



STONE EDGE FARM MICROGRID PROJECT

SONOMA • CALIFORNIA

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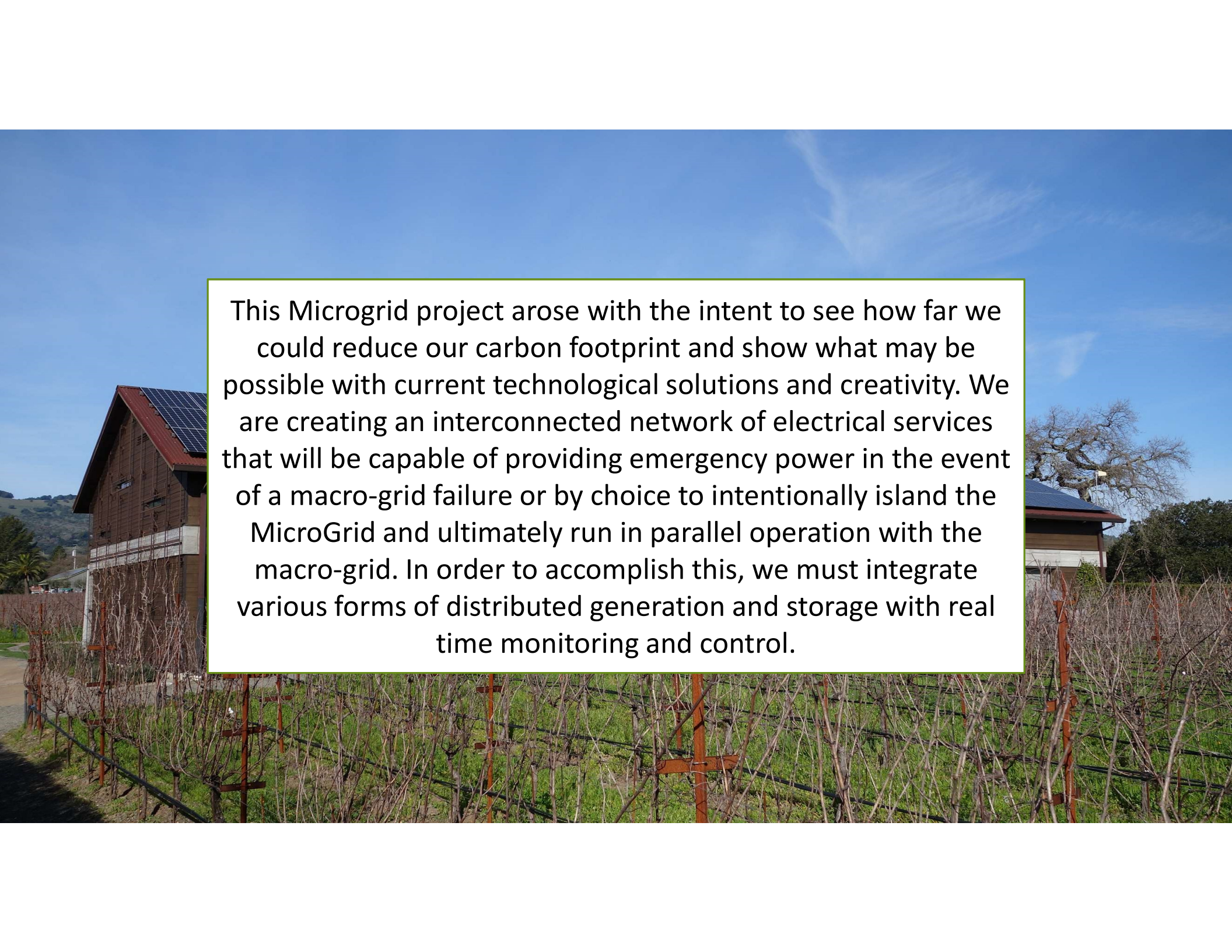
We demonstrate what is possible



Stone Edge Farm Proprietors:



- ▶ **Mac & Leslie McQuown**
- ▶ After earning a mechanical engineering degree at Northwestern University, a Harvard M.B.A., and serving as an officer in the navy, Mac embarked on a career in banking and finance in New York. He joined Wells Fargo in San Francisco in 1964, where he and colleagues created the first stock index fund. He subsequently founded and built several entrepreneurial businesses.
- ▶ Mac began collecting wine in 1965. With his friend Dick Graff, the legendary winemaker, he co-founded the Chalone Wine Group in 1970, serving on its board for twenty-five years. In 1980 he co-founded Carmenet Winery and began an enduring friendship with Jeff Baker, now Stone Edge Farm's winemaker.
- ▶ Mac credits his wife, Leslie, with providing Stone Edge Farm's overarching aesthetic vision. Her eye for design informs the property's architecture and landscaping, with its outdoor rooms, inviting courtyards, and art pieces.

