Energy and Environmental Engineering
CEME 102

Dr. Kamlesh S.

Assistant Professor, MED

SVNIT Surat

GLOBAL AND NATIONAL ENERGY SCENARIO. **(1 hours)**

INTRODUCTION TO ENERGY SOURCES **(2 hours)**

Classification of Energy Sources in terms of Primary and Secondary Sources, Commercial and Non Commercial Sources of Energy; Renewable and Fossil based Sources of Energy;

INTRODUCTION TO FUELS AND ITS PROPERTIES **(1 hours)**

INTRODUCTION TO VARIOUS ENERGY CONVERSION SYSTEMS (6 hours)

like Power Plant, Pump, Refrigerator, Air Conditioner, Internal Combustion Engine, Solar PV Cell, Solar Water Heating System, Biogas Plant, Wind Turbine System general functioning including their normal rating specifications.

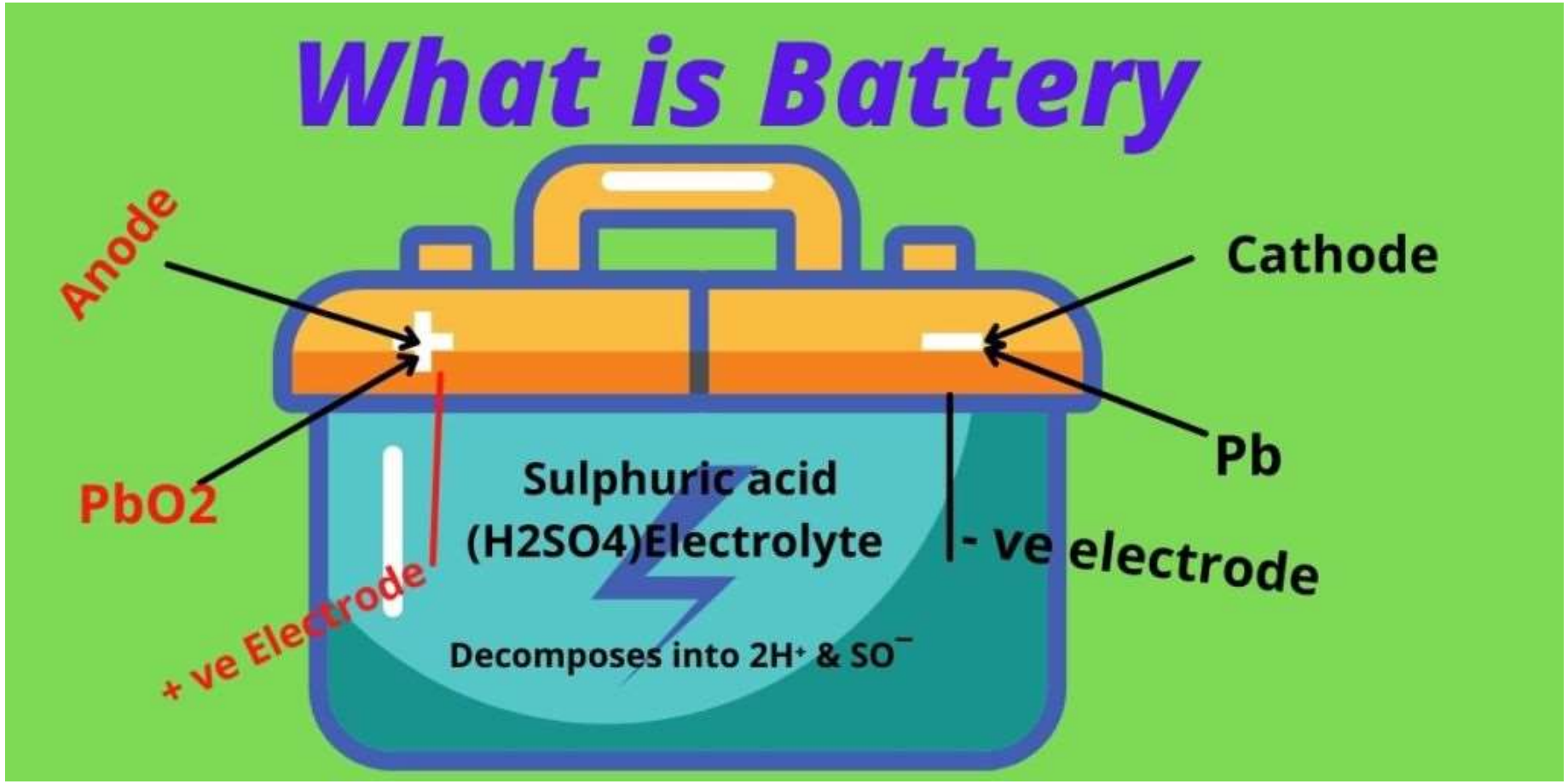
ASPECTS OF ENERGY CONSERVATION AND MANAGEMENT (4 hours)

