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Renewables for Energy Access and Sustainable Development in East Africa

 Springer

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Foreword

Imagine life with no electricity. No fridge with vaccines for a newborn child, nor important anaesthetics for the mother giving birth. No exposure to computers in school. No machines to produce. And yet more than a billion people live without.

Then consider the difficulty of the analyst wishing to study how to electrify a country and supply energy to drive its development. They are faced with a mountain of a task. Data is limited; modelling tools are expensive.

Ponder the plight of the policymaker who should manage national resources, set market rules and engage with investors and development partners. The latter want hard auditable information. In many instances that type of information simply does not exist. Investment is therefore not made. Those without electricity stay without and, in turn, are locked out of the opportunities that most of the readers of this book will enjoy.

In this book, the authors join the charge to help breach this deadlock—with a focus on East Africa. They do so by mapping the high potentials of renewable and gas reserves in the region, as well as the complementary role they may play. Then, by taking advantage of scientific advances in open data and free open models, they deliver quantitative scenarios. These provide a powerful vision. Together with thought-leading analysis the authors help orientate the debate around—and potential directions for—investment and development in electrification, gas and renewable energy deployment.

Along the way they leave as a legacy transparent, reproducible, reconstructable data, tools and insight. This is a unique and powerful contribution.

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About the Fondazione Eni Enrico Mattei (FEEM)

The Fondazione Eni Enrico Mattei (FEEM), founded in 1989, is a non-profit, policy-oriented, international research centre and a think tank producing high-quality, innovative, interdisciplinary and scientifically sound research on sustainable development. It contributes to the quality of decision-making in public and private spheres through analytical studies, policy advice, scientific dissemination and high-level education. Thanks to its international network, FEEM integrates its research and dissemination activities with those of the best academic institutions and think tanks around the world.

About FEEM's *Future Energy Program* (FEP)

The *Future Energy Program* (previously called *Energy Scenarios and Policy* program) aims to carry out interdisciplinary, scientifically sound, prospective and policy-oriented applied research, targeted at political and business decision-makers. This aim is achieved through an integrated quantitative and qualitative analysis of energy scenarios and policies. This innovative and interdisciplinary approach puts together the major factors driving the change in global energy dynamics (i.e. technological, economic, geopolitical, institutional and sociological aspects). FEP applies this methodology to a wide range of issues (energy demand and supply, infrastructures, financing, market analyses, socio-economic impacts of energy policies).

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Abbreviations

AfDB	African Development Bank
BCA	Benefit-Cost Analysis
Bcm	Billion cubic metres
CF	Capacity Factor
CIA	Central Intelligence Agency
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CSP	Concentrated Solar Power
EA	East Africa = EA-8: Burundi, Kenya, Malawi, Mozambique, Rwanda, South Africa, Tanzania, Uganda
EA-7	East Africa (EA-8) excluding South Africa
EA-8	East Africa including South Africa
EAC	East African Community
EAPP	Eastern Africa Power Pool
FDI	Foreign Direct Investment
FiT	Feed-in-Tariff
GIS	Geographical Information System
GDP	Gross Domestic Product
GNI	Gross National Income
GW	Gigawatt
GWh	Gigawatt hour
HFO	Heavy Fuel Oil
HVDC	High Voltage Direct Current
IEA	International Energy Agency
IHME	Institute for Health Metrics and Evaluation
IPCC	Intergovernmental Panel on Climate Change
IEA	International Energy Agency
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
kV	Kilovolt

kWh	Kilowatt hour
LCOE	Levelised Cost of Electricity
LPG	Liquefied Petroleum Gas
MBTU	Million British Thermal Units
MG	Mini-Grid
Mt	Megaton
MW	Megawatt
NG	Natural Gas
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OnSSET	Open-Source Spatial Electrification Tool
PJ	Petajoule
PPA	Power Purchase Agreement
PPP	Purchasing Power Parity
PV	Photovoltaic
RCT	Randomised Control Trial
RE	Renewable Energy
RE-FiT	Renewable Energy Feed-in-Tariff
SDG	Sustainable Development Goal
SA	Standalone system
SPPA	Standardised Power Purchase Agreement
SSA	Sub-Saharan Africa
ST	Short ton
TWh	Terawatt hour
UN	United Nations
UNDP	United Nations Development Programme
USD	United States Dollar
US EIA	United States Energy Information Administration
V	Volt
VRE	Variable renewable energy
WTP	Willingness-to-pay