Sustainability and Almonds: Where are We?

Gabriele Ludwig

Almond Board of California

Jeff Dlott

SureHarvest

Tim Birmingham

Almond Board of California

growing ADVANTAGE™ The Almond Conference

2014 Almond Sustainability Report

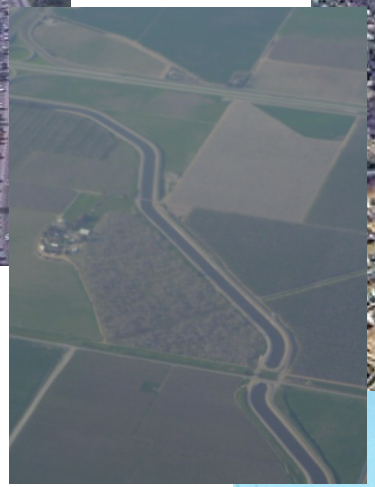
CALIFORNIA ALMOND SUSTAINABILITY PROGRAM

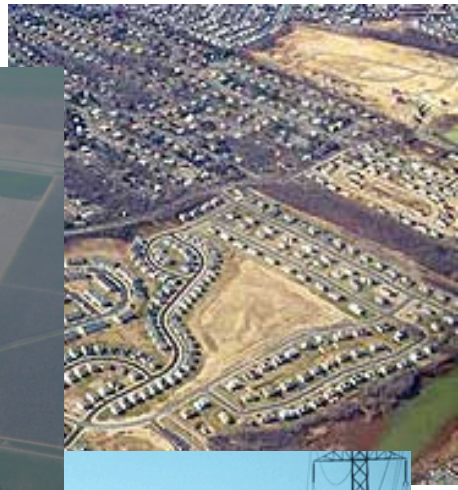
Rapidly changing world affecting resources and costs

The world is changing…

- More people
- Less land
- More pressure on fewer resources

➔ Increased production costs





Fortunately, almond growers are adept at adapting!

Almond harvest: 1939

2009

Rapidly Changing World:
Almonds - With Increased Size Comes Increased Scrutiny

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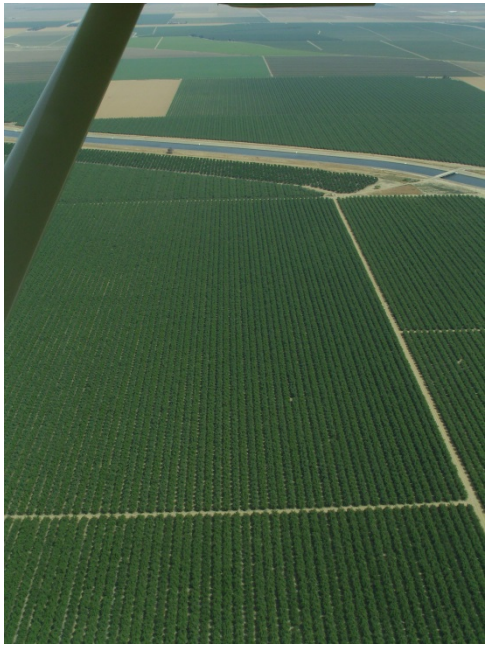
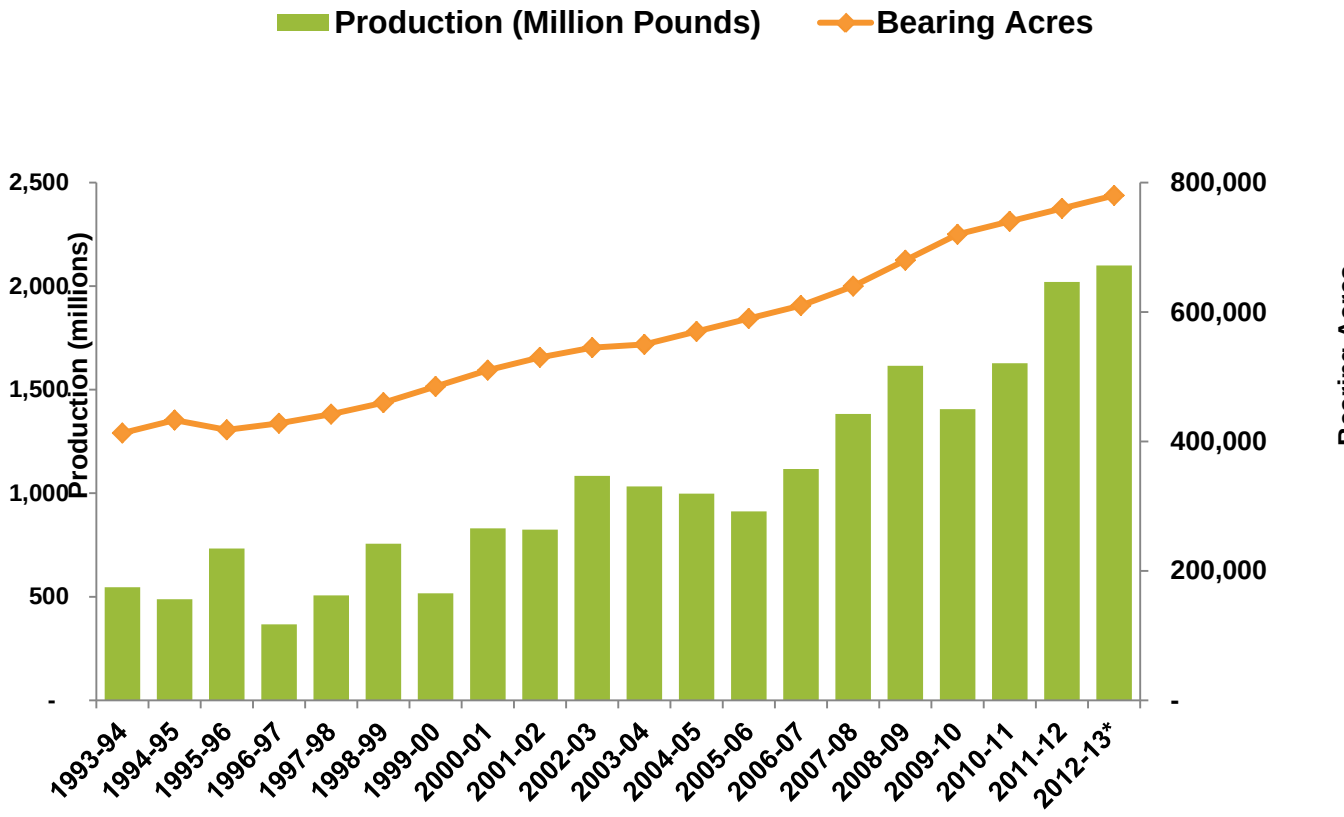
Almonds are:
2 crop in total acreage in California
3 crop in total value in California
1 crop in export value in California
➔ MUCH MORE VISIBLE





ABC Strategic Environment

A Crop of Choice

Almond farming in California is considered by all to be a crop that is good for the state and the country, and has a long term comparative, competitive advantage versus other countries of origin

The Nut of Choice

The use and consumption of almonds is considered essential to global importers, manufacturers, product developers, marketers, retailers, and consumers

So, why a Sustainability Program?

For Almonds to be a crop of choice to grow:

Need to continue to learn about and share practices to improve production efficiencies (profits)

Optimize the efficient use of natural resources (e.g., water, nutrients, energy)

Optimize the efficiency of field operations (e.g., pest management, harvest)

➔ AND document almond growers' thoughtfulness

So, why a Sustainability Program?

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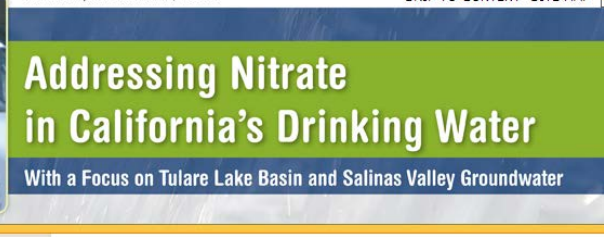
To be a Crop of Choice need buyers and the license to operate

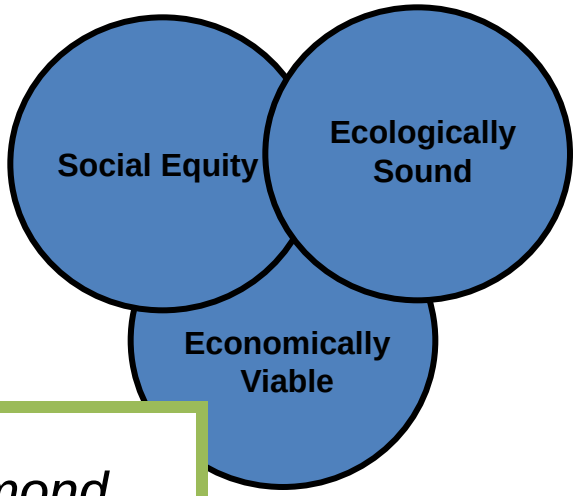
Need for transparency of production practices in the marketplace

Need for conveying accurate production information to public policy makers and regulatory agencies

➔To Document and Tell the Almond Story!



Almond Sustainability Definition



Sustainable almond farming utilizes production practices that are economically viable and are based upon scientific research, common sense and a respect for the environment, neighbors and employees.

The result is a plentiful, healthy and safe food product.

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California Almond Sustainability Program

Five self-assessment modules;

- Irrigation Management
- Nutrient Management
- Energy Management
- Pest Management
- Air Quality

Drafted:

- Financial Management
- Ecosystems Management
- Water Quality (integrated into existing modules)
- Social Responsibility (HR/ Neighbors) next

www.sustainablealmondgrowing.org

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Sustainability Trends and the 2014 Almond Sustainability Report

Jeff Dlott, Ph.D.

Outline


sustainability
reporting
organization
sustainability
business
social
management
impact
environmental
chain
guidelines
corporate
citizenship
Global
companies
employees
accounting
stakeholder
metrics
reports
reputation
integrated
topics
standards


2014
CALIFORNIA ALMOND SUSTAINABILITY PROGRAM
ALMOND SUSTAINABILITY REPORT

Sustainability Trends: Business View

pwc

accenture

Deloitte.

ERNST & YOUNG
Quality In Everything We Do

KPMG
cutting through complexity

Harvard Business Review

BAIN & COMPANY

FOOD FORESIGHT
Celebrating 20 Years
1993-2013

Sustainability Trends

1. Sustainability Being Embedded into Overall Strategy

2. Greater Emphasis on Value Creation
   - Reduce Costs
   - Grow Sales
   - Manage Risks
   - Enhance Brand

3. "More with Less" is Becoming a Need to Have not a Nice to Have
   - Real Resource Constraints (e.g. water, land, etc.)

