
Søren Jensen
Certified
Corporation

Today's Agenda

- Status
- Why us?
- Emerging Futures
- Sufficient & Efficient
- Current trends
- Conclusion

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Why us?

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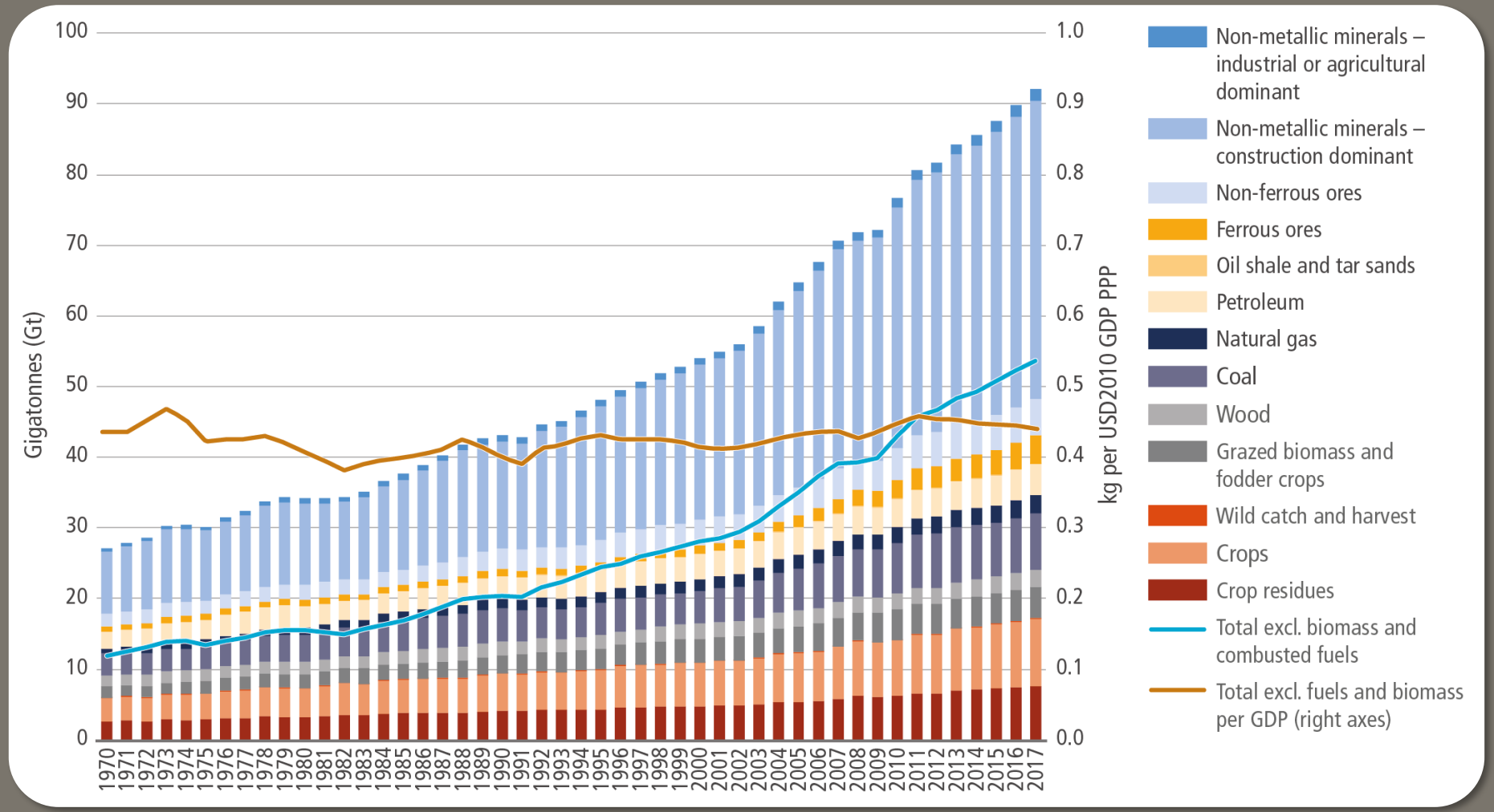
Raw natural materials extraction



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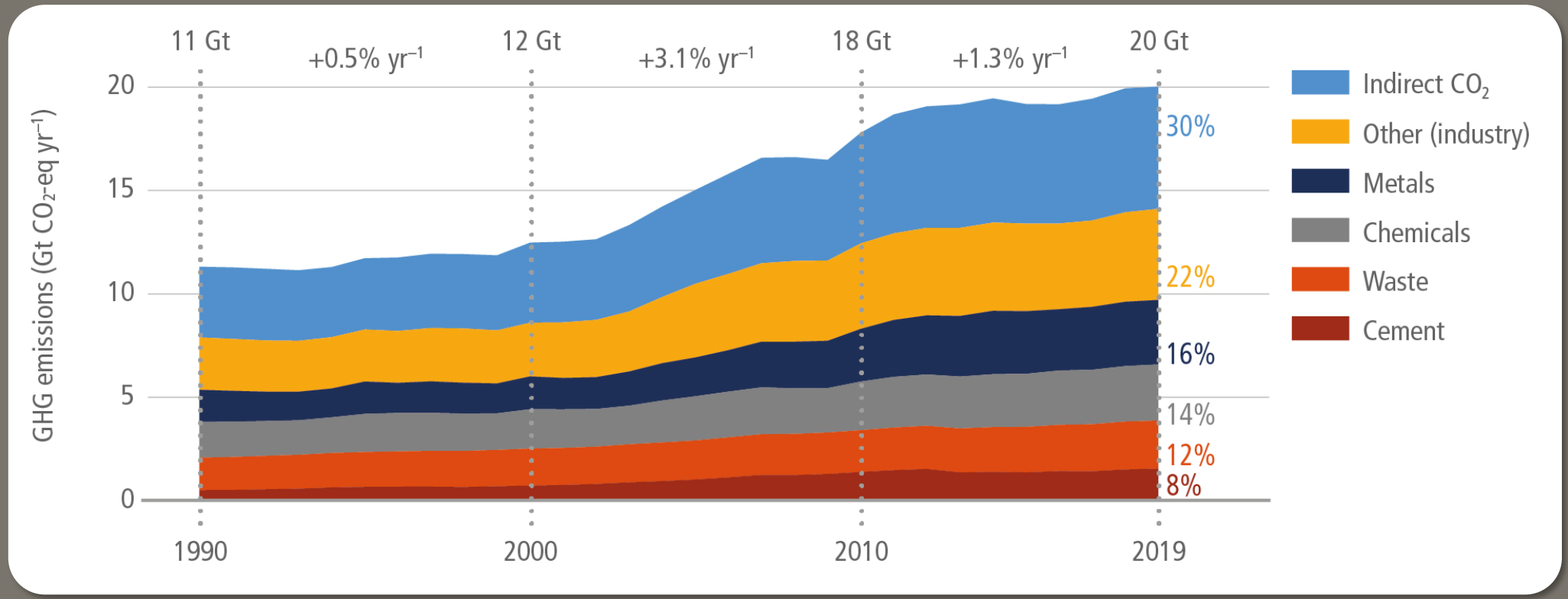
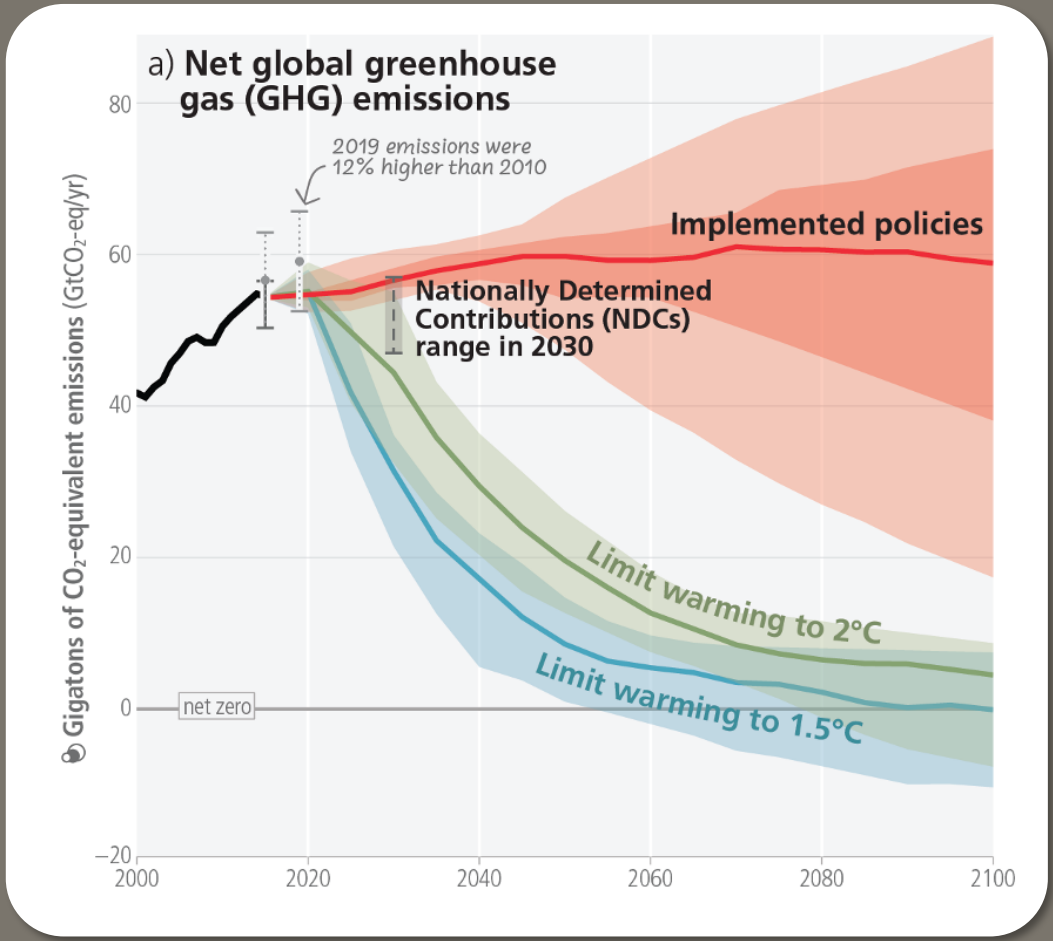
Global industry sector emissions



