KEYNOTE

Der Klimawandel und die große Transformation

Hans Joachim Schellnhuber

International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

TPA – Energy tomorrow,
Wien, 24 Apr 2024,

Der Klimawandel und die Große Transformation

Prof. Dr. Dr. h.c. mult. Hans Joachim Schellnhuber

Generaldirektor, International Institute for Applied Systems Analysis (IIASA);
Gründer, Bauhaus Erde gGmbH

BAUHAUS EARTH

SPIEGEL Wissenschaft

»Die Kontrollinstrumente spielen verrück

UMWELT Der Klimaforscher Hans Joachim Schellnhuber erklärt, wieso ihn die derzeitigen Wetteranomalien schockieren und warum er den Optimismus einiger Kollegen nicht teilt.

Der Telegrafenberg in Potsdam sei der schönste Wissenschaftsstandort in Mitteleuropa, sagt Schellnhuber, 73. Der emeritierte Professor für Theoretische Physik hat hier 1992 das Potsdam-Institut für Klimafolgenforschung gegründet. Ab Dezember wird er das Internationale Institut für Angewandte Systemanalyse im österreichischen Laxenburg leiten.

SPIEGEL: Herr Schellnhuber, der neue Chef des Weltklimarats, Jim Skea, hat Ende Juli dem SPIEGEL erklärt, dass die Welt bei einer Erwärmung um 1,5 Grad nicht untergeht. Er fordert pragmatische Lösungen statt einer Schockstarre. Hat der Mann recht?

Schellnhuber: Wenn man in einem brennenden Haus sitzt, sollte man sich natürlich nicht von Todesangst lähmen lassen. Und unser Haus brennt. Deshalb wird entspanntes Löschen hier oder da ebenfalls ins Verderben führen: Dramatische Herausforderungen verlangen dramatisches Handeln.

SPIEGEL: Ist der Chef des Weltklimarats also zu optimistisch?

Schellnhuber: Jim war immer schon ein fröhlicher Pragmatiker. Das mögen die Politiker, aber er sendet ein falsches Signal an die Öffentlichkeit.

SPIEGEL: Wie schlimm steht es denn Ihrer Ansicht nach?

Schellnhuber: Mit der bisherigen Klimapolitik werden wir die 1,5-Grad-Linie keinesfalls halten und die völkerrechtliche Leitplanke von 2 Grad durchbrechen. Spätestens dann ist unsere Zivilisation in Gefahr. Die Menschen haben ein Recht, dies durch die Wissenschaft zu erfahren.

SPIEGEL: Kurz bevor sich die Länder auf das Weltklimaabkommen 2015 einigten, sagten Sie dem SPIEGEL, es gebe noch Chancen, dass das planetare Gefährt »nur« hässliche Beulen davonträgt, der Totalschaden lasse sich vielleicht noch verhindern. Sind wir acht Jahre danach näher an den Beulen oder am Totalschaden?

Schellnhuber: Leider gilt Letzteres. Zum einen hat die Forschung mittlerweile ein relativ klares Bild davon, wie dieser Totalschaden zustande kommen könnte. Zum anderen spüren wir bereits bei der aktuellen Erderwärmung, die 2022 noch 1,2 Grad betrug, wie das Klimasystem zu zappeln beginnt. Irgendwie spielen die Kontrollinstrumente des Raumschiffs Erde momentan verrückt. Stellen Sie sich zum Vergleich vor, Sie steuern ein Flugzeug über den Atlantik, und die Armaturen zeigen plötzlich gewaltige Ausschläge. Sie würden in Panik geraten. Ich arbeite seit 40 Jahren in der Klimaforschung, aber solche Anomalien wie in den letzten Monaten haben wir noch nie registriert.

SPIEGEL: Was halten Sie derzeit für außergewöhnlich?

Schellnhuber: Das Jahr 2023 wird den Blick auf die Welt verändern. Seit März schlagen etwa die Durchschnittstemperaturen der Meeresoberflächen extrem aus un… nicht einmal mehr den ge… Jahresverläufen. Aber ohne… lende Wirkung der Ozeane … planetare Erwärmung schon… ter fortgeschritten. Das wird … der Wissenschaft kaum zur … genommen. Dieses Kalender… höchstwahrscheinlich zum h… der Messgeschichte werden, … bereits an der 1,5-Grad-Linie … dürfte. Insbesondere die Sep… temperaturen haben viele … fassungslos gemacht. Außer… die Ausdehnung des antar… Meereises abrupt abgenomm…

SPIEGEL: Wie erklären Sie sic… se Phänomene?

Schellnhuber: Es gibt drei … keiten. Die erste Variante: »… pens«. Zufällig bewegen si… viele der unzähligen Klimav… in die gleiche Richtung und … ein neues Gesamtbild vor. … malie löst sich aber bald wi… Die zweite Variante: Die Au… kündigen den Übergang in e… Phase der Klimakrise an. Be… Übergängen pendeln wicht… ßen immer stärker und länge… her, bis es zum Systembruch…

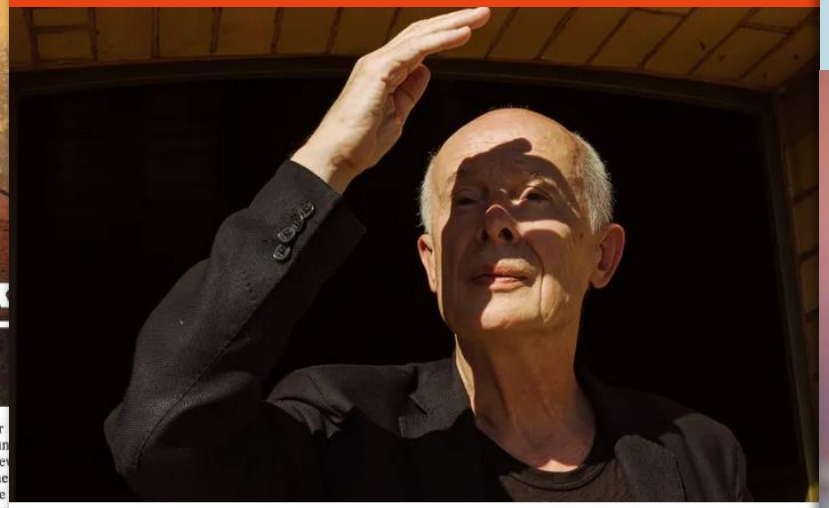
SPIEGEL: Was meinen Sie mit … bruch?

Schellnhuber: Es wäre der B… der Holozän-Welt, die unsere… tion in den letzten 12.000 Ja… ermöglicht hat. Der System… erfolgt über Rückkopplungen…

Waldbrände in Griechenland: »Dieses Potpourri des Grauens wird sich in den kommenden Jahren noch verschlimmern«

Physiker Schellnhuber

DER SPIEGEL



Physiker Hans Joachim Schellnhuber: »Alle Kontrollinstrumente spielen verrückt« Foto: Doro Zinn / DER SPIEGEL

Wissenschaftler warnt vor dem »Klimainfarkt«

»Wir verlieren gerade überall unsere klimatische Heimat«

Das Jahr 2023 könnte erstmals eine Erwärmung um 1,5 Grad erreichen: Klimaforscher Hans Joachim Schellnhuber sagt, wieso ihn die derzeitigen Wetteranomalien schockieren und er den Optimismus einiger Kollegen nicht teilt.

Ein SPIEGEL-Gespräch von **Susanne Götze**

29.10.2023, 08.00 Uhr • aus **DER SPIEGEL 44/2023**

DERSTANDARD

KLIMAKRISE

Klimaforscher Schellnhuber: "Werden auch über das Zwei-Grad-Ziel hinausschießen"

Der weltweit angesehene Klimaexperte im Gespräch über rote Linien, die bedrohlichsten Kippelemente und seine beste Idee gegen den Klimawandel

Interview / Klaus Taschwer, Tanja Traxler

14. Februar 2024, 09:00, 972 Postings

Waldbrände 2023





Kanada

Rhodos

Teneriffa

Hawaii

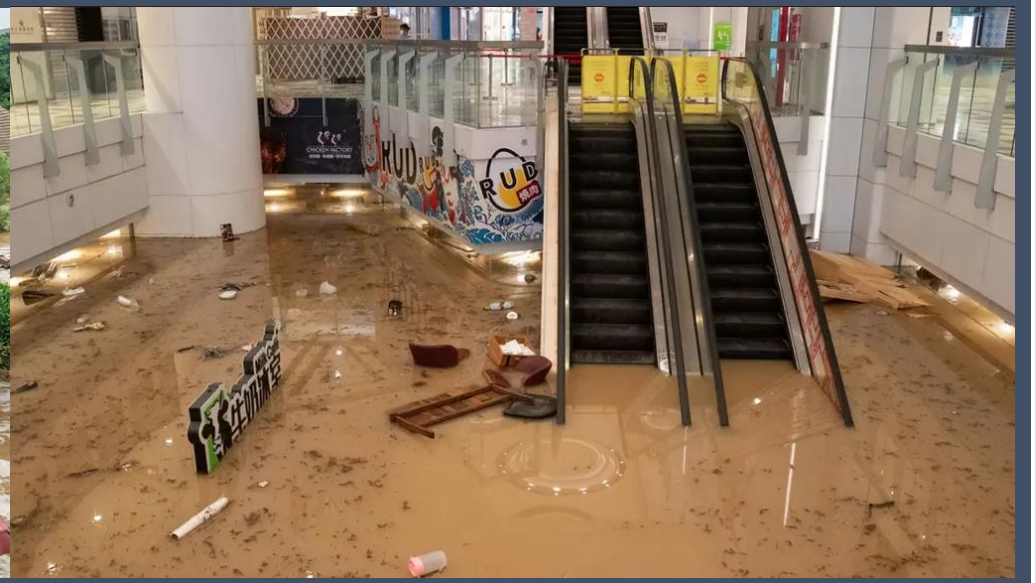
Irini
(bei Athen)

Chile

Überschwemmungen 2023

Italien

Griechenland



Hongkong

Slowenien

Türkei

Libyen

Daniels Verwüstung

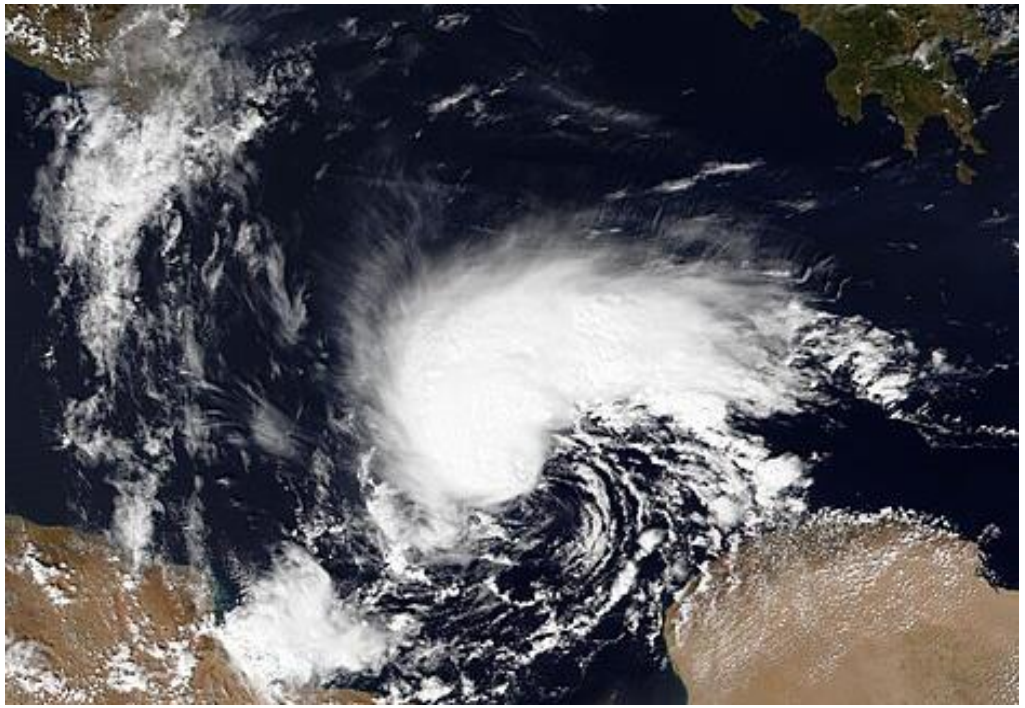
Full article: here

The Guardian

What are medicanes? The 'supercharged' Mediterranean storms that could become more frequent

Agence France-Presse

15 Sep 2023



Medicane Daniel (also known as Storm Daniel) to the north of Libya on September 9, 2023.
©Wikimedia Commons, 2023

The flash flood that has killed thousands of people in Libya this week followed the 'medicane' storm Daniel

Cars piled up atop wave breakers and the rubble of a building destroyed in flash floods after the Mediterranean storm, also known as a 'medicane', Daniel hit Libya's eastern city of Derna. Photograph: AFP/Getty Images

Das Pariser Abkommen

Weltklimarat ≤ 1.5°C !

Beschränkung der Erderwärmung auf "weit unter" 2 Grad Celsius

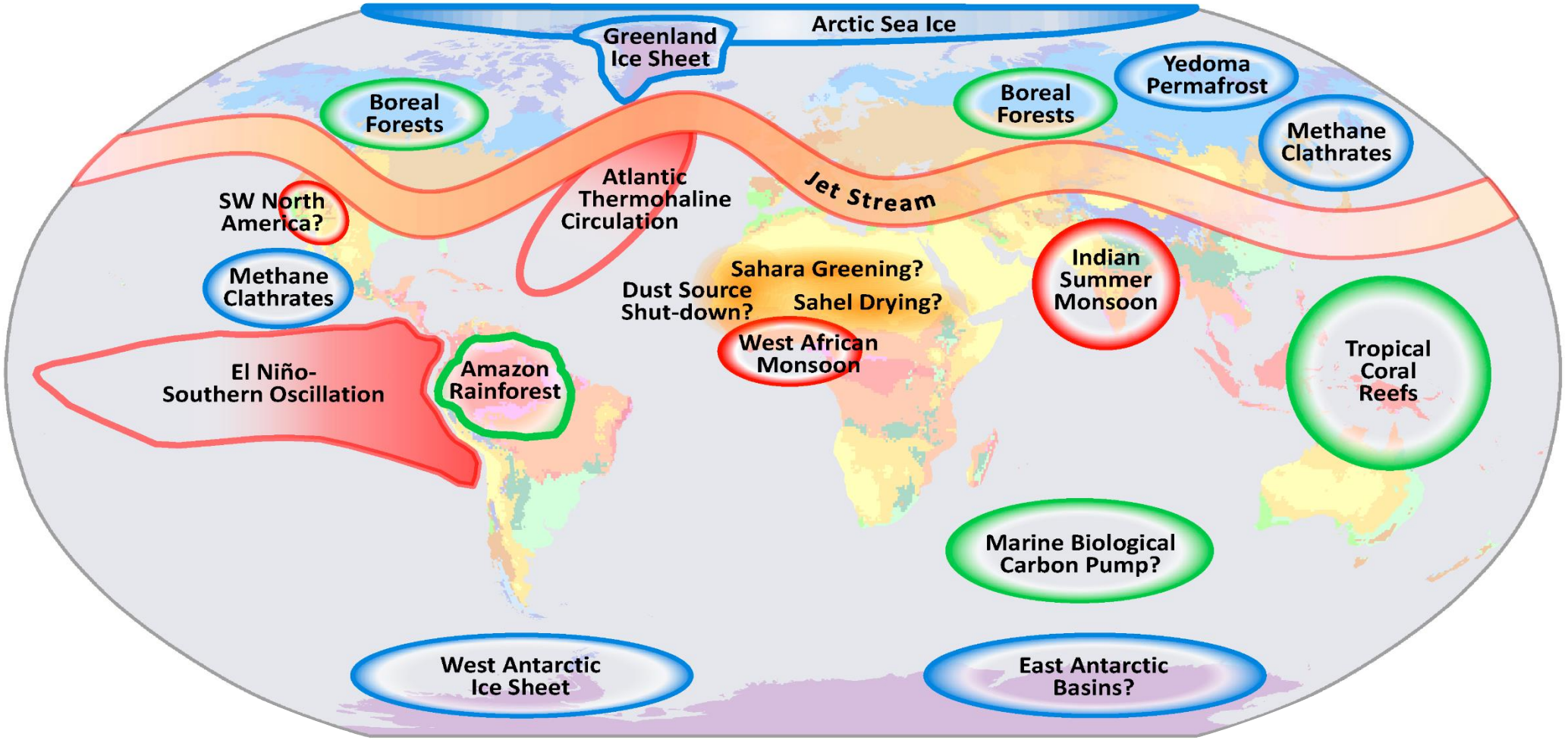
Netto-Null Emissionen von Treibhausgasen nach Mitte des 21. Jahrhunderts

