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A number of dramatic changes are reshaping infrastructure, a sector that has always been considered by investors and asset managers as a safe harbor in the field of alternative investments. Understanding the future of infrastructure is indispensable for guaranteeing a sustainable future for our planet and the welfare of the world's population. Enhancing our knowledge of this asset class is one important step we can take toward reaching this crucial goal.

This book presents the collected results of the first year of activity in a five-year research plan on the future of infrastructure and how to prepare for the unexpected. This work is being carried out by a group of Bocconi University researchers under the Antin IP Associate Professorship in Infrastructure Finance. Its goal is to improve and disseminate the culture of infrastructure among academics, professionals and policymakers, in order to spark debate on the future of infrastructure and the evolution of the way in which financial markets will support relative investments and financing needs.

This represents a vital and very timely topic. Infrastructure is called to serve as a real catalyst for growth precisely when the industry is undergoing a process of change as it matures. Historically, factors such as regulation, high barriers to entry, rigid demand, and hedges against inflation allowed infrastructure investors to benefit from stable and inflation-linked cash flows for extended periods of time. However, a combination of renewed attention to environmental impact and ESG, world population dynamics and urbanization trends, the impact of the digital revolution, a change in the attitude of society and politicians toward infrastructure—these are only a few examples of the megatrends that investors and asset managers expect to reshape the

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established business model of infrastructure. This poses important questions to industrial developers/utilities, investors and asset managers about the long-term changes that the sector will experience in the next few years. An understanding of these megatrends, how new ecosystems work and how investors can adapt their strategies to the new investment environment are key success factors for lasting and sustainable investment strategies. Indeed, a clear conception of all this is essential for long-term investors wishing to identify the best investment opportunities available and avoid the trap of investing in stranded assets.

To this end, the book collects a series of contributions covering the key megatrends that are expected to reshape the way we think about infrastructure and the implications for infrastructure investors and asset managers. The main focus is on Europe and the European Union, specifically three key sectors: power and energy, transportation infrastructure, telecoms and ICT. However, in many sections of the book, given the magnitude of changes and megatrends, reference to global trends and perspectives is natural and necessary.

The book is organized in six chapters. The first three follow a sectorial approach, in line with the way in which infrastructure investors and asset managers are still used to allocating resources. However, this is shown to be an overly-simplified stance in today's world where the boundaries of traditional sectors are blurring under pressure from technological and sociocultural disruptive forces. In light of this, the rest of the book provides a discussion of the emergence of a new infrastructure ecosystem and the implications for investors and asset managers.

More specifically, Chap. 2, by Matteo Di Castelnuovo e Andrea Biancardi, is focused on the future of energy infrastructures. The chapter starts by providing a detailed account of the global energy balance and its evolution, from oil to natural gas and renewables, and eventually turns its attention to electricity. In particular, six key trends in the electricity ecosystem are identified and discussed: decarbonization, electrification, decentralization, customer activation, digitalization and the convergence of industries. All together, these trends represent the driving force of what is labelled an "R-evolution". The chapter then provides an in-depth analysis of the economics behind such a course, highlighting the role played by offshore wind in the process, as well as the merit order book, and discussing the function of networks and the need for flexibility and storage as both enablers and constraints. The chapter concludes with an assessment of the impact of the "R-evolution" on the financial performance of European utilities and on the demand for rare earth elements and other metals.

Chapter 3, by Oliviero Baccelli, provides insight into future developments in the transport infrastructure sector. First, the chapter describes the three main trends currently influencing transport infrastructure investments across the EU: demographic changes, urbanization and ageing. Then, it highlights the increasing prominence of international tourism and discusses the organizational, technological and regulatory innovations and challenges in three key transport sectors: airports, ports and railways. This analysis is then integrated into the context of the European political agenda by means of a thorough discussion of the EU infrastructure policy,

the decarbonization program and the role of the European Investment Bank as early mover in more innovative sectors.

In Chap. 4, Francesco Sacco shifts focus to the telecom infrastructure business and its evolution, as the number of people and devices that are connected constantly grows, and the flow of data escalates at an unprecedented pace. In particular, the chapter highlights the centrality of the telecom network and its value, revisiting its evolution in light of the growth in the demand for connectivity as people change their living and working habits. Moreover, it provides a detailed discussion of the regulatory issues raised by the ever-greater centrality of the network and the potential risks posed by its vulnerability. The chapter concludes by providing an overview of the emerging investment opportunities that originate by the formation of different layers of telecom infrastructure across fixed networks and network evolution, as well as the development of wireless business models centered around 5G.

Considering the disruptive forces reshaping the infrastructure ecosystem in the energy, transport and telecom sectors, in Chap. 5 Markus Venzin and Emilia Konert take a broader view to analyze how investment decisions in the infrastructure world will change and how incumbents can adapt by means of business model innovation through corporate entrepreneurship initiatives. In order to identify where disruption is coming from and why it is so difficult for incumbents to react, the chapter starts by defining small disruptions with big impacts. The discussion then moves on to the creation of industry adaptability through the protection of core investments, the use of core investments to accelerate the business of startups, the improvement of the profitability of core investments with an acceptable risk, or the implementation of alternative investment strategies by learning from disruptors. Narrowing down the argument to infrastructure, this leads the authors to advance a proposal for the development of an “infrastructure radar” to navigate the infrastructure disruption map and give decision makers the tools they need to identify the most promising infrastructure investment opportunities.

Chapter 6, by Stefano Gatti and Carlo Chiarella, looks instead at the disruptive trends reshaping the infrastructure ecosystem with the aim of drawing general implications for investors and asset managers. The chapter starts with an overview of the current state of infrastructure investing and how investors are approaching this alternative asset class. The picture that emerges shows that the aspects which have contributed in the past to the success of the infrastructure asset class are increasingly offset by new elements that pose growing threats to the ability of asset managers to continue offering investors attractive yields. This is followed by a thorough discussion of the technological and socio-cultural trends with the strongest potential impact on infrastructure investment, trends which are shown to affect multiple infrastructure sectors at the same time. This last crucial observation prompts to question the traditional business model of infrastructure asset managers based on sectorial specialization, which may therefore become inefficient and prove unable to capture those transformative trends that would guarantee investors long-term sustainable returns. This leads to the proposal of a new approach to infrastructure investing by which the traditional *silos* strategy, based on sectorial/industry specialization, is replaced by *eligibility criteria*, where infrastructure is no longer defined based on

industries but on features/characteristics of the needs served by that same infrastructure. By doing so, the chapter suggests that asset managers adopt a less dogmatic view of infrastructure, stretching the very concept and embracing an investment approach closer to traditional private equity with a redefined balance between reliable income streams and capital appreciation/capital gains. More specifically, two complementary courses of action are recommended to adapt to a changing ecosystem. The first one, which is more short-term oriented and more in line with the investment style of private equity, involves tactical optimization aimed at enhancing performance but not changing the long-term strategic vision. The second one, which is instead oriented on an extended time horizon, involves redefining the selection criteria asset managers use in light of the lasting trends that are reshaping the way modern society works and lives. This would allow them to identify the investments with the best potential in the long run and exploit continuative strategic opportunities by means of “theme” investing.

Chapter 7 summarizes the main results from each contribution and sheds light on future development of research on this field.