2015 State Water Efficiency and Enhancement Program

Request for Grant Applications

Released:
May 18, 2015

Grant Applications Due:
By 5:00 p.m. PDT on June 29, 2015
No late submissions accepted.

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PROGRAM PURPOSE

The California Department of Food and Agriculture (CDFA) is pleased to announce, in coordination with the State Water Resources Control Board (SWRCB) and the Department of Water Resources (DWR), a competitive application process for the 2015 State Water Efficiency and Enhancement Program (SWEEP).

The program's objective is to provide financial incentives for California agricultural operations to invest in water irrigation treatment and/or distribution systems that reduce greenhouse gas (GHG) emissions and save water.

*Projects **must** reduce water use **and** GHG emissions.*

FUNDING

Emergency drought legislation AB 91 (Chapter 1, Statues of 2015) authorized CDFA to disperse up to $10 million to California agricultural operations investing in irrigation and distribution systems that reduce water use and GHG emissions. The maximum grant award is $150,000 with a recommended 50 percent match of the total project cost. CDFA reserves the right to offer an award different than the amount requested.

Cannot exceed $150,000 per project.

50 percent match of the total grant request recommended.

ELIGIBILITY

The project installation must be on a California agricultural operation. For the purpose of this program, an agricultural operation is defined as row, vineyard, field and tree crops, commercial nurseries, nursery stock production, and greenhouse operations.

Projects ***must*** reduce water use ***and*** GHG emissions. Applicants must provide supporting documentation directly related to actual on-farm water consumption and GHG emissions to be eligible for funding through this program.

Supporting documentation to substantiate pre-project water use and GHG emissions must be provided. *(See pages 3 – 4)*

TIMELINE:

The application period begins May 18, 2015 at 8 a.m. PDT. The deadline to submit an application is June 29, 2015 at 5 p.m. PDT. No exceptions will be granted for late submissions.

CDFA will conduct five workshops on how to complete and submit a 2015 SWEEP grant application. For application workshop schedule and locations, visit the SWEEP website at www.cdfa.ca.gov/go/SWEEP.

May 18, 2015 8:00 a.m. PDT	Invitation to submit Grant Applications
May 28 – June 9, 2015	Application Workshops
June 29, 2015 5:00 p.m. PDT	**Grant Applications Due**
July – September 2015	Technical Review Process
September 2015	Announce and Award Funding

No late applications – Submit Early!

PROGRAM REQUIREMENTS

Applications will be evaluated based on specific project criteria that increase water conservation by improving water irrigation and/or distribution systems, and through energy efficiencies that reduce GHG emissions. (See pages 5 – 6 for the list of project criteria.)

*Projects **must** reduce GHG emissions **and** water use.*

An agricultural operation can only submit one application using a unique tax identification number.

Agriculture operations awarded a previously funded SWEEP project ***cannot*** submit an application for the same property location(s) (Assessor's Parcel Number(s)). However, agriculture operations awarded a previously funded SWEEP project are encouraged to apply for a new project that impacts different property location(s).

Important Deadlines:
Installation – April 30, 2016
Verification – May 31, 2016

Project installation must be completed by April 30, 2016. Following project installation, the verification component must be completed by May 31, 2016.

Applicants are required to submit a project design for the proposed water irrigation and/or distribution system, including an explanation of how water savings and GHG reductions will be achieved. (See page 5 for more specifics on project design requirements.)

SWEEP grant funds cannot be used to expand existing agricultural operations, and therefore, additional new acreage cannot be converted to farmland.

SWEEP funding cannot be combined with United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) Environmental Quality Incentive Program financial assistance. However, other energy-reduction based incentive programs may be used with the SWEEP program.

Allowable Costs

Applicants should use the USDA, NRCS payment schedules as a guide, to the extent feasible, to determine project costs. (See Appendix E for the USDA, NRCS Payment Schedules.)

Project costs must clearly support installation of irrigation systems, including, but not limited to, supplies, equipment, and contractor (labor). Project costs

must be used for products that are directly related to irrigation on agricultural operations that reduce GHG emissions and water use.

Supplies: Supplies are items with an acquisition cost under $5,000 per unit and have a useful life of less than one year.

Equipment: Equipment is an article of nonexpendable, tangible personal property and has a useful life of more than one year, and a purchase cost which equals or exceeds $5,000 per unit.

Contractor: Contractor fees are for labor to install the project, and should be reasonable and consistent with fees in the marketplace for the same or similar services.

Unallowable Costs

The following are unallowable costs:

- Project design costs
- Post-project service charges and maintenance costs associated with the irrigation system
- Non-labor costs (e.g., management) and fees associated with project oversight
- Supplies and equipment costs not related to irrigation or water distribution systems

SUPPORTING DOCUMENTATION REQUIREMENTS

Applicants must use actual on-farm water and energy use documentation to calculate baseline water use and GHG emissions. Therefore, applicants are required to submit their supporting documentation to substantiate water savings and GHG reductions calculations provided in their application.

