BOOSTY

SuperCAP vs Traditional

HELVI®

SUPER CAPACITOR vs BATTERY

Batteries and capacitors seem similar as they both store and release electrical energy.

However, there are crucial differences between them that impact their potential applications due to how they function differently

SUPER CAPACITOR vs BATTERY

Super capacitors are some of the best devices around for delivering a quick surge of power. Because Super capacitors stores energy in an electric field, rather than in chemical reaction, it can survive hundreds of thousand more charge and discharge cycles than battery can!

SUPER CAPACITOR vs BATTERY

SUPER CAPACITORS vs Lead-Acid (SLI) batteries

	Lead-Acid (SLI) battery	ProCap Super capacitor
Energy Storage	Chemical	Physical
Life	Short (1 - 4 years)	Long (8 - 10 years)
Charge Rate (Time)	Long (14 - 16 hours)	Short (15 - 30 seconds by any running alternator) 5 - 6 hours by supplied charger
Discharge Rate (Time)	Long	Short (15-30 seconds)
Energy Density	High	Low
Power Capability	Low	High (100 - 1000 times higher)
Maintenance	High	None
Operating Voltage Window	10.5 to 12.7	around 15
Cycle Life	Low (Average ~ 400)	High (Upwards of 1.000.000)
Charging Circuit	Complex (Different rates for different batteries)	Simple
Internal Resistance	High (Increases with Use & Age)	Very Low
Self-Discharge Rate	Very Low	High
(+) Plate Corrosion	Yes	Not Applicable
(-) Plate Sulfation	Yes	Not Applicable
Acid Stratification	yes	Not Applicable
Resting Time	Moderate	Not Applicable
Disposal Problems	High (Contains LEAD)	Low (No LEAD)

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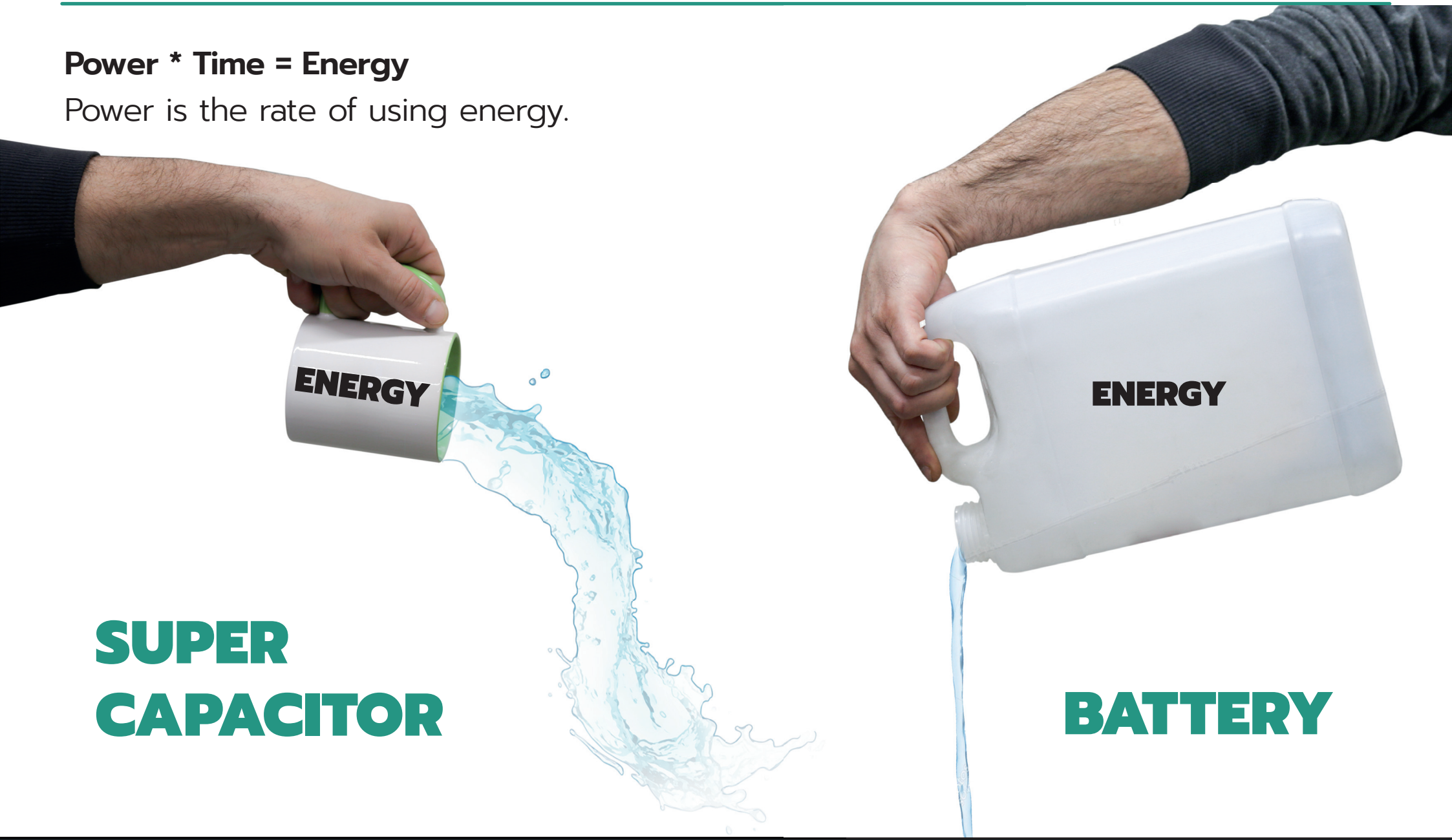
SUPER CAPACITOR vs BATTERY

