

Agriculture / Pumping Subcommittee Meeting #4



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Agenda

Measure No	Measure Name	eTRM Year	
3.01	Agricultural Pump System Overhaul for Pumps	2017	Pumping
3.05	VFD on Agricultural Well Pumps (<=300hp)	2017	
3.07	Vertical Hollow and Solid Shaft Pump Motors	2018	
3.03	Farm Sprinkler to Micro Irrigation Conversion	2017	Irrigation
3.04	Low Pressure Sprinkler Nozzles	2017	
3.02	Agricultural Ventilation Fans	2017	Dairy
3.06	Milk Cooling Scroll Compressor	2018	
3.14	Greenhouse - Heat Curtain	2018	Greenhouse
3.15	Greenhouse - Infrared Film	2018	

- Goals / Objectives

- Review Materials:

- Ag Pumping, Sub Comm Mtg 4 – r2.ppt
 - Technology Summary - 3.0 Ag Pumping r3.1.xls

- Measure Status

- Planned for 2017
 - 3.05, Variable Frequency Drive on Agricultural Well Pumps
 - 3.02, Agricultural Ventilation Fans
 - Planned for 2018 or Hold

3.05 VFD on Ag Well Pumps

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- Phase 1 / Phase 2 Approach

- Phase 1 – PG&E approved workpaper

- ✦ Based upon 298 custom projects
 - ✦ Savings varies by
 - Well pumps ($\leq 300\text{hp}$; $\leq 600\text{hp}$), Booster pumps ($\leq 150\text{hp}$)
 - New measure codes (offering) require enhanced specification (up to 600hp)
 - Power quality and persistence improvements
 - Keep existing measure codes
 - ✦ Delivery varies by
 - REA / NC;
 - PreRebDown / DI
 - ✦ Apply the measure statewide

- Phase 2 – Improve savings accuracy

- ✦ Document longer pump EUL
 - Currently, REA measure \rightarrow EUL = 10 yrs; RUL = 3.3 yrs
 - Consider SCE 30-yr database of pump tests to document
 - ✦ Consider more sensitive parameters than pump type (Well / Booster)
 - Operating hours (Muni vs Ag)
 - ✦ Opportunity to pump to open vessel (*Suggested in Subcom Mtg #2*)

Blue Text = Change to existing workpaper that is occurring in parallel

3.05 VFD on Ag Well Pumps

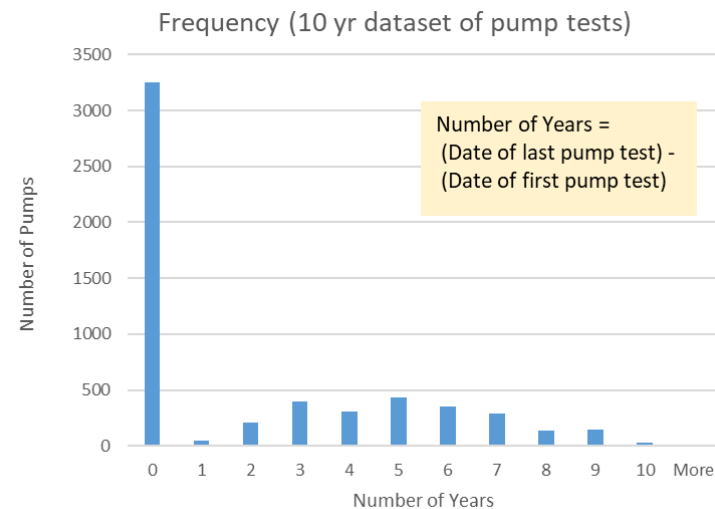
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- Preliminary results from dataset

- Note that this is a conservative result since the first pump test is not at the start of the pump life and the last pump test is not at the end of life

- Plan

- Use a 30-yr when it is available
- Perform analysis on Pump IDs included from 20-30 yrs ago only
 - ✦ This may reduce the conservative effect on the back-end of the calculation (reduce right censoring effect)
- Perform analysis on Pump IDs originating from 15-25 yrs ago since the typical time between pump test is 4.3 yrs (based upon another study)
 - ✦ Assume that if a pump ID is present in the 15-25 yr period but not in the 25-30 yr period, then this would also minimize the front-end effect



