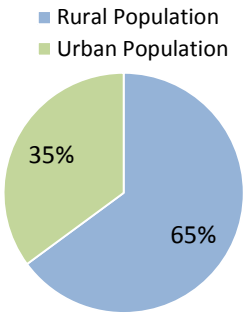
Country: Madagascar

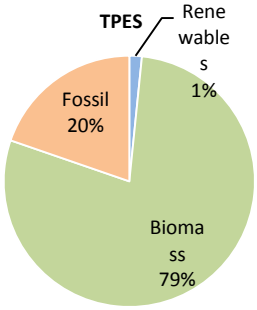
Socio- economic framework

	Year	Unit	Value
Population	2014	millions	23.57[1]
Demographic growth	2014	%	2.82%[1]
Surface	2014	km^2	587 295[1]
GDP	2014	M US$	10 590[1]
GDP per capita	2014	US$ per cap	449[1]
GDP growth	2014	% /year	2.9%[1]
Fragile country status	2014	Index	Yes-3.04[2]
Governance	2014	Index	48.2[3]
Governance variation over 5 years	2014	Index	-1.1[3]
Human development	2013	Index	0.498[4]

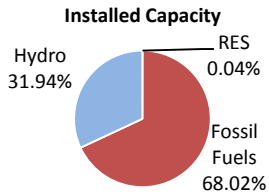


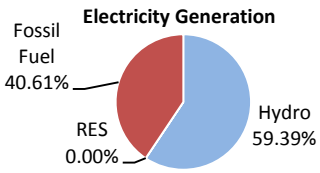
Consumed Energy (million toe=11.65 MWh)

	Year	Unit	Value
Total Primary energy Supply (TPES)	2012	Million toe	3.77[5]
Primary energy Supply - Biomass	2011	Million toe	2.90[6]
Primary energy Supply - Fossil	2011	Million toe	0.73[6]
Fraction of Non-Renewable Biomass	2009	%	33%[7]
Primary energy Supply - Renewable (incl.hydro)	2011	Million toe	0.06[6]
Primary energy - Net Import electricity	2011	Million toe	0[6]
Primary energy - Net import hydrocarbon	2011	Million toe	0.61[6]
Total Final Energy Consumption	2011	Million toe	2.82[6]
Final energy - Modern BLEN(*)	2011	Million toe	0.10[6]
Final Energy - Electricity	2011	TWh	1.05[6]



Electricity





	Year	Unit	Value
Peak demand	2014	MW	320[8]
Installed connected capacity	2013	MW	507[9]
Thermal installed capacity (fossil fuels)	2013	MW	345[9]
Hydro installed capacity	2013	MW	162[9]
Renewable installed capacity (ex.hydro)	2013	MW	0.224[9]
IPP/installed capacity	2011	%	6.3%[6]
Total Electricity production	2014	GWh	1487[10]
Electricity generation from fossil fuels	2012	GWh	604[10]
Electricity generation from hydro	2012	GWh	883[10]
Electricity generation from renewable	2012	GWh	0.006[10]
Electricity consumption including self-consumption and losses	2014	GWh	1487[10]
Average consumption per capita	2014	kWh per cap	63[11]
Total losses (technical and non-technical) as a production % (**)	2014	%	33%[12]
Total losses (technical and non-technical)(**)	2014	GWh	487[12]
Imports (+) exports (-)	2014	GWh	0[10]
Global electrification rate	2012	%	15.4%[1]
Urban electrification rate	2012	%	60.7%[1]
Rural electrification rate	2012	%	8.1%[1]
HV lines(+)	2014	km	To be confirmed
MV lines(+)	2014	km	3210[13]
LV lines(+)	2014	km	6564[13]
Renewable energy/global electricity production	2014	%	59%[14]
Connections to the LV network	2014	Thousands	455[15]
Average tariff/social	2014	US$c/KWh	11.6[16]
Ratio cost/tariff	2014		1.66[16]

The EU's Technical Assistance Facility for the Sustainable Energy for All initiative–Eastern and Southern Africa
Project financed by the European Union and implemented by a consortium led by Atkins

