



Integrating the Planetary Boundaries framework into ICT company reporting - a first approach

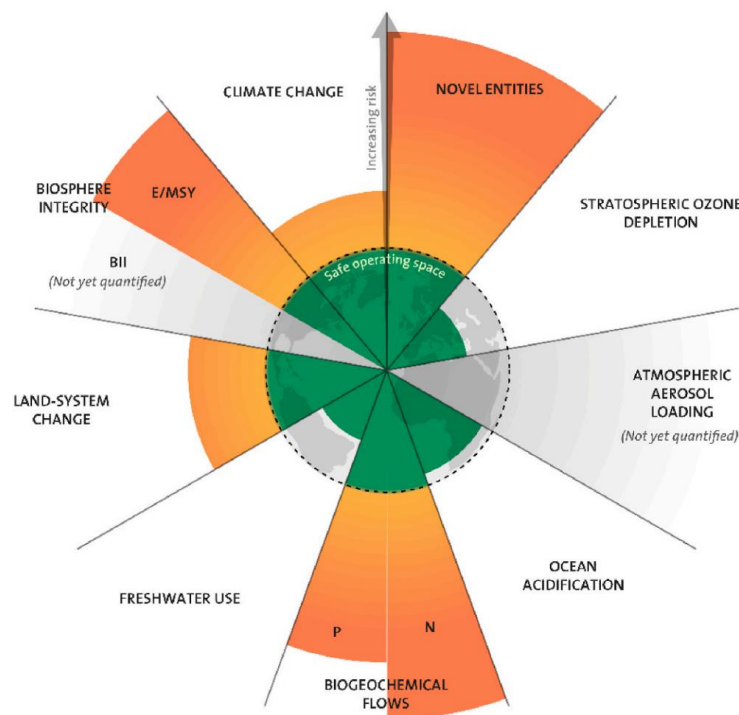
The Planetary Boundaries consists of critical boundaries in nine different areas that the human impacts on the planet must be kept within to not risk the stability of the Earth's life-sustaining systems. Here, the planetary boundaries framework is downscaled to fit corporate sustainability reporting. By this it can increase companies' awareness from current focus on greenhouse gas (GHG) emissions to their wider environmental impact and assist in target-setting.

The Planetary Boundaries framework

The Planetary Boundary framework describes a safe operating space where humanity can thrive now and in the future. The framework has defined nine Earth system processes shown in the picture. Control variables¹ are used to track the state of the Earth-system processes relative to the established boundaries. The transgression of one or several Planetary Boundaries increases the risk of destabilizing the Earth system and can trigger unfavourable environmental change.

The control variables of the Planetary Boundaries framework cannot be directly applied at a company level. A novel approach to help companies consider the control variables of the Planetary Boundaries framework is presented based on two main steps. Firstly, an investigation of prior work, including attempts to apply the Planetary Boundaries framework at a corporate level. This was used to identify applicable proxies, hence simplified representations of the control variables which could be monitored at a company scale. Secondly, the selection of sixteen relevant and reportable proxies.

¹ Each threshold of the Planetary Boundaries framework has been defined using one or several of control variables associated with the Earth-system processes and their thresholds jointly define the safe operating space for humanity.



(Credit: Designed by Azote for Stockholm Resilience Centre, based on analysis in Persson et al., 2022 and Steffen et al., 2015, Attribution: CC BY 4.0).

Sixteen reportable proxies suggested

To expand current ICT companies' sustainability reporting into covering all nine Planetary Boundaries, one to three proxies are suggested for each Planetary Boundary.

The proxies for aerosol loading, climate change, ocean acidification, and ozone depletion focus on emissions of aerosols, greenhouse gases and ozone depleting substances. These emissions have been deemed the most relevant for ICT companies as they can be emitted e.g., during the transportation and production.

The proxies for freshwater use and novel entities focus on ICT companies use of freshwater, plastics and chemicals. The proxies for biogeochemical flows differ as the focus on the losses of phosphorous and nitrogen.

The proxies for biosphere integrity and land-system change focus on company-operated land including the restoration and degradation of land. The biosphere integrity proxies also cover the generation of waste and introduction of invasive species which negatively impacts biodiversity. Waste generation occurs throughout the whole operation and invasive species can be introduced e.g., by planting non-native species on company land.



The following table covers the suggested proxies.

Planetary Boundary	Proxy
Aerosol loading	Emissions of sulphur oxides (SO _x), nitrogen oxides (NO _x), and particulate matter (PM) [kg/year] Emissions of organic carbon and non-methane volatile organic compounds (NMVOC) if relevant [kg/year]
Climate change	Emissions of carbon dioxide equivalents (CO ₂ e) [tonnes/year]
Ocean acidification	Emissions of carbon dioxide (CO ₂), carbon monoxide (CO), and methane (CH ₄) [tonnes/year]
Ozone depletion	Emissions of chlorofluorocarbons (CFCs), Halons, hydrofluorocarbon (HCFC), and refrigerant R-40 [tonnes/year]
Freshwater use	Tier 1: Consumption of freshwater [m ³ /year] Tier 2: Consumption in relation to available freshwater [‰]
Novel entities	Use of plastic [kg/year] Use of chemicals [kg/year]
Biogeochemical flows (phosphorous and nitrogen)	Loss of phosphorous [kg/year] Loss of nitrogen [kg/year]
Biosphere integrity (biodiversity loss)	Degradation of land [hectare] Generation of waste [kg/year] Prevalence of invasive species on company land [species]
Land-system change	Land use [hectares/year] Restoration of natural habitats [hectares/year]

Feasible but challenging to integrate Planetary Boundaries into ICT sustainability reporting

Using Ericsson as an example, the current data collection for the annual report is sufficient to apply two of the proxies: climate change and the chemical novel entities proxies. It partly covers nine of the proxies and is completely lacking for six of them. However, Ericsson would need to expand the data collection to cover all proposed proxies. There is also a need for a refined reporting granularity for nine of the proxies. The proxies that appear to be the most challenging to apply are biosphere integrity, land-system change, and Tier 2 freshwater use which is consumption in relation to available freshwater [‰].



The evaluation indicates that integrating the proxies to integrate Planetary Boundaries considerations into current reporting is feasible, but a challenging task. However, implemented, this would take ICT companies' sustainability reporting to a next level compared to today's practices.

Why the Planetary Boundary framework and possible future improvements

Corporate sustainability reports tend to focus on climate change and the reduction of GHG emissions.

Using the Planetary Boundary framework as a foundation will help ICT companies to consider their impacts in relation to the full range of Planetary Boundaries. This can also help identify impacts that have not been thoroughly considered, such as biodiversity.

The Planetary Boundaries framework stresses the interdependency between the Earth systems and the importance of considering all boundaries simultaneously. However, expanding the company reporting to include all proxies at the same time may seem overwhelming and discourage their application. For this reason, it is believed that companies could start with a partial integration of the proxies and then expand.

Reference to full paper:

Erlandsson J, Bergmark P, Höjer M. Establishing the planetary boundaries framework in the sustainability reporting of ICT companies – A proposal for proxy indicators. 2022. *Journal of Environmental Management* 329 (2023) 117032. <https://doi.org/10.1016/j.jenvman.2022.117032>