

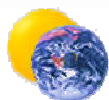
# Solar Energy:

## An Investment and Cost Guide

### For Delaware Poultry Growers



University of Delaware  
Delaware Science and Technology Council  
January 2010



Center for Energy and Environmental Policy

## Contact Information

Robin Morgan  
Dean  
College of Agriculture and Natural  
Resources  
University of Delaware  
(302) 831-2501  
[morgan@udel.edu](mailto:morgan@udel.edu)

Mike Bowman  
President  
Delaware Technology Park  
(302) 452-1100  
[mike.bowman@deltechpark.org](mailto:mike.bowman@deltechpark.org)

David Weir  
Director  
Delaware Biotechnology Institute  
(302) 831-1818  
[dsweir@udel.edu](mailto:dsweir@udel.edu)

John Byrne  
Director  
Center for Energy and Environmental Policy  
(CEEP)  
University of Delaware  
(302) 831-8405  
(302) 831-3098 (fax)  
[jbyrne@udel.edu](mailto:jbyrne@udel.edu)  
CEEP website: <http://www.ceep.udel.edu>

Andrea Kreiner  
207 Concord Road  
Dover, DE 19904  
(302) 423-2766  
(302) 730-3088 (fax)  
[akreiner@verizon.net](mailto:akreiner@verizon.net)

Marlene Elliott Brown  
State Director  
Delaware/Maryland  
USDA Rural Development  
(302) 857-3580  
[marlene.elliottbrown@de.usda.gov](mailto:marlene.elliottbrown@de.usda.gov)

Bruce Weaver  
Energy Specialist  
USDA Rural Development  
(302) 857-3580

Charlie Smisson  
Delaware Energy Office  
(302) 735-3480  
[Charlie.smisson@state.de.us](mailto:Charlie.smisson@state.de.us)

Scott Lynch  
Delaware Energy Office  
(302) 735-3480  
[scott.lynch@state.de.us](mailto:scott.lynch@state.de.us)

## Table of Contents

<u>Section</u>	<u>Page Number</u>
Introduction	4
Economic Impact	5
Decision Guide – How to Estimate Net Cost and Annual Savings	8
Solar Energy System Operation and Size	13
Pilot Study	14
Green Energy Fund Grant	15
USDA Renewable Energy Grants, Loans, and Loan Guarantees	18
Federal Tax Credits for Solar Energy	22
Renewable Energy Credits	24
Who Can Provide Assistance	25
Key Definitions & Acronyms	26
Appendices – Checklists and Forms	28
A – Green Energy Fund Grant Program	
B – Federal Commercial Solar Tax Credit	
C – Renewable Energy Credits (RECs)	
D – USDA Renewable Energy Grant	
E – USDA Renewable Energy Loan	
F – Project Calculations Including Tax on Savings and Energy Sales	

# Solar Energy: An Investment and Cost Guide For Poultry Growers

## Introduction

Solar energy systems are widely recognized as reliable and clean sources of electricity. Solar panels, which contain photovoltaic cells, convert sunlight into electricity, and they have the advantage of being located directly on site where electrical power is required. This renewable form of energy may be of value to poultry growers to reduce the need for purchased electricity to power poultry houses.

Investment for solar energy systems can be significant, and the payback return will vary according to the specific needs and circumstances of individual poultry producers. Both the U.S. government and Delaware policies encourage the use of renewable energy including solar energy. Grants, tax and renewable energy credits, and loan or loan guarantees are offered as incentives to help offset the investment in renewable energy. The electricity supplier will purchase the electricity generated by the solar energy system of a poultry grower at market price up to the annual amount of electricity historically used by the poultry producer.

The purpose of this guide is to enable a poultry grower to evaluate the initial investment, annual revenue or savings, and investment pay period for solar energy systems.

We would like to recognize the contributions to this guide from the University of Delaware Center for Energy and Environmental Policy (CEEP), Lado Kurdgelashvili, and John Byrne. The tables provide examples that were prepared using PV Planner, a software tool developed by CEEP with partial support from the National Renewable Energy Laboratory (USA). For additional information on this software, please see [http://ceep.udel.edu/publications/energy/reports/2006\\_es\\_READY\\_PV\\_Planner\\_software\\_BIPV\\_analysis.pdf](http://ceep.udel.edu/publications/energy/reports/2006_es_READY_PV_Planner_software_BIPV_analysis.pdf)

This guide was prepared by Andrea Kreiner, A. Kreiner Company, with input from Mike Bowman (Delaware Technology Park), Robin Morgan (University of Delaware, College of Agriculture and Natural Resources), and David Weir (Delaware Biotechnology Institute). Gary Van Wicklen (University of Delaware, College of Agriculture and Natural Resources) and Katy O'Connell (University of Delaware, College of Agriculture and Natural Resources) are acknowledged for helpful suggestions on the manual.

## Economic Impact on Poultry Growers

The following information is needed to estimate the potential economic impact of installing and operating a solar energy system.

- 1) The historical annual cost of electricity for the poultry houses.

This cost is the annual savings possible from use of solar energy instead of purchased electricity from the electric suppliers. We suggest that "historical energy use" be calculated as the average energy use over the previous three to five years.

