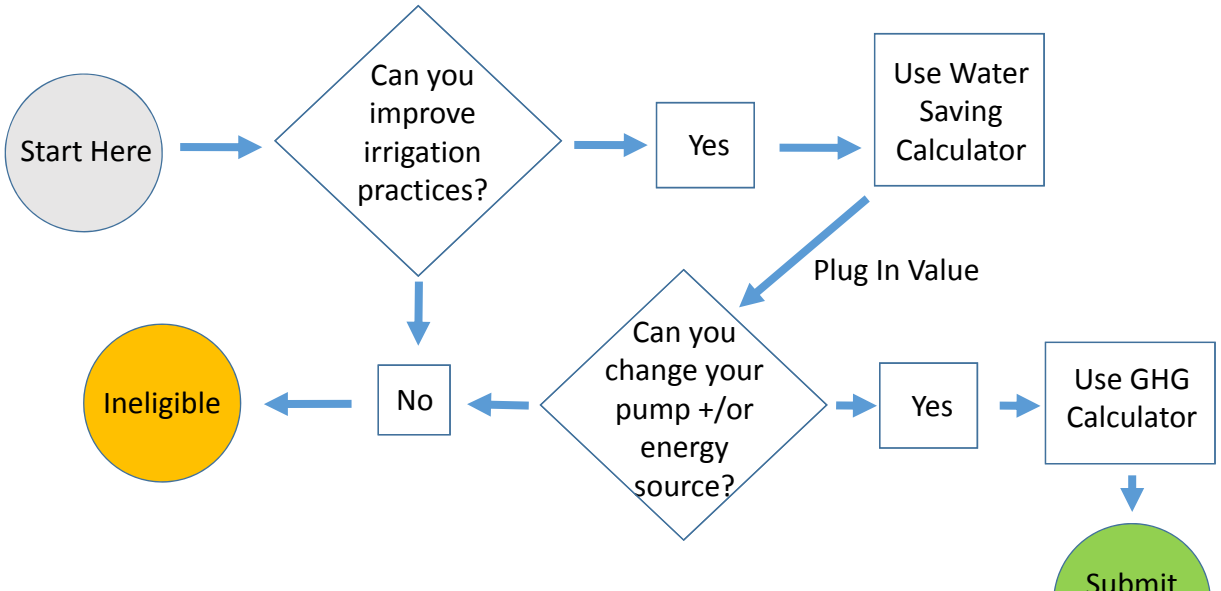
2016 CDFA SWEEP Grant Program Workshop

July 5, 2016

How to Use the Water Savings & GHG Calculators

Mike Blankinship

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering



CDFA SWEEP Overview

Blankinship & Associates, Inc.
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Irrigation System Improvements

Current System	Change
SURFACE IRRIGATION	Replace unlined ditch with pipeline/lining
SURFACE IRRIGATION	Replace a leaky pipeline with a pipeline
SURFACE IRRIGATION	Improve DU (Split runs, higher Q, etc.)
SURFACE IRRIGATION	Install a tailwater recovery system
SURFACE IRRIGATION	Landleveling (previously leveled)
SURFACE IRRIGATION	Landleveling (previously unleveled)
SPRINKLER IRR. (Hand Move/Side Roll)	Replace surface irrigation
SPRINKLER IRR. (Solid Set, Undertree)	Replace surface irrigation
SPRINKLER IRR. (Solid Set, Undertree)	Replace hand move sprinkler
TRICKLE IRRIGATION	Replace surface irrigation
TRICKLE IRRIGATION	Replace under tree, solid set sprinkler
TRICKLE IRRIGATION	Replace hand move sprinkler
CENTER PIVOTS	Replace surface irrigation
CENTER PIVOTS	Replace wheel lines

