



**University of
Zurich^{UZH}**

Science & Sustainability Education

BILDUNG IN ZEITEN DER KLIMAKRISE

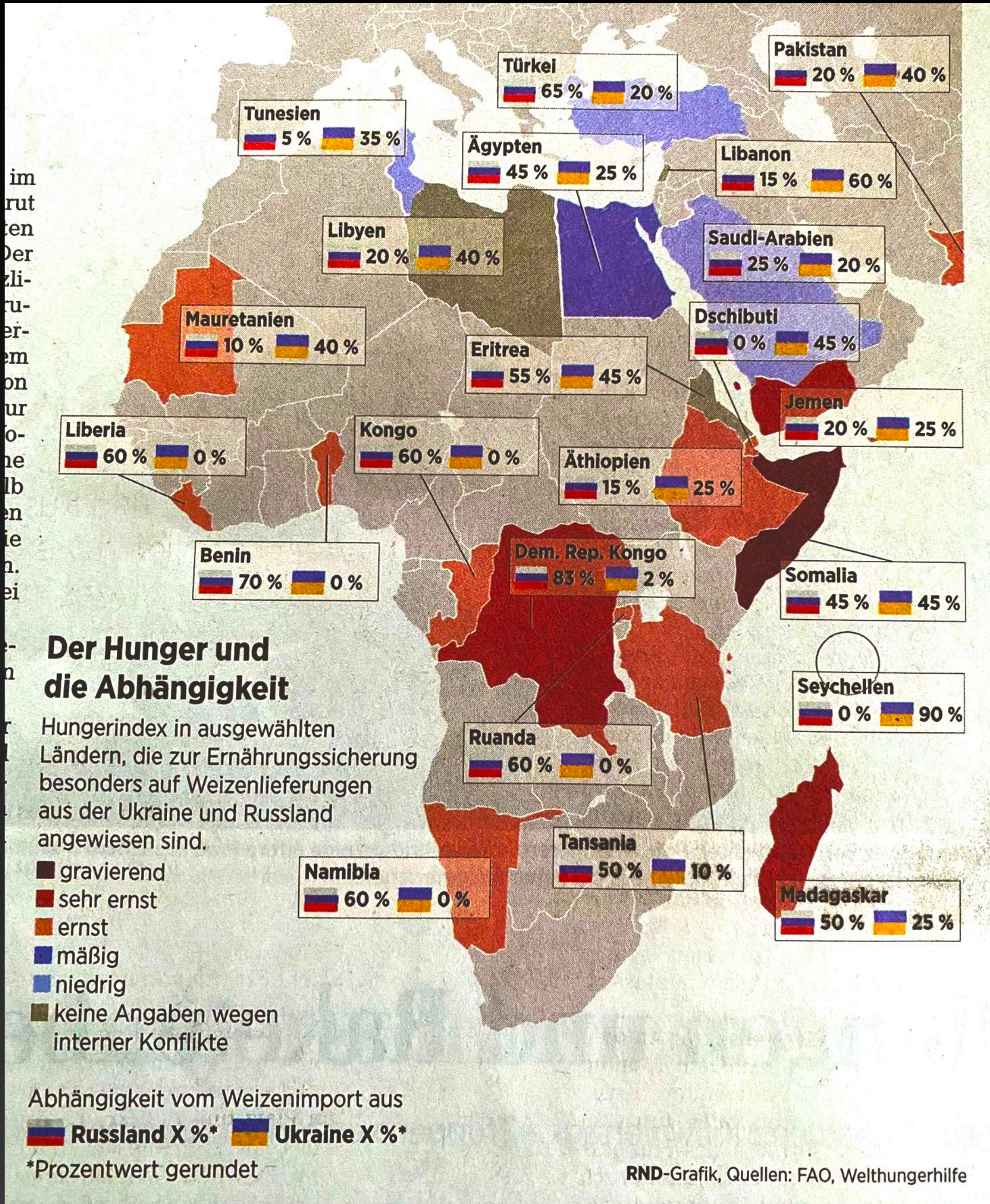
VON DER POLITISCHEN HERAUSFORDERUNG ZUR DIDAKTISCHEN REALITÄT

Prof. Dr. Kai Niebert | kai.niebert@uzh.ch



*Eröffnung der deutschen Automobil-Ausstellung 1924 zu Berlin.
Gesamtansicht der Automobilhalle nach der Eröffnung, wo Personen- u. Luxuswagen
ausgestellt sind.*

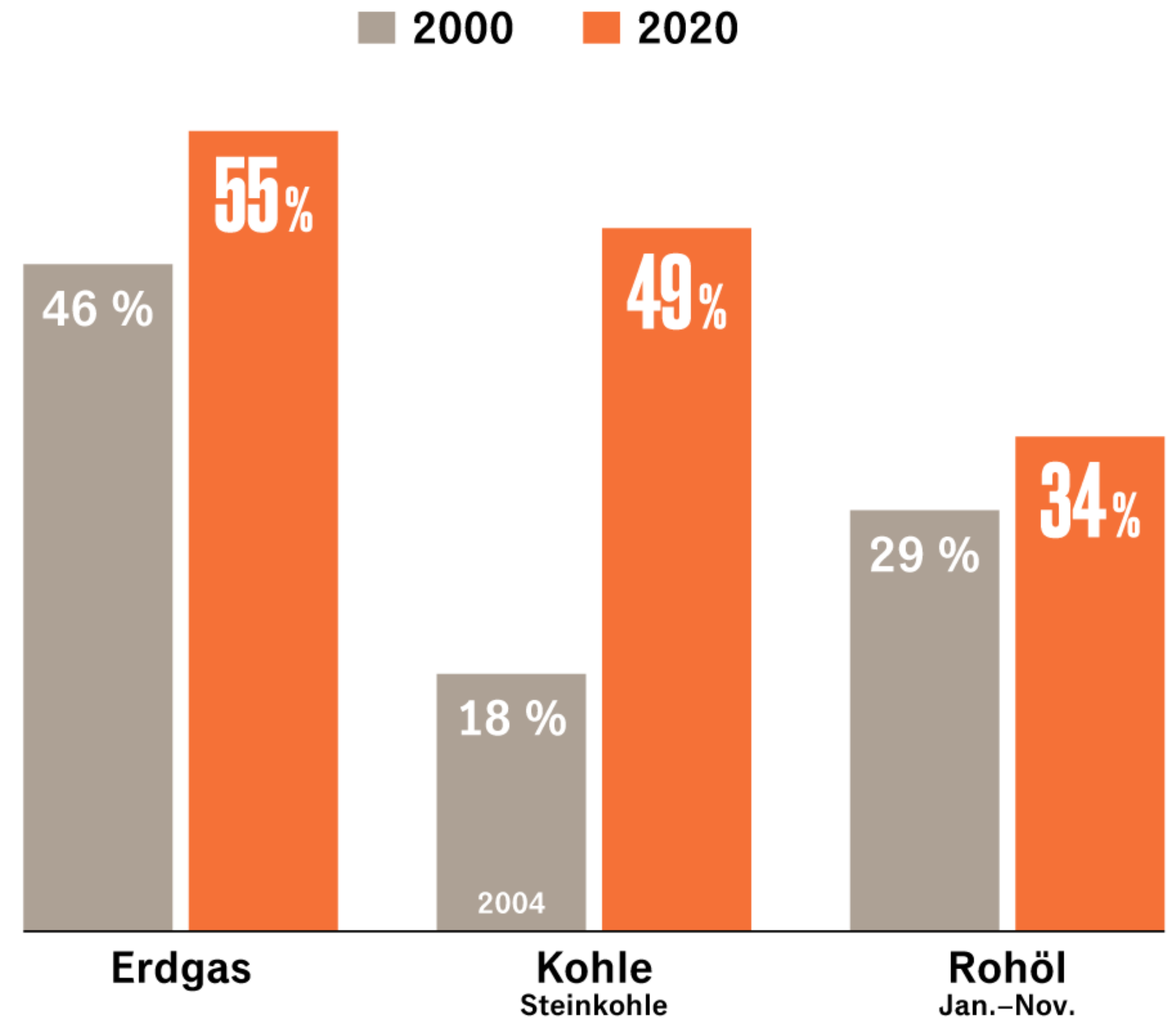


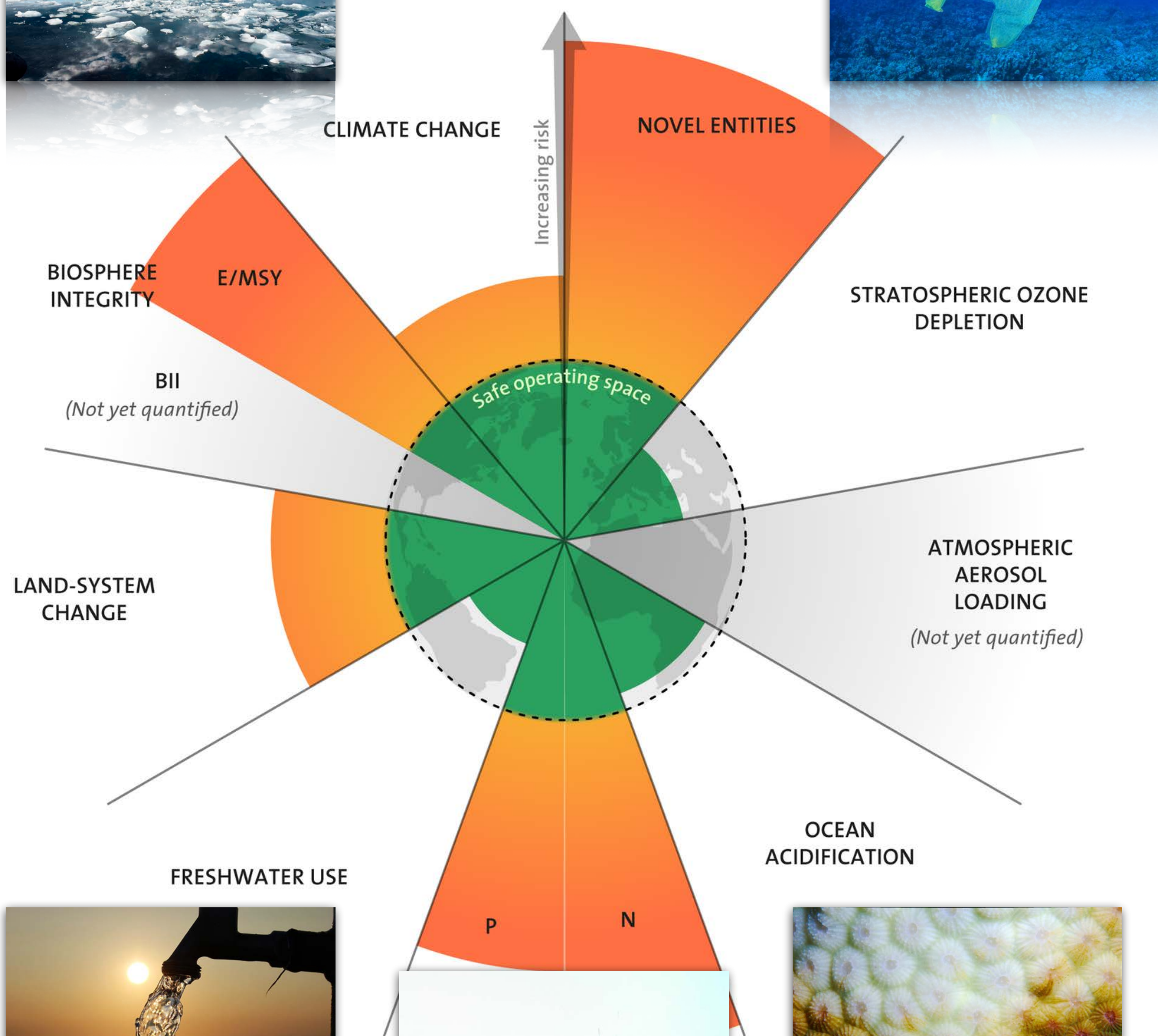
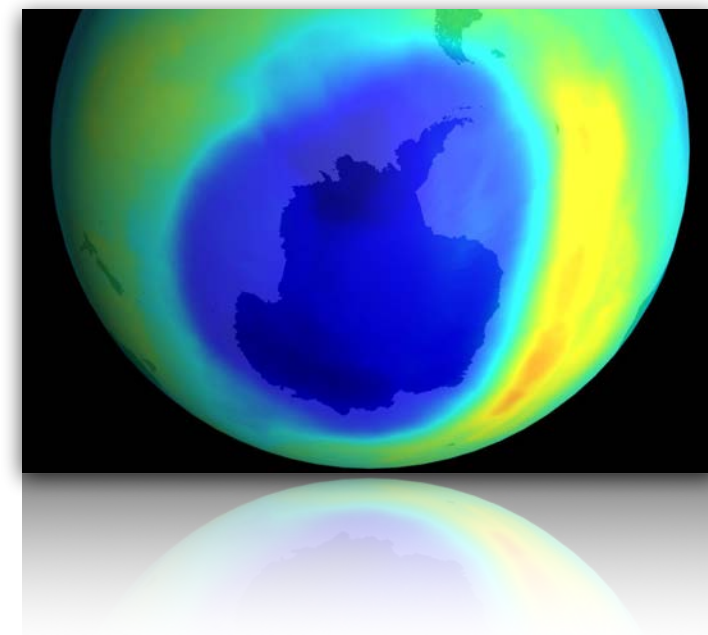


Kampf ums Gas

Deutsche Abhängigkeit steigt

Russischer Anteil an Rohstoff-Importen nach Deutschland





Steffen, W., Richardson, K., Rockstrom, J., Cornell, S. E., Fetzer, I., Bennett, E. M., et al. (2015). Sustainability. Planetary boundaries: guiding human development on a changing planet. *Science*, 347(6223), 1259855–1259855.

Persson, L., Carney Almroth, Collins, C.D., Cornell, S., de Wit, C. et.al. 2022. Outside the Safe Operating Space of the Planetary Boundary for Novel Entities *Environ. Sci. Technol.*, <https://doi.org/10.1021/acs.est.1c04158>

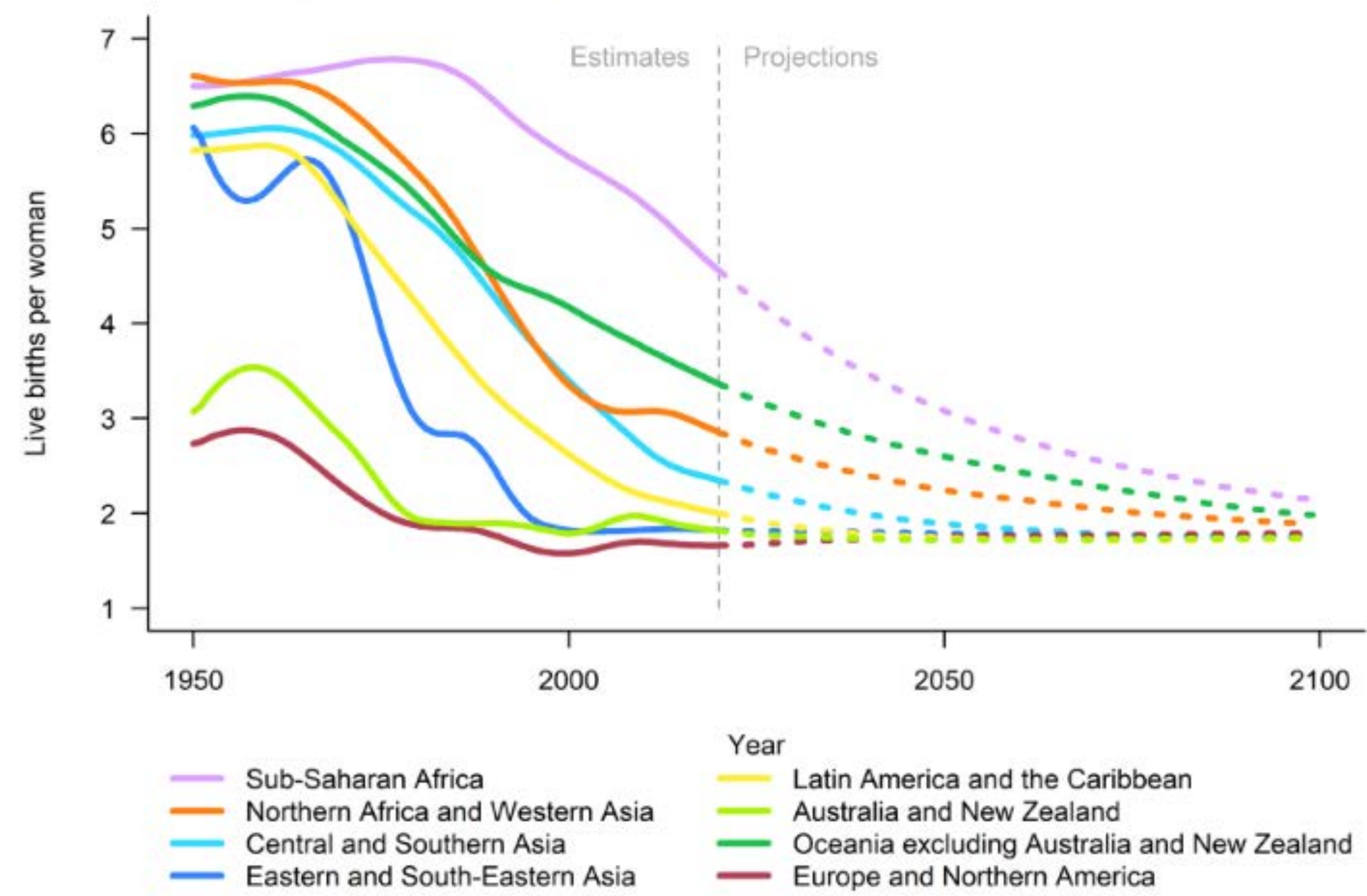
**Club of Rome**

Forscher fordern Belohnung für kinderlose Frauen

Seit Jahrzehnten warnt der Club of Rome vor ungebremstem Wachstum. Ein neuer Bericht versammelt nun Forderungen zum politischen Umsteuern. Eine davon: Kinderlose Frauen sollen mit 50 eine Prämie von 80.000 Dollar erhalten.



