



DANISH BUILDING RESEARCH INSTITUTE
AALBORG UNIVERSITY COPENHAGEN



ASSESSING BUILDINGS' ABSOLUTE ENVIRONMENTAL SUSTAINABILITY PERFORMANCE

USING LCA FOCUSING ON
CLIMATE CHANGE IMPACTS

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2030

**85% INCREASE IN GLOBAL
CONSTRUCTION MARKET (TO
\$15.5 TRILLION)**

PWC, 2015

2060

**BUILDING FLOOR AREA
DOUBLED**

WORLD GBC, 2017



TODAY

**BUILDINGS ARE RESPONSIBLE
FOR 36% OF CO2 EMISSIONS
40% OF ENERGY
CONSUMPTION**

EUROPEAN COMMISSION, 2019



TODAY

**BUILDING INDUSTRY
PRODUCES 4.1 MILLION TON
WASTE EVERY YEAR
... OR A THIRD OF ALL WASTE**

DK-GBC, 2018



LIFE CYCLE ASSESSMENT

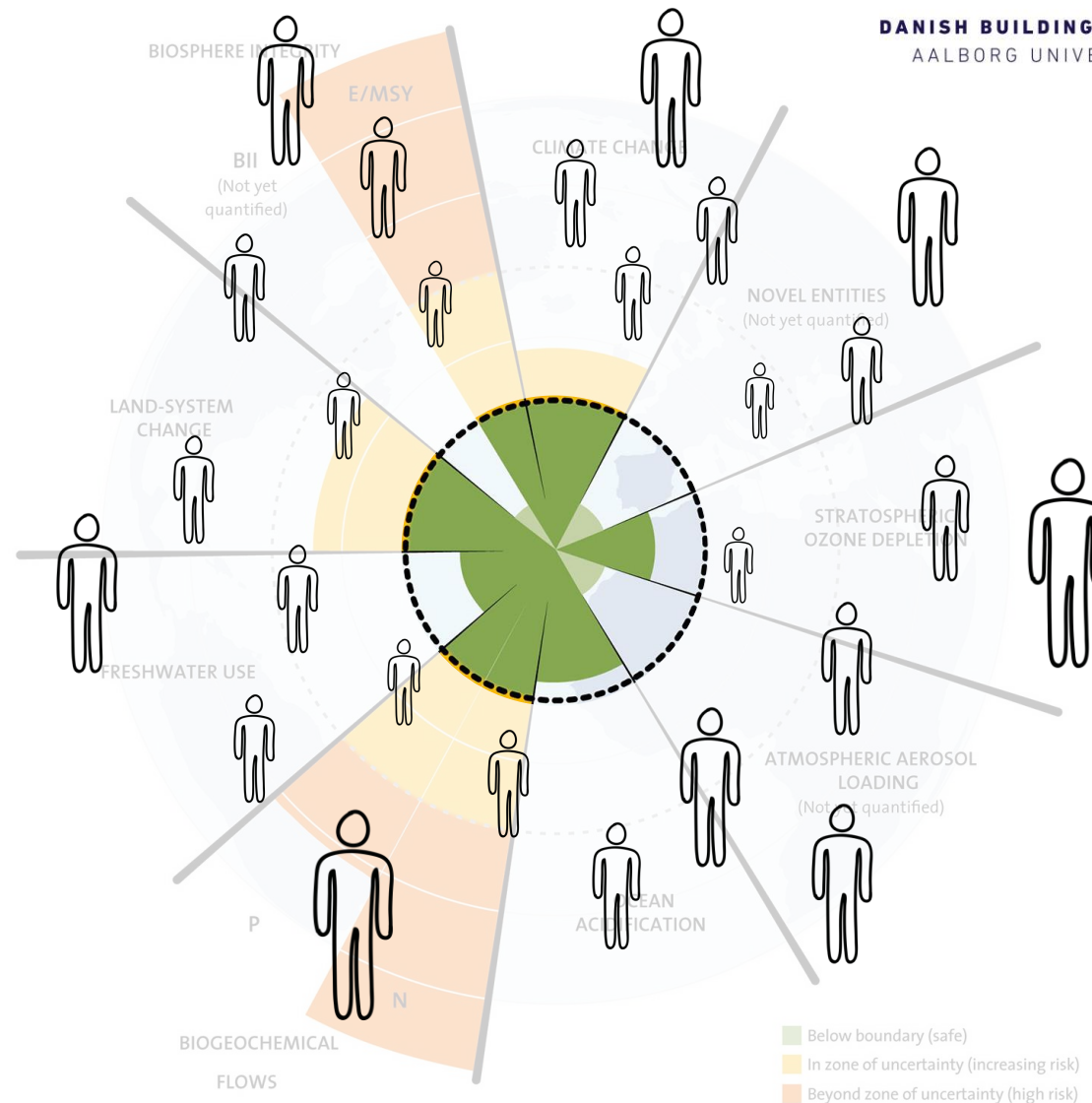






PLANETARY BOUNDARIES

HOW TO SHARE?





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OUR STUDY

MINI CO2 HOUSES

TRADITIONAL
MAINTENANCE-FREE
(TMF)



UPCYCLE HOUSE (UP)



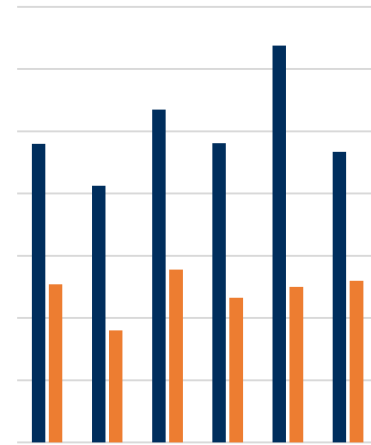
INNOVATIVE
MAINTENANCE-FREE
(IMF)



QUOTA HOUSE (Q)



ADAPTABLE HOUSE (AD)