Applicants that do not attach supporting documentation with their application will not be considered for funding.

The specific program requirements pertaining to water and GHG supporting documentation are outlined below:

Water Documentation Requirements

The actual baseline water value provided in the application must be supported by the documentation attached to the application. Applicants must address in the application how the baseline water use value is directly related to the actual on-farm water use data in the supporting documentation.

Baseline Water Support:

- *Water Bill and/or Flow Meter Readings*
- *Irrigation Water Savings Calculator*

The USDA, NRCS Field Office Technical Guide – Irrigation Water Savings Calculator is a useful tool to assist applicants in calculating their baseline water use and projected water savings after project installation. (See Appendix D: Supplemental Guidance for Determining Water Use and Greenhouse Gas Emissions.)

Since applicants must input specific variables directly related to on-farm irrigation, the Irrigation Water Savings Calculator is sufficient supporting

documentation to demonstrate baseline water use. If applicants have actual on-farm water documentation (e.g., water bills or flow meter readings), applicants should submit those documents to support their water calculations provided in their application.

Greenhouse Gas Documentation Requirements

The actual GHG baseline value provided in the application must be supported by the documentation attached to the application. Applicants must address in the application how the baseline value is directly related to the actual on-farm energy use data in the supporting documentation.

CDFA acknowledges that calculating baseline GHG emissions and projected GHG reductions is challenging, and therefore, CDFA provides a GHG calculator tool and links to assist applicants in this process. However, applicants using CDFA's GHG calculator tool are required to provide supporting documentation to substantiate GHG calculations provided in their application.

To meet the GHG supporting documentation requirement, applicants are required to submit actual on-farm energy use for supporting documentation, including, but not limited to, utility bills, actual fuel receipts, and field operational logs (e.g., tractor passes) covering five months of the peak irrigation and growing season. Furthermore, the projected GHG savings value should be based on the same 5 month time period.

In addition, applicants will be required to describe how the documentation supports GHG baseline calculations in their application.

GRANT APPLICATION PROCESS

Electronic Grant Application

CDFA has entered into an agreement with the SWRCB to host a web-based application submission process. Grant applications must be submitted electronically on the Financial Assistance Application Submittal Tool (FAAST) system. Applicants must register to receive a login account for FAAST in order to submit an application. FAAST can be accessed through the SWRCB website: https://faast.waterboards.ca.gov.

FAAST is organized into several tabs and includes a question and answer format. There is a series of questions requesting information regarding the proposed project. Questions are answered in one or more of the four following formats: a drop down menu; a check box; a text box with predetermined character limitations; or as a document attachment.

Prior to beginning the electronic data entry using the FAAST system, applicants are encouraged to gather all required information using Appendix A, B, and C to facilitate effective and timely submission of the application. Applicants are required to submit five types of attachments: (1) Project

CDFA's GHG Calculator Tool is available on the SWEEP Website: www.cdfa.ca.gov/go/SWEEP

Baseline GHG Support:

- *Utility Bills, Fuel Receipts, or Feld Operational Logs*
- *Answer application question explaining how GHG baseline calculations relate to the documents provided*

See Appendix A for the list of required application questions as they appear in FAAST.

Design; (2) Budget Worksheet (Appendix B); (3) baseline water use supporting documentation; (4) baseline GHG emission supporting documentation covering five months of the irrigation season; and (5) Disadvantaged Communities Census Tract (Appendix C).

If applicants are providing matching funds, they are encouraged to attach matching funds written documentation describing the contribution type, source, and amount.

Project Design

A design plan is essential for establishing water and energy efficiency. A design plan ***must*** be submitted with the grant application. If the project includes new infrastructure, such as new irrigation piping, pumps, or sensors, then a detailed schematic must be provided and include locations of that infrastructure on the field. When projects involve improvements to existing infrastructure, the project design must include a schematic showing where the improvements will be made to existing infrastructure. Design plans must include pertinent agronomic information, such as the crop and the water distribution uniformity value of the irrigation system.

For projects that do not include water distribution or irrigation equipment installation, a narrative describing the project, including agronomic information, must be attached to the application as the project design.

If the design plan calls for the use of evapotranspiration (ET) based irrigation scheduling, the agricultural operator must be able to show that water deliveries can be made on a consistent basis to accomodate that scheduling.

Review Process

CDFA will conduct two levels of review during the grant application process. The first level of review is an administrative review to determine whether all required grant application information was entered along with all required attachments. The second level is a technical review to evaluate grant applications based on the ranking criteria. The technical reviewers are a group of agricultural irrigation water system specialists and experts affiliated with the University of California and California State University systems.

Project Criteria and Ranking

CDFA's intent is to fund projects that can produce the highest degree of water savings and GHG emission reductions. Therefore, applications will be ranked based on the level of water savings (acre-inches/year/acre) ***and*** GHG reductions (Tonnes CO_2 equivalent/year/acre) for a proposed project.

See Appendix D for Supplemental Guidance on determining water savings and GHG reductions calculations.

