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# Design for sustainability

*Current economic models rely on a level of resource consumption that will rapidly destroy the ecosystems on which we depend. We must now design circularity into all that we do*

By **Christa Liedtke**, Director, Sustainable Production and Consumption, Wuppertal Institute/Folkwang University of Arts, Industrial Design

**S**ince the Industrial Revolution, global resource consumption has been on the rise. It is not possible to predict an end to this growth. More than seven billion people today wish for a good and safe life – for themselves, their children and their children’s children. This involves consuming products and services.

Only a fraction of the resources we use ‘circulate’ within the global economy – for reuse or recycling. Instead, humans have created ‘dumping grounds’ for spent resources: the oceans for plastic, the atmosphere for greenhouse gases and the soil for fertiliser or municipal waste.

Another facet of the current economic structure is that access to resources, and therefore access to prosperity, is unequally distributed. This results in uneven development opportunities and disparate social participation.

The consequences are destructive: global warming, and the depletion of biodiversity and ecosystem ‘services’ that people draw upon for relaxation and wealth. In many regions, this leads to social dislocation, poverty, hunger and conflict. In its report *Assessing Global Resource Use*, the UN International Resource Panel proceeded on the assumption that the world consumed

▲ As cows scavenge for food, waste pickers look for recyclable material at a landfill site in Makassar, Indonesia



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According to recent statistics, the world's population is growing at the rate of 80 million a year and is expected to reach 11 billion by the end of this century: from now to 2030, three billion new consumers will enter the middle class and push demand for goods and services to unprecedented levels.

The circular economy is one way to slow down the excessive depletion of the planet's resources: waste is a resource that must be given value and must feed the production and consumption system. In this way it will contribute to reducing demand for additional raw materials.

In Italy, since the 1990s, the materials recovery sector has experienced strong growth and diversification. From a sector mainly focused on the scrapping of ferrous metals, recycling has strongly diversified. Now, it encompasses a growing volume of paper, plastics and waste electrical and electronic equipment recycling, as well as the recovery of aggregates and biomass.

It is now two years since the EU adopted the Circular Economy Action Plan. This year, the European Commission has adopted a new set of measures – the 2018 Circular Economy Package – as part of its continued efforts to make the action plan a reality. However, there are several challenges that pose a threat to the EU's latest commitment. Since last year, many recycling companies have struggled to place large quantities of secondary

raw materials of average quality on the market. As a result, these companies are now left holding excess stock.

Countries must now wait and see what Europe decides for the new design and recycling standard to help the disassembling of products and support the circular economy market. Yet, no matter how strict the new requirements, the materials recovery process is still likely to produce waste – no matter how small a quantity – for many years to come. That waste could be recovered for its energy content or (the worst-case scenario) would need to be disposed of.

The sustainability of a circular economy system depends also on the availability of those plants that can close the waste management cycle. Without that, the costs of disposing of waste coming from recycling processes will rise. The result could be that in an attempt to reduce a country's dependency on raw material imports, it could instead become reliant on other countries that are better equipped with waste management plants.

*FISE Assoambiente is the Italian Association representing companies involved in municipal hygiene services, waste management and soil remediation. It is concerned with regulations and technical aspects to develop the necessary conditions that allow fair competition in the market and the industrialisation of the waste sector.*

[www.assoambiente.org](http://www.assoambiente.org)



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88.6 billion tonnes of resources in 2017 – triple the amount of consumption in 1970. Low-income countries consume ten times less per person than high-income countries but as they develop, according to current economic patterns, that gap will diminish and the global rate of consumption will continue its growth trend.

It is estimated that the growth of a new consumer class in emerging countries will comprise three billion people by 2050. As their societies develop, considerably more people than before will have a share in prosperity – a very positive development but ultimately unsustainable if it is based on the resource-heavy lifestyles of today's wealthy economies.

The UN's statistics on the 12th Sustainable Development Goal (SDG) show that annually about 1.3 billion tonnes of food gets turned into waste. Between 2002 and 2020 they predict a 30 per cent increase in cars, 40 per cent rise of private motor traffic and a tripling of global air travel. Associated with these trends is an increasing amount of waste and material loss into the environment. The UN predicts that if the global population reaches 9.6 billion by 2050, people will need the equivalent of almost three planets to satisfy their consumption demand.

