

UNCSD Rio +20 Libya National Report Future We Want Focal Point on Renewable in Libya

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Abstract. The paper is designed to present Libyan UNCSD Focal point actions, activities and strategies in the field of the renewable energy in Libya. It is a concerted attempt that demonstrates how to try and spread and instill the culture within Libyan society of the idea of renewable energy. It uses best practices and lessons learnt to start this culture at an early stage via universities, Libya academies, high institutes and technical colleges in Libya and even schools. After presenting lessons learnt it highlights a way forward towards low carbon economy in Libya designed to encounter the dangers of global warming and encouraging the use of renewable sources of energy.

Keywords: Libyan UNCSD Rio+20 Focal Point, Renewable energy, lessons learnt

1. Introduction

Libya as a second biggest North African country accounts for an area of 1.76 sq km i.e. half the size of India. It is located between Algeria and Tunisia in the west and Egypt in the east, bordering the Mediterranean Sea in the north and (from west to east) Niger, Chad and the Sudan in the south. Almost all its land territory is land area apart from the access to the Mediterranean Sea (about 1,770 km of coastline). [1,2] This is a rich country in renewable energy resources. It has the potential to produce the equivalent to almost seven million barrels of crude oil per day in energy. It could generate enough renewable power to meet its own demand and a significant part of the world energy demand by exporting electricity. As per an estimate Libya has an average daily solar radiation rate of about 7.1 kilowatt hours per square meter per day (kWh/m²day) on a flat plane on the coast and 8.1kWh/m²day in the south region. The country uses only 0.1% of its estimated 88% desert territory for solar power.

Paper is designed to demonstrate that how UNCSD Rio+20 Focal point responsible for sustainable livelihood in Libya is devising a clear strategy to demonstrate that within a defined timetable Renewable energy technology has the potential by taking it forward. This is being planned by assisting the country in developing its manpower as human resources that are capable of installing and maintain renewable energy systems. Strategy considers untapped the country's dry, hot and prolonged gusts as of great potential for wind power. All it needs is to harness only a tiny fraction of the renewable energy resources it has available in the form of solar and wind power. Thus it would, not only meet its own demands for energy, but also a significant part of the world's demands by exporting electricity as a gateway to EU & Africa..

2. An Appraisal of Libya Its Economy and Energy Situation

94.5 of Libya is desert and semi desert. The country has virtually no accessible water resources on the earth's surface. Libyan climate ranges from Mediterranean along the coast line to extremely dry in the interior south. The barren, flat and undulating plains have barely 1.03 percent land as arable. Out of petroleum, natural gas and gypsum as most prominent natural resources, the first two are the main driving factor for the Libyan economy. Hydrocarbons contribute about 95% of export earning, 65% of the GDP and about 80% of government revenue[2]. It is also due to the fossil resources, that Libya has always enjoyed a fairly high international interest and relevance. Although 17, Feb 2011 revolution has impeded its economic

activities, it is still widely considered to be a land of a unique opportunity for entrepreneurial activity and thus economic growth.

Ethnic Arabs, arabized Berbers, Tuareg and Tubu population which forms around 97% of population follows Islam (Sunni Muslim approximately). The official national language is Arabic.

95% of Libyan export revenues is dominated by the oil sector (3). In addition to the petroleum and petrochemicals industry, country is also active in the aluminum, iron and steel and cement industry. In 2012, crude oil, refined petroleum products, natural gas and chemicals were exported to Italy (23.5%), Germany (12.5%), China (11.3%), France (9.7%), Spain (7.6%), UK (4.7%) and US (4.5%). Libya mainly imports machinery, semi-finished goods, food, transport equipment, consumer products. The main import trading partners in 2012 were China (13.7%), Turkey (12.3%), Italy (8.7%), Tunisia (7.3%), South Korea (6.2%), Greece (5.4%) and Germany (4.9%).(4,8,9)

As per estimates in 2011, Libya has produced about 30,962 ktoe of energy, which is about 360,088.19 GWh. Crude oil makes up almost 79% of energy production. Renewable energies have been neglected and has only risen to about 0.06%.(5,9) IEA, estimates during the year 2011 given in the Table.1 below shows total energy production.

