

Software in times of (climate) crisis

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ZEISS Digital Innovation

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Software in Times of Climate Crisis

The Speaker



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bitkom



State of Climate Crisis

State of Climate Crisis

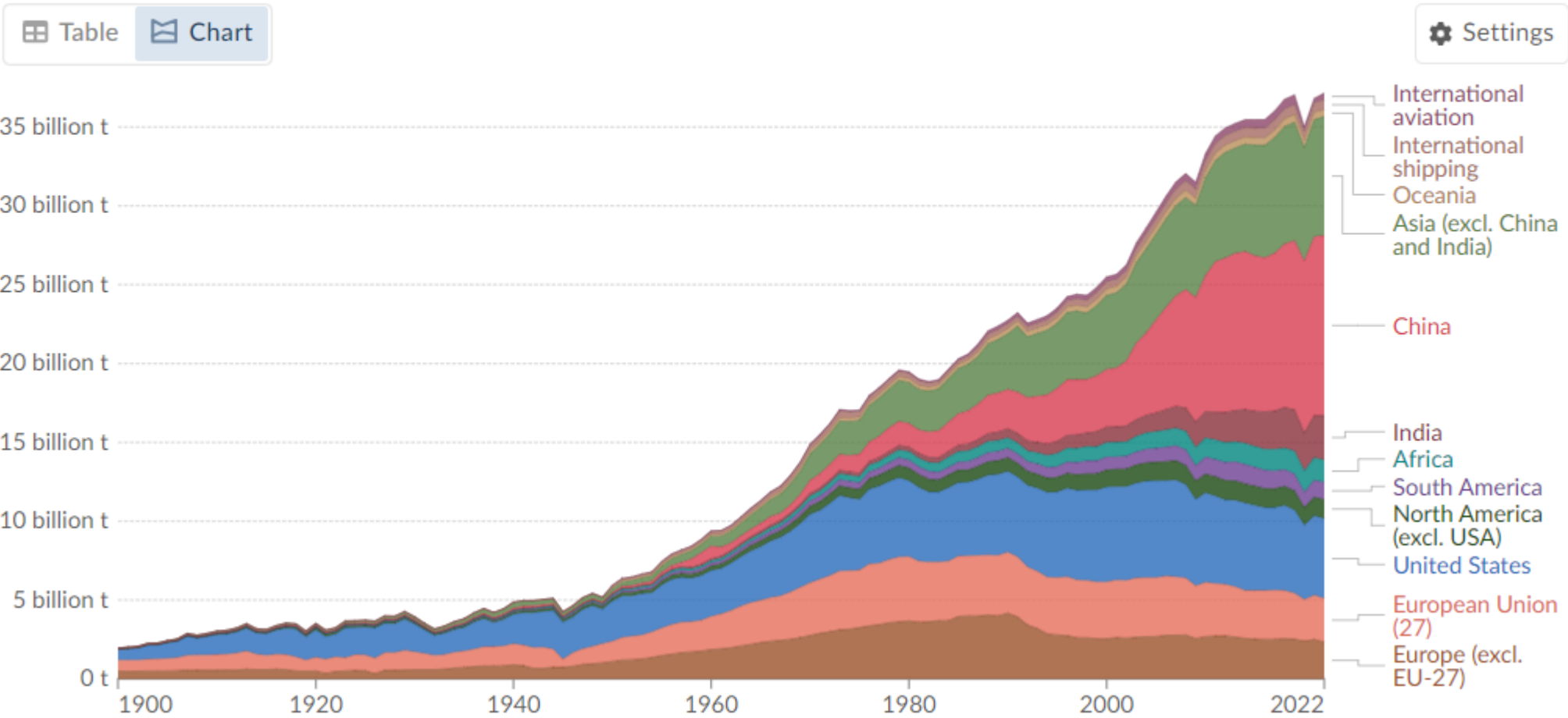
Global CO2 Emissions



Annual CO₂ emissions by world region

Emissions from fossil fuels and industry are included, but not land-use change emissions. International aviation and shipping are included as separate entities, as they are not included in any country's emissions.

