

COUNTRY CHAPTER: MALI

Author of Country Chapter
Souleymane Diallo (Dr. Ing. Eng.)

**Coordination and Review
of the Country Chapter**
Anton Hofer, (MSE, Dipl.-Ing./FH, M.A.)
WIP-Renewable Energies
www.wip-munich.de
Munich, Germany

Editor
Deutsche Gesellschaft für Technische
Zusammenarbeit (GTZ) GmbH
Department Water, Energy, Transport
Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany
www.gtz.de

On behalf of
Federal Ministry for Economic
Cooperation and Development (BMZ)

Editorial staff
Diana Kraft
Tel: +49 (0)6196 79 4101
Fax: +49 (0)6196 79 80 4101
Email: diana.kraft@gtz.de



CONTENTS MALI

ACRONYMS, ABBREVIATIONS AND MEASUREMENTS	146
SUMMARY	148
1 COUNTRY INTRODUCTION	149
1.1 Geography and Climatic Conditions	149
1.2 Political, Economic and Socio-economic Conditions	149
2 ENERGY MARKET IN MALI	150
2.1 Overview of the Energy Situation	150
2.2 Energy Capacities, Production, Consumption and Prices	150
2.3 Market Actors and Regulation Structures	153
3 POLICY FRAMEWORK FOR RENEWABLE ENERGIES	155
3.1 Policies, Strategies and Programs for Renewable Energy Promotion	155
3.2 Regulations, Incentives and Legislative Framework Conditions	156
4 STATUS AND POTENTIAL FOR RENEWABLE ENERGIES	156
4.1 Biomass/Biogas	156
4.2 Solar Energy	157
4.3 Wind Power	157
4.4 Hydro Power	158
5 MARKET RISKS AND BARRIERS	159
6 RENEWABLE ENERGY BUSINESS INFORMATION AND CONTACTS	160
7 BIBLIOGRAPHY	161
8 ANNEX	163



ACRONYMS AND ABBREVIATIONS

MALI

AMADER	Agence Malienne pour le Développement de l'Énergie (Malian Agency for the Development of Domestic Energy and Rural Electrification)
AMARAP	Agence Malienne de Radioprotection (Malian Agency for Radioprotection)
AUREP	Autorité pour la Promotion de la Recherche Pétrolière au Mali (Authority for Oil Exploration)
CdR-ER	frame of reference for the development of rural electrification
CEWR	Commission of Electricity and Water Regulation
CFAF	CFA Franc (1 Euro = 655,957 CFAF)
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (Interstate Committee for Fight against the Drought in the Sahel)
CNESOLER	Centre National de l'Énergie Solaire et des Énergies Renouvelables (National Center of Solar Energy and Renewable Energies)
CREE	Commission de Régulation de l'Électricité et de l'Eau (Commission of Electricity and Water Regulation)
DGD	Direction Générale des Douanes (Directorate General of Customs)
DNCC	Direction Nationale du Commerce et de la Concurrence (National Directorate of Trade and Competition)
DNT	Direction Nationale du Transport (National Directorate of Transport)
DNGM	Direction Nationale de la Géologie et des Mines de la République du Mali (National Direction of Geology and Mines)
DSF	Decentralized Services Firms
ECOWAS	Economic Community of West African States
EDM – SA	Énergie du Mali (Malian utility)
GDP	Gross Domestic Product
GPP	Groupement Professionnel des Pétroliers du Mali (Oil Industry Professionals Group)
IN	Interconnected Network
KfW	Kreditanstalt für Wiederaufbau (German Banking Group including KfW Entwicklungsbank/German Development Bank)
LEP	Local Electrification Plan
LV	low voltage
MEA	Ministre de l'Environnement et de l'Assainissement (Ministry of Environment and Sanitation)
MEIT	Ministry of Economy, Industry and Trade
MEMW	Ministry of Energy, Mines and Water
MF	Ministry of Finance
MV	medium voltage
NGO	Non-governmental Organization
OMVS	Organisation pour la Mise en Valeur du Fleuve Sénégal (Organization for the Valorization of the Senegal River)
ONAP	L'Office National des Produits Pétroliers (National Office of Petroleum Products)
PCASER	Projets de Candidatures Spontanées d'Électrification Rurale (Projects of Spontaneous Candidacy for Rural Electrification)
PPER	Programme Prioritaire du Electrification Rural (Rural Electrification Priority Programs)
PRODER	Programme Decennial du Electrification Rural (Decennial Program of Rural Electrification)
PV	Photovoltaic
RE	Renewable Energy
REF	Rural Electrification Fund
SHS	Solar Home Systems
SOGEM	Société de Gestion de l'Énergie de Manantali (Manantali Energy Management Company)
SSD	Societe de Services Decentralises (Decentralized Service Companies)
USD	United States Dollar
VAT	Value Added Tax



MEASUREMENTS

GWh	gigawatt hours
ha	hectare
kg	kilogram
km ²	square kilometer
kWp	kilowatt peak
mm	millimeter
m ³	cubic meter
MW	megawatt
MWh	megawatt hours
TOE	tons of oil equivalent
°C	degree Celsius



SUMMARY

The Country Study of Mali is to provide an overview of the country's energy market and to support decision-making for private investments for the renewable energy (RE) sector in Mali. The study is structured as follows:

Chapter one provides Background Information on Mali. This includes an overview of geographical and climatic conditions, as well as the most important facts in view of political, economic and socio-economic conditions of Mali.

Chapter two summarizes facts and figures of Mali's Energy Market including stakeholders and market actors involved as well as sector related regulations.

Chapter three presents the currently existing Political Framework for Renewable Energies in Mali. This includes an overview of support mechanisms for photovoltaic (PV) as well as already existing regulations, incentives and legislative framework conditions.

Chapter four provides a brief overview of the Status Quo and Potential for Renewable Energies in Mali.

Chapter five summarizes the existing and potential Market Risks and Barriers in general with focus on RE.

Chapter six presents a compilation of the most relevant Renewable Energy Business Information and Contacts of Mali.



1 COUNTRY INTRODUCTION

1.1 GEOGRAPHY AND CLIMATIC CONDITIONS

Mali, a vast landlocked country in the heart of West Africa, is situated between latitudes 10° and 25° North and between longitudes 4° East and 12° West. It covers a total area of 1,241,238 km² and has 7,000 km of frontiers bordering seven countries, i. e. Senegal, Mauritania, Algeria, Niger, Burkina Faso, Côte d'Ivoire and Guinea.

The climate is tropical dry and is divided in four different zones: a Saharan climate (desert) in the North (annual rainfall less than 200 mm), Sahel in the middle (annual rainfall between 200 mm and 600 mm), Sudanian (annual rainfall between 600 mm and 1,000 mm) and Sudano-Guinean in the South (rainfall > 1,000 mm). The temperatures are high and the average rainfall is low. The average maximum temperature varies between 34 and 37°C, the average minimum between 21 and 23°C. The maximum relative humidity oscillates between 31 and 75%, the minimum between 11 and 38%. Mali has two alternating seasons:

- A dry season varying from a nine month period in the North (October to June) to a six month period in the South (November to April)
- A rainy season lasting from May to October in the South and from July to September in the North adjourned by more or less intense inter-seasons with “neither rainy, nor dry” periods.

Mali's geography is the reason why the country's economy is largely rural based and explains the central role of hydrology in the energy sector.

1.2 POLITICAL, ECONOMIC AND SOCIO-ECONOMIC CONDITIONS

Mali gained its independence in September 1960. The route to democracy, however, has been a long and difficult quest occasionally marked by violent outbreaks. Political pluralism was introduced in March 1991 under challenging circumstances. The Constitution provides the creation of eight Republican institutions and guarantees their independence through a pre-defined balance of power and the respective means of control. The Government, reigned by the Prime Minister, sets out and conducts the nation's policies and directs the armed forces. The Parliament, comprising of a single chamber, is called the National Assembly.

