Pickett Landfill Solar Project

Resilience Analysis using older 2,200 kW cable

Craig Lewis
Executive Director
650-796-2353 mobile
craig@clean-coalition.org

Gregory Young
Program Manager
805-350-2931 mobile
greg@clean-coalition.org

Key analysis steps

The Clean Coalition conducted the following steps to complete a resilience analysis for the Fishers Island Community Microgrid, using only the older 2,200 kW cable:

- **Step 1: Establish an updated Baseline Load Profile (BLP)**
  - Load data from calendar year 2022 (CY2022) was used — consistent with the main feasibility study.
  - A 2,200 kW threshold was applied by subtracting this value from each hourly load interval; negative values were set to zero.
  - The resulting profile represents the load that exceeds the 2,200 kW cable's capacity and was used as the BLP for both Scenarios 1 and 2.
- **Step 2: Define Solar Generation Profile (SGP), Battery Energy Storage System (BESS), and diesel generator**
  - **Scenario 1:**
    - Solar: Based on production data from the 990 kWac Pickett Power Landfill Solar PV project, as used in the main feasibility study.
    - Diesel Generator: 2,490 kW / 4,200 kWh diesel generator (existing unit).
  - **Scenario 2**:
    - Solar: Same as Scenario 1.
    - BESS: 1,827 kW / 3,854 kWh BESS, consistent with the main feasibility study.
    - Diesel Generator: Same as Scenario 1.
- **Step 3: Conduct Resilience Analysis using the Clean Coalition's Solar Microgrid Analysis Platform (SMAP)**
  - The Clean Coalition's Solar Microgrid Analysis Platform (SMAP) was used to generate Energy Flow Diagrams (EFDs) for each scenario, utilizing the BLP and corresponding system configurations.
- **Step 4: Summarize Results**
  - Resilience performance results were compiled and analyzed for each scenario.

Scenario sizing & resilience results

BLP details

- Total annual load: 3,433 kWh
- Peak load: 225 kW

Solar Microgrid sizing

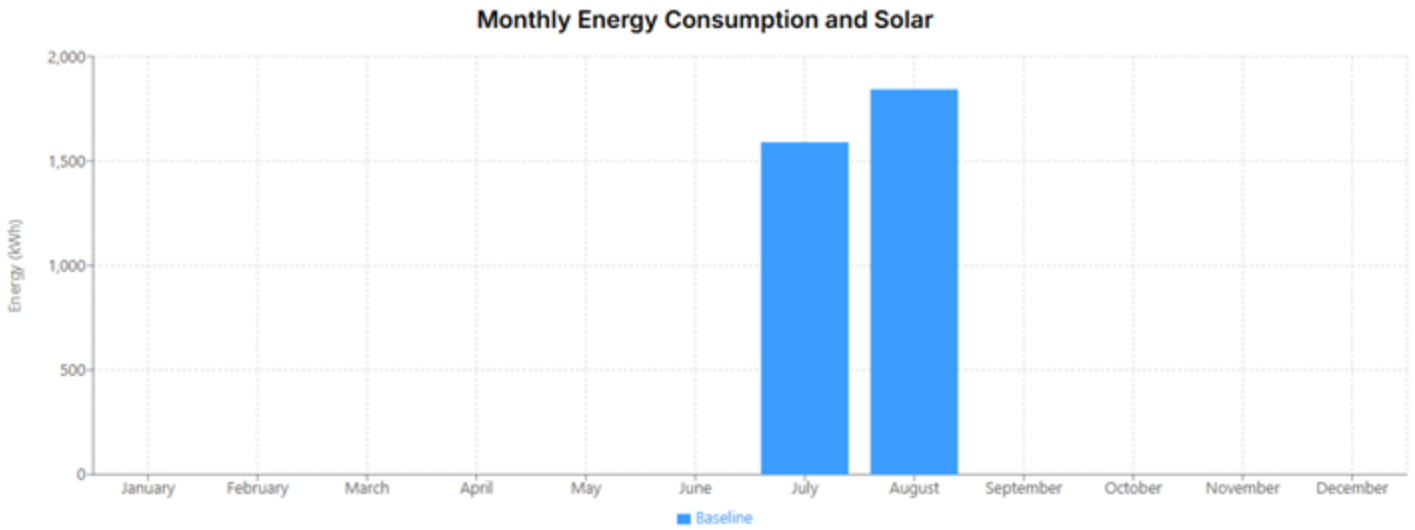
- Scenario 1:
  - Solar: 990 kWac, 1,271 kWdc
  - Diesel Generator: 2,490 kW / 4,200 gallons
- Scenario 2:
  - Solar: 990 kWac, 1,271 kWdc
  - BESS: 1,927 kW / 3,854 kWh
  - Diesel Generator: 2,490 kW / 4,200 gallons