4. Trust and Transparency More Important than Ever

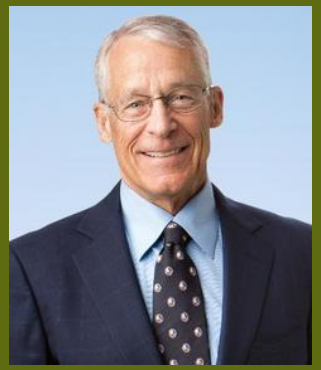
Sustainability as Strategy?

"Doug McMillon Elected New Chief Executive Officer of Wal-Mart Stores, Inc."

"…A merchant at heart, Doug has…a keen sense of where our customers globally are heading next.

He has also shown strong leadership on environmental sustainability and a commitment to using Walmart's size and scale to make a difference..."

Rob Walton
chairman of Walmart's board of directors
November 25, 2013



Trend 1:
Strategy & Sustainability

BAIN & COMPANY

- Launched 20-years ago – first global survey of executives' behavior and attitudes of management tools
- More than 1,200 global executives interviewed for this 14th report

Top 10 Management Tools

2000	2006	2008	2010	2012
1 Strategic Planning	1 Strategic Planning	1 Benchmarking	1 Benchmarking	1 Strategic Planning
2 Mission & Vision Statements	2 CRM	2 Strategic Planning	2 Strategic Planning	2 CRM
3 Benchmarking	3 Customer Segmentation	3 Mission and Vision Statements	3 Mission and Vision Statements	3 Employee Engagement Surveys
4 Outsourcing	4 Benchmarking	4 CRM	4 CRM	4 Benchmarking
5 Customer Satisfaction	5 Mission and Vision Statements	5 Outsourcing	5 Outsourcing	5 Balanced Scorecard
6 Growth Strategies	6 Core Competencies	6 Balanced Scorecard	6 Balanced Scorecard	6 Core Competencies
7 Strategic Alliances	7 Outsourcing	7 Customer Segmentation	7 Change Management Programs	7 Outsourcing
8 Pay-for-Performance	8 Business Process Reengineering	8 Business Process Reengineering	8 Core Competencies	8 Change Management
9 Customer Segmentation	9 Scenario & Contigency Planning	9 Core Competencies	9 Strategic Alliances	9 Supply Chain Management
10 Core Competencies	10 Knowledge Management	10 Mergers & Acquisitions	10 Customer Segmentation	10 Mission and Vision Statements

BAIN & COMPANY

Strategy and Benchmarking Top Management Tools

SureHarvest

Top 10 Management Tools

2000	2006	2008	2010	2012
1 Strategic Planning	1 Strategic Planning	1 Benchmarking	1 Benchmarking	1 Strategic Planning
2 Mission & Vision Statements	2 CRM	2 Strategic Planning	2 Strategic Planning	2 CRM
3 Benchmarking	3 Customer [illegible]	3 Mission and Vision Statements	3 Mission and Vision Statements	3 Employee Engagement Surveys
4 Outsourcing	4 Benchmarking	4 CRM	4 CRM	4 Benchmarking
5 Customer Satisfaction	5 Mission and Vision Statements	5 Outsourcing	5 Outsourcing	5 Balanced Scorecard
6 Growth Strategies	6 Core Competencies	6 Balanced Scorecard	6 Balanced Scorecard	6 Core Competencies
7 Strategic Alliances	7 Outsourcing	7 Customer Segmentation	7 Change Management Programs	7 Outsourcing
8 Pay-for-Performance	8 Business Process Reengineering	8 Business Process Reengineering	8 Core Competencies	8 Change Management
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10 Core Competencies	10 Knowledge Management	10 Mergers & Acquisitions	10 Customer Segmentation	10 Mission and Vision Statements

HBR SPOTLIGHT

Strategy & Society

The Link Between Competitive Advantage and Corporate Social Responsibility

by Michael E. Porter and Mark R. Kramer

HARVARD BUSINESS REVIEW • HBR.ORG • DECEMBER 2006

california almonds™
Almond Board of California

DAY 2: WEDNESDAY, DECEMBER 4
CROP OF CHOICE OVERVIEW

DAY 2: WEDNESDAY, DECEMBER 4
NUT OF CHOICE OVERVIEW

CALIFORNIA ALMOND SUSTAINABILITY PROGRAM™

Focus on Competitive Advantage

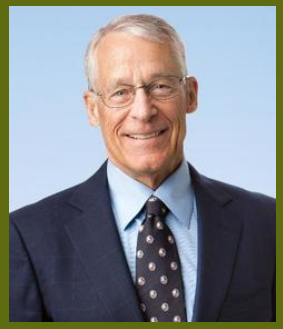
HBR SPOTLIGHT

Strategy & Society

The Link Between Competitive Advantage and Corporate Social Responsibility

by Michael E. Porter and Mark R. Kramer

1 Retailer



1 Specialty Crop

DAY 2: WEDNESDAY, DECEMBER 4
CROP OF CHOICE OVERVIEW

DAY 2: WEDNESDAY, DECEMBER 4
NUT OF CHOICE OVERVIEW

CALIFORNIA ALMOND SUSTAINABILITY PROGRAM™

Trend 2:
Sustainability and Value Creation

2. Greater Emphasis on Value Creation

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Quality In Everything We Do

Deloitte.

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KPMG
cutting through complexity

Best Practices

Analyze if value is generated by implementing the practices

Create and Sustain Value

- Reduce Costs
- Grow Sales
- Manage Risks
- Enhance Brand

Value Analysis & Mapping for the Farm

accenture

pwc

Ernst & Young
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Deloitte.

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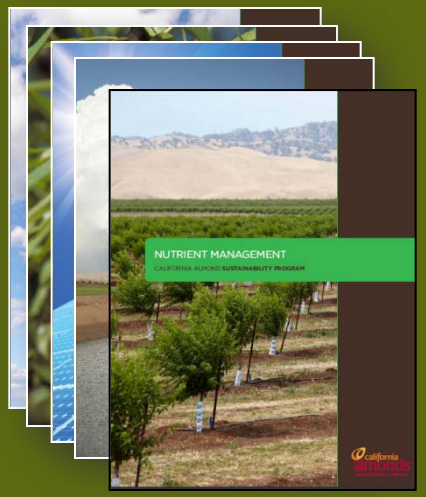
cutting through complexity

Useful for Agriculture?

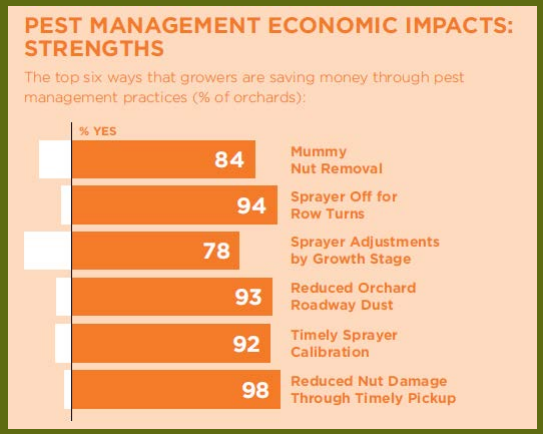
- Reduce Costs
- Grow Sales
- Manage Risks
- Enhance Brand

Grower Economic Value Generation

- Reduce Costs
- Manage Risks
- Enhance Brand

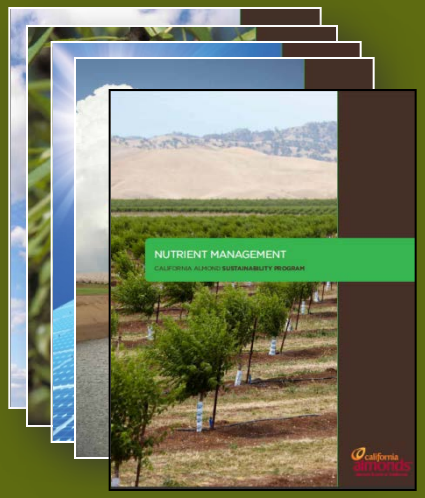


- Water Use Efficiency
- Nutrient Use Efficiency
- Energy Use Efficiency
- Pesticide Use Efficiency
- Optimize Yields
- Sustain High Quality or Improve Quality and Consistency
- Meet Air Quality Compliance Standards
- Simplify Efforts to Document and Communicate Sustainability BMPs to Buyers, Regulators and other Stakeholders

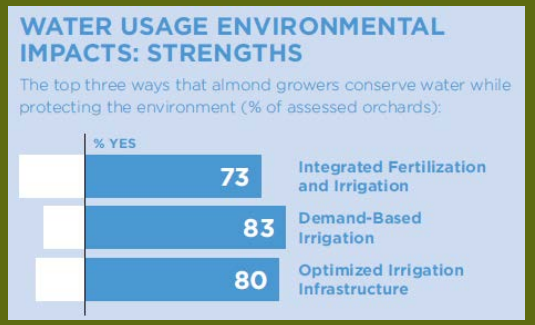


Environmental Value Generation

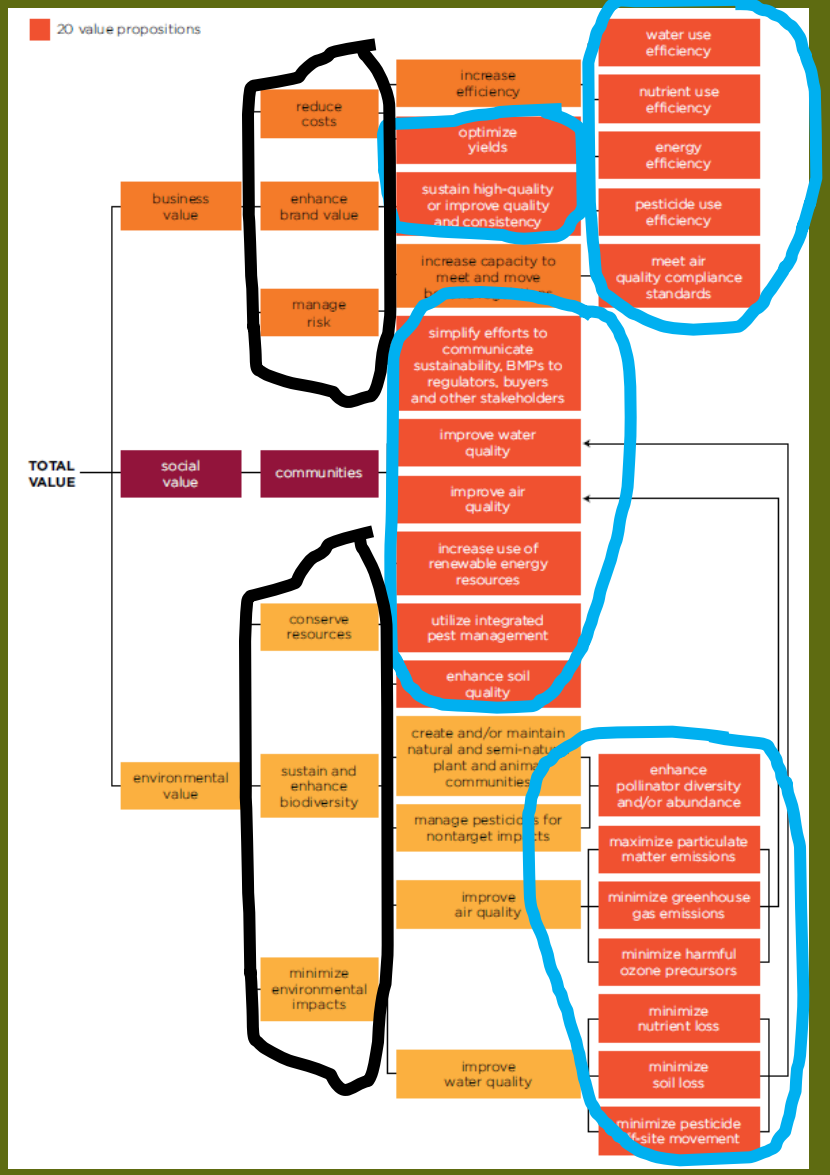
- Conserve Resources
- Sustain & Enhance Biodiversity
- Minimize Environmental Impacts



