

Africa-EU Renewable Energy Cooperation Programme (RECP):
Higher Education for Renewable Energy

Country Mapping



Niger

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Figure 1: Map Niger (CIA, 2014)

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1 Niger at a Glance

1.1 Population and Geography

Table 1: Population (World Bank, 2014a)

Population, total (2013)	17,831,270
Population, growth (2013)	3.8%
Population density (2013)	14.08 / km ²
Urban population (2013)	18.37%
Life expectancy at birth (2012)	58 years
Major Cities (2013)	Capital: Niamey (1.3 million) Other: Maradi, Tahoua, Zinder
Language	French (official), Hausa, Zarma, Tamasheq, Fulfulde, Kanuri, Tubu, Arabic, Gourmanchéma
Ethnic Groups (2001 census)	Haoussa 55.4%, DjermaSonrai 21%, Tuareg 9.3%, Peuhl 8.5%, Kanouri Manga 4.7%, other 1.2%
Religion	Muslim 80%, other (includes indigenous beliefs and Christian) 20%

Table 2: Geography and climate (CIA, 2014a)

Location	Western Africa, southeast of Algeria, landlocked country, northern four-fifths is dessert
Area	1,266,700 km ²
Neighbouring Countries	Algeria, Benin, Burkina Faso, Chad, Libya, Mali, Nigeria
Climate	desert; mostly hot, dry, dusty; tropical in extreme south
Terrain	predominately desert plains and sand dunes, flat to rolling plains in south, hills in north
Natural hazards	recurring droughts, floods and locust infestation

1.2 Government and Legislation

Table 3: Government system Niger (CIA, 2014a), (Transparency International, 2013)

Official name (local)	Republique du Niger
Conventional short form	Niger
Form of state	Republic
Administrative divisions	8 regions including 1 capital district: Agadez, Diffa, Dosso, Maradi, Niamey, Tahoua, Tillaberi, Zinder
Chief of state	President Issoufou Mahamadou (since 7 April 2011)
Head of Government	Prime Minister Brigi RAFINI (since 7 April 2011); appointed by the president
Parties as distributed in the Assembly of the Republic (votes by party)	PNDS-Tarrayya 33%, MNSD-Nassara 21%, MODEN/FA-Lumana 20%, ANDP-Zaman Lahiya 7.5%, RDP-Jama'a 6.5%, UDR-Tabbat 5.4%, CDS-Rahama 3.3%, UNI 1%
Independence	3 August 1960 (from France)
Corruption perception index ¹	34 (of 100), Ranks 106 (of 177 countries in total)

After its independence from France in 1960, Niger was led for the first 14 years by a single-party civilian regime under Diori Hamani. In April 1974 the military took over and Seyni Kountché ruled the country until his death in 1987. His replacement Ali Saibou made some political reforms and in 1989 he was elected as the president of the 2nd republic in Niger again in a single-party regime. This changed with the first multi-party regime after the election in December 1992. In the following years until 1999 Niger was affected by several military regimes and constitutional changes. The last military regime started in February 2010 to restore democracy and to install a good government. With a new constitution and free and fair elections Niger started 2011 in the 7th republic with Mahamadou Issoufou as the president. Elections in Niger take place every five years. (Wikipedia, 2014).

Currently, the executive part of the government consists of the current President Mahamadou Issoufou, the Prime Minister Brigi RAFINI and the 37-member cabinet. The legislative branch comprises the unicameral National Assembly of the Republic of 113 seats. With 33%, the strongest power is the PNDS-Tarrayya (CIA, 2014a).

With returning to free elections in 2011 Niger's democratic institutions have been stabilised significantly (Bertelsmann Stiftung, 2014). Nevertheless, the recent and still ongoing processes of political instability in neighbouring countries (Mali, Lybia, Chad, Nigeria) and the internal opposition from e.g. Tuareg do have strong impact on the security situation in Niger,

¹ The corruption perception index is developed by Transparency International. A value of 0 is counted as highly corrupt and 100 as very clean.

in particular for non-Africans. Thus, the German foreign ministry e.g. currently (February 2015) expressively warns against any travelling outside the capital Niamey.