Resilience results (Year 1):

- The 2,200 kW older cable is unable to meet 3,432 kWh of annual load.
  - **Scenario 1 (Solar + Diesel Generator):**
    - **2,444 kWh** of the unmet load is served directly by solar generation.
    - The remaining **989 kWh** is supplied by the diesel generator.
  - **Scenario 2 (Solar + BESS + Diesel Generator):**
    - **2,444 kWh** of the unmet load is served by solar.
    - The remaining **989 kWh** is served by the BESS (via time-shifted solar).
    - **0 kWh** is required from the diesel generator.

Scenario analysis

Load profiles

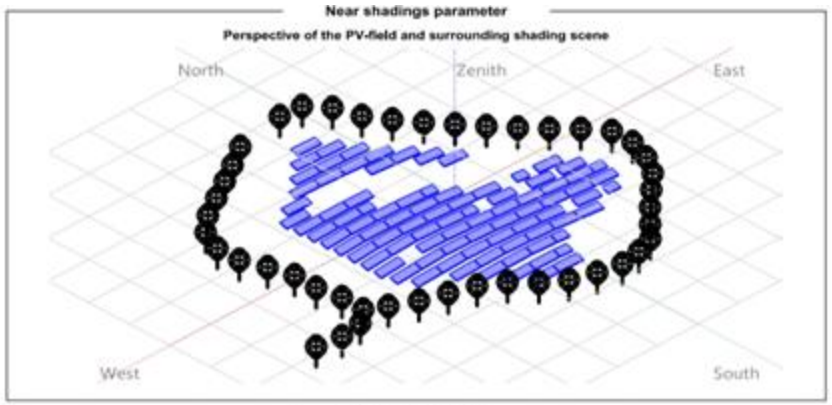


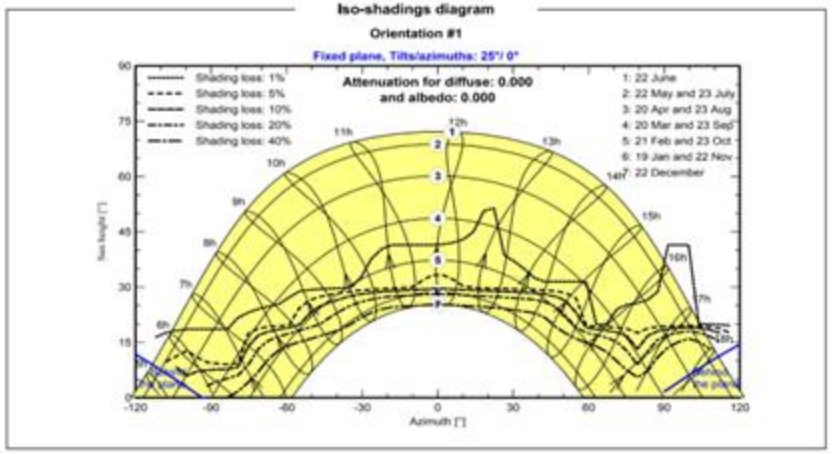
BLP Peak Load: 225 kW

Total Monthly and Daily Max, Average, and Min Electricity Usage by Profile Type

Month	Baseline			
	Max Daily [kWh]	Average Daily [kWh]	Min Daily [kWh]	Monthly Total [kWh]
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	568	51	0	1,590
August	730	59	0	1,843
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Annual Total				**3,433**

