

The Council highlighted the potential for the Department from better use of data and discussed how the Department can best address the challenges of the exponential increase in data and issues around its availability, collection, dissemination and use.

The Council also provided advice to the Transport Systems Catapult (TSC) on a project on the use of data and data analytics to better plan and manage large road upgrade schemes to help minimise disruption to the users. The Council members agreed that the issue of congestion and traffic management around road works on the strategic road network provided a valuable test-bed for understanding the value of combining multiple data sources to enable better planning and understanding the impact on the surrounding local road network.

This project will be taken forward with the TSC, Highways Agency/Highways England and DfT.

5.5 Departmental Interaction and Impact

The DfT Science Advisory Council primarily works together with the Departmental CSA, to identify Department areas to help support and challenge and provide expert independent advice. The Council offers strategic science and engineering advice on policy issues and Departmental delivery. The Council members have also played a leading role in steering the Department's horizon scanning capability, offered advice and challenge to key projects and extended the Department's network of contacts by strengthening links with the wider scientific community.

The formal Council reporting channel is through the CSA. However, each meeting of the Council has included key policy leads and has been attended by senior officials at Director, Director General level or by the Permanent Secretary. This has enabled the Council to provide the advice and challenge to the policy owner. Policy colleagues have had the offer of making further contact with Council members and/or their contacts as required, thus further strengthening the relationship between the Council and policy teams.

While the Council has provided advice across a range of policy areas in its first year, there remain areas of the Department where there is only limited awareness and visibility of the Council. Broadening the Council's interaction and impact in the Department will be a key focus of its second year of operation.

A mechanism by which any individual Council member's expertise can be used within the Department, outside of a formal Council meeting, would further raise the profile of independent engagement across the DfT. This will also be a focus in the coming year.

The majority of SAC meetings have been attended by a senior official. The Permanent Secretary attended the first Council meeting, as well as attending a working dinner to discuss High Speed Rail. Each meeting has also been attended by a Director General with an interest in the main discussion topic. It has also been noted that the Permanent Secretary and Director Generals have welcomed, on a number of occasions, input, challenge and advice from the Council, and made known their support of a close working relationship. A particular example of this is the Director General for the Resources and Strategy Group welcoming the Council's contribution and interest in being the link between the Council and Executive Committee.

6. Summary and Conclusions

Much of the first year of operation has focussed on bringing the Council members up to speed with how the Department works and its main priority areas. It is beginning to show an impact in individual policy areas, however, there remains significant scope to increase the Council's visibility, influence and impact in the Department.

There has been clear impact of the Council on the policy areas explicitly discussed at the meetings, such as in the design of the Autonomous Vehicle competition and the Government response to the Brown review. The Council has also helped shape specific projects in energy and data, both of which will report in the next annual reporting period. It has helped drive DfT's new Horizon Scanning and Technology Watch activities and has identified key technology areas for 'deep dive' review. Going forward, the Council's review of the Department's Evidence and Research Strategies (ERS) will help provide an external viewpoint of the Department's research programme. This highlights a good use of expert and strategic thinking across a wide range of research and ensures the Department's research needs are identified.

The Council is beginning to become embedded in the Department, however a key focus for next reporting year will be to increase visibility across DfT, particularly with Executive Committee members, Non-Executive Directors and Ministers. It is also important the Council members are proactive about bringing key strategic Science and Engineering issues to the attention of the Department and provide strong challenge to the Department's Science and Technology work. It will also be worth considering the relationship and role with DfT agencies, particularly with the change in status of the Highways Agency and Network Rail.

Overall, the Science Advisory Council has made good progress in its first year of operation and provides a valuable resource of strategic S&T advice, however work needs to continue to ensure this resource is better utilised. Progress has already been made to address some of these issues by, for example, extending the length of Council meetings to allow more time for consideration of key issues, and the identification of a small number of additional members to augment the Council's expertise in key areas.

There are a number of opportunities upcoming in the next reporting year including: the appointment of a new Departmental CSA; the election of a new Government; and a Comprehensive Spending Round. The latter two events will present significant opportunities for the Council to influence the future direction of Science and Engineering in the Department.

A decision will also need to be made in the next reporting year on the future of the Council. Any continuation of the Council's mandate will require replacing

the current *ad-hoc* status with a more formal structure following the Nolan Principles⁵ including appointment of new members.

⁵ <https://www.gov.uk/government/publications/the-7-principles-of-public-life/the-7-principles-of-public-life--2>

7. Annex A

Biographies of Council members

Chair, Robert Mair



Robert Mair is the Sir Kirby Laing Professor of Civil Engineering and Head of Civil and Environmental Engineering at Cambridge University. He was Master of Jesus College 2001-2011 and Senior Vice-President of the Royal Academy of Engineering 2008-2011. Before he was appointed to a Professorship at Cambridge in 1998 he worked in industry for 27 years, in 1983 founding the Geotechnical Consulting Group, an international consulting company based in London. He is Chairman of Laing O'Rourke's Engineering Excellence Group.