In 2007, Mali's population was estimated at 13.9 million inhabitants. The northern region of the country (Tomboctou, Gao and Kidal), which covers more than 60% of the territory, houses only 10% of the total population. The overall population growth rate is about 3%, whereas the urban population is increasing at a rate of 5.2% due to rural exodus. The majority of Malians, however, are still living in rural areas (70%).

According to the 2007/2008 Human Development Report, Mali ranks at 173 out of 177 (South Africa: 121, Guinea: 160, Chad: 170 and Central African Republic: 171).



MAP OF MALI

The Gross Domestic Product (GDP) per capita increased from USD 260 in 2000 to 500 in 2007. The Gross National Income per capita based on purchasing power per capita rose from USD 750 in 2000 to USD 1,040 in 2007.

Mali's potential wealth lies in mining and the production of agricultural products, livestock and fish. In 2006, cotton, gold and livestock made up 80–90% of Mali's total export earnings. Small-scale traditional farming dominates the agricultural sector. About 90% of the 1.4 million hectares (3.4 million acres) are under cultivation mainly for the subsistence farming of cereals, primarily sorghum, millet, and corn. Mali's economy is largely dominated by agriculture (employing 83.4% of the active population) followed by industry and service sectors (employing 4.1% respectively 12.5%).

The real growth rate of the GDP has experienced an uneven evolution reflecting amongst other determinants the climate factor and the difficulty to access maritime ports of neighboring countries. Table 1 presents the evolution of the GDP and the growth rate.

TABLE 1
Evolution of the GDP and the Growth Rate

	2002	2003	2004	2005	2006	2007
GDP (billions of CFAF)	2,223	2,454	2,632	2,893	3,125	3,356.5
Real growth rate in %	4.3	7.6	2.3	6.1	5.0	5.4

Source: Commission de l'UEMOA, Comité de Convergence et BCEAO, as of April 2007



2 ENERGY MARKET IN MALI

2.1 OVERVIEW OF THE ENERGY SITUATION

The total energy consumption of Mali was 3,212,560 toe in 2002, mainly based on consumption of wood and charcoal (81%), followed by oil products (16%) and electricity (3%). The sector-based use of energy is separated in descending order of their significance as follows: households (approx. 86%), transportation (nearly 10%), industry (approx. 3%, half of which is being used for mining) and agriculture (less than 1%). This energy shares based on source and sector vary but little from one year to another. RE (solar, wind, Hydro Power etc.) is currently used at a rate insignificant to the energy balance. There is no liquid or gaseous biomass energy as part of the official supply in Mali (only solid biomass such as wood).

2.2 ENERGY CAPACITIES, PRODUCTION, CONSUMPTION AND PRICES

Electricity Sector

The electricity industry was state owned up to the year 2000 when reforms in the sector transferred 60% of the property to the so called “strategic partners” consisting of SAUR International and IPS West Africa. After five years of private operation, SAUR International gave up its ownership of properties by selling shares to the Government of Mali (by October 2005). IPS West Africa is now holding 34% of the Malian utility “Énergie du Mali” (EDM-SA). The majority of shares, however, are in the hand of the State of Mali. The reforms mentioned above lead to the foundation of the Malian Agency for the Development of Domestic Energy and Rural Electrification (AMADER). Its major objective is to handle rural electrification by dealing with private operators. According to the National Directorate of Energy (DNE), the rate of access to electricity in 2007 was estimated at 17% on the national scale and 5% in rural areas (as compared to merely 1% in 2000 before reforms).

The total installed capacity of power supply of the Interconnected Network (IN), consisting of three hydroelectric power stations and two thermal power stations, was 130.49 MW in 2007 (not including the Manantali site, which jointly belongs to Mali, Mauritania and Senegal). In addition to the IN facilities, EDM-SA operates nineteen insulated centers equipped with diesel generators and two centers supplied by a network from Côte d’Ivoire. The total installed capacity of power supply of the insulated centers rose from 31.5 MW in 2005 to 38.3 MW in 2006 following the strengthening of the output in various centers including Mopti and Sikasso. Table 2 presents the evolution of power generation. Figure 2 illustrates the energy mix in the electricity sector of Mali.

EDM-SA’s gross electricity production increased by 8.9% from 865.8 GWh in 2006 to 942.5 GWh in 2007. The purchase of energy originating from the hydroelectric power station of Manantali contributed with more than one third of the production on the IN equaling 294.4 GWh (35.4%). The evolution of the thermal component in the total production of the system was subject to fluctuations during the last five

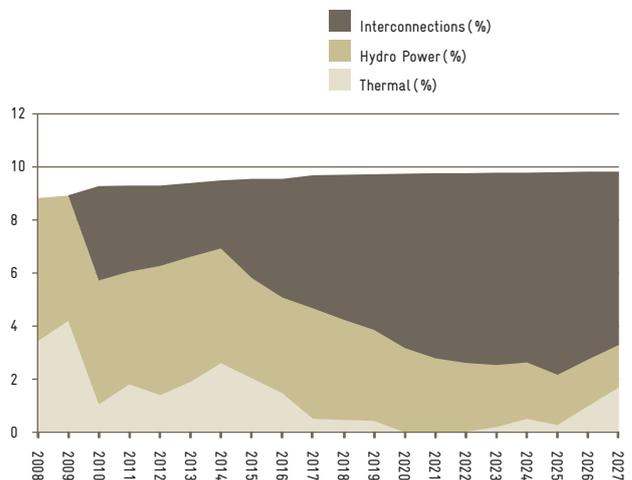
years. It decreased from 26.7% in 2002 (with the start up of Manantali) to 16.6% in 2003 before increasing again to 19.2% in 2004, 20.1% in 2005, 22.8% in 2006 and 40.7% in 2007 (see Figure 3).

TABLE 2
Evolution of Power Generation Capacity

		2001	2002	2003	2004	2005	2006	Growth rate
Total installed capacity including:	MW	146	249	248	251	245	255	4.3%
Interconnected Network (IN)	MW	115	117	109	109	109	113	3.4%
Manantali	MW		104	104	104	104	104	
Insulated centers	MW	31	29	35	38	32	38	21.6%
Peak capacity of the IN	MW	82	87	98	111	123	133	7.5%

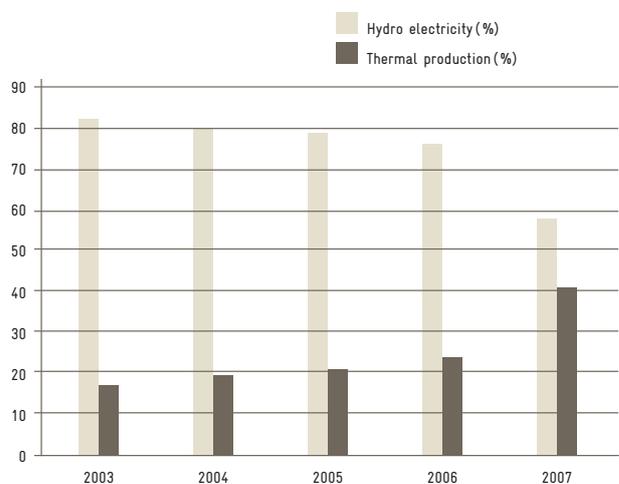
Source: Énergie du Mali, 2005, 2006 and 2007 reports

FIGURE 2
Energy Mix of the Electricity Sector



Source: graph compiled by the author with data from EDM-SA, as of 2008

FIGURE 3
Share of Hydro Power and Thermal Power for the Electricity Production



Source: Energie du Mali, 2005, 2006 and 2007 reports



The total energy consumption between January and December 2007 was 730.7 GWh, as opposed to 666.4 GWh in 2006. This corresponds to an increase of 9.7%. Low voltage sales for the whole EDM-SA were 424.7 GWh 2007 as opposed to 373.5 GWh in 2006, equalling an increase of 13.7%. Table 3 summarizes the overall electricity consumption of Mali.

The Interconnected Network had 151,324 consumers (LV + MV) in 2007 as opposed to 140,968 in 2006 equaling an increase of 7.3%. IN & Insulated Centers together supplied 151,377 LV and 1,003 MV consumers in 2007, as opposed to 140,043 LV and 925 MV consumers in 2006. Table 4 presents the numeral evolution of individual electricity clients.

