



Institute for
European
Environmental
Policy

IEEP backgrounder

Sustainable consumption



Backgrounder on sustainable consumption

**THINK
2030**

Science-policy
solutions for a more
sustainable Europe

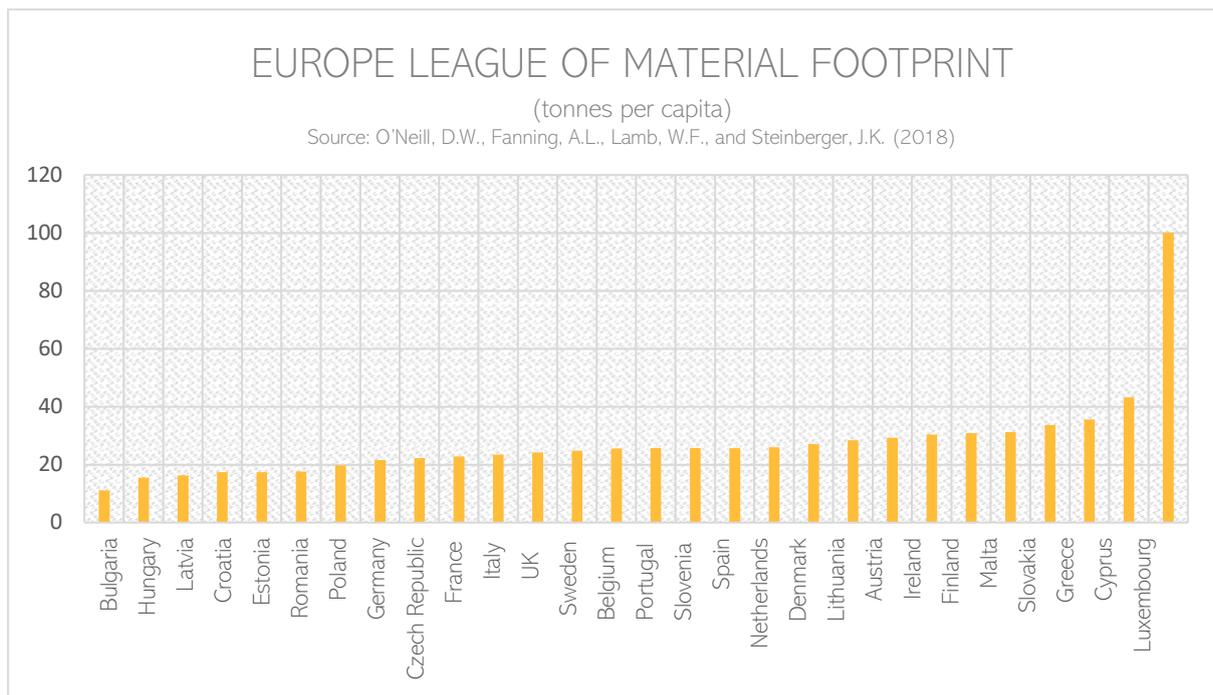
If everyone in the world wanted to consume in the same way as Europeans by 2050, we would need a quantity of natural resources equivalent to three Earths.¹¹ Sustainable consumption aims at defining how consumption could be changed in line with constraints linked with the amount of resources than exist on the planet.

How to measure sustainable consumption?

In our [sustainable consumption paper](#) and our recommendations, we use the unit of measurement called material footprint. Material footprint is a consumption-based indicator of resource-use which measures the use of renewable and non-renewable material resources (excluding water and air) plus the erosion caused by agriculture and forestry. It describes the resource use associated with the whole life-cycle of products, services and activities.

How do we solve the challenge?

We use for this section the findings of an academic paper which looks at Finnish households.^{vii} In order to compare across European countries, please note that Finland has the following ranking in terms of European countries:



Mobility

Key challenges:

- **Air pollution:** In 2015, the concentration of particulate matter in atmosphere in the EU reached 14.5 $\mu\text{g}/\text{m}^3$ (SDGs report p 68). Life expectancy in Europe's 25 most polluted cities could increase by almost 2 years, if air pollution was adequately addressed.^{viii2}

¹ <https://www.upi.com/WWF-report-By-2050-we-will-need-3-planets/85601337117734/>

- **High material and energy use:** the production of cars requires high level of energy and material use, some of them highly polluting such as batteries.
- **Climate change:** In the EU, road transport's emissions are today around 17% above 1990 levels, while the contribution of road transport to total EU GHG emissions has increased by around half — from 13 % of the total in 1990 to almost 20 % in 2014.^{ix} Aviation accounts for approximately 2.1 % of global CO2 emissions – roughly equivalent to Germany's total emissions. With the anticipated growth in air traffic, emissions in 2050 are expected to be seven to ten times higher than 1990 levels.^x

