



Together, Building a Better California

Pacific Gas and Electric Company (PG&E)

Energy Efficiency Business Plan

Agricultural Sector Chapter

Stage 2 Draft – May 2016

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1) PG&E's Portfolio Vision

PG&E's energy efficiency portfolio is designed to support California's integrated plan for addressing climate change with a goal of reducing greenhouse gas (GHG) emissions to 40% below 1990 levels by 2030.¹ For decades, energy efficiency has played a key role in meeting the state's GHG emissions reduction goals. Recent legislative and gubernatorial action has brought energy efficiency into the forefront, recognizing it as one of the most cost-effective ways to reduce California's carbon emissions.

Since 2007, the enabling policy framework and the "big, bold" energy efficiency strategies presented in the California Long-Term Energy Efficiency Strategic Plan provided a sound roadmap for energy efficiency. The Strategic Plan set Zero Net Energy (ZNE) goals for residential, public and non-residential new construction by 2020, 2025 and 2030, respectively, among other goals to guide market transformation.² Additionally, the Existing Buildings Energy Efficiency Action Plan, borne out of Assembly Bill (AB) 758, sets forth a clear vision to accelerate the growth of energy efficiency and reduce energy waste.

In 2015, California redoubled its efforts to deliver substantial energy savings and GHG emissions reductions. Through landmark climate legislation, SB 350, the Governor set forth ambitious energy efficiency goals – to double the rate of savings by 2030. These important energy efficiency goals "create a framework to make energy efficiency a way of life in California."³

These ambitious goals call for unprecedented scale and new ways to achieve energy efficiency savings.

Our Mission: PG&E's mission is to inspire and empower our customers to eliminate unnecessary energy use within California. Our vision is to reduce per capita carbon production by 2030 through our portfolio of innovative and scalable energy efficiency solutions.

To meet the state's and customer's energy efficiency and carbon reduction goals, PG&E recognizes the need to change the way we encourage our customers to take action and scale energy savings cost-effectively to meet the state goals.

PG&E has devised five key strategies to make significant impact in reducing energy waste and maximizing the value of energy efficiency for our customers.

- Enable energy efficiency as a clean distributed energy resource (DER) to deliver grid benefits
- Reduce all energy waste efficiently, focusing on stranded potential that exists in much of California's building stock
- Focus on directed market transformation and more integration to increase adoption and drive deeper, more persistent energy savings that support customers and the grid.

¹ <http://www.calepa.ca.gov/Climate/Documents/2015/CAStrategy.pdf>

² California Energy Efficiency Strategic Plan, January 2011 update

http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

³ Ibid

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- Supercharge local, regional, and national partners, the right decision-makers, and the ecosystem of energy efficiency stakeholders⁴ to continue to make impactful changes in California.
- Simplify our portfolio with a laser-focus on operational excellence

Over the next five years, PG&E will shift the way we motivate our customers to save energy. Transitioning away from traditional incentives, PG&E will explore new service and performance models to inspire and empower customers so that we reduce customers' energy bills, unlock the stranded potential found in much of California's existing building stock, and to more cost effectively target energy waste in California today.

Tools to Scale

Achieving state goals, as well as PG&E's portfolio vision, will require a paradigm shift and a new generation of tools to cost-effectively scale. With these tools, PG&E positions its customers for greater energy bill reductions, the state for increased GHG reductions and energy efficiency savings, and the grid with a resource on which it can count. Thanks to enabling legislation such as AB 802, many of these tools are now a reality. Key interventions and strategies include:

- Data-driven targeting and decision making
- Meter-based savings
- Behavioral, RCx, O&M (BROs)
- Finance as an enabler
- Purposeful code readiness
- End-to-end project development and technical assistance

As part of the strategy to meet this vision, PG&E's Agricultural sector goal is to cost effectively scale EE in a customer-centric manner to help meet state policy goals by inspiring and empowering customers to eliminate unnecessary energy use.

In order to meet our Agricultural sector goals, PG&E will focus its efforts in four key categories:

- 1) Increased program participation
- 2) Improved understanding of the market and better program targeting
- 3) Effective program delivery within current policy framework
- 4) Collaborative development of new regulatory policies to allow for program innovation

⁴ Stakeholders include, but are not limited to: state agencies, specifically California Public Utilities Commission and California Energy Commission (CEC), manufacturers, distributors, contractors, Investor Owned Utilities, Program administrators, energy efficiency program implementers, capital providers and customers.

