



Regional Initiative for Promoting Small-scale Renewable Energy Applications in Rural Areas of the Arab Region (REGEND)

Assessment Report of Prevailing Situations in Rural Areas in Lebanon



Shared Prosperity Dignified Life



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Sverige

Economic and Social Commission for Western Asia

Regional Initiative for Promoting Small-scale Renewable Energy Applications in Rural Areas of the Arab region (REGEND)

Assessment Report of Prevailing Situations
in Rural Areas in Lebanon

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Preface

This baseline study report was developed by the Energy Section in the Climate Change and Natural Resource Sustainability Cluster (CCNRS) of the United Nations Economic and Social Commission for Western Asia (ESCWA) within the framework of the “Regional Initiative for Promoting Small-scale Renewable Energy Applications in Rural Areas of the Arab Region” (REGEND), implemented by ESCWA in partnership with the Swedish International Development Cooperation Agency (Sida).

The REGEND project focuses on three pilot countries, namely Lebanon, Jordan and Tunisia and includes baseline studies as preliminary assessment of prevailing situations in rural areas of each of the pilot countries to collect existing and relevant qualitative and quantitative information regarding energy and rural development needs, which will serve as a basis for the identification of the main key issues to be addressed, potentials and opportunities for safe and sustainable use of renewable energy, and possible strategies and interventions (information and awareness campaigns, training, research, projects, policies). The assessment study served to select the local communities where the project activities will be undertaken, especially pilot projects.

The present report covers the case study for Lebanon. It was prepared by Ms. Jessica Obeid, Sustainable Development Expert, with substantive contribution and under the supervision of Ms. Radia Sedaoui, Chief Energy Section, CCNRS, ESCWA. Substantive contribution was also provided by Mr. Jil Amine, Sustainable Development Officer, CCNRS, ESCWA.

Data sources

This report relies on data collected from a combination of data sources, data collected in the field, and data provided by key national stakeholders and the members of REGEND’s Local Facilitating Team: Ms. Nadine Saba, Board President and Program Director, Akkar Network for Development; Ms. Ilda Nahas, Executive Director, Lebanese Microfinance Association; Mr. Michel Issa El Khoury, Director of Abdeh Station, Lebanese Agricultural Research Institute; and Mr. Alain Chatry, North Area Manager, United Nations Development Programme (UNDP); as well as key stakeholders interviewed and the outcomes of a focus group discussion on the development of the study.

Executive Summary

The United Nations Economic and Social Commission for Western Asia (ESCWA) is implementing the Regional Initiative for Promoting Small-scale Renewable Energy Applications in Rural Areas of the Arab region (REGEND) in partnership with the Swedish International Development Cooperation Agency (Sida). The project aims to improve livelihoods and economic benefits in rural communities, particularly among marginalized groups, and promote social inclusion and gender equality. It seeks to satisfy energy needs and showcase the effectiveness of the bottom-up approach in achieving results by addressing energy poverty, water scarcity and vulnerability to climate change and other natural resources challenges. Pro-poor investments will be promoted using appropriate small-scale renewable energy technologies to facilitate productive activities and stimulate entrepreneurial development.

A baseline study was developed within the REGEND framework, and an assessment conducted to guide future REGEND activities in Lebanon. This covered socioeconomic and political dynamics, and environmental considerations linked to productive activities by sector; access to energy services and availability of supply sources; and associated technologies needed to support resilience in rural communities. The main findings and recommendations are as follows:

- Significant improvement in the Human Development Index (HDI) with its related social indicators, but not within economic indicators. Poverty and unemployment remain high and stagnant, with deterioration in air quality and the environment. Overall, socioeconomic issues are persistent, indicating structural challenges;
- Despite Gross Domestic Product (GDP) growth, these challenges have an impact on the labour market and prohibit job creation, resulting in high unemployment and informal labour;
- The economy is dependent on foreign aid. The business investment climate is weak and efforts to address structural issues are lacking;
- Future infrastructure investment plans are expected to accentuate large regional disparities, which should be addressed to enhance the economy and decrease inequality in living conditions;
- Across the governorates, the North and Akkar still have the poorest populations and lowest socioeconomic indicators. Disparities also exist between villages and towns within the same governorate. Data is unavailable but interviews confirm that mountain areas have low development indicators, with fewer interventions, especially villages in the North;
- A few strong cooperatives have grown and maintained sustainability, especially in agriculture, and in villages where the municipality has been inconsistent or incapable, and where the Government has failed;
- Productive activities suffer from poor Government support, fragmented sectors, lack of technological improvements, and high production and operating costs;
- The proliferation of unplanned and uncoordinated interventions in rural

areas following the Syrian crisis, seeking rapid response and impact, has hindered adequate development;

- Growth of micro-, small- and medium-sized enterprises (MSMEs) across productive sectors is necessary to drive the economy. Incentives should be provided, focused on decreasing operating and production costs and creating an enabling environment for all businesses, across all regions;
- In rural areas, enhancing MSMEs across agriculture and other productive activity value chains would improve socioeconomic conditions by creating jobs for the most vulnerable;
- It is less difficult to secure seed funding for early-stage entrepreneurs than it is to upscale a business. Growing a business is rarely accounted for at the start-up stage;
- Entrepreneurship in rural areas is need-based and more common among men than women;
- There is a lack of management expertise and skills for selling products and growing market share, such as marketing and branding, especially among women;
- Most activities by women in productive sectors are in-house and informal;
- Equipping women with the necessary business skills improves their decision-making, enabling them to assume greater roles and responsibilities;
- The unreliable electricity supply is a common barrier for improvement in productive sectors;
- Renewable energy presents an opportunity

to rectify the uneven distribution of electricity. It can achieve reliable and cheaper access to energy, decrease operating and production costs, improve air quality and the environment overall, and create job opportunities across the value chain;

- Savings on operating costs incurred when implementing a renewable energy system can be channelled into efforts to increase visibility through marketing and exhibitions, leading to a better market share and business growth;
- Renewable energy mitigates climate change, the impact of which is estimated to be costly for the economy, directly and negatively affecting the agriculture sector;
- Decentralized renewable energy increases energy security in rural areas – typically the first to be impacted in a conflict or crisis scenario – and improves social cohesion.

The second part of the study focuses on the process to recommend a pilot rural community/communities where most of REGEND's activities will be conducted. Communities were selected for assessment, to collect qualitative and quantitative information regarding energy and rural development needs. Stakeholders were then interviewed and site visits conducted to distinguish key issues and the potential and opportunities for safe and sustainable use of renewable energy as a catalyst for rural development. Prospective strategies and interventions (information and awareness campaigns, training, capacity-building, research, projects and policies) were identified.

The rural communities selected were Akkar El Atika and Chaqdouf, both in Akkar Governorate.

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Abbreviations and Explanatory Notes

CAS	Central Administration of Statistics	LCRP	Lebanon Crisis Response Plan
CSO	civil society organization	MW	megawatt
DESA	Department of Economic and Social Affairs	MWh	megawatt hour
EDL	Électricité du Liban	MWp	megawatt peak
ESCWA	Economic and Social Commission for Western Asia	MSMEs	micro-, small- and medium-sized enterprises
FAO	Food and Agriculture Organization of the United Nations	NGO	non-governmental organization
GDP	gross domestic product	OCHA	Office for the Coordination of Humanitarian Affairs
GEF	Global Environment Facility	PV	photovoltaic
GII	Gender Inequality Index	SWOT	strengths, weaknesses, opportunities and threats
GHG	greenhouse gas	REGEND	Regional Initiative to Promote Small-Scale Renewable Energy Applications in Rural Area in the Arab Region
HDI	Human Development Index	UNDP	United Nations Development Programme
IFAD	International Fund for Agricultural Development	UNHCR	United Nations High Commissioner for Refugees
ILO	International Labour Organization	USAID	United States Agency for International Development
kVA	kilo-watt ampere		
KW	Kilowatt		
kWh	kilowatt-hour		
kWp	kilowatt-peak		
LBP	Lebanese pound		
LCEC	Lebanese Center for Energy Conservation		

Introduction

The United Nations Economic and Social Commission for Western Asia (ESCWA) is implementing the Regional Initiative for Promoting Small-scale Renewable Energy Applications in Rural Areas of the Arab region (REGEND) in partnership with the Swedish International Development Cooperation Agency (Sida). The project aims to improve livelihoods and economic benefits in Arab rural communities, particularly among marginalized groups, and to promote social inclusion and gender equality. It seeks to satisfy energy needs and showcase the effectiveness of the bottom-up approach in achieving results by addressing energy poverty, water scarcity and vulnerability to climate change and other natural resources challenges. Pro-poor investments will be promoted using appropriate small-scale renewable energy technologies to facilitate productive activities and develop entrepreneurial opportunities¹.

A baseline study was developed within the REGEND framework, and an assessment conducted to guide REGEND's future activities in Lebanon. This covered socioeconomic and political dynamics, and environmental considerations linked to productive activities by sector; access to energy services requirements and the availability of supply sources; and associated technologies required to support resilience in rural communities. Data were collected on current and potential productive activities in the selected rural areas by sector (for example, agricultural, agri-food, animal husbandry products, tourism, small industries, water resource management, food security and environment) and on identified energy service needs (present, and potential future evolutions and desirable levels of access) as well as existing sources of supply and technologies (costs, affordability and reliability, among others).

Methodology

The assessment has benefited from primary and secondary data, and included meetings with key informants, stakeholders and focus groups. For site selection, socioeconomic indicators were assessed on national and regional levels, including a PESTE analysis that took into account political, economic, social, technological and environmental aspects. Agricultural areas were mapped, including livestock, water resources, handicrafts and ecotourism projects, in addition to security concerns, to shortlist a group of villages. A strengths, weaknesses, opportunities and threats (SWOT) analysis was conducted for each visited community, followed by a focus group meeting where the successful community was selected.

The potential for women's economic activity and the involvement of civil society

organizations (CSOs) and international agencies within villages presented a further layer of assessment, along with the pro-activeness and capacity of cooperatives, and the vulnerability scoring under the Lebanon Crisis Response Plan (LCRP), which assisted in narrowing down the shortlist to six villages, subject to a detailed site assessment.

A major challenge was the lack of reliable national data, and limited data on the rural regional level, with no further segregation. When available, data were found to be inconsistent, with wide discrepancies across publications. The data used in the report are from publications following the most credible methodologies and sampling in the case of surveys.



1. Baseline Study

A. Country overview

1. National competitiveness

Compared with the Middle East average, Lebanon ranks significantly lower for the strength of its institutions, infrastructure and macroeconomic environment, and lower for market size and innovation. The country meets the regional average in terms of financial markets, and sits slightly higher in health, primary and higher education, good market and labour market efficiency, technology readiness and business sophistication.

Lebanon should boost efforts to promote innovation, build its infrastructure and improve the overall economy and business environment.

2. General socioeconomic development

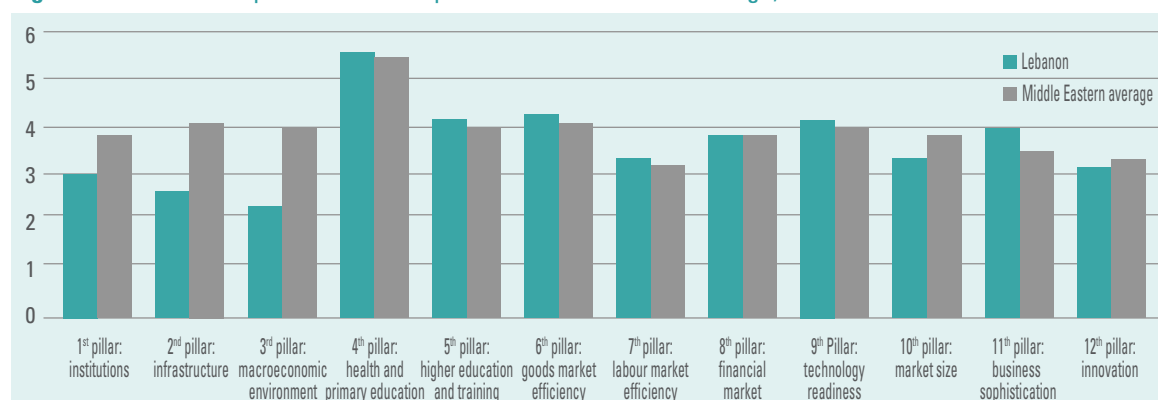
Administratively, the country is divided into eight governorates, as per the 2004 amendments to Decree no. 116 of 1959

that had divided the country into six governorates. A ninth governorate was announced in 2017. The eight are Akkar, North, Baalbek-Hermel, Beirut, Bekaa, Mount Lebanon, Nabatieh and South. The governorates are divided into districts with the exception of Akkar and Beirut, which have one district each, divided into municipalities. The rate of economic activity in 2009 was 48 per cent, based on the population aged 15 and above (Yaacoub and Badre, 2011, p.4). The bulk of this activity is located in Beirut and Mount Lebanon, where approximately half the population resides (Presidency of the Council of Ministers, 2012, p.15).

(a) Gross domestic product

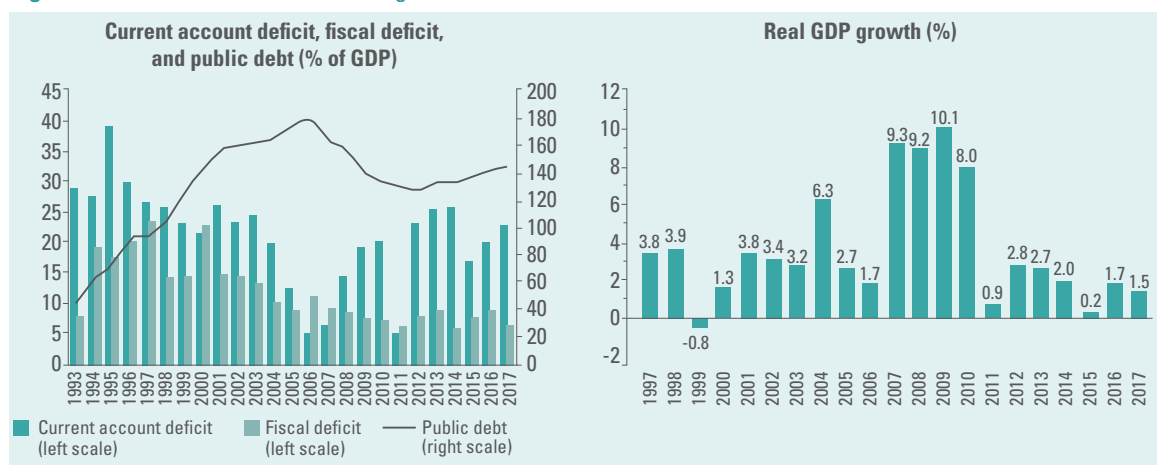
In 2018, the gross domestic product GDP reached \$56.7 billion, up from the previous year's \$54.2 billion. But public debt is high and the credit rating is negative. The debt-to-GDP ratio reached 152 per cent (equivalent to \$86 billion) by the end of 2018, the highest in the past decade and the third largest globally, with

Figure 1 National competitiveness compared with Middle East average, 2018



Source: World Economic Forum, 2018.

Note: The Global Competitiveness Index measures all indicators on a 1-7 scale; with 1 being the lowest performance and 7 the highest. The score is informative for policymakers as a guide to action on the progress of key economic indicators.

Figure 2 Lebanon's deficit and GDP growth

Source: World Bank, 2018, p. 7.

a fiscal deficit ranging from 6 to 8 per cent, increasing the risk profile (World Bank, 2018, p. 5) and threatening economic and fiscal crisis unless there is urgent reform. The informal economy contributes 30 per cent to GDP and employs 40 per cent of the workforce in jobs with low salaries and lack of benefits (Ministry of Agriculture, FAO and REACH, 2015, p. 13).

Real GDP growth is volatile and has drastically decreased in the past decade, falling to a record low (after the 1999 crash of -0.8 per cent) of 0.2 per cent in 2015. It recovered slightly in 2016, and was reported at 1.5 per cent in 2017 (World Bank, 2018, p. 7).

Although growth has slightly improved, it has remained insufficient to improve income and employment rates. In fact, the negative outlook threatens further economic deterioration.

(b) Inflation rate and Consumer Price Index

The inflation rate rose to 6.5 per cent in May 2018, the highest in a five-year period, but fell to 3.15 per cent in February 2019, a 19-month low (Trading Economics, 2019a). By the end of 2018, the Central Administration of Statistics (CAS) reported an average inflation rate of 6.2 per

cent (National News Agency, 2018), driven by increasing oil prices and public sector salaries. In January 2019, the Consumer Price Index was recorded at 107.23, a decrease of 0.73 per cent on the previous month, but an increase of 3.17 per cent compared with the same month in 2018 (CAS, 2019).

Beirut recorded a 0.78 per cent decrease, and Mount Lebanon 0.61, compared with -0.70 in the North, -0.69 in Nabatieh, and -0.33 in the South. The lowest figure was recorded in Bekaa, with a reduction of 1.76 per cent (CAS, 2019).

(c) Micro-, small- and medium-sized enterprises

Micro-, small- and medium-sized enterprises (MSMEs) should be an enabler of economic growth and employment opportunities. In Lebanon they constitute 93-95 per cent of all companies (Ministry of Economy and Trade and UNDP, 2014, p. 12), highlighting how problematic it can be for them to grow and be competitive at the national, regional and international levels.