Total fertility rate by region, estimates and projections, 1950-2100



Source: United Nations Department of Economic and Social Affairs, Population Division (2019a). *World Population Prospects 2019*.



Artikel 20a

Der Staat schützt auch in
Verantwortung für die
künftigen Generationen die
natürlichen
Lebensgrundlagen und die
Tiere im Rahmen der
verfassungsmäßigen Ordnung
[...]



Prof. Dr. Gerd de Haan
Institut Futur

OECD (2005)

Gestaltungskompetenz and the twelve part-competencies (Transfer-21 2008)

Interactive use of media and methods (tools)

- ability to use language, symbols and text interactively
- ability to use knowledge and information interactively
- ability to use technologies interactively
- gather knowledge with an openness to the world and integrating new perspectives
- think and act in a forward-looking manner
- acquire knowledge and act in an interdisciplinary manner

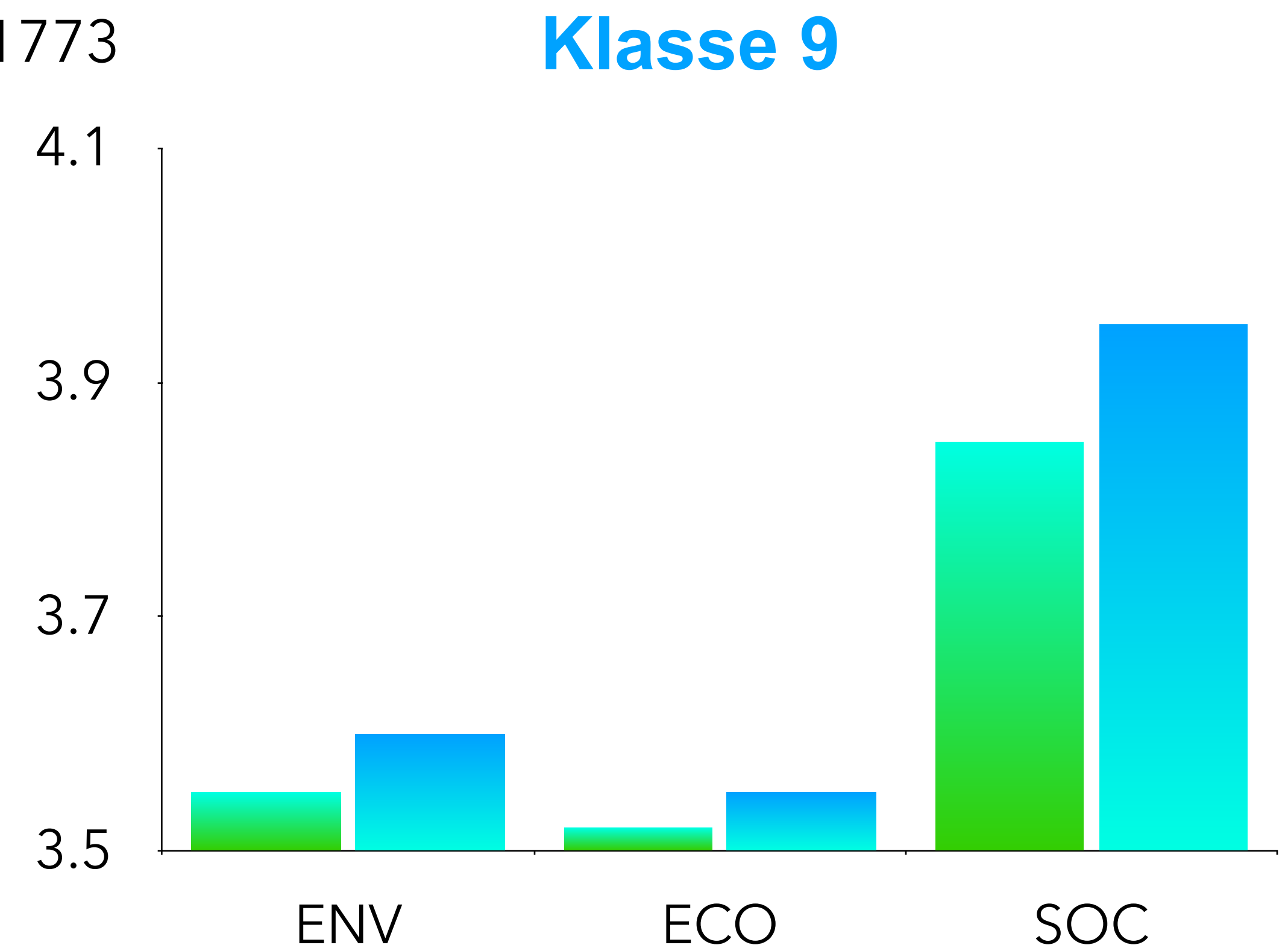
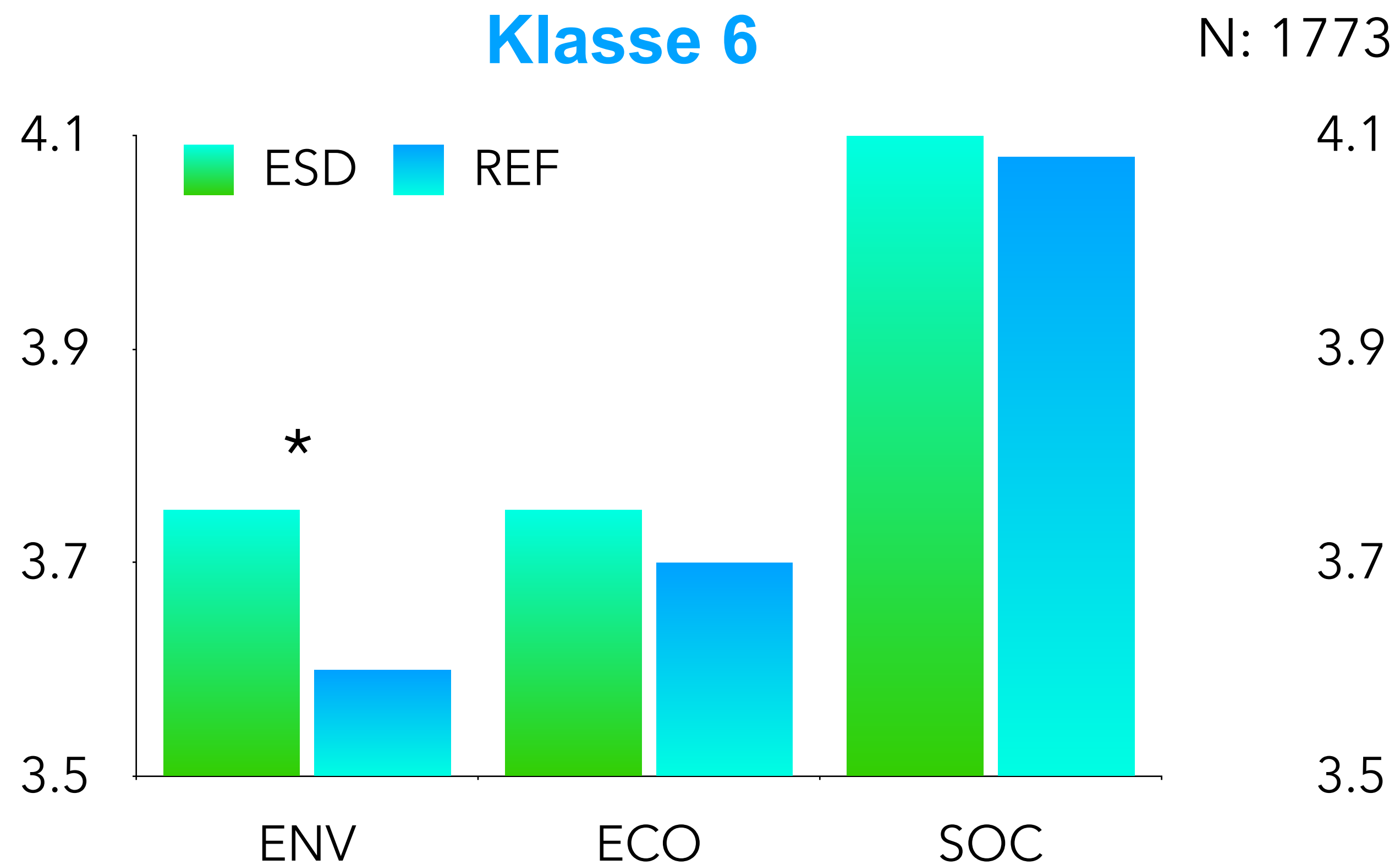


Arnim Wiek
ASU

	Systems Thinking	Anticipatory	Normative	Strategic	Interpersonal
1	PS2 Understanding and knowledge of natural processes and resources	PS11 Participatory elicitation competence; "desirable future states"	PS3 Concern for justice	PS18 Adaptation	PS1 Civic engagement
2	PS4 Integrated Assessment	PS16 Fairness and equity; "future generations"	PS16 Fairness and equity	PS19 Green materials design	PS6 Integrate across disciplinary lines
3	PS6 integrate across disciplinary lines	PS13 Ability to use triple bottom line concepts consider "future"	PS30 Diversity of knowing and learning; "problems based on worldviews"	PS22 Community development	PS16 Interdisciplinarity
4	PS11 Resilience competence	PS16 Decisionmaking under uncertainty	PS30 Awareness of values	PS13 Ability to use triple bottom line concepts effectively	PS30 Interdisciplinary collaborative inquiry
5	PS13 Life cycle competency	PS11 Resilience competence; "long range planning"	PS7 Measuring and modeling sustainability	PS19 Green infrastructure design	PS10 Communication about sustainability
6	PS14 Resilience competency		PS30 Analysis; "assessing sustainability"	PS13 Ability to apply the principles of green chemistry and green	PS21 Humility
7	PS16 Interdisciplinarity and interconnectivity			PS9 Practical skills	PS11 Participatory elicitation competence
8	PS1 Ecological resilience			PS30 Synthesize information on alternatives and draw implications	PS9 Communicative skills
9	PS11 Systems thinking competence				PS9 Social teamwork
10	PS25 Theory of complexity				PS9 Networking and convincing
11	PS25 System dynamics modeling				PS9 Interdisciplinary attitude
12	PS26 Systems thinking				
13	PS26 Temporal and spatial scaling				
14	PS28 Systemic thinking				
15	PS31 Land change, human dimensions				
16	PS7 Measuring and modeling sustainability				
17	PS17 Ecological footprint, biocapacity, resource accounting				
18	PS24 Competence in harnessing and integrating knowledge to address				
19	PS21 Interpreting social systems as information processing systems				
20	PS16 Understanding of legal structures				

The effect of implementation of education for sustainable development in Swedish compulsory schools – assessing pupils' sustainability consciousness

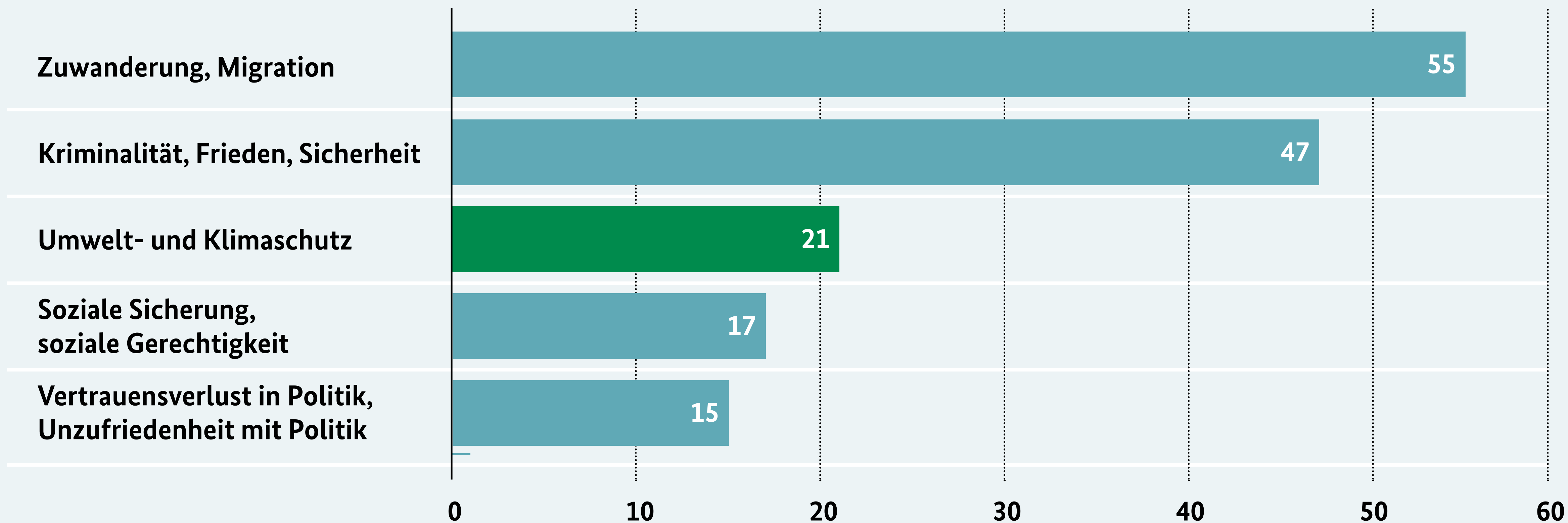
D. Olsson^{a*} , N. Gericke^a and S.-N. Chang Rundgren^b



Schulprogramme haben keinen
nennenswerten Einfluss auf die Einstellungen
und Routinen der Lernenden.

