



CA Wine's Climate Protection Initiatives: On-Farm Renewable Energy and Biofuels

California & Agriculture Summit
October 1, 2009

A close-up photograph of a bunch of blue grapes on a vine, with some green leaves visible in the background. The text 'CALIFORNIA SUSTAINABLE WINEGROWING ALLIANCE' is overlaid in yellow, bold, sans-serif capital letters on the left side of the image.

CALIFORNIA
SUSTAINABLE
WINEGROWING
ALLIANCE

Allison Jordan
Executive Director
CSWA



Overview

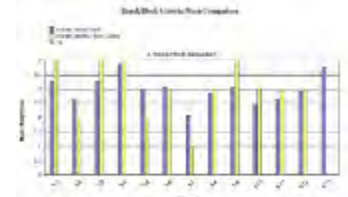
- CA Sustainable Winegrowing Program
- Climate Protection Initiatives
- On-Farm Renewable Energy and Biofuel Feedstock



CA Sustainable Winegrowing Program



CA Sustainable Winegrowing Program



Priority	Category	Current Status	Plan of Action	Timeline
1	Water	Current: 100% efficient irrigation system	1. Upgrade to drip irrigation system by 12/31/2023	12/31/2023
2	Energy	Current: High energy consumption	2. Implement energy-saving measures (e.g., LED lighting) by 06/30/2024	06/30/2024
3	Waste	Current: Limited recycling program	3. Expand recycling program to include all vineyard waste by 09/30/2024	09/30/2024
4	Community	Current: No formal community engagement	4. Establish a community advisory committee by 03/31/2025	03/31/2025



Code of Sustainable Winegrowing Practices

- Viticulture
- Soil Management
- Vineyard Water Management
- Pest Management
- Wine Quality
- Ecosystem Management
- Energy Efficiency
- Winery Water Conservation & Quality
- Material Handling
- Solid Waste Reduction & Management
- Environmentally Preferred Purchasing
- Human Resources
- Neighbors & Communities
- Air Quality





Energy Efficiency

- 28 workshops – 950 participants
 - Include alternative energy and bio-fuels
- 5-fold increase in # of annual EE projects since 2005 (359 total)
- \$6.25 million in PG&E rebates
- Eliminated 30,371 tons CO2
- 55 million KWH in energy savings
- 4,226 cars off the road for one year



Thanks to
John Garn and
PG&E for data



Climate Protection Initiatives

The Joy of Tech™

by Nitrozac & Snaggy



joyoftech.com

Parducci is First Carbon Neutral

Winery in U

A Winery in
the Way

Sta How did they do that?

County Leads

16 Oregon based wineries and

up to the

Carbon Neutral Challenge

The California Aims To Enlist

Solutions Act of 2006

Grove Mill and
"Green Choice"
Certification

Supp

Mission

great carbon

Winery:

?

?

in-

le on

(FOOD)

IT Week: Tesco to

introduce carbon

footprint labels

Car

tator

in the Air:

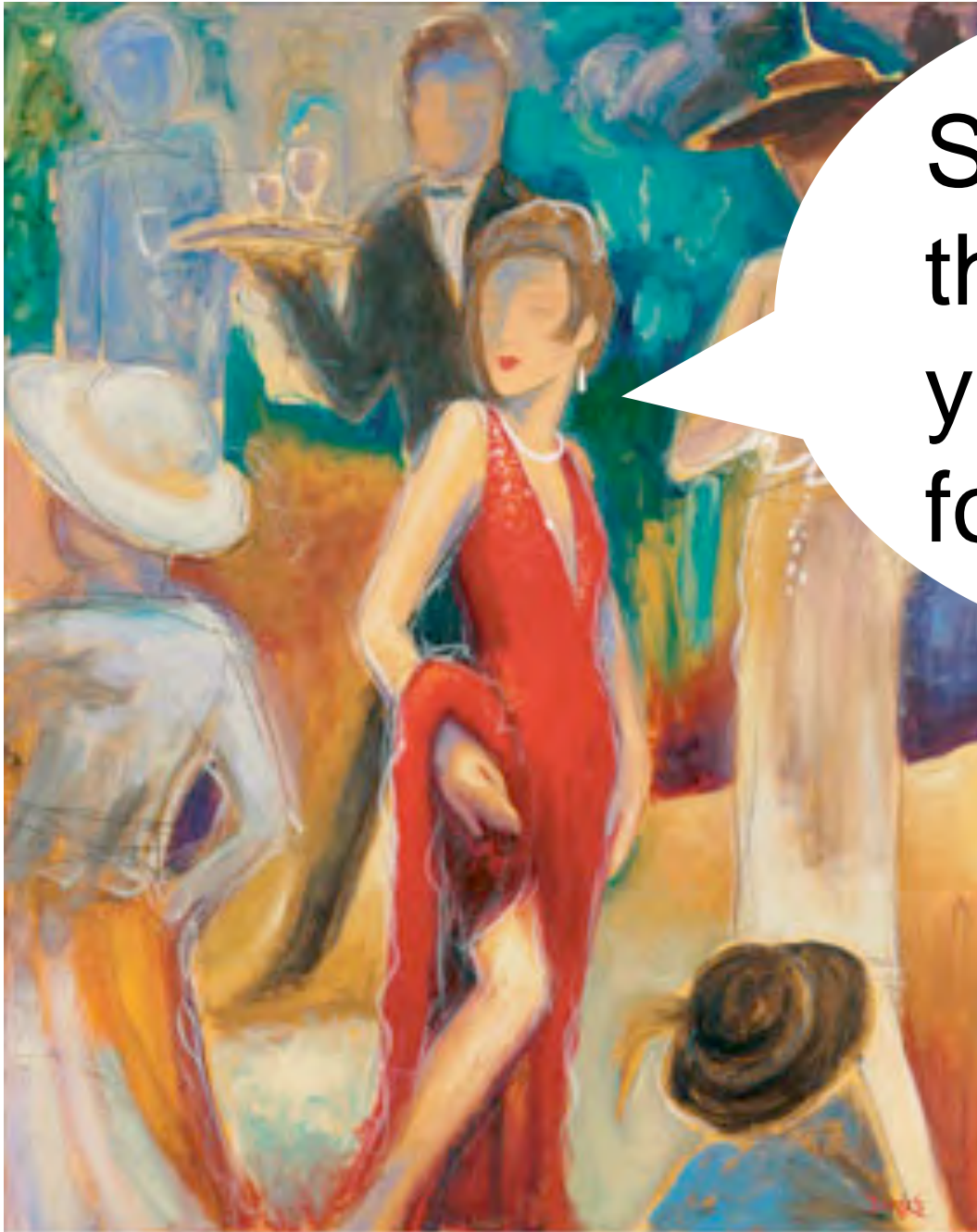
utral Wine

re trying to offset

gas emissions

feasible?

New Zealand Wine Company became the world's first carbon neutral vineyard.



So, what's
the size of
your carbon
foot print?

COCKTAIL PARTY
Cocktail Party



Wine Industry GHG Protocol

Welcome to the International Wine Industry Greenhouse Gas Accounting Calculator Move To Next Page

In order to select the familiar units and region specific emission factors, please select a region from the coloured maps below.

You have selected the following country and region: **Australia** **Western Australia**

	Volume	Energy	Mass	Mileage	Gas Units	Distance	Crush	Power	Sugar
Australia	L	GJ	Kg	L/100km	scM	Km	Tonnes	MWh	Brix
New Zealand	L	GJ	Kg	L/100km	scM	Km	Tonnes	MWh	Brix
United States	Gal (US)	Btu	lb	mpg	scf	mi	ton (long)	Therm	Brix
South Africa	L	Btu	Kg	L/100km	scM	Km	Tonnes	MWh	Brix
United Kingdom	Gal (imp)	Btu	lb	L/100km	scf	mi	ton (long)	Therm	Brix

A credible, free, easy to use, wine industry specific protocol and calculator that will satisfy GHG accounting needs:

