Battery Wear Cost per kWh Throughput

Battery degradation (wear) cost and total cost per kWh delivered from pack cost, cycle life, depth of discharge, average capacity over life and charging price.

Method: Battery throughput cost

Input parameters

Unit system: SI

Parameter	Value	Unit
Battery pack cost (per kWh of capacity)	250.00	
Cycle life to end of life	6,000.0	
Depth of discharge per cycle	90.000	%
Average capacity over life (fraction of new)	90.000	%
Round-trip efficiency	90.000	%
Charging energy price (per kWh)	0.050000	

Calculated results

Parameter	Value	Unit
Lifetime energy delivered per kWh of capacity (kWh)	4,860.0	
Wear cost per kWh delivered	0.051440	
Charging cost per kWh delivered	0.055556	
Total cost per kWh delivered	0.10700	

Notes for this case

• Wear cost = C_b/(N·DoD·f_avg); total = wear + charging price/η. Cycle life falls at higher depth of discharge and temperature; use the maker's cycle-life curve at the planned DoD. Financing and calendar ageing are not included.

Formula and method

$$c_w = \frac{C_b}{N \cdot DoD \cdot f_{avg}}, \quad c = c_w + \frac{c_{ch}}{\eta}$$

Variables

C_b	Battery pack cost (per kWh of capacity)	-
N	Cycle life to end of life	-
DoD	Depth of discharge per cycle	-
f_{avg}	Average capacity over life (fraction of new)	-
η	Round-trip efficiency	-
c_{ch}	Charging energy price (per kWh)	-
E_{life}	Lifetime energy delivered per kWh of capacity (kWh)	-
c_w	Wear cost per kWh delivered	-
c_{ch}/η	Charging cost per kWh delivered	-
c	Total cost per kWh delivered	-

Method and standards

Battery throughput cost.

Assumptions and limits

- Cycle ageing only; constant prices.

References

Battery throughput cost

Report details

Report reference	FCC-YF79-8GAE (the same inputs always give the same reference)
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Calculator	Battery Wear Cost per kWh Throughput
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/batteries-ups/battery-cost-per-kwh-throughput

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.