1.3 Economy and Infrastructure

Table 4: Economic figures Niger (World Bank, 2014a), (CIA, 2014), (UNDP, 2014)

Overview			
World Bank Rating	Low income		
Human Development Index HDI (2013)	0.337 (Rank: 187/187)		
GINI Index	2011: 31.2		
Population living below poverty line (2007)	59.5%		
Currency	West African CFA franc (XOF)		
Economic Indicators	2011	2012	2013
GDP (in constant 2005 Billion US\$)	4.48	4.97	5.16
GDP per capita PPP (constant 2011 international \$)	829	884	883
GDP per capita growth (annual %)	-1.52	6.66	-0.05
Unemployment, total (% of total labour force) (modelled ILO estimate)	5.1	5.1	--
Unemployment, youth (% of total labour force aged 15-24) (ILO)	7.2	7.2	--
Ease-of-doing-business index (1: most business friendly)	--	174	176
Inflation, consumer prices (annual %)	2.94	0.46	2.3
Structure of Economy	2011	2012	2013
Agriculture, value added (as % of GDP)	38.23	38.17	--
Industry, value added (as % of GDP)	16.08	20.37	--
Services, etc. value added (as % of GDP)	45.46	41.46	--

The UNDR World Development Report ranks the Human Development in Niger as the lowest in the world, although the HDI increased annually by 5.4% during the last ten years (UNDP, 2013). The low human development is underlined by the percentage of the overall population who are living below the national poverty line (59.5%) and a high income inequality, indicated by the GINI index of 34 (World Bank, 2014).

The World Bank rates Niger a Low Income Country. In the last decade the GDP growth rate has been very inconstant. In 2012 it was at a high of 10.8%, following a negative growth of 0.9% in 2009 (World Bank, 2014).

The economy is mostly based on the service sector and the agriculture sector with contribution to the GDP of 41% and 38% respectively. The Industry only represents 20% of the country’s GDP. Agriculture mainly relies on subsistence crops and livestock. Niger has the largest uranium resources in the world and a large potential in the exploitation of mineral and fossil resources, including gold, oil and coal. In recent years, the economic development suffered from terrorist and kidnapping activities near its uranium mines (CIA, 2014a).

Almost half of the government budget is covered by international donor funds. Niger has benefited from debt relief programmes, which allowed to increase government spending on programmes for poverty reduction, health care and primary education (CIA, 2014a).

The recent inflation rate of 2.3% is quite low and the currency has a fixed peg to the Euro (World Bank, 2014).

Table 5: Infrastructure Niger (CIA, 2014a), (Internet World Stats, 2013)

Railways	none
Roads	18,949 km, of which 3,912 km paved
Airports (2013)	30 in total of which 10 have paved runways
Telephones (main lines in use) (2012)	100,500
Telephones - Mobile cellular (2012)	5.4 million
Internet users (2013)	300,000(1,7%)

In Niger there are only 300 km of waterways: the Niger, the only major river, is navigable to Gaya between September and March (CIA, 2014a).

“Niger has made significant progress in some areas of its infrastructure, including water and telecommunications. But the country still faces a number of important infrastructure challenges, the most pressing of which is probably in the water and sanitation sector, as 82% of Nigeriens still practice open defecation, the highest in the continent. Niger also faces significant challenges in the power sector, as only 8% of the population is electrified” (Dominguez-Torres & Foster, 2011). According to the figures from the recent SNV report the rate stays between 10 and 15%, with 230,000 electricity subscribers to NIGERELEC(SNV, Raach Solar, 2014, p. 22).

Niger possesses an inadequate telecommunications system, with small wires, radio telephone communications, and microwave radio relay links concentrated in the South western area of the country. However, there is a rapid growth in the mobile phone coverage (CIA, 2014a).

