The international journal of science / 15 February 2024

nature

Calling all engineers: *Nature* wants to publish your research

Papers in engineering are under-represented, even neglected, in the journal. We want to change that.

Last month, materials scientist Matic Jovičević-Klug and his colleagues reported how 'red mud', an iron oxide waste product generated during aluminium manufacturing, can be repurposed for 'green' steelmaking. Their findings[1] have the potential to reduce carbon dioxide emissions from steelmaking by using a circular-economy approach.

Had an article reported the implementation of this same process on a larger, even industrial scale, many readers might have been surprised to see it in *Nature*.

Well, we want to change this perception.

We want the world of engineering to know that its research, whether as a proof of concept or at the implementation stage, will be considered by *Nature*'s editors and reviewers, as it is already by colleagues at other Nature Portfolio journals. The most recent of these, *Nature Chemical Engineering* and *Nature Reviews Electrical Engineering*, were launched in January.

We are proud to have already included some notable examples in *Nature*'s pages. On 31 January, for example, Zhixun Wang at Nanyang Technological University in Singapore and his colleagues described a method to produce flexible semiconductor fibres without defects or cracks that could be used in wearable devices[2]. One advantage of this technology, write Xiaoting Jia and Alex Parrott in an accompanying News and Views article[3], is its industrial readiness, because the semiconductor fibres can be woven into fabrics using existing methods.

So why emphasize our willingness to consider more such studies now? Last summer, *Nature* published a series of editorials on the Sustainable Development Goals (SDGs), the world's plan to end poverty and achieve environmental sustainability. The plan isn't going well — most of the goals and associated targets will not be met by the United Nations' self-imposed 2030 deadline.

The series brought home the realization that SDG-related research is not yet a priority for many researchers, especially for those in high-income countries, compared with their colleagues in low- and middle-income countries. Partly in response, more than 40 Nature Portfolio journals put out a collective call for papers on topics relevant to the SDGs as part of a drive to get researchers thinking about how their work might move the world closer to meeting the goals.

> "Engineering is rooted deep in *Nature*'s history."

In this context, studies that show how discoveries and inventions can be applied in real-world settings, including by testing and evaluating products and processes on large scales, are often highly relevant to the Nature Portfolio journals. *Nature*'s publishing criteria require that papers report original research that is of outstanding scientific importance. The journal also expects that a study reaches "a conclusion of interest to an interdisciplinary readership". Our message is loud and clear — that readership includes engineers, as well as scientists from all disciplines.

Back to the future

By putting out this call for more engineering research, we are restoring a connection with engineers and the field of engineering that is rooted deep in *Nature*'s history. In *Nature*'s first issue, published on 4 November 1869, readers will find a discussion on the likelihood of silting in the Suez Canal[4], one of the largest engineering projects of the nineteenth century. The canal was a hot news topic, because it was due to open two weeks later, on 17 November. There was much public debate, and a degree of anxiety about such geoengineering feats. A correspondent to *Nature*, Thomas Login, had worked on the 437-kilometre Ganges Canal, which had opened 15 years earlier to connect the Ganges and Yamuna rivers in India. The Ganges Canal's waterways were intended to irrigate massive stretches of farmland, thereby reducing the risk of famine in a region where people had previously experienced hunger when the rains failed. I have no doubt there are many who will say the Suez Canal "is a total failure", Login wrote. He was confident that the canal would succeed.

This is not an isolated or rare example. Subsequent editions of *Nature* include engineering conversations and critiques. The journal also published regular reports of meetings of professional engineering societies — just as those of other scientific societies were discussed.

The late nineteenth century was an age of ambitious, and controversial, imperial-era projects. It was also a time when scientists and engineers wanted to read about each other's work in the same journal. As editors and publishers, we accept our share of responsibility for how things have turned out. Our responsibility now is to renew this connection.

Creating by collaborating

We want to recognize engineering in other ways, too. By highlighting the profession's approach to collaboration, for example. Last week, the Queen Elizabeth Prize for Engineering, equivalent in recognition to the Nobel prizes, was awarded to two engineering researchers for their contributions to the field of modern wind-turbine technology. Unlike recipients of some of the more well-known science prizes, Andrew Garrad and Henrik Stiesdal were not rewarded for a single landmark achievement, but for their 40-year partnership in designing, testing and improving wind turbines that are now built on an industrial scale around the world. The prize recognizes decades of painstaking, sometimes incremental, and, yes, collaborative achievements.

