What is the real size of your generator and what can it really do?

Everyone believes that when you purchase a generator, you are getting the full power that's written into the model on the side of the machine. Well, we're here to tell you and explain how untrue that is. All generators are sold as kVA (Kilo-Volt-Amps) models, even though you measure all your jobsites in kW (Kilowatts). Why is that, and what does this mean.

kVA is a measure of apparent power: This is the total amount of power in use in a system. In a 100% efficient system kW = kVA. This kVA is made up of the unit's kW and kVAR.

What does kVAR mean?

kVAR is a measure of reactive power: this is the power that hasn't converted into kVA. In simpler terms, reactive power is the unused power generated by reactive components in a generator. When energy from a generator creates motion, light, heat, and sound, those are all powered by kW (real power).

A **kilowatt (kW)** is simply the measure of how much power an electric appliance consumes—it's 1,000 watts to be exact. You can convert watts **(W)** to kilowatts **(kW)** by dividing your wattage by 1,000. **1,000W = 1 kW**

So now we know the terms and where the measurements originated from; But why are units measured in kVA and when kW is what we need? It all started as a marketing ploy to label units with a larger size. A unit rated in kVA rather than kW appears to be a larger size, even though they have the same output. Unfortunately, this strategy stuck, and the majority of units today are still labeled this way.

So, we need to break this down a little further. There are different ratings for generators as well. We have a Standby rating, and a Prime Power rating.

Standby generator, backup generator, or backup power generator: No matter what you call it, a standby generator comes on when the grid goes down. Within seconds of a power outage, a standby generator automatically turns on and sends power to appliances and lights within a home, office, or building. Standby generators run approximately 250 hours a year and have a life expectancy of around 3,000 hours. These generators are typically permanently mounted near a building and need an automatic transfer switch to function.

A **Prime Power Generator** is one that serves as the primary source of power for the operation and can be skid or trailer mounted for mobile applications. These are designed to work long term. Most often, a prime power generator is designed to support a variable load that is drawn over time. These generators will typically run 8 hours a day and up to 6,000-8,000 hours a year. This is the type of generator we are discussing.

So, let's say you purchased a 25 kVA machine. The kW of that machine will be 80% of its kVA, meaning you purchased a 20kW machine. That's still a lot of power. But we can take this one step further. That 20kW is prime power, three phase. So, what happens if we switch the unit to Single-Phase? Is it still a 20kW machine? No, it's not.

When you change your voltage selector switch to Single-Phase you are changing the winding pairings for your generator. This will reconfigure the windings to produce power for only two of the three output lines. This means that you lose a third of your machine's capacity and no longer have a full 20kW available. In Single-Phase, your unit would only be capable of 14kW. This theory applies for any size unit you purchase. The model is in kVA, the actual power you can get out of the machine is 80% of that (your kW), and then a much lower kW available in Single-Phase.

Why this is important? To keep your diesel generator from light loading (Wet Stacking), you need to maintain high engine temperature and proper combustion. To do this, you need to size your units properly and maintain load of 60% or higher. When you're under this loading size, wet stacking is more likely to occur.

1770 Raiders Way // Henderson, NV 89052 // 562-450-3570 x 3 // support@anacorp.com
Support Deptartment

Here's the issue: By switching your unit to Single-Phase, you now would need to be running full load to maintain that 60% load on the machine. This is due to losing line 2 on the generator. Now in single phase, even at full load, your max loading on that engine will only equal 60% of the engine's full power.

This is why customers that primarily run generators in single phase applications, see the lightest loading and Tier 4 related failures. The exhaust system is clogging up due to light loads and lower engine temperatures. Below is a scale of ANA units to show the kVA, to three phase kW, to Single-Phase kW relation.

Kva		3Ø kW		Single-Phase kW
25	- — -	20	- — -	14.4
36	- — -	28.5	- — -	26
45	- — -	36	- — -	26
65	- — -	50	- — -	36
100	- — -	80	- — -	62
125	- — -	100	- — -	72
150	- — -	120	- — -	87
220	- — -	176	- — -	- — -
400	- — -	320	- — -	- — -

1770 Raiders Way // Henderson, NV 89052 // 562-450-3570 x 3 // support@anacorp.com
Support Deptartment

Here are the formulas to calculate load kW based off Voltage, Amperage, and Power Factor:

Single-Phase	Three-Phase
$$\frac{\text{Volts x Amps x PF}}{1000}$$	$$\frac{\text{1 732 x Volts x Amps x PF}}{1000}$$

Keep in mind that Single-Phase is rated at 1.0 power factor and Three-Phase is rated at .8 power factor for the generator. This is important to help you size your load properly and get the average Load Profile. Load Profiles are critical in today's circumstances to prevent wet stacking situations simply by sizing units correctly.

Our goal is to educate customers on the proper way to use and size their units, so they can operate at peak efficiency and prevent jobsite downtime. By taking advantage of information such as this and collecting load profiles you can better support your fleet and keep your customers happy.