

SOLAR ENERGY IN THE NORTHERN CAMEROON

Marthe Djuikom¹, Charles Ndjomaha², Michel Vandenberg³

- 1: Ministry of the Environment and Forestry - Immeuble ministériel n°2 - Yaoundé (Cameroon)
Tel.: +237 9500213, +32 478 69 22 95 djuikom@hotmail.com or djuikom2@yahoo.fr
- 2 : Centre des Etudes de L'Environnement et de Développement du Cameroun - BP 410 Maroua Extrême-Nord (Cameroun)
Tel. : +237 229-30-61 Fax.: +237 229-33-91
- 3 : Institut für Solare Energieversorgungstechnik (ISET) e. V. - Königstor 59 - D 34119 Kassel (Germany)
Tel.: +49-561-7294-103 Fax.: +49-561-7294-100 mvandenberg@iset.uni-kassel.de

ABSTRACT: In 2003, the Cameroonian Ministry of the Environment and Forestry has initiated a research project for studying the promotion of renewable energies and their impact on rural development. This work has been realized jointly with the department of Economy and Rural Development of the Agronomic University of Gembloux (Belgium), the "Centre Des Etudes de L'Environnement et de Développement du Cameroun (CEDC, Maroua) and the Institut für Solare Energieversorgungstechnik (ISET, Germany).

This initiative comes when the electricity sector in Cameroon has been facing important changes (Privatization of the national company of electricity, creation of a rural electrification agency, multiplication of the dialogues and seminars around the strategies of promotion for renewable energies, frequent black-outs during the dry season).

The first objective of the project is to contribute to a better knowledge of the situation of the use of renewable energies in Cameroon. Therefore, Mrs Marthe Djuikom undertook from July to September 2003 a socio-economic survey on the use of solar energy in the northern Cameroon.

The next step will be the creation of an energy program at the CEDC with the following tasks: promotion of photovoltaic technology, support of local and international synergies on the organisational aspects, training, information and coordination of reflexions at the local level for the promotion of rural electrification projects.

Keywords: Developing countries, Rural electrification, Sociological

1 INTRODUCTION

The experts of development are unanimous for saying that the supply of energy is one of the factors that can not be ignore for the socio-economic development. Historically, one could show that there is an interdependence between individuals and the nations growth of the resources, their quality of life, social equity and the energy technologies development

The planet disturbances related energy production and consumption pushed to the exploration and the new conquest of the most natural and inexhaustible forms of energy. We means the renewable energies by the wind, the sun, water..

At this time while the fight against poverty is one of the great concerns of multiple development institutions, it is perhaps time to sensitize and propose the potential, central and innovator roles which renewable energies could play in the sustainable development concerns in developing countries and particularly in rural areas. We think that these new energy sources could contribute to thrust the social and economic sustainable development even the political and the people of these countries...

As far as the households and micro rural enterprise are concerned, the electrification by these sources of energy could improve the quality of life, the sources of income, the working conditions, the techniques of conservation of products for human consumption and marketing, but also several domestic services.

For lack of extending on the total energy situation, we choose to share in this paper, the results of our field work research. This work highlights the situation of current use of photovoltaic in Cameroon, and particularly

in the Northern of this country. These results are a contribution to a better knowledge of the uses of solar energy in this province.

2 ELECTRICITY SECTOR SITUATION

Cameroon has an installed electric generation capacity of 817MW, of which 88% is hydroelectric and 12% is thermal. The country's two main hydro power stations are located in the south part, and the much smaller Lagdo station is located in the north. Generation and distribution of electricity was handled by 'Société Nationale d'Electricité du Cameroon: SONEL' till July 2001 when the U.S. based firm AES acquired 56% and Cameroon Government sold the remaining 44% to private investors. The national agency "Agence pour l'Electrification Rurale" (AER) was created in 2001 to take care of the rural electrification.

3 SOCIO-ECONOMICAL SURVEY

North Cameroon covers 10% of the territory and has the best solar resource of the country. The 2003 field survey was designed to answer questions such as:

- What is the present situation of solar energy applications in this part of Cameroon?
- How could solar energy - contribute in domestic energy needs in the far north of Cameroon, - stimulate socio-economic activities, - help to preserve the environment by reducing gas emissions

The study reviews the different categories of actors involved in solar systems, makes a diagnostic of the present situation and analyses ways of promoting this source of energy. Reflection is carried on for the creation of an energy program at the regional environment study center (CEDC).