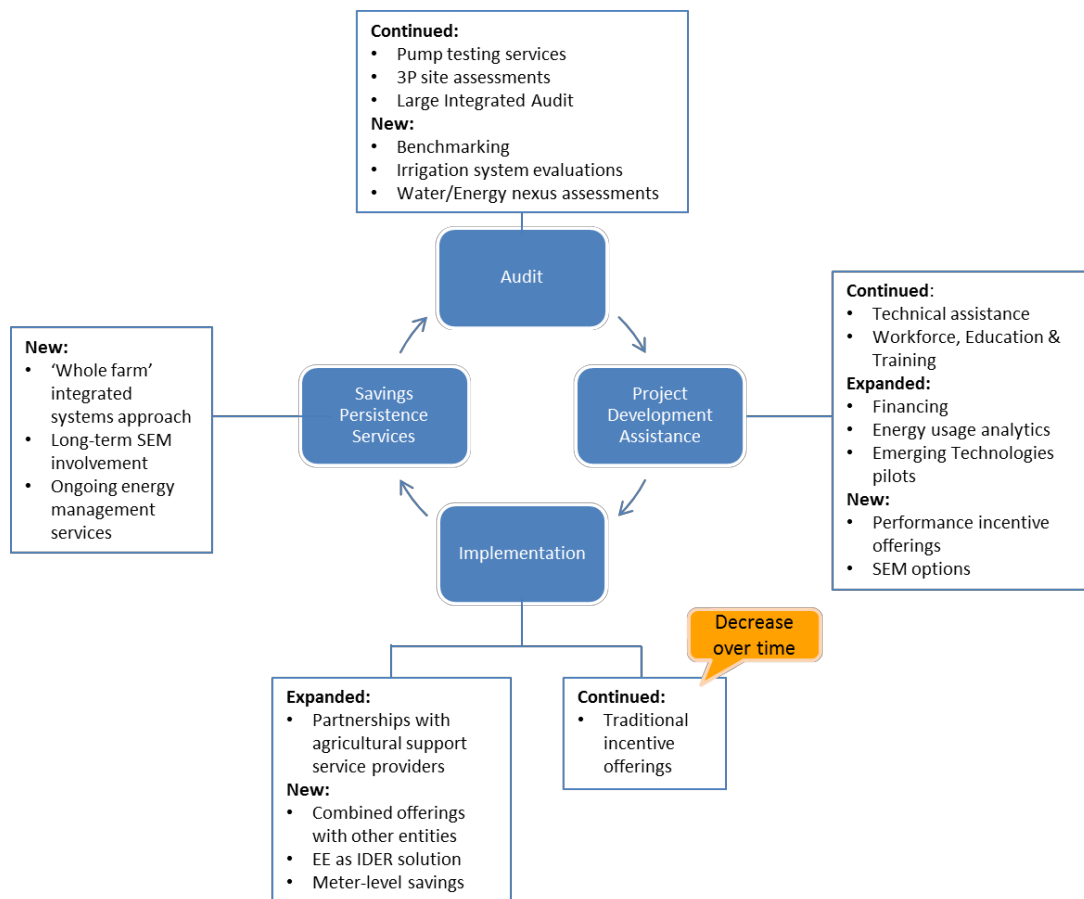
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Key Segment Metrics:

- Energy savings (kWh, kW, and therm)
- Cost effectiveness (TRC and PAC)
- Cost per unit of energy (\$/kWh, \$/KW, and \$/therm)
- Adoption of Strategic Energy Management Practices

PG&E's Agricultural Portfolio Priorities

PG&E realizes that many of the state's goals set forth in AB 350 and the Long-Term Energy Efficiency Strategic Plan cannot be met without changing the approach to how EE is delivered. Collaboration and communication will be critical in determining how to implement new strategies like AB 802 and Strategic Energy Management, to simplify and increase program participation and capture currently stranded savings. PG&E will prioritize alignment of program goals to customers' needs regarding GHG and other resource-management goals in a way that meets the needs of California's EE policy framework. Behavioral program approaches will be incorporated where possible, leveraging benchmarking to motivate agricultural customers to take action while minimizing the need for incentives. The challenge will be to incorporate new tools and policies while simplifying the customer interaction to allow greater participation. Given that 95% of California is currently in a state of drought and this remains a primary concern of farmers, PG&E must prioritize tailoring its program offering to alleviating relevant pressure on agricultural customers going forward.



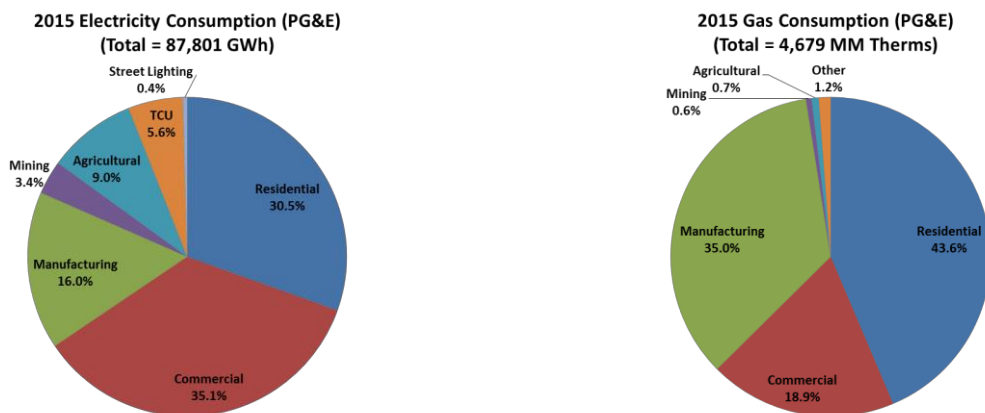
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2.) PG&E Agricultural Sector Overview

