

Greenwashed catalysis?



The 27th United Nations Climate Change Conference placed the risks of greenwashing under the spotlight. In this Editorial, we reflect on the implications of this phenomenon for science and peer review.

The 27th Conference of the Parties to the United Nations (UN) Framework Convention on Climate Change (COP27), held last month in Sharm el-Sheikh, Egypt, has concluded without major progress on the phase out of fossil fuels, leaving many observers disappointed and concerned¹. The goal of keeping the global temperature rise below 1.5 °C is becoming ever more challenging with the lack of practical implementation schemes.

The delegates, however, could at least achieve significant progress by agreeing to the creation of a loss and damage fund, which will support low- and middle-income countries in tackling the financial challenges materializing as a consequence of climate change. While the mechanisms of the scheme remain undefined, this fund represents a step forward towards putting realistic economic figures on the costs of global warming and acknowledging collective responsibility.

The conference also saw the release of the report² from the UN's High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities, whose task over the past year has been the evaluation of criteria associated with net-zero pledges from businesses as well as from local government and regions – defined as non-state actors. This report contains a set of ten recommendations aimed at counteracting dangerous forms of greenwashing – in essence, unsupported sustainability claims – that may accompany voluntary commitments to reach net zero. Disingenuous and non-accountable net-zero claims by non-state actors can impair the effectiveness of global programmes for the reduction of emissions, and negatively affect the credibility of actions to contrast global warming at large. The group insists, therefore, on oversight through the independent validation of targets and methodologies to reduce emissions based on a set of internationally acknowledged criteria.



Moreover, they stress the necessity of evaluating value chains in their entirety, placing emphasis on the importance of developing transition plans that must necessarily account for the phasing out of fossil fuels.

Science is ultimately crucial to inform and guide the development of credible plans to achieve net-zero targets. While the considerations of the report are tailored to corporate and private enterprises as well as local administrations, the question arises as to whether they can be extended to science itself. Is there a danger of greenwashing in science?

As editors at a catalysis journal, we are exposed to a significant amount of research that has potential implications for the realization of net zero. However, we are often confronted with studies that, despite their use of a narrative centered on the promise of decarbonization and the reduction of greenhouse gases, fail to provide a quantifiable impact in those areas. Looking at the field of catalysis, it is obviously understandable that a kinetic analysis or the study of reaction intermediates does not come implicitly with any immediate implication for the field of emissions control. However, when the process under consideration is the production of a fuel or the conversion of CO₂, for example, connections can be

established, at least in principle. As is so often the case though, the devil is in the details. In order to evaluate how a laboratory-scale catalytic process can contribute to the reduction of CO₂ emissions, practical considerations including the energy mix required to run the process³ and the potential to scale-up should be taken into account.

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While back-of-the-envelope calculations are useful to get a first idea – and such information can be informative – claims should be commensurate to the depth and rigour of the evidence produced. Eventually, in order to firmly establish the sustainability of a method, specific scholarly approaches, such as life

cycle assessment (an investigation into the cradle-to-grave environmental impacts of a system) or similar, are the preferred choice. Such analyses are non-trivial and should be carried out in collaboration with researchers who are familiar with their intricacies. When performed under realistic conditions, the resulting level of insight renders them the most appropriate instrument to combat the proliferation of studies that seek to classify a process as relevant in the context of net zero for the sole reason of involving greenhouse gases. An interesting example in this regard is dry reforming of methane that is often described as an important means to decarbonize the chemical industry even though its overall energy demand compares unfavourably with that of steam methane reforming⁴ – the established methane reforming method

in industry. Accordingly, the key enabler remains low-carbon energy, rather than the process itself.

We all have a part to play. As authors, it is reassuring not to forget that our science is interesting in and of itself, and needn't be dressed up with claims of greenness, except as appropriate and supported. As reviewers, and of course editors, we hold an important role as independent gatekeepers against excessive claims. The established peer review process developed in research publishing over many years is essentially the same model underlying the UN taskforce which seeks to hold net-zero pledges to account. As science evolves and adopts an increasing focus towards sustainable applications, peer review must also adapt to inspect claims that go beyond the basic science.

While perhaps seeming innocuous on the individual level, such claims, when unsupported or exaggerated, can slowly add up to undermine the stated aims, the environmental cause and eventually even the credibility of science itself.

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