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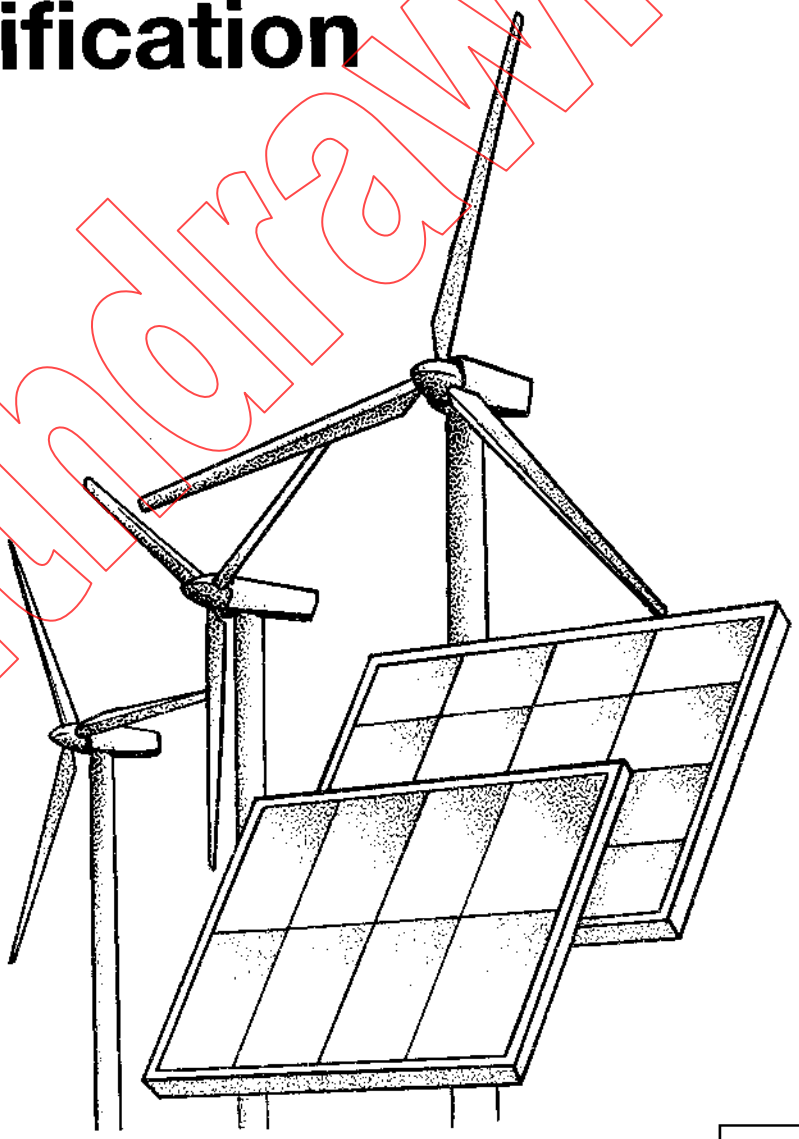

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EDF
Electricité de France

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public and established in an organization operating under given procedures.

IEC/PAS 62111 was submitted by Electricité de France and has been processed by IEC technical committee 82: Solar photovoltaic energy systems.

This PAS is also relevant to the activities of TC 21, Secondary cells and batteries, and TC 88, Wind turbine systems.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document:
Draft PAS	**Report on voting**
82/221/PAS	82/224/RVD

Following publication of this PAS, the technical committee or subcommittee concerned will investigate the possibility of transforming the PAS into an International Standard.

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this PAS may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

Title

Specifications for the use of REN in Rural Decentralised Electrification

Summary The General Directives for the use of Renewable Energies in Decentralised Rural Electrification take the form of 24 documents describing the functional specifications on which the design, implementation and exploitation of the constituent parts of these electrification systems should be based.

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SPECIFICATIONS FOR THE USE OF REN IN RURAL DECENTRALISED ELECTRIFICATION

"DRE SPECIFICATIONS"

GENERAL INTRODUCTION

Decentralised Rural Electrification projects are now being implemented in France as well as on the export market (particularly in developing countries) with no guidelines to enable those involved to establish common standards for use as a reference in assessing the quality of the installations.

It is for this reason that professionals in the area concerned have decided to pool their experience in order to establish a set of recommendations which will, when applied, provide a benchmark for the quality of the installations designed, installed and operated on this basis.

A list of those who have contributed to the content of these Directives may be found as an appendix. This document is therefore intended for the use of the **Project supervisor** and, in general, all those responsible for establishing calls for tender (e.g. : EDF - GDF Centres, Services or Electrification Syndicates in France, Independents, Development Aid Associations, etc.), as a guide to analysis of requirements and to improve the clarity of the responses they receive.