These challenges are rooted in the structure of an economy that provides limited growth opportunities, requires high upfront capital and registration costs, and incurs high taxes and

heavy operational costs, hindering the sustainability of companies and their long-term survival.

The registration process is lengthy and costly, and, along with the tax burden, leads many MSMEs to opt to remain informal, especially in rural areas, thus eliminating the potential to tap into funds and upscale.

While Lebanon's entrepreneurship is praised – and on the national level estimated to be opportunity-oriented – on the small scale, and especially in rural areas, it is mostly necessity-driven and aimed at generating income for the mostly deprived households.

(d) Poverty

In Lebanon there is a substantial lack of published data on poverty (UNDP, 2018). When available, it is more than a decade old and inconsistent across publications. The poor population is dominated by unemployment and unskilled work, mainly in the construction and agriculture sectors (UNDP, 2008, p. 14).

The United Nations Development Programme (UNDP) reported that the cost of halving extreme poverty would be minimal compared with Lebanon's external debt, yet, if not properly addressed, such costs would significantly increase (UNDP, 2008, p. 14).

A decade on, the situation has not improved, especially with the Syrian crisis, and the fiscal and economic crisis limiting employment opportunities and draining savings, particularly of the country's most vulnerable populations. A 2016 report by UNDP finds that 30 per cent of the Lebanese population, or 1.5 million people, live on less than \$4 per day (Fadel, 2019). Of these, 300,000 are classified as extremely poor, living on less than \$2 per day (Chadi, 2018), and unable to cater for basic needs, such as proper nutrition. More than 20 per cent of the extreme poor were in the agriculture sector, the highest level compared with other sectors (World Bank, 2013, p. 48).

An impact assessment of the Syrian crisis found it would increase poverty and deteriorate human capital, and estimated that by the end of 2014 it may have pushed 170,000 Lebanese into poverty and 220,000-324,000 mostly unskilled young people into unemployment (World Bank, 2013, p. 2). This was despite regular assistance for the most vulnerable in the form of small direct cash transfers covering basic goods and services.

3. Demographic indicators

The population of Lebanon was 6,074,874 in March 2019, according to United Nations estimates (World Population Review, 2019), which has increased at a rate of 28 per cent in less than five years (OCHA, 2019) due to the influx of Syrian refugees. With a country area of 10,452 km², the population density currently stands at about 582 people per km², up from 419 before the Syrian crisis, and putting Lebanon at 19 in the world rankings. The country also has the highest global concentration of refugees. The capital Beirut is the most populated city in the country, with 1,916,100 residents. The 20 most populated cities, with the exception of Baalbek (in the tenth place), are located along the coast. The female share of the population is 49.7 per cent (World Bank, 2017).

The country has witnessed rapid urbanization, the urban population increasing from 60 per cent in 1970 to 85 per cent in 1996. It was estimated at 88 per cent in 2017 (Statista, 2017).

Emigration rates are high, and peaked during the civil war between 1975 and 1990. Low economic growth and high unemployment in recent times have led to elevated rates of emigration, especially among young people seeking higher educational levels, and better employment opportunities and living standards. There is a large brain drain in Lebanon, and an ageing population.

Total life expectancy is estimated at 77.8 years (World Population Review, 2019).

4. National economic and financial environment

Unaddressed, structural economic issues

The economy has been historically liberal. Key employment sectors are services, banking, insurance and trade. Lebanon's strategic geographical location and its services-orientation have driven it towards commerce and trade. It also benefits from highly-educated and skilled labour.

Yet, the economy has major structural issues that restrain growth, including a high reliance on aid and remittances:

- a. Large monetary inflows that increase the cost of non-tradable goods and services, decreasing export capacity and leading to a continuous trade deficit and increased real exchange rates (Lebanese Center for Policy Studies, 2000, p.2);
- b. Large share of low-skilled employment in the public sector;
- c. Lack of sustainable and equal development across regions, with no defined strategy to drive growth in underdeveloped areas;
- d. Low reforms and ability to create jobs.

Volatility in growth has been a consequence of these, and of domestic and regional politics and conflicts (World Bank, 2018, p. 8), and has characterized the national economy.

The economy is further aggravated by high operational costs, driven by the elevated cost of energy, and the overall costs associated with an interrupted electricity supply, known as the value of lost load. This is estimated at an average of \$700 for each megawatt-hour (MWh) not supplied (Ministry of Energy and Water, 2010), amounting to approximately \$23.23 billion for the period 2009-2014 (Bouri and Al Assad, 2016).

The Syrian crisis has delivered a further hit. According to the LCRP – stating World Bank preliminary findings on the economic and social effect of the conflict² – by the end of 2015 the impact on Lebanon's economy was estimated at \$18.15 billion, driven by the loss in trade from closure of trade routes, pressure on public services and infrastructure, and overall economic slowdown.

Despite the economic issues, relative financial stability has been maintained through policies led by the central bank, Banque Du Liban (BDL), to safeguard the local currency – the Lebanese pound (LBP) has been pegged to the dollar since 1997 – but which have, over time, increased the financial sector's vulnerability.

Amid the challenges faced by all sectors, banking has been fairly protected. The sector remains the most robust although it is currently facing pressure due to decreasing liquidity in the market. The lack of liquidity and the growing debt, have increased the risk and cost of keeping the currency pegged, but with the heavy reliance on imported goods, devaluation would weaken the purchasing power of the majority of people.

5. Risks and challenges facing the national economy

High dependence on aid and politics, and low competitiveness

The economy is highly dependent on unsustainable foreign aid and international support, which is reflected in the large size of the loans compared with the country's size. Overall, the business investment climate is weak, reflected in the inability to attract direct foreign investment.

Reliance on foreign aid means Lebanon is dependent on the economic situation and political agenda of donor countries. As an oil-importing country, any price decrease is positive for the economy. It reduces the cost of oil imports and the cost of electricity subsidies for fossil fuel-dependent power generation.

It also reduces the energy cost for consumers, thereby increasing their purchasing power. But it also means Gulf countries, historically supporters of the Lebanese economy, contributing less in foreign aid, and expatriates working in the Gulf sending fewer remittances home. Moreover, aid has typically been tied to conditions, often political, which has made Lebanon a proxy to opposing players, setting the scene for power struggles.

Thus, economic dependence on foreign countries has also made Lebanon politically dependent on them; the entirety of its productivity sectors depends on political stance and regional turmoil. Tourism, for instance, is halted by neighbouring conflict. The agriculture sector, mostly exporting to Arab and neighbouring countries because of the low ability to meet international standards and rules of origin, is deeply impacted by disruption to trade routes caused by conflict. Businesses in general lack competitiveness due to several factors, including high operational costs and a lack of growth incentives.

Attempts to address these economic woes have barely touched the surface, and the Government has resorted to random, unstructured tax increases and reductions in social benefits while safeguarding banking, the country's biggest sector. This has widened the gap between the rich and poor, decreasing the share of the population classified as middle-income.

The inability to tackle structural challenges in the economy has served as a threat multiplier, exacerbating the impact of the worsening situation with severe consequences for citizens, especially the most vulnerable. Government culture should change; from one seeking profit from local MSMEs and businesses, to one that accepts their growth is necessary to grow the economy. Incentives should be provided. The focus should be on decreasing operating costs and creating an enabling environment for all businesses, throughout all regions.

6. Social indicators

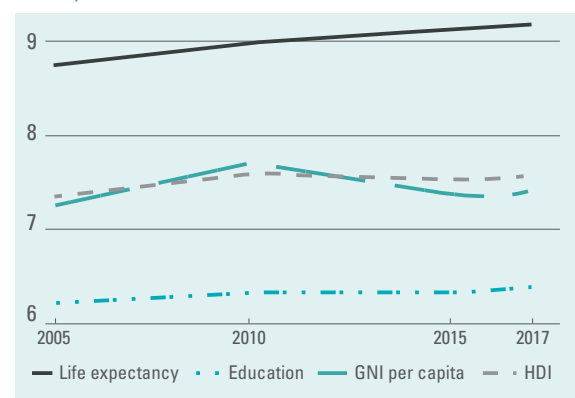
A livelihood assessment of Lebanese host communities in 2015 found that men were the head of the household in 86 per cent of those surveyed (Ministry of Agriculture, FAO and REACH, 2015, p. 3).³ Half of the heads of the surveyed households had received primary education, 13 per cent a secondary education and 10 per cent had obtained a university degree.

(a) Human Development Index

According to UNDP's 2017 Human Development Index (HDI) values, Lebanon scores 0.757, up from the 2005 value of 0.732. This is considered a high human development indicator, placing Lebanon at 80 of the 189 assessed countries and territories. For comparison purposes, Jordan and Tunisia share an HDI value of 0.735, and are ranked at 95. The average value for Arab countries is 0.699.

The increase in Lebanon's HDI value in the past decade is attributed to improved life expectancy at birth, which has increased by 9.5 years, the 1.2 increase in the mean years of schooling, and the 0.8 increase in years at school.

Figure 3 Trends in Lebanon's Human Development Index, 2005-2017



Source: UNDP, 2018.

The HDI also measures the Gender Inequality Index (GII) that estimates the loss in human development due to inequalities. It assesses gender-based inequalities in the three areas of reproductive health, empowerment and economic activity. Lebanon's GII value is 0.381, ranking it at 85 out of 160 countries. Jordan's value is 0.460, ranking it at 108, while Tunisia has a value of 0.298, ranking it at 63. Lebanon should, therefore, make significant improvements.

(b) Education

Enrolment in primary education was estimated at a constant of more than 90 per cent in the period 2006-2016 (World Bank, 2013, p. 76). Enrolment in public schools amounted to only 30 per cent of total enrolled students, with a predominance of children from low-income households. More privileged children attend private schools, which provide better educational quality and higher academic outcomes, though at a significantly higher cost. Private schools are dominantly located in urban areas, with high density in Beirut and Mount Lebanon.

The enrolment rate in primary education was 72 per cent and the transition rate to secondary education 96 per cent, according to CAS data in 2009 (Kawar and Tzannatos, 2013, p.6).

Gender parity is reached at the primary educational level but is higher for girls at secondary level, with a gender index of 1.1. This is due mainly to boys dropping out to join the workforce, especially in less developed areas.

Sixty-five per cent of workers have attained secondary education or less, and it is estimated that these jobs can be easily lost to low-skilled migrants accepting lower incomes (Robalino and Sayed, 2012, p. 3).

(c) Environment

Lebanon's 2016 Environmental Performance Index stands at 69.14, ranking it at 94 out of 180 countries, and nine out of 19 assessed countries in the Middle East and North Africa (MENA) region (Ministry of Environment, 2016). While

doing better than several others regionally, the country has to significantly improve the quality of its environment.

Since 2016, the environment is estimated to have further deteriorated, following a prolonged waste management crisis. Solid waste has been left on the streets, and periodically incinerated in the vicinity of populated neighbourhoods.

Deteriorating air quality is exacerbated by the electricity sector's chronic inefficiencies, mainly emissions from thermal power plants using heavy fuel and diesel oil, the spread of power barges along the coastline, and a proliferation of private diesel generators across populated neighbourhoods. In addition, transport sector emissions are relatively high due to the lack of public transport, among other factors.

7. Job market and unemployment

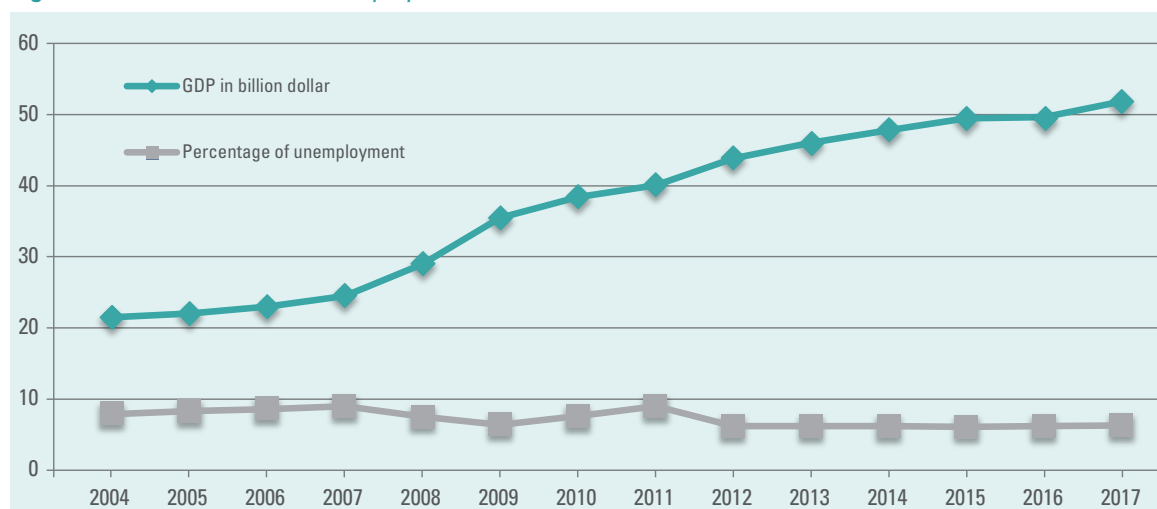
The labour market is characterized by structural issues that at times prohibit job creation, despite the increase in GDP. The result is high unemployment and informal labour.

Unemployment was estimated at 15-25 per cent in 2017 (Ministry of Economy and Trade, 2019, p. 51), with most new jobs in activities with low productivity. Employment growth was insignificant in productive activities such as agriculture and industry (World Bank, 2018, p. 9). The Syrian refugee crisis has negatively impacted the labour market, creating increased competition for jobs with Lebanese host communities, especially in rural areas.

Prior to the refugee crisis, GDP growth did not necessarily lead to more jobs, evidence of the structural issues beyond economic growth.

Figure 4 maps the trends in GDP and the unemployment rate over the period 2004-2017 when GDP was growing steadily, especially 2009-2012, despite which unemployment was rising.

A literature review shows the same structural issues repeated over time, which highlights the lack of clear national policy to improve the

Figure 4 Trends in GDP and unemployment rate

Source: Trading Economics, 2019b; Trading Economics, 2019c.

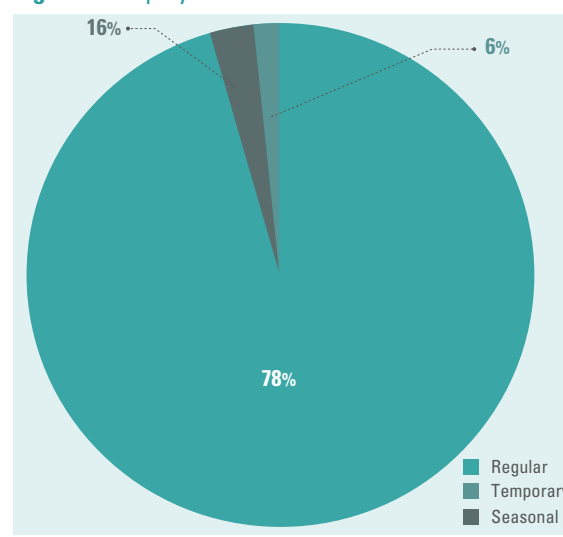
situation through optimizing public spending, enhancing the business environment, and promoting capacity-building to reduce the mismatch between education and job requirements.

Labour trends reveal a significant delay in the transition between school and first job. The average unemployment period for the first-time job seekers with no university enrolment is 16 months, and for those with university degrees it is 10 months (Robalino and Sayed, 2012, p. 18). For workers aged approximately 45 who become unemployed at mid-career level, the period increases to about one year.

The economic activity rate is estimated at 48 per cent (The Global Economy, 2018; Yaacoub and Badre, 2011, p.4), which is the share of the population aged 15 and above participating in the labour market.

There is no consensus on the unemployment rate, which is documented from 15-25 per cent up to 40 per cent. The highest rate is for people younger than 35 years, which amounts to 34 per cent, while the rate for women is 18 per cent, and for overall workers holding a university degree 14 per cent (Robalino and Sayed, 2012, p. 2).

There is an excess of low-skilled labour in the market, which, coupled with a mismatch of labour availability and market needs, leads to increased competition, higher unemployment rates and lower wages. With the pressure on the economy and low growth, this may result in a lower share of regular employment and increase seasonal and temporary employment rates, unemployment levels and duration periods (figure 5).

Figure 5 Employment trends at the national level

Source: Ministry of Agriculture, FAO and REACH, 2015, p. 16.



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B. Prevailing conditions in rural areas

1. Defining the rural context in Lebanon

There is no consensus on the definition of a rural context, which is reflected in publications on rural development and related matters in Lebanon.⁴ The majority refer to rural areas without referencing a methodology for defining the rural context, or they rely on a broad definition that does not result in a clear classification or understanding of rural locations.

In general, academics revert to a range of narratives to describe rural, such as the region in the country, population size, socioeconomic factors and the distance from urbanized areas. For the purpose of this study, the author found only a small share of publications defined rural, and wide differences in how the rural context is identified. There is not a correct definition, as the multiple factors do not fit one specific category (Hawley and others, 2016).

For consistency in publications and statistics, a national definition of rural areas should be adopted. The United Nations Population

Division defines urban as “de facto population living in areas classified as urban as per the criteria of each area or country”, and rural as “de facto population living in areas classified as rural” (DESA, 2018a). However, in its 2018 paper on world urbanization, it notes that demarcation is not a simple process, and that defining criteria vary between countries, and between data sources within the same country (DESA, 2018b, p.2).

