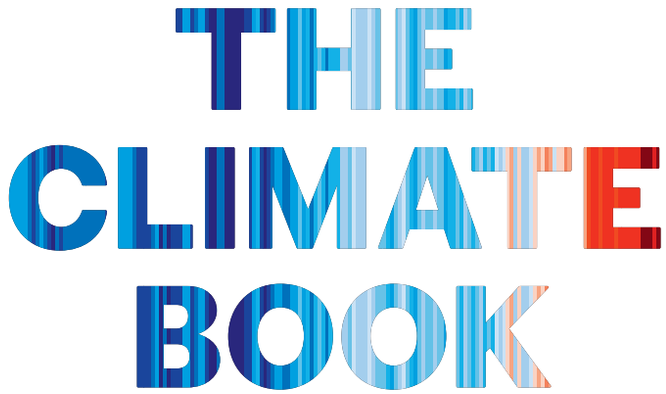
Greta Thunberg was born in 2003. In August 2018, she started a school strike for the climate outside the Swedish Parliament that has since spread all over the world. She is an activist in Fridays for Future and has spoken at climate rallies across the globe, as well as at the World Economic Forum in Davos, the US Congress, and the United Nations.



CREATED BY

GRETA THUNBERG

allen lane
an imprint of
PENGUIN BOOKS

Penguin Random House UK

UK | USA | Canada | Ireland | Australia
India | New Zealand | South Africa
Allen Lane is part of the Penguin
Random House group of companies
whose addresses can be found at
global.penguinrandomhouse.com

First published by Allen Lane 2022
001

Collection copyright © Greta Thunberg, 2022
Essays copyright © the individual authors, 2022
The moral right of the author has been asserted
Art Direction: Jim Stoddart
Design: Stefanie Posavec
Graph and chart design: Sonja Kuijpers
Cover artwork: *Warming Stripes* by Ed Hawkins
The credits on page 444–6 constitute an extension
to this copyright page
Printed and bound in Italy by Printer Trento S.r.l.
The authorized representative in the EEA is
Penguin Random House Ireland, Morrison Chambers,
32 Nassau Street, Dublin D02 YH68
A CIP catalogue record for this book
is available from the British Library
: 978–0–241–54747–2

www.greenpenguin.co.uk

MIX
Paper from responsible sources
FSC® C018179

Penguin Random House is committed to a sustainable future for our business, our readers and our planet. This book is made from Forest Stewardship Council® certified paper.

PART ONE /

How Climate Works

1

1.1 ‘To solve this problem, we need to understand it’ / Greta Thunberg 2

1.2 **The Deep History of Carbon Dioxide** 6
Peter Brannen / Science journalist, contributing writer at the *Atlantic* and author of *The Ends of the World.*

1.3 **Our Evolutionary Impact** 9
Beth Shapiro / Professor of Ecology and Evolutionary Biology at University of California Santa Cruz and author of *Life as We Made It.*

1.4 **Civilization and Extinction** 11
Elizabeth Kolbert / Staff writer for the *New Yorker* and the author, most recently, of *Under a White Sky: The Nature of the Future.*

1.5 ‘The science is as solid as it gets’ / Greta Thunberg 18

1.6 **The Discovery of Climate Change** 23
Michael Oppenheimer / Atmospheric scientist, Princeton University’s Professor of Geosciences and International Affairs and long-time IPCC author.

1.7 **Why Didn’t They Act?** 29
Naomi Oreskes / Professor of the History of Science and Affiliated Professor of Earth and Planetary Sciences at Harvard University.

1.8 **Tipping Points and Feedback Loops** 32
Johan Rockström / Director of the Potsdam Institute for Climate Impact Research and Professor at Potsdam University.

1.9 ‘This is the biggest story in the world’ / Greta Thunberg 41

PART TWO /

How our Planet is Changing

44

2.1 ‘The weather seems to be on steroids’ / Greta Thunberg 48

2.2 **Heat** 50
Katharine Hayhoe / Endowed Chair and Distinguished Professor at Texas Tech University and author of *Saving Us.*

2.3 **Methane and Other Gases** 53
Zeke Hausfather / Lead climate researcher lead at Stripe, research scientist at Berkeley Earth.