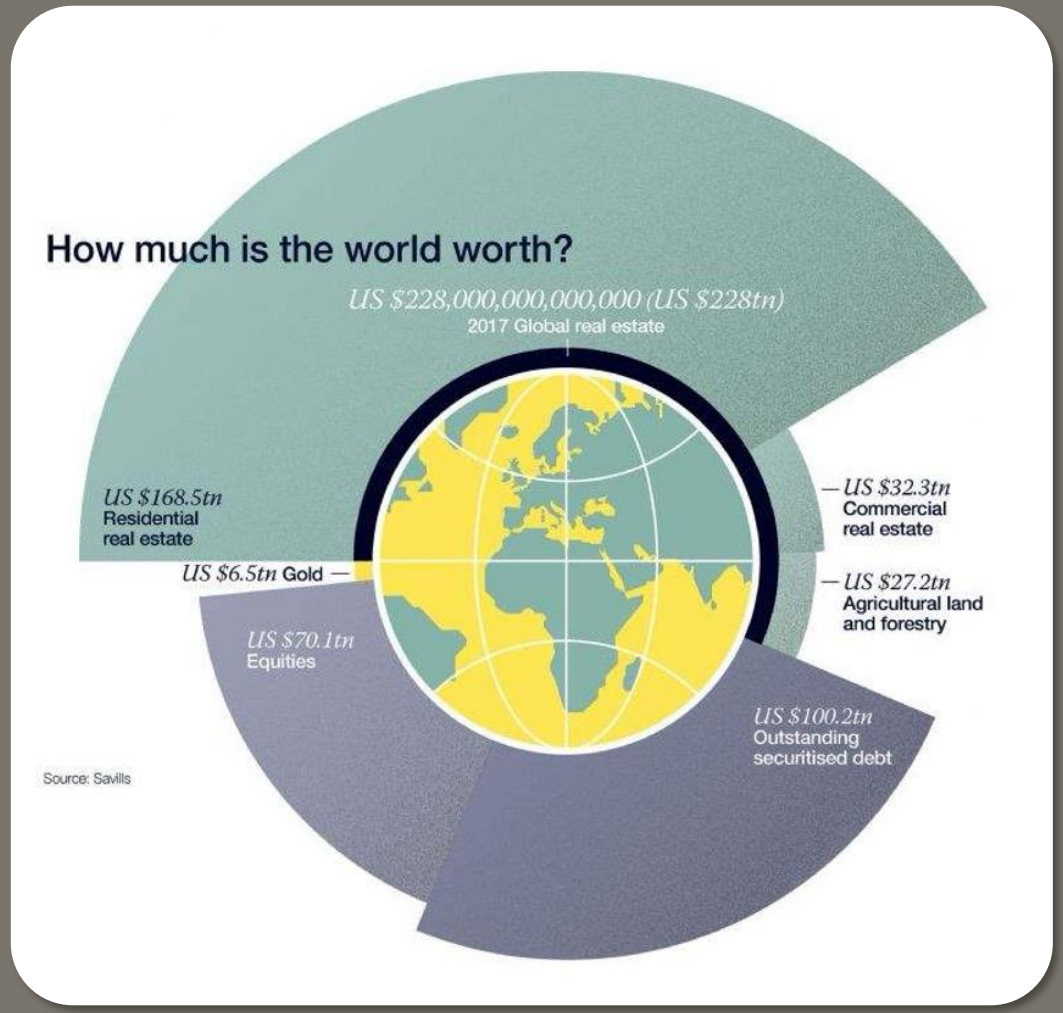
UN IPCC

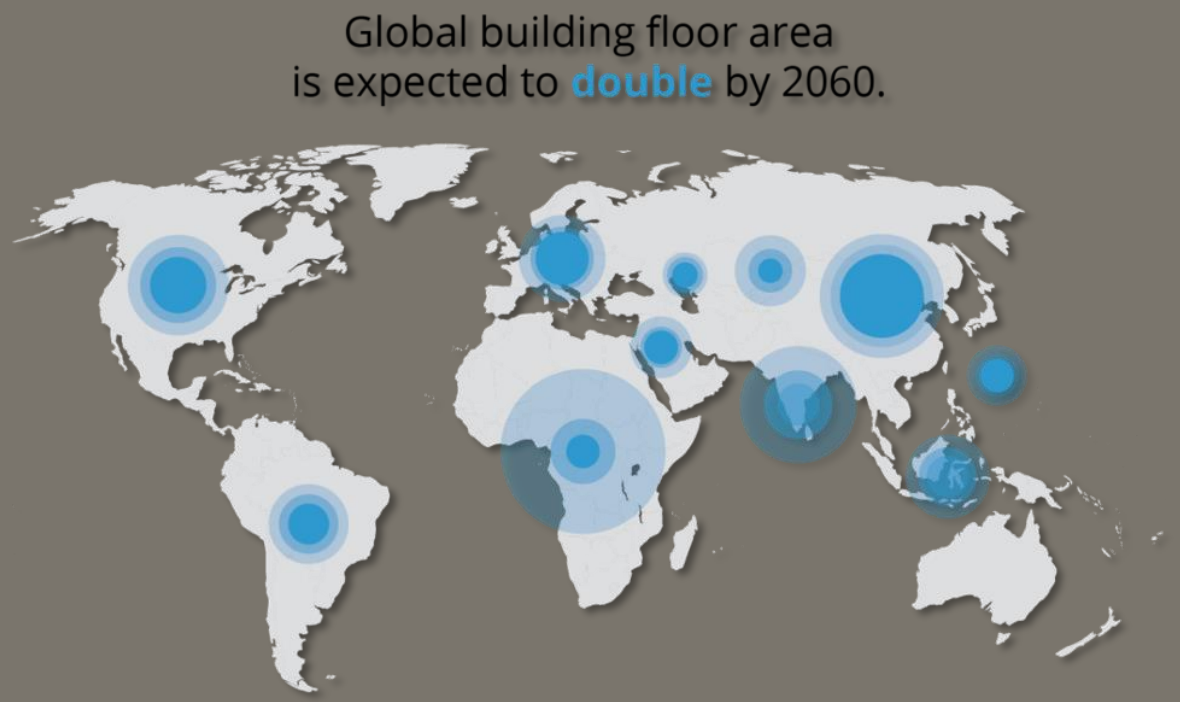


UN Secretary-General António Guterres:

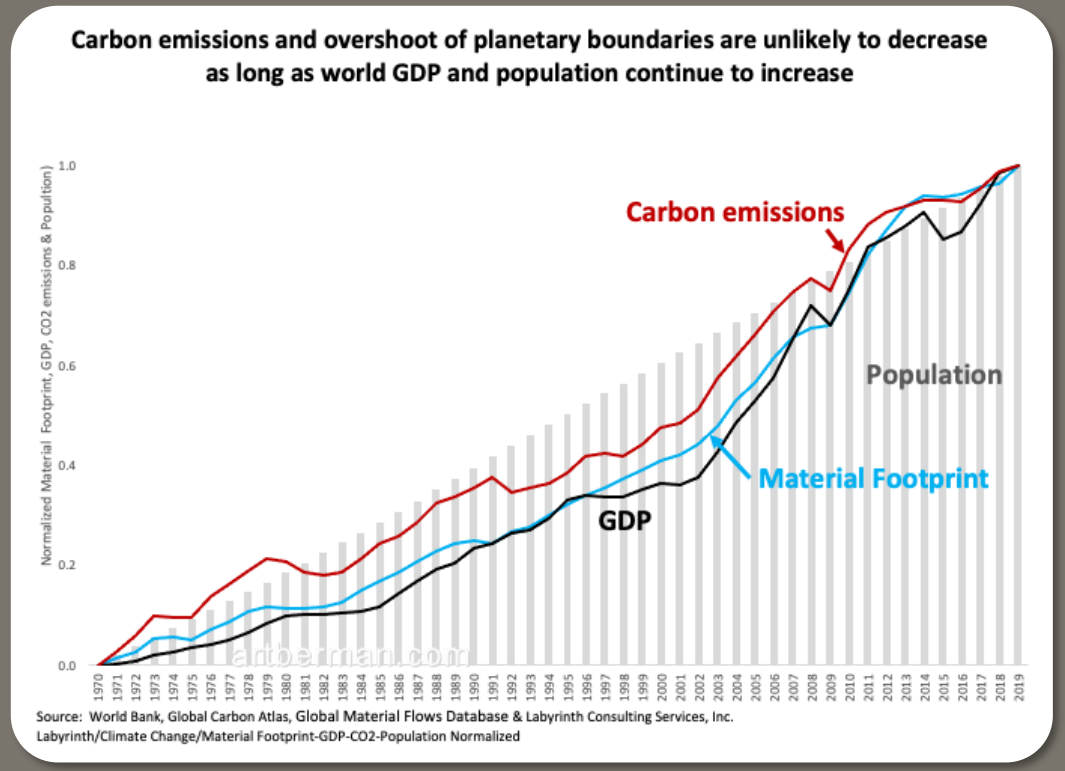
Cities are where the climate battle will largely be won or lost.