4 LOCALIZATION OF THE ZONE

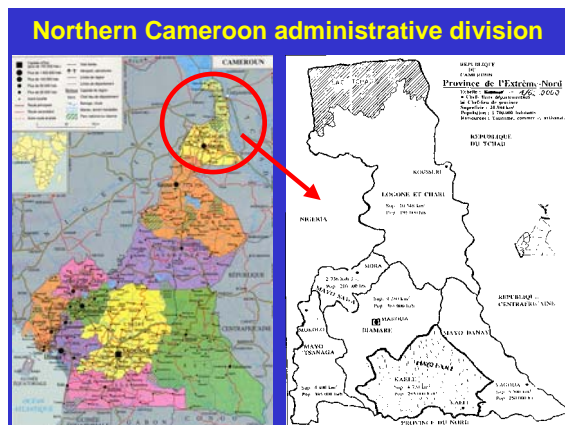


Figure 1 : Study region

5 RESEARCH RESULTS

5.1 Summary presentation of the province

Geographical situation: In Sahara zone, between the parallels 10° and 13° north latitude and the meridian lines 13° and 16° of longitude East.

Surface: It occupies about 6,8% of the national territory, that is 32.316 km²

Administrative divisions: It consists of 6 departments, 40 sub department and 4 districts out of respectively 58, 268 and 54 which is made up the national territory.

Climate: Tropical type with alternation of a long dry season (May- October) and a short wet season (June-September). The rain level (Pluviometry) between 700 and 1600mm is the weakest of the country

Demography: With its 2.570.607 inhabitants in 1999 , 1.855.695 in 1987 and 1.394.765 in 1976, it represents the most populated province on a respective total population of 14.859.000 inhabitants in 1992, 10.493.655en 1987 and 7.663.246 into 1976.

Energy situation: The establishment of electric distribution network in the province follows the principal axes connecting the capitals of departmental to the provincial capital : Maroua (except Logone and Chari).

Consumption of electricity in the province: Following table is the electricity sale and numbers of subscribers in the province (public distribution), Value in million F CFA and 1euro = 655.96 FCFA

Table 1: Electricity consumption in Northern Cameroon

Years	94/95	95/96	96/97	97/98	98/99
Electricity sales MCFA	1279	1228	1253	1507	1825
numbers of subscribers	12998	14131	15239	16765	17375
Total population of the province					2,570,607

Source: Statistics tabulated Extract (DSCN)

5.2 Typology of actors implied in the photovoltaic area

Our typology of people and structures using or in connection with at least a photovoltaic solar installation in the province, makes it possible to arise three (3) great types of actors in the solar energy sector. Particularly we identified:

- 47 users, in the whole domain of PV using
- Only 1supplier of materials at the local level)
- 6 potential popularizers at the local level.

5.3 Use of photovoltaic solar energy

The solar resource or the daily radiation average on the horizontal surface (kWh /m² / day), of the localities between the latitude 10 and longitude 14, reached a minimum, as indicates in the following graph, in July and August of about 5.2 kWh/m². These values according to specialists', are favorable to the exploitation of this energy source in the concerned zone. The daily solar radiation in this area arises as it follows.

Table 2: Solar resource in Northern Cameroon

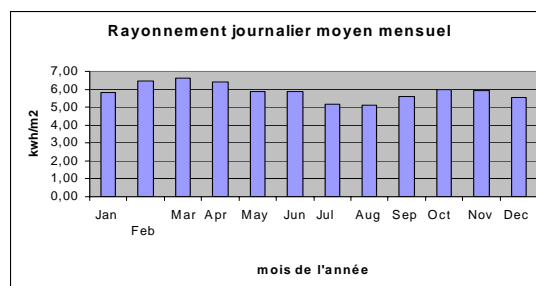
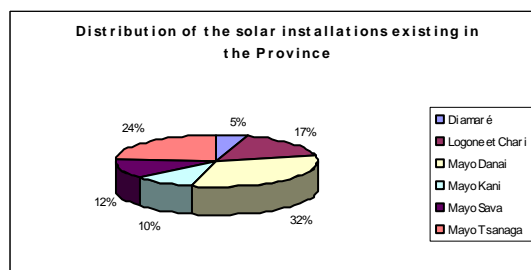


Table 3: Geographical distribution of PV installations



Source : results of the author field work investigation

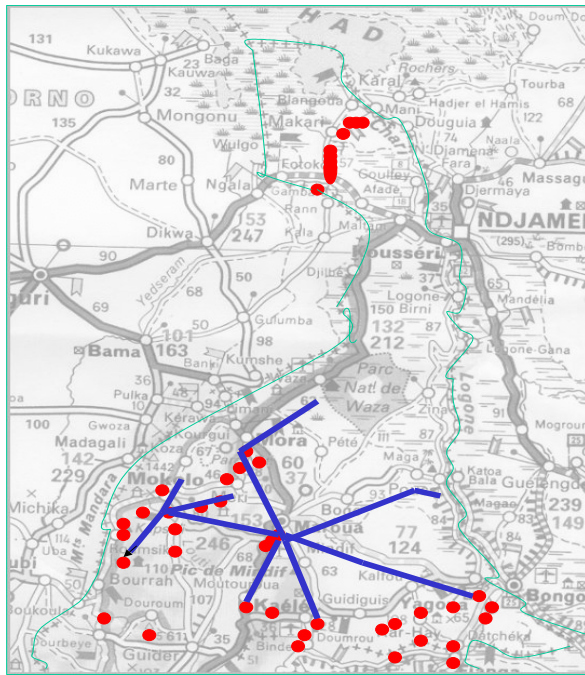


Figure 2 : Approximate Localization of zones where photovoltaic is used (red dot = PV installation surveyed; blue line = Electricity distribution grid)