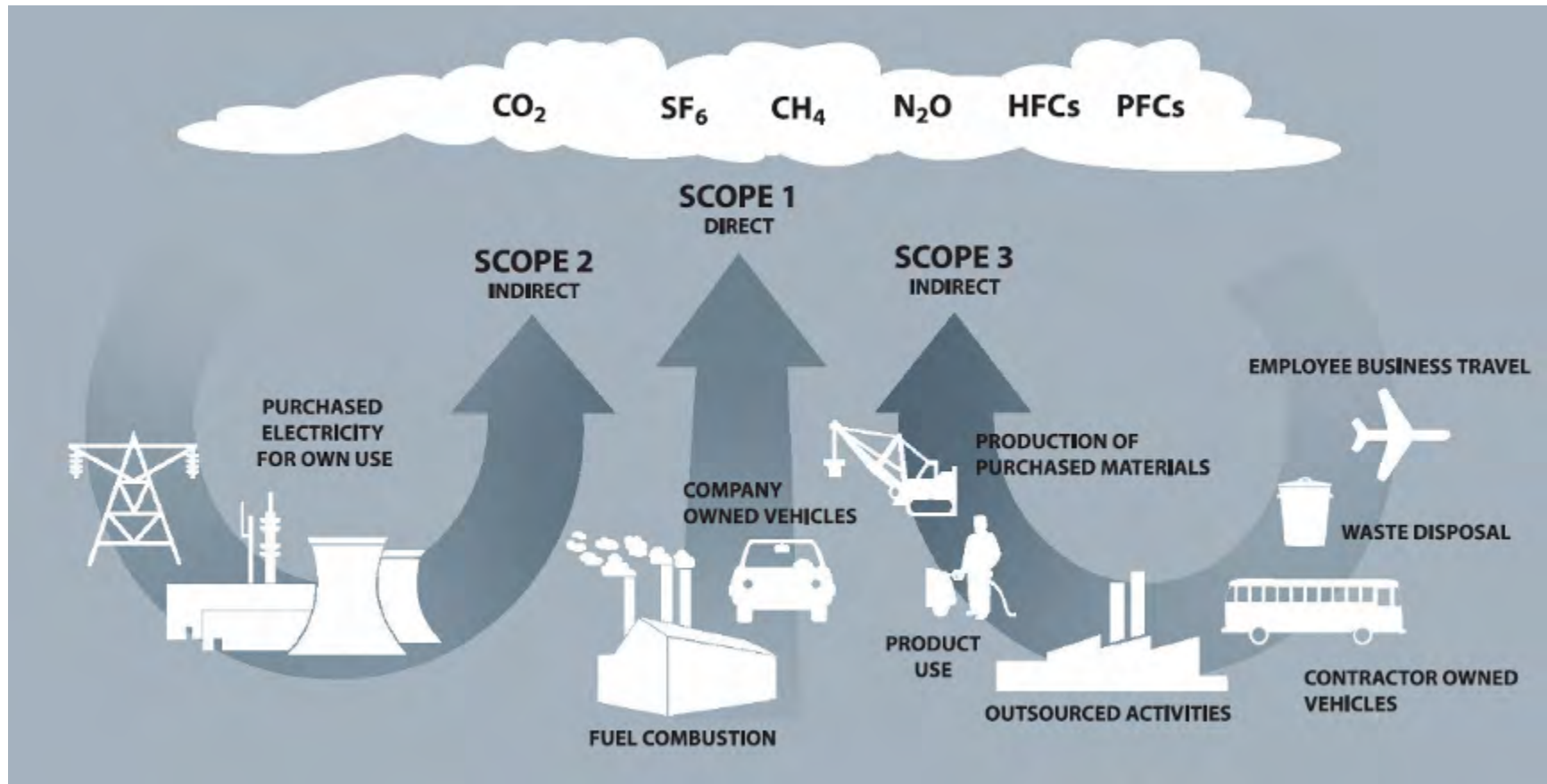
- Operational tracking
- Market access
- Future regulatory requirements
- Carbon credit accounting

International Partners: California Wine Institute, New Zealand Winegrowers Winemakers' Federation of Australia, South African Wine and Spirit Board, **Provisor Lt**

www.wineinstitute.org/ghgprotocol



Wine Industry GHG Calculator





Vineyard Management Practices and Carbon Footprints

Vineyard Impacts on Atmospheric GHGs

Model Components		CO ₂ (X)	N ₂ O (300X)	CH ₄ (25X)
Uncertainty	Carbon Sequestration	---	+/-	+
	Tillage	+++	+/-	+/-
	Nitrogen Fertilizer	+/-	+++	-
	Blomass			
	Vine C Storage	--	?	?
	Vine Decomposition	+++	++	+
	Soil Amendments			
	Compost	--	++	+
	Manure	--	++	+
	Lime	+/-	+/-	?
Cover Cropping	+/-	+/-	+	
Irrigation Water	+/-	+++	+	
Fuel Use				
Vehicles	+++	++	+	
Pumps	+++	++	+	
Electrical Grid	+++	++	+	

Legend: + = Increases - = Decreases ? = Unknown +/- = Site Specific
 Number of symbols indicates relative magnitude of impact.



