

# Preface

---

Steven Fries is economic counsellor at Shell International Ltd. and former group chief economist for Shell. The views expressed in the book are those of the author alone. They do not necessarily reflect those of acknowledged individuals, Shell International Ltd. or any other company of the Shell group of companies. All references in this book to external sources—primarily refereed journal articles, academic books and working papers and publications of governments, government agencies and intergovernmental and international organizations—and their analyses and conclusions do not necessary reflect those of the author.

The economics of transforming energy systems are analogous to orchestrating journeys and passengers—long-distance journeys sustained by changing technologies to provide low-carbon energy for transport, and vehicles to convert it into motion. These new technologies already include solar photovoltaic panels and battery electric automobiles. But a richer analogy for transforming energy systems is perhaps catching connecting trains to complete journeys, with low-carbon technologies providing connecting services to reach intended destinations for energy systems and the societies they serve. The key challenge is ensuring that sufficient connecting services—such as low-carbon electric power, rail network electrification and high-speed rail services—are available for societies sufficiently soon to both limit climate change and reach their intended societal destinations. In energy-related sectors, as with others, markets do much of the orchestrating of economic activities—both investments and consumer choices. But in energy system transformations, markets alone are insufficient to the task, especially in the early stages of change, because of multiple market imperfections, missing key markets, network effects and distributional impacts of change.

This book examines the experience with ongoing energy system transformations to learn lessons about effective roles of governments and policies as well as businesses, customers and markets in this crucially important journey. It aims to help ensure that the connecting low-carbon services that societies require are available in time for boarding and the sustainable destinations they offer attract most firms and households to them. To be avoided are both energy system transformations with too many passengers missing connecting services and reaching unintended destinations—with scrambles for a handful of electric taxis to get where they want to go—and climate change impacts to which societies and ecosystems would struggle to adapt.

In addition to the urgency of governments, businesses and households acting effectively and decisively to limit climate change, my motivation for writing this book arose from my experiences as an economist working in government (UK Department of Energy and Climate Change), industry (Shell) and an international financial institution (European Bank for Reconstruction and Development). The book aims to distil what has been learned from ongoing energy system transformations so that the immense challenges faced by societies in cutting net emissions of carbon dioxide and other greenhouse gases from energy systems in the decades ahead might be addressed more decisively. This learning from experience is informed by the rapidly accumulating body of academic research on climate change and energy system transformations. The perspective offered on this analysis and evidence is that of an applied economist, informed and shaped by experiences in transforming energy systems. The intended audience is policy makers in government and decision makers in industry and business. It is also hoped that the book may be of interest to academic and general audiences concerned with one of the most pressing and challenging issues of the day.

The book also reflects a lesson learned from the post-communist transformations in Eastern Europe and Central Asia. In that context, narrowly honed economic policy prescriptions, such as rapid liberalization of market prices and mass privatization, fell far short of the goals that some of its policy architects had intended. Amidst imperfect and incomplete markets, potentially time-inconsistent government policies, absent or inappropriately designed market-supporting institutions, and arrays of interests for and against reforms, such ‘shock therapies’ left some political and economic system transformations stuck and incomplete. More comprehensive reforms were sustained, including some with significant international support from the European Union, international financial institutions and others. Such a complex, systemic transformation was not guided alone by the invisible hand of market forces and private property rights. Rather, its sustained advance required comprehensive, coherent and credible government reform strategies supported by international engagement, coordination and cooperation (EBRD, 1999, pp. 4–12).

Similar issues and risks arise in transforming energy systems. A narrowly honed economic policy prescription of emissions pricing to internalize the environmental externality and government support for research and development to account for knowledge spillovers risks falling short, with transformations becoming stuck. This book thus examines evidence on both orthodox and heterodox domestic policies to transform domestic energy systems, as well as potential bases for international coordination of climate actions. The aim is to identify those energy-reform strategies that could accelerate and sustain energy system transformations and consolidate them with low-carbon technologies, renewable resources and alternative choices through mutually

reinforcing actions of governments, businesses and households. The economic analysis and evidence that informs these reform strategies considers the multiple market imperfections and missing markets that beset energy systems and their distributional impacts, and balances risks of both market failures and government policy failures.

This book was written with the support of two people to whom I would like to express particular thanks: Jeremy Bentham and Sir David Hendry. They provided early encouragement, engaged in valuable discussions and provided helpful comments as the book took shape. It benefits too from comments and suggestions of Robert Ritz, Dirk Smit and Charlotte Taylor, who generously read the manuscript, and seminar participants at the Peterson Institute for International Economics. But one's understanding of such complex issues as climate change and energy system transformations is inevitably shaped by many ongoing interactions and discussions. For them, I would like to thank those with whom I have worked closely over many years on these issues in government and business, including Paul Bailey, Tijs Beek, Peter Betts, Neil Bush, Jason Eis, Vivien Geard, Martin Haigh, Peter Heijmans, David Hone, Malika Ishwaran, Cho Khong, Paro Konar-Thakkar, Eric Ling, Duncan Millard, Andrew Ray, Hugo Robson, Darci Sinclair, Oleksiy Tatarenko, Sam Thomas, Wim Thomas, Simon Virley, Alec Waterhouse, Mark Weintraub and Geraldine Wessing. I would also like to thank Rebecca Surender for her patient support and impatient encouragement while writing this book.

In addition, the book benefits from an understanding of energy systems and their societal contexts embodied in a series of Shell energy scenarios ([www.shell.com/scenarios](http://www.shell.com/scenarios)), although it is not based on them. They include the *New Lens Scenarios—A Shift in Perspective for a World in Transition* (2013), *Better Life with a Healthy Planet—Pathways to Net Zero Emissions* (2016) and *Sky—Meeting the Goals of the Paris Agreement* (2018). All of them envisaged societies transforming their energy systems and achieving net zero emissions from energy, but in differing enabling contexts—social, political, economic and technological—and over varying time horizons and climate change outcomes. The most recent Shell scenarios—*The Energy Transformation Scenarios* (2021)—explore potential impacts of the global novel coronavirus pandemic for societal efforts to achieve net zero emissions. All of these scenarios examine critical uncertainties that lie ahead and use stretching assumptions and projections to understand their implications. They are not predictions of the future, but rather tools to explore uncertainties and learn from future possibilities. This book aims to learn lessons from ongoing energy system transformations by examining accumulating evidence about them.

