

well as taking an active role in monitoring, investigating, and addressing issues related to research misconduct. Individuals, research institutions, and research sponsors are charged with developing educational programs that support research integrity, leveraging collaborative partnerships to share best practices around promoting integrity in research.

The report also calls for institutional and federal protection for whistleblowers; for enough information to be made available (during or shortly after publication) for a “person knowledgeable about the field and its techniques to reproduce reported results”; for funding to be allocated to ensure the availability of data and code needed to replicate published research; for disclosure of all statistical tests (including negative results) to become routine and encouraged by sponsors, institutions, and journals; and for public and private research sponsors to fund and conduct research that assesses the research culture and develop steps to address environment-related research misconduct and/or detrimental research practices. In addition, the establishment of an independent, non-profit Research Integrity Advisory Board is recommended to provide support for

all members of the scientific research enterprise by sharing expertise and methods for responding to current and future challenges.

Scientific societies and journals are specifically called out within the report to play a larger role in promoting integrity in research. One of the recommendations is for societies and journals to develop and strictly maintain clear authorship standards that designate only individuals that have made a “significant intellectual contribution” as authors. In addition, societies and journals are charged with providing identification for at least one author that assumes responsibility for the entirety of the work and requiring disclosure of contributions made by each author. Lastly, the report calls on societies and journals to explicitly specify that gift or honorary authorship, coercive authorship, ghost authorship, and omitting authors that have met the authorship standards are unacceptable practices.

“MRS has long placed an emphasis on research integrity and authorship practices in its publication policies,” says Eileen M. Kiley, MRS Director of Communications. In fact, MRS has a long-standing policy on publication ethics that, as Kiley points out, already fulfills several of the

recommendations made by the Academies report. Specifically, the policy calls for the results of research to be “recorded and maintained in a form that allows analysis and review, both by collaborators before publication and by other scientists, for a reasonable period after publication.” In addition, the policy explicitly defines authorship standards that limit authors to those who “have made a significant scientific contribution to the concept, design, execution, or interpretation of the research study,” and outlines the role of collaborators and co-authors to ensure responsibility and contributions are appropriately assigned. Baker, who is also the chair of the MRS Publications Committee, sums up MRS support for integrity in science saying, “The editors of all MRS journals, along with the staff at MRS Headquarters and our publishing partners at Cambridge University Press work diligently to ensure the highest possible standards.”

The two additional ongoing Academies studies are investigating the challenges and benefits of open science (free public access to the results of scientific research) and exploring the issues of reproducibility and replication in science.

**Jennifer A. Nekuda Malik**

## EU aviation and shipping face big challenges in reducing environmental impact

A massive shift in innovation, consumer behavior, and utilization of more ambitious green technologies to power aircraft and seafaring cargo ships will be crucial to reducing their long-term carbon footprint. A European Environment Agency (EEA) report says incremental measures such as improving fuel efficiency to cut emissions will not be enough for the aviation and shipping sectors to meet European greenhouse gas emissions and sustainability targets.

Aviation and shipping are the focus of the latest EEA “Transport and Environment Reporting Mechanism (TERM)” report published recently. The two

sectors have come under increased scrutiny over their rising emissions and how they can meet EU decarbonization goals.

By 2050, global aviation and shipping together are anticipated to contribute almost 40% of global carbon dioxide emissions unless further mitigation actions are taken. The report notes that in many ways the sectors are locked into established ways of operating, which can be difficult to change. For example, past investments in conventional airport and seaport infrastructure can delay the uptake of more sustainable technologies and opportunities to encourage alternative cleaner modes of transport

like rail, for shorter trips. Similarly, the long lifespan of airplanes and vessels can hamper a faster shift to cleaner technologies. Other hurdles to be overcome include the lack of research on cleaner fuels for both aircraft and ships as well as the costs involved in producing them.

The TERM report stresses that governments have a key role to play by supporting investment in research, product standards, and subsidies for new emerging technologies, and to spur the sharing of data and information on the viability of new technologies. Efforts to promote debate on sustainable travel and consumer behavior and changes to lifestyles and transport habits can also help in the long term to reduce carbon emissions and other impacts associated with aviation and shipping. □

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