The report analysed 233 cases (countries or areas) to derive their classification criteria, found to be as follows:

- a. 108 cases use population size or density;
- b. 59 cases use administrative criteria;
- c. 37 cases use demographic characteristics;
- d. 38 cases use economic indicators as part of the criteria.

According to the Organization for Economic Cooperation and Development’s 1994 classification, a rural area has a population density lower than 150 people per km² (with China and Japan the exceptions), and regions are segregated into three types, as follows:

- a. Predominantly rural regions – more than 50 per cent of the population live in a “rural community”;
- b. Intermediate regions – 15-50 per cent of the population live in a “rural community”;
- c. Predominantly urban regions – less than 15 per cent of the population live in a “rural community”.

Lebanon has no census or official classification of rural context, though many initiatives and researchers have attempted to define rural areas. NASA Earth’s rural-urban mapping project differentiates the urban versus rural areas based on population density, and areas comprising at least 251 residents per km².

Yet, in less than five years, the population had increased at a rate of 28 per cent due to the influx of refugees from the Syrian Arab Republic (OCHA, 2019). In March 2019, it was estimated at 6,074,874 (World Population Review, 2019), significantly increasing population density.

Defining urban areas based on population size and density may be misleading and lead to inaccurate research results, especially when a project considers a multitude of factors and data are not accurate or recent, as in the case of Lebanon. The United Nations Department of Economic and Social Affairs (DESA) paper on urbanization notes 1990 as the most recent data for Lebanon’s urban versus rural population, while the other countries cite data from 2005 or after.

The Economic and Social Fund for Development at the Presidency of the Council of Ministers, however, reports that non-urban areas constituted 50 per cent of the population in 1960, decreasing to 30 per cent in 1980, and 20 per cent in the 2000s (Economic and Social Fund for Development, 2000, p. 42).

Lebanon’s Rural tourism strategy states that “rural” is directly linked to rural areas, countryside and agriculture (Ministry of Tourism, 2015, p.10). Historically, agriculture was considered the main income-generating source

for rural families (Anriquez, and Stamoulis, 2007), and there was an overlap between agricultural and rural areas. This has changed over time as there is an increasing number of jobs in rural areas in non-agriculture sectors, and many farmers are no longer rural (Bollman, 2007, p. 6).

Identification of rural-urban areas should take a multidimensional approach that accounts for economic activities, including the agriculture sector (which remains an important indicator for rural contexts even if not the sole one), geographic factors, population size and density (Pizzoli, 2007, p. 2).

A paper published by Statistics Canada states that rural is “distance and density” (Bollman, 2007, p. 6), suggesting that low population density and long distances to access services and markets are indicators of a rural context. Lebanon report on poverty (Economic and Social Fund for Development, 2000, p. 77), however, finds that measuring accessibility is more relevant than distance.

Several academics suggest relying on socioeconomic indicators, such as infrastructure or human resources, which can be identified through education level, estimated to be low in the rural context (Pizzoli, 2007, p. 3). Others propose using land cover, topography and other natural characteristics, on the basis that rural areas are formed of forests, and agricultural and natural lands, some of which – mountains or areas with extreme climate – hinder activity (Pizzoli, 2007, p. 3).

Lebanon’s rural context is atypical when typical indicators are factored, such as population, demographics, socioeconomics, activities and environment. Many rural areas seem to be semi-urban but retain rural aspects (Ministry of Tourism, 2015, p.10). Moreover, data segregated by area are not commonly available.

Assessing vulnerabilities may assist in identifying the rural context. The classification of the 251 most vulnerable areas conducted

Table 1 Pillars for village selection

Pillar 1	Relatively vulnerable rural area
Pillar 2	Strong local governance (municipalities and cooperatives)
Pillar 3	Availability of natural resources (agricultural land, springs, rivers)
Pillar 4	Infrastructure and ease of access
Pillar 5	Availability of productive activities with growth potential
Pillar 6	Potential for active participation of women in the labour force
Pillar 7	Low security risk
Pillar 8	Active civil society organizations

for the LCRP by the Government and the United Nations was helpful but was not considered a key pillar for REGEND selection as the indicator involved two criteria, vulnerability and the concentration of Syrian refugees, which left a fair margin of vulnerable villages unaccounted for in the 251 areas.

Overlapping the vulnerable areas, some derived from the 251 LCRP areas and others identified through discussions with development agencies' representatives, in addition to population density, agricultural areas and other rural indicators, enables an identification of the rural areas for the purpose of this study.

For the purposes of the study, other factors were also considered, such as governance of the local community, productive sectors and the potential for empowering women in productive activities.

Villages across Lebanon were assessed, mainly in areas with low socioeconomic indicators as per the findings of the following sections, which are mostly in Akkar, detailed hereafter. Scoring was undertaken for the key pillars (table 1) to shortlist potential target areas.

Villages with “red flags” were dismissed: for example, those with weak local governance, high security risk, relatively high level of interventions and low potential for productive activities and involving women. Six villages were selected in the second shortlisting (table 2).

With the exception of Tall Abbas El Gharbi, the second shortlist of villages have ecotourism activities in common and are all located on hiking trails, which attract visitors and boost economic activities. Details of these sites are listed in part 2 section A.

Stakeholders operating in rural areas, especially within Akkar Governorate, reinforce three main factors for successful interventions, as follows:

- a. Adopting a participatory approach by taking time to identify areas of intervention and assess the needs of the local community;
- b. Identifying and engaging key people in decision-making processes;
- c. Making sure to follow up to counter the significant lack of trust.

Table 2 Shortlisted villages

Village	Governorate
Akkar El Atika	Akkar
Fnaydek	Akkar
Chaqdounf	Akkar
Tall Abbas El Gharbi	Akkar
Mechmech	Akkar
Rashaya-Hasbaya	Bekaa

2. Rural development in the country

Selective, unsustainable and unplanned

In 2014, the Ministry of Social Affairs estimated that 12 per cent of Lebanon's population is rural, which is 20-25 per cent of the active population.

Poverty is often concentrated in rural areas (UNDP, 2008, p. 26) despite levels fluctuating across regions, and within the same region. This requires resources to be directed at these areas. Yet, development in general, and in rural areas in particular, has been selective and lacking a national vision and policies. Succeeding Governments have not identified a sustainable strategy to develop rural areas, especially the most underprivileged. Rural areas have been characterized by deteriorating infrastructure and public services, and increased demographic pressures. Outages of electricity and water are longer and more frequent than in urban areas and many villages are not served by wastewater treatment facilities.

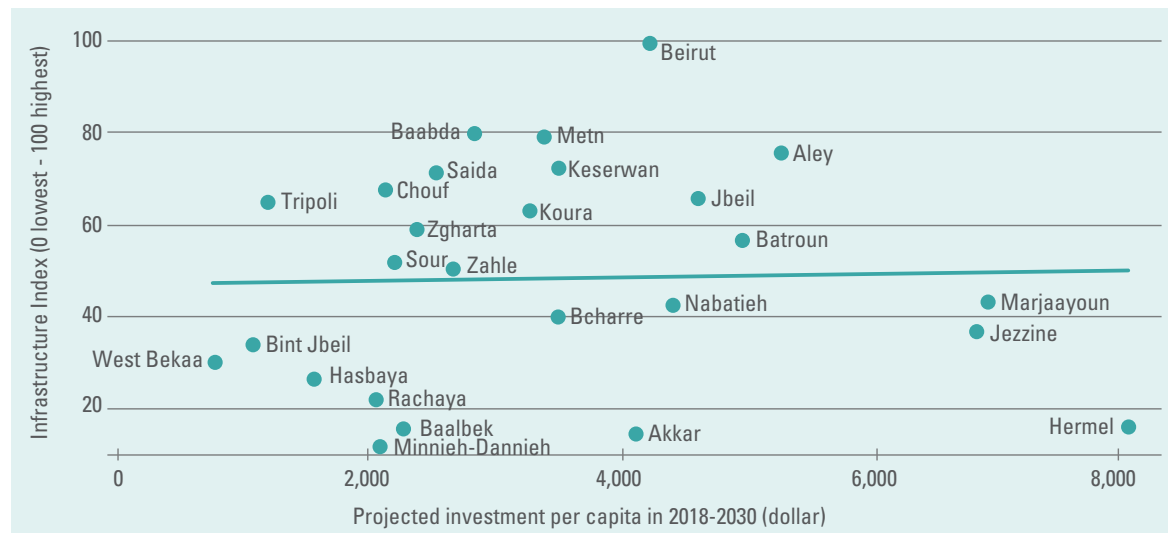
Infrastructure projects to be funded through the 2018-pledged CEDRE⁵ capital investment

programme do not account for regional disparities or development needs, thus the criteria for selecting beneficiary locations does not seem to include them. The needs of a specific area are often compromised for political agendas and gain.

Spending by the Council for Development and Reconstruction (2005) has favoured regions with developed infrastructure, such as Batroun, with an investment per capita amounting to \$250, Jbeil with \$184, Shouf with \$181 and Beirut with \$165. A low investment budget is allocated to underprivileged areas, amounting to \$40-50 in Akkar and Baalbek (Sanchez, 2018, p. 9).

Development is based on donor focus and funding. The lack of a coherent national strategy and needs' assessment has contributed to the unsustainable and unplanned development of rural areas. The result is a duplication of works in some areas, leaving gaps and unmet needs in others, and unsustainable implementation that lacks capacity-building, maintenance and follow-up, especially in deploying technological systems.

Figure 6 CEDRE projected investments



Source: Sanchez, 2018, p. 10.

The situation has been exacerbated by the influx of refugees, who are mostly in the poorest rural areas as they are located in the vicinity of conflict regions. In discussions, some municipalities in Akkar, in the north, reported hosting more refugees than Lebanese citizens. Stakeholders working in development and aid agencies and CSOs, however, say municipalities tend to aggravate the issues and exaggerate numbers.

The habitually weak local municipalities, which barely served citizens' needs prior to the crisis, report increased pressure. All public services have deteriorated, to the extent where some municipalities can no longer afford the higher refuse collection fees driven by the increased frequency of collections. Between April and May 2019, interviewed municipalities in Akkar reported that several of the smaller municipalities were closing⁶ due to the fiscal burden, lack of support from authorities and depleting grants from foreign donors. This has also increased unemployment and informal work.

Large grants and funding have been disbursed to public institutions and CSOs since the beginning of the Syrian crisis, and the resulting proliferation of projects proved difficult to coordinate when the LCRP took shape in 2016. This, along with a continued reduction in pledged funds, have rendered the strategic development of rural and vulnerable areas challenging, and increased the tendency of CSOs to plan projects depending on specific grant priorities.

Absence of government strategy, weak governance in the allocation of grants and different agendas among stakeholders have resulted in further regional disparities, and the duplication of projects.

There are other structural issues that hinder the optimal allocation of aid. The Government and the CSOs in the field operate on separate levels, and communication channels between the two are customarily broken. The problem persists

despite the Government attempts to tackle it in the LCRP by establishing sectorial committees holding periodic meetings between the corresponding ministry (serving as an umbrella) and the local and international organizations active in that sector, and enabling a software-based reporting system.

Consequently, adequate development and sustainability have been compromised for the sake of government institutions, agencies and organizations' goals.

But rural development is also constrained by the legal mandates of the municipalities. Even when funds are available and a needs assessment has been conducted, there are limited actions local governance/municipalities can implement, especially in terms of infrastructure. The bulk of projects revolve around solid waste and water infrastructure, with the energy regulatory framework hindering investment in large-scale electricity generation projects.

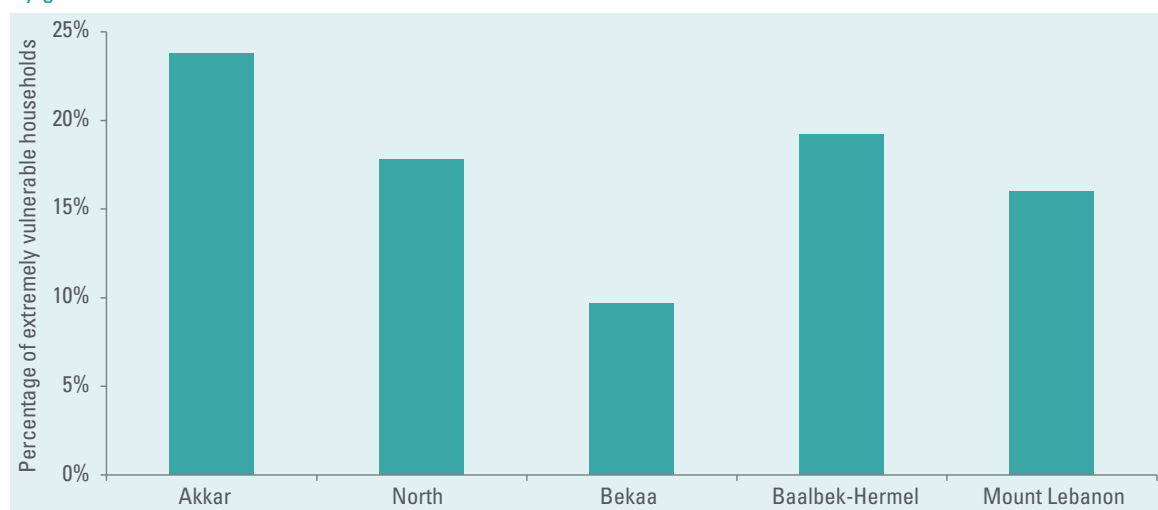
Addressing regional disparities in development should be a key priority in building the resilience of the population and enhancing the economy. Insufficient investment will preserve regional disparities and increase inequality in living standards (Sanchez, 2018, p. 11).

3. Socioeconomic indicators in rural areas

(a) Low income, high unemployment and small opportunities

Rural areas are characterized by low income. Despite the number and extent of interventions to tackle the Syrian refugee crisis and build the resilience of host communities over recent years, studies still show the most vulnerable Lebanese and refugees residing in rural areas in governorates in the north and east (Lebanon Government and the United Nations, 2019) and peripheral areas, which aligns with findings of the socioeconomic indicators divided by governorate, presented in (Figure 7, Figure 8, and figure 9).

Figure 7 Extremely vulnerable households registered with the National Poverty Targeting Programme, by governorate



Source: Lebanon Government and the United Nations, 2019.

Extremely vulnerable households registered with the National Poverty Targeting Programme are mostly concentrated in the North region (41 per cent in Akkar and the North Governorates), followed by Bekaa (29 per cent including Bekaa and Baalbek-Hermel Governorates), and Mount Lebanon (16 per cent). Detailed segregation in (figure 7) shows the highest levels of household vulnerability are in Akkar Governorate.

Vulnerable households report shortages in basic needs, such as food, health and rent payments. The majority are located in rural areas of the governorates.

Data obtained from UNDP on the percentage of poor population by region in 2004 show that North Lebanon (including Akkar, which had just been announced a separate governorate) had the highest percentage of poor with 38 per cent, followed by Mount Lebanon with 27.3 per cent.

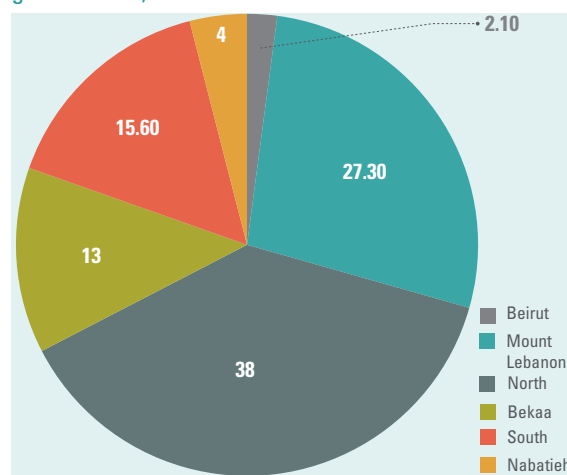
According to the Ministry of Social Affairs, the most vulnerable rural populations comprise smallholders, including livestock and poultry farmers, wage labourers and daily workers, fishermen and women heads of households.

Agriculture is the main source of income for the majority of Lebanon's rural population.

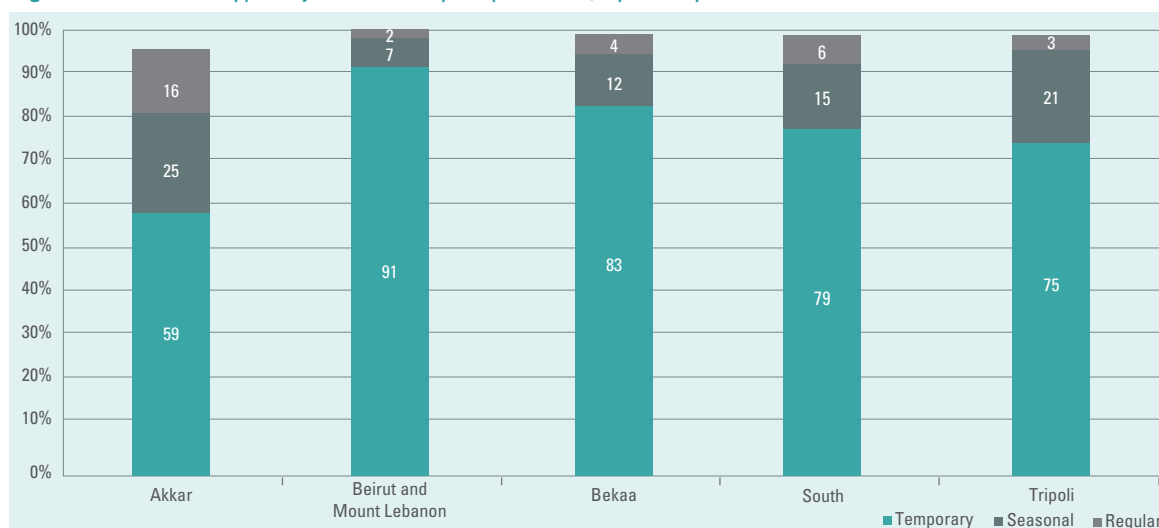
A significant share is employed in the public sector; mostly the army and security forces. Significant activity in informal economic sectors is reported (Robalino and Sayed, 2012, p. 3).