2 Energy and Renewable Energy

2.1 Overview

Table 6: Country Energy Overview (EIA, 2014), (REN21, 2014), (WHO, 2014), (World Bank, 2013)

	2001	2011
Energy use (TWh)	4.40	5.28
Energy production (TWh)	1.17	6.15
Net import of energy (% of Energy use)	73.40	-16.48
Electricity consumption (TWh)	0.37	0.88
Electricity production (TWh)	0.16	0.30
Electricity consumption per capita (kWh/person)	32.47	53.30
Total electricity capacity (MW)	145	134
Electric power transmission and distribution losses (% of output)	6.88	7.00
Access to electricity, total	7% (2000)	9% (2010)
Urban	n. a	45%
Rural	n. a.	1%
Electricity production by source (in % of the total electricity production)		
Hydro	0.0	0.0
Nuclear	0.0	0.0
Oil, gas and coal sources	100%	100%
Renewable Energy excl. Hydro	0.0	0.0
Share of population using solid fuels	94% (2012)	

The comparison of the energy use to the energy production of Niger shows that in 2001 only 27% of the overall energy used was from internal sources. In 2011 the energy import dependence could be shut down and even 16% was exported.

The electricity sector in Niger cannot produce enough to cover the demand, making it a net importer of electricity from Nigeria (almost 87%) (Ministere de L'Energie et du Petrole, 2014) Niger's electricity consumption is at a very low level and even significantly lower than the SSA average of 535 kWh in 2011 (one tenth). The electricity capacity of Niger stayed nearly constant over the last years at 140 MW thermal power only.

The energy losses in the transmission and distribution grids of 7% are a little bit lower than the SSA average and a first indicator for a more or less reliable grid - although data about shortcuts are missing. But only 45% of the urban households have access to electricity. This number falls to 1% in the rural areas. The share of population using biofuels lies at 94% (comparison: Rwanda: >95%; Zimbabwe: 71%).

2.2 Energy Policy

Table 7: Niger Energy Policy (Reegle, 2014), (IRENA, 2013)

Organisations responsible for energy policies	Ministry of Energy and Petroleum (MEP)
Energy regulator	The Autorité de Régulation Multisectorielle (ARM, Authority of Multisector-Based Regulation)
Government Agencies	The CNEDD (Conseil National de l'Environnement pour un Développement Durable – National Environmental Council for Sustainable Development) The CNES (Centre National de l'Énergie Solaire – National Centre of Solar Energy)
Energy policy publications	Stratégie Nationale sur les Énergies Renouvelables (SNER, National Renewable Energies Strategy) Stratégie Nationale d'Accès aux Services Energétiques Modernes (SNASEM, National Strategy for Access to Modern Energy Services) Stratégie Nationale des Energies Domestiques (SNED, National Strategy for Domestic Energies)
Targets to increase use of Renewable Energy	To increase the use of renewable energy in the national energy balance from less than 0.1% to 10% by 2020
Subsidies/Incentives for RE	Tax reductions

The main public authority for electricity is the Ministry of Energy and Petroleum (MEP) which is responsible for sector-based policy, defining the legislative and statutory framework for activities in the production, transport, import, export and distribution of energy (Reegle, 2014).

The Autorité de Régulation Multisectorielle (ARM, Authority of Multisector-Based Regulation) is the energy regulator of Niger and was established in 1999. Among the main responsibilities are the regulation of the sectors of energy, telecommunications, transport and water (Reegle, 2014).

In 2004 the new Electricity Code was adopted and the Société nigérienne d'électricité (NIGELEC), which held the monopoly before on generation, transmission and distribution of

electrical energy, had to accept the generation of energy by independent producers (Reegle, 2014).

The target of the National Renewable Energies Strategy is to increase the share of renewable energy sources from less than 0.1% in 2003 to 10% by 2020. Linked to this target, the government plans to promote the use of renewable energy supply systems, to reduce the impact on forest resources, to electrify the rural areas on basis of renewable energy and to strengthen the education, research and development related to renewable energy technologies (Reegle, 2014).