1. The Agricultural sector comprises roughly 9% of electric and almost 1% of gas usage in the PG&E service territory.
2. Small, medium, and large customers participate in PG&E Agricultural programs, and participation by customer size roughly aligns with savings; however, large customers (>500 GWh or 250,000 Therms) clearly dominate the sector.
3. Understanding trends in how customers interact with Agricultural programs can help guide future planning and greater EE uptake. Pumps/VFD savings are in high demand, whereas both lighting and refrigeration savings per participant is dropping.

Observation: The Agricultural sector accounts for a relatively small portion of the state's electric and gas usage and associated GHG emissions; nonetheless, it remains relevant because it has broad economic impacts for the Central Valley and rural communities in California..

PG&E serves nearly 16 million people over 70,000 square miles. The PG&E Agricultural sector serves 96,931 electric customers, 2,585 gas customers,⁵ and represents more than 9% of system-wide electric usage; whereas less than 1% for gas. For the 2013-15 program cycle, PG&E's Agricultural energy efficiency programs saved 46 MW, 160.3 GWh, and 3.3 million Therms.



Source: 2015 Integrated Energy Policy Report (IEPR)

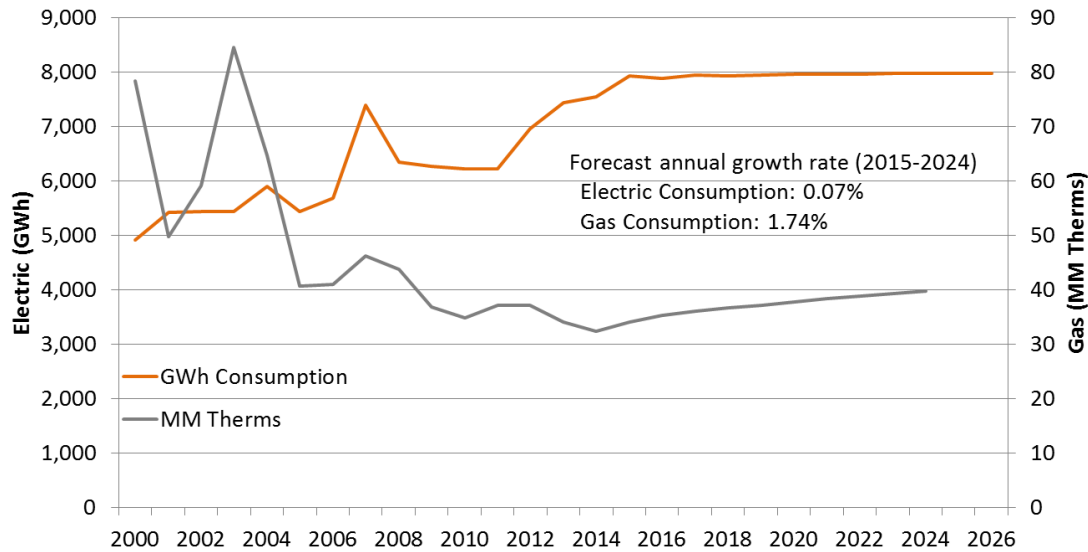
Observation:

PG&E's Agricultural sector electricity consumption has steadily climbed over the past 10 years, but is forecasted to be relatively flat over the next decade. Despite declining gas consumption, the CEC expects this sector to grow steadily over the next decade. At the same time, PG&E is unclear as to what is driving the IEPR forecast.

⁵ Based on 2015 PG&E data.

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Agricultural Energy Consumption Forecast

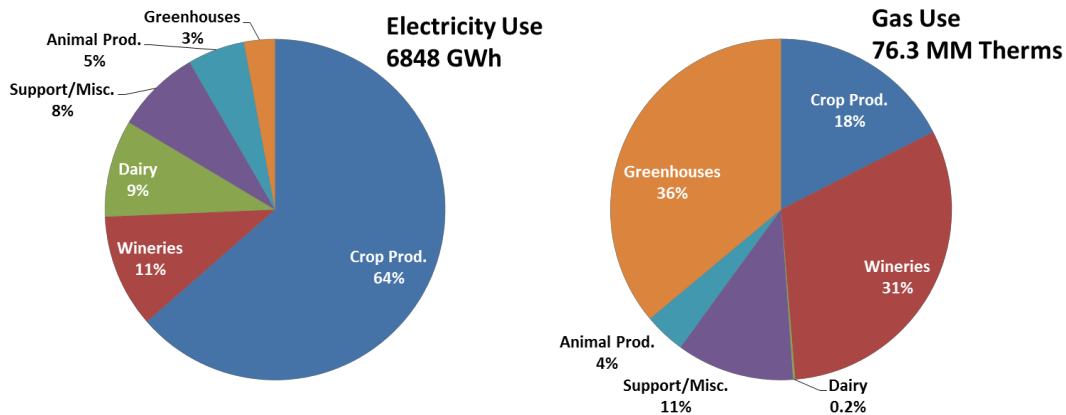


Source: IEPR 2015 Forecast, CEC

Observation: The energy consumption of most agricultural segments is typically either predominately electric or predominately gas.