Vineyard Management Practices and Carbon Footprints

Carbon Footprints, Emissions and Sequestration

CSWA would like to thank the California Department of Food and Agriculture, the US Department of Agriculture Specialty Crop Innovation Grant Program, and the University of California, Davis for making this publication possible.

Project Partners:
 Allied Grape Growers
 American Vineyard Foundation
 California Association of Winegrape Growers
 California Farm Bureau Federation
 California Grape and Tree Fruit League
 Sun-Maid Growers of California
 University of California, Davis
 Wine Institute

GHG Estimates from Combustion of Fossil Fuels

- Diesel produces 22 kg CO₂ equivalents (CO₂, N₂O + CH₄)/gallon
- Gasoline produces 10.5 kg CO₂ equivalents/gallon
- Propane produces 8.5 kg CO₂ equivalents/gallon
- Natural gas produces 1.5 kg CO₂ equivalents/meter³

The California grape and wine community, like many other agricultural and business sectors, is increasingly interested in better understanding its 'carbon footprint'. A carbon footprint can be defined as a comprehensive measure of the amount of greenhouse gases (GHGs) produced and consumed, and is used to determine whether or not individual operations are contributing to the increase of GHGs in the atmosphere and therefore global climatic change. Some vineyard operations, such as tractor driving, "produce" the GHG carbon dioxide (CO₂). Indeed, the key agricultural sources of atmospheric CO₂ are the combustion of fossil fuels and soil management practices that increase the decomposition of soil organic matter. The growing of grapes, however, also "consumes" CO₂ through photosynthesis. For this reason and others, agriculture, including grape growing, is a significantly smaller source of CO₂ than transportation and other industries. However, assessing a carbon footprint for an individual vineyard is somewhat more complex.

Agricultural activities emit two additional GHGs – nitrous oxide (N₂O) and methane (CH₄). The main GHG produced by viticulture is likely N₂O. It is generally believed that the CH₄ footprint in vineyards is insignificant. The importance of N₂O comes from its strong ability to act as a GHG. N₂O is roughly 300 times more effective than CO₂ at trapping heat in the Earth's atmosphere, so a small amount of N₂O can cause as much global warming as a very large amount of CO₂. To calculate a carbon footprint according to the protocol outlined by the International Panel on Climate Change (IPCC) requires the assessment of all GHGs combined into a cumulative, representative number, where non-CO₂ emissions such as CH₄ and N₂O are converted to CO₂ equivalents. For example, this is done for N₂O by multiplying the amount of emissions by its global warming potential (how much better it is at trapping heat than CO₂, or 300). Thus, in terms of equivalents, one kg of N₂O equals 300 kg of CO₂.

Besides being a source of GHGs, agricultural systems can help offset emissions by the long-term storage of carbon in vegetative structures and soils. This process is referred to as carbon sequestration, and according to some models, perennial crops like vineyards and orchards are expected to sequester more carbon than annual crops. Vineyard establishment and management practices can differentially influence the amounts and relative proportions of vineyard GHG emissions and carbon sequestration and, thus, can be adapted to reduce emissions and increase carbon storage to achieve a more desirable balance.