- 2) The size of the solar energy system (in kW) needed to meet the electrical needs of the poultry houses. Each kW of a system produces about 1440 kWh annually for a system installed in Delaware (based on longitude and latitude for Laurel, Delaware).

This value is the historical annual electricity usage in kWh of the poultry houses divided by 1440.

- 3) The approximate investment for a properly sized solar energy system without any state or federal incentives. The average capital cost of an installed solar energy system is \$8,000/kW.

The size of the system desired (in kW) multiplied by \$8,000 equals the projected total cost of installed solar energy system without incentives.

- 4) The applicable funding assistance and annual revenue specific to the poultry grower's circumstances.

## Summary of Financial Incentives

Several categories of possible investment funding assistance are available for poultry growers. The major options are the Delaware Green Energy Fund, the USDA Renewable Energy Grant program, and Federal Solar Tax Credit. Additional funding assistance may be available from the Delaware Sustainable Energy Utility (SEU), the sale of renewable energy credits (RECs), and annual savings on purchased electricity. A brief summary of each category of funding assistance follows. Greater detail on each is provided later in the manual on pages 15-24. Checklists and Forms are included in the Appendix.

### Delaware Green Energy Fund

The Delaware Green Energy Fund incentive program should be considered first because it has applicability to poultry growers, particularly those who purchase electricity from Delmarva Power. The electricity provider and number of meters on the poultry farm are key issues. For Delmarva Power customers, the Fund grants a rebate of 25% of the solar energy system investment up to a maximum rebate of \$250,000 (\$500,000 investment) per meter. The rebate for customers of other electricity suppliers is typically \$30,000 (see page 16).

The number of meters determines the number of qualified rebates. For example, a Delmarva Power customer who has six poultry houses on one meter could qualify for a \$125,000 rebate (25% of \$500,000 investment) for a solar energy system. Another grower may have three houses hooked up to one meter and three more houses hooked up to a second meter. This grower could qualify for two rebates of \$125,000 each enabling installation of a much larger solar energy system.

### USDA Renewable Energy Grant

If a farm is located in a USDA “rural”<sup>1</sup> area, then it may be eligible for a USDA Renewable Energy Grant. This grant is independent of the number of meters. The grant provides up to 25% of the entire solar energy system’s eligible costs up to a maximum grant award of \$500,000 (\$2,000,000 investment).

Should a grower receive a grant from USDA, the value of that USDA grant must be deducted from the solar energy system investment before determining the Green Energy Fund grant. For example, if a \$500,000 solar energy system qualified for a USDA grant of \$125,000 (25% of \$500,000), then the Green Energy Fund grant would be based on an investment cost of \$375,000 (\$500,000 minus \$125,000).

---

<sup>1</sup> Any area other than a city or town with a population greater than 50,000 and the urbanized area contiguous and adjacent to such a city or town according to the latest decennial census of the United States.

## **Federal Solar Tax Credit**

The third investment assistance is more speculative and dependent upon federal legislation. Extension of current legislation, which expires at the end of 2016, is not known. The Federal Solar Tax Credit is 30% of the eligible solar energy system cost for systems installed and put into service by the end of 2016. The tax credit can be carried forward for 20 years and back for one year. If you are unable to claim the entire 30% of your purchase, you can carry forward the unclaimed portion to future years through 2016. The value of the credit is dependent upon the poultry grower's specific tax situation, and a tax consultant should advise the grower.

## **Additional Funding**

Projects greater than \$500,000 may receive funding assistance through the Delaware Sustainable Energy Utility (SEU) in 2010. The formation and rules for the SEU are still under development. More information on the progress of the SEU can be obtained from the Delaware Energy Office (302-735-3480).

## **Renewable Energy Credits**

Renewable Energy Credits (RECs) are a tradable commodity linked to the amount of electricity the solar energy system produces regardless of whether electricity is to power the poultry houses or sold to the supplier. The price of RECs can vary, but the general trend has been increasing value. For example, solar energy systems in Delaware may produce RECs that can be traded to New Jersey where recent prices have exceeded \$.20/kWh.

## **Annual Savings**

As discussed earlier, the electrical supplier will pay market price for all electricity produced by the solar energy system up to the historical annual consumption by the poultry houses. The source of the grower's power will determine the specific price. For example, Delmarva Power would pay a higher price than the Delaware Electric Cooperative. Both the value of traded RECs and the purchased electricity are ongoing annual income for the grower.

# Decision Guide – How to Estimate Net Cost and Annual Savings

When reviewing the economics of solar energy systems for poultry houses, it is important to consider the cost of the system, size of the system (size as per needs without oversizing), savings on electricity bills, the applicable funding sources, and personal financial and tax situations.

The Decision Guide that follows incorporates these items in an orderly process with examples. Later sections detail more about solar energy system operation and sizing and provide specifics related to each funding assistance program.