Our World
in Data



State of Climate Crisis

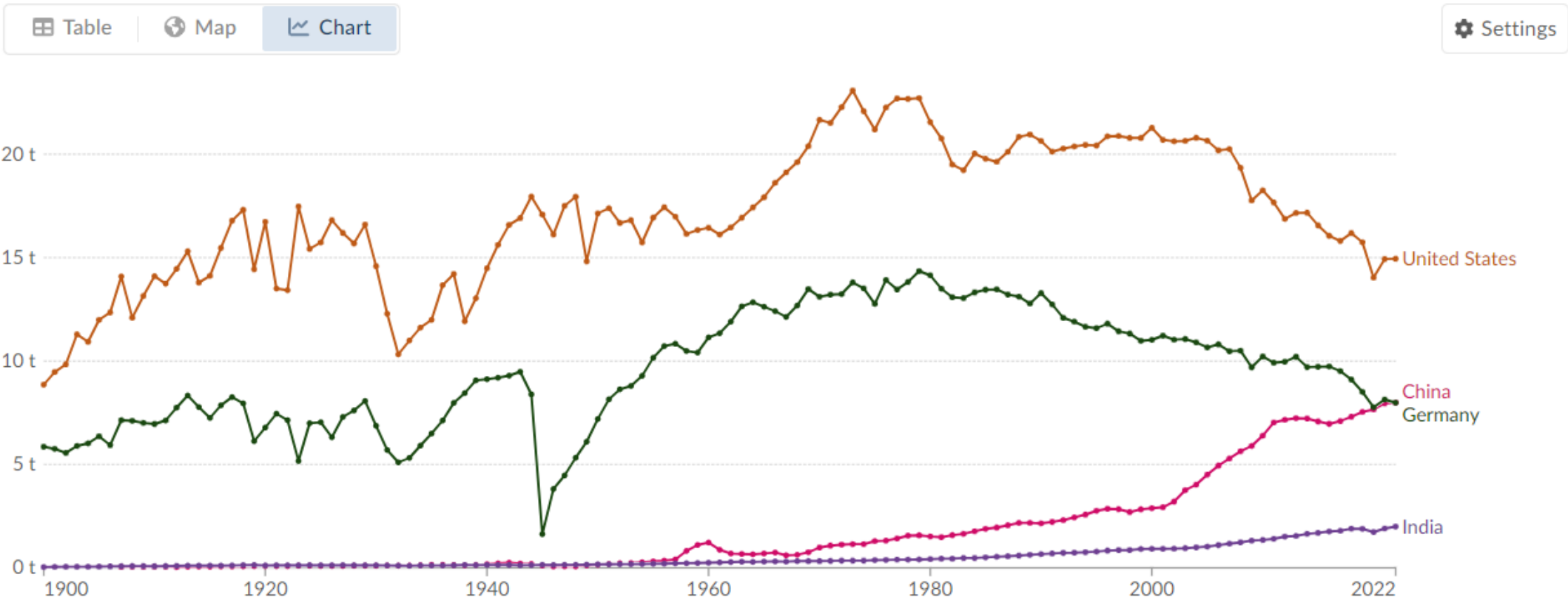
CO2 emissions per capita



Per capita CO₂ emissions

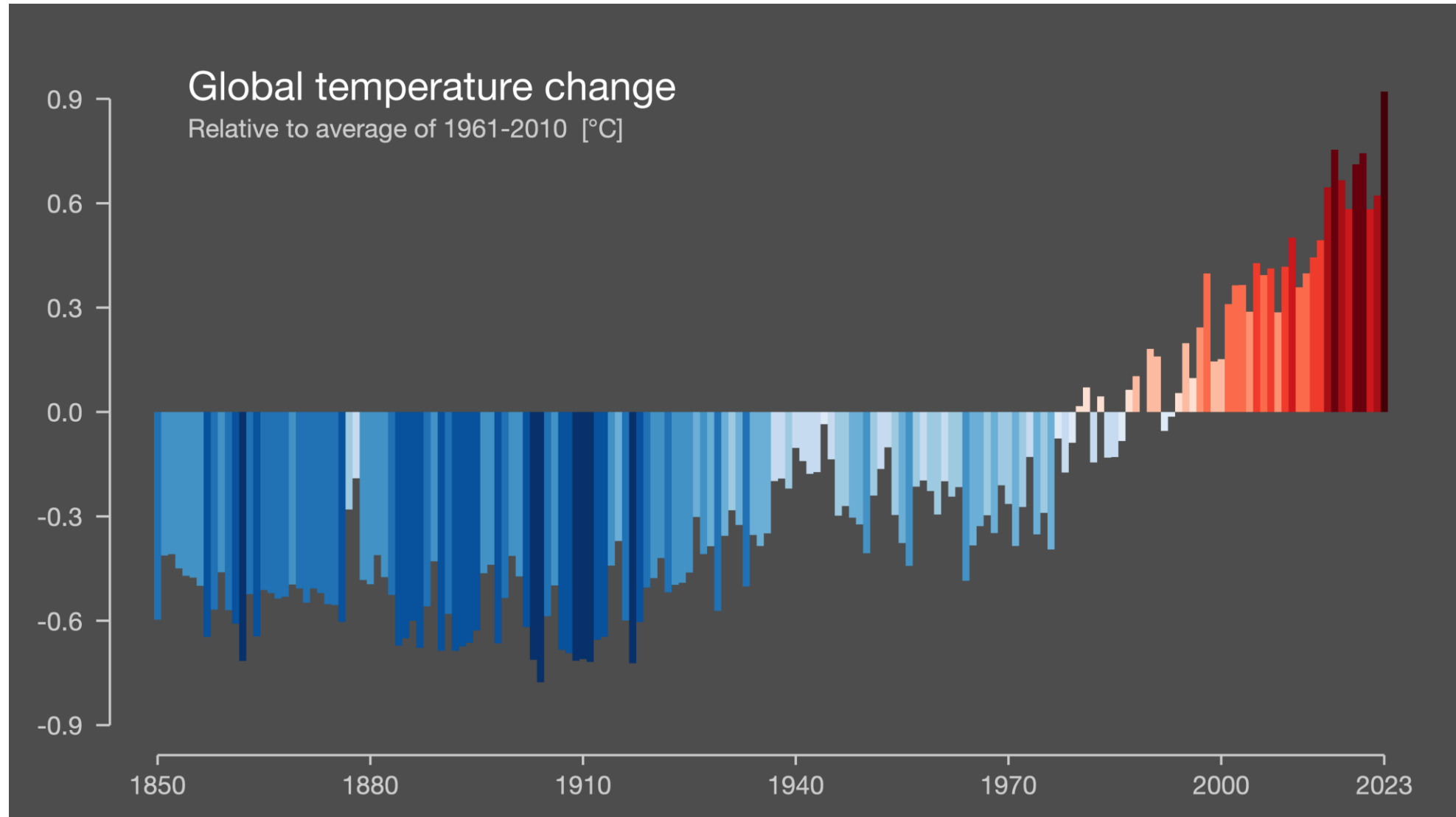
Carbon dioxide (CO₂) emissions from fossil fuels and industry. Land-use change is not included.