Nationale Emissionsziele regelmäßig überprüft und verschärft

Industrieländer stellen von 2020-2025 jährlich 100 Milliarden USD bereit

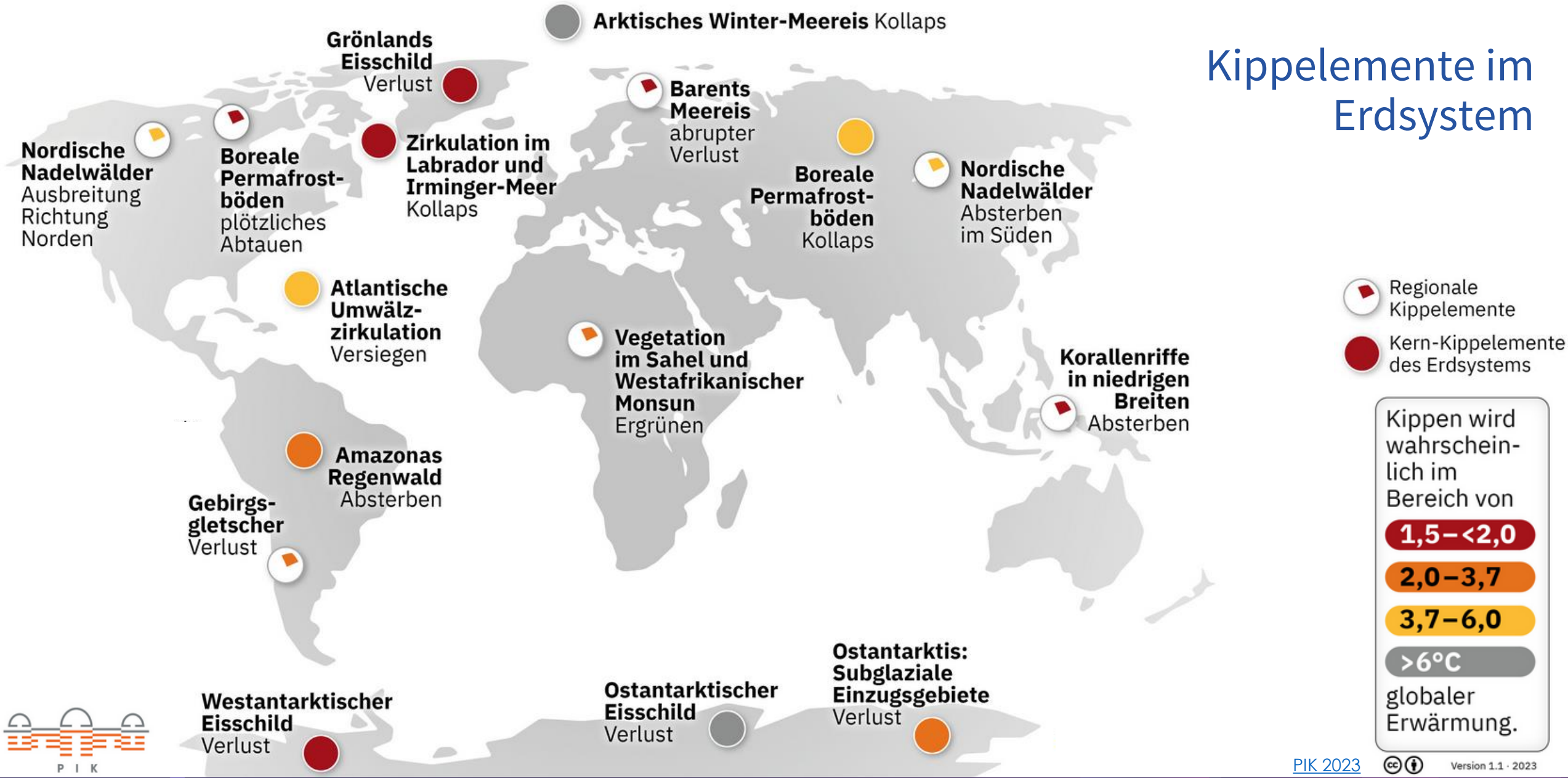
Bildquelle: https://www.wmo.int/media/

Drohende Risiken: Kippelemente im Erdsystem



PIK 2017, nach Lenton et al. 2008

Kippelemente im Erdsystem



Full article: here

The Guardian

Science
21 Dec 2023

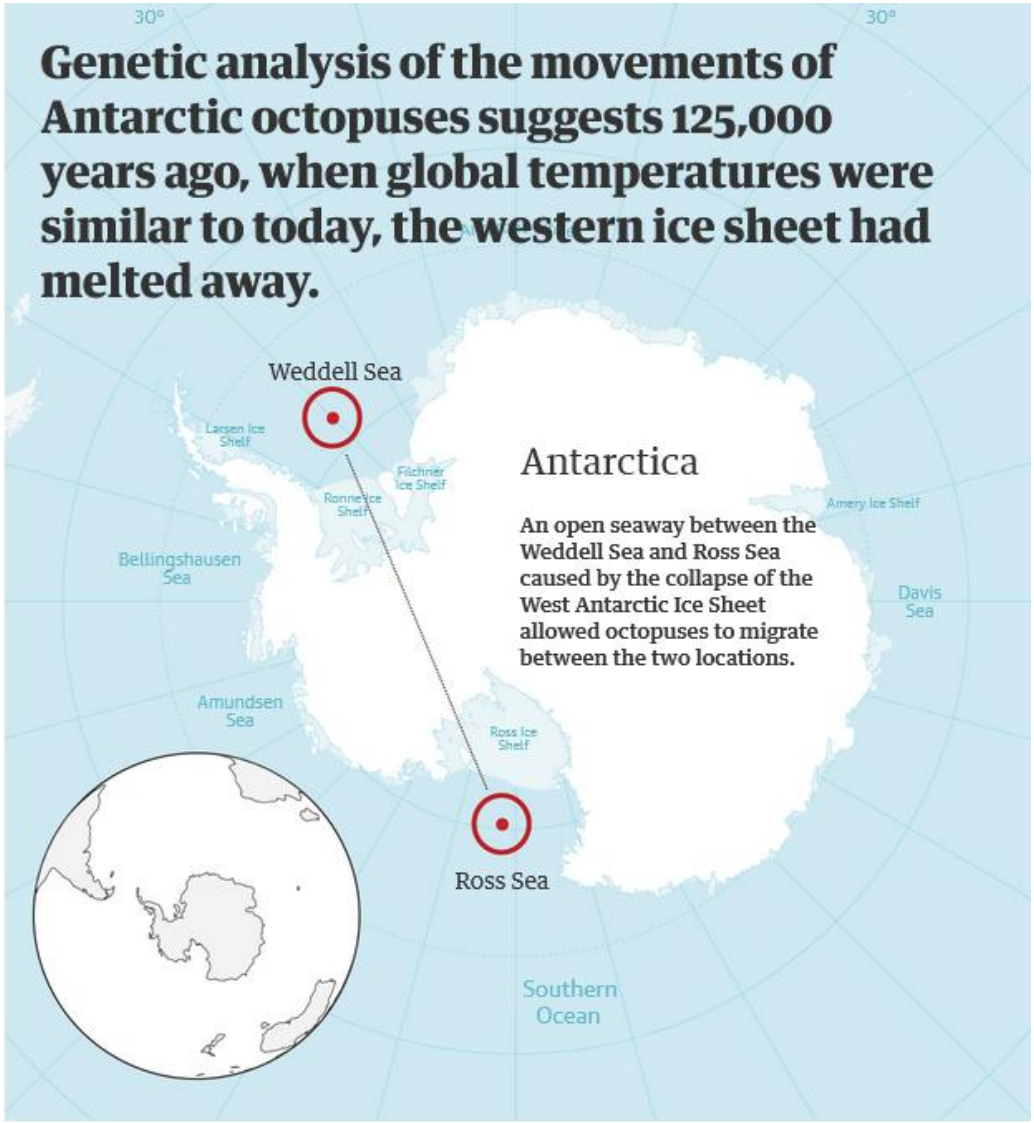
Genetic insight on ice sheet history

A. DUTTON AND R. M. DECONTO

Abstract

At the South Pole of Earth sits a landmass that has been home to a continent-sized ice sheet for the past 34 million years. Scientists have long been drawn to this icy expanse, initially to explore and discover, and later to study the evolution of the Antarctic continent, climate, and ice sheet. Despite decades of probing the region from the surface and from space, some important aspects of Antarctic history remain elusive. On page 1384 of this issue, Lau *et al.* (*1*) make headway to fill one such knowledge gap by reporting genetic evidence that two distinct populations of octopus were connected by a waterway across an area now completely covered by the ice sheet. This suggests that the West Antarctic Ice Sheet (WAIS) collapsed during a past warm period ~129,000 to 116,000 years ago, known as the Last Interglacial.

Full paper: here



Guardian graphic

ScienceAdvances
9 Feb 2024

Physics-based early warning signal shows that AMOC is on tipping course

RENÉ M. VAN WESTEN , MICHAEL KLIPHUIS, AND HENK A. DIJKSTRA

Full paper: here

Abstract

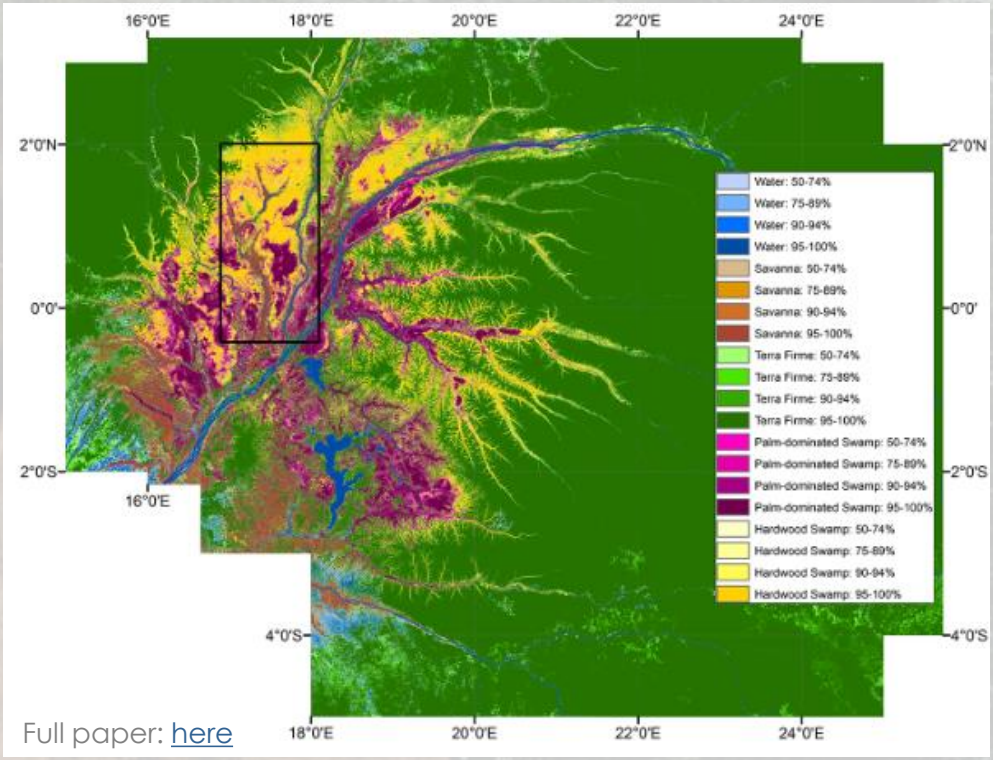
One of the most prominent climate tipping elements is the Atlantic meridional overturning circulation (AMOC), which can potentially collapse because of the input of fresh water in the North Atlantic. Although AMOC collapses have been induced in complex global climate models by strong freshwater forcing, the processes of an AMOC tipping event have so far not been investigated. Here, we show results of the first tipping event in the Community Earth System Model, including the large climate impacts of the collapse. Using these results, we develop a physics-based and observable early warning signal of AMOC tipping: the minimum of the AMOC-induced freshwater transport at the southern boundary of the Atlantic. Reanalysis products indicate that the present-day AMOC is on route to tipping. The early warning signal is a useful alternative to classical statistical ones, which, when applied to our simulated tipping event, turn out to be sensitive to the analyzed time interval before tipping.

11 January 2017

nature

Age, extent and carbon storage of the central Congo Basin peatland complex

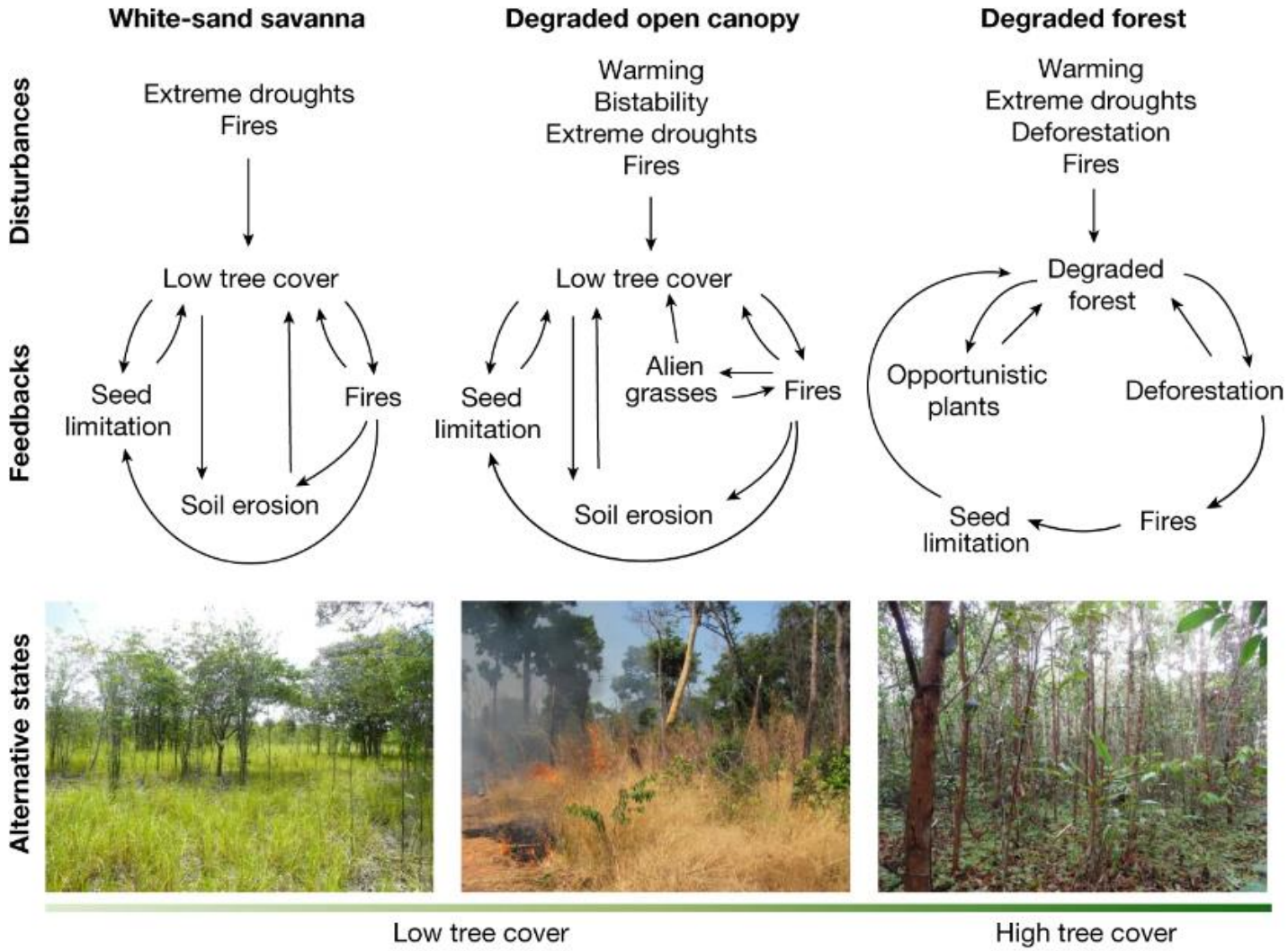
Greta C. Dargie, Simon L. Lewis, Ian T. Lawson, Edward T. A. Mitchard, Susan E. Page, Yannick E. Bocko & Suspense A. Ifo



Full paper: here

nature
14 February 2024

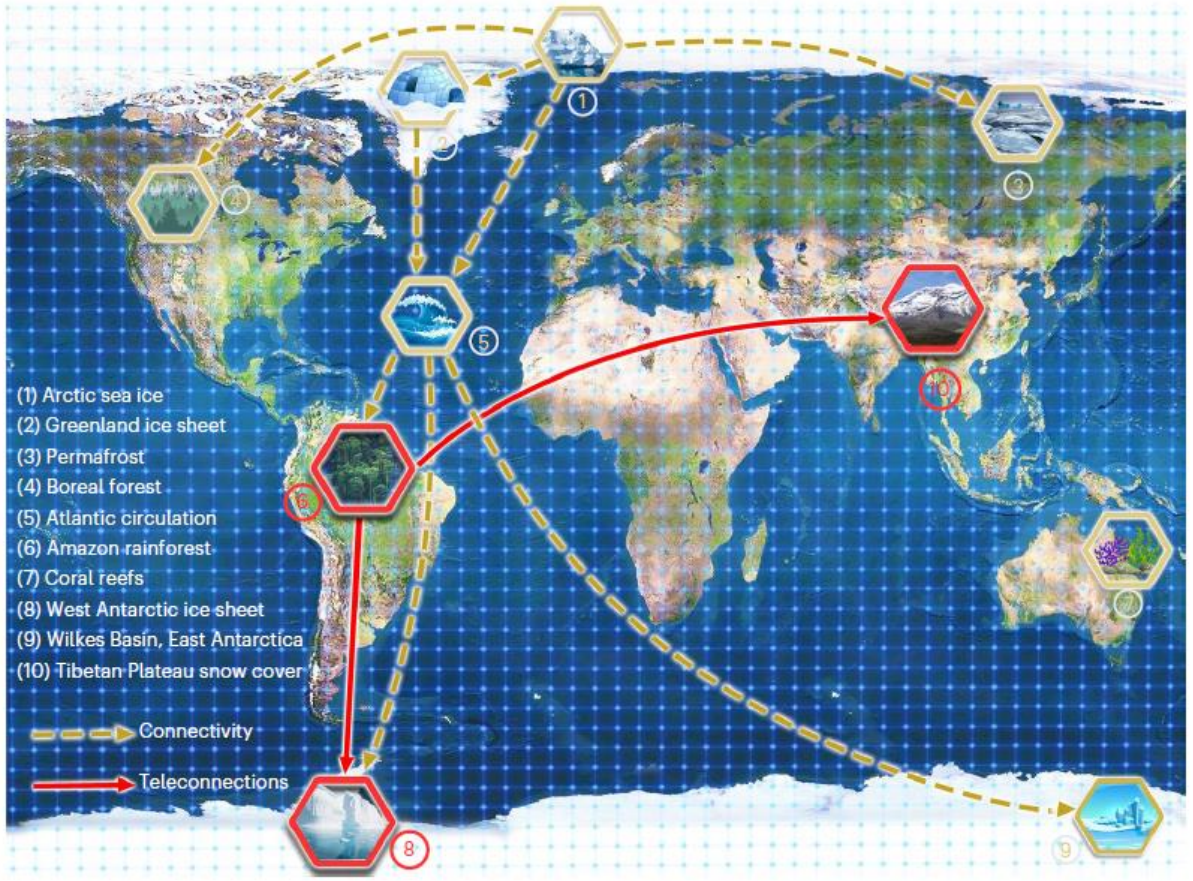
Critical transitions in the Amazon forest system

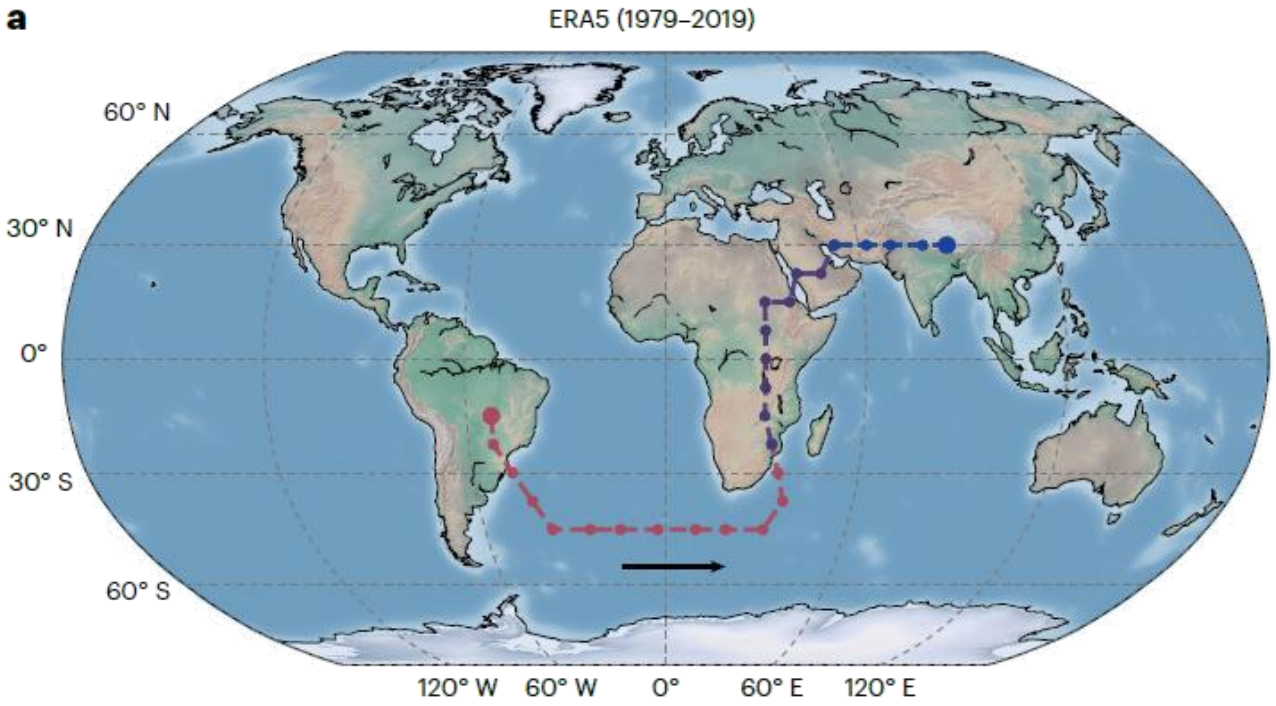


nature climate change
05 January 2023

Teleconnections among tipping elements in the Earth system

Teng Liu, Dean Chen, Lan Yang, Jun Meng, Zanchenling Wang, Josef Ludescher, Jingfang Fan ✉, Saini Yang ✉, Deliang Chen, Jürgen Kurths, Xiaosong Chen ✉, Shlomo Havlin & Hans Joachim Schellnhuber

