

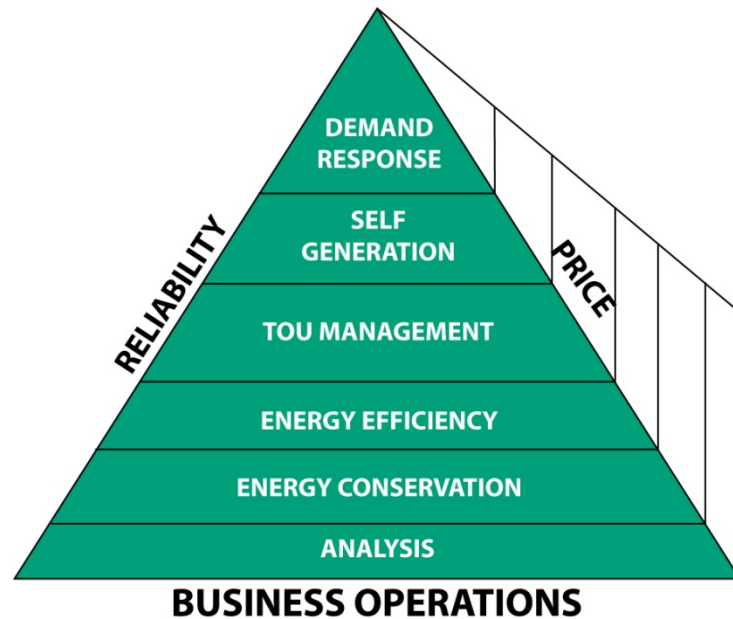
# Emerging Green Trends for Wineries - Energy Management

Towards Climate Neutrality  
through Efficiency, Generation  
and Carbon Offsets

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# What I'll Cover...Emerging Trends in:

- The PG&E and CSWA partnership
- Methods for Assessing Facility Opportunities
- Emerging Efficient Technologies
- Demand Response
- Generation
- Climate Smart





# PG&E and CSWA Partnership



- Since 2005, PG&E and CSWA co-hosted 22 workshops for 700+ attendees on winery energy management
- Currently, PG&E and industry partners (CLFP, CSWA) are working to merge environmental, regulatory and energy programs and solutions
- 2008-9 winery workshop topics were expanded to encompass
  1. Water and Energy Management
  2. Greenhouse Gas Management Strategies
  3. Green Building for Wineries