2.4 **Air Pollution and Aerosols** 57
Bjørn H. Samset / Senior researcher at CICERO Centre for International Climate Research, an IPCC lead author, and expert on the effects of non-CO_2 emissions.

2.5 **Clouds** 60
Paulo Ceppi / Lecturer in climate science at the Grantham Institute and the Department of Physics at Imperial College London.

2.6 **Arctic Warming and the Jet Stream** 62
Jennifer Francis / Senior scientist at the Woodwell Climate Research Center and formerly Research Professor in Marine and Coastal Sciences at Rutgers University.

2.7 **Dangerous Weather** 67
Friederike Otto / Senior lecturer in Climate Science at the Grantham Institute at Imperial College London and co-lead of World Weather Attribution.

2.8 'The snowball has been set in motion' / Greta Thunberg 72

2.9 **Droughts and Floods** 74
Kate Marvel / Climate scientist at the Columbia University Center for Climate Systems research and the NASA Goddard Institute for Space Studies.

2.10 **Ice Sheets, Shelves and Glaciers** 76
Ricarda Winkelmann / Professor of Climate System Analysis at the Potsdam Institute for Climate Impact Research and the University of Potsdam.

2.11 **Warming Oceans and Rising Seas** 78
Stefan Rahmstorf / Head of the Earth System Analysis department at the Potsdam Institute and Professor of Ocean Physics at the University of Potsdam.

2.12 **Acidification and Marine Ecosystems** 84
Hans-Otto Pörtner / Climatologist, physiologist, Professor and Head of the Department of Integrative Ecophysiology at the Alfred Wegener Institute.

2.13 **Microplastics** 86
Karin Kvale / Senior researcher at GNS Science and expert in modelling the role of marine ecology in global biogeochemical cycles.

2.14 **Fresh Water** 88
Peter H. Gleick / Co-founder and president-emeritus of the Pacific Institute, member US National Academy of Sciences, hydroclimatologist.

2.15 'It is much closer to home than we think' / Greta Thunberg 90

2.16 **Wildfires** 96
Joëlle Gergis / Senior lecturer in Climate Science at the Australian National University and lead author on the IPCC Sixth Assessment Report.

2.17 **The Amazon** 99
Carlos Nobre / Earth System scientist on The Amazon, Chair of the Science Panel for the Amazon and the convener of the Amazonia 4.0 project.
Julia Arieira / Plant Ecologist and Earth system scientist at Brazil's Federal University of Espírito Santo.
Nathália Nascimento / Geographer and Earth system scientist at Brazil's Federal University of Espírito Santo.

2.18 **Boreal and Temperate Forests** 102
Beverly Law / Professor Emeritus of Global Change Biology and Terrestrial Systems Science at Oregon State University.

2.19 **Terrestrial Biodiversity** 106
Andy Purvis / Biodiversity researcher at the Natural History Museum in London; led a chapter of the first IPBES Global Assessment of Biodiversity & Ecosystem Services.
Adriana De Palma / World Economic Forum Young Scientist and senior researcher at the Natural History Museum in London.

2.20 **Insects** 110
Dave Goulson / Professor of Biology at the University of Sussex; author of over 400 scientific articles on insect ecology and, among other books, *Silent Earth*.

2.21 **Nature's Calendar** 113
Keith W. Larson / Ecologist researching environmental change in the Arctic and Director of the Arctic Centre at Umeå University.

2.22 **Soil** 116
Jennifer L. Soong / Soil ecologist at Granular Inc. Affiliate scientist at Colorado State University and Lawrence Berkeley National Laboratory.

2.23 **Permafrost** 118
Örjan Gustafsson / Professor in Biogeochemistry at Stockholm University, and elected Fellow of the Royal Swedish Academy of Sciences.

2.24 **What Happens at 1.5, 2 and 4°C of Warming?** 122
Tamsin Edwards / Climate scientist at King's College London, an IPCC lead author and science communicator specializing in uncertainties in sea-level rise.

PART THREE /

How It Affects Us 128

3.1 'The world has a fever' / Greta Thunberg 132

3.2 **Health and Climate** 134
Tedros Adhanom Ghebreyesus / Director-general of the World Health Organization.

3.3 **Heat and Illness** 137
Ana M. Vicedo-Cabrera / Environmental epidemiologist, leader of the Climate Change and Health research group at the University of Bern.