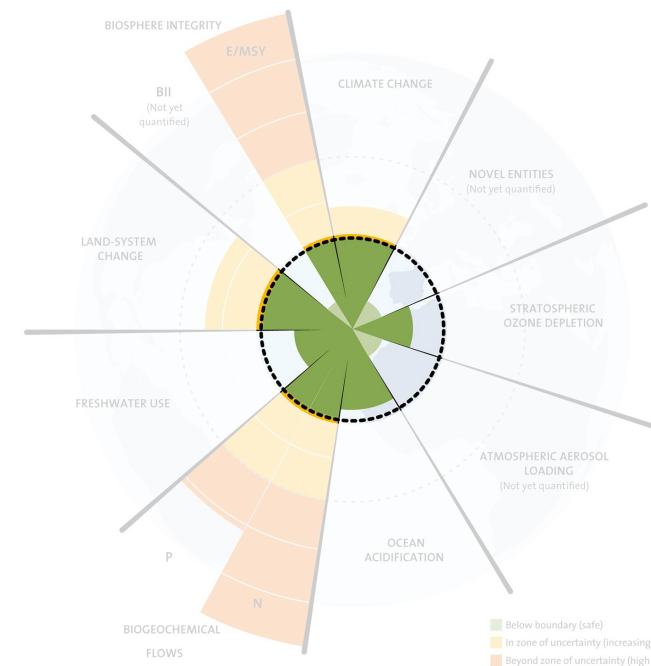
CHARACTERISED
IMPACT SCORE

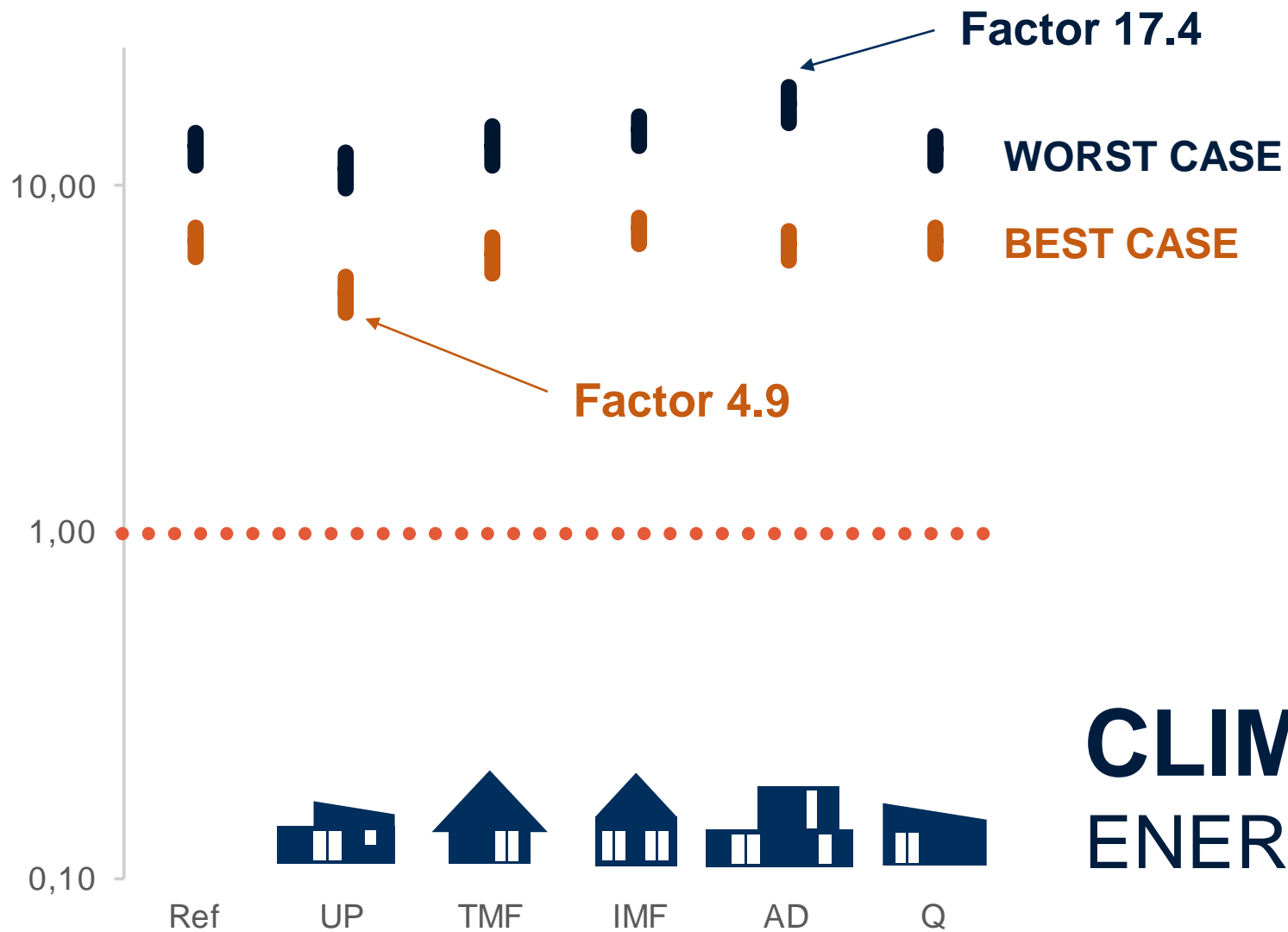
$$\frac{C_{IS}}{AS * SOS_{PB}} \leq 1$$

SHARE ASSIGNED
FROM WORLD
TO DWELLING



WORLD PLANETARY BOUNDARY





CLIMATE CHANGE ENERGY IMBALANCE



WHAT NOW?

1.

Current approaches are insufficient.

2.

Need for completely new strategies.

3.

Not settle for lower, but strive for low enough.

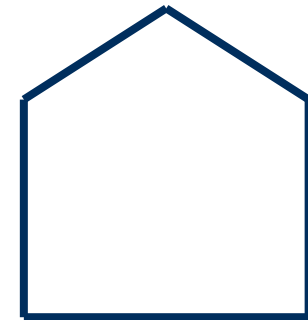


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THANK YOU!

CAMILLA E. ANDERSEN
PERNILLE K. OHMS



EQUAL PER
CAPITA

$$\frac{1 \text{ person}}{\text{world}_{pop}}$$

*

FINAL CONSUMPTION
EXPENDITURE

$$\frac{FCE_{household}}{FCE_{person}}$$

*

FINAL CONSUMPTION
EXPENDITURE

$$\frac{FCE_{building}}{FCE_{household}}$$