

Program will start at 10:00 am



# ETCC QUARTERLY MEETING: *MAKING EMERGING TECHNOLOGY WORK IN THE AGRICULTURAL SPACE*

April 26, 2016

Energy Training Center, Stockton, CA

HOSTED BY: Pacific Gas & Electric

**Wifi: xxxxx      WIFI code: xxxxx**

# Welcome, Safety and ETCC Updates

**Mangesh Basarkar**

Manager, Product Management, Energy Efficiency  
Products | Pacific Gas & Electric

# WELCOME!

---

Before we get started....  
housekeeping and safety

# FOR OUR ONLINE MEETING PARTICIPANTS

- Quick logistics
  - Phone lines are muted, so if no sound is coming from your speakers, [click here](#)
  - Speaker check: select “raise” hand in the control panel to confirm you are able to hear
  - Please use question field to ask questions during Q&A or if any technical issues

# HOUSEKEEPING FOR ALL PARTICIPANTS

- Please **turn off** or **silence** your phone, and **step outside** for any non-program conversations
- Video and audio recording today's session
  - Will be posted on [www.etcc-ca.com](http://www.etcc-ca.com)
- Slides will be posted to [www.etcc-ca.com](http://www.etcc-ca.com)
- Don't forget to fill out evaluations!

# SAFETY MESSAGE

- In the event of an emergency:
  - Earthquake
  - Fire
  - Other evacuation
- Meeting point
- 911
- CPR

# TODAY'S AGENDA

10:00 AM	Welcome, Safety & ETCC Updates
10:20 AM	<b>What Does Success Look Like? Building a Partnership with the ET Program</b>
11:30 PM	LUNCH (provided)
12:35 PM	<b>Field to Market: What are the Needs in the Agricultural Space?</b>
1:55 PM	BREAK
2:15 PM	<b>Emerging Solutions: What Technologies are Available for the Agricultural Space?</b>
3:30 PM	WRAP UP

# EMERGING TECHNOLOGIES COORDINATING COUNCIL (ETCC)

The ETCC supports ETP efforts in the advancement of energy efficiency and demand response initiatives through its leadership, impact and influence in the emerging technology domain. It pursues this objective by strategically engaging with a wide range of external ET stakeholders and effectively and efficiently managing coordination among ETCC members.

Members include:





# EMERGING TECHNOLOGIES PROGRAM MISSION

“...to increase energy efficiency market demand and technology supply through evaluation of *emerging* and *underutilized* advanced technologies to increase customer savings...”



## Zero Net Energy



## LED Lighting



## EE Rebates



Refrigerator Recycling  
\$35 rebate  
Free pickup  
[→ Learn More](#)

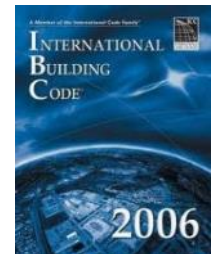
## Retail and Manufacturer Strategy



## Appliance Standards



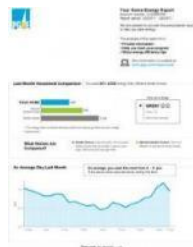
## Building Codes



## HVAC



## Home Energy Report



## Contractor Training and outreach

# ET PROGRAM DESIGN

## Technology Development Support

- Provide resources to transform early-stage technologies / concepts into saleable products
- Develop forward-looking product specifications
- Provide outreach to early-stage entrepreneurs, investors, and analysts (TRIO)

## Technology Assessment

- Evaluate performance claims
- Generate energy savings and cost data required for regulatory approval of a new EE measures

## Technology Introduction Support

- Conduct scaled field placements to foster market traction
- Build demonstration showcases to create visibility / market awareness
- Conduct third-party solicitations using competitive bidding (TRIP solicitation)

# UPCOMING ETCC EVENTS

Date	Event	Location & Host
September 8, 2016	Q3 Meeting: Residential	San Diego (SDG&E)
December 7, 2016	Q4 Meeting: Industrial	Sacramento (SMUD)
April 19-21, 2017	Emerging Technologies Summit	Los Angeles (SoCal Gas)

To sign up for the ETCC Insight newsletter, check the box on the sign-in / registration sheet or sign up online at: [www.etcc-ca.com/subscribe](http://www.etcc-ca.com/subscribe)