His research group at Cambridge specialises in the geotechnics of tunnelling and underground construction. He has advised on numerous tunnelling and major civil engineering projects in the UK and worldwide, including the Jubilee Line Extension project for London Underground. He introduced the technique of compensation grouting to the UK; this was successfully used to protect Big Ben from movement due to construction of the adjacent Westminster Station and the technique has now been adopted world-wide. He is closely involved with Crossrail, Europe's largest civil engineering project, and is a member of its Engineering Expert Panel. He gave evidence to the House of Commons and House of Lords Select Committees in connection with the Crossrail Bill.

Professor Mair also leads the Centre on Smart Infrastructure and Construction at Cambridge, involving the innovative use of the latest sensor technologies to monitor the behaviour of civil engineering infrastructure. He chaired the Royal Society/Royal Academy of Engineering Report on Shale Gas for the Government, published in 2012. He was elected a Fellow of the Royal Society in 2007 and awarded the CBE in 2010 for services to Engineering.

Sue Duncan



Sue Duncan is an independent research consultant, with over thirty year's experience working in the public sector, at the centre of government in the Cabinet Office and Treasury, and in social policy departments, such as the Department for Work and Pensions, and Communities and Local Government.

While at the Cabinet Office, she worked in the Prime Minister's Strategy Unit and was Director of Policy Studies in the Centre for Management and Policy Studies, where she was responsible for good practice in policy making, research and evaluation and for evidence-based policy making. For much of her civil service career she was in the Government Social Research service (GSR), where she worked closely with senior civil servants and Ministers, providing research based advice and policy analysis to inform government decision making. Her career in government culminated in her appointment as the first ever Chief Government Social Researcher, responsible for the thousand or so social researchers working across government.

She has written and lectured widely on policy, research, research utilisation and evidence-based policy making. Publications include a book on the policy process under New Labour (Bochel & Duncan 2007) *Making policy in theory and practice* (Bristol: Policy Press), and articles in peer reviewed journals. She is a social scientist and has a BSc (Hons) from the University of Bath and an MA from the University of Sussex. She was a Visiting Professor at the University of Bristol and is now a Visiting Professor at the University of Lincoln; a Fellow of the Market Research Society; an Academician of the Academy of Social Sciences; a member of the Social Research Association; an Honorary Fellow of Cardiff University and an Honorary Doctor of the University of Bath. She is also President of the Social Policy Association; a Trustee of the Stroke Association and Chair of its Research Strategy Committee.

Barry Clarke



Barry Clarke, Past President of the Institution of Civil Engineers and Professor of Civil Engineering Geotechnics, is a founding Director of the Institute of Resilient Infrastructure at the University of Leeds. He is a Past President of the UK Engineering Professors Council; represents higher education on the Board of CITB ConstructionSkills, the training body for

the UK construction industry; is chair of E4BE, a UK Construction Industry Council led body that focuses on the educational base of professionals working in the built environment; is a member of the Engineering Strategic Advisory Team of EPSRC, the research funding body for engineering research in the UK; and is Chairman of the Engineering Accreditation Board, a body that brings all the UK professional engineering bodies together to address the education of engineers.

Paul Stein



In his early career Paul Stein has held engineering roles with Philips, Thorn-EMI and Thales in the field of radio communications systems. Then as Managing Director of Roke Manor Research, a Siemens Company, he span out its most famous commercially successful innovation, 'Hawk-Eye'. In 2003 he joined the Siemens UK Executive Management Board with special responsibilities for innovation and business strategy. In 2006 he moved to the UK Ministry of Defence as the Director General, Science and Technology. In 2010 Paul joined Rolls-Royce, the global power systems company, as the group Chief Scientific Officer. Amongst other responsibilities, Paul is shaping the Rolls-Royce Innovation Strategy

which is helping maintain the business at the leading edge of its markets. Paul is a Fellow of the Royal Academy of Engineering, a Fellow of the Royal Aeronautical Society and a Fellow of the Institution of Engineering and Technology.

Paul Newman



Paul Newman is the BP Professor of Information Engineering at the University of Oxford and an EPSRC Leadership Fellow. He heads the Mobile Robotics Group within the Department of Engineering Science which enjoys a world leading reputation in mobile autonomy - developing machines and robots which map, navigate through, and understand their environments. His focus lies on pushing the boundaries of navigation and autonomy techniques in terms of both endurance and scale. He enjoys collaborations with many industrial partners (esp. BAE, Nissan, BP, Guidance Ltd) which provide exploitation

opportunities to drive the research. The group has developed a keen focus on intelligent transport.