3.4 **Air Pollution** 140
Drew Shindell / Climate scientist and Distinguished Professor at Duke University's Nicholas School of the Environment, author on multiple IPCC Assessments.

3.5 **Vector-borne Diseases** 143
Felipe J. Colón-González / Assistant Professor at the Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine.

3.6 **Antibiotic Resistance** 147
John Brownstein / Chief innovation officer, Boston Children's Hospital; Professor of Biomedical Informatics and Pediatrics, Harvard Medical School.
Derek MacFadden / Clinician scientist at the Ottawa Hospital; Junior Clinical Research Chair in Antibiotic Use and Antibiotic Resistance at the University of Ottawa, Canada.
Sarah McGough / Infectious disease epidemiologist, Harvard T. H. Chan School of Public Health.
Mauricio Santillana / Professor of Physics, Northeastern University, and Adjunct Professor of Epidemiology, Harvard T. H. Chan School of Public Health.

3.7 **Food and Nutrition** 149
Samuel S. Myers / Principal research scientist, Harvard T. H. Chan School of Public Health and Director, Planetary Health Alliance.

3.8 'We are not all in the same boat' / Greta Thunberg 154

3.9 **Life at 1.1°C** 158
Saleemul Huq / Director of the International Centre for Climate Change and Development at the Independent University, Bangladesh.

3.10 **Environmental Racism** 162
Jacqueline Patterson / Founder and Executive Director of the Chisholm Legacy Project, a resource hub for Black front-line climate justice leadership.

3.11 **Climate Refugees** 165
Abrahm Lustgarten / Investigative reporter for *ProPublica* and the *New York Times Magazine*; author of a forthcoming book about climate-driven migration in the US.

3.12 **Sea-level Rise and Small Islands** 169
Michael Taylor / Caribbean climate scientist, IPCC lead author, professor and dean of the Faculty of Science and Technology, the University of the West Indies, Mona.

3.13 **Rain in the Sahel** 171
Hindou Oumarou Ibrahim / Indigenous woman, geographer and coordinator of the Association of Indigenous Women and Peoples of Chad; UN Sustainable Development Goals advocate.

3.14 **Winter in Sápmi** 173
Elin Anna Labba / Sámi journalist and writer working with indigenous literatures at Tjállegoahte in Jokkmokk, Sweden.

3.15 **Fighting for the Forest** 176
Sonia Guajajara / Brazilian Indigenous activist, environmentalist and politician, and coordinator of the Association of Indigenous People of Brazil.

3.16 'Enormous challenges are waiting' / Greta Thunberg 180

3.17 **Warming and Inequality** 182
Solomon Hsiang / Scientist and economist, Professor and Director of the Global Policy Laboratory at UC Berkeley; co-founder of the Climate Impact Lab.

3.18 **Water Shortages** 186
Taikan Oki / Global hydrologist, former Senior Vice-Rector of the United Nations University, and an IPCC Coordinating Lead Author.

3.19 **Climate Conflicts** 188
Marshall Burke / Associate Professor in the Department of Earth System Science at Stanford University and co-founder of Atlas AI.

3.20 **The True Cost of Climate Change** 191
Eugene Linden / Journalist and author; his most recent book on climate change is *Fire and Flood*. Previously, *The Winds of Change* won a Grantham Award.

PART FOUR /

What We've Done About It 196

4.1 'How can we undo our failures if we are unable to admit that we have failed?' / Greta Thunberg 200

4.2 **The New Denialism** 204
Kevin Anderson / Professor of Energy and Climate Change at the Universities of Manchester, Uppsala and Bergen.

4.3 **The Truth about Government Climate Targets** 210
Alexandra Urisman Otto / Climate reporter at the Swedish newspaper *Dagens Nyheter* and co-author of *Gretas resa* (*Greta's Journey*).

4.4 'We are not moving in the right direction' / Greta Thunberg 216

4.5 **The Persistence of Fossil Fuels** 219
Bill McKibben / Founder of the environmental organizations 350.org and Third Act and author of more than a dozen books, including *The End of Nature* and *Eaarth*.

4.6 **The Rise of Renewables** 224
Glen Peters / Research Director at the Centre for International Climate Research in Oslo; member of the executive team of the Global Carbon Budget; an IPCC lead author.