Applicants will need to address mulitple project criteria listed below that their proposed project will incorporate to achieve the water savings and GHG reductions values provided in their application.

Soil Moisture Sensors

Use of soil moisture sensors (NRCS Practice Standard 449) with electronic data output and flow meters, or electronic weather station linked to irrigation

controller, for growers to ensure efficient irrigation scheduling (must specify with a new or existing system); new systems will receive additional consideration for funding.

Evapotranspiration (ET) based Scheduling

Use of ET based irrigation scheduling, such as the California Irrigation Management Information System (CIMIS), and flow meters on existing or proposed projects to optimize water efficiency for crops.

Water Pumping

Reduction of GHGs from water pumping, including (1) fuel conversion; (2) improved energy efficiency of existing systems; and (3) reduced pumping due to the other criteria. For example, the conversion of a fossil fuel pump to solar, wind or electric will result in a reduction of carbon dioxide GHGs. NRCS Conservation Practice Standard 372 may apply.

Micro-Irrigation or Drip Systems

Use of micro-irrigation or drip systems to replace flood or furrow irrigation. Should follow NRCS Conservation Practice Standards 441 or 442.

Low Pressure Systems

Use of low pressure irrigation systems to reduce pumping and energy use.

Variable Frequency Drives

Use of Variable Frequency Drives to reduce energy use and match pump flow to load requirements. Should follow NRCS Conservation Practice Standard 533.

Other Management Practices

The use of any other management practice(s) that will result in water savings and GHG reductions.

Environmental Co-Benefits

The environmental co-benefits of the project will be considered during the review process. Examples of co-benefits include, but are not limited to, improved air quality and facilitation of nitrogen fertilizer management with irrigation management to reduce the movement of nitrates to groundwater.

Disadvantaged Communities (Census Tract)

Project sites located in a disadvantage community as determined by the census tract number(s) will receive additional consideration for funding during the review process.

Applicants can identify their project's census tract number(s) by using the following Disadvantaged Communities Census Tract online tool: http://maps.gis.ca.gov/cdfa/tractfinder.html

The list of SWEEP project criteria offers many opportunities for agriculture operations to achieve water savings and GHG reductions.

Projects located in a disadvantaged community will receive additional consideration for funding.

Disadvantaged communities is defined by CalEPA. (See CalEnviroScreen for more information).

See Appendix C for the Disadvantaged Communities Census Tract template.

Applicants are required to complete and attach the Disadvantaged Communities Census Tract template to their application identifying the census tract and county information for each property location impacted by a project.

Matching Funds

Applicants are strongly encouraged to include a 50 percent match of the total project cost. Applications that include matching funds will receive additional consideration for funding.

50 percent matching funds is encouraged.

Matching funds are defined as a portion of project costs not borne by the funding source, and can include cash and/or in-kind contributions. In-kind contributions include costs associated with contractors (labor) involved with the installation of the project. Applicants choosing to use matching funds are encouraged to submit written documentation describing the source of matching funds with the grant application.

AWARD PROCESS

CDFA will notify all applicants regarding the status of their grant applications. Successful applicants will receive a Grant Agreement with specific instructions regarding award requirements including information on project implementation, verification, and payment process.

AWARD REQUIREMENTS

Project Implementation

Once a Grant Agreement is executed, the grant recipient can begin implementation of the project. Due to the short timeline associated with the emergency drought funds, projects must be installed by April 30, 2016.

Grant recipients are expected to use and maintain their system for a minimum of 10 years or according to the USDA NRCS Practice Lifespan Table. For purposes of demonstrating the long-term success of SWEEP funded projects, CDFA may request information regarding water savings and GHG reductions associated with the project over this 10 year period.

See USDA, NRCS Practice Lifespan Table

Project Verification

Following project implementation, CDFA will, or in partnership with a Resource Conservation District, initiate the verification component. The verifier will visit the project site, and inspect the completed project to ensure design specifications were met and the system is working effectively. In addition, the verifier will confirm that projects will result in water savings and GHG emission reductions. The verification component must be completed by May 31, 2016.

Important Deadlines:
Installation – April 30, 2016
Verification – May 31, 2016

Payment Process

CDFA will provide the grant recipient with the necessary grant award and invoicing documents. Grant recipients may be eligible to receive an advance

payment up to 25 percent of the total grant award for project installation. The remaining funds will be allocated on a reimbursement basis through monthly invoicing.

CDFA will withhold 10 percent from the total grant award until the verification requirement is complete to ensure grant recipients install their project as approved by CDFA. Invoicing and closeout of all project expenditures must be completed by June 30, 2016.

ASSISTANCE AND QUESTIONS

CDFA cannot assist in the preparation of grant applications; however, CDFA will provide a SWEEP Frequently Asked Questions (FAQ) link on the SWEEP website by 5:00 p.m. PDT on Friday, June 12, 2015 to ensure all applicants have the benefit of reviewing general program questions and answers.

In order to maintain the integrity of the competitive grant process, CDFA is unable to advise and/or provide individuals with any information regarding specific applications during the solicitation process.

