

Buy one, get one free doesn't work for the planet

The gains from more-sustainable production methods are being wiped out as the world continues to buy and use more stuff.

The annual report by the Sustainable Development Solutions Network (SDSN) ranks countries' overall progress towards meeting the 17 United Nations Sustainable Development Goals (SDGs). Since 2017, the same three nations have consistently come out on top: Finland, Sweden and Denmark (see go.nature.com/3sf1muh).

But the SDSN also produces a second ranking, in which, this year, the trio came in 128th, 137th and 139th, respectively, out of 166 countries. This is the Spillover Index, measuring how much each country's actions affect other countries' ability to achieve the SDGs, in ways both positive and negative. For example, if a country imports running shoes, most SDG reporting would allocate the relevant carbon emissions, chemical waste, impact on forests and employment conditions in factories to the exporting country. However, the Spillover Index is different in that it attributes all of these manufacturing impacts to the importing country.

Nature is examining progress towards all the SDGs, from promoting clean energy to reducing inequality, as they reach the halfway stage. According to the SDSN, a non-profit body with close links to the UN, the failure to account for spillover effects and address outsourcing is among the reasons there has been so little progress in achieving many of the SDGs – in particular SDG 12, to “ensure sustainable consumption and production patterns”.

One of the main indicators of sustainable production and consumption is a nation's 'material footprint': the total mass of natural resources (fossil fuels, biomass, metallic ores and minerals) that it consumes from anywhere in the world. Lumping disparate materials together by mass might not seem a particularly sophisticated measure. However, the developers of the metric, including Heinz Schandl, who studies resource efficiency at the Commonwealth Scientific and Industrial Research Organization in Canberra, maintain that it provides a good headline indicator of environmental impact. According to both SDG 12 and SDG 8 (growth), the world's current material footprint of 100 billion tonnes a year needs to come down.

Work by Schandl and his colleagues has shown some improvement in the efficiency with which the world uses materials, known as resource efficiency, in recent years (M. Lenzen *et al.* *Nature Sustain.* **5**, 157–166; 2022); humans are producing more products from each kilogram of material

than before. But rising global affluence is blotting out these efficiency gains, ensuring that the material footprint continues to rise. Under a 'business as usual' scenario, it will reach 160 billion to 180 billion tonnes a year by 2060, predicts Schandl, who is also a member of the UN Environment Programme (UNEP) International Resource Panel (IRP), which documents the world's use of resources.

Hopes that things can be turned around are often expressed in terms of establishing a more 'circular' economy. The idea is to transform the 'linear' economy (take, make, waste) into one in which materials are reused or recycled, avoiding the creation of waste and limiting the use of raw materials. The idea is simple, attractive – and fiendishly difficult to implement.

The largest driver of rising material footprints in the past two decades has been the investment of upper-middle-income countries, mostly in the Asia-Pacific region, in construction and durable goods. These materials are not yet wasted – the minerals, aggregates and steel in newly built city infrastructure could, in theory, be reused in the future. But widescale reuse needs a concerted push from governments and industry. “At the moment, the circular economy is still a vision,” says Stefanie Hellweg, a specialist in ecological systems design at the Swiss Federal Institute of Technology in Zurich, and a member of the IRP.

A further obstacle to a circular economy, adds Paul Ekins, an environmental economist at University College London, is that much sustainability progress has been made on the production side. Consumption, meanwhile, is rising, offsetting those gains. Internal combustion engines provide a good example. Various technologies have improved fuel efficiency, but consumer demand for (and auto industry promotion of) heavier vehicles has blunted any impact on carbon emissions. Other industries have similar stories. Reductions in emissions from livestock through the use of seaweed feeds might not reduce the sector's overall carbon footprint if meat-eating continues to increase.

Slowly the idea seems to be filtering through that changing attitudes needs more than just exhortations. How to practically change both producer and consumer behaviour – and a better understanding of the potential role of the advertising industry – presents a clear goal for research.

The first of SDG 12's indicators is the number of policies being developed to support the shift to sustainable production and consumption. In 2022, 484 such policies were reported, up from 303 in 2018. And policy will be aided by better indicators. That must surely include making the Spillover Index part of the SDG reporting framework. What's more, countries will soon be able to access a platform, overseen by UNEP, that should have all the data and tools they need to calculate their material footprint and thus to design policies to take into account the true environmental impacts.

Researchers have already done much – especially by developing measurement tools – to set the scene for more-sustainable production and consumption. It is essential that these efforts be augmented with more studies in the field of behaviour change, or they risk becoming diluted.

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