The ecological dimensions of sufficiency

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18th June 2022

Defining sufficiency

Harry Frankfurt (1987): to have enough is to have the resources you need in order to implement your basic aims.

Elizabeth Anderson (1999): To have enough means able to function as a fully fledged member of one’s society.

Sen (1999) and Nussbaum (2011): What matters is to ensure that individuals can live a life worthy of a human being. Such a life is one in which central human functionings are present such as being well nourished, being healthy, using one’s senses, imagination and reason, having attachments to other people.

Henry Shue (1992): Some social goods are essential for survival. “Even in an emergency one pawns the jewellery before selling the blankets” - distinguish between subsistence and luxury emissions.

Sufficiency in political philosophy

- Liberal egalitarianism concerned with arguments for how to operationalise principles of equality and liberty
- Primary goods are not pegged to environmental or ecological considerations
- Evolves into a debate about thresholds - questions of entitlement, desert, luck
- Lack of attention to intertemporal or spatial distribution of primary goods (apart from Rawls' Just Savings principle)
- Ecology: principle of *self-sufficiency* lauded in context of scarcity
- Thoreau: "As you simplify your life, the laws of the universe will be simpler; solitude will not be solitude, poverty will not be poverty, nor weakness weakness."
- Post-materialism: trend in high income countries where a share of voting preferences delinked from material demands in favour of 'quality of life' issues

What is sufficiency?

- Living within planetary boundaries
- Meeting basic needs:
  - Food, clothing, housing, education (see UNDP HDI)
  - Employment both a means and an end
  - Participation in decision making
- Sharing resources equitably
- Not over-using carbon and other sinks
- Renewable resource use consistent with regenerative capacities of ecological systems
- Non-renewable resource use consistent with intertemporal justice framework

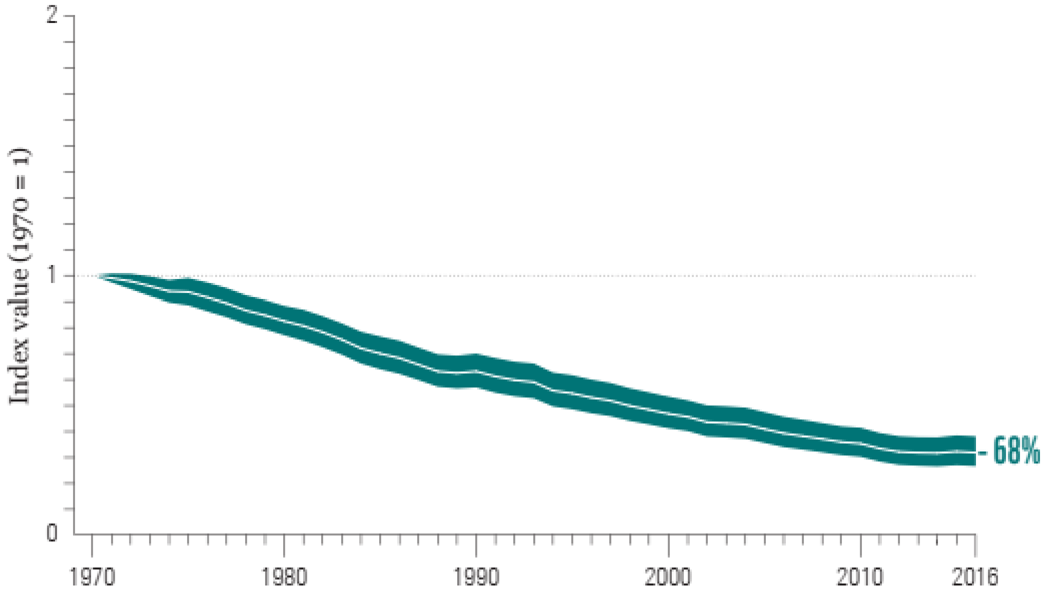
Living Planet Index 2020

Figure 1: The global Living Planet Index: 1970 to 2016
Average abundance of 20,811 populations representing 4,392 species monitored across the globe declined by 68%. The white line shows the index values and the shaded areas represent the statistical certainty surrounding the trend (range: -73% to -62%). Source - WWF/ZSL (2020)[107].