Check the ETCC website for updates: <http://www.etcc-ca.com/events>



# WHAT DOES SUCCESS LOOK LIKE? BUILDING A PARTNERSHIP WITH THE ET PROGRAM

**Dean Kunesh**, Senior Solutions Marketing Manager | Pacific Gas & Electric – *moderator*

**Tom O'Donnell**, Principle Engineer | E&J Gallo Winery

**Dan Sonke**, Manager of Ag Sustainability Programs | Campbell Soup Company

Dean Kunesh  
Senior Solutions Marketing Manager |  
Pacific Gas & Electric

Tom O'Donnell  
Principle Engineer | E&J Gallo Winery



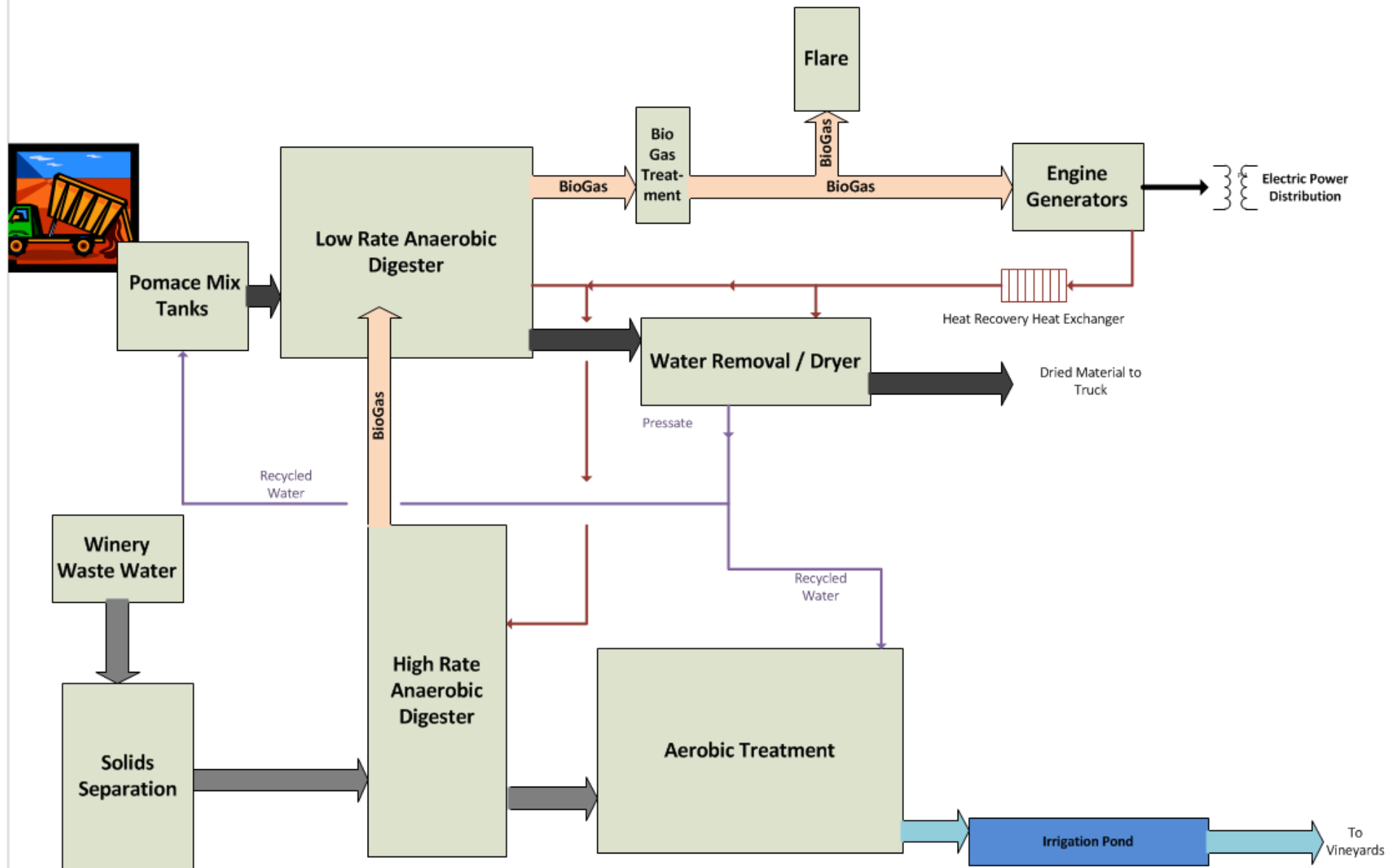
E&J Gallo Winery

# Livingston Water Innovation and Energy (LWINE)

- Design to treat wastewater:
  - 450,000 Gallons / Day of Water
  - Lower COD
  - Lower Nitrates
- Generate 2 MW of Power

[tom.odonnell@ejgallo.com](mailto:tom.odonnell@ejgallo.com)







Dan Sonke  
Manager of Ag Sustainability  
Programs | Campbell Soup Company

# Campbell Soup Company



\$8 Billion Portfolio





# Tomato Operations & the Water-Energy Nexus





## DISCUSSION / Q&A

### WHAT DOES SUCCESS LOOK LIKE? BUILDING A PARTNERSHIP WITH THE ET PROGRAM

**Dean Kunesh**, Senior Solutions Marketing Manager | Pacific Gas & Electric – *moderator*

**Tom O'Donnell**, Principle Engineer | E&J Gallo Winery

**Dan Sonke**, Manager of Ag Sustainability Programs | Campbell Soup Company

# LUNCH

**Program will resume at 12:35 pm**

PLEASE FILL OUT EVALUATIONS!