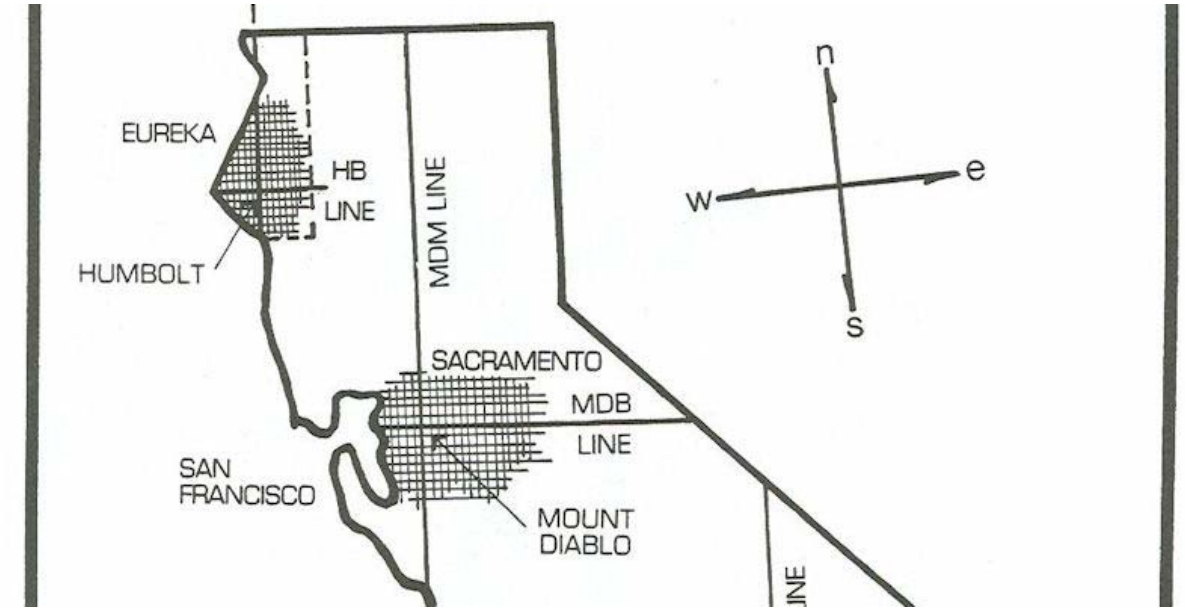
Example Project:

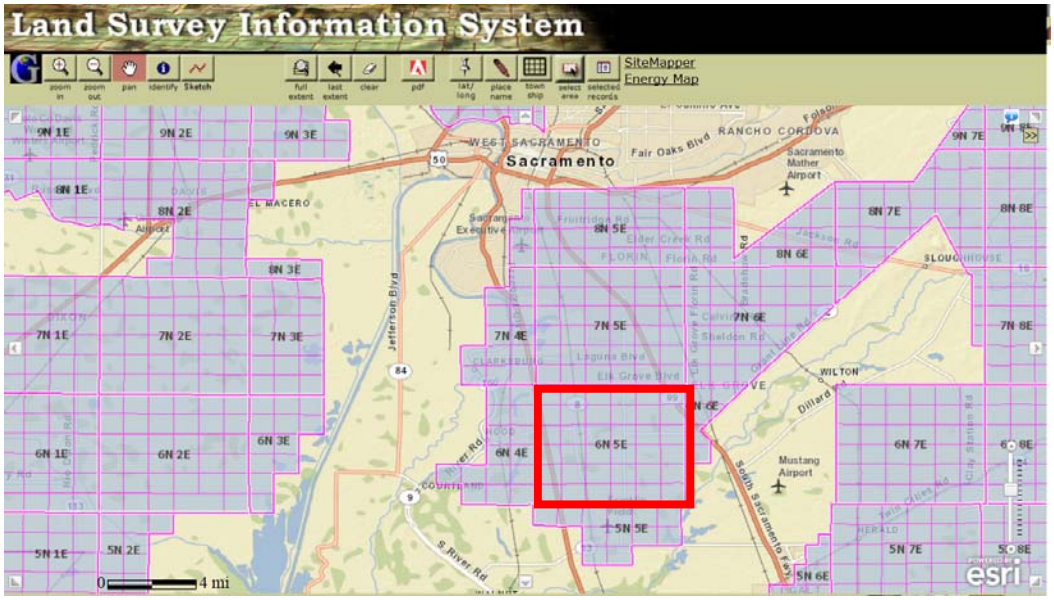
- 100 Ac of Almonds
- Clay Loam Soil in Sacramento Co.
- Change Surface Irrigation to Trickle
- Install:
  - Soil moisture, flow, Eto meters
  - Swap diesel for electricity
  - Install new VFD well pump
- $100K Grant Request

