

# Material MATTERs

Innovation Challenges of Circularity in the Construction  
Eco-System - A Contractor's View

Norbert Pralle



Let's talk about ETV as a tool to foster circular economy value chains and business models

WEBINAR| February 17<sup>th</sup>, 2022



# CONCLUSIONS

Urban areas  
today are the  
**SRM stockpiles**

**Design for  
Circularity.**

Circularity is an  
**information  
challenge.**  
Advent of  
**Internet of  
Materials**

**Life Cycle  
is  
Key.**

**"CaaS"**

**Regulatory  
Frameworks** must  
accommodate  
circularity .

Need for **climate  
target oriented**  
certification  
schemes

**Technologies**  
are readily  
**available.**

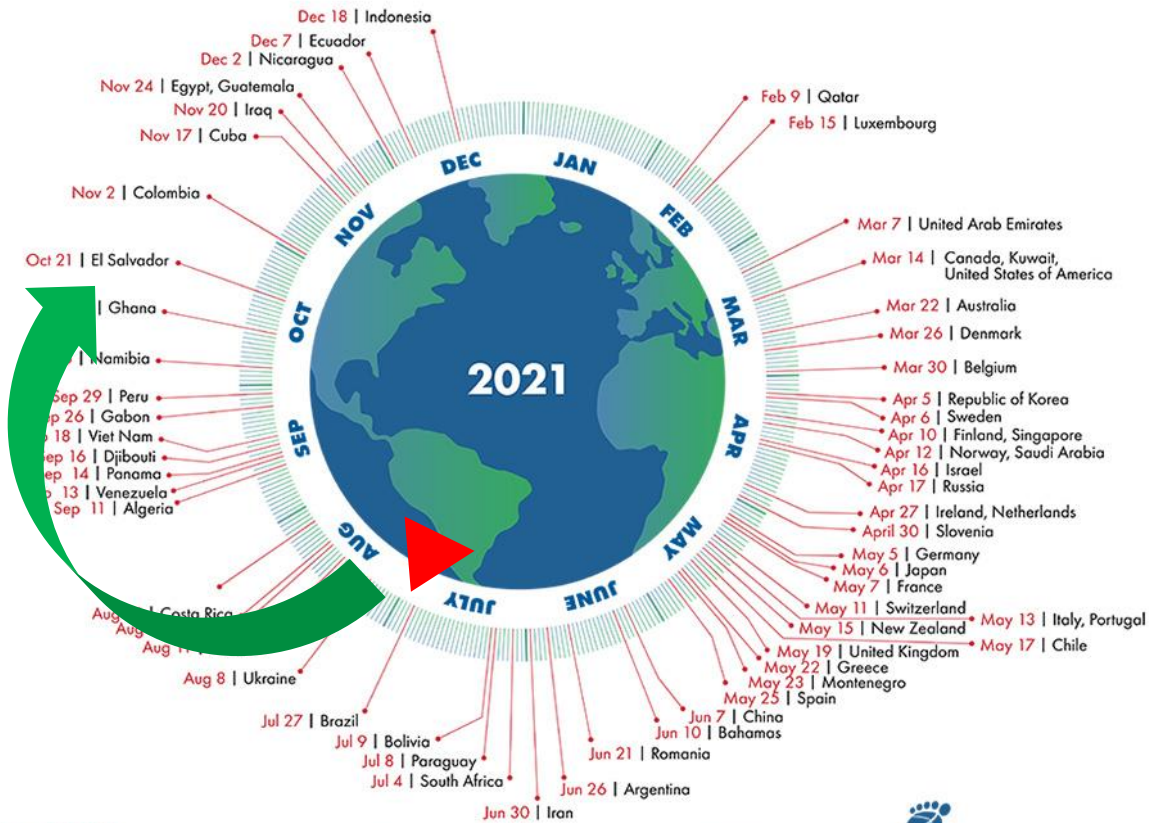
**Educate** for  
Circularity.

# PLANETARY BOUNDARIES

July 29<sup>th</sup>

## Country Overshoot Days 2021

When would Earth Overshoot Day land if the world's population lived like...