# FIELD TO MARKET: WHAT ARE THE NEEDS IN THE AGRICULTURAL SPACE?

**Robert Parkhurst**, Director, Agriculture Greenhouse Gas Markets | Environmental Defense Fund - *moderator*

**Stuart Styles**, Director, Irrigation Training Center | Cal Poly San Luis Obispo

**Laurie Park**, Principal | Water Energy Innovations, Inc.

**Neil Black**, President | California Bioenergy

Robert Parkhurst  
Director, Agriculture Greenhouse Gas  
Markets | Environmental Defense Fund

Stuart Styles

Director, Irrigation Training Center | Cal  
Poly San Luis Obispo



# Field to Market: What are the needs in the Agricultural Space

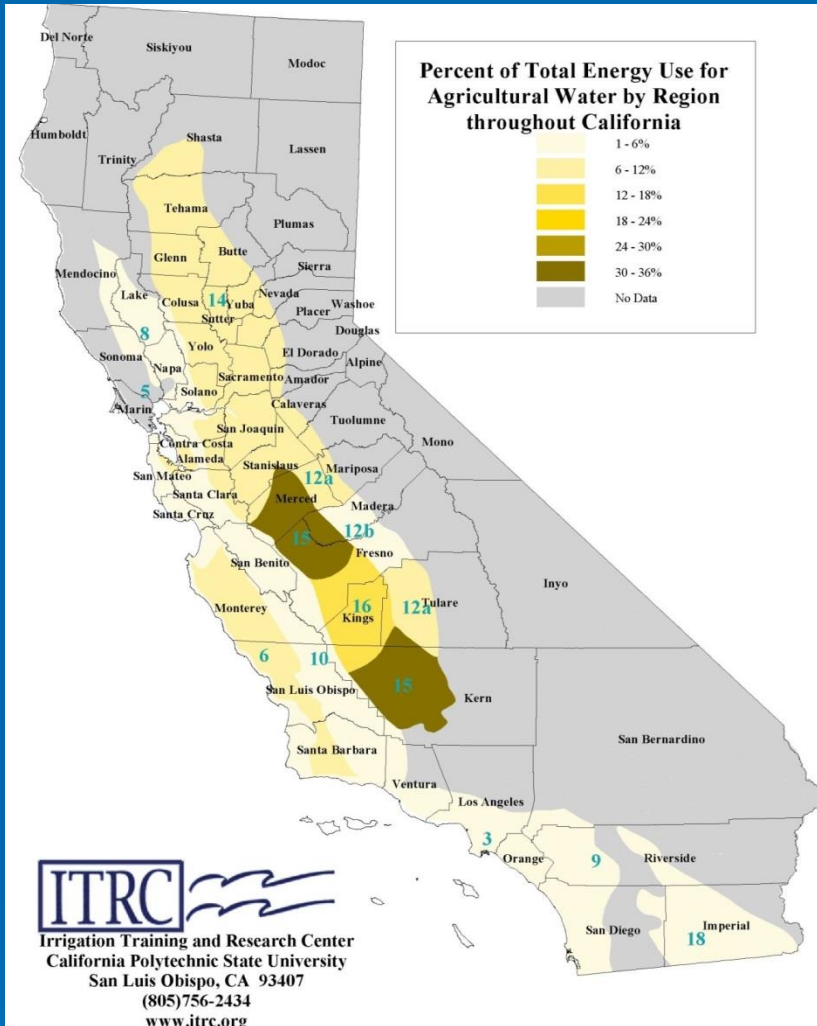
Dr. Stuart Styles  
Director

Cal Poly Irrigation Training and Research Center  
[www.itrc.org](http://www.itrc.org) [sstyles@calpoly.edu](mailto:sstyles@calpoly.edu)

Specialization: Modernization of irrigation systems  
(including both on-farm and irrigation projects)

# California Ag Energy and Water Use

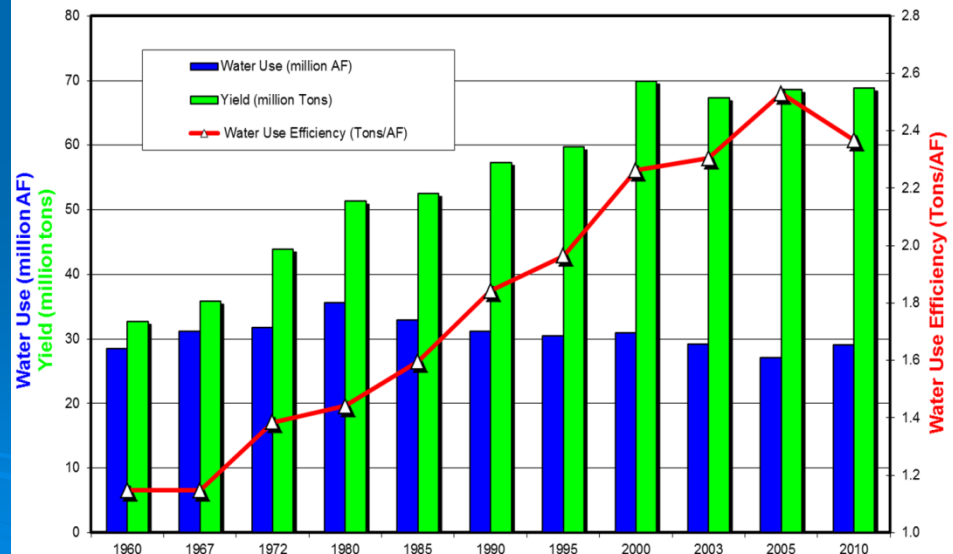
Graph of water use compared to yield.