The SWRCB website at https://faast.waterboards.ca.gov also contains a Frequently Asked Questions section and a User's Manual for the FAAST system. If after reading the information available on the website, you have questions about the FAAST system, please contact FAAST customer service at (866) 434-1083, Monday through Friday, 8:00 a.m. to 5:00 p.m. PDT or via email, faast_admin@waterboards.ca.gov.

SWEEP Website:
www.cdfa.ca.gov/go/SWEEP

FAAST Technical Support:
Contact SWRCB at
Faast_admin@waterboards.ca.gov
Or
(866)434-1083

APPENDIX A: GRANT APPLICATION QUESTIONS (AS THEY APPEAR IN FAAST)

Under the General Information and Project Budget tabs, applicants must respond to the following:

Applicant Organization:
Legal name of Agriculture Operation that will be the lead applicant for this project

Submitting Organization:
Name of organization submitting application

Project Title:
Insert a title that is clear, concise, and descriptive of the project

Project Description:
Briefly summarize proposed project including all project criteria addressed and crop type

Project Budget:
Funds requested and anticipated matching funds

Under the Application Questionnaire tab, applicants must also respond to the following Grant Application questions based on SWEEP requirements:

SECTION I: PREVIOUSLY FUNDED PROJCET

1. Has your agriculture operation received a previously funded SWEEP project?

    a. If yes, provide the Agreement Number(s) and corresponding Assessor's Parcel Number(s) of where the project(s) were implemented.

SECTION II: PROPERTY LOCATION

2. Indicate property location(s) of where the project will be implemented. Address the following:
    a. Address or Nearest Cross Streets
    b. City, Zip Code
    c. County
    d. Assessor's Parcel Number(s)
    e. Acreage that will be impacted by the project
    f. Current land use and crop

3. Provide the Irrigation District(s) where the project will be implemented.

4. Indicate if the property location(s) water source is surface water (water delivered to the property) or groundwater pumped from on-farm wells.

SECTION III: RANKING

The purpose of Section III is to rank applications based on the level of water savings and greenhouse gas emission reductions.

5. Indicate projected water savings ***AND*** greenhouse gas emission reductions.
    a. Indicate projected water savings (acre inches/year/acre).
    b. Indicate the projected greenhouse gas emission reductions (Tonnes of CO_2 equivalent/year/acre).

SECTION IV: PROJECT CRITERIA

The questions in Section IV apply to the project criteria established for evaluating applications.

6. *Project Criteria*
    a. Address all applicable project criteria and provide an explanation for all criteria selected. Only indicate criteria that are being incorporated as part of the project. (Do not indicate a criterion if it is already the current practice at the project site.)

SECTION V: ENVIRONMENTAL CO-BENEFITS

7. *Environmental Co-Benefits*
   Select all environmental co-benefits the project potentially impacts and explain all potential co-benefits selected. Examples of co-benefits include, but are not limited to, improved air quality and facilitation of nitrogen fertilizer management with irrigation management to reduce movement of nitrates to groundwater.

SECTION VI: CURRENT WATER USE SYSTEM

The questions in Section VI apply to the ***current*** irrigation and/or distribution system. The purpose of this section is to understand an applicant's current water use and greenhouse gas emissions.

8. *Description of current water use system*
   Describe in detail the ***current*** water use system and associated energy sources. At a minimum, applicants should address the current crop, irrigation type, irrigation management, and fuel source(s).

9. *Current baseline water use*
   Indicate current baseline water use per acre (acre inches/year/acre). Refer to Appendix D of the Request for Grant Applications for assistance in calculating baseline water use.

10. *Provide a detailed explanation of the methodologies used to calculate baseline water use.*

11. *Current baseline greenhouse gas emissions*
    Indicate current baseline greenhouse gas emissions associated with the water use (Tonnes CO_2e/year/acre). Refer to Appendix D of the Request for Grant Applications for assistance in calculating greenhouse gas emissions.

12. *Provide a detailed explanation of the methodologies used to calculate baseline greenhouse gas emissions.*

13. *Explain in detail how the baseline greenhouse gas value calculated is supported by the on-farm energy documentation attached to the application.*

SECTION VII: PROPOSED WATER USE SYSTEM

The questions in Section VII apply to the ***proposed*** water use system on the property. The purpose of this section is to estimate the potential gains in water and energy efficiencies and the associated decrease in greenhouse gas emissions.

14. *Description of proposed water use system*
    Explain in detail the proposed water use system and associated energy sources. At a minimum, applicants should address the proposed crop, irrigation type, irrigation management, and fuel source(s).

15. *Water use after project implementation*
    Indicate the estimated water usage of proposed project (acre inches/year/acre).

16. *Provide a detailed explanation of the methodologies used to calculate projected water use.*

17. *What percentage (0-100) of the estimated total water savings (from Question 5a) will be from surface water supplies?*
    Indicate the percentage of the total water savings that will be surface water (water delivered to the property) as opposed to groundwater pumped from on-farm wells.