ATKINS

Version dated 28.10.15

Legal, regulatory and institutional framework

Energy policy	- Declaration of the Energy Policy Madagascar 1999 - National Energy Policy in accordance with the Plan of Actions of Madagascar (2005) - Sector Policy Letter Water and Electricity 2007. - National Policy of Mines and Hydrocarbons 2014. - Malagasy Forest Policy 1997. - National Policy for the Fight against Climate Change 2010.
Energy laws	- Law no. 98-032 (1999) Reforming the electricity sector. - Law no. 99-010 (1999) Governing the activities of the downstream petroleum sector. - Law no. 2002-001 (2002) Creation of National Electricity Fund (FNE). - Law no. 2004-003 (24 June 2004) on the liberalisation of the downstream petroleum sector and amending certain provisions of Law no. 99-010 (17th April 1999) governing the activities of the petroleum downstream sector. - Law no. 2004-31 (2004) Penalties for violations of the law on the activities of the downstream petroleum sector.
Enforcement texts	- Decree 2001-173 (2001) for the application of Law 98-032. - Decree 2001-803 (2001) for the organisation and function of the Board of Electricity Regulation (ORE). - Decree 2001-849 (2001) for the tariffs (prices) of electricity. - Decree No. 2002-1550 (2002) Establishment of the Agency for the Development of Rural Electrification ADER. - Decree No. 2003-194 modifying decree No 2001-803. - Decree No. 2003-510 modifying decree No. 2002-1550. - Decree N° 2005-062 (2005) fixant les modalités de perception des redevances sur le chiffre d'affaires annuel des permissionnaires et concessionnaires du secteur de l'Energie électrique par l'Office de Régulation de l'Electricité (ORE) - Decree N° 2011-261 (2011) fixant les attributions du Ministre de l'Energie ainsi que l'organisation générale de son Ministère. - Order N° 3910-2009 (2009) portant modalités d'ajustement des tarifs de vente d'Electricité - Order N° 2005-1055 (2005) fixant le taux d'un pourcentage des redevances sur le chiffre d'affaires des Permissionnaires et Concessionnaires du secteur de l'Energie électrique - Decree No. 99-279 Establishment of Malagasy Hydrocarbons Office. - Decree No. 82-312 to Regulate Charcoal production.
Electricity/energy regulator	Board of Electricity Regulation (ORE), established according to Law no. 98-032 to become an independent electricity sector regulator.
Electricity operators	JIRAMA (state owned electricity and water utility); IPP concessionaires: HYDELEC (24.3MW of hydro capacity), HFF (5.3MW hydro and 20MW thermal), QMM (3.8 MW thermal).
Rural electrification body	Agency for the Development of Rural Electrification (ADER). National Electricity Fund was created in 2002 managed by ADER.
Renewable energy body	None.
Energy conservation body	None.
Energy objectives	The new energy policy (currently under consultation) includes the following objectives for 2030: Access of 70% of the population to modern lighting sources (connection, solar panel, solar lamp); Penetration of improved cooking stoves to 71% of the population; 60% of businesses and industries have implemented energy efficiency measures by 2030. Electricity mix in the interconnected system by 2030: 75% hydropower, 15% thermal plants, 5% wind, 5% solar. Electricity mix in the mini networks: 50% hydropower, 20% biogas, 25% diesel, 5% solar. In total 805 of the energy mix for 2030 will be covered by renewable energy.
Feed-in tariff policy	No.
Metering policy for billing	Yes.
Public procurement (auctions)	No.
Unbundling	No. JIRAMA is a vertically integrated company which is operating the transmission and distribution systems.

Private sector environment

Sector private bodies	Madagascar Group of Companies (GEM, Group of Employers Malagasy (FIVMPAMA), Chambers of Commerce and Agriculture, Observatory of the Public life in Madagascar (SeFaFi), Alliance Voahary Gasy FAMARI, KOMANGA, Mandresy, Tany Meva Foundation, ADES.
Public incentives	Tax incentives: exemption from customs duties and VAT on imported equipment for RE. Tax reduction of 50% of the investment made for companies investing in RE.
Financial grants	No.
IPPs	HYDELEC (24.3MW of hydro capacity), HFF (5.3MW hydro and 20MW thermal), QMM (3.8 MW thermal) small auto producers and "permissionnaires" for local generation.
PPPs	The PPP bill in the final stages of being prepared as the current framework does not define the roles, obligations and rights of the partners.
Business index	Ranked 163 out of 189 countries by the WB for 2014 (down 6 places from 157 in 2013)[17].

International Cooperation in the energy sector

Joint Declaration EU-country	No.
Energy as a focal sector for 11th EDF	No.
Donors active in the country	EU, World Bank, BADEA, OFID, KFAED, AfDB, BEI, GIZ, AFD, China Cooperation, UNDP, JICA.
Coordination among donors	The EU coordinates with all development partners and NGOs. A Strategic Dialogue Group (under Prime Minister) has been revamped in 2014 to discuss the political and socio-economic context of development cooperation. Fifteen sectorial groups meet at a technical level.

Main issues and opportunities[18]

- Low access to electricity and modern energy sources in general, relying excessively on biomass.
- Low efficiency charcoal production practises that should be replaced.
- Installed capacity for electricity production is low and the transmission/distribution networks should be developed.
- Total dependence on imported oil products for modern energy sources.
- Electricity prices do not cover the production costs.
- Achieve the required levels of funding by adopting a new PPP law to ensure the private partner's will to invest.
- Increase the installed capacity of hydropower to exploit the large existing potential.
- Explore the existing oil resources.

(*) BLEN includes **B**iogas, **L**PG, **E**lectricity and **N**atural Gas.

(+) Total length of the JIRAMA operated three interconnected networks (Antananarivo, Tamatave and Fiananrantsoa) and five autonomous centres of large areas and small and medium centres in rural areas. Voltage levels: HV (63, 138kV), MV (5, 5.5, 15, 20, 30, 35kV), LV (230V).

Sources:

1 World Bank; Available: http://data.worldbank.org/country/madagascar, [Accessed on 2/09/2015]. The source of the share of rural and urban population is the CIA World Factbook available at: https://www.cia.gov/library/publications/the-world-factbook/geos/ma.html [Accessed on 2/09/2015].

2 World Bank Country Policy and Institutional Assessment (CPIA) Score; Available: http://www.worldbank.org/content/dam/Worldbank/document/FragilityandconflictFY14FragileSituationList.pdf, [Accessed on 27/08/2015].