In spite of existing investment-related difficulties, a high growth rate can be observed in the sector of electricity and the distribution network in particular. The consumption of energy is growing at the same rate as the country's economical growth. The power supply in particular is constantly challenged to meet a faster growing demand. To avoid critical situations for the economy caused by energy shortage, a Watching Commission has been set up. Between 2006 and 2007, the total installed capacity of the interconnected network increased by 16%, but still could not fully meet to the actual needs. Electricity production on the whole increases by 8.9% per year, while EDM-SA's sales of LV and MV have increased by 13.7% and 4.5% thus leaving a considerable demand unsatisfied. In fact, the average coverage rate of the major electrified city is only about 50%. This situation is due to the difficulties of investing in the distribution networks for an environment characterized both by the low density of consumer locations and the weak income level throughout the population.

The electricity company EDM-SA is strongly supported by the Government in the respect of tariffs for oil products and the existing tax and customs system. In order to limit the increase in the effective EDM-SA tariffs (by reducing the expenses of the company), the Government has been granting exemptions on the purchases of fuels intended for the production of electricity since 2002. The current procedure is to refund the related customs duties and taxes as discharged by EDM-SA. Since June 2002, however, EDM-SA has been benefiting from the mode of the Mining Code¹ granting exemptions of taxation at source for purchase of fuels; thus saving the company a considerable amount of money. Moreover, within the framework of a rehabilitating program, EDM-SA is benefiting from an indistinct tax system with regard to its investment plan 1995–2005 implying both external financial resources and self-financing. The tax considers both big projects and spare parts intended for the reconditioning of generators, networks materials and means of operation. In 2001 and 2002, the prices were increased. The increase of 2001 was partially cushioned by the Government through a compensation of more than 10 billion CFAF. In 2003, there was a first tariff decrease, and the missing revenues resulting from the tariff decrease were entirely compensated by the Government (up to 7.2 billion CFAF). In 2004, the Regulation Commission decided on a price reduction. Tariffs remained steady up to 2008. The evolution of electricity tariffs between 2001 and 2007 is presented in Table 5.

TABLE 3
Electricity Consumption

		2001	2002	2003	2004	2005	2006	Growth rate
Total consumption of electricity	MWh	377,682	432,326	484,198	541,102	616,230	662,510	7,5%
of that								
Medium voltage	MWh	177,041	199,333	206,867	242,420	272,545	289,017	6,0%
Low voltage	MWh	200,641	232,993	257,329	298,682	343,685	373,494	8,7%

Source: Énergie du Mali, 2005, 2006 and 2007 reports

TABLE 4
Number of Electricity Clients

RATE OF USING ELECTRICITY		2001	2002	2003	2004	2005	2006	Growth rate
Total number of users		90,953	112,703	131,029	145,479	160,201	174,152	8,7%
of that								
Medium voltage		712	771	884	951	1,019	1,109	8,8%
Low voltage		90,241	111,932	130,145	144,528	159,182	173,043	8,7%

Source: Énergie du Mali, 2005, 2006 and 2007 reports

TABLE 5
Evolution of Electricity Tariffs²

	2001	2002	2003	2004	2005	2006	2007
CFAF	96.49	103.98	95.7	85.16	84.67	84.16	85.42
Eurocent	14.73	15.87	14.62	13.00	12.93	12.85	13.04

Source: Énergie du Mali, 2005, 2006 and 2007 reports

¹ LE PRÉSIDENT DE LA RÉPUBLIQUE MALI, 1999)

² CURRENT CONVERSION RATE: 1 EURO = 655,95F CFAF, DEC. 2009



In 2004, the Commission of Electricity and Water Regulation (CREE) decided on a price reduction without compensation by the client. Since then, prices have remained steady in spite of the huge rise in international market prices for oil products and the continuous increase in the share of thermal production. The principles determining the prices in the field of rural electrification are (i) freedom of tariffs for entities being subject to various authorizations and declarations and (ii) regulated prices for licenses in compliance with the contracts signed with clients.

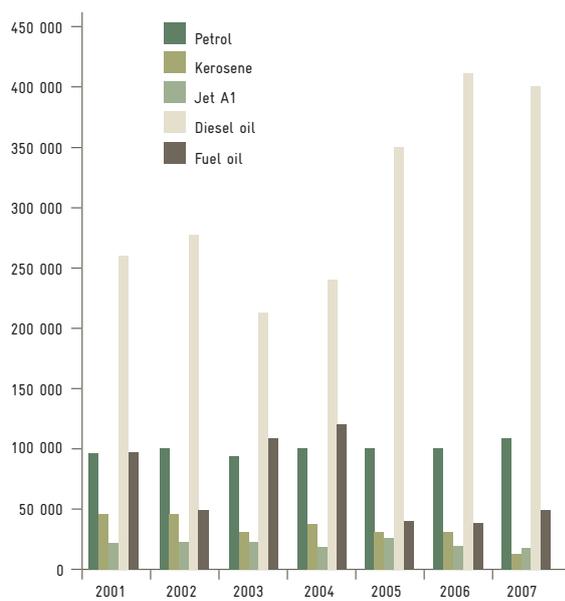
AMADER ensures that prices for entities being subject to various authorizations and declarations remain compatible and that incentive measures are taken to avoid that operators under a monopoly situation achieve unjustified profits.

The sales within concession systems benefiting from a situation of exclusiveness or natural monopoly are subject to a price regulation by directive of CREE. Taking into account the variations of costs according to the demand, the regulated prices are defined per tariff period and are revised according to the directives of the Regulation Commission CREE. Within the conceded perimeter there is equalization of tariffs.

Petroleum Sector

Mali does not produce petroleum and has no refinery. Therefore, all petroleum products are imported through principal trunk roads leading to the West African ports, i.e. Abidjan (Côte d'Ivoire), Cotonou (Benin), Dakar (Senegal), Lome (Togo), and Tema (Ghana). The consumption is dominated by diesel oil. Table 8 shows the volume of petroleum imported between 2001 and 2007. Some of the oil imports in the far North of the country may have been obtained informally from Algeria. Figure 4 indicates the evolution of imported petroleum products.

FIGURE 4 Evolution of Petroleum Imports (2001–2007)

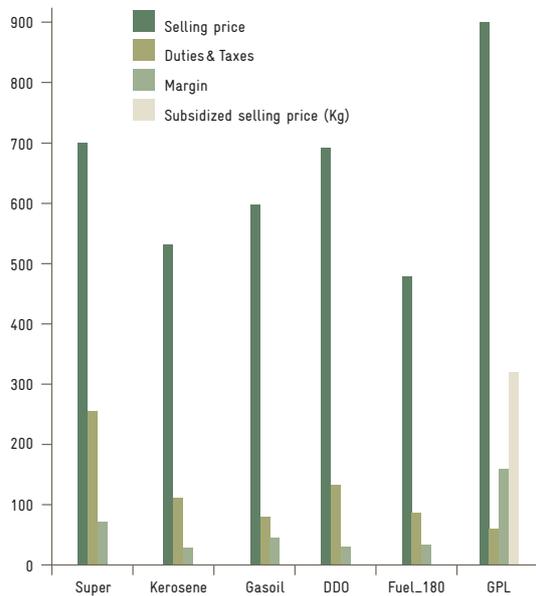


Source: graph compiled by the author with data from ONAP, as of 2008

The consumption of petroleum products is mainly divided into the following sectors: transport (70%), industry (20%), household (8%) and agriculture (2%). Diesel oil is by far the most used fuel (see graph above). The storage capacities are mainly located in the capital city of Bamako, but some private operators are running tanks in the western region about 90 km from the Senegal border. Many mining companies are directly served from these storage capacities in the city of Kayes.

