

Preface

There comes a point in every writing project when a book passes from being a possibility (one among many) to something that simply demands to be written. That point came for me at the time of the Copenhagen “Conference of the Parties” under the Kyoto Protocol in December 2009. Like much of the world, I had been monitoring the press and the statements from scientists on the looming threat of global warming, and I too was caught up in the enthusiasm that Copenhagen might deliver a global pact to reduce carbon emissions and “save civilization” as we know it. As we found out, Copenhagen delivered no such thing—and apart from the vested interests that blocked any hope for a pact, the Copenhagen conference was marked by the arrival of the Chinese as major participants in the debate and, in the eyes of many, as obstacles to a global agreement. This struck me at the time as grossly imbalanced—for anyone who knew anything about global warming knew that the Chinese were only adding carbon to the massive emissions already released by the Western powers. Had people done their homework, they would have known that China’s emissions were rising at the time, precisely because it was expanding its energy system at an unprecedented pace to underpin a massively expanding manufacturing system that in turn underpinned the country’s bid to industrialize and raise hundreds of millions of people out of poverty. How could anyone seriously expect China (and India or Brazil, or other countries) to sign up to a pact that would see carbon

emissions constrained and then fall while it was still pulling its population out of poverty by industrial growth?

This sense of imbalance prompted me to look more closely at China's energy policies (strategies)—and what I found was even more surprising. While the environmentalists and activists who had been so bitterly disappointed by Copenhagen were blaming China for the fiasco and pointing to its “black” coal-fired industrialization strategy as culprit, in its own quiet way China had in fact been ramping up renewable energy industries at a pace and scale that far exceeded those of any other country. The costs of renewable power were coming down because China was driving the scale of their expansion. If the world was greening, it was mostly because of China. And it was not just energy, but resources generally, with China elevating the notion of a circular economy (in which waste outputs would be channeled as inputs for alternative industrial activities) as a national industrial and development strategy. I learned later that China was also fashioning a novel approach to finance, ensuring that long credit lines were extended to enterprises producing renewables like solar photovoltaics and wind power turbines to enable these industries to grow rapidly and become competitive much faster than if they were powered by market forces alone.

And so what demanded to be written was an account of the issue of the greening of our industrial system viewed not as a moral imperative as seen by the West but as an extraordinary development challenge for China and other newly industrializing nations looking to join the club of industrialized countries—without destroying their own and everyone else's environment. For China it is a matter of fashioning the green growth strategies that are able to balance the black strategies of burning coal and oil and creating unbreathable air in China's cities. My understanding of the issues evolved from an initial concern with climate change and international action to become a concern as to whether China would be allowed by the international community to complete its industrialization without destroying the earth; this led me to think through the fundamental changes to the industrial system that would be called for if such a strategy were to succeed. Seen from this perspective, so much of the outpouring of concern over climate change and carbon emissions is highly Europe- and America-centric, viewing the problem as one of excessive growth and China's concerns as marginal—sometimes quite explicitly

condemning China's millions to perpetual poverty by decreeing that their turn at the industrialization wheel would never come. But the argument that formed for me and which is now expressed in this book is that the next phase of industrialization is the one that will be the most critical, because it will determine whether our industrial way of life—with all its capacity to raise incomes and wealth and banish age-old prejudices—can exist in balance with our planetary ecological niche. And central to this phase is China and its emerging green development model—what scholars like Hu Angang call China's "inevitable choice." We are witnesses to the greatest uncontrolled planetary experiment ever undertaken, and we know not whether China's greening will occur in time or at the requisite scale. The future is far from being determined.

As this book took shape, it became more and more about the wellsprings and operating principles of capitalism itself and less about the details of renewable energies or resource efficiencies or eco-finance. And in this way the book became a long argument with economists, many of whom are concerned by the issues but take a narrow view, considering the role of carbon taxes and cap-and-trade schemes as exhausting the possibilities for effective action. In the case of China it is clear that while market-based incentives are playing an important role (e.g., in the Sloping Lands program, where farmers are paid to cease planting crops on steep lands vulnerable to soil erosion), the real factor driving change is the capacity of the state to intervene and change economic incentives. From this perspective I see this book as an imaginary dialogue with a fine economist, Deidre McCloskey. Her current magnum opus on what she calls the virtues of capitalism, elaborated in text after text, adopts a strikingly original position that capitalism has been an unalloyed triumph for humanity and that so much of the opposition comes from a failure not just of imagination but also of appreciation of the evidence. As McCloskey develops the next volumes in this monumental treatise (through the highly innovative approach of posting a draft to the web and inviting comments from serious readers), she drops hints here and there that capitalism would solve all the environmental problems—if allowed to work properly, without government interference. This position echoes that of some economists who call themselves "free-market environmentalists." Since I am calling for the greening of capitalism and not just for a few environmentally friendly policies here and there, it seems only reasonable