Hallfredotstir (2011); Krnel und Naglic (2009), Ozsoy (2012); Boeve-de Pauw & Van Petegem (2011); Legault & Pelletier (2000); Berglund, Gericke, & Chang Rundgren (2014)

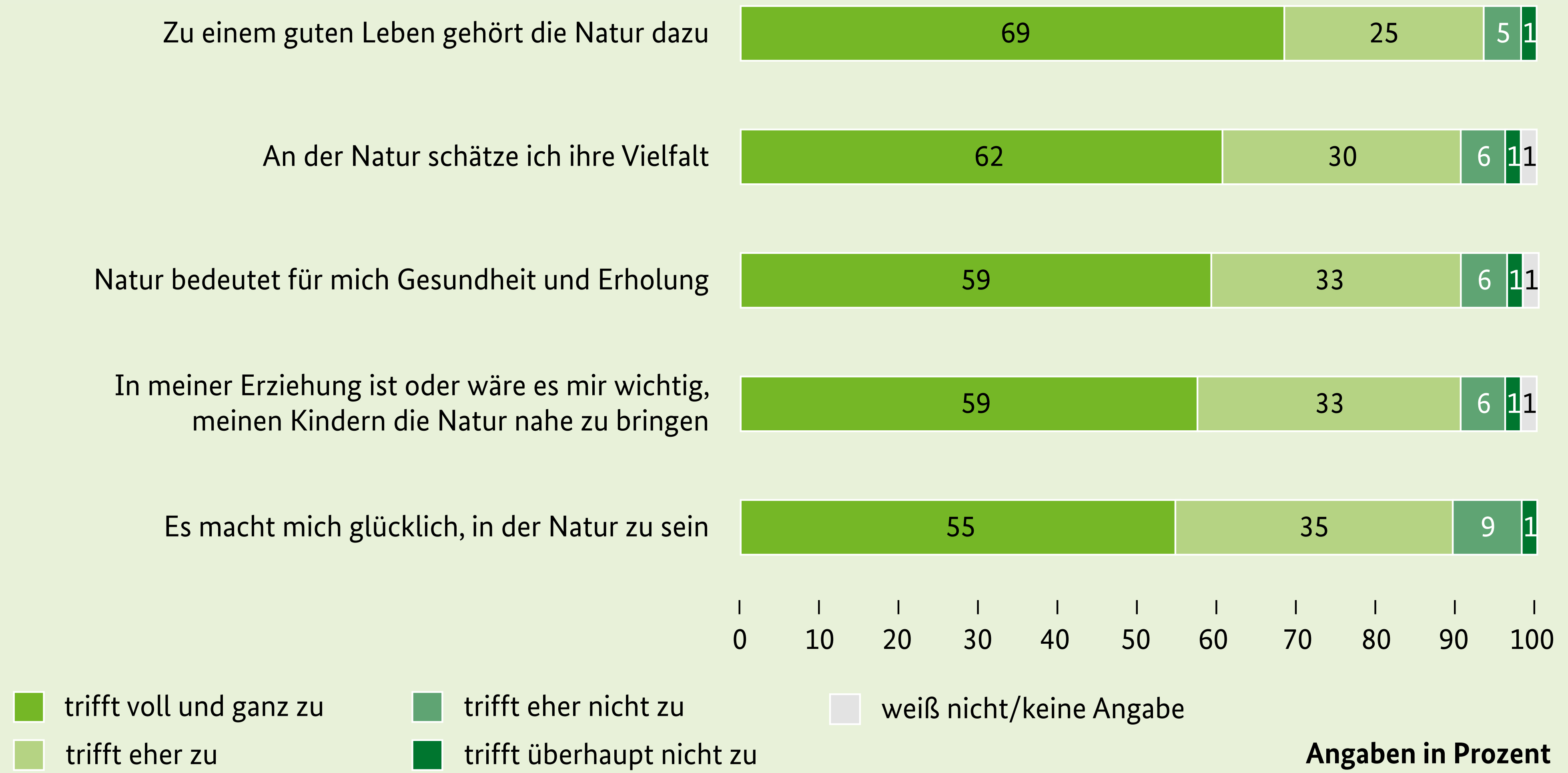
Übersicht in: Niebert, K. (2016). Nachhaltigkeit lernen im Anthropozän. In M. K. W. Schweer (Ed.), Bildung für nachhaltige Entwicklung in pädagogischen Handlungsfeldern (pp. 77-94). Frankfurt a.M.: Peter Lang.

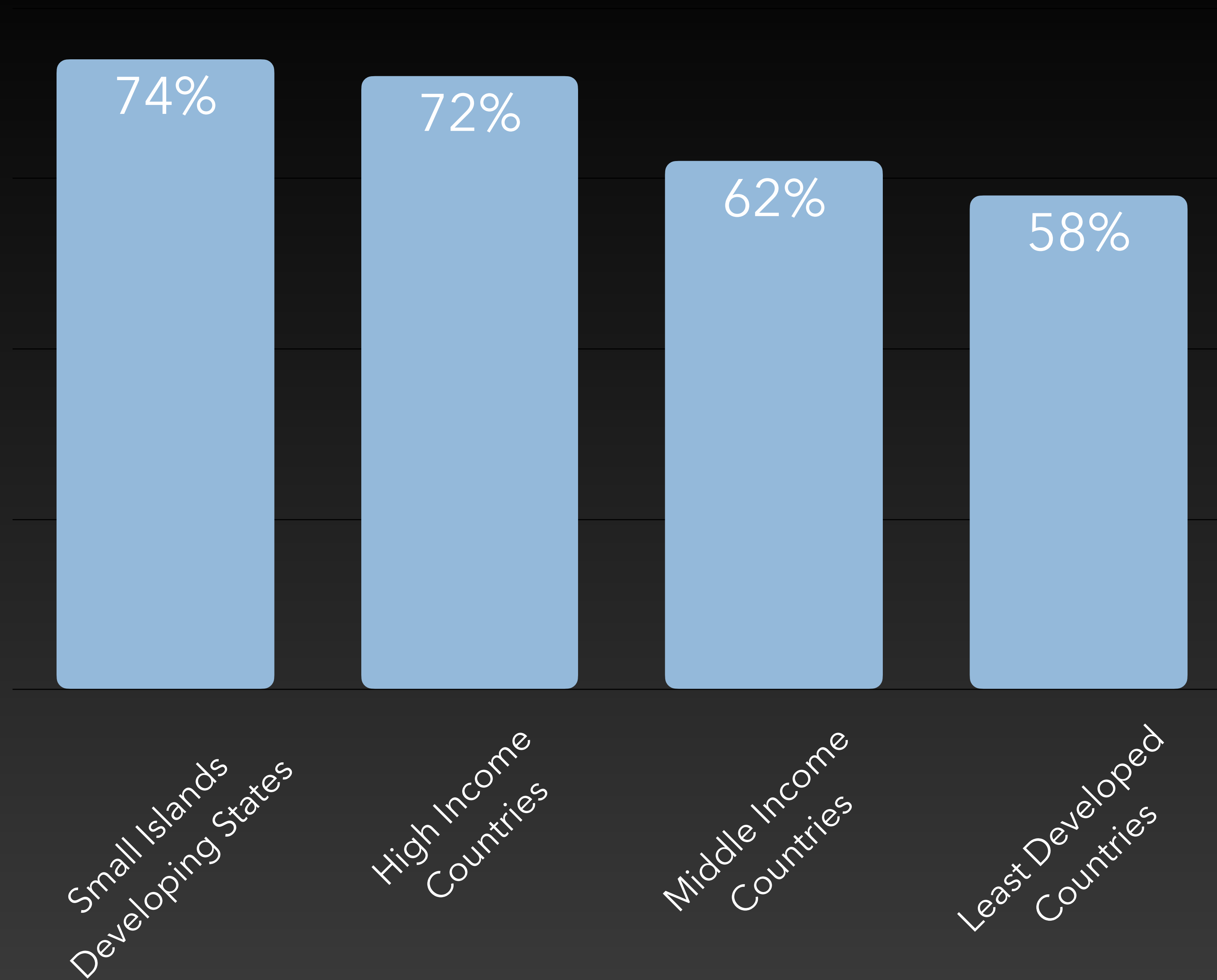
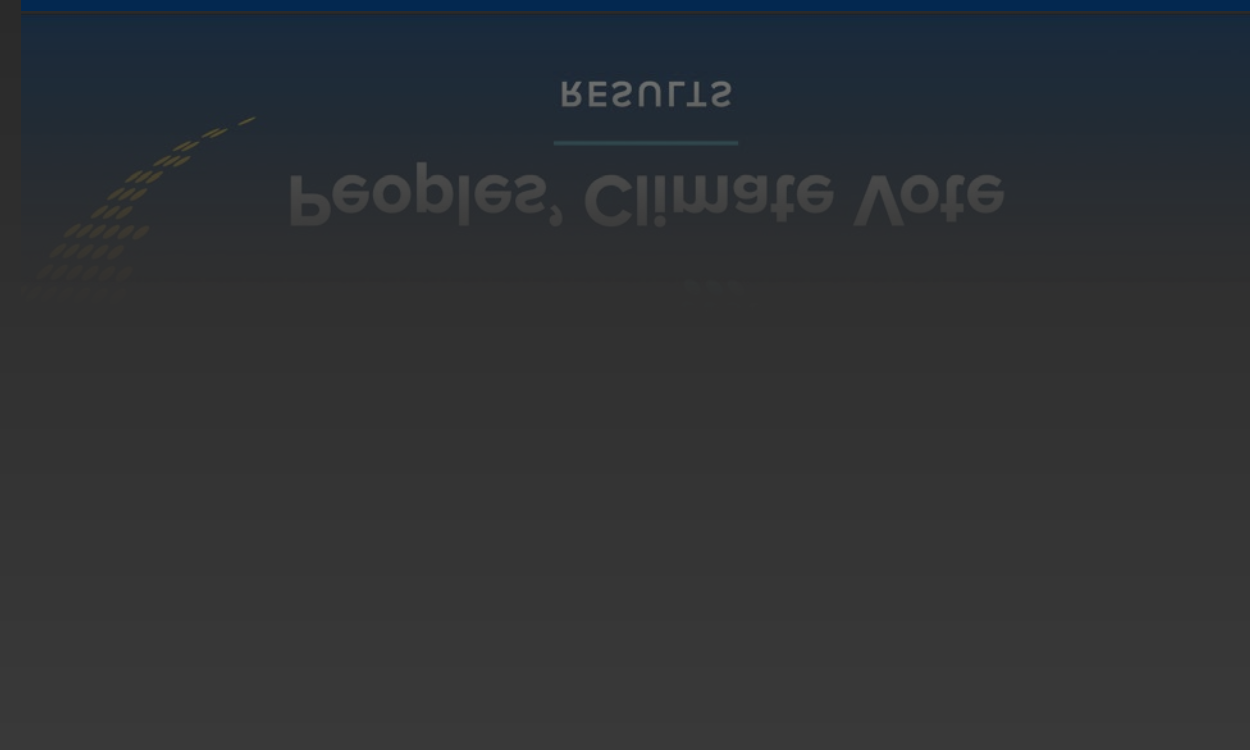
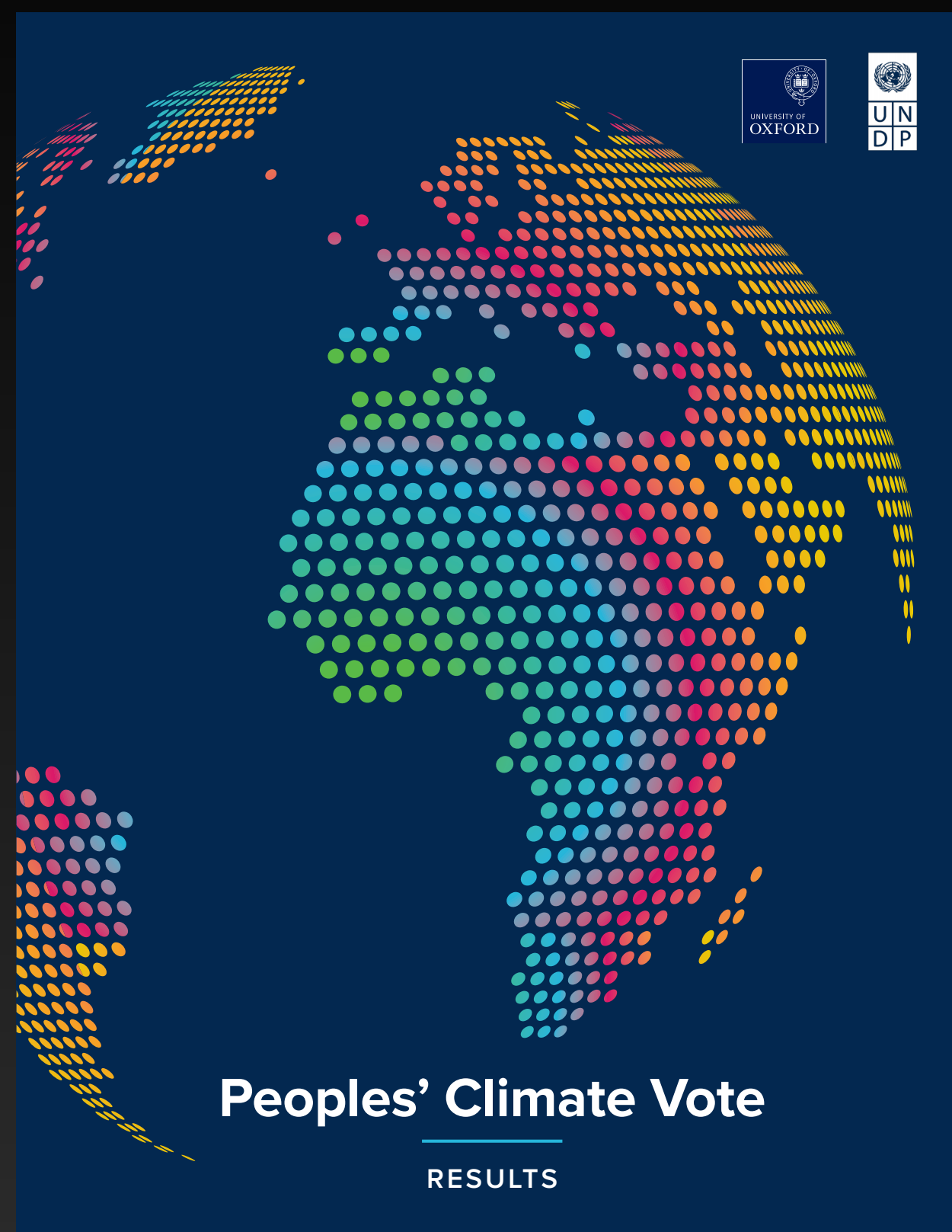


Frage: Was, glauben Sie, sind die wichtigsten Probleme, denen sich unser Land heute gegenüber sieht?