The FAO livelihoods assessment finds that Akkar has the highest share of insecure jobs

Figure 8 Percentage of poor population, by governorate, 2004



Source: UNDP, 2008, p. 20.

Figure 9 Share and type of jobs of survey respondents, by surveyed area

Source: Ministry of Agriculture, FAO and REACH, 2015, p. 16.

(figure 9). Only 59 per cent are estimated to hold regular jobs, the lowest in the country, with 25 per cent employed on a seasonal basis and 16 per cent holding temporary jobs (Ministry of Agriculture, FAO and REACH, 2015, p. 16).

All indicators show that despite interventions by humanitarian aid agencies and CSOs throughout the Syrian crisis, the North and Akkar Governorates that make up Northern Lebanon still hold the poorest populations and the lowest socioeconomic indicators across regions. Disparities also exist between villages and towns within the same region. Data are unavailable, but interviews with area managers in development agencies confirm the mountainous areas also have low development indicators but with fewer interventions.

Poverty and unemployment in rural areas have led to the proliferation of cross-border smuggling of merchandise and illicit goods, though smuggling was prevalent prior to the Syrian conflict. The rural population traded petroleum products informally, especially diesel, which was cheaper on the Syrian side. This practice was changed during the crisis, giving way to opposite trade flows, from Lebanon to the Syrian Arab Republic (World Bank, 2013, p. 39).

With their lack of access to human resources, markets and technology, several MSMEs in rural areas are not registered but continue to face financial hurdles. Registered MSMEs experience bigger financial challenges, with taxes added to high operating costs. A review of loans to owners of rural MSMEs through microfinancing institutions show small value loans between \$1,000 and \$3,000 obtained to start or grow a business, typically in the agriculture sector and including flowers, livestock, handicrafts and ecotourism activities. Despite the small amounts, MSMEs struggle with repayments due to their tax burden and operating costs.

The tax regime does not differentiate between the types of MSMEs and their capacity. The Government has issued 6-10 years of income tax exemption for rural industrial MSMEs but the adoption of the law is low (Ministry of Economy and Trade and UNDP, 2014, p. 44). Strict application is required, and further incentives promoting rural MSME growth.

Enhancing MSMEs across the agriculture and other productive activity value chains in rural areas would improve the socioeconomic conditions by creating job opportunities for the most vulnerable.

Participants in focus groups in the framework of REGEND project highlighted fair activity by women in leading businesses in rural areas, though they pointed out that when a male head of household is in military service or in the security forces and therefore prohibited from starting a business, he may register it in his wife's name, a practice that is legitimately allowed by microfinance institutions in rural areas.

(b) Education

Regional disparities in enrolment in primary and secondary educational are significant. Despite a national enrolment rate of 90 per cent in primary education, the rate in the North – the lowest among regions – stands at 76 per cent. In Akkar, just 54 per cent of heads of households have obtained primary education, and the Governorate records the lowest enrolment in secondary education and the lowest rates for heads of households attending university, which is estimated at 4 per cent (Ministry of Agriculture, FAO and REACH, 2015, p. 15).

There is also gender disparity at the secondary level, with the poorest governorates of North (including Akkar) and Bekaa showing a better retention rate for girls, and more boys going for early employment.

There are also regional disparities in the quality of education, which is higher within private schools, mostly located in Beirut and Mount Lebanon. Higher class repetition⁷ is found in rural areas.

(c) Employment

Agriculture is either the sole source of income for most of the rural population or an additional source. Women's primary activity in the majority of villages is in the sector, followed by education.

There are regional discrepancies in the type of employment and categories. According to the

FAO's 2015 livelihood survey, agriculture and informal commerce were the primary income source in the northern governorates, with 32 per cent in the North and 29 per cent in Akkar, while in the rural villages of Baalbek-Hermel, 54 per cent of respondents reported unskilled labour as their primary source of income (Ministry of Agriculture, FAO and REACH, 2015, p. 15). The highest household monthly incomes were recorded in areas with the best rates of regular employment, atypical of rural areas of Akkar and the North Governorates, where most respondents detailed seasonal or temporary employment. Peripheral rural areas are characterized by low employment opportunities and income.

4. Political conditions: effects of decentralization, legal issues

Decentralization promotes equitable development by switching administration and decision-making from the centre to local and regional levels. Lebanon, however, is a heavily centralized country, and favours central political control. Attempts to promote a legal framework for decentralization have largely failed.

Achieving impartial and sustainable development across regions will require thoroughly implementing decentralization. The immediate impact will be financial autonomy, allowing the regions to look to their own needs, independently of the national political agenda.

A focus on monitoring at local – smaller – level would also enforce accountability, which is currently absent at national, central level.

Citizens express a lack of trust in the central administration, particularly in rural areas. The Government is perceived negatively, due to the lack of improvements and development. Decentralization can create a higher level of engagement and involvement by the local community in decision-making.

Decentralization creates employment opportunities across all regions, not just in the central areas, and promotes entrepreneurship and the development of MSMEs, further improving the local economy. But legal and governance issues persist, as follows:

- a. Current structure limiting the authority of municipalities and unions of municipalities;⁸
- b. Absence of laws and a proper framework for implementing an adequate decentralized system;
- c. Lack of consensus at the national level on the type of decentralization, and on the level the process would be implemented;
- d. Need to update laws to enable implementation.

A decentralization law requires political consensus, which is absent. Hence, the decentralization of services would constitute a step forward.

5. Environmental conditions: vulnerability to climate change, water availability and soil degradation

(a) Vulnerability to climate change

Lebanon's total greenhouse gas (GHG) emissions amounted to 18.5 million tonnes of carbon dioxide equivalent in 2000, an increase of 2.77 per cent from 1994 (Ministry of Environment, 2011b, p. 2). In 2013, it had risen to 26.28 million tonnes (Ministry of Environment, 2017, p. 14).

The energy sector, comprising electricity generation and transport, is the main contributor to GHG emissions, with an estimated share of 74.86 per cent of total emissions. The agriculture sector accounts for 5.76 per cent (Ministry of Environment, 2011a, p. 31).

Despite being a non-industrial country, Lebanon's emissions are high. At current

trends, the direct cost of climate change – in the form of heat waves, droughts, increased precipitation, extreme weather – will be high. The immediate impact will be severe in the agriculture sector, negatively impacting the rural economy and the income and employment of rural households. The potential consequences will be damaged and reduced produce, flooding of crops, partial and full season produce waste, and an increased need for water, with its associated costs. This is already happening, periodically, in some villages and is expected to get worse without proper mitigation measures.

Any direct costs will result in indirect costs on the national economy, in loss of revenue from major productive sectors, and a resulting and significant reduction in GDP and employment opportunities. The total cost on the economy for 2020 is estimated at \$1.9 billion, rising to \$16.9 billion in 2040, and \$138.9 billion in 2080 (Ministry of Environment, UNDP and GEF, 2015a, p.11).

Emissions from the agriculture sector fell by 5 per cent in 2012, compared with the 2005 baseline, due to a decrease in livestock heads (sheep and goats). The reduction is more significant when compared with the baseline year 1994, which is mostly attributed to reduced nitrogen fertilizer use and the addition of crop residues to soils, mostly between 1994 and 2006 (Ministry of Environment, UNDP and GEF, 2015b,p.i). The largest share of GHG emissions in agriculture comes from soil; thus, tackling this is a major factor in reducing the sector's overall footprint.

Agriculture, fisheries and forestry account for just 1 per cent of the energy sector's total GHG emissions (Ministry of Environment, UNDP and GEF, 2015c, p.19).

(b) Water availability

The total available amount of water is estimated at 4.1 billion m³, of which 1 billion m³ are across borders. Another share goes to the sea.



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Compared with the Arab region, especially neighbouring countries, Lebanon has historically been ranked as water-rich. Like most countries in the Middle East, however, it is classified as water-scarce,⁹ with a total annual renewable water resources share of 770 m³ per person.

Water shortage is exacerbated by several factors, including increased population and demand, the effects of climate change and water pollution. There are shortages currently, especially during summer months, and many areas have to purchase additional supplies.

Despite the amount of rainfall, there are challenges in capturing and retaining water, and also around the contamination of surface water and groundwater. There are gaps in water records and data, but anecdotal evidence supports the idea that groundwater is mostly unclean, aggravated by the digging of unlicensed wells and lack of wastewater infrastructure.

The Ministry of Energy and Water launched an ambitious water sector strategy in 2012 to address these infrastructure and sector management deficiencies. Initiatives include increasing storage capacity through dams and artificial groundwater recharge, reducing network losses, improving wastewater networks and increasing the number of treatment networks,

improving sector capacity, tariff restructuring, and reforming policies and laws.

Water conservation has been largely untapped, with no adequate planning or awareness campaigns on efficient use and conservation mechanisms, especially in sectors that rely heavily on water, and where shortages may cause a loss of revenue and employment, such as in agriculture. Initiatives tend to be individual, entrepreneurial and non-governmental.

(c) Soil degradation

Rapid urbanization and changes in land use have led to a large share of productive land being degraded, especially in coastal areas, which already had limited land resources. These factors, along with climate change, are threat multipliers to soil erosion.

Despite a lack of data and estimates, Lebanon is considered to be at high risk of erosion, deforestation and reduced soil quality and productivity. The structure of the land exacerbates matters, with 75 per cent of the territory consisting of slopes and steep land.

The soil is, therefore, vulnerable; it is estimated that 50 per cent of the territory is highly susceptible to future desertification, with the highest vulnerability in Baalbek-Hermel and the lowest in central areas of Mount Lebanon (Darwish and others, 2012).

C. Current and potential productive activities

1. General overview

Low quality, low support and high costs

Growth in productive activities is hindered by an uncompetitive economy, high operating costs and low compliance with international standards.

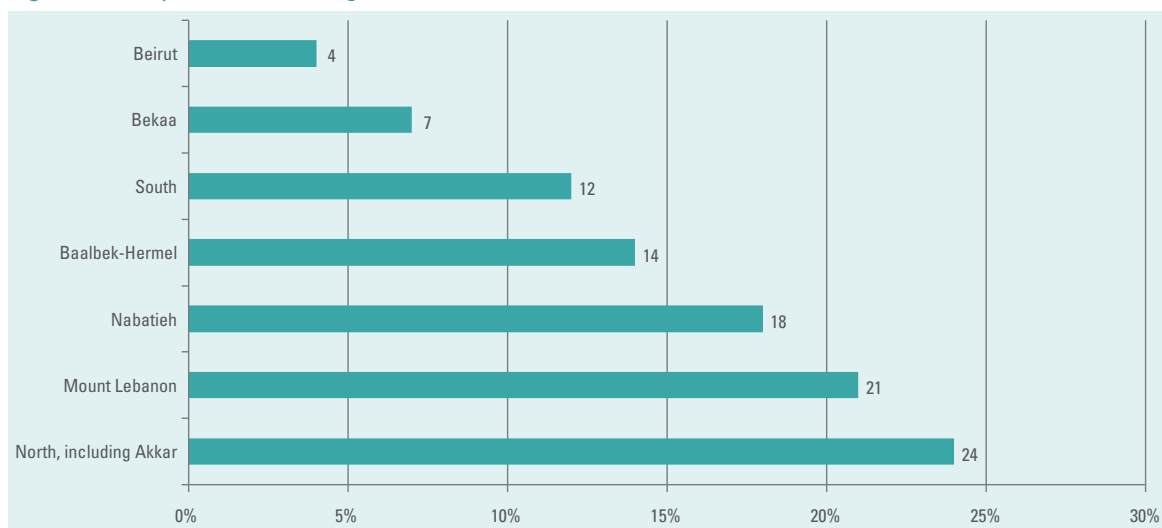
Several factors negatively impact on the quality of local products and reduce standards, such as:

- Absence of quality control supervision and inspections;
- Lack of government support;
- Insufficient capacity and know-how especially as most enterprises are small- and medium-sized, and family businesses;
- Small local market;
- High operating costs;
- High global competition with the market flooded with cheap imported products that local producers cannot compete against.

High operating costs, driven by high energy costs, mainly electricity, coupled with large, uncontrolled imports from markets producing cheap products in mass across all sectors, render Lebanese products more expensive and less competitive than regional and international counterparts, forcing either a reduced profit margin or poorer quality. Other factors are sector-specific, such as the high use of fertilizers in agriculture. Cutting down operating costs is a key requirement to enhance the quality of productive activities and increase revenues and employment opportunities.

Regional disparities and the lack of development strategies have led to a proliferation across productive sectors of cooperatives; that is, people-centred enterprises owned, controlled and run by and for their members. Cooperatives are a major contributor to the economy in many developed and developing countries, including Lebanon (figure 10), where, for several decades, they have attempted, and sometimes succeeded, in filling shortcomings in government policies, especially in the agriculture sector. Yet they suffer significant challenges, resulting in a weak cooperative environment overall, to the point where success is an exception, fragmentation the rule.

Figure 10 Cooperatives across governorates, Lebanon



Source: ILO, 2018, p. 9.

Half of registered cooperatives operate in agriculture. They are dominant in agricultural areas characterized by small-scale farmers (ILO, 2018, p. 9).

There are 125 women-led cooperatives out of a total of 1,238, or 10 per cent, according to 2017 figures (ILO, 2018, p. 9). Most operate in agri- and traditional food processing, and struggle with market exploration, promotion, negotiation and sectoral growth compared with their male counterparts.

With weak and inconsistent municipalities, the general characteristic of local governance in rural areas, and in the absence of a national development policy, growth across productive sectors has been achieved and maintained where the cooperatives are mostly strong. It is estimated that only 33 per cent of registered cooperatives are active (ILO, 2018, p. 9), with major discrepancies in their capabilities.

Overall, gaps in data exist in several productive sectors.

2. Agriculture

Lebanon has the highest rate of cultivable land per capita in the Arab region (USAID, 2018), although it has retracted over the past two decades (Haydamous, and El Hajj, 2016, p. 2), driven by the increase in population, density and urbanization. According to the Agriculture Census (2010), the total agricultural land area was 332,000 hectares, with a total cultivated land area of 231,000 hectares and a total irrigated area of 113,000 hectares (Ministry of Agriculture, 2014, p. 11).

The sector's share of GDP in 2016 was 4 per cent, equivalent to \$1.5 billion, while the agri-food industry added 5 per cent. Yet, agriculture's contribution to GDP in rural areas was approximately 80 per cent. The Ministry of Agriculture's 2015-2019 strategy sought to boost the sector's contribution from 4 to 6 per cent, but increased public spending to increase productivity and employment levels had a minimal effect.

In 2010, 8 per cent of the total labour force was employed in the sector. By 2018, it had fallen to 7.6 per cent nationally, but was at 25 per cent for the local rural communities overall (Ministry of Economy and Trade, 2019, p. 254).

Agriculture is considered the main income-generating activity for rural families (Anriquez and Stamoulis, 2007). Farmers and agriculture workers are among the poorest employees across all sectors, with 40 per cent considered poor (ESCWA, 2016, p. 11).

According to FAO, the main challenges are as follows:

- a. Decreased agriculture productivity and profitability;
- b. Decreased household incomes and revenues from the sector;
- c. Decreased employment opportunities;
- d. Increased production costs;
- e. Inadequate and high cost of storage and transport;
- f. Depleted land, forests and wood resources;
- g. Increased water scarcity.

The sector is dominated by traditional methods, and barely benefits from new technologies in its value chains. High energy prices impact on production costs, water is scarce and innovations in its use limited. The sector consumes 64 per cent of the available water supply. Inefficient flood irrigation accounts for 50-70 per cent of irrigation mediums (ESCWA, 2016, p. 55), with the remainder coming via water pumps, which is a significant improvement in recent years.

The sector is also highly vulnerable to climate change, which will likely worsen drought. A fall in precipitation will increase the need for water, and decrease the sector's contribution to the local and national economy.

Agriculture, poorly managed by the Government and cooperatives, is fragmented. The small size of many farms affects farmers' ability to collaborate, which makes it difficult to acquire technological equipment and storage facilities, and benefit from resources such as renewable energy to improve irrigation and decrease operating costs.

In the past three years, solar photovoltaic (PV) water pumps have gained traction in the sector, increasingly requested by government officials and deployed by development and humanitarian aid agencies.

3. Livestock

According to FAO (2016), approximately 12,000 households derive their income, fully or partly, from livestock and milk production. Small-scale workers and women working in milk processing and cattle breeding are estimated to be the poorest. Seven per cent of cooperatives deal with livestock and dairy products.

Livestock accounts for 36 per cent of agricultural production, mostly cow milk, and cattle and chicken meat. Lebanon has 400,000 hectares of pasture that can support livestock production (Ministry of Economy and Trade, 2019, p. 255). There are 77,000 head of cattle in total, spread over 10,400 farms, and 350,000 sheep and 450,000 goats, spread over 5,850 farms (IFAD, 2017, p.3). Cattle-breeding is mainly for milk production, and sheep for meat.