Real estate in numbers





Decouple



Ex-CEO of Unilever Paul Polman

What holds us back then, if anything, is a lack of willpower, moral leadership and imagination

Emerging Futures

It was the best of times,
it was the worst of times

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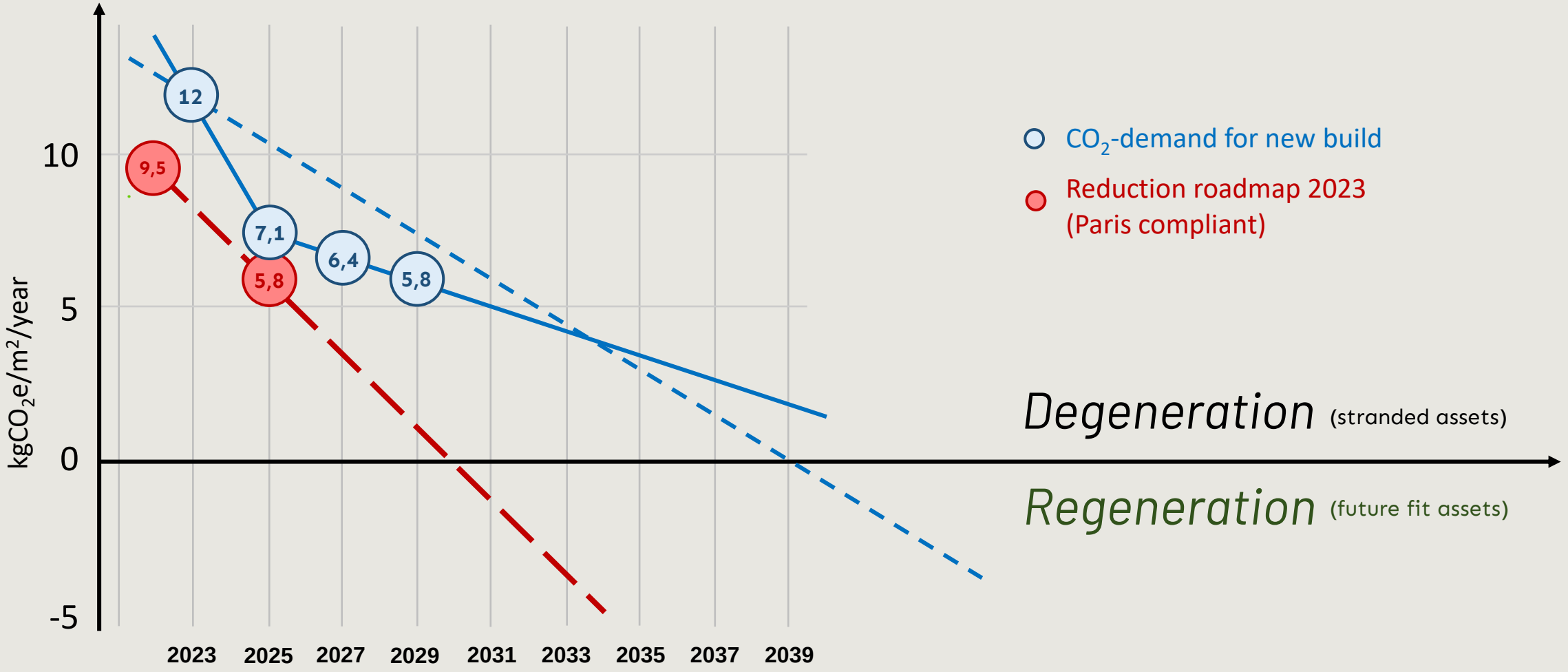
Carbon efficiency



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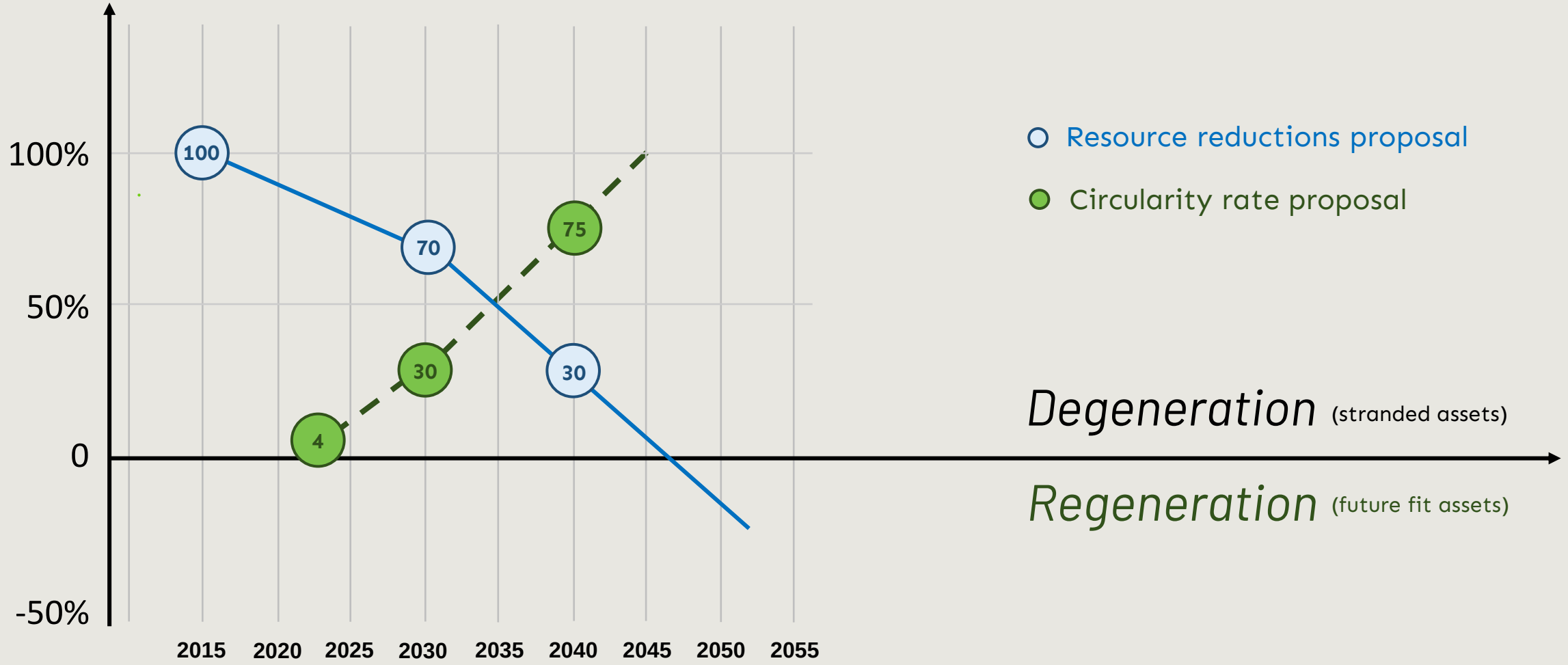
Material efficiency



Sustainable

Doing a bad thing better,
so we can continue to do it

Resilient

Stuff is going to happen, and things are change is going to happen, [so] prepare for it

Regenerative

Time to think differently
to achieve different goals

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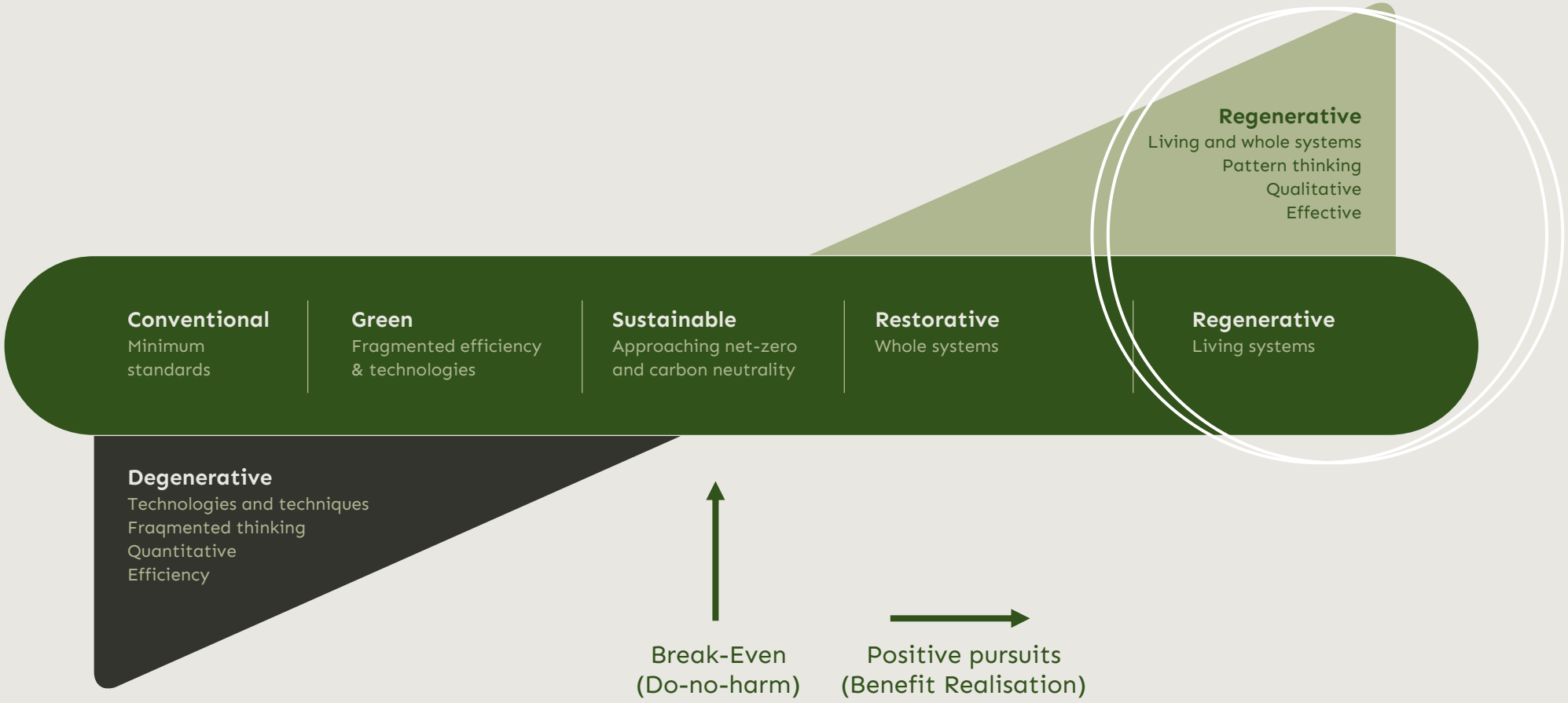
Regenerative