Our World
in Data



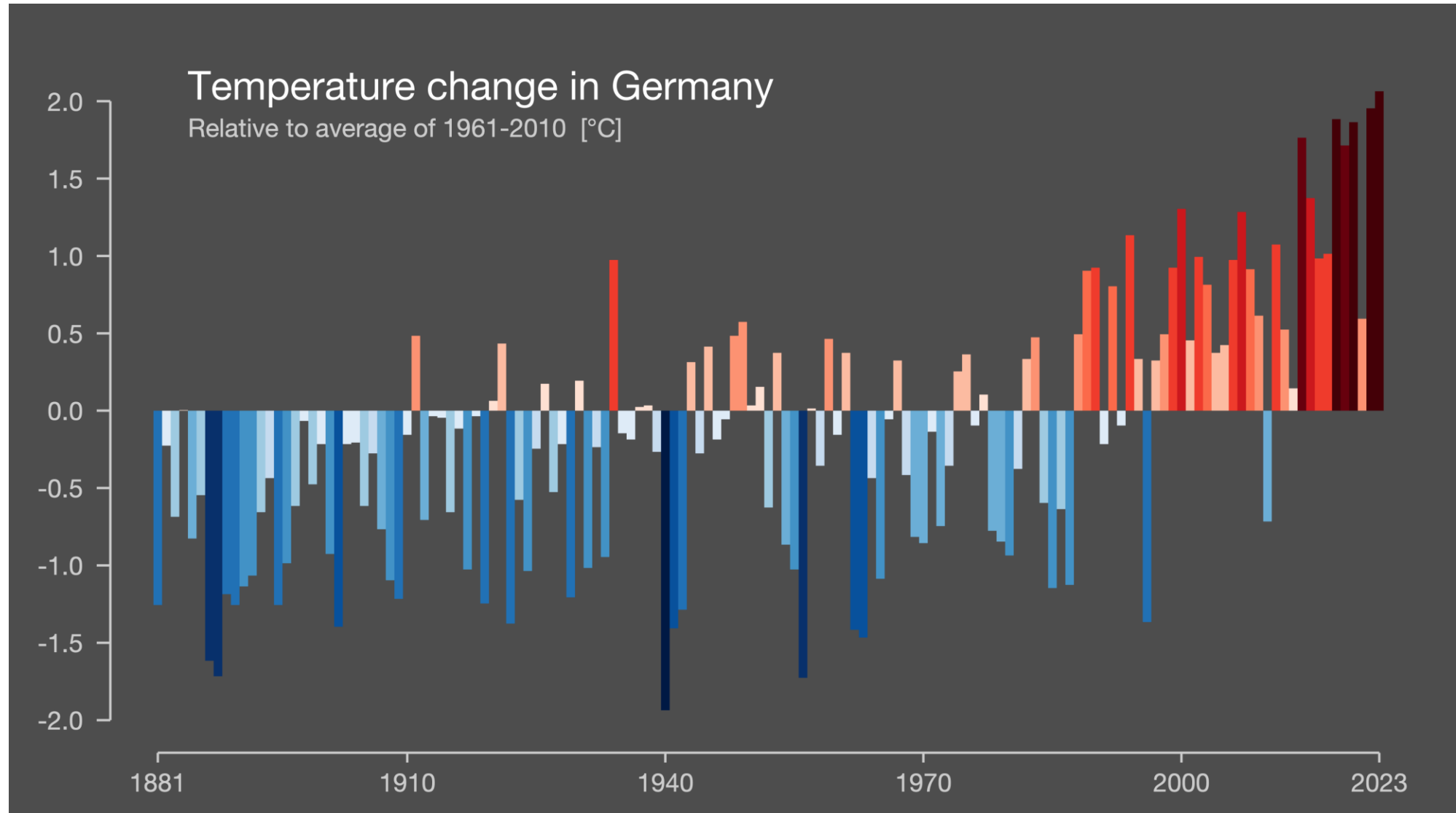
State of Climate Crisis

Global Temperature



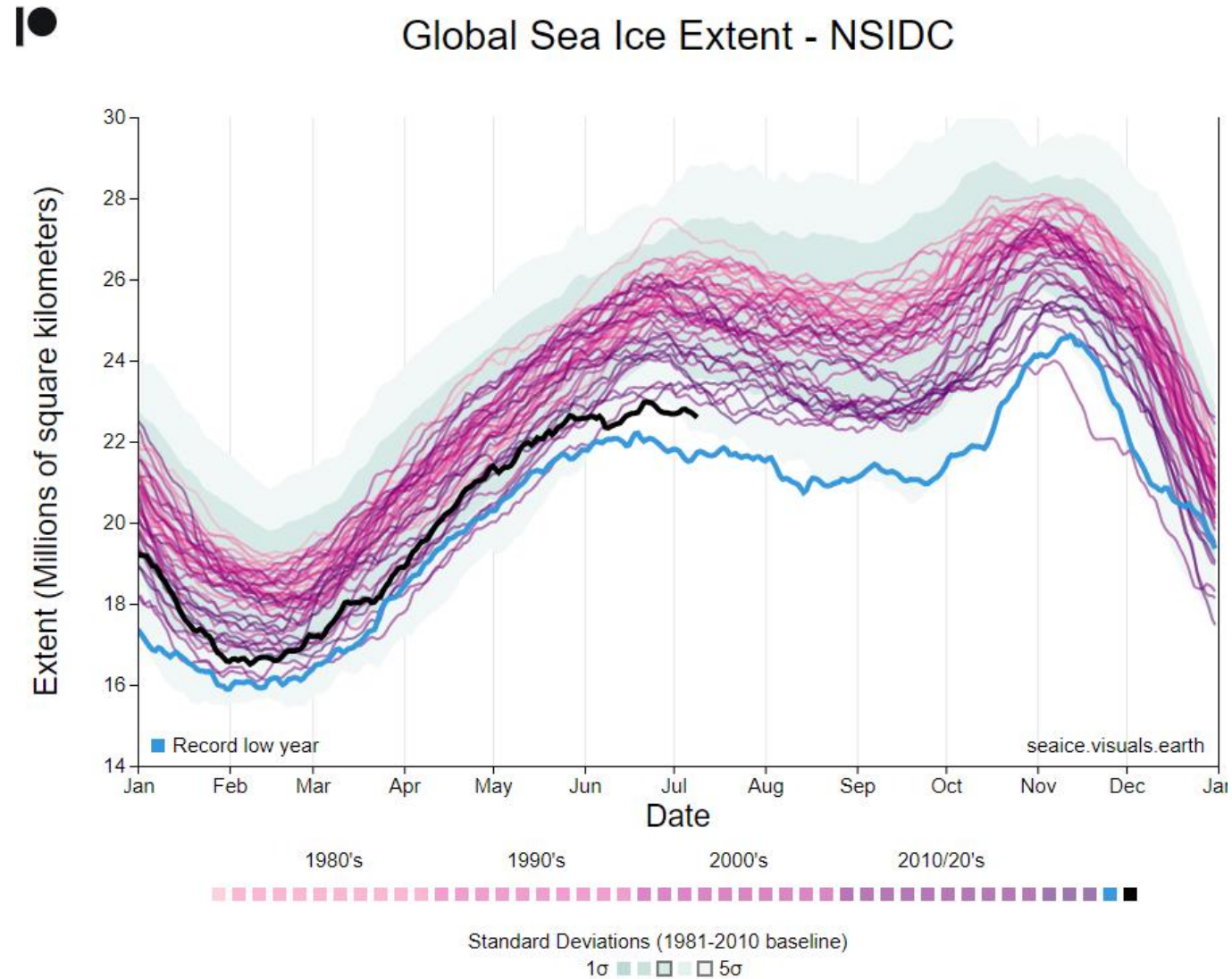
State of Climate Crisis

Climate Change in Germany



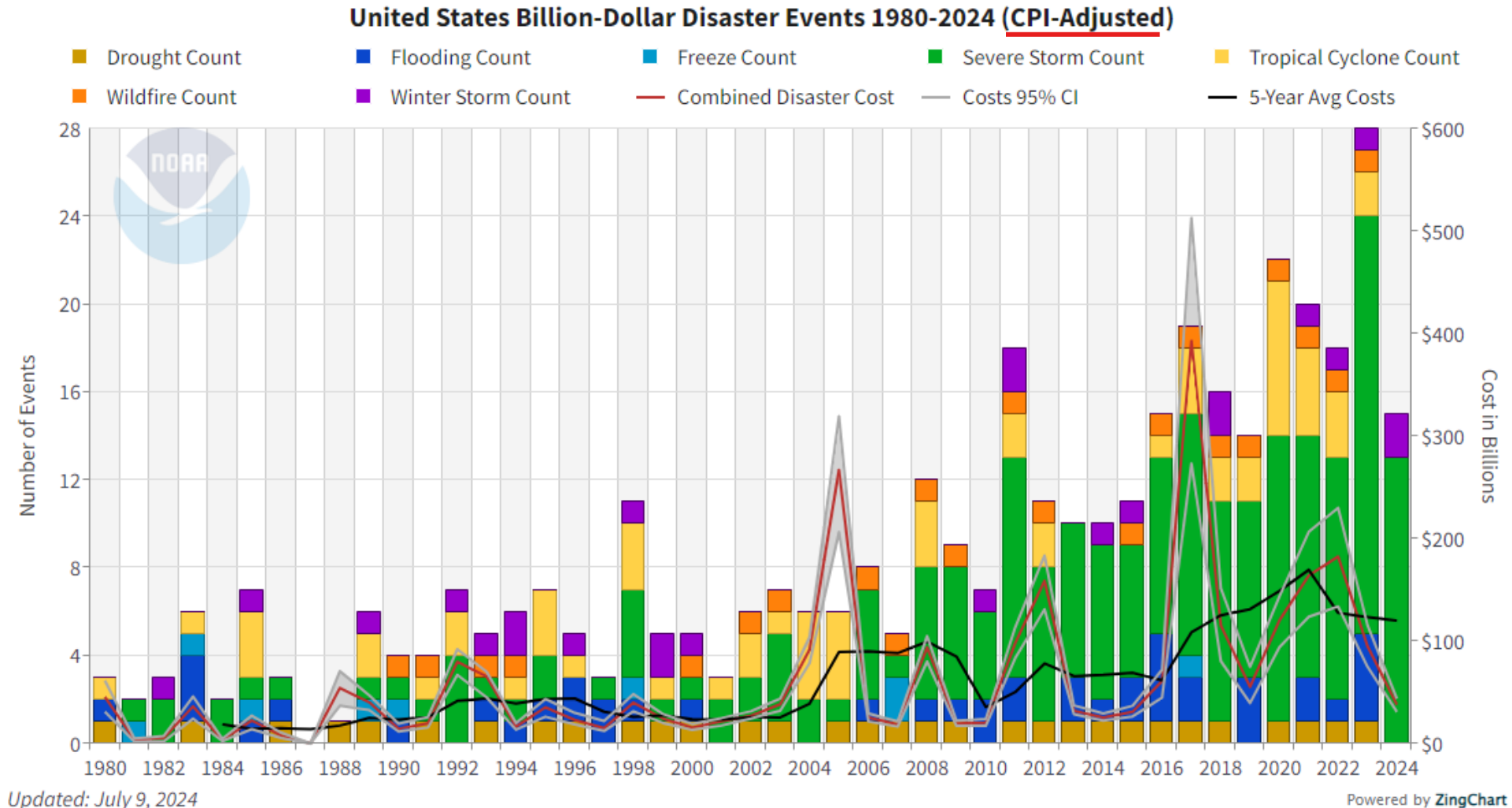
State of Climate Crisis

Global Sea Ice



State of (Climate) Crisis

Rising number of disasters



State of (Climate) Crisis

Disaster / Crisis Fatigue

"Disaster Fatigue"

A sense of exhaustion or burnout resulting from continuous exposure to a series of disasters, such as natural calamities, pandemics, or economic crises. This condition is characterized by a diminished capacity to respond to new disasters or crises with the same level of urgency and concern as before.