Demand for local dairy products is high, estimated at 114 litres per capita in 2013, which has potentially increased with the refugee influx (IFAD, 2017, p.3).

Much the same as the overall sector, livestock production suffers from high costs.

4. Fish farming

Fish farm cooperatives represent the lowest share of the total cooperatives, accounting for 3 per cent. In Lebanon, 20 per cent of food

consumed comes from fish farming, with the highest share being imported. In 2017, imports were estimated at \$155 million (Ministry of Economy and Trade, 2019, p. 752).

The industry has little growth potential considering the small scale of the enterprises, the country's geography and the high competition, which limit production capacity and profitability.

5. Tourism

Tourism is a main pillar of the economy, contributing 3.1 per cent to GDP in 2016 (Ministry of Economy and Trade, 2019, p. 27). This was down from 3.3 per cent in 2010, prior to the Syrian crisis, but showed recovery when compared with the intervening period.

In 2014, the sector directly accounted for 7.4 per cent of national employment, and an additional 20.3 per cent in indirect employment, mostly in the food and beverage industry (Chlouk, 2016, p. 4).

There are two types of tourism in Lebanon: urban, revolving around the major cities and site attractions; and rural, which explores village culture, tradition and nature.

Historically, urban tourism has been the key attraction for foreign visitors but regional conflict and political stances have resulted in a decrease in the number of tourists. In recent years, rural tourism has gained momentum, especially with the increasing investment in boutique hotels and ecolodges, and hikers and local explorers who have put villages on the tourist map; the Lebanon Mountain Trail, for instance, has mapped villages along a hiking trail, with activities and accommodation options. The Ministry of Tourism has listed rural tourism among its priorities, developing a strategy to encourage it.

The return on cultural heritage and traditional tourism in Lebanon is high, estimated at \$7 of economic activity for every \$1 invested (Chlouk, 2016, p. 5).



The sector has high growth potential and is expected to recover quickly when the region's political situation improves. Aside from the geographic location, however, there are several challenges, as follows:

- a. Lack of infrastructure investment, especially outside urban areas;
- b. Poor public and reliable transport domestically, and high cost of flights;
- c. Low marketing and promotional materials;
- d. Deteriorating environment and natural resources;
- e. High operating costs.

Similar to the other productive sectors, the high costs due to high water and electricity bills are hindering growth and profitability, increasing room rates, for example, thereby reducing Lebanon's appeal compared with cheaper neighbouring destinations, such as Egypt and Turkey.

6. Handicrafts

Historically a major contributor to the local economy, especially in rural areas, the handicraft sector is retracting due to diminishing demand.

Famous locations for handicrafts, particularly traditional ones, are as follows:

- a. **Blown glass:** Present in Tyre, Sidon and Tripoli, this ancient technique transforms molten glass into different glass shapes and colours, for various purposes;
- b. **Weaving:** Used for the fabrication of tablemats and traditional caftans and abayas from goat and sheep wool. Common in villages and cities across Lebanon, such as Baskinta, Zouk, Irsal and Chhim;
- c. **Pottery:** Still common in rural areas, especially in Beit Chabab, Rashayya, Assia, Douma, Khaldeh and Al Mina. Production of jars, bowls and plates from mud;
- d. **Soaps:** The most famous locations are Sidon and Tripoli, which produce soaps in various geometric shapes, perfumes and colours;
- e. **Woodwork:** Concentrated in Tripoli, Al Arez (The Cedars) and suburbs, and Beirut, work includes types of manufacturing, sculpture and paintings;
- f. **Carved cutlery handles:** Concentrated in Jezzine, this is the traditional handicraft experiencing the highest reduction in demand.

7. Home-made food processing

Food processing in the home is dominant in rural areas, especially among women. It is mostly informal, hence data are lacking on its size and revenue.

Operation costs are the cost of energy for the cooking process and cold storage. Interviews with rural women producing home-made food reveal it constitutes a significant share of their household income, with most sales neighbourhood-based. The majority also reported being unable to upscale and expand, and to find new buyers.

D. Country energy sector

1. Rural electrification

The electricity supply is characterized by chronic shortages and unreliability, uneven distribution, and high costs, all of which are aggravated in rural areas, which are marginalized in discussions about the challenges facing the sector.

Lebanon reports 99 per cent electrification, yet seldom receives a reliable electricity supply. Rural areas record the worst supply and quality. The sector suffers from a chronic elevated shortage in supply. Available generation capacity estimated at 2,000 megawatt (MW), coupled with a peak demand of more than 3,500 MW, results in scheduled electricity load shedding for 12-18 hours per day. The gap is mostly covered by private generators, operating on diesel and with a capacity estimated at higher than 1,000 MW, distributed across the country, though with a predominance in highly populated urban areas.

Distribution of electricity is uneven and inequitable; the further away from the capital, the higher the electricity shortage. Thermal power plants responsible for 91.9 per cent of

generation are mostly spread along the coast, with uneven distribution of capacities.

The capital Beirut benefits from more than 20 hours of electricity supply per day, but this can drop to less than 12 hours in rural areas, and even lower in peripheral areas. In addition to the low supply hours, rural areas also experience low-quality electricity, limiting the use of many electricity appliances; often they are barely able to power light bulbs. The voltage drops from a nominal 220 volts to approximately 180 volts in rural areas and has been recorded at 140 volts in some peripheral regions, such as the northern border with the Syrian Arab Republic. Rectifying this, and regulating voltage, incurs additional costs for residents in rural areas.

The unreliable supply has also played a role in delaying access to technology in rural areas. Only half of the farmers use water pumps for irrigation, hampered by their lack of access to capital and electricity. Most do not use cold storage facilities, given their high operating costs. Public schools have frequently received computers from international aid agencies to introduce technology in the curriculum but the majority report being unable to use them due to power outages, along with the lack of skills. The unreliable supply is a common barrier to improving other education and productivity sectors.

Further, the energy regulatory framework hinders investment in large-scale generation projects, and the purchase of electricity, with monopoly control of generation held within the national electricity utility and with the Government as the single buyer.

The majority of the rural population have learned to manage their daily activities without reliance on the electricity sector, which has hindered development of other sectors and rural areas overall.

To improve the situation, energy projects in rural areas should acknowledge five pillars (table 3).

Table 3 Pillars for energy projects in rural areas

Pillar 1	Achieve electricity equity and sustainability
Pillar 2	Reduce unreliability and costs
Pillar 3	Enhance energy security, namely availability, affordability, accessibility and acceptability
Pillar 4	Reduce tension and build resilience
Pillar 5	Mitigate the impact of climate change

2. Existing sources of energy supply

At the national level, inefficient thermal power plants dominate electricity generation. Expensive, polluting fossil fuels, heavy fuel oil and diesel oil account for 91.9 per cent of energy sources. The remainder is generated through renewable energy sources, mostly hydropower, with a minor contribution from solar energy, estimated at 56.37 megawatt-peak (MWp) in 2018 (LCEC, 2019, p. 6).

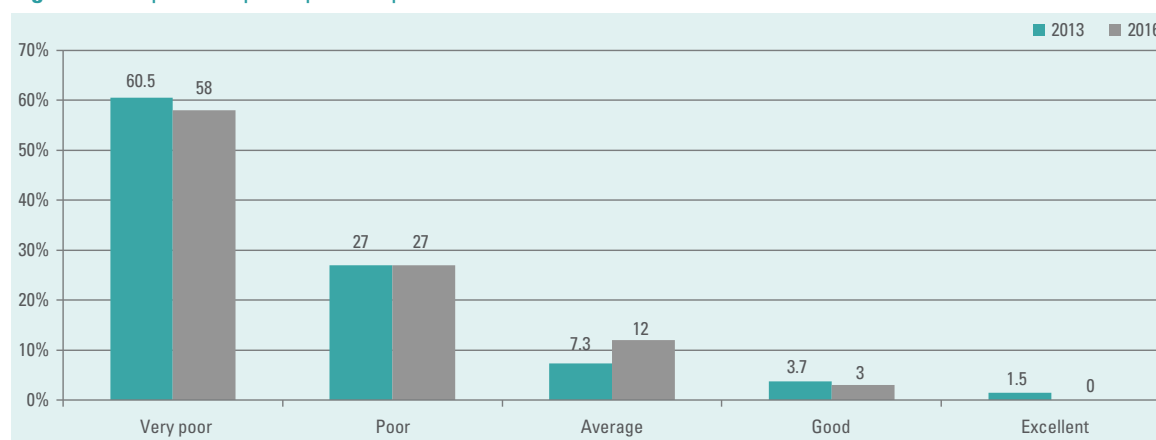
Electricity from the national utility grid is subsidized, sold at an average tariff of 9.5 cents per kilowatt-hour (kWh). Average generation costs range from 17 to 23 cents per kWh. In 2018, the cost of subsidies was estimated at \$1.4 billion. These subsidies, plus significant technical losses, result in an annual fiscal deficit of \$1.5-2 billion, and added \$36 billion to the \$86 billion public debt to the end of 2017.¹⁰

Despite the subsidies, consumer costs are in general very high, driven by the price of electricity purchased from private generators during load-shedding hours, which can be higher than 30 cents per kWh.

On average, 11.2 per cent of household income is spent on electricity, with approximately half of all citizens paying more than 10 per cent. When the \$1.5-2 billion in treasury transfers to the State-run electricity utility Électricité du Liban (EDL) is taken into account, the average household income spent on electricity rises to 16.6 per cent.

The majority of citizens have a negative perception of electricity quality (figure 11). The highest share of people rate electricity as very poor, or poor.

In terms of access to electricity, the rural population is divided into those who either own or subscribe to a private diesel generator or uninterruptible power supply (UPS), and those

Figure 11 Population perception of power sector

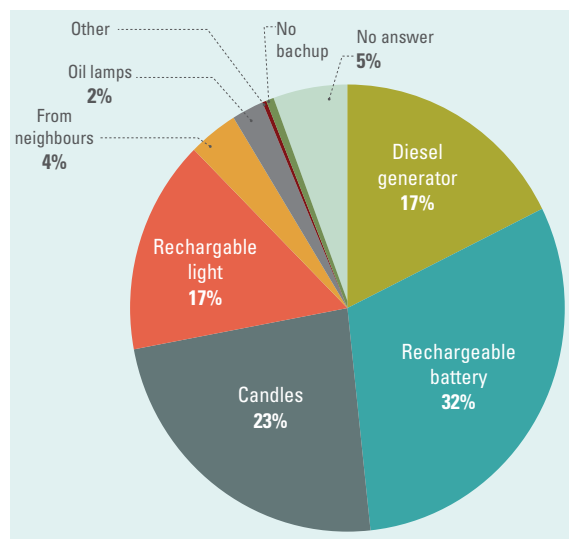
Source: Survey conducted by UNDP CEDRO, disseminated in a presentation by Hassan Harajli, 2017.

who rely on candles, torches or similar basic lighting systems during power cuts. Both pay a high price for the failing sector. Those in the first category have to pay higher total electricity bills than residents in the capital, since the bulk of their needs are met through diesel generators that are billed at a cost significantly higher than the subsidised tariff. The second group lose opportunities to work, study and complete activities typically enabled via reliable access to electricity.

According to a survey published by UNDP in 2016,¹¹ only 30 per cent of households with a \$500-1,000 monthly income had access to either an owned generator or a subscription to a neighbourhood generator, or an uninterruptible power supply, and only 3.1 per cent of households with incomes lower than \$500 had such access (Harajli and others, 2016).

Households comprise on average 6.5 people and the monthly income was found to be \$342, with 30 per cent reporting a monthly income equal to or less than \$100 (Beucler, 2016). The majority of survey respondents (32 per cent) relied on rechargeable batteries as a source of electricity, and 23 per cent on candles. Only 17 per cent had a diesel generator or a subscription.

Figure 12 Off-grid sources of electricity in surveyed rural households, 2016



Source: Beucler, 2016.

The average monthly expenditure on electricity was found to be \$26, equivalent to approximately 7.6 per cent of monthly income. For the poorest, reporting a monthly income of \$100, 20 per cent was spent on electricity (Beucler, 2016).

The first priority need was found to be for lighting, followed by using a washing machine, then a refrigerator, demonstrating the importance of a reliable electricity supply in daily activities, and the burden on households unable to pay for private generators. Entertainment, as in television, was fourth in the needs' assessment.

The Syrian crisis has increased the level of interventions by development and humanitarian aid agencies in rural areas, in sectors such as health and education. Providing these basic services requires extensive energy and several agencies and CSOs have purchased diesel generators, due to their "fast, cheap and simple deployment" compared with renewable energy. Most lack the technical expertise, and funding, to implement renewable energy solutions. The resulting cost is high, on electricity bills and the environment.

Biomass for heating is used intensively in rural areas, negatively impacting forestry and natural resources. The development of sustainable briquettes has failed to keep pace, and to this end, several energy interventions under the LCRP focused on providing efficient stoves and imported sustainable briquettes.

UNDP attempted to promote sustainable briquettes but, with no local availability, they had to be imported from Europe, making them non-sustainable and expensive. To tackle this, briquetting facilities were implemented in two villages: Andaket Akkar, a forest area of 1,200 hectares, and Bkessine South, a forest area of 200 hectares. They served as forest management, mitigating fires and providing the villages and neighbouring towns with sustainable briquettes. There are challenges hindering their replication, however, including: extensive site requirements, namely forest size and amount and types of wood/trees and their associated calorific values, and the needs of the local communities; high capital and operating costs; and cheaper competitors.

3. Potential for renewable energy

Lebanon has abundant natural resources for renewable energy implementation, which provides an opportunity to rectify the chronic uneven distribution of electricity supply. While thermal power plants are polluters, and distributed along the coast, deploying renewable energy would provide a more equitable spread and develop rural areas, by enabling access to technologies and creating jobs.

Transmitting electricity across the country from the coast within current grid inefficiencies and bottlenecks incurs high losses and associated costs. Deploying renewable energy in rural areas has the potential to lower electricity costs by reducing transmission and distribution costs, and to provide better quality electricity.

Decentralized renewable energy increases energy security in rural areas, which are usually the first to be impacted in a conflict or crisis scenario.

But, above all, deploying renewable energy in rural areas would drastically improve the competitiveness of MSMEs, lowering operational and production costs across productive sectors, thus creating more jobs and enhancing economic prospects.

(a) Bioenergy

The potential for bioenergy is high, with the most fertile areas on the coast and in Bekaa (UNDP CEDRO, 2012). The use of crops for bioenergy may provide an opportunity for rural and vulnerable areas. For biogas, co-digestion¹² is most suited to rural areas.

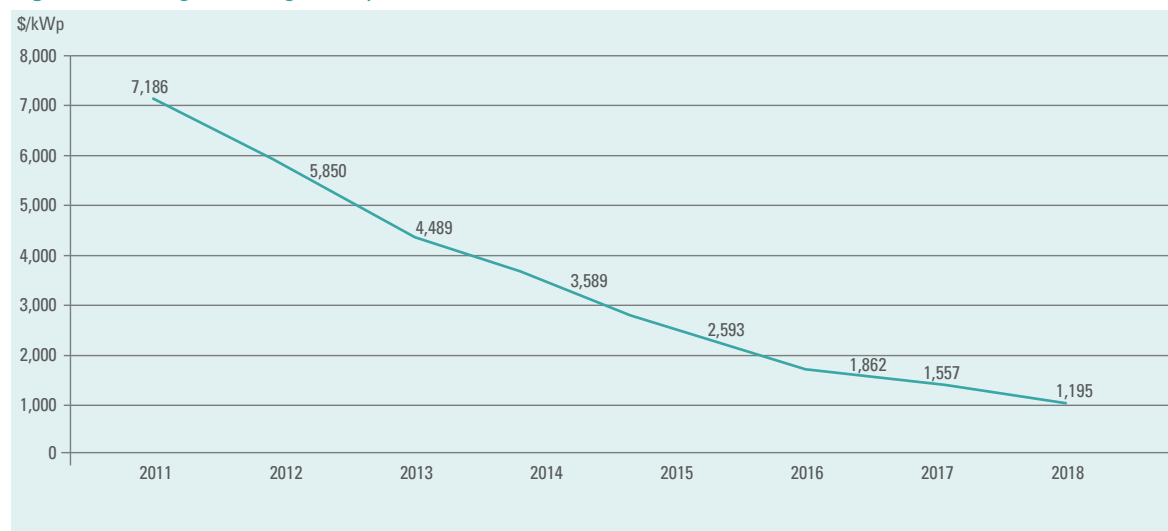
Bioenergy can provide job opportunities across the supply chain, from production, harvesting, collection, transport and storage, to the conversion plant, and then in distribution to consumers.

Yet, bioenergy is hampered by a number of barriers, which are as follows:

- a. Requires extensive assessment of site and available raw materials;
- b. Lacks suppliers, technological know-how, and operation and maintenance expertise;
- c. Low market demand drives up initial capital cost.

In 2017, UNDP assessed the potential of biogas from crop residues and manure, aiming to pilot the technology in rural areas and coastline towns. The significant costs, of more than \$10,000 per kWh according to a development agency in Lebanon that tendered such projects, meant the projects were not executed.

Figure 13 Changes in on-grid PV prices



Source: LCEC, 2019, p. 25.

