

Sustainability in Entrepreneurship

The Role of Materials and Economic Growth



Dr. Friedrich Hinterberger

Ulysseus University Summit 26, *MCI Innsbruck*, 9.6.2026

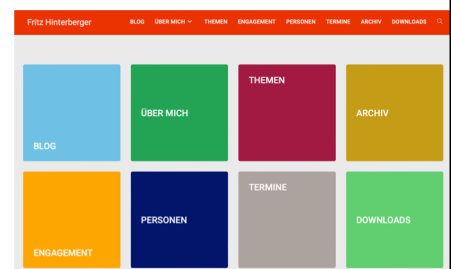
Friedrich „Fritz“ Hinterberger

Sustainability researcher

Networker, communicator and **activist**

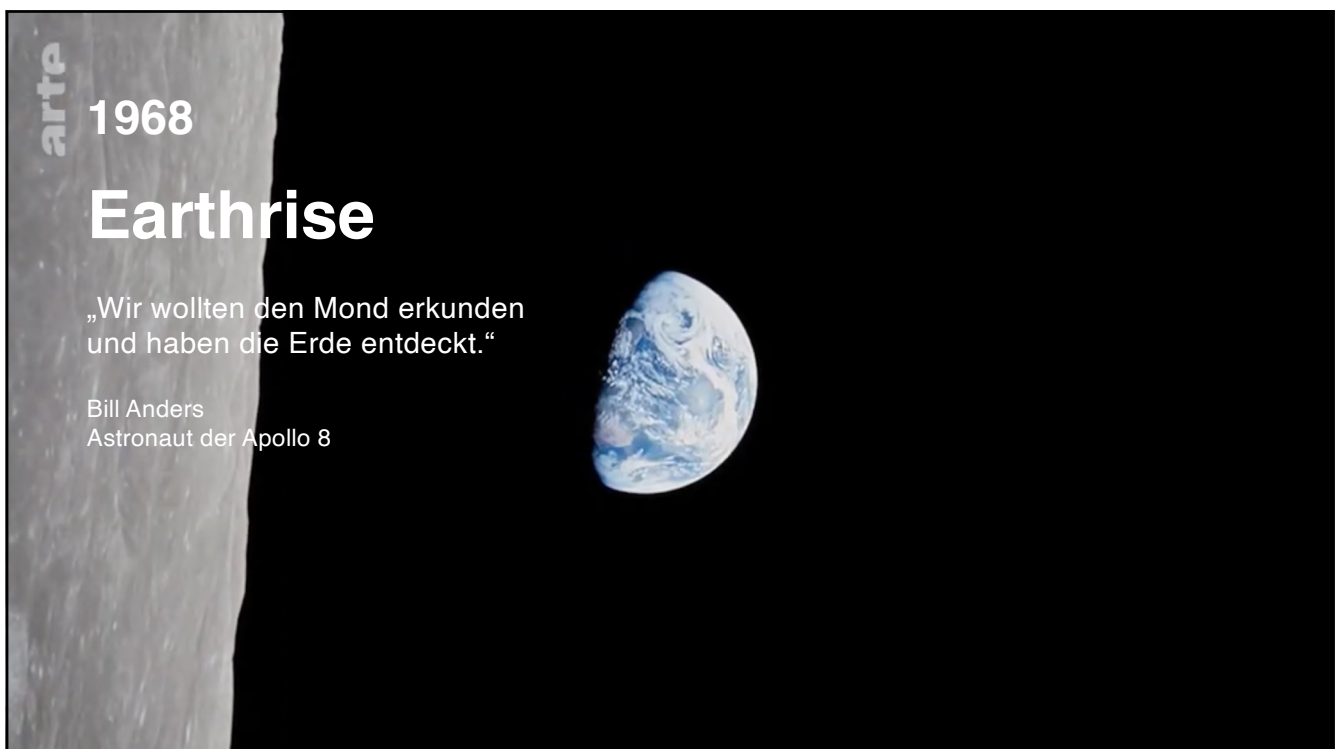
Member of the **Club of Rome**

<https://fritz.hinterberger.com>



What I want to achieve

- present the **work of the Club of Rome** from 1968 to 2026
- explain why **materials and the limits to growth matter** today
- show how **progress is possible** while accepting the limits
- link to **entrepreneurship in a systemic framing**



1968

Foundation of the
Club of Rome



<https://www.clubofrome.org>

1970

First publication of the Club of Rome

The Predicament of Mankind

When we consider the truly critical issues of our time such as environmental deterioration, poverty, endemic ill-health, urban blight, criminality, etc., we find it virtually impossible to view them as problems that exist in isolation --or, as problems capable of being solved in their own terms. For even the most cursory examination will at least reveal the more obvious (though not necessarily the most important) links between problems. Where endemic ill health exists, poverty cannot easily be divorced from it, or vice versa. Certain kinds of criminal behavior often, though not always, seem to be related to poverty or slum living conditions. Furthermore, if we try to solve any such problems exclusively in their own terms we quickly discover that what we take to be the solution of one category of problem