A photograph of a vineyard with a wooden building in the background under a blue sky. The vineyard is in the foreground, with rows of grapevines supported by wooden stakes. The building is a large, dark wooden structure with a red roof and solar panels. The sky is clear and blue.

This Microgrid project arose with the intent to see how far we could reduce our carbon footprint and show what may be possible with current technological solutions and creativity. We are creating an interconnected network of electrical services that will be capable of providing emergency power in the event of a macro-grid failure or by choice to intentionally island the MicroGrid and ultimately run in parallel operation with the macro-grid. In order to accomplish this, we must integrate various forms of distributed generation and storage with real time monitoring and control.

Why Build a Microgrid?

- ▶ A Microgrid provides a unique opportunity to establish energy independence and to reduce pollutants emitted when using non-renewable energy sources. Additionally, in the event of any type of main grid failure, personal safety, information security, and electrical accessibility may be compromised. A Microgrid prevents the above instances from occurring and give communities the ability to generate, store, and distribute their own sustainably sourced electricity for any use. Although this Microgrid is specific to Stone Edge Farm, the project is meant to be a demonstration open source platform, setting an example for any size facility, community, or city in a clean energy revolution.

Project Overview:

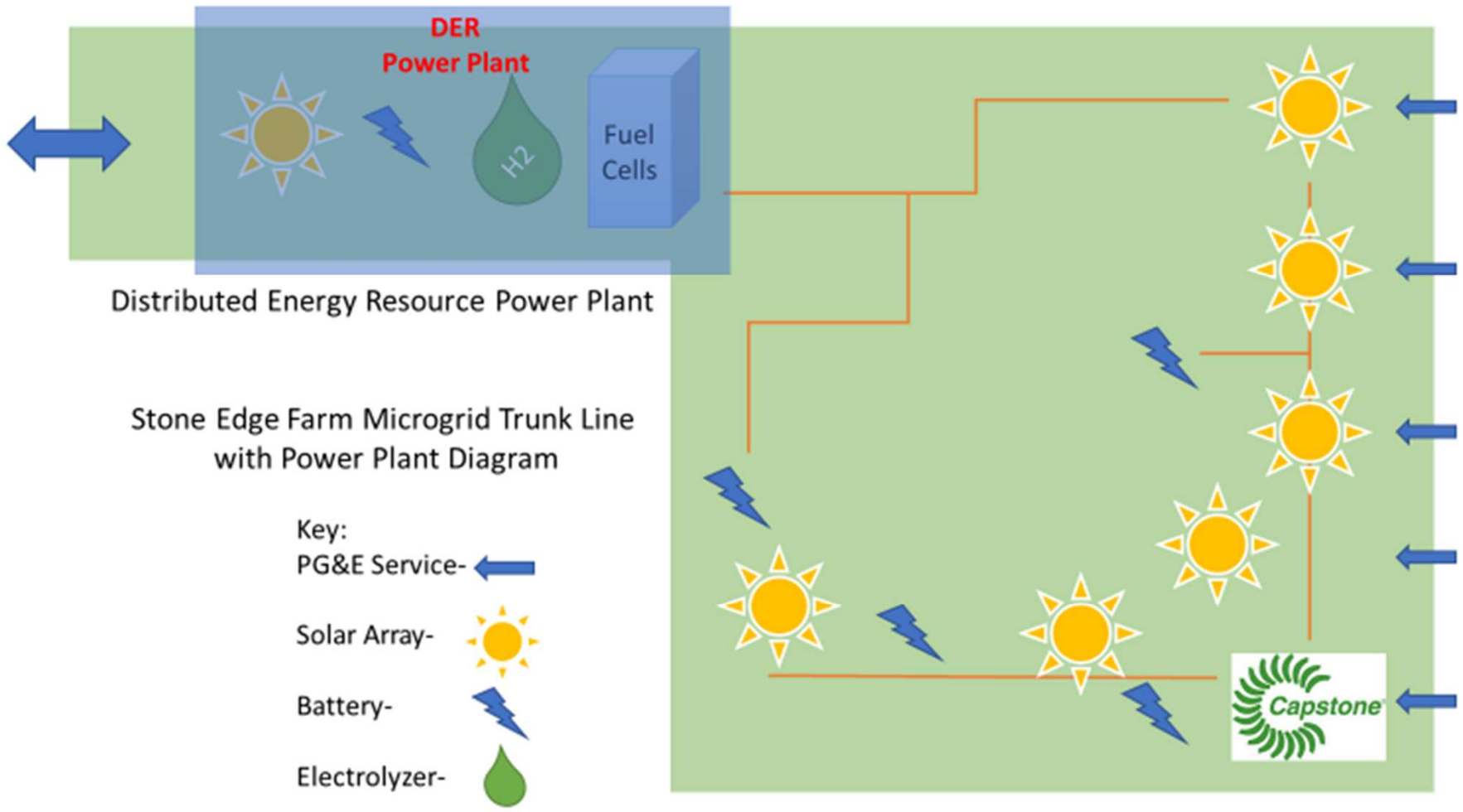
The Stone Edge Farm sits on a campus of 16 acres including 16 buildings and 7 PG&E electrical service meter entries. There are three 480 volt, 3 phase and four 240 volts, split phase services. There are 58 electrical service panels in the system. We have now internally connected the 7 metered services together within the walls as an island able electrical grid.



