

Chapter 1

Introduction



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Abstract This is a brief introduction to the status of the international climate negotiations of the United Nations Framework Convention on Climate Change (UNFCCC) and its latest scientific publications, the status of global greenhouse gas emissions, and the impact of the pandemic on energy-related CO₂ emissions. The research focus of this book is presented, and how the second part of the book relates to our first book *Achieving the Paris Climate Agreement Goals* is explained.

The background to the creation of the book is given. The parameters upon which the authors focused when documenting the assumptions used for all calculations are explained. The results and their derivation are presented.

Keywords United Nations Framework Convention on Climate Change (UNFCCC) · Net-zero targets · Achieving the Paris Climate Agreements

The climate and energy debate continues to be high on the political agenda at inter-governmental summits. However, since the publication of our first edition *Achieving the Paris Climate Agreement Goals* in February 2019, the situation has changed dramatically. The COVID-19 pandemic dominates almost every conversation, both in the private sphere and in international political discussions. For the first time since the beginning of the United Nations Framework Convention on Climate Change (UNFCCC) with Climate Conference COP1 in 1995 in Berlin, Germany, a conference was cancelled. COP26 was meant to be in November 2020 but had to be pushed back by 12 months in response to the pandemic.

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As a consequence of travel restrictions and lockdowns in almost all countries worldwide, the oil demand decreased by nine billion barrels per day compared with 2020 (BP, 2021, p. 23). Industry production dropped because workers could not come to work, restaurants had to close, and public life almost came to a halt in many countries. Global energy-related CO₂ emissions declined by 5.8% in 2020, equal to about 2 Gt (IEA, 2021)—an unprecedented event. Even the global financial crisis of 2009 did not have such a profound impact on global emissions. At the time of writing this book—December 2021—the pandemic persists. However, global CO₂ emissions have bounced back and increased by 4.8% in 2021—to almost the same level as before the pandemic.

Extreme weather events (extreme rainfall and floods, cyclones, and bushfires) have increased in frequency. Australia experienced the worst bushfire season on record between September 2019 and March 2020—known as the *Black Summer* (Cook et al., 2021). In June 2020, the Arctic region of Siberia experienced a heat wave with temperatures up to 38 °C and wildfires covering almost one million hectares. The World Meteorological Organization (WMO) recognised this as a new Arctic temperature record (WMO, 2021).

Time is running out. In August 2021, the Sixth Assessment Report (AR6) of the United Nations Intergovernmental Panel on Climate Change (IPCC) was published. The First Assessment Report was launched in 1990 and underlined the importance of climate change as a challenge with global consequences that required international co-operation (IPCC, 2021). Thirty years later, the IPCC states unequivocally that the world is already in the middle of climate change. UN Secretary-General António Guterres said the Working Group’s report was nothing less than ‘a code red for humanity. The alarm bells are deafening, and the evidence is irrefutable’ (UN, 2021).

On the positive side, the international finance industry is increasingly engaged in the international and national climate debate. Initiatives such as the UN-convened Net-Zero Asset Owner Alliance (NZAOA, 2021) and the Glasgow Financial Alliance for Net Zero (GFANZ, 2021) represent leading financial institutions committed to achieving the goals of the Paris Climate Agreement and transitioning their investment portfolios to achieve net-zero greenhouse gas (GHG) emissions by 2050.

Our first book laid out global and regional 100% renewable energy scenarios with non-energy GHG pathways for +1.5 °C or +2 °C warming scenarios and compared them with a reference case. Those scenarios were calculated under the leadership of the Institute for Sustainable Futures (ISF) at the University of Technology Sydney (UTS) in close co-operation with the German Aerospace Center (DLR) and the University of Melbourne, Australia. The model used for that project became known as the *OneEarth Climate Model* (OECM) in 2020 during the numerous debates that followed the book launch in February 2019.

The second book focuses on sectorial pathways and provides key performance indicators (KPIs) for industry sectors to limit the global temperature increase to 1.5 °C.

The OECM is an integrated energy assessment model to be used for developing science-based net-zero targets for all major industries in a granularity and with the

KPIs needed to make short-, mid-, and long-term investment decisions. The 1.5 °C emission pathways developed by UTS are no or low overshoot scenarios (SSP 1), as defined by the IPCC. This means that a carbon budget overshoot is avoided and that the CO₂ already released is not assumed to be ‘removed’ by unproven technologies still under development, such as carbon capture and storage. The OECM does take ‘technical’ negative emissions into account, but only natural carbon sinks, such as forests, mangroves and seaweed, which will compensate for the process emissions that are currently unavoidable, such as those from cement production.

A number of climate modelling organisations, including the Energy Transitions Commission, the Potsdam Institute for Climate Impact Research, the Science-Based Targets Initiative, the Carbon Risk Real Estate Monitor (CRREM), and the World Wide Fund for Nature (WWF), were invited to peer-review the OECM-derived net-zero pathways between mid-2020 and mid-2021.

The book documents all the steps in the scenario development and provides a detailed analysis of the main assumptions and scenario narratives. The results of the OECM 1.5 °C pathways for 12 industry and service sectors include the total remaining carbon budget and *Scope 1, 2, and 3* emissions for each sector.

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