The Water-Energy-Food Nexus Approach for Rural Development: the role of small-scale renewable energy technologies and gender empowerment

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Regional Initiative for Promoting Small-Scale Renewable Energy Applications in Rural Areas of the Arab Region (REGEND)-Lebanon Intervention from a Nexus Approach





Ms. Jessica Obeid
Sustainable Energy Expert





## **Rural Indicators**



| Rural Population         | 12% of Lebanon's population is estimated to be rural  |  |  |  |  |  |  |
|--------------------------|---|--|--|--|--|--|--|
| Active Population        | Rural population accounts for an estimated 20-25% of the active population  |  |  |  |  |  |  |
| Poverty                  | Poverty is dominant in the rural areas of Akkar, North, South, Bekaa a Baalbek-Hermel   |  |  |  |  |  |  |
|                          | Rural poor are mostly small farmers, wage labourers, fishermen, and women heads of households   |  |  |  |  |  |  |
|                          | The most remote rural areas are characterized by low-income levels  |  |  |  |  |  |  |
| Main Productive Activity | Agriculture, with its related subsectors  |  |  |  |  |  |  |
|                          | Agriculture is either the sole source of income or an additional source of income for the majority of the Lebanese rural population         |  |  |  |  |  |  |
| Women Activity           | A study found that in 48% of surveyed Lebanese villages, the primary activity of women is in the agricultural sector, followed by education |  |  |  |  |  |  |

## The complexity and inter-linkages of rural natural resources

- Succeeding governments have not identified a sustainable strategy to develop rural areas, especially the most underprivileged.
- Productive activities suffer from poor government support, fragmented sectors, lack of technological improvements, and high production and operating costs.
- Lebanon is witnessing increased water stress. The water shortage is exacerbated by several factors, including increased population and demand, effects of climate change and water pollution.
- Rapid urbanization and changes in land use led to large share of productive land being degraded. These factors, along with climate change, are threat multipliers to soil erosion. It is estimated that 50 per cent of the territory is highly susceptible to future desertification.
- Food security is threatened by climate change, and the agriculture sector is constrained by energy and water resources and land availability.
- The unreliable electricity supply is a common barrier for improvement in productive sectors.
- Agriculture sector, main productive activity, is dominated by traditional methods and barely benefits from new technologies in its value chains.

High energy prices impact on production costs

The sector consumer 64 per cent of the available water supply

Inefficient flood irrigation accounts for 50-70 per cent of irrigation mediums

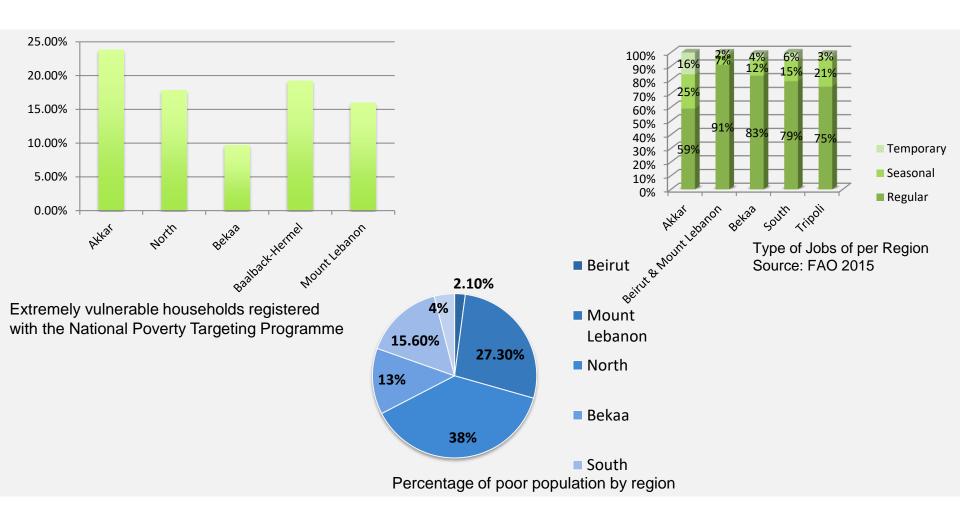
# Electricity consumption in agriculture and traditional water irrigation



# Barriers to rural women employment and entrepreneurship

- **Legal barriers:** lack of perceptible laws and policies support women's labor, and existence of discriminatory laws, especially the personal status law, which gives authority to the religious communities to apply their own laws on inheritance, children custody, divorce, etc.
- Cultural Barriers: 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. Entrepreneurship in rural areas is need-based and more common among men
  than women. There is a lack of management expertise and skill for selling products and
  growing market share, such as marketing and branding, especially among women.
- Financial Barriers: inheritance law in most cases denies women land ownership right, therefore creating further obstacles to securing loans through collateral guarantee. In addition to low banking access, especially in light of Lebanon's economic and financial crises.