It is also intended for **Project Contractor** based in research bureaux, project planners, REN agencies in developing countries, service companies, companies involved in the electrification of villages, etc., as a guide to the presentation of their reasons for the technical options they have made in their response to the call for tender, in a format which would be comprehensible to a Project Supervisor**.**

Constructor, installers, operators and maintenance contractors will also find proposed product specifications, recommendations for the design and installation of systems, practical guidelines for operating and maintaining the installations in these Directives.

The content of these Directives is intended as a **guide** to the identification of energy requirements, of products which are technically best suited within the economic context ; it will provide a resource for :

- **selecting** an REN system suited to the installation site (adapting the solution to the needs) ;
- **specifying** a system for a pre-determined site (architecture, components, energy management, protection, etc.) ;
- **preparations** for the operation and maintenance of a REN system (guidelines to be applied).

In format, the **DRE SPECIFICATIONS** are divided into five major sections :

Part A : From Energy Requirements to Electrification System ;
Part B : Guidelines for System Design and Operation ;
Part C : Technical Specification of Components ;
Part D : Guide to Specification of a System for a Specific Site ;
Part E : Product Specifications (planned).

Table 1 provides a brief summary of each of the sections.

Table 1 : List of DRE documents

Part	Title
Series A : From Energy Requirements to Electrification System	
A 1	From the Requirements to be met to the Proposals for a Range of Electrification Systems
A 2	Results expected from the Process of System Design
A 3	Contractual Framework governing the Relationships Involved
A 4	Quality Assurance for Project Design and Implementation
Series B : Guidelines for System Design and Operation	
B 1	Architecture of Electrification Systems
B 2	Guidelines for Production Sub-System Design (planned)
B 3	Guidelines for Distribution Sub-System Design (planned)
B 4	Energy Management Guidelines
B 5	Guidelines for Data Acquisition
B 6	Guidelines for the Protection of Persons and Property from Electrical Hazards
B 7	Guidelines for Operation, Maintenance and Renewal
Series C : Technical Specification of Components	
C 1	Photovoltaic Array
C 2	Building-integration of Photovoltaic Arrays
C 3	Wind Generator
C 4	Electrogenerator Set
C 5	Battery
C 6	Converter
C 7	Energy Management
C 8	Climatic and Environmental Testing
Series D : Guide to Specification of a System for a Pre-Determined Site	
D 1	Methods for Characterising Needs (planned)
D 2	Guidelines for Selecting a System (planned)
D 3	Typical Functional Description of a Private Electrification System (planned)
D 4	Typical Functional Description of a Public Service Electrification System : Micro Power Stations
D5	Typical Functional Description of a Public Electrification System : Micro grids
Series E : Product Specifications (planned)	

The current 1997 edition will be expanded in 1998 by feedback from the application of these recommendations to **DRE** systems now being implemented throughout the world, and by the development of industrial products where the design, installation and implementation have been based on the proposed specifications.

The General Directives for the Use of REN for Decentralised Rural Electrification were drawn up for EDF by :

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Title

Part A : From Energy Requirements to Electrification System

Section 1 : From the Requirements to be met to the Proposals for a Range of Electrification Systems

Number of pages 14 (including appendices)

Type Specification

Associated Document(s) DRE - B1: "Architecture of Electrification Systems".

Summary This document offers an initial approach to a range of systems for decentralised rural electrification, based on a theoretical analysis of user requirements and of data arising from socio-economic surveys. 8 types of system were selected as responding to three types of need. The electrification systems identified were on stream renewable energy process supply systems, private systems and service systems.

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CONTENTS

1. Vocation of Decentralised Rural Electrification Systems

Decentralised rural electrification systems are intended to supply electricity for use throughout rural areas, to sites not connected to the national grid.

The type of use is, in most cases, as follows :

- isolated private dwellings,
- dwellings in village groups,
- public service (public lighting, pumping stations, health centres, places of worship, public buildings, etc.),
- centres of economic activity (workshops, micro-industries etc.).

These systems can be sub-divided into three categories :

- process electrification systems (for example, pumping) ;
- private electrification systems (PES) for single users ;
- public service electrification systems (PSES) for public service users.

The process electrification systems and private electrification systems have only two sub-systems :

- a sub-system **producing** electrical energy ;
- a sub-system **consuming** this energy.

The public service electrification systems, on the other hand, have 3 sub-systems :

- a sub-system **producing** electrical energy.

  By convention, this section is called a "**micro power station",** the term "micro" indicating the modest levels of power produced (from a few kVA to a few dozen kVA) :
- a sub-system **distributing** this power.

  By convention, this section is called a "**micro-grid"**, the term "micro" indicating the modest levels of capacity.
- a **user** sub-system consisting of user distribution circuits and electrical equipment.