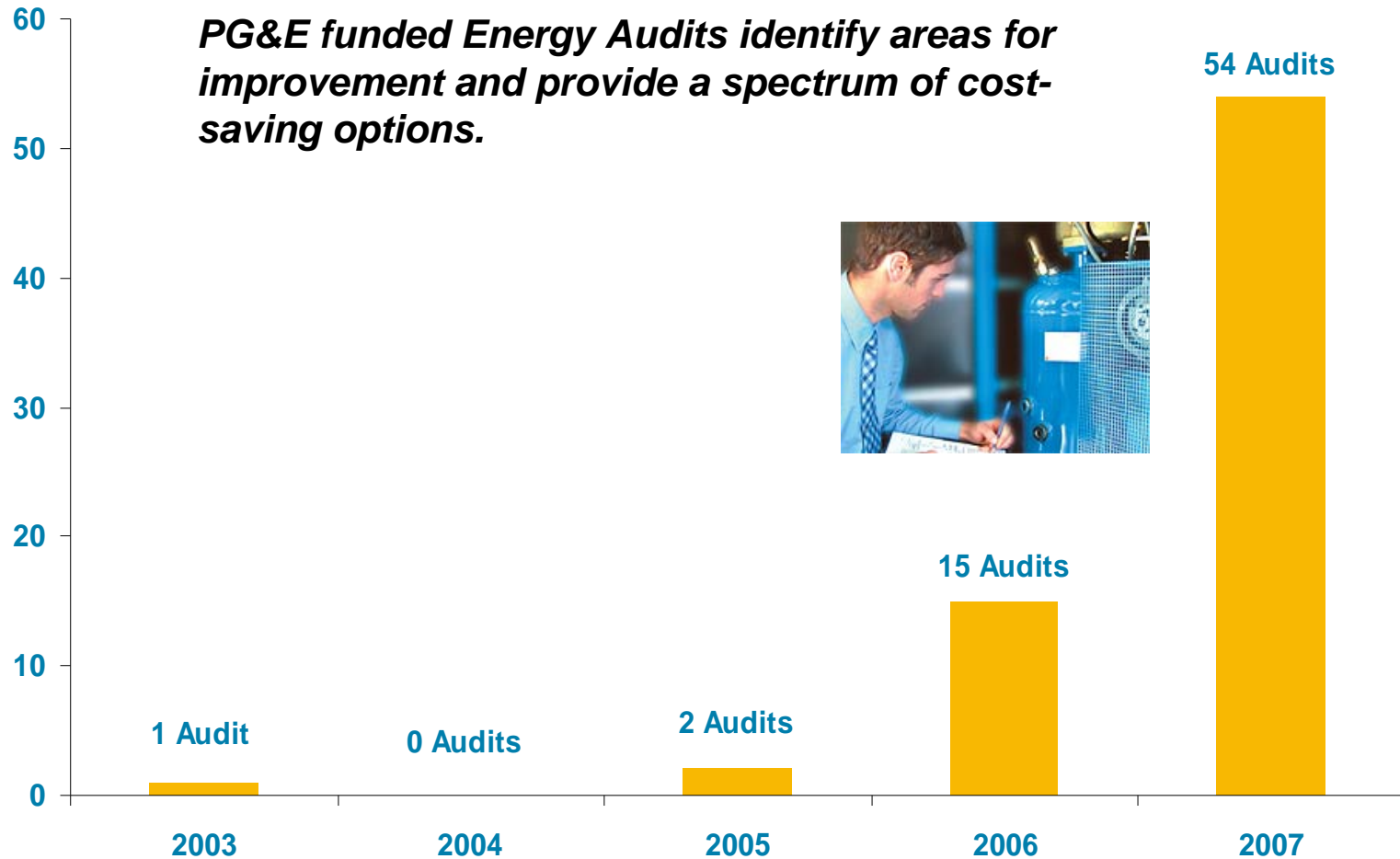
# Assessment: Comprehensive

- PG&E is rolling out a Continuous Energy Improvement (CEI) platform and resources for customers
- CEI takes a comprehensive approach to strategic energy planning similar to CSWA assessment and action platform
  - Commit, Assess, Plan, Implement, Review, Reward
  - Both management & technical opportunities are considered



- PG&E CEI implementation pilot is wrapping up two wineries

# Assessment: Technical Energy Audits



# Energy Efficiency

## Standard Winery Efficiency Projects:

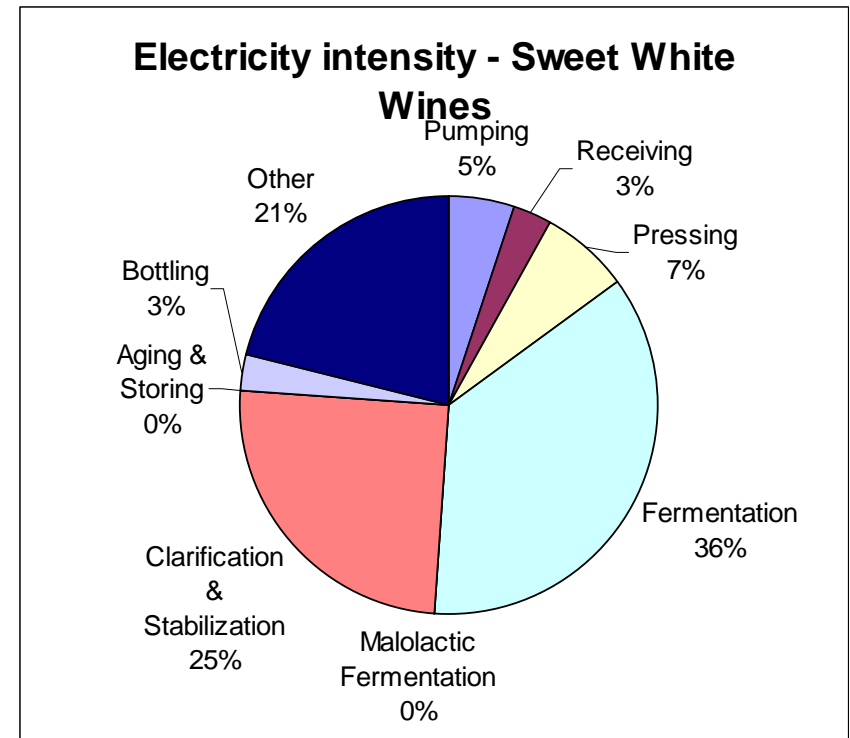
- Insulating wine tanks
- Industrial refrigeration retrofits
- Process controls - i.e., VFDs on Motors
- Lighting retrofits
- Etc.