Energy Conservation Act, Energy Policy of Company; Need for Energy Standards and Labelling; Energy Building Codes.

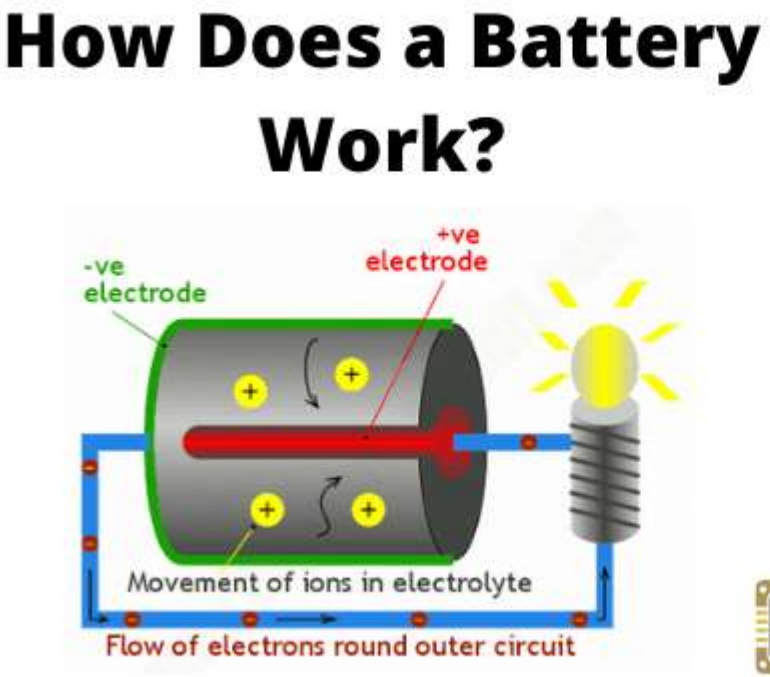
ENERGY STORAGE IN BATTERIES **(2 hours)**

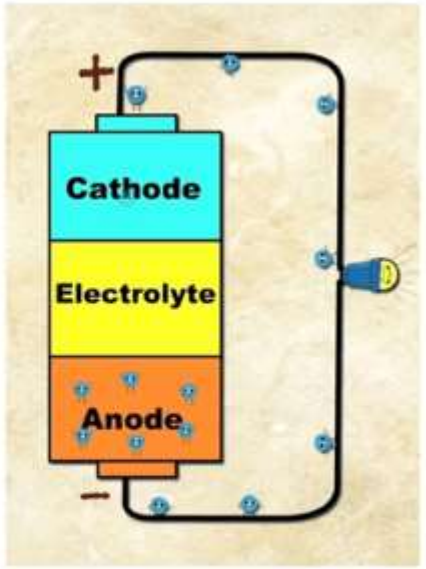
Type of batteries; Electric Vehicles

Battery??