3 Ibrahim Index of African Governance (IIAG), Available: www.moibrahimfoundation.org/interact, [Accessed on 24/08/2015].

4 UNDP - Human Development Reports, Available: hdr.undp.org/en/countries/profiles/MDG, [Accessed on 24/08/2015].

5 UN Energy Statistics Yearbook 2012, Available: http://unstats.un.org/unsd/energy/yearbook/default.htm, [Accessed on 2/09/2015].

6 UN Stats Energy Balances and Electricity profiles 2011, http://unstats.un.org/unsd/energy/balance/default.htm, [Accessed on 2/09/2015].

7 Bailis,R., Drigo, R., Ghilardi, A. & Masera,O. "The carbon footprint of traditional woodfuels", Nature Climate Change 5: 266-272, 2015.

8 JIRAMA GD/DPS Statistiques de Ventes, Abonnes et Productions JIRAMA 2014, Available at http://www.ore.mg/DonneesTechniques/StatExpl/PDF/Stat2014.pdf, [Accessed on: 04/09/2015].

9 Expression of interest to participate in the scaling up Renewable Energy in low income countries programme, Ministry of Energy, 2013, Available https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Madagascar_EOI.pdf, [Accessed on 2/09/2015].

10 According to JIRAMA the total generation in 2013 was 1423GWh and in 2014 1487GWh (Available at: http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=pdcelec [Accessed 04/09/2015]).

11 JIRAMA, 2014. Calculated as the ratio of the consumption provided by JIRAMA (Available at: http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=pdcelec [Accessed 04/09/2015]) and the total population.

12 According to JIRAMA data total losses including non-technical losses reached 33% for the electricity consumed within the network in 2013 and 32.8% in 2014 (Calculated form the generation data available at http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=pdcelec and sales data available at: http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=ventes.

13 JIRAMA, Statistiques de Distribution Electricité 2014. Available at: http://www.jirama.mg/index.php?w=scripts&f=telecharger_dpesitew.php&act=sig_distrib_elec [Accessed: 04/09/2015].

14 JIRAMA, 2014. Calculated from the data of JIRAMA for the generation per source (Available at: http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=pdcelec [Accessed 04/09/2015]).

15 JIRAMA Subscribers information, 2014, available at http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=abonnes, [Accessed: 04/09/2015].

16 Projet d'assistance pour le développement d'une nouvelle politique et d'une stratégie de l'énergie pour la République de Madagascar, "Rapport de la Mission de Cadrage", Septembre 2014 available at http://www.euei-pdf.org/sites/default/files/files/field_pblctn_file/Rapport%20de%20mission%20Mission%20de%20cadrage%20EUEI%20PDF%20-%20Madagascar%20-%20%20version%20web.pdf [Accessed 06/09/2015]. Tariffs are available from the Office de Regulation de l'Electricité, 2015, available at http://www.ore.mg/ [Accessed 04/09/2015]. The minimum level of residential tariff is 4US cents/kWh for residential consumers, below 3kW capacity with a consumption less than 25 kWh.

17 World Bank, Available: http://data.worldbank.org/indicator/IC.BUS.EASE.XQ, [Accessed on 25/08/2015].

18 The main issues were identified in the Projet d'assistance pour le développement d'une nouvelle politique et d'une stratégie de l'énergie pour la République de Madagascar, "Rapport de la Mission de Cadrage", Septembre 2014.

Country: Madagascar

ANNEX 1 – PRIMARY DATA STATISTICS AND ACCESS TO MODERN ENERGY SOURCES

SE4ALL Objectives	*Indicators*	*Unit*	*Statistics*						*Target*
			Total				Rural	Urban	Total
			1990	2000	2010	2012	2010	2010	2030
Universal access to modern energy	Electricity access	% of population	9	11	14	15	8	61	70
	Non-solid fuels access	% of population	2	2	2	2	2	2	
			1990		2010	2012	1990-2010	2010-2012	2030
Doubling energy efficiency	Improvement rate of Primary energy intensity	CAGR %					0.89	0.76	
	Cumulated energy savings	PJ					267	82	
	Ratios primary energy/final energy		-		-	-			
	Primary energy intensity level	MJ/$2011 PPP	5.3		6.3	6.4			
			1990	2000	2010	2012			2030
Doubling the renewable energy share	Total final consumption	PJ			114	119			
	RE share in the total consumption	%	86.4	78.5	82.5	78.4			
	RE share in the total electricity generation	%			58.2	32.6			80
	RE share in the total electricity production capacity	%			34.4	30.3			

Source:
SE4ALL Progress towards Sustainable Energy 2015, Global Tracking Framework (GTF), accessed from http://www.se4all.org/tracking-progress/ on 24/08/2015
SE4ALL Global Tracking Framework 2013, accessed from http://www.se4all.org/tracking-progress/ on 24/08/2015.

Note: Figures used in this annex are those of the GTF which uses the same definitions for all countries. However, these definitions are not always those used in the other parts of the fiche.