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DER

Power Plant

Fuel Cells

H₂

Distributed Energy Resource Power Plant

Stone Edge Farm Microgrid Trunk Line with Power Plant Diagram

Key:

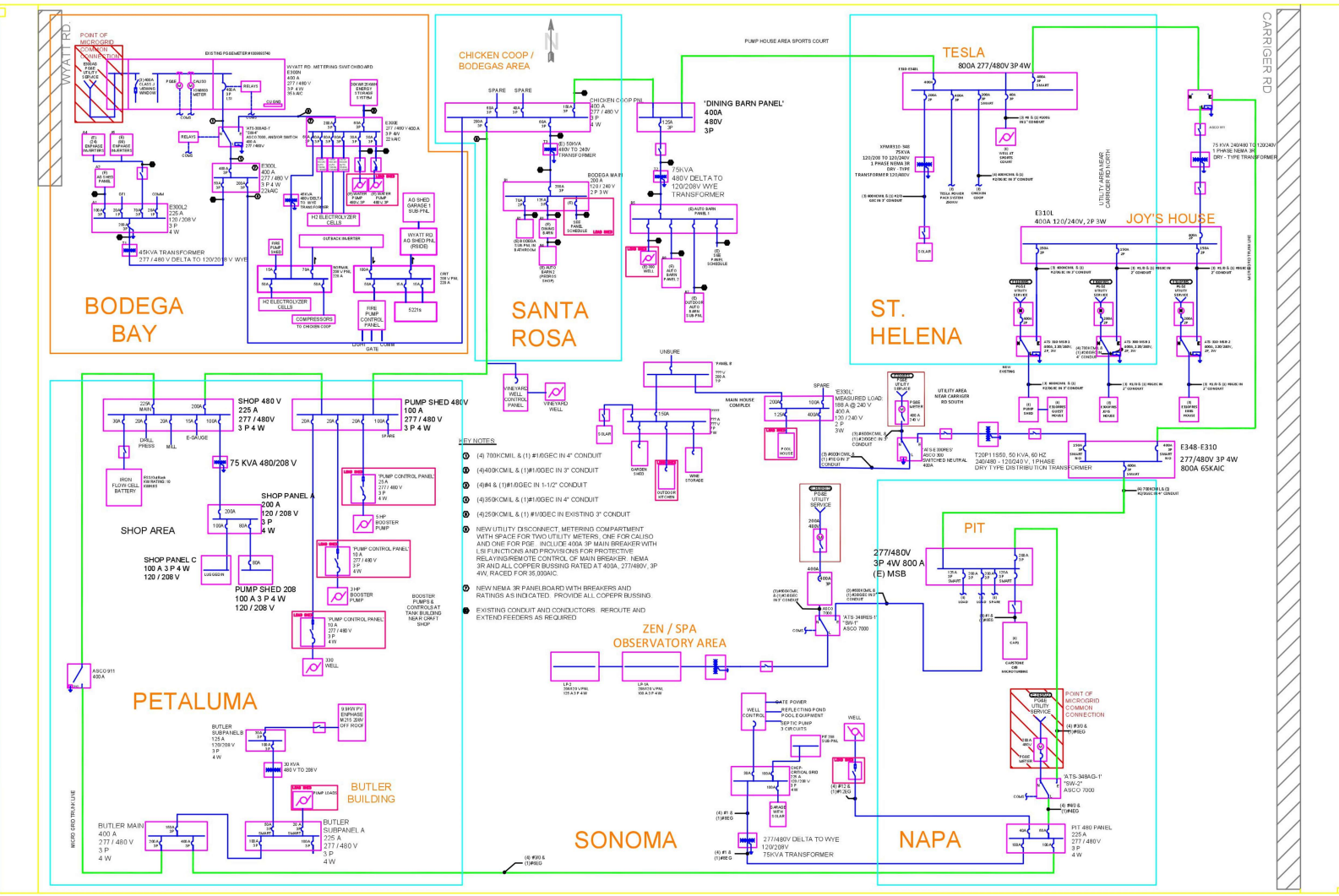
PG&E Service- ←

Solar Array- ☀

Battery- ⚡

Electrolyzer- 💧





BODEGA BAY

SANTA ROSA

ST. HELENA

PETALUMA

SONOMA

NAPA

KEY NOTES

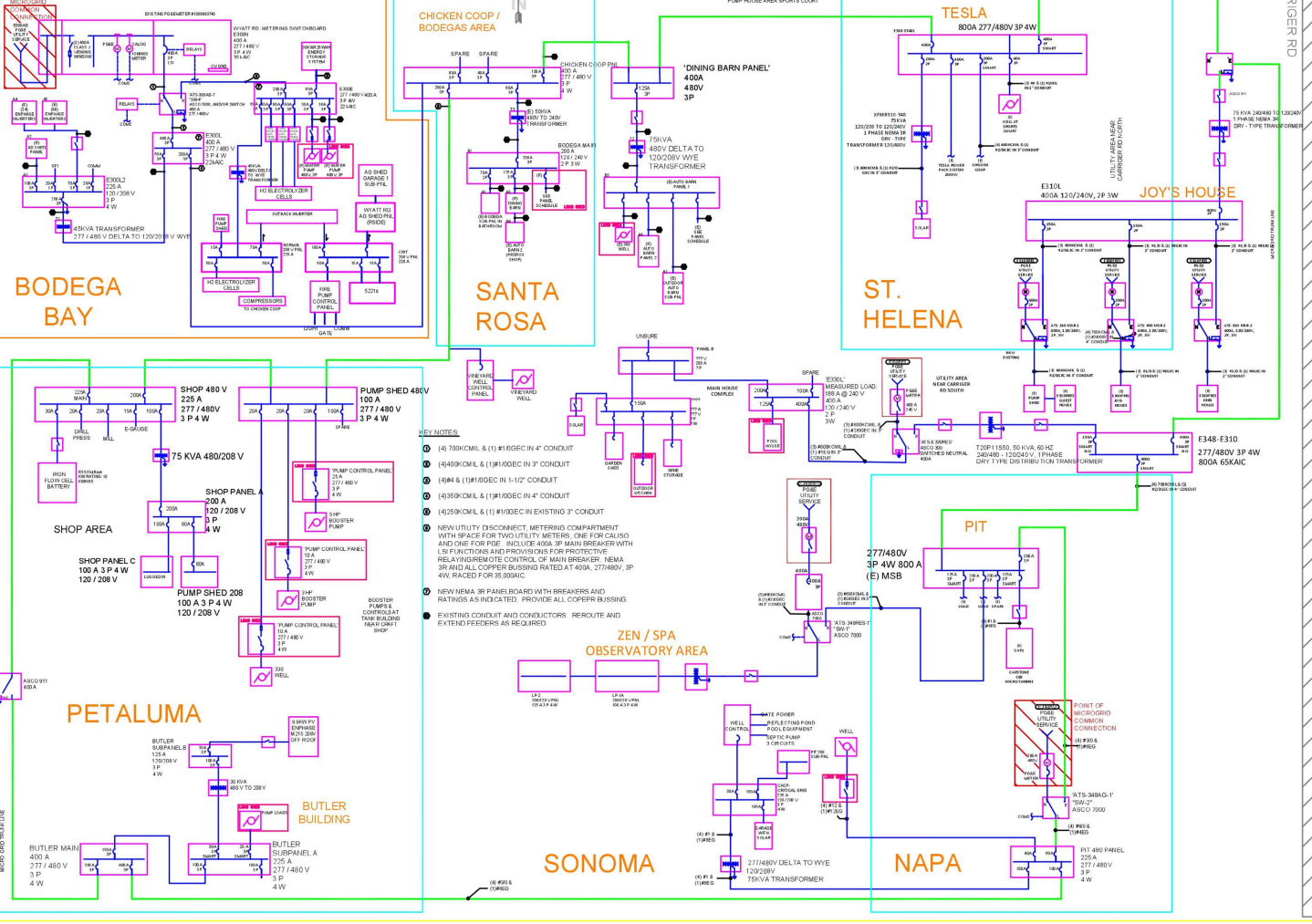
- 1 (4) 799KCMIL & (1) #10GEC IN 4" CONDUIT
- 2 (4) 400KCMIL & (1) #10GEC IN 3" CONDUIT
- 3 (4) 8 & (1) #10GEC IN 1-1/2" CONDUIT
- 4 (4) 350KCMIL & (1) #10GEC IN 4" CONDUIT
- 5 (4) 250KCMIL & (1) #10GEC IN EXISTING 3" CONDUIT
- 6 NEW UTILITY DISCONNECT, METERING COMPARTMENT WITH SPACE FOR TWO UTILITY METERS, ONE FOR CALISO AND ONE FOR PSE. INCLUDE 400A 3P MAIN BREAKER WITH LSI FUNCTIONS AND