18. *Greenhouse gas emissions after project implementation*
    Indicate estimated greenhouse gas emissions from the proposed project (Tonnes CO_2e/year/acre).

19. *Provide a detailed explanation of the methodologies used to calculate projected greenhouse gas emissions.*

SECTION VIII: REQUIRED ATTACHMENTS

Applications must include five required attachments to be considered for funding under this program. Attach the following documents:

20. *Project Design (attachment):*
    Applicants must attach a copy of the proposed system design. Refer to the Grant Appliction Process, Project Design section on page 5 of the Request for Grant Applications.

    Is the Project Design attached?

21. *Budget Worksheet (attachment):*
    Download, complete, and attach the "Budget Worksheet" template.

    Is the "Budget Worksheet" attached?

22. *Baseline Water Documentation (attachment):*
    Is supporting documentation attached for baseline water use calculations?

23. *Baseline Greenhouse Gas Documentation (attachment):*
    Is supporting documentation attached for baseline greenhouse gas emission calculations?

24. *Disadvantaged Communities Census Tract (attachment):*
    Download, complete and attach the "Disadvantaged Communities Census Tract" template.

    Is the "Disadvantaged Communities Census Tract" attached?

SECTION IX: MATCHING FUNDS

25. *Matching Funds(attachment):*
    If matching funds (cash) have been secured, attach matching funds documentation. Documentation should confirm the contribution source, type, and amount of contributions in support of the project.

    If applicable, is matching funds (cash) documentation attached?

APPENDIX B: BUDGET WORKSHEET

Budget Worksheet

Complete the budget worksheet to show the breakdown of cost for the proposed project. Matching funds are strongly recommended, but not required. *Matching funds can include cash and/or in-kind contributions. The equation to calculate the percentage of matching funds is as follows: total match/total grant request = percentage match. Cash contributions are the amount of funds that will be contributed by the applicant to this project. In-kind contributions include contributions by the applicant in the form of contractor (labor) involved with the installation of the project. In-kind contributions must be indicated here in monetary value.

Budget Categories	Grant Request (in $)	Cash Match (in $)	In-kind Contribution (in $)
Supplies- Itemize all supplies. Supplies are anything with an acquisition cost under $5,000 per unit. Rows may be added.			
Subtotal (Supplies)	$ -	$ -	$ -
Equipment- Itemize all equipment. Equipment is an article of nonexpendable, tangible personal property having a useful life of more than one year and a purchase cost which equals or exceeds $5,000 per unit (purchased or cost for rental). Rows may be added.			
Subtotal (Equipment)	**$ -**	**$ -**	**$ -**
Contractor - Compensation for individual contractor fees should be reasonable and consistent with fees in the marketplace for similar services (See Appendix E NRCS payment schedules, which include labor costs).			
Cost per Hour (including benefits)			
Number of Hours			
Subtotal (Contractor)	**$ -**	**$ -**	**$ -**
Total	**$ -**	**$ -**	**$ -**

APPENDIX C: DISADVANTAGED COMMUNITIES CENSUS TRACT

Instructions: Identify the census tract ID Number and County information for each Assessor's Parcel Number impacted by a project using the online tool below.

Online Tool: http://maps.gis.ca.gov/cdfa/tractfinder.html

Assessor's Parcel Number (APN)	Census Tract ID Number	County

APPENDIX D: SUPPLEMENTAL GUIDANCE FOR DETERMINING WATER USE AND GREENHOUSE GAS EMISSIONS

SWEEP funding is provided through the Greenhouse Gas Reduction Fund (GGRF), the proceeds of California's greenhouse gas cap and trade program. The GGRF is intended to further the reductions of greenhouse gas emissions (GHG) and all projects that receive funding through GGRF must show GHG reductions. Therefore, in order to be eligible for a SWEEP grant, an applicant ***must*** show that ***both*** water savings ***and*** greenhouse gas emissions reductions will occur due to the proposed project.

Calculating the greenhouse gas reductions and water savings associated with an irrigation project is challenging. CDFA recommends applicants work with available experts, such as utility companies, United State Department of Agriculture, Natural Resource Conservation Service (USDA NRCS), Resource Conservation Districts (RCD), and irrigation supply companies, to determine baseline and projected water use and GHG emissions. However, applicants not utilizing those resources can use tools and calculators to determine baseline calculations. This document will provide conceptual guidance, calculators, and resources to assist with the GHG and water calculations.

Water Use

USDA NRCS Field Office Technical Guide – Irrigation Water Savings Calculator

http://efotg.sc.egov.usda.gov/treemenuFS.aspx

This calculator allows applicants to input specific information related to their current on-farm irrigation system to obtain baseline water use calculations. Similarly, applicants can input specific parameters related to their proposed irrigation system to obtain their projected water savings calculations.

To use the Irrigation Water Savings Calculator: (1) click on Section I; (2) click on Resource Assessment Tools; and (3) click on Irrigation Water Savings Calculator (CA). The calculator is a Microsoft Excel file providing options for irrigation system improvement types, level of Irrigation Water Management, soil type, crop type, and ET zone information.