4.7 **How Can Forests Help Us?** 230
Karl-Heinz Erb / An IPCC lead author, Director of the Institute of Social Ecology and associate Professor at the University of Natural Resources and Life Sciences, Vienna.
Simone Gingrich / Assistant Professor, Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna.

4.8 **What about Geoengineering?** 233
Niclas Hällström / Director of WhatNext?, President of the ETC Group, and senior affiliate at Centre for Environment and Development Studies, Uppsala University.
Jennie C. Stephens / Dean's Professor of Sustainability Science and Policy at Northeastern University, and author of *Diversifying Power*.
Isak Stoddard / PhD candidate in Natural Resources and Sustainable Development at the Department of Earth Sciences, Uppsala University.

4.9 **Drawdown Technologies** 235
Rob Jackson / Earth scientist at Stanford University and Chair of the Global Carbon Project.

4.10 'A whole new way of thinking' / Greta Thunberg 240

4.11 **Our Imprint on the Land** 244
Alexander Popp / Senior scientist at the Potsdam Institute for Climate Impact Research and leader of a research group on land-use management.

4.12 **The Calorie Question** 248
Michael Clark / Environmental scientist at the University of Oxford, focusing on food systems' contribution to climate, biodiversity and well-being.

4.13 **Designing New Food Systems** 252
Sonja Vermeulen / Director of Programs at CGIAR, and Associate at Chatham House.

4.14 **Mapping Emissions in an Industrial World** 256
John Barrett / Professor in Energy and Climate Policy, University of Leeds, government advisor to DEFRA and an IPCC lead author.
Alice Garvey / Researcher at the Sustainability Research Institute, University of Leeds.

4.15 **The Technical Hitch** 260
Ketan Joshi / Freelance writer, analyst and communications consultant, who has previously worked for a variety of Australian and European climate organizations.

4.16 **The Challenge of Transport** 265
Alice Larkin / Vice-Dean and Head of School of Engineering and a Professor of Climate Science and Energy Policy at the Tyndell Centre, University of Manchester.

4.17 **Is the Future Electric?** 271
Jillian Anable / Co-director of CREDS Centre for Research in energy demand solutions.
Christian Brand / Co-director of UK Energy Research Centre and Associate Professor at University of Oxford. Author of *Personal Travel and Climate Change*.

4.18 'They keep saying one thing while doing another' / Greta Thunberg 278

4.19 **The Cost of Consumerism** 281
Annie Lowrey / Staff writer at the *Atlantic*, covering economic policy, and author of *Give People Money*.

4.20 **How (Not) to Buy** 285
Mike Berners-Lee / Professor at Lancaster University's Environment Centre, Director of Small World Consulting Ltd and author of *There is No Planet B*.

4.21 **Waste around the World** 290
Silpa Kaza / Senior urban development specialist in the World Bank's Urban, Disaster Risk Management, Resilience and Land Global Practice.

4.22 **The Myth of Recycling** 295
Nina Schrank / Senior campaigner for the Plastics Team at Greenpeace UK.

4.23 'This is where we draw the line' / Greta Thunberg 301

4.24 **Emissions and Growth** 306
Nicholas Stern / Professor of Economics and Government; Chair of the Grantham Research Institute, London School of Economics and Political Science.

4.25 **Equity** 308
Sunita Narain / Director-general of the Centre for Science and Environment, a not-for-profit public interest research and advocacy organization based in New Delhi.

4.26 **Degrowth** 310
Jason Hickel / Economic anthropologist, author and Professor at the Institute for Environmental Science and Technology at the Autonomous University of Barcelona.

4.27 **The Perception Gap** 313
Amitav Ghosh / Author of sixteen works of fiction and non-fiction; the first English-language writer to receive India's highest literary honour, the Jnanpith Award.

PART FIVE /

What We Must Do Now 320

5.1 'The most effective way to get out of this mess is to educate ourselves' / Greta Thunberg 324

5.2 **Individual Action, Social Transformation** 328
Stuart Capstick / An environmental social scientist based at Cardiff University and Deputy Director of the Centre for Climate Change and Social Transformations.
Lorraine Whitmarsh / Professor of Environmental Psychology, University of Bath; Director of the Centre for Climate Change and Social Transformations.