Key

Global Living Planet Index

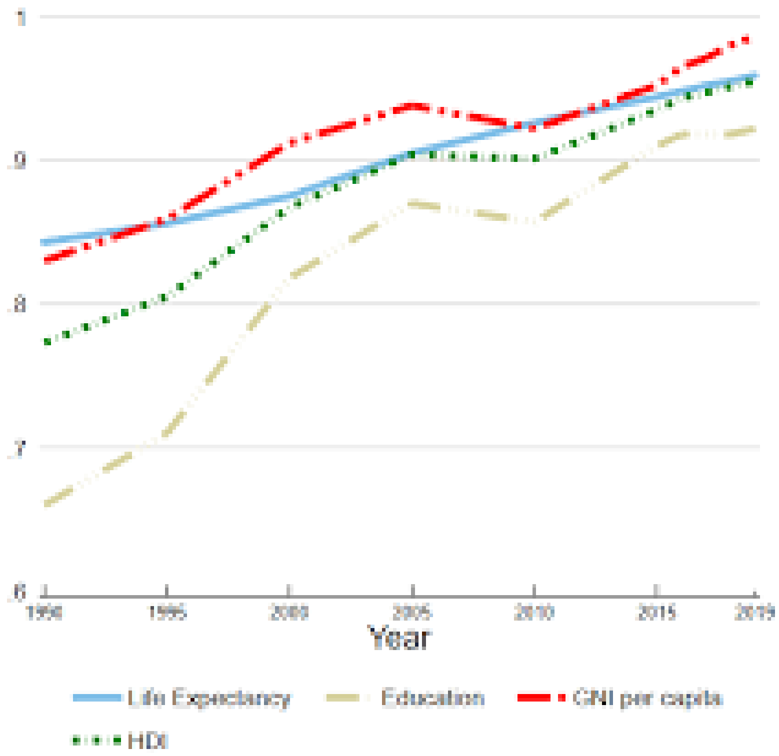
Confidence limits



Ireland and HDI

The Next Frontier:
Human Development
and the Anthropocene

https://hdr.undp.org/sites/default/files/Country-Profiles/IRL.pdf



Planetary Boundaries framework 2015

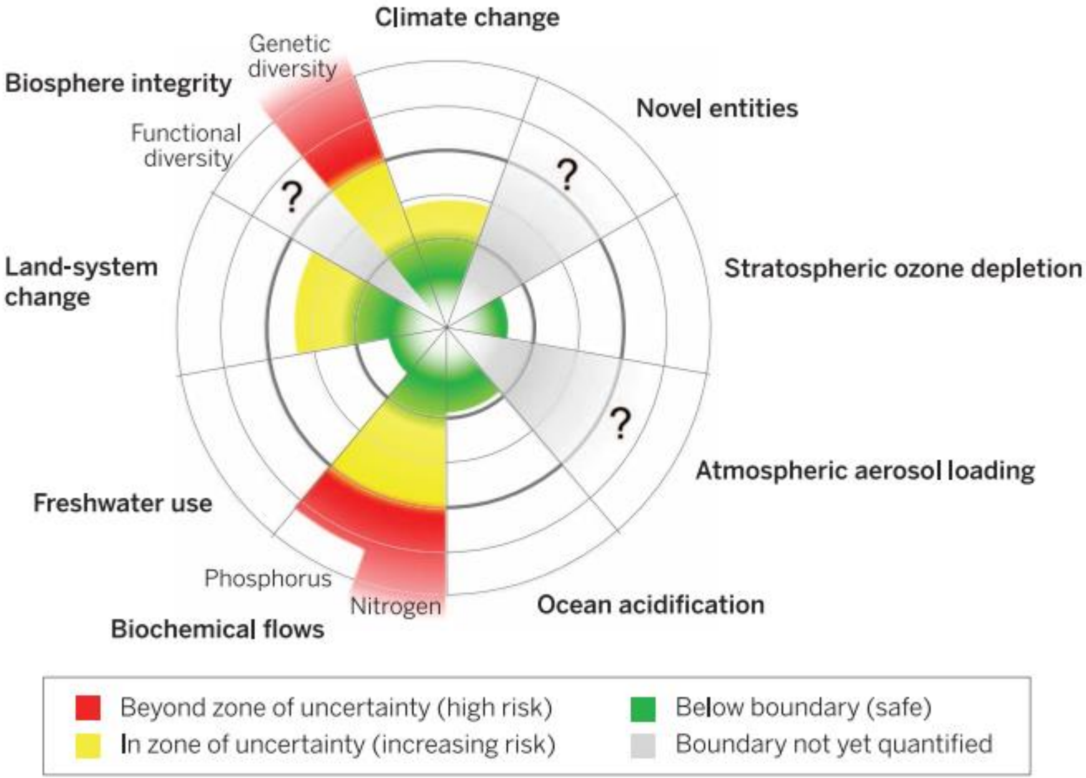


Table 1. The updated control variables and their current values, along with the proposed boundaries and zones of uncertainty, for all nine planetary boundaries. In the first column, the name for the Earth-system process used in the original PB publication (R2009, reference 1) is given for comparison.