What is Battery
Anode
Cathode
PbO2
Pb
Sulphuric acid
(H2SO4)Electrolyte
- ve electrode
+ ve Electrode
Decomposes into 2H⁺ & SO⁻⁻

Working of a battery





E4U Electrical 4 U

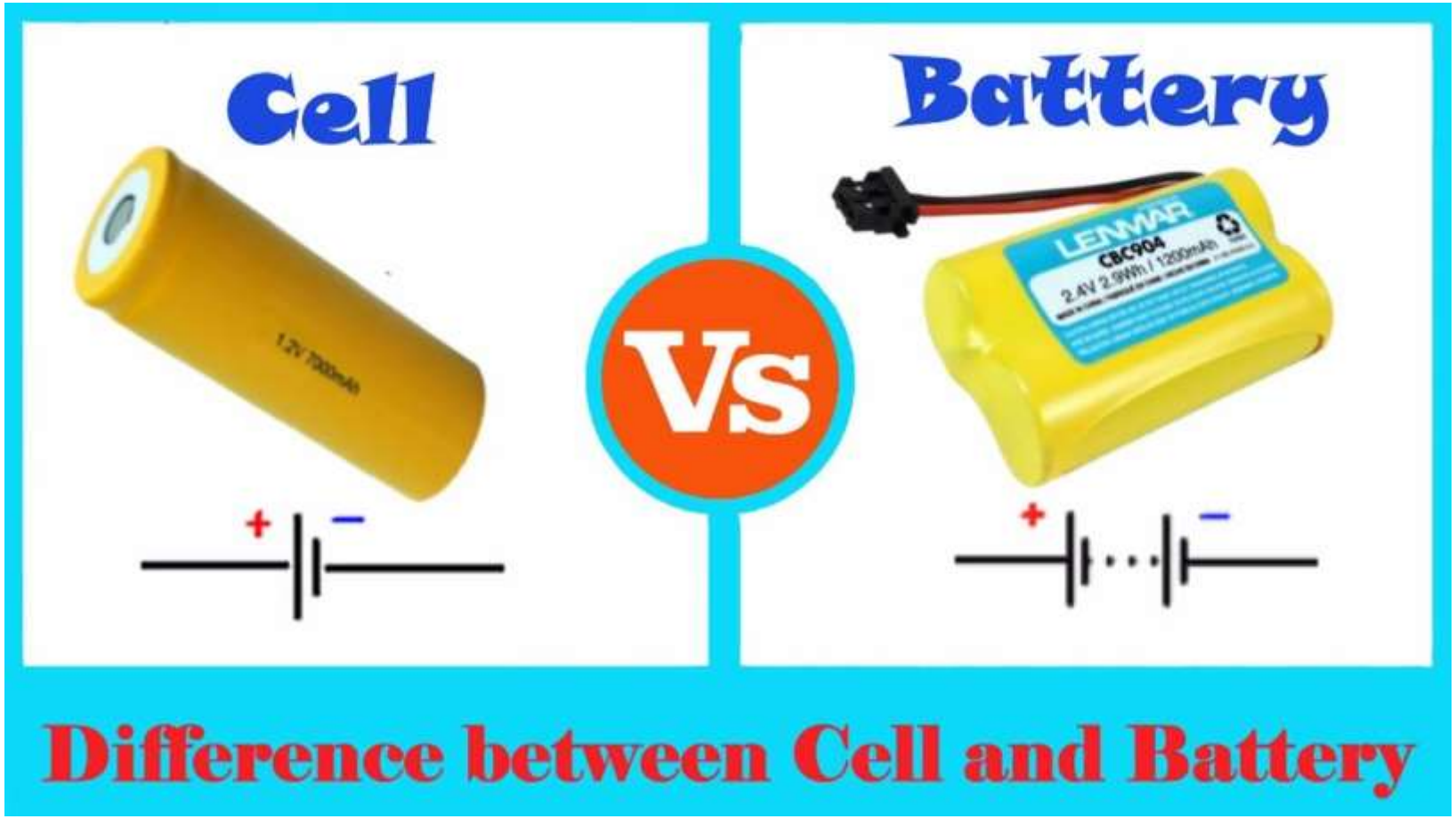
A battery converts chemical energy into electrical energy through a chemical reaction. Within the battery, two different materials called electrodes react with an electrolyte, generating an electric current. One electrode undergoes oxidation (loses electrons), while the other undergoes reduction (gains electrons), creating a flow of electrons through an external circuit, powering devices connected to the battery. This process continues until the reactants are depleted, requiring recharging or replacement of the battery.

