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**« Les limites planétaires : une approche physique de l'impossibilité  
d'un développement durable. »**

**By**

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In 1987, the Brundtland Report defined sustainable development at United Nations level. According to the famous formula, it is a matter of 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'. The rest of the text is less well known, but intriguing to say the least: 'The notion of sustainable development certainly implies limits. These are not absolute limits, however, but those imposed by the current state of our technology and social organization, and by the capacity of the biosphere to withstand the effects of human activity. But we are capable of improving our technology and social organization so as to pave the way for a new era of economic growth.

Two key elements emerge from this discourse: (i) sustainable development is in line with liberal economic orthodoxy, which sees economic growth as both a means and an end; (ii) the biosphere's capacity to support human activity has a limit (but not an absolute limit?).

In 2009, researchers at the Stockholm Resilience Centre developed an initial model of Planetary Limits based on geophysical and biological cycles, demonstrating that human activity was placing the Earth system in a state of dangerous imbalance. This model, widely criticized, has since been strengthened and refined, enabling its authors to state in 2023 that at least 6 of the 9 limits scientifically defined and assessed had now been exceeded, including three at a very high level of risk.

In this presentation, we will describe these planetary limits and the physical quantities chosen.

In the second part, we will extend the discussion to other physical limits that have an indirect impact on the Earth system: raw and secondary material resources. Using the examples of certain common metals, notably copper, we will discuss the viability of economic scenarios based on technological development to achieve carbon neutrality by 2050.