Source: National Footprint and Biocapacity Accounts, 2021 Edition  
data.footprintnetwork.org

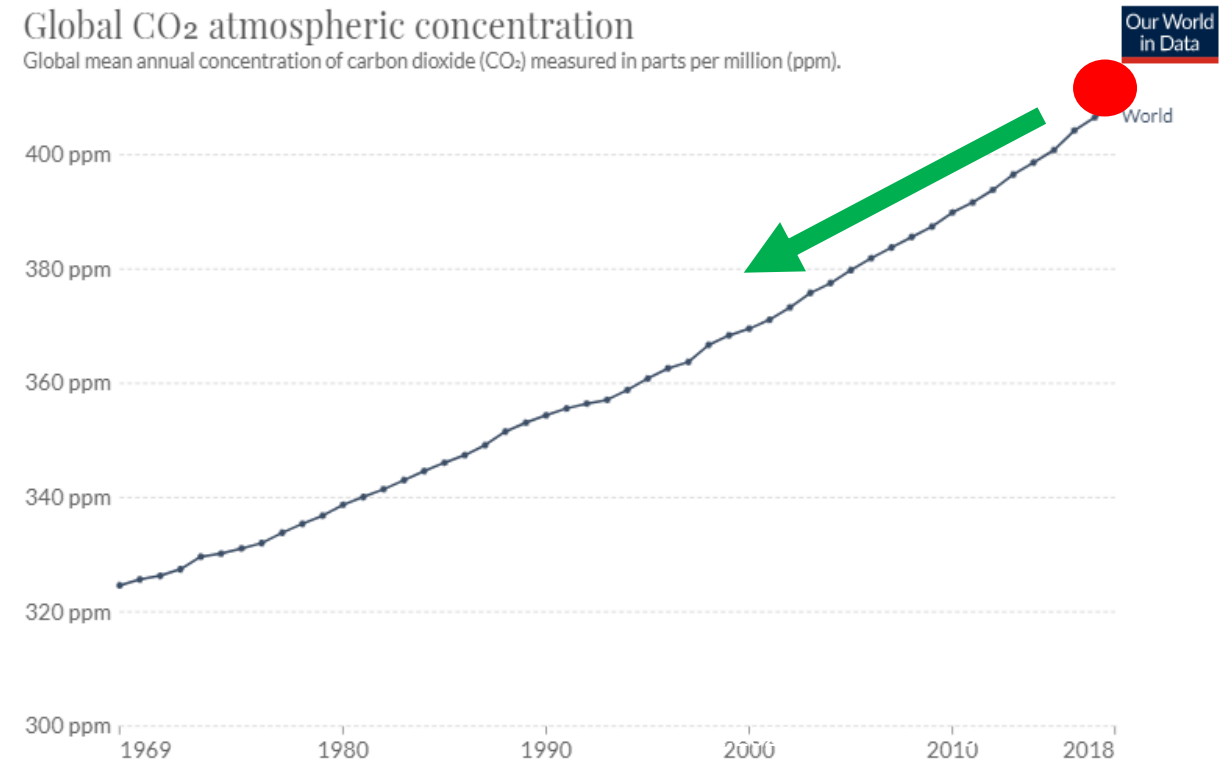


414 ppm

## Global CO<sub>2</sub> atmospheric concentration

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Global mean annual concentration of carbon dioxide (CO<sub>2</sub>) measured in parts per million (ppm).