Examples of options to reduce the material footprint of mobility

Mobility—from 17.3 to 2 tons/(per capita)			
Reduction required by	Direct consumption Amount (sufficiency)	Present	17,500 km
		Future	10,000 km
Share in household's material footprint	Material intensity (efficiency)	Present	1.44 kg/person-km* (private car) 0.53–1.2 kg/person-km (train) 0.06–0.56 kg/person-km (plane) 0.26–0.38 kg/person-km (bus, coach, tram, metro, ferry, bike)
		Future	0.2 kg/person-km
Core statement	The material footprint for mobility can be reduced from 17.3 to 2 tons (per capita per annum): <ul style="list-style-type: none"> - by making public transport and biking still more resource-efficient; - by reducing the role of private cars dramatically; - by limiting the amount of kilometres travelled to 10,000 km/(per capita per annum); - by changing travel requirements for work and leisure, e.g., by a higher attractiveness of the living environment as well as the change of production and communication structures that allow a reduction in mobility and transports; - by the integrative management of mobility and ICT options. 		

* kg/person-km: material input in kg per person transported one kilometre.

Nutrition

Key challenges:

- **Food waste:** An estimated nine million tonnes (or 20kg per capita) of food is wasted in the agriculture sector in the EU-28 each year.^{xi}
- **Plastic waste:** Europeans, on average, throw away more than 30kg of food packaging made out of plastic per person per year.
- **Harmful chemicals:** Many single-use food contact materials, including plastics, may pose health risks to consumers due to chemical migration. 214.5 million tonnes of chemicals hazardous to health were consumed in the EU in 2016.^{xii}

- **Land conversion and over-use of planetary resources:** world agriculture was responsible for roughly 80 percent of tropical deforestation between 2000 and 2010.^{xiii}
- **Water depletion:** Agriculture accounts for 70 percent of the world's freshwater withdrawals.^{xiv}
- **Soil health:** 10 million hectares abandoned per year because of soil erosion and related loss of productivity.^{xv}
- **Biodiversity:** Farmland makes up 47% of the European territory. For several years, scientists have pointed out a decline of farmland biodiversity. Between 1990 and 2015 common bird species have declined by 10.3%, with common farmland birds have declined by 29.7% since 1990. Between 2000 and 2015, grassland butterfly populations in Europe shrank by 17%.^{xvi}

Examples of options to reduce the material footprint of nutrition

Nutrition—from 5.9 to 3 tons/(per capita per annum)			
Reduction required by	Direct consumption amount	Present	840 kg (including drinks)
		Future	600 kg (including drinks)
Share in household's material footprint	Material intensity	Present	7 kg/kg (including drinks)
		Future	5 kg/kg (including drinks)
Core statement	The material footprint for nutrition can be reduced from 5.9 to 3 tons (per capita per annum): <ul style="list-style-type: none"> - by reducing the amount of food and drinks consumed to a healthy and still enjoyable level; - by developing acceptable and delicious diets e.g., towards notably less meat and dairy products; - and by increasing the resource efficiency in the food chain e.g., through waste prevention. 		

Housing

Key challenges:

- **Energy use:** Buildings are responsible for approximately 40% of energy consumption and 36% of CO₂ emissions in the EU. Currently, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient.^{xvii} Homes account for 25% of the total EU energy consumption.^{xviii} Energy consumption for households is mostly related to heating (65%) and electricity for appliances and light (14%).^{xix}
- **Material footprint:** Globally, the resource footprint of housing and infrastructure represents 42.4 billion tonnes annually, more than nutrition (21.8 billion tonnes), mobility (12 billion

tonnes), consumables like mobile phones, refrigerators, clothing (9.1 billion tonnes) or healthcare (2.3 billion tonnes).

- **Land degradation:** 367.2 square metres of land were covered by artificial surfaces per capita in 2015.^{xx}
- **Lack of recycling:** only 45.3 % of total municipal waste generated in the EU was recycled in 2016.^{xxi}

Examples of options to reduce the material footprint of housing

Housing—from 10.8 to 1.6 tons/(per capita per annum)			
Reduction required by	Direct consumption amount	Present	38 m²/capital (house) 1 1500 kWh (heat and electricity)
		Future	20 m²/capital (zero energy house) 1 000 kWh (electricity)
Share in household's material footprint	Material intensity	Present	65 kg/ m²/a (house, unheated/uncooled) 0.6 kg/kWh (Finnish heat and electricity)
		Future	65 kg/ m²/a (house, heated/cooled) 0.3 kg/kWh (European electricity)
Core statement	<p>The material footprint for housing can be reduced from 10.8 to 1.6 tons/(per capita per annum):</p> <ul style="list-style-type: none"> - by developing zero-energy houses not exceeding present houses' material intensity - (<i>i.e.</i>, strongly combining energy and resource efficiency); - by drastically shifting electricity production from fossils to renewables, especially wind and solar energy; and - by decreasing individual living space. The impacts of the latter on the individual - well-being can be reduced by increasing shared living space and improving public space more liveable and attractive. 		