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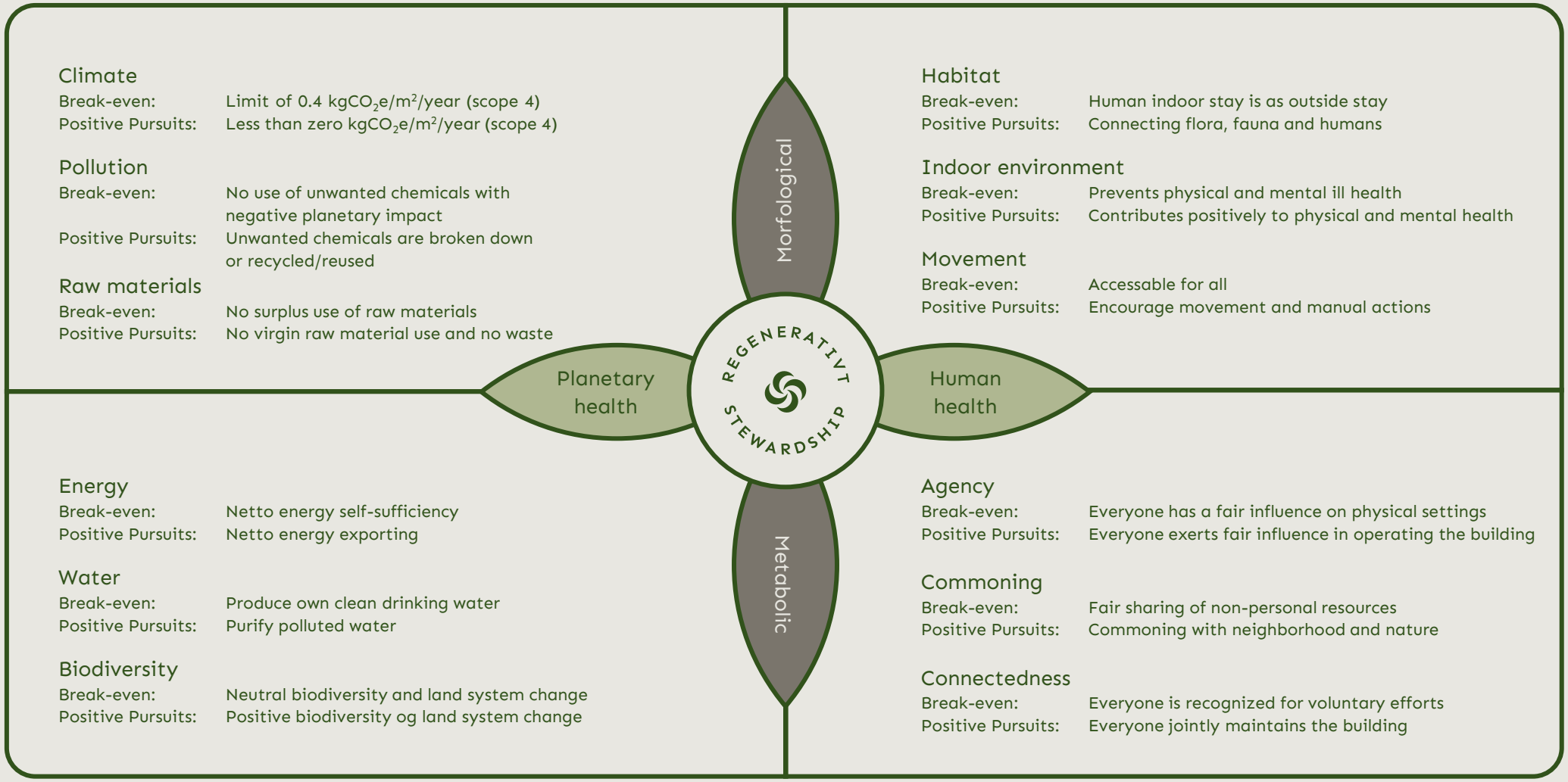
Create a built environment which evolves in harmony with nature



Climate
Break-even: Limit of 0.4 $kgCO_2e/m^2$/year (scope 4)
Positive Pursuits: Less than zero $kgCO_2e/m^2$/year (scope 4)

Pollution
Break-even: No use of unwanted chemicals with negative planetary impact
Positive Pursuits: Unwanted chemicals are broken down or recycled/reused

Raw materials
Break-even: No surplus use of raw materials
Positive Pursuits: No virgin raw material use and no waste

Habitat
Break-even: Human indoor stay is as outside stay
Positive Pursuits: Connecting flora, fauna and humans

Indoor environment
Break-even: Prevents physical and mental ill health
Positive Pursuits: Contributes positively to physical and mental health

Movement
Break-even: Accessable for all
Positive Pursuits: Encourage movement and manual actions

Energy
Break-even: Netto energy self-sufficiency
Positive Pursuits: Netto energy exporting

Water
Break-even: Produce own clean drinking water
Positive Pursuits: Purify polluted water

Biodiversity
Break-even: Neutral biodiversity and land system change
Positive Pursuits: Positive biodiversity og land system change

Agency
Break-even: Everyone has a fair influence on physical settings
Positive Pursuits: Everyone exerts fair influence in operating the building

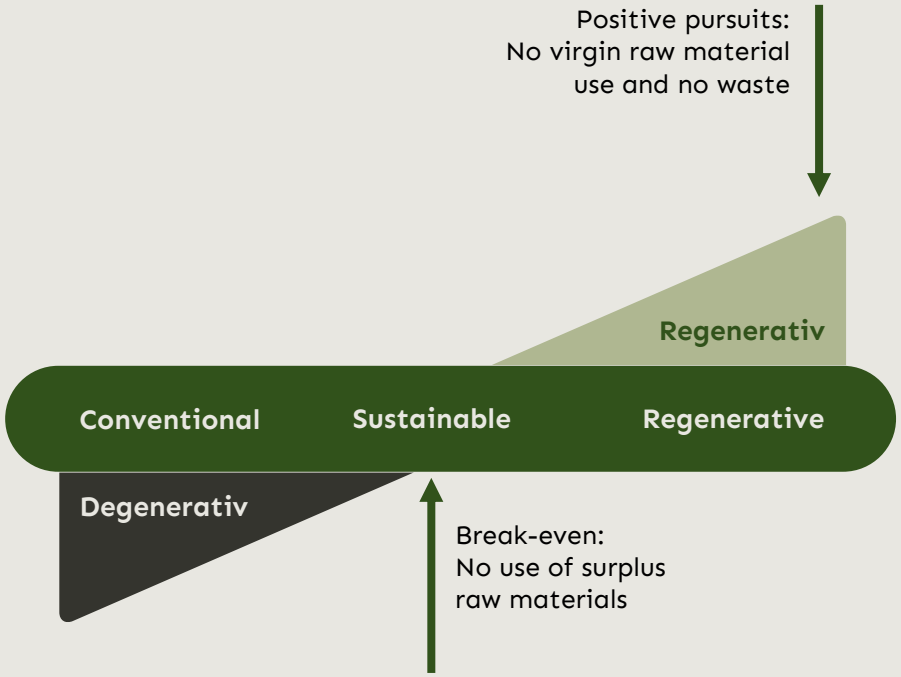
Commoning
Break-even: Fair sharing of non-personal resources
Positive Pursuits: Commoning with neighborhood and nature

Connectedness
Break-even: Everyone is recognized for voluntary efforts
Positive Pursuits: Everyone jointly maintains the building