Top electricity consumers by Agricultural sub-segment are crop producers, wineries, dairies, and greenhouses. Notable observations are that greenhouses represent 3% of total electric consumption but 36% of gas; wineries represent 11% of electric consumption, but 31% of gas. These segments are balanced by crop production, which consumes only 18% of total gas consumption, but 64% of electric.

Agricultural Consumption by Segment

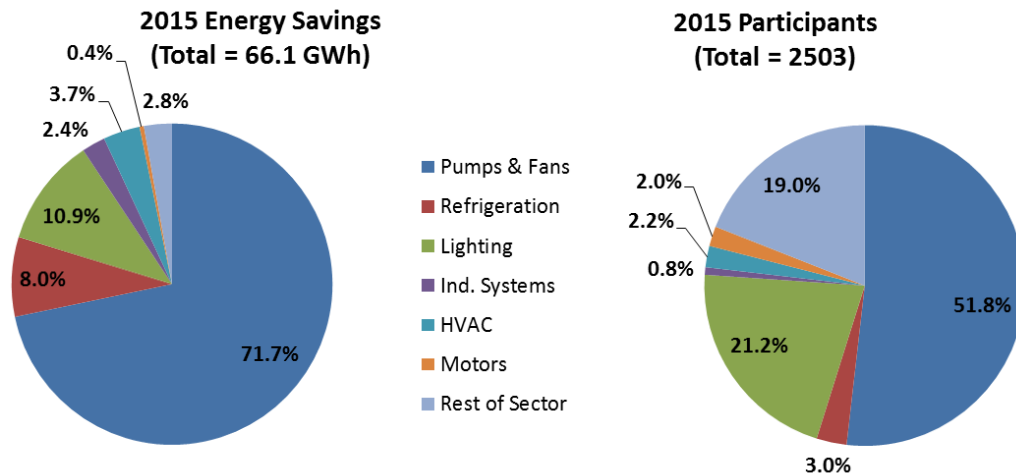


Source: PG&E internal data (2015 Sales)

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Observation: Program savings are concentrated in relatively few measures, and measure savings by technology is roughly aligned with the number of participants.

The majority of electric savings for the portfolio are derived from pumps/variable frequency drives (VFDs), followed by lighting and refrigeration. Over half of PG&E's program participants are utilizing pumps and VFDs, which account for 70% of total savings in the Agricultural portfolio. The remainder of the sector largely comprises appliances, building envelope, electronics and IT, food service technology, and motors.

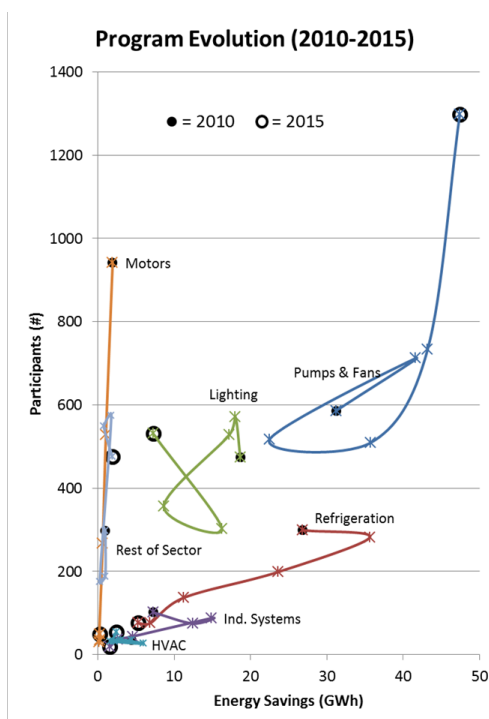


Source: PG&E internal data

Observation: Most of our programs are trending towards diminished savings and reduced customer participation, except for pumps and VFDs.

Understanding trajectories of how customers interact with various programs can help guide future planning and greater EE uptake. Notably, pump/VFD savings are in high demand, whereas both lighting and refrigeration savings per participant is dropping. For refrigeration, the general trend over the past six years has been fewer participants and fewer saving; for lighting, the overall trend has been to save less energy with the same number of participants; for pumps/VFDs, the overall trend is exponential savings with more participants. Thus, with the exception of pumps/VFDs, most PG&E Agricultural programs are moving toward zero savings.

