

## **Education in Alternative Sources of Energy: Experience at Cefet-Pb in Brazil**

Walmeran José Trindade Jr.  
Centro Federal de Educação Tecnológica da Paraíba – CEFET-PB  
Coordenação de Eletrotécnica - COELT  
Av. 1º de maio, 720 - Jaguaribe  
João Pessoa – PB, Brasil  
CEP 58015-430, Phone: 83 208 3061  
e-mail: walmeran@cefetpb.edu.br

### **Abstract**

The Federal Technical Schools in Brazil, nowadays, Federal Centers of Technological Education have got large experience in the technician formation. At the moment, the Brazilian energetic scenery is passing by a strong pressure, which imposes a reaction of these educational centers, to collaborate with the solution of this serious national problem. The formation of qualified human resources in this area of alternative sources of energy is a necessary and coherent reply in this reality.

It is presented the experience of the Federal Center of Technological Education in Paraíba (CEFET-PB) in the subject matter of Alternative Sources of energy, as part of the pedagogical project of the Electrotechnique Course, whose aim is to form technicians with competences and abilities for the project, installation and maintenance of wind and solar centers for generation of electrical energy. The teaching methodology and the laboratory facility are also presented.

**Keywords:** alternative energy, solar energy, wind energy, education

### **1. Introduction**

The last years the interest for generation of electrical energy has increased from alternative and/or renewable sources in Brazil. The Brazilian dependence on the hydric energetic matrix has showed its negative side, due to the lack of investments in the sector, from the demand which increases at about 5% a year, and the periodical events of dryness which compromises the hydrographic basin former of reserve of potential energy. The environmental invocation has also led to guide/direct politics of incentive to change or to diversify our energetic matrix. The effective implantation and the use of alternative technologies to the generation of electric energy depends on the financial factor. Yet, the human resource factor perhaps be the most preponderant. Qualified technicians to design, install and maintain systems of generation of electric energy from solar or wind energy are necessary.

The Federal Technical Schools in Brazil, nowadays, Federal Centers of Technological Education have got large experience in the formation of technicians. At the moment, the Brazilian energetic scenery is passing by a strong pressure, which imposes a reaction of these educational centers, to collaborate with the solution of this serious national problem. The

formation of qualified human resources in this area of alternative sources of energy is a necessary and coherent reply in this reality.

## **2. Aims of the course**

The aim of teaching the subject matter Alternative Sources of Energy at CEFET-PB is to form technicians in Eletrotecnique with competences and abilities for the project, installation and maintenance of wind and solar centers for the generation of electrical energy besides giving technical support to the communities of Paraíba State interested in installing small wind and solar centers.

## **3. Teaching Methodology**

The formation of human resources in alternative sources of energy happens through the inclusion in the pedagogical project of the Technical Course in Eletrotecnique from CEFET-PB, in the subject matter Alternative Sources of Energy (FAE). In this subject matter the technical, environmental and economical fundaments of the small wind and solar centers for the generation of electrical energy are worked. Explanatory classes, experiences in laboratories (installation, maintenance, design, etc.) and technical visits are some pedagogical instruments/procedures adopted.

The experiments in laboratories are divided into simulations of mounting photovoltaic and wind systems, through didactic kits, and in the real mounting of those systems into real structures available in the laboratory. (see photos on the last page).

The basic or training courses in alternative (solar and wind) sources of energy are based on the FAE formal subject matter of the Technical Course in Eletrotecnique from CEFET-PB, giving the same quality of the courses for those people who are not enrolled in the Institution.

The technical consulting will be done through the involvement of teachers and students from the referred course in partnership with communitary associations, making even possible communitary probation/training in Alternative Sources of energy.

## **4. Laboratory Facility**

The Technical Course in Eletrotecnique at CEFET-PB has got well-structured classrooms and laboratories. As examples, we can cite: Laboratory of Basic Electricity; Eletrical Machines, Basic and Industrial Electronics; Conventional and Automatic Building Installations; Electrical Commands; Installations of High Voltage; CLP and Informatics, and the Laboratory of Alternative Sources of Energy (LabFAE).

The structure of the Laboratory of Alternative Sources of energy consists of didactic kits in solar and wind energy, real structures of mounting photovoltaic and wind systems, besides a solar termic system for warming the water, to demonstrate (in implementation). Also, it is running, the project of criating the Solar House at CEFET-PB, whose aim is to present/to leak out the technologies in Alternative Sources of Energy.

## **5. Conclusions**

The Electrotechnique Course at CEFET-PB is well-structured concerning either to the teachers staff or its facilities. Most teachers are graduated in Electrical Engineering. Part of them has got Masters and/or PhD degrees. Its facilities is also well organized and the inclusion of the subject matter Alternative Sources of Energy in the pedagogical project of the course gives more quality to the graduate technicians in this area. The educational centers which form this special qualified technician have to prepare itself in advance to the challenge: to supply the regional market of electrical energy of qualified human resources and updated them in the new technologies of the sector, even with the possibility of the appearance of enterprises with render services of consulting, installation and maintainance of photovoltaic aeolic systems.

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Figure 1: Didactic kits in solar energy.



Figure 2: Real structure of mounting photovoltaic systems.