PROVISIONS FOR PROTECTIVE RELAYING/REMOTE CONTROL OF MAIN BREAKER. NEMA 3R AND ALL COPPER & BRASS RATED AT 800A, 277/480V, 3P, 4W, RATED FOR 35,000AIC.
- 7 NEW NEMA 3R PANELBOARD WITH BREAKERS AND RATINGS AS INDICATED. PROVIDE ALL COPPER BUSBARS.
- 8 EXISTING CONDUIT AND CONDUCTORS. REROUTE AND EXTEND FEEDERS AS REQUIRED.

WYATT RD

CARRIGER RD

MICRO GRID TRANSFORMER

MICRO GRID TRANSFORMER



7 Solar Arrays- Enphase Energy M250 and S280
Microinverters

Capstone C65 Microturbine- Inverter Output

Tesla Industrial PowerPack- DynaPower Inverter

ESS Iron Flow Battery- Outback Grid Tie Battery Inverter

Aquion Energy Aqueous Battery Bank- Ideal Inverters

Simpli-Phi Batteries- Schneider Electric Inverter

Millennium Reign Triple Twin Hydrogen Electrolyzer

ReliOn Plug Power 2200X Hydrogen Fuel Cells- Outback
Inverters





Renewable hydrogen station from Millenium Reign Energy



Hydrogen fueling station



Millenium Reign hydrogen electrolyzer



Hive of Relion H₂ fuel cells



Toyota Mirai fuel cell car - powered by hydrogen



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Hydrogen applications

- ▶ Chemical industry
- ▶ Remote area electrical backups
- ▶ Natural Gas Supplement
- ▶ Combustion Engines
Trigeneration
- Energy Storage (Overgeneration)
- Load and Peak Shaving
- Transportation Fuel (V2G)
- Scalability



A smart grid is a modernized electrical grid that uses analog or digital information and communications technology to gather and act on information - such as information about the behaviors of suppliers and consumers - to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity.