**ITRC**  
Irrigation Training and Research Center  
California Polytechnic State University  
San Luis Obispo, CA 93407  
(805)756-2434  
www.itrc.org

Map showing where  
in the state the  
energy is being used.

California - Water Use Efficiency



1960-1995 values from David Kranz, California Farm Bureau (<http://www.cfbf.com/info/waterwise.cfm>).  
Year 2000 Data from the following sources: [California Land and Water Use](http://www.landwateruse.water.ca.gov/annualdata/datalevels.cfm), California Department of Water Resources. <<http://www.landwateruse.water.ca.gov/annualdata/datalevels.cfm>>  
[Annual Statistical Reviews](http://www.nass.usda.gov/caindex.htm), [Historic Commodity and Principle Crops Data](http://www.nass.usda.gov/caindex.htm), United States Department of Agriculture. <<http://www.nass.usda.gov/caindex.htm>>

Laurie Park  
Principal | Water Energy Innovations, Inc.

Neil Black  
President | California Bioenergy



CALIFORNIA  
BIOENERGY

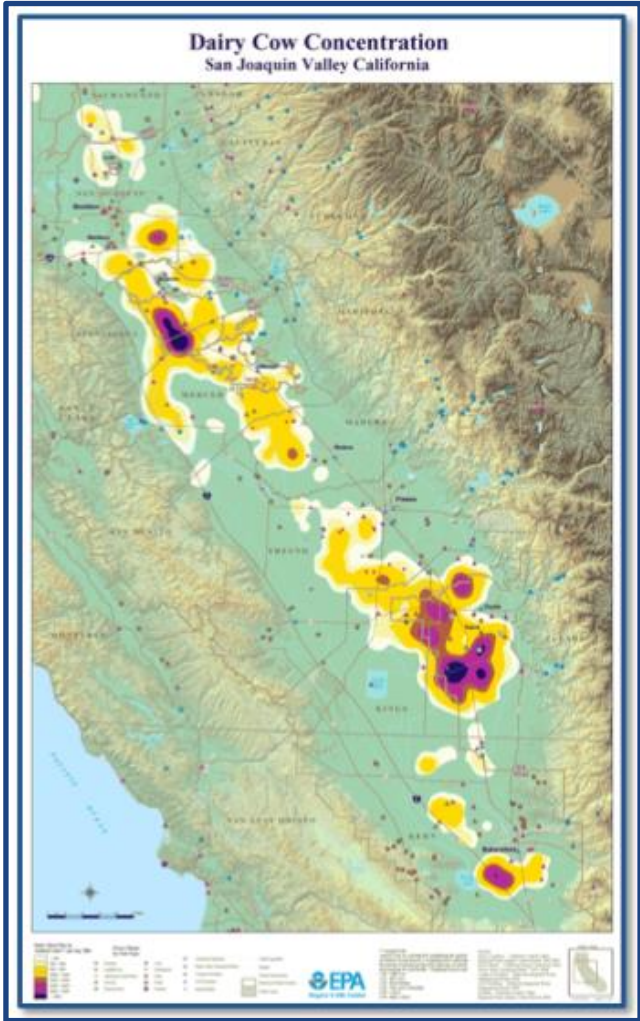
Plugging Dairies into a Renewable Future.

## **ETCC Conference**

April 26, 2016



# California Dairy Industry Key Statistics



- Largest dairy industry, 20% of America's milk
- 1.8M milk cows, 1,500 dairies
- Majority of farms concentrated in the San Joaquin Valley
- Industry generates 50% of CA CH<sub>4</sub> emissions, 25% from lagoons
- Dairy digesters provide a solution with multiple benefits to California and the farmer



# Benefits of Dairy Digesters

- Capture and destroy vented methane
- Energy generation
  - Electricity. Renewable source to power ~450,000 homes. Biogas can be stored to generate electricity as needed. Engine heat can cool milk.
  - Vehicle fuel (R-CNG). 1 cow = ~ 3000 car or 500 truck miles. Plus cleaner than diesel.
- Nutrient management
  - Consistent manure water, can flow into irrigation system
  - Increase in plant soluble nitrogen: potential decrease use of chemical fertilizers and enhanced ground water
  - Will be testing for use into drip irrigation systems



# CalBio Contact Information

Neil Black

[nblack@calbioenergy.com](mailto:nblack@calbioenergy.com)

cell: 917-589-6009

[www.calbioenergy.com](http://www.calbioenergy.com)





## DISCUSSION / Q&A

### FIELD TO MARKET: WHAT ARE THE NEEDS IN THE AGRICULTURAL SPACE?

**Robert Parkhurst**, Director, Agriculture Greenhouse Gas Markets | Environmental Defense Fund - *moderator*

**Stuart Styles**, Director, Irrigation Training Center | Cal Poly San Luis Obispo

**Laurie Park**, Principal | Water Energy Innovations, Inc.

**Neil Black**, President | California Bioenergy

BREAK

**Program will resume at 2:15 pm**

PLEASE FILL OUT EVALUATIONS!