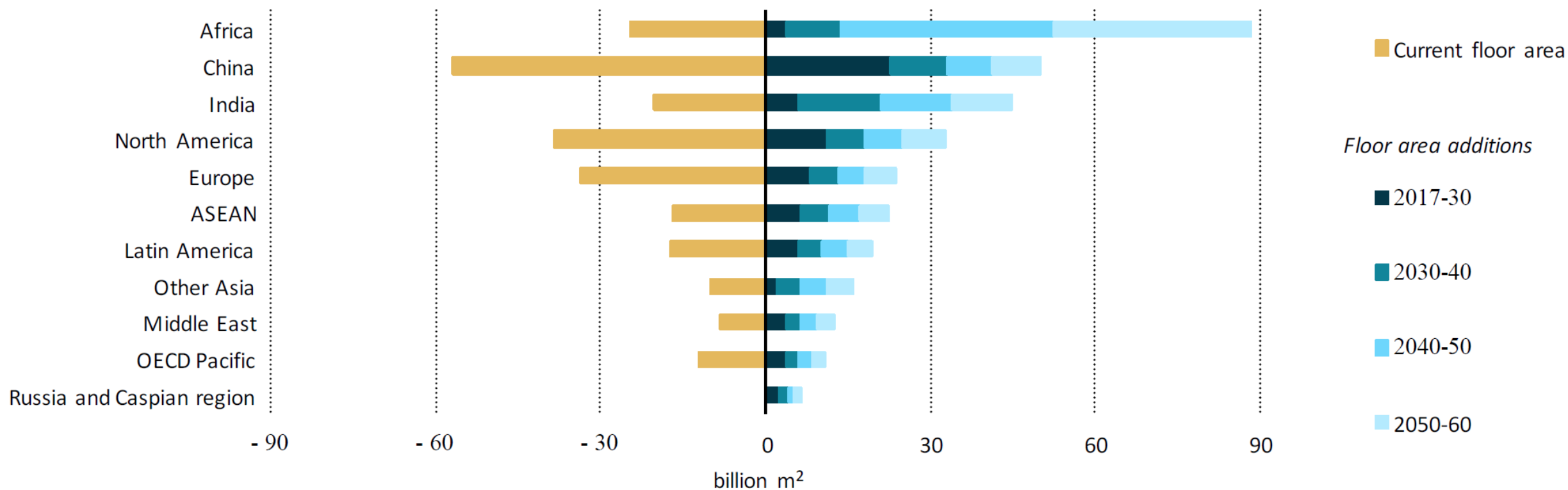


Source: NOAA/ESRL Global Monitoring Division

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY




# NEED FOR BUILDINGS



Notes: OECD Pacific includes Australia, New Zealand, Japan and Korea; ASEAN = Association of Southeast Asian Nations.  
Source: IEA (2017), Energy Technology Perspectives 2017, IEA/OECD, Paris,



# NEED FOR BUILDING INFRASTRUCTURE

An aerial photograph of New York City, showing the dense urban landscape of Manhattan and the surrounding areas. The Hudson River is on the left, and the East River is on the right. The city is surrounded by water, and the sky is blue with some clouds. A small white box is visible in the upper center of the image.

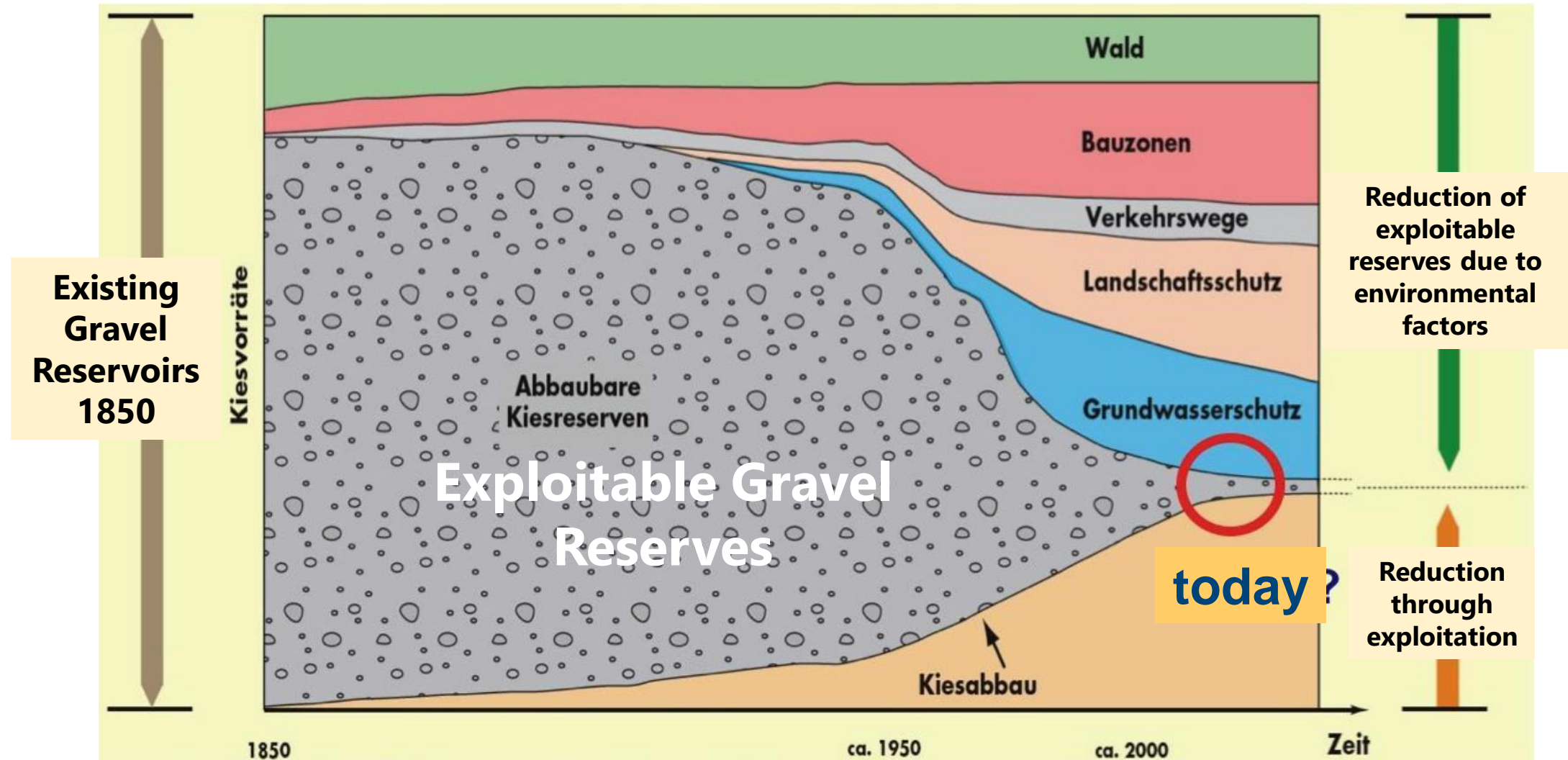
“To accommodate the world-wide demand of expected growth by 2050, we need to construct ...