> 110 military conflicts world wide

Sustainability

Sustainability

Attempt at a simple definition



Sustainability

Ecological

Social

Economic

Integration of sustainability factors into the decision-making processes and operations of companies, with the aim of achieving long-term sustainable and responsible business practices.

Environmental

The impact of the company on nature and the environment.

- Energy Efficiency
- Water Management
- Greenhouse Gas Emissions
- Biodiversity Loss
- De-/Reforestation
- ...

Social

How a company interacts with employees, suppliers, customers and society.

- Employee safety and health
- Working Conditions
- Diversity
- Equity and Inclusion
- Conflicts and Humanitarian Crisis
- ...

Governance

Includes a company's internal control systems, practices and procedures.

- Corporate Governance
- Preventing Bribery and Corruption
- Diversity of Board of Directors
- Executive Compensation
- Cybersecurity
- ...

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Goals

First climate neutral continent

Until 2050

At least 55% less

Net greenhouse gas emissions
by 2030 compared to 1990

3 Billion

Additional trees in the EU by 2030

Current State

Over 100€ billion

Value of climate-neutral start-ups in the EU
in 2021 (Double compared to 2020)

More than 400 GW

Wind and solar energy production
capacity in the EU in 2022
(25% more than in 2020)

4.5 Million

Green jobs in 2019 in Europe
(3.2 million in 2000)

NFRD

(Non-financial Reporting Directive)

CSRD

(Corporate Sustainability Reporting Directive)

Affected companies	Capital market companies with more than 500 employees.	>	European companies with €40 million in sales, €20 million in assets or 250 employees.
Content	Disclosure of information on non-financial topics.	>	Disclosure of sustainability information regulated by the EU Sustainability Reporting Standards.
Format	In the management report or as a separate report.	>	In the management report and electronically via European Single Electronic Format.
Review	Only check if NFRD report is available.	>	Mandatory audit by external, independent and accredited third parties.

Supply Chain Act (Lieferkettensorgfaltspflichtgesetz)

"The law **regulates corporate responsibility for respecting human rights in global supply chains**. This includes, for example, protection against child labor, the right to fair wages as well as protection of the environment."

Applies since: 1. Januar 2023
Scope of application: Germany

Inflation Reduction Act (IRA)

„...modernize the electric grid, build a nationwide network of electric vehicle chargers, strengthen the battery supply chain, expand public transit and passenger rail, invest in new clean energy and emissions reduction technologies [...] —all while **creating new, high-quality jobs, including union jobs, with good benefits and supportive services** that build pathways for all to the middle class.

Applies since: 16. August 2022
Scope of application: USA

500 Billion Dollars
investments

14th five year plan des National People's Congress (NPC)

"During 2021–2025, **energy and carbon intensity are targeted to decline by 13.5% for energy and 18% for carbon intensity** per unit of GDP. Other binding targets include increasing (i) the share of days with good air quality in cities up to 87.5% (from 87% in 2020); (ii) the share of surface water at or better than grade III up to 85% (from 83.4% in 2020); and (iii) forest coverage up to 24.1% (from 23.2% in 2019).² As a nonbinding indicator, the proportion of **nonfossil fuels in primary energy consumption is set at 20% from 15%** in the previous plan. The Plan promotes low-carbon development and the circular economy with new approaches to transport, energy production, and waste management policies."

Applies: 2021-2025
Scope of application: China

The Role of Software Development

The Role of Software Development

Different perspective



Sustainability by Software

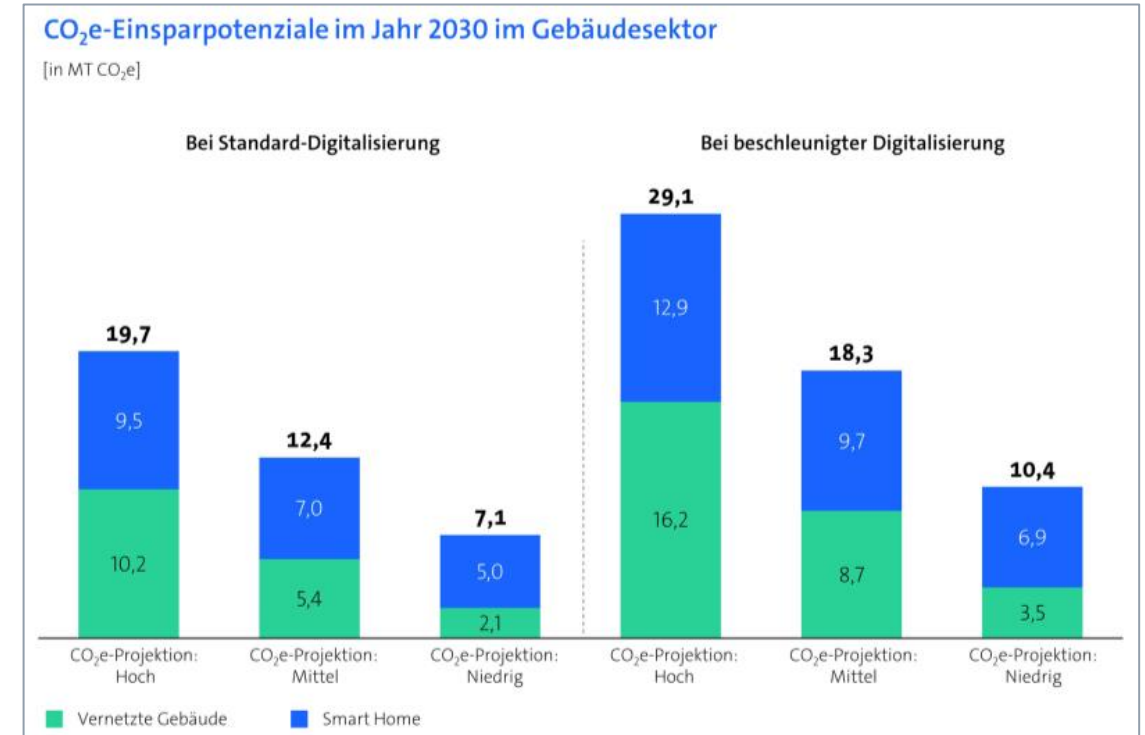
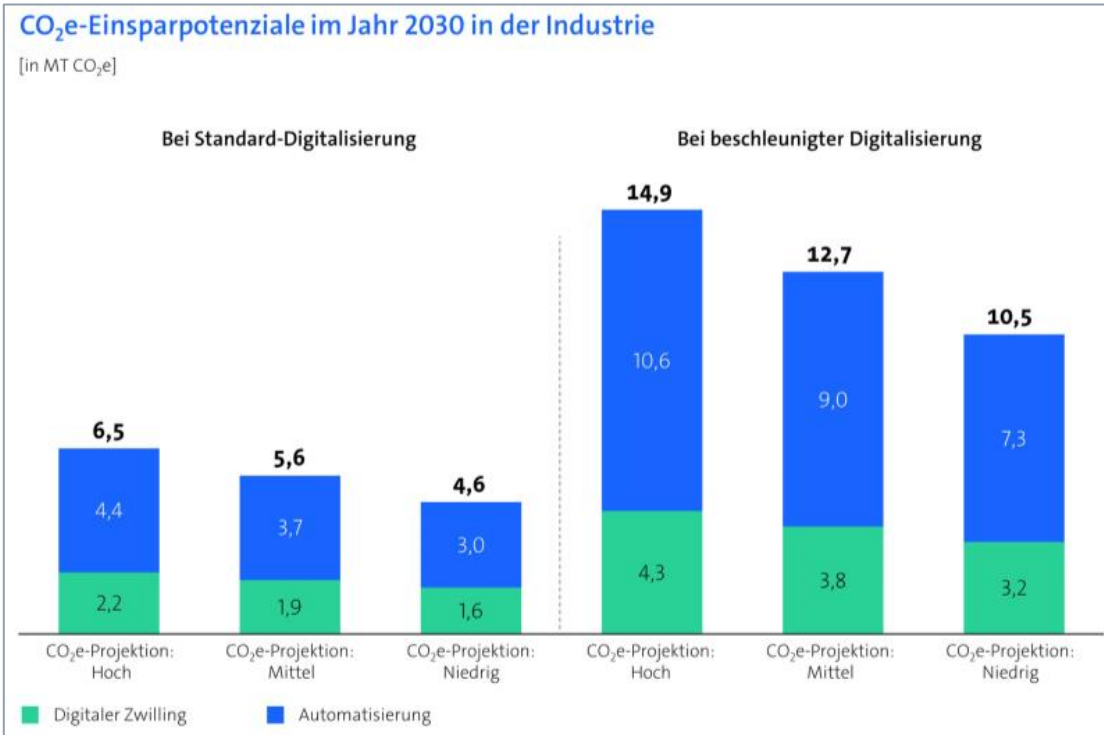
involves leveraging software to promote sustainable practices and reduce environmental impact, which can help organizations reduce their environmental footprint and promote responsible business practices.