# EMERGING SOLUTIONS: WHAT TECHNOLOGIES ARE AVAILABLE FOR THE AGRICULTURAL SPACE?

**Carolyn Weiner**, Manager, Industrial Ag and Water Program | Pacific Gas & Electric - *moderator*

**Yanbao Ma**, Professor of Mechanical Engineering | UC Merced

**Krishna Somayajula**, Engineer | CLEAResult

**Doug Scott**, President and Founder | VaCom

Carolyn Weiner  
Manager, Industrial Ag and Water  
Program | Pacific Gas & Electric

Yanbao Ma  
Professor of Mechanical Engineering |  
UC Merced



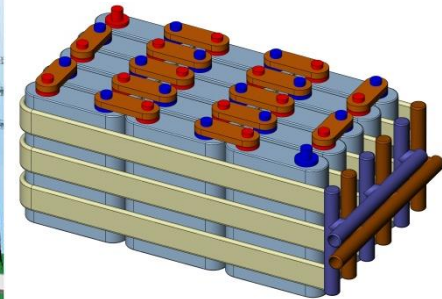
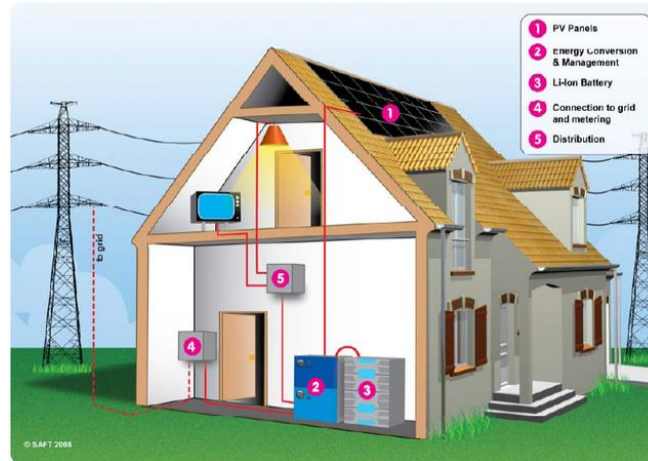
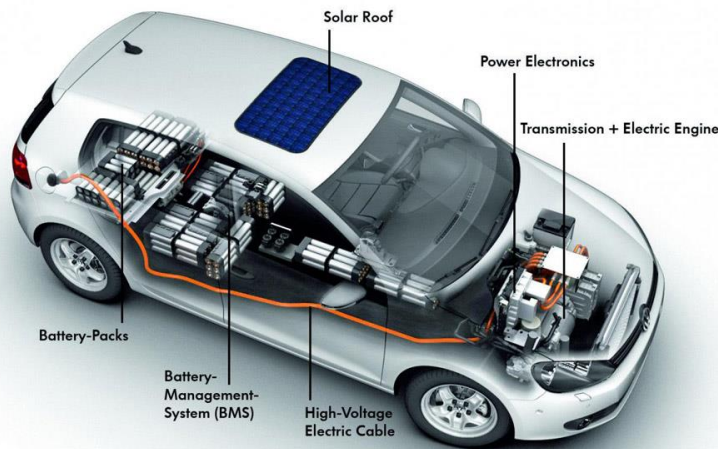
# Sustainable Water & Energy Technologies

Professor Yanbao Ma

[Yma5@ucmerced.edu](mailto:Yma5@ucmerced.edu)

([Welab.ucmerced.edu](http://Welab.ucmerced.edu))

## 1. Develop cost-effective reliable and safe energy storage systems



California renewable energy goal: **33%** renewable portfolio standard by **2020**; **1,325 MW** energy storage be completed by **2020** and implemented by **2024**.

