



Lebanon Energy Efficiency & Renewable Energy Finance Facility



SUPPORTED BY Banque du Liban

*Sustainable Energy Investment* ► *Improved Business Results*

# ***Energy Efficiency and Renewable Energy in Animal and Crop/Fruit Farming***

The agricultural sector offers a very large range of energy efficiency and renewable energy opportunities, including those related to farm and operational buildings, those related to specific farming processes as well as associated mobile equipment. Below you can find many examples on energy saving opportunities.

**OUR ADVICE:** Consult with our engineers before making any new 'energy saving' purchases to make sure they will be appropriate for your needs.

## OVERVIEW OF EXAMPLES FOR ENERGY SAVING AND RENEWABLE ENERGY INVESTMENTS IN THE AGRICULTURAL SECTOR

<p><b>ADMINISTRATIVE AND OPERATIONAL BUILDINGS</b></p> <ul style="list-style-type: none"> <li>Insulation</li> <li>Heating and Cooling</li> <li>Lighting</li> <li>Solar PV</li> <li>Solar Water Heaters</li> </ul>	<p><b>ANIMAL FARMING - CATTLE / DAIRY</b></p> <ul style="list-style-type: none"> <li>Building insulation</li> <li>HVAC</li> <li>Solar PV</li> <li>Solar Hot Water Heaters</li> <li>Barn lighting</li> <li>Energy efficient dairy lighting</li> <li>Energy efficient milking equipment</li> <li>Energy efficient cooling tanks</li> <li>Tractors, farm equipment</li> </ul>
<p><b>CROPS AND FRUIT</b></p> <ul style="list-style-type: none"> <li>Grain Storage and Processing</li> <li>Fruit and crop drying, including solar dryers</li> <li>Fruit processing</li> <li>Tractors, seeders, harvesting machines</li> <li>Greenhouse insulation, heating and cooling</li> <li>Energy efficient motors and pumps</li> </ul>	<p><b>ANIMAL FARMING - POULTRY</b></p> <ul style="list-style-type: none"> <li>Energy efficient poultry lighting</li> <li>Ventilation and heating/cooling systems</li> <li>Solar PV and Solar Hot Water for stables</li> <li>Tractors, farm equipment</li> </ul>

### DAIRY OPERATIONS

More than most other agricultural operation, dairies rely on electrical energy for milking (vacuum pumps), cooling and storing milk, heating water, and lighting. With rising energy costs, unstable energy supply and static dairy prices, energy costs can be the difference between making and losing money. Savings opportunities include for example energy efficient:

- **Lighting** – use energy efficient LED lighting and save up to 40-70% per lighting unit (Based on LED T8 or T12)
- **Ventilation** – use energy efficient ventilation systems and save up to 50%
- **Milking units and Milk cooling** – replacing old milking equipment and milk coolers versus modern ones can save up to 30-50% in electricity
- **Water heating** – use solar hot water heaters, which can save up to 90% in energy costs (compared to a solid fuel boiler)
- **Vacuum pump motors** (e.g., variable speed drives) – you can save up to 60% in energy costs. A Variable Frequency pump or drive which changes the pumps capacity to meet the milking need resulting in energy savings of 50- 80%. It is recommended that Variable Frequency Drives be used for varying loads such as milk pumps, vacuum pumps and ventilation fans
- Heat extracted from a milk during cooling by a **heat recover system** ( e.g. plate heat exchanger) can be recycled to preheat water for sanitation use in the barn
- In addition, dairy operations are perfect for **biogas** plants and help you to increase your energy supply by making your own
- Install **PV panels** on stable and building roofs to make your own energy
- On-demand livestock watering systems reduce water consumption and energy

### MINI CASE - FARM MACHINES



For processing of fields, a company operated several types of tractors. Some of them were quite old and showed high fuel consumption. In order to increase productivity and reduce fuel costs the company replaced 3 of the old tractors against modern efficient models.

This resulted in annual fuel savings of 11,200 liters (25% saving) and a 30% decrease in processing time.

### MINI CASE - FARMING



A crop farmer replaced his continuous cross flow dryer with a continuous flow in-bin dryer. The investment was USD 60,000 and reduced annual energy consumption

by 120 MWh – which represented a 40% reduction. Additional savings were achieved by installing a control system for measuring grain humidity.

### MINI CASE - POULTRY FARMING



Ventilation is essential for keeping air quality in poultry breeding. Speed controlled ventilation limits energy consumption and heat demand of the facility

can be reduced. A poultry breeder equipped 25 fan motors with a total capacity of 100 kW with variable speed drives. The average energy consumption of motors was reduced by 45% annually! In addition, egg conveyors, fodder and manure transportation were modernized.

### GREENHOUSES

Typical annual greenhouse energy usage is 75% for heating, 15% for electricity and 10% for vehicles.

Energy conservation solutions range from common sense to extremely efficient heating, cooling and watering systems. Reduce Air Leaks by using door closers, weather stripping (doors, vents, fan openings) and lubricating louvers (a partially open louver may allow several air changes per hour):

- Poly film with an infrared inhibitor on the inner layer can give 15% energy savings
- Thermal Blankets can achieve 20%-50% energy savings
- Insulation of foundation and sidewalls
- Solar PV
- Heat exchanger and greenhouse control for ventilation will improve energy efficiency

### GRAIN DRYING

In some situations, more energy is used to dry a crop than to grow it. Planting techniques and moisture monitoring can help. If mechanical drying is required, the selection of a modern system can save up to 40% energy. It may also be possible to consider a solar drying system.

### BUILDINGS

Improve farm buildings, including administrative buildings and housing for workers by insulating buildings and using efficient heating and cooling. LED lighting can be installed in barns and in other areas of the farm to reduce the electric bill. Use solar Hot Water Heaters for your warm water needs and install solar PV panels to replace part of the electricity you buy of the grid. Consider solid fuel boilers, which can use part of the bio-waste produced on the farm to heat water and spaces.







## WHAT IS LEEREFF?

LEEREFF stands for 'Lebanon Energy Efficiency & Renewable Energy Finance Facility'. LEEREFF is a dedicated credit line for companies who wish to invest in sustainable energy including:

- Renewable energy
- Energy Efficiency in industry and commerce
- Green Buildings (Commercial)

LEEREFF offers investment support through loans from The European Investment Bank (EIB) and Agence Française de Développement (AFD), with interest rate subsidies provided by the Banque du Liban (BDL), and free technical assistance provided by an international team of engineers, financed by the EU.

Please visit our website to find out how you can benefit from and apply for a LEEREFF loan: [www.leereff.com](http://www.leereff.com)



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