Bitte tragen Sie hier die zwei aus Ihrer Sicht wichtigsten Probleme ein. (Offene Frage, maximal zwei Nennungen möglich)

*N=2.026, Onlinebefragung, 1. Befragungswelle, Stichprobe ab 14 Jahren, Nennungen ohne „Entwicklung städtischer und ländlicher Räume“, „Sonstiges“, „weiß nicht“ und „keine Angabe“
(Angaben in Prozent)*





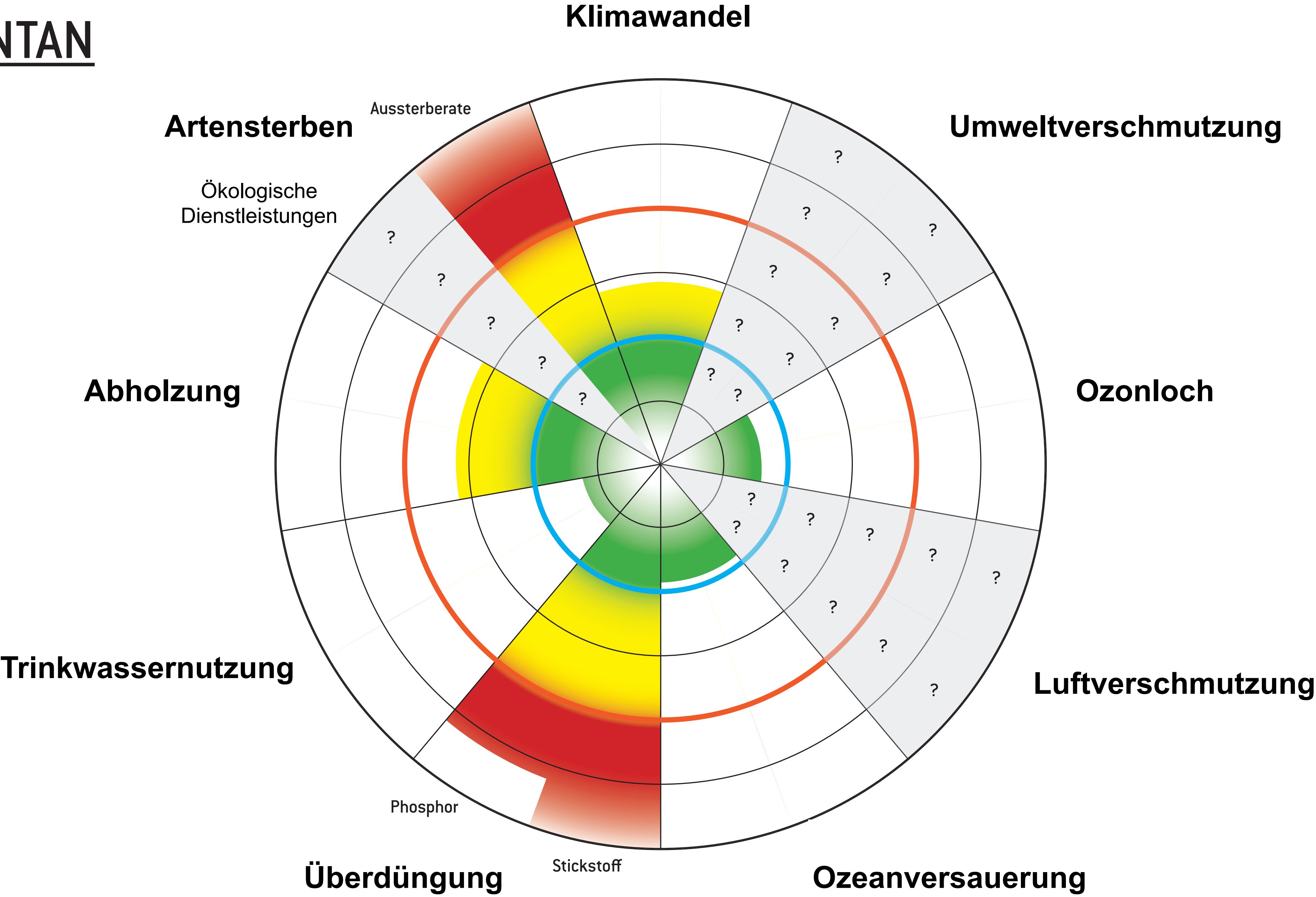
	Mainstream	Critical-creative	Precarious
positive attitudes to nature	0.92	1.20	0.87
Resource-consumption	1.01	1.11	0.82

UBA (2016): Repräsentative Erhebung von Pro-Kopf-Verbräuchen natürlicher Ressourcen

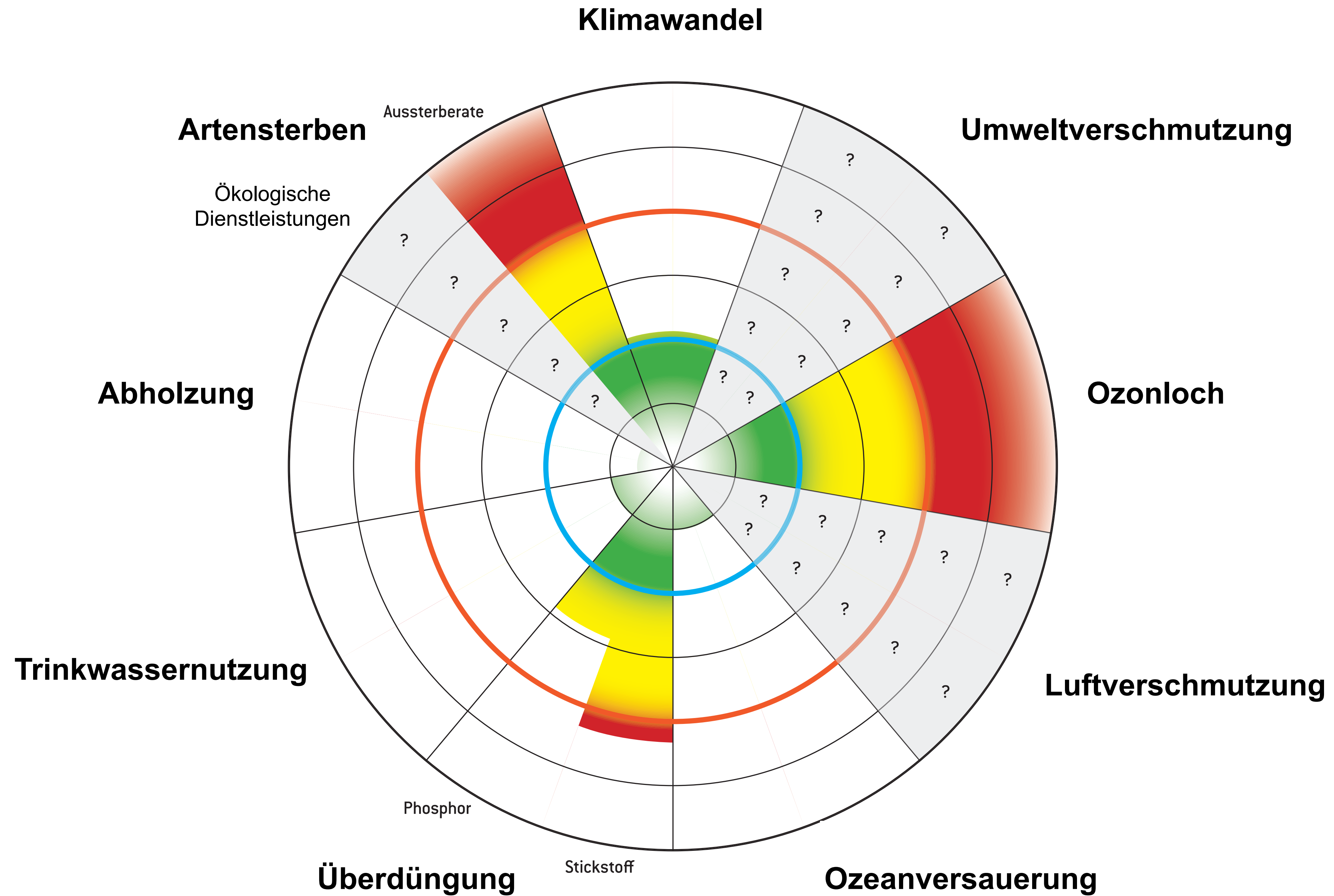
**Es gibt keine – oder im schlimmsten Fall eine
negative – Korrelation zwischen
Umweltbewusstsein und Umweltverhalten.**

UBA (2016): Repräsentative Erhebung von Pro-Kopf-Verbräuchen natürlicher Ressourcen

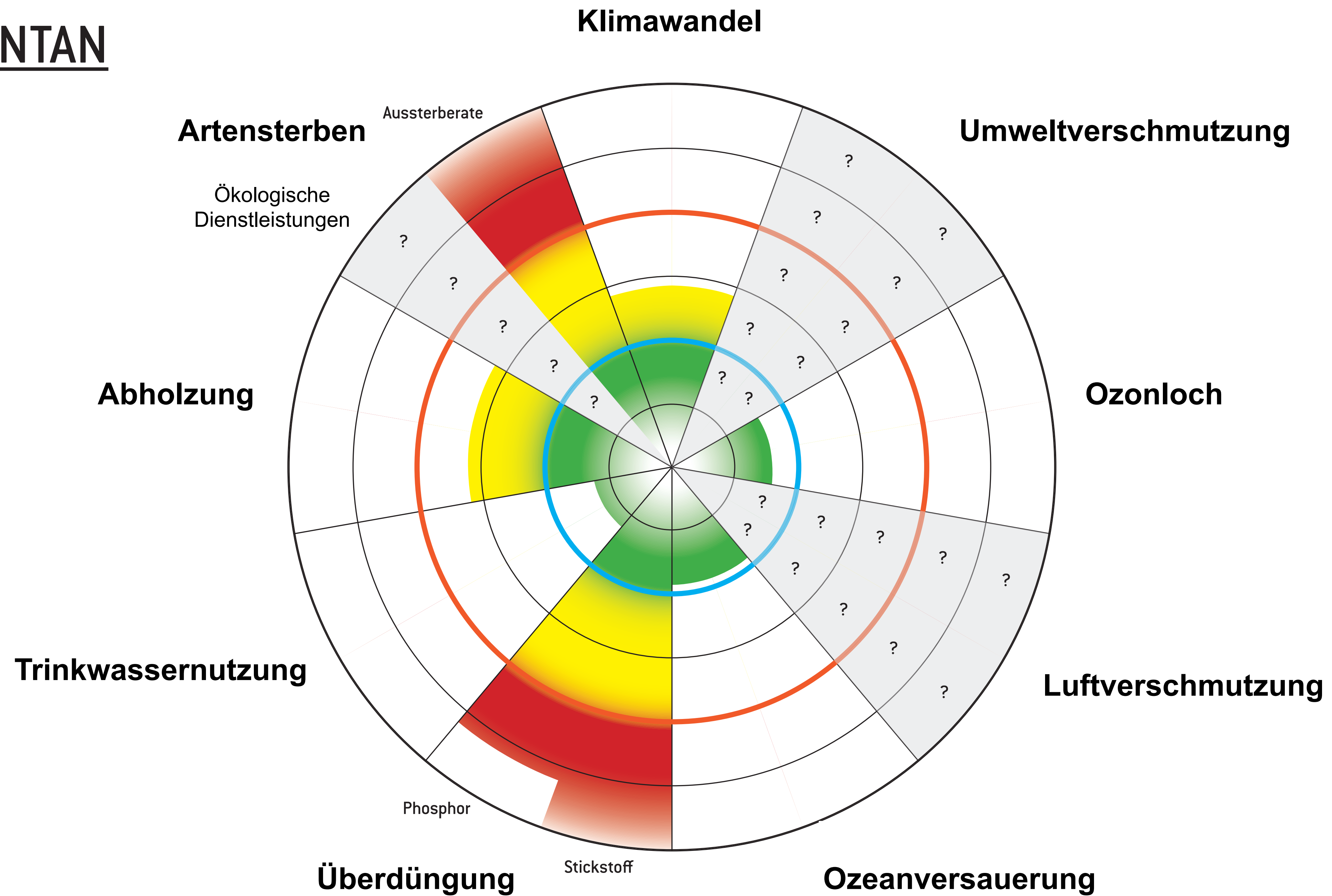
MOMENTAN



1990



MOMENTAN





28th Meeting of the Parties to the Montreal Protocol
10 - 14 October 2016, Kigali, Rwanda



DUBAI PATHWAY
CFL HFCs



MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL

UNDP

WORLD

ZAMBIA



57 Mrd. Euro

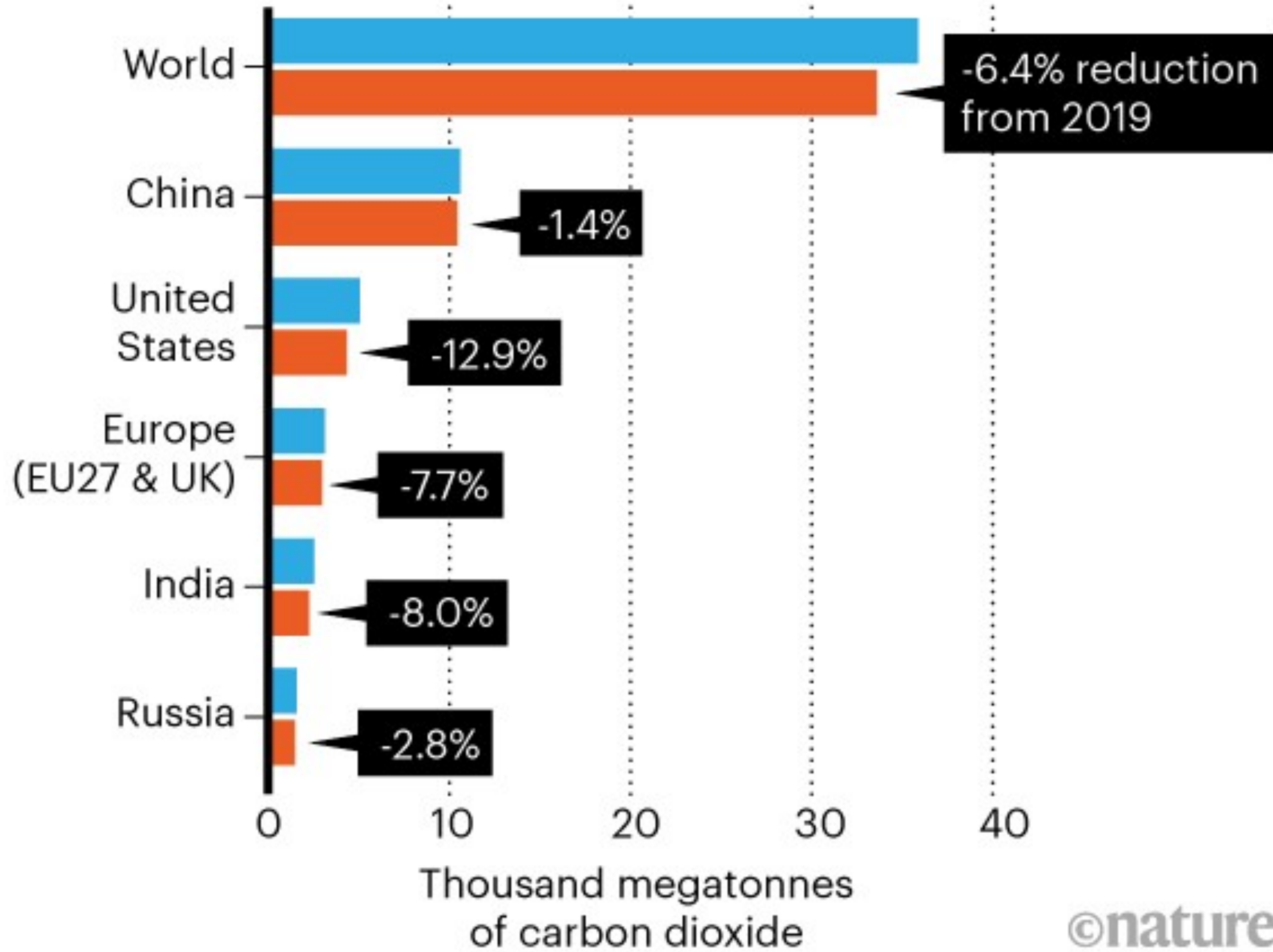
Umweltschädliche
Subventionen

2,6 Mrd.
Euro



BMUV

Annual emissions total: 2019 2020



Bringen Sie die Handlungsoptionen von der privaten in die öffentliche Sphäre.

ipcc

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

Summary for Policymakers

WGI

Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

MCI

Intergovernmental Panel on Climate Change Sixth Assessment Report of the Working Group I Contribution to the

ipcc

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2022

Impacts, Adaptation and Vulnerability

Summary for Policymakers

WGII

Working Group II contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

MCII

Intergovernmental Panel on Climate Change Sixth Assessment Report of the Working Group II Contribution to the

ipcc

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2022

Mitigation of Climate Change

Summary for Policymakers

WGIII

Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

MCIII

Intergovernmental Panel on Climate Change Sixth Assessment Report of the Working Group III Contribution to the

Systematic Review

The (Un)political Perspective on Climate Change in Education—A Systematic Review

Johanna Kranz ^{1,*} , Martin Schwichow ² , Petra Breitenmoser ^{3,4} and Kai Niebert ^{4,*} 

- ¹ Center of Excellence for Climate Change Impacts, Research Institute of Forest Ecology and Forestry Rhineland-Palatinate, 67705 Trippstadt, Germany
- ² Department of Physics Education, University of Education Freiburg, 79117 Freiburg, Germany; martin.schwichow@ph-freiburg.de
- ³ Department of Primary Education, Zurich University of Teacher Education, 8090 Zurich, Switzerland; petra.breitenmoser@phzh.ch
- ⁴ Institute of Education, University of Zurich, 8001 Zurich, Switzerland
- * Correspondence: johanna.kranz@klimawandel-rlp.de (J.K.); kai.niebert@uzh.ch (K.N.)

