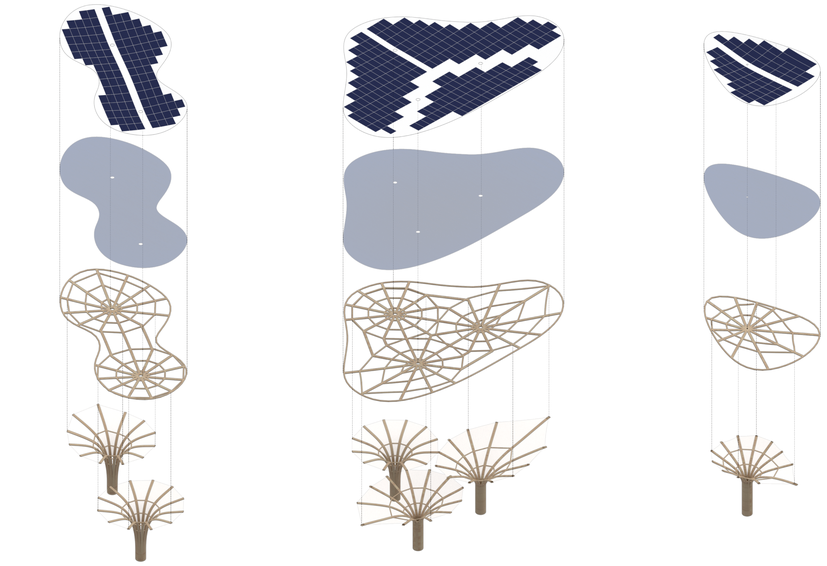
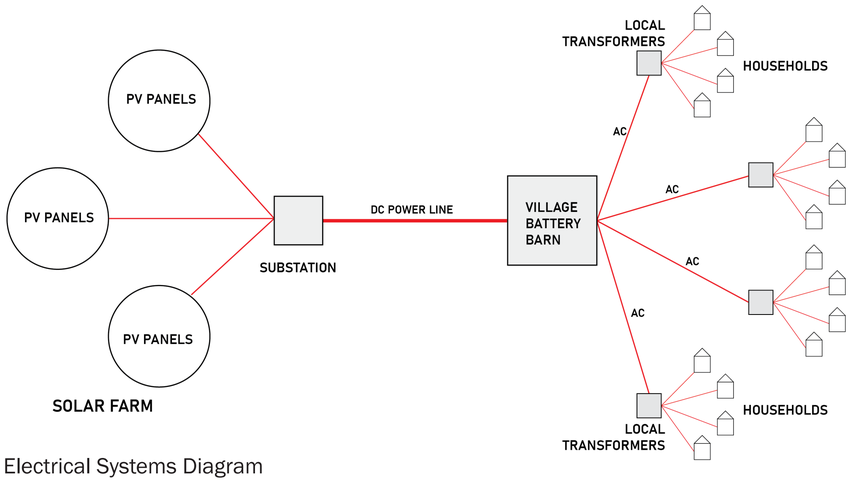
Solar Energy Collection



Solar Trees Exploded Axonometric



Electrical Systems Diagram

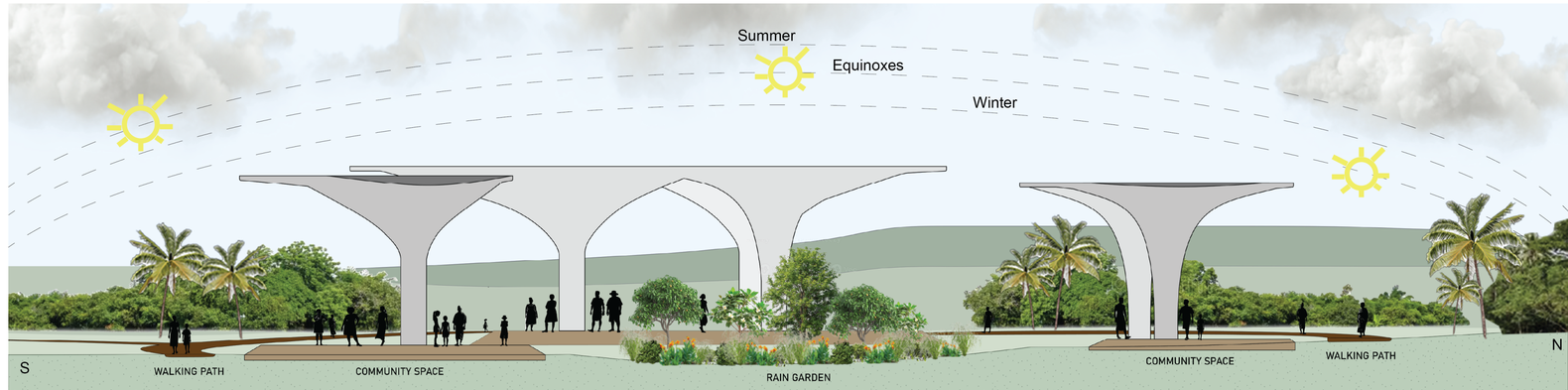
Month	Solar Radiation ($kW/m^2/day$)	Electricity (kWh)
1	6.29	14,894
2	5.9	12417
3	4.98	11792
4	4.87	11121
5	4.32	10472
6	3.79	8898
7	4.06	9872
8	4.56	11043
9	4.74	10999
10	5.27	12551
11	4.76	10973
12	4.96	11749
Year	**4.88**	**136,779**

Solar Collection Data

Based on PVWatts simulation, the Solar Farm is projected to produce 136,800kWh of electricity annually. Seasonal variation of electricity generation is moderate. It is the highest in January (summer in the Southern hemisphere) at 14,894kWh and the lowest in June (winter) at 8,898kWh (See the Table). The monthly average is 11,400kWh.