5.3 **Towards 1.5°C Lifestyles** 331
Kate Raworth / Co-founder of Doughnut Economics Action Lab and Senior Associate at Oxford University's Environmental Change Institute.

5.4 **Overcoming Climate Apathy** 337
Per Espen Stoknes / A psychologist, TEDGlobal speaker and Co-director of the Centre for Sustainability at the Norwegian Business School.

5.5 **Changing Our Diets** 340
Gidon Eshel / Professor of environmental physics at Bard College, New York.

5.6 **Remembering the Ocean** 344
Ayana Elizabeth Johnson / Marine biologist, co-founder of the policy think tank Urban Ocean Lab, co-editor of *All We Can Save*, and co-creator of *How to Save a Planet*.

5.7 **Rewilding** 348
George Monbiot / Writer, film-maker and environmental activist; author of a weekly column for the Guardian as well as various books and videos.
Rebecca Wrigley / Founder and Chief Executive of Rewilding Britain and has worked in conservation and community development for thirty years.

5.8 'We now have to do the seemingly impossible' / Greta Thunberg 354

5.9 **Practical Utopias** 360
Margaret Atwood / Booker Prize-winning author of more than fifty books of fiction, poetry and critical essays.

5.10 **People Power** 364
Erica Chenoweth / Political scientist, Professor at Harvard University.

5.11 **Changing the Media Narrative** 369
George Monbiot / Writer, film-maker and environmental activist; author of a weekly column for the Guardian as well as various books and videos.

5.12 **Resisting the New Denialism** 372
Michael E. Mann / Atmospheric Science at Penn State, IPCC contributor, and author of many books, including *The New Climate War*.

5.13 **A Genuine Emergency Response** 375
Seth Klein / Team lead with the Climate Emergency Unit and author of *A Good War: Mobilizing Canada for the Climate Emergency*.

5.14 **Lessons from the Pandemic** 378
David Wallace-Wells / *New York Times Opinion* writer and magazine columnist. Author of *The Uninhabitable Earth: Life After Warming*.

5.15 'Honesty, solidarity, integrity and climate justice' / Greta Thunberg 386

5.16 **A Just Transition** 390
Naomi Klein / Journalist and bestselling author; UBC Professor of Climate Justice and Co-director of the Centre for Climate Justice at the University of British Columbia.

5.17 **What Does Equity Mean to You** 396
Nicki Becker / Law student and climate justice activist from Argentina. Co-founder of Jovenes por el Clima; active in Fridays For Future MAPA.
Disha A. Ravi / Indian climate and environmental justice activist and writer.
Hilda Flavia Nakabuye / Climate and environmental rights activist who founded Uganda's Fridays For Future movement.
Laura Verónica Muñoz / Ecofeminist from the Colombian Andean mountains involved in Fridays For Future, Pacto X el Clima and Unite for Climate Action.
Ina Maria Shikongo / Mother, climate justice activist and poet active in the Fridays For Future International movement.
Ayisha Siddiqa / Pakistani-American storyteller, climate justice advocate and Co-founder of Polluters Out and Fossil Free University.
Mitzi Jonelle Tan / Full-time climate justice activist based in the Philippines involved with Youth Advocates for Climate Action Philippines and Fridays For Future.

5.18 **Women and the Climate Crisis** 402
Wanjira Mathai / Kenyan environmentalist and activist, and Vice-President and Regional Director for Africa at the World Resources Institute.

5.19 **Decarbonization Requires Redistribution** 405
Lucas Chancel / Co-director of the World Inequality Lab at the Paris School of Economics and Affiliate Professor at Sciences Po.
Thomas Piketty / Professor at EHESS and the Paris School of Economics, Co-director of the World Inequality Lab and the World Inequality Database.

5.20 **Climate Reparations** 410
Olúfẹ́mi O. Táíwò / Assistant Professor of Philosophy at Georgetown University, and author of *Reconsidering Reparations* and *Elite Capture*.

5.21 **Mending Our Relationship with the Earth** 415
Robin Wall Kimmerer / SUNY Distinguished Teacher of Environmental Biology, founder and Director of the Center for Native Peoples and the Environment.

5.22 'Hope is something you have to earn' / Greta Thunberg 421

What Next? 424

Index 437

Illustration Credits 444

A note on the cover 446
Ed Hawkins / Professor of Meteorology at the University of Reading.