Abstract: Mitigating and adapting to climate change requires foundational changes in societies, politics, and economies. Greater effectiveness has been attributed to actions in the public sphere than to the actions of individuals. However, little is known about how climate literacy programs address the political aspects of mitigation and adaptation. The aim of this systematic literature review is to fill this gap and analyze how public-sphere actions on mitigation and adaptation are discussed in climate literacy programs in schools. Based on database searches following PRISMA guidelines we identified 75 empirical studies that met our inclusion criteria. We found that central aspects of climate policy such as the 1.5-degree limit, the IPCC reports, or climate justice are rarely addressed. Whilst responsibility for emissions is attributed to the public sphere, the debate about mitigation usually focuses on the private sphere. Climate change education does not, therefore, correspond to the climate research discourse. We show that effective mitigation and adaptation are based on public-sphere actions and thus conclude that effective climate education should discuss those public actions if it is to be effective. Hence, we propose that climate education should incorporate political literacy to educate climate-literate citizens.

Keywords: climate change education; climate literacy; climate change; sustainability education; political education; literature review; private and public-sphere action; mitigation; adaptation; climate justice

1. Introduction

The global climate crisis is probably the greatest social challenge of the 21st century and dealing with it is the most important task for our societies and economies. An essential step towards mastering this global challenge is meeting the agreements of the 2015 Paris Climate Conference to limit global warming to 1.5 °C [1]. This requires prompt and extensive efforts to reduce greenhouse gas emissions to mitigate climate change. Besides mitigation measures, actions to adapt to climate change are crucial to make societies and infrastructure as resilient as possible to both the existing and foreseeable consequences of climate change. In this regard, the Intergovernmental Panel on Climate Change (IPCC) provides regular scientific assessments on climate change and its implications as well as mitigation and adaptation options. These overviews represent the state of knowledge concerning climate change and are the key basis for international negotiations.

In IPCC reports (e.g., [2–5]) and political documents [6–8] on climate change, education is considered to be of great importance for making societies and economies carbon-neutral and resilient to the consequences of climate change. Education is seen as a key for changing individual behaviors and for generating public support for—or at least an understanding



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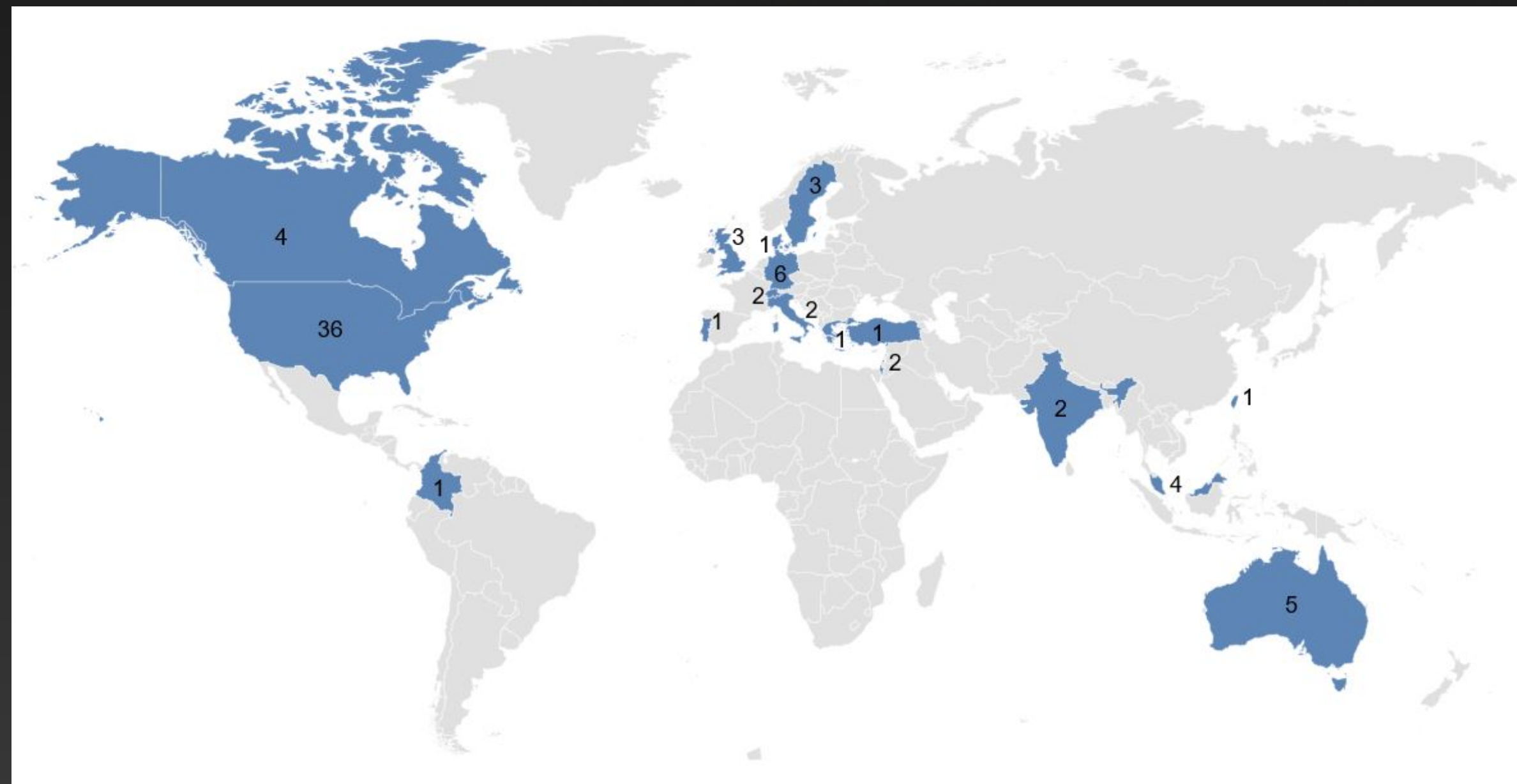
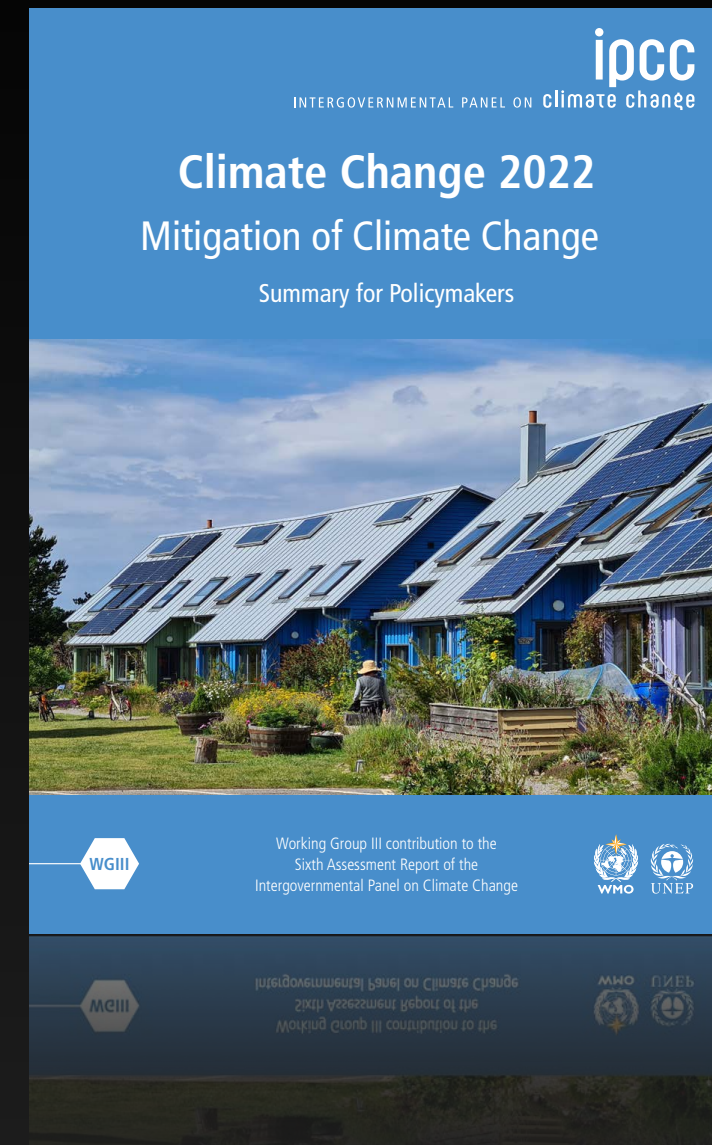
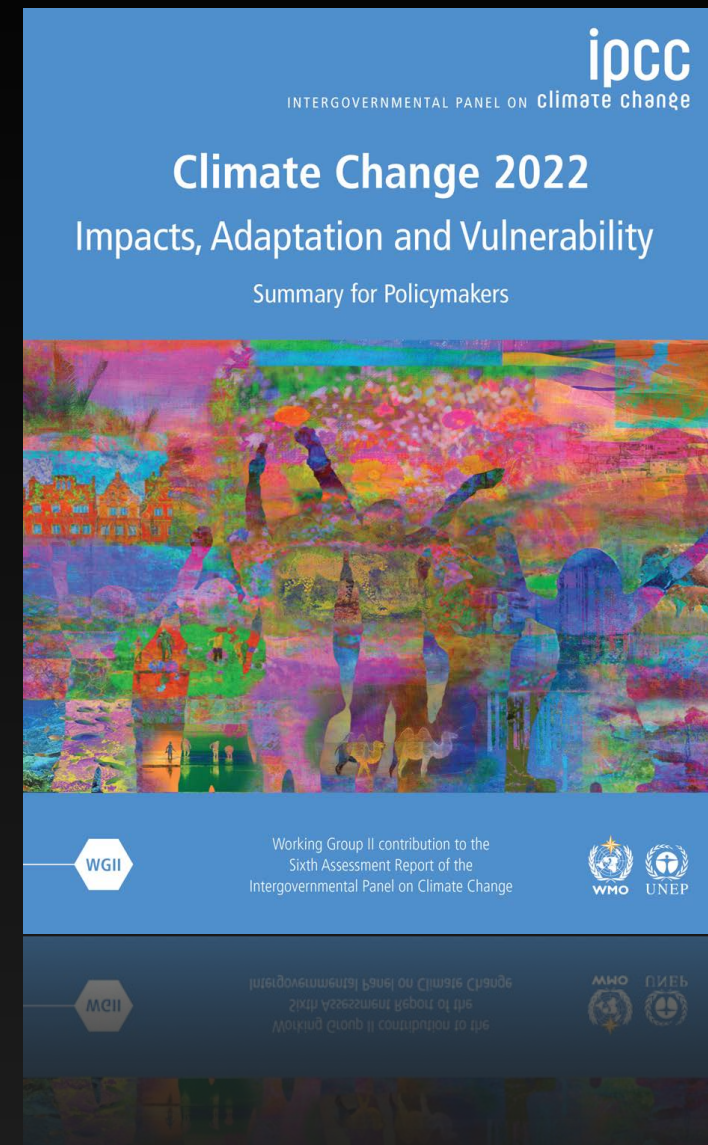
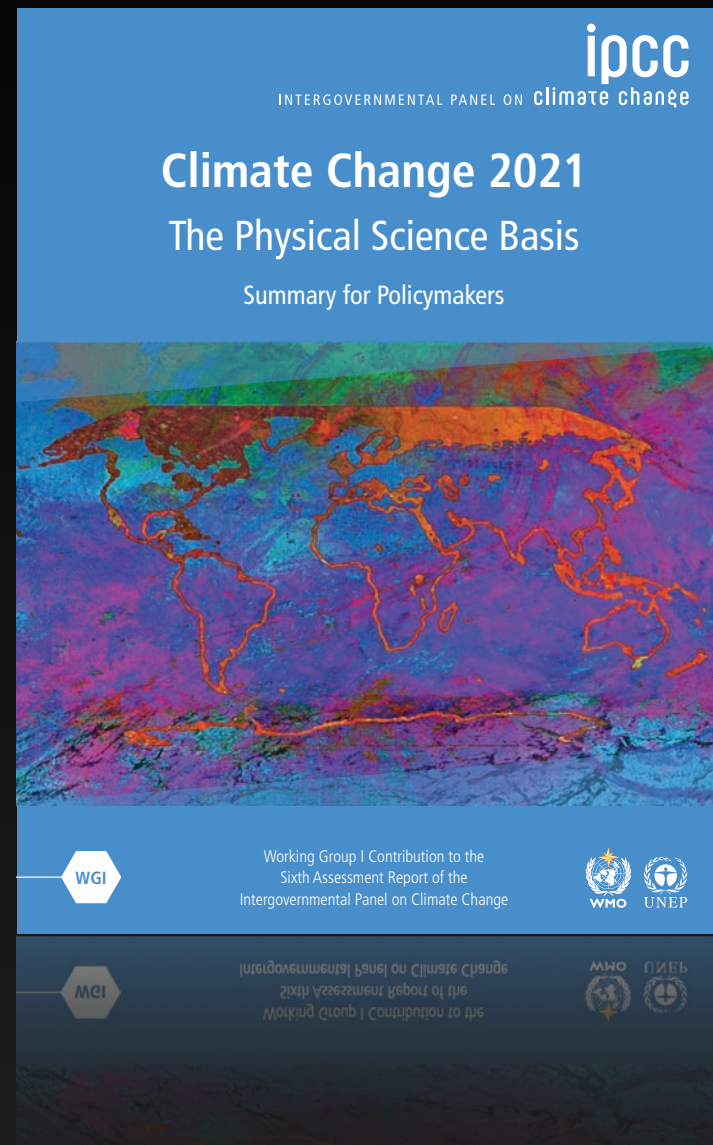
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Systematic Review