Table 1.Total energy production (2011)

Energy source	in ktoe	in %
Coal and peat	0	
Crude oil	24,371	78.7
Oil products	0	
Natural gas	6,419	20.7
Nuclear	0	
Hydro	0	
Geothermal, solar, etc.	0	
Biofuels and waste	172	0.55
Electricity	0	
Heat	0	
Total¹	30,962	100.00

¹Due to rounding's, the percentages may not add up to a hundred.

2.1 An Overview of Electricity Demand and Supply & Consumption

The electricity generation has more than doubled from 2000 to 2010. The country as per 2010 estimates had a total electricity installed capacity of 6.8 GW, which is generated by power plants either fueled by oil or natural gas. World Bank estimates show that, 99.8% of the Libyan people have access to electricity, which is the highest rate among African countries.(6,7,8,9). Out of the total final consumption of 22,035 GWh in 2011, Commercial and Public Services accounted for 36% whilst the residential sector amounted to 24% and the Industry to 22%. Electricity consumption in Libya during 2011 was of the order of total 32.96 TWh meaning 3.73 MWh per capita.

The national electric grid consists of a high voltage network of about 12,000 km, a medium voltage network of about 12,500 km and 7,000 km of low voltage network. Some villages and remote areas which are located far away from these net-works cannot be connected to the grid due to economic reasons. Those locations with a small population and a small amount of energy demand, use diesel generators as a power supply, requiring regularly maintenance and supply of fuel.(10,13)

There is an operating grid interconnection to Egypt with a capacity of 240 MW which is 180 km long. Regarding to grid access of renewable energy projects, there is neither a priority access granted to RE by law nor has a grid code been developed yet. Additionally, a detailed map for potential RE site is missing.

Table 2 below sector specific energy consumption of Libya

Sector	Consumption GWh	in in %
Industry	4,864	22
Transport	0	0
Residential	5,365	24
Commercial and Public Services	7,915	36
Agriculture / Forestry	2,292	10
Fishing	0	0
Other Non-Specified	1,599	7
TFC	22,035	

3. UNCSO RIO+20 Led Methods for Estimation of Potential of Renewable in Libya

Libya is developing local Libyan resources to meet the anticipated future renewable energy needs in cooperation with global, regional & UN partners who are already engaged to review, amend, modify and add value to our renewable business plans. With the state of the art input from the world class partners (UNCSO Rio+20 Libya National Focal Point, US GESMI, WEF Switzerland, MITA Malta, UNDP ICT Practice area, UNIDO/NEPAD APCI, EU 2014 ERASMUS Plus, etc) Libya aims to develop the Renewable industry by matching the available resources to the upcoming projects. This is in line with the national economic development strategy in New Libya using Assessment Centre Approach for tapping underutilized and Critical Link in the Organizational Value Chain. Using reliable (i.e. consistent in measurement) and valid (i.e. measure what they purport to measure) the value added by Assessment Centers in development and selection practices are based on validated design, compared to conventional standardized psychometric measures. Against this background, Libyan Assessment Centre uses these sophisticated tools, especially in light of a hibernating global economy for rebuilding Libya. Libyan Assessment Centre methodology is designed so as to demonstrate the following:

- strong return on investment;
- precision and accuracy in measurement;
- integration of technology;
- support better talent management, selection, and development decisions;
- reduced cultural bias;
- clear linkage to key organizational outcome (i.e. higher performance, lower turnover, less absenteeism);
- justification of further investments in HR initiatives to senior management; and
- increasing the perceived value of HR to the organization

Thus the main purpose of Assessment Centers (ACs) in Libyan energy organizational environment is to help successfully and accurately measure job-related traits of individuals to help predict their future performance and assess their suitability for roles. Effective human resource strategies being employed includes: selection and development decisions; workforce capability; employee engagement; talent management and succession planning that would be built on the foundation of accurate and reliable

information. It uses proven expertise to help in providing rich layers of information for managerial decision-making. Human related diagnostic information is intended in all likelihood only result in valued organizational outcomes when assessment practices are clearly linked to long-term strategy.