He obtained an M.Eng. in Engineering Science from Oxford University, Balliol College in 1995. He then undertook a Ph.D. in autonomous navigation at the Australian Center for Field Robotics, University of Sydney, Australia. In 1999 he returned to the United Kingdom to work in the commercial sub-sea navigation industry. The navigation software he wrote then was used to repair the Deep Sea Horizon leak in 2010. In late 2000 he joined the Dept of Ocean Engineering at M.I.T. where as a post-doc and later a research scientist, he worked on algorithms and software for robust autonomous navigation for both land and sub-sea agents. In early 2003 he returned to Oxford as a Departmental Lecturer in Engineering Science before being appointed to a University Lectureship in Information Engineering and becoming a Fellow of New College in 2005, Professor of Engineering Science in 2010 and BP Professor of Information Engineering and Fellow of Keble College in 2012. He was elected a Fellow of the Royal Academy of Engineering in 2014.

Peter Jones



Peter Jones is Professor of Transport and Sustainable Development in the Centre for Transport Studies at University College London, and was previously Director of the Transport Studies Group at the University of Westminster. He has a wide range of transport research and teaching interests, covering both analytical methods and policy. These include traveller attitudes and behaviour, travel trends and the determinants of travel demand, traffic restraint studies, accessibility studies, policy option generation, major transport economic and social impact studies, public engagement, development of new survey and

appraisal methods, and advances in urban street planning and design.

He is a member of the Independent Transport Commission and the Transport for London Roads Task Force; he also chairs the West End Partnership's Transport Group. He was recently a member of the International Task Force for the Chinese 'Green Travel in Cities' initiative, and has carried out various advisory roles for the European Commission and for several national and city governments.

Ricardo Martinez-Botas,



Ricardo is Professor of Turbomachinery at Imperial College London, and Head of the Thermofluids Division in Mechanical Engineering. He leads a research group in the area of low carbon vehicles with particular emphasis to highly downsized engines, turbochargers and energy storage systems. The work has attracted wide support not only from Government agencies but also from the automotive industry.

8. Annex B

Terms of Reference for DfT Science Advisory Council

1. Aim of Council

The SAC's primary aim is provide independent scientific and technical advice to DfT.

The provision of independent scientific and technical advice by the SAC will help to assist the DfT CSA to assure the quality and appropriateness of the Department's use of Science and Technology (S&T).

2. SAC Objectives

The objectives of the council are:

- i. To advise the department on its systems, capability and processes for obtaining (S&T) advice that is fit for Departmental needs;
- ii. To review the Department's strategic S&T priorities;
- iii. To comment on key S&T risks, and contribute to horizon scanning capability;
- iv. To reinforce links to national and international research community enabling DfT to get access to the best evidence;
- v. To respond to ad-hoc requests for advice to support policy, where appropriate.

3. Responsibilities of the SAC Chair

- i. The Chair is responsible for effective operational working of SAC and the delivery of SAC objectives, including the provision of high-quality timely advice.
- ii. The Chair is responsible for ensuring the independence, objectivity and impartiality of the SAC.
- iii. The Chair will report the SAC's advice to the DfT CSA including alerting DfT to new evidence likely to have an impact on current thinking; if appropriate the Chair could make representations to DfT DG's the DfT Permanent Secretary or the GCSA.
- iv. The Chair is responsible for ensuring that the full range of scientific views (expressed by SAC members) are appropriately taken into account during meetings and recorded in the minutes.

- v. The Chair is responsible for representing the consensus of the membership; agreeing and summarising the decisions taken by the SAC and resolving any disagreements within the SAC.
- vi. If the Chair is unable to continue in the role for any reason the Secretariat will consider and implement appropriate measures on a case by case basis.

SAC Chair Appointment and Rotation

Candidates for the SAC Chair will be nominated from learned societies and professional institutions. From this short list the DfT CSA, in consultation with the SAC secretariat and senior DfT colleagues, will make a recommendation to ministers for the position of SAC Chair.

If approved by ministers an invitation will be sent to the selected candidate.

If the Chair should step down the DfT CSA and SAC Secretariat will decide on succession planning, taking advice from the SAC membership. The selection process will likely follow similar steps as set out above

SAC Appointment and Process for Filling Expertise Gaps in SAC

The SAC would consist of approximately 6-8 members made up of mixture of senior academics and industries representatives. The members would be drawn from a mix of transport and non-transport domains, with a focus on candidates who can take a strategic view of Departmental issues. Candidates will be nominated from the learned academies, professional institutions and societies and selected using the criteria below:

- Independently Minded and Intellectually Neutral⁶
- Expertise, Skills and Experience
- Seniority and International Reputation
- Familiarity with Government Processes and Key Policies
- Promotion of Fair and Independent Process

Candidate nominations will be sent to the Chair and DfT CSA, who will agree the final short list. A small panel led by the Chair and including the DfT CSA will then make a final selection with agreement from Ministers. An invitation letter from the Chair and CSA will be sent to the selected candidates.