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Source: PG&E internal data

3) Summary of Agricultural Problem Statements and Strategies/Solutions

Introduction

The agricultural sector has been broken down into segments which are defined by activity type and energy consumption. The segments that make up the primary focus of the agricultural sector are: field production, dairies, wineries and greenhouses. These segments combined represent 88% of electrical consumption and 85% of gas consumption for the sector.

While each of the segments has its own set of opportunities and challenges, there are some common themes that have impacts across the sector. The drought and water availability will continue to be the primary focus for agricultural customers. The lack of product development and a shrinking measure mix have restricted what IOUs have to offer to customers, while access to capital and financial constraints limit customers' ability to make EE upgrades. All of this is coupled with knowledge gaps pertaining to the sector which are a barrier to identifying and developing relevant offerings to the various segments.

In order to address these challenges, PG&E is developing solutions that look at what can be done in the short, medium and long term. These solutions will be rolled out through promoting targeted technology, programmatic structure, financing options and educational efforts.

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Overview of Problem Statements and Solutions

Problem Statements	High Level Solutions
<p>1) Water continues to be a major concern for agricultural customers</p>	<p>Near Term:</p> <ul style="list-style-type: none"> Continue successful EE program offerings, while seeking innovative means to incentivize efficiency-driven market transformation Improve and prioritize EE agricultural offerings relevant to water conservation and the water-energy nexus <p>Mid Term</p> <ul style="list-style-type: none"> Incentivize irrigation system optimization, while exploring ways to create a performance management model Target adoption of technologically-advanced irrigation systems <p>Long Term</p> <ul style="list-style-type: none"> Developing a behavioral program/benchmarking leveraging data sources such as CIMIS Develop a 'whole farm' program Explore partnerships with irrigation districts/ DWR to offer financial incentives to growers
<p>2) EE offerings to the agricultural sector have been reduced, while the costs to develop and implement new measures have increased.</p>	<p>Near Term:</p> <ul style="list-style-type: none"> Continue offering current successful programs Increase outreach and education to contractors and agricultural support service providers <p>Mid Term:</p> <ul style="list-style-type: none"> Develop calculators that can account for site specifics and can be adjusted as the market/policy changes Continue to target segments with high growth potential Develop targeted and specialized SEM offerings <p>Long Term:</p> <ul style="list-style-type: none"> Develop platform to enable customers to view advanced data analytics of their energy usage Explore opportunity for integrated/IDER offerings Offer 'whole farm' approach Partner with USDA, NRCS, and Cooperative Extension Service

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<p>3) The cost to install more efficient equipment or to optimize systems constitutes a barrier to customers implementing EE</p>	<p>Near Term:</p> <ul style="list-style-type: none"> • Coordinate with other IOUs to resolve greenhouse ISP issue and begin re-engaging customers in this segment • Develop targeted offerings for SMB greenhouse customers • Plan for potential load growth in the greenhouse segment with lighting and HVAC measures available in the portfolio • Promote OBF/OBR financing to customers in this segment <p>Mid Term:</p> <ul style="list-style-type: none"> • Develop and offer pre-approval of OBF loans with higher caps and extended lifetimes • Expand technical assistance offerings <p>Long Term:</p> <ul style="list-style-type: none"> • Develop partnerships with entities, such as the REAP to offer incentives and loans to farmers making EE upgrades • Explore NRCS financial offerings and programs
<p>4) Lack of a comprehensive database of characteristics, operations, and opportunities within various Agricultural segments</p>	<p>Near Term:</p> <ul style="list-style-type: none"> • Develop stronger ties with key trade and agricultural support organizations to deepen understanding of challenges and opportunities facing specific customer types • Conduct segment-specific ISP studies to determine specific baselines; ex: PVC pipe (PG&E), greenhouses <p>Mid Term:</p> <ul style="list-style-type: none"> • Research/ benchmarking/ EM&V studies • Partner with CA ag universities to do ongoing studies/ market research to drive innovation in the sector • Partner with the USDA, NRCS, and Cooperative Extension Service, leveraging their research and solutions for EE/water <p>Long Term:</p> <ul style="list-style-type: none"> • Explore emerging new service providers like the Farmers Business Network (FBN) offering

Agricultural Problem Statements

Problem Statement 1: Water continues to be a major concern for agricultural customers.

Observations: 95% of California is currently in a state of drought and potentially faces a “megadrought” in the future.⁶

Persistent water scarcity has prompted a string of relevant Executive Orders and drought management initiatives in California, clearly impacting decisions and livelihoods in the agricultural sector. California has more than 76,400 farms,⁷ and farmers claim four-fifths of all the water that its citizens consume.⁸

Becoming more successful in this sector space requires sufficient funding and time commitment on PG&E’s part, as well as establishment of appropriate methodology to calculate site-specific water/energy nexus for well pumping. To this end, PG&E should strive to partner with organizations such as USDA, NRCS, and Cooperative Extension Service to help support and implement solutions. Farmers have traditionally trusted these entities– and thus without the support of these groups, barriers to EE participation stand to increase. Notably, because farmers look to NRCS as a key support organization, NRCS’ participation should garner broad support from farmers.

