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**COAR Design Group**
200 E Street
Santa Rosa, CA 95404

Attn: Jeff Katz

Re: Napa County Farmworker Housing Center Studies
Power Back-Up System Report

Dear Jeff,

As requested by the County of Napa, O'Mahony & Myer visited three Napa County Farmworker Housing Center sites in March and June of 2025, to review the existing power systems. The purpose of our visits were to study the requirements for various power back-up scenarios, in the event of PG&E grid outages.

The three sites studied include:

1. Calistoga Farm Labor Camp (3996 St. Helena Hwy. North, Calistoga)
2. River Ranch Farmworker Housing (1109 Silverado Trail, St. Helena)
3. Mondavi Center Farm Labor Camp (5589 Silverado Trail, Napa)

Each of the three facilities currently use a small portable 7kW generator to back-up power to the water treatment systems at each site, to maintain a clean water supply during utility power failures. This system requires manual operation and has limited back-up time, due to the small portable generator gas tank sizes. The systems at each of the three sites could be better served with an automatic and more robust solution to provide power back-up.

Additionally, the County is interested in understanding what would be involved in expanding the back-up power at each site to include options for kitchen back-up and full facility back-up, with either a generator solution or Photovoltaic (PV) and a Battery Energy Storage System (BESS).

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We have studied the existing conditions at each site and have evaluated each for what it would take to provide an automatic generator, solar PV, and BESS back-up options for the following conditions:

1. Water treatment system power back-up only.
2. Water treatment and kitchen power back-up.
3. Entire facility power back-up.

Note that when solar PV is used as power back-up, it must be paired with a suitable Battery Energy Storage System (BESS). Solar alone cannot provide power back-up when the utility grid power fails, as code requires solar alone to be shut-off when the grid is off, to prevent back-feeding the local utility system.

When used with a battery, the solar power can be stored in the batteries, as well as feed loads during daylight hours when the sun is out. When utility power fails, the PV / BESS system is automatically isolated from the utility grid and can then operate the loads on its own, until utility grid power is restored. Battery systems do have limited run-time, depending on load, so having a good PV system to recharge the batteries is important. A small generator can also be paired with the PV / BESS system to provide additional battery charging, in the event of low sunlight, but that scenarios is not explored here, as it can take on various forms of design and operation, which is beyond the preliminary scope of this study.

Following is a breakdown of the three sites and what it would take to upgrade the electrical infrastructure at each site to achieve the goals described below.

*Refer to the numbered schematic power single line diagram figures at the end of the report, as referenced below for each option.*

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## CALISTOGA FACILITY

The Calistoga site is currently fed with a single free-standing electrical main panel, with (4) utility meter services. The service meters include:

1. Residential Lower (Panel A – PG&E Meter #1006745725)
   100 Amps, 120/240V, 1-Phase, 3-Wire

2. Residential Upper (Panel B – PG&E Meter #1006745722)
   100 Amps, 120/240V, 1-Phase, 3-Wire

3. Reminder of Site (Panel C – PG&E Meter #1008848681)
   400 Amps, 120/240V, 1-Phase, 3-Wire

4. Fire Pump (PG&E Meter #1006726037)
   225 Amps, 120/240V, <u>3-Phase, 4-Wire, Delta</u> *

* The Delta service voltage configuration for the Fire Pump branch requires some special consideration with regards to the back-up power system components. A Delta service is inherently un-balanced, but can be fed with a generator with appropriate ratings without any issues. Using a battery system on a Delta connected service requires the battery system to only support the 1-Phase 120/240V portion of the system. The battery system cannot support an un-balanced 3-Phase Delta system without possibly compromising the longevity of the batteries and the inverter. This means there are some limits to the PV/BESS solution, as discussed below, since the battery can only back-up 1-phase loads:

**<u>Option 1 (Water Treatment Back-Up Only)</u>:**

The water treatment system is fed from the Panel 'C' service branch, via a 1-Phase, 120/240V branch Panel 'A1' at the newest Dorm building. Panel 'A1' then feeds the (2) water filter pumps (240V), the well pump (240V), and the filter power receptacles (120V).

There is currently a portable 7kW, 120/240V, 1-Phase generator that is wired through a 30 Amp manual transfer switch to provide partial back-up power to a 30 Amp circuit for the water system. It is not clear which water system load is on the 30 Amp back-up, but it does not appear that all water system loads are on back-up, since Panel 'A1' includes a 50A breaker for the well pump, (2) 30A breakers for the water filter pumps, and (1) 20A breaker for 120V receptacles.

<u>Permanent Generator Option</u> *(See Figure 1)*:

In order to provide full Panel 'A1' automatic generator power back-up to serve the water system loads, the Panel 'A1' feeder should be intercepted and provided with an automatic transfer switch, as shown in Figure 1.