The contributors have assembled thousands of references and citations for the chapters in *The Climate Book*. While these notes are too numerous to be printed within this book, they can be found at **theclimatebook.org**

Next pages
Frozen bubbles of methane in Lake Baikal, Russia.

primary suppliers of seedlings in their communities, ensuring that everyone participated in tree planting and that their farms were covered in green vegetation. It is women like these, women who protect the soil and produce food for the community, who are the landscape guardians and climate activists of our time.

These communities have enlisted scores of women to mobilize and begin the important work of planting trees. And now they are everywhere. They are in the homes, on the streets and in the fields, and we need to give them the opportunity to prepare the whole continent for what is coming. As Wangari Maathai so aptly said, 'In the course of history, there comes a time when humanity is called to shift to a new level of consciousness, to reach a higher moral ground . . . A time when we have to shed our fear and give hope to each other. That time is now.' As breadwinners, entrepreneurs and providers of food, shelter and education for their children, women will not surrender their livelihoods to climate change. They will prepare. They will adjust, and they will adapt. They just need the means to do so. It is incumbent upon governments to ensure that policies, laws and financial institutions support the backbone of our societies to the fullest because, if they break, we all will. /

When women possess land, and the seeds and tools to work it, they possess agency to adapt to climate change.

5.19

Decarbonization Requires Redistribution

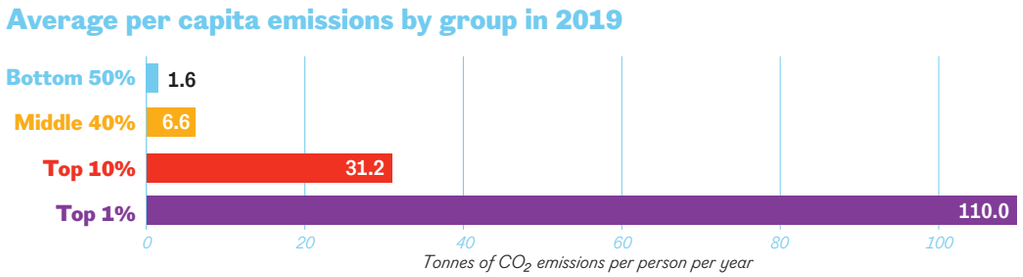
Lucas Chancel and Thomas Piketty

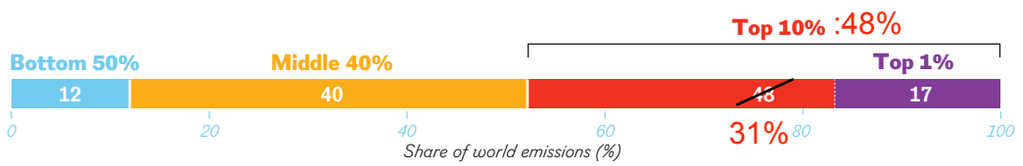
Let's face it: our chances of staying under a 2°C increase in global temperature are not looking good. If we continue business as usual, the world is on track to heat up by at least 3°C by the end of this century. At current global emissions rates, the carbon budget that we have left if we are to stay under 1.5°C will be depleted in six years. The paradox is that, globally, popular support for climate action has never been so strong. According to a recent United Nations poll, 64 per cent of people around the world see climate change as a global emergency. So, what have we got wrong so far?

There is a fundamental problem in the contemporary discussion of climate policy: it rarely acknowledges inequality. Poorer households, which are low CO_2 emitters, rightly anticipate that climate policies will limit their purchasing power. In return, policymakers fear a political backlash should they demand faster climate action. The problem with this vicious circle is that it has lost us a lot of time. The good news is that we can end it.

Let's first look at the data. In 2021, an average human being emitted about 6.5 tonnes of greenhouse gases. This average, however, masks huge inequalities. The top 10 per cent of emitters eject on average about 30 tonnes per year per person, while the poorest half of the population emits about 1.5 tonnes per year per person. Put differently, the top 10 per cent of the world's population are responsible for about 50 per cent of all greenhouse gas emissions, while the bottom half of the world contributes just 12 per cent of all emissions (Fig 1 & Fig 2).

