Conclusions

English translation from the study 'Hoe groen kunnen we vliegen?'
Publicatienummer: 09.7842.18

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Air travel has major environmental impacts

Air travel generates noise, causes air pollution and contributes to global warming. Without additional policy measures, the share of aviation in each of these problems will continue to rise in the years ahead, even though a reduction in greenhouse gas emissions is essential to combat climate change.

Optimistic aviation scenarios, but climate impact continues to grow

Government policy is generally elaborated on the basis of future projections and scenario studies. Without exception, current scenarios of trends in air travel show strong further expansion of the aviation as a result of ever-rising prosperity. In certain respects, though, these scenarios paint an all too rosy picture of the future:

- Although the price of oil has a significant impact on demand for air travel, oil price fluctuations are insufficiently reflected in aviation scenarios. If these proceeded from the oil prices currently predicted, projected growth in air travel would be prove to be rather more modest.
- A higher oil price will mean a decline in growth in demand for aviation, both in the Netherlands and globally. In addition, a higher oil price will give airlines an even greater incentive to achieve fuel savings (and thus reduced CO_2 emissions). As a result, and owing to declining growth in demand, a higher oil price leads to a clear slackening of the growth of the climate impact of aviation.
- A possible decision by Air France/KLM to limit the scale of its intercontinental network at Schiphol may mean a significant reduction in the number of passengers and aircraft movements at this airport. In terms of global emissions this will have hardly any impact, however.
- While most scenarios assume the price of air tickets will continue to fall, we consider it far more likely that the recent sharp decline in the costs and prices of aviation will flatten out. The main drivers – liberalisation and the associated emergence of low-cost carriers – have now played out on the intra-European market and will have less impact on prices in intercontinental markets. In addition, a new wave of consolidation in the airline industry may have a countervailing effect.
- Extension of the high-speed rail network may lead to a considerable reduction in demand for air travel from the Netherlands. Up to around 40% of flights are to destinations less than 800 km away, the break-even point at which air travel begins to deliver gains in terms of reduced travel time.
- As the existing policy framework is further fleshed out, the environmental costs of aviation will be internalised. By including this sector in the EU ETS, a start has already been made with the external costs of CO_2 emissions. This will mean less pronounced growth of the industry.

In conclusion, as things stand at the moment, existing scenarios of demand for air travel make insufficient allowance for a number of major uncertainties. If these were better incorporated, there would be more variation in the results. Our analyses indicates that there is a high probability that growth in global demand, and certainly growth at Schiphol, will prove to be lower than the scenarios project. Nonetheless, even in scenarios with less pronounced growth sectoral CO_2 emissions will continue to grow.

Technological and operational measures can limit the growth of environmental impacts

Improved aircraft technology and the use of biofuels provide scope for reducing emissions, or, more precisely, emissions per passenger-kilometre. Biofuels reduce CO_2 emissions but have no effect on non-CO_2 climate like contrails. Less is to be expected from operational improvements and transport alternatives for transport such as video-conferencing.

At the same time, it is clear that the growth rates currently projected will cancel out any gains in efficiency. If the scale of air travel continues to grow, there is no way that either major technological improvements or biofuels can reduce emissions to the level of 2005, let alone to that of 1990, say. Although there is every chance that sectoral growth will in fact turn out to be less pronounced than predicted in the scenarios, a stabilisation or reduction of emissions would seem to be a long way off for the time being.

It should be noted, moreover, that the efficiency improvements are conditional. *If* the ACARE targets are met and *if* more efficient aircraft are also commercially attractive; *if* biofuels can be developed that reduce emissions along the entire supply chain and *if* those biofuels are no more expensive than conventional kerosene; *if* the scope for operational improvements has not been exhausted and *if* teleconferencing indeed starts replacing business flights, *then* the growth in emissions can indeed be halted or, in this most optimistic scenario, emissions may even gradually start to fall.

There is clearly little chance of all these trends actually materialising. Without government action, therefore, aircraft emissions will in all probability continue to grow. The next section considers how government policy can stimulate the envisaged technological developments and how such policy might lead to a stabilisation or reduction of emissions.

Improved environmental performance requires robust government policy

Robust environmental policy can create incentives for technological and operational measures. The environmental impact of technological improvements depends on their penetration of the fleet. That impact will be directly proportional to the financial benefits for operators. Economic policies addressing the indirect climate impacts of NO_x emissions at altitude, contrails, local air pollution at ground level and noise will promote the introduction of new, clean technology. To achieve a solid reduction in the environmental impact per passenger-kilometre it is therefore essential that policy goes beyond including aviation in the EU ETS. Policies also need to be put in place to reduce the sector's other environmental impacts, such as policy to control NO_x emissions (inclusion in the EU ETS, or a charge), policy to reduce other climate impacts and noise (a tax on air travel, for example) and policy to combat air pollution (an LTO emissions charge).

Government policy geared to internalising external costs can put a brake on growth in demand for air travel, moreover. This is essential to prevent the environmental gains of technical improvements being cancelled out by growth in the overall scale of air travel.

In the most favourable case, it is not unfeasible for growth in aviation emissions to be slowed down. This will require robust government policy, however. Only then will technological advances be rewarded and penetrate the aircraft fleet. And only thus can demand for air travel develop in such a way that it does not cancel out the effect of technological improvements.

Without additional policy measures, the aviation sector's demand for emission credits may increase to 9% of the sum total allocated to other sectors. This will result in a further increase in ETS prices, which will have a knock-on effect in other ETS sectors, too. Electricity prices in the EU will rise and industrial manufacturing will become a costlier business here. In the absence of additional measures this could lead to politically undesirable situations, such as 'carbon leakage' in industry, for example, or a sharp rise in consumer electricity prices.