Petroleum products are strategic goods because of the dependencies that occur in a landlocked country to import them. The share in the energy mix and their respective contribution to the customs revenues increased from 31.6% in 2000 to 37,6% in 2004. The oil bill, however, rose to 242 billion CFAF in 2006 without any chance to raise the fiscal receipts at the same rate. The current price fixing system of oil products was established in July 2001 and entails a monthly change of the prices at pump stations. The tariffs follow the development of the international market prices and based on the average of these prices. The price structure in Mali is determined according to the mentioned import of petroleum products via principal trunk roads connected to West African ports (see above). Butane in cylinders of 2.75 kg and 6 kg is being subsidized by the Government of Mali in order to promote the substitution of fuel wood and charcoal. The pricing structure of petroleum products is presented in Figure 5.

FIGURE 5 Pricing Structure of Petroleum Products



Source: graph compiled by the author with ONAP data, as of 2008

The taxation of the oil sector is based on the Principle of Taxing Oil Products proposed by the Economic and Monetary Union of West Africa – UEMOA/ECOWAS. The overall taxing includes customs duties, the statistical royalty, ECOWAS Community Tax, the inland duty on oil products and VAT. Current price information (updates available at www.onapmali.com) on the most prominent fuels is presented in Table 6.



TABLE 6
Current Price Information of Fuels³

PRODUCT	CFAF PER LITER/KG (LPG ONLY)
Petrol	635
Kerosene	450
Gasoil/diesel oil	545
Fuel oil	352
Jet A1	Free
LPG (with subsidy; bottles 2.7 kg & 6 kg)	320
LPG (without subsidy)	739

Source: table compiled by the author with ONAP data, as of 2009

Biomass Sector

As in most developing countries, especially in Sub-Saharan Africa, wood energy remains the most common fuel used in Malian households. The yearly consumption is approximately 6 million metric tons. Considering the relative prices of alternative sources of energy, the existing practices and the traditions of the population using wood energy, this situation is likely to remain unchanged. The wood energy consumed primarily comes from natural forests. The organized rural market meets an increasing share in the supply of urban centers as does the uncontrolled/informal operating system. A slow but sure transition from crude wood to charcoal as well as an increase in the requirements for primary energy sources can be registered.

2.3 MARKET ACTORS AND REGULATION STRUCTURES

Responsibilities of the multiple energy issues are shared among four ministries, one Regulation body and eight public or para-governmental technical arms in Mali.

The Ministry of Energy, Mines and Water (MEMW) is in charge of defining the energy policy and general energy planning (demand and supply), as well as of the control and monitoring of the electricity (thermal and hydro) and renewable energies sectors, and only partly petroleum products. The MEMW also supervises several institutions:

The National Direction of Energy – its role is to evaluate the potential of energy resources and ensure their valorisation; to study, control and supervise the energy production and to ensure compliance with technical specifications and safety requirements; to take part in co-operation projects in the fields of energy, to process the issuance of licenses for the realization of energy infrastructures by self producers, para-governmental and private operators, decentralized communities and others.

The National Center of Solar Energy and Renewable Energies (CNESOLER): As a division of the National Direction of Energy, the CNESOLER is in charge of the research and promotion of RE equipments, i.e. in the fields of biomass, micro-Hydro Power, solar and wind energies (aero generators and wind mills for water pumping systems).

The Malian Agency for the Development of Domestic Energy and Rural Electrification (AMADER) that is funded by the World Bank. The role of AMADER is to reduce the household energy consumption through energy efficiency and substitution programmes. Furthermore, it is in charge of the development of access to modern energy services in rural and peri-urban areas.

The Malian Agency for Radioprotection (AMARAP) is in charge of pacific use of nuclear energy and protection against harmful ionizing radiations.

The National Direction of Geology and Mines (DNGM) in charge of oil geology, geophysics and exploration through the Authority for Oil Exploration (AUREP). DNGM also hosts the laboratories aiming to control the quality of all petroleum consumed in the country (all imported for now).

The Ministry of Environment and Sanitation (MEA) handles the biomass energy supply (particularly fuel wood and charcoal) through the forestry department. This department has one specialist working at AMADER in order to harmonize views, policies and practices.

The Ministry of Finance (MF) is the key body in the import and storage of petroleum products through the National Office of Petroleum Products (ONAP).

The Ministry of Economy, Industry and Trade (MEIT) is in charge of setting prices and regulating concurrence for petroleum products through the ONAP. Trade and Economy used to be in the same department than the Finance. ONAP is therefore in between the two ministries MF and MEIT.

The Commission of Electricity and Water Regulation (CEWR) is independent from government operators and has juridical personality and financial autonomy. CEWR is in charge of the regulation of the sector of electricity and potable water. More specifically, CEWR ensures the application of tariff policies and regulates public services of electricity in urban areas. Furthermore, it is in charge of the development of public services, consumer protection, quality management and the approval and controlling of tariffs.

Electricity Sector

As already indicated the MEMW supervises the entire electricity policy and planning activities. A deep reform of the sector undertaken from 1998 to 2000 primarily resulted in:

- The privatization of the utility “Energie du Mali (EDM - SA)” on December 21, 2000.
- The creation of the Commission of Electricity and Water Regulation (CREE), on March, 2000.
- The establishment of a legislative and regulatory scope for the organization of the electricity sector on March 2000.
- The streamlining of the role of the Government concerning policy, regulation, planning and coordination of the electricity sector.
- The disengagement of the Government from operational activities of electricity industry, in particular production, transmission, and distribution.
- The opening of the electricity sector to private operators of any origin.

³ CURRENT CONVERSION RATE: 1 EURO = 655,95F CFAF, DEC. 2009



Today, a few operators of the private sector provide the public service of electricity, the most significant of which is Energie du Mali (EDM-SA) as a licensee for electricity public service in 38 urban localities. On the other hand, forty small companies got authorization of public service of electricity in rural zones (starting in 2004) including two Decentralized Services Firms (DSF). Other actors are made up of sub-regional entities:

- Société de Gestion de l'Énergie de Manantali - SOGEM (Trust company of Manantali Energy), public corporation of estate created by the Member States of the Organization for the Valorization of the Senegal River (OMVS), which include Mali, Mauritania and Senegal.
- ESKOM Energie de Manantali (ESKOM Energy of Manantali), Malian subsidiary of ESKOM Corporations (South Africa), in charge, on behalf of SOGEM, of operating and maintaining the dam, producing and transporting the energy of the hydroelectric power station of Manantali to the three countries.

Petroleum Sector

The petroleum sector falls under different ministries (Finance, Economy-Industry and Trade, as well as Energy). A reform of the sub-sector undertaken in 1992 resulted in the withdrawal of the State from any commercial activity (distribution, storage and marketing) at the profit of private operators. The State limited its role to fundamental missions for supply planning and regulating the whole supply-delivery chain. These missions are ensured through its technical departments which are:

- The National Office of the Petroleum products (O.N.A.P).
- The National Directorate of the Trade and Competition (D.N.C.C).
- The National Directorate of Transport (D.N.T).
- The Directorate-General of Customs (D.G.D).

In 2003, there were twenty five agreed private oil operators were including the members of the "Oil Industry Professionals Group (GPP)" who are local subsidiaries of the multinational companies (Mobil, Shell, and Total-Mali). At present, there are almost sixty private oil operators. Mali counts five sedimentary basins covering about 900.000 square kilometers. From 1960 to 1968, the petroleum exploration was conducted by the national company «SONAREM». From 1968 to 1985, the first petroleum Code was adopted. At that time, the sedimentary basins were opened to all potential investors. The permits were granted to five petroleum companies (Texaco, Sun, Murphy, Elf and Esso). The perimeters of the permits were mainly situated in the Taoudenit basin and the Gao basin (1970-1985). Up to 2005, the history of petroleum exploration in Mali clearly indicates that the sedimentary basins of the country are under explored with a very low level of seismic coverage and a very little number of exploration wells (in average one well per basin). In total, five wells were drilled in the five sedimentary basins. To promote exploration during the last four years, the Government of Mali undertook some major activities:

- A review of the petroleum code. The new code has been adopted by the National Assembly on August 2004 and was proposed to the potential investors.
- The creation of the "Authority for the Petroleum Exploration Promotion in Mali (AUREP) in September 2004.