(b) Solar PV

Lebanon has about 300 sunny days a year, with an average insolation¹³ of more than 2,100 kWh/m². This high frequency, along with a moderate temperature, enables the optimum operation of solar PV systems.

Despite its minor contribution to the energy mix, installed solar PV capacity increased from 433 kilowatt-peak (kWp) in 2010 to 56.37 megawatt-peak (MWp) in 2018 (LCEC, 2019, p. 19), an indicator of future possibilities in Lebanon.

With the abundant sunshine, local technical expertise and falling capital costs, solar PV has the highest deployment potential in rural areas. The systems are less complex to maintain and operate than other renewable energy systems, as rural experience has shown. By the end of 2018, areas such as Akkar, Baalbek-Hermel and Bekaa accounted for 1 per cent, 5 per cent and 25 per cent, respectively, of the total installed solar PV capacity.

The on-grid cost of solar PV has fallen significantly (figure 13). In 2018, the cost of a 1 kWp on-grid solar PV system (without battery storage) averaged approximately \$1,195 in the Lebanese market (LCEC, 2019, p. 37).

Investment in solar PV, however, still relies heavily on grants and loans. In 2018, \$13.18 million of the total \$22.71 million in PV investments came from the Central Bank's National Energy Efficiency and Renewable Energy Action plan loan (LCEC, 2019, p. 8).

Technical capacity and know-how has improved significantly, with specialized companies increasing from seven in 2008 to more than 66 in 2018, according to the Lebanese Center for Energy Conservation (LCEC) records.

Solar PV may be limited by the availability of land and roofs, and design should account for this, with structures that also allow land to be used for other purposes, such as agriculture ground-mounting systems.

(c) Wind

Wind energy holds strong potential in Lebanon. It has fewer land limitations than solar PV, although it has other site-specific barriers. A main challenge is resource availability. Economically viable wind speeds are not present across the country. The Lebanon wind atlas, commissioned in 2011, has potential in Akkar. The northern areas show the most promise, with wind speed ranging between 6.5 and 9.5 m/s at 80 m above ground level (UNDP CEDRO, 2011).

In the past, wind systems were cheaper than solar PV but the situation has changed, and wind is now cheaper only in Class A sites (UNDP CEDRO, 2015).

Small-scale wind systems and hybrid solar PV have been implemented in a few villages in Akkar and Bekaa but with limited success due to system operation and maintenance, and noise complaints, despite wind turbine capacity averaging 1 kWp.

Across the value chain, wind systems can create job opportunities in services, installation, maintenance and operation. The first wind farms may provide a learning opportunity, and an example of renewable energy empowering rural areas. Despite extensive delays stalling the project – which is not uncommon across different energy projects in Lebanon – three wind farms with a total capacity of 226 MW are to be implemented in Akkar, mainly in Jabal Akroum. Three power purchase agreements were signed in 2018, enabling the Government to buy the generated green electricity from the awarded private companies.

Throughout the two years of construction and the 20-year operation period, wind farms will transform low-income rural areas into prosperous ones, through job creation and local economic development. Hundreds of engineers, tradesmen and labourers will be required to take on the many preparations needed before the wind farms are commissioned and

operational. The transformation will continue when the wind farms are up and running, with permanent jobs created to support operation and maintenance. A significant share will be filled by local workers, which presents a huge opportunity for young women and men

seeking work in rural Akkar and the surrounding regions. Personnel working on site will stimulate the local economy with their spending on accommodation, groceries and transport. Businesses such as hotels, restaurants, supermarkets and other retail outlets, attracted

Table 4 Comparison of energy pillar scores, three scenarios

Scenario impact	Business as usual scenario	2019 electricity policy paper scenario	Small-scale renewable energy deployment scenario
Average cost of electricity	Électricité du Liban: 9.5 cents/kWh ^a Private generator: 30 cents/kWh ^b	Following subsidy removal, Électricité du Liban: 14.4 cents/kWh	Solar PV levelized cost of electricity: 5-6 cents/kWh for on-grid commercial scale projects ^c 11 cents/kWh including lithium batteries ^d
Achieve electricity equity and sustainability	X	!	✓
Reduce electricity unreliability	X	!	✓
Enhance energy availability and accessibility	X	!	✓
Increase energy affordability	X	X	✓
Promote energy acceptability	X	X	✓
Reduce tension and build resilience	X	X	✓
Mitigate the impact of climate change	X	X	✓

Notes

^a Ministry of Energy and Water, 2019, p.8.

^b Ministry of Energy and Water, 2020, p.1.

^c According to the Ministry of Energy and Water latest utility-scale solar PV bid offers, opened in 2019, and still unawarded.

^d Levelized cost of electricity for solar PV systems, including lithium batteries, is theoretical and has not been tested. First pilot projects might yield to higher prices.

The remaining information are based on the author's findings.

Table 5 Socioeconomic impact of renewable energy in rural areas

1. Decreasing the cost of energy	Reducing electricity bills, driven by high diesel generation costs, and removing electricity subsidies in the future. Renewable energy would cut transmission and distribution costs.
2. Improving economic conditions	Decreasing overall operating costs would render productive sectors more competitive. Renewable energy would contribute to poverty reduction.
3. Creating employment opportunities	Job opportunities available across the value chain of different technologies. Transfer of technology and know-how provides new skills, especially for the high number of unemployed, slowing rural to urban migration and retaining citizens in their lands.
4. Enhancing energy security	Achieving reliable, high-quality electricity supply through environmentally friendly and affordable solutions. Rural areas are the most vulnerable to conflict and crises, and decentralized solutions would achieve a level of autonomy and resilience.
5. Reducing GHG emissions	Proliferation of diesel generators has increased GHG gas emissions and reduced air quality. Climate change is a threat multiplier, impacting more severely the most vulnerable areas. Renewable energy would help mitigate the impact of climate change on the most vulnerable.
6. Building peace and resilience	Implementing community renewable energy would improve resilience and reduce conflicts.

Source: Author's findings.

to the area to serve the workforce, will spur new economic activity and create more jobs (Amine, 2018).

(d) Energy pillar indicators comparison

Table 4 compares energy pillar indicators in three scenarios: business as usual; implementing the 2019 electricity sector's policy paper (unpublished); and deployment of small-scale renewable energy, and the impact on rural areas.

4. Experience of introducing small-scale renewable energy in rural areas

The first renewable energy applications were implemented in rural areas. The 300 kW wind turbine for water irrigation in Ammiq in West Bekaa was a landmark in the region despite the technical and legal challenges that left it non-operational for a significant period. In 2009, a UNDP CEDRO project launched the implementation of 25 small-scale solar PV systems, ranging from 1.125 to 1.8 kWp, in schools, clinics and municipalities in villages in Bekaa, Akkar and South. A unique design enabled dual operation, of on-grid and

stand-alone off-grid with batteries. The project aimed to reduce the cost of electricity and provide a reliable, continuous supply in the public sector, and did not involve the productive sectors until 2014.

Since 2010, solar energy projects thrived, increasing technical expertise and competition, thus enabling a significant reduction in system costs. The average cost of dual-mode systems typical in rural areas has changed dramatically over the years (table 6).

The MEDSolar project in 2014 targeted the implementation of solar systems in rural areas with a capacity larger than 100 kWp to pilot integration of three power sources: the grid, solar PV and on-site generators, along with battery storage for the critical load. An agri-industry and a food market benefited from the project (box 1).

Table 6 Changes in capital expenditures (CAPEX) of PV systems, 2009-2017

Year	Average cost of dual-mode PV system 1.8 kWp with lead acid batteries (\$)
2009	29 000
2010	20 000
2011	16 000
2012	13 000
2013	10 000
2014	8 000
2015	7 000
2016	8 000
2017	6 000

Source: UNDP CEDRO project data; UNDP DREG, 2018.

Box 1 Solar PV system in agriculture market and industry

Faced by regular electricity blackouts leading to a heavy reliance on expensive and polluting diesel generators, the Emkan agriculture market and René Moawad Foundation agriculture facility, located in Akkar and Mejdleya-Zgharta respectively, switched towards solar energy, to increase their energy security, and decrease their operation costs.

The Emkan Souk Akkar is an agricultural market renting store area to small and medium farmers in the area, and linking them to larger ones. The René Moawad Foundation agri-center comprises an apple storage facility and a small agri-industry, buying agricultural products from small farmers in the area, and selling them back to large distributors on the market. Both facilities' goal is to empower the small farmers and provide employment opportunities in their areas of operation.

Through the European Neighbourhood Partnership Investment (ENPI)-funded MEDSOLAR Project, the two facilities received a grant covering 94 per cent of a 120 kWp and 136 kWp hybrid solar-diesel system, respectively, with battery storage covering the critical load of 100 kWh. With a capital cost of \$180,000-185,000, including the cost of battery storage and complex controller and monitoring equipment, the pay-back period is estimated at 6.5 years.

The state-of-the-art system architecture entails that the system operates in three modes and draws power from three sources: solar energy as a primary source, complemented by either the electricity utility EDL (when it is available) or the diesel generator (during EDL blackout periods), or from the battery storage. The system therefore aims at reducing the consumption from EDL and the back-up generator, and when possible, substituting the generator for battery storage usage during some off-peak hours. Consequently, the system would save on both electricity bills, and decrease the facilities' diesel consumption and operation costs, freeing amounts of money for investments in much needed agricultural activities in these rural areas.

The solar PV panels were installed on the facilities' roof, and were visible to the staff and visitors, which according to the facilities' representatives were fully aware of the systems' benefits and their impact on operation cost reduction, to the extent where farmers in Emkan Souk Akkar started requesting a decrease in rent fees, stating that the facility's administration was receiving "free electricity".

Despite the challenges faced in implementation due to the low voltage below nominal values especially in Akkar, and the complexity of such a controller system in a rural area, the systems are fully operational and the facilities' administration report satisfaction with the systems and a 35-50 per cent reduction in electricity consumption on sunny days. The systems have also enabled transfer of technology and know-how, with the facilities' maintenance teams capable of handling the minor tasks and the necessary maintenance routines, following a capacity building training which was a part of the system's implementation.

The persistent challenge is reportedly the net-metering scheme, which would unlock the system's full potential and would allow further reduction in the electricity bills, as the systems would inject the electricity surplus into the grid, especially during weekends in René Moawad Foundation and mornings in Souk Emkan, when the operation is at its lowest. Yet, at the time of writing; two years following the systems' completion in 2017, EDL has not yet installed the necessary bi-directional meters and approved the net-metering process at the facilities.

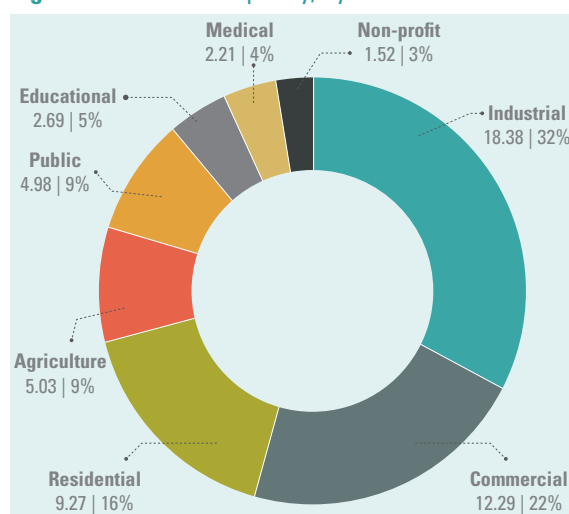
Figure A. René Moawad Foundation 135 kWp PV system- Zgharta



Figure B. Emkan Souk Akkar 120 kWp PV system



Source: Author.

Figure 14 Solar PV capacity, by sector

Source: LCEC, 2019, p. 30.

In rural areas, the most commonly applied solar PV systems are solar PV pumps, for their proven socioeconomic benefits to the agriculture sector. By the end of 2018, their capacity was 5.07 MWp, 9 per cent of total installed capacity (LCEC, 2019, p. 32).

The Syrian refugee crisis and its impact on grid electricity – estimated at 480 MW by UNDP – has led donors and aid agencies to allocate resources to implementing renewable energy systems in rural areas. Among these are the United Nations High Commission for Refugees (UNHCR), the United Nations Human Settlements Programme (UN-Habitat), the French humanitarian non-governmental organization (NGO) ACTED, the aid and development agency Mercy-USA and UNDP. Reporting to the LCRP's tracking software, Activity Info, shows a focus on villages in Akkar and Bekaa. The interventions had covered more than 50 villages in these two governorates by 2019, at differing levels and amounts. The energy models delivered either solar PV street lights for municipalities, or solar kits that enable three rooms in a household to be lit. Some have provided stoves and briquettes.

The selection of systems suggests the potential decision-making criteria behind agency interventions, as follows:

- a. Create a social benefit;
- b. Reduce tensions between host communities and refugees;
- c. Cheap and easy to deploy;
- d. Minimal to no maintenance.

Agencies with larger funds at their disposal and in-house technical expertise in renewable energy, such as UNDP and the René Moawad Foundation, have additionally implemented small-scale systems in different facilities – municipalities, health clinics, schools, industries, markets – in order to reduce their total electricity bills and GHG emissions. UNDP has also piloted a community solar PV project in Kabrikha, a village in South Lebanon (box 2).

Past experience in implementing renewable energy systems in rural areas shows the following factors should be taken into account:

- a. Capacity of the beneficiary is important to the project success;
- b. Installed equipment should be high quality to ensure system durability;
- c. Operation and maintenance should be addressed beforehand as most rural facilities lack the financial capacity for repairs;
- d. Training and capacity-building for local staff and users enables successful technology transfer that covers regular maintenance tasks.

E. Entrepreneurial development in rural areas

1. Potential for building entrepreneurial activities and role for small-scale applications

Entrepreneurship in rural areas is need-based, rather than skill- or market-based. The lack of know-how and the necessary skills to start, operate and grow a business have been barriers to entrepreneurship development. Equipping the rural population with skills would

Box 2 Green village: community solar system Kabrikha, South of Lebanon

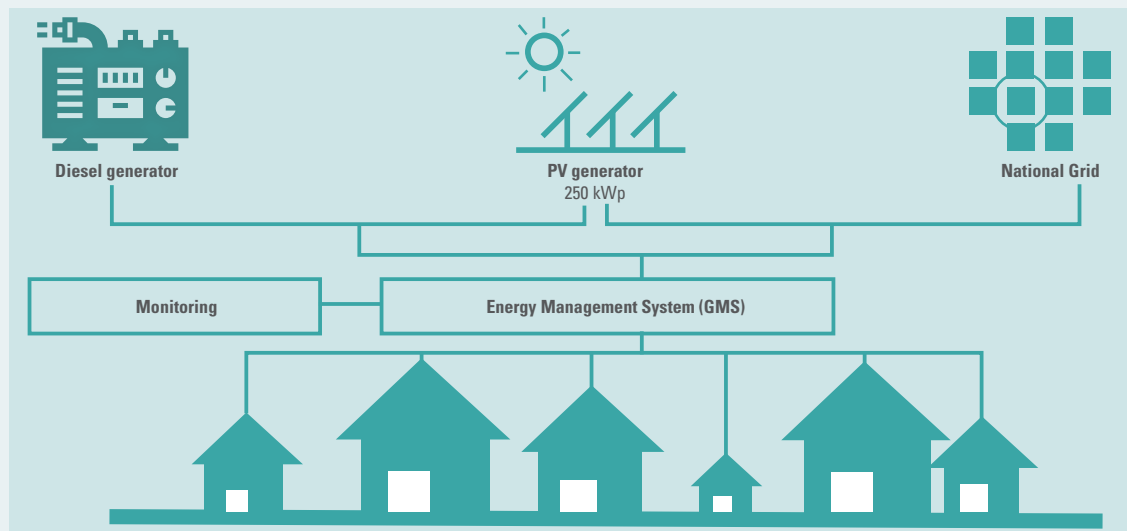
Overview

The UNDP CEDRO Project implemented a 250 kWp community solar plant in Kabrikha, a village of 400 households, with an average residency of five individuals per household, located in the South of Lebanon, thus, establishing the country's first green village, with the necessary technical, legal and financial structure, aiming for a breakthrough in a monopolised, single-buyer electricity structure suffering from inefficiencies and unreliability.

The hybrid solar PV-diesel plant comprises a centralised PV generator, inverters, PV plant controller unit, generator control unit, substation, data loggers and auxiliary equipment, in addition to smart meters enabling proper reading and data collection of the monthly consumption of residences in the village.

The plant is estimated to produce 307 MWh of electricity annually, enabling a reduction of GHG emissions of 250 tonnes per year, and is configured as follows:

Figure A. Configuration of the community solar plant in Kabrikha



Operation

The community solar plant runs in dual mode, as shown in [figure A](#) above; it is complemented by either the electricity utility EDL, or the municipal diesel generators. During blackout hours, the plant injects electricity through the municipality's separate electricity network.

In fact, one of the main criteria for the selection of the beneficiary village in addition to the size and number of households, electricity consumption, land availability, and ability to contribute to the system's implementation was the existence of a separate generator network and units, operated by the municipality, which was later connected to the PV plant. The municipality of Kabrikha owns and operates four diesel generators, of which two are typically in use at a certain period of time, while two remain on stand-by, and supplies electricity during blackout hours to 90 per cent of the households, with the remaining ten owning their own private generators. Out of the total 400 households, 160 have expressed interest to be connected to the community solar plant. Worth mentioning however is that the village is not fully occupied all year long, as many of its citizens live abroad.