Sustainability in Software

involves using sustainable practices in the design and development of software, such as using energy-efficient hardware or adopting sustainable development methodologies, to reduce the environmental impact of software and promote responsible business practices.

The Role of Software Development

Sustainability by Software



Bitkom is an industry association with the overarching goal is to make Germany a leading digital location, drive forward the digital transformation of the German economy and administration, strengthen digital sovereignty and achieve broad social participation in digital developments.

The Role of Software Development

Be aware of the Induction Effect!



Induction Effect – An increase in the level of energy or resource consumption that was caused or enabled by the emergence of “new options” arising from technological change.



Google emissions jump nearly 50% over five years as AI use surges (ft.com)

Table 8 – Energy intensity (MWh/revenue \$M)				
	FY20	FY21	FY22	FY23
Electricity consumed within the organization (MWh)	10,770,714	13,621,517	18,153,454	23,567,502
Revenue (\$M)	143,015	168,088	198,270	211,915
Electricity consumption normalized by revenue (MWh/\$M)	75	81	92	111

What’s going on with Microsoft’s energy intensity? (latitudemedia.com)



Microsoft’s AI Investment Imperils Climate Goal As Emissions Jump 30% - Bloomberg

The Role of Software Development

Different Perspectives



Sustainability by Software

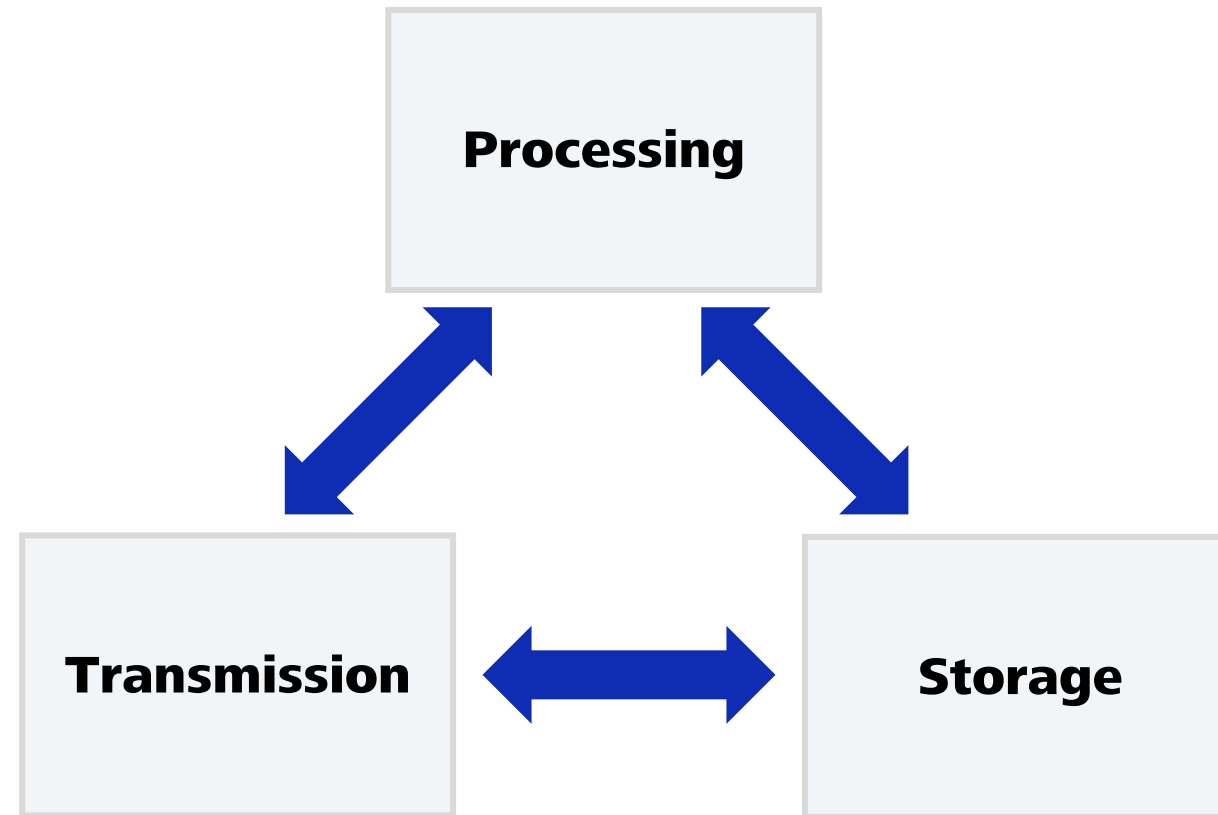
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The Role of Software Development