Biomass Sector

Biomass-energy is under the supervision of MEA – respectively under its forestry department (see chapter 2.3) all aspects related to the supply, while the MEMW manages the demand aspects including also efficiency and substitution policies. Among the strategies implemented, one can quote the attempt to formalize the wood-energy business, the empowerment of rural communities' through the creation of rural markets, the improvement of the institutional and legal framework of the natural forests management and the promotion of alternative energy sources such as LPG. New forestry framework allows putting in place a better regulation and a more coherent legislation aiming at a sustainable management of forest resources, particularly with regards to household energy issues which need:

- A good wood-fuel supply to urban centers at optimal cost to the consumer and the community surrounding the forest.
- A sustainable management of the wood resources as a significant contribution to the fight against the desertification.
- The new legislation put in place comprises two laws and one decree:
- Law 95-004 of January 18, 1995 fixing the conditions of forest stock management.
- Law 95-003 of January 18, 1995 organizing exploitation, transport and trade of wood fuels.
- Decree 422/P-RM of December 5, 1995 fixing the rates and the distribution of taxes to be perceived during the exploitation of forest resources, replaced by decree N (402/P-RM of December 17, 1998 fixing the rates, modalities of recovering and distributing taxes perceived when harvesting state owned forested areas.

The adoption of this new legislation led to the set up of a National Strategy of Household Energy in Mali (1996) and eased:

- Decentralization of management, tax perception and delivery of transport documents.
- Reinforcement of professional activities in the field of transport and trade of wood energy.
- Constraint to the payment of tax and fees on wood – broad access to energy.
- Rate of tax according to the origin or the mode of exploitation of wood energy.
- Self-reliance of the rural sector in financing issues, forestation and reforestation initiatives.

The decree fixing the rates and the distribution of the taxes is favorable to managed forests where the tax is the lowest, compared to other areas which are not under control. It shares the benefits of taxes between the State and the decentralized Communities. The laws allows thus among populations, communities and the Government to generate incomes within the framework of a concerted and sustainable management of forest resources.



3 POLICY FRAMEWORK FOR RENEWABLE ENERGIES

3.1 POLICIES, STRATEGIES AND PROGRAMS FOR RENEWABLE ENERGY PROMOTION

The overall objective of the energy policy of Mali (enacted by the Government in March 2006) is to contribute to the sustainable development of the country, through the supply of energy services accessible to the highest possible number of the population at low cost, and supporting the promotion of socio-economic activities. Its specific objectives are to:

- Fulfil the energy needs of the country in quality, quantity and at low cost.
- Ensure protection of people, property and environment.
- Build capacities in orientation, management, control and strategic monitoring of the energy sector.
- Maximize the advantages of international co-operation for the country in the field of energy.
- The strategic paths include, among other, the valorization of national energy resources and the research for sustainable solutions and lower cost for the implementation and utilization of energy services (production, conveying, distribution, use, and maintenance).

In other words, both the described specific objectives and the strategic paths of the national energy policy indicate the importance attached to the valorization of the RE potentials sources (RE) that the country abounds in the form of sun radiation, wind conditions, hydraulic resources and biomass. The integration of RE in the energy policy of Mali was concretized through institutional and regulatory measures, and also through the practical achievements mentioned further on in this document.

Mali doesn't have a structured renewable energy market. The RE sub-sector still appears mainly as informal. However, Mali has always had a proactive policy with regard to renewable energies, which was concretized by the creation of the „Laboratory of solar energy“ in 1964. More recently, a national strategy for the development of RE was worked out and adopted in January 2006. The integration of RE in the energy policy of Mali was concretized through institutional, legislative and regulatory measures including:

- Taking into account the fight against poverty, thus echoed in the energy policy through the objective of satisfying the highest possible number of people with energy services; from that follows the creation of AMADER intended for rural areas, the creation of funds for rural electrification, strategies and research in progress for reducing the impact of energy consumption on households, and from which also results the adoption of adequate systems of environmental protection, etc.).
- Taking into account the new reality of decentralization to better involve local authorities in energy services (delegation of the duties of client to the decentralized communities).

- In the field of decentralized electrification, the Frame of Reference for the Development of Rural Electrification (CdR-ER) constitutes an inventory of the major principles which will guide the set up of the regulation in the sector of rural electrification.
- From a fiscal point of view, the willingness to promote RE is expressed by the Government's renunciation to certain taxes through:
 - The Decree 02-026/P-RM of January 30, 2002 stating suspension of the collection of VAT, import duties and taxes on solar and RE equipment is a result of this willingness to promote renewable energies.
 - The order 04-1360/MEF-SG of July 12, 2004 defining the tax and customs system applicable to the markets and contracts fulfilled under the responsibility of the AMADER.

The Rural Electrification Fund (REF) plays a key role in this policy for facilitating access to energy services which are based mainly on RE technologies. The Fund is made up of Government endowment, subsidies from development partners, donors, gifts and legacy, loans, 25% of sales incomes or renewal of authorizations whose holders benefitted from the subsidy provided by AMADER. Its management as ensured by AMADER must be directed in priority towards the operational funding objectives of the investments. It must also reinforce the particular risks relating to the amount invested in the private sector through guarantee mechanisms.

REF is intended to have three types of accounts. Its Subsidy Account is the principal source of funding investment operations in the sector of rural electrification. It is the only one implemented to date. The Guarantee Account of REF should be set up for private operators in order to provide them with guarantees from banks and decentralized finance companies. The Account of Credit, which is the third account type of the REF, is to create long-term sources of financing for operators of the RE sector, by placing long term financial resources at the disposal of banks and decentralized finance companies to ensure adequacy between incomes and expenditures.

Producers and distributors (private operators) regulate their status through a request for authorization or a declaration filed at AMADER. This regulation is a necessary condition before private operators can apply for funding from the REF for the development of their project, and – through this – enjoy exclusive title of exploitation on the area covered by the declaration or authorization.

In order to promote the establishment of the private sector as a major factor in rural electrification within the framework of a public/private partnership, AMADER launched with the assistance of the World Bank and KfW (Kreditanstalt fuer Wiederaufbau – Entwicklungsbank/German Development Bank) the Decennial Program of Rural Electrification (PRODER). The implementation of this program includes two operating modes: the Rural Electrification Priority Programs (PPER) which constitutes the top-down procedure of PRODER and the Projects of Spontaneous Candidacy for Rural Electrification (PCASER) which constitutes the bottom-up procedure besides the central programming of PPERs.



The top-down procedure relates to 10 zones of electrification which cover the whole Malian territory. Each zone, which has a Local Electrification Plan (LEP), will be assigned a permit holder following a competitive bidding organized by AMADER. This permit holder will enjoy exclusiveness in the electrification of the area covered by the permit. The LEP developed in eight Multisectoral Electrification Zones envisage the initial electrification of 136 localities with a population of about 500,000 inhabitants in 2008. The PACSER can be implemented by local communities, groupings of ultimate consumers, NGOs and private investors.

The law provides that when an operator is assigned a Multisectoral Electrification Zone where there are preexisting Projects of Spontaneous Candidacy for Rural Electrification (PCASER), the PCASER actors and the permit holders can make agreements so that the latter could resume the project for a compensation whose amount will be defined during negotiations under the aegis of AMADER.

Decentralized Service Companies (SSD) are added to these PCASERs, operating either at the level of a locality or several localities of a commune. They have a monopoly on the territories which are conceded to them. The first two are a) the SSD of Yeelen Kura which operates in the area of Koutiala and which currently proposes primarily domestic services using photovoltaic kits, and b) the SSD of Koraye Kurumba, which electrified four administrative centers of commune in the area of Kayes, using LV networks and diesel power stations working five hours a day.