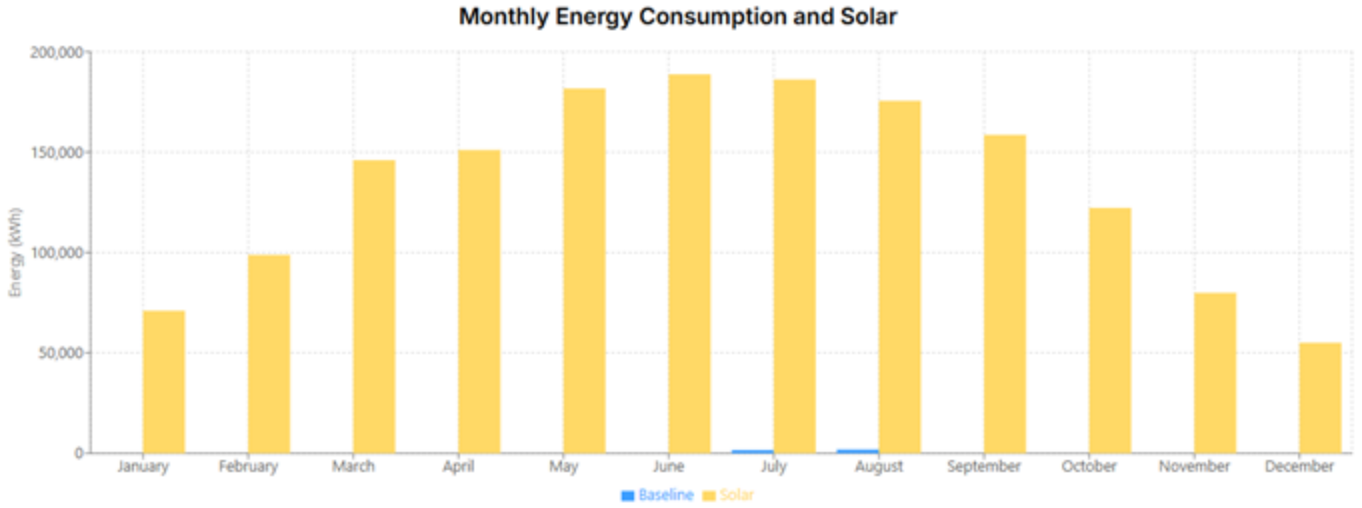
Pickett Landfill Solar PV project - 990 kWac, 1,271 kWdc





Fishers Island - Picket Landfill Solar Summary With Load after 2,200 kW Cable				
Site	BLP Total Annual Load (kWh)	Solar System Size (kWac)	Total Annual Generation (kWh)	BLP Percentage of NZE
Pickett Power	3,433	990	1,614,673	47034%

BLP and 990 kWac solar (Year 1)



Total Monthly and Daily Max, Average, and Min Electricity Usage by Profile Type

	Baseline				Solar Generation			
Month	Max Daily [kWh]	Average Daily [kWh]	Min Daily [kWh]	Monthly Total [kWh]	Max Daily [kWh]	Average Daily [kWh]	Min Daily [kWh]	Monthly Total [kWh]
January	0	0	0	0	4,260	2,290	482	70,987
February	0	0	0	0	6,069	3,529	0	98,816
March	0	0	0	0	7,750	4,709	772	145,993
April	0	0	0	0	8,017	5,035	0	151,044
May	0	0	0	0	8,404	5,861	1,701	181,689
June	0	0	0	0	8,557	6,292	2,684	188,762
July	568	51	0	1,590	8,382	6,005	842	186,152
August	730	59	0	1,843	8,110	5,662	2,339	175,524
September	0	0	0	0	7,825	5,286	1,582	158,575
October	0	0	0	0	7,124	3,942	263	122,208
November	0	0	0	0	5,423	2,663	205	79,893
December	0	0	0	0	2,835	1,775	167	55,030
Annual Total				**3,433**				**1,614,673**

