

## The Light Beyond the Clouds

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Beyond the dark clouds there is light. Is this a topical description for the past, present and future of our industry? In the past, it was our ambition to travel fast and above the weather that inspired the development of the jet engine by its inventors, Sir Frank Whittle and Dr. Hans von Ohain in the late 1930s and early 1940s. A similar sentiment may be seen in the motto of the Royal Air Force, “per ardua ad astra” (through adversity to the stars). Since the 1950s, millions of flights carrying billions of passengers have burst into bright sunlight when taking off from a grey-weather airport to fly above the clouds; similarly, millions of tourists have left cloud-bound climates to enjoy the sunshine in distant places; places that would have been inaccessible to the majority in the absence of massive investments and the efforts of thousands of engineers in the technology for advanced, reliable and very safe propulsion systems.

Society in general and our industry in particular is now passing through a dark cloud arising from the tragic health and economic consequences of Covid-19. However, the recovery prospects are good in the medium term. The pandemic has brought about significant changes in the working patterns of many economic sectors and suppressed both leisure and business travel. Some of these changes may have some permanency, including a much more widespread use of home working and greater use of online conferencing for business meetings. Employers and employees can derive and are deriving benefits from more flexible approaches to employment. However, the need to meet international colleagues and clients, face-to-face remains, and the pent-up demand for international tourism will be satisfied. It is widely recognised that tourism brings a wide range of cultural, social and economic benefits. The contribution of civil aviation to this large, important and growing economic sector is clear. In many island nations, tourism is close to, or exceeds 50% of the local GDP, and in Europe, tourism was approaching a value of 1 trillion Euros pre-pandemic. Vaccinations are showing that the pandemic can be tamed and that, with appropriate precautions, life will progress to a new normal. So, there is every reason to be optimistic and expect, perhaps within two years, that we will break through the dark cloud of the pandemic, hopefully, giving rise to a higher and brighter demand to travel for tourism.

Another dark cloud that we are confident will be left behind is the environmental footprint of aviation. It is very important that zero-carbon flight is secured without constraining demand, given all the technological, economic and social benefits that aviation brings. We firmly believe that, through technology, our community has the solutions simultaneously to protect the environment and the socio-economic benefits of civil aviation. These technologies are wide-ranging and encompass the use of

hydrogen, sustainable aviation fuels, advances in propulsion systems and aircraft, electrification and hybrid gas turbines, fuel cells and clever power management systems. To balance the protection of affordable air travel and protection of the environment, there are two fundamental tasks our community needs to undertake:

1) to communicate widely and robustly the socioeconomic benefits of aviation. This is a necessity to provide a counterbalance to pessimistic voices that are proposing simply to curtail flying. We must also persuade governments and international bodies to contribute to the cost of this transition. Aviation is known to be a net 'donor' of technology to other sectors. The benefits of government investments cascade to sectors well beyond aviation. This long-term benefit ratio has been shown to be over 30:1.

2) to communicate the exciting and important intellectual challenge to the younger generation. The success of our noble enterprise is dependent on attracting large new cohorts of young, talented and well-educated individuals to deliver the analysis, research, development and products that will underpin the transition to 'green' aviation.

ISABE (the International Society for Air-Breathing Engines), strongly allied to the RAeS, is centrally placed to contribute to these endeavours. As we plan our next major conference in Ottawa (25-27 September 2022), this Aeronautical Journal Special issue devoted to ISABE and propulsion gives a foretaste of the contributions from many nations, showing that our community has the breadth, inspiration, knowledge, products and wherewithal to fly beyond dark clouds and take us to a brighter future beyond.

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