May 2009 www.sustainablewinegrowing.org



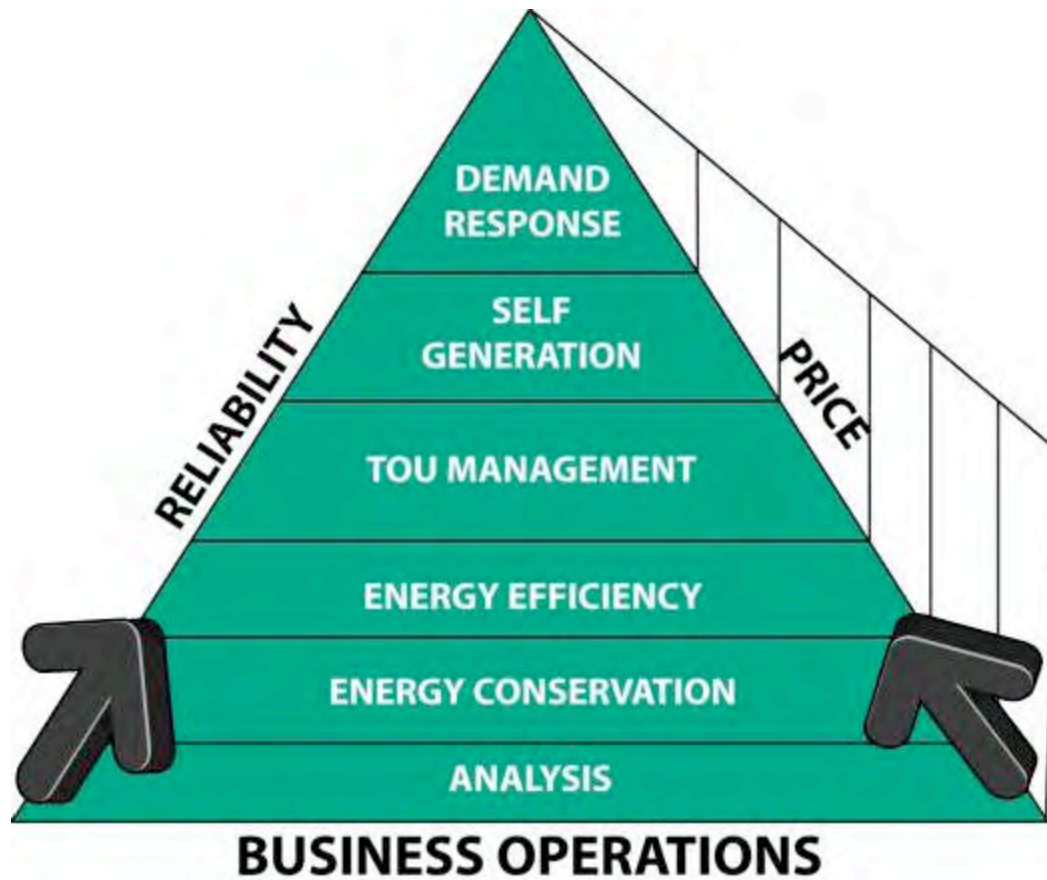
On-Farm Renewable Energy and Biofuels



© Scott Adams, Inc./Dist. by UFS, Inc.



PG&E's Energy Pyramid





Solar Benefits

Reliable Technology

- Major brand name companies offering 20-25 year warranty
- 40-50 year service life

Compelling Economics

- Fast pay-back with all-cash option
- Improved cash flow when financed; leasing relatively low-cost
- Insulation from rising energy prices

Improved Sustainability

- Eliminate carbon emissions: huge amounts!!!!
- Eliminate your contribution to local power plant pollution
- Eliminate reliance on fossil fuels for electricity

Marketing Benefits

- P.R. opportunities
- Retail merchandising tool to influence tasting room sales
- Web site presentation to reinforce brand equity



- From Sunlight
Electric presentation
at SWP Energy
Workshop



CA Wineries With Solar

Alexander Valley Vineyards
Bargetto's Santa Cruz Winery
Casa Nuestra Winery &
Vineyards LLC
Chateau Montelena Winery
Clautiere Vineyards
Cline Cellars
Concannon Vineyard
Cooper-Garrod Estate
Vineyards
David Coffaro Vineyard &
Winery
De Tierra Vineyards
Domaine Carneros
Drytown Cellars
Far Niente Winery
Fetzer Vineyards
Frog's Leap Winery
Gonzales Winery
Green and Red Vineyard
Grgich Hills Cellar

Gundlach Bundschu Winery
Handley Cellars
Honig Vineyard and Winery
Jacuzzi Family Vineyards
J. Lohr
Larkmead Vineyards
L'Aventure Winery
Long Meadow Ranch Winery
The Lucas Winery
Meridian Vineyards
Merry Edwards Wines
Merryvale Vineyards
Miner Family Vineyards
Moshin Vineyards
Mount Eden Vineyards
Nickel and Nickel
Oakville Ranch
Paloma Winery
Parducci
Patz & Hall

Peju Province Winery
Philo Ridge Vineyards
Quivira Vineyards & Winery
Ridge Lytton Springs
Robert Keenan Winery
Rodney Strong Vineyards
Saintsbury
Saxum Vineyards
Seavey Vineyard
Seghesio Family Vineyards
Sierra Vista Winery
Silver Oak Cellars
Spottswoode Estate Vineyards &
Winery
Staglin Family Vineyards
Storrs Winery & Vineyards LTD
Tablas Creek Vineyard
Trefethen Vineyards
Trinchero Winery
V. Sattui Winery
ZD Wines AND MORE...