- Water Use Efficiency
- Increase Use of Renewable Energy Sources
- Utilize Integrated Pest Management
- Enhance Soil Quality
- Enhance Pollinator Diversity and/or Abundance
- Minimize Particulate Matter
- Minimize Greenhouse Gases
- Minimize Harmful Ozone Precursors
- Minimize Nutrient Loss
- Minimize Soil Loss
- Minimize Pesticide Off-Farm Movement



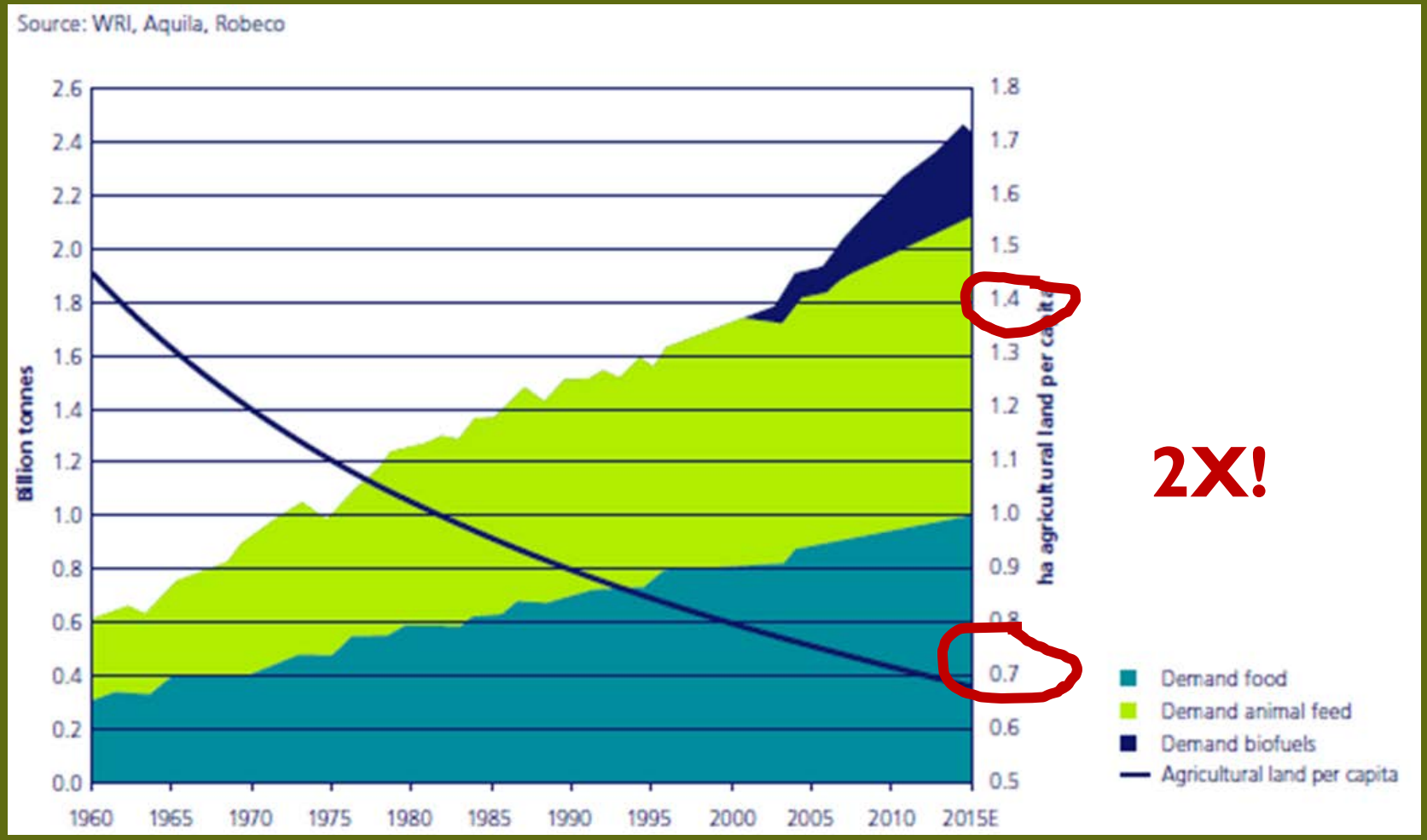
Almond Sustainability Value Map



Trend 3:
Producing More with Less

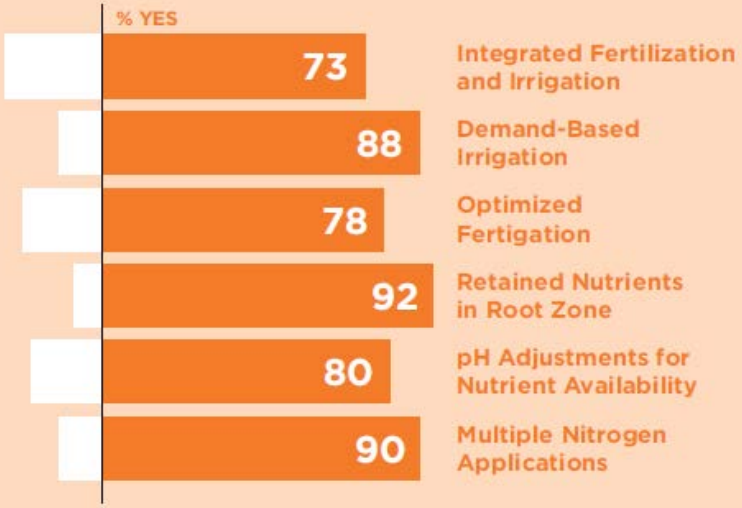
"Food production will have to increase by 70% over the next 40 years in order to meet soaring demand"

UN Food and Agriculture Organization



NUTRIENT MANAGEMENT ECONOMIC IMPACTS: STRENGTHS

The top six ways that growers are saving money through nutrient management practices (% of orchards):



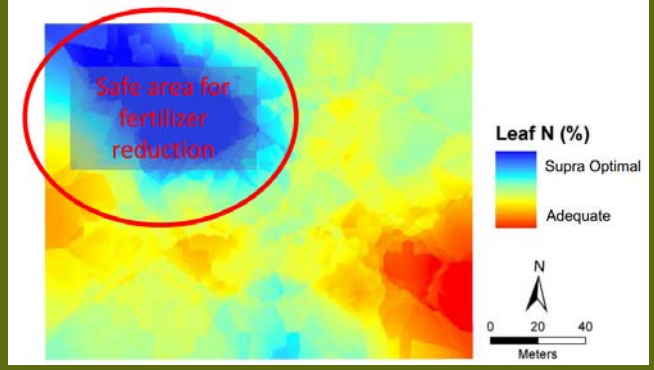
Crop Nutrient Status & Demand in Almond: Patrick Brown