Areas of effect



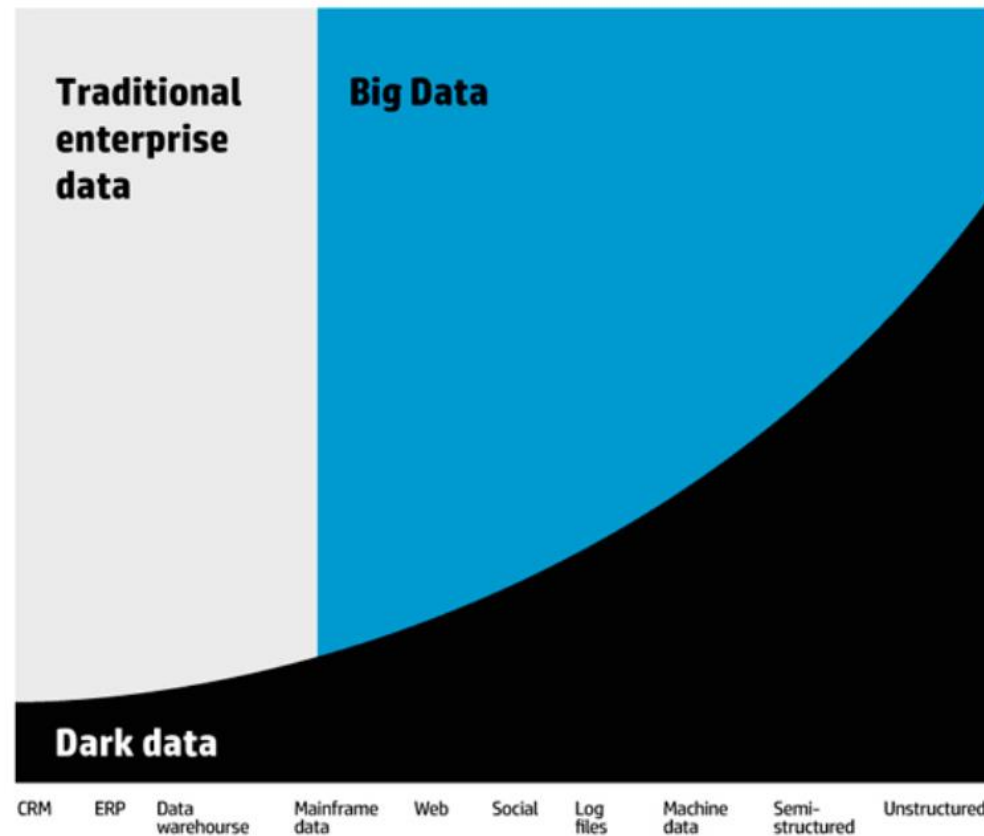
The Role of Software Development

Dark Data



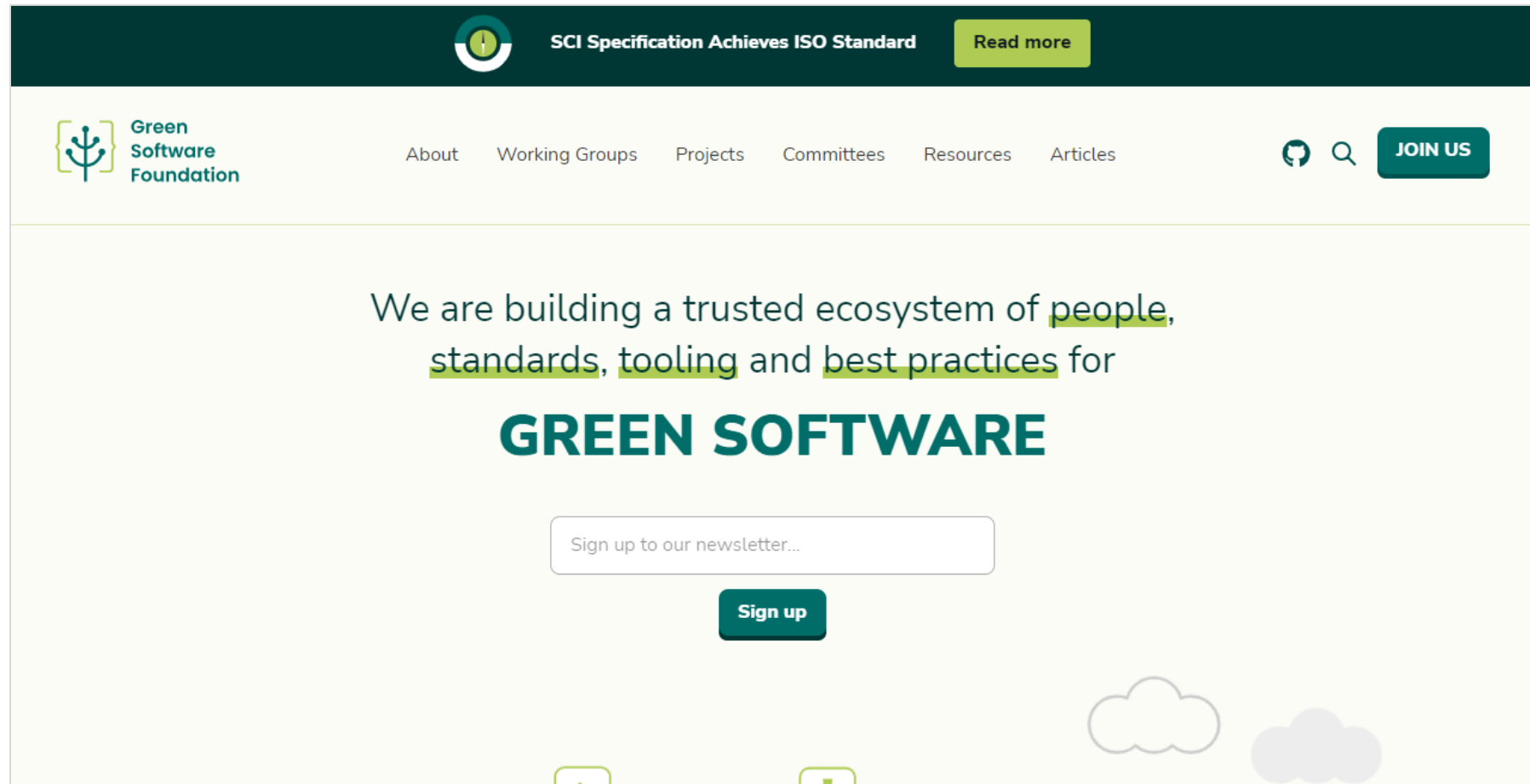
No idea where these numbers come from....

Gartner defines dark data as the information assets organizations collect, process and store during regular business activities, but generally fail to use for other purposes.



The Role of Software Development

Green Software Foundation



The Role of Software Development

Information technology – Software Carbon Intensity (SCI) specification



- Methodology for calculating the rate of carbon emissions for a software system.
- Purpose is to help users and developers make informed choices about which tools, approaches, architectures, and services they use in the future.