THE CLUB OF ROME

THE PREDICAMENT OF MANKIND

Quest for Structured Responses
to Growing World-wide
Complexities and Uncertainties

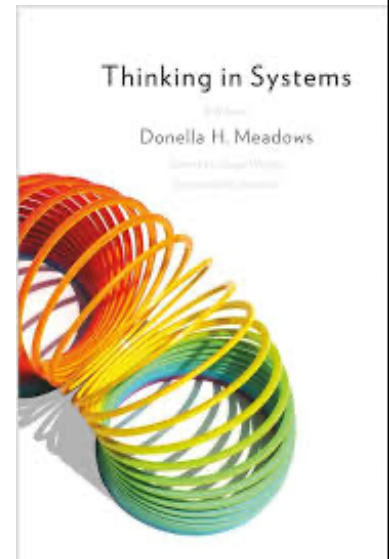
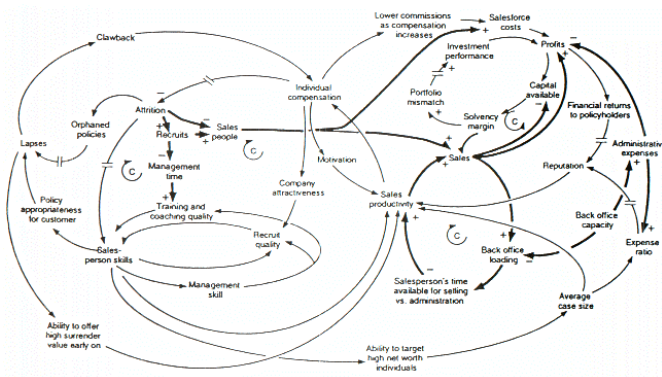
A PROPOSAL

1970



System Dynamics

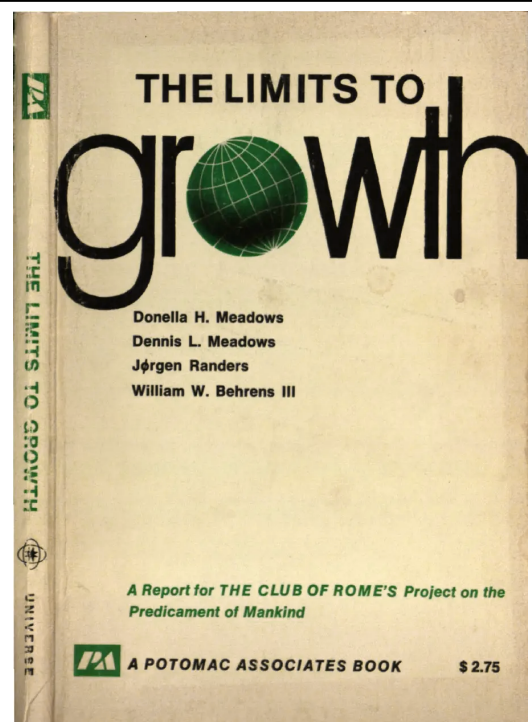
understanding the nonlinear behaviour of complex systems over time using stocks, flows, internal feedback loops, table functions and time delays.