## Cost of the System and Electricity Bill Savings:

1. **What is your current annual electricity usage (in kWh)?** \_\_\_\_\_
2. **What size (in kW) should a solar energy system be to meet your needs?** \_\_\_\_\_  
(Divide usage in kWh by 1440 to determine the size in kW needed.)
3. **What is the cost of a system to meet that need?** \_\_\_\_\_  
(A good estimate to use is about \$8,000/kW. Multiply the system size in kW by \$8000 to estimate the cost of the system.)
4. **What is the amount of your annual electricity bill?** \_\_\_\_\_  
(This is the potential savings in electricity costs)

## Funding To Offset Costs:

### Green Energy Fund Grant:

5. **How much are you eligible to receive in a Green Energy Fund grant?**
  - a. Enter the number of supplier meters linked to your poultry houses. \_\_\_\_\_
  - b. Enter  $\frac{1}{4}$  the cost identified in item 3. If you receive any other grant funding for the project, subtract it from item 3 and enter  $\frac{1}{4}$  of the remaining cost. \_\_\_\_\_
  - c. Enter the maximum refund allowed by your electricity supplier (see page 16). \_\_\_\_\_
  - d. Multiply item 5c by item 5a. \_\_\_\_\_
  - e. Enter the smaller of the two numbers, item 5d or item 5b. This is the total amount that could be obtained from the Green Energy Fund for the project.  
\_\_\_\_\_

Most solar contractors will accept assignment of the Green Energy Fund grant as a payment source, in which case, your out-of-pocket cost of the system would be item 3 minus item 5e.

**USDA Renewable Energy Grant:**

- 6. How much are you eligible to receive as a USDA Renewable Energy Grant?**
- a. Are you located in an area designated as rural by the USDA? \_\_\_\_\_
  - b. If the answer to item 6a is “yes” then continue.
  - c. Enter  $\frac{1}{4}$  the cost identified in item 3 or \$500,000, whichever is smaller. \_\_\_\_\_

**Income:**

**Tax Implications:**

*You should consult with a tax accountant in making the determinations regarding tax implications.*

**7. Commercial Solar Tax Credit**

- a. Enter 30% of the cost identified in item 3. \_\_\_\_\_
- b. Enter the number of years over which you wish to spread the tax credit, with a maximum of 21 (20 years forward & 1 year back). \_\_\_\_\_
- c. Divide item 7a by item 7b, this would be the average annual tax credit.  
\_\_\_\_\_

**8. Depreciation**

Enter the depreciation allowance for the equipment. \_\_\_\_\_

**9. Federal Tax Obligation on Grants Received**

- a. Enter Tax on Green Energy Fund Grant. \_\_\_\_\_
- b. Enter Tax on USDA Renewable Energy Grant. \_\_\_\_\_

**Renewable Energy Credits:**

**10. How much are you eligible to receive for your RECs?**

- a. Enter the number of kWh your system is anticipated to produce per year.  
\_\_\_\_\_.
- b. Enter the anticipated value of a REC. \_\_\_\_\_
- c. Multiply item 10a by item 10b. This is the anticipated amount you may receive for your RECs. \_\_\_\_\_

## Examples

For the examples below, the poultry farm for each system is assumed to be located in a USDA designated rural area, have an electricity cost of \$0.135/kWh, have only one meter linked to the poultry houses, and have an average electricity usage of 2893 kWh/month per poultry house. The assumptions include a depreciation allowance over five years and a federal tax rate of 39.5%. It is also assumed that both the tax credit and the depreciation will be spread over 5 years. The examples do not include potential loan funding nor do they include discounting or replacement of electrical equipment over the lifetime of the photovoltaic panels. These examples do not include tax paid on the energy bill savings or REC sales. Calculations that include tax on the energy bill savings and REC sales are shown in Appendix F.

The Net Balance is calculated as follows:

1. Start with the *cost* (a negative number)
2. Add:
  - a. Potential *annual electricity savings* multiplied by 5 (the number of years in the example)
  - b. Potential *annual REC receipts* multiplied by 5 (the number of years in the example)
  - c. *USDA grant*
  - d. *Green Energy Fund grant*
  - e. *Annual Solar Tax Credit* multiplied by 5 (the number of years in the example)
  - f. *Depreciation*
3. Subtract:
  - a. Tax on *Green Energy Fund grant*
  - b. Tax on *USDA grant*
4. The resulting number is the Net Balance after 5 years

<b>Base Case with Federal Solar Tax Credit</b>			
	72,000 kWh usage (50 kW system)	90,000 kWh usage (62.5 kW system)	120,000 kWh usage (83.3 kW system)
Cost of Project	(\$400,000)	(\$500,000)	(\$666,667)
<b>Recurring Income</b>			
Potential Annual Electricity Cost Savings	\$9,721/yr; \$48,605/five yrs	\$12,150/yr; \$60,750/five yrs	\$16,200/yr; \$81,000/five yrs
Potential Annual REC Receipts	\$14,400/yr; \$72,000/five yrs	\$18,000/yr; \$90,000/five yrs	\$24,000/yr; \$120,000/five yrs
<b>Potential Funding</b>			
USDA Grant (25% of cost)	\$100,000	\$125,000	\$166,667
Green Energy Fund Grant (25% of cost less USDA grant)	\$75,000	\$93,750	\$125,000
<b>Tax Implications</b>			
Commercial Solar Tax Credit (spread over five years)	\$24,000/yr; \$120,000/five yrs	\$30,000/yr; \$150,000/five yrs	\$40,000/yr; \$200,000/five yrs
Depreciation Allowance	\$134,302/five yrs	\$167,878/five yrs	\$223,837/five yrs
Tax on Green Energy Fund	(\$29,625)	(\$37,031)	(\$49,375)
Tax on USDA Grant	(\$39,500)	(\$49,375)	(\$65,833)
<b>Net Balance (see below)</b>			
After 5 years	\$80,782	\$100,972	\$134,629