Break-even og Positive Pursuits

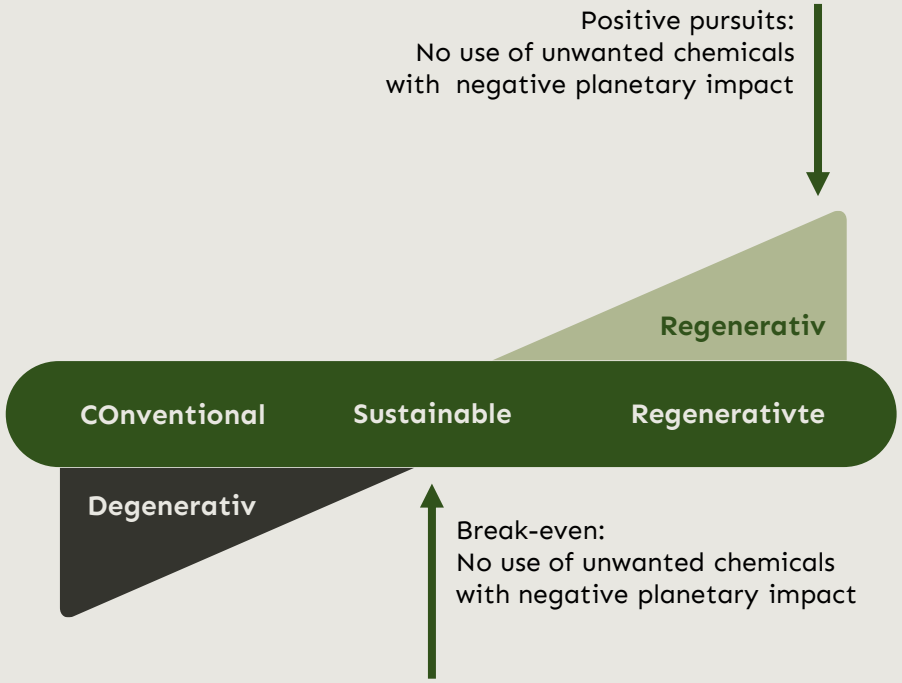
Raw matetials

From construction as a consumer of non-renewable raw materials – To construction that consumes no virgin raw materials and generates no waste during building, operation, or deconstruction.



Pollution

From construction as a source of pollution –
To construction that contributes to prevention, recycling/reuse, and the breakdown of harmful chemicals.



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Sufficient & Efficient

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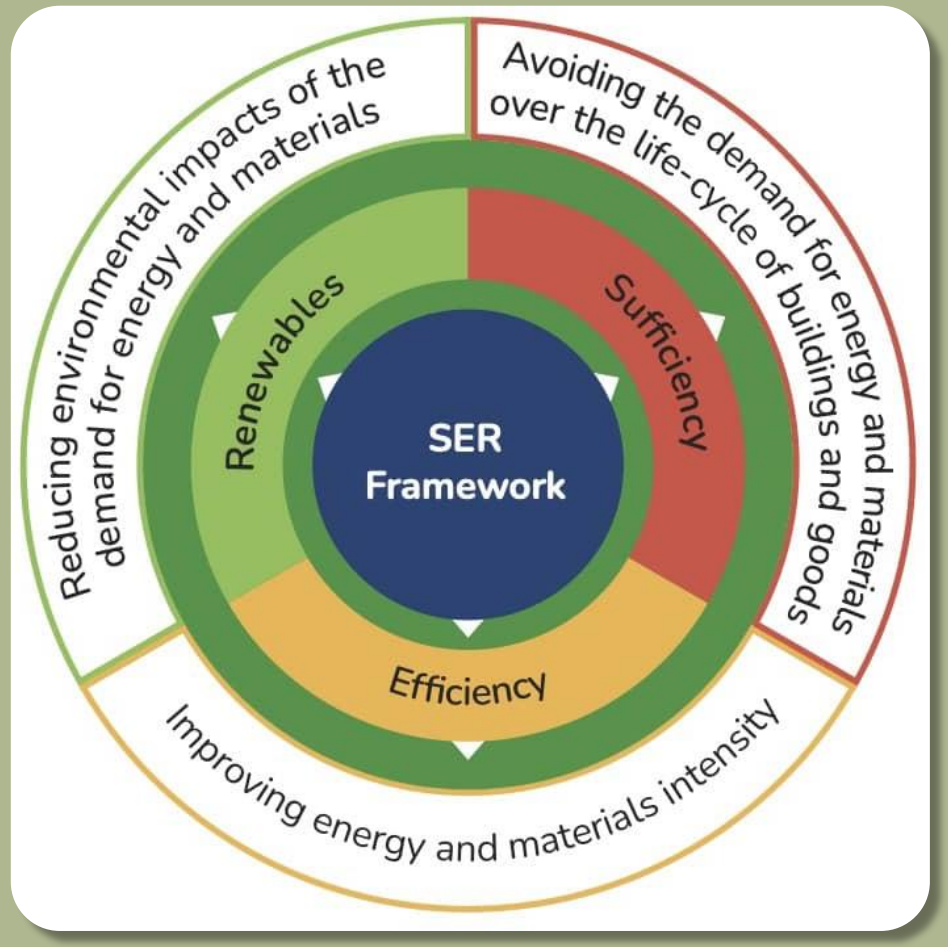
IPCC AR6 WGIII



Sufficient = Least materials

Efficient = Right materials

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Misalignment

Design occupancy for office building with 16 floors and 30,000m² office area

Calculations are approximate to illustrate variation between disciplines.

Ventilation — 3,000 people

BSRIA Rules of Thumb Guidelines for Building Services 5th Edition, Table 3

10m² per person = 3,000 people

Space Planning — 3,750 people

BCO Specification for Offices, 2014

High Density	= 8m² per person	= 3,750 people
Low Density	= 13m² per person	= 2,308 people

Fire Design — 7,500 people

BS 9999:2017 Table 9, Typical Office Floor Space Factors

High Density	= 4m² per person	= 7,500 people
Low Density	= 10m² per person	= 3,000 people

Structural Design — 85,500 people

BS EN 1990, BS EN 1991-1-1

Ultimate Limit State, γ_q = 1.5 (live load partial factor), α_N = 0.50 (reduction factor at ground floor column)

q_k = 3kN/m² over 95% of floor area (Typical value not including partitions or 5% more heavily loaded areas)

Total load ($\gamma_q \alpha_N q_k A$) = 64MN. Assuming each occupant = 0.75kN **= 85,500 people**

Removing 75kg per m² for office equipment from the value for q_k *= 64,125 people...*

Serviceability Limit State, γ_q = 1.0 (partial factor for live load), α_n = 0.5 (reduction factor for multi-storey)

Total load ($\gamma_q \alpha_N \alpha_A q_k A$) = 43MN. Assuming single occupant 0.75kN **= 57,000 people**

Removing 75kg per m² for office equipment from q_k *= 42,750 people...*

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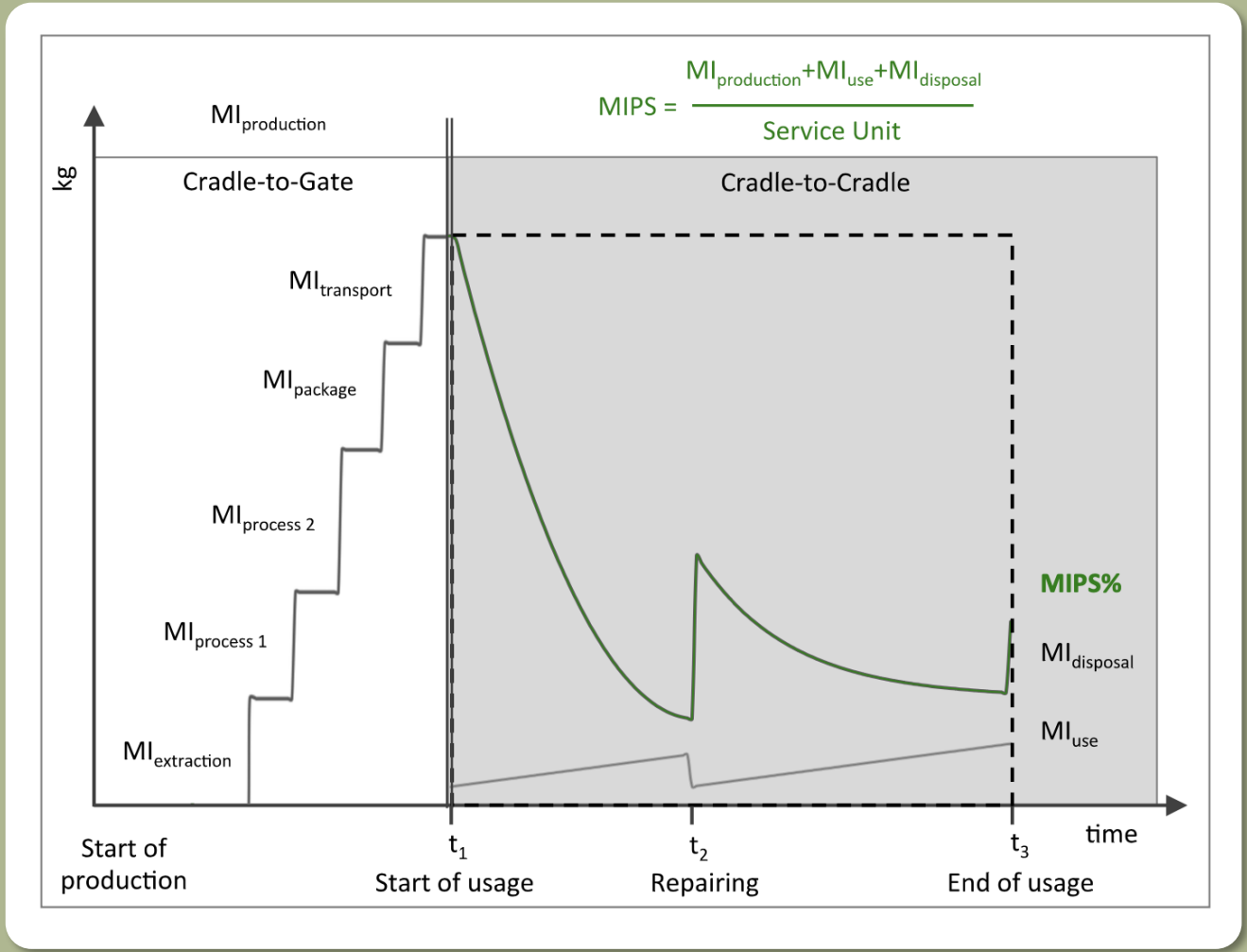
Material Intensity Per Service



$$MIPS = \frac{M}{S} = \frac{Material\ Input}{Service\ Unit}$$

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First principles still applies

Structures

The overall requirements and methods are established by BR18.