Development of Leaf Sampling Methods & Nutrient-Budget Fertilization

Patrick Brown, Saiful Muhammad and Sebastian Saa Silva

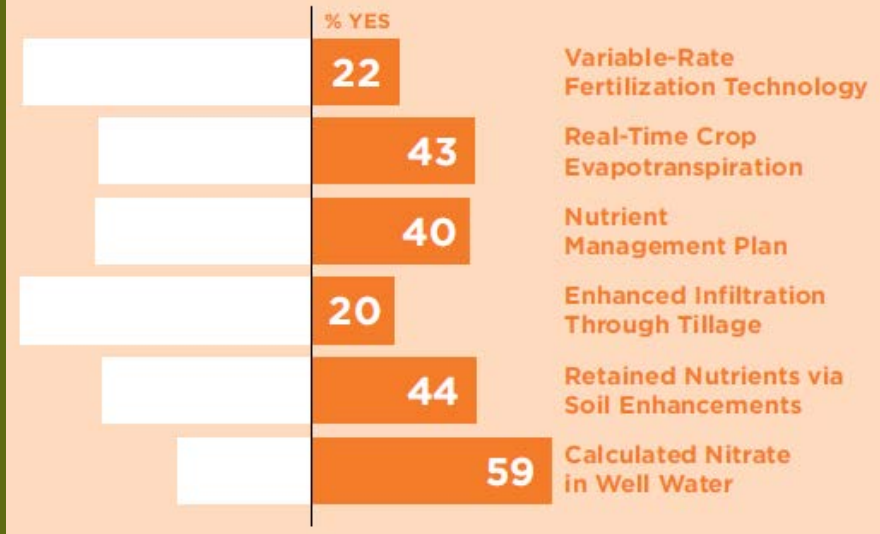
Spatial distribution of leaf N

Identification –Management - Economics

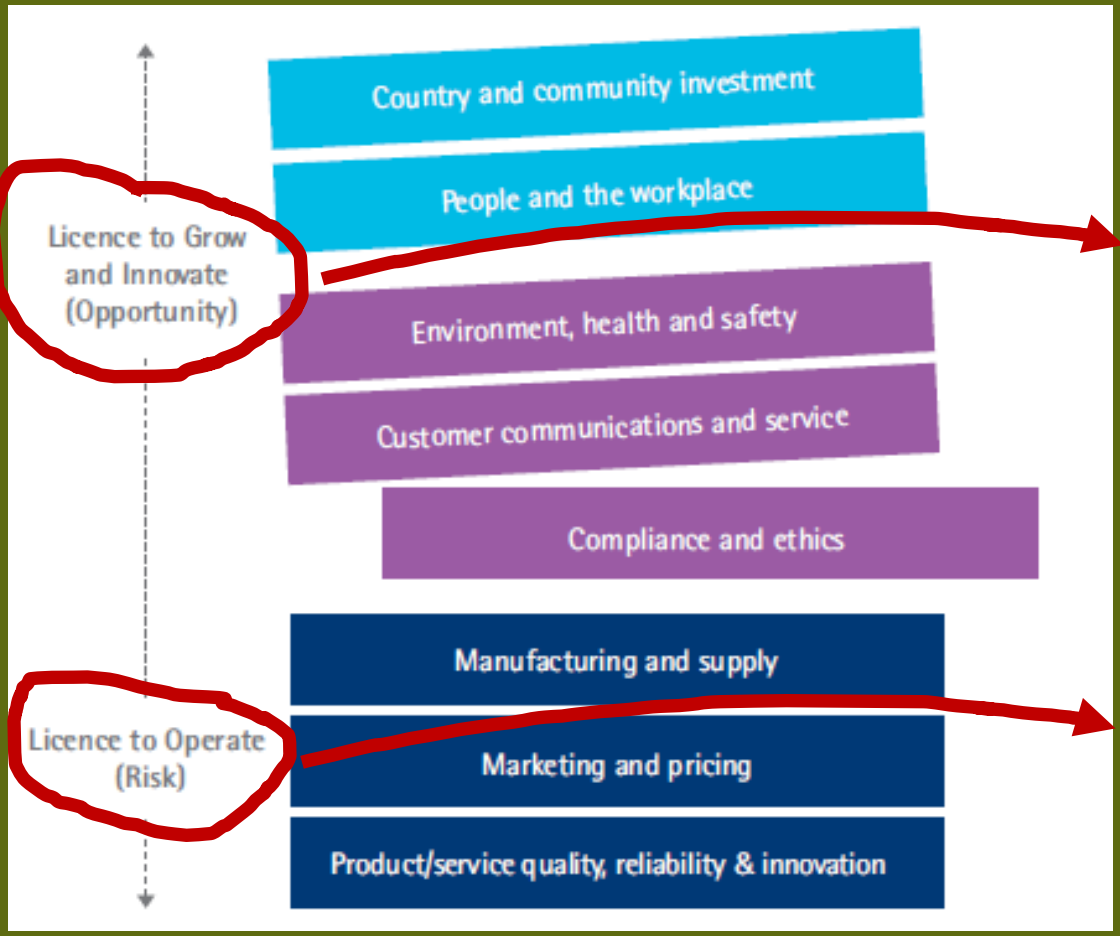


NUTRIENT MANAGEMENT ECONOMIC IMPACTS: OPPORTUNITIES

The top six ways growers could increase savings through nutrient management practices (% of orchards):



Trend 4:
Trust and Transparency



DAY 2 : WEDNESDAY, DECEMBER 4
NUT OF CHOICE OVERVIEW

DAY 2: WEDNESDAY, DECEMBER 4
CROP OF CHOICE OVERVIEW

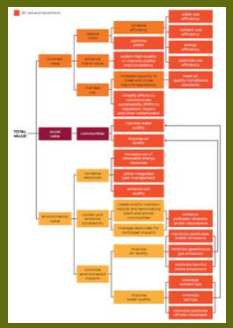
Transparent Actions Lead to Trust

MONITORING ELECTRICITY USE		Yes/Current practice / No	Have tried it / Haven't tried it / Not familiar with it	STATISTICS: SAMPLE SIZE	PERCENT YES	CONFIDENCE LEVEL
1	Electricity use in my operation was recorded and tracked beyond filing paid bills.			142	38.3	4.9
2	Electricity use was recorded and tracked for the operation as a whole.			138	83.3	6.2

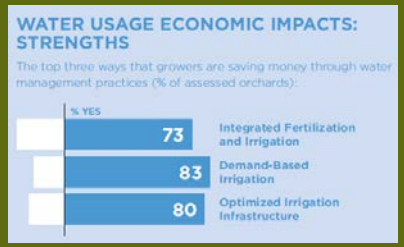
Sustainability Trends and the 2014 Almond Sustainability Report

- Sustainability Becoming Embedded into Overall Strategy
- Greater Emphasis on Value Creation
  - Reduce Costs
  - Grow Sales
  - Manage Risks
  - Enhance Brand
- "More with Less" is Becoming a Need to Have not a Nice to Have
  - Real Resource Constraints (e.g. water, land, etc.)
- Trust and Transparency More Important than Ever

Summary: Trends and ABC CASP



Your Confidential Benchmark Report



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Almond Board of California

growing ADVANTAGE™ The Almond Conference

Transforming CASP Data for Strategic Use

Practice	Response	% of orchards ± 95% confidence level	Why not? (% of orchards) Not familiar	Not tried	Have tried
Insect, Mite and Disease Monitoring					
Frequency of and Who Does Insect, Mite & Disease Monitoring	Occasional/None	8.0			
	Regular non-PCA	17.5			
	Regular by PCA	74.5			
Of orchards monitored for insects, mites & diseases…					
Monitoring data, university guidelines & experience are used to design & implement management strategies	Yes	86.1 ± 5.8			
	No	13.9 ± 5.8	2.2	8.0	3.6
Navel Orangeworm					
Mummy nuts are counted & removed during winter to reduce outbreaks of navel orangeworm & brown rot	Yes	86.2 ± 5.6			
	No	13.8 ± 5.6	2.1	3.4	8.3
Hullsplit sprays are based on egg-trap counts & degree-days	Yes	80.2 ± 3.4			
	No	19.8 ± 3.4	0.0	12.3	7.5
Weeds					
Species and infestation levels are monitored & recorded to inform the management strategy and type and timing of controls	Yes	65.7 ± 7.9			
	No	34.3 ± 7.9	2.1	24.3	7.9
Monitoring records include growth stages & potential resistance issues	Yes	45.7 ± 8.3			
	No	54.3 ± 8.3	2.9	35.7	15.7

Participant Data → Interpretation → Strategic Use

Value Mapping

Topics (incl. cross-module)

Rapidly Changing World:
Almonds - With Increased Size Comes Increased Scrutiny

- Water use/ ground water pumping impacts on local communities
- Harvest dust complaints
- "Monoculture" of Almonds
- Pesticide use around honey bees (Movie "More than Honey")

Merced County is sinking; researchers blame over-pumping of groundwater

BY J.N. SBRANTI
jnsbranti@modbee.com November 21, 2013

Martin Sullivan: Almond harvest too dusty

Published: October 22, 2013

MID: Wells threaten soil in Stanislaus County

As Stanislaus County supervisors received a glowing report Tuesday on the **surge of almond production,** a couple of blocks away irrigation leaders somberly discussed the downside.

Tuesday, July 23, 2013 at 10:10 PM

Transforming CASP Data for Strategic Use: Telling the Almond Story

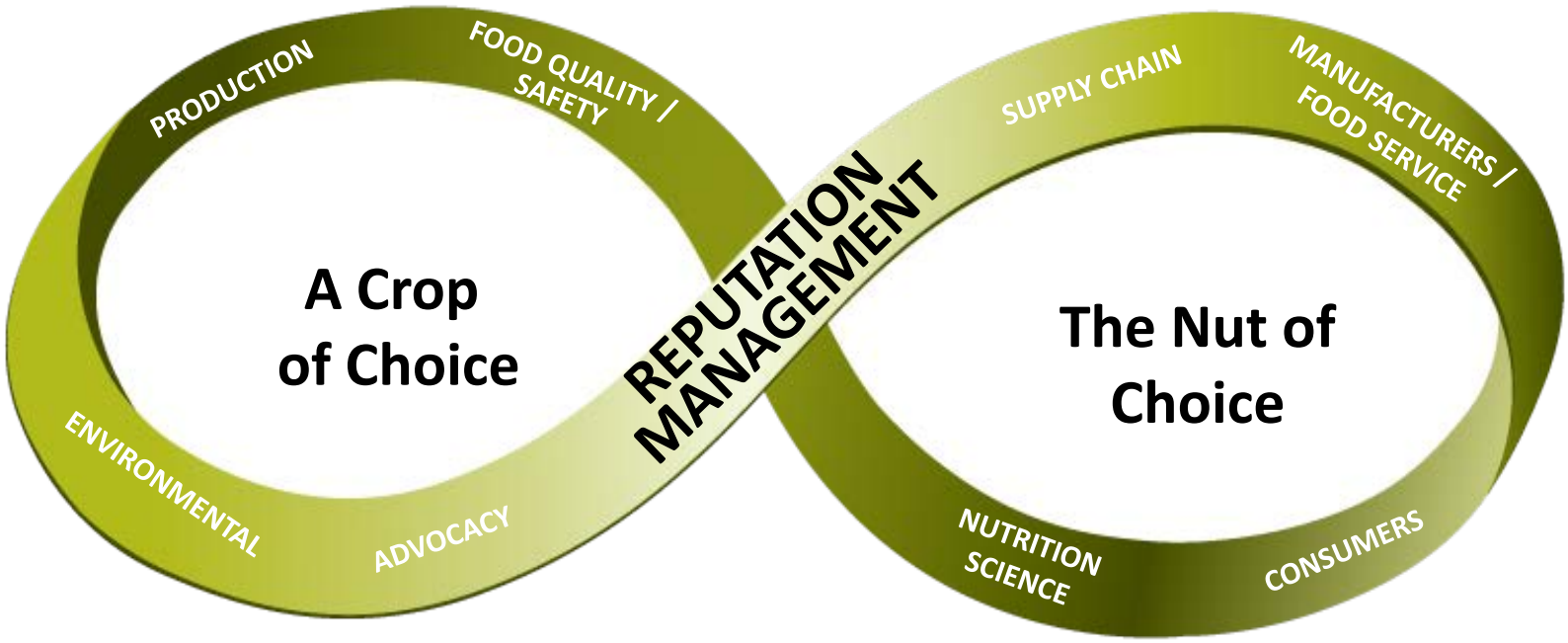
Use of practices to minimize dust during harvest:

➔ Majority participants use key practices to reduce dust such as correct sweeper head height (79%), orchard floor management (88%), etc.