## Emerging Energy Efficient Technologies:

- Electrodialysis to replace cold stabilization for tartrate removal
- New Wastewater Treatment approaches
- New battery recharge for forklifts

# Emerging Technologies: Electrodialysis

- PG&E Winery Energy is 400 GWh/yr
- Energy intensity ranges:
  - 0.8 - 3 kWh/Gallon
  - \$0.09 - \$0.33/Gallon
- Stabilization : 25%



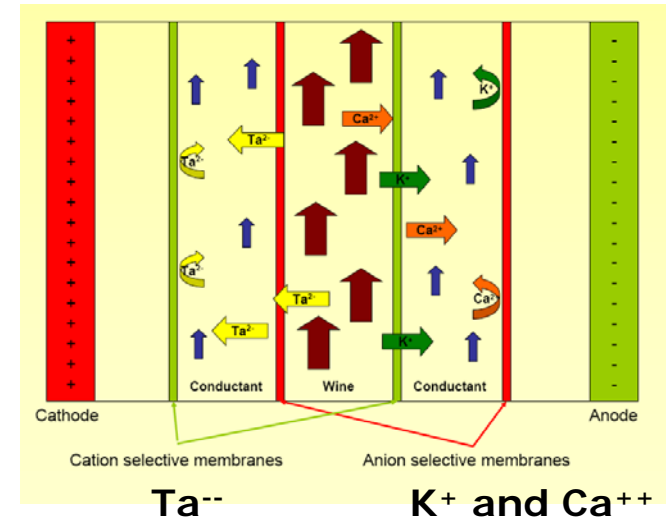
# Emerging Technologies: Electrodialysis

- Replaces cold stabilization with energy savings of 90%+ of the energy required for cold stabilization in un-insulated tanks



# Electrodialysis: A proven technology

- Gallo started first tests in 80s
- Industrial research re-started in 1990 in France with pilots in 1992
- Extensive quality impact assessment 1992-1998 → Certification in 1997
- FDA certification in 2004
- Today, more than 70 units worldwide processing 128 MM Gallons/year.
- In CA, vendor WineSecrets provides both mobile and permanent solutions



# Electrodialysis: Pilots Conducted

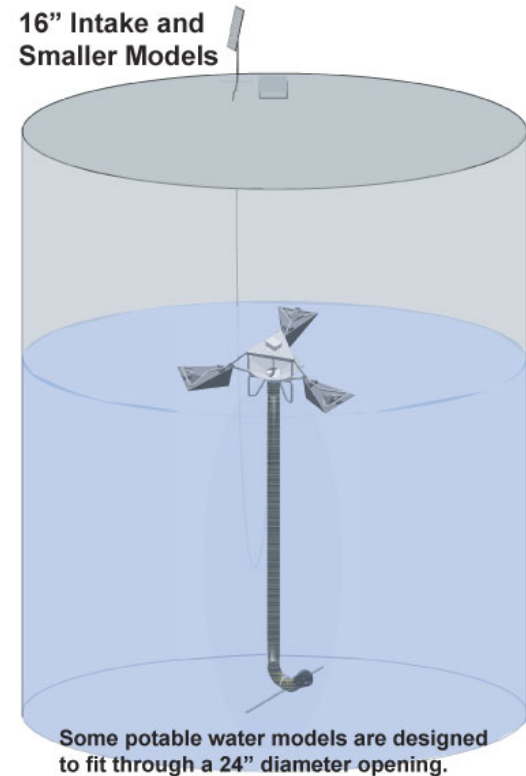
- Two pilots by PG&E, one at SCE looking at savings with insulated & uninsulated tank, comparing cold stabilization and electro-dialysis on the same wine
  - Assessment of the energy savings
  - Validation of calculation method
  - Support of incentive packages
- Pilot Study Reports available upon request
  - <http://www.etcc-ca.com/database/summary.php?id=444>
  - <http://www.etcc-ca.com/database/summary.php?id=441>
- Summary article in Practical Winery and Vineyard
- PG&E can calculate your estimated energy savings and incentive to pay for this technology