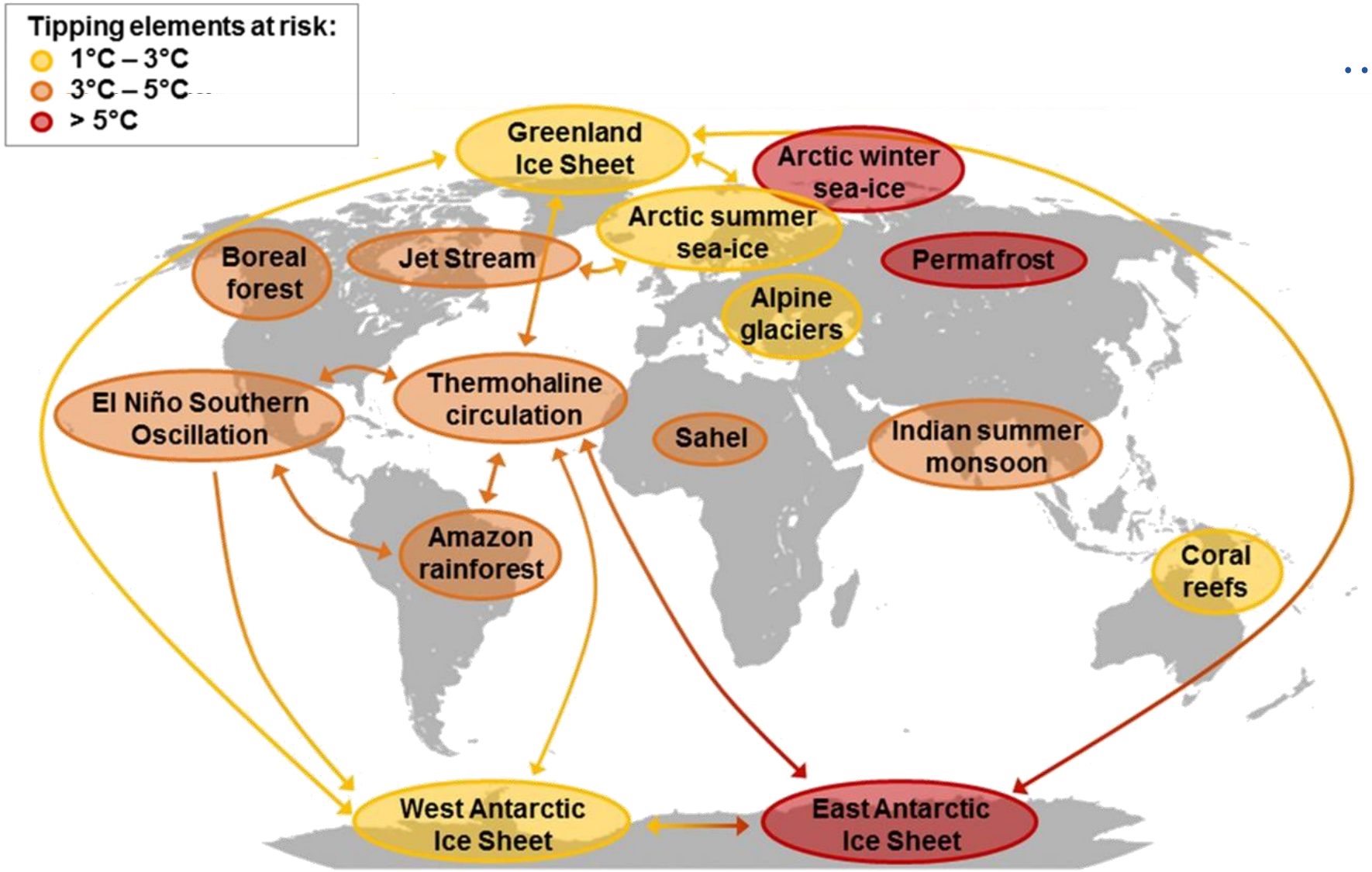




Full paper: here

Eine globale Erwärmung von mehr als 1,5 °C könnte mehrere Klimakippereignisse auslösen

… und Kippkaskaden



Steffen et al. 2018

Der Klimanotstand ist real

PNAS
August 1, 2022

Climate Endgame: Exploring catastrophic climate change scenarios

Luke Kemp, Chi Xu, Joanna Depledge, Kristie L. Ebi, Goodwin Gibbins, Timothy A. Kohler, Johan Rockström, Marten Scheffer, Hans Joachim Schellnhuber, Will Steffen, and Timothy M. Lenton

Abstract

Prudent risk management requires consideration of bad-to-worst-case scenarios. Yet, for climate change, such potential futures are poorly understood. Could anthropogenic climate change result in worldwide societal collapse or even eventual human extinction? At present, this is a dangerously underexplored topic. Yet there are ample reasons to suspect that climate change could result in a global catastrophe. Analyzing the mechanisms for these extreme consequences could help galvanize action, improve resilience, and inform policy, including emergency responses. We outline current knowledge about the likelihood of extreme climate change, discuss why understanding bad-to-worst cases is vital, articulate reasons for concern about catastrophic outcomes, define key terms, and put forward a research agenda. The proposed agenda covers four main questions: 1) What is the potential for climate change to drive mass extinction events? 2) What are the mechanisms that could result in human mass mortality and morbidity? 3) What are human societies' vulnerabilities to climate-triggered risk cascades, such as from conflict, political instability, and systemic financial risk? 4) How can these multiple strands of evidence—together with other global dangers—be usefully synthesized into an "integrated catastrophe assessment"? It is time for the scientific community to grapple with the challenge of better understanding catastrophic climate change.

Full paper: here

PNAS · OPINION

Climate change and the threat to civilization

Daniel Steel[a], C. Tyler DesRoches[b,1], and Kian Mintz-Woo[c,d]

Full paper: here

In a speech about climate change from April 4th of this year, UN General Secretary António Guterres lambasted "the empty pledges that put us on track to an unlivable world" and warned that "we are on a fast track to climate disaster" (1). Although stark, Guterres' statements were not novel. Guterres has made similar remarks on previous occasions, as have other public figures, including Sir David Attenborough, who warned in 2018 that inaction on climate change could lead to "the collapse of our civilizations" (2). In their article, "World Scientists' Warning of a Climate Emergency 2021"—which now has more than 14,700 signatories from 158 countries—William J. Ripple and colleagues state that climate change could "cause significant disruptions to ecosystems, society, and economies, potentially making large areas of Earth uninhabitable" (3).

Because civilization cannot exist in unlivable or uninhabitable places, all of the above warnings can be understood as asserting the potential for anthropogenic climate change to cause civilization collapse (or "climate collapse") to a greater or lesser extent. Yet despite discussing many adverse impacts, climate science literature, as synthesized for instance by assessment reports of the Intergovernmental Panel on Climate Change (IPCC), has little at all to say about whether or under which conditions climate change might threaten civilization. Although a body of scientific research exists on historical and archeological cases of collapse (4), discussions of mechanisms whereby climate change might cause the collapse of

The consequences of climate change are likely to be dire—and in some scenarios, catastrophic. Scholars need to start discussing the mechanisms whereby climate change could cause the actual collapse of civilizations. Image credit: Flickr/Spencer.

Author contributions: D.S., C.T.D., and K.M.-W. performed research; and D.S., C.T.D., and K.M.-W. wrote the paper.

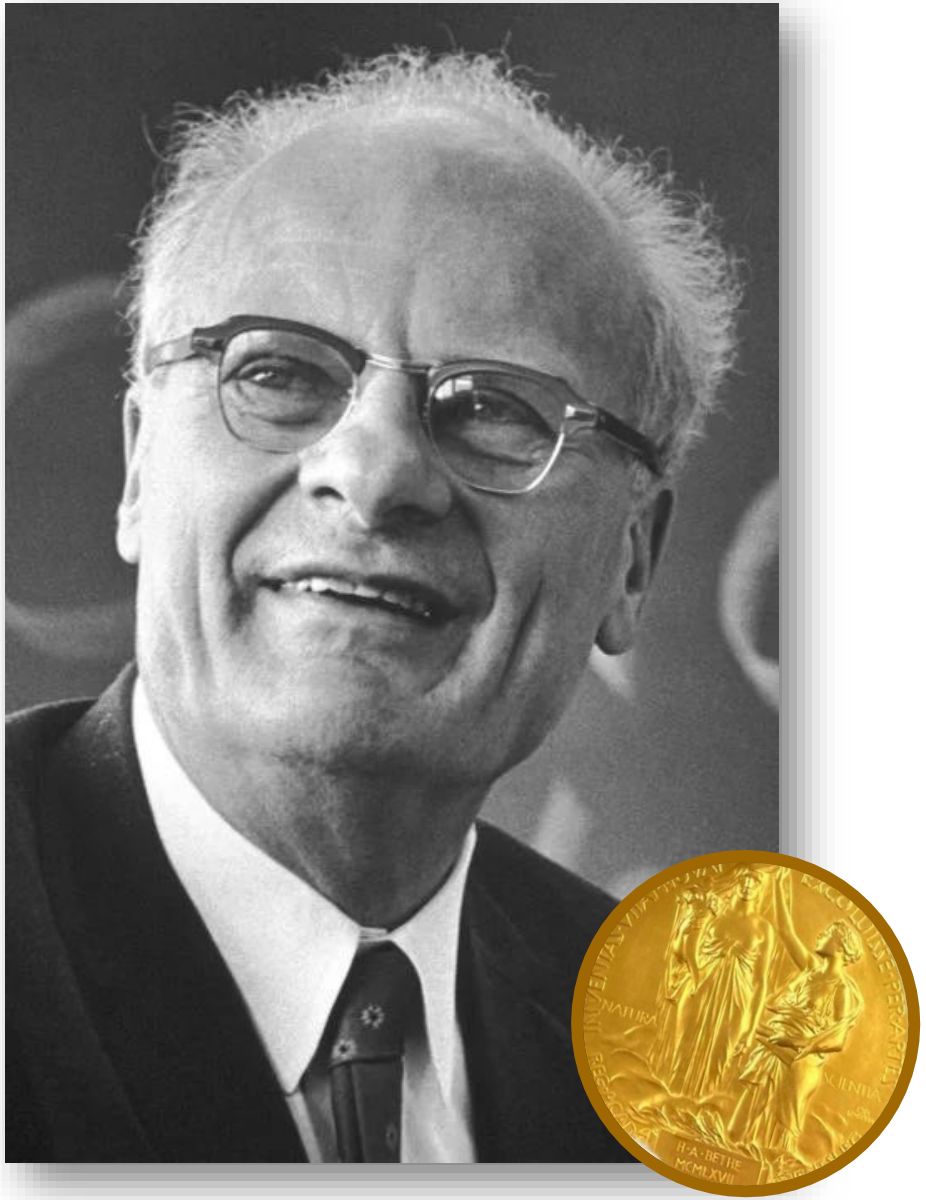
The authors declare no competing interest.

[1]To whom correspondence may be addressed. Email: tyler.desroches@asu.edu.

Published October 6, 2022.


CILLIAN MURPHY
EMILY BLUNT
MATT DAMON
ROBERT DOWNEY JR.
FLORENCE PUGH
A FILM BY CHRISTOPHER NOLAN
OPPENHEIMER
7 21 23
SHOT WITH IMAX FILM CAMERAS
WRITTEN FOR THE SCREEN AND DIRECTED BY CHRISTOPHER NOLAN


LEONARDO DiCAPRIO
JENNIFER LAWRENCE
ROB MORGAN
JONAH HILL
MARK RYLANCE
TYLER PERRY
TIMOTHÉE CHALAMET
RON PERLMAN
ARIANA GRANDE
SCOTT MESCUDI
CATE BLANCHETT
MERYL STREEP
Don't Look UP
NACH ZIEMLICH MÖGLICHEN BEGEBENHEITEN
EIN FILM VON ADAM McKAY
DON'T LOOK UP
STORY BY ADAM McKAY & DAVID SIROTA
SCREENPLAY BY ADAM McKAY
DIRECTED BY ADAM McKAY
IN AUSGEWÄHLTEN KINOS AB DEZEMBER UND AUF
NETFLIX
NETFLIX | AB 24. DEZEMBER



Hans Albrecht Bethe (* 1906, † 2005)

Der Nobelpreis für Physik 1967 wurde Hans Albrecht Bethe „für seine Beiträge zur Theorie der Kernreaktionen, insbesondere seine Entdeckungen über die Energieerzeugung in Sternen“ verliehen.

“Meister der Unmöglichkeitstheorie”

„Wenn die Welt einmal untergehen sollte,
ziehe ich nach Wien, denn dort passiert alles
50 Jahre später.”

Gustav Mahler

Full paper: here

22 May 2023 nature sustainability

Quantifying the human cost of global warming

Timothy M. Lenton ✉, Chi Xu ✉, Jesse F. Abrams, Ashish Ghadiali, Sina Loriani, Boris Sakschewski, Caroline Zimm, Kristie L. Ebi, Robert R. Dunn, Jens-Christian Svenning & Marten Scheffer

The Guardian

Eine globale Erwärmung um 2,7 °C könnte *ein Drittel (22-39 %)* der Menschen aus ihrer klimatischen Nische stoßen!

above 29C by 2030, a level at which very few communities have lived in the past.

Up to 1 billion people could choose to migrate to cooler parts of the world, it said, although those areas remaining within the climate niche would still experience more frequent heatwaves and droughts.

However, urgent action to lower carbon emissions and keep global temperature rise to 1.5C would cut the number of people pushed outside the climate niche by 80%, to 400 million.

Full article: here

Das ist das prognostizierte Ergebnis der derzeitigen weltweiten Klimapolitik!

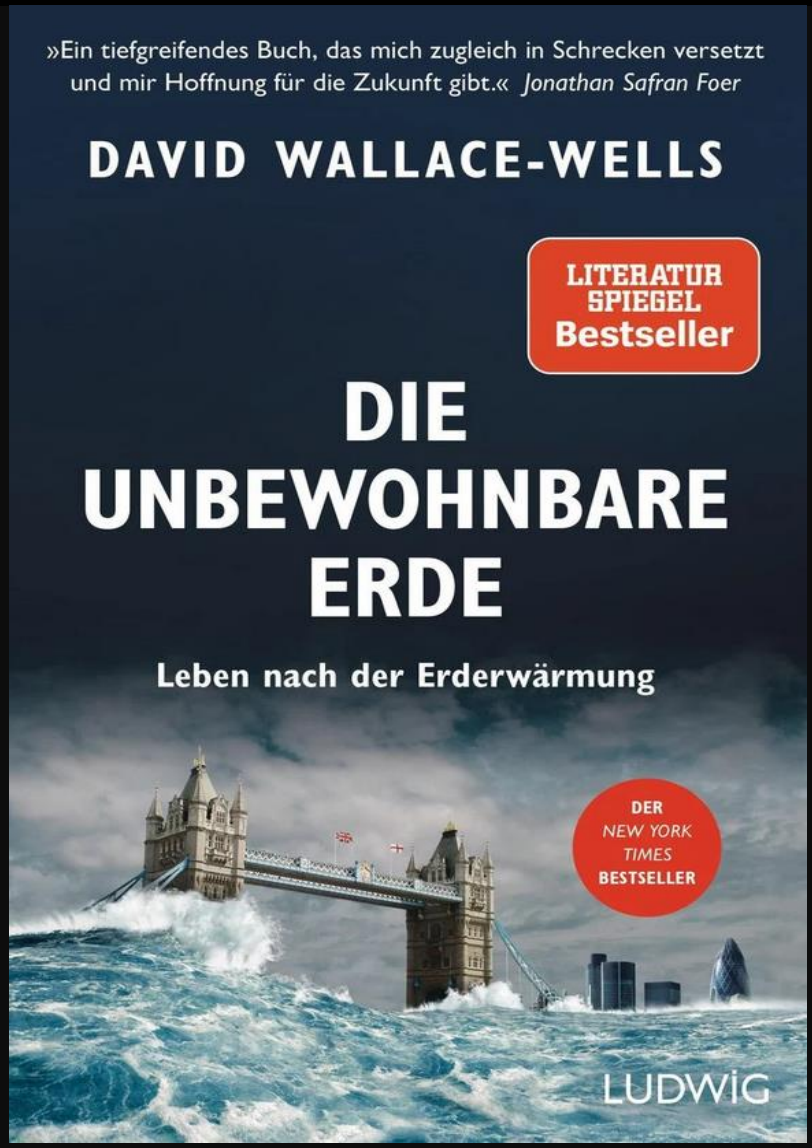
NEW YORK

Intelligencer

The Uninhabitable Earth

Famine, economic collapse, a sun that cooks us: What climate change could wreak — sooner than you think.

By **David Wallace-Wells**



What are the Economic Costs of Climate Change?

nature climate change

Article

https://doi.org/10.1038/s41558-024-01990-8

Climate damage projections beyond annual temperature

Received: 24 July 2023

Accepted: 20 March 2024

Published online: 17 April 2024

Check for updates

Paul Waidelich, Fulden Batibeniz, James Rising, Jarmo S. Kikstra & Sonia I. Seneviratne

Estimates of global economic damage from climate change assess the effect of annual temperature changes. However, the roles of precipitation, temperature variability and extreme events are not yet known. Here, by combining projections of climate models with empirical dose–response functions translating shifts in temperature means and variability, rainfall patterns and extreme precipitation into economic damage, we show that at +3 °C global average losses reach 10% of gross domestic product, with worst effects (up to 17%) in poorer, low-latitude countries. Relative to annual temperature damage, the additional impacts of projecting variability and extremes are smaller and dominated by interannual variability, especially at lower latitudes. However, accounting for variability and extremes when estimating the temperature dose–response function raises global economic losses by nearly two percentage points and exacerbates economic tail risks. These results call for region-specific risk assessments and the integration of other climate variables for a better understanding of climate change impacts.

Projections of economic damage from climate change are key for evaluating climate mitigation benefits, identifying effects on vulnerable communities and informing discussions around adaptation needs, as well as loss and damage financing. On a global or country level, such assessments have focused on how projected changes in annual mean temperatures affect gross domestic product (GDP)[1–4]. However, the widespread losses in recent years driven by flooding and drought suggest that precipitation variability and extremes are similarly important[5,6]. Anthropogenic forcing is increasing the frequency and intensity of precipitation extremes and variability on multiple scales, altering daily temperature patterns and driving an overall increase in precipitation over land[5,7]. Continued global warming is expected to exacerbate these trends, potentially with uneven impacts across regions[8–10]. Therefore, including precipitation, variability and extremes can improve the precision, comprehensiveness and interpretability of climate change damage estimations[11].

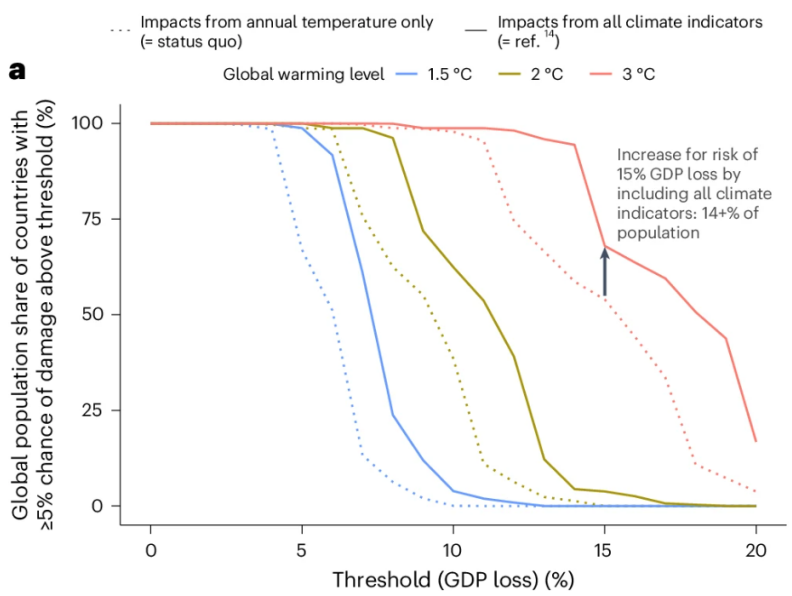
Economic damage from climate change can be assessed either bottom-up by quantifying, valuating and aggregating specific impacts (for example, crop failures or labour supply changes) or top-down by identifying the statistical relationship between observed climatic shifts and economic growth, while both approaches have advantages and limitations, top-down approaches usually neglect climatic shifts beyond annual temperature changes[12]. To address this shortcoming, recent studies have estimated the relationship between macrolevel income and a wider range of climatic indicators, such as total precipitation[13,14], temperature variability[13,15] or temperature and precipitation extremes and anomalies[13,16,17]. However, these studies do not investigate how much the inclusion of these climate indicators alters previous economic assessments of climate change, which is highly relevant for policy-making and future adaptation. A notable exception is ref. 15, which projects the effects of annual precipitation and temperature shifts on inequality. A comprehensive assessment of the projected