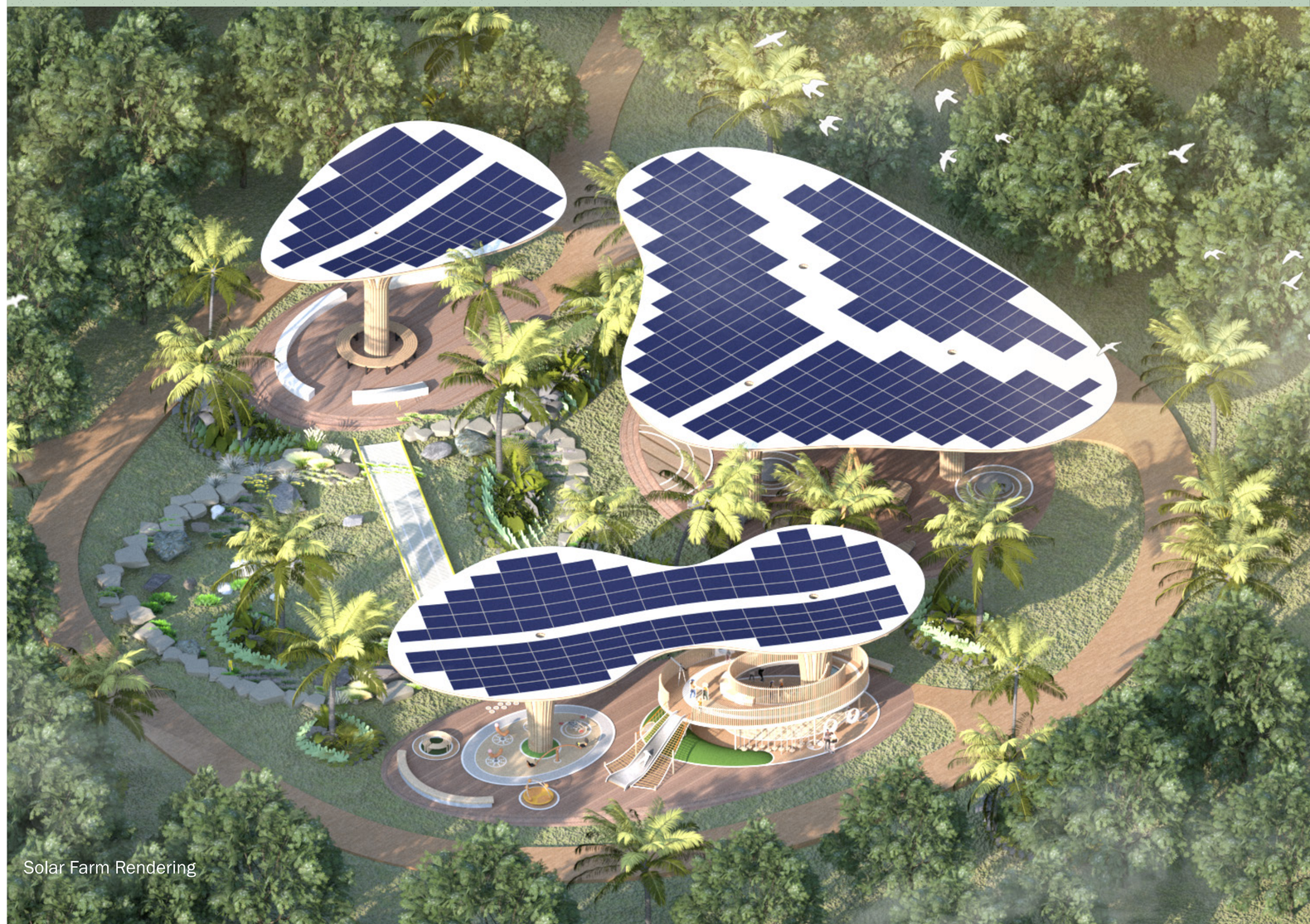
The tree-like structures are capped with monocrystalline solar PV panels to maximize electricity generation. While a 16 degree tilt would produce the most energy in Fiji, we calculated that a flat surface will produce only 4.8 less than the optimal tilt angle. Considering the structural stability and easier maintenance access to PV panels, the structure's roof surfaces are designed to be nearly flat with an average inclination of 2% for rainwater drainage and harvesting. The flat roof installation ensures the PV panels generate electricity without being shaded by adjacent panels. By making the roof surface flat, the effective catchment surfaces of the structures are maximized; the most volume of rainwater is harvested from the given roof size.

The direct current (DC) electricity generated from solar panels is transmitted first to a substation located at the Solar Farm and then to the main power center housed within the village center or in a barn adjacent to the center via underground conduits. Locating the power center and battery banks at the village center ensures their security and ease of maintenance access. The DC electricity is converted to alternating current (AC) prior to transmission to households to meet domestic demands or stored to the batteries.



Site Section

• Summer Solstice (December 21st): The sun rises slightly south of east and sets slightly south of west, taking a higher path across the sky.
• Winter Solstice (June 21st): The sun rises slightly north of east and sets slightly north of west, taking a lower path across the sky.
• Equinoxes (March 21st & September 23rd): The sun rises directly east and sets directly west, following a path that is intermediate between the two solstices.



Solar Farm Rendering