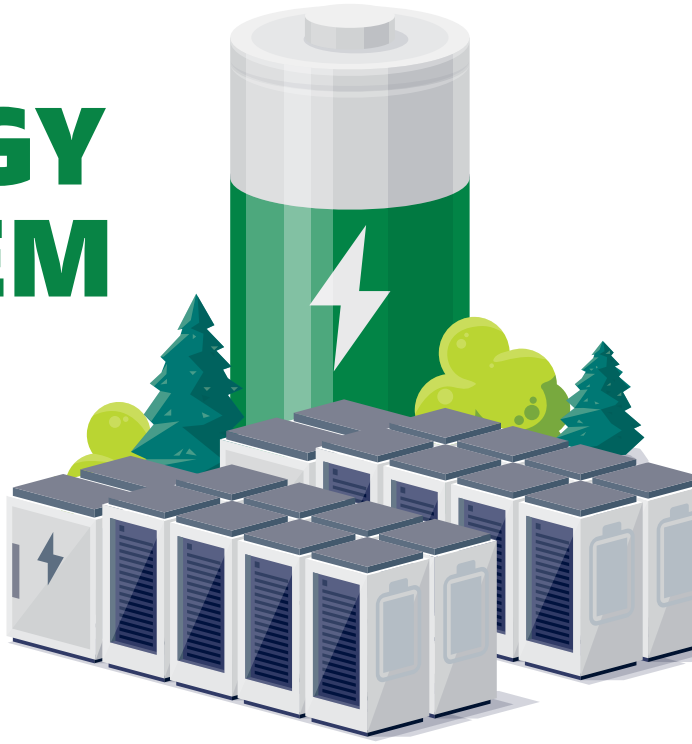
Clearway

# BATTERY ENERGY STORAGE SYSTEM



*Battery Energy Storage Systems (B.E.S.S.)* refers to the entire **system that collects energy** from the electrical grid or adjoined generators – like a natural gas plant or solar farm – **and stores** it until the energy is ready to supply the grid at another time

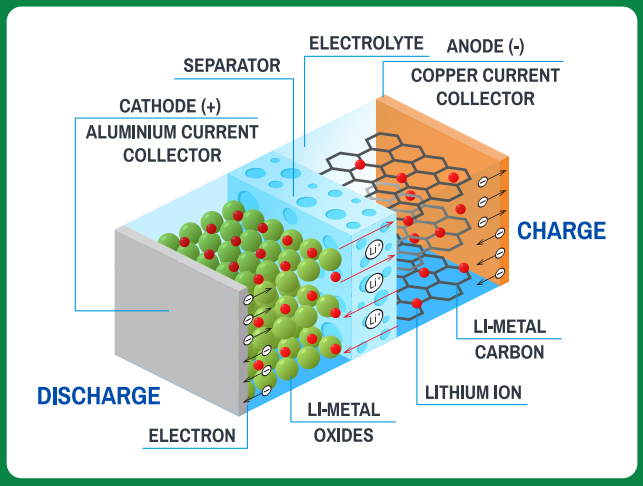
**BESS can serve many purposes.** Batteries can be installed in small or large quantities for different uses.

Large-scale BESS **projects range in size** from that of a basketball court to a soccer field. Batteries may be sited in desert or arctic environments, and from remote areas to urban centers.

## Li-ion Batteries:
## How do they work?

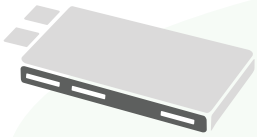
**Lithium-ion based batteries** are the dominant technology in the market for BESS due to its:

- **Higher Energy Densities** (Longer discharge time)
- **Higher Power Densities** (Higher capacity)
- **Smaller Footprint**
- **Reduced Degradation Over Time**
- **Lower Environmental Impact**




***The movement of the lithium ions creates free electrons in the anode which creates a charge at the positive current collector. An electrical current then flows from the current collector to power deices or the grid.***

# What's Inside BESS?



## Cell

A battery cell consists of a basic lithium-ion unit that can be assembled, as a group within a frame, as a module.

## Module

Module frames protect cells against movement, heat and vibrations

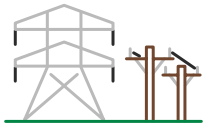
## Rack/Pack

Packs are groups of modules that are equipped with control and protection systems.

## Container

Battery packs are housed in specially engineered containers, outdoor cabinets or purpose-built buildings

# BENEFITS



### Creating a More Resilient Grid

Like back-up batteries or generators, BESS can supply entire buildings, or the electrical grid by providing electricity during power disruptions or extreme weather outages. This ensures critical infrastructure and safety systems, from lighting to heating, can keep running when needed.

### Support Economies

Large-scale energy storage development can grow local economies and broaden tax bases - which can reduce local taxes. In 2022 in the US, the expanding industry of BESS employed nearly 70,000 people from development to construction and innovative engineering to advanced manufacturing.

### Reducing Costs

BESS allows for the storing of energy when there is excess, and the price of electricity is low. BESS later discharges that energy when demand is high. By doing so, BESS can help make the most efficient use of our grid, helping utilities and households save money on electricity. Also, by providing back up power, BESS can reduce costly damages that can occur from outages.

### Enhancing Renewable Energy

Wind and solar are intermittent resources - wind does not always blow and sun does not always shine. BESS can store renewable energy, as its generated and demand is low, to be used when it is needed. By adding flexibility to the grid, we can use more low-cost renewable power.

## BESS & The Electricity Grid

### Generation

The facilities that create electricity from resources such as natural gas, solar, or wind

### BESS

Depending on their size and purpose, batteries may be connected to different locations on the grid. Large-scale batteries typically connect to the high voltage transmission system.

### Transmission

The high voltage infrastructure that moves electricity from where it is generated to areas where it is used

### Distribution

The lines and poles that bring electricity into homes and businesses

### Load

Source of electricity demand such as homes and businesses

Sources: Department of Energy | University of Melbourne | GE | ACP | Department of Energy: U.S. Energy & Employment Jobs Report