Earth-system process	Control variable(s)	Planetary boundary (zone of uncertainty)	Current value of control variable
Climate change (R2009: same)	Atmospheric CO_2 concentration, ppm	350 ppm CO_2 (350–450 ppm)	398.5 ppm CO_2
	Energy imbalance at top-of-atmosphere, W m^{-2}	+1.0 W m^{-2} (+1.0–1.5 W m^{-2})	2.3 W m^{-2} (1.1–3.3 W m^{-2})
Change in biosphere integrity (R2009: Rate of biodiversity loss)	*Genetic diversity:* Extinction rate	< 10 E/MSY (10–100 E/MSY) but with an aspirational goal of ca. 1 E/MSY (the background rate of extinction loss). E/MSY = extinctions per million species-years	100–1000 E/MSY
	Functional diversity: Biodiversity Intactness Index (BII) Note: These are interim control variables until more appropriate ones are developed	Maintain BII at 90% (90–30%) or above, assessed geographically by biomes/large regional areas (e.g. southern Africa), major marine ecosystems (e.g., coral reefs) or by large functional groups	84%, applied to southern Africa only
Stratospheric ozone depletion (R2009: same)	Stratospheric O_3 concentration, DU	<5% reduction from pre-industrial level of 290 DU (5%–10%), assessed by latitude	Only transgressed over Antarctica in Austral spring (~200 DU)
Ocean acidification (R2009: same)	Carbonate ion concentration, average global surface ocean saturation state with respect to aragonite (Ω_{arag})	≥80% of the pre-industrial aragonite saturation state of mean surface ocean, including natural diel and seasonal variability (≥80%– ≥70%)	~84% of the pre-industrial aragonite saturation state
Biogeochemical flows: (P and N cycles) (R2009: Biogeochemical flows: (interference with P and N cycles))	*P Global:* P flow from freshwater systems into the ocean	11 Tg P yr^{-1} (11–100 Tg P yr^{-1})	~22 Tg P yr^{-1}
	P Regional: P flow from fertilizers to erodible soils	6.2 Tg yr^{-1} mined and applied to erodible (agricultural) soils (6.2-11.2 Tg yr^{-1}). Boundary is a global average but regional distribution is critical for impacts.	~14 Tg P yr^{-1}
	N Global: Industrial and intentional biological fixation of N	62 Tg N yr^{-1} (62–82 Tg N yr^{-1}). Boundary acts as a global 'valve' limiting introduction of new reactive N to Earth System, but regional distribution of fertilizer N is critical for impacts.	~150 Tg N yr^{-1}

Earth-system process	Control variable(s)	Planetary boundary (zone of uncertainty)	Current value of control variable
Land-system change (R2009: same)	*Global:* Area of forested land as % of original forest cover	*Global:* 75% (75–54%) Values are a weighted average of the three individual biome boundaries and their uncertainty zones	62%
	Biome: Area of forested land as % of potential forest	*Biome:* Tropical: 85% (85–60%) Temperate: 50% (50–30%) Boreal: 85% (85–60%)	
Freshwater use (R2009: Global freshwater use)	*Global:* Maximum amount of consumptive blue water use ($km^3 yr^{-1}$)	*Global:* 4000 $km^3 yr^{-1}$ (4000–6000 $km^3 yr^{-1}$)	~2600 $km^3 yr^{-1}$
	Basin: Blue water withdrawal as % of mean monthly river flow	*Basin:* Maximum monthly withdrawal as a percentage of mean monthly river flow. For low-flow months: 25% (25–55%); for intermediate-flow months: 30% (30–60%); for high-flow months: 55% (55–85%)	
Atmospheric aerosol loading (R2009: same)	*Global:* Aerosol Optical Depth (AOD), but much regional variation		
	Regional: AOD as a seasonal average over a region. South Asian Monsoon used as a case study	*Regional:* (South Asian Monsoon as a case study): anthropogenic total (absorbing and scattering) AOD over Indian subcontinent of 0.25 (0.25–0.50); absorbing (warming) AOD less than 10% of total AOD	0.30 AOD, over South Asian region
Introduction of novel entities (R2009: Chemical pollution)	No control variable currently defined	No boundary currently identified, but see boundary for stratospheric ozone for an example of a boundary related to a novel entity (CFCs)	