3.02 Agricultural Ventilation Fans

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- Only one workpaper
- Phase 1
 - Offerings based upon fan size
 - ✦ 24-26", 36", 48", ~~50-52"~~ (remove 50-52" option)
 - ✦ Enabled for Downstream – now only enabled for 3P
 - Savings documented per fan (one for one replacement)
 - Fans qualify based upon a Qualified Products List (BEES lab tested)
- Phase 2 – currently custom / not deemed
 - 50-52" option will be a custom measure
 - Add a 72" option - Larger fans are more efficient
 - Include a VFD option – Control based upon temperature
 - Include new construction/added load
 - ✦ Farms that do not have cow cooling yet
 - Consider other sensitive variables (Climate Zone, Setpoint)

Ag / Pumping Measures

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- Not Pursuing
 - 3.04 - Low Pressure Sprinkler Measure – Measure Issues
- On Hold
 - 3.07, Vertical Hollow Shaft Pump Motors – DOE Rulemaking
 - 3.06, Milk Cooling Scroll Compressor – Minor measure
- Future Measure
 - 3.16, New Water Pump Upgrade – New DOE standard
 - 3.03, Micro/Drip-Conversion Measure
 - ✦ Needs more constraints / ISP for Vineyards and Tree Crops (still available for veg)
 - ✦ CalDWR to update study
 - ✦ Even if go to ISP; potentially make it a “to-code; to ISP measure” vs sunset
- Update Measure to be Responsive to Disposition
 - 3.01, Agricultural Pump System Overhaul - Dataset review
 - 3.14, Greenhouse - Heat Curtain – Based upon DEER savings
 - 3.15, Greenhouse - Infrared Film – Based upon DEER savings

3.01 Agricultural Pump System Overhaul

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- Status

- PG&E – Claiming kWh savings only
- SCE – Deemed program on hold; custom program for all pumps (min threshold for custom)
- SDG&E – Custom program only

- Next

- PG&E / ITRC – Peak Demand study (Q4 2017)
- PG&E / ITRC – Hours of Operation (Q2 2018)
- Update savings for disposition
 - ✦ Reviewing SCE data set to document energy savings
 - About 10 year history with customer data removed
 - We will attempt to include PG&E / SDG&E pump test results (different format)

3.01 Agricultural Pump System Overhaul

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Expectations

Existing data set (SCE)