The (Un)political Perspective on Climate Change in Education—A Systematic Review

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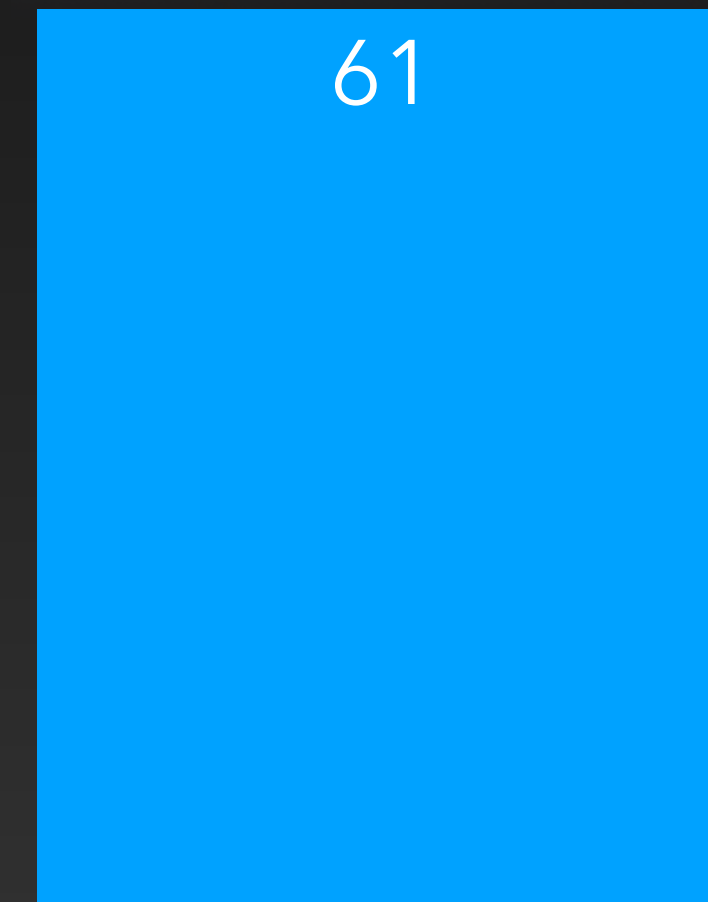
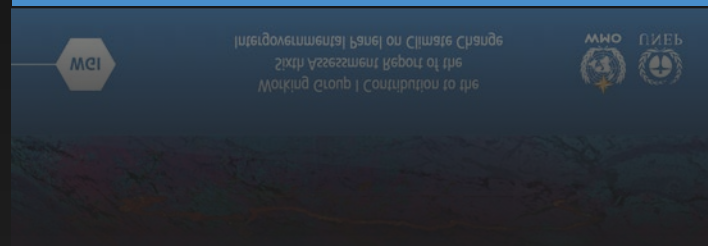
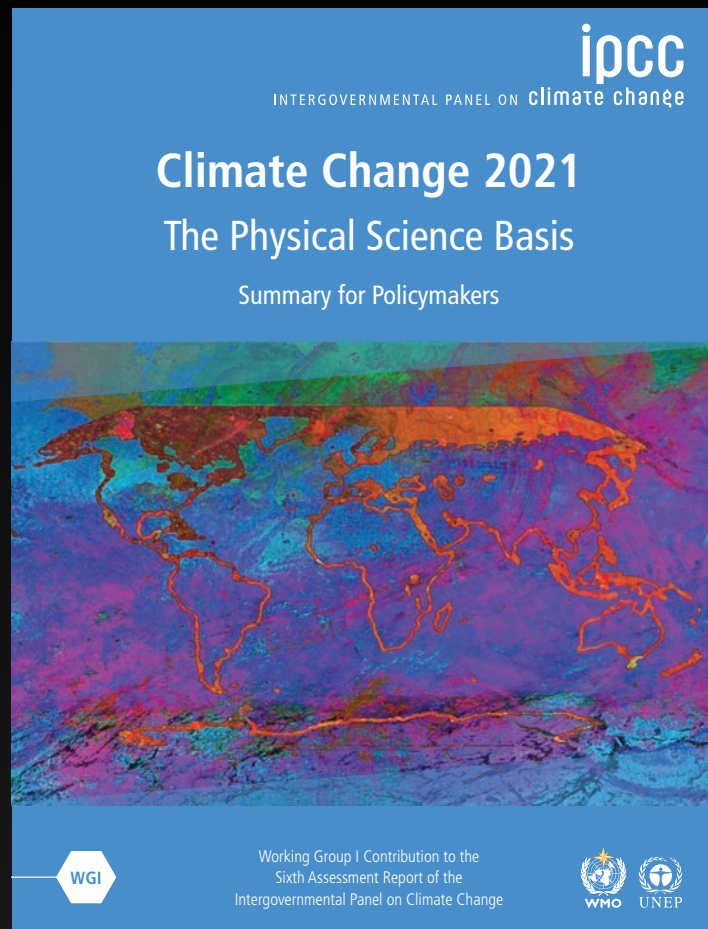
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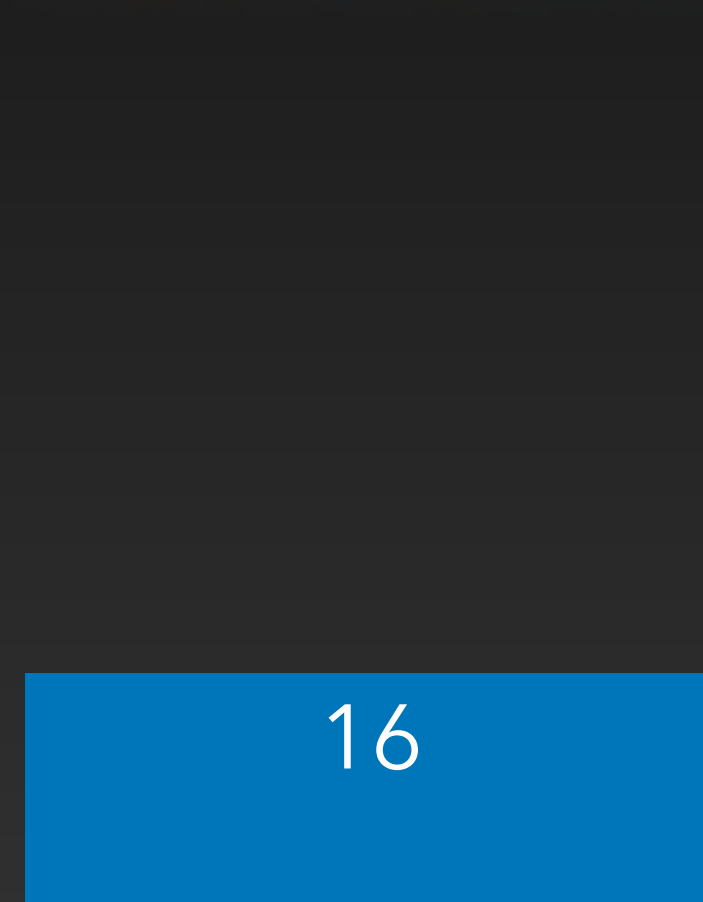
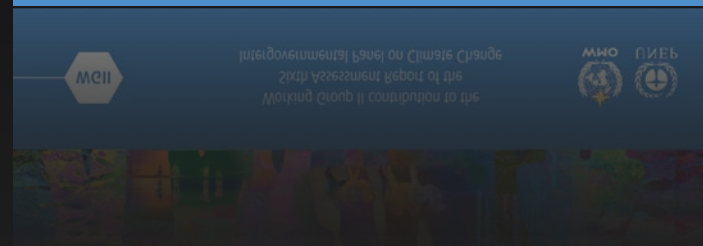
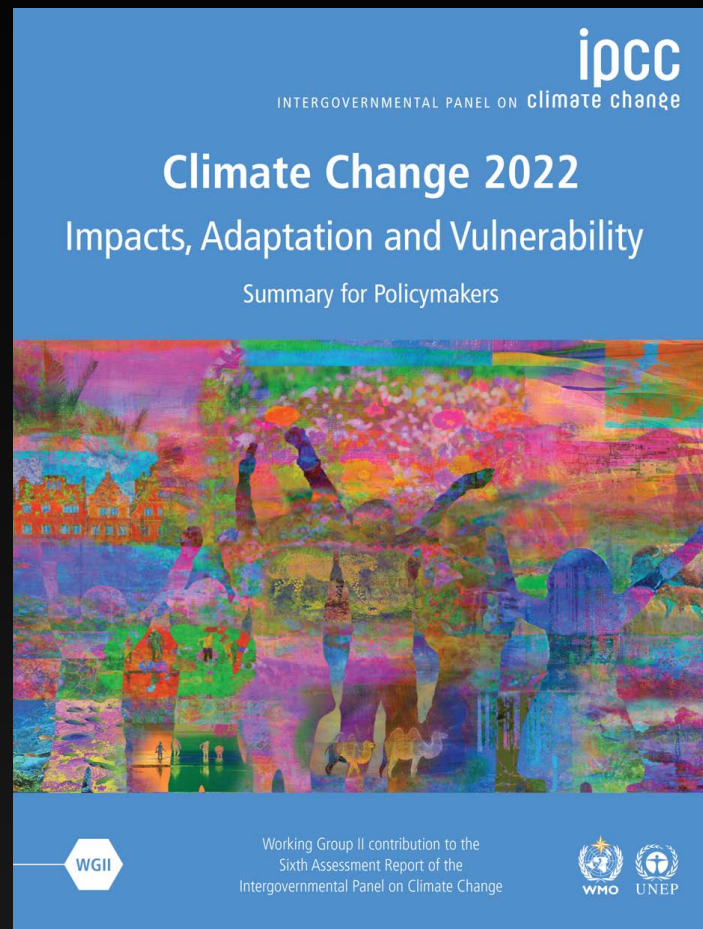
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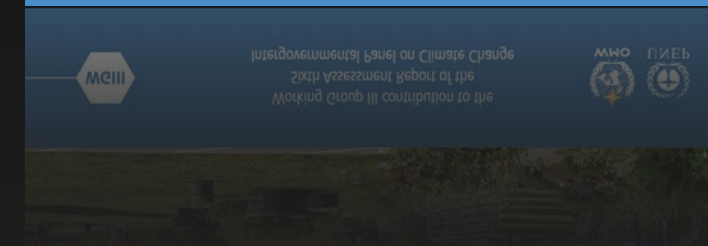
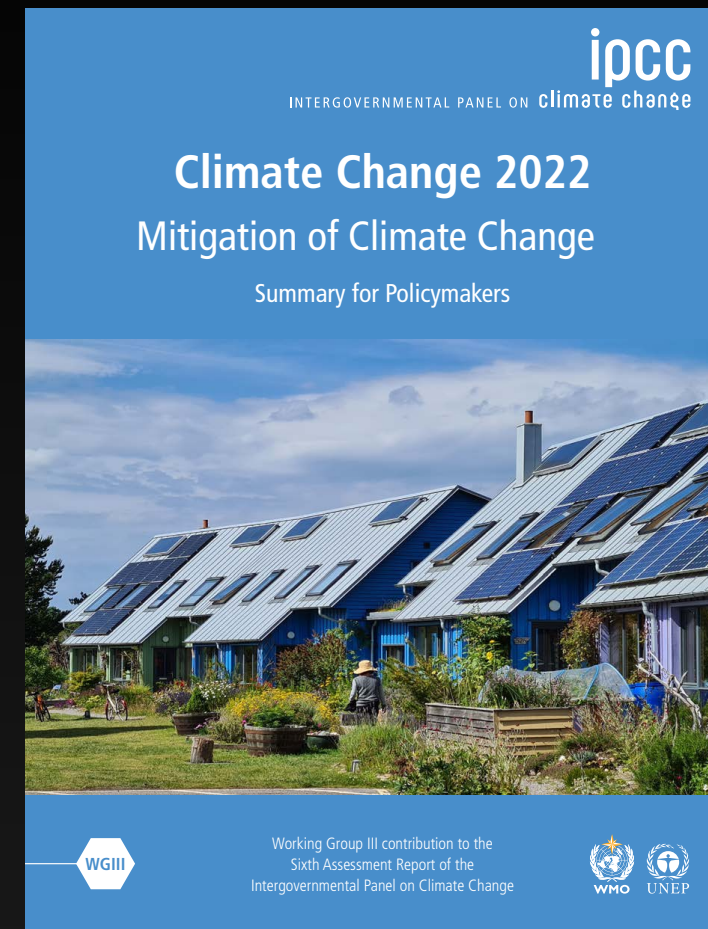
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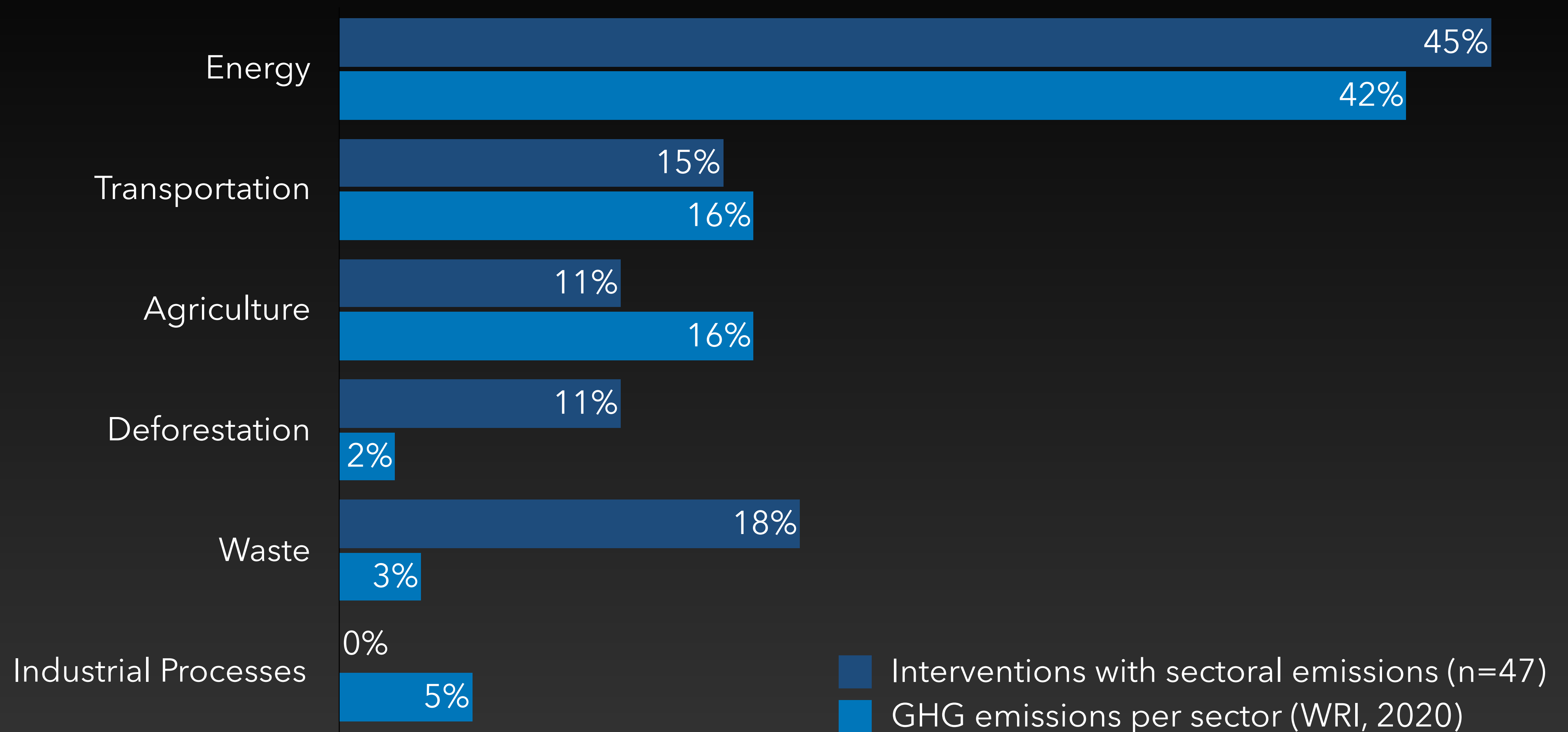
Physics