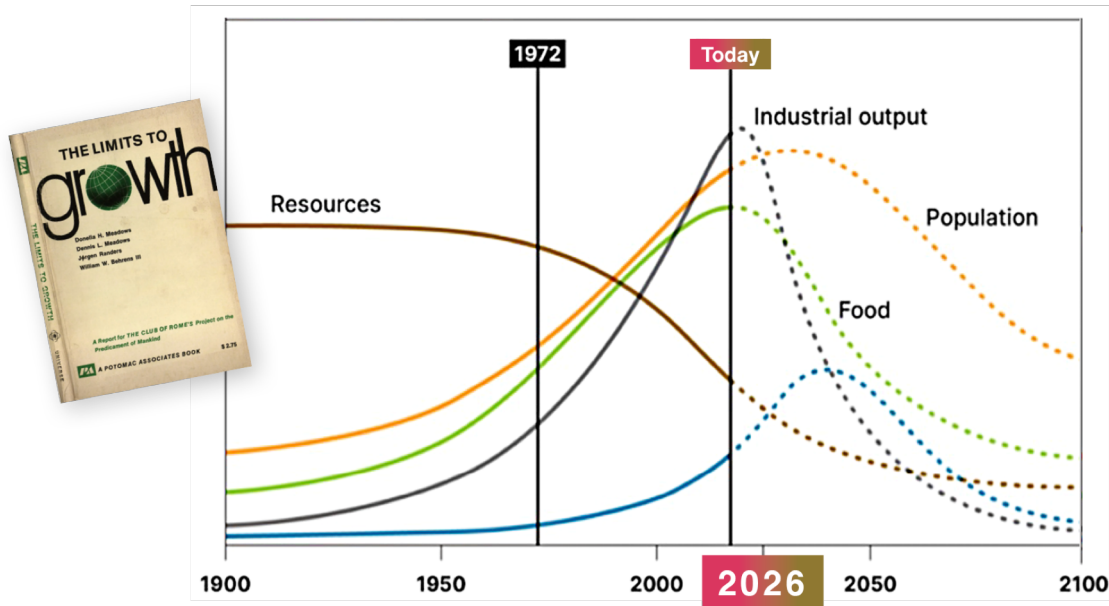
1972

First report
to the Club of Rome

**The Limits
to Growth**



The „limits to growth“ are here to stay

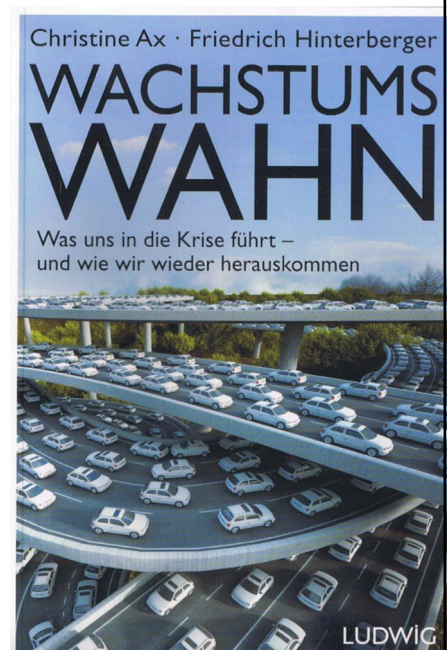


The „Limits to Growth“ become increasingly noticable

Growth is „slowing down“
(= linear, not exponential).

The „growth drivers“ aren't driving any more:

- **Supply:** work, capital, natural resources
- **Demand:** consumption, exports, investment and government expenditure



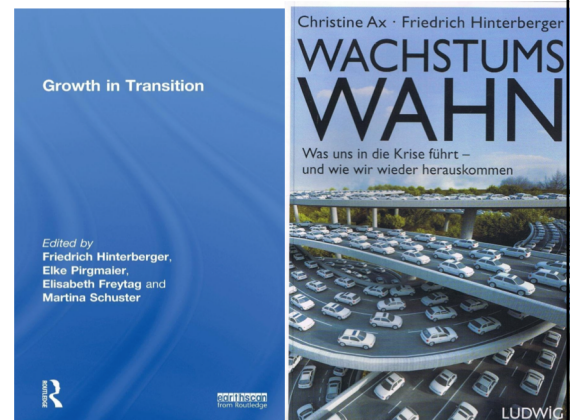
Growth in Transition

Despite differing perspectives on growth issues, working together to chart a course towards a positive future and a good life.

- What constitutes a **good life**?
- What should grow, and what should not, what must grow?
- Environmental impact? Quality of life?
- How shall costs and benefits be **distributed**?

<https://www.wachstumimwandel.at>

Wachstum im Wandel



Wealth and Wellbeing

The Wellbeing Economy Alliance (WeAll)

Wellbeing Economy Governments
(Schottland, Island, Wales, Neuseeland, Finland)



Community Wealth Building (Scotland) Act 2026

2026 asp 7

„Life itself is wealth!“ (Christine Ax)

<https://weall.org/hub/austria>

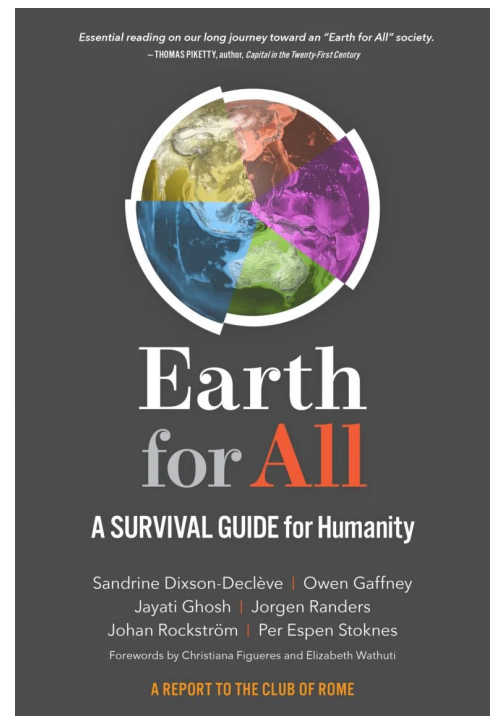


2022

Report to the
Club of Rome

Earth for All

A Survival Guide
for Humanity



**The 5 necessary „turnarounds“
to achieve an Earth4All**



Materials matter



Taskforce on materials and consumption to drive sustainable resource use



23 May 2025 – In response to the urgent need for a more sustainable approach to resource use, The Club of Rome and the Hot or Cool Institute have launched a Materials and Consumption Taskforce. The taskforce aims to highlight the critical importance of materials and consumption in the context of the global economic system.