For the implementation, UNDP developed a legal framework enabling community net-metering, and a billing scheme catering for this, in collaboration with EDL.

The project's goals are reported as follows:

- Providing an innovative and clean electricity production and allowing the village residents to benefit from the abundant solar energy;
- Introducing the concept of a centralized community-owned PV plant system;
- Providing accurate readings of the households' monthly electricity consumption and remote and infrared monthly readings;
- Introducing, testing and demonstrating community-level net metering through virtual net-metering.

Figure B. Kabrikha 250 kWp community solar panels



Source: Author.

lessen the risk of failure and stimulate activities, thus increasing revenues and employment opportunities.

The approach should include several pillars, as follows:

- Know-how to start a business;
- Skills to grow a business from micro to small and medium scale;
- Factors ensuring sustainability;
- Ability to identify competitive edge.

The potential for developing entrepreneurial activity multiplies when training on skills and the pillars is available to people in rural areas.

Renewable energy systems can create job opportunities for the local community in installation, maintenance and operation across the value chain following thorough

capacity-building. Reskilling through the transfer of technology and know-how provides new jobs and increases entrepreneurship, thus lowering unemployment and slowing migration to urban areas, mainly the capital.

Further, renewable energy increases the productivity and performance of sectors by significantly reducing operating costs, and creating employment across productive activities. The electricity blackouts in rural areas result in high economic and financial costs and require a shift in work hours to accommodate the scheduled power supply, leading to major loss of productions and revenues. Cooperatives not able to afford a private generator or to subscribe to a neighbourhood generator may have to shut down during power outages. Those who decide to invest in a second power source complain about high operating costs driven by two

electricity bills, and confirm these expenses hinder growth and the marketing of their businesses.

Stakeholders emphasize the potential of renewable energy to improve life conditions and productive activities through continuous access to electricity, and the displacement of private generators, which often reduces bills. Savings on operating costs can be channelled into increasing visibility through marketing and exhibitions, or investing in new production lines or innovative solutions, ultimately leading to increased sales and business growth.

With a collapsing economy and declining living standards, entrepreneurship is set to grow, particularly in rural areas. Many interviewees spoke of their aspirations to establish new revenue streams by starting or developing a business, which an expanding renewable energy sector combined with a reskilled workforce can enable.

2. Risks and challenges

Despite the economic need and the desire to embark on an entrepreneurial journey, local communities still lack finance to start, or in particular, grow a business, market access, know-how and management skills. Readiness to start a business is limited since the risk is perceived to be high. Anxiety over generating sufficient revenue, or not being able to scale up the business, results in a fear of the fixed costs, taxes and permit fees. This leads to more informal entrepreneurs, employing seasonal, temporary and freelance individuals. A lack of data, information and market research adds to the barriers.

Assistance from the government, national or local, is rarely available. The rural population has limited knowledge of the broader national market and international opportunities. This limits entrepreneurial activities to their local areas, or even their small circles, decreasing market reach and therefore revenues. Interviewees reported having the capacity to

increase production and product lines but cited lack of market potential as a deterrent.

There is also poor understanding of marketing. Lack of knowledge, and of channels to market products, was reported by interviewees, despite the conviction they should be able to reach a bigger market. In an increasingly digital world, the rural population faces digital illiteracy and an inability to keep pace with rapid technological change. Social media can play a role in increasing reach but capacity-building is also necessary.

In a survey of 2,000 individuals for the 2018 Global Entrepreneurship Monitor report for Lebanon, more than two thirds of adults perceived themselves as having the necessary skills to start a business, ranking the country the fifth highest on this indicator (Hill, 2018, p.10). But there is a gap between perception and reality, especially in rural areas, where the obvious lack in skills is obstructing the development of businesses.

Growing a business is rarely accounted for at the start-up stage. This, coupled with the lack of basic management skills, is leading to business failures or a permanent inability to grow.

The dominant patriarchal society is a further barrier to rural women's entrepreneurship as they are still viewed as housewives. Entrepreneurship is more common among men than women, whose productive activity is mostly in-house and informal.

Interviews with local stakeholders clearly show the need to promote women's capacity to start, manage and market a business.

3. Women's empowerment rural development programmes

In recent years, there has been a sharpened focus on empowering women as part of rural socioeconomic development, with many local and international organizations implementing projects that have achieved relatively

significant results. Key themes noted are the cultural barriers hindering women's activity, wide discrepancies in the local context, and the desire for fast impact.

In selecting geographic locations for projects in general, those with more open cultural backgrounds have been favoured. This has left a significant share of the rural population behind. In more restrictive cultures, the focus has been on mainstreaming activities within the scope of a project, providing limited interventions prioritizing women. But trends are changing, with an increasing number of initiatives – either being assessed or in the early stages of implementation – seeking especially to involve more women in productive activities.

Some projects in the early stages aim to map the women in productive sectors, target women cooperatives by assisting their start-up or their growth, or build digital applications to promote products outside their geographic areas. Being selected is considered a main enabler of implementation. Successful projects have resulted in more autonomy, expanding the capacity and financial independence of women participants, although follow-up, especially in the early stages, has often been crucial.

Despite tangible improvements in many areas, the absence of follow-up was the major shortcoming in most implemented projects. The majority of organizations are looking for direct and fast impact, driven by donor requirements

for immediate results, but the long-term impact is often compromised.

Work that has focused on developing cooperatives has had significant impact, as the women involved displayed entrepreneurial spirit and an eagerness to improve revenues.

Microfinance institutions are also turning more to women, relaxing barriers to financial access. Interviews with microfinance institution representatives conducted for this study in March and April 2019, along with an assessment of their published case studies, showcase significant drive and determination among women who have tapped into their funds, with a high share of success stories, though pointed regional disparities and cultural influences.

Discussions with local stakeholders identify decision-making and responsibility-taking as a barrier hindering women's greater engagement in productive activities.

Those in rural areas are shying away from having to make decisions and assume large responsibilities. Observed to be doing fairly well when local or international organizations were involved in the decision-making, women's performances fall off when that participation ended. Equipping them with the business skills to improve their decision-making, and assume greater roles and responsibilities, is key to encouraging their participation in productive activities.



2. Field Assessment

A. Methodology

This second part of the baseline study focuses on the process to select a rural community/communities where most REGEND activities will be conducted; in particular, the pilot projects to be selected based on specific criteria already defined in the REGEND document.

The REGEND project stresses the importance of an integrated approach for the economic and social development of rural areas to improve rural livelihoods. This can be achieved through the better management of available natural resources, and the optimal use of small-scale renewable energy technologies.

A diagnosis/assessment was undertaken in selected communities to collect qualitative and quantitative information on energy and development needs. Stakeholders were interviewed and site visits made to identify the key issues to be addressed and the potential for safe and sustainable use of renewable energy as a catalyst for rural development. Possible strategies and interventions were identified, including information and awareness campaigns, training, capacity-building, research, projects and policies.

The analysis aided strategic planning by identifying strengths, weaknesses, opportunities and threats (SWOT) that could affect the activities of REGEND. The assessment aimed to achieve the following:

- a. Understand major socioeconomic challenges, especially for rural women (main income sources, potential of the region, principal economic activities);

- b. Identify biggest barriers to development in the selected community/communities;
- c. List activities based on small-scale renewable energies to be undertaken to enhance rural livelihoods;
- d. Identify the type of assistance to be offered to the selected community/communities and the organizations working there to improve economic situation and performance;
- e. Assess capacity needs at various levels (local administration, socio-professional structures, rural woman).

The study sought to identify potential national and key local stakeholders, who will form part of the local facilitating team to be established at the national/community level. This work was carried out using the following methodology:

- a. Set, validate and apply the selection criteria to identify the rural community/communities that will benefit from the project's activities;
- b. Selection criteria established and validated with the participation of stakeholders;
- c. Field survey undertaken in six rural communities to collect, analyse and process data and information.

During the assessment phase, many interviews were conducted with leaders of targeted stakeholders, including government officials, farmers, cooperatives, municipalities and unions of municipalities, CSOs and agriculture departments. A list of interviewed stakeholders/entities is provided in the annex to the report.

B. Selecting a pilot rural community

In order to select the pilot rural community/communities, a stakeholders meeting was organized in Beirut. Selection criteria were established and validated through a focus group meeting organized by ESCWA and the LCEC, with involvement of key stakeholders, namely, UNDP, FAO, the Ministry of Social Affairs and the American University of Beirut (AUB).¹⁴

These criteria were as follows:

- The regional development index of the proposed region;
- The potential to enable small-scale renewable energy applications that could help improve the livelihoods of the rural population;
- The existence of one or more socio-professional structures able to guarantee the sustainability of the project (cooperatives, NGOs);
- The existence of solid structures able to gather and unify rural women;
- Accessibility of the rural community;
- The security situation;
- A budget dedicated to the pilot projects in the framework of the REGEND project.

According to the selection criteria and an initial assessment, villages were shortlisted for site visits, as follows:

Village	Governorate
Akkar El Atika	Akkar
Fnaydek	Akkar
Tall Abbas El Gharbi	Akkar
Mechmech	Akkar
Chaqdouf	Akkar
Rashaya-Hasbaya	Bekaa

Village	Governorate
Akkar El Atika	Akkar
Chaqdouf	Akkar

Based on an assessment following site visits and interviews with local stakeholders, the following two villages were selected for implementation (for further details, see section I):

Akkar El Atika, located in Jered Akkar, and Tall Abbas El Gharbi, in Sahel Akkar, offer different agricultural produce (mostly apples versus potatoes/wheat) and different energy loads, and were initially estimated to serve as complementary case studies. Both locations have complementary cooperatives and agri-food production. The great distance between the two sites and the dominant patriarchy in Tall Abbas El Gharbi led to higher scores on the key pillars in Akkar El Atika. Chaqdouf, a small village located 4 km from Akkar El Atika, serves as a complementary village encompassing the project's key requirements. The combination of Akkar El Atika and Chaqdouf for project implementation was found to be optimal.

C. General observations

There is a widening trust deficit towards the Government, donors and CSOs, especially in Akkar.

Political, financial and economic crises in the country have resulted in an almost complete loss of trust in Government. In rural areas, this has been aggravated by the lack of equitable development of regions, and the increasing pressure on the most vulnerable populations, the majority of which live in rural areas. According to field work, citizens have lost trust in donors, development and humanitarian aid agencies and implementing CSOs; they appear to have overpromised and underdelivered, leading to dissatisfied local communities. Citizens are now asking whether “they are going to see any benefits at all”.

Similar to donor fatigue, the local community is suffering from assessment and survey fatigue. There is an overwhelming sense that a significant number of development and aid agencies and CSOs undertake thorough assessments, collect data and then either disappear or implement small-scale projects “mostly for the refugees”, as reported by large numbers of citizens. This has resulted in a lack of motivation among the majority of citizens speaking to donors and organizations.

Lack of trust and fatigue have led to a suspicion of information sharing. The local community has been hesitant about sharing data and information, especially on the extent of their productive activities. The majority have also been reluctant to answer questions related to their energy bills and spending; some have given obviously incorrect information and others declined to answer. Given most economic activity in rural areas is informal, the economic and financial crisis has exacerbated fears of the Government and how information will be used and shared.

The socioeconomic indicators seem worse on the ground than in data and figures. Vulnerability

of the local community is seen to have multiplied in the past few years. All of those interviewed voiced frustration over the economic crisis, stated an inability to make ends meet, and expressed significant worry about their future prospects. Even households that appear less vulnerable and are at middle-income level are living by low-income indicators, facing increased stress and lower, non-regular income, with lower purchasing power. This is especially true of Akkar, where the majority of villages reported a significant fall in living standards and spending ability compared with previous years. It is worth noting that these indicators were originally low.

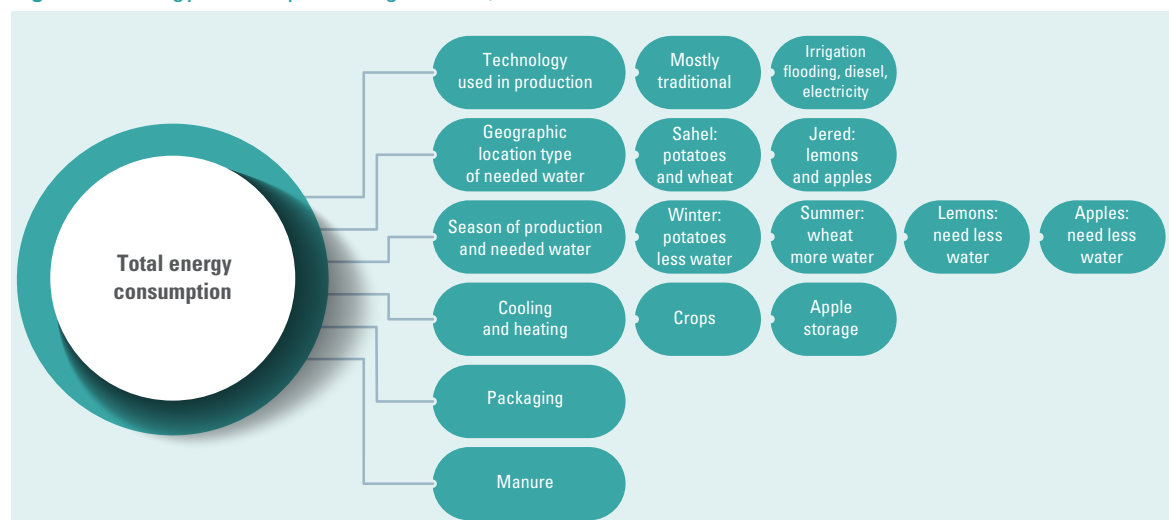
Most villages visited have active CSOs, although all reported their involvement was decreasing due to stress on budgets and donor fatigue.

D. Energy findings

1. Energy situation in rural areas

The energy situation in rural areas is worsening, as reported by stakeholders who were interviewed.

Figure 15 Energy consumption in agriculture, Akkar



Source: Author.

Note: Energy consumption, excluding transport.

Figure 16 Image of traditional diesel tractor irrigation, Akkar



Source: Author.

In Rashaya-Hasbaya, which traditionally has had a better electricity supply than other areas due to the region's hydropower plants, interviewees reported an increasing number of blackout hours. They were concerned about a tariff hike due to the elimination of subsidies.

Interviewees in Akkar have also reported increasing power cuts, allegedly reaching 48 consecutive hours in spring 2019.

2. Energy usage in productive activities

(a) Agriculture

Energy consumption varies depending on the technology used in production, the type of crops (which is also related to the geographic location), the season of production and the corresponding water requirements and technology adopted for irrigation, the cooling and heating requirement (when applicable), fertilizer and manure, and storage packaging process.

Agricultural production in Akkar depends on the geographic location. Potatoes and wheat are dominant in Sahel Akkar (that is, Tall

Abbas El Gharbi), while lemons, tomatoes and apples are the most important in Jered Akkar (Akkar El Atika and Fnaydek). Producing apples requires less manure, less water and thus less energy consumption, but a high electricity requirement for cold storage. Potatoes are cultivated in winter, and require irrigation only once or twice, depending on the precipitation level. Wheat is grown in summer, and requires irrigation approximately six times. However, potatoes and wheat are cultivated in the same land.

There are three types of irrigation in Akkar; half is traditional and manual, the remainder split into irrigation through electricity located close to households and irrigation through a diesel tractor in isolated agricultural areas (figure 16).

(b) Agri-food industry

Agri-food is mostly produced through electrical machinery and equipment supplied by development and aid agencies to support the sector, even in small cooperatives in rural areas. However, produce is seasonal, and equipment is not run simultaneously, which decreases the total electricity load of cooperatives.

For apple production, several cooperatives have electrical machinery for apple size selection, but reported resorting to manual trial of apples.

With the exception of dairy products (detailed in the following section), agri-food industries and cooperatives do not often require cold storage.

(c) Livestock and dairy products

The energy consumption in livestock differs according to the type and its requirements.

Cows require less energy than poultry.

Electricity is needed for milk extraction through electrical equipment, mostly in medium and large farms, and for cold storage. Poultry production requires heating and cooling, and the energy/electricity load is higher. Traditional cooling is carried out through the desert cooling process, where a device cools air through the evaporation of water.

For dairy products, the constant need for fridges and cold storage is responsible for the bulk of electricity consumed.

Some rural households own a few heads of cattle and/or poultry, and produce dairy products, manually and informally. The only energy requirement is for refrigerator usage. Stakeholders interviewed reported using their regular household fridge for this purpose.

(d) Handicrafts

Handicrafts are uncommon in the selected rural areas, especially Akkar. Chaqdouf was the only village reporting active production, with a fabric workshop employing women and using electricity, mostly for machinery and lighting. In Tall Abbas El Gharbi, one woman-led household depends significantly on handicraft (crochet) and requires lighting only.

(e) Ecotourism

With the exception of Tall Abbas El Gharbi, all the visited sites are located on Lebanon's Mountain Trail, and have active ecotourism,

particularly Rashaya-Hasbaya. The sector is still in its infancy, with most villages having low numbers of ecolodges or guest houses, or none at all, and few restaurants. Improvements are planned for the sector, however. Existing restaurants and guest houses are run by men, assisted by their wives, especially for cooking and cleaning.

The energy consumed is mostly for lighting, heating and cooking purposes.