ANNEX 2 – INSTITUTIONAL AND POLITICAL FRAMEWORK

N : not achieved **F**:foreseen **D** : drafted **AP** : Approval national process **A**: adopted **I** : implemented **S** : Success story

POLICY ASPECTS	N	F	D	AP	A	I	S	COMPLEMENTARY ASSESSMENT ELEMENTS
1 *Energy sector*								
Political objectives Energy laws					✓			Declaration of the Energy Policy Madagascar 1999; National Energy Policy in accordance with the Plan of Actions of Madagascar (2005); Sector Policy Letter Water and Electricity 2007; National Policy of Mines and Hydrocarbons 2014. Law no. 98-032 (1999) Reforming the electricity sector; Law no. 99-010 (1999) Governing the activities of the downstream petroleum sector; Law no. 2002-001 (2002) Creation of National Electricity Fund (FNE); Law no. 2004-003 (24 June 2004) on the liberalisation of the downstream petroleum sector and amending certain provisions of Law no. 99-010 (17th April 1999) governing the activities of the petroleum downstream sector.
Energy regulation authority					✓			Board of Electricity Regulation (ORE), established according to Law no. 98-032 to become an independent electricity sector regulator. There is no overall energy sector regulator.
Partnership agreement with the EU		✓						Energy projects will be included in the 11th EDF.
Fragile country status								Yes. Madagascar has a World Bank CPIA score of 3.04 regarding fragile situations in 2014. According to IMF[1], the country remained fragile for the whole period 2011-2013 and is among the countries that have regressed in fragility since the 1990s.
2 *Engagement and preparation for SE4ALL*								
Opting-in	✓							
Gap analysis	✓							
Action Agenda	✓							
NREAP	✓							
NEEAP	✓							
Investment Prospectus	✓							
SE4ALL Secretariat	✓							

[1] "Building Resilience in Sub-Saharan Africa's Fragile States", IMF 2015, available at https://www.imf.org/external/pubs/ft/dp/2015/afr1505.pdf [Accessed on 25/08/2015]

3	*Private sector participation*							
Investment and concession laws					✓			The Electricity law no. 98-032 set up the liberalised electricity market and the legal basis for concessions for IPPs, transmission and distribution operators. A new PPP law is under finalisation which foresees a secure, transparent and robust regulatory framework. Law No 2007-036 (2008) refers to investments in Madagascar.
Private sector activities						✓		Concessionaires IPPs: HYDELEC (24.3MW of hydro capacity), HFF (5.3MW hydro and 20MW thermal), QMM (3.8 MW thermal). There are many small local licensed generators and two auto producers. In the hydrocarbon sector private operators can get trading licensed and establish a distribution network covering all the districts in the country for four years (to ensure supply to the entire country).
Investors protection			✓					According to the US Dept. of State[2] "Madagascar's investment climate shifted significantly in the first half of 2014 and further improvements appear likely if favourable political changes continue". The investment Law 2007-036 provides foreign and local investors protection against nationalization, expropriation, and requisition, with the exception of public interest cases[3]. The country is ranked 84 out of 189 countries in the "protecting investors" topic of the World Bank "Doing business" analysis[4].
National financial incentives					✓			Exemption from customs duties and value added tax (VAT) on imported equipment for renewable energy. Companies that invest in the production and supply of renewable energy may benefit from a tax reduction equal to the income tax of 50% of the investment made.
Institutional support to private sector			✓					The Economic Development Board of Madagascar is offering support to prospective investors. According to the US Dept. of State[2], many troubling issues remain in the investment climate including weakness in the judicial system and the banking sector, corruption, lack of transparency in decision making, limited transport infrastructure.
4	*Energy access*							
Energy access policy and targets				✓				The new energy policy includes the following objectives for 2030: Access of 70% of the population to modern lighting sources through connection to the grid, using solar panels or using solar lamps; Penetration of improved cooking stoves using LPG, ethanol, briquettes of other alternatives to wood and charcoal, to 71% of the population.
Agency / Rural energy fund						✓		The Agency for the Development of Rural Electrification (ADER) was established by decree 2002-1550 (as amended by decree 2003-510 and 2011-262) under the Ministry of Energy. Its main mission is to increase the rate of access to electricity in rural and suburban areas. To achieve this mission ADER manages the National Electricity Fund (NEF) created in 2002. NEF is financed through a levy on electricity consumption, direct transfers from the State and support from donors. ADER has achieved 144 projects of which 104 are operational for the electrification of almost 200 villages.
Rural electrification master plan	✓							ADER has a pipeline of projects to fund for rural electrification through a tendering process, chosen from regional plans since there is no national rural electrification master plan. The New Energy Strategy includes an investment

[2] U.S. Department of State available at: http://www.state.gov/documents/organization/233896.pdf [Accessed on 06/09/2015].
[3] U.S. Dept. Of State, Madagascar Investment Climate Statement, 2015, available at http://www.state.gov/documents/organization/241855.pdf, [Accessed 07/09/2015]
[4] World Bank, available at http://www.doingbusiness.org/data/exploreeconomies/madagascar/ , [Accessed 08/09/2015]