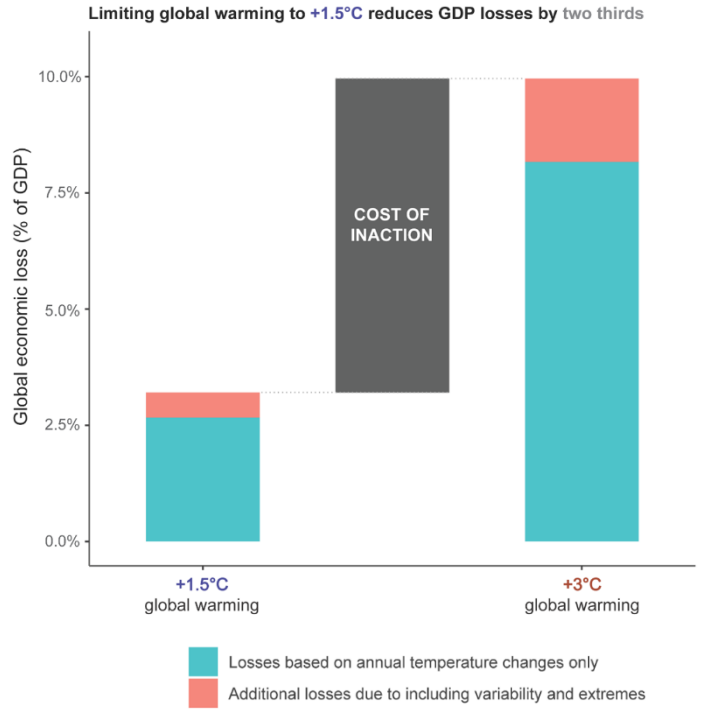
[1]Climate Finance and Policy Group, ETH Zurich, Zurich, Switzerland. [2]Institute for Atmospheric and Climate Science, ETH Zurich, Zurich, Switzerland. [3]Oeschger Center for Climate Change Research, University of Bern, Bern, Switzerland. [4]Climate and Environmental Physics, Physics Institute, University of Bern, Bern, Switzerland. [5]School of Marine Science & Policy, University of Delaware, Newark, DE, US. [6]Centre for Environmental Policy, Imperial College London, London, UK. [7]Grantham Institute for Climate Change and the Environment, Imperial College London, London, UK. [8]Energy, Climate and Environment (ECE) Program, International Institute for Applied Systems Analysis, Laxenburg, Austria. e-mail: paul.waidelich@gess.ethz.ch

Paul Waidelich, Fulden Batibeniz, James Rising, Jarmo S. Kikstra & Sonia I. Seneviratne

nature climate change

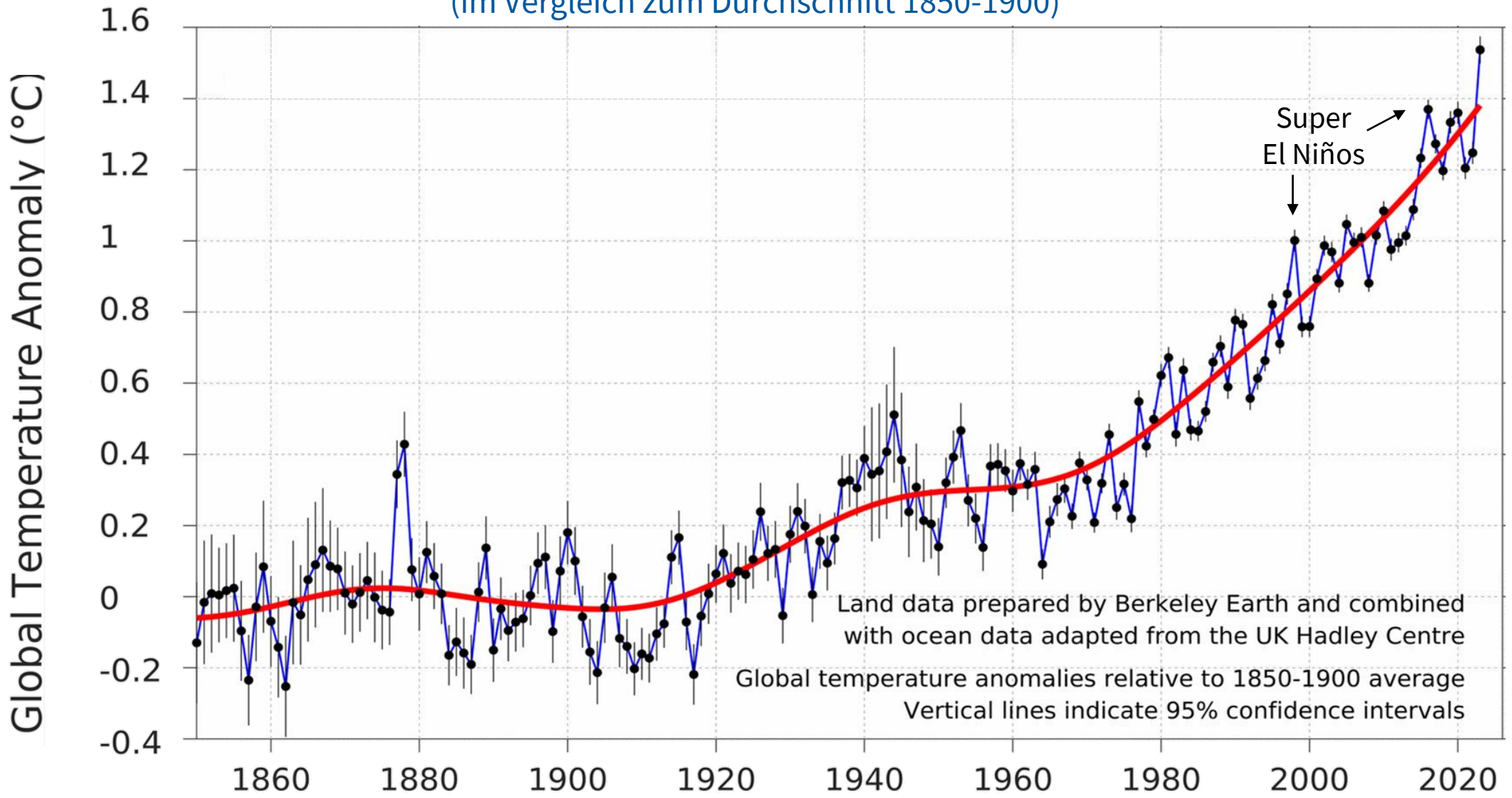
17 April 2024





Globale Durchschnittstemperatur

(im Vergleich zum Durchschnitt 1850-1900)



Berkeley Earth 2024

Globale Temperatur erstmals 2 Grad höher als in vorindustrieller Zeit

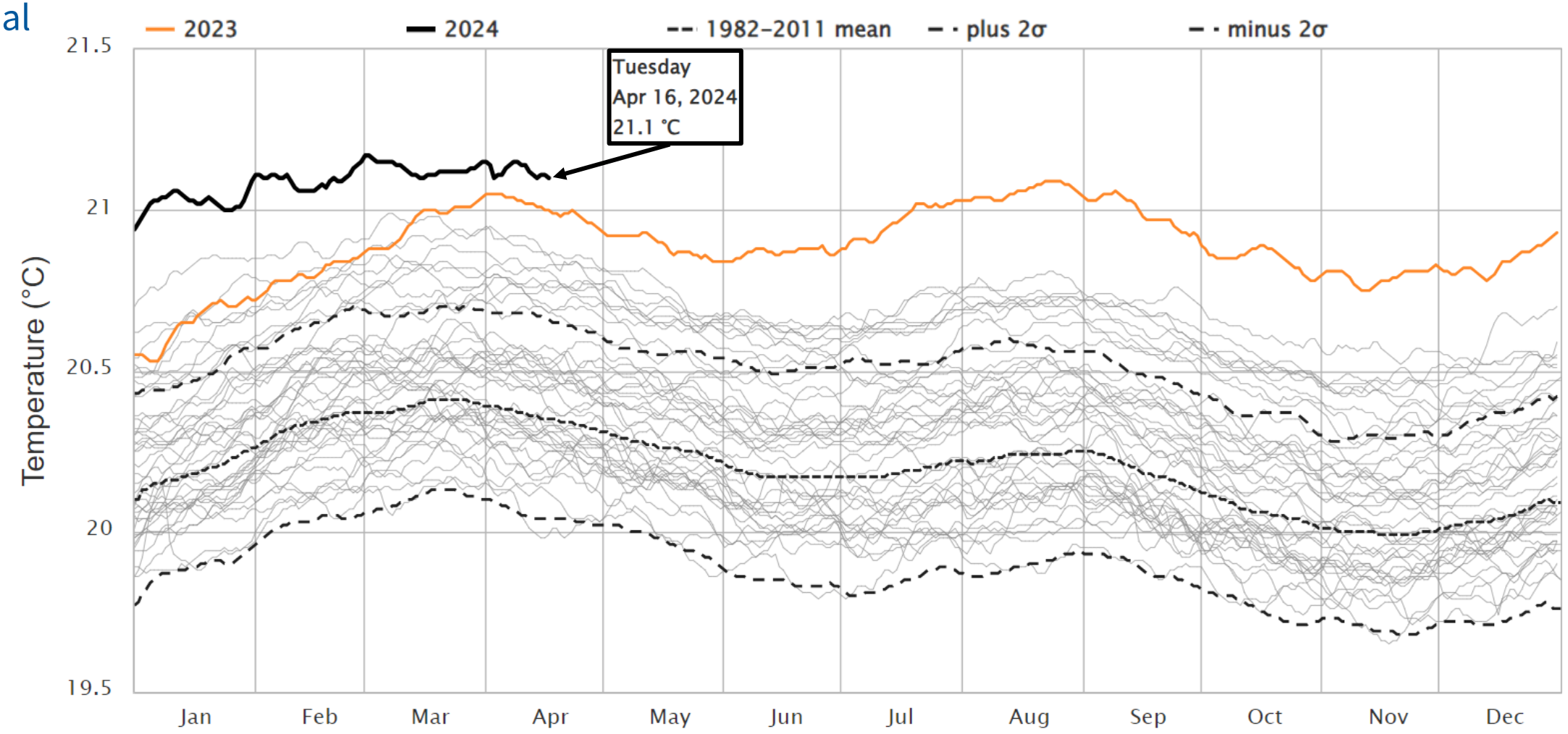
Spektrum.de
21.11.2023

Am 17. November wurde zum ersten Mal die Zwei-Grad-Grenze überschritten. Das ergeben Daten des EU-Klimawandeldienstes Copernicus. Fachleute sprechen von einer »alarmierenden Regelmäßigkeit«.

Originalartikel: hier

Ozean-Oberflächentemperatur

Global



World view A personal take on science and society

nature

Full article: here

19 March 2024

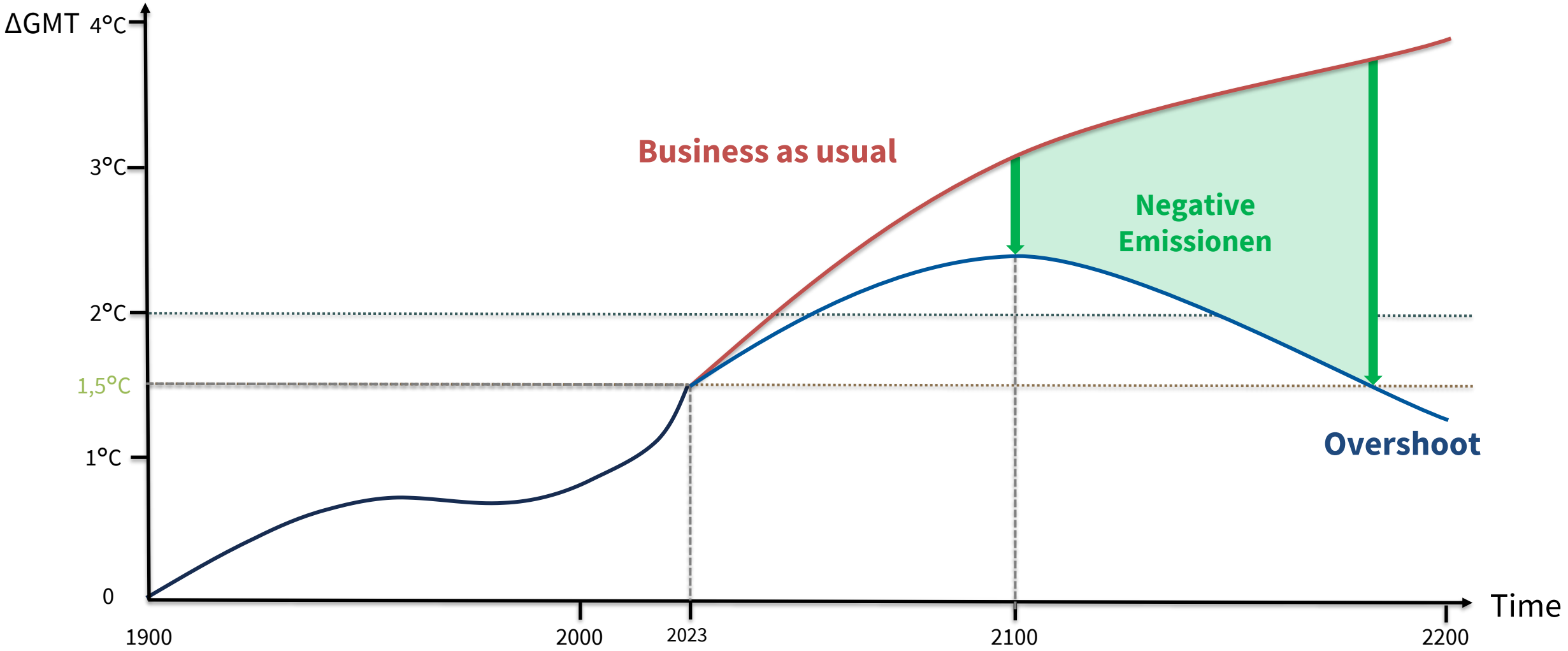
Why 2023's heat anomaly is worrying scientists

If the anomaly does not stabilize by August, then the world will be in uncharted territory."

Gavin Schmidt

Climate models can't explain 2023's huge heat anomaly — we could be in uncharted territory

Klimareparatur: Repair or Despair!



Schellnhuber & Köllner 2022 (unpublished)

Die Große Doppel-Transformation

1 Dekarbonisierung der Weltwirtschaft bis 2050

2 Massive Extraktion von CO_2 aus der Erdatmosphäre

Energie- und Materialströme gemeinsam betrachten!

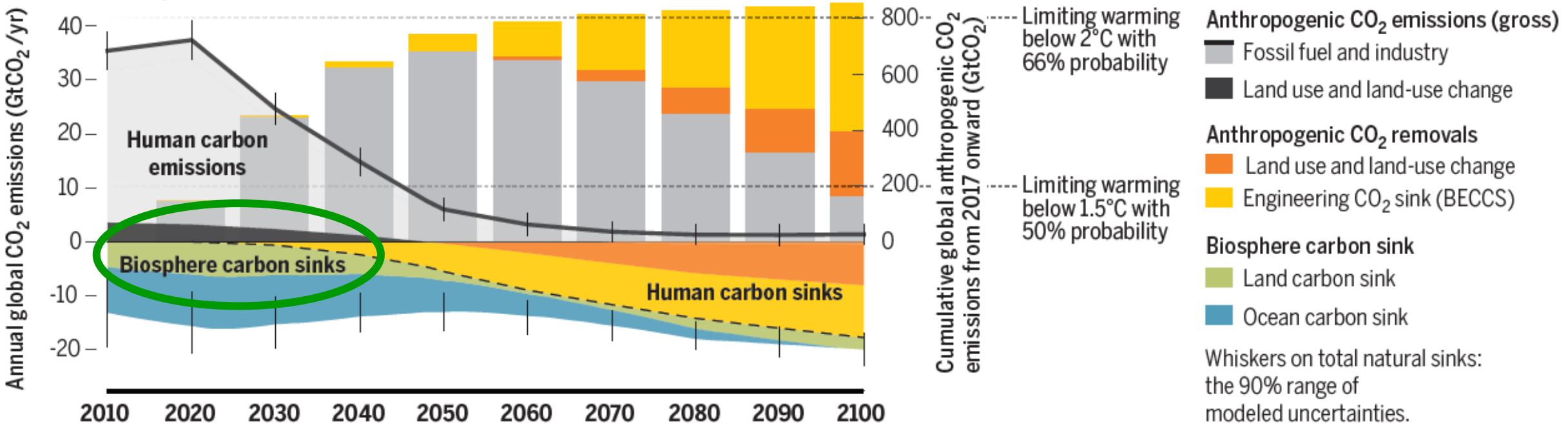
Der Fahrplan für die Transformation

Science
24 Mar 2017

JOHAN ROCKSTRÖM, OWEN GAFFNEY, JOERI ROGELJ, MALTE MEINSHAUSEN, NEBOJSA NAKICENOVIC, AND

HANS JOACHIM SCHELLNHUBER

Decarbonization pathway consistent with Paris agreement

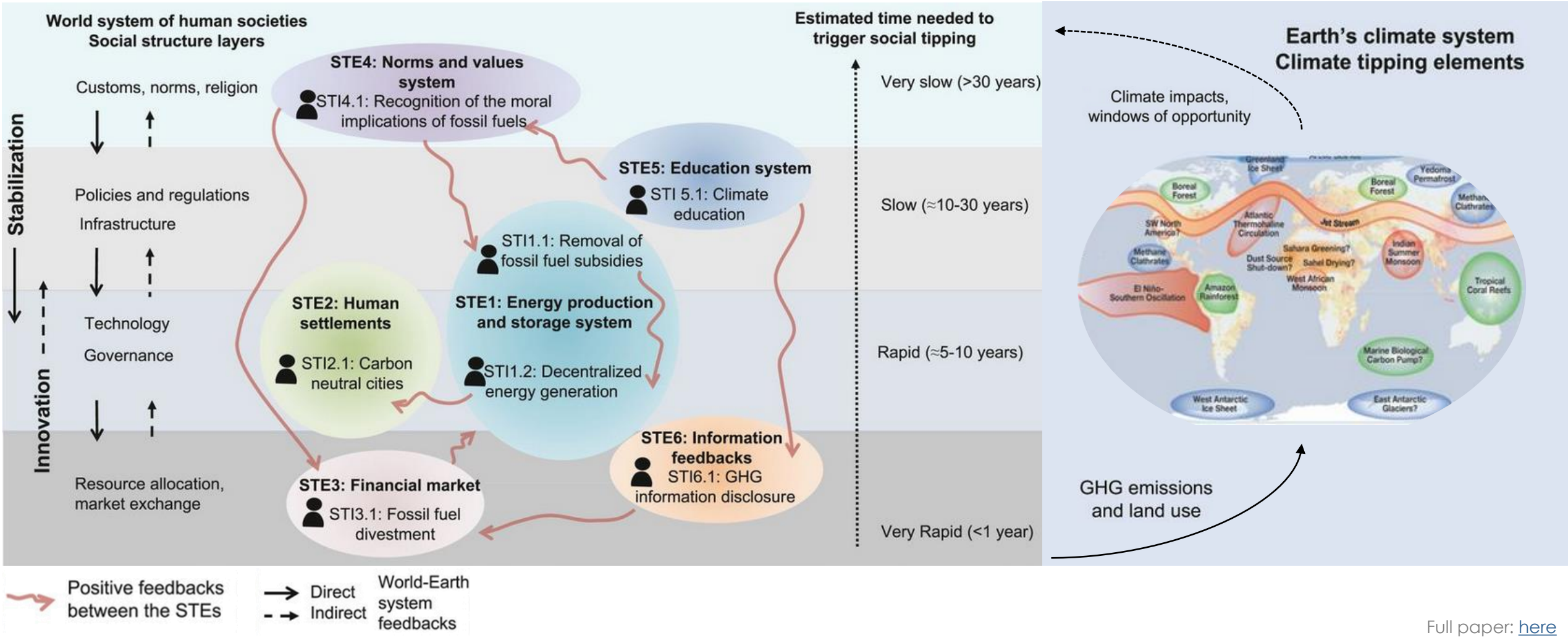


Full paper: here

Social tipping dynamics for stabilizing Earth's climate by 2050

PNAS
January 21, 2020

Ilona M. Otto[a,1,2], Jonathan F. Donges[a,b,1,2], Roger Cremades[c], Avit Bhowmik[b,d], Richard J. Hewitt[e,f], Wolfgang Lucht[a,g,h], Johan Rockström[a,b], Franziska Allerberger[a,i], Mark McCaffrey[j], Sylvanus S. P. Doe[k], Alex Lenferna[l], Nerea Morán[m,n], Detlef P. van Vuuren[o,p], and Hans Joachim Schellnhuber[a,q,2]



Full paper: here

International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

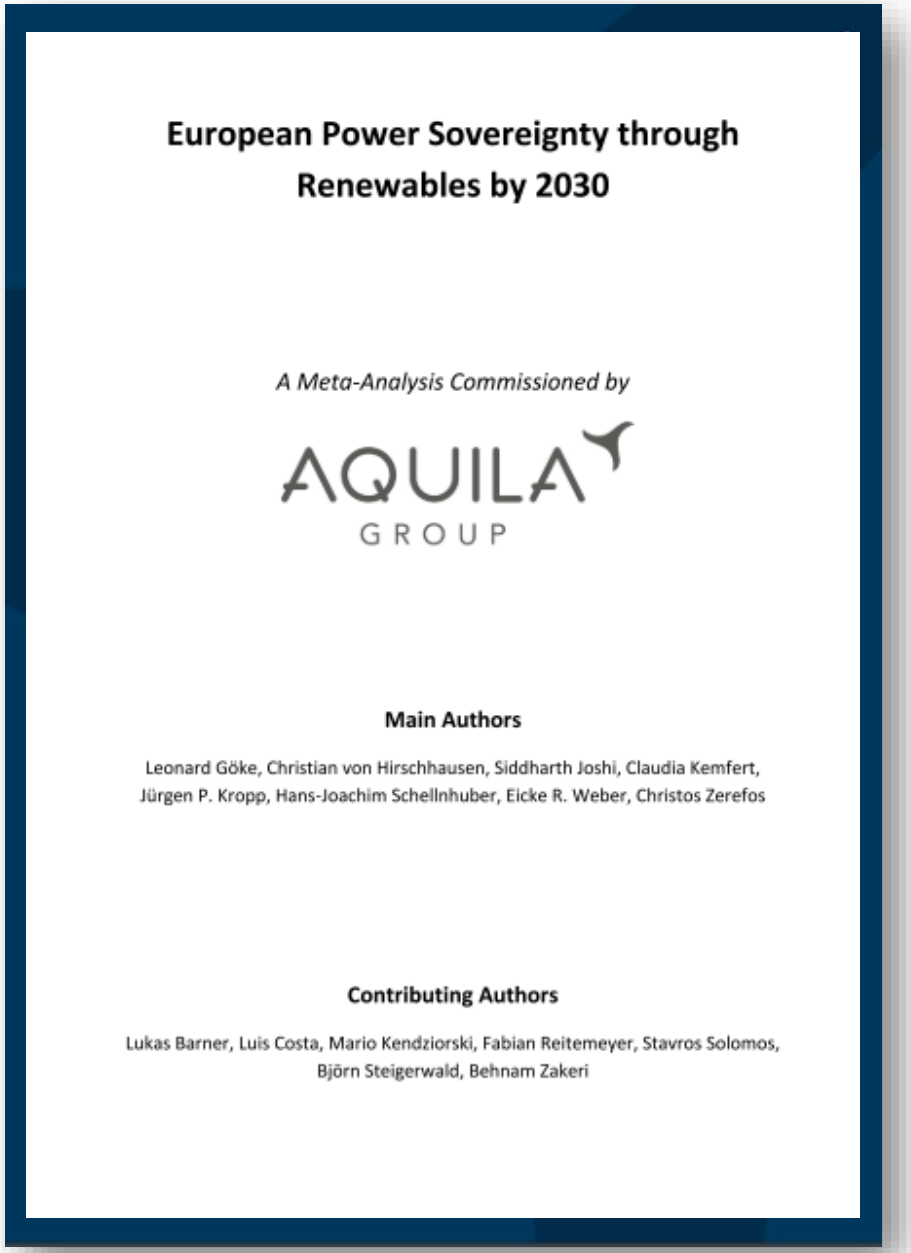
Aquila Capital
München, 08 Mär 2024

Auf dem Weg zur Europäischen Energiesouveränität

Hans Joachim Schellnhuber

Generaldirektor, International Institute for Applied Systems Analysis (IIASA);
Gründer, Bauhaus Erde gGmbH

BAUHAUS EARTH



European Power Sovereignty through Renewables by 2030

Executive Summary

What is the present state of play with respect to these three criteria?