With the world facing growing pressures from resource scarcity, environmental degradation, accelerating climate change and geopolitical tensions, the taskforce recognises that materials

and consumption lie at the heart of many interconnected crises. From the escalating demand for critical minerals to the impact of supply chains on climate change and social inequalities, addressing these issues is essential to building a sustainable and resilient future.

Materials produce income and wealth

The **economy** needs labor, capital, and raw materials (= nature).

Everything **we consume** is based on raw materials.

Mining plays a special role in industry: coal, ore, steel.

The emergence of the **labor movement and its achievements**.
Its impact on entire **regions** (Salzkammergut, Erzberg, Ruhr area, Rust Belt, etc.).

Sustainability: more than „Energy“ and CO₂

News, Stories & Speeches Events Get Involved Language ▼ Search...

UN environment programme

Who we are ▼ Where we work ▼ What we do ▼ Publications & Knowledge

HOME / TOPICS / FINANCE AND ECONOMIC TRANSFORMATIONS

The International Resource Panel

Every Euro „moves“ 1 kilogram of nature.
- a threefold increase over the last 50 years (and still rising!)

Facebook Twitter LinkedIn YouTube Instagram

JOHANNES EISELEDER VIA.COM

Material Footprints

1 Smartphone (150 g)

=

70 kg

Austria:

Per capita: 20 tonnes/year

= 55 kg/day



„Hidden material flows“: Biodiversity and Human Rights

- Material flows that **do not enter** the economy as transactions, but that are **relevant** from an environmental point
- we need to include unused materials and **indirect flows associated with international trade.**
- Extraktivism of **biotic und abiotic Materials** destroys human and ecological habitat.

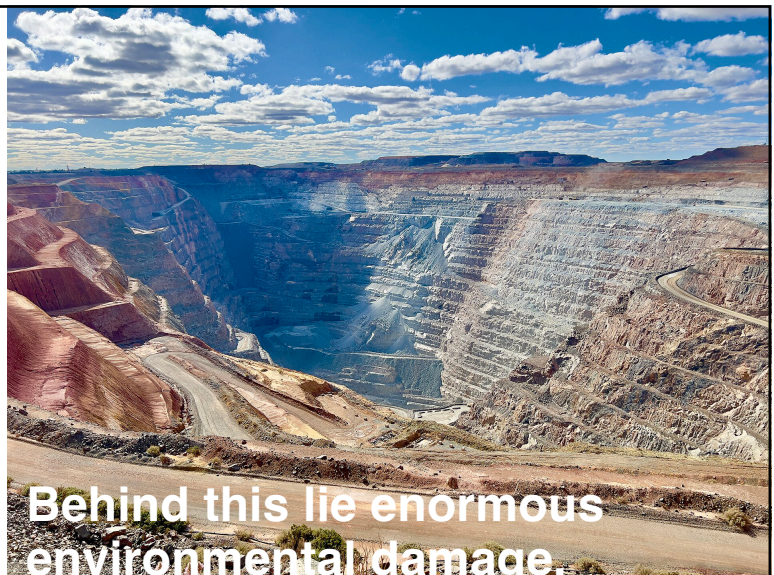


Example gold mine

1 golden ring (5 g)
=
2,5 tonnes of nature!

Example car (1 tonne)

=
15 tonnes (production)
(plus 8 tonnes in use)



Behind this lie enormous
environmental damage,
displacement of people,
disease and death.

Raw materials are becoming increasingly scarce

- Rising demand
- Decreasing proportion of usable material increases costs
- Few regulations to protect nature and people in the Global South

=> Mining becomes increasingly aggressive

Exploitation of raw materials as quickly as possible
Hardly any benefits for local populations.

Corporations devour land and leave destruction in their wake.

But: Profits and losses are unequally distributed.

This leads to conflict

- locally
- regionally
- globally

Materials for „clean energy“...

An official website of the European Union How do you know? ▾

 European Commission

EN

Business, Economy, Euro

Internal Market, Industry, Entrepreneurship and SMEs

Home Single market ▾ Industry ▾ Entrepreneurship and SMEs ▾ Access to finance ▾ Sectors ▾ Tools and databases

Home > ... > Sectors > Raw materials, metals, minerals and forest-based industries > Areas of specific interest > Critical raw materials > Critical Raw Materials Act

