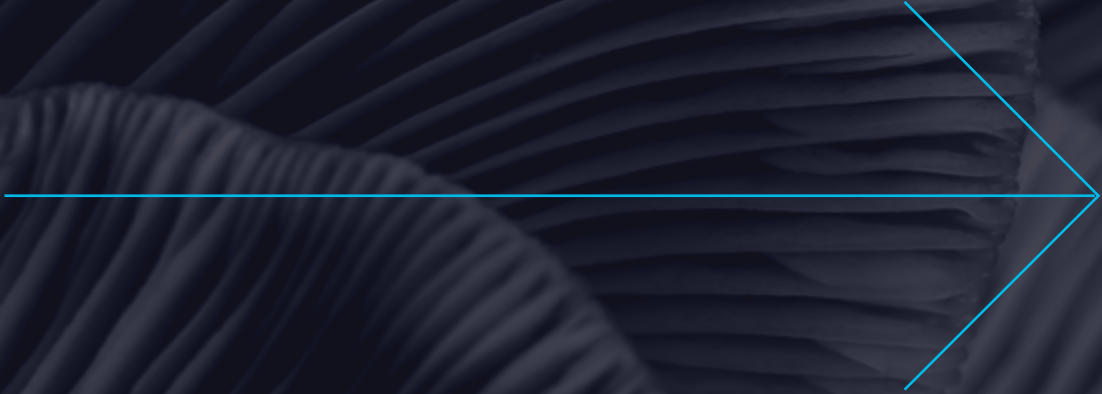


climate tech

for a Sustainable Planet

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Executive conversations with...



**JOHAN
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Director

**Potsdam Institute for
Climate Impact Research**



PLANETARY BOUNDARIES: A SCIENTIFIC GUIDE TO OUR SUSTAINABILITY JOURNEY



The Potsdam Institute for Climate Impact Research has a two-fold mission —advancing the scientific frontier on inter-disciplinary climate impact research for global sustainability and contributing knowledge and solutions for a safe and just climate future. It was founded in 1992 and has over 400 employees of whom over 250 are scientists.

Johan Rockström is Director of the Potsdam Institute for Climate Impact Research. In addition, he is also Professor at the Institute of Earth and Environmental Science at Potsdam University, and Professor in Water Systems and Global Sustainability at Stockholm University. Johan gained international recognition for his role in the development of the Planetary Boundaries framework, which has since become a universal benchmark of sustainability science. His research activities cover a range of topics within Earth system science and global sustainability in the Anthropocene, with the overarching research question: “What is the safe operating space for humanity’s future on Earth, and which sustainable transformations can take us there?”

The Capgemini Research Institute spoke to Johan about the principles behind Planetary Boundaries and how the framework is helping to drive conversations – and action – on sustainability.

PLANETARY BOUNDARIES

In 2009, you helped design the Planetary Boundaries framework. Can you help our readers understand the concept behind it and its implications?

The Planetary Boundaries framework was the result of the integration of three scientific advancements. The first is the evidence that humans have entered the Anthropocene¹ era as the dominant force of change on our planet. The second is the overwhelming evidence that the Holocene² is a unique state of equilibrium that has enabled the development of modern civilizations. The third is the understanding of “tipping points,” where irreversible shifts in the biophysical processes that regulate the climate on Earth permanently alter our living environment.

In essence, the Planetary Boundaries framework is a scientific guide to our journey through the Anthropocene: what we, humanity, can do to keep the planet in a manageable state. The framework provides boundaries that, if observed with discipline, give us a good chance of keeping the planet in a safe operating space, not too dissimilar to that provided for us by the Holocene period. Going beyond these boundaries, however, risks reaching the tipping points that will undermine the Earth’s life-support systems.