➔ Could encourage more care on separator fan speeds (46%)

14. Year-round orchard floor management resulted in a smooth and level orchard floor to optimize harvest efficiency and minimize dust.	87.7%
15. Operators of sweepers and pickup machines have been trained in techniques to reduce dust.	72.8%
16. To reduce dust, the sweeper head was set at the manufacturer-recommended height (not lower).	79.3%
17. The sweeper head used tines made of wire instead of rubber/plastic.	55.7%
18. Sweepers designed to minimize passes and reduce dust were used.	64.6%
19. When near sensitive surroundings (roads, homes, etc.), conventional pickup machines were driven at reduced speeds and were positioned to discharge debris into the orchard, away from sensitive surroundings.	83.6%
20. Speeds for separator fans on conventional pickup machines were lowered (e.g., 910 rpm instead of 1,080 rpm).	46.1%

What happens in the field affects the market



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2014
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ALMOND SUSTAINABILITY REPORT
california almonds
Almond Board of California
RGY ENVIRONMENTAL IMPACTS:
ORTUNITIES
e six ways that growers could further protect the environment
gh energy management practices (% of orchards):
% YES
27
Variable-Speed Drive Pumps
35
Regulated Deficit Irrigation
43
Real-Time Crop Evapotranspiration (ETc)
22
Variable-Rate Fertilization Technology
23
Low-Emission Transportation
18
Computer-Controlled Irrigation
Where it is practical to implement these techniques, they provide opportunities to further increase energy stewardship through more precise irrigation and nutrient management along with using low-emission technologies for cars and trucks and cleaner-burning fuels for any motorized vehicles used by the farming operation. Variable-speed drives can be up to 50% more efficient than regular motors, and regulated deficit irrigation, where feasible, can reduce water use by 20% without significant yield reductions. In addition, use of real-time crop evapotranspiration data and computer-controlled irrigation to determine and implement when and how much to irrigate can further improve water and thus energy use efficiencies.

Sustainability Report

- Represents data collected from 2009 - August, 2013
- 1,080 individual participants
  - 575 participants submitted assesments
- 638 Orchards Assessed
- 95,496 acres assessed – represents 255,891 acres
- Details the collective practices
- Calls out strengths and areas for improvement

Introduction Section

This introductory chapter is organized into the following sections: Definition of Sustainability, About CASP, Data Analysis and Reporting, and CASP — Going Forward. The Introduction is followed by four topic chapters that highlight industry-wide use of BMPs that have the greatest positive impact on the environment and grower economics, opportunities for the industry to generate more value, and in-depth details on topic-specific practice adoption. Topical chapters are Energy, Air, Water and Land, which includes the subtopics Nutrients, Pests and Bees.

INTRODUCTION

This is the first California Almond Sustainability Program (CASP) Industry-Wide Report. It details the collective use of best management practices (BMPs) by California Almond growers who have participated in the program by voluntarily assessing and reporting practices on their orchards. This Almond Sustainability Report is the result of more than five years of planning, development and implementation efforts, and is based on more than four decades of grower innovation and research supported by the Almond Board of California (ABC) to drive grower profitability, environmental stewardship and market growth.

CASP was officially launched as a program of ABC in the fall of 2009, when the first growers completed self-assessments. ABC has invested and continues to invest in the creation of self-assessment tools that enable growers and handlers to better document and communicate their use of BMPs, and to identify potential opportunities to create additional economic, environmental and community value.

The statewide results presented in the following pages demonstrate that an almond farm in the Central Valley of California is an embodiment of the expression "The whole is greater than the sum of its parts." Sustainability is about looking at the whole system.

This report highlights the interrelated nature of farming, in which implementing one practice can have positive (or negative) effects on other practices and their environmental and economic outcomes.

The interrelatedness of topics and practices will be apparent after reading the chapter summaries. For example, BMPs that optimize water use efficiency may reduce energy use through reductions in the pumping of water. This, in turn, improves air quality because less fuel is combusted to pump the water. Integrated pest management practices that reduce in-season or dormant-season spraying reduce fuel consumption and related emissions due to fewer equipment passes, and fewer applications reduce the likelihood of off-site pesticide movement because less pesticide is applied. And, use of fertigation and variable-rate fertilizer applications, which place the right amount of nutrients in the tree's root zone at the right time, results in less fertilizer applied and lost to the environment, improving the quality of groundwater and surface water.

The California Almond Sustainability Program has drawn from and has become more integrated into Almond Board programs such as Production and Environmental Research, Industry Services, Nutrition Research, Regulatory Affairs and Global Market Development. Production Research has funded research projects that have resulted in dramatically improved quality, yield and production efficiency in almond orchards. Many of these projects have also advanced environmental stewardship, such as increased water use efficiency, nutrient use efficiency and reduced pesticide risk.

Results of this work formed the basis for many BMPs, which have been incorporated into the CASP assessment tools to provide a path to improved production practices. ABC has used its outreach capabilities to increase CASP participation, thereby delivering the results of production and environmental research to growers and handlers, while insights from CASP have also been integrated into conversations with key regulatory and customer stakeholders.

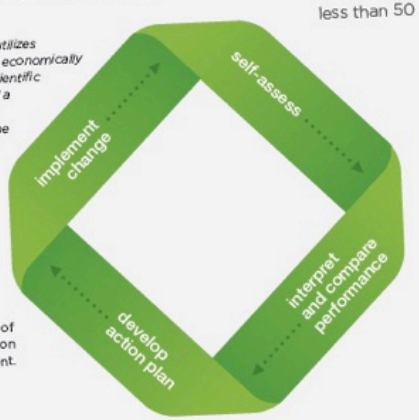
CASP has become a vital and influential program due to substantial grower and handler participation. The CASP assessment tools not only enable participant self-assessment but also serve as grower and handler educational resources to improve production or processing practices.

About the California Almond Sustainability Program (CASP)

CASP is guided by the following sustainability definition, developed with almond growers and handlers in 2005, and subsequently adopted by the Almond Board:

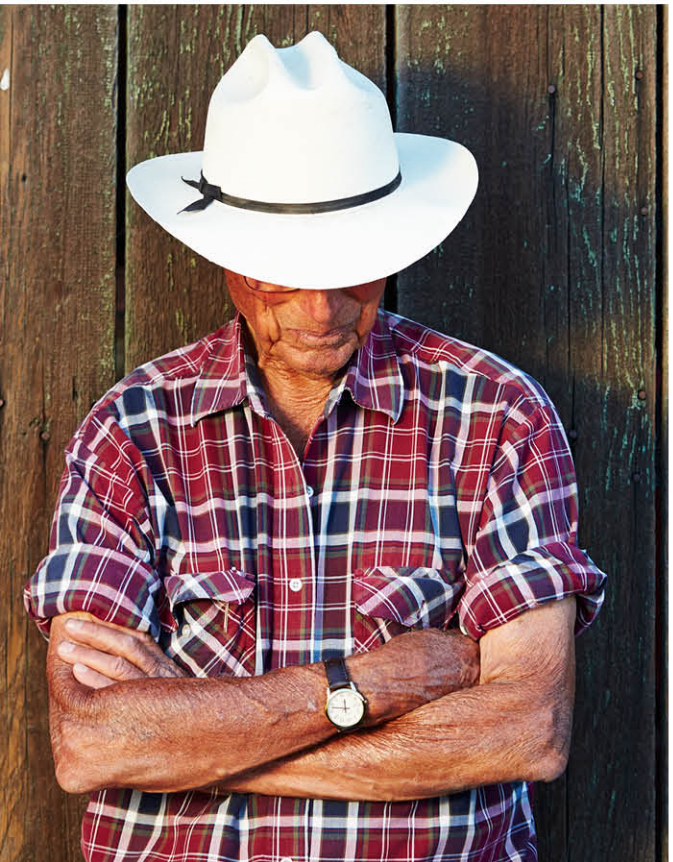
Sustainable almond farming utilizes production practices that are economically viable and are based upon scientific research, common sense and a respect for the environment, neighbors and employees. The result is a plentiful, healthful, safe food product.

CASP has been designed, and continues to evolve, to include the interrelated components of grower and handler assessment of practices and metrics; the interpretation, reporting and communication of results; and the application of results for targeted education and continuous improvement.



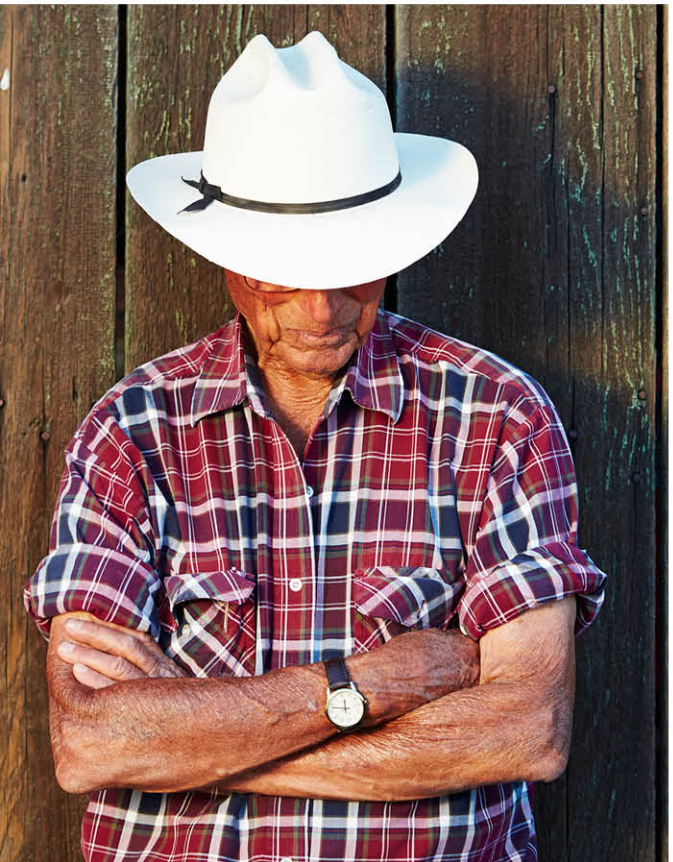
About California Almonds

California Almonds make up about 80% of global and virtually 100% of domestic almond supplies. According to the 2007 USDA Ag Census, there are around 6,500 California Almond farms. Of those, 72% are family owned and 51% are less than 50 acres.