Their work also brought together researchers from other

nature

fields, such as mathematics, fluid physics, electronics and materials science. Such an approach to problem-solving needs to become the norm if the world is to succeed in addressing global challenges, Stiesdal, a former chief technology officer at Siemens Wind Power, told *Nature*. We wholeheartedly agree.

Engineering and science are like two ships that have set sail close together, but in many ways have gradually drifted apart. We can't let that continue. Having engineers back in *Nature*'s pages is long overdue, not least for the health of our planet and the well-being of all people.

1. Jovičević-Klug, M., Souza Filho, I. R., Springer, H., Adam, C. & Raabe, D. *Nature* **625**, 703–709 (2024).
2. Wang, Z. *et al. Nature* **626**, 72–78 (2024).
3. Jia, X. & Parrott, A. *Nature* **626**, 38–39 (2024).
4. Login, T. *Nature* **1**, 24 (1869).

EU climate policy is dangerously reliant on untested carbon-capture technology

Europe's ambition for emissions reductions is to be welcomed — but look at the detail, and significant hazards emerge.

Last week, the European Commission published its long-awaited recommendations for climate targets for 2040. The commission, which is the executive arm of the European Union, is recommending that EU member states cut greenhouse-gas emissions by 90% by 2040, compared with 1990 levels. If countries agree, this would be an interim milestone, ahead of the European Climate Law, which sets out a legally binding target for net-zero emissions by 2050.

A target cut of 90% is not as ambitious as some headlines suggest. The EU's existing policies could reduce emissions by 88% by 2040, according to its own projections. This would be achieved mainly through phasing out coal, converting most fossil-fuel power to renewable sources such as solar, wind and tidal energy, and electrifying transport. There will still be emissions from some vehicles on the road, from shipping and from aviation. Some oil and gas power will also be in use. The commission is, therefore, proposing to accelerate technologies, such as carbon capture and storage (CCS), that can take up some of those remaining emissions and store the gases, possibly underground.

The 2040 interim target was proposed by independent climate-science advisers to the EU, and it's good to see their proposal being implemented. But the advisers also cautioned that getting to 90% by including CCS technologies will be challenging. The biggest obstacle is that the technology is not ready — a point reiterated by climate scientists who *Nature* spoke to in our news reporting of the announcement. At present, there is not a single fully operational CCS plant in Europe, nor a system for governing and regulating the technology. So far, ten CCS projects are planned in the EU, according to the commission's science advisers. Assuming they all function, their combined carbon-capture capacity is expected to be less than the expected contribution from CCS to achieve the EU's 2040 climate target.

> **"There is not a single fully operational CCS plant in Europe."**

It is worth quoting the science advisers' views on the risks versus the benefits of emphasizing CCS: "This presents a dilemma for policymakers who need to find ways to incentivise sustainable carbon removal scale-up, while avoiding the risk of disincentivising greenhouse-gas emission reductions in different sectors by more conventional means and a suitable governance system." Emissions reductions "by more conventional means" includes efforts to cease the burning of fossil fuels; the advisers are keen to ensure that these are not sidelined by policymakers.

The interim climate target will now be discussed by member states, and could face some opposition. European countries have historically set more-ambitious climate targets than other high-income countries, but some of the bloc's largest nations, such as France and Germany, are now facing pressure to weaken climate commitments, or are actually reneging on climate pledges — as the United Kingdom is also doing. This pressure is coming from many sides, including political parties and specific sectors, such as farmers. People have legitimate fears about the loss of jobs in carbon-heavy industries and over who will pay the costs of converting to electric vehicles or decarbonizing home-heating systems.

In this respect, the commission's proposal could have been more persuasive. The document advocates for protecting the most vulnerable in the coming energy transition, as well as ensuring that EU industry stays competitive. But it is light on the specifics of how this should happen. There is a body of research on how to achieve an equitable and just climate transition. There are also lessons from other countries, notably the United States, on how at-risk communities should be supported. The European Commission should ask its science advisers to synthesize this knowledge in the same way they have synthesized research on scenarios for the climate target itself.

Much of the current public discussion around climate policies presumes that of the options available, business as usual is a better, or neutral option, against which other choices are necessarily worse. But, as the commission emphasizes, "the costs and human impacts of a changing climate are large and growing". Delaying action will itself be costly. That must be emphasized with more vigour and urgency over the next few months as the commission seeks to get agreement on its interim targets. It rightly has based its target on the consensus of scientific advice. It should consult its advisers as it begins its period of public engagement. Researchers can help by advising on not just how its targets could be achieved, but also the costs of not doing so.