								plan, an important part of which is rural electrification. The final report on "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification" 2013[5] includes rural electrification plans for three regions (Boeny, Sava and Sofia).
Increasing EA investment plan		✓						The New Energy Strategy includes an investment plan, covering energy access.
EA decentralized initiatives					✓			Rural electrification options to achieve the targets include standalone renewable electricity generation systems and micro-grids.
Traditional fuels replacement			✓					Penetration of improved cooking stoves using LPG, ethanol, briquettes of other alternatives to wood and charcoal, reaching 71% of the population by 2030. The New Energy Strategy foresees the investment plan required to achieve these targets.
Independent distribution networks						✓		The distribution system of Madagascar consists of three interconnected networks, five large autonomous centres and 87 small and medium autonomous centers (about 30 in rural areas) with an installed capacity of 250kW each and a mini-network for the distribution of electricity).
Electricity distribution master plan			✓					The final report on "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification" 2013[6] includes a least cost development plan for generation, transmission and distribution of electricity in the three networks and the three non-connected regions.
Specific measures for the poor		✓						Special tariff for electricity consumption below 25 kWh. Grants for replacement of cooking equipment.
Microfinance instruments		✓						Madagascar's microfinance sector was established in 1990 and started to grow rapidly in the last ten years.
Pre-electrification		✓						One of the targets of the New Energy Strategy is achieving access of 70% of the population to modern lighting sources through connection to the grid, using solar panels or using solar lamps, by 2030.
5	*Renewable energy (RE)*							
RE Policy				✓				The New Energy Strategy includes the following RE objectives for 2030: In the interconnected system 75% of the electricity generated from hydropower, 5% from wind and 5% from solar (the remaining 15% from thermal power plants); in the mini-networks 50% of electricity generated from hydro, 20% from biogas produced from rice hulls and 5% from solar. Overall 80% of the energy mix in 2030 will be covered by renewable energy sources.
Agency / RE Fund	✓							ADER and NEF are dealing with renewable energy as part of their activities. JIRAMA is responsible for exploiting RE for electricity generation in the interconnected system. There is no dedicated RE agency.
RE master plan		✓						The New Energy Strategy includes targets and investment requirements for RE penetration. There is no dedicated RE Masterplan.
Biofuels regulatory frameworks	✓							No regulations for biofuels exist.
Wood energy regulations					✓			Decree no. 82-312 of 19 January 1982 regulating the manufacture of charcoal. Decree 97-1200 of 2 October

[5] "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification", Mavethic Consulting, 2013 available at: http://www.ore.mg/Publication/Rapports/RapportMAVETHIC%20CONSULTING-PEMC2013.08.04.pdf, [Accessed 06/06/2015].

[6] "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification", Mavethic Consulting, 2013 available at: http://www.ore.mg/Publication/Rapports/RapportMAVETHIC%20CONSULTING-PEMC2013.08.04.pdf, [Accessed 06/06/2015].

								1997 adopting the Malagasy forest policy. Decree No. 2005-849 of 13 December 2005 revising the general conditions of application of the law No. 97 017 of 8 August 1997 revising forest legislation. Decree 2000-383 of 7 June 2000 concerning afforestation.
Solar/wind regulations	✓							No regulations for solar/wind exist.
RE resources mapping			✓					There is no RE atlas. The hydropower potential for a number of sites has been assessed and the effort will continue. The wind potential of some areas has been assessed but there is no wind atlas. An initial assessment of the potential for hydro, wind and solar has been produced but needs to be analyzed in more detail[7].
RE Promotion		✓						RE installations is part of the rural electrification programme.
RE long-term funding	✓							There are no specific funding mechanisms or feed in tariffs for RE. There is only an exemption from customs duties and value added tax (VAT) on imported equipment for renewable energy and companies that invest in the production and supply of renewable energy may benefit from a tax reduction equal to the income tax of 50% of the investment made.
Green Energy Fund	✓							NEF is the only fund that covers RE applications (among others).
Network connection studies	✓							The only network connection studies are associated with the feasibility studies of specific hydropower projects.
6	*Energy Efficiency (EE)*							
EE Policy			✓					The New Energy Strategy foresees the implementation of EE measures in 60% of industries and businesses by 2030, focusing in thermal uses and the replacement of all inefficient charcoal producing practices using traditional kilns.
EE national action plan	✓							There is no EE action plan. The only targets are described in the New Energy Strategy.
EE Standards and labels	✓							
EE Promotion	✓							
Electricity losses reduction programme.		✓						The current level of technical and non-technical losses is 33%. The reduction of losses is mentioned in the New Energy Strategy but there is no specific target set.
Improved stoves programs				✓				Target in the New Energy Strategy for 70% of the population to use efficient stoves by 2030.
Ban on non-efficient appliances	✓							
Incentives for efficient appliances	✓							
Demand-side management	✓							

[7] Expression of interest to participate in the Scaling up Renewable Energy in Low Income countries program (SREP), Ministry of Energy, 2014, available at http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Madagascar_EOI.pdf, [Accessed 08/09/2015].

Country: Madagascar

7	*Electricity sector*							
Legal definition of the institutional players						✓		Law no. 98-032 (1999) for reforming the electricity sector set up the market liberalisation for the sector. Concessionaires for generation, transmission and distribution are foreseen. The O.R.E. is the regulator of the electricity sector issuing concession licenses. However the process is not fully operational, the concessions of JIRAMA have expired and need renewal, while the operation of the transmission and distribution system is performed only by JIRAMA.
Tariff policy					✓			The tariffs are set by the Board of Electricity Regulation (O.R.E.) and applied by JIRAMA. A block tariff system exists with different tariffs for residential, commercial and industrial consumers. The rules are set in Decree 2001-849 (2001) for the prices of electricity.
Interconnection rules		✓						Madagascar is an island which is not connected to any other electricity network. Regulations exist for the distribution system standards.
Isolated networks rules	✓							
Feed-in tariff policy	✓							There are no feed-in tariffs for renewable electricity.
RE minimum % imposed to producers	✓							
RE certificates trade	✓							
Free access to the domestic network					✓			Law 98-032 foresees that the licensed IPPs are guaranteed access to the network.
Net metering	✓							
Unbundling	✓							
Decentralized transport networks	✓							
Least cost development plan				✓				The final report on "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification" 2013[8] includes a least cost development plan for generation, transmission and distribution of electricity in the three networks and the three non-connected regions.
Electricity master plan	✓							There is no overall electricity masterplan. Required investments are included in the New Energy Strategy and in the report mentioned above.
Privatization / commercialisation					✓			There are three large IPPs and many small "permissionnaires" for local generation and two licensed auto producers.
Utility management contract	✓							
Utility financing plan		✓						An estimate of the cost for the achievement of the electrification targets is included in the New Energy Strategy and in the "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification" report (2013).