Johan Rockström,
Director,
Potsdam Institute for
Climate Impact Research
Impact Research



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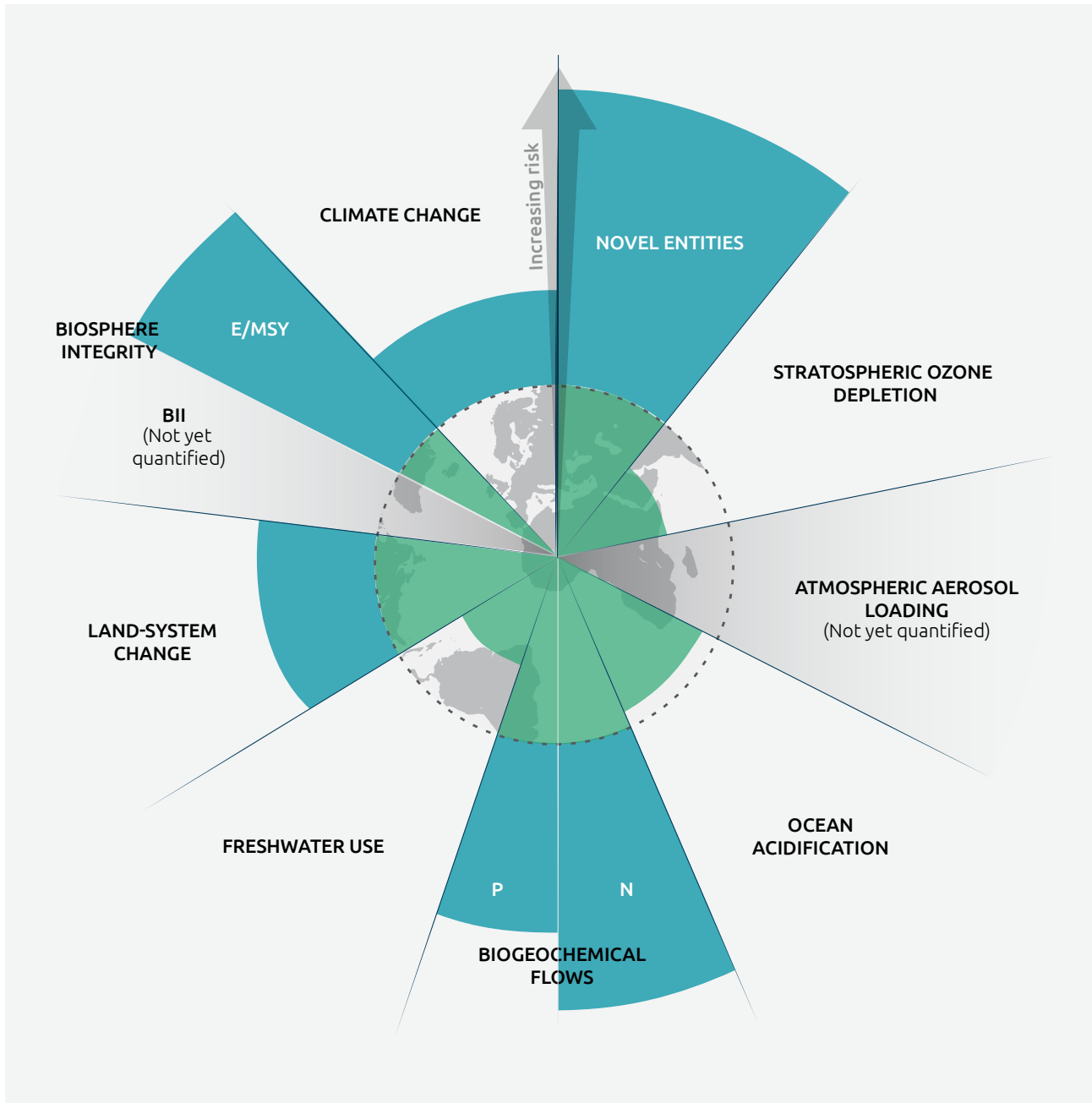
1 The Anthropocene Epoch is an unofficial unit of geologic time, used to describe the most recent period in Earth's history when human activity started to have a significant impact on the planet's climate and ecosystems.
2 The Holocene Epoch covers the past 12,000 years of warm and stable interglacial climates.

We invited scientists across all disciplines to help us identify the nine boundary systems, a framework we finalized in 2015. To my mind, the Planetary Boundaries framework is an essential guide to our transformation to sustainability and to a safe landing for humanity.



**GOING BEYOND THESE
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Figure 1: Planetary Boundaries framework



Source: Stockholm Resilience Centre. Estimates of how the different control variables for seven planetary boundaries have changed from 1950 to present. The green shaded polygon represents the safe operating space.

