TRANSITIONING TO A PROSPEROUS, RESILIENT AND CARBON-FREE ECONOMY

This book is a comprehensive manual for policy-makers addressing the issues around human-caused climate change, which threatens communities with increasing extreme weather events, sea-level rise and declining habitability of some regions due to desertification or inundation. The book looks at both mitigation of greenhouse gas emissions and global warming and adaption to changing conditions as the climate changes. It encourages the early adoption of climate change measures that this can be achieved while maintaining prosperity. The book takes a sector-by-sector approach, starting with energy and includes cities, industry, natural resources and agriculture, enabling practitioners to focus on actions relevant to their field. It uses case studies across a range of countries, and various industries, to illustrate the opportunities available. Blending technological insights with economics and energy policy, the book presents the tools decision makers need to achieve rapid decarbonisation, while unlocking and maintaining productivity, profit and growth.

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A Guide for Decision Makers

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Foreword

MALCOLM TURNBULL
Former Prime Minister of Australia

Another title for this book could be: *No More Excuses: How We Can Slash Our Emissions, Save Our Planet and Pay Less for Electricity*.

The brutal physical consequences of global warming are confronting us every day – from an eerily temperate arctic to the worst bushfires in our history, only the wickedly and wilfully blind can ignore the urgency for decisive action to reduce our emissions and slow the relentless heating of our planet.

Global warming has always been a wicked problem because it calls on present generations to take action to prevent adverse consequences for generations yet unborn. Or that's how it was seen 20 years ago. Now the adverse consequences are upon us, and our children and grandchildren's generations are marching in the street to demand immediate action.

And yet, because of a toxic alliance between right-wing populist politics, their amplifiers in the media and the fossil fuel lobby, we have seen climate action delayed and frustrated, and the science that demands it denied.

Right at the heart of the political, or policy, problem has been the need to persuade today's voters to pay more for energy in order to protect the planet for future generations. Well, that was the economic argument we used to face. But today, thanks to extraordinary improvements in the technology of renewable generation and storage, we can now say with confidence that, with the right planning, we can rapidly transition to a world where energy is both much greener and cheaper.

It doesn't often happen, but right now, thanks to science, we can have our cake and eat it too. But we cannot delay. All of the political manoeuvres and debate can delay action to address global warming, but they cannot delay its consequences.

The more than 60 authors of this book demonstrate with comprehensive research, backed by practical examples, that we can transition to a low-carbon economy in order to avoid catastrophic damage to our planet, and at the same time support prosperous and adaptive societies. This book has the facts and figures that will refute the arguments of those who say 'we can't afford it'. It is, in short, a pragmatic handbook on how to achieve the transition to a decarbonised world that is both prosperous and resilient.

Although it covers many technical areas, the book is designed to be accessible to a wide audience including non-technical readers. The book examines the policy environments and the challenges of bringing about the necessary transition. It describes the main technologies

available to deliver clean energy, including solar photovoltaics and wind which are now the cheapest sources of energy in most parts of the world. The chapters on wind energy, solar photovoltaics and storage in particular demonstrate how and why the costs have dramatically declined, in large measure thanks to the contribution of Australian scientists and researchers.

I was pleased to see the detailed discussion of pumped storage hydro, including the two large-scale Australian projects: Snowy Hydro 2.0 and Battery of the Nation. As Prime Minister of Australia, I had the opportunity to be very effectively educated in pumped storage hydro by one of the authors of this book, Andrew Blakers. This enabled me to conceive the national pumped hydro agenda in general and these two major projects in particular.

While the message of the authors is overwhelmingly positive and encouraging for those who support stronger immediate action to cut emissions, it is not unrealistic. The discussion of the opportunities for green hydrogen is very objective and canvases the particular challenges of storing and transporting hydrogen. On the very encouraging side, the authors make the good point that desalinating seawater for the purpose of electrolysis is a negligible additional cost to the process.

The question of how countries can transition to low-carbon economies and the likely outcomes for societies and economies were explored in the UN Deep Decarbonisation Pathways Projects. The book reviews these studies and their outcomes in a chapter covering 16 countries. It applies these studies to Australia, to examine how economies can navigate the transition with continuous growth, and emerge with greater and more sustainable prosperity than would be possible under 'business-as-usual'. This is a strong message based on deep research and is pitched in a way that can be understood by key decision makers in government, industry and the wider community.

The book also examines key sectors of the economy and how they are both contributing to and being affected by climate change. These sectors include: cities and their components; land use, forestry and agriculture; transport; mining, oil and gas; and industry and manufacturing. In many cases, measures to reduce emissions also have co-benefits. Replacing gas heating with electric heat pumps not only reduces emissions but also delivers cost savings. Electrification of mines using electrically powered conveyors to replace diesel trucks not only reduces greenhouse emissions but also avoids air pollution. The chapters on land use, forests and agriculture explore in depth the complex problems of achieving sustainability in these ecosystems, which are highly involved in carbon cycles affected by deforestation and changes in land use, but also critical to the health of people and the planet.

The book adopts an optimistic tone but also acknowledges the challenges and barriers to transitioning to low-carbon economies. It discusses the ways in which resources can be misallocated as a consequence of poor governance in various ways, including in embedded subsidies for fossil fuels which can distort markets at the expense of renewables.

This is not a book which addresses the poisonous politics of climate change – there wouldn't be enough room for the science and engineering if it was – but there is a brief discussion of the ways in which vested interests can use existing provisions in free trade

agreements, such as investor–state dispute settlement clauses to block renewables supported by state environmental policies.

The Intergovernmental Panel on Climate Change (IPCC) considers that to have a reasonable chance of avoiding catastrophic effects from climate change it is necessary to limit global warming to 2 °C, requiring substantial and rapid reductions in greenhouse gas emissions and adaptation to the climate change impacts we cannot avoid. This is the imperative behind this handbook for policy-makers and practitioners that will enable a prosperous and resilient transition to future decarbonised economies. It also emphasises that now is the time for new and effective solutions.

Every politician and policy adviser who cares about climate action should read this book. It provides so many of the practical answers we need if we are to effect this transition, as we must. Just as the existential challenge we face is grounded in the laws of physics, so must our response be equally scientific. We need evidence-based policy founded on engineering and economics – not ideology and idiocy.