✦ Savings = kW * OPE-Imp & HOU

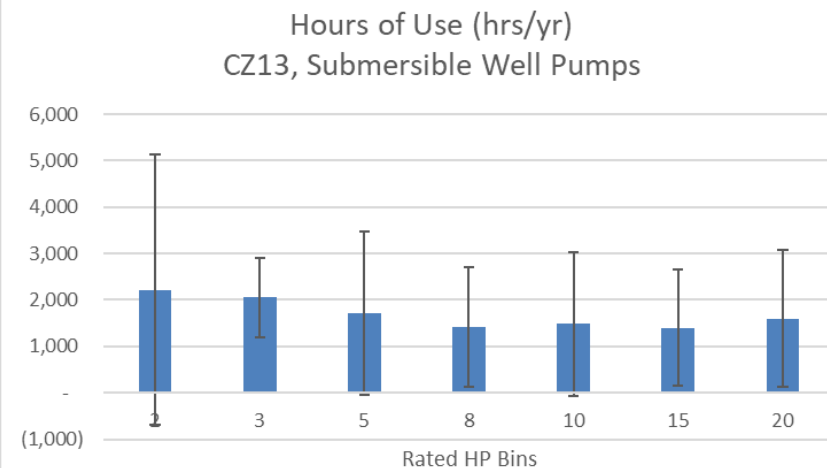
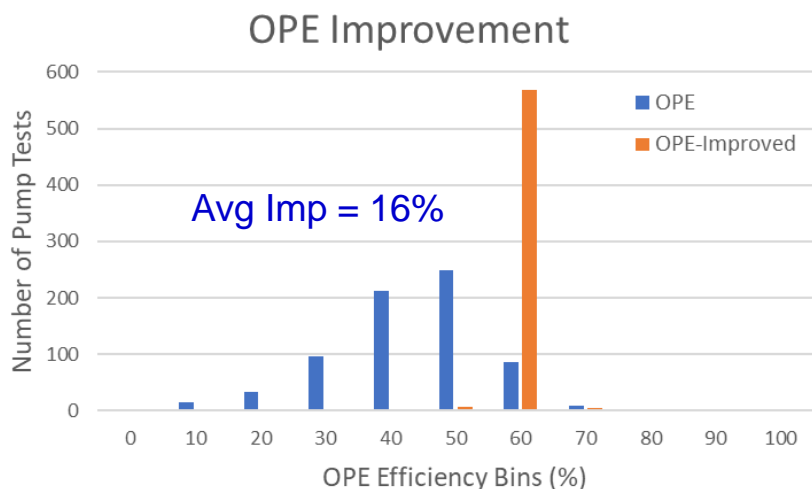
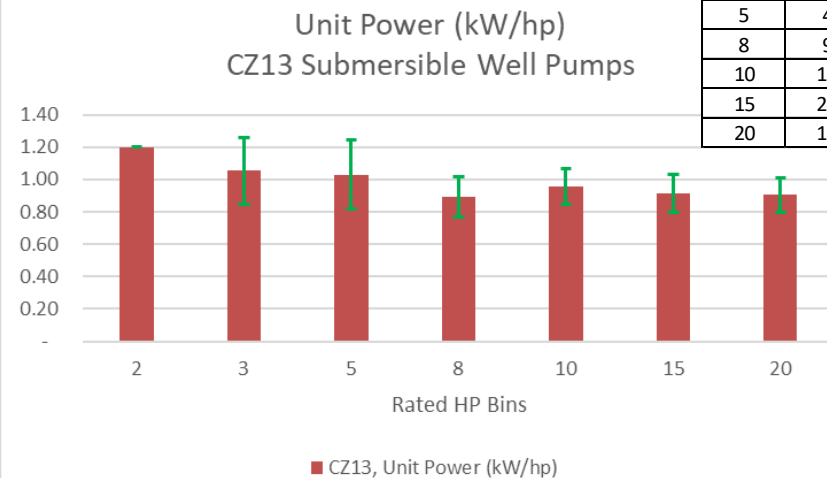
Examine

✦ Submersible Well pump

✦ CZ13

✦ Population of 1,495 tests

HP	Number
2	2
3	5
5	44
8	90
10	193
15	242
20	153



3.01 Agricultural Pump System Overhaul

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- Working with SCE to understand if their dataset can:
 - Meet the Disposition request for (taken from II-B):
 - A. Pumps with rated-hp that are covered by the workpaper
 - B. Pumps with both pre- and post- test data
 - C. Exclude Base and Post OPE within >10% of total pump head
 - A. Higher post flow rates should not eliminate data
 - SCE - 10-year Pump Test dataset
 - ✦ Less than 25 hp: (9,944 pump test records; 5,575 pump IDs)
 - ✦ Pre- and Post-Data: (4,368 records; 2,323 pump IDs)
 - Qualifying record: Not one test only; Not first test of many
 - ✦ Total Pump Head within >10% (2,347 records)

3.01 Agricultural Pump System Overhaul

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- Preliminary results from dataset:
 - OPE difference between successive tests yielded a smaller number of tests than expected with savings.
 - Why? Hypothesis include:
 - ✦ Fewer post tests are not being completed for smaller pumps
 - ✦ Only reviewing delta between successive test, not across multiple
 - Also considering:
 - ✦ Linking incentives paid -> minimal data in this set
 - 533 records = Pump Overhaul (PM-90890)
 - 434 records = also not the first pump test
 - 237 records = also with 10% total head
 - ✦ Linking post-test field -> minimal data in this set (25 records)

Greenhouse Measures

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- Update Measure information

- ❑ Be responsive to disposition concerns; follow-up on ISP concerns.
- ❑ Modify PG&E workpaper to mimic the DEER measures in blue.