# ED Pilot Results Summary

	<b>COLD STB – PGE(1)</b>	<b>COLD STB - PGE(2)</b>	<b>COLD STB – SCE(1)</b>	<b>COLD STB – SCE(2)</b>	<b>ED – PGE</b>	<b>ED – SCE</b>
Type of Wine	<b>Pinot Grigio</b>	Chardonnay	Sauvignon + Sryah	Sauvignon + Sryah	<b>Pinot Grigio</b>	Sauvignon + Sryah
Total Vol	<b>18,500 gal</b>	24,000 gal	13,334 gal	13,334 gal	<b>21,500 gal</b>	13,334 gal
Tank Insulated?	<b>No</b>	Yes	No	No	<b>n/a</b>	n/a
Cooling Method	<b>Glycol Refrig</b>	Glycol Refrig	Glycol Refrig	Flash Refrig	<b>n/a</b>	n/a
Stabilizing Period	<b>1,108 hr</b>	122 hr	336 hr	27 hr	<b>31 hr</b>	17 hr
Seeding?	<b>No</b>	Yes	Yes	Yes	<b>No</b>	Yes
Energy Usage	<b>22,965 kWh</b>	538 kWh	10,067 kWh	601 kWh	<b>170 kWh</b>	95 kWh
<b>Energy Intensity KWh/gal</b>	<b>1,200</b>	22	755	45	<b>8</b>	7

# Emerging Tech: Solar Powered Water Circulator

- Applicable for:
  - Lagoon/municipal waste water treatment
  - Fresh water circulation
  - Recreational lakes
- Lifts water from bottom of pond, induces flow at the surface
- Solar cells and battery allows for continuous operation for up to 3 days
- Each solar powered water circulator can replace on average 30 hp of aeration equipment
- Best performance under steady state conditions



# Emerging Tech: Microbubble Circulation and Stratification aka Blue Frog/Gold Frog

- Lagoon wastewater treatment system that attempts to mimic natural pond biology
- Allows insoluble BOD to sink to bottom
  - Treated anaerobically
- Treats soluble BOD aerobically with microbubbles added at the surface
- Reduces horsepower requirements by 50% compared to traditional aeration systems
- Challenges at current winery assessment
  - Currently not meeting surface DO regulatory requirement ( $>1$  mg/L)
  - System designed to eliminate odor and treat BOD with  $<1$  mg/L DO



