Sustainable Air Transport in 2050

A recent Swedish project explored three scenarios of air travel on a sustainable path in 2050. The results suggest that slower aircraft configuration cruising at lower altitudes would entail a 56% cut of CO₂ emissions compared to 2000. If this technology is coupled with a weakened emphasis on economic growth and less hectic lifestyles, air travel would significantly increase in a sustainable and environmentally friendly way.

The fast growth of air transport results in undesirable increases in CO₂ emissions worldwide. In the EU, CO₂ emissions from aviation grew by nearly 70% from 1990 to 2002. Even though aviation's share of overall EU greenhouse gas emissions is still modest (about 3%), its emissions are growing faster than any other sector and risk undermining progress achieved through emission cuts in other areas of the economy.

In its efforts to curb the global greenhouse gas emissions, the EU has adopted the IPCC’s sustainable target level for CO₂ concentrations in the atmosphere equivalent to 450 ppm CO₂ level. This level implies the reduction of global emissions of CO₂ by 42% by 2050 compared to 2000 and by about 50% between 2050 and 2100.

A recent Swedish project explored three possible scenarios that may lead to sustainable air transport in 2050 implying a stabilisation of CO₂ concentration in the atmosphere at 450 ppm. The researchers used a backcasting approach which includes setting targets, outlining future Images (scenarios) in which society meets the targets, and analysis of paths from the present to the future Images.

All the Images were thus tailored to meet the 450ppm CO₂ target and they all assume the use of fossil fuel, kerosene. The Images differ in employed technologies and main drivers of air travel development.

It is argued that although the introduction of more radical aircraft designs probably has the highest ultimate potential for reducing energy use and emissions, this option is associated with a large uncertainty regarding the successful market deployment of such aircrafts. Therefore less risky technology trajectories were considered:

- **Image 1** is characterised by continued incremental refinement of the conventional aircraft configuration. The development of air travel is guided by rapid economic growth resulting in rapid pace in society and hectic lifestyles.

- **Images 2 and 3** switch to high speed propeller aircraft cruising at lower speeds and lower altitudes. Contrary to Image 1, Images 2 and 3 assume a slower pace in society since the focus has shifted from economic gain to activities relying less on consumption and more on leisure. The two Images differ in spatial focus, with Image 2 implying global spatial interest resulting in long distance leisure travels; and Image 3 being locally and regionally oriented.

It is concluded that even though a 40% reduction of fuel intensity may be achieved by refinement of the conventional aircraft, this path is probably not sufficient to reach the target levels. On the other hand, lowering the speed and the altitude of cruising by using high speed propellers entail a 56% cut of CO₂ emissions compared to year 2000. If this technology trajectory is combined with a development characterized by a weakened emphasis on economic growth together with less hectic lifestyles, it may be possible to reach even the most demanding of the target levels (i.e. assuming that the share of the air ravel CO₂ emissions doubles compared to 2000). Air travel per capita in 2050 would then be slightly higher than in 2000. If only the less demanding target level is to be reached (a constant share of CO₂ emissions from air travel compared to 2000) global air travel per capita could be about 110% higher than in 2000.

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