Guest Foreword

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The new technologies of the 19th and 20th centuries have helped create climate change: endless engines burning fossil fuels—coal, oil, and gas—and emitting the carbon stored into the atmosphere for millennia. The new technologies of the 21st century will provide the means of mitigating and adapting to the "change" we humans have created. The critical and urgent means of saving our planet are certainly new energy technologies: cost-efficient and reliable ways of harnessing the ever renewable sources of sun, wind, and water; safer nuclear energy; new ways of tapping the heat deep in the earth; new micro-power grids that can distribute and share the energy we do not need. Equally important, however, even if far less noticed, are *breakthroughs in financial technology*.

One of the biggest obstacles to fighting climate change effectively is *lack of trust*. Trust among nations is necessary to conclude international agreements; and it is even more essential to implement them, as late US President Ronald Reagan so memorably said in the course of concluding arms control agreements with the Soviet Union, "*Trust, but verify*." In other words, trust is bolstered by the actual ability to see whether or not your negotiating partners are in fact living up to the commitments they have made.

The international acronym for this process is MRV: Measurement, Reporting, and Verification measures. The Paris Agreement on climate change commits its 195 signatories to reducing carbon emissions to levels that will "hold the increase in the climate's average temperature to well below 2 degrees centigrade above pre-industrial levels" and to working toward limiting that increase to 1.5°C.

Those commitments, in turn, depend on the willingness of the developed countries—all of which burned carbon with abandon as they developed—to finance the adoption and use of

cleaner energies by developing countries. Indeed, Article 2 of the Paris Agreement further commits to "making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development."

The developed countries have pledged to "mobilize" US$100 billion a year in climate finance through 2025. These funds are supposed to enable developing country governments and subnational governments—provincial governors and mayors—to convert or install or adopt sustainable energy systems that will lower their emissions. Making sure that developed country governments actually provide the funds they promise—which are only a fraction of the actual need—is hard. But equally hard is ensuring that the funds once committed actually get spent.

Think about the process of getting a loan from your bank. The bank needs to know that who you say you are, that you will actually spend the money the way you say you will spend, and that you actually own the assets you put up as collateral. The bank will not take your word for it; you have to fill out lots of documents and get them verified by third parties—your employer, your local government, credit agencies, etc. Now think of all the verification that has to take place when the government of a small, poor, and risky country—or the mayor of a badly functioning and corrupt city—seeks millions or hundreds of millions of dollars to implement a clean energy project. How can the lender be sure that the funds will actually be used as the borrower says they will be used, rather than being siphoned off for individual gain or for some very different projects?

Enter *Blockchain*! Here is the simplest explanation I can think of. Imagine that you are sharing a house with three housemates. You know each other, but you are not family. You each agree to contribute US$25 a week for household expenses into a common pot. You could each spend your US$25 every week on food and other household items to be shared and keep a ledger of your expenses. At the end of the week you could meet with your housemates and compare ledgers and the receipts that verify that you did in fact spend the money the way you say you did. That process is cumbersome and complex enough that no one will want to meet; the entire arrangement will quickly break down.

Alternatively you could each agree to put your US$25 into a glass jar on the kitchen counter; anyone who is going to the grocery store could take an amount from the jar and replace it with a receipt showing what was purchased with the money. But suppose one of your housemates just takes money from the jar for his/her own purposes and does not admit it? Or loses a receipt for food that is consumed before the end of the week? Or forges a receipt?

Now imagine that every time one of you takes money from the jar and spends it on a household expense, and that set of transactions—the taking and spending—is recorded,

time-stamped, and sent to each of you via your email. All of you see the transaction in real time on one set of books that is collectively stored and monitored. You can see when money was put into the jar, when it was taken out, how it was spent. And if one of you pays a third party to go shopping or to repair a household item and the third party has permissioned access to the Blockchain set of accounts, you can all see the transfer to the third party and whether the third party meets its commitments. *Trust but verify*—easily, quickly, and cheaply.

I will not explain all the wonderful ways that Blockchain can create trust and thereby unblock chains of financial commitments. That is what this book is for. Not only financial transactions, a Blockchain network can also track and trace virtually anything of value, thereby minimizing risk and g costs for all stakeholders. At the age of limiting and adapting to climate change, those things of value include the flow of power itself from household to household on distributed micro-grids, the exchange of carbon credits, and community and crowd funding for local renewable energy permits, to name a few.

The contributions in this book are optimistic and exciting. They offer hope and genuine progress on the most important global issue facing our generation. Equally important to me, however, is how this book came about.

The Paris Agreement was a classic example of statecraft: governments coming together to negotiate and reach an agreement that each was then responsible for implementing. President Donald Trump's decision to pull the United States out of the Paris Agreement was also an example of statecraft, even if it was bad and shortsighted statecraft. But the day after Trump's decision, 30 mayors, 3 governors, over 80 university presidents, and 100 business leaders began negotiating with the UN to have their submissions of commitments to reduce carbon emissions accepted alongside other countries. Their action was not statecraft, but what I have called "*webcraft*"—the ability to contribute to solving global problem and to shape global outcomes through the design, creation, and mobilization of many different types of networks.[1]

The emergence of the International Core Group on Blockchain Climate Finance, founded by Alastair Marke, as a not-for-profit web-based international network of individuals who are concerned about the current global climate finance gap and who share a vision of how the deployment of Blockchain technology could help bridge that gap is another example of webcraft. In moving from a LinkedIn group to a more formal Global Blockchain for Climate Network capable of undertaking projects like writing and publishing this book, the Network is an inspiring example of citizen power in global affairs. It brings together academics, development professionals, technologists, economists, journalists, lawyers, and

[1] Anne-Marie Slaughter, *The Chessboard and the Web: Strategies of Connection in a Networked World* (Princeton, NJ: Princeton University Press, 2017).

scientists, aligning expertise and interests in ways that can do things which governments often cannot do.

Blockchain is just the beginning!

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