Source: Results from PV Planner© software developed by the Center for Energy & Environmental Policy, University of Delaware (contact Dr. John Byrne, Director [jbyrne@udel.edu](mailto:jbyrne@udel.edu)) and a spreadsheet application developed by College of Agriculture and Natural Resources, University of Delaware (contact Katy O'Connell, [kvo@udel.edu](mailto:kvo@udel.edu)).

<b>Base Case without Federal Solar Tax Credit</b>			
	72,000 kWh usage (50 kW system)	90,000 kWh usage (62.5 kW system)	120,000 kWh usage (83.3 kW system)
Cost of Project	(\$400,000)	(\$500,000)	(\$666,667)
<b>Recurring Income</b>			
Potential Annual Electricity Cost Savings	\$9,721/yr; \$48,605/five yrs	\$12,150/yr; \$60,750/five yrs	\$16,200/yr; \$81,000/five yrs
Potential Annual REC Receipts	\$14,400/yr; \$72,000/five yrs	\$18,000/yr; \$90,000/five yrs	\$24,000/yr; \$120,000/five yrs
<b>Potential Funding</b>			
USDA Grant (25% of cost)	\$100,000	\$125,000	\$166,667
Green Energy Fund Grant (25% of cost less USDA grant)	\$75,000	\$93,750	\$125,000
<b>Tax Implications</b>			
Depreciation Allowance	\$134,302/five yrs	\$167,878/five yrs	\$223,837/five yrs
Tax on Green Energy Fund	(\$29,625)	(\$37,031)	(\$49,375)
Tax on USDA Grant	(\$39,500)	(\$49,375)	(\$65,833)
<b>Net Balance</b>			
After 5 years	(\$39,218)	(\$49,028)	(\$65,371)

Source: Results from PV Planner© software developed by the Center for Energy & Environmental Policy, University of Delaware (contact Dr. John Byrne, Director [jbyrne@udel.edu](mailto:jbyrne@udel.edu)) and a spreadsheet application developed by College of Agriculture and Natural Resources, University of Delaware (contact Katy O'Connell, [kvo@udel.edu](mailto:kvo@udel.edu)).

Appendix F includes charts that show the calculations assuming that there will be taxes paid on the electricity bill savings and energy sales. It is important to consult a tax accountant to determine the appropriate calculations for your project.

## Solar Energy System Operation and Size

During hours of daylight, even on cloudy or rainy days, solar radiation is collected onto solar panels. The panels are made of numerous rows of photovoltaic cells that convert photons from the sun into direct current electricity. An inverter transforms the direct current to alternating current electricity suitable to power a poultry house.

Solar panels intended for poultry houses can be roof- or ground-mounted. For poultry farms, ground mounting may be preferred because of convenience of installation and better alignment to capture solar energy. In addition, expensive structural reinforcement may be necessary to safely support roof mounting of photovoltaic panels.

Automatic switching equipment is a part of the solar energy system used to accept purchased electricity from the supplier or to return unused electricity back to the supplier. The billing from a supplier takes into account the amount purchased by the grower and the amount supplied back to the grid from the grower. The result is called net metering. Full market price is credited by the supplier for electricity produced by the solar energy system up to the historical electricity usage of the poultry houses. Electricity sold to the supplier above the historical usage is valued at a low rate (\$.02/kWh).

The size of a solar energy system measured in kW will depend on several factors such as the electricity demand of the poultry houses, the number of meters on the farm (one for each poultry house or one for multiple poultry houses), and initial investment affordability. A solar energy system contractor can assist with proper sizing determination by a review of electric bills and the number of solar energy systems desired. The installed solar energy system should not exceed the historical electricity demand since there is only a \$.02/kWh credit for any excess sold to the supplier beyond the historical usage.

Solar panels have a typical life of 25 years and require little maintenance. Inverter lifetimes are estimated to be approximately ten years. As technology improves in photovoltaic cells, upgrades should be possible to the system.

The actual energy use by a poultry house will vary depending on age of the house, size of the house, weather, management conditions, and energy efficiency of installed equipment. In general, the annual electric use by a poultry house could range from 25,000 to 40,000 kWh. Thus, a poultry house would require a 20 to 30 kW system, depending on the conditions listed above.

Installation costs for a solar energy system can range from \$6,000 to \$10,000 per kW depending upon civil work, code requirements, transportation costs, and site and electric meter conditions. For example, a typical poultry operation might require about a 50 kW system, and the installed cost could range from \$300,000 to \$500,000. Although installation of a solar energy system seems expensive, there are a variety of grants and tax incentives available to offset costs.