# Demand Response Projects

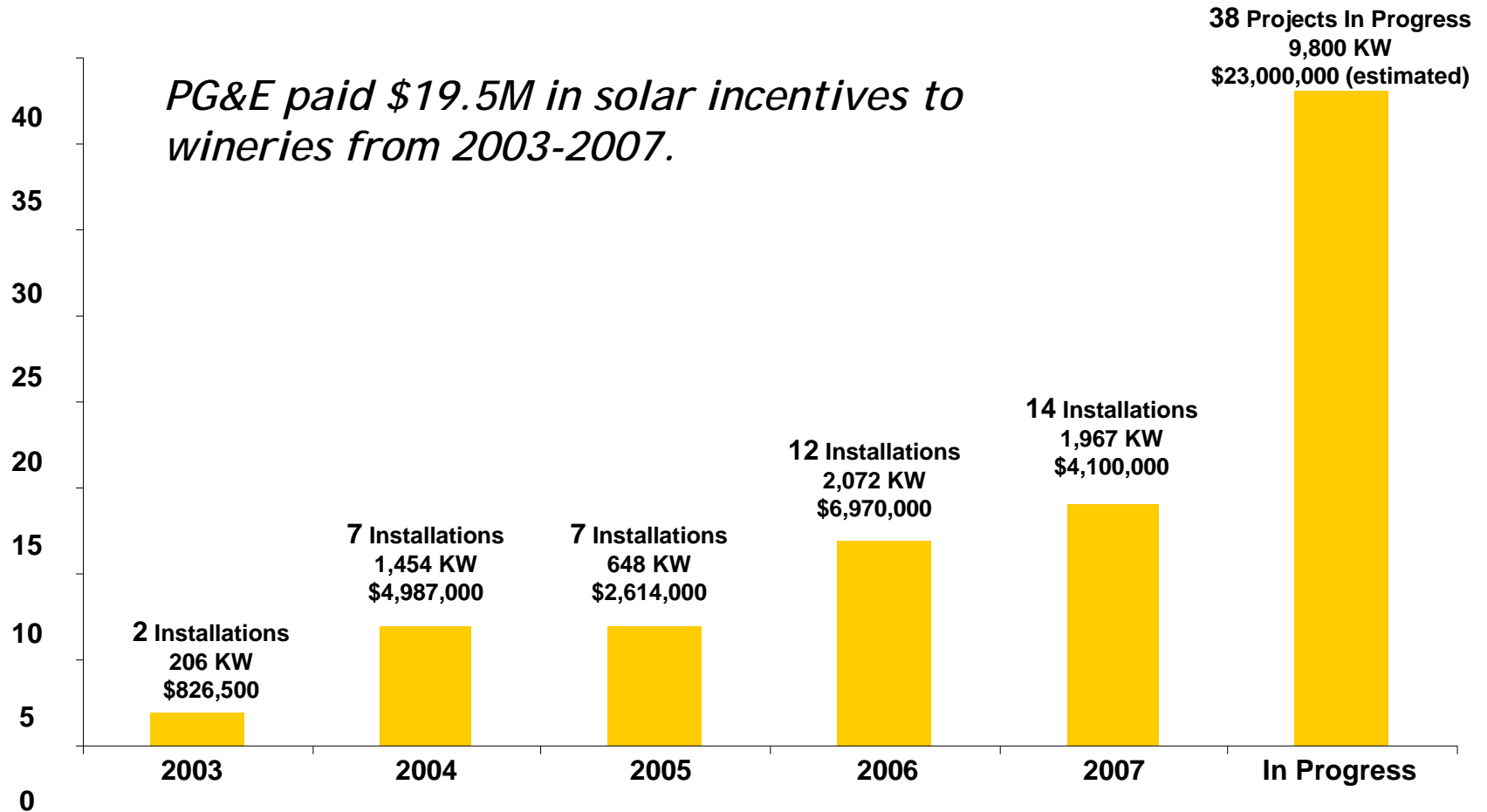
- DR programs use rate discounts, DR audits, and generous equipment incentives to encourage customers to drop energy load during DR events
  - New Peak Choice DR program allows customers an “a la carte” menu to select program options
- PG&E’s largest DR projects have been with wineries who use advanced control systems to optimize their refrigeration systems
  - PG&E’s Technical DR Incentives paid for these control systems in full

# Generation at Wineries

- Solar
  - Solar has been adopted in wineries faster than any other industry
  - In fields, on roofs, on parking garages, at the ends of vineyards, on pontoons on ponds...!
- Biogas recovered from wastewater, “scrubbed” of impurities, and injected into boilers or onto the grid
- Biogas fuel cells now available