Power * Time = Energy

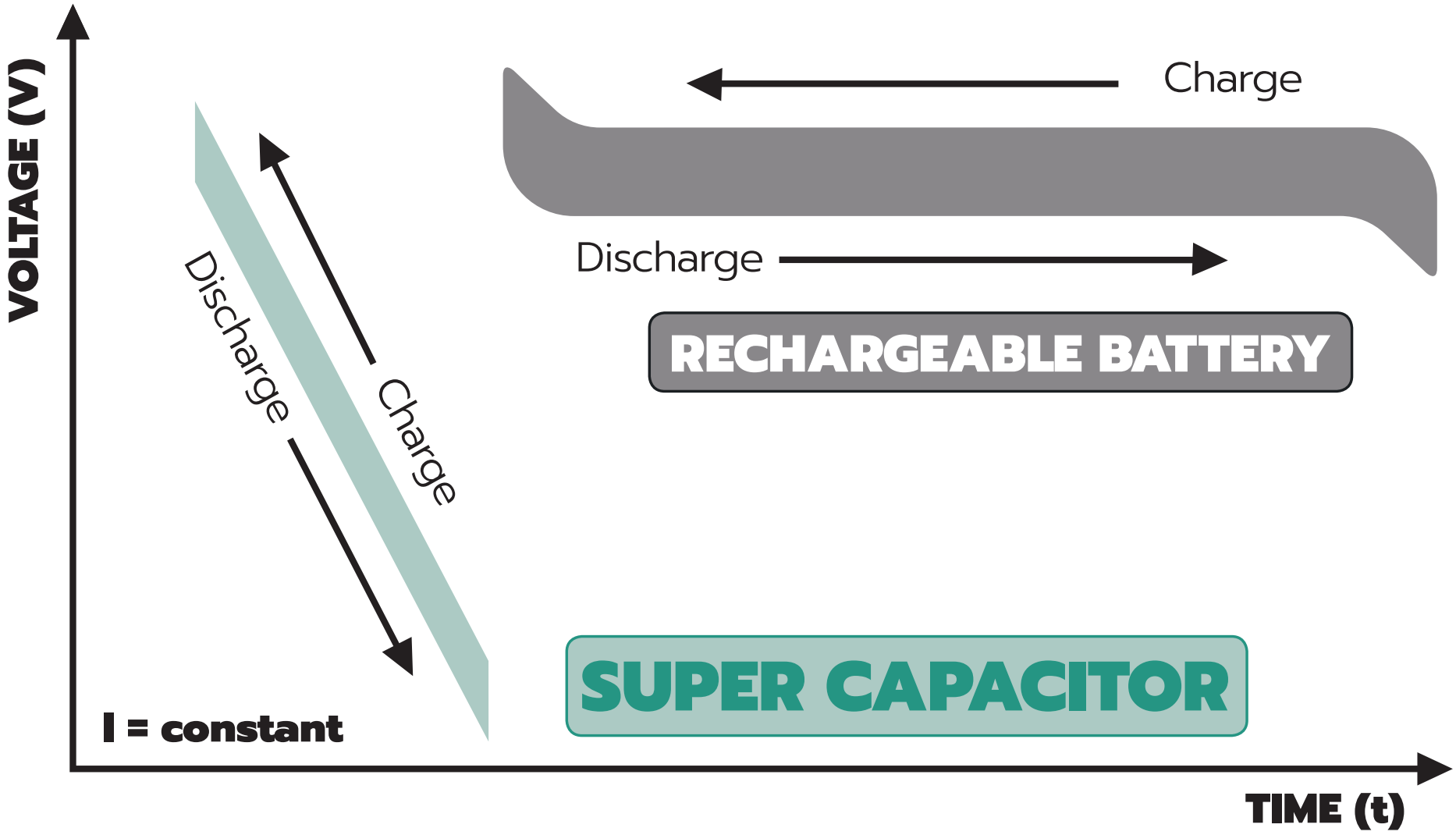
Power is the rate of using energy.