[8] "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification", Mavethic Consulting, 2013 availabe at: http://www.ore.mg/Publication/Rapports/RapportMAVETHIC%20CONSULTING-PEMC2013.08.04.pdf, [Accessed 06/06/2015].

ANNEX 3 – ELECTRICITY SECTOR ASSESSMENT

CRITERION	INFORMATION
Electricity sector policy	
Electricity sector laws	Law no. 98-032 (1999) Reforming the electricity sector. Law no. 2002-001 (2002) Creation of National Electricity Fund (FNE).
Unbundling	JIRAMA is a vertically integrated company and the interconnected transmission and distribution system operator.
Regulation of the sector	The Board of Electricity Regulation (ORE) is established according to Law no. 98-032 to become an independent electricity sector regulator.
Master Plans / Least cost development plans/ Capacities expansion plan	The final report on "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification" 2013[9] includes a least cost development plan for generation, transmission and distribution of electricity in the three networks and the three non-connected regions.
Networks and access development	The report mentioned above includes the required development of transmission and distribution lines.
IPPs	There are three large IPPs: HYDELEC (24.3MW of hydro capacity), HFF (5.3MW hydro and 20MW thermal), QMM (3.8 MW thermal) and many small autoproducers and "permissionnaires" for local generation.
RE based electricity production objectives	The New Energy Strategy includes the following RE objectives for 2030: In the interconnected system 75% of the electricity generated from hydropower, 5% from wind and 5% from solar (the remaining 15% from thermal power plants); in the mini-networks 50% of electricity generated from hydro, 20% from biogas produced from rice hulls and 5% from solar.
Power purchase agreements, feed-in tariffs	There are no feed in tariffs. There are PPAs that are used by the current IPPs (most of the IPPs are based on hydropower production).
Access to transport networks regulations	Law no. 98-032 foresees the access of all licensed IPPs to the network. There are a number of regulating decrees for the network access: Décret n° 60-294:Portant détermination des conditions techniques auxquelles doivent satisfaire les distributions d'énergie électrique; Décret n° 62-535: Portant déterminant des conditions techniques auxquelles doivent satisfaire les installations d'énergie électrique; Décret n°64-013: Portant réglementation générale en matière d'opération d'énergie électrique à usage public.
Sector reforms	The electricity sector was reformed with the introduction of law no. 98-032 in 1999. The aim was to open the investments in the electricity sector to private investor in order to finance the electrification of the country and to promote efficiency and the quality of the service provided.

[9] "Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification", Mavethic Consulting, 2013 available at: http://www.ore.mg/Publication/Rapports/RapportMAVETHIC%20CONSULTING-PEMC2013.08.04.pdf, [Accessed 06/06/2015].

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CRITERION	INFORMATION
Enterprises and services	
PRODUCTION	
Main companies and shareholders	State Owned: JIRAMA was created as a state monopoly for electricity and water in 1974, and after 1999 it is a state owned company with concessions for electricity generation and the operation of the transmission network and distribution network. Private: IPP concessionaires: HYDELEC (24.3MW of hydro capacity), HFF (5.3MW hydro and 20MW thermal), QMM (3.8 MW thermal). There are 36 “permissionnaires” for small scale electricity generation and two licensed auto producers.
Production (GWH)	In 2013 total electricity generation was 1423GWh and in 2014 1487GWh.
Installed capacity (MW)	Total installed capacity in 2013 was 507MW (162MW hydropower and 0.224MW solar and wind).
Production mix (GWh)	In 2014 hydro generated 883GWh, oil fired plants 603GWh and the solar and 6MWh by solar and wind plants (the corresponding generation was 808GWh hydro, 614GWh oil and 7MWh by solar).
Peak demand (MW)	The peak demand was 320MW in 2014.
TRANSPORT	
Enterprises	JIRAMA is the transmission system operator.
HV lines length and capacity	To be confirmed
Exports/Imports	The electricity system of Madagascar is not interconnected to any other system.
DISTRIBUTION	
Enterprises (s)	JIRAMA is the distribution system operator.
MV and LV lines length and capacity	MV lines have a length of 3210km and operate at 5, 5.5, 15, 20, 30 and 35kV. LV lines operate at 230V and have an estimated length of 6564km.
Clients	In 2014 there were 455 thousand connections to the network of JIRAMA.
Total sales and tariff categories	Total electricity sales by JIRAMA in 2013 were 952GWh and in 2014 1000GWh. There are three different geographic zones for the tariffs and for each zone there are different tariffs for high voltage industrial installations, medium voltage industrial (long, short and time of use) medium voltage non-industrial (long, short, time of use), low voltage general tariff, LV general residential tariff (with two energy blocks <130kWh and >130kWh), LV Eco non-residential (with two energy blocks <25kWh and >25kWh) and LV Eco residential (with two energy blocks <25kWh and >25kWh).
Demand forecast on the interconnected network (MW)	The final report on “Updating Development Plans Electrical Systems of three networks operating JIRAMA and three regions for Rural Electrification” 2013, includes a forecast of the demand for each of the three networks for the probable scenario: Network 1 consisting of: Interconnected network of Antananarivo with peak demand 246MW in 2020 and 381MW in 2030; Interconnected