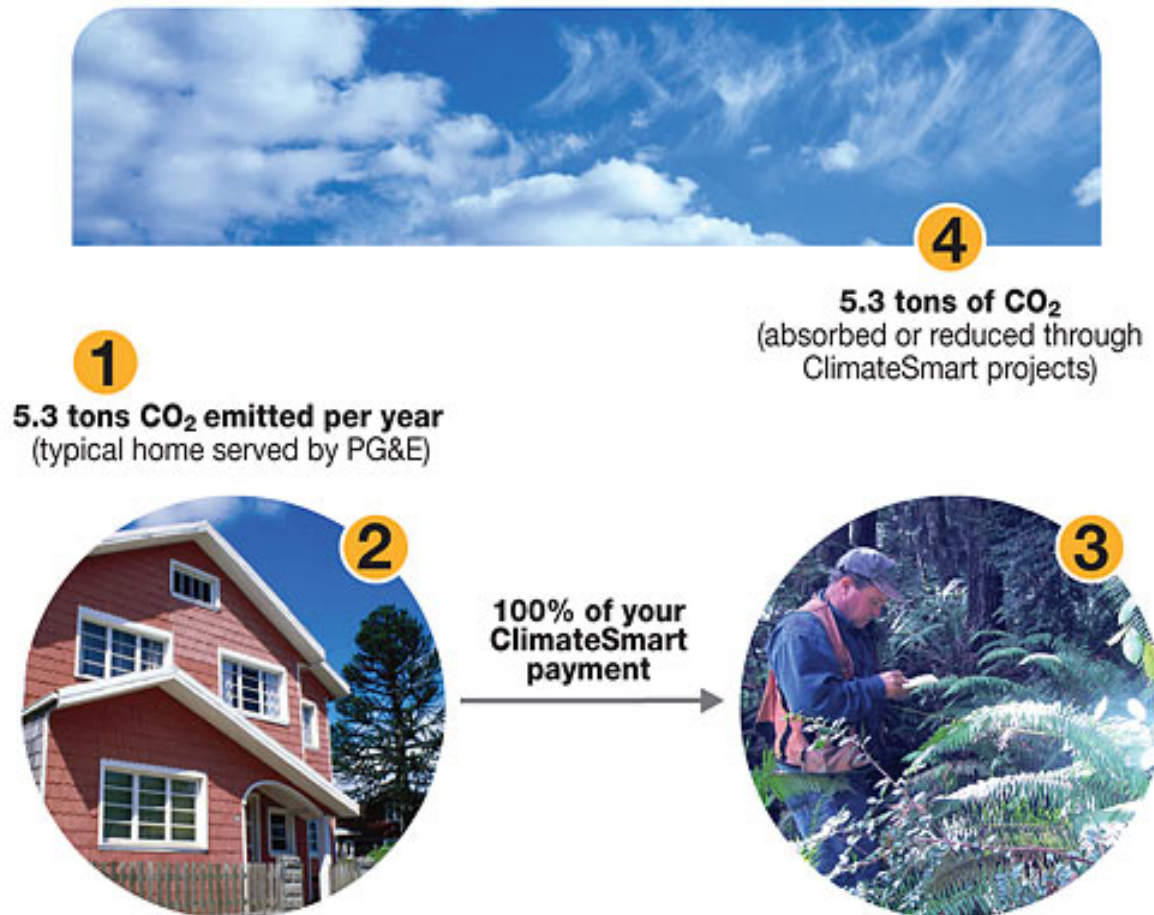
# California Incentives Spur Winery Solar Installations

*PG&E paid \$19.5M in solar incentives to wineries from 2003-2007.*



# Carbon Offsets: ClimateSmart™

ClimateSmart allows customers to voluntarily make their energy use climate neutral



# How ClimateSmart Works

- Cost is based on usage
  - \$0.00254 per kWh, \$0.06528 per therm;
- Investment in CA-only projects that reduce greenhouse gas emissions
- Livestock manure management, landfill gas capture, forest conservation, and reforestation
- Come by the PG&E booth to calculate your carbon footprint and find out more about ClimateSmart



# Selected ClimateSmart Customers



West Sacramento



WALDECK'S OFFICE SUPPLIES

