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RENEWABLE ENERGY

From Europe to Africa

David Elliott and Terence Cook

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Preface

Over the last ten years or so, there has been a concerted effort to support the use of renewable energy in less developed countries. The long-term aim has been to reduce emissions from the use of fossil fuels, but shorter-term aims include providing energy sources for the many who are currently off the power grid. Thus, the United Nations' (UN) Sustainable Development Goals include providing '*affordable, reliable, sustainable and modern energy for* all', with projects being supported across the developing world under the *Sustainable Energy for All* programme.

It has not always been easy. Most of the countries targeted are relatively poor and there can be mismatches in expectations and conflicts with other development goals, with energy issues and renewables, in particular, not necessarily being high on local /national agendas.

This book gives an account of some of the problems encountered—for example, looking at how hard it is to make interventions in countries where there is no experience with renewables. There are potential conflicts between what they want (e.g. economic growth and jobs) and what agencies want to see (e.g. green power capacity), what is needed (low-carbon energy) and what is available (dirty fossil fuel). Our main focus in this book is on Africa, but these problems are not unique to the developing world. We also look at experiences with similar programmes in Central and Eastern Europe, some of them initiated by the European Union (EU) as part of the EU enlargement process, and some extending into relatively undeveloped countries near the EU. In the case of the EU expansion, part of the aim was to ensure that the candidate countries complied with EU directives on Renewable Energy. In the case of the UN- and EU-supported

work in Africa described in this book, there was also pressure to reform policies, as a condition for receiving aid and technical assistance from the EU. In both cases, that sometimes led to conflicts.

Moreover, in both cases, in addition to varying local deployment issues, policies, and conflicts, there were also sometimes conflicts *within* and *amongst* the support agencies, as well as a potential for bureaucratic inefficiency. Certainly, with large aid budgets being involved, there are issue of programme effectiveness and accountability. The likelihood that donor countries will have their own commercial interests and may seek to build markets for equipment and services that they can supply also raises a range of political and economic issues: who are these programmes really for? What are the costs and risks of technology transfer? Can local technology and skill bases be created?

It is now apparent that the development of renewables will progress apace around the world. In many cases, it is the newly industrialising countries that are taking the lead, following China's example, with China also keen to promote its influence and technology in the developing world. With the West no longer necessarily in the forefront, new models of global development may now be needed. This book explores the implications and looks at how the development process may and should change. It draws on fieldwork carried out by Terence Cook in Central and Eastern Europe as part of an Open University (OU) project led by David Elliott, and then, in Africa, funded by the EU under the UN *Sustainable Energy for All* programme. That programme remains a cornerstone in development efforts in the energy field, but as this book explains, revisions, alternative and additional approaches may be necessary, and indeed, seem to be emerging.

In a hopefully not-too-presumptuous approach, to provide a convenient framework, in the case study parts of this book, we make use of our OU teamwork, reporting on its phases and development chronologically, so as to structure our exploration of the issues and cue in the case studies from each region. While we are indebted to the various EU sources of funding for this work, our account of it is an independent one.

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Author Biographies

David Elliott is a professor based at the Open University (OU), UK. Elliott's expertise is in renewable energy policy, on which he has written extensively. He has worked on a range of projects, including an OU-led New Europe-New Energy programme (2003–2011), together with co-author Terence Cook.

Terence Cook is a research fellow at the Open University, UK. Cook has worked on a series of European Union (EU)–supported projects focused on sustainable energy in Africa. He has extensive fieldwork experience of projects and practices in developing countries, most recently via his involvement with the work of EU's Technical Assistance Facility in Eastern and Southern Africa, in support of the United Nations' *Sustainable Energy for All* programme.

Abbreviations

Power Units

GW	Gigawatt – 1000 MW
TW	Terawatt – 1000 GW
MW	Megawatt – 1000 kilowatts

Energy Units

kWh	Kilowatt-hour
GWh	Gigawatt-hour
MWh	Megawatt-hour
TWh	terawatt-hour

Technology

CSP	Concentrated Solar (thermal) Power
EfW	Energy from Waste
PV	Photo-voltaic solar

Support Schemes/Programmes/Agencies

CDM	Clean Development Mechanism
FiT	Feed-In Tariff
IEA	International Energy Agency
IRENA	International Renewable Energy Agency
NGO	Non-Government Organisation
REEEP	Renewable Energy and Energy Efficiency Programme
SE4All	Sustainable Energy for All

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CHAPTER 1

Introduction: Energy Changes

Abstract Emissions from fossil fuel combustion have major local and global environmental, social, and economic impacts. Progress in reducing emissions has been made by some industrial countries, with, for example, renewable energy systems being widely adopted, and as the economies of the less developed regions of the world begin to expand, they too will have to make changes in energy production and use. This introductory chapter outlines the key energy policy issues and the options for action, with renewables being seen as central, and with the focus of the book being on related development programmes in Africa, for example, under the UN *Sustainable Energy for All* programme, but also on work on renewables by and in the European Union in the case of Eastern and Central Europe.

Keywords Climate change • Renewable energy • Development aid • Sustainable energy for all

1.1 Mitigating Climate Change

Climate change is a global issue. Whoever produces greenhouse gases such as carbon dioxide, and wherever these emissions occur, they eventually spread in the upper atmosphere, and by interacting with incident solar energy, play a role in changing the climate everywhere. Local effects, however, will differ, depending on topography and geography, and the impact of these effects will also differ, depending on the local social and economic

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situation. Some of the largest impacts may fall on those countries least equipped to deal with them—for example, poor countries in the global south, where weather-related stresses (e.g. due to flooding, high temperatures, and droughts) are already a problem. A 4° or 5 °C average temperature rise could make parts of the equatorial belt almost uninhabitable in summer, while the associated sea level rise and storms could inundate many key coastal cities and food growing areas (IPCC 2017).

In the short term, the only option available to most poor countries is to adapt as best they can to the changes—for example, by better emergency planning and building more flood defences. This will not solve the problem, which will continue to get worse unless more radical solutions are adopted worldwide. The destruction of forests, which act as carbon sinks, makes the problem worse, as do some farming methods, but the core problem is the combustion of fossil fuels in power stations, homes, by industry, and also in vehicles, including ships and aircraft. Around 80% of the energy used at present globally comes from the combustion of fossil fuels—coal, oil, and gas. That underpins much of the global economy. Reforestation would help by creating a renewed carbon sink, but it would not allow us to continue to burn off the remaining fossil resources on any significant scale. The production and release of carbon dioxide gas has to stop, and soon.

The implication is that we must switch, globally, to using non-fossil energy sources for energy production. Using energy more efficiently will also help, so that less energy has to be produced, but however much we avoid energy waste, we will still need energy sources, and the only non-fossil options we have at present are nuclear and the various renewable sources.

Nuclear power has a range of significant economic, safety, and security problems, making it arguably not well suited to wide-scale expansion, whereas renewables are generally much more benign. Although they do have their own problems, the situation at present is that while the global nuclear contribution seems fairly static at around 11% of global electricity, renewables are expanding rapidly, already supplying over 24% of global electricity, with costs continuing to fall. Projections are that they could be supplying up to 50% of electricity in many countries by 2030 (some have already reached that) and much more globally by 2050, given proper support. Indeed, in some countries, near 100% may be possible by then, with renewables also making major contributions to heat supply and transport (Elliott 2015). Some even say that most countries can get near 100% of their total *energy* from renewables by 2050, given the political will (Jacobson et al. 2017).