Bargetto's Solar Case Study

- 3 kilowatt solar panels in vineyards to irrigate vineyards
 - Expected to generate 4,500 kwh and offset 200,000 pounds of CO₂ production at Moss Landing's natural gas power plants over the next 25 years
- System anticipated to pay for itself in four years from \$1,800 a year savings on electric bills
- Challenge: Took 1 ½ yrs. to get county permit and panels running





Biodiesel Benefits

Environment

- Nontoxic and biodegradable
- Clean burning (reduces emissions including |bon dioxide, particulates, carcinogens)
- Renewable



Economy

- Made in America - supports domestic agricultural producers and increases national energy security
- Job creation and increased tax base
- Diversifies fuel supply and provides hedge against rising petroleum prices

Performance

- Road tested and simple to use
- Reduced maintenance costs

- From Community Fuels presentation at SWP Energy workshop



Bio-Fuels in Wineries & Vineyards

- Benzinger Family Winery
- Bokisch Vineyards
- Fetzer Vineyards
- Frey Vineyards
- Greenwood Ridge Vineyards
- Halter Ranch Vineyard
- The Hess Collection Winery
- Honig Vineyard & Winery
- Heller Estate Vineyards
- Laetitia Vineyard and Winery
- Long Meadow Ranch Winery
- Meridian Vineyard
- Navarro Vineyards
- Parducci
- Porter Creek Vineyard
- Tres Sabores
- Vino Farms
- Yorkville Cellars



Bio-Fuel Testimonials

- “Biodiesel is **non-toxic** and has very few emissions. The men operating the tractors and forklifts throughout the day are no longer inhaling harmful fumes. That's very important to us.”
- "For me, the most important aspect of all of this is simple; we're **farmers helping farmers.**”
- “Like our use of solar energy for electricity, biodiesel fuels allow us to employ renewable energy sources to meet our farming needs and at the same time create a **healthier, safer work environment.**”
- “This (biodiesel) replaces the solvent that we have to pay to get replaced every three months, and this other microbial cleaner we tried that's a hazard to dispose of. The biodiesel is so much **cheaper** – we can use the same 5 gallons for months. And it's **safer. It's not flammable.**”

- From Community Fuels presentation at SWP Energy workshop



Bio-Fuel Testimonials

- “Biodiesel is **non-toxic** and has very few emissions. The men operating the tractors and forklifts throughout the day are no longer inhaling harmful fumes. That's very important to us.”
- "For me, the most important aspect of all of this is simple; we're **farmers helping farmers.**”
- “Like our use of solar energy for electricity, biodiesel fuels allow us to employ renewable energy sources to meet our farming needs and at the same time create a **healthier, safer work environment.**”
- “This (biodiesel) replaces the solvent that we have to pay to get replaced every three months, and this other microbial cleaner we tried that's a hazard to dispose of. The biodiesel is so much **cheaper** – we can use the same 5 gallons for months. And it's **safer. It's not flammable.**”

- From Community Fuels presentation at SWP Energy workshop



Pomace to Energy Research

- **INNOVATION:** Akali pulping process as pretreatment to enable anaerobic digestion (AD) of pomace
- **SCOPE:** UCD experiments to verify AD performance and design parameters for winery/vineyard wastes – associated engineering and cost evaluation to determine feasibility/design of scale-up
- **GOAL:** ~300 MW biomass electricity from waste streams

Project Team: Evan Hughes, Harrison Cooper and
UCD's Ruihong Zhang, Xiguang Chen, Sharon Shoemaker



Biodigesters: Process Water to Energy

- Sun-Maid Growers of CA biodigester treats 100K G of process water and biowaste solids
 - Reduces solids and BOD by 85%; eliminates odors
 - Produces enough methane to run the stills
 - Replaces 75% of SM natural gas needs
 - Improves water quality- stored in lined ponds, water evaporates, and remaining solids sold for compost



Photo Courtesy of Sun-Maid



www.sustainablewinegrowing.org



Thank you!