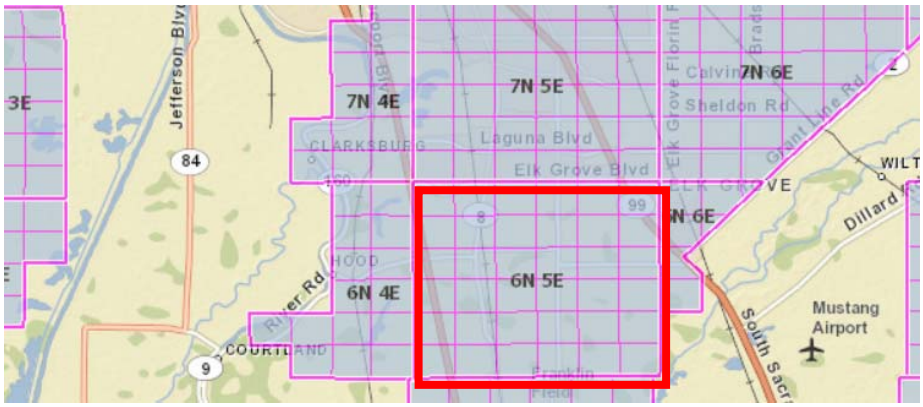
USDA-NRCS Water Savings Calculator

3 Basic Questions:

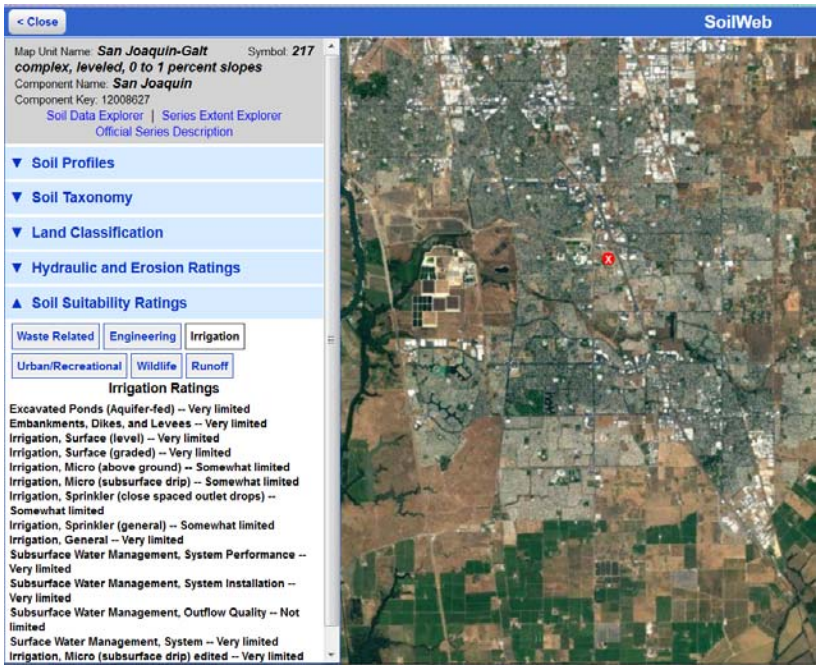
- Where are you?
- What are your soils?
- What do you want to do?