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CRITERION	INFORMATION
	network of Toamasina with peak demand 29MW in 2020 and 41MW in 2030; Ambosita with peak demand 1.4MW in 2020 and 2.1MW in 2030. Network 2 consisting of: Antsiranana with peak demand 14MW in 2020 and 23MW in 2030; Ambilobe with peak demand 1.4MW in 2020 and 1.9MW in 2030. Network 3: Morondava with peak demand 2.34MWin 2020 and 3.3MW in 2030.
Tariff / cost recovery / subventions	
Electricity tariffs	The tariff system is quite elaborate[10]: There are three geographic Tariff Zones and for each zone there are tariffs for High Voltage, Medium Voltage industrial consumers, Medium Voltage other consumers and Low voltage consumers: HV Tariff Long Usage, All Zones: Power charge 10.42 US$/kW per month, energy charge 4US cents/kWh[11] HV Tariff time of use, All Zones: Power charge 48 US$/kW per month, Energy price peak hours 14US cents/kWh, energy price day period 3US cents/kWh, energy price night period 2UScents/kWh. MT Industrial: For each Zone there are three categories: Long use, Short Use and Time of Use tariffs and for each there is a power charge (ranging from 5.68 to 10.5 US$/kW per month and an energy charge ranging from 2UScents/kWh for the night period to 21 Us cents/kWh for the peak period of ToU tariff in Zone 3. MT non-industrial tariff follows the same approach as the industrial tariff structure. LV General Tariff is split into residential and non-residential consumers. Non Residential tariffs have a power charge ranging from 1US$/kW per month to 0.5US$/kW per month and an energy charge ranging from 9US cents/kWh to 20US cents/kWh. LV General Residential is a block tariff with lower tariffs for consumption below 130kWh (6-15 Us cents/kWh) and higher prices for consumption above 130 kWh (10-19 Us cents/kWh depending on the Zone). Finally LV "economic" tariff is for consumers with a power demand less than 3kW and the charge is 4US cents/kWh for energy consumption less than 25kWh and 19-22US cents/kWh for consumption above 20kWh.
Social tariff	There is no information for a social electricity tariff. The LV "economic" tariff is offering lower prices to consumers with very low electricity consumption (<25kWh) and low capacity (<3kW).
Cost coverage through tariffs Planned tariffs adjustments	Operational costs are not covered by the current tariff levels. Any tariff changes are decided by the O.R.E.. According to the Project for the development of a "New energy policy and strategy in the Republic of Madagascar"[12] the average generation cost is 633 Ar/kWh (about 19US cents/kWh) while the average sales price is 382 Ar/kWh (11 US cent/kWh). Therefore there is a ratio of about 1.65 between cost and tariff.
Level and subsidies sources	The Ministry of Energy provides subsidies to JIRAMA in order to cover the financial losses due to the tariffs that do not cover operational costs, the high losses and the low rate of bills collection. According to the Activity Report 2013 of JIRAMA the State subsidies to JIRAMA in order to cover the losses in 2012 were 67 million USD and in 2013 72 million USD.

[10] JIRAMA available at: http://www.jirama.mg/index.php?w=scripts&f=Jirama-page.php&act=tarifelec [Accessed 06/09/2015].

[11] The conversions from Malagasy Ariary to US dollars were based on the rate of 1USD = 3280 Ar (from http://www.xe.com/currencyconverter/convert/?Amount=1&From=USD&To=MGA accessed on 06/09/2015).

[12] Projet d'assistance pour le developpement d'une nouvele politique et d'une strategie de l'energie pour la Republique de Madagascar, « Rapport de la Mission de Cadrage », Septembre 2014, available at http://www.euei-pdf.org/sites/default/files/files/field_pblctn_file/Rapport%20de%20mission%20Mission%20de%20cadrage%20EUEI%20PDF%20-%20Madagascar%20-%20%20version%20web.pdf [Accessed 06/09/2015].