- The power sector in the narrow sense is already self-sufficient, as electricity is mainly imported and exported within the European Union (EU27) and between the European and associated countries (cf. Table 4.4).
- Although 38% of the electricity sector in Europe was based on renewable energy sources in 2022, slightly more than 40% of the electricity in Europe is still be produced on the basis of fossil energy and a further 22% is provided by nuclear energy. In this respect, there is an indirect dependency. The fossil energy source is predominantly gas, of which about 50% on average in Europe came from Russia until 2022.
- The dependence of the European power sector on fossil energy has even increased due to the nuclear phase-out after 2022 (cf. Table 8.1).
- The previous growth rates in the RE sector are not sufficient to achieve the defined self-sufficiency targets in the power sector by 2030.

Kann der Westen Putins heilige Finanz-Kuh schlachten?

Full article: here

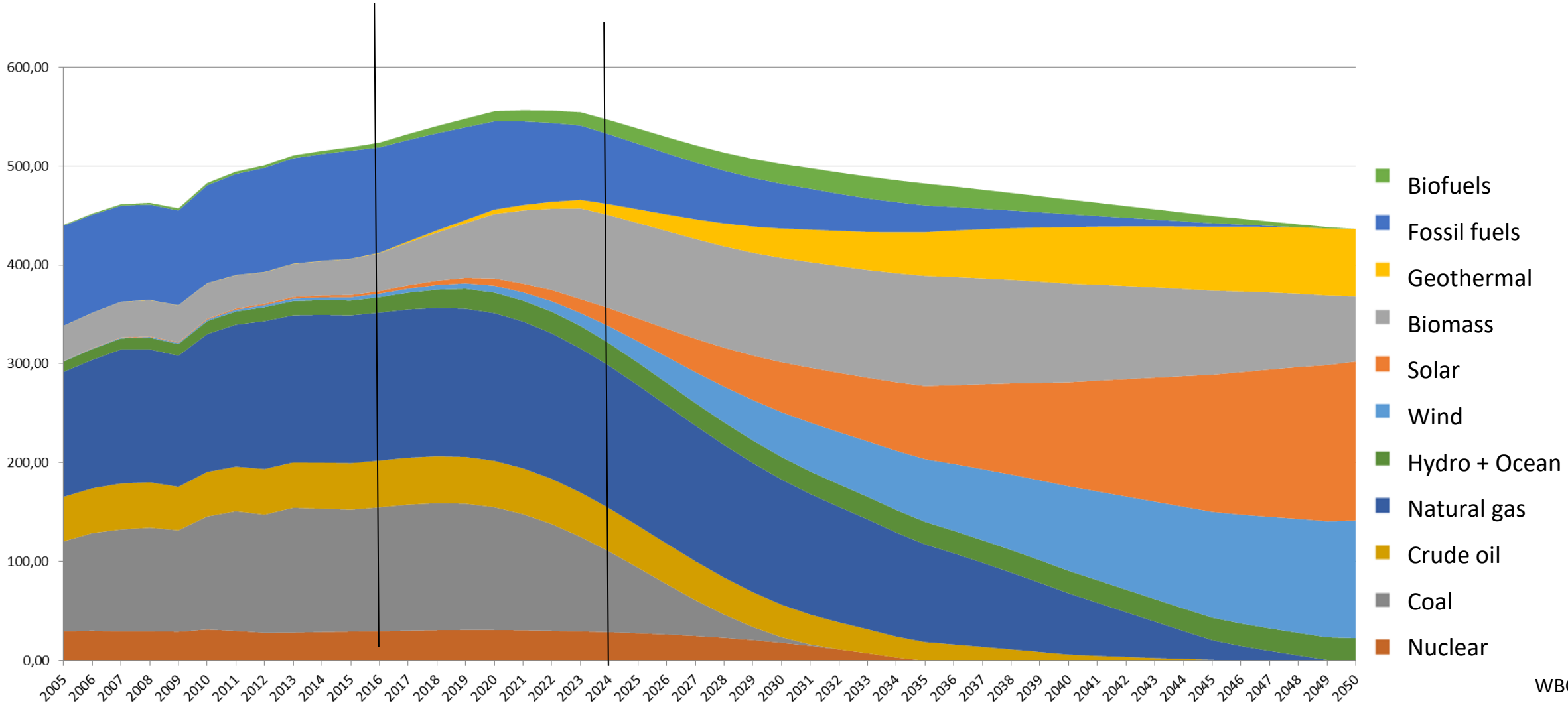
The Guardian

Patrick Wintour
Diplomatic editor

Mon 14 Mar 2022 09.28 GMT

The Nord Stream 2 facility at Lubmin in Germany has been suspended, but gas remains the central issue in the west's economic war with Russia. Photograph: Hannibal Hanschke/Reuters

WBGU Vision (2016)
Konform mit dem 1,5°C-Szenario für die globale Energiewende



WBGU, 2017

A PATH TO SUSTAINABLE ENERGY BY 2030

SCIENTIFIC AMERICAN®
November 2009
Article here

Wind, water and solar technologies can provide 100 percent of the world's energy, eliminating all fossil fuels. HERE'S HOW

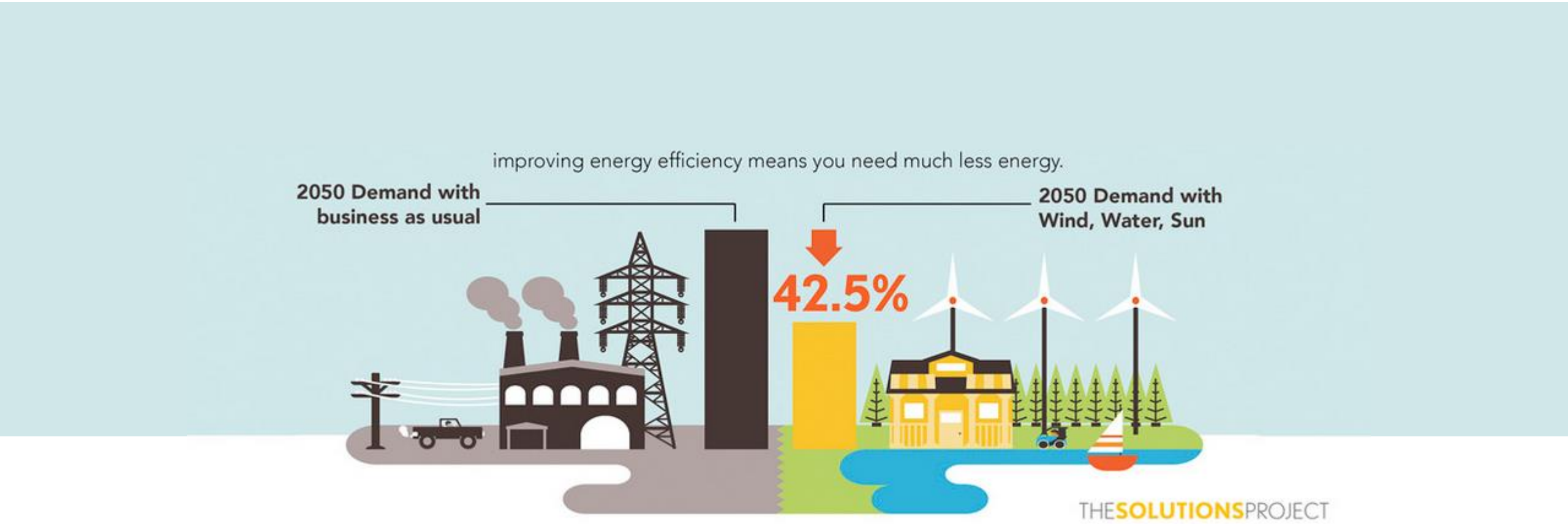
- Supplies of wind and solar energy on accessible land dwarf the energy consumed by people around the globe.
- The authors' plan calls for 3.8 million large wind turbines, 90,000 solar plants, and numerous geothermal, tidal and rooftop photovoltaic installations worldwide.
- The cost of generating and transmitting power would be less than the projected cost per kilowatt-hour for fossil-fuel and nuclear power.
- Shortages of a few specialty materials, along with lack of political will, loom as the greatest obstacles.

By Mark Z. Jacobson and Mark A. Delucchi

Full paper: here

September 2017, Joule

100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World



ARTICLE

https://doi.org/10.1038/s41467-019-08855-1 OPEN

nature COMMUNICATIONS 2019

Radical transformation pathway towards sustainable electricity via evolutionary steps

Dmitrii Bogdanov [1], Javier Farfan[1], Kristina Sadovskaia[1], Arman Aghahosseini [1], Michael Child [1], Ashish Gulagi[1], Ayobami Solomon Oyewo[1], Larissa de Souza Noel Simas Barbosa[2] & Christian Breyer [1]

Full article: here

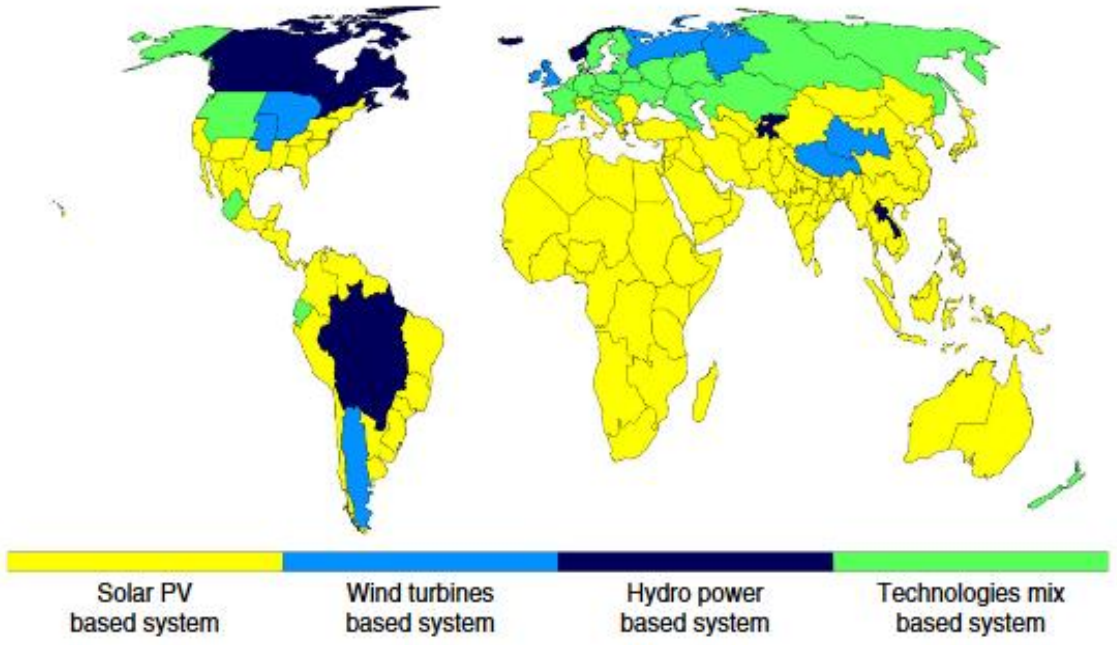


Fig. 1: Main types of 100% renewable electricity systems based on their main source of electricity (>50% share of electricity generation). If none of the technologies have a share exceeding 50% defined as "Technology mix-based system"

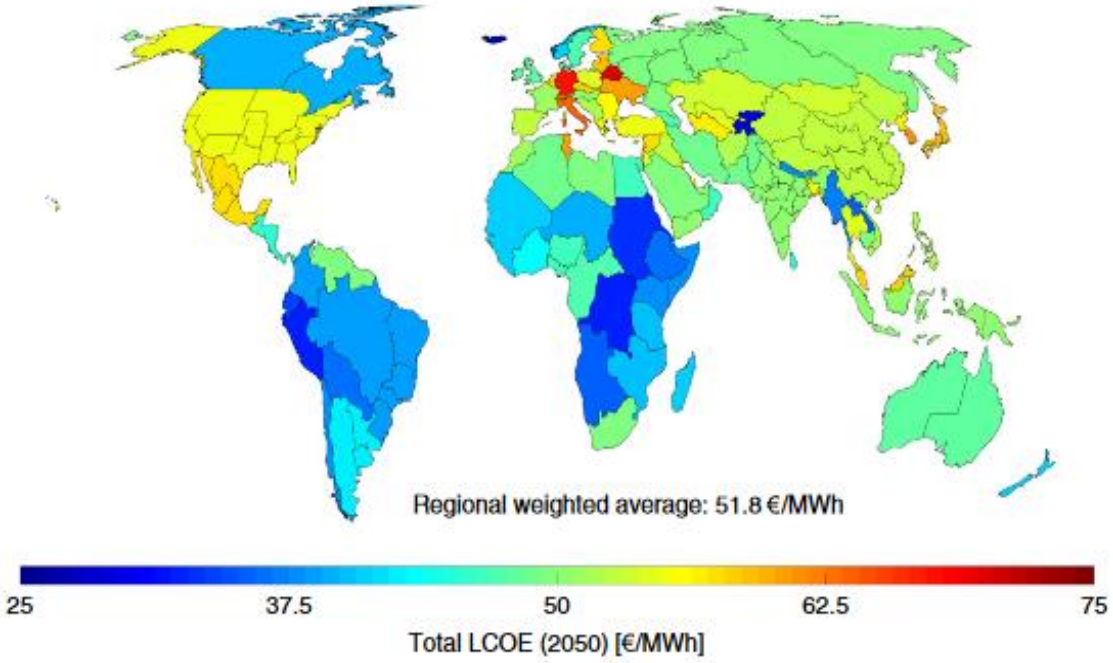
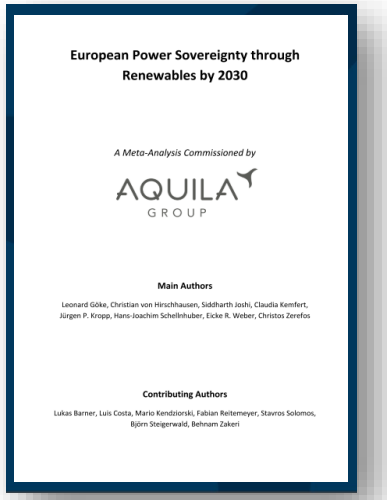


Fig. 2: Levelized cost of electricity for 100% renewable electricity systems in 2050. Numbers are calculated based on the generation mix for 2050 and financial and technical assumptions for all electricity system components.

Photovoltaic Potential


European Power Sovereignty through Renewables by 2030

A Meta-Analysis Commissioned by

AQUILA GROUP

Main Authors

Leonard Göke, Christian von Hirschhausen, Siddharth Joshi, Claudia Kemfert, Jürgen P. Kropp, Hans-Joachim Schellnhuber, Eicke R. Weber, Christos Zerefos

Contributing Authors

Lukas Barner, Luis Costa, Mario Kendziorski, Fabian Reitemeyer, Stavros Solomos, Björn Steigerwald, Behnam Zakeri

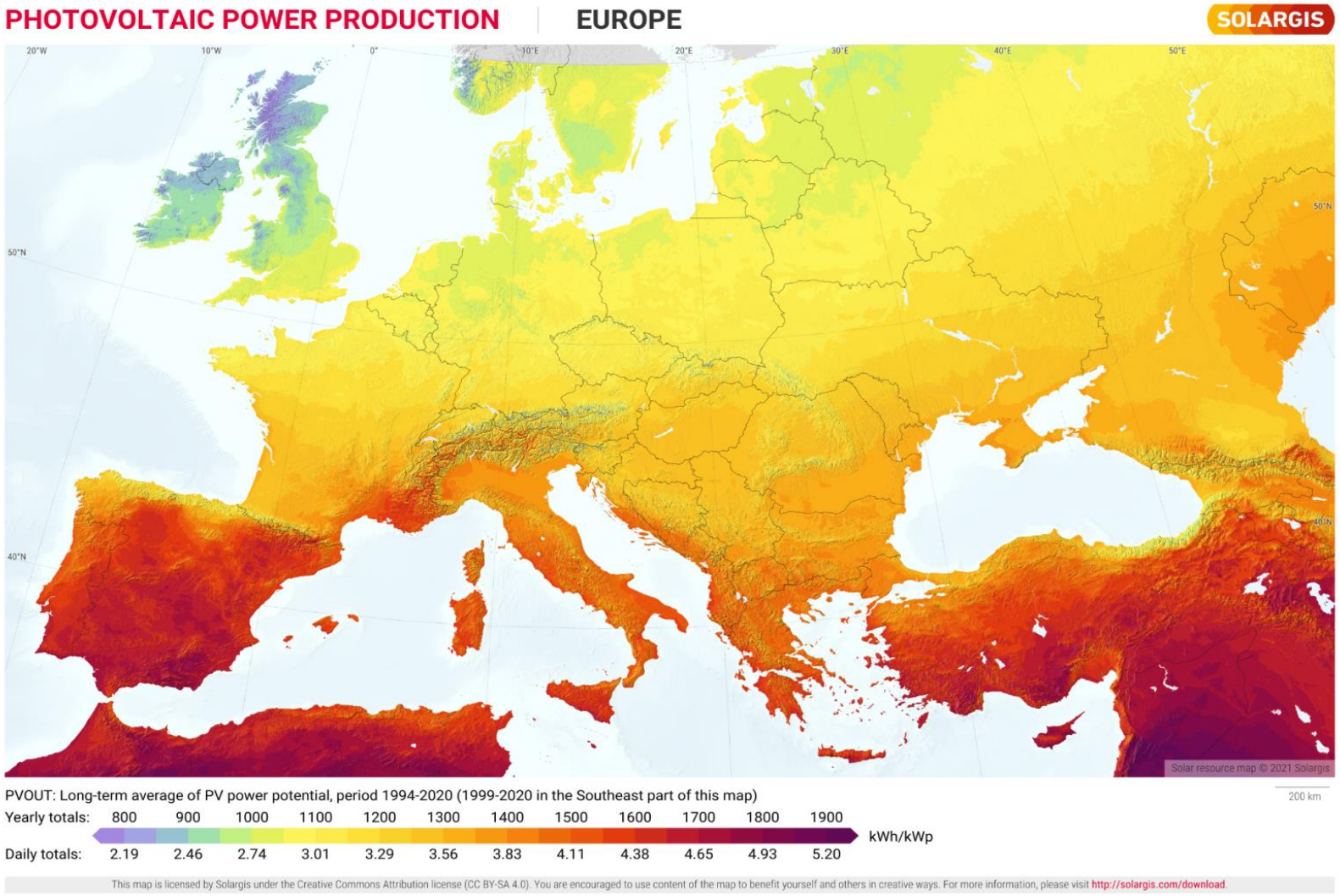


Figure 3.5: Potential photovoltaic electricity production (Source: Global Solar Atlas 2.0: 2023).

