

WHAT IS A **BATTERY ENERGY STORAGE SOLUTION?**

TODAY, THE MOST COMMON FORM OF ENERGY STORAGE (THE BATTERY) CONTINUES TO GROW BY LEAPS AND BOUNDS. FIND OUT ABOUT THE MANY POSITIVES A **BATTERY ENERGY STORAGE SOLUTION (BESS)** PROVIDES YOU.

To experience the interactive elements of this book on a **MOBILE DEVICE** or **TABLET**, please visit this [LINK](#).

GENERAC® | **MOBILE**



POWERING A SMARTER WORLD.

Since the invention of batteries in 1800 by chemist and physicist Alessandro Volta, batteries have served as power banks, becoming today's most common worldwide electrical storage solution.

THE FUTURE OF STORED ENERGY IS NOW.

- The storage of energy in batteries is growing exponentially. It can be stored instantly to be used at another time, which makes it a game-changer as it significantly cuts fuel consumption and emissions.
- Using energy storage and alternative fuels/energy sources can reduce the amount of diesel fuels used.
- Batteries have been around for over 200 years — but rechargeable battery energy storage that provides temporary power for large equipment is now shaping the future.

This eBook highlights important aspects and benefits of a BESS and its operation; types of energy storage in batteries and advantages; why battery energy storage is the future; and key device applications.



RENTAL



CONSTRUCTION



OIL AND GAS



EVENTS



DISASTER
RELIEF



ENVIRONMENTALLY
FRIENDLY



01

02

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09

MAKE YOUR LEARNING COME TO LIFE.

As you explore this eBook, watch for and then click on “live” graphics and icons for a more informative, interactive experience.

EXAMPLES OF INTERACTIVE ELEMENTS:

BUTTON



Orange and/or underlined text

UNDERSTANDING ENERGY. WHAT IS IT?

Energy is governed by the laws of physics and has different properties. If we follow what is established by the law of conservation, energy cannot be created or destroyed; it can only be transformed from one form of energy to another.

For example, if we build a wood fire (internal energy), it will eventually begin to move out and expand, converting into heat (thermal energy) by accelerating the air particles that surround the fire.

This illustration also shows another property of energy: degradation. Heat and noise are two ways in which energy degrades — since only a certain part of the energy is transformed into useful work, and the other is lost. Now, just imagine modifying all this degrading energy and storing/saving it to be used later!

HOW A BATTERY STORES ENERGY

Battery energy storage takes energy (the ability to do work) and holds it inside a device where it can be easily accessed when needed. This “device” is a battery, which works because of a chain of electrochemical reactions that happen within it — causing an electric current to be produced.

STORAGE OPERATION OF ENERGY IN BATTERIES.

- Inside a battery is a positive electrode (cathode), a negative electrode (anode) and an electrolyte that allows for the movement of electrons.
- This movement produces an electrical current that feeds the electrical circuits and, as a result, carries the electrical energy of the battery to the outside.
- Likewise, there are rechargeable batteries that can be used on multiple occasions, thanks to their ability to reverse the chemical reaction. (These also do have a lifetime and cannot be reused infinitely.)

MORE ON BATTERIES

ENERGY IN A CHEMICAL REACTION

A battery is a device that stores chemical energy and converts it to electrical energy. The chemical reactions in a battery involve the flow of electrons from one material (electrode) to another through an external circuit.

1. The flow of electrons provides an electric current that can be used to do work.
2. Thus, when discharging, a battery converts chemical energy into electrical energy.

BATTERY TYPES

COMPARE THE TECHNOLOGY

THE BENEFITS OF BOTH BATTERY TYPES

	LEAD ACID BATTERIES	LITHIUM ION BATTERIES

*Battery discharge and recharge equals one cycle; Depth of Discharge (DoD) up to 80%.

**Charging time may change depending on battery size and amount of energy used to charge.

SAY YES TO BESS

Today's energy grid faces a new set of challenges and the potential for infrastructure instability due to:

- A need to transition away from fossil fuels toward renewable energy sources
- Spiking demand due to increased electrification of vehicles and use in homes with limited distribution capacity.

A Battery Energy Storage Solution (BESS) allows energy from an electrical generating source to be stored and then later redistributes that energy to a site that needs power.

BESS lets energies be stored, saved and accessed due to weather complications or large physical distances that prevent the construction of appropriate infrastructure to be distributed. It's ideal for cramped urban areas, remote destinations, noise-sensitive locations and many other types of environments.

HOW A HYBRID POWER SYSTEM WORKS

BATTERY STORAGE + ENERGY SOURCE = HYBRID POWER SYSTEM

Much like a hybrid car combines the use of a battery and an engine to deliver better fuel efficiency and environmental benefits, hybrid power systems pair a diesel generator with an energy storage solution to achieve the same positive result.

- Power applications like construction worksites and short-term events can be vulnerable to a variety of electrical loads.
- Using a generator on its own that's subject to underloading requires additional features to mitigate potential wet-stacking issues. Pairing it with a BESS eliminates the need for these features while enabling the generator to operate only at optimum efficiency.



WHAT'S THE NEED?

INVEST IN YOUR FUTURE.

There are so many beneficial reasons to switch to using a battery energy storage solution, from saving fuel and reducing CO2 to diminishing noise, helping the environment and saving money.

BESS can quickly become your best option when you're facing a set of limitations in mobile applications due to noise, available space, emissions, fuel costs, generator wet stacking and other factors.

THESE APPLICATIONS CAN CONSIST OF:

MORE ABOUT GENERAC


Founded in 1959, Generac was the first to manufacture affordable home standby generators and develop an engine specifically for generator use.

Today, we are **the #1 manufacturer** of home standby generators and offer the widest range of power products in the market, including portable, residential, commercial and industrial generators. We are also the lead designer and manufacturer of manual and fully automatic transfer switches and accessories for backup power applications up to 2 MW.

Generac Mobile products provide reliable power, light, water and heat solutions to a variety of industries and in some of the most demanding environments.



POWERING A SMARTER WORLD

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