Barriers:

- The consequent rising costs of purchasing and pumping water are impacting profitability, and will likely limit available capital to invest in EE opportunities among agricultural customers going forward.
- PG&E’s pursuit of energy savings from this sector is increasingly misaligned with most farmers’ motivations, as water (rather than energy) is of primary concern under current conditions.⁹
- PG&E is facing rising costs and diminishing returns vis-à-vis energy savings in the agricultural EE segment.

⁶ Measure, Application, Segment, Industry (MASI): Agriculture, Navigant Consulting for Southern California Edison, 2015, p. 43.

⁷ California Agricultural Statistics Review, 2014–2015, p. 1:
<https://www.cdfa.ca.gov/statistics/PDFs/2015Report.pdf>.

⁸ *Farmers Try Political Force to Twist Open California’s Taps*, New York Times, December 20, 2015.

⁹ Evergreen Economics, SDG&E Agricultural Sector Market Study, March 26, 2015, p 26.

Strategies/Solutions:

1) Current/ Near-Term Solutions

- Improve and prioritize EE agricultural program offerings relevant to water conservation and the water-energy nexus.¹⁰
 - Target EE measures that save water as well as energy, such as:
 - i. Changing water-cooled refrigeration to air cooled refrigeration
 - ii. Incentivize improved distribution uniformity to reduce overwatering and pump run times
 - Subsidize irrigation system evaluations and water management tool purchases (e.g. soil moisture sensors, flow meters).
 - Provide guidance and training on how to utilize tools to establish and maintain optimal irrigation practices¹¹
- Continue successful EE program offering, while also seeking nuanced, innovative means to incentivize efficiency-driven market transformation.
- Maintaining consistent and relevant EE program offerings will be critical to building trust with customers and agricultural support service partners.
- Leverage relationships and trust built through the continuing programs to ease transition to new program models and offerings

2) Mid-Term Solutions/ Transitional

- Incentivize irrigation system optimization through traditional channels, while also exploring ways to create a performance management model.
- Target adoption of more technologically advanced irrigation systems (i.e. those that operate based on soil moisture level sensors rather than visual cues by the farmer).
- Explore the feasibility of incentivizing practices such as zero grade, no tillage/strip-till, deficit irrigation, and other practices that can reduce water use and pumping requirements.

3) Innovative/ Long-Term Solutions

- Developing a behavioral program/benchmarking leveraging data sources such as California Irrigation Management Information System (CIMIS).

A [recent study \(PDF\)](#) by the Pacific Institute found that a combination of agricultural technology — such as shifts from flood irrigation to sprinkler- and drip-irrigation systems — and management scenarios together could reduce agricultural water use in the state by 17 percent. (Greenbiz: Answers to CA drought: regulate groundwater use, grow less thirsty crops, apply tech, April 13, 2015)

"The most important (approach to the drought) is rethinking demand for water. We've learned that we are reaching what I call peak water in California in terms of our ability to squeeze any more new water out of our rivers and aquifers. But there is enormous potential to do the things we want with less water, that is use water efficiently," Pacific Institute President Dr. Peter Gleick. Greenbiz - Welcome to the water tech boom: 3 ways to do more with less, 5/28/16

¹⁰ Evergreen Economics, SDG&E Agricultural Sector Market Study, March 26, 2015, pp. 29-31.

¹¹ *ibid*

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- Develop a Whole farm program with system-level approach to managing energy (i.e. system-performance management, real time pump tests, energy intensity field mapping, and integration with farm management tools.
- Assess the possibility of issuing rebates for switching crop types/seed varieties (that are proven to require less water to reach germination) or long term fallowing of land.
- Explore partnerships with irrigation districts and Department of Water Resources (DWR) to offer financial incentives for agricultural customers to implement more efficient water use technologies and practices

Cross-Cutting Support:

- Emerging Technologies to evaluate and support roll out of new technologies and practices
- Advanced Pumping Efficiency Program Mobile Education Center (WE&T) to provide training across PG&E's service territory
- Marketing to craft and deliver the message to customers and vendors

Industry Partners:

- Center for Irrigation Technology, CSU Fresno
- Irrigation Training & Research Center, Cal Poly
- Water agencies and irrigation districts
- DWR, USDA, NRCS

Metrics for Success:

- Water savings
- Energy savings
- Increase in customer participation across the sector
- Creation of, and participation in, a "whole farm" program

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Strategic Plan Directives:

“Design and launch focused program for irrigation efficiency, refrigeration, and process heating.” (3-1)

“Expand programs to wider audience and promising end uses.” (3-1)

“Conduct marketing and outreach to stimulate efficiency actions.” (3-1)

Problem Statement 2: The rate of market saturation with current measures has outpaced the rate of new measure introduction leaving a substantial gap in the portfolio of offerings for Agricultural customers.

Observations:

A strong disconnect exists between EE policy and market realities in the Agricultural sector, which is compounded by pervasive risk aversion and slow technology adoption among customers.