Potential Rooftop PV Utilization (Germany)

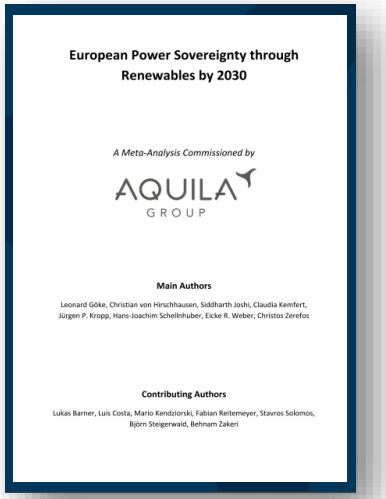


Figure 6.1: Utilisation of potentials for rooftop PV on new buildings in different German cities. While in Essen, approx. 63% of newly built roof areas are covered by rooftop PVs this holds only for 10% in Hamburg. Thus, cities do not exploit their full potential. Note, these numbers are also biased by the underlying construction activities in the respective cities, although the trend may persist (Source: LichtBlick Solarcheck 2021).

Wind speed and respective Electricity production

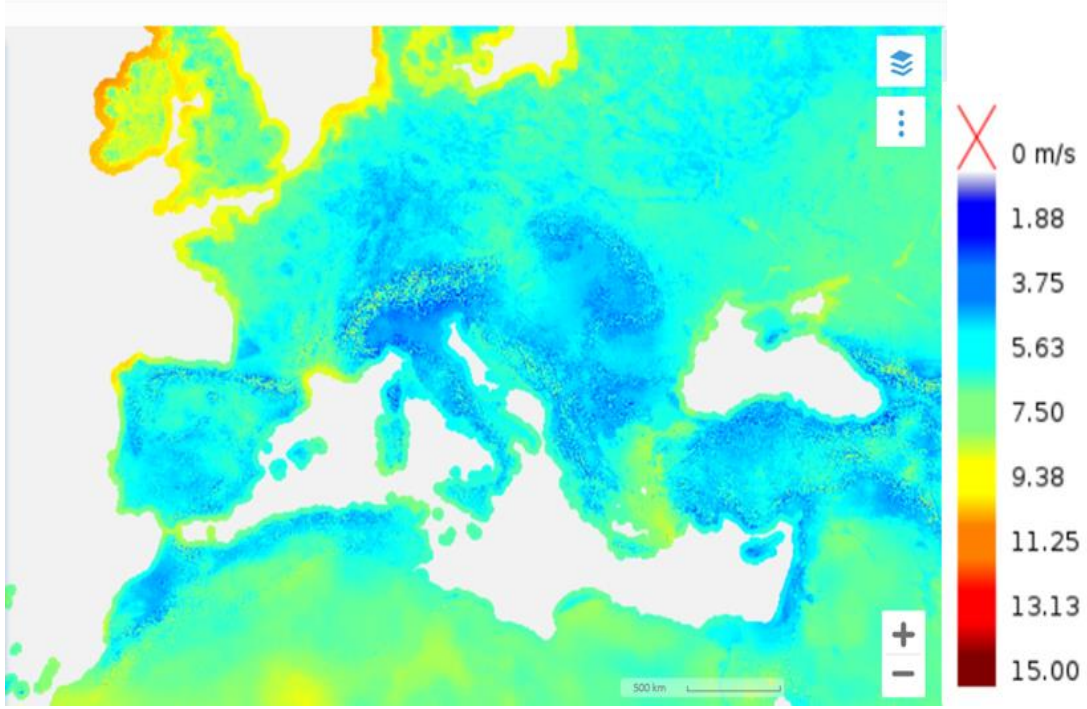


Figure 3.1: Annual average wind speed (m/s) from the Technical University of Denmark via the Global Wind Atlas. It takes into account small-scale spatial variability of winds speeds and surface roughness change effects. (Source: https://globalatlas.irena.org).

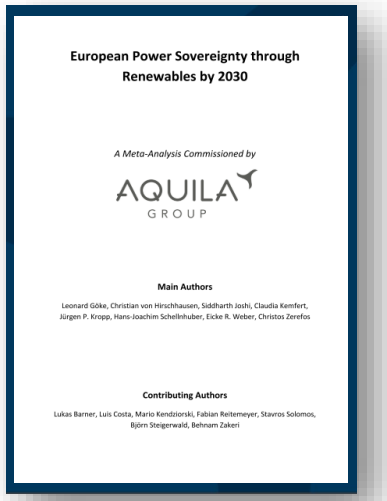

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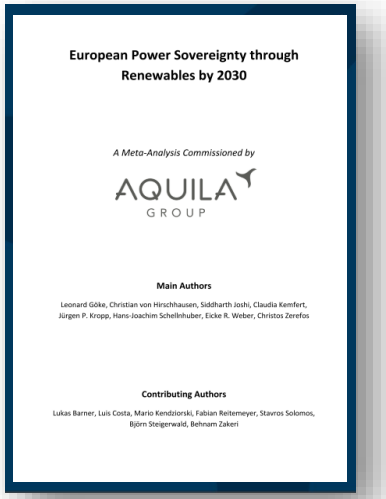
Table 3.1: Electricity production from wind power in 2021 in the EU27+UK (TWh) (Wind Europe 2021).

EU + UK electricity consumption (TWh)	Onshore wind energy production (TWh)	Offshore wind energy production (TWh)	Total wind energy production (TWh)	Share of consumption met by wind energy
2,921	357	80	437	15%

Floating Wnd Turbines Potential (2030)



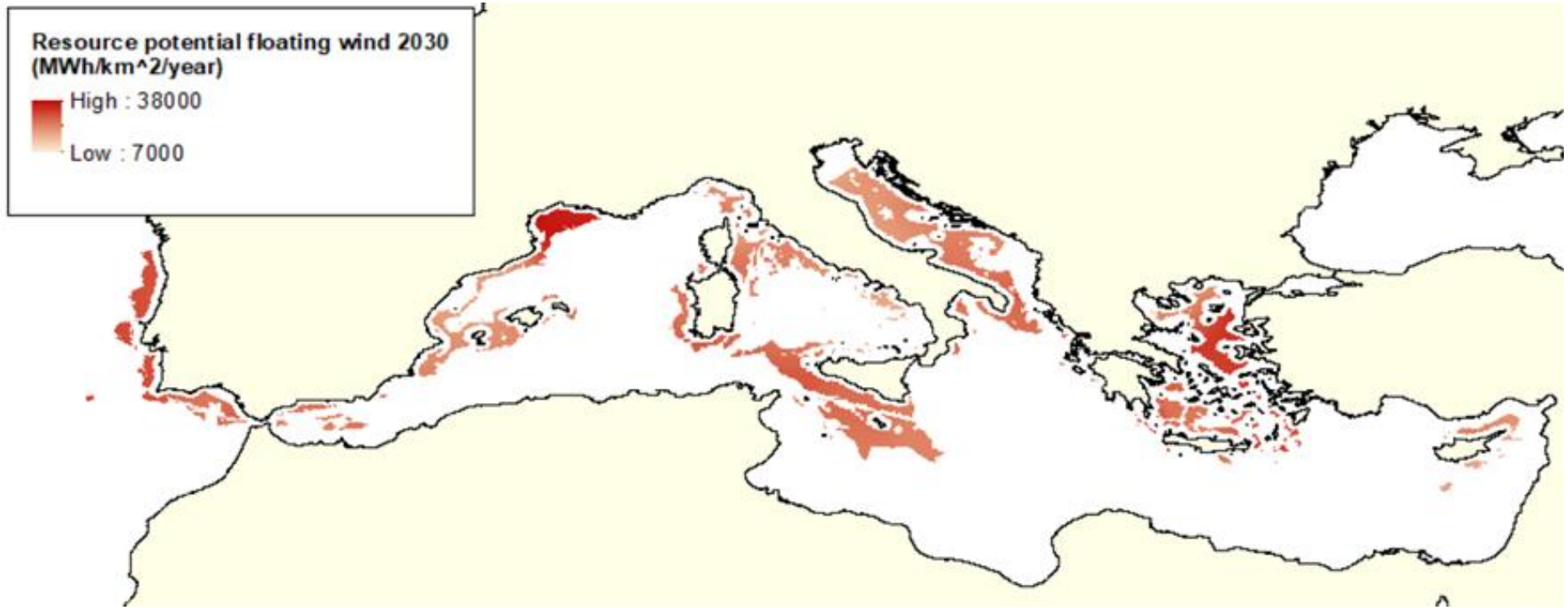
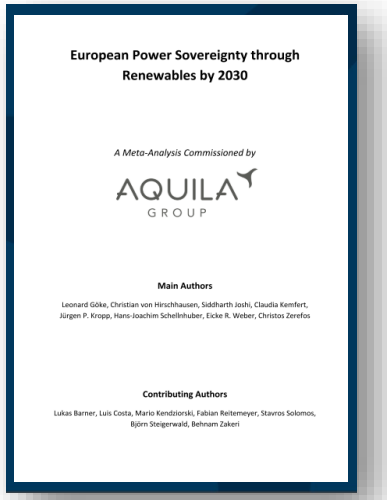


Figure 3.16: Resource potential for floating wind turbines in 2030 in MWh/m2/yr (Source: EC 2020).

Potential Locations for Offshore Wind Farms



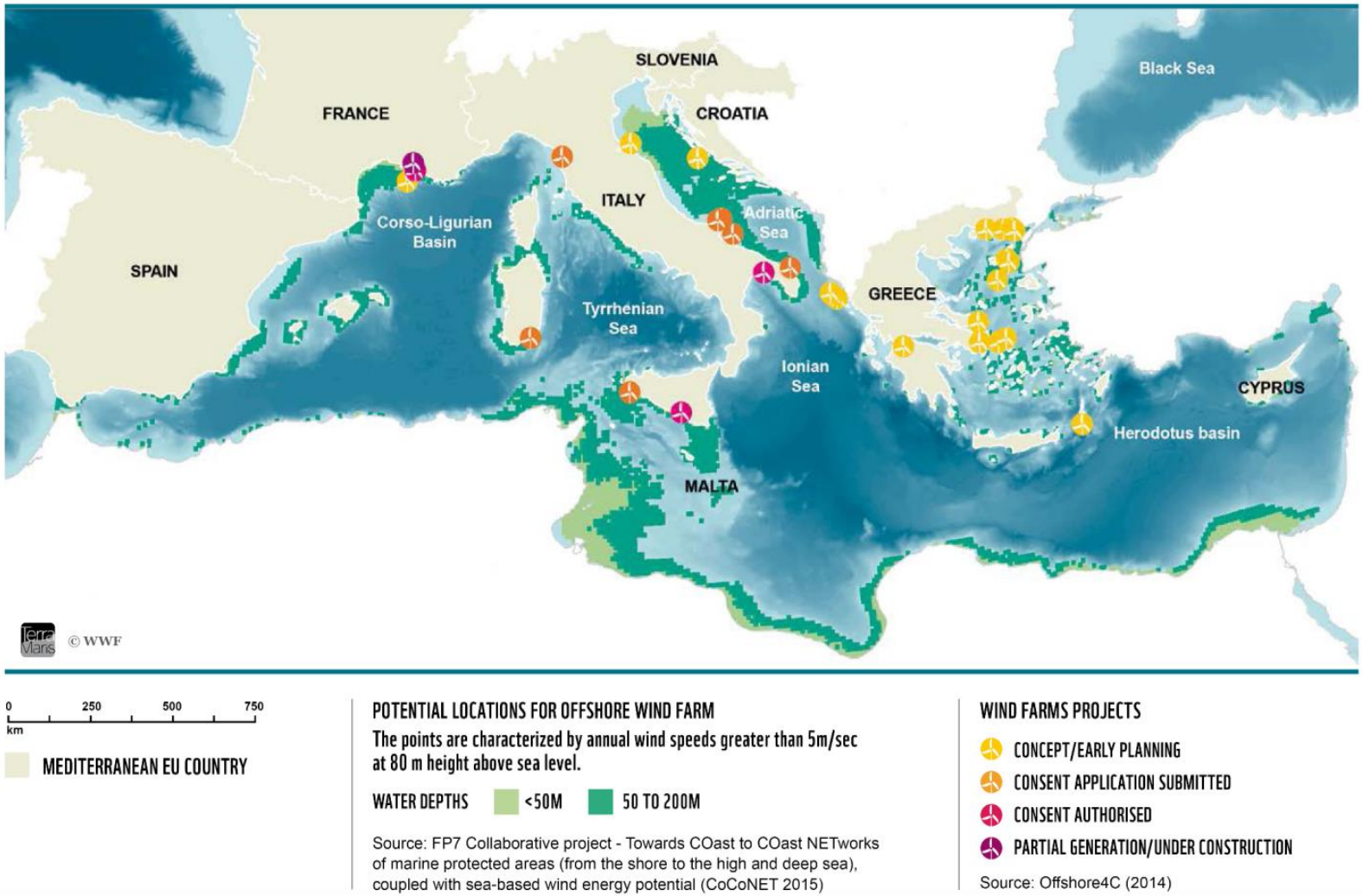
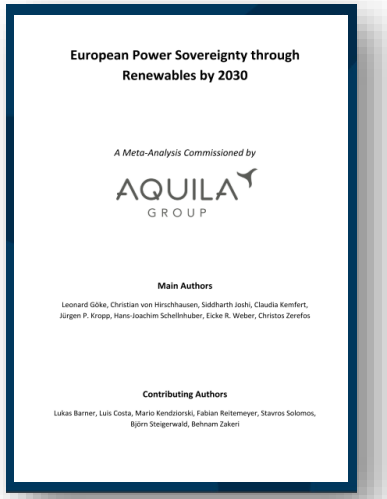


Figure 7.1: Potential locations for offshore wind farms in the Mediterranean (from Piante and Ody, 2015).

Shallow Geothermal Fields and Areas of Geothermal Interest in Greece



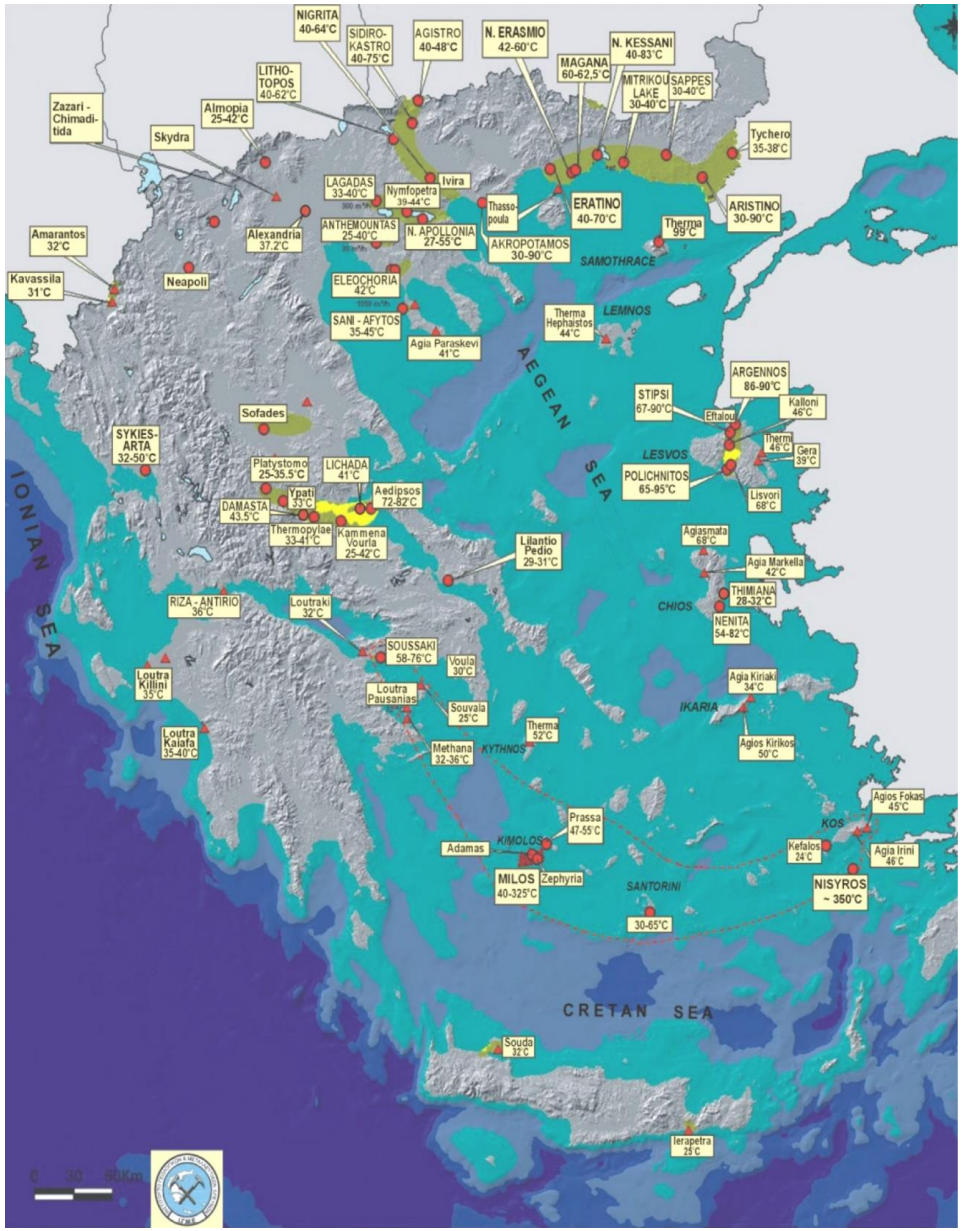
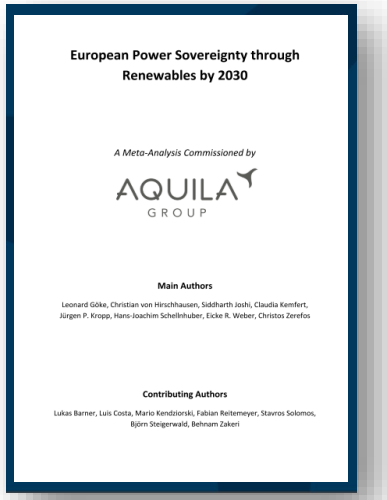


Figure 3.24: Shallow geothermal fields and areas of geothermal interest in Greece. (This map has been compiled by I.G.M.E. – Division of Geothermal Energy and Thermal Mineral Waters, with recent modifications and additions by Arvanitis A. The officially characterized as proven and probable geothermal fields are written with capital letters into the frames and the other areas of geothermal interest with no classification are written in lower case letters), (from Andritsos et al., 2010).



Challenges

- Self-Sufficiency in electricity achieved (almost)
- Substitution of traditional primary energy resources is the problem (57% dependency on fossils/uranium)
- Behavioral changes can mitigate enery bill by 20-25%
- Sector capacity built-up is by far too slow, but still possible
- Solar and wind costs are unbeatable in comparison to traditional resources
- Grid infrastructure needs (distributed) extension – in terms of length, but also storage capacities
- European integration helps to protect the climate and welfare (burden sharing!)
- One dependency should not substituted by another (e.g. Russia/China)
- Built-up of industries in Europe is necessary!
- Digitalization will help to manage distributed networks and power generation
- unexploited RES are located in Southern Europe
- Much more ambitious policies are needed (reduction, coordination, built-up, hydrogen)
- Stable 24/7/360 electricity supply, needs oversizing generation capacity from wind and solar

Mit freundlicher Genehmigung von Jürgen Kropp

How and why do spectacular buildings get commissioned and procured? What are their visible urban effects? What can urban planners, architects, and policymakers learn in order to engage in more successful citymaking?

