

# THE FUTURE OF BATTERY STORAGE



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# BATTERIES FOR GRID STORAGE

Lead-Acid



Sodium-Sulfur



Lithium-ion

Zinc-Bromine



Vanadium



# KEY PERFORMANCE INDICATORS (KPI)

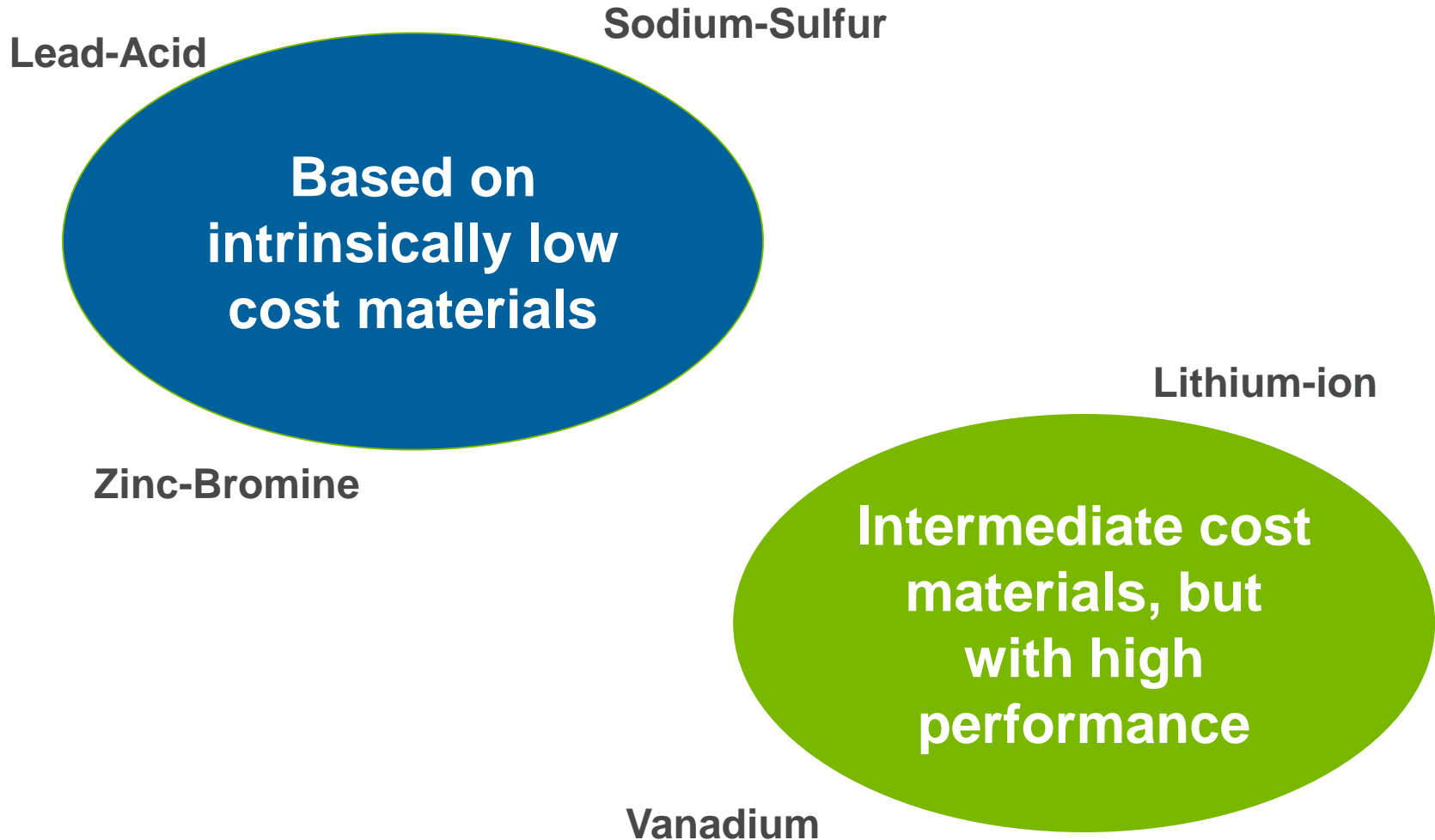
Winning technology will exhibit best combination of KPI

- Capital cost
- Round trip efficiency
- Life
- Safety and Environment
- Footprint
- Operation



Li-ion is the winning technology today

# BATTERIES FOR GRID STORAGE





# PATHWAYS TO LOW-COST STORAGE

- Battery price ~ material cost X materials requirement

- $\$/kWh = \frac{(\$/kg)}{(kWh/kg)}$



**Lead acid**

If \$/kg are low then a low Wh/kg won't hurt



If \$/kg are moderate, then a higher energy density lowers

**Long duration storage with extremely low cost requires high energy density, low cost and reversible systems**

