



Chapter 1

Introduction

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*“Idealism is the last luxury that only young people have”
-Tan Malaka*

The young generation has always been Indonesia's powerhouse since its formation. Young Indonesians have contributed to many sectors of Indonesia, and with the bonus demography of youth, soon it is expected that Indonesia will thrive as part of the big 5 in the world's economy. This economic aspiration may not be achievable if Indonesia lacks a strong energy sector to support economic growth. Without sustainable energy, Indonesia will always be the market, not the producer, on the global stage. Economic growth is interlinked to energy. On the other hand, the threat of climate change has risen significantly in recent years, and it has become more evident than ever before. The

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increased frequency of natural disasters in Indonesia can be attributed to climate change. Therefore, Indonesia, as a part of the G20, needs to become a leader in global efforts to tackle climate change.

Indonesian students abroad come together in this book, trying to contribute from afar to how Indonesia can achieve energy sustainability while also strengthening Indonesia's economic growth. By looking from an "outside perspective" of Indonesia, we would highlight some key aspects of Indonesian status to energy sustainability and climate change and how it can progress further.

The Indonesian Government has some plans to manage Indonesia's rich resources of carbon-free and renewable energy. It can be seen through the National General Energy Plan (*Rencana Umum Energi Nasional*-RUEN). RUEN manages to accommodate all the potential and develop some energy diversification in Indonesia. Strengthened by the National Energy Policy Law (*UU No. 14 Tahun 2007 tentang Kebijakan Energi Nasional*), Indonesia plans to achieve 23% renewable energy in the energy mix by 2025. On the other hand, Indonesia has been hit hard by the COVID-19 pandemic. The pandemic delays a few major renewable energy projects that should have been done in 2020–2021. Indonesia needs to increase the rate of renewable energy deployment. However, the current status of renewable energy in Indonesia is still around 15%. Indonesia's primary energy sources are still heavily dominated by coal, oil, and gas. On the other hand, pressure from around the world is mounting due to climate change. Indonesia has pledged to become a net-zero carbon emitter by 2060. It was written in Indonesia's Nationally Determined Contribution (NDC) at the Conference of Parties (COP) 26 in Scotland. Aside from the critique of whether this pledge is achievable to be done by Indonesia, one certain thing is that Indonesia needs to circle back on its plan toward energy sustainability and climate change. Some efforts need to be accelerated to keep Indonesia on pace to become a net-zero carbon emitter in 2060. It motivates Indonesian students abroad through the Energy Commission of Overseas Indonesian Students'

Association Alliance (OIAA) to contribute their ideas through this book.

This book is entitled *Strategy towards Net-Zero Emissions by 2060 from the Renewables and Carbon-Free Energy Perspectives* because we want to highlight some key aspects of energy in Indonesia that can contribute to achieve net-zero carbon emission by 2060. We divide this book into three general ideas/parts. In the first part, we highlight the policies that have been implemented and how it helps Indonesia's effort toward energy sustainability and efforts to tackle climate change. Specifically, we explore Indonesia's current position and strategy for renewable energy. This is an important basis to work on as we already know what has been decided and done in the past. This part consists of two chapters. Chapter 2 discusses Indonesia's current national strategy and commitment toward the transition to carbon-free and renewable energy. The discussion includes bills and laws that have been ratified and implemented throughout the years. We discuss the impact of those bills on Indonesia's current energy situation, and the commitments that have been proclaimed on the world stage. From the ratification of the National Energy Policy in 2014 to the COP26 in 2021, Indonesia has had a specific target and roadmaps on tackling climate change and smoothly transitioning from a fossil fuel energy-dependent country to the hub of renewable energy. However, just like everything in the world, implementing of the policies may meet some challenges. Chapter 3 discusses those possible hindrances and challenges to achieve the net-zero carbon emission target. In this chapter, we explore many possible angles that could be the hindrances to achieve the energy transition. Dependencies on fossil fuels and the reluctance of industries to transition to renewable energy are a few examples of the challenges in achieving net-zero carbon emission. These topics are explored more in the chapter.

The second part of the book discusses a new nomenclature that will accurately describe net-zero carbon emission, carbon-neutral and renewable energy. The term "carbon-free" energy is used instead of

new energy because the term new energy still includes some energy sources that heavily emit carbon. The examples are gasified coal, methane, and dimethyl ether. Carbon-free energy should be the term broadly used to describe energy transition. After introducing carbon-free and renewable energy, we discuss the current status, potentials, and challenges of carbon-free and renewable energy technology. The chapters discuss mainly the technical aspect of each technology. The technology includes solar power, hydropower, wind power, biomass, geothermal, nuclear energy, and hydrogen energy. Carbon capture technologies are also rising to push the net-zero carbon emission target even further. Technologies such as Bioenergy Carbon Capture and Storage (BECCS) are being made around the world. However, this book focuses on the primary energy producer technologies from renewables and carbon-neutral technologies. There are a lot of things that can be expanded and implemented better in each type of energy. For example, the use of hydrogen should be boosted because hydrogen is one of the most versatile types of energy carrier. Energy storage is still a problem on a renewable energy-based grid, and hydrogen as an energy carrier can create stability and reliability in the system. Another topic explored in each technology is the future of the technology and how it can be improved to tackle climate change. For example, the idea of floating solar panels has been discussed in several conferences and academic presentations in solar energy. It is said that it can help expand without causing any harm. Another example is the use of pumped-storage hydroelectricity plants in hydropower technology and small and modular reactors in nuclear technology.

With the background of technical aspects explained in Part 2, the third part of the book discusses the future of energy transition and how the existing net-zero carbon emission roadmaps and plans can be improved to truly meet the target. The discussion is not only limited to the policy aspect, but also the socio-economic aspect of the target including improvement of human welfare, gender equality, and job creation. Lastly, the book concludes with ideas and recommendations from Indonesian students abroad on how we can meet

the net-zero carbon emission target. This recommendation is vital for us, Indonesian students, because we are the ones that will implement these roadmaps, plans, and recommendations in the future.

In the last few years, the OISAA has published several books and recommendations, especially energy. This book is a complement to those previous books. We hope it creates impacts for the future, as small as it can be.