



GUIDE TOWARDS A
SUSTAINABLE ENERGY
FUTURE FOR THE AMERICAS

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Preface

Energy is essential to human civilization. It is necessary for all aspects of modern life ranging from cooking, to powering machines, to transportation, to heating our dwellings and to providing a source of artificial light. Over the broad sweep of human history, we have moved from relying on wood based energy to the coal-powered industrial revolution to petroleum based energy to nuclear and to solar and biobased energy sources and each of these energy sources continues to be important in the world's contemporary energy economy.

As the human population approaches eight billions the challenges of sustainable energy are taking center stage. The United Nations Sustainable Development Goals (SDGs) include as SDG 7 "to ensure access to affordable, reliable, sustainable and modern energy for all". Concerns about climate change, driven by fossil fuel based CO₂ emissions, are forcing a reevaluation of our dependence on different energy sources and are stimulating new research investments in low carbon and sustainable energy systems. We are witnessing an energy transformation that seems gradual, but when looked at retrospectively is impressive. Fuel efficiency and per capita energy consumption have improved substantially over the last half-century, but the pace of improvement must accelerate if we are to achieve a sustainable energy economy.

The purpose of this volume is to provide a science-based analysis of the current energy situation of the Americas and to look into the near term future of energy in the Hemisphere. The book considers key challenges such as bringing adequate energy to under served populations; renewable energy sources and the biofuel revolution and the role of gender in the energy economy. Each chapter includes country specific boxes that provide a picture of energy sources on a national and regional basis. The book also considers the challenges of building the institutional capabilities necessary to advance national energy economies.

The Hemisphere of the Americas is fortunate is having rich energy sources and in having a strong scientific enterprise dedicated to improving energy efficiency and access. While many challenges must be addressed as we move forward, the picture is one of substantial, yet still inadequate progress. It is vital to continue to invest in the scientific innovations that will support a sustainable energy future. Accordingly, we are pleased to present this contribution to the road map for achieving SDG 7 from the Science Academies of the Americas.

Michael Clegg
Co-Chair IANAS, USA

Juan Asenjo
Co-Chair IANAS, Chile



Introduction

John Millhone and Claudio Estrada

IANAS Energy Program Co-Chairs

The Americas are an abundant source of energy; all forms of energy, fossil energy and renewable energy, traditional sources and newly discovered sources. We are continuing to discover new sources of energy and how these sources can be used more efficiently and with less pollution. These energy sources are distributed geographically across North, Central, South America and the Caribbean. They contribute to sustain the industries, buildings and transportation of the Americas. A sustainable energy future for the Americas will depend on how we select from this mix of energy resources, transform those sources into useable forms, transport the energy to end users, and improve the efficiency of the end uses. The results will determine the social, environmental and economic future for generations of Americans.

Science and technology have a critical role to play in achieving this sustainable future. Science discovers the energy resources, develops technologies that bring energy sources to end-users, invent energy efficient products, and guide the management of energy systems. Recognizing this role, the InterAcademy Council (IAC), representing the world's leading academies of science, published a report in 2007, *Lighting the way; Toward a sustainable energy future*.¹ For more information on the report, see Box A.

The report motivated the Inter-American Network of Academies of Sciences (IANAS), the network of the 21 science academies in the Western hemisphere, to initiate an Energy Program to chart the path to a sustainable future in the Americas. Thanks to the commitment of the 21 Energy of Focal Points, experts appointed by the Academies of Sciences, and the support of other people and organizations from different scientific organizations, this book summarizes the findings and recommendations of the Program.

1. The Americas played a leading role in the InterAcademy Council's report. The Study Panel that drafted the report was co-chaired by Steven Chu, then Director, Lawrence Berkeley National Laboratory, and later U.S. Secretary of Energy, and Jose Goldemberg, Professor, University of Sao Paulo, Sao Paulo, Brazil,