Source: http://www.geocommunicator.gov/blmMap/MapLSIS.jsp



Source:
http://casoilresource.lawr.ucdavis.edu/gmap/

Irrigation System Changes to Consider

Current System	Change
SURFACE IRRIGATION	Replace unlined ditch with pipeline/lining
SURFACE IRRIGATION	Replace a leaky pipeline with a pipeline
SURFACE IRRIGATION	Improve DU (Split runs, higher Q, etc.)
SURFACE IRRIGATION	Install a tailwater recovery system
SURFACE IRRIGATION	Landleveling (previously leveled)
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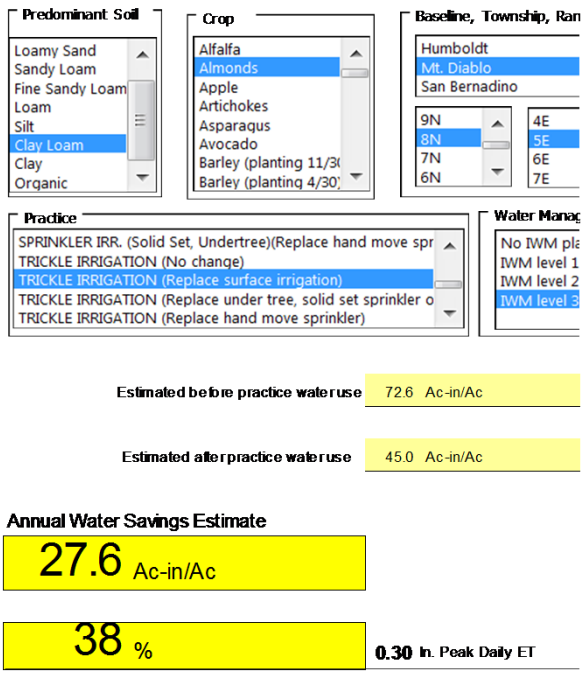
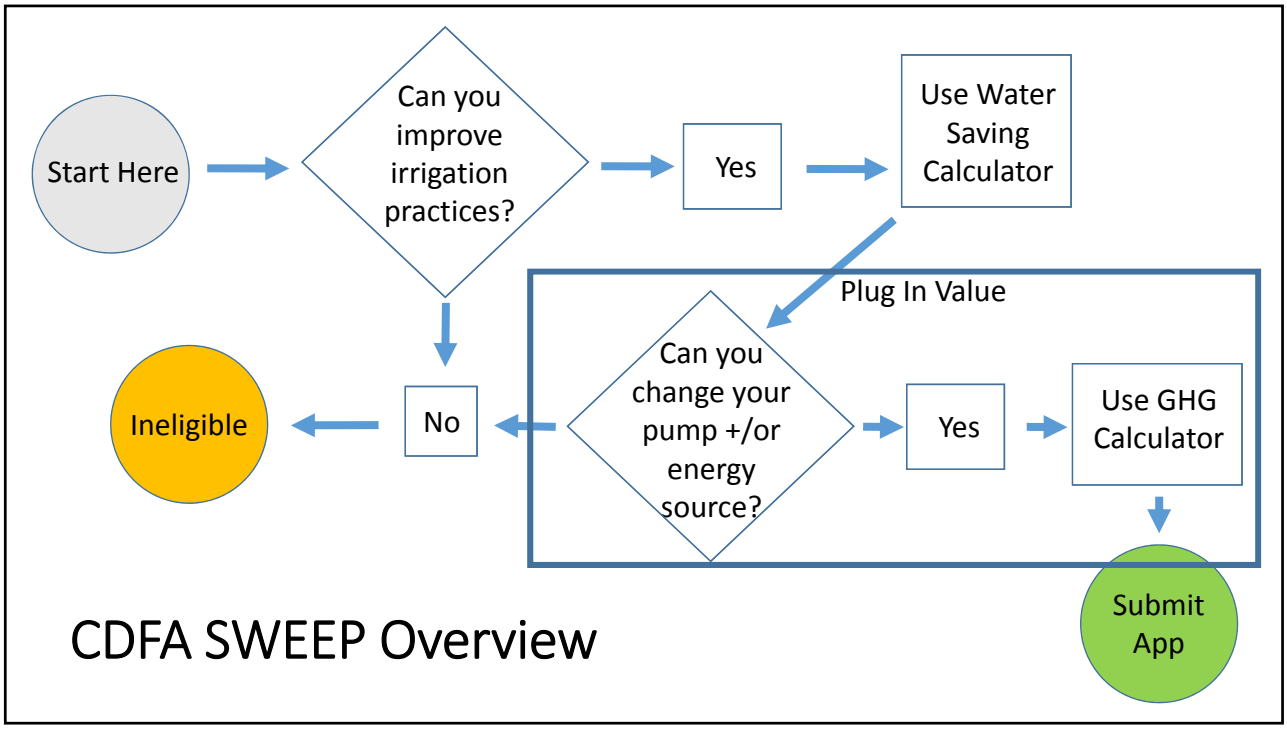
TRICKLE IRRIGATION	Replace under tree, solid set sprinkler
TRICKLE IRRIGATION	Replace hand move sprinkler
CENTER PIVOTS	Replace surface irrigation
CENTER PIVOTS	Replace wheel lines

Irrigation Water Management Plan Levels

IWM Level	Tools Involved	Potential Water Savings
0	No soil moisture equipment, no flow meter	0%
1	Soil moisture equipment	5%
2	Soil moisture + flow meter	10%
3	Soil moisture + flow meter + volumetric management using soil/flow/ET information	15%



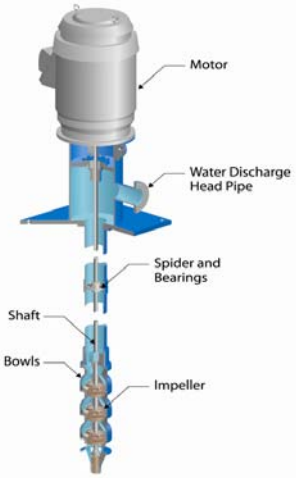


Green House Gas (GHG) Calculator

2 Basic Questions:

- Do you have pump efficiency data?
- What power source options do you have?