Cell vs Battery

CELL

A single unit that generates electrical energy through chemical reactions.

Used in devices requiring low power, such as remote controls and watches.

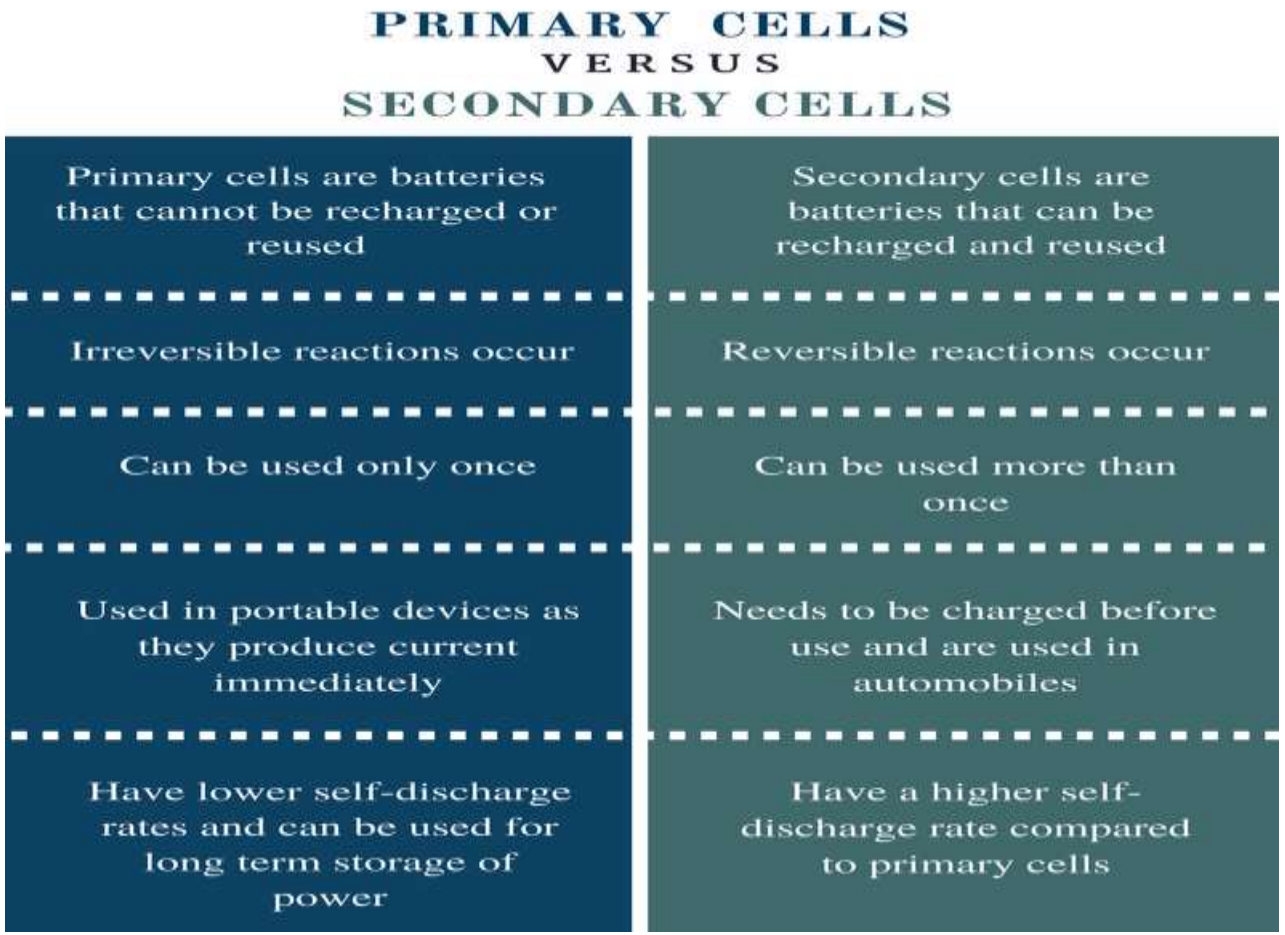


BATTERY

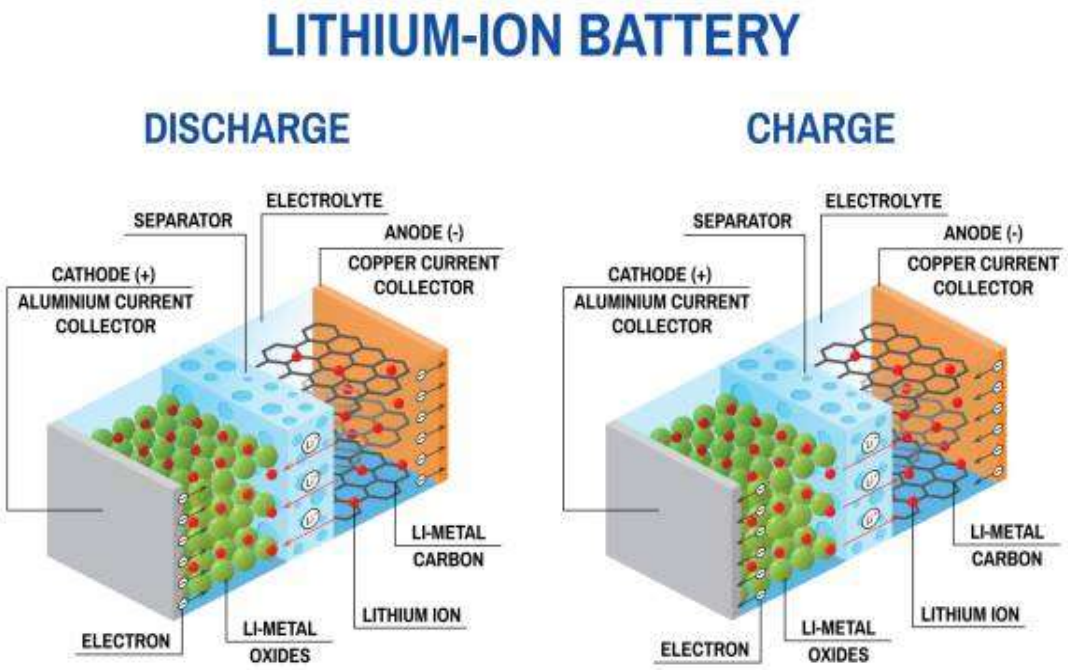
A collection of cells connected in series or parallel to provide a larger voltage and capacity.
Functions by combining multiple cells to increase energy storage and output.
Utilized in high-power applications like laptops, and electric vehicles.