... the equivalent of one New York City every month - for the next forty years.”

Paul Hawken  
Re-Generation: Ending the Climate crisis in one generation.



# MATERIAL AVAILABILITY





# PARADIGM SHIFT: From natural sources ...





# PARADIGM SHIFT: ... to urban areas as secondary material stockpiles





# THE LIFE CYCLE DILEMMA

Site is the fixed location of the building

Structure is the building's skeleton including the foundation and load-bearing elements

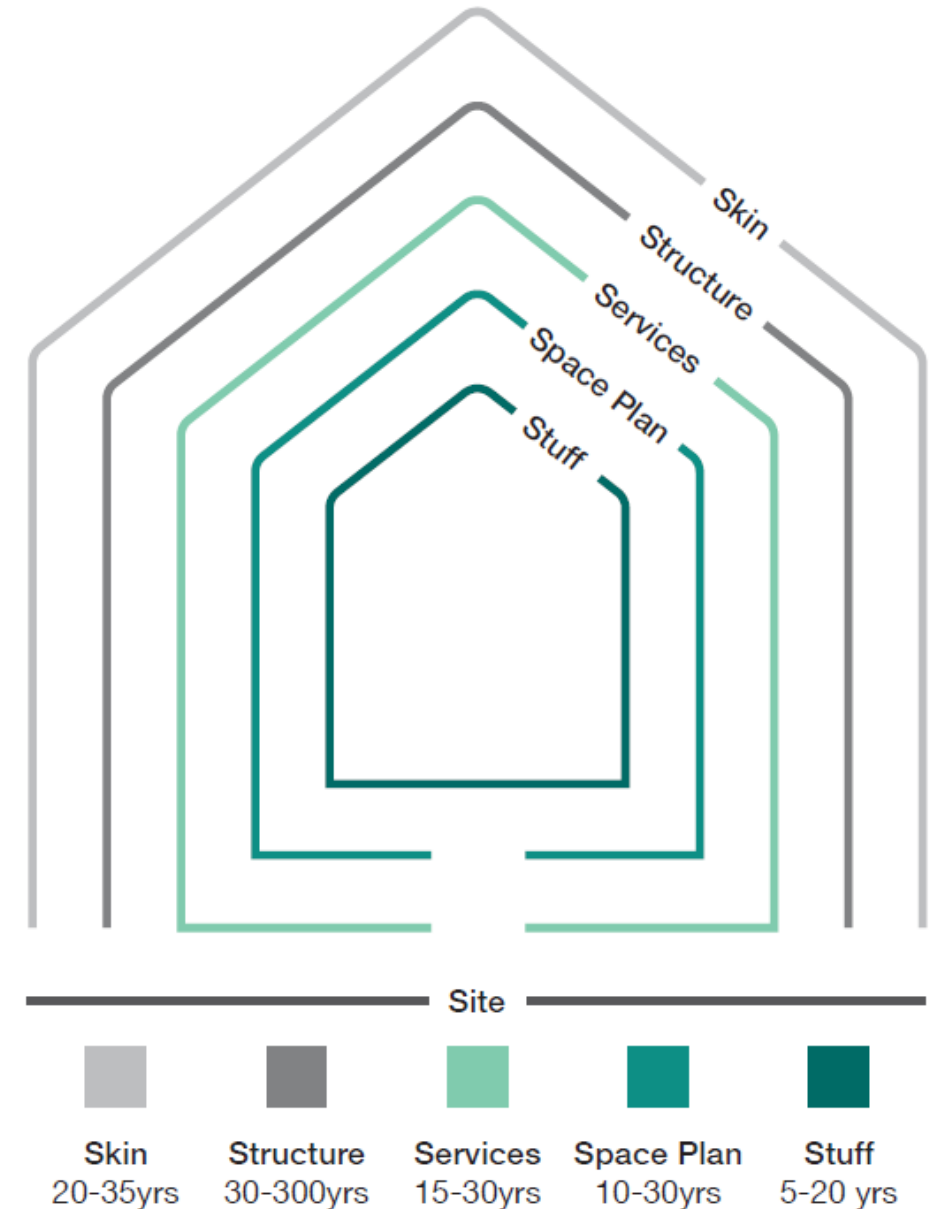
Skin is the façade and exterior

Services are the pipes, wires, energy and heating systems

Space Plan is the solid internal fit-out including walls and floors

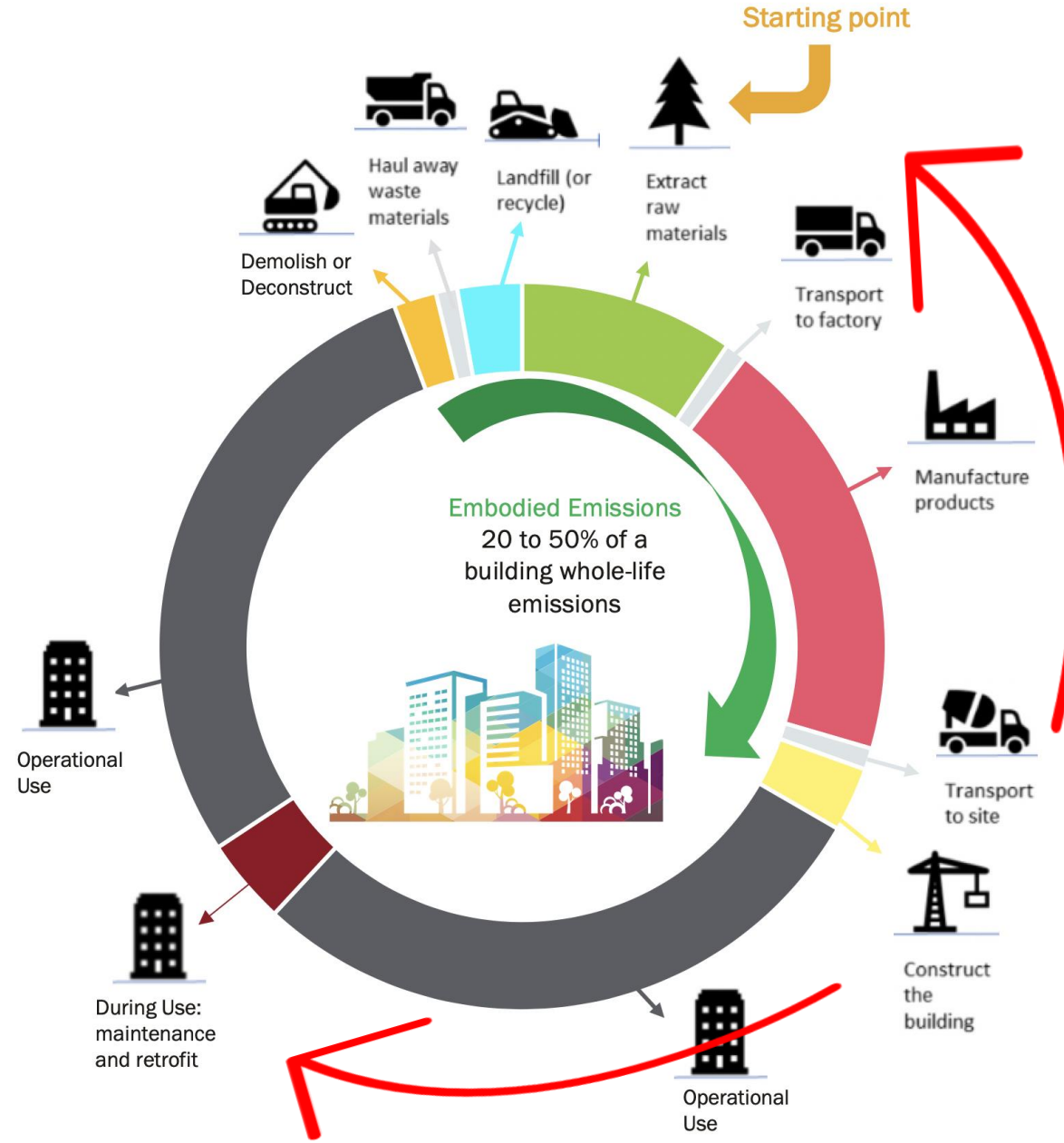
Stuff is the rest of the internal fit-out including the furniture, lighting, and ICT