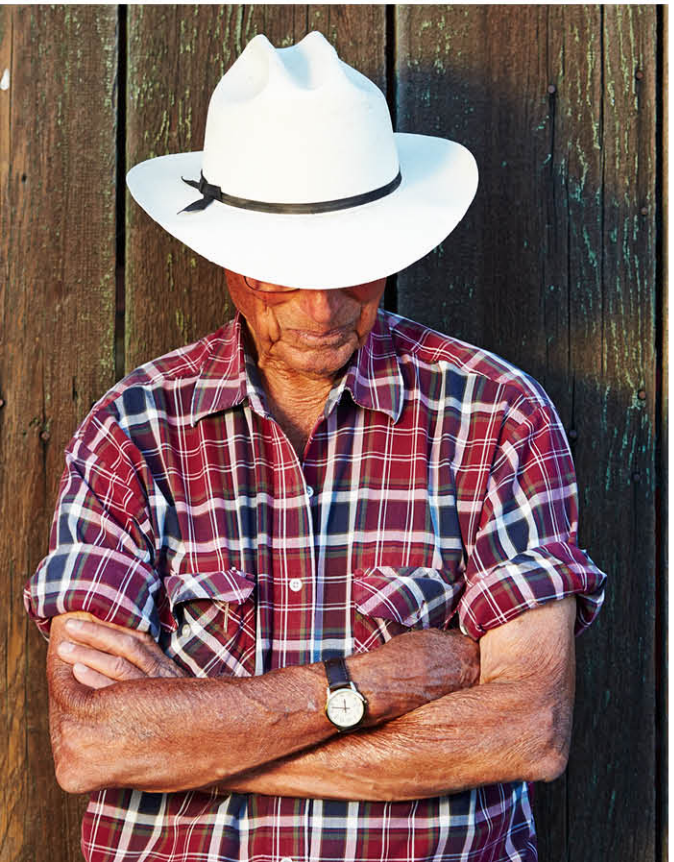
Report is divided into four main topic areas:

1. Energy
2. Air Quality
3. Water
   - Usage
   - Quality
4. Land
   - Nutrient Management
   - Pest Management
   - Bees



Across topic areas report based on three main categories and grower practices:

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis



- 1. Energy
  - Environmental impacts
    - » Overview
    - » Strengths
    - » Opportunities
  - Economic impacts
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    - » Strengths
    - » Opportunities
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- 2. Air Quality
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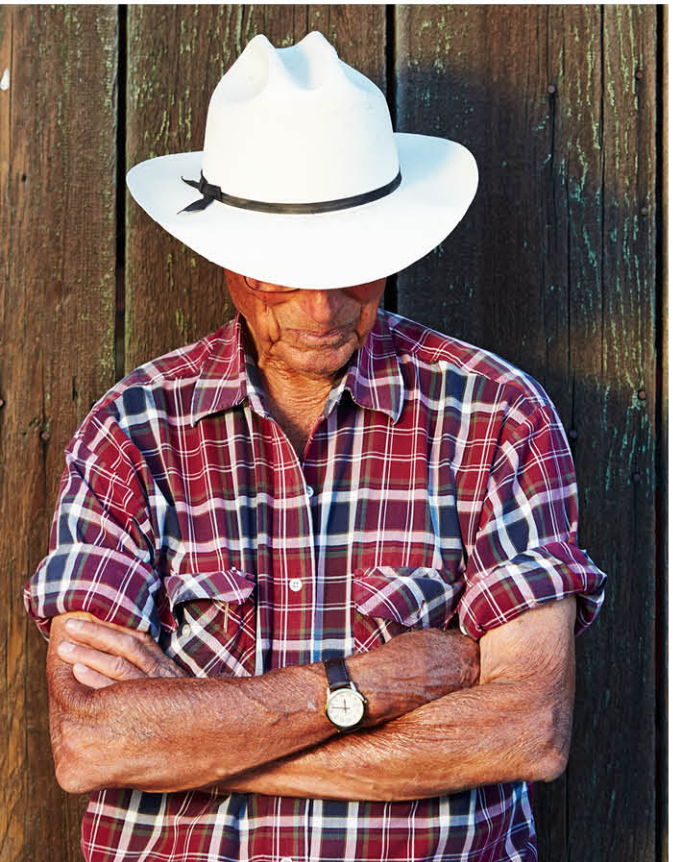

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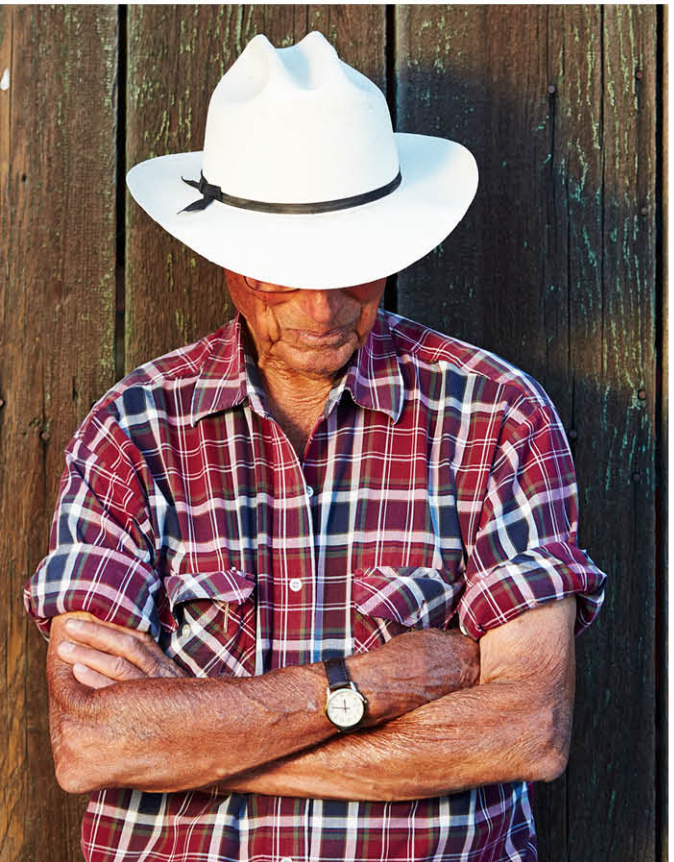
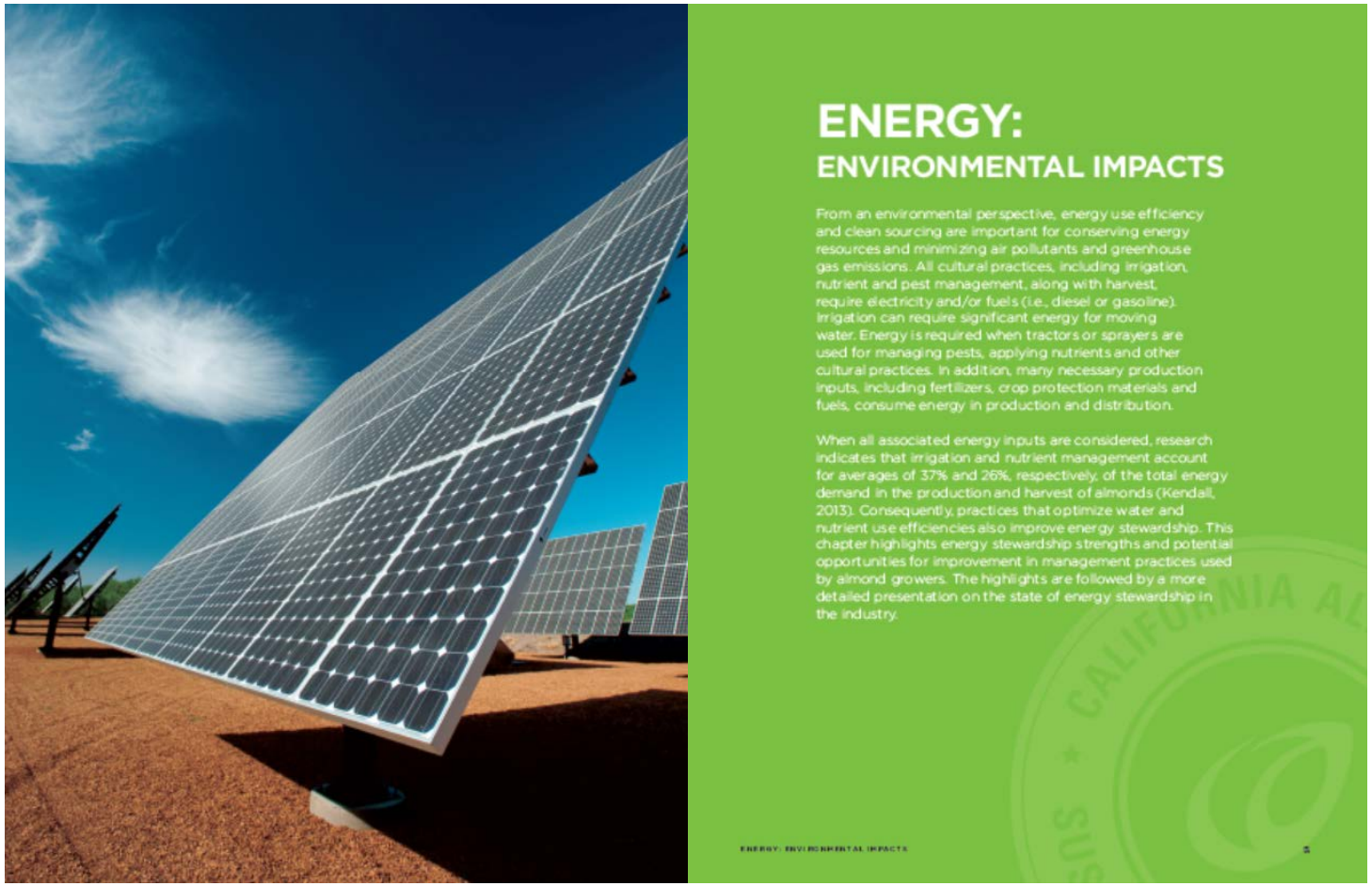


- 1. Energy
- 2. Air Quality
  - Detailed Analysis
- 3. Water
  - Usage
  - Quality
- 4. Land
  - Nutrient Management
  - Pest Management
  - Bees
    - » Environmental and Economic impact overview

Let's look at one topic area – Energy (Pages 12-13)

Intended to provide brief overview of Energy practices impact on the Environment

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis



ENERGY:
ENVIRONMENTAL IMPACTS

From an environmental perspective, energy use efficiency and clean sourcing are important for conserving energy resources and minimizing air pollutants and greenhouse gas emissions. All cultural practices, including irrigation, nutrient and pest management, along with harvest, require electricity and/or fuels (i.e., diesel or gasoline). Irrigation can require significant energy for moving water. Energy is required when tractors or sprayers are used for managing pests, applying nutrients and other cultural practices. In addition, many necessary production inputs, including fertilizers, crop protection materials and fuels, consume energy in production and distribution.

When all associated energy inputs are considered, research indicates that irrigation and nutrient management account for averages of 37% and 26%, respectively, of the total energy demand in the production and harvest of almonds (Kendall, 2013). Consequently, practices that optimize water and nutrient use efficiencies also improve energy stewardship. This chapter highlights energy stewardship strengths and potential opportunities for improvement in management practices used by almond growers. The highlights are followed by a more detailed presentation on the state of energy stewardship in the industry.