3.2 REGULATIONS, INCENTIVES AND LEGISLATIVE FRAMEWORK CONDITIONS

In the field of RE most activities and entrepreneurship relate to trade of equipments. Recent investments and businesses relate especially to the opportunities offered by AMADER in the field of rural electrification and the almost feverish passion for biofuels. Small Hydro Power generating systems and solar energy are offering recent opportunities through the procedures of licensing at AMADER. There are certainly official engineering departments and achievements, but also much of informal trade of RE technologies. The following has been achieved so far:

- Renewable energies adjusted to the concern of end-users.
- Nearly 700 solar PV pumps installed.
- More than 50,000 individual lighting systems are under operation.
- Telecommunications using intensively photovoltaic equipments for the power supply of insulated sites, more than 750 kWp installed.
- A significant decrease of the price of photovoltaic equipments: for example, the price of installed peak Watt decreased from 20,000 CFA Francs as at the beginning of the Eighties to approximately 6,000 (in 2008/2009).

4 STATUS AND POTENTIAL FOR RENEWABLE ENERGIES

4.1 BIOMASS/BIOGAS

The ecological diversity of Mali results in a very contrasted forest situation between shrubby savannas in the North of the country (covers less than 10m³/ha), striped bush with stem wood volumes sometimes reaching 20 to 40 m³/ha (covers 25% of the southern part of the country), then forests of the Sudanian Guinean zone (covering between 50 and 80 m³/ha), and the forests galleries of the West of the country (which sometimes cover even more than 100 m³/ha). The national forest estate is approximately 100 million ha for a production of approximately 21 million ha. The surface with controlled exploitation is more than 350,000 ha. Forest surfaces and their productivity are in perpetual regression. According to various studies, 100,000 to 400,000 ha are lost every year due to anthropogenic actions (such as deforestation, clear cuts etc.) and climatic variations. This regressive evolution of the forests occurring these last decades is - on the one hand - due to the climatic changes. Biomass represents nearly 90% of the domestic energy source of the country, proving that the other conventional products still have a marginal role in the field.

The potential of animal wastes and plant residues is high and well distributed on the whole territory. Agricultural residues (straw, rice husk, stalks of cotton, millet, sorghum, corn, etc.) are significant almost everywhere except, of course, in the Saharan northern part of the country. The biomass is available, in particular around the agro-industrial units installed in some areas (Office du Niger, Office Riz Segou, Office Riz Mopti and Office de la Haute Vallée du Niger). The enormous potential of biomass energy cultivation in the country (jatropha, sugar canes) would allow the production of vegetable oils and alcohols that can be used as fuels in substitution to hydrocarbons.

The quantity of stems of cotton plant produced per annum is estimated at 400,000 tons in Mali. The potential production of waste from rice production is more interesting. As an example, the potential of biomass from the cultivation of rice in two areas of the region of Ségou is about 265,000 tons of straw and 55,000 tons of husk. In a study entitled "From the Rice husk to Energy", realized in 2005 by an American company, it is specified that with a current annual production of 800,000 tons rice paddy, the production of rice straw would be approximately 168,000 tons and would make it possible to produce (126 GWh). The study pointed out that the availability of the rice husk could be limited. This limitation is mainly due to the disappearance of large mills which, following the privatization of the industry and the trade of rice at the beginning of the 90s, were closed for various reasons and were replaced by decentralized small systems run by village associations. Raw materials are dispersed within a very extended area, resulting in high collection and transport cost to any energy plant. This study stresses that the only active large mill in the town of Ségou currently produces 2,000 tons of rice husk per annum, while in a group of villages located in the zone of Niono, 10 mills with a capacity of two tons per hour (each) produce approximately 15,000 tons of rice husk per annum.



These mills, which are located in a radius of 10-15 km, should be supplemented by 10 other mills of similar capacity, which would raise the total availability of husk to 30,000 tons per annum. In this context, the study specifies that a capacity of 15,000 tons per annum would make it possible to operate a unit of co-generation of 1.2 MW (consuming 45 tons of husk per day during 330 days per annum). Two other regions, Mopti and Tombouctou, produce enough rice husk which could feed co-generation units that can operate for base load and reduce considerably fossil fuel consumption in EDM – SA power stations of these two towns that are far from being connected to the national grid.

With regards to further biomass applications, so far Mali does not have any significant liquid or gaseous biomass based plant or equipment under utilization. In the past, however, the rice agro-industry⁴ had experimented with two 100 kW power plants based on producing methane from rice husk for feeding a diesel engine. This equipment, a Chinese technology, did not overcome the experimental stage. In the same area, the sugar cane industry tested some engines using alcohol, but this small-scale experiment was never expanded. The only biomass based liquid energy producer is Mali Biocarburant. Since 2008, a small-scale bio diesel plant has been extracting jatropa oil and transforming it into biodiesel through an etherification process. The production is expected to reach about 4,500 tons per year. Further information is available at www.malibiocarburant.com.

4.2 SOLAR ENERGY

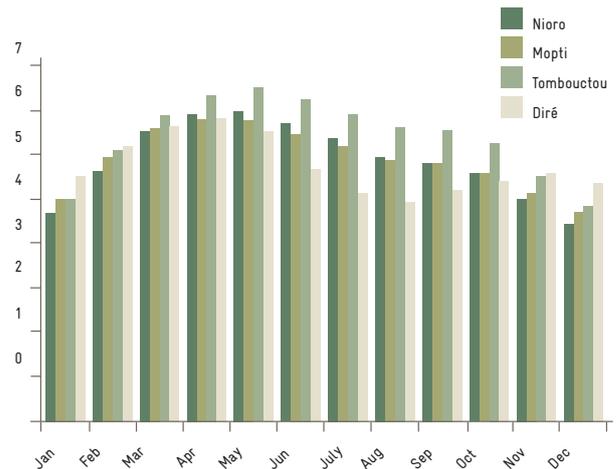
The average solar radiation is 6 kWh/m² per day. The average daily duration of sun lighting varies between 7 and 10 hours. With a little more than 700 PV solar pumping units, more than 50,000 Solar Home Systems (SHS), hundreds of household solar water heating installations solar drying system – the latter mainly used by women for food processing small businesses –, Mali has sufficient experience today to appreciate the root barriers in changing the scale in harnessing RE sources. However, other niches such as solar air-conditioning are experiencing a rather slow development compared to the local potentialities. The most relevant prediction may lie on forecasting electricity generation in isolated cities. The most recent significant RE investment in Mali is a centralized 75 kW PV plant aimed to supply electricity to Kimparana, a village situated in the central part of the country at up to 525 km from the capital city. Other investments in rural electrification, using RE technologies are under preparation.

As a forecasting, there are a lot of possibilities of self generation (solar energy, bio-fuels, etc.), which allow the production of small quantities of electricity to those clients, invoiced on contractual basis, and ensure profitability of the operations. For example, EDM-SA is feeding remote medium sized cities with diesel engines reaching a total of 100 MW. A little share of 20 to 40% of solar PV make a forecast of almost 27 to 54 MWp of PV panels. These prospects attract a lot of investors. Thus, on January 21, 2008 AMADER was able to sign agreements for a total of 3.2 billion CFA F. Of

that amount 2.3 billion were provided by AMADER (under World Bank funding), and 927 million by local private operators. The agency indicated that out of the 30 operators that had expressed their interest for the subsidies, nine tenders of business plans were retained. These projects were subsidized at 65–75% and 6,154 electrical connected consumers (households and small businesses) will benefit from these projects of rural electrification.