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CRITERION	INFORMATION
Financial situation of the main enterprises	The current tariffs do not allow JIRAMA to fully recover the operation costs which causes problems to its financial operation. Furthermore, the high level of losses and the low rate of bills collection (mostly post-paid) weaken the cash flows for JIRAMA. As was mentioned above the state had to subsidise the operation of JIRAMA which has negative financial results since 2010. To solve part of the problem the Government decided to increase the capital of JIRAMA by 50billion Ar (about 22million USD) in 2014.
Performance: losses / efficiency/ service quality	
Production performance	Some thermal power plants operate at a specific consumption which is below the accepted values according to the findings in (12). According to the data of JIRAMA the average specific consumption of all thermal power stations was 0.65l/kWh in 2013 and 0.67l/kWh in 2014 (this includes HFO and Diesel used in all thermal power plants). The improvement of the operating efficiency is among the priorities of the New Energy Strategy.
Transport losses, evolution and objectives Distribution losses (technical and non-technical)	According to JIRAMA the total losses in the network (technical and non-technical) are at a level of 33% in 2013 and remained at the same level over the last year. There are no detailed data about the level of losses in the transmission and the distribution systems. The New Energy Strategy mentions the reduction of losses as one of the objectives, but there are no defined targets set.
Revenues	The revenue losses of JIRAMA were at the level of 67 million USD in 2012 and 72 million USD in 2013 and had to be covered by the State.
Shutdowns and improvement objectives	The quality of the electricity service is rather poor with a total of outages of 1345 hours for 2011 (JIRAMA). The improvement of the service is part of the new energy strategy, without specific targets.
Off-grid electrification and electricity access	
Electrification rate (urban/rural)	According to the values reported for 2012 by the World Bank the electrification rates are 8% for the rural population, and 60% for the urban population with an overall electrification rate of 15% in 2012.
Electrification objectives	The new energy policy includes the following objectives for 2030: Access of 70% of the population to modern lighting sources through connection to the grid, using solar panels or using solar lamps.
Rural electrification agency	The Agency for the Development of Rural Electrification (ADER) was established by Decree 2002-1550 (as amended by Decree 2003-510 and 2011-262) under the Ministry of Energy. Its main mission is to increase the rate of access to electricity in rural and suburban areas. To achieve this mission ADER manages the National Electricity Fund (NEF) created in 2002. NEF is financed through a levy on electricity consumption, direct transfers from the State and support from donors. ADER has achieved 144 projects of which 104 are operational for the electrification of almost 200 villages.
Off-grid electrification situation and programmes	Off grid electrification is part of the objectives of ADER. Information to be obtained about the current situation.
Off-grid operators	There are 36 small generators that are licensed from O.R.E. for electricity production on mini-grids.
Isolated networks regulations	Regulations do not exist.
BoP Policy (Bottom of the Pyramid)	Information to be obtained.

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CRITERION	INFORMATION
Energy Efficiency (EE)	
Demand-side management	There are no demand side management activities in the electricity sector.
EE activities	There are no EE activities in the electricity sector.
Other aspects	
Regional electricity market	The electricity system of Madagascar is not interconnected with any other and there are no plans for an interconnection. JIRAMA is a member of the Association of Electricity Companies in Africa.

ANNEX 4 - NATIONAL TARGETS FOR ENERGY ACCESS, RENEWABLE ENERGY AND ENERGY EFFICIENCY

Country	Sector	Policies and objectives	Source
SADC - Southern African Development Community[13]	Access	At the high level SADC Regional Energy Access workshop held in Maseru on November 4, 2009, the following SADC Energy Access goals were agreed: • Member States have as a strategic goal the harnessing of regional energy resources to ensure, through national and regional action, that all the people of the SADC Region have access to adequate, reliable, least cost, environmentally sustainable energy services. The operational goal is to endeavour to halve the proportion of people without such access within 10 years for each end use and halve again in successive 5 year periods until there is universal access for all end uses.	SADC Regional Energy Access Strategy and Action Plan (March 2010)[14]
	Renewable Energy	The draft Renewable Energy Strategy and Action Plan (February 2012- it is not approved yet) included ambitious targets for the deployment of renewable energy technologies : • RE grid connected share: 21% in 2015, 33% in 2020 and 39% in 2030. • Off-grid share of renewable energy: 2.5% in 2015, 5% in 2020 and 7.5% in 2030. • Biofuels: Ethanol 10% share of total fuels in 2020 and 20% in 2030; Biodiesel 5% in 2020 and 10% in 2030.	SADC Regional Infrastructure Development Master Plan: Energy Sector Plan. (August 2012)[15]
	Energy efficiency	The draft Renewable Energy Strategy and Action Plan (February 2012- it is not approved yet) included ambitious targets for the Energy Efficiency: • Energy efficiency savings achieved of grid use: 5% in 2015, 10% in 2020 and 15% in 2030. • Penetration of efficient cooking/heating devices: 5% in 2015, 10% in 2020 and 15% in 2030. • Efficient charcoal production share 5% in 2020 and 5% in 2030.	SADC Regional Infrastructure Development Master Plan: Energy Sector Plan. (August 2012).
Madagascar	Oil and gas	-	New Energy Strategy August 2015
	RE	By 2030 in the interconnected system 75% of the electricity to be generated from hydropower, 5% from wind and 5% from solar (the remaining 15% from thermal power plants); in the mini-networks 50% of electricity to be generated from hydro, 20% from biogas produced from rice hulls and 5% from solar. Overall 80% of the energy mix in 2030 will be covered by renewable energy sources.	
	Access	By 2030, access of 70% of the population to modern lighting sources through connection to the grid, using solar panels or using solar lamps; Penetration of improved cooking stoves using LPG, ethanol, briquettes of other alternatives to wood and charcoal, to 71% of the population.	
	Energy efficiency	By 2030, implementation of EE measures in 60% of industries and businesses by 2030, focusing in thermal uses and the replacement of all inefficient charcoal producing practices using traditional kilns.	

[13] Madagascar is a member state of the Southern African Development Community (SADC). The SADC objectives are presented for comparison with the objectives of Madagascar.

[14] Available at http://www.sadc.int/files/5713/5791/7436/EUEI_PDF_SADC_Regional_Energy_Access_Strategy_Mar_2010_EN.pdf [Accessed on 27/08/2015]

[15] Available at http://www.sadc.int/files/5413/5293/3528/Regional_Infrastructure_Development_Master_Plan_Energy_Sector_Plan.pdf [Accessed on 27/08/2015]

Country: Madagascar