## "Urban mining Index





# CONTRACTOR'S (POTENTIAL) LEVERAGE





# BIGGEST LEVERS

Floor space

Housing  
Durability

Construction  
Materials



circularity-gap.world

**HEIGHT**  
expresses the **mass material**  
reduction in **Gt**

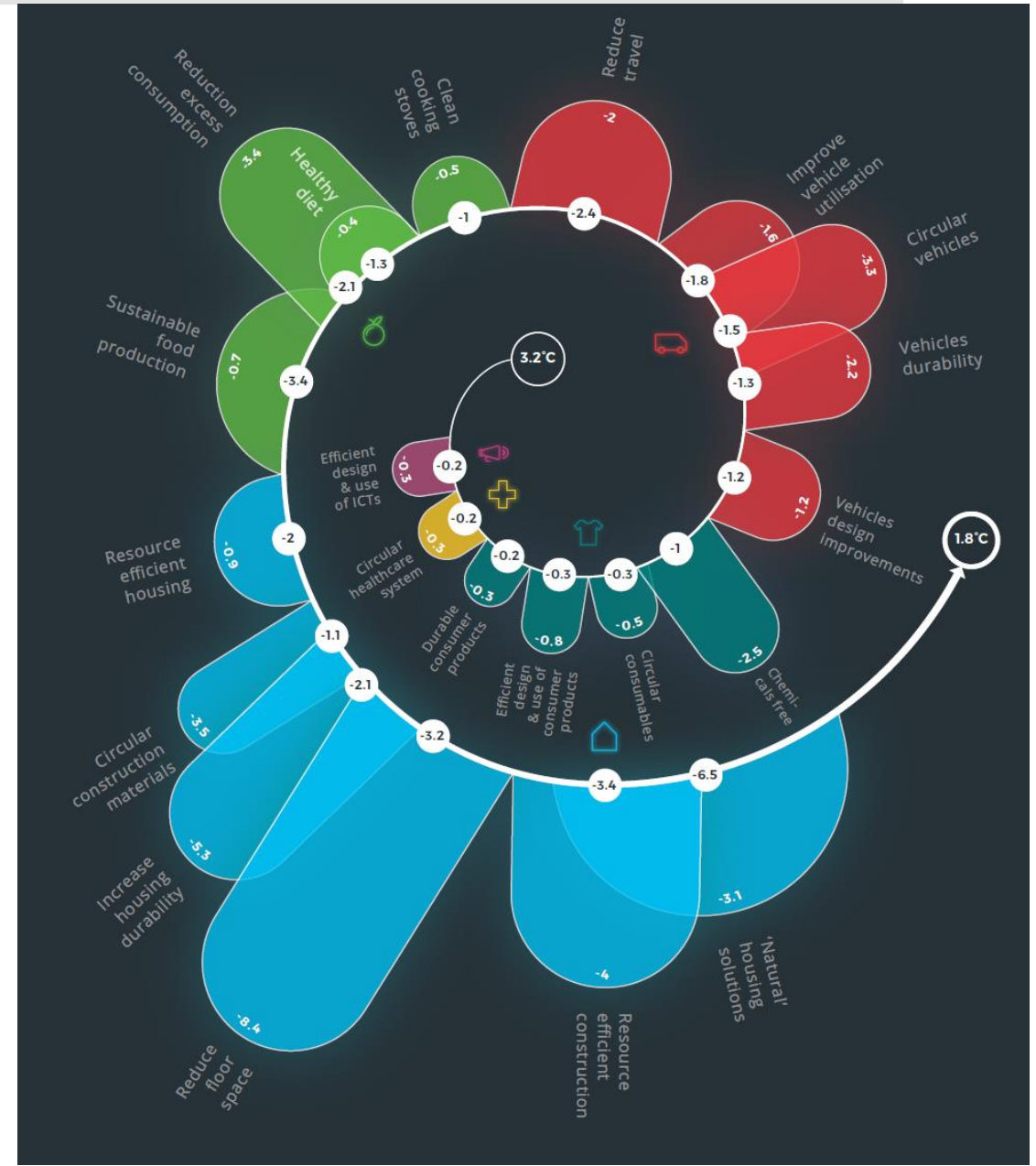


**WIDTH**  
expresses the **emissions**  
reduction in **Gt CO<sub>2</sub>eq**

**COLOUR**  
represents a societal need:

- CONSUMABLES**
- COMMUNICATIONS**
- HOUSING**
- MOBILITY**
- HEALTHCARE**
- NUTRITION**