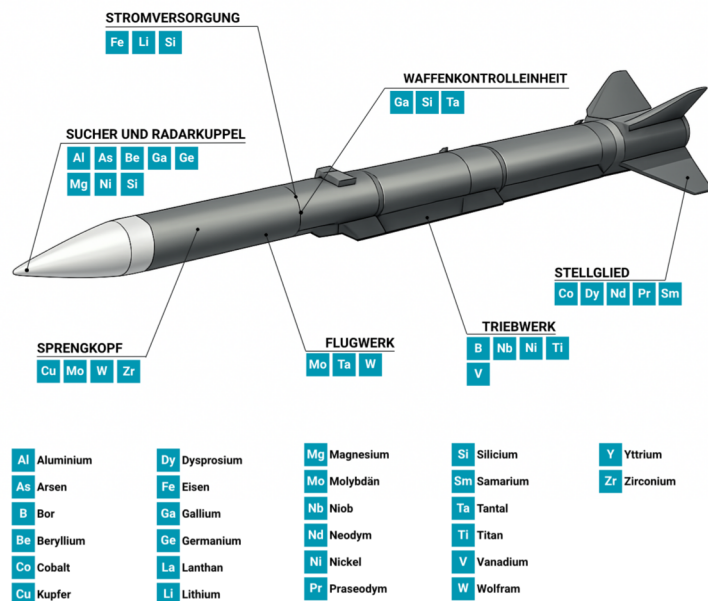
Critical Raw Materials Act

Page contents

Overview of the Critical Raw Materials Act

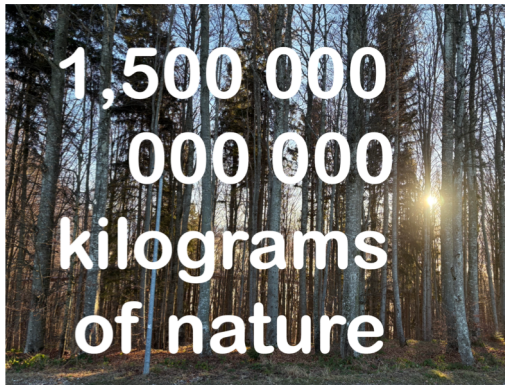
Critical Raw Materials are indispensable for the EU economy and a wide set of necessary technologies for strategic sectors such as renewable energy, digital, aerospace and defence. The Critical Raw Materials Act (CRM Act) will ensure EU access to a secure and sustainable supply of critical raw materials, enabling Europe to meet its 2030 climate and digital objectives.

.. or arms?



The military's hunger for materials

More than



is extracted every year
for military purposes.

Factor X !

We can and must produce
our prosperity with **a fraction**
of today's raw material consumption.

And we need to **share**
material consumption **more equally**.

=> requires systemic thinking



Ecological Economics 29 (1999) 53–56

ECOLOGICAL
ECONOMICS

COMMENTARY

FORUM

Dematerialization, MIPS and Factor 10
Physical sustainability indicators as a social device

Friedrich Hinterberger ^{a,*}, Friedrich Schmidt-Bleek ^b

^a Wuppertal Institut, Dillpetersberg 19, Postfach 100480

^b Factor 10 Institute, La Riva, 10000, CA

Received 5 June 1997; received in revised form 29 December 1998

In 1992, the concept of material intensity per unit service (or function)—in short MIPS—had been proposed by Schmidt-Bleek as an initial measure for estimating the eco-efficiency (the life-cycle wide environmental impact intensity) of infrastructures, goods, and services. The concept of MIPS includes energy intensities by integrating the material flows associated with energy inputs. The inverse of MIPS is the resource productivity (see Schmidt-Bleek, 1994; Schmidt-Bleek et al., 1998).

MIPS is computed in mass (of material input MI) per total units of service (S) delivered by the good over its entire life span. Manufacturing, transport, packaging, operating, re-use, re-cycling, and re-manufacturing are accounted for and so is the final waste disposal. It is usually split up into five categories of materials: biotic, abiotic, earth

movements, reliable toxic substances, such as lead, mercury, and cadmium. The material intensity per unit service (MI) is the material input per unit of service. MIPS is the inverse of MI. MIPS is computed in mass (of material input MI) per total units of service (S) delivered by the good over its entire life span. Manufacturing, transport, packaging, operating, re-use, re-cycling, and re-manufacturing are accounted for and so is the final waste disposal. It is usually split up into five categories of materials: biotic, abiotic, earth

**FACTOR
FOUR**
DOUBLING
WEALTH,
HALVING
RESOURCE USE

THE NEW REPORT TO THE CLUB OF ROME

ERNST VON WEIZSÄCKER

AMORY B. LOVINS • E. HUNTER LOVINS

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PII: S0921-8009(98)00080-9

1979

Report to the Club of Rome

„No Limits to Learning“

based on

- anticipation
- participation.

It described the gap between the systemic complexity of our world and the human capacity to deal with it as the "human gap", which needs to be closed.



NO LIMITS TO LEARNING

BRIDGING THE HUMAN GAP

A Report to the Club of Rome

JAMES W. BOTKIN
MAHDI ELMANDJRA
MIRCEA MALITZA

Copyright Club of Rome 1998



2026

Upcoming report
to the
Club of Rome

**No Limits
to hope**



No Limits to Hope is a global initiative launched by The Club of Rome, The Fifth Element, and the WEEC Network to inspire educators, learners and citizens alike to pursue a global shift in learning paradigms to address humanity's most pressing challenges.