Ecological footprint

The Ecological Footprint adds up the ecological goods and services people demand that compete for space. It includes the biologically productive area (or biocapacity) needed for crops, grazing land, built-up areas, fishing grounds and forest products. It also includes the area of forest needed to absorb additional carbon dioxide emissions that cannot be absorbed by the oceans. Both biocapacity and Ecological Footprint are expressed in a common unit called a global hectare (gha).

WWF Living Planet reports 2014, 2016, 2020

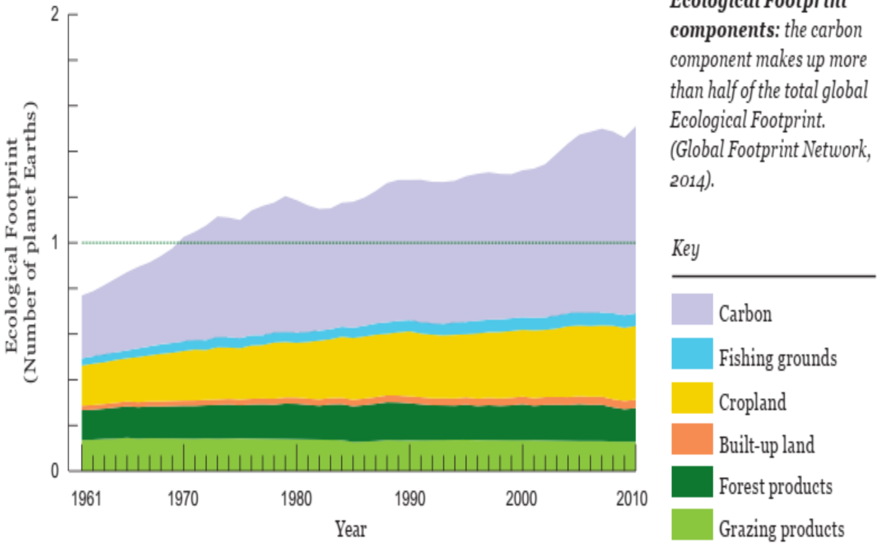
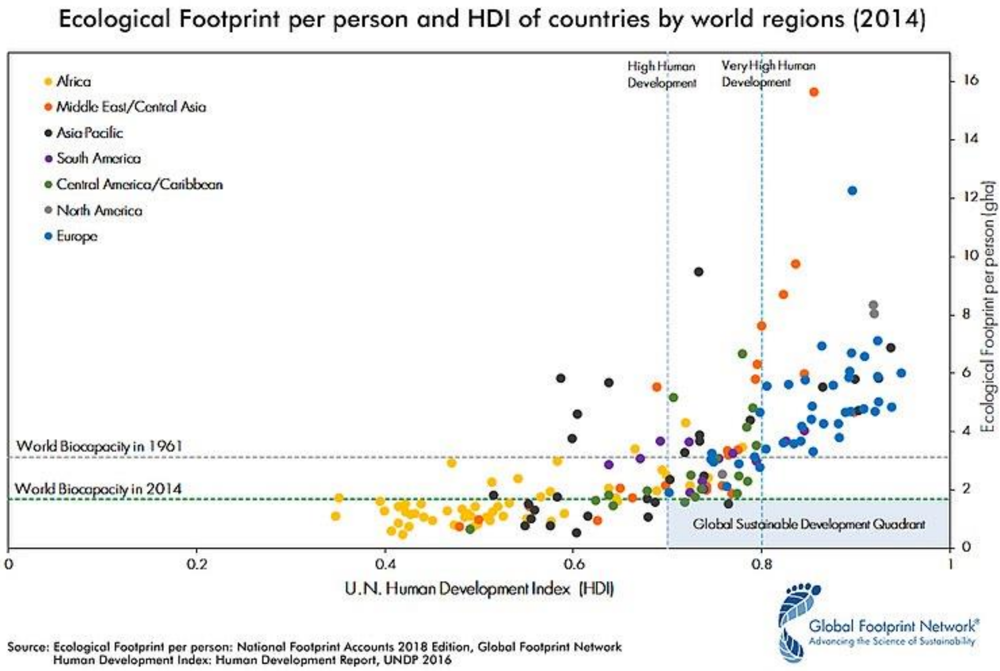