PV / BESS Option *(See Figure 2)*:

In order to provide full Panel 'A1' automatic PV/BESS power back-up, Panel 'A1' can be provided with a small PV/BESS system, as shown in Figure 2.

The battery system will act as the required automatic isolation device and will automatically feed the load as needed, when normal utility power fails.

A small generator is optional in this configuration and could be tied-in with a manual transfer switch at the location shown on the diagram, similar to the existing back-up situation with the 7kW portable generator. The generator would charge the battery when grid utility power is out and PV is not operational.

**Option 2 (Water Treatment and Kitchen Load Back-Up):**

Both the Water Treatment loads (Panel 'A1') and the Kitchen loads (Dining Hall Panel) are on the Panel 'C' service branch. The kitchen panel feeds various laundry, bathroom, garden, and sewage alarm loads, in addition to kitchen loads. However, some of these loads, such as Laundry, can be manually left off during an outage to keep the total load and generator size down. It would not make feasible sense to try and separate only specific kitchen loads from these panels and redirect them to the generator.

Permanent Generator Option *(See Figure 3)*:

In order to provide back-up to both branches with an automatic generator, the Panel 'A1' and Panel 'D' feeders should be redirected to a new Panel 'E' for back-up power, and connected with a new automatic transfer switch as shown in Figure 3.

PV / BESS Option (See Figure 4):

In order to provide Panel 'A1' and Dining Hall Panel 'D' automatic PV/BESS system power back-up, the panels can be provided with a PV/BESS system similar to the water only load back-up, as shown on Figure 4.

This configuration is not recommended, since it is power limited to 200A, due to the 120/240V, 1-Phase nature of the system. A required 400A, 1-Phase BESS system is not readily available at 1-phase configuration, so the 200A, 15kW size will limit the power back-up for both the water loads and the kitchen..

If used at this smaller size, the battery system will act as the required automatic isolation device and will automatically feed the load as needed, when normal utility power fails.

A small generator is optional in this configuration and could be tied-in with a manual transfer switch at the location shown on the diagram, similar to the existing back-up situation with the 7kW portable generator. The generator would charge the battery when grid utility power is out and PV is not operational.

**Option 3 (Full Facility Load Back-Up):**

Full facility power back-up is very similar to the above option 2, in terms of equipment, but would include larger equipment and a larger interconnection, to serve the total facility load.

Permanent Generator Option (*See Figure 5*):

The Calistoga site is complicated by the fact that there are (4) separate meters, (3) of which are 1-Phase and (1) is 3-Phase (the fire pump).

Complete facility back-up would require (4) separate transfer switches, with (2) central generators. The 1-Phase generator would have (3) output breakers and the 3-Phase generator would have (1) output breaker.

If a portion of the loads, such as the Upper and Lower Residence panels were not required, this solution could be scaled down accordingly, with less transfer switches and less generator output circuit breakers.

See Figure 5 for the Panel 'C' main facility branch, which would probably be the most important branch to start with. The other (3) branches would include similar connections, but of varying sizes.

PV / BESS Option:

In order to provide full facility PV/BESS back-up on any of the 1-Phase metered service branches, separate PV/BESS back-up systems can be provided, similar to the water only load back-up, as shown on Figure 5, but with a 15kW PV/BESS instead.

This is not recommended for the Panel 'C' branch, since the PV/BESS is power limited to 200A / 15kW, due to the 120/240V, 1-Phase nature of the system. A required 400A, 1-Phase BESS system for the Panel 'C' branch is not readily available at 1-phase configuration. The 200A / 15kW size will limit the power back-up to the branch being served.

A 15kW PV/BESS system could be provided for the Panel 'A' and Panel 'B' branches separately, similar to Figure 5, but with a PV/BESS instead.

The PV/BESS option cannot be designed into the 3-Phase Delta style service for the fire pump (not a commercially available configuration).

No diagrams are therefore provided for the full back-up option.

## MONDAVI FACILITY

The Mondavi site is currently fed with a single free-standing, indoor rated electrical main panel with (1) dedicated utility meter service (PG&E Meter #1008820483, 600 Amps, 120/208V, 3-Phase, 4-Wire).

There is also a caretaker residence on this site that has its own residential style electric meter and panel. The residential service is 200 Amps, 120/240V, 1-Phase, 3-Wire.

The residential service is not detailed in this study, but could be provided with a separate generator and/or PV/BESS system as needed, similar to the solutions for the remainder of the site.

For the remainder of the site, the following options are possible:

**Option 1 (Water Treatment Back-Up Only):**

The water treatment system is fed from the main service panel, via a 1-Phase, 120/240V branch Panel 'P' for the "Pump House". Panel 'P' feeds the well pump (240V), the booster pump (240V), the fire pump and jockey pump, as well as some misc. lights and power receptacles (120V).