The National Strategy for Access to Modern Energy Services Niger aims to increase the percentage of the population with access to modern energies until 2015. It specifically aims to improve the access to modern fuels for cooking, the access to motive power for villages with 1,000–2,000 inhabitants and the access to electricity for rural and peri-urban populations, to reach a cover rate of 66% (Reegle, 2014).

The target of the National Strategy for Domestic Energies is a coherent framework for the sub-sector of domestic energies. The following four actions shall help to reach the goal:

- “Assuring the sustainable use of forest resources and better reforestation,
- Promoting alternative sources of energy (other than wood) and improving the efficiency of the appliances used,
- Strengthening the capacity of the main market actors for a better management of the sector,
- Setting up communication to inform and educate the actors on issues related to the production and use of domestic energies” (Reegle, 2014).

2.3 Renewable Energy

2.3.1 Potential and Projects

Solar: Niger is endowed with favourable solar radiation between 1,825 kWh/m² and 2,500 kWh/m² per year, while the average period of sunshine varies between seven and ten hours per day. The capacity of photovoltaic installations in Niger stood at 1,170 kWp in 2006. About 2,000 m² of absorbers are used for thermal energy (hot water). The use of solar for cooking and drying is very low, but Niger rates the 15th most viable country in the world for further uptake of the technology by Solar Cookers International (Reegle, 2014). The Association Professionnelle de l’Energie Solaire (APE-Solaire) comprises private companies and operators in Niger, with currently roughly 600 kWp installed (SNV, Raach Solar, 2014, p. 18).

Wind: In Niger there is no wind power plant connected to the grid. Because of an average wind speed of 5 m/s in the North and 2.5 m/s in the South of the country there is a moderate potential for wind power utilisation. For water pumping purposes, about 30 small-scale wind turbines are installed off the grid (Reegle, 2014).

Biomass: There is a substantial use of biomass in Niger with the vast majority coming from the use of fuel wood for heating, lighting and domestic tasks. The potential for biomass is 9.9 million hectares of forest and 59 Mt of animal and agricultural wastes. Biogas is only experimentally used with a potential of 1 million hectares. At the moment there are 10 small-scaled biogas digesters (primarily of the dome type) installed (Reegle, 2014).

Hydro: Niger does not have any hydro power plant connected to the grid. The potential is estimated at 270 MW of undeveloped hydro-electric, primarily from the Niger river and its potential damming. Current projects are the 125 MW Kandadji project, 200 km upstream from Niamey, the capital, as well as two smaller dams at Gambou (122 MW) and Dyodyonga (26 MW). Smaller hydro systems have the potential to produce nearly 8 GWh per year mainly in Sirba and Gouroubi Dargol (Reegle, 2014).

2.3.2 Market and Jobs

An analysis on renewable energy potential estimated the employment in the RE sector (solar thermal, wind and PV) at 1,600 full jobs (RECIPES, 2006).

The national platform to promote renewable is the National Association of Solar Professionals (APE-Solaire). To improve the renewable energy technologies market, a tax exempt status has been set for 1,240,000 solar lamps (SNV, 2014).

SNV has programmes that can help to create jobs in different areas. An example is the programme "Capture the sun: Electricity for everyone", that promotes a business model for solar multipurpose units, sold and maintained by local small enterprises directly linked to international companies (SNV, 2015). The Awango programme of the company TOTAL aims to offer economically viable energy solutions for low income communities. It commercializes a line of photovoltaic lamps and cell phone chargers (TOTAL, 2014).

The state-owned utility NIGELEC² "held a monopoly on the generation, transport and distribution of electrical energy until 2003. Under the terms of the new Electricity Code adopted in 2004, independent producers may establish operations in the country and generate power, but they are generally required to sell their surpluses to NIGELEC, which is responsible for transmitting and distributing the surplus to customers. Electricity tariffs are fixed by decree. SONICAR, which is treated as an independent producer, generates electricity in the north of Niger and sells it directly to the mining companies; it also sells some to NIGELEC for its distribution in the cities of Agadez, Arlit, Akokan and Tchirozérine. In the rest of the territory, power is generated and distributed exclusively by NIGELEC" (Reegle, 2014).

