Development of Software Tool for Integration of Grid Tied Roof Top Solar Photo Voltaic System for Dairy Industry

Mr. N. G. Ajjanna[1], Dept. of E&E, JNNCE, Shimoga, India, (M) 9686799389, nga_ee@jnnce.ac.in
Dr.H.B.Suresh[2] Professor, Dept. of E&E, JNNCE, Shimoga, India. , (M) 9611581458, hbs_ee@jnnce.ac.in
Dr.L.K.Sreepathi[3]. [3]Farmar Vice-principal, JNNCE, Shimoga, India, (M) 9448000643, sreepathi.lk@gmail.com

ABSTRACT

Population in India is continuously increasing, meanwhile the demand for milk and hence electricity demand for processing the milk and milk products has also been continuously increasing. Hence electrical energy is very crucial in diary industry. This paper focus on the development of a software tool for integration of Grid Tied Roof Top Solar Photovoltaic System (RTSPV). Computer programme has been written by using Python language in pycharm platform to determine the size of the RTSPV plant, based on Contract Demand and average units consumed per Month. An application software tool has been developed to determine the different component's required for installing RTSPV System, such as number of solar panels based on its power rating, inverters with its rating, rating of the AC Distribution Board (ACDB), length and size of the underground cable from AC Distribution Board to low tension (LT) side of the transformer and the energy that can be generated at a proposed site. Further, the software tool developed can be used to estimate the payback period and reduction of carbon footprints. In order to estimate the above parameters, Shimoga Milk Union Limited (SHIMUL) dairy, Shimoga, Karnataka, India has been selected. It has been estimated that **30%** of the total electrical energy required for the dairy industry can be met by installing RTSPV, the payback period has been estimated as **five years,** carbon footprints are reduced by around **480** tonnes per annum and slot -1 tariff charges refered to Time of Day Tariff (TOD) has also been reduced.

Keywords: Energy consumption in dairy, Rooftop Solar PV System, Application software.

1. Introduction:

The dairy industry plays major role in handling the abundant quantity of perishable liquid milk. Which has to be processed or converted into valuable products. This process demands large amount of electrical energy which leads to a higher production cost [17]. There is a serious concern to minimize the use of electrical energy from grid to save cost of electrical energy and major concern to preserve natural resources and thereby to minimize the global warming [13]. Electrical power is used throughout the dairy industry to drive process, compressed air systems, motors, fans, pumps, lighting and HVAC systems [3]. In addition to this, electrical power is used for cooling, freezing and cold storage. The Refrigeration in the dairy plants accounts about **55 to 60 %** of total electrical energy consumed. Diesel generator is also used as a captive power generation. In absence of grid power, diesel generator produces the electrical energy required for the dairy industry. As per the primary data collected from SHIMUL dairy, diesel generator consumes around **800 to 850** litres of diesel; boiler consumes **170 to 190** tonnes of briquettes per month. Further, dairy industry consumes an average electrical energy of **2, 50,000 units** per month and procures **1, 50,000** litres of milk per day [11]. In order to reduce the energy drawn from the grid and to reduce the carbon emission, integration of rooftop solar photovoltaic system with grid connected is highly essential. In view of the above, the present study has been carried out with the following objectives.

- To incorporate the decentralized energy technology (RTSPV) to meet the demand of the dairy industry.
- To develop software tool for integration of Grid Tied RTSPV) in order to estimate different equipment's and devices.
- To provide energy security for dairy industry with due environmental consideration.

2. Development of software tool :

Software tool is developed to determine the components and its rating, investment required for installing RTSPV system based on the average number of units required per month or the roof top area available for installing the solar power plant. It is also used to estimate the savings and reduction in carbon footprint.