

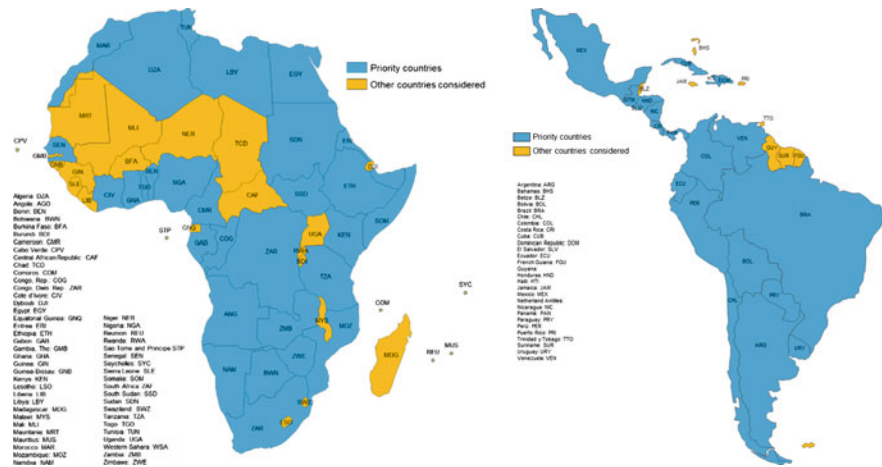
# Preface

Africa and Latin America are comprised of some of the world's most prosperous nations and some of the world's poorest. With more than 20% of the global population, these nations all strive to enhance their economic prosperity and to build a social fabric and a business community that allows their citizens' opportunities for success in the future. For many nations, in these regions, any goals beyond basic sustenance represent a marked improvement in the standard of living and basic services, but all nations recognize the inextricable link between economic prosperity and energy consumption and the challenges associated with building a secure energy future that fuels their long-term economic growth.

This book is intended to serve as an introduction and initial source of information for students, researchers, and other professionals interested in the energy sectors for nations that comprise both Africa and Latin America (Fig. 1) with a specific focus on low-carbon energy systems. This book coalesces information that is often difficult to find in the published literature to provide the most current material on how the energy sector is evolving in these countries and the challenges they face in moving from a disaggregated, nonstandard energy sector framework to a fully integrated, yet distributed sector. The most important up-to-date numerical data related to energy production, capacity, efficiencies, production costs, etc., are exposed in 14 chapters, 208 figures, and 52 tables, integrated in terms of units and methodology. We have attempted to rely on the recent (2014–2016) technical peer-reviewed literature in our assessments of each technology and the role they play in these nations, but for many countries, this information is often limited and for some nearly nonexistent. As such, we have also relied on government, non-government, and trade organization publications where necessary to supplement insights gained from the refereed literature.

This book begins with an assessment of the current energy situation and trends in Africa and Latin America and the significant constraints on meeting their future energy needs with current practices. These constraints include social, political, regulatory, financial, technical, economic, and policy considerations and challenges. We begin by examining the current energy trends in Africa and Latin America and the constraints that current practices place on meeting future energy





**Fig. 1** African and Latin American priority countries and other countries considered in this book

needs. Later chapters present a more detailed description and analyses of each low-carbon energy technology and the role they play in countries that comprise these two regions. These chapters are supported by a large number of illustrations and data summary tables to offer valuable insights into the topics and technologies discussed. We have integrated 94 “Case examples” from the refereed literature in each of the chapters that identify specific examples of technology developments and deployments or a synthesis of the challenges, successes, and deliberations related to specific technologies and/or the complementary capability that has arisen as a result of access to low-carbon energy resources (e.g., ethanol gel stoves). Our case examples incorporate experiences from nearly every nation in these two regions and are intended in part to serve as “models for success” that may be emulated elsewhere within African and Latin American countries.

This book is intended to provide a basis for understanding the energy context for both Africa and Latin America by serving as a resource to help define strategies that accelerate the deployment of indigenous low-carbon energy technologies in a manner that enhances long-term economic prosperity. The authors enjoy “real-world experience” in teaching energy concepts and principles in “emerging” countries, and this book summarizes much of the information we use in the classroom interactions with our students. Both of our universities draw significantly upon students from African and Latin American countries, and our cities serve as gateways to these regions for trade, commerce, and education. Also, we plan to use this book as our resource for teaching classroom and online courses in the coming years in our respective universities. The authors will be available for readers to discuss any data or analysis published in the book (rglemus@ull.edu.es), and the readers will be encouraged to propose any additional and recognized content that they consider can enrich future editions. The readers who collaborate in the



enrichment of future edition content will be mentioned in the acknowledgements of the edition where this content is added.

Priority countries for this book were identified based on the available reliable data on the energy sector.

## **African Countries**

Algeria, Angola, Benin, Botswana, Cameroon, Congo, Democratic Republic of Congo, Cote d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Ghana, Kenya, Libyan Arab Jamahiriya, Morocco, Mozambique, Namibia, Nigeria, Senegal, South Africa, Sudan (covering South Sudan), United Republic of Tanzania, Togo, Tunisia, Zambia, Zimbabwe, and other African countries briefly considered (Burkina Faso; Burundi; Cape Verde; Central African Republic; Chad; Comoros; Djibouti; Equatorial Guinea; Gambia; Guinea; Guinea-Bissau; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Niger; Reunion; Rwanda; Sao Tome and Principe; Seychelles; Sierra Leone; Somalia; Swaziland; Uganda; and Western Sahara).

## **Latin American Countries**

Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela, and other Latin American countries briefly considered (Antigua and Barbuda; Aruba; Bahamas; Barbados; Belize; Bermuda; British Virgin Islands; Cayman Islands; Dominica; Falkland Islands; French Guyana; Grenada; Guadeloupe; Guyana; Jamaica; Martinique; Montserrat; Netherlands Antilles; Puerto Rico; St. Kitts and Nevis; Saint Lucia; Saint Pierre et Miquelon; St. Vincent and the Grenadines; Suriname; Trinidad and Tobago; and Turks and Caicos Islands).

To discuss regional energy figures (mainly supply, capacities, and production), we use the IEA and US EIA Statistics Databases. We consider these sources very rigorous, but the methodology employed produces 2-year delayed data with respect to present. To compensate this drawback, in many chapters, more updated estimations, provided by global and prestigious associations related to the specific technology, are referred.

This book would not have been possible without the selfless support of many that believe as we do that we must improve the economic prosperity of global citizens everywhere and that energy is key to a prosperous future. Brooke L.E.S. Fontenot-Amedee has been gracious with her time and insight on information technology, and The Good Shephard Foundation has provided financial and moral



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The University of La Laguna, the University of Texas System, and the University of Texas at San Antonio have continuously encouraged collaborative research opportunities on renewable energy between our universities. Dr. Alfonso “Chico” Chiscano, MD has dedicated his life to the spirit of collaboration between San Antonio and the Canary Islands and has continuously nourished this relationship over decades.

We also want to make special mention to our image designer, Aneliya Stoyanova, and to Oyinkansola Adeoye, who has contributed along with many others technical support.

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