ENERGY: ENVIRONMENTAL IMPACTS

Strengths and Opportunities: Energy Environmental Impacts (Pages 14 -15)

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis

ENERGY ENVIRONMENTAL IMPACTS: STRENGTHS

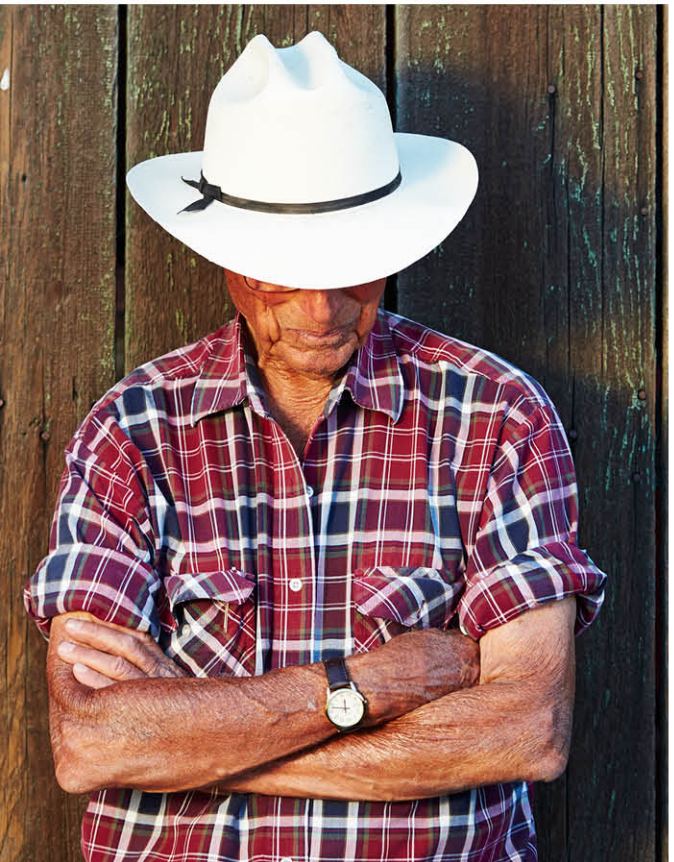
The top six ways that growers are protecting the environment through energy management practices (% of orchards):

This set of strengths demonstrates that California Almond growers implement management practices to improve energy efficiency where it counts most — for irrigation and nutrient management, which together account for 60% of the average energy demand. Additionally, growers are limiting equipment passes during the season and at harvest, which further contributes to overall energy and air quality stewardship.

ENERGY ENVIRONMENTAL IMPACTS: OPPORTUNITIES

The top six ways that growers could further protect the environment through energy management practices (% of orchards):

Where it is practical to implement these techniques, they provide opportunities to further increase energy stewardship through more precise irrigation and nutrient management along with using low-emission technologies for cars and trucks and cleaner-burning fuels for any motorized vehicles used by the farming operation. Variable-speed drives can be up to 50% more efficient than regular motors, and regulated deficit irrigation, where feasible, can reduce water use by 20% without significant yield reductions. In addition, use of real-time crop evapotranspiration data and computer-controlled irrigation to determine and implement when and how much to irrigate can further improve water and thus energy use efficiencies.



Strengths and Opportunities - Energy: Environmental Impacts

- Strengths - The top 6 ways that growers protect the environment through energy management practices

- Opportunities – The top 6 ways that growers could improve on practices that impact the environment

Economic Impacts Overview: Energy (Pages 16-17)

Intended to provide brief overview of Energy practices impact on the Environment

- Environmental impacts
  - Overview
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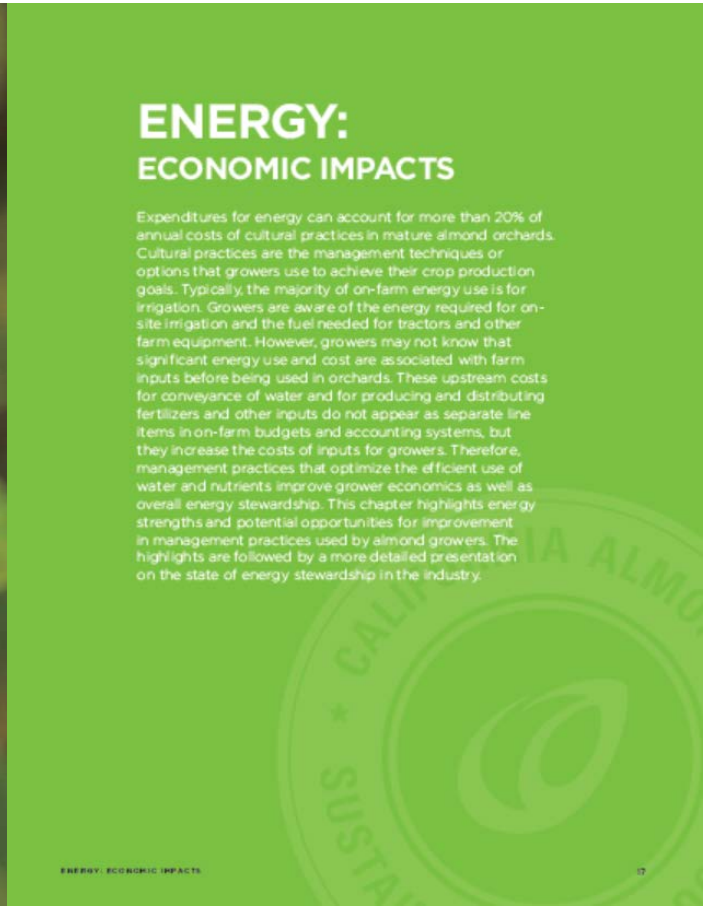
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis



Strengths and Opportunities: Energy Economic Impacts (Pages 18-19)

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis

ENERGY ECONOMIC IMPACTS: STRENGTHS

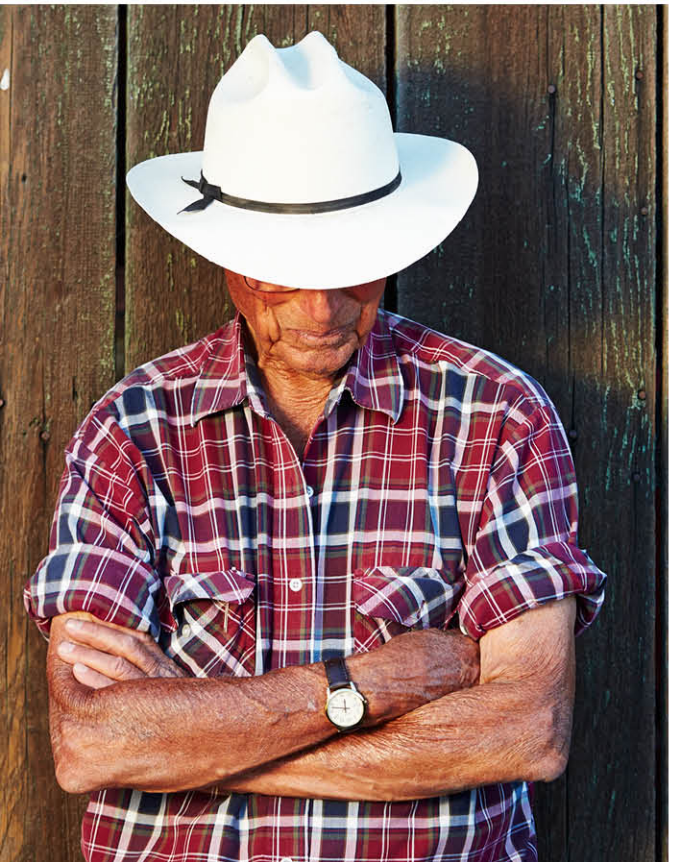
The top six ways that growers save money through energy management practices (% of orchards):

The data demonstrates that the majority of almond growers are using advanced irrigation and nutrient management processes and technologies to generate economic value through efficient use of resources. The results also show that growers are using equipment and implementing techniques to reduce equipment passes through the orchard during the season and at harvest, which directly translates to reduced fuel costs. The top grower economic strengths are similar to the top energy stewardship strengths for energy management. This is because increasing use efficiencies, particularly for water, fertilizers and fuel, is directly tied to improving environmental stewardship.

ENERGY ECONOMIC IMPACTS: OPPORTUNITIES

The top six ways that growers could increase savings through energy management practices (% of orchards):

The results indicate there are opportunities for growers to improve economics by reducing energy costs, optimizing yields and addressing regulatory risks through more precise irrigation and nutrient management. Energy and cost savings for irrigation may be realized by scheduling based on real-time crop evapotranspiration and regulated deficit irrigation (up to 20% less water for pumping), and use of variable-speed drives (up to 50% less energy) and computer-controlled technology. Use of nutrient management plans and precision application technology, where feasible, can optimize fertilizer use and limit costs.



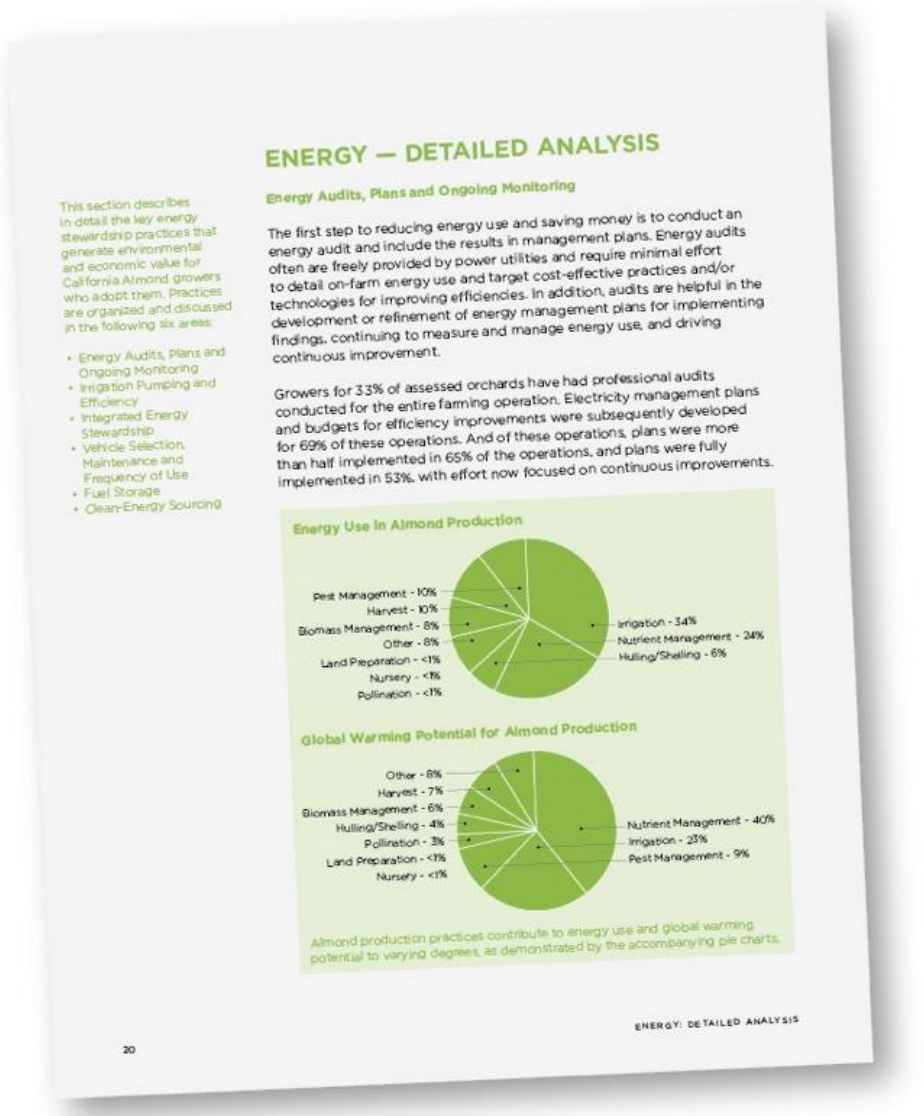
Strengths and Opportunities - Energy: Economic Impacts