Types of Batteries

Classification of Batteries



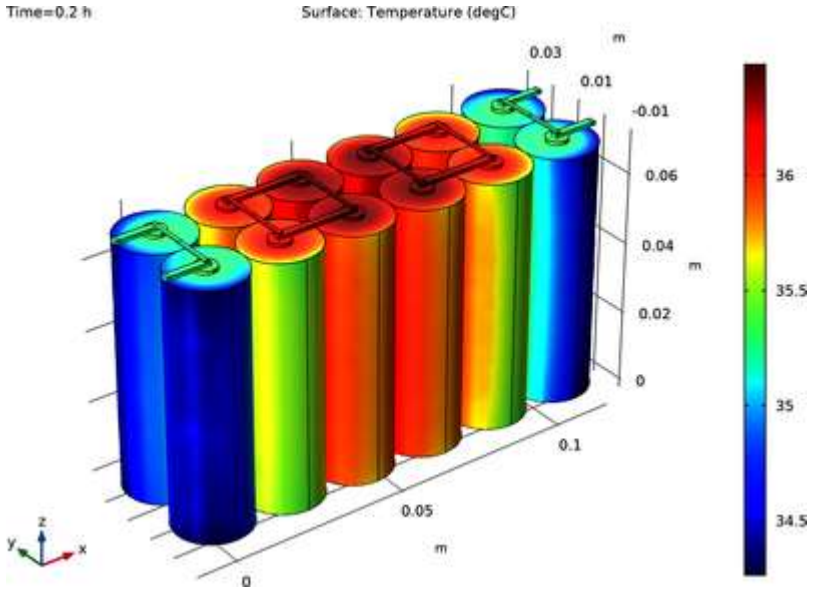
Lithium–ion Battery

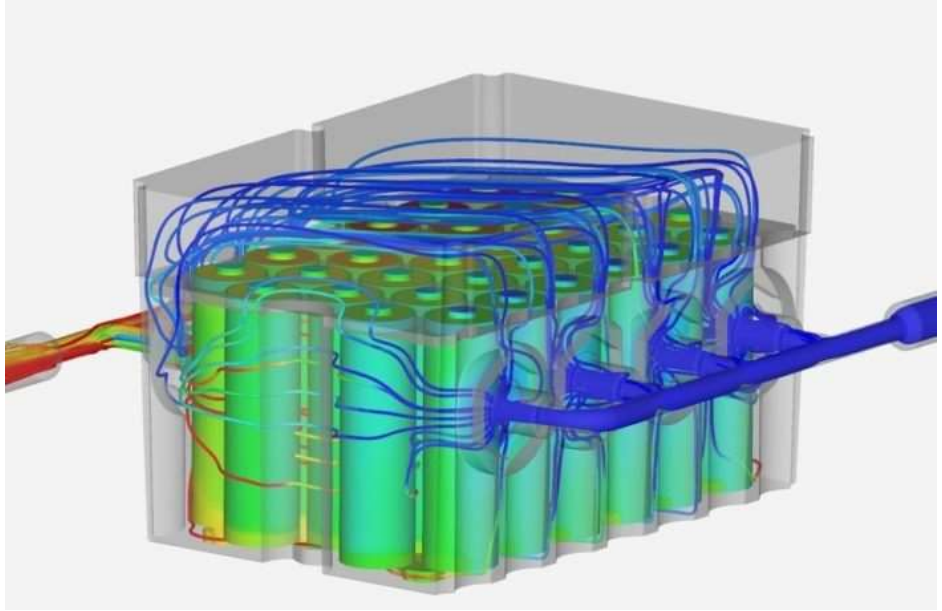


Lithium-ion batteries are a popular choice for portable electronics and electric vehicles due to their high energy density, lightweight design, and long lifespan. They utilize lithium ions moving between positive and negative electrodes to store and release energy efficiently. Their rechargeable nature makes them a sustainable solution for various applications, contributing to the advancement of clean energy technologies.

Application of Batteries

Battery thermal management:Ensuring Optimal Performance





Effective battery thermal management is crucial for enhancing performance, longevity, and safety of battery systems. By maintaining ideal operating temperatures, we prevent overheating, which can degrade battery life and compromise safety. Implementing strategies such as active cooling or heating systems ensures optimal conditions for batteries, maximizing efficiency and reliability. In summary, prioritizing battery thermal management is key to unlocking the full potential of energy storage solutions.