FIGURE 6

Average Solar Insulation in 4 Cities of Mali (KWh/m²/day)



Source: Graph compiled by the author S. Diallo - 2009 (Data from NASA Surface meteorology and Solar Energy Data Set)

4.3 WIND POWER

From 2001 to 2004, GTZ supported the Direction de l'Énergie (DNE) within the Ministry of Energy in Mali (MMEE) in appraising a project aiming to integrate wind turbines into the diesel-fuelled isolated grid supplying the provincial capital city of Gao in the northeast of the country. Results of wind measurements (March 2001 - October 2003) showed a relatively low wind potential. Mean wind velocities are 5.3 m/s at a height of 41 m and 4.7 m/s at a height of 26 m. Based on these measurements and with the assistance of DNE and the power utility Energie du Mali (EDM), GTZ undertook a technical and economic feasibility study⁵ conducted by Lahmeyer. The study was finalised in July 2004 and showed a positive result. Total investment for a 900 kW wind farm is estimated at EUR 1.7 million. The relatively high level of feed-in tariffs that will be necessary for the wind turbine generating systems (roughly 18 €-cent/kWh) can be justified on economic grounds, however, as this is below the cost of diesel generation (at the time of the study: approx. 21 €-cent/kWh). The high cost of diesel is due above all to the expensive and lengthy transport route for the fuel. The study, though, worked on the assumption of an average crude oil price of USD 25 per barrel as applicable in 2004, so the costs of electricity generation from diesel in Gao are likely to be considerably higher by now.

4 OFFICE DU NIGER, AS OF 1969

5 GTZ, AS OF 2004



An exhaustive review shows that more than 150 wind pumps and more than 10 aero-wind pumps (for the production of electricity) were installed throughout Mali, especially in the Sahelian area. The energy services provided by these wind mills were mainly used for supply of drinking water and creation of income generating activities (gardening/truck farming, etc.) as well as for pastoral hydraulics.

TABLE 7
Speed and Frequency of Wind: Series of Measurements in Gao (2003)

Direction (°)	0	30	60	90	120	150	180	210	240	270	300	330
Wind (m/s)	5.3	5.0	5.7	5.8	5.5	4.9	4.8	4.8	5.2	4.6	4.0	5.3
Frequency (%)	12.	9.6	15.2	10.9	5.6	5.0	8.4	7.2	8.9	6.7	3.8	6.4

Source: Direction Nationale de l'Energie, 2003

4.4 HYDRO POWER

A hydroelectric potential of about 1,050 GW and 5,000 GWh of average production is identified for the principal rivers and their tributaries: Out of this national hydroelectric potential, less than 15% are currently exploited. Table 8 presents the hydro power sites currently in operation, Table 9 indicates the estimated capacity of potential sites for micro Hydro Power Generation.

TABLE 8
Hydro Power Site in Operation

SITES UNDER OPERATION				
N°	Name	River	Capacity MW	Producible GWh
1	Sotuba I	Niger	5.4	40
2	Felo I	Sénégal	0.6	3
3	Sélingué	Sankarani	44	180
4	Manantali	Bafing	200	800
Total			244	1023

Source: Direction Nationale de l'Energie, 2006

TABLE 9
Potential Sites for Micro Hydro Power Generation

N°	Name of the site	River or Region	Fall (H) in meters	Estimated Capacity (KW)
1	Seuil de Talo	Bani	4,5	2400
2	Seuil de Djenné	Bani	2/5	1000
3	Farako 1	Sikasso	7	50
4	Farako 2	Sikasso	15	25
5	Sirakorobougou	Sikasso	7	3
6	Mimbougou	Sikasso	3	8
7	Woroni	Sikasso	60	350
8	Kéniéto	Kéniéba/Kayes	90	250

Source: Direction Nationale de l'Energie, 2006



5 MARKET RISKS AND BARRIERS

The main risk for the RE market development in Mali is the lack of the enforcement of the existing energy policy. Some merchants with a general license of trade could sell RE technologies without any feedback for maintenance and other services, deserving the image of the energy source and/or technologies. There is no dedicated body for quality control at the borders of the country aiming to select good comparative standards for the market.

Investments in RE in Mali are not easily quantifiable because activities in this field are generally built-in as part of multi sector programs (including issues on health, education and energy), and it is often difficult to precisely evaluate the energy share of these projects. Until now, the most active segment of the solar market is for water pumping which received important support from the CILSS (Inter-states Committee for Fight against the Drought in the Sahel) with funds of the European Union. Domestic and “Community” segments (the latter being mainly a market for refrigeration) are not very active compared to physical conditions and/or technical potential.

The segment of the professional energy applications offers many opportunities. However, the energy choice made by the national telecom operator was directed, so far, towards the diesel generators. A private company started at the beginning of the 1990s to install 18 solar PV systems (with an average power output of about 2.5 kWp) for telecom relays.

The Code of Investments in Mali established a privileged tax system in order to promote the investments of private (national and foreign) capital for production activities and service deliveries. It offers the necessary guarantee to secure the investments made by the national and foreign operators intervening in the exploration, exploitation, conveyance and refining of liquid or gas hydrocarbons. A survey of entrepreneurs and investors in Mali has identified the stable political climate, safety, costs of various factors (especially labor) and an advantageous tax regime as significant attractions for foreign investors. The survey also emphasized that the institutional reforms and the new regulatory environment were encouraging a climate of trust. Only with respect to the judicial system the survey noted a wish/recommendation for more transparent decision-making processes. This new phase of development presents interesting investment opportunities in specific sectors such as mining, energy, infrastructure and service development (especially in the context of privatization), and cotton.

Any Malian or foreign corporation or individual may acquire or create a commercial, industrial, or banking and financial company in Mali. The Constitution guarantees free enterprise and property rights in Mali. There are no specific restrictions on access to various investment areas or on the creation of companies. And Malian legislation does not oblige foreign investors to make the Malian Government or a Malian person or corporation a partner in their companies, except in the mining and petroleum industries, where the Malian Government reserves a minority interest of approximately 20%.

The conditions of approval for the creation of a company are defined in Order 95-159/P-RM dated 12 April 1995. In order to minimize formalities, a structure known as the “Guichet Unique” (“single window concept”) was created by the Direction Nationale des Industries (National Directorate of Industries). The Guichet Unique is under the Ministry of Economy, Industry and Trade and is responsible for informing, advising and assisting investors concerning the procedures they must take. It has four sections: Registration; Manufacturing and Agricultural Activities; Buildings, Public Works and Real Estate; and Service Activities.

All areas of activity are covered by the Guichet Unique, except health care, education, communications, audiovisual, print media, purely commercial activities, petroleum and mine prospecting and exploitation, which are governed by other laws. The Guichet Unique is an ideal contact for project promoters, acting as their interface with the administration.

Recently, Mali sped up property registration by decentralizing and reorganizing their registries. The country also reformed business start-ups by introducing a single company identification number. Mali has also cut the time for start-up processes. However, the country’s rank is still very low in the “World Bank doing business profile” (166 out of 181 countries). The results are presented in Table 10.

Further information regarding potential investments could be obtained at the “Agence pour la Promotion des Investissements au Mali”⁶.

TABLE 10
Ease of Doing Business Ranking of Mali

SELECTED INDICATORS	
Ease of doing business	166
Starting a business	162
Dealing with construction permis	106
Employing workers	94
Registering property	94
Getting credit	145
Protecting investors	150
Paying ????	156
Trading across borders	166
Enforcing contracts	158
Closing a business	114