These have always allowed for project-specific verification of the general functional requirements.

Function

§ 340.

The planning, construction, operation and maintenance of structures and building parts must be carried out in a way which ensures that:

1) injuries or damage is not inflicted on persons and buildings on own plot or on other plots;
2) no health risk occurs to persons owing to failing structures;
3) satisfactory functionality and durability is achieved;
4) no health risk occurs to persons owing pest intrusion.

Metode

§ 356.

§ 344(2) to § 351 and §§ 353-355 may be derogated from if it can be ensured and documented by other means that derogation is safe, and if a safety level as described in § 344(2)(1) can be achieved.

1) DS/EN 1990 Basis for planning of load-bearing structures with DS/EN 1990 DK NA.

Current trends

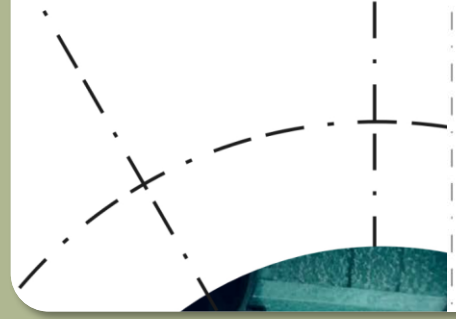
Three horizons

BMW Foundation
Herbert Quandt

NAVIGATING THE PATHWAY TOWARDS REGENERATION:

APPLYING THE THREE HORIZONS MODEL TO NEW MATERIALS

RESPOND

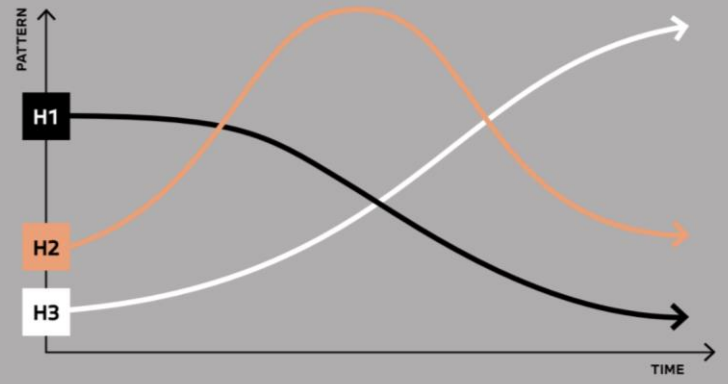


THE FIRST HORIZON – H1
represents the way things are currently done, the prevailing system. When this dominant paradigm starts to show signs of strain and is no longer considered to be fit for purpose, there is a case for change.

THE THIRD HORIZON – H3
shows what a desirable future state may look like.

THE SECOND HORIZON – H2
is an arena of transition where innovations get established to help make our desired future a reality. It points us to what may need to happen in terms of rethinking and (re)inventing new processes, structures, technologies and ways of working in order to create a bridge between the current (H1) and the future (H3) system.[1]

THREE HORIZONS

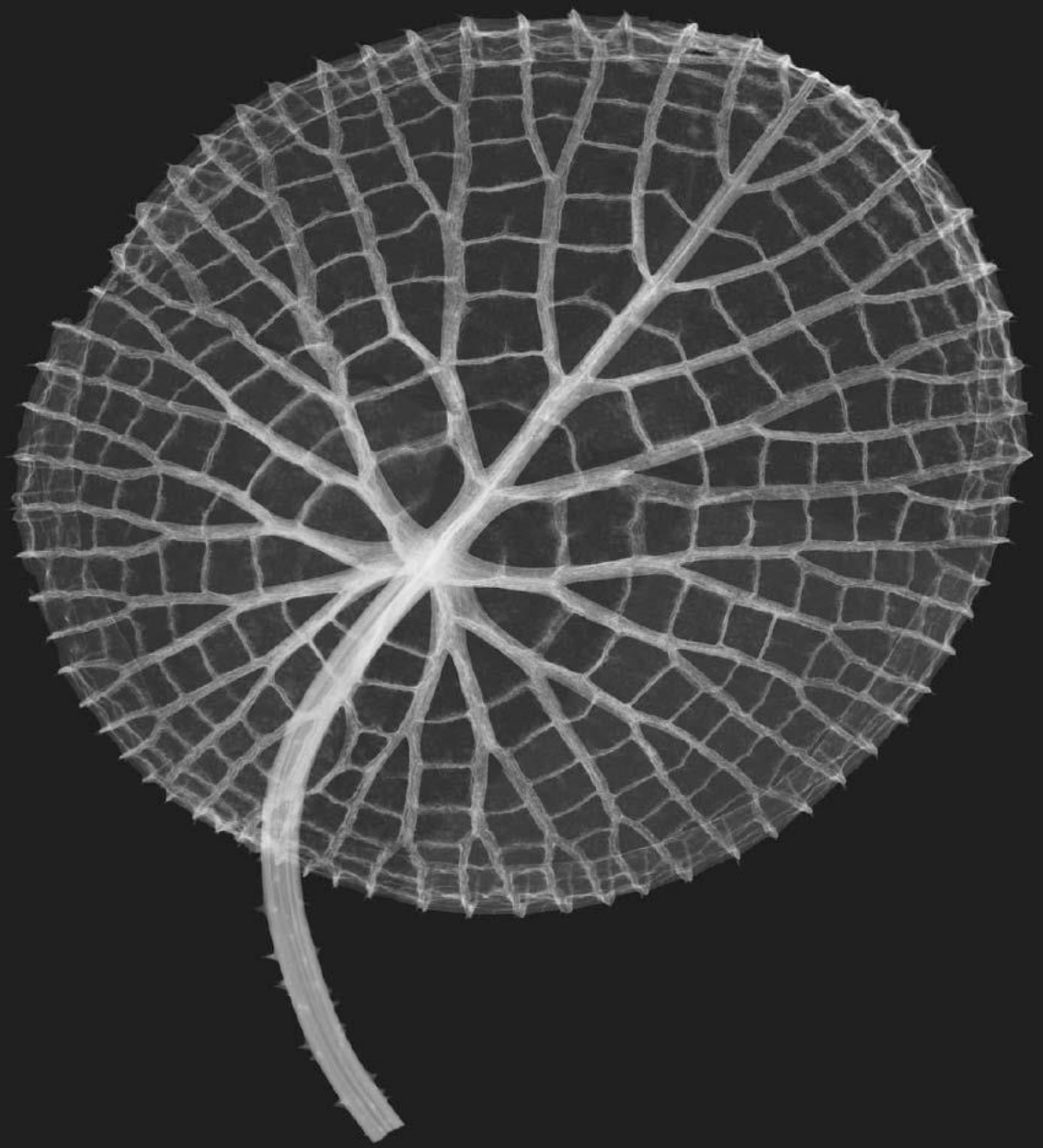


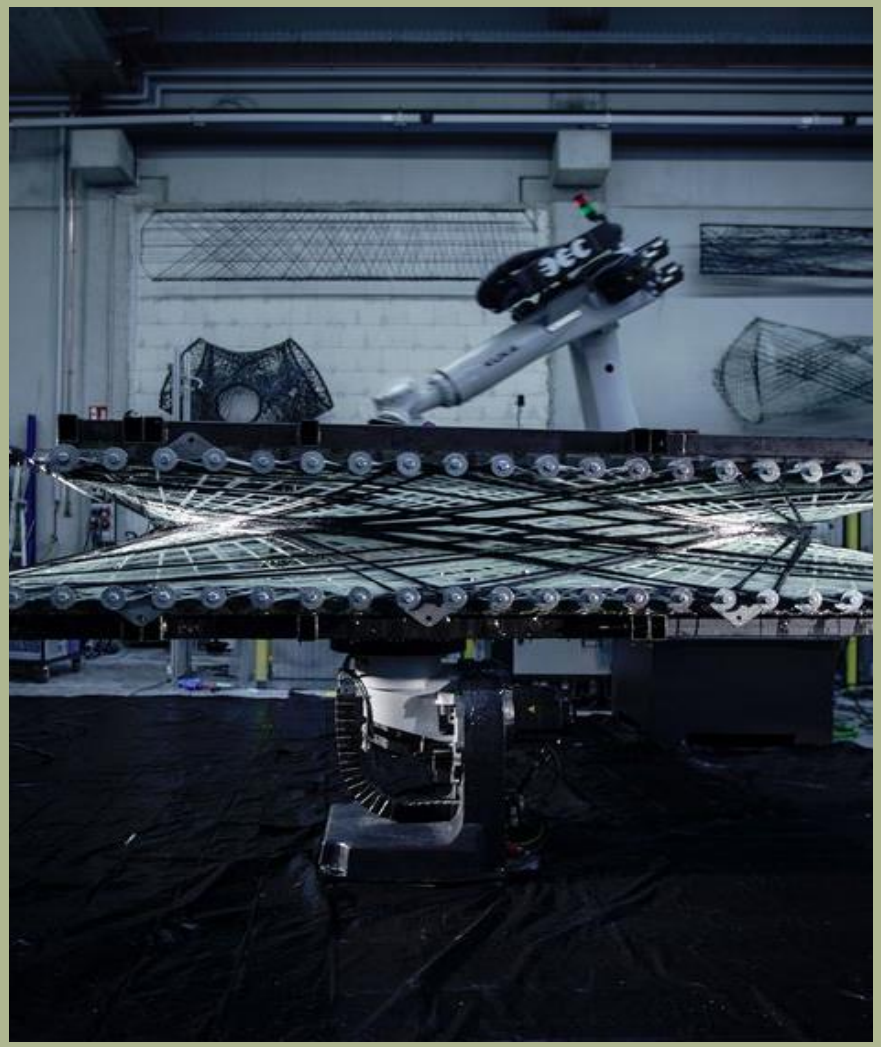
The International Futures Forum (https://www.iffpraxis.com) describes the Three Horizons as follows:

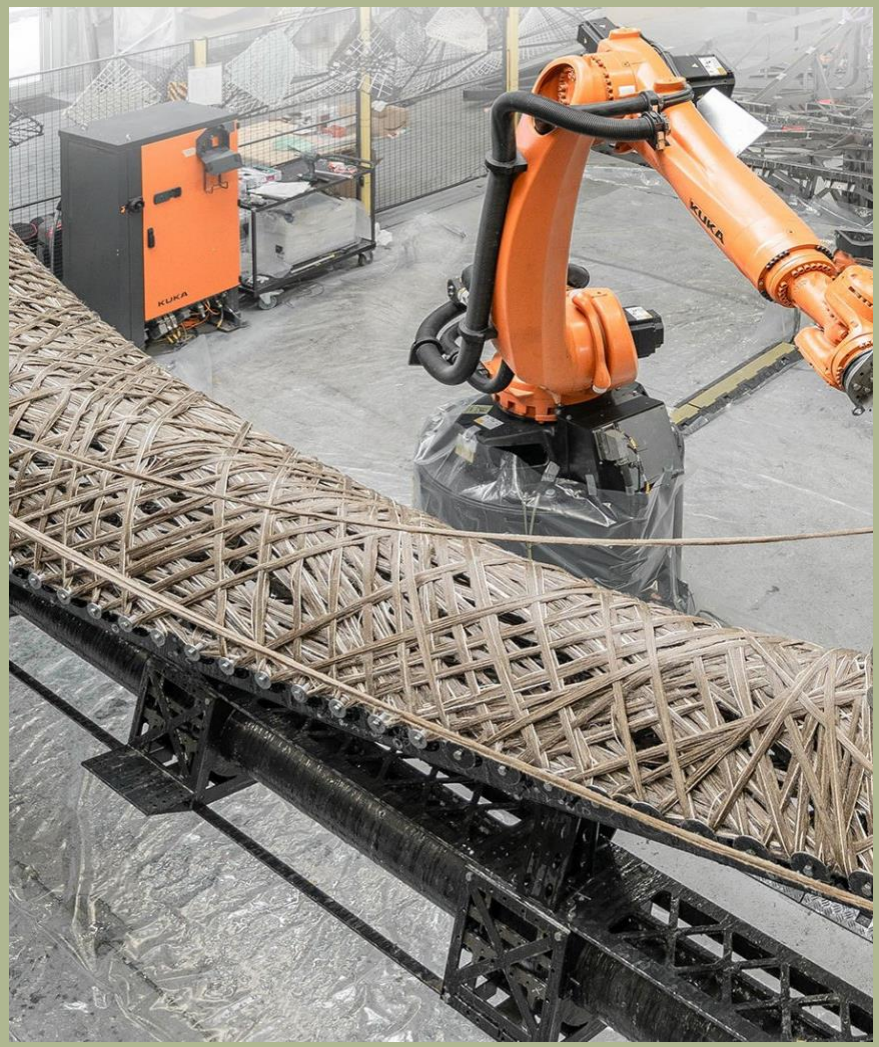
The **first horizon** — H1 — is the dominant system at present. It represents 'business as usual'. We rely on these systems being stable and reliable. But as the world changes, so aspects of 'business as usual' begin to feel out of place or no longer fit for purpose. Eventually 'business as usual' will always be superseded by new patterns of activity.

The **third horizon** — H3 — emerges as the long-term successor to 'business as usual'. It grows from fringe activity in the present that introduces completely new ways of doing things which turn out to be much better fitted to the world that is emerging than the dominant H1 system.

The **second horizon** — H2 — is a pattern of transition activities and innovations, people trying things out in response to the ways in which the landscape is changing. Some of these innovations will be absorbed into the H1 systems to improve them and to prolong their life (we call these innovations 'H2 minus'), while some will pave the way for the emergence of radically different H3 systems (we call those 'H2 plus').