Water Use Equations

Baseline Water Use	The **pre-project** volume of water that has been applied to the crop over the previous growing season. This is reported in the SWEEP application as acre-inches per year per acre. Use actual on-farm data to support this calculation. = Total water use over the previous growing season ÷ acres
Projected Water Use	The estimated volume of water that will be applied to the crop in the next growing season **after** the proposed project is installed. This is reported in the SWEEP application as acre-inches per year per acre. Use the USDA NRCS irrigation water savings calculator or a project design to determine the estimated total water use during the post-project growing season. = Estimated total water use during the growing season after project ÷ acres
Water Savings	The estimated volume of water that will be saved due to the project. This is reported in the SWEEP application as acre-inches per year per acre. = Baseline Water Use − Projected Water Use

Greenhouse Gases

Greenhouse Gas Quantification Concepts

When deciding how to best calculate the GHG reductions from a project, consider the project components and how they influence the energy use of the irrigation system. The following questions may help applicants decide how to proceed with calculating GHG reductions.

1. **Does the project utilize soil moisture sensors and/or irrigation scheduling and/or other management practices that will simply reduce the amount of water applied and therefore reduce pumping?** If there are not any other changes to the infrastructure of the irrigation system, then greenhouse gas savings will be proportional to the water savings. (For example, 10 percent water savings = 10 percent greenhouse gas reductions.) Provide supporting documentation regarding baseline on-farm water and energy use. In this situation supporting documentation for the GHG component would be utility billing or fuel invoices associated with pumping. Prepare to explain methodology and inputs in the application.

2. **Does the project improve energy efficiency of pumps or convert energy sources (e.g., diesel to electric)?** If so, greenhouse gas savings will be due to decreased energy use or the lower emission rate of the new energy system. (For example, electric pumps have a lower emission rate than diesel pumps.) Utilize the CDFA greenhouse gas calculator for fuels to determine GHG savings. Provide supporting documentation regarding baseline on-farm water and energy use. In this situation supporting documentation for the GHG

component would be utility billing or fuel invoices for pumping. Prepare to explain methodology and inputs in the application.

3. **Does the project involve converting from flood irrigation to micro-irrigation and is the project going to result in reduced field operations (e.g., tractor passes)?** Utilize the CDFA greenhouse gas calculator for fuels to determine GHG savings. Provide supporting documentation regarding baseline on-farm water and energy use. In this situation, supporting documentation might be a log of the field operations having to do with the tractor passes required due to furrow irrigation. Prepare to explain methodology and inputs in the application.

   Note: If the conversion of the irrigation type from flood to micro-irrigation will increase the pressure or pumping requirements of the system and does not involve a fuel conversion, then the project may not result in net GHG reductions and will, unfortunately, not be eligible for SWEEP funding.

4. **Does the project combine multiple components such as soil moisture sensors or irrigation scheduling AND fuel conversion AND irrigation type changes?** If so, determining greenhouse gas savings is more complex. (1) Utilize actual on-farm energy records to determine baseline greenhouse emissions using CDFA's GHG calculator for fuels; (2) determine estimated water savings from irrigation changes and irrigation management by using the NRCS water savings calculator; (3) determine how much energy the new system will use to adequately irrigate (matching the results of the NRCS water savings calculator); 4) utilize CDFA's greenhouse gas calculator for fuels to estimate GHG reductions. Plan to explain methodology and inputs in the application.

   Alternatively, calculate greenhouse gas savings based on the fuel conversion component alone (similar to #2 above). This is the component of the project that will likely result in the largest GHG savings.

Glossary of Greenhouse Gas Terms

Carbon dioxide	Carbon dioxide (CO_2) is the primary greenhouse gas emitted through human activities.
Carbon Dioxide Equivalent (CO_2e)	A measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example, the global warming potential for methane over 100 years is 25.

<table>
<tr><td>Emission Factor[1]</td><td>The mass of the GHGs emitted per unit of fuel. Please see the table below for emission factors
<table>
<tr><th>Fuel</th><th>Emission Factor</th></tr>
<tr><td>Electricity</td><td>0.00028 Tonnes CO_2e/kwh</td></tr>
<tr><td>Diesel</td><td>0.01024 Tonnes CO_2e/gallon</td></tr>
<tr><td>Gasoline</td><td>0.00881 Tonnes CO_2e/gallon</td></tr>
<tr><td>Biodiesel</td><td>0.00946 Tonnes CO_2e/gallon</td></tr>
<tr><td>Propane</td><td>0.00574 Tonnes CO_2e/gallon</td></tr>
<tr><td>Natural Gas</td><td>0.00005 Tonnes CO_2e/SCF</td></tr>
</table></td></tr>
<tr><td>Global Warming Potential</td><td>(GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.</td></tr>
<tr><td>Greenhouse Gases</td><td>Gases that trap heat in the atmosphere, contributing to climate change. (In the case of the SWEEP program, the primary greenhouse gas of concern is carbon dioxide which is an emission from fossil fuel combustion during pumping or equipment operations).</td></tr>
<tr><td>Metric Ton (Tonne)</td><td>A unit of mass equivalent to 1000 kilograms or 2204.62 pounds.</td></tr>
</table>