Becoming more successful in this space requires several key shifts in approach.

- Streamlining custom project approach to align with customer needs and timelines
- Presenting EE in the context of how it can benefit their operations and bottom line
- Maintain consistency with the segment in order to foster trust that will allow access to deeper EE savings

Barriers:

- Challenges finding customers willing to take all the necessary steps to participate in the current Custom process
- Customer/site specific variables and inconsistent system processes do not translate well into Deemed measures¹²
- Product development (i.e. time/expense needed to develop Deemed measures) is poorly aligned with market trends and potential
- Measure sunsets and policy impacts have reduced offerings to this sector.
- M&V and EM&V requirements are disproportional to the impact and risk within the segment

Strategies/Solutions:

A. Current/ Near-Term Solutions

- 1) Continue offering current successful programs [APEP, calculated, Deemed, Dairy & Winery Industry Efficiency Solutions (DWEIS)] to keep delivering the solutions that are available now.
- 2) Increase outreach and education to contractors and agricultural support service providers (APEP MEC at pump companies for pump overhaul and VFD education) to promote current solutions and help inform future offering.

¹² 2014 Ex Post Evaluation Results (conducted by the CPUC on PG&E).

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Strategic Plan Directives:

“Coordinate technical assistance, funding, and incentive mechanisms. (2-2)

“Identify the programs and major funding sources affecting the management of energy, air and water resources, and climate change.” (2-2)

“Identify approaches to cross market and leverage resource management goals across programs, funding, and technical assistance.” (2-2)

B. Mid-Term Solutions

- 1) Develop targeted approaches for utilizing existing and emerging technology offerings to drive development in this sector.
- 2) Develop calculators that can be used to account for site specifics and can be adjusted as the market/policy changes which will allow customers to plan for EE upgrades.
- 3) Continue to target segments with high anticipated growth potential (row/permanent crops, greenhouses, lighting and HVAC loads).
- 4) Leverage programs to develop and conduct ET studies (performance-based payments or subsidize equipment purchase)
- 5) Leverage existing programs to evolve into targeted and specialized SEM offerings

C. Innovative/ Long-Term Solutions

- 1) Develop platform to enable customers to view advanced data analytics of their energy usage across their operations which will allow them to make more informed decisions about their energy use
- 2) Explore opportunity for integrated/IDER offerings (across DG/DR/EE/EV)
- 3) Integrate offerings into Whole Farm approach
- 4) Partner with governmental agencies to leverage their research and solutions for EE and water conservation on the farm.

Cross-Cutting Support:

- Marketing to provide continued support in promoting EE message and opportunities
- Workforce Education and Training for support services and vendors to increase awareness of EE practices and applications
- Emerging Technologies to develop and support pilots

Industry Partners:

- External partners: Department of Water Resources, USDA, CFBA, water districts
- Statewide IOU coordination to better align offerings and defray development costs
- CPUC to participate in and approve innovative project/program approaches
- Implementers to assist in administering and implementing the programs
- Agricultural support services to promote and deliver solutions

Metrics for Success:

- Development of effective tools to evaluate irrigation system efficiency for incentives
- Increase in customer participation across the sector

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Problem Statement 3: The Agricultural customer lacks the financial resources to purchase more efficient equipment or leverage tools to support their optimization needs.

Observations:

- Agricultural customers are faced with myriad challenges, such as water availability, disease, environmental regulations, and changing consumer demands– all of which will impact the viability of their operations and ability to invest in EE.
- Ensuring the health and yield of their crops or animals is the primary focus.
- Growers will repair the equipment for as long as possible and will only replace equipment on failure¹³
- Becoming more successful in this segment requires providing incentives and financing options to cover first cost barriers for efficient equipment purchase and installation.
- Another critical element includes offering the technical support to identify and implement those opportunities.

Barriers:

- Many small-to-medium size operations do not have sufficient resources available to prioritize EE.
 - Farmers prioritize having their systems running over energy efficiency¹⁴
- Lack of appropriate and sufficient EE programs and financing mechanisms to engage greenhouse customer base:
 - Statewide moratorium on most greenhouse measures pending completion of ISP study
 - Family-owned greenhouses are often financially unable to do EE; the majority rely on EE programs to upgrade equipment and need financial support to uphold EE standards.
- The current OBF cap is too low for significant EE investment in this segment.

Strategies/Solutions:

A. Current/ Near-Term Solutions

- 1) Coordinate with other IOUs to resolve greenhouse ISP issue and begin re-engaging customers in this sector
- 2) Develop targeted offerings for small to medium greenhouse customers
- 3) Plan for potential load growth in the greenhouse sector with lighting and HVAC measures available in the portfolio
- 4) Promote OBF/OBR financing to customers in this segment

¹³ Measure, Application, Segment, Industry (MASI): Agriculture, Navigant Consulting for Southern California Edison, 2015, p. 25.

¹⁴ Ibid, p. 48.