Building on the legacy of the 1979 report to The Club of Rome, No Limits to Learning, this project seeks to bridge the "human gap" between knowledge and action and re-examine humanity's quest for meaning and a good life. The project will produce a report, hold conferences and webinars, and publish articles, with the aim to catalyse cultural change, facilitate transformative learning, and create new knowledge.

Our work ▾ Publications Insights ▾ Get involved About us ▾



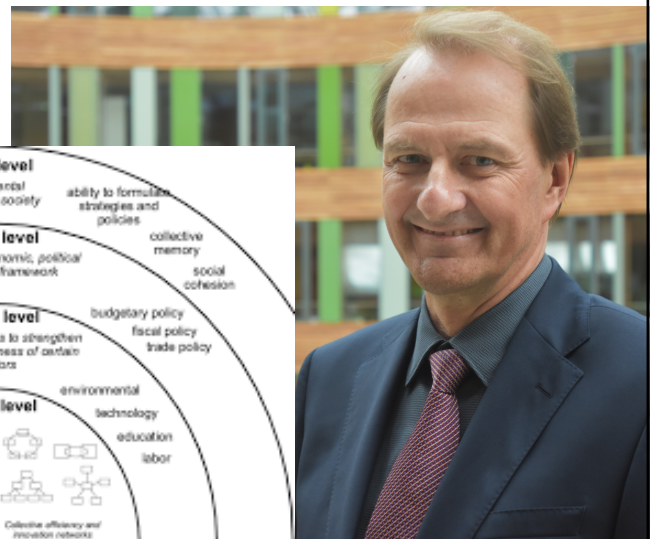
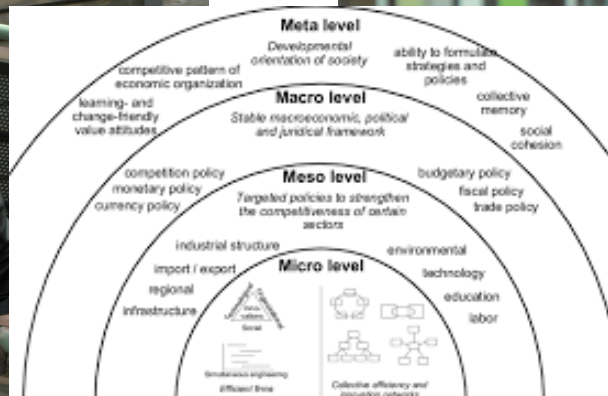
To reach these ambitious objectives, we invite researchers, educators, and practitioners who have explored new learning paradigms and their ability to foster systemic transformation to submit research proposals, papers, and case studies to be included in the report.

The four levels of change

- micro
- meso,
- macro
- meta

are systemically intertwined.

Systemic competitiveness



Macro: the great challenges of our time we are facing and need to face

- **C**limate,
- **C**apitalism,
- **C**onflicts and
- **C**omputers (AI)

are systemically intertwined

and need to be tackled together.

External and internal dangers

external : climate, conflicts, war, inflation, diseases, AI...

internal: crisis of social cohesion and liberal democracies

The external risks

- push internal issues into the background
 - devour vast amounts of money and resources
- (these are then lacking for social and environmental concerns).

Therefore:

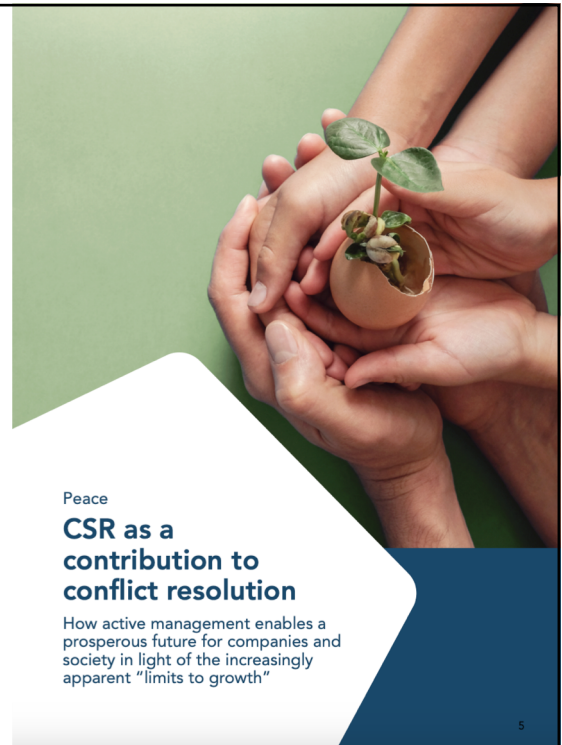
Environmental problems, social problems, and armed conflicts
must and can be solved together.

