

## Lead Acid Replacement with Lithium-Ion Solutions



### BENEFITS:

#### Longer Lifecycle

Up to 10x longer lifecycle compared to lead-acid

#### Larger Depth of Discharge

Lithium can run at 90% DoD unlike lead-acid's limited 50% max DoD

#### Cost Effective Clean Technology

Low to zero emission solution eliminates most carbon costs

#### Increased Energy Density

Higher density batteries fits more storage capacity into less space

#### Flexible Charge & Discharge Rate

Twice as quick to charge and discharge compared to lead-acid

### TRENDS:

*"Applications with high-voltage, high-capacity requirements are adopting lithium-ion technology because of its high energy density, small size, and low weight.."*  
- Robin Tichy, Power Electronics 2020

### CHALLENGE:

Integrating a green solution to replace lead acid batteries that reduces maintenance, cost, and carbon emissions while avoiding the dangers of sulfuric acid and lead.

### TROES' SOLUTION:

TROES' Battery Energy Storage system offers the ability to replace lead acid batteries with lithium-ion phosphate (LFP) solutions. Li-ion is the ideal solution due to its lower weight, reduced maintenance costs, longer life cycle, and instantaneous demand support.



# TROES Lithium-Ion vs Lead-Acid Battery Comparison:

Model	TROES LFP	Lead-Acid	Carbon Foam Lead-Acid	AGM Lead-Acid
Maximum C Rate	1C	0.1C	Up to 1C	0.25C/1C <sup>3</sup>
Cell Configuration	2P16S	1P4S	N/A	N/A
Voltage (V)	51.2	48	12V <sup>1</sup>	12V
Rated Capacity (Ah)	180	190	68 <sup>1</sup>	100
Energy (kWh)	9.2	9.12	0.82 <sup>1</sup>	1.2
Temperature Range (°C)	0 - 45	20 – 30 (-40 - 50)	-20 - 50	-15 - 40
Dimension L*W*H (mm)	600*540*270	561*500*316	340*172*238	330*171*220
Energy Density (kWh/L)	0.1052	0.102	0.0542 <sup>1</sup>	0.0967
Depth of Discharge (%)	90%	50%	80%	60%-70%
Lifespan	10 years 6000 cycles	1000 cycles	1000-1300 cycles	1200 cycles
Price Range (\$)	Subject to change	383	549 <sup>2</sup>	384
Levelized cost of energy(\$/kWh) <sup>4</sup>	0.010	0.042	0.52	0.26

1. Calculated under the 1C condition

2. Average lead-acid cost according to U.S. Department of Energy 2019 Energy Storage Report

3. Calculated using 0.25 charge rate and 1C discharge rate

4. Formula to calculate levelized cost of energy = price/(lifespan\*energy)