Scenario 2: BESS details

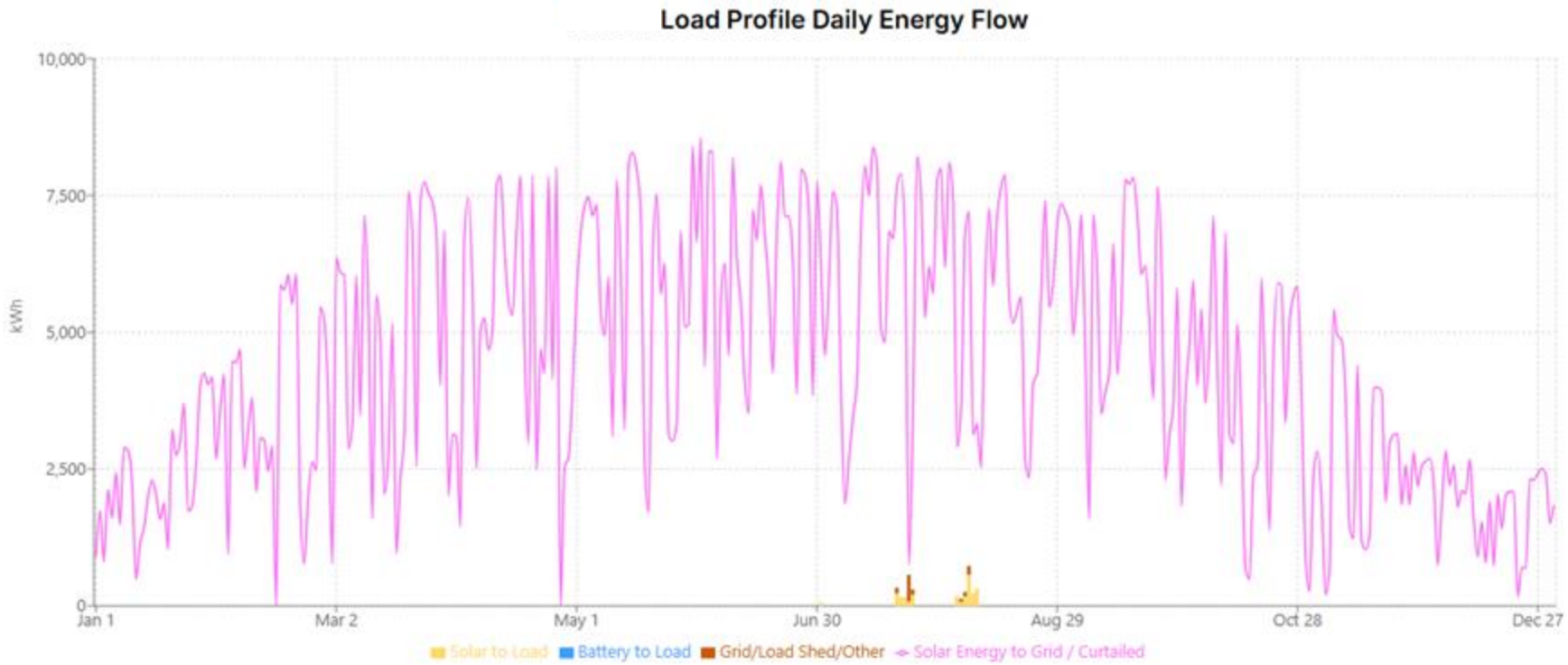
One 1,927 kW / 3,854 kWh Tesla Megapack II XL was used in Scenario 2

- 4.015% charge rate.
- 4.015% discharge rate.
- 100% initial state of charge (SOC)
- 100% max SOC
- 0% min SOC

Scenario 1 & 2: Diesel generator

- **Generator Specs:**
  - Model: Cummins 2500DQLC
  - Rated Output: 2,490 kW
  - Fuel tank (sub-tank): 4,200 gallons
  - Fuel Type: Diesel
- **Step 1: Estimate Energy Content of Diesel**
  - 1 gallon of diesel contains ≈ 37.95 kWh of thermal energy.
  - Total thermal energy = 4,200 gal × 37.95 kWh/gal = 159,390 kWh (thermal)
- **Step 2: Estimate Generator Efficiency**
  - Most large diesel generators run at ~30% to 40% efficiency, converting thermal energy to electricity.
  - Let's assume a 35% efficiency (a realistic midpoint for a large generator like this):
    - Usable electrical energy = 159,390 × 0.35 = **55,787 kWh** (electric)