CSR for peace!

Fair distribution of resource costs and benefits on local, regional and global levels enhances **sustainability and peace**.

- **Positive contributions** for people and nature
- Anchoring (measurable) **goals in the company**
- **Deriving indicators from goals** (not the other way around)

<https://www.csr-verband.org/>



Indicators for regeneration

More than Sustainability

- realizing **good sustainable impacts** by investing into the generation of common livelihoods
- scaling good impacts up for an ecological resilient and life-worthy, just and peaceful world

*„Sustainability, in the sense of **future viability**, unites the stabilization, development, protection and integrity of our shared foundations of life and the living diversity of evolution with humankind.*

Daniel Dahm

<https://unitedsustainability.com>

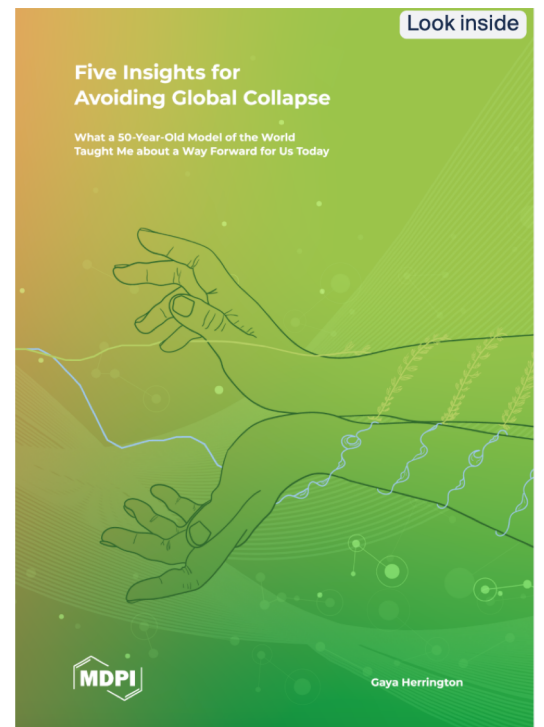


Meso: Bioregionalism

Gaya Herrington

„We are on the verge of collapse“

- We are inextricably linked;
- Growth is not a sustainable goal;
- We must reset our priorities;
- Time is running out;
- The end of growth does not mean
the end of progress.



From „either-or“ to „both-and“

Rene Schmidpeter:

- Circular economy enables regional value creation and requires communication/cooperation.
- Technology/Mindset/Networks
- New thinking, arts und design

<https://www.bfh.ch/de/ueber-die-bfh/personen/ccpbeqqmiiv4/>



Meta: How we see and communicate about the world

Luis Klein

„System Wisdom“

- UBUNTU:
„I am, because we are“
- TIAN XIA.
„Embrace the whole“ (as if)
- TAMKEEN
„Developing a shared understanding“

<https://www.youtube.com/watch?v=D6SpcZrx2k&list=PLSVaEiHMi2FN-eTowlaDI2Rap127fbH3q&index=4>



Thinking in Systems means

I am not alone when I want to achieve something

&

I can contribute from anywhere in the system.

Example MILA

- a cooperative of people working for their own better shopping
- good quality and prices
- 3 hours/month of work
- collaborative decision making
- ...

<https://www.mila.wien>

MILA Mitmach-Supermarkt



Example WaLeWi

- an association of people working for their own better living
- affordable housing together
- sociocracy
- affecting the neighborhood
- ...

<https://www.walewi.at>



Verein für gemeinschaftliches
Wachsen, Leben und Wirken
ZVR-Zahl: 1728857185
E-Mail: office@walewi.at
Website: www.walewi.at