E. State of local governance/ municipalities

Municipalities in rural areas are characterized by poor resources and a demonstrable lack of trust in centralized Government and, increasingly, in development and aid agencies. They maintain agencies have not been assisting in the most relevant areas, or with the required finance.

Following the Government's failure to disburse payments since 2016, the majority of municipalities across the country went on strike in the winter and spring of 2019, during the period of this study, and halted such action at the end of the spring following partial disbursement of payments. In Akkar, the interviewed municipalities have stated that smaller municipalities had closed permanently. The few that had the financial capacity to remain open have shown a higher interest and capacity for the REGEND project.

The remaining municipalities that have either temporary or permanently closed have lower resources and internal capacity, and most likely an inability to contribute to any project implementation, not even in-kind contributions.

All those interviewed requested renewable energy interventions, the majority for village water pumping systems. The union of Rachaya-Hasbaya is considering implementing

a centralized hybrid solar PV/diesel system to supply the village with electricity, thereby reducing the need for costly municipal diesel generators.

In general, municipalities were concerned about raising expectations for projects that might not happen, and even the active ones facilitated access to only a sample of people.

F. Cooperatives

The number of active and credible cooperatives is low; less than 10 in Akkar, and four in Sahel Akkar, as reported by stakeholders.

These play a significant role, especially in agriculture and agri-food. They bring together small farmers and provide necessary crops and fertilizers, selling them to the farmers at the production cost.

Productive activities in rural areas lack coordination, are fragmented and run informally in small enterprises and households, hence the growing importance of reliable cooperatives in these environments.

Cooperatives have a high-energy consumption depending on their operation, outlined as follows:

- a. Agriculture cooperatives that produce crops (Tall Abbas El Gharbi) – heating and cooling loads driving their consumption in addition to some electrical equipment;
- b. Agri-food cooperatives (Fnaydek and Akkar El Atika) – production machinery and electrical equipment with significant consumption.

While they occupy an important role in rural areas, interviews with stakeholders indicate that having strong cooperatives not aligned with the municipality can result in conflicts of interest and tension, negatively impacting the sector.

Stakeholders recommend ensuring that the two entities are aligned.

G. Women's role

Women in Akkar are less involved in productive activities than in the other surveyed rural areas, and mainly within the agri-food industry and cooperatives. Some are active in the informal economy with agri-food and livestock, and run small businesses from their households.

Details on women's activities in each village can be found in the site overviews.

H. Site overviews

1. Fnaydek, Akkar

Apple production dominates agriculture. The two major productive entities are the women-led agri-food industry cooperative, and Emkan, an apple storage facility.

The cooperative, which is operational all year with an average of five women full-time and up to 20 seasonal staff, is active and participates in weekly food exhibitions in Koura, Tripoli and Zgharta. It has received funding from the United States Agency for International Development (USAID) and other organizations but no municipal support. The cooperative runs on power from the State-run EDL and a 55 kilo-volt-ampere (kVA) back-up generator.

During the summer, the cooperative's EDL bills are approximately \$67-87 per month and it requires on average one and a half barrels of diesel fuel.

Using renewable energy would allow a significant reduction in operating costs, enabling the cooperative to invest in new lines of production, and increasing income and the potential to hire more women.

Emkan's apple storage facility serves approximately 1,000 small farmers, only four of whom are women. It comprises large cold rooms, operating on a seasonal basis.

Figure 17 Images of Fnaydek women-led cooperative, Akkar



Source: Author.

SWOT analysis	
Strengths	Weaknesses
Presence of a strong woman-led cooperative employing a significant number of women	Limited productive activity across the village Limited women's activities outside the cooperative Limited entrepreneurial spirit, especially among women
Opportunities	Threats
Potential to increase lines of production, revenues and employment by reducing operating costs through implementing a renewable energy system	Weak local governance threatening successful implementation of the project Limited project beneficiaries and overall impact

2. Akkar El Atika, Akkar

Akkar El Atika is vulnerable, but despite being inconsistent, is more active than other municipalities in the region.

In collaboration with UNDP, the German Development Bank KfW and the Ministry of Social Affairs, the municipality completed in 2017 the construction of a facility to be used by the three active agricultural cooperatives: the Agricultural Cooperative Union, the

Women's Association for Processing Agri-Food Products and the Beekeeping Union. Women participate in the first two, with the Women's Association led by women and employing about 40 seasonal women workers. The cooperatives have electrical equipment, and a small back-up diesel generator serving two of the three cooperatives.

The agriculture and beekeeping cooperative unions sell to local beekeepers and farmers in the area at production cost. A renewable

Figure 18 Images of the Akkar El Atika cooperatives



Source: Author.

energy system would reduce the cooperatives' electricity bills, and lead to a further reduction in the production costs of these local farmers and beekeepers across the area.

The beekeepers cooperative produces 10 tonnes of honey per year but requires training on how to raise queen bees. To increase sales and revenues, the cooperative is currently working with the Chamber of Commerce Industry and Agriculture of Tripoli and North Lebanon to create a registered honey brand.

The woman-led cooperative has lacked the finance to market its products in nearby villages and distant cities, which would increase sales. Transport to and from rural Akkar is a serious burden. A positive experience working with CSOs has facilitated participation in exhibitions where it has been able to sell listed products. Implementing a small-scale renewable energy system would reduce high operating costs, and increase the profit share and the ability to invest in marketing and visibility platforms.

The cooperative has expressed an interest in developing marketing skills, and using social media and Internet advertising to achieve wider outreach and sales, and in developing activities to produce more fruit-based products.

The village has one ecolodge and two others under construction. The expectation is that they will be run primarily by men, assisted by their wives. There are also tourist sites that need to be rehabilitated, and the municipality is ranking ecotourism higher on its agenda. Four restaurants in the village are on the Lebanon Mountain Trail and are also led by men.

Akkar El Atika includes a river and 356 water wells. Details on water flow and hydropower were not available, which limits any assessment of their potential.

There is wind potential on the village hill, where six private cow farms sit close to each other, typically consuming electricity mostly for producing cow's milk.

SWOT analysis	
Strengths	Weaknesses
Presence of a strong woman-led cooperative employing a significant number of women	Limited entrepreneurial spirit especially among women Women-led cooperative's limited experience in marketing, advertising and selling products
Opportunities	Threats
Potential to significantly decrease operating costs and increase profit margin, part of which can be invested in participating in exhibitions, marketing and better positioning in the local market	Existing inability to easily involve a significant number of women in productive activities

3. Tall Abbas El Gharbi, Akkar

The municipality is active, with a higher financial and manpower capacity than others in the area. The mayor heads the cooperative for agricultural produce, livestock and manure, which operates 50 per cent of agricultural land in the Sahel Akkar area.

The dominant agricultural produce is potatoes in winter, wheat in summer. Water pumps run either on EDL supply in areas close to houses, or are traditionally diesel- powered on land distant from houses. The pumps consume 9.5 kW (25 amperes and three-phase).

The cooperative runs a manure factory that collects wheat and compresses it, later packaging it to be sold to farmers. Adding manure saves 30 per cent in production costs. The factory has 10 employees, all male, relying on a 100 kVA back-up generator during EDL blackouts.

Farmers working in potatoes and wheat comprise a large share of women, most of them refugees.

The village also has a cooperative working in crop production that was established by UNDP as part of a peacebuilding project. It runs on

Figure 19 Images of upcoming agri-food industry, Rashaya



Source: Author.

SWOT analysis	
Strengths	Weaknesses
Strong and engaged local governance Presence of two active cooperatives	Very limited entrepreneurial spirit especially among women Lack of women-led cooperatives or initiatives
Opportunities	Threats
High ability of follow-up by the municipality ensuring project sustainability Opportunity to reduce operating costs for village farmers	Dominant patriarchal society threatening the engagement of a significant share of women in productive activities

a 60 kVA generator, requiring electricity for heating, cooling and electrical equipment. There are between six and eight daily women workers. The cooperative sells crops at production cost to local farmers, which is a 30 per cent reduction compared with the regular market price. Installing a renewable energy system will further reduce the cooperative's operating costs, enabling lower crop costs for the local farmers. The mayor indicated that cooperatives in Tall Abbas El Gharbi are barely surviving due to increased operating costs, especially for electricity.

There are informal productive activities, mainly households keeping livestock and producing dairy items. Discussion with the local community revealed the majority are led by men but are run by their wives when the men assume other roles. Households require fridges for cold storing dairy produce, and all report having a generator subscription of approximately \$47-53 per month, which, with the EDL bill, totals \$100.

One woman operates a handicraft activity (crochet) and needs lighting.

4. Rashaya-Hasbaya, Bekaa

Rashaya in the Bekaa Governorate is less vulnerable than the villages in Akkar. Local governance is strong, engaged and can contribute heavily to projects, at union and municipality level.

The agri-food industry is made up of one cooperative, one private MSME and also informal household produce. The MSME, which is led by women, produces organic food such as tomatoes, cucumbers and peanuts, and also lavender. Electricity is needed mostly to operate electrical equipment, especially drying machinery. Land irrigation is done through water-pumps operating on EDL supplies.

The agri-industry cooperative, is headed by a man and his wife, and employs eight women, rising to 18 women in the peak summer season. The highest energy load is for two cooling rooms to store dairy products, which is connected to a 6 kW solar PV system with battery storage that was implemented through a grant by the humanitarian aid organization Mercy Corps. The monthly electricity bill has since fallen from \$133- 166 to \$60.

One woman runs a kitchen from her house, using electricity for cooking and refrigeration, with a total bill of approximately \$100 per month, in addition to liquefied petroleum gas purchases for cooking.

The village has three private guest houses, operated by men and their wives, with the bulk of their energy load used for heating and lighting. A few households produce agri-food and dairy products, with most work done by housewives. In addition, there are three small cow farms, run by men, and consuming electricity for milk production.

These activities all typically rely on the EDL for electricity but have been suffering from an increase in the number of blackout hours since the end of 2019. Stakeholders fear the negative impact of upcoming tariff hikes on operating costs, approved by the parliament in 2019 as part of that year's electricity plan, and which would limit their sustainability and resilience. Small-scale renewable energy systems would mitigate that risk and increase profit margins, therefore improving investment ability.

Lessons learned from the PV system installed in the Rashaya agri-food industry include the following:

- a. Future implementation should take account of local abilities, and look to expand capacity in operation and maintenance, especially for small tasks such as cleaning PV panels and monitoring battery levels;
- b. Additional emphasis should be placed on supplying and implementing high-quality material and components.

SWOT analysis	
Strengths	Weaknesses
Strong and engaged local governance at union level Active women in the population	Higher socioeconomic indicators than other areas Lower electricity bills at current tariff, driven by high electricity supply compared with other regions
Opportunities	Threats
High follow-up ability by the municipality ensuring project sustainability Opportunity of engaging a significant share of women in productive activities	Low impact of renewable energy, and the overall REGEND project, at current supply

5. Mechmech, Akkar

The village of Mechmech has limited engagement in productive activities. There is minor agricultural activity, and then only in the summer period. According to the local community, reduced profitability is the reason behind the retracting agriculture sector.

Ecotourism is active in the municipality, which includes the Darb El Arz hiking trail,

though there are few things to do in the village.

Women's involvement in productive activities is limited. Some households keep livestock and produce dairy items in an informal way. In these households, a woman's role is limited to assisting her husband.

There are no active cooperatives, or intentions to establish them.

SWOT analysis	
Strengths	Weaknesses
None	Very limited entrepreneurial spirit and fragmented society Limited productive activities Lack of cooperatives
Opportunities	Threats
None	Limited collaborative potential and ability to engage women in productive activities

6. Chaqdouf, Akkar

Chaqdouf, a small village of 100 citizens, has no agricultural activities but has invested in handicrafts. Women are employed in a sewing factory established by the local NGO Live Akkar, which was founded by the mayor. The NGO is seeking to establish a chocolate factory in the village, which has received official approval.

The sewing factory employs six women part-time. It includes seven pieces of sewing equipment running on electricity. The electricity

bills amount to approximately \$150 per month, of which \$100 is for a private generator subscription.

The municipality is keen to create employment opportunities for local women, and strives to ensure a follow-up component in the projects implemented.

A small-scale renewable energy system would reduce the factory's operating costs, enabling it to better invest in new production lines and employ more local women.

Figure 20 Images of sewing factory, Chaqdouf



Source: Author.

SWOT analysis	
Strengths	Weaknesses
Active local governance engaged in promoting productive activities especially for women Presence of a sewing factory employing women	Lack of agriculture sector Limited entrepreneurial initiative Limited experience in marketing, advertising and selling products
Opportunities	Threats
Significantly decreasing the sewing facility's operating costs will increase its ability to invest in new production lines and employ more local women	Village mayor is also the head of the NGO investing in productive activities

In addition, the community – mostly women – would benefit from the improved skills gained through starting and managing a cooperative, and operating and maintaining a solar PV system.

I. Recommendations

1. Recommended site

Thorough site assessments and the SWOT analyses have shown that socioeconomic indicators are lower in Akkar than in other governorates, which highlights the need for increased intervention. On this basis, the rural communities recommended for implementing REGEND's field projects and capacity-building activities were Akkar

El Atika and Chaqdouf, which both hold the higher positive attributes of the five shortlisted sites in Akkar.

2. Suggested project interventions

These are productive activities, involving the relatively active participation of women, fair governance, and active and credible cooperatives and CSOs. They will benefit most from small-scale renewable energy implementation and capacity-building activities.

Being in the same vicinity (the villages are 4 km apart), capacity-building activities can take place at one of the two villages and include the residents of both. Akkar El Atika has more available space than Chaqdouf.

Village	Project implementation	Capacity-building
Akkar El Atika	<ul style="list-style-type: none"> • Solar PV systems, including battery storage, for the three cooperatives; • Solar water heater; • Procurement of equipment and training on their operation to grow current productive activities or develop new ones. 	<ul style="list-style-type: none"> • Managing cooperatives; • Entrepreneurship; • Marketing; • Branding; • Operation and maintenance of solar PV systems.
Chaqdouf	<ul style="list-style-type: none"> • Solar PV systems, including battery storage for sewing factory; • Solar water heater; • Procurement of equipment and training on their operation to grow current productive activities or develop new ones. 	<ul style="list-style-type: none"> • Starting and managing a cooperative; • Entrepreneurship; • Marketing; • Operation and maintenance of solar PV systems.

Women in both villages suffer from a lack of entrepreneurship and marketing skills. Those in Chaqdouf will benefit from learning how to establish and nurture women-led cooperatives.

In addition to the suggested capacity-building, communities require training in operating and

maintaining renewable energy systems. The lack of finance for equipment replacement and maintenance requires that the best industry standards are followed, and high-quality equipment is supplied and implemented. A maintenance provision should be accounted for.

Annex

Interviewed Stakeholders/Entities

	Title	Type of industry
1	Area manager	International organization
2	Area manager	International organization
3	Faculty professor	Academia
4	Assistant	Academia
5	Manager	Microfinance
6	Area director	Government institute
7	Technical manager	Non-governmental organization
8	Director	Non-governmental organization
9	Advisor	Government institute
10	Livelihood expert	Government institute
11	Area director	Government institute
12	Environment expert	Non-governmental organization
13	Energy expert	International organization
14	Social entrepreneur	Private sector/non-governmental organization
15	Social entrepreneur	Non-governmental organization
16	Mayors and municipal board members from Akkar, Bekaa, and Mount Lebanon Governorates	Government institutes
17	Head of union	Government institute
18	Head of union and cooperative	Government institute/cooperative
19	Decentralization expert	Non-governmental organization

Endnotes

1. Productive activities are usually defined as activities that have economic value in the marketplace. A more contemporary definition includes any activity that produces a valued good or service, even if it is not paid for.
2. The World Bank report was published in 2013. See World Bank, 2013.
3. The survey was conducted in October–November 2014 and included 855 households of Lebanese host communities.
4. For further information, see Coburn and others, 2007; Coladarci, 2007; Cromartie and Bucholtz, 2008; Hart, Larson and Lishner, 2005; Howley, Theobald and Howley, 2005; Braga, Remoaldo and Fiúza, 2016.
5. CEDRE stands for Conférence économique pour le développement, par les réformes et avec les entreprises (Economic conference for development through reforms with the private sector).
6. As stated by stakeholder during interview.
7. The number of repeaters in a given grade in a given school year, expressed as a percentage of enrolment in that grade the previous school year, according to the United Nations Educational, Scientific and Cultural Organization.
8. A union of municipalities comprises several municipalities and its council is made up of the heads of these municipalities. The municipal union handles public projects of common benefit for the member municipalities.
9. Water scarcity can mean scarcity in availability due to physical shortage, or scarcity in access due to the failure of institutions to ensure a regular supply or due to a lack of adequate infrastructure, according to UN-Water.
10. According to Lebanese President Michel Aoun, speaking at the Council of Ministers, March 2018.
11. 196 families in rural areas in the North, Bekaa and South of Lebanon were surveyed. See Beucler, 2016.
12. Co-digestion is a process where energy-rich organic waste (fats, oils, grease and/or food scraps) are added to dairy or wastewater digesters with excess capacity. In addition to diverting them from landfills/public sewers, these materials have at least three times the methane production potential (e.g. biogas) of biosolids and manure, according to the United States. Environmental Protection Agency.
13. Insolation is the amount of downward solar radiation energy incident on a plane surface, according to Global Energy Balance, 2016, available at <https://geba.ethz.ch/>.
14. For more details, see <https://www.unescwa.org/events/group-meeting1-REGEN-renewable-energy-Lebanon>.

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