² Société nigérienne d'électricité

2.4 Conclusion: Barriers, Trends and Patterns

Electricity consumption in Niger is very low; generation is based entirely on conventional thermal production. Biomass is the main source of energy, especially fuel wood, and is used for heating, lighting and domestic appliances. The target of the government is to increase the energy consumption from renewable energy sources from less than 0.1% in 2003 to 10% by 2020.

In the electricity generating sector the only large-scale projects are the construction of hydro power plants with approximately 270 MW of generation capacity. One of the main barriers is the low potential of hydro power. However, Niger has favourable solar radiation. Tax exemption schemes shall encourage the roll-out of renewable energy.

One of the country's key challenges is the low electricity access rate. With the National Strategy for Access to Modern Energy Services Niger aims to increase the access rates in rural and peri-urban areas to 66% by 2015. "The Programme Régional Biomasse Énergie (PRBE) is implemented by the ECOWAS/UEMOA with the financial support of the Netherlands. This program joins the framework of the implemented PEC (Politique Énergétique Commune – Common Energy Policy) of the UEMOA, and contributes to the long-term management of biomass in a policy to fight poverty and promote environmental protection" (Reegle, 2014)

In summary, Niger has a high potential for the use of renewable energy, particularly for solar and biomass energy, and a low access rate to the grid. The target to reach the 10 per cent mark of renewable energy in the whole energy consumption is not very ambitious and might not be enough to encourage the development of the sector.

3 Education and Higher Education

3.1 Primary and Secondary Education

Education in Niger is free and compulsory for the first eight years, normally between the ages of seven and fifteen. Primary school lasts six years and is completed by a national exam for which the children receive the *Certificat D'Etudes Primaires Elementaires* (CEPE). The secondary school follows the French model of education and is split up into two parts. The first is the four year lasting lower general secondary cycle. The following upper secondary cycle lasts three additional years and on completion of this cycle and an examination, students are awarded the *de bachelier de l'enseignement du second degré*. As an alternative to the traditional upper secondary cycle there is also a technical secondary option, which is three years as well and students earn their *bachelier technicien* (technical degree) (U.S. University Directory, 2014).

Niger has a literacy rate of only 13.6%, one of the lowest values in West Africa. The enrolment ratio to primary education is limited by the fact that many areas do not have a school. However, there are activities by the UNESCO and France to alleviate this problem. One attempt is the installation of movable tent schools to serve the nomadic population in the north of the country. In addition, the language of instruction has been changed from French to a local language (U.S. University Directory, 2014).

The enrolment ratio for primary, secondary and tertiary education is shown in Table 8:

Table 8: Gross Enrolment Ratio in the primary, secondary and tertiary education sector (Unesco Institute for Statistics, 2014)

	Primary Education	Secondary Education	Tertiary Education
Gross Enrolment Ratio	71.1% (2012)	15.9% (2012)	1,8% (2012)

3.2 Higher Education

3.2.1 Shape of higher education

There are five public and two private universities in Niger. The oldest and largest higher education institution is the University Abdou Moumouni in Niamey. In 2013, 13,078 students were enrolled in this university. It offers degrees in several faculties, including the College of Agronomy, the College of Humanities, the College of Science and the Teachers College (Université Abdou Moumouni de Niamey, 2013).

The Islamic University of Niger in Say, was established in 1986. The university is funded by members of the Organisation of Islamic Cooperation. In 2010, three more public universities have been launched in Maradi, Zinder and Tahoua. All three universities have less than 5,000

students each and provide technology and science courses only. The first private university, the l'Université Canadienne du Niger was established in 2002 and the University of Maradi followed in 2004 (Racelma, 2012).

Other higher education institutions focus on teacher training for the primary schools (Ecole Normal) or on postsecondary vocational and technical studies (U.S. University Directory, 2014).

