

Field study of multifunctional platforms in Mauritania



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ARTICLE INFO

Article history:

Received 12 November 2013

Revised 17 July 2014

Accepted 17 July 2014

Available online xxxx

Keywords:

Multifunctional platform

Rural areas

Solar photovoltaic

ABSTRACT

A multifunctional platform (MFP) is a building containing electrical generating system and a variety of electricity consuming devices selected to serve the specific needs of rural villages. Commonly, in West Africa, the generating system consists of a diesel engine and batteries. Typical loads include grain mills and de-hulling. In Mauritania, the generating systems commonly include only photovoltaic generating systems and batteries. We visited 14 such MFPs and interviewed users and representatives of organizations that have sponsored the systems. Major benefits of the MFPs include creation of jobs, resulting in better incomes for population, and time saved by women in the traditional processing of cereals. Major problems we noticed include low maintenance and without control of some MFPs. We performed a brief techno-economic analysis of alternative generating/storage systems and found that, for the loads common in the Mauritanian MFPs, a photovoltaic/battery system is most economical and that diesel generators tend to increase the levelized cost of electricity.

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Introduction

Following from experiments beginning in the late 1980s, and piloted in its present form in the mid-1990s, the multifunctional platform (MFP) is now installed in several villages in Mali, Burkina Faso, Guinea, Senegal (UNDP, 2014) and recently in Mauritania, with photovoltaic battery (PV-battery system) as the main technology. The MFP is a decentralized energy system with a technology that has been specifically designed to address different energy needs in rural areas (Denton, 2004). The platform installed in these countries includes a diesel engine, grinder, husker, alternator, and battery charger (PTM, 2006).

Most MFPs are located in Mali because it is where the development of the MFP took place; its impact is already being assessed in many

studies. The work concerning the MFPs began in 2004 in the Tassakane and Iloa villages, supported by technical supervision of the national coordination (Mali government), subsequently, in 2005 in the Djeigalia, Toya and Koriomé villages, and finally, in 2006 in the Hondoubomokoina and other villages (Diawara and Toure, 2006).

The MFP can resolve the energy poverty problems and to contribute for achieving the Millennium Development Goals (MDGs).

In Mauritania, the MFP consists of the following elements: a grain mill kit, a freezer kit, a battery charging kit, a kit including audio-visual materials and cell phone charging station, and a lighting kit. Each kit is powered by a PV-battery system. Drawing from original research with institutions in Mali and six other countries, Sovacool et al. (2013) explore the history, benefits, challenges, and lessons learned from the multifunctional platform program of Mali. This study shows that the Mali government goes to install 1800 platforms by the end of 2012 and the main advantageous of these projects are: empowered women, enhanced food security and community cohesion. However, there is a set of challenges: a growing number of nonfunctional platforms, lack of policy coordination, poverty and dependence on imported technology.

Morris and LaRocco (2011) propose a toolkit to provide a potential model to guide investment in MFP decisions and assist in strategy implementation in Senegal. This study recommends a three-tiered sustainable strategy: increasing the profitability of the existing MFPs

Abbreviations: ADER, Development Agency of Rural Electrification; APAUS, Agency for Promotion of Universal Access to Regulated Services; COE, levelized cost of electricity (\$/kWh); EU, European Union; GRET, Investigation Group of Interchange Technologies; MEPM, Ministry of Energy, Petroleum and Mining; MFP, multifunctional platform; MFCP, multifunctional centralized platform; MFIP, multifunctional individual platform; MDGs, Millennium Development Goals; Moghataa, Mauritanian provinces; PRSP, Poverty Reduction Strategy Paper; PV-B, photovoltaic-battery system; SHS, solar home system; TENMIYA, Innovation Center for the Development of Water, Energy and Environment; UNDP, United Nations Development Programme; Wilaya, Mauritanian regions.