Over the past three decades, the share of emissions of the global top 1 per cent of emitters (a group fifty times smaller than the global bottom 50 per cent) rose from around 9.5 per cent to 12 per cent. In other words, global carbon inequalities are large, but the gap between the very top and the rest of





Figures 1, 2 (above) and 3 (overleaf): Personal carbon footprints include emissions from domestic consumption, public and private investments, and imports and exports of carbon embedded in goods and services traded with the rest of the world. Estimates are based on the systematic combination of tax data, household surveys and input–output tables. Emissions are split equally within households.

the population has been growing over time. This is not simply a rich versus poor countries divide: there are huge emitters in poor countries, and low emitters in rich countries.

Consider the US, for instance. Every year, the poorest 50 per cent of the US population emit about 10 tonnes of CO_2 per person, while the richest 10 per cent emit close to 75 tonnes per person. That is a gap of more than seven to one. Similarly, in Europe, the poorest 50 per cent emit about 5 tonnes per person (less than the global average), while the richest 10 per cent emit about 30 tonnes – a gap of six to one. In East Asia, and in China in particular, the richest 10 per cent have a higher carbon footprint than the richest Europeans. Poorer world regions also exhibit significant inequalities, although it is necessary to zoom in on very wealthy groups (i.e. the top 0.1 per cent or above) to observe levels of emissions that are broadly comparable to those observed for wealthy groups in rich countries.

We stress that a lot remains to be done to precisely measure carbon inequalities. Governments should publish up-to-date numbers every year – at least as often as they publish GDP and growth statistics. We provide updated figures on carbon inequalities on the World Inequality Database (wid.world). Such information is necessary to design and evaluate any successful climate transition pathway.

Where do the large carbon inequalities that we have documented come from exactly? The rich emit more carbon through their direct carbon emissions (that is, the oil they put in their cars), but also from the goods and services they buy, as well as from the investments they make. Low-income

groups emit carbon when they use their cars or heat their homes, but their indirect emissions – that is, the emissions from the stuff they buy and the investments they make – are significantly lower than those of the rich. As we show in our recent World Inequality Report (2022), the poorest half of the population within each country in the world barely have any wealth, meaning that they have little or no responsibility for emissions associated with investment decisions.

Why do these inequalities matter? After all, shouldn't we all reduce our emissions? Yes, we should, but obviously some groups will have to make a greater effort than others. Intuitively, we might think here of the big emitters – the rich – right? True, and also poorer people have less capacity to decarbonize their consumption. It follows that the rich should contribute the most to curbing emissions, and the poor be given the capacity to cope with the transition to 1.5°C or 2°C. Unfortunately, this is not what is happening – if anything, what is happening is closer to the opposite.

In France, in 2018, the government raised carbon taxes in a way that hit rural, low-income households particularly hard, without much affecting the consumption habits and investment portfolios of the well-off. Many families had no way to reduce their energy consumption. They had no option but to drive their cars to go to work and to pay the higher carbon tax. At the same time, the aviation fuel used by the rich to fly from Paris to the French Riviera was exempted from the tax change. Reactions to this unequal treatment eventually led to the reform being abandoned. These politics of climate action, which demand no significant effort from the rich yet hurt the poor, are not specific to any one country. Fears of job losses in the automobile, fossil or heavy metal industries are regularly used by business groups as an argument to slow climate policies.

Countries have announced plans to cut their emissions significantly by 2030, and most have established plans to reach net zero somewhere around 2050. Let's focus on the first milestone, the 2030 emission reduction target: according to a recent study, as expressed in per capita terms, the poorest half of the population in the US and most European countries have already reached or almost reached the target. This is not the case at all for the middle classes and the wealthy, who are well above – that is to say, behind – the target.

One way to reduce carbon inequalities is to establish individual carbon rights, similar to the schemes that some countries use to manage scarce environmental resources. For instance, in France, in times of stark water shortages, it is possible to prevent all water use that is not strictly essential (that is, for drinking, sanitation, cooking or emergency uses). This approach amounts to equalizing water consumption across the population.

Equal individual carbon quotas set by the authorities of a country would inevitably raise multiple technical issues, but from a social justice standpoint, it is a strategy that deserves attention. There are many ways to reduce the overall emissions of a country, but the bottom line is that anything but a strictly egalitarian strategy inevitably means demanding greater climate mitigation efforts from those who are already at the target level, and less from those who are well above it. This is basic arithmetic.