## Rural socio-economic characteristics: Low income, high unemployment and small opportunities



## Barriers to rural women employment and entrepreneurship

- Growth of micro, small and medium-sized enterprises (MSMEs) across productive sector 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 and cooperatives across agriculture and other productive activity value chains would improve socioeconomic conditions by creating jobs for the most vulnerable.
- Equipping women with the necessary business skills improves their decision-making, enabling them to assume greater roles and responsibilities.

## Role of small-scale renewable energy in the foodwater-energy nexus in rural areas

|                          | Just development of rural areas  |  |  |  |  |  |
|--------------------------|--|--|--|--|--|--|
| 1. Rural development     | Transfer of technology and know-how provides new skills, especially for women, slowing rural to urban migration and retaining citizens   |  |  |  |  |  |
| 2. Rural economy         | In times of worsening economic crisis, the major benefit of small-scale RE is enhancing the rural economy, through enabling job creation and attracting funding and investments  |  |  |  |  |  |
| 3. Productive activities | Reduction of operating costs, increasing businesses and cooperatives ability to invest in new production lines and employ more local women   |  |  |  |  |  |
| 4. 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. Water efficiency      | Improving irrigation technologies, promoting water conservation and efficient usage  |  |  |  |  |  |
| 6. Land use              | Preservation of land for agriculture, and forests  |  |  |  |  |  |
| 7. Climate change        | Energy, water and land use management technologies leverage the rural natural capital and lead to more productive and resilient communities in the face of climate change Reduction in greenhouse gas emissions  |  |  |  |  |  |

## Pillars for the community's identification and selection

| Pillars | Relatively vulnerable rural area   |
|---------|--|
|         | Availability of natural resources (agricultural land, springs, rivers, etc.) |
|         | Availability of productive activities, with growth potential                 |
|         | Human resources and active population  |
|         | Infrastructure and ease of access  |
|         | Active participation of women in the labor force (or potential)              |
|         | Strong local governance (municipalities)                                     |
|         | Low security risk  |
|         | Active NGOs  |



## Akkar El Atika

### Chaqdouf







roperty may be

### Challenges to sites implementation

- Lack of updated data and information segregated by region
- Absence of data collection and sharing, combined with lack of trust in government and agencies
- Lack of and electricity consumption monitoring on the buildings level for the proper technology sitting and design
- Lack of roof and/or as-built drawings for the system design
- Poor understanding of the market outside the local level, and lack of marketing skills
- Security and political risk
- Economic and financial crises

#### **Facilitation**

#### **Local Facilitating Team**

Food and Agriculture Organisation

UNDP- LHSP Project, North Area

Lebanese Agricultural Research Institute (LARI)

Ministry of Agriculture - Aabdeh, Akkar

Lebanese Center for Energy Conservation

Mada Association

#### Local level: Akkar El Atika

Municipality

Cooperatives

#### Local level: Chaqdouf

Municipality

Live Akkar NGO

### **Sites interventions**

| Village        | Project Implementation   | Capacity Building   |
|----------------|--|---|
| Akkar El Atika | <ul> <li>25 kWp solar photovoltaic system including lithium-ion battery storage, for the building of three cooperatives.</li> <li>200 liters solar water heater</li> <li>LED lighting retrofit for the women cooperative (that doesn't have efficient light bulbs) and the municipality</li> <li>Procurement of equipment facilitating the works, including beeswax machinery, pomegranate squeezer and peeler, fridge and cooking gas.</li> </ul> | <ul> <li>Managing cooperatives</li> <li>Entrepreneurship</li> <li>Marketing</li> <li>Branding</li> <li>Operation and maintenance of solar systems</li> <li>Training on equipment operation to grow current productive activities or develop new ones</li> </ul> |
| Chaqdouf       | <ul> <li>10 kWp solar photovoltaic systems for a sowing factory.</li> <li>200 liters solar water heater</li> <li>LED lighting retrofit</li> <li>Procurement of new types of sewing machines to extend the work lines and products</li> </ul>   | <ul> <li>Starting and managing a cooperative</li> <li>Entrepreneurship</li> <li>Marketing</li> <li>Operation and maintenance of solar systems</li> <li>Training on equipment operation to grow current production lines or develop new ones</li> </ul>          |