Figure 3: The Ecological Footprint components: *the carbon component makes up more than half of the total global Ecological Footprint. (Global Footprint Network, 2014).*

Ireland's Ecological footprint

- We would need **2.8 planets** if everyone in the world used natural resources at the same rate as Ireland.
- In 2017, Ireland's **country overshoot day fell on 10 May**. A country's overshoot day is the date when Earth Overshoot Day would fall if all of humanity consumed like the people in this country.
- The average Ecological Footprint of Irish residents is **4.8 global hectares per person**. The world average is 2.8 global hectares per person.
- **53 per cent** of Ireland's Footprint comes from the carbon Footprint, and that's smaller than the world average of 60 per cent!
- Ireland's ecological budget went into the red in **1968**.



A good life for all within planetary boundaries

Table 1. Country performance with respect to per capita biophysical boundaries

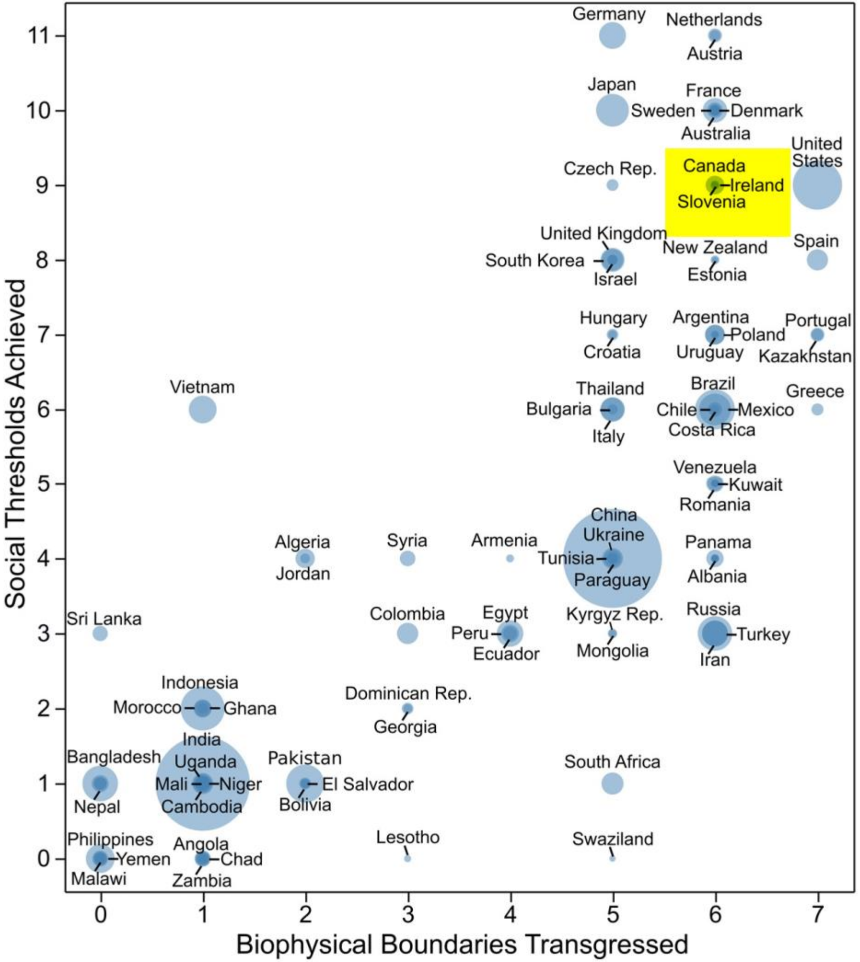
Biophysical Indicator	*N*	Planetary Boundary	Per Capita Boundary	Countries Within Boundary (%)
CO_2 Emissions	145	2 °C warming	1.61 t CO_2 y^{-1}	34
Phosphorus	144	6.2 Tg P y^{-1}	0.89 kg P y^{-1}	44
Nitrogen	144	62 Tg N y^{-1}	8.9 kg N y^{-1}	45
Blue Water	141	4000 km^3 y^{-1}	574 m^3 y^{-1}	84
eHANPP	150	18.2 Gt C y^{-1}	2.62 t C y^{-1}	44
Ecological Footprint	149		1.72 gha y^{-1}	43
Material Footprint	144		7.2 t y^{-1}	44

Meeting social needs

Table 2. Country performance with respect to social thresholds.

