

# “Accelerating the Transition to a 100% Renewable Energy Era”

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## **Reviewed by Paul Taylor**

Johnson Matthey, Orchard Road, Royston, Hertfordshire, SG8 5HE, UK

**Email:** [Paul.D.Taylor@matthey.com](mailto:Paul.D.Taylor@matthey.com)

## **Introduction**

“Accelerating the Transition to a 100% Renewable Energy Era” is part of the series Lecture Notes in Energy that contains 24 papers from multiple authors. The notes provide a topical and comprehensive source of information on achieving the transition to a low-carbon energy system, which is essential in the fight against climate change as we transition from our use of fossil fuels to clean energy.

The book provides in-depth analysis of the various solutions that will contribute to this change, such as hydrogen fuel, low carbon buildings and cities, security of supply, energy grids and energy storage. The collection of papers provides the necessary data, case studies and analysis to frame the topic and explore the challenges and potential solutions.

## **Background**

There has been a fundamental change in our awareness of our connection with the natural environment. In January 2020, Australia experienced devastating wildfires, and there was significant flooding in the UK. At the same time, a new zoonotic virus, COVID-19, was beginning to spread around the world. It was more evidence, if

any were needed, that there is a clear link between our actions and the natural world. The subsequent COVID-19 lockdowns, where people had to stay at home in their local areas, also enabled a deeper connection with nature as we spent more time at home or outdoors and were able to see the change in seasons and hear the birdsong instead of traffic. Air quality in many cities also improved.

Reducing our impact on the environment is critical if we are to avoid the acceleration and escalation of climate change and reduce the likelihood of future pandemics. Quite simply, we are running out of time and yet many of the technologies and solutions are already available. In the UK, the Government is responding to the upsurge in public sentiment around these issues by recently announcing its Ten Point Plan (1) and is looking to put land stewardship at the centre of farming. An ambitious greenhouse gas reduction target of 68% by 2030 has been set and the sale of new petrol and diesel vehicles will cease in 2030. Later in 2021, Glasgow is hosting the crucial 26th United Nations Climate Change Conference of the Parties (COP26) meeting (2). There is cause for optimism although challenges still remain. Understanding the deployment of new technology will be central to achieving our climate goals.

## **Challenges, Solutions and Technologies**

This book represents a comprehensive source of information on renewable energy in terms of the various challenges, solutions and technologies. Each chapter is presented in the format of a scientific paper, which is understandable given the academic

and expert authors that have contributed. The papers are detailed and are mostly accessible although I would say that some chapters are for deep subject matter experts and require the full attention of the reader. The content can quickly become dense or assume expert knowledge. The book is designed for both postgraduates and non-specialist researchers.

From my personal perspective as a sustainability professional, I was able to benefit from reading the book. It has helped me to understand the renewable energy landscape and many of the specific topics within this. For example, in Johnson Matthey we are seeking to incorporate renewable energy at our manufacturing sites and are also developing our businesses in manufacturing hydrogen fuel cells and battery cathode materials for electric vehicles. Reading the book has deepened my understanding of the different technologies and the choices that are necessary.

The first chapters provide a helpful introduction before moving into more specific topic areas. The initial chapter shows the global energy consumption by sector for buildings (36%), industry (31%), transport (28%) and others (5%). The subsequent chapter states that pathways limiting global warming to 1.5°C require rapid and extensive transitions in all sectors and also makes the point that there are many other advantages to a low-carbon future, such as improved air quality and social prosperity. Progress has been slow but there is evidence for optimism with an increase in renewable electricity generation of around 3.1% per year between 2010 and 2016, which could approach 100% by 2050. Worryingly, the paper also states that current fossil fuel production will peak between 2030 and 2035 but would have needed to peak in 2020 to align with the Paris Agreement goals (3).

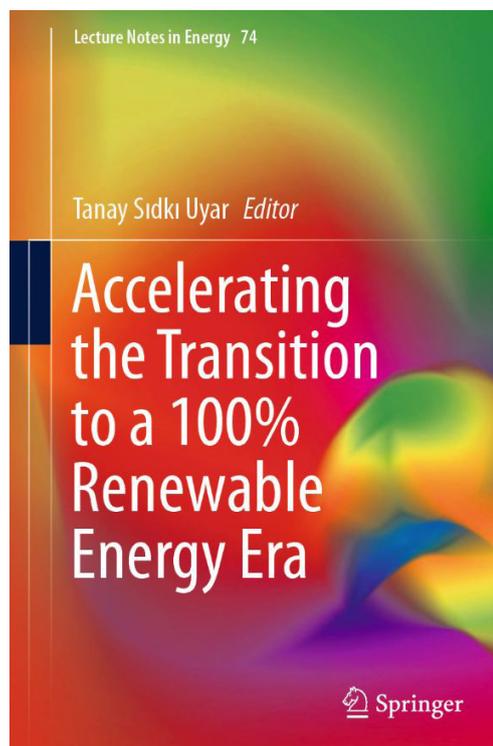
The subsequent chapters build upon the introduction by presenting deep-dives into the opportunities and challenges that have been outlined. I particularly enjoyed reading the papers associated with the role of hydrogen, as this is an important growth area for Johnson Matthey and it is a fantastic resource for all those that wish to deepen their understanding. Other papers investigate the challenges and solutions associated with energy storage and supply, either for hydrogen or the complexities of moving away from centralised electricity storage to microgrids, and address the challenges of intermittent supply from renewable sources (the phrase 'dark calm' is a term that I was

not aware of in this context). These technologies and challenges are likely, however, to touch our lives over the coming years as we transition to a low-carbon economy and should therefore be of interest to all, not just those working in this topic area.

## Conclusions

This book presents a comprehensive and detailed analysis on how to transition to a renewable energy future. It will be of value to anyone with an interest in the topic and will be particularly valuable to those that are working in this field, such as researchers or those in the corporate environment. The papers (lecture notes) are scientific and detailed and require the reader's full attention and in some instances I would argue they require a certain amount of pre-existing subject matter expertise.

In conclusion, the book is a curation of lecture notes that has been successful in providing a holistic and topical analysis of the challenges and solutions related to the urgent need for decarbonising our energy systems. As such, it is an asset to those wishing to improve their knowledge in this arena.



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## References

1. "The Ten Point Plan for a Green Industrial Revolution: Building Back Better, Supporting Green Jobs, and Accelerating our Path to Net Zero", The Stationery Office, London, UK, 2020
2. 26th UN Climate Change Conference of the Parties (COP26), 1st–12th November, 2020, Glasgow, UK
3. 'The Paris Agreement', United Nations, New York, USA, 2015, 27 pp

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## The Reviewer



Paul Taylor is the Sustainability Manager for Johnson Matthey, UK, within their Battery Materials business where the use of renewable energy plays a critical role in producing and powering the new wave of electric vehicles. Paul has been working in the area of environment and sustainability for nearly 20 years, having first completed his PhD in measurement uncertainty before working with global brands across a range of sustainability challenges to improve the sustainability performance of their products.