Overall Pumping Efficiency (OPE) is a Combination of Efficiencies…



- Motor Efficiency – 90-95%
- Transmission Efficiency – 95-97%
- Bowl Efficiency – 60s – high 70s

Thus, OPE = ME x TE x BE

Good OPE:

.66 (66%) = .93 x .97 x .73

15 Pacific Gas and Electric Company® Put More Power Through the Pump! Center for Irrigation Technology

GHG Emission Reduction Calculator

Fuel	EER-Adjusted CI (g C/MJ)
Solar/Wind Power	0
Electricity	31
Biodiesel/Renewable Diesel	38
Natural Gas	86
Gasoline	99
Diesel	103

General Project Information		
Input Data	Pre-Project	
Irrigated Project Area (acres)	100	
Funds requested ($)	$ 100,000	
Pump fuel or electricity use (gallons, scf, kWh)	2,000	
Fuel type	Diesel	
Fuel Emissions Factor	0.013818137	
Life of Project (yrs)	10	
Pump and Motor Enhancement and Replacement - This Section required for all applicants		
Input Data	Pre-Project	Post-Project
Motor Rated Horsepower (hP)	100	100
Operational Hours (hr) (if Known) - If unknown, leave cell blank		
Motor Efficiency (%)	75%	85%
Pump Efficiency (%)	75%	85%
System Pressure (ft)	User may override system pressure if known.	User may override system pressure if known.
Pumping depth (ft)	100	100
Discharge pressure (ft)	50	35
Friction losses (ft)	10	10
Are you installing a VFD?	N/A	VFD Well Pump
VFD Efficiency (%)	0%	85%
Irrigation System Enhancement (for systems utilizing pumps)		
Input Data	Pre-Project	Post-Project
Water savings (from NRCS) (%)	N/A	38%
Fuel Conversions and Renewable Energy		
Input Data		Post-Project
Renewable energy capacity (kW)		
New fuel type		Electricity
Fuel Emissions Factor		0.000378576
Fuel conversion		Diesel to Electricity
Conversion Factor		0.300992604

Part 1

Part 2

Part 3

GHG Calculator: Part 1

General Project Information	
Input Data	Pre-Project
Irrigated Project Area (acres)	100
Funds requested ($)	$ 100,000
Pump fuel or electricity use (gallons, scf, kWh)	2,000
Fuel type	Diesel
Fuel Emissions Factor	0.013818137
Life of Project (yrs)	10

GHG Calculator : Part 2

Pump and Motor Enhancement and Replacement - This Section required for all applicants		
Input Data	**Pre-Project**	**Post-Project**
Motor Rated Horsepower (hP)	100	100
Operational Hours (hr) (if Known) - If unknown, leave cell blank		
Motor Efficiency (%)	75%	85%
Pump Efficiency (%)	75%	85%
System Pressure (ft)	User may override system pressure if known.	User may override system pressure if known.
Pumping depth (ft)	100	100
Discharge pressure (ft)	50	35
Friction losses (ft)	10	10
Are you installing a VFD?	N/A	VFD Well Pump
VFD Efficiency (%)	0%	85%

GHG Calculator : Part 3

Irrigation System Enhancement (for systems utilizing pumps)		
Input Data	**Pre-Project**	**Post-Project**
Water savings (from NRCS) (%)	N/A	38%
Fuel Conversions and Renewable Energy		
Input Data		**Post-Project**
Renewable energy capacity (kW)		
New fuel type		Electricity
Fuel Emissions Factor		0.000378576
Fuel conversion		Diesel to Electricity
Conversion Factor		0.300992604

GHG Summary

Results	GHG Emissions (MTCO2e)
GHG Benefits/Yr	29.53
GHG Benefits over Useful Life	295.28
GHG Reduction/Ac	**2.95**
Total Funds Requested	$100,000
Total GHG Reduction/$	**0.003**

MTCO2e= Metric Tons CO2 Equivalent

Questions?

Mike Blankinship
(530) 757-0941
mike@h2osci.com

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