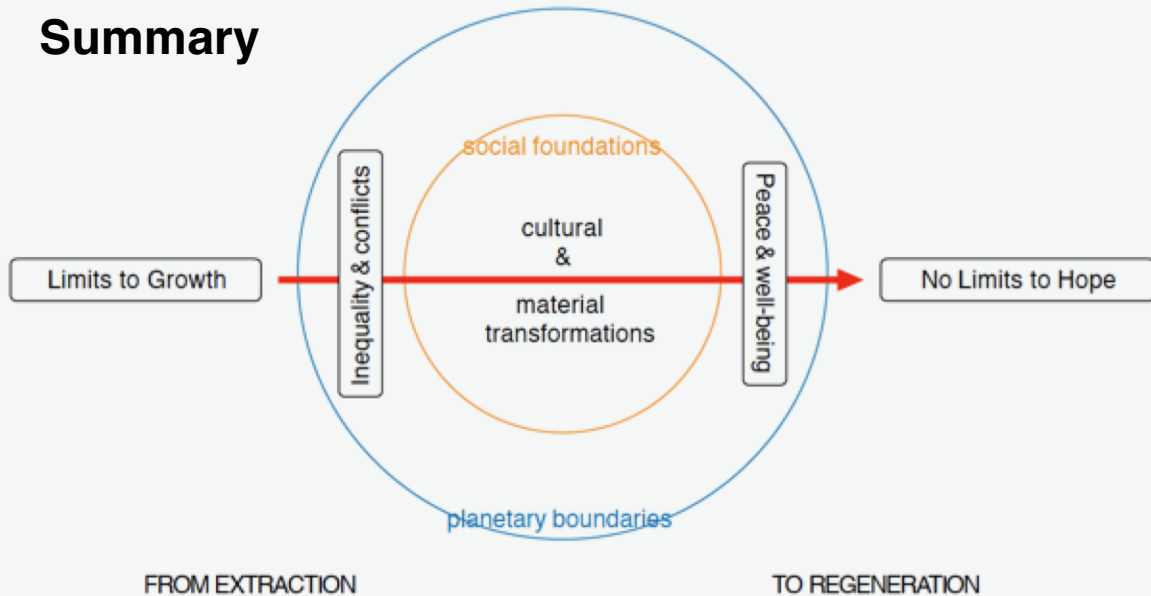
VEREIN ZUKÜNFTIGE HÄUSER AKTUELLE TERMINE MITGLIED WERDEN FAQ WEITERES

Baugruppe WaLeWi:

Gemeinschaftliches und leistbares
Wohnen in Wien



Summary



It's the process: 5 Steps

- Best available knowledge
- Mourn and accept the existence of crises
- Understand the systemic connections
- Set concrete goals for a good life
- Work together to achieve them
- Celebrate what has been achieved!

wellbeing.jetzt

Wellbeing im Salzkammergut

<https://salzkammergut.wellbeing.jetzt>

<https://wachstumimwandel.at/imagine-the-pluriverse/>

Wachstum
im Wandel

**Imagine
the
Pluriverse**

Viele Welten —
eine Erde für alle

Earth 4All

TEACH IN

im Rahmen der

Klima Biennale Wien
2026
09.04. - 10.05.

6. MAI 2026
18-21 Uhr, Festplatz Zentrale Kunsthaus Wien
Café Friedlich, Untere Weißgerberstraße 13, 1030 Wien

Kunsthaus Wien Friedlich

Imagine all the People

Imagine there's no heaven
It's easy if you try
No hell below us
Above us only sky

Imagine all the people
Living for today

© Lennon

Imagine there's no countries
It isn't hard to do
Nothing to kill or die for
And no religion, too

Imagine all the people
Living life in peace

© Lennon

You may say I'm a dreamer
But I'm not the only one
I hope someday you'll join us
And the world will be as one

Imagine no possessions
I wonder if you can
No need for greed or hunger
A brotherhood of men

© Lennon

Imagine all the people
Sharing all the world

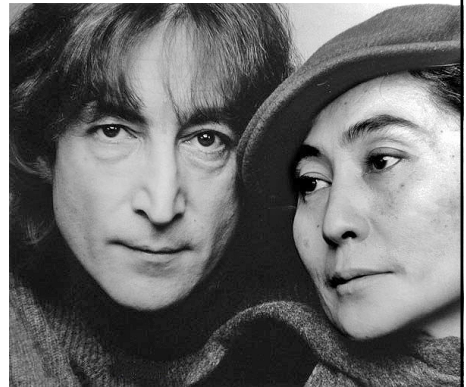
You may say I'm a dreamer
But I'm not the only one
I hope someday you'll join us
And the world will live as one

© Lennon

© John Lennon and Yoko Ono



© Fibonacci



© Jack Mitchell

Join me on Substack !



Mourning and fighting for the glaciers

Arts and activism against mining in Argentina, Austria and everywhere

APR 14 · FRITZ HINTERBERGER



Blogposts by Fritz

Various observations and ideas

✓ **Subscribed**

We gotta live the change.

But where to and how?

MAR 11 · FRITZ HINTERBERGER



Damage of war and before

... and after

MAR 3 · FRITZ HINTERBERGER



The Limits to Growth are Here to Stay

an economic view

FEB 23 · FRITZ HINTERBERGER



Security and peace



Recommendations



Thinking about...
Timothy Snyder



ESG on a Sunday
Beslik Sasja



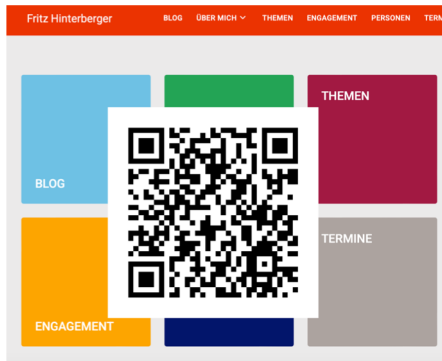
Paul Krugman
Paul Krugman



The Seneca Effect
Ugo Bardi

Danke, thank you ... !

The presentation is available
here for **download**:



<https://fritz.hinterberger.com>



fritz@hinterberger.com