Lifestyle

Key challenges:

- **Lack of reparability and programmed obsolescence:** Two thirds (65 per cent) of people are frustrated by products that do not last.^{xxii} According to EEB, 77% of EU citizens would rather repair their goods than buy new ones.^{xxiii}
- **Lack of recycling:** In 2013, only 25% of the 5.8 million tons of fabric waste in Europe was recycled.^{xxiv} To make a mobile phone, for example, 60 different metals are required, only around 20 of which can currently be recycled, and only 16% of mobiles are collected for reprocessing.^{xxv}
- **Increasing consumption of non-essential goods:** In 2014, there were already more phones (7.22 billions) on the planet than humans (7.19 billions).^{xxvi}

New technologies with a high carbon and material footprint:

- Data centres account for around 2% of global greenhouse gas emissions, in other words as much as all air traffic.^{xxvii}
- Depending on the scenarios, automation could either halve or double energy consumption for mobility.^{xxviii}

Household goods production (cradle to retail)—from 3 to 0.5 tons/(per capita per annum)			
Reduction required by	Direct consumption amount	Present	1943 items/household (avg), out of which 568 second-hand or similar [39]
		Future	fewer own items
Share in household's material footprint	Material intensity	Present	200 kg/(per capita per annum) as an average for the 12 product groups, with a range from 15 to 420kg/(per capita) per one product group and with only 3 product groups below 170 kg/(per capita) [39]
		Future	42 kg/(per capita per annum) on average for each of the 12 product groups
Core statement	The material footprint for leisure can be reduced from 2 to 0.5 tons/(per capita per annum): <ul style="list-style-type: none"> - The material footprint for household goods can be reduced from 3 to 0.5 tons/(per capita per annum) by increasing longevity, decreasing ownership of equipment, increasing sharing options, improving reuse and second hand schemes, <i>etc.</i> 		
Leisure Activities—from 2 to 0.5 tons/(per capita per annum)			
Reduction required by	Direct consumption amount	Present	3.5 h of physical exercise or other leisure activities outside the home [45]
		Future	3 h but strongly dependent on the material intensity of the activity
Share in household's material footprint	Material intensity	Present	1 kg/h for low-infrastructure outdoor activities; 5–15 kg/h for activities requiring infrastructure like buildings, harbours, slopes; ≥30 kg/h for resource-intensive individual activities like sailing, golf, motor sport
		Future	1–6 kg/h (e.g., 2 × 50 h/a × 1 kg/h + 1 × 50 h/a × 6 kg/h)

Core statement	<p>The material footprint for leisure can be reduced from 2 to 0.5 tons/(per capita per annum):</p> <ul style="list-style-type: none">- by rather decreasing than increasing leisure activities that are highly material intensive and/or- by utilizing outdoor options requiring few resources (walking, jogging, canoeing, gardening, ...);- by using infrastructure more efficiently (e.g., schools in the evening); and- by making leisure activities more resource efficient (e.g., longevity of venues, resource efficient use of energy).
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How did we calculate the 80% figure?

Literature from Groezinger (2009)ⁱ and SPREAD Consortium (2012)ⁱⁱ indicates an average per capita material footprint of Europeans between 27 and 40 tonnes per year. A reduction of 80% in per capita material footprint is estimated from the upper bound level (40 tonnes) to reach the sustainable level of 8 tonnes per capita in 2050. This level of material footprint of household consumption is based on existing literature from Schmidt-Bleek (1993)ⁱⁱⁱ, Bringezu (2009)^{iv}, Kotakorpi et al (2008)^v and Lettenmeier et al (2012)^{vi}.

In order to live within planetary boundaries, Schmidt-Bleek (1993) estimated that global resource consumption had to be halved by 2050. Bringezu (2009) used data on use of abiotic and biotic resources and erosion from 2000 and, assuming an expected population of 9 billion in 2050, led to an estimated sustainable material resource use of 10 tonnes per capita per year.

Under the assumption that 80% of the sustainable level of material resource use should be allocated to household consumption and the remaining 20% to public expenditure, the sustainable material footprint of household consumption is estimated at 8 tonnes per capita.

Taking the 40 tonnes level of per capita material footprint as the baseline, the average European has to reduce his/her material footprint by 32 tonnes in 32 years. Based on current resource intensities of materials and assuming no change, this means a reduction in per capita material footprint by 1 tonne each year.

While the target level is set at 8 tonnes, different individual preferences and needs imply that trade-offs among the different categories of consumption can be made. You can find [online a simple test](#) to assess your individual footprint.

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