

**New updated edition**

# **From Sunlight to Electricity**

**A practical handbook  
on solar photovoltaic  
applications**

**Foreword**

**R K Pachauri**



The Energy and Resources Institute

Revised by Suneel Deambi

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**(SECOND EDITION)**

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R K Pachauri**



**The Energy and Resources Institute**

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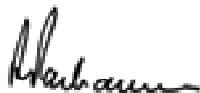
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# Foreword

The PV (photovoltaic) technology programme in India has undergone several changes in terms of technology, approaches to promotion, financial arrangements, and so on. Numerous training programmes have been conducted in the past to equip extension agents, workers of NGOs (non-governmental organizations), and other stakeholders with advancements made in the PV sector. As part of such efforts, numerous documents have also come out as informational packages, dealing with specific issues in the sector — technical, financial, operational and maintenance, and so on. However, there is a lack of a comprehensive document that provides all information related to applications of PV technology, approaches to dissemination, financial arrangements, and institutional and social factors in technology acceptance, beneficial to implementing agencies, financial organizations, and other stakeholders in the PV sector in India.

The present book is an attempt in this direction. It compiles information that gives the reader an overall understanding of the PV sector in India, designs and applications of specific devices and related benefits, finance, policies, and programmes. The book is not only a compilation of information, but also gives a step-by-step methodology for designing PV systems for appropriate applications in rural areas. The book has been written in simple language with numerous illustrations such that readers not very familiar with the PV sector find the contents easy to understand. For others, the book aims at providing guidelines on sizing and installing PV systems, which they will find very useful in their work. This volume is expected to be of interest and importance to all the stakeholders in the PV sector, namely, policy-makers, government officials, NGOs, academic and research organizations.



R K Pachauri  
Director-General, TERI, and  
Chairman, IPCC (Intergovernmental Panel on Climate Change)



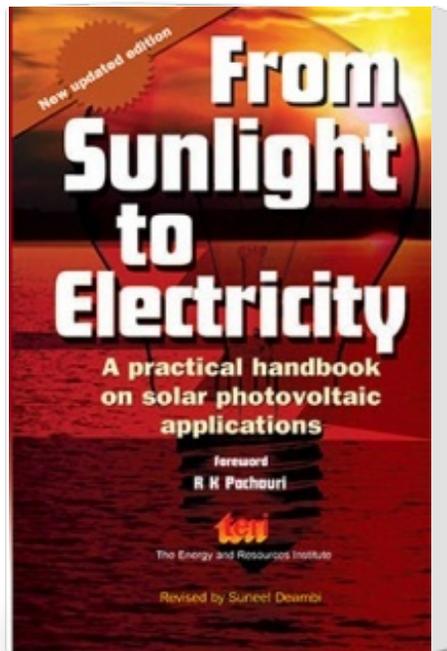
# Preface

Electricity is one of the most vital energy sources for economic activities. The economic development of a country by and large depends on its efficient supply. It can help in transforming the way people live and work. In India, the rural electrification programme started in the 1950s with the aim of promoting economic development and improving the quality of life in rural areas. However, the impact of the programme has been very low. Scattered households in rural areas and the high cost of extending grid electricity supply to these areas have been identified as reasons. Installations of SPV (solar photovoltaic) systems for small-scale electricity generation directly from sunlight can help improve activities in the domestic, health care, agriculture, education, and micro-enterprises sectors. SPV systems have been considered as one of the best options for rural infrastructure projects in electrified/unelectrified areas.

This document compiles information on several aspects, ranging from the history of the technology to its principle, components, applications, advantages, and its limitations. It gives a step-by-step methodology of designing a PV system for appropriate applications in rural areas. The specific applications considered are domestic lighting systems and pumping systems. It also carries lists of system manufacturers and integrators, financial institutions and intermediaries, and state nodal agencies with their communication addresses.

The document contains seven chapters. Chapter I introduces PV technology, its principles, benefits and limitations, and the efforts of the government to popularize the technology in rural areas. Chapter II explains the components of a PV system. Chapter III discusses the applications of various PV systems, namely, domestic lighting systems, solar lanterns, street lights, PV pumps, and refrigeration. Chapter IV deals with designing of a PV system for various applications. In Chapter V, the costing of PV systems has been described. Other information includes market prices of systems/components, central government subsidy, credit facility extended by IREDA (Indian Renewable Energy Development Agency), and the procedure to process soft loans. Chapter VI gives valuable tips on the operation and maintenance of PV systems. Chapter VII provides an overview of the SPV programme in India, and chapter VIII provides overview of the international PV programme and market.

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