<http://www.energy.ca.gov/research/energystorage/tour/roadmap/>

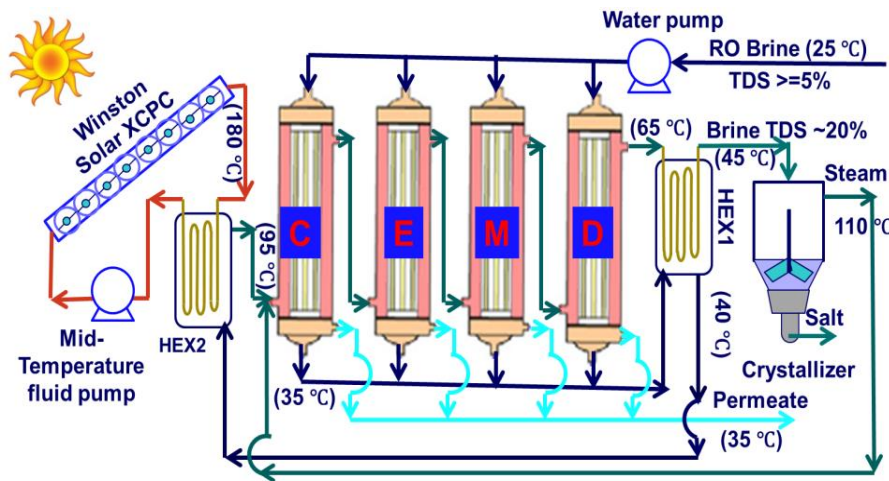


## 2. Develop irrigation drainage water treatment system with zero liquid discharge

- **Salt buildup problems in the San Joaquin Valley (SJV), each year**
  - 2,800,000 tons of salt into the SJV through surface water supplies
  - 350,000 tons of salt carried away by the San Joaquin River
  - 2,450,000 tons of salt buildup each year ( 8 football fields - 100 feet high)

[http://www.water.ca.gov/pubs/environment/salt\\_balance\\_in\\_the\\_san\\_joaquin\\_valley\\_water\\_facts\\_20\\_water\\_facts\\_20.pdf](http://www.water.ca.gov/pubs/environment/salt_balance_in_the_san_joaquin_valley_water_facts_20_water_facts_20.pdf)

## ✓ Our solutions: Drainage water treatment



Schematic of integrated continuous-effect membrane distillation and crystallization system driven by solar thermal energy.

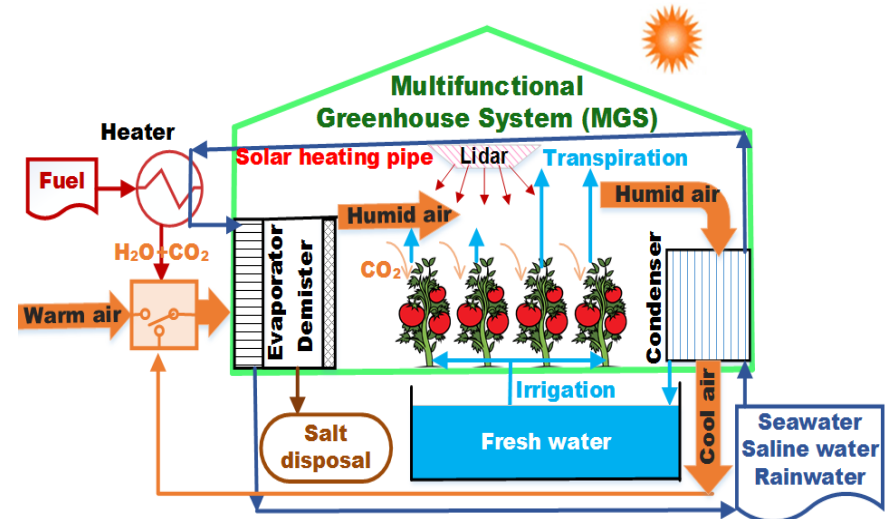


Diagram of a multifunctional greenhouse system.