Numerous methods employed by UNCSO Rio+20 Libya Focal point to estimate the potential of renewable in Libya shows that since energy prices are heavily subsidized in all economic sectors in Libya, it is difficult to estimate the potential of renewable and energy efficiency on a cost-effective basis. The present status is that Renewable are not utilized in significant amounts. Barely 5 MW solar energy is separated into several small PV projects, have been installed yet. Country fails to meet its international obligations requirements envisaged under various UN conventions on climate change.

3.1 Solar Power Potential

A general solar map developed using satellite data shows that Libya has a great potential for solar energy. However, it requires developing a detailed solar atlas.(11,13). Estimates in the coastal regions show that the daily average of solar radiation on a horizontal plane accounts to 7.1 kWh/m²/day. However, the radiation is 8.1 kWh/m²/day in the southern region. The average sun duration of more than 3,500 hours per year means it is equivalent to a layer of 25 cm of crude oil per year on the land surface.

The total installed capacity of solar energy which is barely 5 MW in 2012 is achieved from small **PV** projects since 1976. In the first instance solar system were used to supply a cathodic protection for the oil pipe line connecting the Dahra oil field with the Sedra Port. During 1980, first PV system was used in the communications sector to supply energy to the microwave repeater station near Zella. In all till 2006, 80 stations running by PV in the field of communications have been established.

As per estimates in 2005, the total installed photovoltaic peak power was around 420 kWp. In 2012, it exceeded to 950 kWp. At El-Agailat, a PV pumping system was installed at the beginning of the 1980s. Till 2006, 35 PV water pumping projects have been installed (~110 kWp). The total capacity of PV water pumping system was 120 kWp in 2012. The use of PV systems for rural electrification was only starting in 2003. By 2006, the total number of remote systems installed by General Electric Company of Libya (GECOL) was 340. It had a total capacity of 220 kWp. The Center of Solar Energy Studies (CSES) and the Saharan Center also installed 150 with a total power of 125 kWp. In 2012, the rural electrification PV systems have a capacity of 725 kWp. Currently, there are 3 PV projected in the pipeline: a 14 MW power station in Houn, a 40 MW project in Sabha, and a 15 MW power station in Ghat.

The estimates on technical potential in respect of **concentrated solar power (CSP)**, shows that country can generate around 140,000 TWh/year which is equivalent to 27,000 GW of capacity at 60% load factor.(14). Overview further shows that in 1983, 10 systems of **solar heaters** were installed. Till 2006, an additional 2000 had been deployed.

3.2 Biomass Potential

Estimate concerning Libya's potential of biomass shows that presently Biomass energy sources are small and can only be used on an individual level as an energy source. It is not suitable to produce energy.

3.3 Wind Power Potential

Although there is no detailed wind atlas yet, the general wind map based on satellite data shows that the wind potential is good. The average wind speed at a 40 meter height is between 6-7.5 m/s. The most attractive locations along the Libyan coast is at Dernah. It shows that the average wind speed is around 7.5 meters per second. In many desert oasis in south of country wind energy was used to pump water since 1940. However, since the wind-mills need to be maintained regularly, this way of producing energy has not been developed on a large scale.

4. Discussion of Some Salient Aspects of the Energy Sector in Libya

An in-depth overview of Libyan situation prepared and presented by UNCSO Rio+20 Focal point at numerous fora reveals that country had and is still is having a fairly one-sided economy that heavily relied (and still relies) on the occurrence of fossils. Due to inherent over dependence and ease of accessibility to

huge quantity of fossil energy sources, renewable energy sources were considered to be of secondary relevance. Thus the efforts for pursuit of a diversified and sustainable energy sector has been an still are limited during the old regime mentality that had strongly subsidized energy coming from domestic fossil sources. It developed and maintained hydrocarbon sector with little or no economic incentive to shift to a more sustainable energy mix.