Source: World Bank, The Doing Business Project, 2008

⁶ SEE ALSO WEBSITE OF THE AGENCY: WWW.APIMALI.GOV.ML



6 RENEWABLE ENERGY BUSINESS INFORMATION AND CONTACT

TABLE 11

Governmental Institutions

NAME	ADDRESS & TEL	FIELD OF ACTIVITY	EMAIL
Ministry of Energy, Mines and Water	Colline de Badalabougou BP 19 Bamako - ex CRES	Policy and general planning (demand and supply)	www.mmee.gov.ml
National Direction of Energy	Badalabougou BP 134 Bamako - ex CRES	Evaluation of the potential of energy resources and ensuring of their valori- zation	dne@afribone.net.ml
The National Center of Solar Energy and Renewable Energies (CNESOLER)	Badalabougou BP 19 Bamako - ex CRES	Research and promotion of RE	cnesoler@yahoo.fr
National Engineering School (ENI)	BP 242 Bamako - Mali	Training on energy issues	eni@spider.toolnet.org
The Malian Agency for the Development of Domestic Energy and Rural Electrification (AMADER)	Badalabougou BP E 715 Bamako - Mali	Household energy substitution programs and access to electricity in rural and peri-urban areas	amader@amadermali.net
National Office of Petroleum Products (ONAP)	Quartier du fleuve, Bamako	Pricing and regulation for petroleum products	onapmali@afribone.ml.net
National Representative of the Organization for the Valorization of the Senegal River (OMVS)	Zone industrielle-Route de Sotuba - Rue 851 Porte 407 BP E 2618 BAMAKO - MALI	Valorization of the Senegal River in coope- ration with Mali, Mauritania and Senegal	enomvsmali@omvs-mali.org
Trust Company of Manantali Energy (SOGEM)	ACI 2000 - BP E 4015 BAMAKO - MALI Tel:20298350/20290422	Public corporation of estate created by the member states of the OMVS	sogem@sogem-omvs.com
Énergie du Mali (EDM-SA)	Square Patrice LUMUMBA BP 69 BAMAKO - MALI	Licensee for electricity public service	edm@edm-sa.com.ml/edm@edmsa.net
ESKOM Energy Manantali SA (ESKOM)	Hyppodrome - Avenue Al Quods - Immeuble Boubacar Koïta - BAMAKO - MALI	Operation and the maintenance of the dam, production and transport of energy of the hydroelectric power station of Manantali	eskom@eskom-mali.com
The Malian Agency for Radioprotection (AMARAP)	Badalabougou ex - CRES BAMAKO - MALI	Pacific use of nuclear energy and protec- tion against harmful ionizing radiations	amarap@buroticservices.net.ml
The National Direction of Geology and Mines (DNGM)	Route de Sotuba, Bamako Tel: +223 221 78 81/Fax: +223 221 02 31	Oil geology, geophysics and exploration/ quality control of petroleum products	www.dngm.net
The Commission of Electricity and Water Regulation (CEWR)	Rue 23/23 B.P. 115 Bamako	Regulatory body of the sector of electricity and potable water	cree@creemali.org



TABLE 12
Commercial Partners in the Field of Renewable Energies

NAME	ADDRESS & TEL	FIELD OF ACTIVITY	EMAIL
Ministry of Energy, Mines and Water	Colline de Badalabougou BP 19 Bamako- ex CRES	Policy and general planning (demand and supply)	www.mmee.gov.ml
National Direction of Energy	Badalabougou BP 134 Bamako- ex CRES	Evaluation of the potential of energy resources and ensuring of their valorization	dne@afribone.net.ml
The National Center of Solar Energy and Renewable Energies (CNESOLER)	Badalabougou BP 19 Bamako- ex CRES	Research and promotion of RE	cnesoler@yahoo.fr
National Engineering School (ENI)	BP 242 Bamako - Mali	Training on energy issues	eni@spider.toolnet.org
The Malian Agency for the Development of Domestic Energy and Rural Electrification (AMADER)	Badalabougou BP E 715 Bamako- Mali	Household energy substitution programs and access to electricity in rural and peri-urban areas	amader@amadermali.net
National Office of Petroleum Products (ONAP)	Quartier du fleuve, Bamako	Pricing and regulation for petroleum products	onapmali@afribone.ml.net
National Representative of the Organization for the Valorization of the Senegal River (OMVS)	Zone industrielle-Route de Sotuba - Rue 851 Porte 407 BP E 2618 BAMAKO - MALI	Valorization of the Senegal River in cooperation with Mali, Mauritania and Senegal	cnomvsmali@omvs-mali.org
Trust Company of Manantali Energy (SOGEM)	ACI 2000 - BP E 4015 BAMAKO - MALI Tel:20298350/20290422	Public corporation of estate created by the member states of the OMVS	sogem@sogem-omvs.com
Énergie du Mali (EDM-SA)	Square Patrice LUMUMBA BP 69 BAMAKO - MALI	Licensee for electricity public service	edm@edm-sa.com.ml/edm@edmsa.net
ESKOM Energy Manantali SA (ESKOM)	Hyppodrome - Avenue Al Quods - Immeuble Boubacar Koïta - BAMAKO - MALI	Operation and the maintenance of the dam, production and transport of energy of the hydroelectric power station of Manantali	eskom@eskom-mali.com
The Malian Agency for Radioprotection (AMARAP)	Badalabougou ex - CRES BAMAKO - MALI	Pacific use of nuclear energy and protection against harmful ionizing radiations	amarap@buroticservices.net.ml
The National Direction of Geology and Mines (DNGM)	Route de Sotuba, Bamako Tel: +223 221 78 81/Fax: +223 221 02 31	Oil geology, geophysics and exploration/quality control of petroleum products	www.dngm.net
The Commission of Electricity and Water Regulation (CEWR)	Rue 23/23 B.P. 115 Bamako	Regulatory body of the sector of electricity and potable water	cree@creemali.org

Source: Table compiled by the author S. Diallo, 2009 (data from various documents&address books)



7 BIBLIOGRAPHY

- Direction Nationale de l'Énergie (2006): Sites de Microcentrales.
- ECOWAS, EMUWA (2004). Country Profile Mali: Access to the energy services in rural and peri-urban area to achieve the Millennium Development Goals.
- Énergie du Mali-SA (2002-2007): Rapports annuels.
- GTZ (2004): Wind energy in Mali. Feasibility study (WWW.GTZ.DE/DE/DOKUMENTE/EN-WINDEN-ERGY-MALI-FEASIBILITY-STUDY-GAO-2004.PDF)
- L'Observatoire des énergies renouvelables (2008): www.energies-renouvelables.org.
- Malian Agency for Domestic Energies and Rural Electrification - AMADER (2004/2005): Textes de creation, manuel de procedures de l'AMADER.
- Ministry of Energy, Mines and Water (2006): Document de politique énergétique.
- Ministry of Energy, Mines and Water/Direction of Energy (2005): Multisector Committee of follow-up of the European Initiative.
- Ministry of Finance/Project Coordinating Unit (2004): Annual Report of First Year implementation of the Strategic Framework of Fight against Poverty, CSLP.
- Ministry of Finance (2003): Ex-post evaluation Report on the results obtained within the framework of programs FASR/FRPC of the IMF.
- Ministry of National Education of Mali (2000): Document of the „Decennial Education Project (PRODEC).
- Ministry of Public Health: Document of the „Decennial Health Project (PRODES)“.
- NASA (2008): Surface Meteorology and solar Energy Data Set (<http://eosweb.larc.nasa.gov/sse>).
- National Center for Solar and Renewable Energies (CNE-SOLER)/UNDP Country Office Mali (2001): Reinforcement of the role of women in the promotion of Renewable energies/Impact studies on new and renewable energy technologies.
- Office National des Produits Pétroliers (2008): Structure indicative des Prix des Carburants.
- Office National des Produits Pétroliers (2008): Valeurs en douane des produits pétroliers au titre des importations.
- Plan National d'accès à l'Eau potable – PNAEP 2004-2015.
- UEMOA (2007): Rapport du Comité de Convergence.
- UNCTAD (2001): An Investment Guide to MALI: Opportunities and Conditions.
- UNDP Country Office Mali (2002): Project Document titled „Adoption of New and Renewable Energies on broad scale in Mali.
- UNDP Country Office Mali (2004): Report of Follow-up of Implementation of the Millennium Development Goals (MDGs).
- UNDP/Project PTF (2004): Improve living conditions in rural areas through access to energy/A review of the multi-purpose platform in Mali.



8 ANNEX

TABLE 13

Evolution of Petroleum Imports (2001–2007)

	VOLUME OF PETROLEUM PRODUCTS IMPORTED IN MALI (TONS)						
	2001	2002	2003	2004	2005	2006	2007
Petrol	99.339	105.455	94.818	103.729	103.472	102.726	117.664
Kerosene	45.027	44.396	28.763	36.166	31.267	31.650	16.129
Jet A1	24.494	21.114	20.319	19.758	23.875	20.245	21.790
Diesel	268.180	277.668	21.6066	239.533	354.467	410.356	405.769
Full Oil	98.820	57.126	110.987	121.275	40.378	36.369	52.721

Source: Graph compiled by the author S.Diallo, Data from ONAP, 2008