There is currently a portable 7kW, 120/240V, 1-Phase generator that is wired through a 30 Amp manual transfer switch to provide partial back-up power to a 30 Amp circuit for the water system. It is not clear which water system load is on the 30 Amp back-up, but it does not appear that all water system loads are on back-up, since Panel 'P' includes a 50A breaker, (2) 30A breakers, and numerous 20A breakers for 120V loads.

Permanent Generator Option *(See Figure 6)*:

In order to provide full Panel 'P' automatic generator power back-up to serve the water system loads, the Panel 'P' feeder should be intercepted and provided with an automatic transfer switch, as shown in Figure 6.

PV / BESS Option *(See Figure 7)*:

In order to provide full Panel 'P' automatic PV/BESS power back-up, Panel 'P' can be provided with a small PV/BESS system, as shown in Figure 7.

The battery system will act as the required automatic isolation device and will automatically feed the load as needed, when normal utility power fails.

A small generator is optional in this configuration and could be tied-in with a manual transfer switch at the location shown on the diagram, similar to the existing back-up situation with the 7kW portable generator. The generator would charge the battery when grid utility power is out and PV is not operational.

**Option 2 (Water Treatment and Kitchen Load Back-Up):**

Both the Water Treatment loads (Panel P) and the Kitchen loads (Panel C) are fed from the main service. The kitchen panel feeds various loads in and around the kitchen. Some of these loads, such as Laundry, can be manually left off during an outage to keep the total load and generator size down. It would not make feasible sense to try and separate only specific kitchen loads from these panels and redirect them to the generator.

Permanent Generator Option *(See Figure 8)*:

In order to provide back-up to both branches with an automatic generator, the Panel ‘P’ and Panel ‘C’ feeders should be redirected to a new Panel ‘E’ for back-up power, and connected with a new automatic transfer switch as shown in Figure 8.

PV / BESS Option (*See Figure 9*):

In order to provide Panel ‘P’ and Panel ‘C’ automatic PV/BESS system power back-up, the panels can be provided with a moderately sized PV/BESS system, as shown on Figure 9.

The battery system will act as the required automatic isolation device and will automatically feed the load as needed, when normal utility power fails.

A small generator is optional in this configuration and could be tied-in with a manual transfer switch at the location shown on the diagram, similar to the existing back-up situation with the 7kW portable generator. The generator would charge the battery when grid utility power is out and PV is not operational.

**Option 3 (Full Facility Load Back-Up):**

Full facility power back-up is very similar to the above option 2, in terms of equipment, but would include larger equipment and a larger interconnection, to serve the total facility load.

Permanent Generator Option (*See Figure 10*):

The Mondavi site can be fully backed-up with a single power generator by intercepting the output of the main circuit breaker and redirecting it to a new automatic transfer switch and generator. The transfer switch output would then be landed back on the main service distribution bus. This will require a field modification to the main switchboard, the exact details of which would need to be determined by opening the electrical gear for internal inspection, if this option is chosen. See Figure 10.

<u>PV / BESS Option</u> (*See Figure 11*):

Due to the 600A size of the electric service, a relatively larger PV and BESS system would be required, than for just the kitchen and water system. The size of BESS requires the use of a system that does not support a 600A back-up panel 'E' output, similar to the earlier options.

The 600A back-up system is required to be landed on the main service bussing, along with the larger PV system, and an optional generator, as shown in Figure 11.

The solution would require the entire main service panel to be replaced in place, since to meet code, the bussing would need to be upgraded to a much higher amperage (to have both loads and supply sources on the same bus). The new service gear main breaker would also have to be provided as a motor operated breaker.

The motorized main breaker will act as the required automatic isolation device and will allow the BESS to automatically feed the load as needed, when normal utility power fails. The PV system would also feed loads and charge the battery. The generator is technically optional in this configuration, but recommended, since if the weather is poor for extended periods of time, the battery system may become depleted.

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## RIVER RANCH FACILITY

The River Ranch site is currently fed with a single free-standing, outdoor rated electrical main panel with (1) dedicated utility meter service (PG&E Meter #1010084772, 600 Amps, 120/208V, 3-Phase, 4-Wire).

The following options are possible at River Ranch:

**<u>Option 1 (Water Treatment Back-Up Only)</u>:**

The water treatment system is fed from the main service panel, via a 1-Phase, 120/240V branch Panel 'P' for the "Pump House". Panel 'P' feeds the well pump (240V), the domestic pump (240V), the jockey pump, as well as some misc. lights and power receptacles (120V).

There is currently a portable 7kW, 120/240V, 1-Phase generator that is wired through a 30 Amp manual transfer switch to provide partial back-up power to a 30 Amp circuit for the water system. It is not clear which water system load is on the 30 Amp back-up, but it does not appear that all water system loads are on back-up, since Panel 'P' includes a 30A/2P breaker, (2) 20A/3P breakers, and numerous 20A/1P breakers for 120V loads.