In recent years, media and critical attention has been lavished on famous architects, and the contributions of their designs to the branding of cities. The post-"Bilbao effect" global landscape is one where cities compete for the highest-profile skyscrapers, cultural projects, and high-profile developments designed by star architects whom even casual readers know by first name: Frank Gehry, Bjarke Ingels, Jean Nouvel, Zaha Hadid, Norman Foster, Rem Koolhaas.

Far less is known about the decision-making processes behind these projects and their subsequent urban effects. A unique combination of urban studies and photography, Starchitecture investigates projects designed by star architects in cities including Paris, New York, Abu Dhabi, Bilbao, and the architectural microcosm of the Vitra campus in Weil am Rhein, Germany. Author Davide Ponzini and photographer Michele Nastasi seek to explain and critique a growing global condition by revealing how starchitecture has been and continues to be deployed in cities around the world. The arguments they raise are vital to understanding the urban landscapes of today, and tomorrow.

Contemporary Cities: Sustainable, Inclusive, Beautiful?

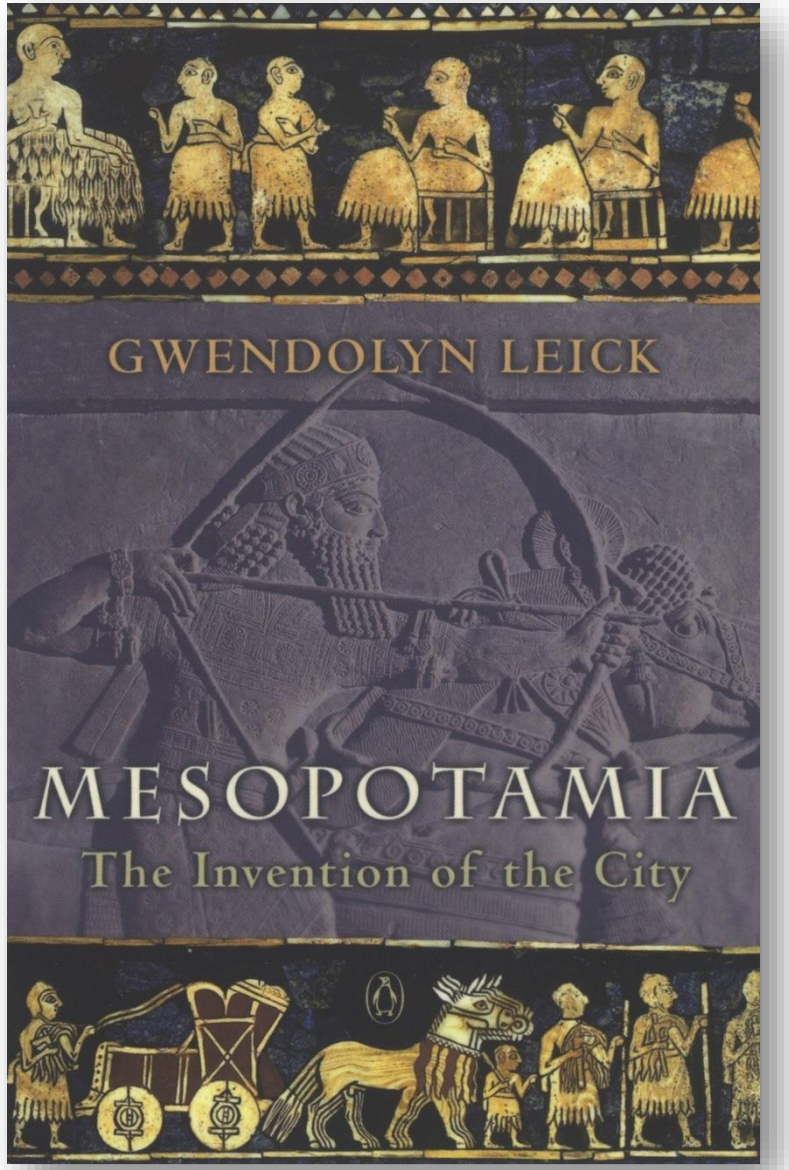
Cairo, Egypt

Contemporary Cities: Sustainable, Inclusive, Beautiful?

Lagos, Nigeria

Contemporary Cities: Sustainable, Inclusive, Beautiful?

Bukavu, Congo



Situated in an area roughly corresponding to present-day Iraq, Mesopotamia is one of the great, ancient civilizations, though it is still relatively unknown. Yet, over 7,000 years ago in Mesopotamia, the very first cities were created. This is the first book to reveal how life was lived in ten Mesopotamian cities: from Eridu, the Mesopotamian Eden, to that potent symbol of decadence, Babylon - the first true metropolis: multicultural, multi-ethnic, the last centre of a dying civilization.

Wikimedia Commons

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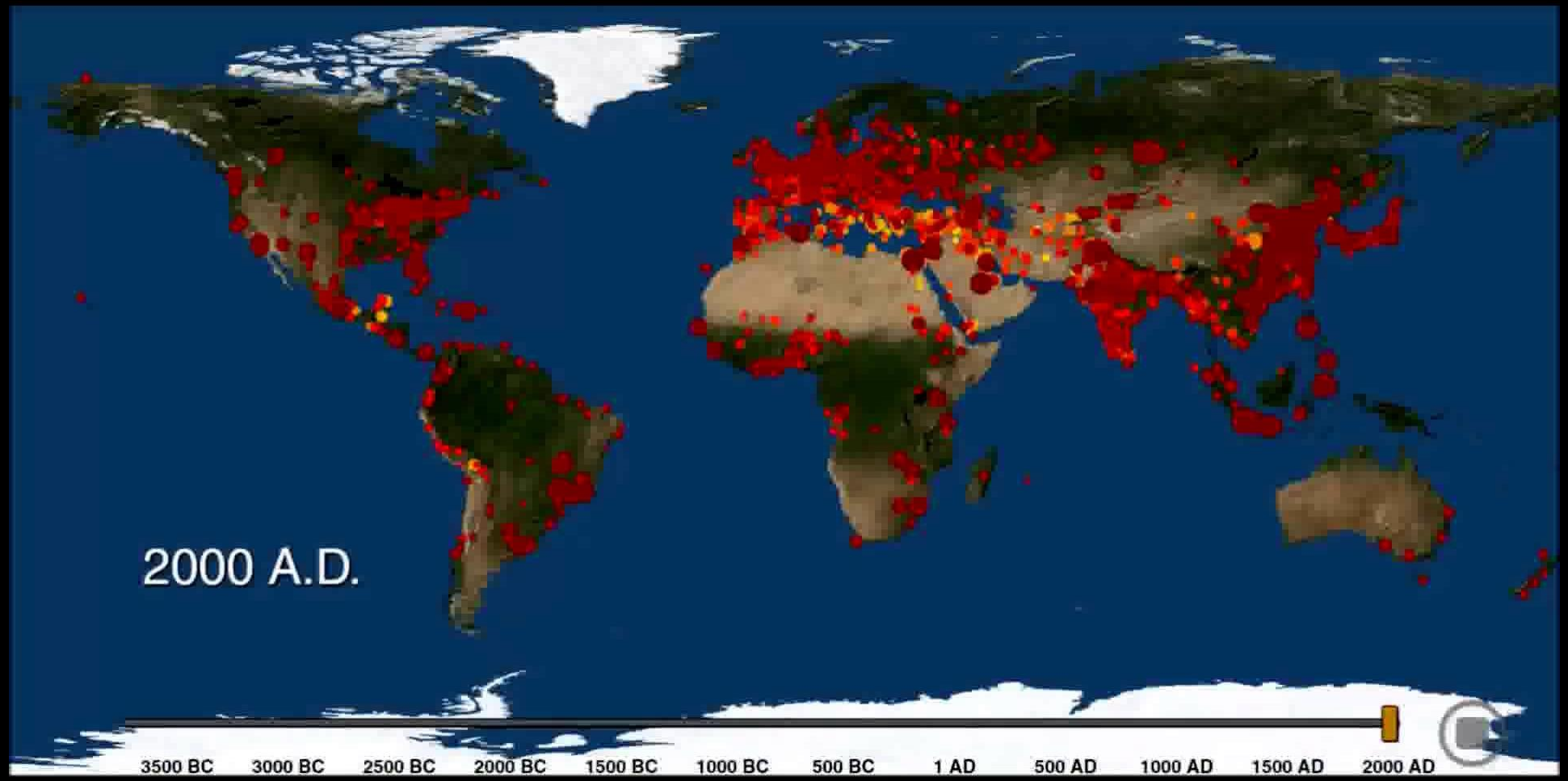
Aufstieg und Fall der großen Weltstädte



Die Geschichte der Urbanisierung, 3700 v.Chr. - 2000 n.Chr.

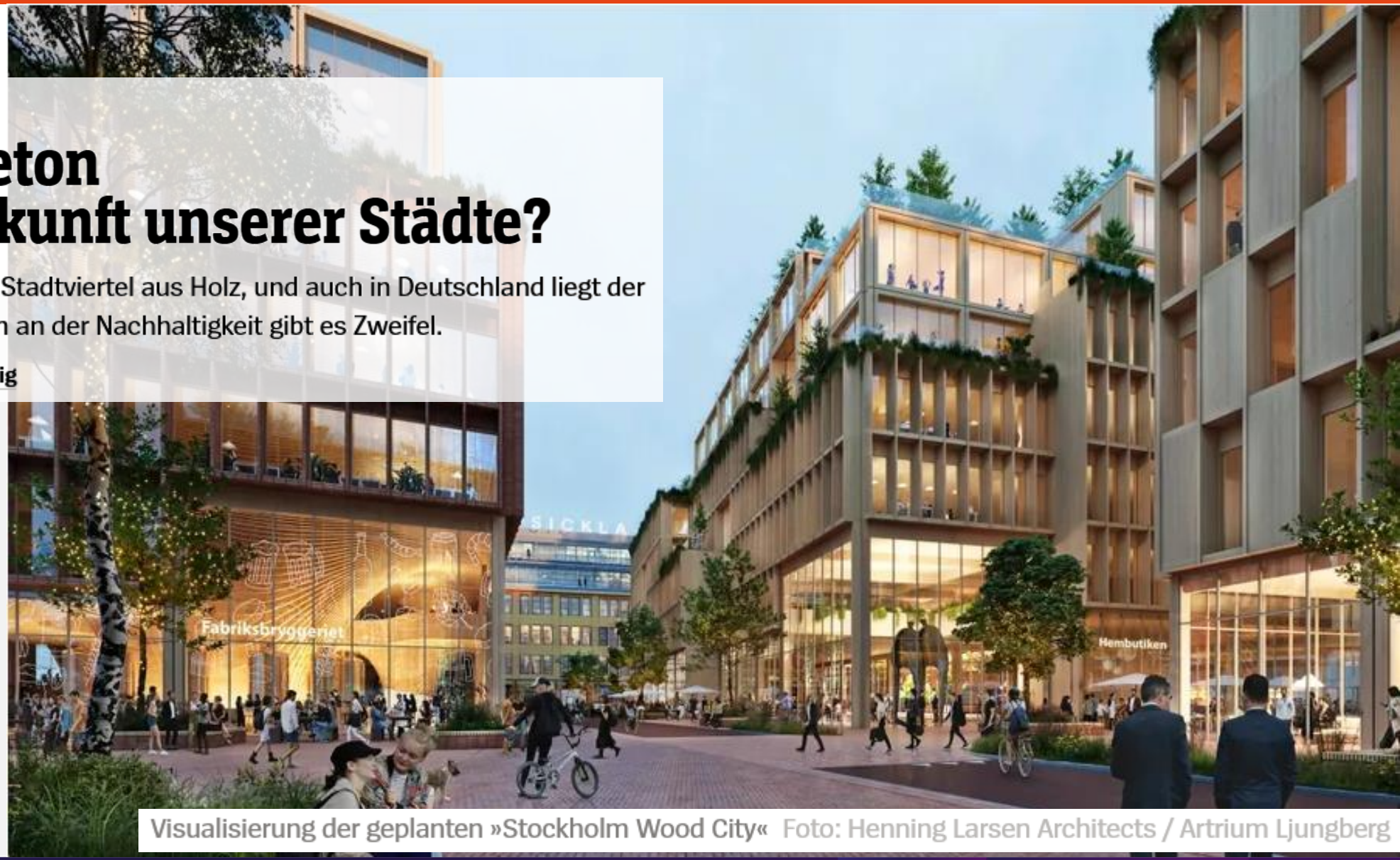
SPIEGEL Wirtschaft

Baumhaus-Boom 20.11.2023

S+ Holz statt Beton – ist das die Zukunft unserer Städte?

In Schweden entsteht ein ganzes Stadtviertel aus Holz, und auch in Deutschland liegt der natürliche Rohstoff im Trend. Doch an der Nachhaltigkeit gibt es Zweifel.

Von **Philip Bethge** und **Henning Jauernig**



Visualisierung der geplanten »Stockholm Wood City« Foto: Henning Larsen Architects / Artrium Ljungberg

Originalartikel: hier

Wood4Bauhaus Virtual Conference,
8 April 2021

Reforesting the Planet, Retimbering the City

Professor H. J. Schellnhuber CBE
Director Emeritus, Potsdam Institute for Climate Impact Research

Städte in der Evolution des Kohlenstoffkreislaufes

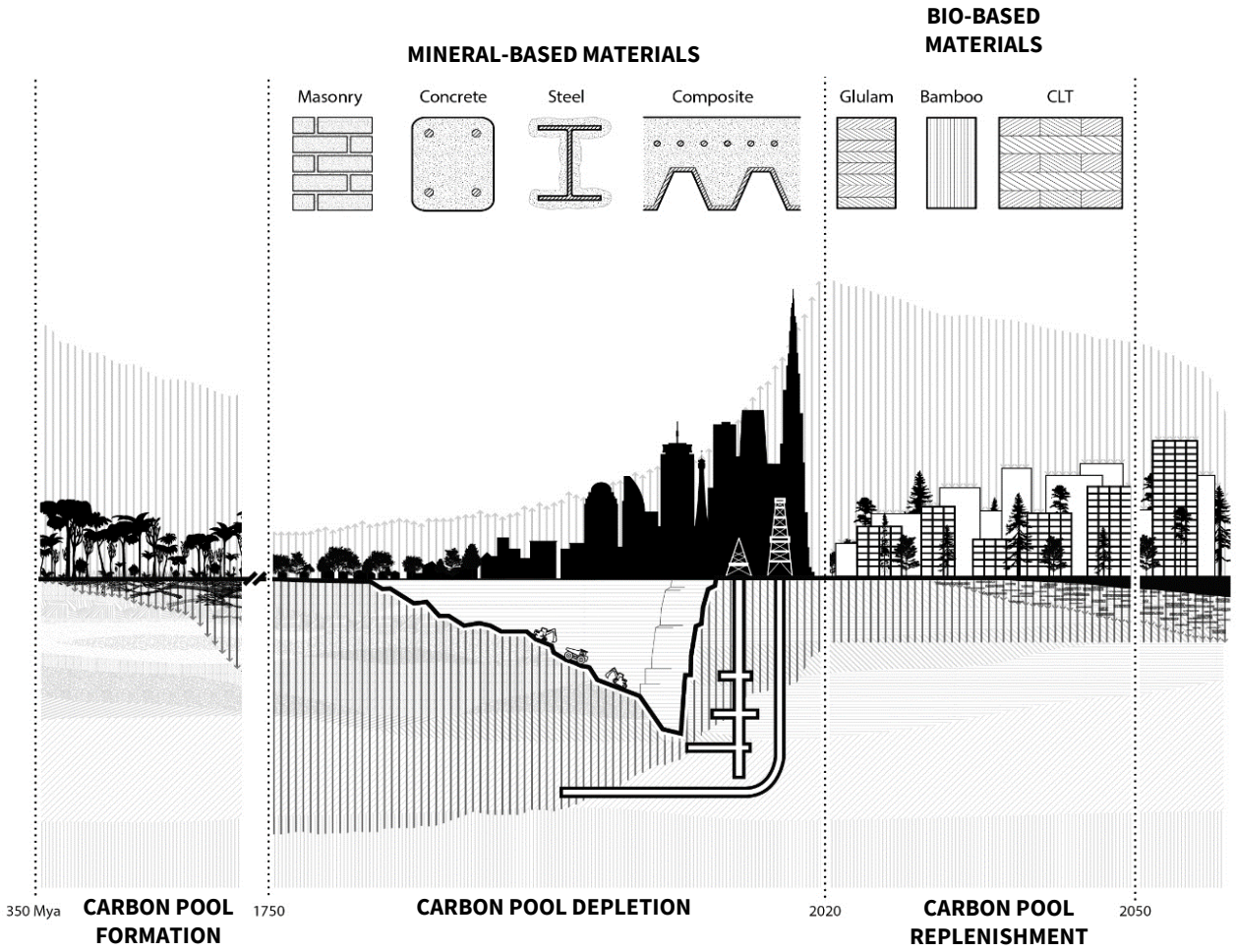
nature sustainability

Perspective | Published: 27 January 2020

Buildings as a global carbon sink

Galina Churkina ✉, Alan Organschi, Christopher P. O. Reyer, Andrew Ruff, Kira Vinke, Zhu Liu, Barbara K. Reck, T. E. Graedel & Hans Joachim Schellnhuber

https://doi.org/10.1038/s41893-019-0462-4



Um das Klima wieder herzustellen

(i) Erhalt und Pflanzung von 500 Millarden Bäumen

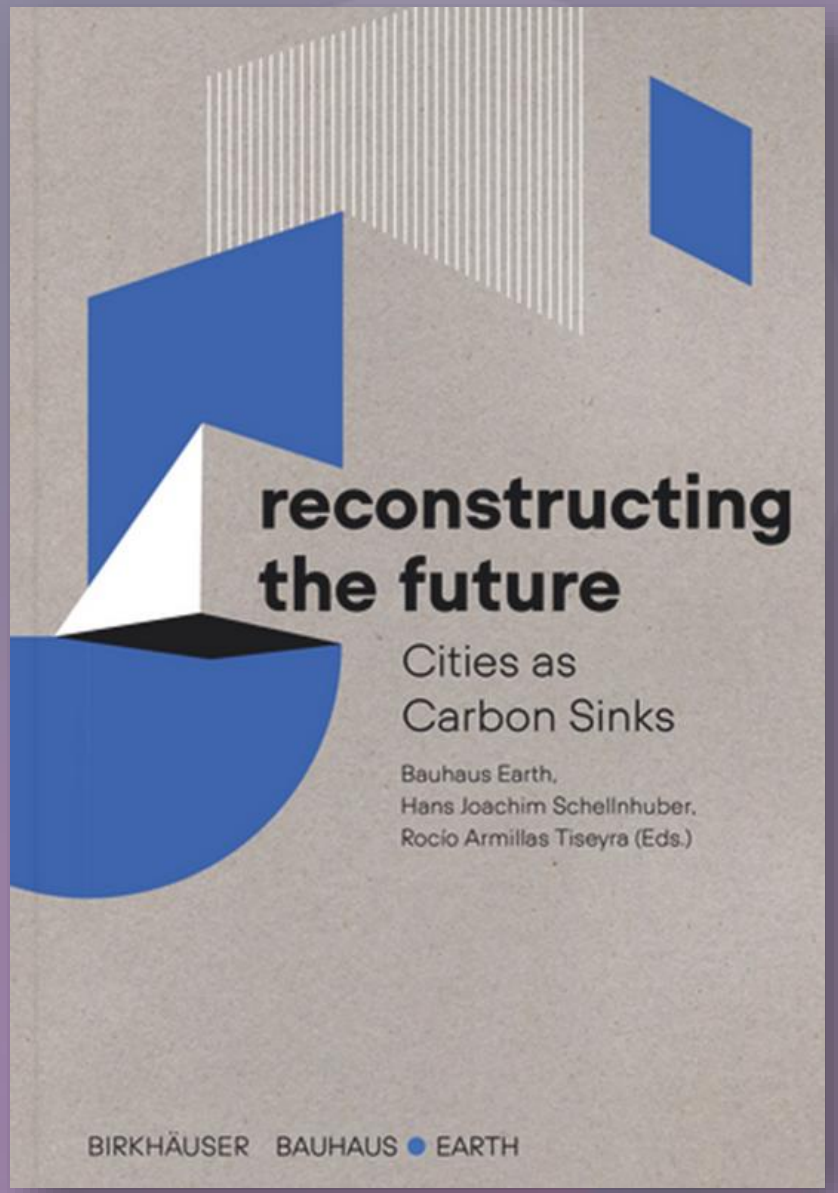
(ii) Bau von 2 Milliarden Wohneinheiten aus der geernteten Biomasse

Die naturbasierte Lösung!