## Pilot Study

In April 2007, the University of Delaware, with the support of the State of Delaware and the local solar energy industry, installed a 42-kW demonstration project on an Allen Family Foods' farm in Laurel, DE. The effectiveness and economics of this solar energy system is continually monitored, and relevant information is available to growers.



Typical ground-mounted solar panels



Solar panel



Inverters to convert DC power to AC power

## Green Energy Fund Grant

The Green Energy Program was created by the Delaware Legislature as a fund to promote installation of renewable energy systems in Delaware, including photovoltaic systems. Delaware's Green Energy Program provides cash incentives available as rebate grants for the installation of photovoltaic systems.

In order to participate in the Green Energy Fund program, the system must be installed in Delaware and the electricity provider must offer a program. Participating electricity providers are:

- Delmarva Power
- Delaware Electric Cooperative
- Municipal Providers:
  - Clayton                      Newark
  - Dover                        New Castle
  - Lewes                        Seaford
  - Middletown                Smyrna
  - Milford

The Delaware Energy Office website, <http://www.dnrec.delaware.gov/energy/services/Pages/GreenEnergyProgram.aspx>, provides detailed information and frequently asked questions for each of the programs. The site also provides a list of Green Energy Program participating contractors. This information can also be obtained by calling the Energy Office at 302-735-3480. If a contractor you have selected is not listed, please use the contractor application link to obtain an application for your contractor. Please note that professionally installed systems must be installed by a participating contractor or a contractor who is capable of becoming approved for the Green Energy Program.

All qualifying systems must have a warranty for protection of the integrity and performance of the components for at least five years. The installation contractor provides the warranty. The installation contractor should include the warranty documents with the system's operating and owner's manuals.

### Eligible Costs

The following costs are eligible for the grant:

- New and previously unused photovoltaic modules
- Foundation for the modules
- Mounting or tracking structures
- Wiring, inverters, and utility interconnection equipment

- Labor costs for the installation of the components
- Required permits and fees for construction and/or installation of a qualifying system
- Engineering costs associated with the system that do not exceed 10% of the total cost of the system

When calculating the total cost of the project for the grant, except for the federal tax credit, all other incentives associated with the project such as grants, rebates, cost sharing, etc., must be subtracted from the total system cost prior to calculating the grant.

### Maximum Grant Awards

The Green Energy Fund grants for photovoltaic systems pay 25% of the installed cost. A photovoltaic system may not have eligible qualifying system costs in excess of \$12 per Watt. Poultry operations are considered non-residential as long as the dwelling is not powered by the system even though the grower may be purchasing electricity at a residential rate from the commercial electricity supplier. For non-residential systems, the maximum grant depends upon the provider, as follows:

Delmarva Power	\$250,000
Delaware Electric Cooperative	\$30,000
*Clayton	\$30,000
Dover	\$15,000
Lewes	\$30,000
Middletown	\$30,000
Milford	\$30,000
Newark	\$30,000
*New Castle	\$30,000
Seaford	\$15,000
Smyrna	\$30,000

\*Provide funding for projects of a public/community nature.

A separate Green Energy Fund grant is available for each provider meter on poultry houses. For example, if poultry houses are attached to two separate meters, and you install systems linked to each meter, you are eligible to receive two Green Energy Fund grants.

### Required Forms

The versions of the forms required depends upon your electricity supplier. All forms can be accessed on the Green Energy Program's website at <http://www.dnrec.delaware.gov/energy/services/Pages/GreenEnergyProgram.aspx> and are included in Appendix A. For each supplier you will need:

- ◇ Green Energy Program Grant Instructions and Checklist

- ◇ The appropriate version of the Grant Reservation Request Form
- ◇ The appropriate version of the Interconnection Application

## USDA Renewable Energy Grants, Loans, and Loan Guarantees

The U.S. Department of Agriculture (USDA) Renewable Energy for America Program (REAP) offers grants and loan guarantees to farmers, ranchers, and rural small businesses, to help them purchase renewable energy systems or make energy efficiency improvements. REAP is a continuation of the program formerly known (prior to 2008) as “Section 9006” or the “Renewable Energy Systems and Energy Efficiency Improvements Grant Program” which was established in the 2002 Farm Bill.

Some of the key provisions of the program are listed below.

- Applicants may qualify for a grant, a guaranteed loan, or a combination of both.
- Renewable energy grants can range from \$2,500 to \$500,000, not to exceed 25% of the eligible project costs.
- Loan guarantees can be for up to 75% of total eligible project costs. Guarantees can range from \$5,000 to \$25,000,000 per project.
- Projects can qualify for combined grant and loan guarantee, but the grant portion is still subject to the above limits, and combined funding assistance cannot exceed 75% of total eligible project costs.

### Who is Eligible to Apply

Poultry growers are eligible as agricultural producers. An agricultural producer is defined as an individual or entity directly engaged in the production of agricultural products, including crops (including farming); livestock (including ranching); forestry products; hydroponics; nursery stock; or aquaculture, whereby 50 percent or greater of gross income is derived from the operations.