Arguably, any deviation from an egalitarian strategy, for example quotas, would justify serious redistribution from the wealthy to the worse off to compensate the latter. Many countries will continue to impose carbon and energy taxes on consumption in the years to come. In this context, it is important that we learn from previous experiences. The French example shows what not to do. In contrast, British Columbia's implementation of a carbon tax in 2008 was a success – even though the Canadian province relies heavily on oil and gas – because a large share of the resulting tax revenues goes to compensate low- and middle-income consumers via direct cash payments. In Indonesia, the ending of fossil fuel subsidies a few years ago meant extra resources for its government but also higher energy prices for low-income families. Fiercely opposed at first, the reform was accepted when the government decided to use the revenue to fund universal health insurance and support for the poorest.

To accelerate the energy transition, we must also think outside the box. Consider, for example, a progressive tax on wealth, with a pollution top-up. This would accelerate the shift out of fossil fuels by making access to capital more expensive for the fossil fuel industries. It would also generate potentially large revenues for governments which they could invest in green industries and innovation. Such taxes would be more equitable, since they target a fraction of the population, not the majority. At the world level, a modest wealth tax on multimillionaires with a pollution top-up could generate 1.7 per cent of global income, as has been shown in recent research. This could fund the bulk of extra investments required every year to meet climate mitigation efforts.

Whatever the path chosen by societies to accelerate the transition – and there are many potential paths – it's time for us to acknowledge that there can be no deep decarbonization without profound redistribution of income and wealth. /

Per capita emissions across the world in 2019

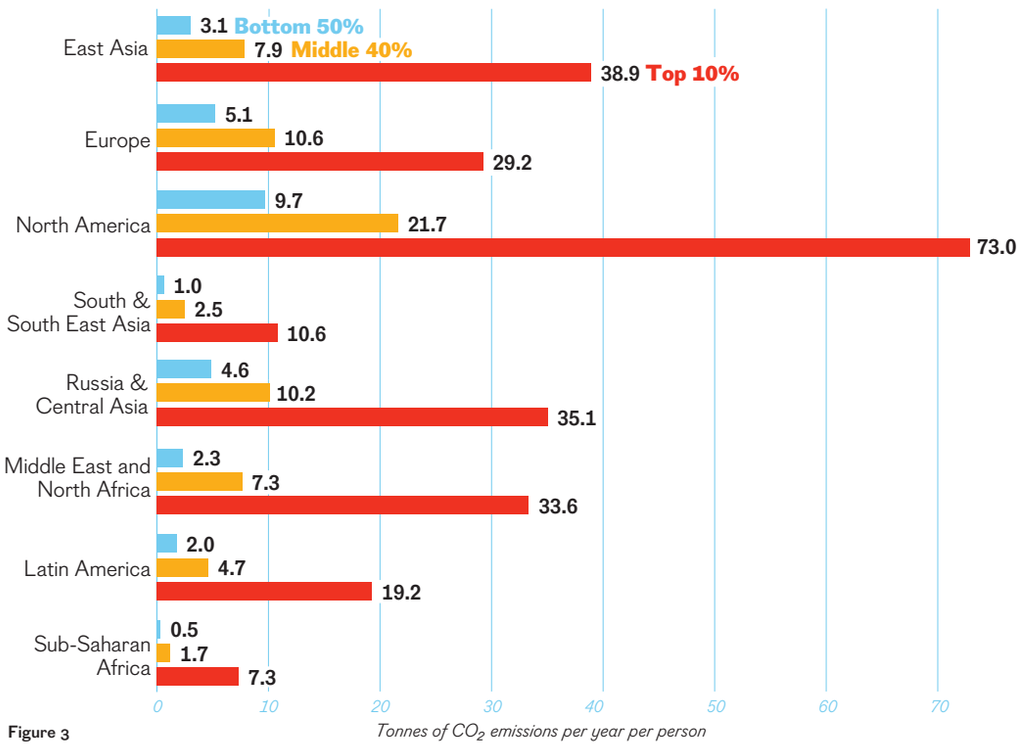


Figure 3

The rich should contribute the most to curbing emissions, and the poor be given the capacity to cope with the transition to 1.5°C or 2°C.