[1] ***EPA Emission Factors for GHG Inventories***
http://www.epa.gov/climateleadership/documents/emission-factors.pdf
This sheet provides emission factors for different energy sources such as diesel, propane, natural gas, and electricity. To calculate emission reductions, multiply the estimated amount of fuel saved by the project by the emission factor of the fuel type. Emission reductions must be reported in Tonnes of carbon dioxide equivalent (CO_2e); numeric factors are provided to convert emissions of methane (CH_4) and nitrous oxide (N_2O) to carbon dioxide equivalent. For projects that save electricity, use a California average factor of 610.82 Lbs CO_2 equivalent/MWh (.000278 Tonnes CO_2e/kWh), unless applicants have information specific to their utility**.**

GHG Equations

Baseline GHG Emissions	The **pre-project** mass of GHG emissions due to irrigation energy inputs over the previous growing season. This is reported in the SWEEP application as Tonnes CO_2e per year per acre. Use actual on-farm data to support this calculation. $= (\text{Total volume of fuel over previous growing season} \times \text{Emission Factor}) \div \text{acres}$
Projected GHG Emissions	The estimated mass of GHG emissions due to irrigation energy inputs in the growing season **after** the proposed project is installed. This is reported in the SWEEP application as Tonnes CO_2e per year per acre**.** $= (\text{Estimated total volume of fuel over the growing season after the project} \times \text{Emission Factor}) \div \text{acres}$
GHG Savings	The estimated mass of GHG emissions that will be saved due to the project. This is reported in the SWEEP application as Tonnes CO_2e per year per acre. $= \text{Baseline GHG Emission} - \text{Projected GHG Emissions}$

GHG Emissions Calculators

CDFA GHG Calculation Tool for Fuels

http://apps4.cdfa.ca.gov/eicalculator/
This calculator will allow the applicant to determine GHG savings by entering the fuel use from before and after project implementation.

COMET-Farm

https://cometfarm.nrel.colostate.edu/Account/LogOn?ReturnUrl=%2fActivityType
COMET-Farm allows applicants to perform an energy audit on their farms.

COMET-Farm Quick Energy Calculator

http://cometfarm.nrel.colostate.edu/QuickEnergy
Although COMET-Farm Quick Energy Calculator is designed to assess GHG reductions after fuel savings are known, it can also be used to determine GHG emissions before project implementation and estimate reductions of GHG emissions after implementation. To determine baseline GHG emissions: (1) input the current use of different energy sources and note the emissions in CO_2e; (2) input the estimated use of the energy sources after implementation and note the emissions in CO_2e; and (3) subtract to find the estimated reductions in GHGs.

Supporting Documents for SWEEP Water and GHG Baselines

Water Baseline Calculation	**Greenhouse Gas Baseline Calculation**
Flow meter readout or compilation record Water statement or bill Completed USDA NRCS Water savings calculator	Electricity billing statements over five months **OR** fuel invoices documenting purchases of pump or tractor fuel over five months **OR** operation logs for pumps or tractors. ***AND*** Answer application question explaining how the documents relate to the greenhouse gas calculations and, if applicable, describe any factors that may not be reflective in these documents to the calculations.

APPENDIX E: USDA NRCS PAYMENT SCHEDULE
(Adapted from USDA NRCS EQIP FY14 Regular Rates for National, State, Locally-led Initiatives)

Practice_Code	Cost_Share_Program	Practice_Name	Component	Unit_Type	Unit_Cost
372	EQIP	Combustion System Improvement	IC Engine Repower, >25 bhp	BHP	75
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, < 12 HP	Ea	628.86
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 12-69 HP	Ea	1972.31
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 70-124 HP	Ea	4617.02
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 125-174 HP	Ea	6632.21
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 175-224 HP	Ea	8795.83
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 225-274 HP	Ea	13462.26
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 275-399 HP	Ea	21026.45
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, 400-499 HP	Ea	27454.2
372	EQIP	Combustion System Improvement	Electric Motor in-lieu of IC Engine, >= 500 HP	Ea	34652.82
372	EQIP	Combustion System Improvement	Mobile IC, 50-149 bhp	HP	268.23
372	EQIP	Combustion System Improvement	Mobile IC, >= 150 bhp	HP	314.85
441	EQIP	Irrigation System, Microirrigation	Vegetation Establishment	Ac	251.93
441	EQIP	Irrigation System, Microirrigation	Orchard-vineyard, 10ac or less	Ac	917.97
441	EQIP	Irrigation System, Microirrigation	Orchard-vineyard, >10ac	Ac	638.96
441	EQIP	Irrigation System, Microirrigation	Orchard-vineyard, durable tubing replace	Ac	315.81
441	EQIP	Irrigation System, Microirrigation	Small Acreage	Ac	1595.84
441	EQIP	Irrigation System, Microirrigation	Row Crop, Buried Manifold	Ac	787.61
441	EQIP	Irrigation System, Microirrigation	Row Crop, Above Ground PE Manifold	Ac	497.89
441	EQIP	Irrigation System, Microirrigation	Retrofit, Irrigation Automation	Ac	405.91
441	EQIP	Irrigation System, Microirrigation	Filter replace	Ac	198.35
442	EQIP	Irrigation System, Sprinkler	Center Pivot, < 600 Ft	LnFt	44.62
442	EQIP	Irrigation System, Sprinkler	Center Pivot, > 600 Ft	LnFt	36.16
442	EQIP	Irrigation System, Sprinkler	Linear Move System	LnFt	33.43
442	EQIP	Irrigation System, Sprinkler	Wheel Line System	LnFt	6.46
442	EQIP	Irrigation System, Sprinkler	Solid Set System	Ac	1146.57

