

## **Abstract**

Palestinian farmers are suffering from shortage of energy sources and from bad environmental situations due to the accumulations of manure near their farms. The results of this research can help those farmers, by applying this project on their farms and providing an alternative source of energy from available manure.

In this study, 0.5m<sup>3</sup> biogas plant was built, and operated by poultry manure in continuous feeding mode; poultry manure was suitable substrate , with total solid content 20%, and C: N ratio 32, the daily average of biogas production was 108 L per a day. Solar system was used in order to increase the temperature of the digester and enhancement the anaerobic process at October and November months. The biogas production was increased by 88% and the temperature increased by 37% by using solar system.

Biogas and the spent slurry were the two main end products. Biogas was directly used for farm heating purposes as substitute of natural gas; the amount of heat that generated from the biogas was 777MJ. The methane percentage in biogas was 46% to 66%. The spent slurry was an excellent fertilizer; it has an NPK ratio of 1:1.3:1.3. The anaerobic digester and the sun drying of the slurry are able to destroy most of pathogens that may present by reduction the FS to 3log 10.

The financial analysis of the biogas plant shows great potential for making profit on the capital investment. The NPV, IRR, BCR, and payback period of financial analysis are 3,535\$, 26.8%, 1.57, and 3.2 years respectively. This shows that the economic profitability of the project is expected to increase, making investment in more worthwhile to farmers, since the substrate available.