<u>Permanent Generator Option</u> *(See Figure 12)*:

In order to provide full Panel 'P' automatic generator power back-up to serve the water system loads, the Panel 'P' feeder should be intercepted and provided with an automatic transfer switch, as shown in Figure 12.

<u>PV / BESS Option</u> *(See Figure 13)*:

In order to provide full Panel 'P' automatic PV/BESS power back-up, Panel 'P' can be provided with a small PV/BESS system, as shown in Figure 13.

The battery system will act as the required automatic isolation device and will automatically feed the load as needed, when normal utility power fails.

A small generator is optional in this configuration and could be tied-in with a manual transfer switch at the location shown on the diagram, similar to the existing back-up situation with the 7kW portable generator. The generator would charge the battery when grid utility power is out and PV is not operational.

**<u>Option 2 (Water Treatment and Kitchen Load Back-Up)</u>:**

Both the Water Treatment loads (Panel P) and the Kitchen loads (Panel K) are fed from the main service.

Permanent Generator Option *(See Figure 14)*:

In order to provide back-up to both branches with an automatic generator, the Panel 'P' and Panel 'K' feeders should be redirected to a new Panel 'E' for back-up power, and connected with a new automatic transfer switch as shown in Figure 14.

PV / BESS Option (*See Figure 15*):

In order to provide Panel 'P' and Panel 'K' automatic PV/BESS system power back-up, the panels can be provided with a moderately sized PV/BESS system, as shown on Figure 15.

The battery system will act as the required automatic isolation device and will automatically feed the load as needed, when normal utility power fails.

A small generator is optional in this configuration and could be tied-in with a manual transfer switch at the location shown on the diagram, similar to the existing back-up situation with the 7kW portable generator. The generator would charge the battery when grid utility power is out and PV is not operational.

**Option 3 (Full Facility Load Back-Up):**

Full facility power back-up is very similar to the above option 2, in terms of equipment, but would include larger equipment and a larger interconnection, to serve the total facility load.

Permanent Generator Option (*See Figure 16*):

The River Ranch site, similar to Mondavi, can be fully backed-up with a single power generator by intercepting the output of the main circuit breaker and redirecting it to a new automatic transfer switch and generator. The transfer switch output would then be landed back on the main service distribution bus. This will require a field modification to the main switchboard, the exact details of which would need to be determined by opening the electrical gear for internal inspection, if this option is chosen. See Figure 16.

PV / BESS Option (*See Figure 17*):

Due to the 600A size of the electric service, a relatively larger PV and BESS system would be required, than for just the kitchen and water system. The size of BESS requires the use of a system that does not support a 600A back-up panel 'E' output, similar to the earlier options.

The 600A back-up system is required to be landed on the main service bussing, along with the larger PV system, and an optional generator, as shown in Figure 17.

The solution would require the entire main service panel to be replaced in place, since to meet code, the bussing would need to be upgraded to a much higher amperage (to have both loads and supply sources on the same bus). The new service gear main breaker would also have to be provided as a motor operated breaker.

The motorized main breaker will act as the required automatic isolation device and will allow the BESS to automatically feed the load as needed, when normal utility power fails. The PV system would also feed loads and charge the battery. The generator is technically optional in this configuration, but recommended, since if the weather is poor for extended periods of time, the battery system may become depleted.

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**General Conclusion and Overall Recommendation:**

Electric Generator Systems:

The addition of permanent electric generators with automatic transfer switches to the sites, in either the small or larger sizes, is the most cost-effective solution, with known maintenance cycles and parts / labor availability. For this reason, and based on the different conditions at the various sites, we recommend this solution, in any of the options outlined above.

BESS Systems:

Site area does appear to exist for the addition of a BESS at each site. However, based on the current cost and complexity of battery energy storage systems, as well as life cycle costs of the batteries that do need to be replaced every 10 years or so, the addition BESS systems may not be cost effective.

If chosen the best BESS solution would be for full facility back-up, using a commercially available 3-phase system to back-up the Mondavi and River sites. The Calistoga site has various issues that make adding a BESS not as desirable.

Solar PV Systems:

After review of each site, due to leach field locations and property lines, the addition of ground mounted solar PV may not be a viable option at any of the sites. Roof mounted PV may also not be feasible, due to the age and structural integrity of the various roofs. This would mean that solar PV modules might best be put on parking lot canopy structures. This may or may not be feasible, depending on site orientation, and the steel structures are normally more expensive than ground or roof mounted systems. Solar would only be warranted if the BESS option was chosen, so the PV and BESS decisions should go hand in hand.

If you have any questions or comments, please do not hesitate to call.

Sincerely,

Pieter Colenbrander, P.E.
**O'MAHONY & MYER**

*See Following Sheets for Schematic Power Single Line Diagrams of Each Option.*