

Preface

Mass transportation has become central to the lifestyle of developed societies. Long-distance commuting to work has become commonplace, and commerce requires ever greater amounts of transport capacity for goods over ever increasing distances. Alongside these trends, the advent of low-cost air travel has led to a massive increase in passenger mileage. Inevitably, such developments have consequences for the environment and, ultimately, also for human health.

Air transport is one of the fastest growing transport sectors and subsonic aircraft operate, typically, in the upper troposphere where their emissions can have an appreciable impact. David Lee reviews the contribution of aircraft to global pollution and examines some aircraft-specific phenomena such as contrail formation that have a direct impact on climate forcing. In the second chapter, Dick Derwent takes a forward look at the possible consequences of a future hydrogen economy, which is seen by some experts as a panacea largely without adverse environmental consequences. This chapter takes a dispassionate look at the effects of increasing the use of hydrogen as a fuel upon atmospheric chemistry and how this will impact upon climate. The overall conclusion, however, is that the climatic effects of a hydrogen economy will be much smaller than those of the carbon economy it may replace and, at least in respect of climate impacts, this is rather reassuring.

An ultimate aim of policy should be to render mass transport sustainable. A valuable tool in assessing progress towards sustainability is the performance indicator, which can be used as a measure of progress. However, devising such indicators is by no means straightforward and in the third chapter Henrik Gudmundsson explains the complexities of devising performance indicators for sustainable transport and reviews some of the more important activities to date. Perhaps even more problematic is the development of policy instruments for achieving sustainable transport. Most members of society have a strong belief in reducing car use, but a much lesser enthusiasm for reducing their use of their own

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car. Inevitably, reductions in car use will only be effected as a result of the introduction of policy instruments such as the congestion charging introduced recently in central London. In the fourth chapter David Begg, who is well known as a transport adviser to the UK government, and David Gray discuss the policy instruments that could be applied and their likely effectiveness.

Transport, especially in the form of road vehicles, contaminates not only the atmosphere but also surface waters. In the next chapter, Mike Revitt examines how traffic is responsible for a wide range of pollutants that subsequently enter and cause deterioration of the quality of surface waters. This is an area where a good deal of specific case study information is available. Engineering controls can be developed but only at considerable expense.

Evaluation of climate change as a result of changes to radiative forcing brought about by greenhouse gases and other atmospheric constituents can currently only be evaluated through the use of computationally intensive global circulation models. One of the major centres for research on climate change is the Max Planck Institute (MPI) for Meteorology in Hamburg, and Martin Schultz, Johann Feichter, and Jacques Leonardi of the MPI have contributed a chapter on climate impacts of surface transport, in which they evaluate the contribution of surface forms of transport to greenhouse emissions and the consequent effects on the atmosphere.

Whilst greenhouse gases have little direct effect on human health, there is ample evidence that other pollutants generated by combustion can have very significant effects on the health of human populations. In the final chapter, Roy Harrison and Stephen Thomas examine the contribution of the various surface transport options to emissions of locally acting air pollutants and review the evidence that those pollutants are having an impact upon public health. Specific studies of the health effects of living in close proximity to major roads are also considered.

This volume of *Issues* represents an important collection of papers on the major aspects of the subject from authors with international reputations for their research in the field. As such, it presents an authoritative review of the current state of knowledge that should prove of lasting value to scientists, policymakers and students on environmental science and engineering courses.

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