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Trends in aircraft propulsion in light of sustainability goals

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The aircraft of the future will, like the aircraft of today, continue to need the airspeed for generating lift (and thereby its load-carrying capacity) and therefore will have to overcome the drag associated with the high-speed travel.
Since the drag is a function of also the surface area of the aircraft carrying payload, efficient and lightweight packaging of the passengers, cargo and the propulsors (aircraft engines) also determine the power consumption of aircraft.
Some novel aircraft configurations will be discussed and their potential for improvement over the current wing/fuselage configurations in terms of pure aerodynamics and in terms of propulsion integration issues will be evaluated. The limits of aircraft configuration changes will also be assessed.
The other part of the flight system, the propulsion system, will be briefly introduced and their efficiency limits evaluated. It will be shown, that the efficiency in aero propulsion is already high and close to its limits. The improvements expected from novel engine/power train achitectures will be discussed.
It will be claimed, that the major mitigation of local negative effects (and thus of human perception) due to long range air transport will come from so-called hybridization in its broad interpretation. The hybridization means that conventional gas turbine technology, albeit at improved performance, will have to be combined with either electric augmentation of certain flight phases or with a capability to utilize unconventional fuels like hydrogen or LNG in the flight phases where the emission of combustion products needs to be tailored. For local only travel this might mean full electrification.
From the above, some research goals will be concluded for the aerospace engineering community.