**TEMPERATURE**  
total mitigation of expected global  
temperature increase by 2050

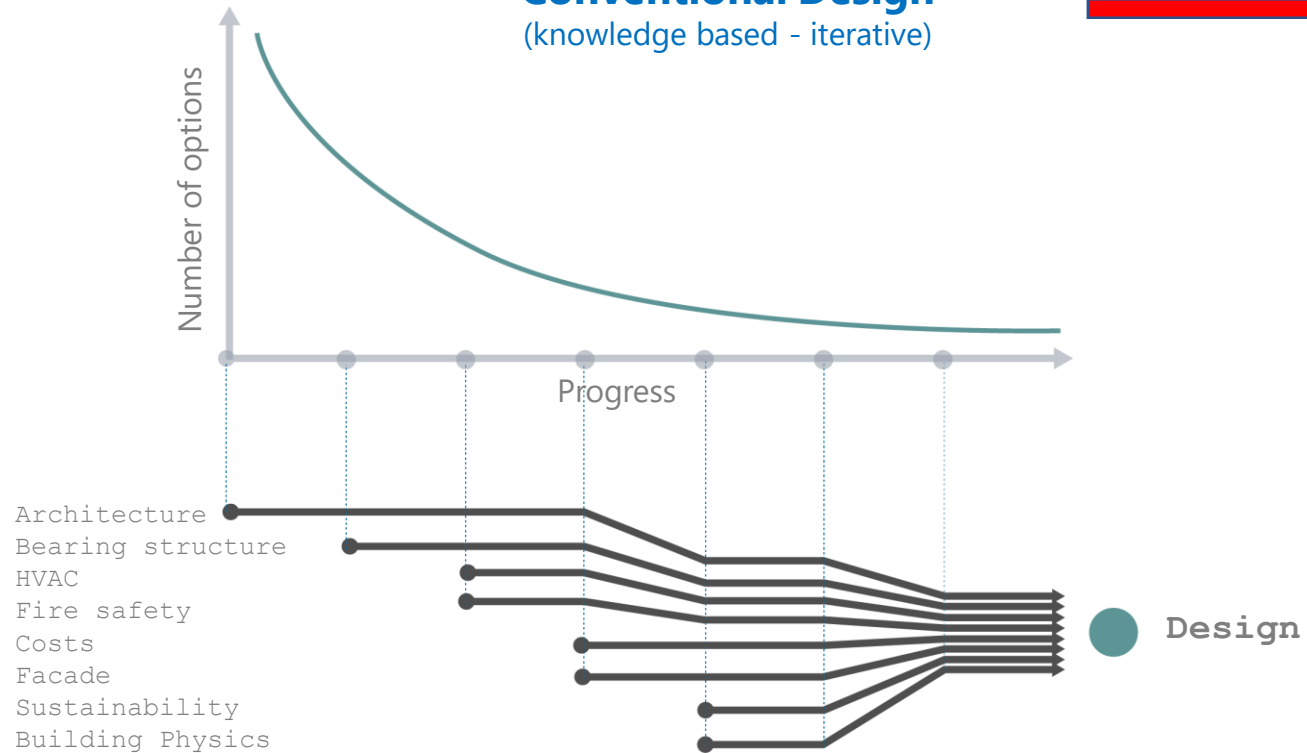




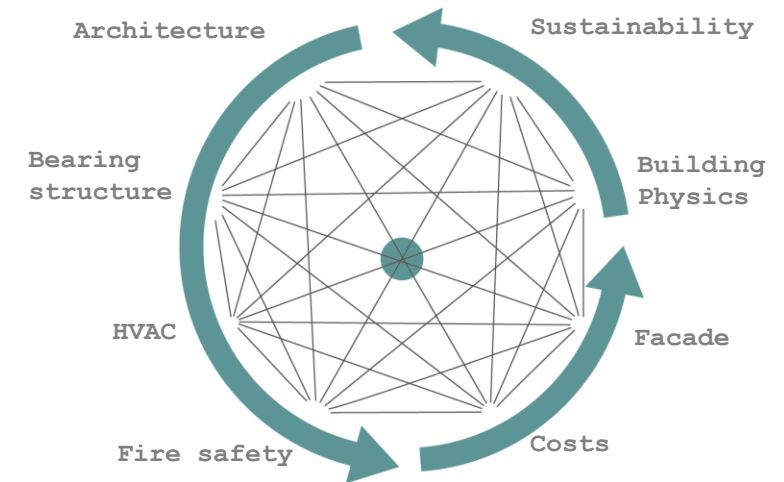
# DESIGN FOR CIRCULARITY – DATA DRIVEN

## Design Process Conventional vs. Generative Design

### Conventional Design (knowledge based - iterative)



### Data Based Design (networked – iterative)





# Engineering (for) the future



Urban Mining & Recycling (UMAR) in Dübendorf (Schweiz),  
Design W. Sobek D. E. Hebel F. Heisel,