SAC Membership

SAC members are expected to commit to the process for a minimum of two years.

⁶ Self-aware, curious, independent, interest in areas wider than individual disciplinary expertise.

The Chair, together with the DfT CSA and SAC Secretariat will regularly review the balance of skills, expertise, and experience of the SAC - in light of both current and anticipated future departmental needs and priorities.

The Chair, together with the DfT CSA and SAC Secretariat will actively plan for SAC succession with the membership's input.

4. Responsibilities of the SAC Secretariat

- i. The SAC Secretariat will assemble, analyse and record conclusions of meetings; the records of the meetings will include a summary of the key SAC discussions and the Chair's summary.
- ii. SAC minutes will be published on Transnet/DfT Website (once ratified by the SAC) and recorded unattributably. If a SAC member wishes to have a comment made attributably, this can be undertaken.
- iii. The SAC Secretariat will provide impartial independent support to the SAC Chair and arrange appropriate briefings.
- iv. The SAC Secretariat will agree the agenda of meetings with the Chair and DfT CSA.
- v. The SAC Secretariat will generate and disseminate papers to members ahead of each meeting.

5. Responsibilities of the SAC Members

- i. Members are expected to abide by the seven principles of public life (Nolan Principles – see below)
- ii. SAC members and the Chair should take note of the GCSA's *Guidelines on the Use of Science and Engineering Advice in Policy Making* and the GCSA's *Principles of Scientific Advice to Government* (details below).

<http://www.bis.gov.uk/assets/goscience/docs/g/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf>

<http://www.bis.gov.uk/go-science/principles-of-scientific-advice-to-government>

- iii. These papers will help the SAC to understand how science advice is taken up with departmental officials. Any issues should be discussed with the SAC Secretariat.
- iv. Members should ensure they understand why they are being appointed to the SAC and in what capacity.

- v. All members should share in the general responsibility to consider the wider context in which their expertise is deployed.
- vi. Members should confirm before accepting an invitation to serve on the SAC that they are clear about the period of the appointment and that they can fulfil the commitment required in terms of appointment, meeting attendance, SAC business and preparation for meetings.
- vii. All members are responsible for ensuring the independence, objectivity and impartiality of the SAC; individuals appointed to the SAC should not act as representatives for their particular profession, employer or interest group, and have the duty to act in the public interest.
- viii. Any changes to the role/function of individual members on the SAC must be agreed with the Chair and DfT CSA.
- ix. Members' role on the SAC should not be circumscribed by the expertise or perspectives he/she was asked to bring to the Group. Members should regard themselves as free and encouraged to question and comment on the information provided or the views expressed by any of the other members; notwithstanding that the views or information do not relate to their own area of expertise.
- x. Members can raise any concerns in regard to the SAC with the Chair or SAC Secretariat.

6. SAC Ways of Working

- i. DfT CSA will inform SAC of DfT's research agenda and the strategic direction of and priorities for departmental science.
- ii. SAC will report via the Chair to the DfT CSA.
- iii. SAC will meet 4 times per year.
- iv. The Council will be supported by a wider network of Subject Matter Experts that would be able to provide more focussed advice on specific issues.
- v. The SAC will provide an annual report to the Permanent Secretary and Ministers. It may also provide specific reports on ad-hoc issues as required.
- vi. Declaration of Interests must be provided and signed by all SAC members (including the Chair) and updated as appropriate and as circumstances change. The Register will be held by DfT only. Any issues should be discussed with the SAC Secretariat.
- vii. SAC members generously provide their time and expertise in-kind, no honorarium is provided. DfT will reimburse all reasonable travel and

incidental expense. In compliance with HMG guidelines, no first class travel can be undertaken for DfT business.

Seven Principles of Public Life ‘Nolan Principles’

1. Selflessness

Holders of public office should act solely in terms of the public interest. They should not do so in order to gain financial or other benefits for themselves, their family or their friends.

2. Integrity

Holders of public office should not place themselves under any financial or other obligation to outside individuals or organisations that might seek to influence them in the performance of their official duties.

3. Objectivity

In carrying out public business, including making public appointments, awarding contracts, or recommending individuals for rewards and benefits, holders of public office should make choices on merit.

4. Accountability

Holders of public office are accountable for their decisions and actions to the public and must submit themselves to whatever scrutiny is appropriate to their office.

5. Openness

Holders of public office should be as open as possible about all the decisions and actions that they take. They should give reasons for their decisions and restrict information only when the wider public interest clearly demands.

6. Honesty

Holders of public office have a duty to declare any private interests relating to their public duties and to take steps to resolve any conflicts arising in a way that protects the public interest.

7. Leadership

Holders of public office should promote and support these principles by leadership and example.