

Compass of the 4 Winds: Power Write Up

Our art installation will utilize roughly 396 meters of LED strips for the thrones and roughly 0.5 meters for the Compass. By the following equations we calculated the power used from these strips at 100% for all 9 days, 70% for 3 days, 50% for 2 days, and 30% for 2 days.

- $Amps\ per\ meter = LEDs/m * mA/LED = A/m$
- $Power\ required = m\ of\ LEDs * A/m * volts = kW$

When calculating power, we utilize the SK6812 LED strip having 30 LEDs per meter. We find that at full Peak Load (all lights on at once at full brightness) is 5.7 kW. To calculate a more realistic load, we will only utilize 1/12 of the total power, because our LEDs will mostly be lit by only one color and will rarely be full brightness. Diesel generators run best above the wet stacking threshold (@ 25% capacity) and below 70% Peak Load. Due to the temperature of the environment (T = 40 degrees C) it is important that we include a performance factor when calculating the size of generator needed (performance factor will be 0.9). Also, we will need AC to DC converters for the 5 volts needed for the LED's, this will approximately bring 90% efficiency for running our system. At a 0.5 Factor for oversizing our generator we will need a generator at roughly 1.7 kW running wattage. The KABUTO GL1100 may provide more wattage than needed. Because it has a lower running wattage this makes it less prone to wet stacking, ensuring that we may use this generator at low loads. At full Peak Load the rate of fuel consumption is roughly 0.85 gallons per hour and at ¼ load it is 0.28 gallons per hour. Through linear approximation at each load specified for our cases, the approximations of the different rates of fuel and the total amount of fuel used for our cases are shown in the table below through equation.

- $Fuel\ Used = Duration * conversion * Rate\ of\ Fuel\ Consumed.$

Cases	100% / 9 days	70% / 3 days	50% / 2 days	30% / 2 days
Rate of Fuel Consumed	0.85 gallons per hour	.66 gallons per hour	.47 gallons per hour	.28 gallons per hour
Conversion	24 hours per day	24 hours per day	24 hours per day	24 hours per day
Duration	9 days	3 days	2 days	2 days
Total fuel Used	183.6 gallons	47.52 gallons	22.56 gallons	13.44 gallons

However, we will run at our calculated realistic load only during the night for each day, thus our more accurate fuel usage is noted below.

	Rate of Fuel Consumed	Conversion (hours/day)	Duration (days)	Fuel Used
MAX Load	0.76	12	9	86
Realistic Load	0.52	12	9	56

In our worst case we will utilize 86 gallons of fuel for the duration of our time at Burning Man. In our realistic case, we will only utilize 56 gallons of fuel for the duration of our time at Burning Man. The 56 gallons of fuel consumption is a more sensible depiction of the project's fuel consumption.