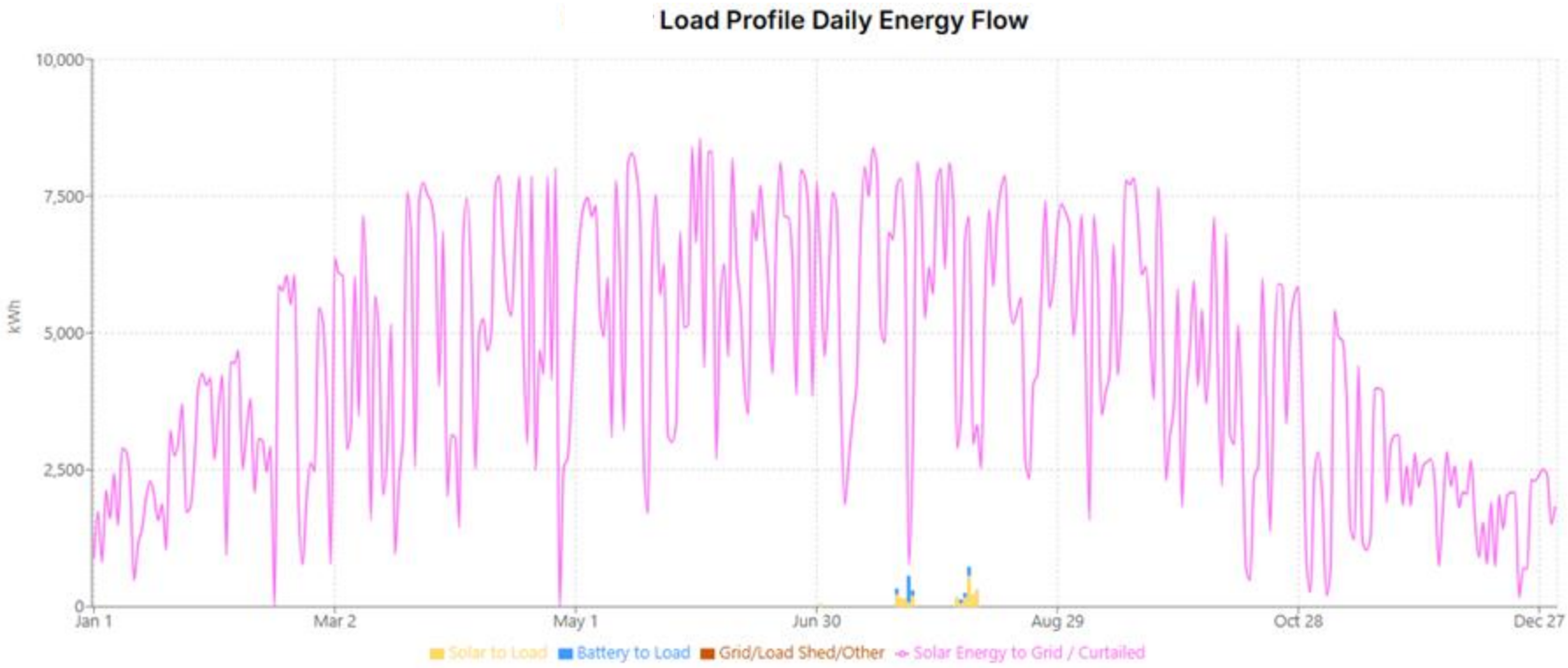
Scenario 1: Energy Flow Diagram (Year 1)
990 kWac and 55,787 kWh diesel generator energy capacity



Master Profile Energy Flow Summary

	Total Annual Load (kWh)	Annual Solar Generation (kWh)	Total Solar to Load (kWh)	Total Battery to Load (kWh)	Solar Energy to Grid/Curtailed (kWh)	Grid Import/Load Shed/Other (kWh)
Energy	3,432	1,614,674	2,444	0	1,612,230	989
Percentage of Load	100.0%	47045.8%	71.2%	0.0%	46974.6%	28.8%
Percentage of Solar	0.2%	100.0%	0.1%	0.0%	99.8%	0.1%

Scenario 2: Energy Flow Diagram (Year 1)
990 kWac, 1,927 kW / 3,854 kWh BESS, and 55,787 kWh diesel generator energy capacity



	Total Annual Load (kWh)	Annual Solar Generation (kWh)	Total Solar to Load (kWh)	Total Battery to Load (kWh)	Solar Energy to Grid/Curtailed (kWh)	Grid Import/Load Shed/Other (kWh)
Energy	3,432	1,614,674	2,444	989	1,611,242	0
Percentage of Load	100.0%	47045.8%	71.2%	28.8%	46945.8%	0.0%
Percentage of Solar	0.2%	100.0%	0.1%	0.1%	99.8%	0.0%