Energy Efficiency

Hardware Efficiency

Carbon Awareness

Conclusion

Conclusion

Pillars of Sustainability



Sustainability

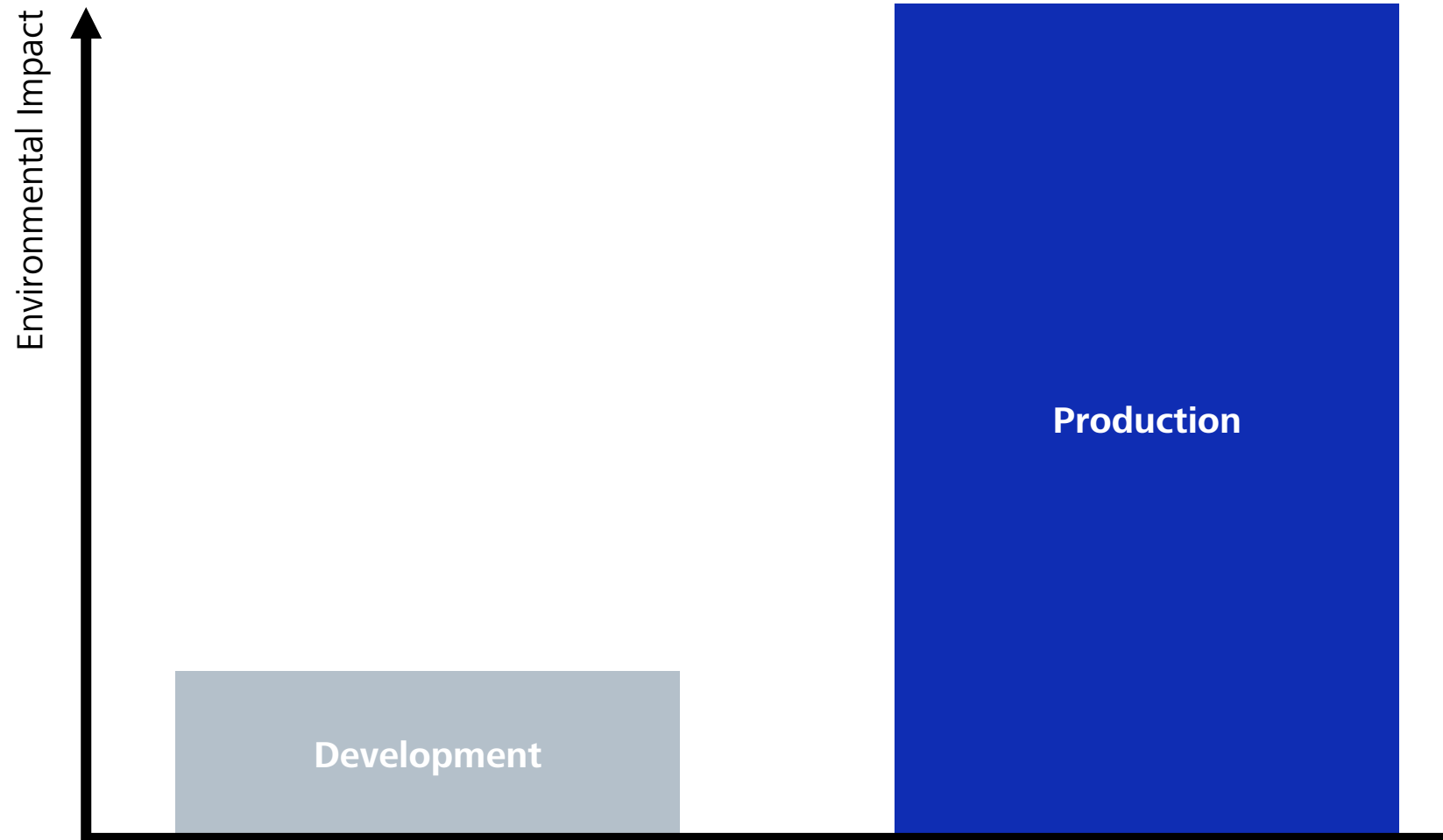
Ecological

Social

Economic

Conclusion

Our decisions are multiplied by our users.

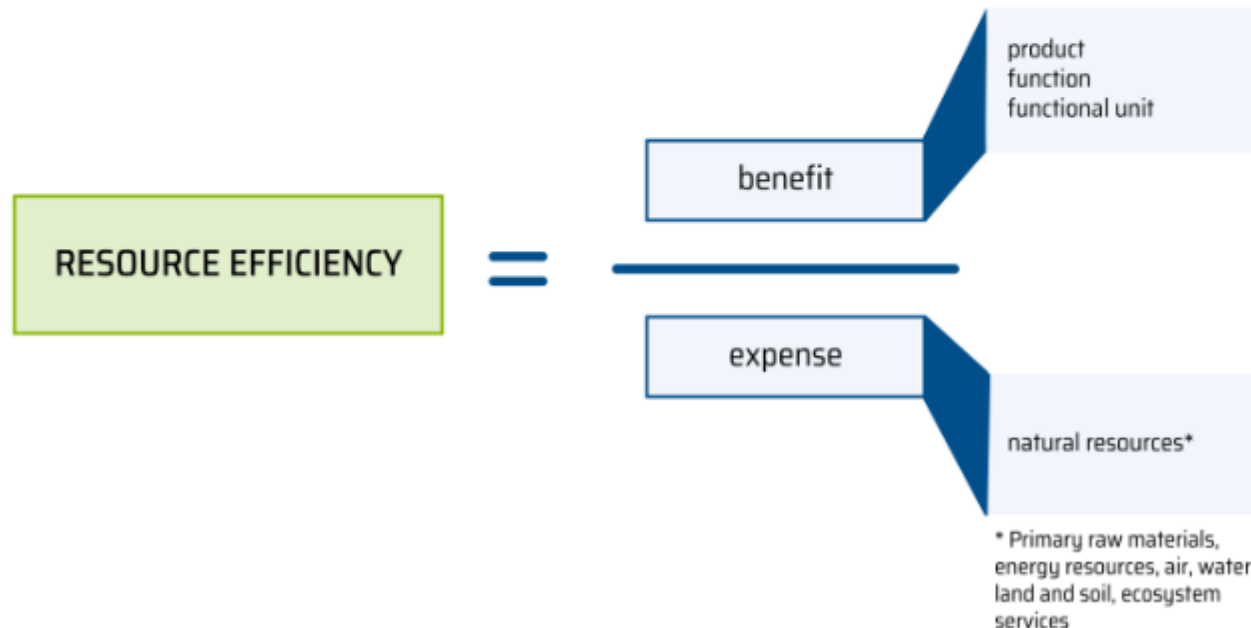


Conclusion

Change the term...

What is Resource Efficiency?

According to the [guideline VDI 4800 part 1](#), resource efficiency (RE) is defined as "the relationship between a specific benefit or result and the deployment of resources required to achieve this".



© VDI ZRE (in Anlehnung an VDI 4800 Blatt 1)



Seeing beyond

State of Climate Crisis

The world 2050



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Climate Crisis May Cause 14.5 Million Deaths by 2050

Published

16 Jan 2024

2024


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[!\[\]\(15a01675795da3c0924461c44b8bf202_img.jpg\)](#) [!\[\]\(5c21dc776ae4aea2d2bd6ea020387e51_img.jpg\)](#) [!\[\]\(0bed848855ad146c0c43ffbd1e78abd6_img.jpg\)](#) [!\[\]\(68c803856f5d0e2869157394e52652f1_img.jpg\)](#)

World Economic Forum, public.affairs@weforum.org

- New World Economic Forum analysis warns that climate-intensified natural disasters may lead to \$12.5 trillion in economic losses and over two billion healthy life years lost by 2050.
- The looming climate crisis will exacerbate global health inequities, leaving the most vulnerable most at risk.
- Urgent global action must be taken to reduce emissions and safeguard human health from the multi-pronged negative impacts of climate change globally.
- Read the [report](#). For more information on the Annual Meeting 2024, visit www.weforum.org. Share on social media using the hashtag [#wef24](#).

[Climate Crisis May Cause 14.5 Million Deaths by 2050 > Press releases | World Economic Forum \(weforum.org\)](#)

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The concept of 'climate refugee': Towards a possible definition

[Briefing](#) – 05-10-2023

According to recent statistics published by the Internal Displacement Monitoring Centre, over 376 million people around the world have been forcibly displaced by floods, windstorms, earthquakes or droughts since 2008, with a record 32.6 million in 2022 alone. Since 2020, there has been an annual increase in the total number of displaced people due to disaster compared with the previous decade of 41 % on average. The upward trend is alarmingly clear. With climate change as the driving catalyst, the number of 'climate refugees' will continue to rise. The Institute for Economics and Peace predicts that in the worst-case scenario, **1.2 billion people could be displaced by 2050 due to natural disasters and other ecological threats**. Despite steps in the right direction, national and international responses to this challenge remain limited, and protection for those affected inadequate. There is no clear definition of a 'climate refugee', nor are climate refugees covered by the 1951 Refugee Convention. The latter covers only people who have a well-founded fear of being persecuted because of their race, religion, nationality, membership of a particular social group or political opinion, and who are unable or unwilling to seek protection from their home countries. This means that climate cannot currently be cited as a reason for seeking asylum or refugee status, although the 2018 Global Compact for Migration, in its second objective, cites climate as a potential reason for migration. While the EU has not formally recognised 'climate refugees', it has expressed growing concern and has taken action to support and develop resilience in countries most vulnerable to climate-related stress. This briefing is an update of an earlier version published in October 2021.

