

Solar Powering Systems for Climate Smart Poultry Production in Georgia

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Poultry Production and Sustainability

Currently, the United States (US) is the world's largest broiler producer and second largest egg producer with the annual sale value of \$40 billion. Georgia is the largest poultry producing state in the US. However, the current poultry and egg production is facing emerging challenges such as environmental impacts (i.e., greenhouse gas emissions from energy use and animal waste). Agricultural system is estimated with 11% contribution to total greenhouse gas emissions in the US. Therefore, climate smart farming is critical for enhancing the sustainability of poultry and egg production. Solar radiation or light (electromagnetic radiation) is emitted by the sun, which can be utilized to generate electricity. The amount of solar radiation in different regions is varying and affected by geographical, climate, and weather conditions. Solar energy is clean and free, which can be utilized as energy source of animal and plant production. Solar power technologies are engineering methods that capture or collect the solar radiation and turn it into electricity, which can be transmitted or stored in batteries for powering residences and agricultural facilities. On average, Georgia receives about 218 sunny days each year, making it a good state for solar power system installations.

Solar Power Systems on Poultry Farms

The installation of solar power systems requires land or space. Coincidentally, the land use for poultry production is not efficient due to planning and zoning requirements for protecting nearby residents from environmental impacts. For instance, poultry farms/houses are required to follow setbacks of 30-120 m (100'-400') from property lines and 90-150 m (300'-500') from any dwellings in the US. To enhance the land use efficiency and reduce farm electricity bills, more and more poultry farms are installing solar panels on the farm spare lands, especially in Georgia, the largest broiler production state in the US. The primary installation methods include ground mounted systems (Figures 1, 2, and 3) and roof mounted system (Figure 4). Roof mounted system has higher land use efficiency as compare to ground mounted system. However, cautions should be paid to

roof conditions as the installation requires newer roof with durable materials that will be able to withstand the load of solar panels.



Figure 1. A ground mounted solar power system with panels on concrete floor (photo credit: Lilong Chai).



Figure 2. Bird view of the ground mounted solar power system on poultry farm (photo credit: Lilong Chai).



Figure 3. A ground mounted solar power system with panels on grass lands (photo credit: Coastal Solar Solutions).



Figure 4. A poultry house-roof mounted solar power systems (photo credit: Coastal Solar Solutions).

Systems Cost and Savings

The current design can offset a 65% reduction in electric utility cost. Electric utility cost is about \$0.08-0.1 per kWh in GA in 2021. Farm generated about 60-65% of the farmer's annual usage. Of

the annual kWh produced by the solar array, about 15% to 18% is sent back to the grid. The farmer will get about \$0.03-0.04 per kWh sent back to the grid. Considering the high initial investment in solar power system, more offsets should be considered to compensate. USDA support for implementation of new technologies within agricultural systems such as solar power systems can be found in programs such as the NRCS Environmental Quality Incentives Program (EQIP) and the USDA Rural Energy for America Program. These programs offer financial incentives and cost-share funds to offset the costs of implementation of new equipment. These government programs are in place to assist producers in upgrading equipment and technology in order to be more environmentally sustainable.

USDA NRCS programs:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/>

USDA Rural Development programs:

<https://www.rd.usda.gov/programs-services/all-programs>

Summary

- 1) Solar powering system has been used to promote climate smart poultry production in Georgia, the largest poultry producing state in the US.
- 2) Poultry farm land use efficiency is improved by installing solar panels for generating cleaner electricity.
- 3) The current design of solar power system can offset a 65% reduction in electric utility cost for poultry farms in Georgia. Electric utility cost is about \$0.08-0.1 per kWh in GA in 2021. Farm generated about 60-65% of the farmer's annual usage.
- 4) USDA assistance programs and tax cut are important for poultry farms to compensate the initial investment.