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B. Mid-Term Solutions

- 1) Develop and offer pre-approval of OBF loans with higher caps and extended lifetimes to enable a series of productive EE investments.
- 2) Expand technical assistance offering to provide customers with more information about the efficiency of their operations e.g. more frequent pump tests or system efficiency evaluations.

C. Innovative/ Long-Term Solutions

- 1) Develop partnerships with entities, such as REAP (Rural Energy for America Program) by USDA or Farm Credit Service, to offer incentives and loans to farmers making EE upgrades.
- 2) Explore NRCS financial offerings and programs to offer in conjunction with EE solutions.

Cross-Cutting Support:

- Financing to enable customers to overcome cost barriers to implementing efficiency projects.
- Marketing to articulate and promote the benefits of financing opportunities for agricultural customers.
- WE&T to educate vendors on financing options to enable them to promote higher cost, higher efficiency equipment and processes.

Industry Partners:

- Government entities such as the USDA or DWR to partner with
- Private entities such as water districts and equipment suppliers/manufacturers to partner with to offer financing
- Implementers to promote and assist customers in identifying opportunities where financing and incentives will achieve the greatest EE potential
- Agricultural lending services to offer and promote lending for EE projects

Metrics for Success:

- Increase in financial offerings targeted to agricultural customers
- Increase in participation across the sector
- Improved TRC and PAC

Strategic Plan Directives:

“Conduct an energy use characterization and efficiency potential study for the statewide agricultural market.” (Strategy 1-1)

“Develop benchmarking resources, tools, and methods for the agricultural sub-sectors.” (Strategy 3-1)

“Update evaluation, measurement, and verification protocols to define energy impacts of water efficiency actions.” (Strategy 3-3)

“Agricultural sector stakeholders have identified the single highest priority is to conduct baseline studies to understand the energy usage patterns in California’s agricultural sector, forecast likely changes in the future, determine the energy efficiency potential in the seven sub-energy sectors, and evaluate the cost effectiveness of measures and programs, best practices, etc.” (p. 47)

“The single most important step [toward better understanding California’s agricultural sector] – which is needed immediately – is to conduct energy use and efficiency potential studies that will provide critical information on a statewide basis.” (p. 48)

Problem Statement 4: The Agricultural sector lacks current market characterization information which is essential to the design of future energy efficiency support services.

Observations:

*The Agricultural industry still lacks a comprehensive database of individual producers in the market and their respective on-farm equipment components. The lack of a comprehensive database makes it difficult to establish baselines, identify market trends, and maintain communication with growers. Working with other utilities and agricultural entities to establish a database of system designs by crop and region.*¹⁵

Becoming more successful in this space requires:

- Establishing methodology and protocols for gathering data on an ongoing basis
- Dedicating sufficient budget to establishing research capacity and continuously updating it as the sectors evolve

Barriers:

- Expensive studies can become of limited value within a few years as the market and technology evolve
- Limited market potential can be a barrier when considering an in-depth study for a specific sub-segment
- The specific needs of EE in California are not part of broader agricultural market characterization reports and studies

Strategies/Solutions:

A. Current/ Near-Term Solutions

- 1) Develop stronger ties with key trade and agricultural support organizations to deepen understanding of challenges and opportunities facing specific customer types (Farm Bureau, Almond Board, pest control advisors, tomato processors, and irrigation companies).
- 2) Conduct segment-specific ISP studies in high potential markets to determine specific baselines; ex: PVC pipe (PG&E), Greenhouse (statewide).

¹⁵ Measure, Application, Segment, Industry (MASI): Agriculture, Navigant Consulting for Southern California Edison, 2015.

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B. Mid-Term Solutions

- 1) Research/ benchmarking/ EM&V studies
- 2) Partner with government entities and agricultural universities to do ongoing studies/market research to allow offerings to adapt and drive innovation in the segment.

C. Innovative/ Long-Term Solutions

- 1) Partner with the USDA, NRCS, and Cooperative Extension Service leveraging their research and solutions of energy efficiency and water conservation on the farm.
- 2) Explore partnerships with emerging new service providers like the Farmers Business Network (FBN) offering. FBN is leveraging the power of large scale data science and machine learning to provide farmers unprecedented, completely unbiased information on the performance and different agricultural products. FBN works by gathering precision Agricultural data directly from its farmer members then analyzes the data and converts it into insights and perspectives that can help farmers make better decisions, manage risk, and ultimately increase the profitability of their farming operations.

Cross-Cutting Support:

- EM&V to evaluate and support data-gathering methodologies and resulting information
- WE&T to reach out to vendors and distribute information
- Marketing to assist in messaging and outreach

Industry Partners:

- Statewide IOU coordination to defray costs and share information
- Third parties (agricultural universities, experts)
- Industry (trade organizations and agricultural support businesses)

Metrics for Success:

- Increase in number of relationships with agricultural support service providers
- More market studies conducted that focus on actionable data
- Increase in number of targeted offerings to customers in this sector