442	EQIP	Irrigation System, Sprinkler	Solid Set System Renovation	Ac	168.38
442	EQIP	Irrigation System, Sprinkler	Handline system	LnFt	3.13
442	EQIP	Irrigation System, Sprinkler	Traveling Gun System, 2" or less diameter Hose	Ea	5757.25
442	EQIP	Irrigation System, Sprinkler	Traveling Gun System, >2" to 3" Hose	Ea	10971.9
442	EQIP	Irrigation System, Sprinkler	Traveling Gun System, > 3" Hose	Ea	20136.95
442	EQIP	Irrigation System, Sprinkler	Big Gun, Stationary	Ea	1463.69
442	EQIP	Irrigation System, Sprinkler	Pod System	Ea	174.11
442	EQIP	Irrigation System, Sprinkler	Renovation of Existing Overhead or Wheel line Sprinkler System	LnFt	3.21
442	EQIP	Irrigation System, Sprinkler	Retrofit, Irrigation Automation	Ac	415.65
449	EQIP	Irrigation Water Management	Basic IWM <30 acres	Ea	380.07
449	EQIP	Irrigation Water Management	Basic IWM >= 30 acres	Ac	15.65
449	EQIP	Irrigation Water Management	Intermediate IWM <30 acres	Ea	570.1
449	EQIP	Irrigation Water Management	Intermediate IWM >= 30 acres	Ac	23.55
449	EQIP	Irrigation Water Management	Advanced IWM <30 acres	Ea	823.48
449	EQIP	Irrigation Water Management	Advanced IWM >= 30 acres	Ac	32.51
449	EQIP	Irrigation Water Management	IWM with Soil Moisture Sensors	Ea	666.62
449	EQIP	Irrigation Water Management	IWM with Soil Moisture Sensors with Data Recorder	Ea	875.49
449	EQIP	Irrigation Water Management	IWM with Irrigation Evaluation	Ea	1866.88
449	EQIP	Irrigation Water Management	IWM with Weather Station	Ea	1922.46
533	EQIP	Pumping Plant	Electric-Powered Pump ≤ 3 Hp	HP	675.99
533	EQIP	Pumping Plant	Electric-Powered Pump ≤ 3 HP with Pressure Tank	HP	892.06
533	EQIP	Pumping Plant	Electric-Powered Pump >3 to 10 HP	HP	224.23
533	EQIP	Pumping Plant	Electric-Powered Pump >10 to 40 HP	HP	210.54
533	EQIP	Pumping Plant	Electric-Powered Pump >40 HP, Centrifugal	HP	134.47
533	EQIP	Pumping Plant	Variable Frequency Drive only (no pump) <=15Hp	Ea	1919.89
533	EQIP	Pumping Plant	Variable Frequency Drive only (no pump) >15 Hp	HP	113.66
533	EQIP	Pumping Plant	Internal Combustion-Powered Pump ≤ 7½ HP	HP	324.45
533	EQIP	Pumping Plant	Internal Combustion-Powered Pump > 7½ to 75 HP	HP	322.39
533	EQIP	Pumping Plant	Internal Combustion-Powered Pump > 75 HP	HP	195.38
533	EQIP	Pumping Plant	Windmill-Powered Pump	Ft	503.39

533	EQIP	Pumping Plant	Solar <1 Hp	Ea	1059.25
533	EQIP	Pumping Plant	Solar, >=1 Hp or Deep Well pump	HP	3165.15
533	EQIP	Pumping Plant	Water Ram Pump	In	574.41
533	EQIP	Pumping Plant	Livestock Nose Pump	Ea	644.42
533	EQIP	Pumping Plant	Vertical Turbine Pump, <100 Hp	HP	247.44
533	EQIP	Pumping Plant	Vertical Turbine Pump >100 Hp	HP	178.6
533	EQIP	Pumping Plant	Piston, manure	Ea	9617.43
533	EQIP	Pumping Plant	Vertical manure pump, PTO	Ea	6577.02
533	EQIP	Pumping Plant	Chopper manure pump	Ea	1013.37