IR Film						
Measure ID	Measure	Pre-existing	App Type	CZ 9 Savings (kWh)	CZ 9 Savings (therm)	Unit
Grnhs-Shell-LowIRRoof	Infrared film applied to roof	bare double-poly greenhouse roof	RobNC	0.024	0.15	Per Area ft2
Grnhs-Shell-LowIR-SingleLayer	Infrared film applied to single-layer wall or roof material	single-layer wall or roof material	RobNC	No Savings	No Savings	
Grnhs-Shell-LowIR_ThermCurt	Heat curtain and IR film installed	bare walls and bare double-poly roof	RobNC	0.122	0.41	Per area -ft2-BA
Grnhs-Shell-Tcurt_to_LIR_Tcurt	Infrared film applied to roof	bare double-poly roofs, heat curtain	RobNC	0.009	0.127	Per Area ft2
Heat Curtain						
Measure ID	Measure	Pre-existing	App Type	CZ 9 Savings (kWh)	CZ 9 Savings (therm)	Unit
Grnhs-Shell-LIR_to_LIR_Tcurt	Heat curtain installed	roof has with IR film and bare walls	RobNC	0.094	0.23	Per area -ft2-BA
Grnhs-Shell-ThermCurt	Heat curtain installed	bare walls and bare double-poly roof	RobNC	0.112	0.258	Per area -ft2-BA

- ✦ IR Film workpaper appears very similar
- ✦ Heat Curtain workpaper uses a different baseline

Greenhouse Measures

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- Update Measure information
 - What needs to be done to be responsive to the disposition?
 - ✦ ISP and Regressive Baselines
 - ✦ Examples:
 - Program exclusions/restrictions/guidelines
 - Distinction from cannabis greenhouses
 - MASI Study (Navigant 2015)
 - Other Greenhouse Studies

Measure Overview – From April

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No.	Measure Names	Plan	PG&E	SCE	SDG&E	SCG	POU
3.01	Agricultural Pump System Overhaul	2017					
3.02	Agricultural Ventilation Fans	2017					
3.03	Farm Sprinkler to Micro Irrigation Conversion	2017					
3.04	Low Pressure Sprinkler Nozzles	2017					
3.05	Variable Frequency Drive on Agricultural Well Pumps	2017					
3.06	Milk Cooling Scroll Compressor	2018					
3.07	Vertical Hollow and Solid Shaft Pump Motors	2018					
3.08	CHR Unit - Electric and Gas	n/a					
3.09	Milk Vacuum Pump VSD	n/a					
3.10	Milk Transfer Pump VSD	n/a					
3.11	Chilled Glycol Pipe Insulation	n/a					
3.12	Glycol tank Insulation	n/a					
3.13	Milk Pre Cooler	n/a					

Measure Overview - Now

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No.	Measure Names	Plan	PG&E	SCE	SDG&E	SCG	POU
3.01	Agricultural Pump System Overhaul	Disposition					
3.02	Agricultural Ventilation Fans	2017					
3.03	Farm Sprinkler to Micro Irrigation Conversion	Hold / Measure Revision					
3.04	Low Pressure Sprinkler Nozzles	Disposition / Standard					
3.05	Variable Frequency Drive on Agricultural Well Pumps	2017					
3.06	Milk Cooling Scroll Compressor	2018					
3.07	Vertical Hollow and Solid Shaft Pump Motors	Federal Code					
3.08	CHR Unit - Electric and Gas	n/a					
3.09	Milk Vacuum Pump VSD	n/a					
3.10	Milk Transfer Pump VSD	n/a					
3.11	Chilled Glycol Pipe Insulation	n/a					
3.12	Glycol tank Insulation	n/a					
3.13	Milk Pre Cooler	n/a					
3.14	Greenhouse - Heat Curtain	2018					
3.15	Greenhouse - Infrared Film	2018					
3.16	New Water Pump Upgrade	In Reivew					