- Strengths - The top 6 ways that growers save money through energy management practices

- Opportunities – The top 6 ways that growers could improve on practices that will increase savings

Detailed Analysis – Energy (Pages 20-24)

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis



This section describes in detail the key energy stewardship practices that generate environmental and economic value for California Almond growers who adopt them. Practices are organized and discussed in the following six areas:

- Energy Audits, Plans and Ongoing Monitoring
- Irrigation Pumping and Efficiency
- Integrated Energy Stewardship
- Vehicle Selection, Maintenance and Frequency of Use
- Fuel Storage
- Clean-Energy Sourcing

ENERGY — DETAILED ANALYSIS

Energy Audits, Plans and Ongoing Monitoring

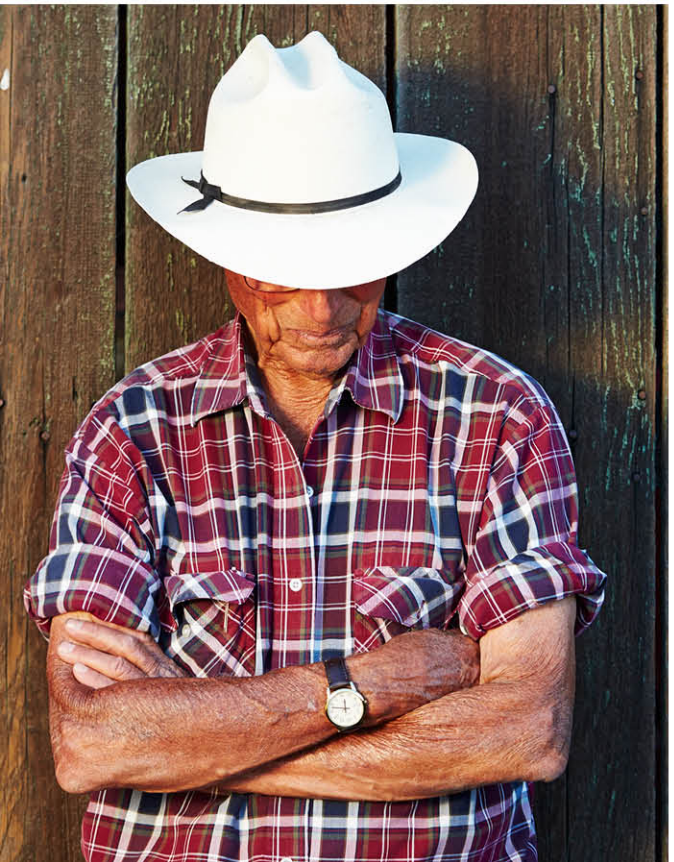
The first step to reducing energy use and saving money is to conduct an energy audit and include the results in management plans. Energy audits often are freely provided by power utilities and require minimal effort to detail on-farm energy use and target cost-effective practices and/or technologies for improving efficiencies. In addition, audits are helpful in the development or refinement of energy management plans for implementing findings, continuing to measure and manage energy use, and driving continuous improvement.

Growers for 33% of assessed orchards have had professional audits conducted for the entire farming operation. Electricity management plans and budgets for efficiency improvements were subsequently developed for 69% of these operations. And of these operations, plans were more than half implemented in 65% of the operations, and plans were fully implemented in 53%, with effort now focused on continuous improvements.

Energy Use in Almond Production

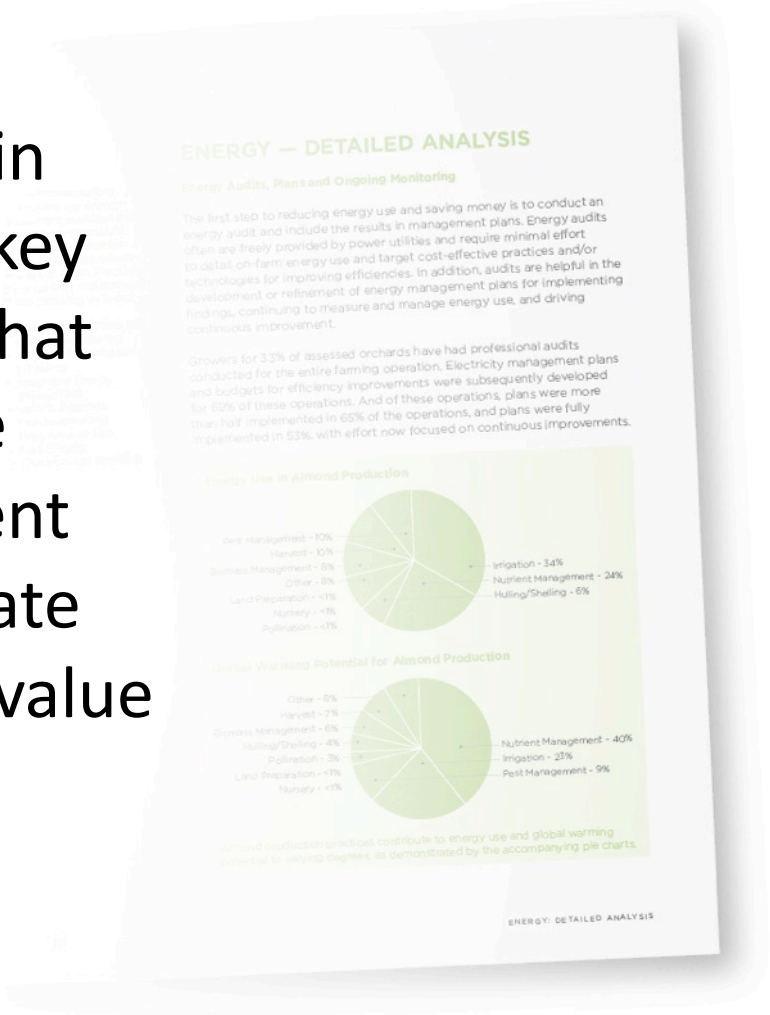
Global Warming Potential for Almond Production

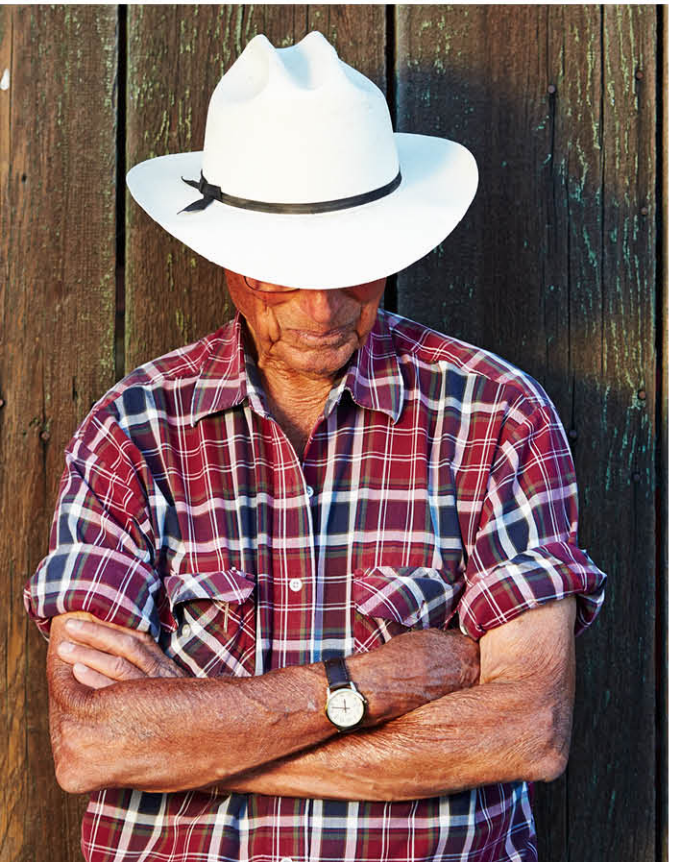
Almond production practices contribute to energy use and global warming potential to varying degrees, as demonstrated by the accompanying pie charts.



Detailed Analysis - Energy

- Describes in detail the key practices that impact the environment and generate economic value





- Repeated for each of the 4 topic areas

TABLE OF CONTENTS

The Missing Piece – Data Repository

- Separate report
- Includes all questions from each sustainability module
  Sample size
  - % “Yes” answers
  - % “No” answers
  - Variations of no
  - Relevancy to different baseline chapters
- Complete 1st Quarter 2014

	MONITORING ELECTRICITY USE	Yes/Current practice / No	Have tried it / Haven't tried it / Not familiar with it	STATISTICS: SAMPLE SIZE	STATISTICS: PERCENT YES	STATISTICS: CONFIDENCE LEVEL	RELEVENCY TO TOPIC AREAS: AIR	BEES	ENERGY	LAND	WATER
1	Electricity use in my operation was recorded and tracked beyond filing paid bills.			142	38.3	4.9					
2	Electricity use was recorded and tracked for the operation as a whole.			138	83.3	6.2					
3	Electricity use was recorded and tracked by specific orchard(s) or facility(ies).			139	77.7	6.9					

2014 Almond Sustainability Report

CALIFORNIA ALMOND SUSTAINABILITY PROGRAM™

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