Krishna Somayajula  
Engineer | CLEAResult





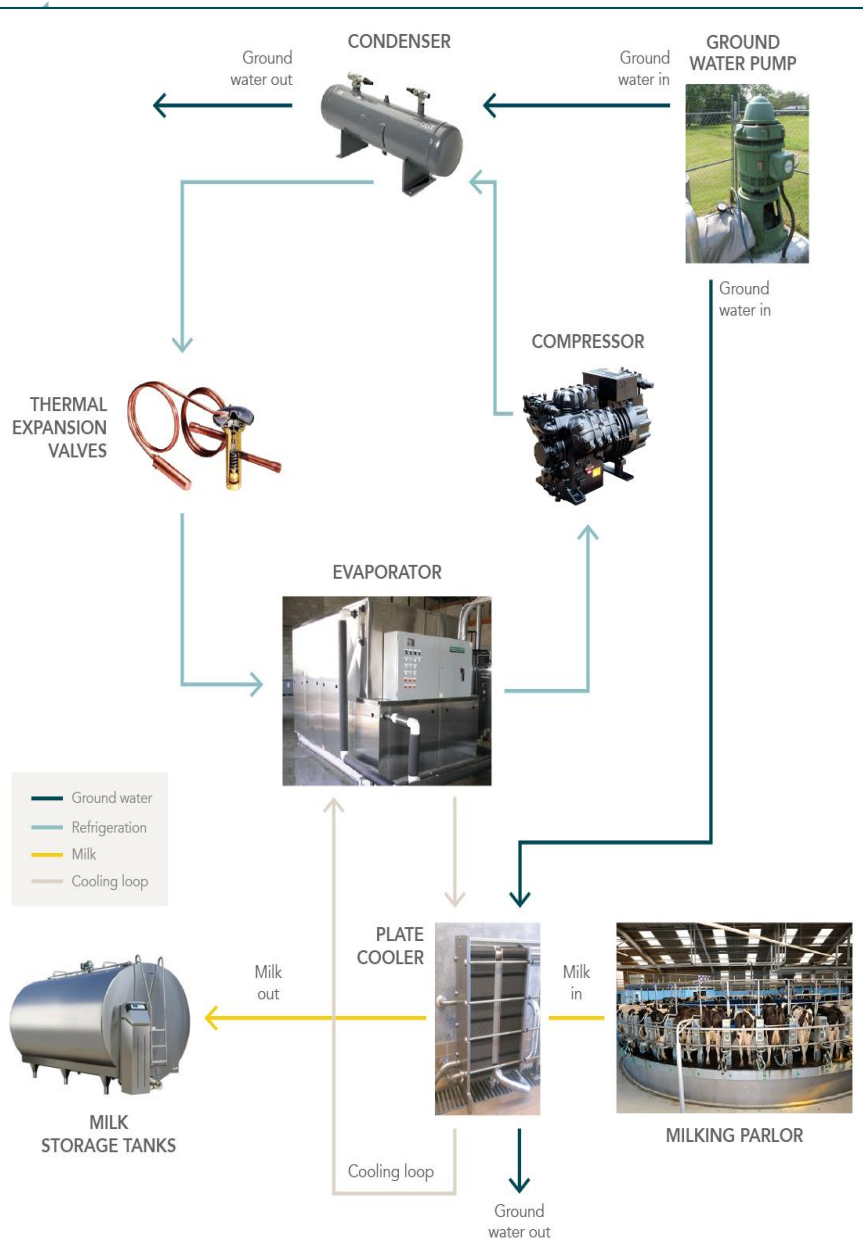
**CLEAResult**

# Energy-Water Nexus in the Dairy Industry

Krishna Somayajula, P.E.

Engineer, CLEAResult Consulting

# Traditional Milk Cooling System in Dairies



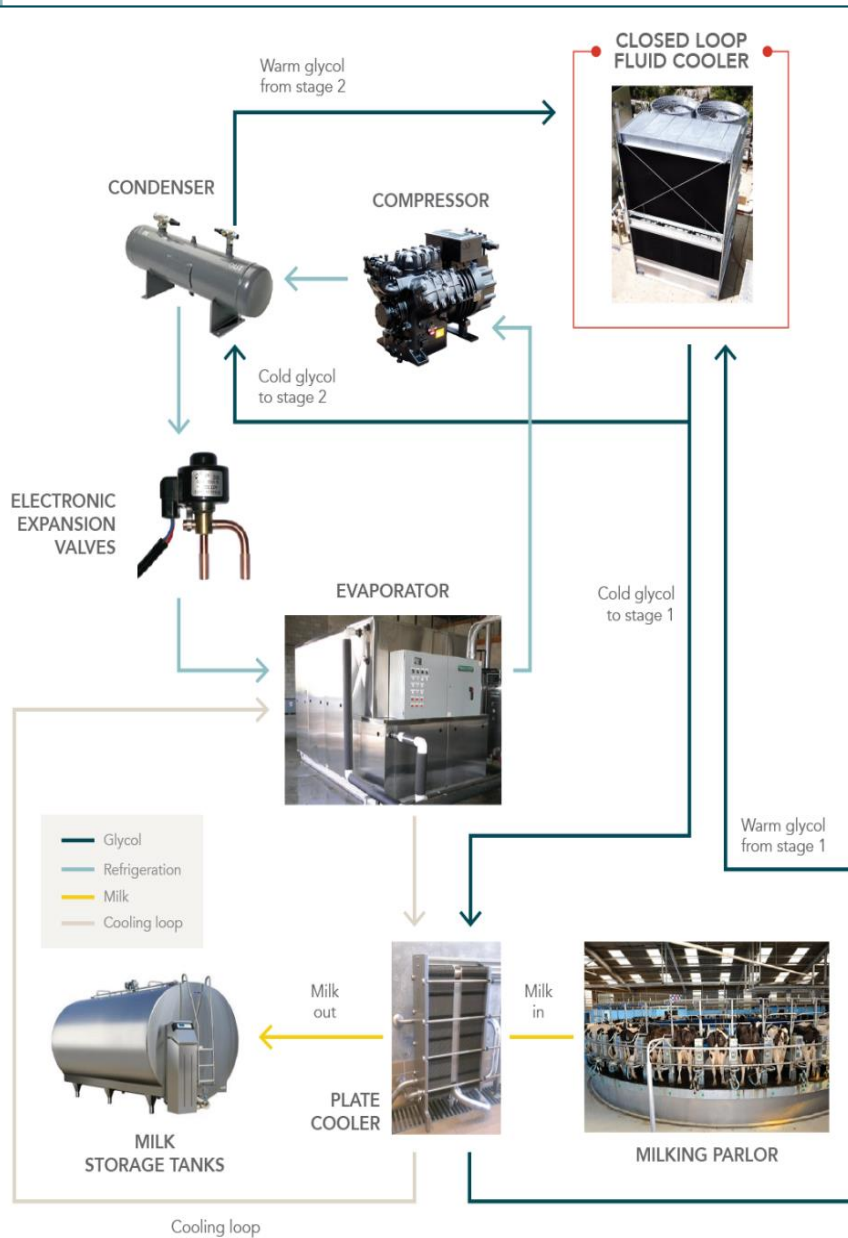
## Typical Operating Conditions:

- Milk required to be cooled to below ~40F within 2 – 4 hrs of extraction to be considered Grade A
- Ground water used to pre-cool milk from 95F to 75/80F
- 30-50 gpm water in pre-cooling stage
- Refrigeration system cools milk from 75/80F to 40F
  - Fixed 225 psig Head Pressure (110F Condensing temp)
  - Groundwater condensers on most dairy refrigeration systems (35-50 gpm water)

## Consequence of Typical Operating Conditions:

- Refrigeration System Efficiency:
  - ~2.0 kW/ton!!
  - ~ 70 millions gallons/yr of water (medium sized dairies) & 130 million gallons/yr (large dairies)
  - ~ approximately 50% of water not required at 4 the dairy and goes to waste!!

# Unitary Cooling System



## Complete solution!

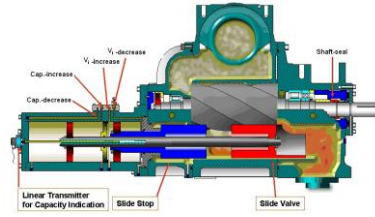
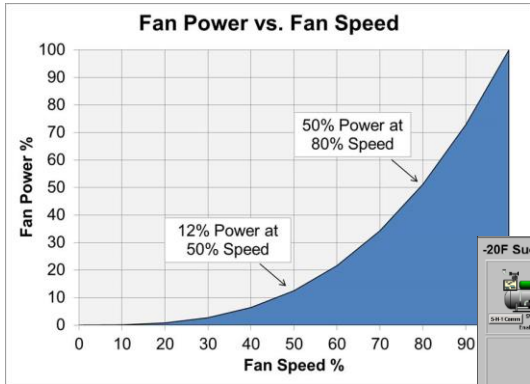
- Replaces ground **water pre cooling & ground water condensers** with closed loop cooling tower
- EEV installation ensures floating head pressure based on cooler tower water temperature
- **Dual benefit** of increased cooling from pre cooling stage & FHP!
- Eliminate 100% of ground water usage previously
- ~ 0.8 – 1.4 kW/ton Efficiency!
- ~ 50-60% reduction in water usage
- (3) Projects installed in 2015 that have yielded ~600,000 kWh in energy savings and ~ 150 million gallons in annual water savings!

Doug Scott  
President and Founder | VaCom

Doug Scott  
VaCom Technologies  
La Verne, California  
dscott@vacomtech.com  
(909) 392-6704



**VaCom**  
Technologies



### -20F Suction Group (SG1)

Compressor	Mode	Capacity (lb/hr)	Pressure (PSIG)
54H-1	Running	~1000	~100
54H-2	Running	~1000	~100
54H-3	Running	~1000	~100
54H-4	Running	~1000	~100

**Control Optimization**

**Heat Rejection Choices and New Technologies**



### Performance Analytics

Power (kW)	0.0
Energy (kWh)	0.0

Power (kW)	274.7
Energy (kWh)	13167.5

Power (kW)	561.7
Energy (kWh)	26961.0

**Performance Analytics**

**Refrigerants**  
 Phase Out: CFCs, HCFCs  
 Phase Down: HFCs  
 New Synthetic Blends?  
 EPA and CARB Low GWP Directions?  
 Natural Refrigerants?





## DISCUSSION / Q&A

### EMERGING SOLUTIONS: WHAT TECHNOLOGIES ARE AVAILABLE FOR THE AGRICULTURAL SPACE?

**Carolyn Weiner**, Manager, Industrial Ag and Water Program | Pacific Gas & Electric - *moderator*

**Yanbao Ma**, Professor of Mechanical Engineering | UC Merced

**Krishna Somayajula**, Engineer | CLEAResult

**Doug Scott**, President and Founder | VaCom

# SESSION WRAP-UP

PLEASE FILL OUT EVALUATIONS!



# UPCOMING ETCC EVENTS

Date	Event	Location & Host
September 8, 2016	Q3 Meeting: Residential	San Diego (SDG&E)
December 7, 2016	Q4 Meeting: Industrial	Sacramento (SMUD)
April 19-21, 2017	Emerging Technologies Summit	Los Angeles (SoCal Gas)

To sign up for the ETCC Insight newsletter, check the box on the sign-in / registration sheet or sign up online at: [www.etcc-ca.com/subscribe](http://www.etcc-ca.com/subscribe)

Check the ETCC website for updates: <http://www.etcc-ca.com/events>