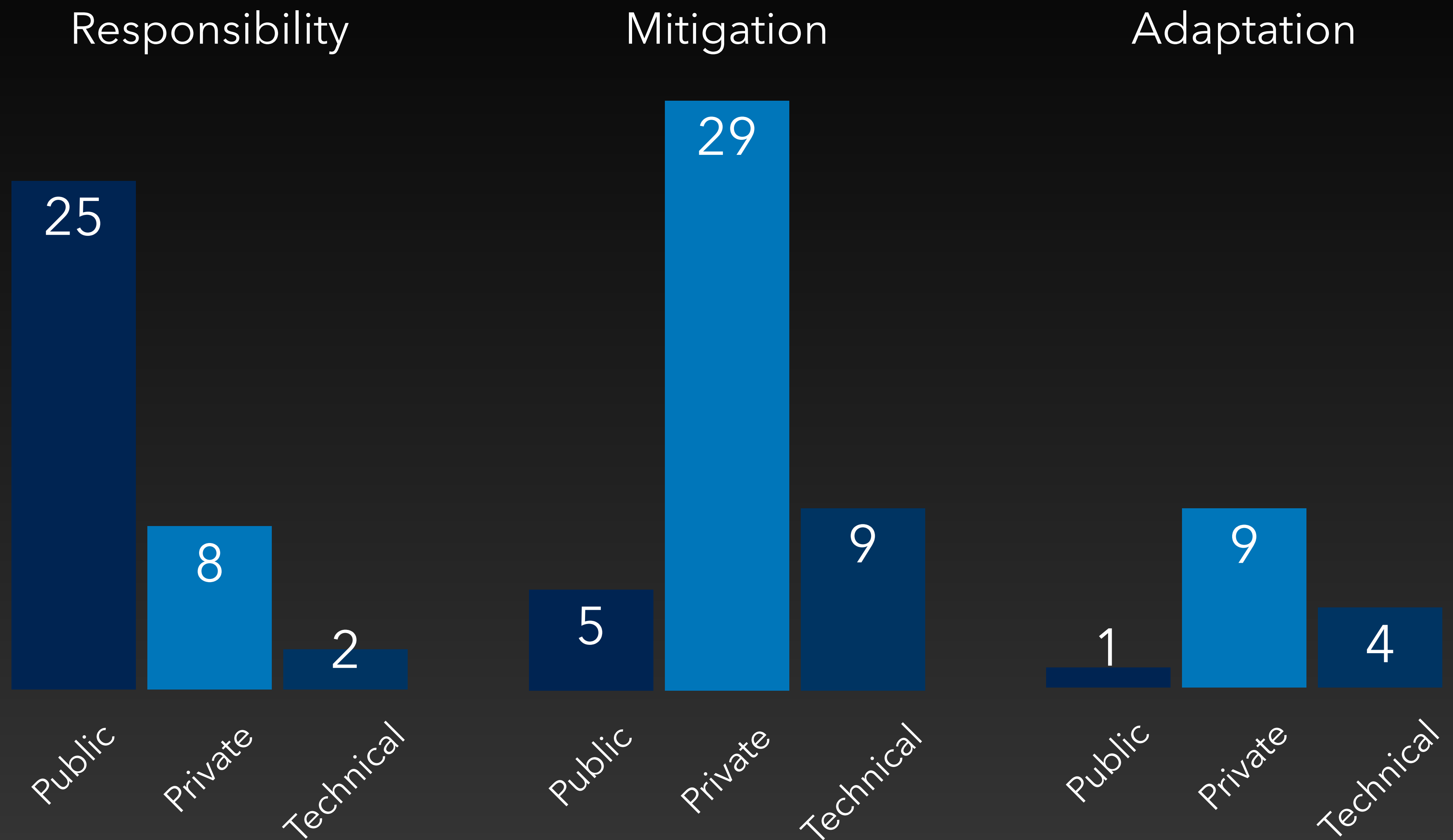


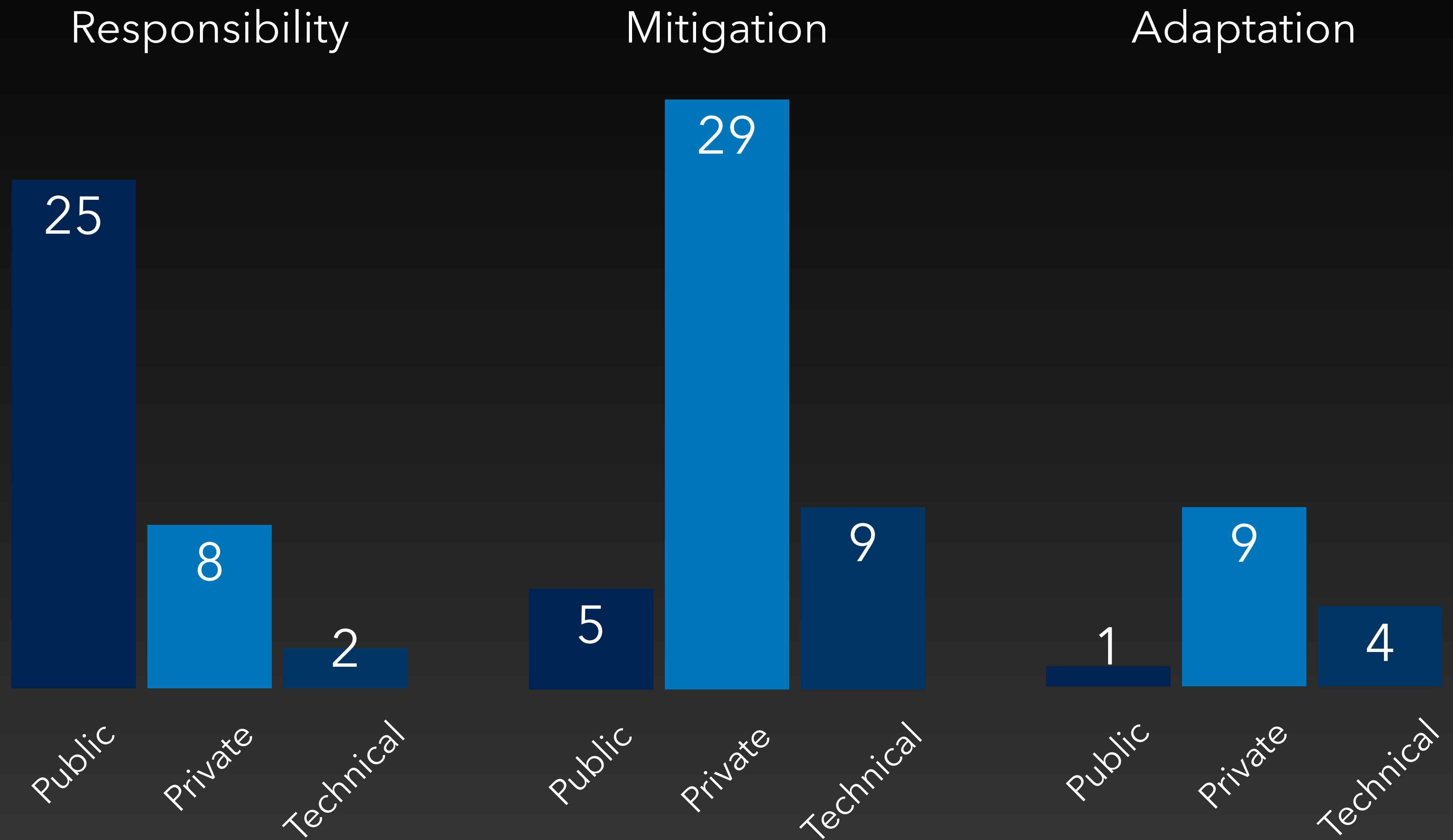
Action



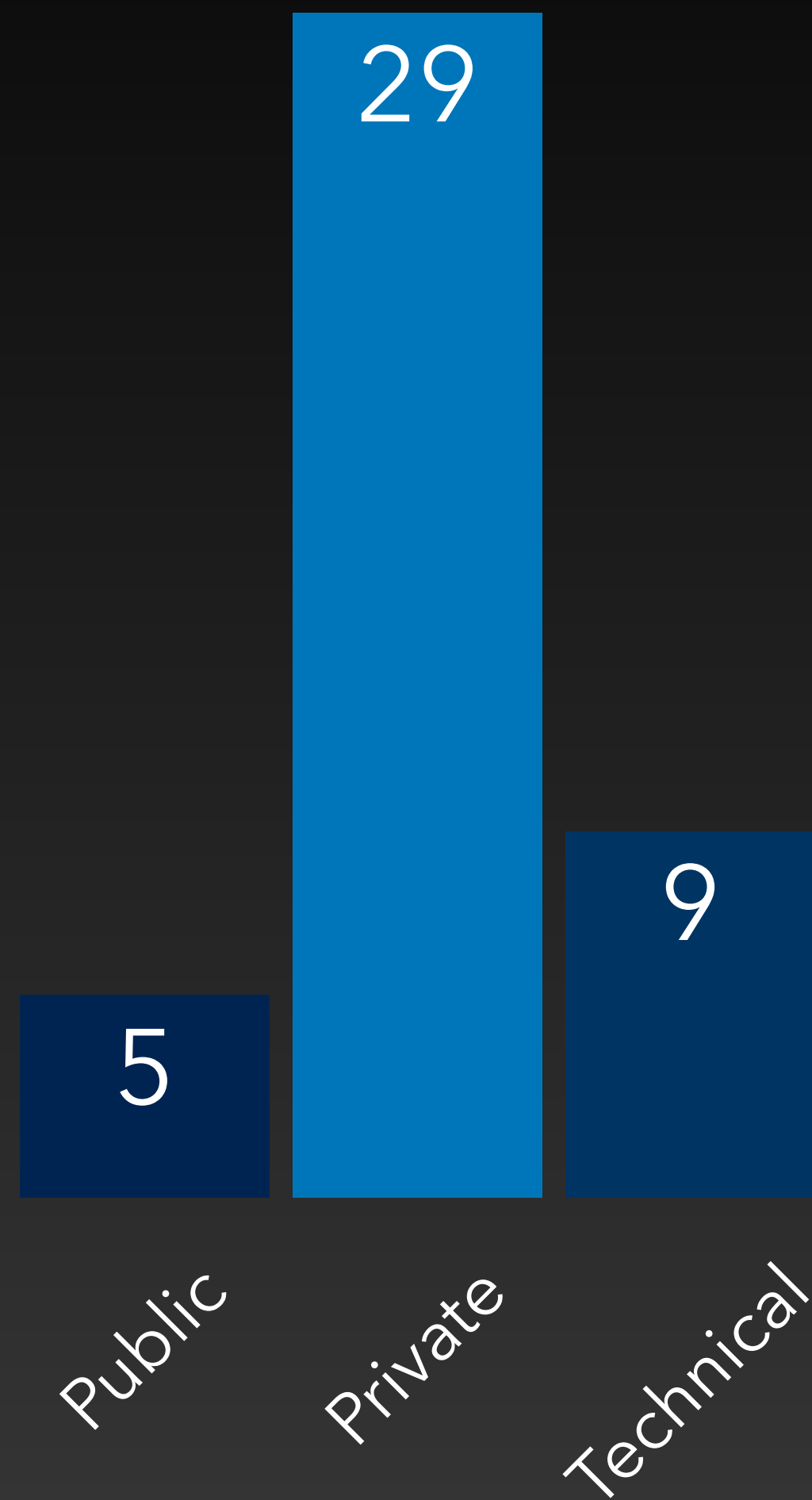
Justice



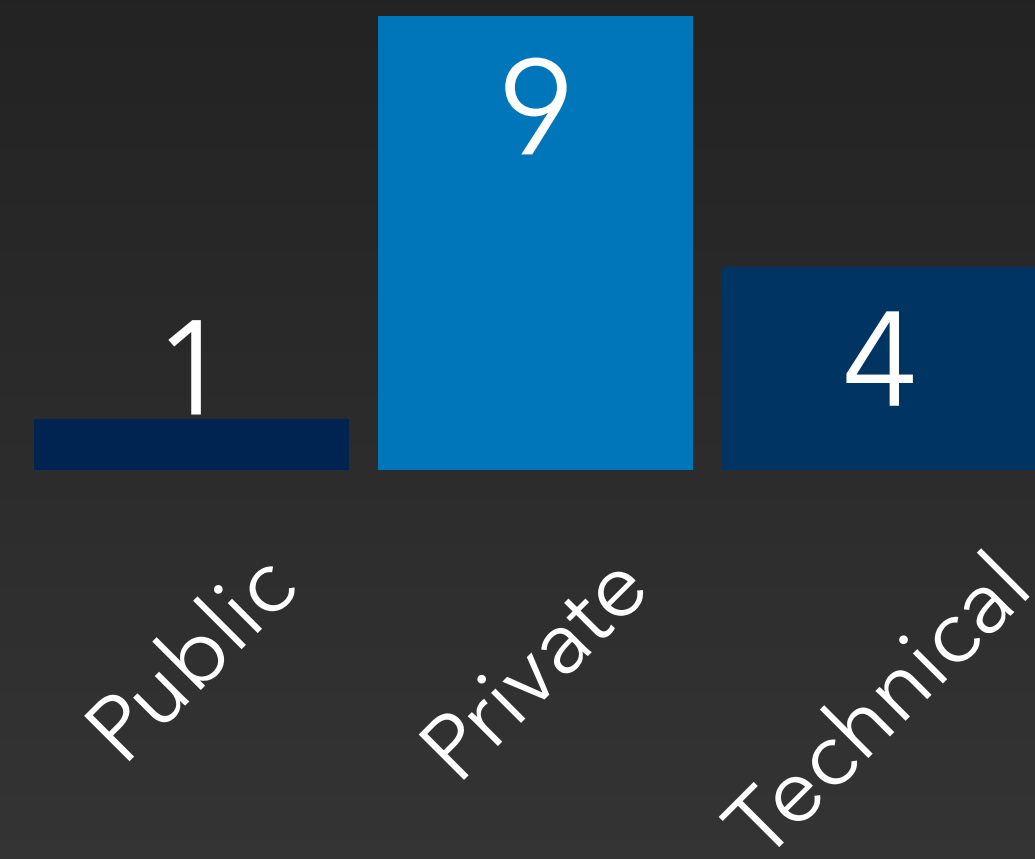




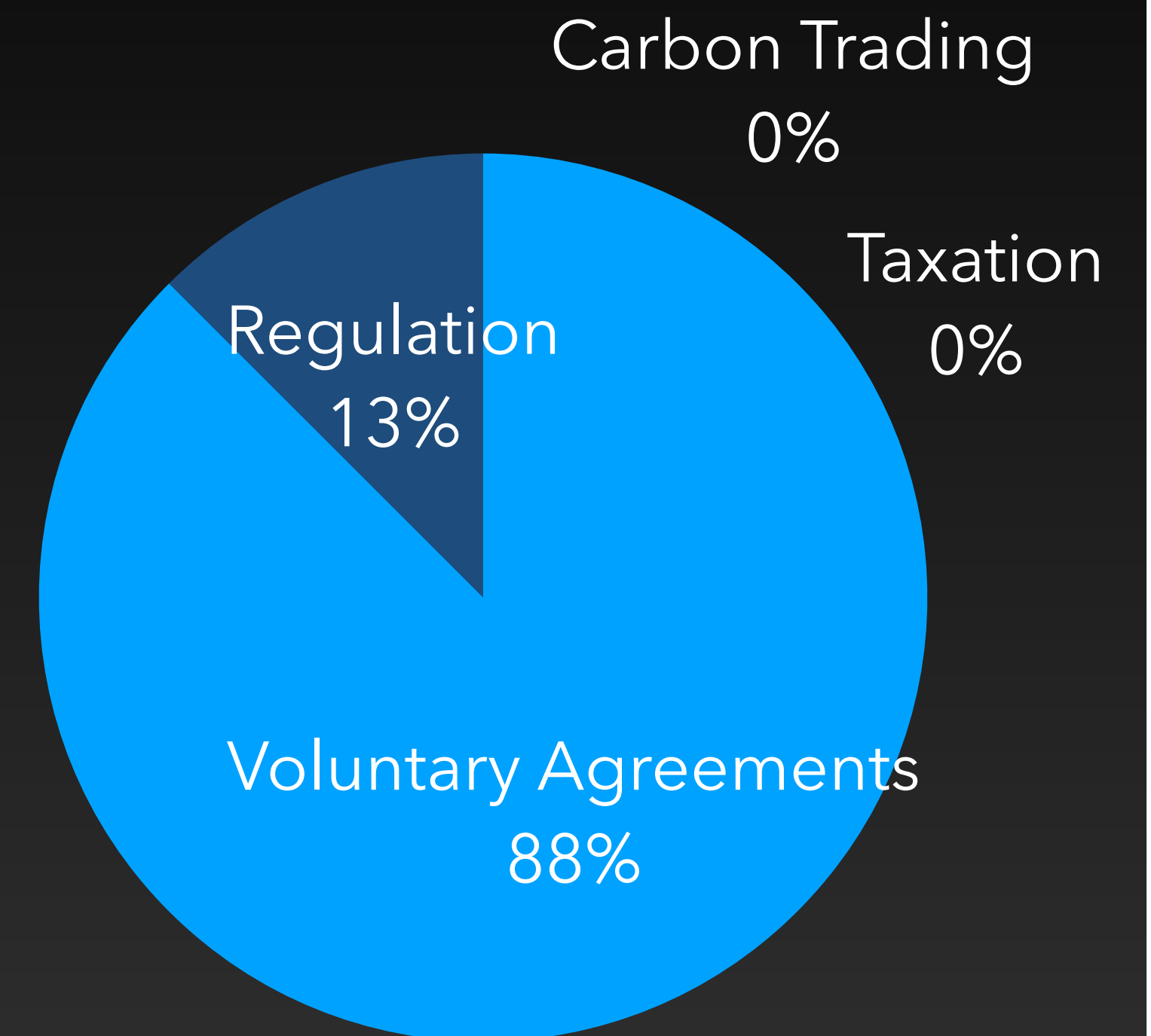
Mitigation

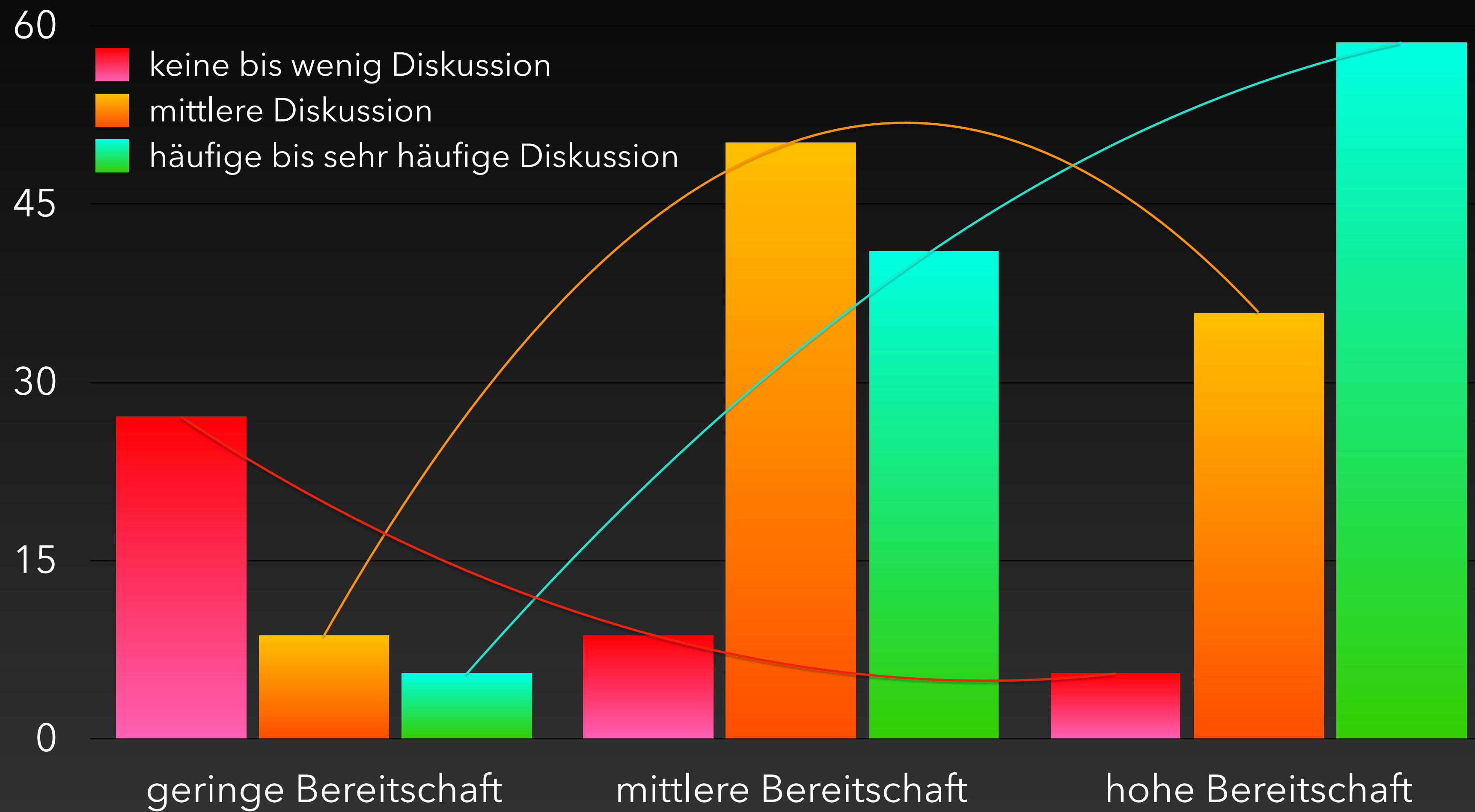


Adaptation

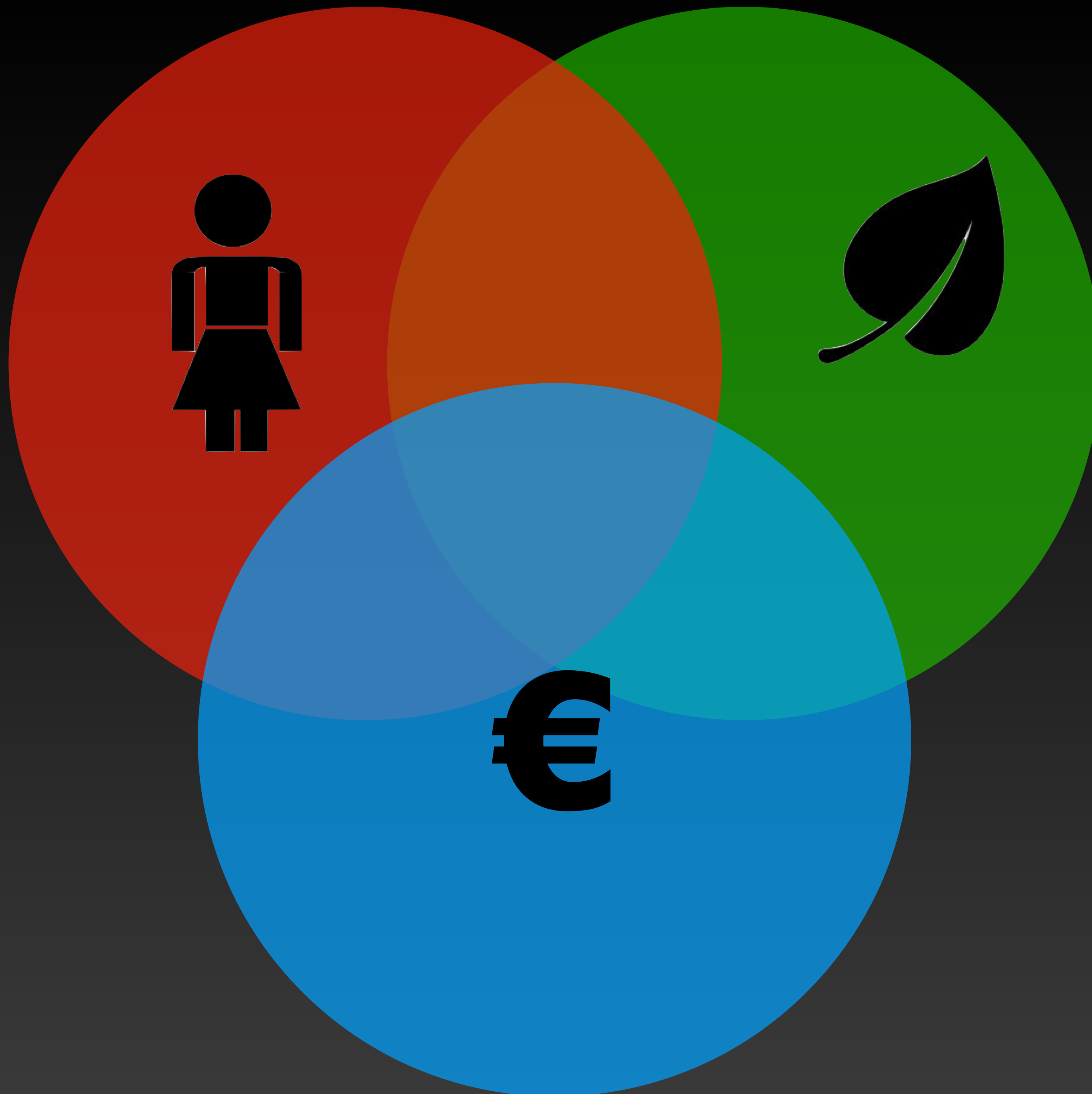


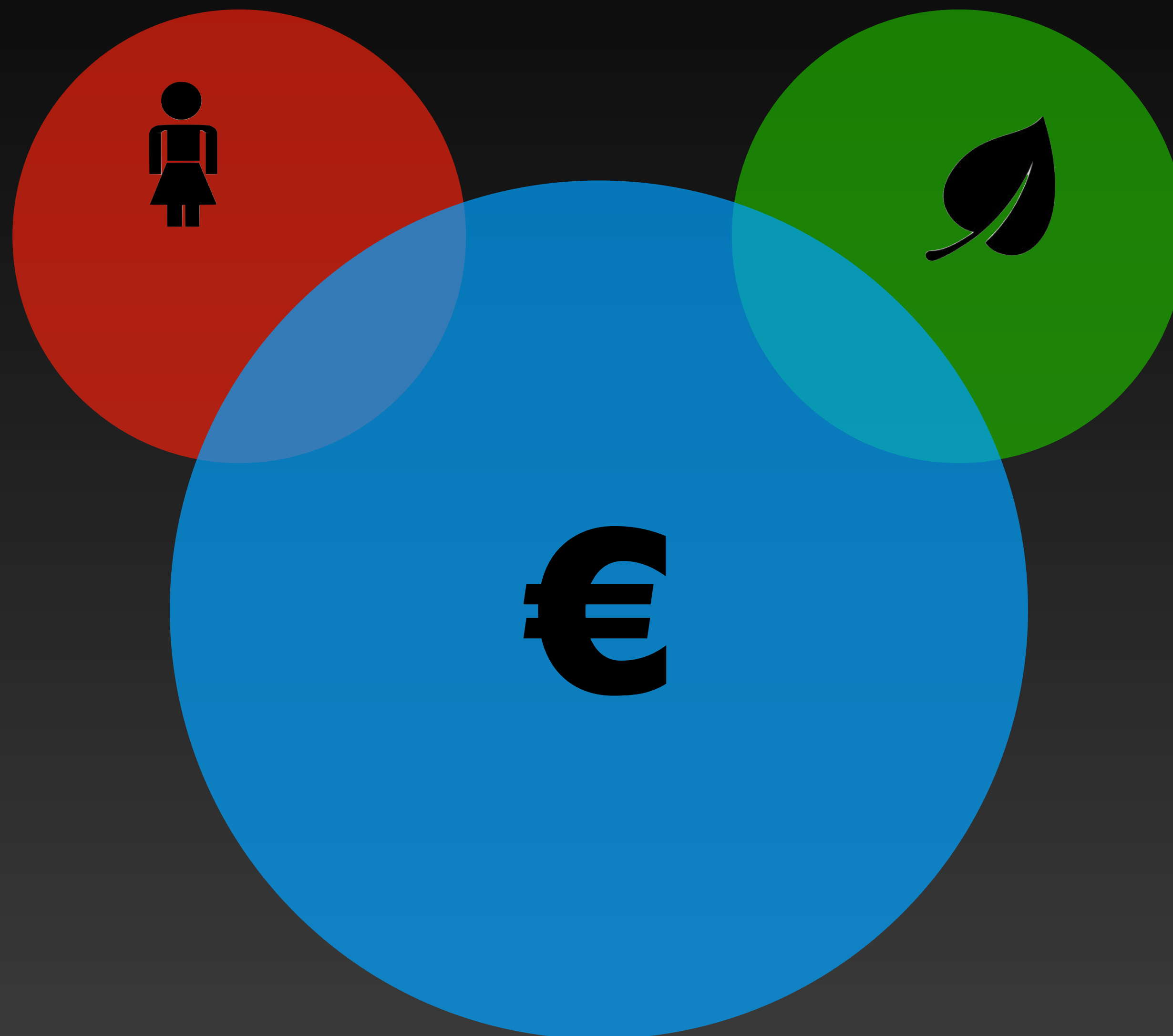
Instruments

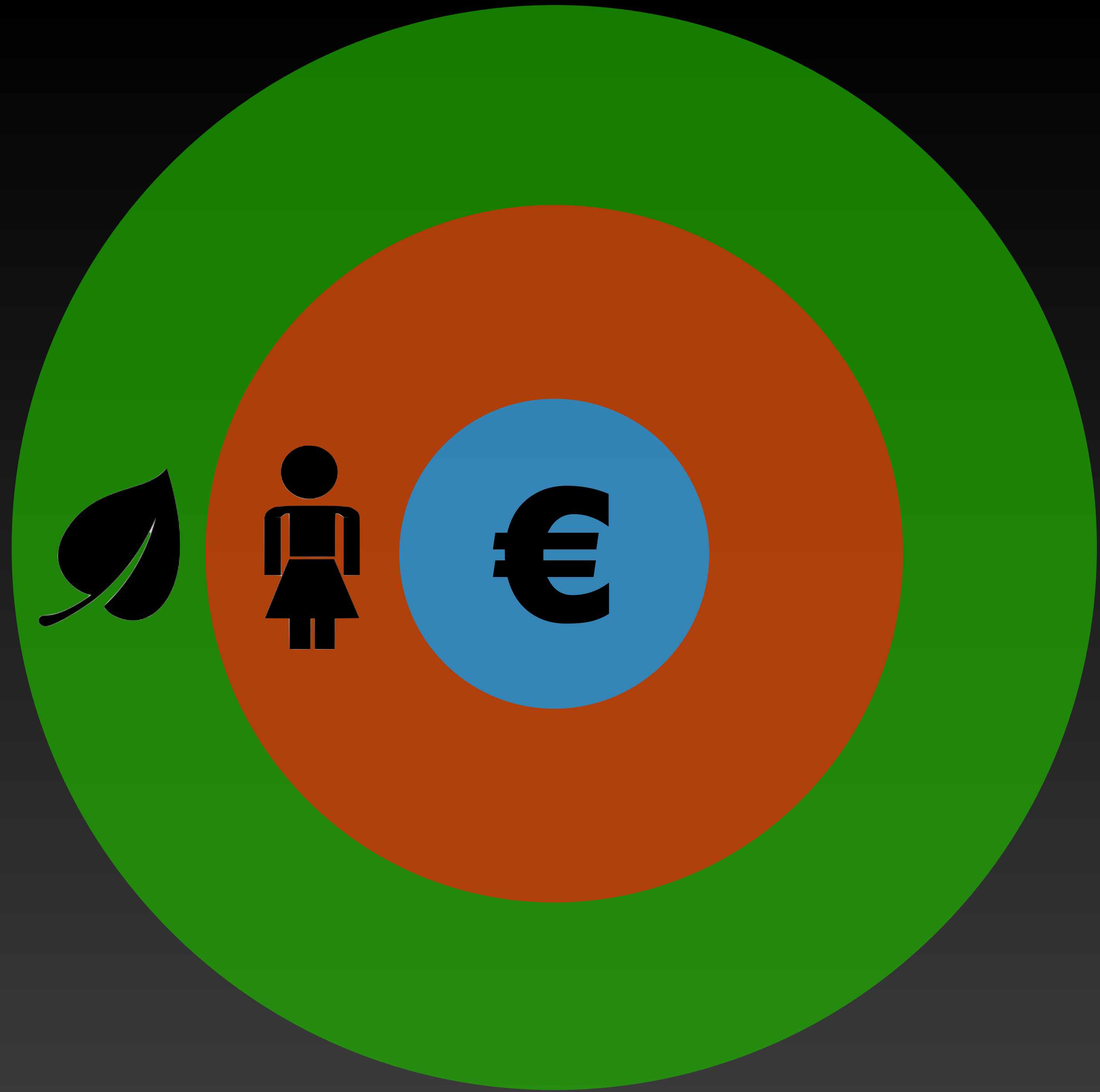




Lange, D., Onken, H., Korn, T (2013): Politische Bildung und Partizipation von Jugendlichen. FES; N=1153







Zum Weiterlesen...

- Kranz, Johanna, Martin Schwichow, Petra Breitenmoser, Kai Niebert. 2022. "The (Un)political Perspective on Climate Change in Education—A Systematic Review" Sustainability 14, no. 7: 4194. <https://doi.org/10.3390/su14074194>
- Niebert, K. (2021): Lessons Learned from Covid-19 – Why education needs to become political. Progress in Science Education 4 (2), 1-7
- Niebert, K. (2019). The Gymnasium in Times of the Anthropocene. In D. Holtsch, M. Oepke, & S. Schumann (Eds.), Lehren und Lernen auf der Sekundarstufe II (pp. 175–187). Bern.
- Niebert, K. (2018). Das Anthropozän ist kein Schicksal, sondern eine Herausforderung. In C. Seige (Ed.), Dossier Anthropozän (pp. 1–14) Bundeszentrale für politische Bildung: Bonn.