**Completely circular building.**



CIRCL Amsterdam  
ABN AMRO BANK,

**Completely circular building.**



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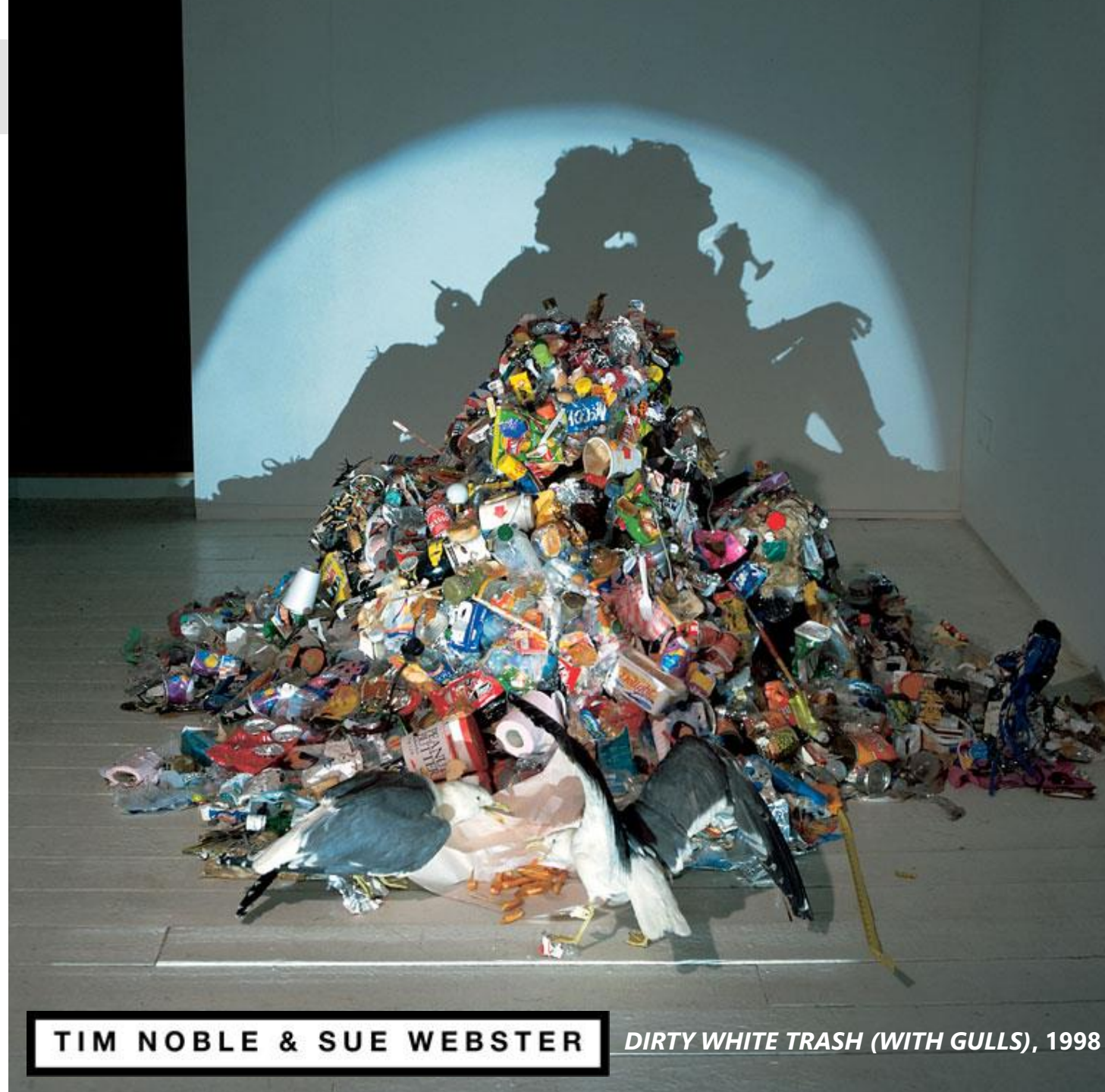
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# Thank you

**“Waste is nutrition”**

Michael Braungart  
*Co-Inventor of Cradle to Cradle*



**TIM NOBLE & SUE WEBSTER**

***DIRTY WHITE TRASH (WITH GULLS), 1998***