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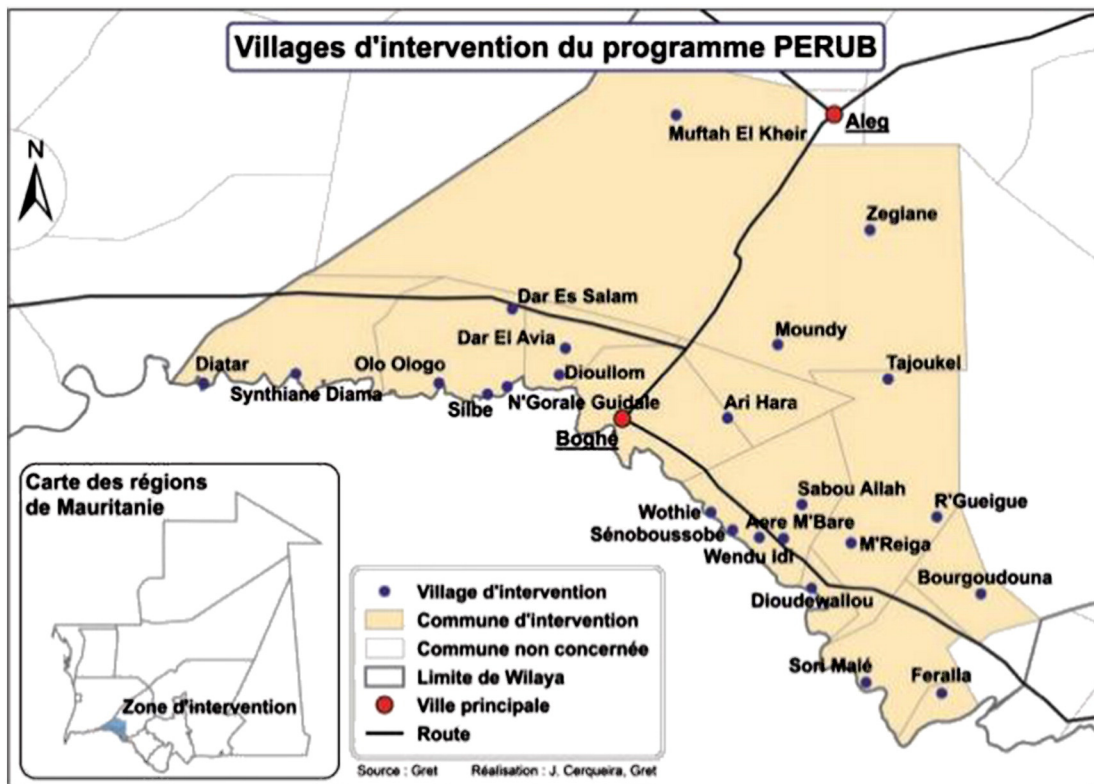


Fig. 1. Villages equipped with multifunctional platforms.

through optimization of the direct services/activities added, establishing a more sustainable capital structure and conducting micro-studies on the village level including an application of an enterprise-customer framework to each village to assess strengths and areas for improvement on a village-level based around financial profitability.

The present study describes the general situation of MFPs installed in rural areas of Mauritania (program, financing, and execution) and their technical characteristics. The study attempts also to describe what would happened if the MFPs installed in Mauritania were operated with other energy sources (photovoltaic-diesel-battery hybrid, diesel-battery and stand-alone diesel). For this particular case, we use HOMER software that several authors have used for techno-economic analysis of renewable energy systems for electrification in remote areas of countries including South Africa, Ethiopia, Senegal, and Cameroun (see for example, Dekker et al., 2012; Bekele and Tadesse, 2012; Bekele and Palm, 2010; Alzola et al., 2009).

We also compare MFPs installed in Mauritania and in West Africa and discuss their benefits and problems. Finally, the last section presents a general conclusion and observations made in the field.

Table 2
Localities selected.

Wilaya	Moghataa	Municipality	Localities
Hodh El Chargui	Néma	Oumavnadeche	BirEhSidiBeye
Hodh el Gharbi	Aioun	Oumlahyadh	Egdemitt
Brakna	Boghé1	Dar el Avia	NDiorol
Trarza	KeurMacene	M'Balal	Al Khawara
Tagant	Moudjeiria	Soudoude	Bader
Adar	Atar	AinEhTaya	Lehseyatt

Methodology

This research is based on semi-structured interviews, visits, technical intervention, and surveys done in rural villages in Mauritania equipped with MFPs. The visits were divided in two phases; the first that was realized in September 2012 in the Brakna and Gorgol regions included six villages. The second phase was realized in May 2013 in eight villages of the Hodh el Gharbi and Gorgol regions. In addition, discussions and technical interchanges were also conducted with energy experts in Mauritania, Ministry of Energy, Petroleum and Mining (MEPM), Agency for Promotion of Universal Access to Regulated Services (APAUS), United Nations Development Programme (UNDP),

Table 1
Multifunctional solar platform systems installed in some regions of Mauritania.

Wilaya (regions)	Years of execution	Financing agencies	Applications
Brakna (25 villages)	2009/2010	\$2,16 M (75% by EU and 25% by MG)	Installation of platform (grain mills, lighting, etc.). (IPSE, 2009)
Hodh El Chargui (11 villages)	2010	\$0.58 M (PNUD and MG)	Total PV installed estimated in 18 kWp (IPSM, 2010)
Gorgol (2 villages)	2011	(PNUD, EU and MG)	Total PV installed estimated in 4.5 kWp

MG: Mauritanian government.

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