SUPER CAPACITOR

BATTERY

SUPER CAPACITOR vs BATTERY



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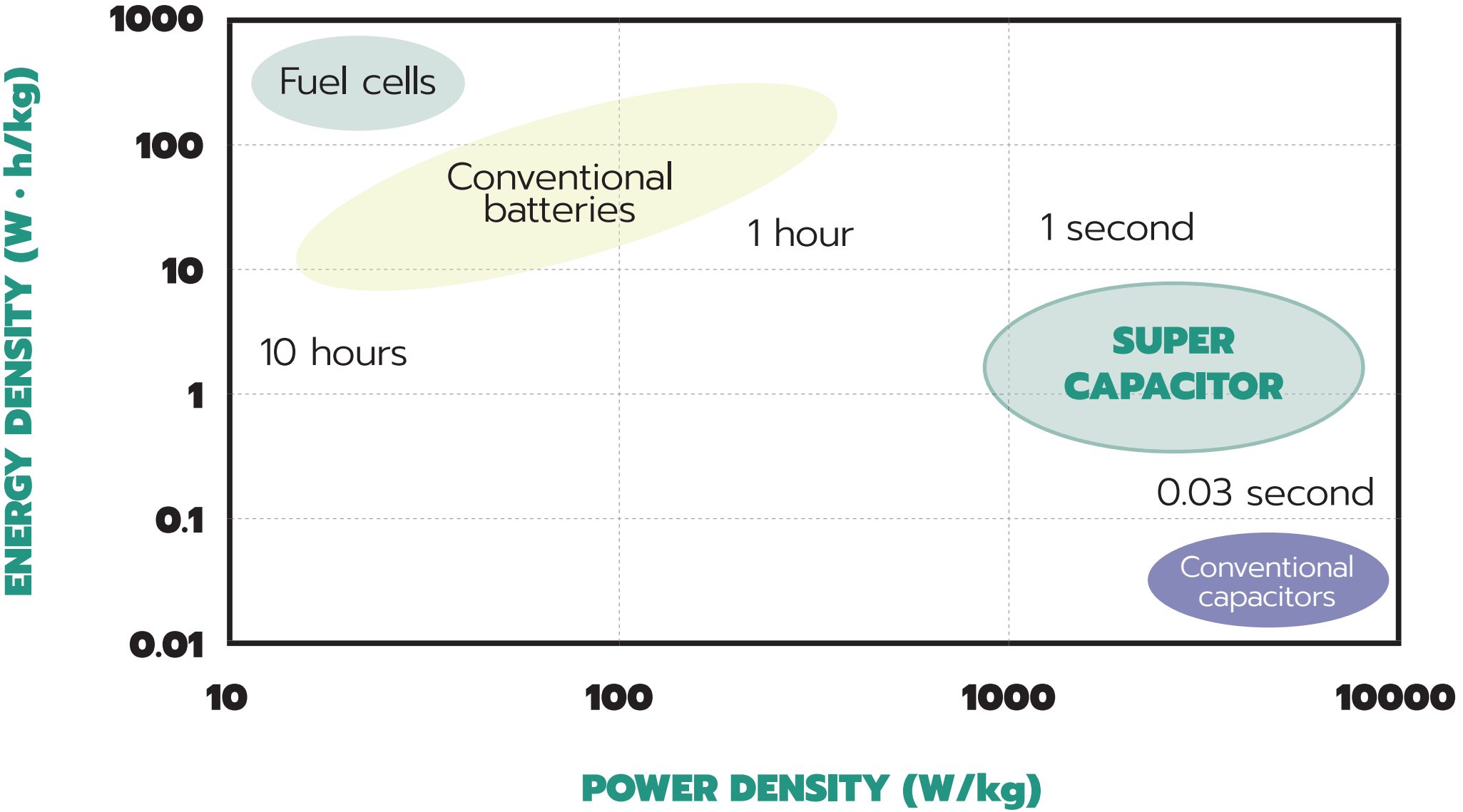
SUPER CAPACITOR vs BATTERY



COMPARATIVE TABLE
SUPER CAPACITORS vs LITHIUM-ION batteries

FUNCTION	SUPER CAPACITOR	LITHIUM-ION (general)
Charge time	1-10 seconds	10-60 minutes
Cycle life	1 million or 30,000h	500 and higher
Cell voltage	2.3 to 2.75 V	3.6 to 3.7 V
Specific energy (Wh/kg)	5 (typical)	100 - 200
Specific power (W/kg)	Up to 10.000	1.000 to 3.000
Cost per Wh	around 15 euros	around 1,5 euros
Service life (in vehicle)	10 to 15 years	5 to 10 years
Charge temperature	-40 to 65°C (-40 to 149°F)	0 to 45°C (32° to 113°F)
Discharge temperature	-40 to 65°C (-40 to 149°F)	-20 to 60°C (-4 to 140°F)

SUPER CAPACITOR - Advantages and Limitations

ADVANTAGES

- Virtually unlimited cycle life; can be cycled millions of time
- High specific power; low resistance enables high load currents,.
- Charges in seconds; no end-of-charge termination required
- Simple charging; draws only what it needs; not subject to overcharge
- Safe; forgiving if abused
- Excellent low-tempoerature charge and discharge performance

LIMITATIONS

- Low specific energy: holds a fraction of a regular battery
- Linear discharge voltage prevents using the full energy spectrum
- High self-discharge voltage prevents using the full energy spectrum
- High self-discharge; higher than most batteries
- Low cell voltage; requires series connections with voltage balancing
- High cost per watt