It is abundantly clear that we need to decouple resource consumption from prosperity. This is the aim of the SDGs, which has generated a call to 'design for a better world'.

To maintain ecosystems, stop global warming and have as many people as possible share in prosperity, we must change the way we design products and services.

We need to:

- design for resource efficiency, creating more with fewer resources
- design for circularity, encouraging multiple uses of high-quality items
- design for social change and equality, encouraging consumption that is eco-intelligent, fair and moderate

Only by combining all three strategies will we achieve success – the realisation of the SDGs. We need to consider all the processes in the lifecycle of a product:



extraction, logistics, production, trading, use and recycling. While 100 per cent circularity might not be possible, we should still aim for it. We need to develop and design products and services that require far fewer resources (raw materials, water, surface area) across their entire lifespans. We need to minimise dangerous substances and waste. And we need to satisfy human needs associated with 21st century lifestyles.

### Design for a better world

Designers and developers have a particular responsibility in delivering the SDGs because they turn people's visions and attitudes into tangible products and services, and because there is no product or service that does not require material input or does not produce waste.

Designing for a better world is the translation of the SDGs into a world of sustainable products, infrastructures and services – that encode sustainability in conduct, form and function and that put humans at the centre.

### Design for a dematerialised circular society

Goods and services are only sustainable if they are as dematerialised as possible and allow for continued use or re-use, or recycling with minimal material loss. They should be easy to disassemble and reuse, through a modular design, for example. They should have a long lifespan and be comprised of few, mostly secondary, materials; only have a small amount of material loss during their lifecycle; and be suitable for renting, sharing and swapping.

Everything contributing to a smaller 'ecological backpack' (the weight of all natural raw materials that are needed for our private consumption) counts as a successful design. Here, production, business and consumption models intertwine – they focus on a different attitude towards the material, the natural world, and its value for individuals and economies.

Design for a dematerialised circular society requires a completely different composition and interaction of research and development, production, trading, consumption and recycling compared to business models

practised thus far. It would significantly change the world of products and waste as we know it.

In 2017 Fairphone published a study containing possible recycling routes on its homepage. It considers a recycling rate of at least 30 to 40 per cent to be possible. This poses an immense challenge for the modification of the 'end of life' route.

### Design for social change and equality – user perspectives

If design is able to impart attitude and values, it is also able to translate the SDGs into the language and codes of products, business models and infrastructures.

The aim is to accomplish more global resource equity, end resource poverty, develop resource wealth on a sustainable level, and allow for participation. According to research by D-mat, Faktor 10 Institut and the Wuppertal Institute, a resource consumption of eight tonnes per person per

Sustainable Living Labs – open innovation ecosystems where designers co-create things with users – show that there is considerable potential for sustainability in the correlation of social and technical innovations.

To change consumption patterns, we need to start by enabling people to change their routines: using instead of owning, being time-rich over being time-poor, and choosing made-to-measure products instead of mass-produced goods as status symbols. If the growing global consumer class are to live resource efficiently, we urgently need new design concepts around status, security and identity.

In the world's poor regions, by contrast, the focus is to survive, reduce poverty and child mortality, improve living standards and for people to fulfil their potential. This also means designing products that enable greater participation. Products and services have to be able to help decrease resource

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year is considered a sustainable lifestyle on a global level. But how far away from that goal are prosperous societies?

The research shows that households in Germany and Finland have an ecological backpack of 14 to 120 tonnes or more per capita per year. Everyone can calculate their own backpack on [www.resource-calculator.de](http://www.resource-calculator.de). Backpacks in similar income brackets show differences up to a factor of four or five.

Yet life satisfaction in these 'materially fulfilled' regions does not go up with increasing consumption. Social activities and being 'time-rich' become more important – these activities, in turn, are mostly resource efficient and create low waste. A challenge for designers is to bring resource-intensive lifestyles down to a sustainable level without causing social conflict and a fear of loss.

poverty and enable sustainable consumption and development opportunities.

In his TED talk 'Design for people, not awards', Timothy Presterio called this design approach 'design for outcome'. After designing products to decrease infant mortality in Asia that were awarded prizes but were not used, he made radical changes to his design process. He asked about the most pressing problems in Asian hospitals and learned that two thirds of infants suffer from jaundice and lack of space. A simple phototherapy with blue light can help.