You have said in the past that there is a risk that net zero targets will be misused. Can you expand on that?

To achieve a safe landing on climate, we need to cut emissions by half by 2030 and continue cutting them by half every decade to reach a net zero world economy by 2050. However, these models are based on assumptions that global agriculture and farming practices will provide a significant carbon sink over the next 30 years, and that natural ecosystems on land will continue to provide major carbon sinks. These models also assume that the oceans will continue to absorb CO₂ until the end of this century. These are huge carbon offsets that are already factored into our assumptions and they therefore can't be factored in again as mitigating possibilities when we calculate time to net zero.

So, the only way to make net zero work is if we add carbon uptake beyond what is already factored into the assumptions in the models. Can we do that? There is certainly room for true net zero compensation by, for example, afforesting completely degraded lands; planting forests in completely unforested areas; or restoring soil carbon in completely degraded regions. However, these measures must be taken without slowing down the phasing out of fossil-fuel emissions. It has to be additional, not an offset.



"The only way to make net zero work is if we add carbon uptake beyond what is already factored into the assumptions in the models."

3 CRITICAL FACTORS: PRICE ON CARBON, TECHNOLOGIES AND REGULATION

What are your views on a carbon tax?

Putting a price on carbon is an absolute necessity of modern economic policy. Burning fossil fuels and damaging the climate without paying for it is the world's largest market failure. Sixty countries in the world have a price on carbon today but it needs to be a universal standard.

Currently there are only small, voluntary green investments in a few markets. We need a price on carbon to be set by widescale legislation across markets and geographies; that is the only way to secure the scale of investment required. The challenge here is to ensure that the revenue from a tax on carbon stores in wetlands or forests is not lost to inefficiencies, but rather returned to the communities that manage these systems, which are often home to invaluable biodiversity and indigenous communities.

Which technologies will drive us to a sustainable future?

We currently emit around 40 billion tons of CO₂ per year. With every passing day, the need for technology for CO₂ removal becomes more urgent. We need to start not only scaling different forms of carbon capture and storage [CCS] technologies, but also supporting R&D into direct air capture. Apart from imposing a price on carbon and investing more heavily in R&D, regulation and governance to support the business and technology development are also key.

"With every passing day, the need for technology for CO₂ removal becomes more urgent."

We need to have a very open discussion on governance, to ensure that carbon-removal technologies are carefully regulated. Too intense a focus on CO₂ removal could impede the transition from fossil fuels, so regulation and governance are necessary to strike a viable balance between reducing emissions and developing renewable-energy sources. Hence, we require a comprehensive approach to supporting the development of carbon-removal technologies, which incorporates both business and technology development and regulation to ensure that these technologies do not create new problems while solving others.

ADJUSTING OUR ECONOMIC MODEL

Can we balance economic growth with a sustainable transition?

Our current economic growth model will not give us the future we need and want. Completely abandoning capitalism to pursue a “degrowth” path would undermine most populations, which rely on conventional economic growth to provide them with a structured life that offers the basics required for subsistence. We don't have time to redesign the global economic system from scratch; we must make adjustments to the current economic model rapidly by setting planetary boundaries, science boundaries, putting a price on pollution and other damage, health threats, climate damage, and biodiversity loss.

We also need to halt the destruction of the Earth's surface; we cannot afford to lose any more of the natural world. It is interesting to see how, even within a conventional economic growth paradigm that is not aligned with the principles of sustainability, there are still potential workarounds to keep it within the planetary bounds operating space. That's where we need to start. In the long term, we need to move away from the over-consumption paradigm and support economic development within scientifically defined boundaries, to ensure social stability and avoid conflict.

Executive Conversations

How do you think the Planetary Boundaries framework can help large organizations?

I'm positively surprised – almost overwhelmed – to see how the Planetary Boundaries framework has become a mainstream part of organizations' culture around the world. Already, around 4,000 companies have adopted science-based climate targets. This year, we'll be launching the science-based target network for the remaining planetary boundaries. Many big companies are ready to move beyond climate and set their business models along a more science-based pathway, starting with biodiversity, and potentially expanding to include water, nutrients, and other essential aspects of planetary conservation. However, as always, there is much more work that needs to be done.





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Potsdam Institute for Climate
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