Post-revolutionary establishment of a Ministry of Electricity and Renewable Energy is indeed a step towards right direction towards sustainable development of Libya. It is an encouraging step towards the integration of the subjects of renewable energy and energy efficiency into the national agenda. The good news is that the Renewable Energy Authority of Libya or REAOL soon after 17 Feb 2011 revolution has established a target of 10% renewable by 2025, which would account for a total capacity of 2219 MW. Intermediate targets are 389 MW by 2015, and 1069 MW by 2020.

Overview of Laws and Regulations shows that there is no legislation which covers the financial support for RE or which addresses the issue of financing additional costs of RE projects. In addition much in demand pressure for the need for a clear legislation for the participation of private capital in the power sector is missing.

There is an absence of policies for RE in Libya. There are no public competitive bidding for large-scale private RE projects. In addition, there is no obligation to conclude long-term power purchase agreements with RE producers. Sorry state is apparent from the fact that there are also not feed-in tariffs and no net-metering policy for small scale RE projects.

In respect of finance and investments, Libya does not have an RE fund for financing RE projects. Further review of present situation shows that the currently planned projects are planned to be financed through government budget. The power sector is still closed for private investors. There are no financial guarantees to private investors to ensure payment under power purchase agreements by the Libyan government. Internal tax privileges are not provided for RE projects. Libya needs a sea change. The Keys to Success are:

1. Accelerate technology transfer to Libya & neighboring Arab, MENA, Mediterranean, Euro-Med&African countries, through Libya (The Gateway to both EU & Africa)
2. Promote renewable culture within our region and establish related industries
3. Strengthen strategic partnership with first tier renewable technology providers.
4. Create successful business projects through technology investments.

Libya Government needs to follow good practices from a country like India that gives multiple benefits to renewable energy projects such as no need for industrial clearance, availability of loan, excise duty exemption, custom duty concession, financial support to renewable energy's R&D projects, income tax holiday, accelerated depreciation, preferential tariffs, interest and capital subsidies, energy buy-back and third party sale and trading. At the same time, the Libya Government must reduce the capital cost of renewable energy projects so that more and more companies can invest in the sector. To fulfill this aim, Government must adopt latest and suitable technologies in the sector and promote healthy competition. REAOL employees need to be leaders in their field capable of delivering valued organizational outcomes where assessment practices are clearly linked to long-term strategy.

5. Concluding Remarks: A Way Forward

Renewable energy is deemed as the future of energy. UNCSD Rio+20 Focal Point is working in that direction with its various policies think tanks and working groups. It welcomes **Renewable Energy Authority of Libya (REAoL)** endeavor to translate theory in to practice. It could be considered to bear the potential of a turn of the tides, if the ambitious goals that have been described by REAoL, are included in legal frameworks and official goals.

Based on UN good practices, the REAOL needs to adapt, adopt and develop Renewable Tech “Delivering as One initiative builds on efforts to increase coherence and effectiveness of client operations at country level. Learning from “One UN”, the aim of this initiative is to drive collaboration and create

efficiencies within the “UN family” and the NGOs they cooperate with. Collaboration is an important word in renewable circles because it is renewable that provides an important foundation for people to collaborate.

Through new systems and tools, advanced networks and streamlined processes, different agencies can work together in “One team” like never before. The realization of economies of scale is a major benefit of the project. The One UN approach allows agencies to access services that are too expensive to be obtained by individual entities on their own.

Finally, Libya need to grasp and cash offers from donors like German GIZ that has rightly and timely initiated a 1,000 Roofs Program, which seeks to install 1,000 PV roof-top systems with a total capacity of 3 MW. No wonder, these Installations that can be on-grid and off-grid have the potential to offer a basis to establish further support instruments, such as a feed-in tariffs.

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