The existing state and privately-owned universities in Niger are listed in Table 9:

Table 9: Universities in Niger (Racelma, 2012)

Public universities	Privately-owned universities
Université Abdou Moumouni de Niamey	Université canadienne du Niger
Université Islamique de Say	Université libre de Maradi
Université de Zinder	
Université de Tahoua	
Université de Maradi	

3.2.2 Higher education policy

The administration body of the tertiary education sector is Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation (MESRI)³. The objectives for higher education include the provision of qualified graduates for government services and the private sector as well as to train graduates who can play a significant role in the development of science. (Ambassade de France au Niger, 2014)

In May 2011 Niger's cabinet decided to establish the Licence-Master-Doctorate (LMD) system as compulsory for higher education institutions, complying with a 2007 West African Economic and Monetary Union directive. The Abdou Moumouni University already adopted this system in October 2009. With this system, three different types of degrees are implemented: the licence (three-year bachelor), masters (two years) and PhD (three years). In addition, international quality standards for tertiary education have to be followed and the access to tertiary education shall be improved. The LMD system is being adopted in the region in order to align curricula and enhance international credibility of the studies (Racelma, 2012).

3.2.3 Funding of higher education

In 2011, 4.5% of national budget was allocated to education, thereof 11.8% for tertiary education which results in roughly 0.5% of the national budget (The Guardian, 2011).

³ Ministry of Higher Education, Research and Innovation

3.3 Renewable Energy Higher Education

With the National Renewable Energies Strategy Niger seeks to strengthen the education and training related to electrical energy.

Within the WASCAL project⁴ the Abdou Moumouni University has already established a Master's Programme on Climate Change and Energy, in close cooperation with universities from Western Africa: Benin, Burkina Faso, Cote d'Ivoire, The Gambia, Ghana, Mali, Nigeria, Senegal, and Togo. At the University of Maradi there are already courses for electricity in general and especially for renewable energy (University of Maradi, 2014).

In 2014 the government has approved to open four new universities, in Agadez (Northeast), Dosso (Southeast), Diffar (South) and Tillabéri (Northwest), each focussing on one important area for development. The one in Agadez is supposed to address fossil and renewable energy matters (University World News, 2014).

3.4 Conclusions and Recommendations

With the implementation of the LMD system the tertiary education sector is set to international standards. Therefore the government has to assure the quality of education. With this system a bachelor's degree now lasts three years instead of four or five years before.

The education quality is one of the main challenges which have to be faced. Another challenge is the rising of the very low tertiary education enrolment ratio with less than two per cent. Unfortunately, there is no data about the education status of the academic staff and the number of bachelor, master and doctoral degrees.

For courses in the field of electricity the University of Maradi offers some education for electricity in general and for renewable energy in particular. This is supported by the National Renewable Energies Strategy which aims to strengthen the education, research and development related to renewable energy technologies.

Within the WASCAL project the Université Abdou Moumouni de Niamey (UAM) offers a Master's Programme (4 semesters) on Energy and Climate Change Mitigation. Following the WASCAL approach the annual intake is limited to 10 students, one from each WASCAL country (Benin, Burkina Faso, Cote d'Ivoire, The Gambia, Ghana, Mali, Nigeria, Senegal, Togo and Niger). This is not matching with the demand for Renewable Energy experts for the region. Therefore, the UAM intends to develop an additional Master's Programme, focussing fully on Renewable Energy. It has the full support of the Ministry, the head of the university, and the staff within the department. It is planned to come as a regional programme, with specialisations in the neighbouring country, such as Senegal/Wind Energy, Burkina Faso/Solar Thermal Application etc. It should be taught in French, with a strong aspect in

⁴ https://icg4wascal.icg.kfa-juelich.de/?set_language=en

English. To support the Abdou Moumouni University's approach to establish a full-fledged Master in Renewable Energy with partners from the Western African region is a very good opportunity to foster the Renewable Energy Higher Education. Of course this has to be coordinated with the government's recent approach to invest in Agadez for research and education.

Niger is currently facing a rather severe challenge concerning its security situation. University co-operations with European university therefore are difficult with other universities outside Niamey.

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