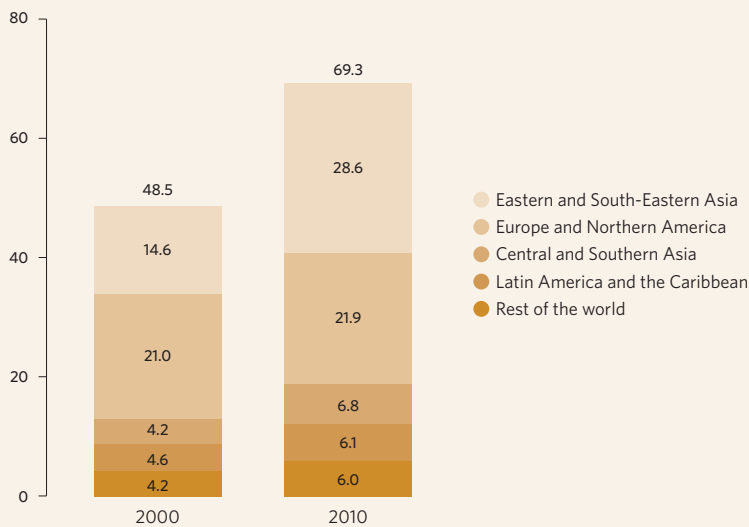
He took the needs of parents, doctors, nurses and technicians (for repairs and maintenance), as well as those of manufacturers and distributors into account in the in-situ development (similar to a Living Lab approach). He then redesigned the product so that it had a high utilisation ratio and low material complexity, and could

## 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

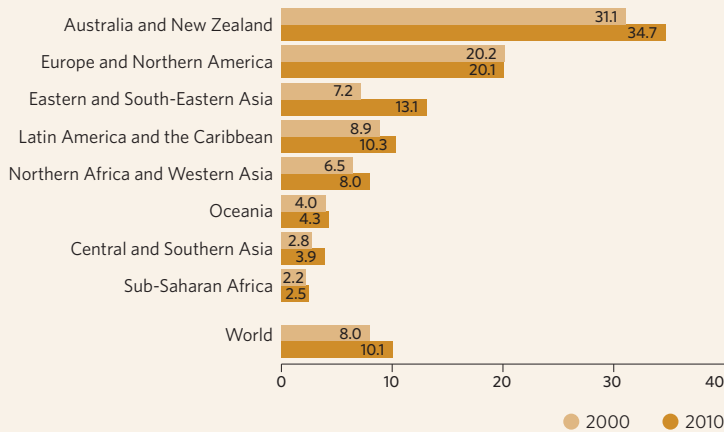



### Ensure sustainable consumption and production patterns

Material footprint, 2000 and 2010 (billion metric tons)



Material footprint per capita, 2000 and 2010 (metric tons)



 **Goal 12** focuses on decoupling economic growth from resource use, and ensuring that hazardous chemicals and wastes are managed in a way that minimises their impact on human lives and the environment

Source: The Sustainable Development Goals Report 2017, United Nations

be locally financed, produced, operated, repaired and maintained.

This is a clear example of designing for actual use and needs, for appearance and trust, for manufacturing and distribution in a modern way. Products like this change the world, creating participation and equal opportunities. Moreover, we can evaluate their contribution to the SDGs.

#### Who can contribute and in what way?

The charge to design for a better world cannot be led by designers alone. They will need support from a broad coalition of actors:

- **Companies:** they must develop and market products and services that make an evident and transparent contribution to the SDGs, and provide information on a certified system for sustainability management.
- **Policymakers:** they must set a reliable framework and incentives for sustainable actions in production and consumption; reward sustainable and resource-efficient activities and product developments; impose taxes on or remove non-sustainable products from the market; and provide information on the sustainability of products. Policies must promote consumer protection, research, design and education for sustainability, create actor and user-integrated innovation spaces for the development of sustainable business models (Living Labs) – and evidently be sustainable themselves.
- **Consumers:** they must buy and use more sustainable products. They should actively ask for education on sustainability and product information systems. They can actively co-develop resource-efficient products and living environments in Living Labs. They must exercise their responsibilities as consumers and participate locally in the implementation of the SDGs.
- **Science:** this must generate the fundamental knowledge and research that can transform societies to be more sustainable and culturally diverse. In particular, science must pursue a valid technological assessment and communicate its results to society and politics. ●