Social Indicator	*N*	Threshold	Countries Above Threshold (%)
Life Satisfaction	134	6.5 on 0–10 Cantril ladder scale	25
Healthy Life Expect.	134	65 years	40
Nutrition	144	2700 kilocalories per person per day	59
Sanitation	141	95% of people have access to improved sanitation facilities	37
Income	106	95% of people earn above $1.90 a day	68
Access to Energy	151	95% of people have electricity access	59
Education	117	95% enrolment in secondary school	37
Social Support	133	90% of people have friends or family they can depend on	26
Democratic Quality	134	0.80 (approximate US/UK value)	18
Equality	133	70 on 0–100 scale (GINI index of 0.30)	16
Employment	151	94% employed (6% unemployment)	38

Within our analytic framework, life satisfaction and healthy life expectancy are classified as measures of human well-being, while the remaining nine social indicators are classified as need satisfiers.



Material footprint:

The material footprint, also known as “raw material consumption” (RMC), measures the amount of used material extraction (minerals, fossil fuels, and biomass) associated with the final demand for goods and services, regardless of where that extraction occurs. It includes the upstream (embodied) raw materials related to imports and exports, and is therefore a fully consumption-based measure.

O’Neill et al adopt a global target of 50 Gt y^{-1}, as it is a common denominator in all the analyses, although we caution that the literature is not very mature in this area. This value leads to a per capita target of 7.2 t y^{-1}, assuming a world population of 7 billion people.

IPCC AR6 Working Group III, chapter 5

- Current socio-economic systems are based on high-carbon economic growth and resource use
- Economic growth is tightly coupled with increasing GHG emissions
- Energy consumption causes economic growth; growth causes energy consumption - bidirectional causal effect
- Energy substitution and efficiency gains may offer opportunities to break the bidirectional dependency
- But relative decoupling won’t be enough!
- Absolute decoupling from both territorial and consumption based emissions at all scales will be required.

Avoid-Shift-Improve options:

Socio-cultural, infrastructural and technological changes.

Avoid: reduce long-haul aviation, provide short-distance low-carbon urban infrastructures

Shift: switch to plant based diets

Improve: building sector, increased use of energy efficient end use technologies and passive housing.

Policy implications

- Providing better services with less energy and resource input is consistent with providing well-being for all
- Demand-side mitigation options bring multiple interacting benefits
- Decentralised energy end-uses avoid technological lock-in and greater employment
- Wealthy individuals contribute disproportionately to higher emissions
- Demand side solutions require both motivation and capacity for change

- Start thinking and planning in terms of per capita limits to resource and sink utilisation
- Rich nations to reduce emissions at rates approx. 13% pa
- Rich nations to downscale economic growth (Hickel)
- Rich nations to reduce per capita resource use rates dramatically – shift towards a post-capitalist society
- Consumption based accounting
- Regulating resource extraction and use
- New ways of sharing: personal carbon trading; ecological tax reforms; provisioning infrastructure not based on cost-benefit analysis
- Closing loops; create circular economy

Housing and Local Area				
Population spending 40% of disposable income on housing (%) *(SILC, 2019)* [9]	4.2%	-2.2 pp	10.1%	Tenure Status Region
New dwelling completions *(CSO, 2020)* [10]	20,584	+13,365		Urban/Rural
A or B Domestic Building Energy Ratings (%) *(BER, 2021)* [11]	37.8%	+21.3 pp		Dwelling type County
Average distance to everyday services *(CSO, 2019)* [12]				*Distance from several services (urban/rural) - hyperlink to graphical breakdown.*
Environment, Climate and Biodiversity				
Pollution, grime or other environmental problems (%) *(SILC, 2019)*	6.5%	+2 pp	14.9%	Poverty status Tenure status
Proportion of water bodies assessed as 'high' or 'good' (%) *(EPA, 2017-2019)*	57%	-2.3 pp[13]		
Greenhouse Gas Emissions (CO2, N2O, CH4, HFC, PFC, SF6) ('000 Tonnes CO2 Equivalents) *(EPA, 2018)*	60,934	+3,344		Sector

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Thank you!

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