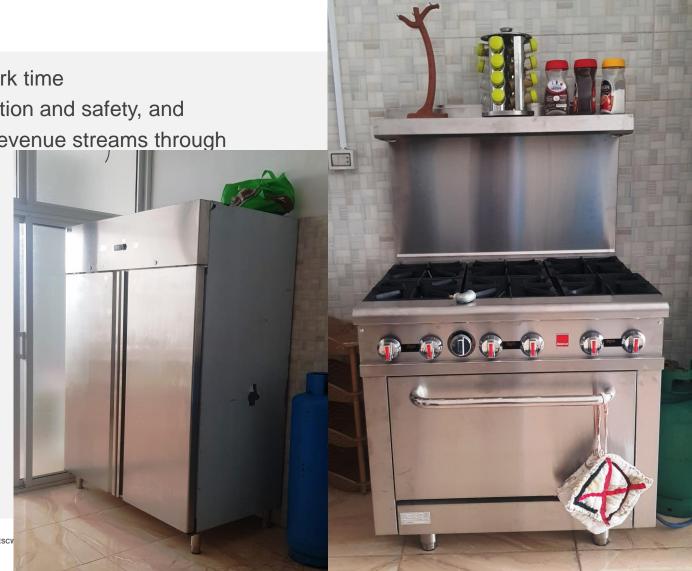
## **Site Interventions**

• Reducing women's work time

Improving food production and safety, and

increasing products and revenue streams through

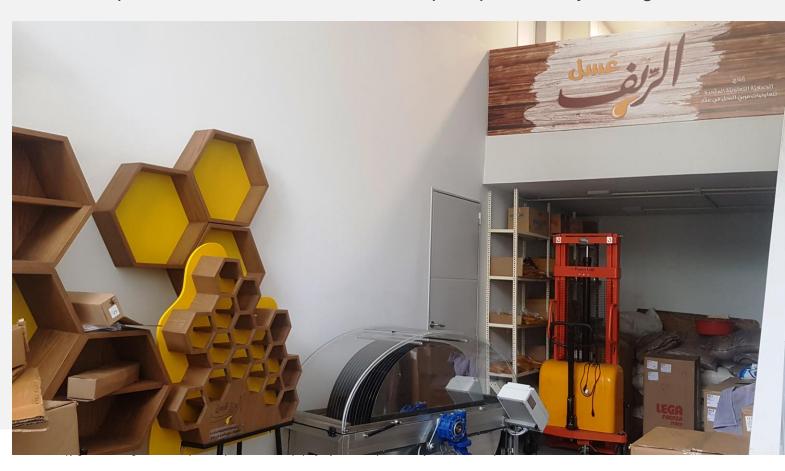
new equipment.



### **Site Interventions**

Improving bees and wax production, and therefore beekeepers productivity through

new equipment.



### **Site Interventions**

- Increasing women's work efficiency
- Enabling new product lines and revenue streams through new sewing machinery.



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## **Current Status: Evaluation and Contract Award**

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| Dual mode transfers for or grid with balatory storage professional pro | 1   | Photovoltaic modules, including the 5% spare spacety (rounded to the next integer), as per the requirements and specifications listed under sections 14.1 and 17 of the RIP's scope 1  L5  V generator complete with wiring (with earth |         | Photovoltaic generator Photovoltaic modules, including the 5% spare capacity (rounded to the next integer), as per the requirements and spacefilestions listed under sections 14.1 |          | ·s                 | ·  |  |
| components of the plant as per the requirements and specifications littled under a section 16.2 of the RVF's stope of works.   | 2   | Phase   | Status  |  |          |                    |  |  |
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|  |     | Total Cost in USD (exclude  | ling Ta | ax)  |          |                    |  |  |

## **Moving Forward**







### **Impact**

- Affordable electricity- Reduction of load on weak electricity grid
- Water and energy conservation
- Food safety
- Rural development
- Introduction of new product lines and revenue streams
- Entrepreneurship and management skills
- Gender mainstreaming
- Local governance of energy and water





#### **Jessica Obeid**

Sustainable Energy Expert jessica.obeid@gmail.com

## Thank you