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Carbon Neutrality in the GCC

An Overview

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1.1 Background

Since the discovery of oil in the Gulf Cooperation Council (GCC) region in the 1930s, energy policies and strategies have been centred around exploiting fossil fuels to supply local energy demands and export this important and lucrative resource to the world (Ulrichsen, 2015). However, challenges posed by climate change issues, along with the restrictions imposed by international accords, such as the Paris Agreement in 2015, necessitate a fundamental reconsideration and revisions of current energy and development strategies in this region (UN, 2015).

The global push towards a more sustainable future has recently taken a new and promising direction. Countries and major companies worldwide are receiving pledges to achieve 'Carbon Neutrality' by 2050, the Paris Agreement's long-term strategy, or even earlier. Carbon Neutrality is defined as a state of net zero carbon-dioxide (CO_2) emissions, which can be reached by balancing the emissions of CO_2 with its removal and/or by reducing or eliminating the need for it in society (Masson-Delmotte et al., 2018). While the main and direct benefits of a carbon-neutral future are the anticipated reductions in greenhouse gas emissions, indirect benefits and payoffs are numerous, including improved air quality, reduced healthcare costs, job creation, and improvements in the overall quality of life, among others (US EPA, 2022).

In line with global trends, the Gulf countries announced several ambitious pledges to achieve carbon neutrality by 2050 or earlier. Most of the climate pledge announcements were made just before the 26th UN Climate Change Conference (COP26), which took place in Glasgow, Scotland, on 31 October–13 November 2021. The degree of commitment to carbon neutrality varied from country to country. For instance, Saudi Arabia, the United Arab Emirates (UAE), and Bahrain all committed to achieving net zero emissions by 2060, 2050, and 2060, respectively, while Kuwait, Oman, and Qatar only committed to a certain percentage reduction in

emissions by different dates (Kramer et al., 2022). Parallel to the pledges, the Gulf countries have taken steps towards carbon neutrality. The UAE has launched the world's largest single-site solar energy project, while Saudi Arabia has announced plans to develop 200 gigawatts of solar energy by 2030. Qatar has also launched several initiatives to promote renewable energy and reduce carbon emissions.

While the mentioned pledges and initiatives are commendable, they face significant challenges in the harsh geographical and socioeconomic reality of the Gulf region. First, the hot and arid climate puts tremendous stress on critical resources, such as energy, water, and food, in addition to presenting unique challenges for renewable energy sources like solar and wind power. Furthermore, the region's rapid development and population growth have resulted in increased energy consumption, making it challenging to reduce emissions without impacting economic growth and development – GCC economies heavily rely on the oil and gas industry. Another challenge facing the Gulf countries is the lack of public awareness of and engagement in the issue of climate change. Many people in the region view climate change as a distant problem that does not affect them directly, and as a result, there is a lack of urgency and political will to address the issue.

1.2 Problem Statement and Objectives

Despite the heightened level of GCC interest, commitments, and investments in carbon neutrality, surprisingly there are no serious efforts to date to pull together scholarship on the adoption challenges for a successful carbon neutrality transition, the implications for the economy and society, and the infrastructure and regulatory requirements that need to be in place. Related efforts have typically been segregated and remain limited in comparison to other growing economies, such as China (CICC Global Institute, 2022). However, the rewards of carbon neutrality are significant, both in terms of mitigating the impacts of climate change and promoting sustainable development and economic growth. Important barriers are expected to hinder the full transition towards carbon neutrality in the GCC. These include – but are not limited to – technology readiness, economic barriers, availability of locally generated knowledge, energy-intensive lifestyles, and rigid institutional and policy structures (Bayoumi et al., 2022; Zaidan et al., 2019).

This edited volume aims to provide the first systematic assessment and understanding of the current trends, challenges, and opportunities for the GCC region to achieve carbon neutrality. Through a compilation and synthesis of scholarly essays and case studies, it offers unique insights into the policy frameworks, technological innovations, and behavioural changes needed to transition from

oil-based to cleaner, knowledge-based economies. The book is intended for policy-makers, scholars, researchers, and students interested in the transition to a sustainable, low-carbon future and offers valuable insights for anyone interested in the global energy transition. Its scope is well along the lines of the United Nations (UN's) Sustainable Development Goals (SDGs); in particular the 11th pillar on 'Sustainable Cities and Communities'.

The core chapters of the book come as a result of the compilation of some of the insightful papers, presentations, and discussions by participants at the 12th Gulf Research Meeting, which was organised by the Gulf Research Center and held at the University of Cambridge in July 2022. Participating authors included a diverse mix of experts from various disciplines and sectors such as policy-makers, engineers, political and social scientists, architects, educators, and researchers.