Applicant eligibility provisions include:

- Individuals must be citizens of the United States (U.S.) or reside in the U.S. after being legally admitted for permanent residence.
- Entities must be at least 51 percent owned, directly or indirectly, by individuals who are either citizens of the U.S. or reside in the U.S. after being legally admitted for permanent residence.
- If the applicant or an owner has an outstanding judgment obtained by the U.S. in a Federal Court (other than in the U.S. Tax Court), is delinquent in the payment of federal income taxes, or is delinquent on a federal debt, the applicant is not eligible to receive a grant until the judgment is paid in full or otherwise satisfied or the delinquency is resolved.
- An applicant who has received one or more grants and/or loans under this program must make satisfactory progress, as determined by the agency,

toward completion of any previously funded projects before consideration for subsequent funding.

## Eligible Projects

As a system that generates electricity from solar energy, solar panels for poultry houses qualify as eligible renewable energy projects. Further eligibility requirements include:

- The project must be located in a rural area. A rural area is any area other than a city or town with a population greater than 50,000 and the urbanized area contiguous and adjacent to such a city or town according to the latest decennial census of the United States.
- The project must be for a pre-commercial or commercially available and replicable technology.
- The project must be technically feasible.
- The applicant must be the owner of the system and control the operation and maintenance of the proposed project. A qualified third-party operator may be used to manage the operation and/or maintenance of the proposed project.
- All projects must be based on satisfactory sources of revenues in an amount sufficient to provide for the operation and maintenance of the system or project.
- Grant applicants must show that the USDA funding is financially necessary for the project.

## Eligible Project Costs

The definition of what is an eligible project cost is different for grants and guaranteed loans. Eligible project costs for both the grant and loan programs include:

- Post-application purchase and installation of equipment;
- Post-application construction or project improvements, except residential;
- Energy audits or assessments;
- Permit fees;
- Professional service fees, except for application preparation;
- Feasibility studies;
- Business plans;
- Retrofitting; and
- Construction of a new facility only when the facility is used for the same purpose, is approximately the same size, and based on the energy audit will provide more energy savings than improving an existing facility. Only costs identified in the energy audit for energy efficiency projects are allowed.

There are two additional eligible costs under the loan program:

- Working capital
- Land acquisition

Additional information on the program can be found on the USDA website <http://www.rurdev.usda.gov/rbs/busp/9006grant.htm>.

## Application Process

The renewable energy grants and loans are managed in Delaware by USDA's Rural Development Office in Dover. Bruce Weaver, USDA's State Energy Coordinator in Delaware, can be reached at (302) 857-3629 or [bruce.weaver@de.usda.gov](mailto:bruce.weaver@de.usda.gov) for more information. It is advisable to contact USDA for assistance if you are considering this grant or loan program. Additional information on the forms can be found online at [http://www.rurdev.usda.gov/regs/regs\\_toc.html](http://www.rurdev.usda.gov/regs/regs_toc.html) under Part 4280-B (Loans and Grants-Renewable Energy Systems and Energy Efficiency Improvements Program).

The Delaware Department of Agriculture (DDA) also has developed a grant template to help you get started on this grant. Contact Mark Davis at (302) 698-4503 to get a copy of the grant package.

## Required Forms and Information

### Grants

The grant forms are available online when the notice of funding is announced for each fiscal year at [www.grants.gov](http://www.grants.gov). For reference, they are also available from Bruce Weaver, in the DDA grant package, and are included in Appendix D of this document.

- ◇ SF 424, Application for Federal Assistance
- ◇ SF 424C, Budget Information – Construction Programs
- ◇ SF 424D, Assurances – Construction Programs
- ◇ RD 1940-20, Request for Environmental Information
- ◇ AD 1048 Debarment
- ◇ AD 1049, Certification Regarding Drug-Free Workplace Requirements
- ◇ Exhibit A-1 of RD Instruction 1940-Q, Certification for Contracts, Grants, and Loans (if the grant exceeds \$100,000)
- ◇ SF LLL, Disclosure of Lobbying Activities
- ◇ AD 1047, Certification Regarding Debarment, Suspension
- ◇ AD 400-1, Equal Opportunity Agreement
- ◇ AD 400-4, Assurance Agreement

The following information will need to be submitted as part of the grant application:

- ◇ DUNS Number
- ◇ Project Summary
- ◇ Financials

- ◇ Certification of Demonstration of Need
- ◇ Organizational Documents and Certificate of Existence
  
- ◇ Technical Report
- ◇ Feasibility Study if project is over \$200,000
- ◇ Spreadsheet of all matching funds

### **Loans and Loan Guarantees**

For guaranteed loans of \$600,000 or less, the following forms are required:

- ◇ RD4279-1A, Application for Loan Guarantee, Short Form
- ◇ RD1940-20

The following information will need to be submitted as part of the loan guarantee application:

- ◇ Project Summary
- ◇ Borrower Eligibility
- ◇ Project Eligibility
- ◇ Operation description
- ◇ Financial information for size determination
- ◇ Financials
- ◇ Spreadsheet showing matching funds
- ◇ Self-Evaluation Score
- ◇ Technical Report
- ◇ Business-level Feasibility Study
- ◇ Intergovernmental consultation comments
- ◇ Lenders complete comprehensive written analysis
- ◇ A proposed Loan Agreement or a sample Loan Agreement with an attached list of the proposed Loan Agreement provisions

The lender will need to have the following information on file for USDA's review:

- ◇ Personal credit report from a credit reporting agency for each owner or person owning 20% or more of the business
- ◇ Appraisals
- ◇ Commercial credit reports obtained by the lender on the borrower
- ◇ Current personal and corporate financial statements of any guarantors
- ◇ Certification by the lender that it has completed a comprehensive written analysis of the proposal, the borrower is eligible, the loan is for authorized purposes with technical merit, and there is reasonable assurance of repayment ability based on the borrower's history, projections, equity, and the collateral to be obtained.

## Federal Tax Credits for Solar Energy

The commercial solar tax credit is 30% of the “tax credit basis” (product plus installation, with no upper limit) that a company has invested in “eligible property” that is “put into service”.<sup>2</sup> Projects put into service from 2009 until the current legislation expires on December 31, 2016 are eligible for the tax credit. **Advice of a tax accountant is strongly suggested in determining your eligibility for the commercial solar tax credit.**

For projects that commence construction before the end of 2010 (with at least 5% of construction expenditures made), interested persons can apply to receive a treasury grant, in lieu of waiting until the end of the year to apply for the tax credits. Seek the advice of a tax account for more information.

### Important Definitions and Details

For photovoltaics:

- **“Eligible Property”** includes all equipment associated with a photovoltaic system.
- **“Put Into Service”** – Equipment is considered to be “put into service” in the year it is capable of being used by the taxpayer for the intended purpose. Typically, four things must happen for this to be true.
  - The equipment must have been delivered and physical construction/installation on the site must have been completed. Contractor personnel may still be on site in support of startup and maintenance and completion of minor tasks such as painting;
  - The taxpayer must have taken legal title and control of the equipment;
  - The taxpayer must have the licenses and permits needed to operate the equipment; and
  - Pre-operational tests must have demonstrated that the equipment can serve its intended function.
- **“Tax Credit Basis”** is the portion of the investment in eligible property upon which the commercial solar tax credit can be claimed. It is the amount that is multiplied by 30% to determine the value of the tax credit.
  - Interest paid on debt to acquire assets is normally deductible. However, under section 266 of the tax code, an election can be made to fold the interest into the tax credit basis. In that case, these expenditures would be deducted over time through depreciation, but, as part of the tax credit

---

<sup>2</sup> Section 48(a)(3) of the Internal Revenue Service (IRS) tax code.

- basis, they would enter into the calculation of the commercial solar tax credit.
- If the company pays federal income tax on the Green Energy Fund grant, the grant will not decrease the amount eligible for the federal tax credit.
  - Renewable energy credits (RECs) have no effect on the tax credit basis.

## Applying the Credit to Taxes

The commercial solar tax credit is considered to be “non-refundable,” meaning that at the end of the year, you cannot receive more back in credits than you paid in taxes throughout the year. If you are unable to claim the entire 30% of your purchase you can carry the unclaimed portion to future years through 2016. It does not matter whether you are receiving a refund or not. These calculations are based on your “tax liability,” the total amount of federal income taxes that you are responsible for paying.

## Impacts of Credits on Depreciation Calculations

For the purpose of calculating depreciation on a commercial solar system, the “tax depreciation value” is a distinct value separate from the tax credit basis. The tax depreciation basis that the taxpayer claims for solar equipment must be reduced by 50% of the tax credit. For example, if a 30% credit is claimed on a system that cost \$500,000, then the owner’s tax depreciation basis in the equipment is  $\$500,000 - (50\% \times \$150,000) = \$425,000$ . The tax depreciation basis is also used to calculate taxable gain or loss when/if the solar panel is later sold. The federal tax credit does not affect the book depreciation basis.

## Required Form

You will either need to file form 3468 Investment Credit or 5695 Residential Energy Credits with your tax return. The forms are available at <http://www.irs.gov/pub/irs-pdf/3468.pdf> and <http://www.irs.gov/pub/irs-pdf/f5695.pdf> respectively, and are included in Appendix B. **Advice of a tax accountant is strongly suggested.**

## Renewable Energy Credits

The Delaware Public Service Commission (PSC) has established a system of tradable renewable energy credits (RECs) that must be used by a retail electric supplier to comply with Delaware's renewable energy portfolio standards. Photovoltaic systems are eligible to receive RECs. One REC is equal to one MWh of electricity produced (1000 kWh); therefore, for each MWh of electricity your photovoltaic system produces, you earn the ability to sell one REC.

Following installation and startup, the energy distribution managers for the northeast electricity grid, PJM Interconnection, will register and certify the unit as a green energy generator and issue the RECs through their Generation Attribute Tracking System (GATS). There is an application process to receive compensation for the accumulated RECs.

Since the RECs are a tradable commodity, the value of a REC may vary. Currently in New Jersey, which has similar rules to those recently established in Delaware, RECs are trading at around \$200/MWh (\$.20/kWh).