[The concept of 'climate refugee': Towards a possible definition | Think Tank | European Parliament \(europa.eu\)](#)

The Role of Software Development

Be aware of the Rebound Effect!

The actual definition and discussion is not as clear as this slide makes it appear!



Rebound Effect – The implementation of efficient technology or practices leads to an increase in overall consumption, (partially) offsetting the initial savings.

Economic

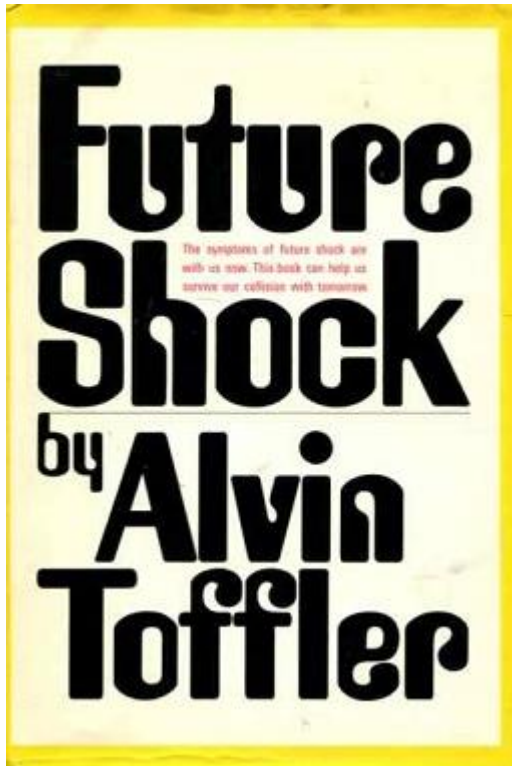
The lower cost of using an efficient device encourages more use of that device, or indirectly, as the money saved from efficiency gains is spent on other goods and services that also consume energy.

Psychological

e.g. *moral licensing*. The purchase or use of a more efficient technology is perceived as a good deed that licenses increased preferences for the purchase or use of that or further technology.

Time

technological efficiency improvements bring changes in the time available. Hence, things can be done faster, in parallel or fill in waiting times resulting in an overall higher consumption.



“Future shock is the shattering stress and disorientation that we induce in individuals by subjecting them to too much change in too short a time.”

“Change is the process by which the future invades our lives, and it is important to look at it closely because, sooner or later, we will all have to deal with the consequences.”

State of (Climate) Crisis

Future Shock in Detail



Adapting to Acceleration: Lessons from Alvin Toffler's 'Future Shock' in the Modern Era



Robert P. Roche III, MBA

I turn ideas into actions and complex concepts into memorable stories
Content Marketing Director for The Last Mile.



1. Dezember 2023

[Adapting to Acceleration: Lessons from Alvin Toffler's 'Future Shock' in the Modern Era \(linkedin.com\)](#)

Accelerated Change: Society is changing at an increasing pace, leading to a sense of overwhelm and disorientation. "Future Shock" refers to the shock state people experience when confronted with overwhelming change.

Technological Progress: The significance of technological progress and its impact on all aspects of life. The speed and scope of technological change will fundamentally alter society and revolutionize the way people live and work.

Adaptation Challenges: Rapid societal changes pose significant challenges for people as they have to adapt to new lifestyles, work environments, and social structures. This causes various responses to change, from fear and resistance to adaptation and transformation.

Need for Future Competence: In a rapidly changing world, developing future competence is crucial. This means having the ability to adapt flexibly to changes, think innovatively, and recognize new opportunities.

“Meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

SUSTAINABLE DEVELOPMENT GOALS



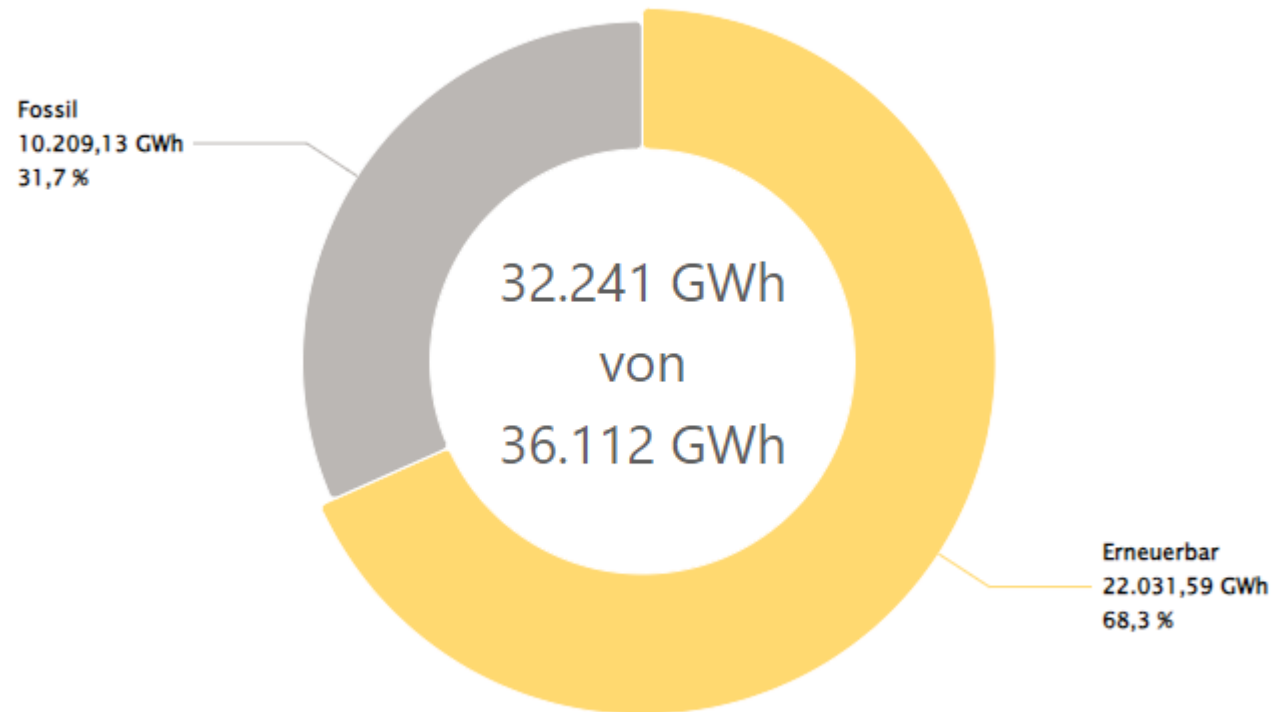
The Sustainable Development Goals form the framework for improving the lives of populations around the world and mitigating the hazardous man-made effects of climate change

Politics, Ethics and more...

Politics, Ethics and more...

Renewable is cheaper!

Net public electricity generation in Germany in June 2024



[Kreisdiagramme zur Stromerzeugung | Energy-Charts](#)



[Analysis: China's clean energy pushes coal to record-low 53% share of power in May 2024 - Carbon Brief](#)