Reconstructing the Future for People and Planet – a New Bauhaus Initiative

PAS Conference, 9-10 June 2022

© Gabriella Clare Marino



BUGA 2019 Pavillon Heilbronn

BUGA 2023 Pavillon Mannheim

BUGA pavilion I Heilbronn, Germany I ICD / ITKE University of Stuttgart

Credit: ICD / ITKE University of Stuttgart

SARA Kulturhus

SKELLEFTEÅ, SWEDEN

Quelle: Åke Eson Lindman, Patrick Degerman, Sven Burman, David Valldeby / White Arkitekter

Geschossfläche
30.000 m²

Stockwerke
20

Bauherr
HENT

Architecture
White Arkitekter
Martinsons (Lieferant und Montage von Holzrahmen)
Derome (Hotelzimmer-Module)

Tragwerksplannung
Florian Kosche

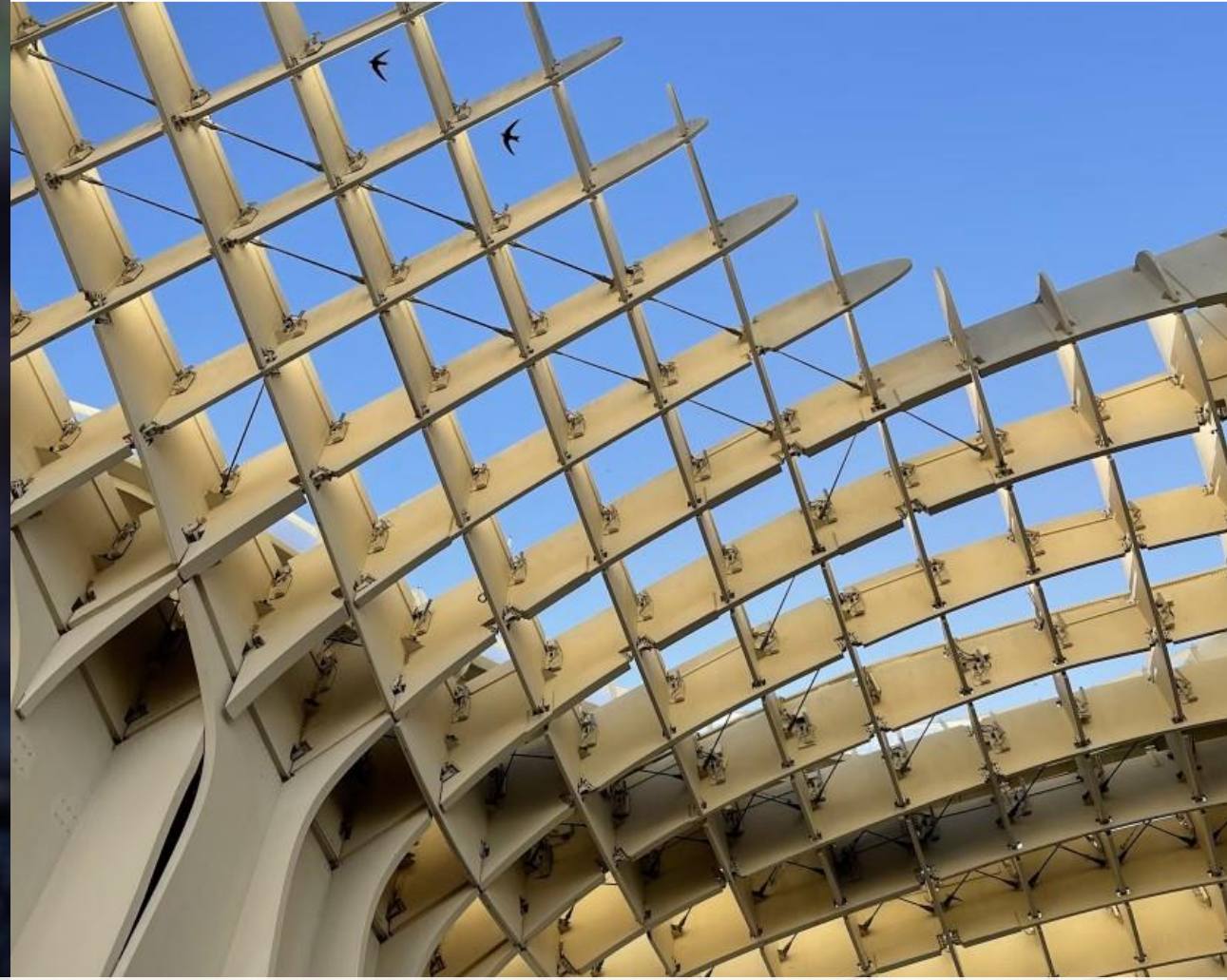
Projektplanung
TK Botnia

Nutzung
Kulturzentrum

ATLASSIAN TOWER

Sydney

Courtesy of WIEHAG



Integrating Sustainable Land Use and Regenerative Architecture

Take-Home Messages

Pflanzen gedeihen dank unserer CO_2-Emissionen

1

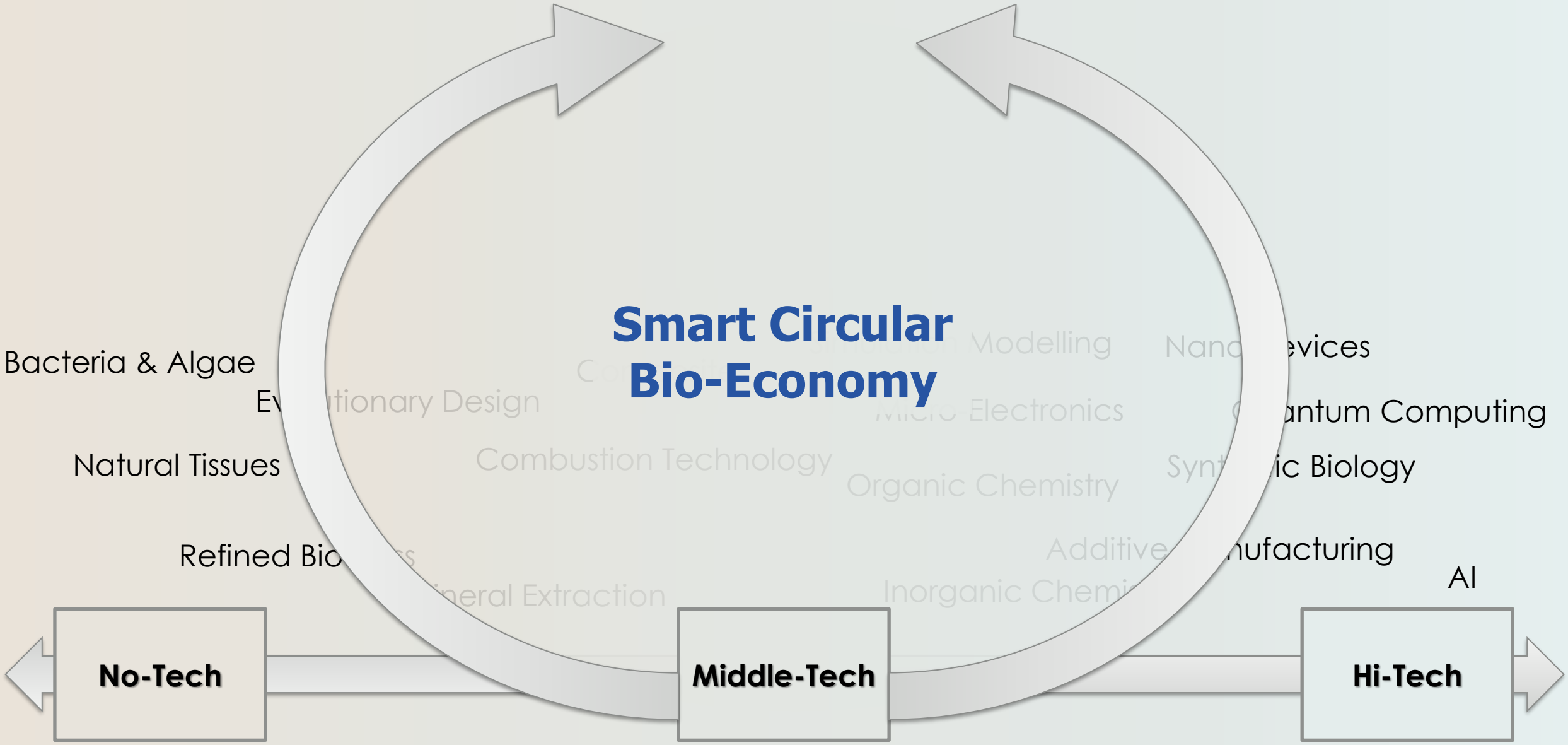
Photosynthese erzeugt aus atmosphärischem Kohlenstoff wertvolle Rohstoffe

2

Die langfristige Nutzung dieser Materialien schafft einen wirtschaftlichen Wert **und** trägt zur Reperatur des Klimas bei.

3

No-Tech Meets Hi-Tech!



No-Tech Meets Hi-Tech!

The Observer
Medical research
4 Feb 2024 full article here

First UK patients receive experimental messenger RNA cancer therapy

The British clinical trial of the revolutionary new mRNA treatment will test its effectiveness in combating a range of cancers

Science

Mar 2018 full article here

REVIEW

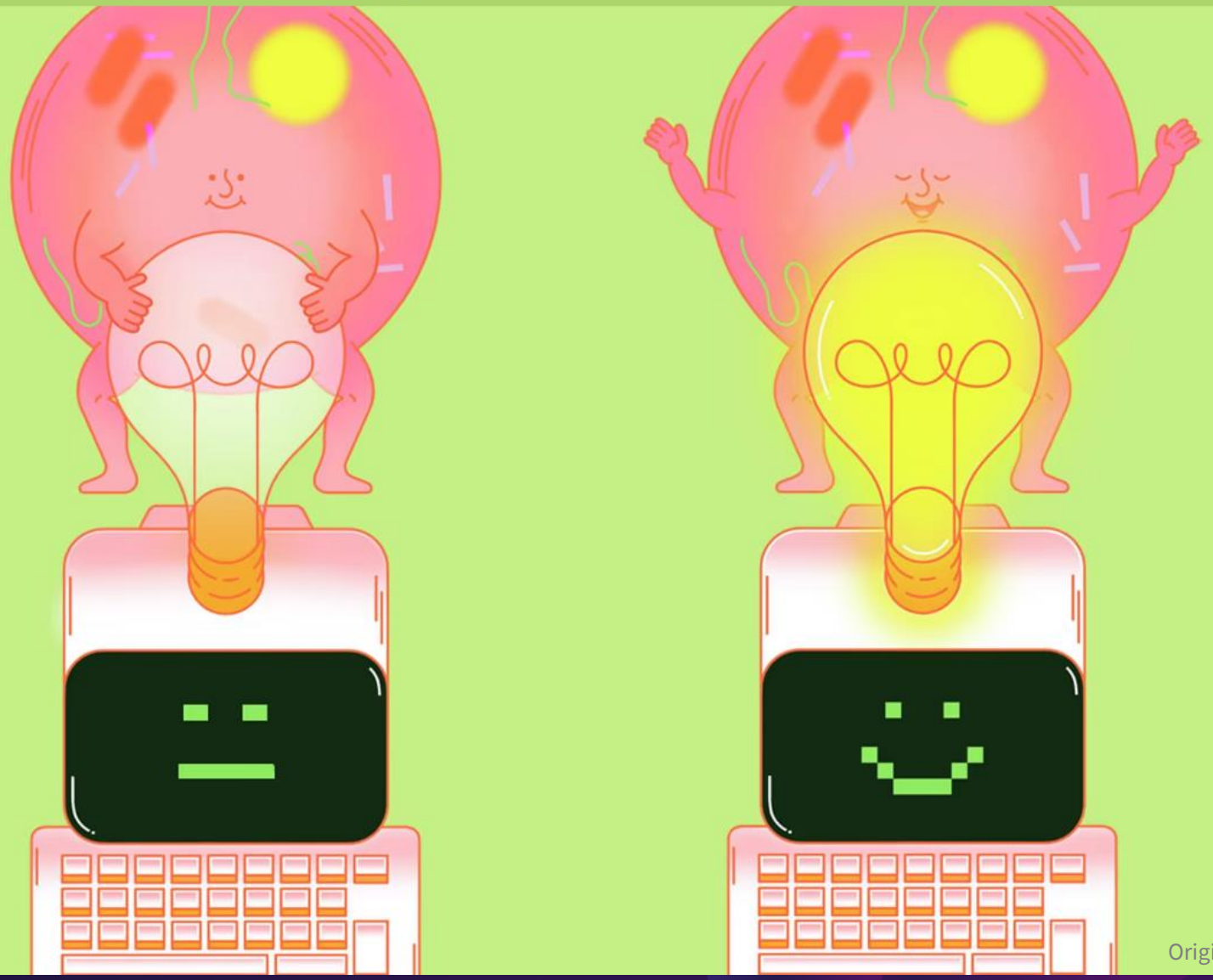
Personalized vaccines for cancer immunotherapy

Ugur Sahin[1,2,3]* and Özlem Türeci[4]

Süddeutsche Zeitung

Organoide Intelligenz

Die Maschine lebt



Originalartikel: hier

DER STANDARD

INFORMATIK-REVOLUTION

Erste Schritte auf dem Weg zu einer Quanten-KI

Künstliche Intelligenz und Quantencomputer verleihen unseren technischen Systemen enorme Fähigkeiten. Nun sollen die beiden Sphären sinnvoll verknüpft werden

Alois Pumhösel

12. April 2024

Originalartikel: hier

STANFORD-STUDIE

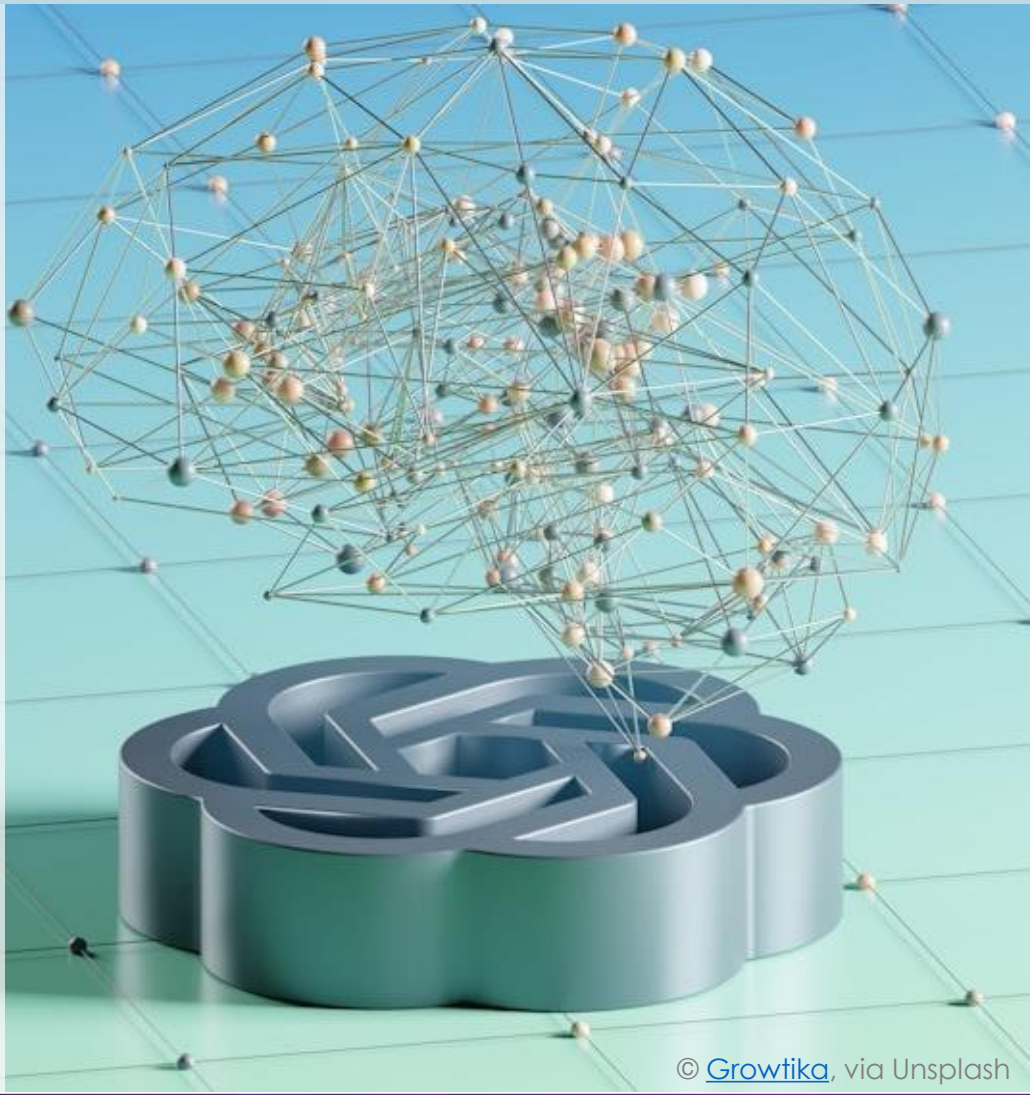
Künstliche Intelligenz übertrifft menschliche Fähigkeiten immer schneller

Der KI-Boom führt zu Höchstleistungen, aber auch zu explodierenden Kosten und immensem Energieverbrauch. Forscher fürchten, dass den Systemen die Trainingsdaten ausgehen könnten

Karin Krichmayr

18. April 2024

Originalartikel: hier



© Growtika, via Unsplash

Artificial Intelligence Index Report 2023

TOP TAKEAWAYS

Artificial Intelligence Index

Stanford University Human-Centered Artificial Intelligence

1. AI beats humans on some tasks, but not on all.

AI has surpassed human performance on several benchmarks, including some in image classification, visual reasoning, and English understanding. Yet it trails behind on more complex tasks like competition-level mathematics, visual commonsense reasoning and planning.

2. Industry continues to dominate frontier AI research.

In 2023, industry produced 51 notable machine learning models, while academia contributed only 15. There were also 21 notable models resulting from industry-academia collaborations in 2023, a new high.

3. Frontier models get way more expensive.

According to AI Index estimates, the training costs of state-of-the-art AI models have reached unprecedented levels. For example, OpenAI's GPT-4 used an estimated $78 million worth of compute to train, while Google's Gemini Ultra cost $191 million for compute.

4. The United States leads China, the EU, and the U.K. as the leading source of top AI models.

In 2023, 61 notable AI models originated from U.S.-based institutions, far outpacing the European Union's 21 and China's 15.

5. Robust and standardized evaluations for LLM responsibility are seriously lacking.

New research from the AI Index reveals a significant lack of standardization in responsible AI reporting. Leading developers, including OpenAI, Google, and Anthropic, primarily test their models against different responsible AI benchmarks. This practice complicates efforts to systematically compare the risks and limitations of top AI models.

6. Generative AI investment skyrockets.

Despite a decline in overall AI private investment last year, funding for generative AI surged, nearly octupling from 2022 to reach $25.2 billion. Major players in the generative AI space, including OpenAI, Anthropic, Hugging Face, and Inflection, reported substantial fundraising rounds.

7. The data is in: AI makes workers more productive and leads to higher quality work.

In 2023, several studies assessed AI's impact on labor, suggesting that AI enables workers to complete tasks more quickly and to improve the quality of their output. These studies also demonstrated AI's potential to bridge the skill gap between low- and high-skilled workers. Still other studies caution that using AI without proper oversight can lead to diminished performance.

8. Scientific progress accelerates even further, thanks to AI.

In 2022, AI began to advance scientific discovery. 2023, however, saw the launch of even more significant science-related AI applications—from AlphaDev, which makes algorithmic sorting more efficient, to GNoME, which facilitates the process of materials discovery.

9. The number of AI regulations in the United States sharply increases.

The number of AI-related regulations in the U.S. has risen significantly in the past year and over the last five years. In 2023, there were 25 AI-related regulations, up from just one in 2016. Last year alone, the total number of AI-related regulations grew by 56.3%.

10. People across the globe are more cognizant of AI's potential impact—and more nervous.

A survey from Ipsos shows that, over the last year, the proportion of those who think AI will dramatically affect their lives in the next three to five years has increased from 60% to 66%. Moreover, 52% express nervousness toward AI products and services, marking a 13 percentage point rise from 2022. In America, Pew data suggests that 52% of Americans report feeling more concerned than excited about AI, rising from 38% in 2022.

Full report: here