Additional information on Delaware's renewable portfolio standards and RECs is available at [www.depesc.delaware.gov/electric/delrps.shtml](http://www.depesc.delaware.gov/electric/delrps.shtml). Additional information on PJM GATS is available at [www.pjm-eis.com/index.html](http://www.pjm-eis.com/index.html). The contact person for the RECs at the PSC is Courtney Stewart (302) 736-7532 [courtney.stewart@state.de.us](mailto:courtney.stewart@state.de.us).

### Application Process

Applications are submitted to the PSC and once approved you receive a GATS certification number that you then use to open an account with GATS.

### Required Forms

The Application for Certification as an Eligible Energy Resource is available through the PSC website [www.depesc.delaware.gov/electric/eer\\_application.pdf](http://www.depesc.delaware.gov/electric/eer_application.pdf) and is included in Appendix C.

## Who Can Provide Assistance?

### Technical

The Delaware Energy Office maintains a list of participating installation contractors in the region for photovoltaic systems. The list can be accessed at <http://www.dnrec.delaware.gov/energy/services/GreenEnergy/Pages/PVInstallers.aspx> or by calling the Delaware Energy Office at (302) 735-3480.

### Funding

Funding assistance can be found from a variety of sources, including the individual funding agencies.

- For information on the Green Energy Fund, contact the Delaware Energy Office at 302-735-3480.
- For information on the USDA programs, contact the Delaware Office at (302) 857-3580, or Bruce Weaver, State Energy Coordinator at (302) 857-3629 or [bruce.weaver@de.usda.gov](mailto:bruce.weaver@de.usda.gov).
- For information on RECs, contact Courtney Stewart at the PSC at (302) 736-7532 or [courtney.stewart@state.de.us](mailto:courtney.stewart@state.de.us).
- The Delaware Department of Agriculture has prepared a basic template for poultry growers for the USDA grants. The templates contain the information that will be applicable for all growers and provides a base to work from in developing a grant application. For information or a copy of the template, contact Mark Davis at (302) 698-4503.

## Key Definitions & Acronyms

**GATS** – Generation Attribute Tracking System, the system used by the northeast electricity grid, PJM Interconnection, to register and certify renewable energy generators and to issue and track RECs.

**kW** – Kilowatt, equal to one thousand watts, is typically used to state the power output of engines and the power consumption of tools and machines. A kilowatt is roughly equivalent to 1.34 horsepower.

**kWh** – Kilowatt-hour, the amount of electrical energy expended by a kilowatt load drawing power for one hour. The energy usage of a typical home in one month is several hundred kilowatt hours.

**PSC** – Delaware Public Service Commission.

**REC** – Renewable energy credit, a tradable commodity linked to the amount of electricity a photovoltaic or other renewable energy system produces.

**USDA** – United States Department of Agriculture.

### Tax Credit Definitions

**Eligible Property** - includes all equipment associated with a photovoltaic system.

**Put Into Service** – Equipment is considered to be “put into service” in the year it is capable of being used by the taxpayer for the intended purpose. Typically, four things must happen for this to be considered true:

- The equipment must have been delivered and physical construction/installation on the site must have been completed. Contractor personnel may still be on site in support of startup and maintenance and completion of minor tasks such as painting;
- The taxpayer must have taken legal title and control of the equipment;
- The taxpayer must have the licenses and permits needed to operate the equipment; and
- Pre-operational tests must have demonstrated that the equipment can serve its intended function.

**Tax Credit Basis** - is the portion of the investment in eligible property upon which the commercial solar tax credit can be claimed. It is the amount that is multiplied by 30% to determine the value of the tax credit.

- Interest paid on debt to acquire assets is normally deductible. However, under section 266 of the tax code, an election can be made to fold the interest into the tax credit basis. In that case, these expenditures would be deducted over time

through depreciation, but, as part of the tax credit basis, they would enter into the calculation of the commercial solar tax credit.

- If the company pays federal income tax on the Green Energy Fund grant, the grant will not decrease the amount eligible for the federal tax credit.
- Renewable energy credits (RECs) have no effect on the tax credit basis.

## **USDA Definitions**

**Agricultural producer** - An individual or entity directly engaged in the production of agricultural products, including crops (including farming); livestock (including ranching); forestry products; hydroponics; nursery stock; or aquaculture, whereby 50 percent or greater of their gross income is derived from the operations.

**Demonstrated financial need** – The demonstration by an applicant that the applicant is unable to finance the project from its own and commercially available resources without grant assistance, or that the project proposed by the applicant cannot achieve the income and cash-flows to sustain it financially over the long term without grant assistance.

**Rural** – Any area other than a city or town with a population greater than 50,000 and the urbanized area contiguous and adjacent to such a city or town according to the latest decennial census of the United States.

## Appendices – Checklists and Forms

A – Green Energy Fund Grant Program

B – Federal Commercial Solar Tax Credit

C – Renewable Energy Credits (RECs)

D – USDA Renewable Energy Grant

E – USDA Renewable Energy Loan

F – Project Calculations Including Tax on Savings and Energy Sales