that I should engage with McCloskey on this point. The big point of disagreement is that I insist that if China and other industrializing powers are to get onto a new, non-fossil-fueled industrial trajectory, it will be only through smart state intervention in the economy, shaping and facilitating the growth of new, green industries. My argument is that prices and markets could indeed shape entrepreneurial decisions once the economy is on a new trajectory—but that state intervention is needed to make the shift, particularly when the vested interests aligned against such a change are as powerful as those of the fossil fuels industry. I come to this position by viewing the issues not through the eyes of the United States or Europe (or Japan) but through the eyes of China and the options it faces. One doesn't have to be an adviser to the Chinese government or an apologist for an authoritarian state to see that China faces formidable problems—and that the way it goes about finding and implementing solutions will have very powerful repercussions for the rest of humanity. This is the starting point for my argument.

As noted, I first started serious work on this book at the end of 2009, at the time of the Copenhagen conference on climate change. As it happened this was also the time when I was taking up the new Eni Chair of Competitive Dynamics and Global Strategy at the LUISS Guido Carli University in Rome. I should like to acknowledge the role of Eni, Italy's largest oil and gas company, in providing me with the freedom (and encouragement) to pursue a renewables teaching agenda at LUISS, including creating a master-level course, "Economics and Management of Energy Business," and inviting me to present an early version of my argument (which had nothing to do with oil or gas) to a seminar at the Eni corporate training center in Milan. My thanks to Giorgio di Giorgio, who made this possible.

My principal debt is to my former doctoral students, Mei-Chih Hu, now a professor at the National Tsinghua University in Taiwan; Hao Tan, now a senior lecturer at Newcastle University in Australia; and Ching-Yan Wu, also teaching and researching in Taiwan. They have been a constant source of encouragement and wisdom on all matters Asian and regular collaborators, as attested by the joint papers cited in this book. Hao Tan in particular has been my principal collaborator and the source of many of the charts utilized in this book; for this I owe him a great debt.

I would also like to acknowledge the input from my esteemed colleagues and collaborators Elizabeth Thurbon and Sung-Young Kim, who read earlier drafts of the book and commented profusely.

Colleagues around the world made important contributions along the way: Keun Lee at Seoul National University, a fellow student of catch-up strategies, who drove me to set the Chinese strategies in a wider developmental context; Sergio Trindade, my co-host at the memorable Conference that we staged on sustainable biofuels at the Rockefeller Foundation's conference facilities at Bellagio on Lake Como; Michael Mann for stimulating exchanges on the feasibility of the next energy transformation; Soogil Young, former head of the Presidential Commission on Green Growth in Korea, who opened the way to comprehending Korea's remarkable policies; my sister Freya Mathews for rewarding discussions on biomimicry; and for their various inputs, Paolo Baroni, Jac-Young Choung, Mark Diesendorf, Rainer Kattel, Mark Kivers, Erik Reinert, Francesco Rullani, Ric Samans, Shahid Yusuf, John Zysman; Myung Kyoon Lee, Darius Nassiry, and Mattia Romani at the Global Green Growth Institute; and finally my colleagues at the Organisation for Economic Co-operation and Development, Andrea Goldstein, Federico Bonaglia, and Annalisa Primi. I would also like to thank Sergio Weguelin, former head of Environmental Affairs at the Brazilian Development Bank, for his clarifying the bank's differential funding strategies. Over the years I have had stimulating exchanges with Sean Kidney, the energetic mover behind the Climate Bonds Initiative, based in London. My thanks also to business colleagues with a greening bent who helped me to formulate the argument: John Harrison (TecEco), Geoff and Phil Bell (Microbiogen), Hans-Joerg Naumer (Allianz Global Investors), and Oliver Yates (Clean Energy Finance Corporation).

Aspects of this book have been tested on numerous audiences at academic institutions around the world, as well as at conferences in Penang on Greening of Urban Growth, and at Hsinchu, Taiwan, on fast-follower development strategies. I have benefited from invitations to participate in landmark conferences on finance, development, and innovation, staged with the support of the Ford Foundation, in Rio de Janeiro (November 2011) and in Beijing (October 2013): my grateful thanks to Bill Lazonick of the University of Massachusetts; Ana Celia Castro of the University of Rio de Janeiro; and Leonardo Burlamaqui, then of the Ford

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As in everything I do, my wife and partner, Linda Weiss, has been a perceptive critic and discussant, sharing all the struggles to bring these ideas to fruition and to scholarly standard even while laboring on her own magnum opus, now published by Cornell University Press.