5.4 Classification of the users

92% of the identified users were surveyed. They are primarily consisted of:

- Religious communities (57%) with development or rural animation, education, health services,
- Households (12%). They are especially : the elites and their relationships , the expatriates residence (representation of international organizations) and women rural entrepreneur in trade sector,
- Public services (21%) in which 90% concerned health services (especially for the childbirth during the night), government security office (gendarmerie) for radio messages transmission and more safety by lighting,
- International organizations and training center (10%)

Table 4 : Typology of PV users

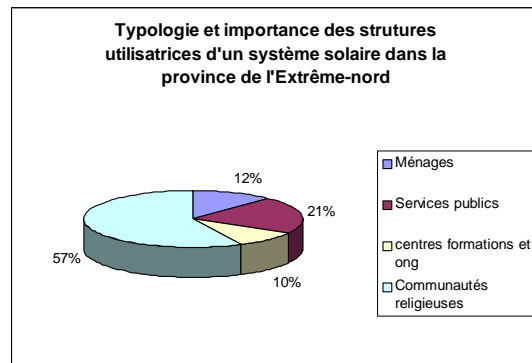


Table 5: PV for households

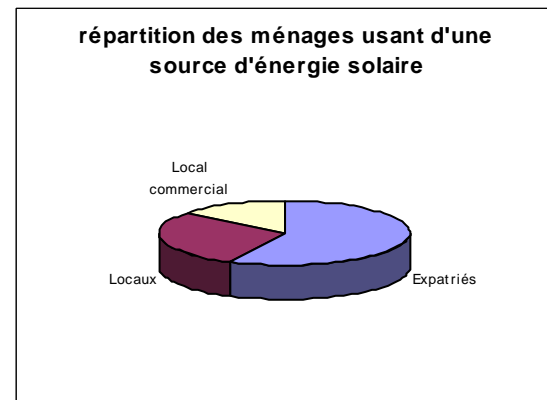
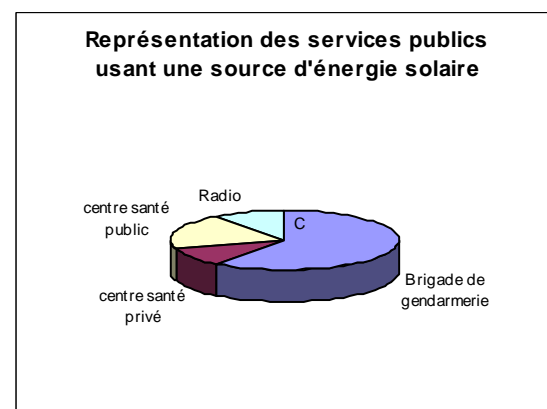


Table 6: PV for public structures



Sources: Results from our field work investigation

6 CONCLUSION

Our research report is one of unusual source contributing to information on the current situation of photovoltaic in Cameroon and particularly in northern part of this country.

It could provide arguments to the national and regional institutions to engage in feasibility studies of rural electrification projects, by other sources than the conventional network.

It could also be an argument of installation of an energy program at the Center of Environment and Development Study of Cameroon (CEDC), established in Maroua ; for the promotion of other energy sources according to the local situations

7 REFERENCES

[1] De Gouvello Christophe & Maigne Yves, L'électrification rurale décentralisée, une chance pour les hommes, des techniques pour la planète, guide technique, éd Systèmes Solaires, dec 2000, 363p.

[2] Djuikom Marthe , Energie solaire dans la province de l'extrême nord du Cameroun : situation et perspective de sa promotion pour le développement des activités socio économiques, mémoire de DEA inter universitaire en Environnement - Développement et Sociétés, Gembloux, jan 04, 100p.

[3] Ministère de l'économie et des Finances (MINEFI), Annuaire statistique du Cameroun de 1999, Direction de la statistique et de la comptabilité Nationale (DSCN).

[4] Vandenberg Michel, Energie solaire et production d'électricité :Un outil d'analyse technologique, économique et géographique du potentiel des filières photovoltaïques et thermiques, thèse de doctorat en énergétiques à l'école de mines de Paris, 11 décembre 1997.

[5] <http://eosweb.larc.nasa.gov/sse/RETScreen>

[6] www.worldbank.org/html/fpd/esmap

[7] www.areed.org/french/formation/guide/index.htm