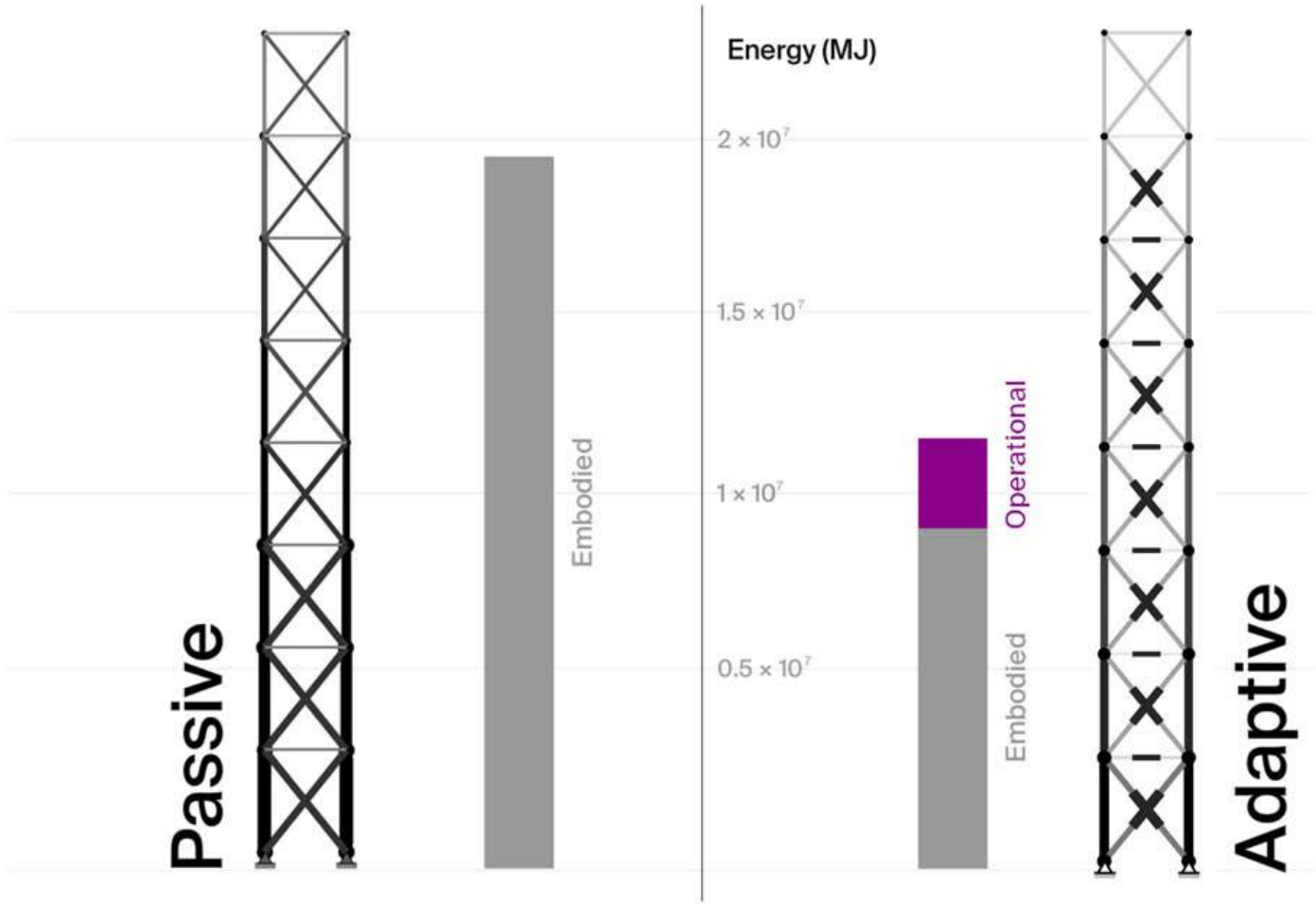


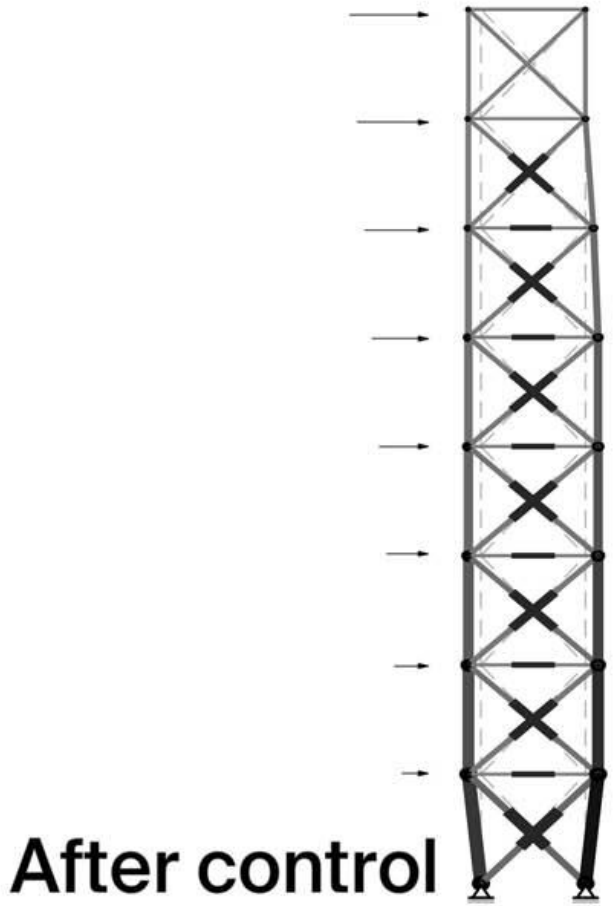



KUKA
KUKA

Deformed Shape before Adaptation

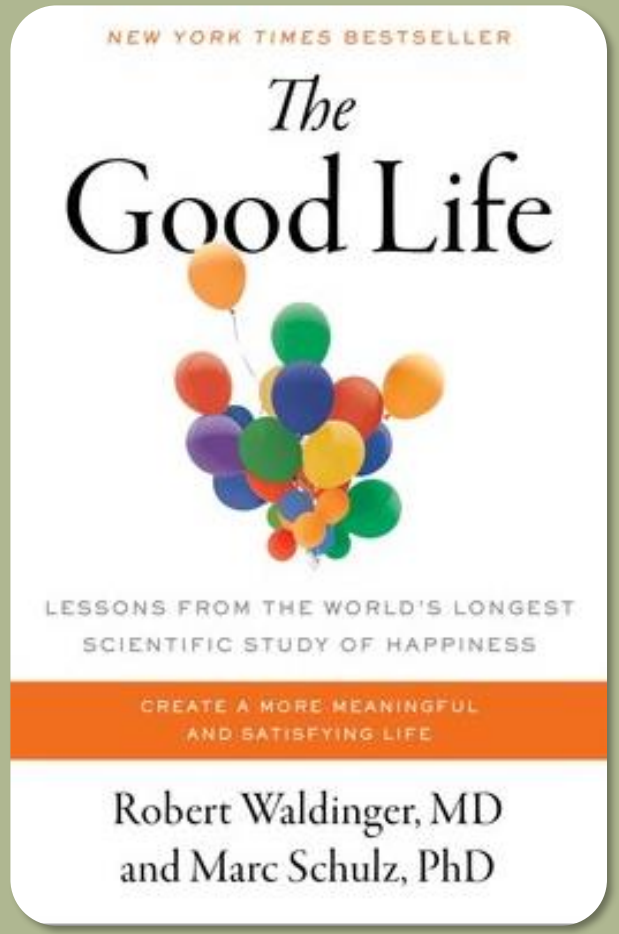
High-Rise Structure

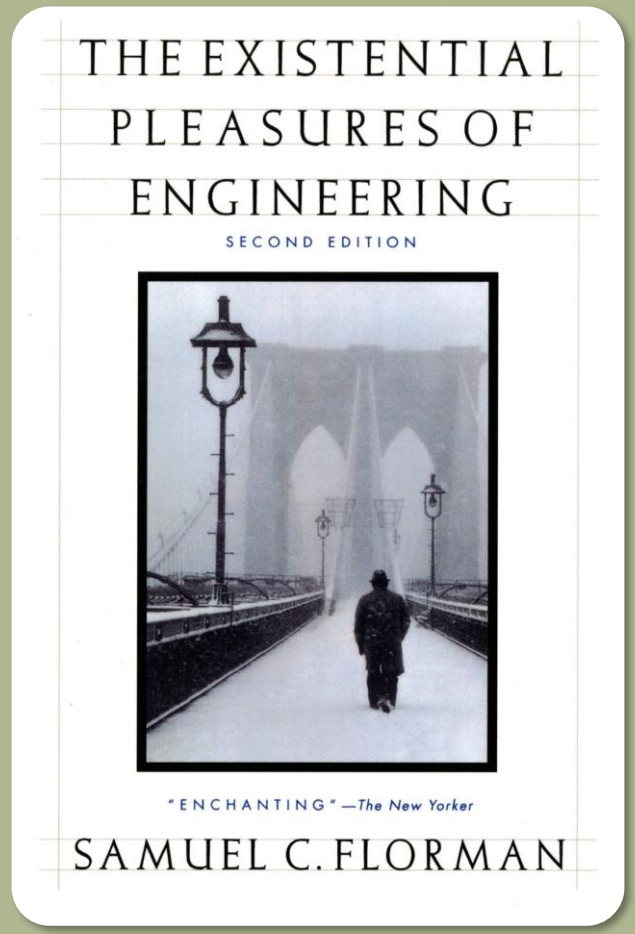




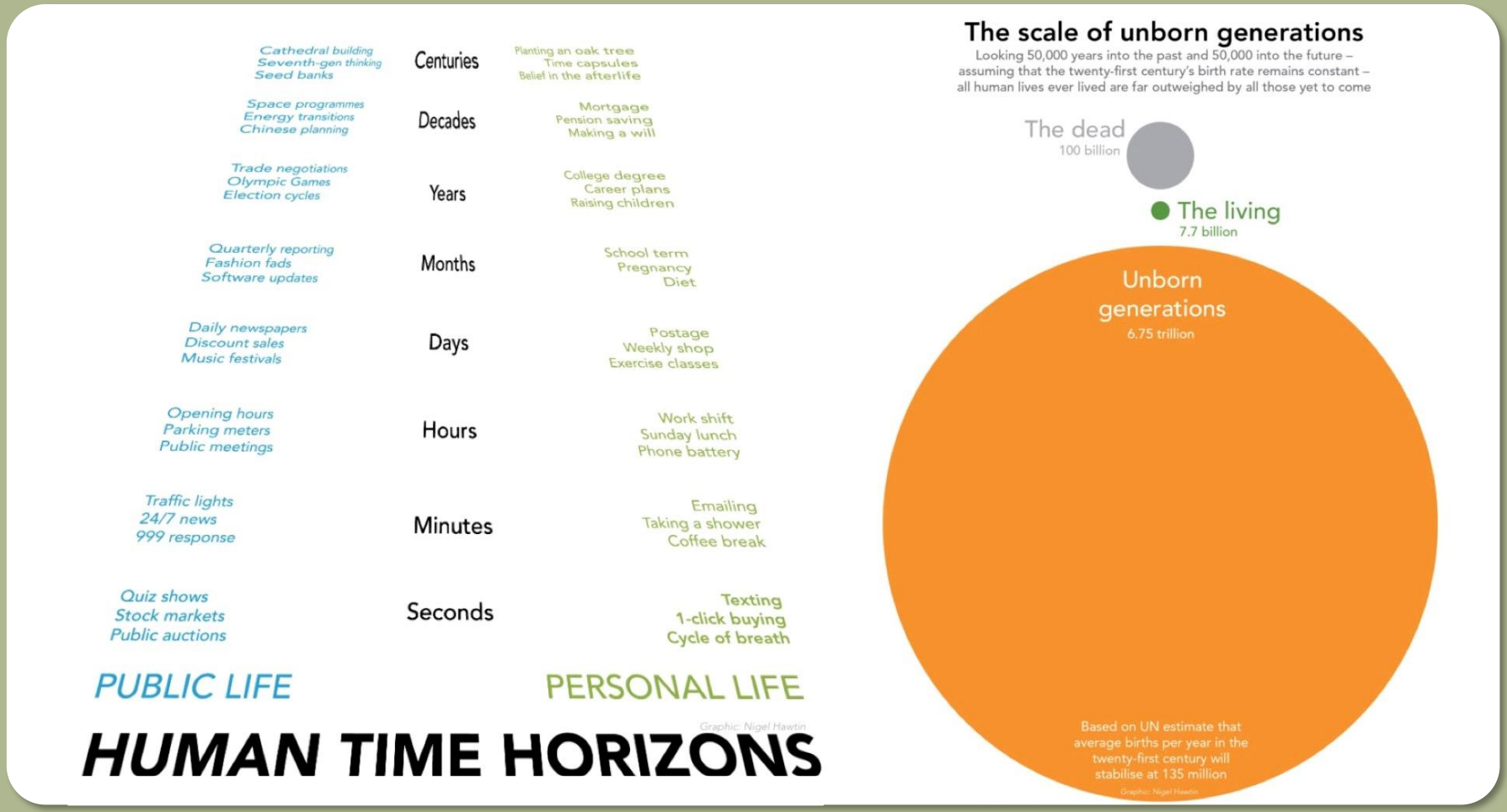
Final thoughts

Being engaged in activities I care about – with people I care about





The Good Ancestor



Modified from Ed Hawkins @ showyourstripes.info

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Building for the Next Generation, Today