1.3 Book Structure

Following this Part I introduction (Chapter 1), the chapters of the book are divided into a further five parts, each one focusing on a theme of a particular aspect of the transition to carbon neutrality.

Part II, 'Circular Carbon Economy and Pathway Frameworks', provides a roadmap for GCC countries to transition from oil-based to cleaner, knowledge-based economies. Chapter 2, 'Circular Cities: One of the Pathways to Carbon Neutrality', by Okan Geray and Gamze Hakli Geray, discusses the concept of circular cities and its social, economic, and environmental implications for urban contexts in the GCC. Chapter 3, 'The GCC and the Circular Carbon Economy: Progress and Potential', by Mari Luomi, Fatih Yilmaz, and Thamir Al Shehri, compares the GCC countries' progress towards Circular Carbon Economies (CCEs) and their potential to achieve carbon neutrality by mid century. Finally, Chapter 4, 'Net Zero Saudi Arabia: How Green Can the Oil Kingdom Get?', by Jim Krane, examines the implications of Saudi Arabia's goal to achieve net zero emissions by 2060 and the challenges of transitioning from a fossil fuel-driven economy to a net zero carbon future.

Part III, 'Infrastructure', discusses the infrastructure required to achieve net zero emissions. Chapter 5, 'Energy Efficiency and Carbon Neutrality Potentials for the Building Sector in the GCC Region', by Moncef Krarti, presents an overview of the current trends in energy demands in the building sector for the GCC region and countries with an emphasis on historical trends in the energy efficiency performance of buildings. Chapter 6, 'Electrifying Public Transport Networks in Dubai: Environmental Benefits, Urban Improvements, and Social Challenges', by Giovanna Potestà and Mario Tartaglia, examines the potential benefits and social challenges of Dubai's plan to electrify its public transport network. Finally,

Chapter 7, 'Net Zero Emissions in the GCC Region: Challenges and Opportunities for Green Hydrogen Applications', by Ahmed Badran, examines the potential benefits of green hydrogen technology for GCC countries in reducing carbon emissions and greenhouse gases and the challenges that may hinder its adoption in the region.

Part IV, 'Policy and Data Transparency', explores the regulatory and reporting frameworks needed to measure progress towards carbon neutrality. Chapter 8, 'GCC Carbon Neutrality and Net Zero Policy Tracker: Framing, Methodology, and Findings', by Andreas Rechkemmer, Logan Cochrane, and Noureddine Radouai, presents a policy tracker for climate policies of GCC states aimed at achieving mitigation goals of the Paris Agreement and carbon neutrality targets. Chapter 9, 'Data Policies and Governance for Greenhouse Gases Reports and Initiatives', by Hesham M. Al-Ammal, examines the lessons learned from the Kingdom of Bahrain's national initiative for reporting on the its state of carbon and greenhouse gases. Finally, Chapter 10, 'Key Issues for Long-Term Climate Policy Design in GCC Countries with a Focus on Qatar', by Frederic Babonneau, Ahmed Badran, Maroua Benlahrech, Alain Haurie, Maxime Schenckery, and Marc Vielle, tackles the challenges and options of designing an efficient long-term global climate policy for GCC countries.

Part V, 'Behavioural Aspects and Human Factors', examines how the GCC's transition to carbon neutrality will be influenced by behavioural and human factors. Chapter 11, 'Energy Transition in Oil-Rich Countries: The Role of Resource Nationalism', by Susan Kurdli and Renato Lima-de-Oliveira, explores how domestic political factors related to oil and gas resource nationalism influence energy transition capabilities. Chapter 12, 'Toward Smart Buildings and Communities in the Gulf States: Analysis of Human and Social Dimensions in the Transition to Carbon-Neutral Cities Using Artificial Intelligence', by Ammar Abulibdeh, Esmat Zaidan, and Mohsen Jafari, investigates the interaction of people with their built environments to better understand drivers of occupants' indoor comfort and related energy behaviours. Finally, Chapter 13, 'EU–GCC Cooperation Opportunities on Behavioural Energy Efficiency', by Konstantinos Koasidis, Nikolaos Vourgidis, Vangelis Marinakis, Filippos Serepas, and Haris Doukas, aims to facilitate a knowledge transfer between the European Union (EU) and the GCC to enhance the ability of the two regions to trigger end-user behavioural changes and help them achieve their energy efficiency targets.

The book concludes with Part VI, Chapter 14, 'Outlook of Net Zero GCC States', by Wael A. Samad, Ahmed Badran, and Elie Azar. This chapter synthesises the key findings and lessons learned from the various chapters, reflecting on the policy measures, technological innovation, and behavioural change enablers needed for a successful carbon neutrality transition in the GCC region.

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