Flywheels and their use as a power booster

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We develop, manufacture & market

revolutionary Power Boosters

Enabling & accelerating widespread deployment of

EV ultra-fast charging. Today. Anywhere. For Good.

zooz

Zichron Pilot – The first installation of Zooster-100 (Dec 2022)

Co operation

דור אלון

afcon Electric Mobility Shlomo Group

Supported by:

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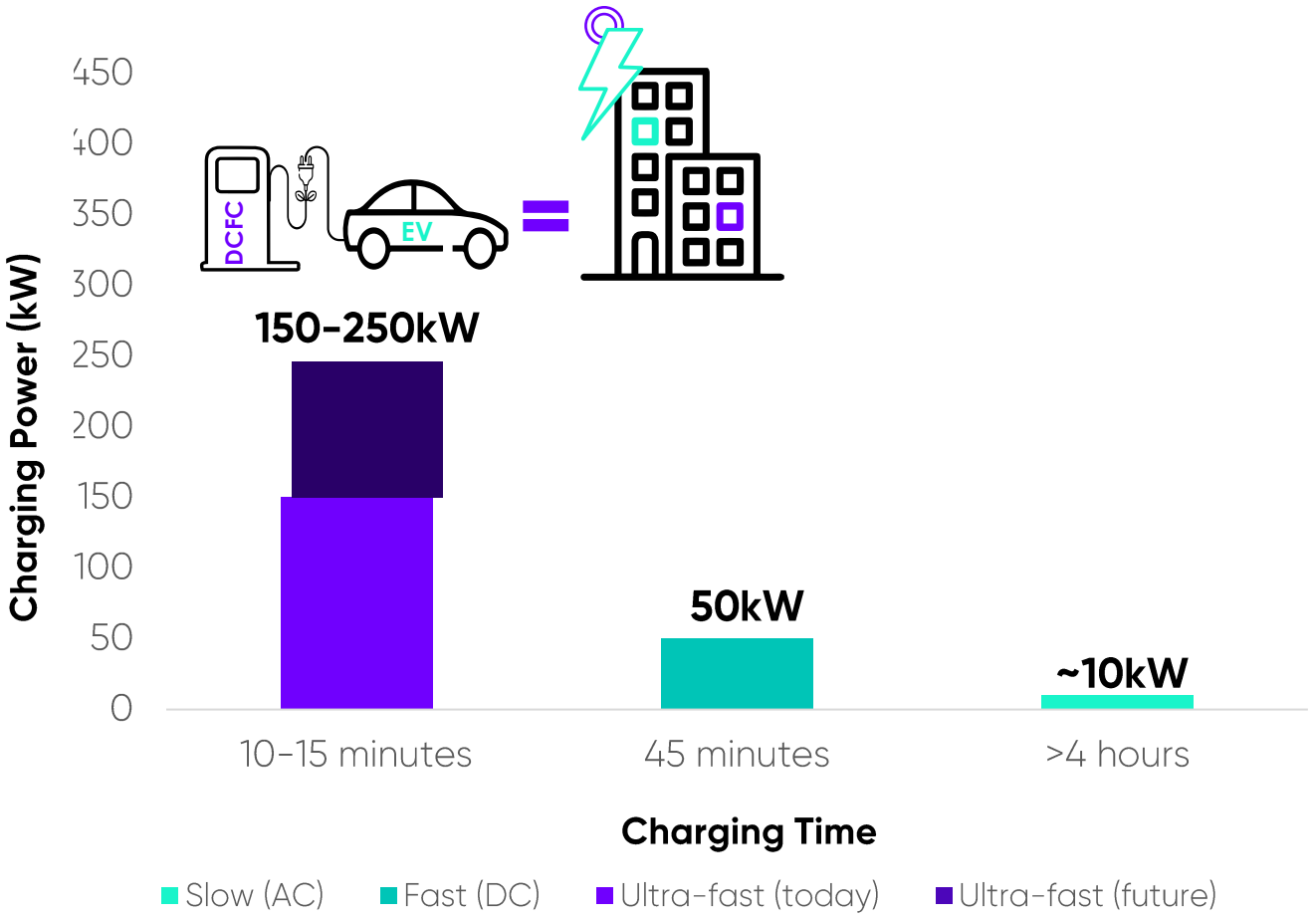
Existing Electric Grid Cannot Support EV Ultra-Fast Charging

An EV charged in less than 15 min. consumes electrical power equivalent to that of a multistory building



THE NEED

EV owners expect a "fueling-like" ultra-fast charging experience.

Ultra-fast charging infrastructure is critical to enable EV mass adoption

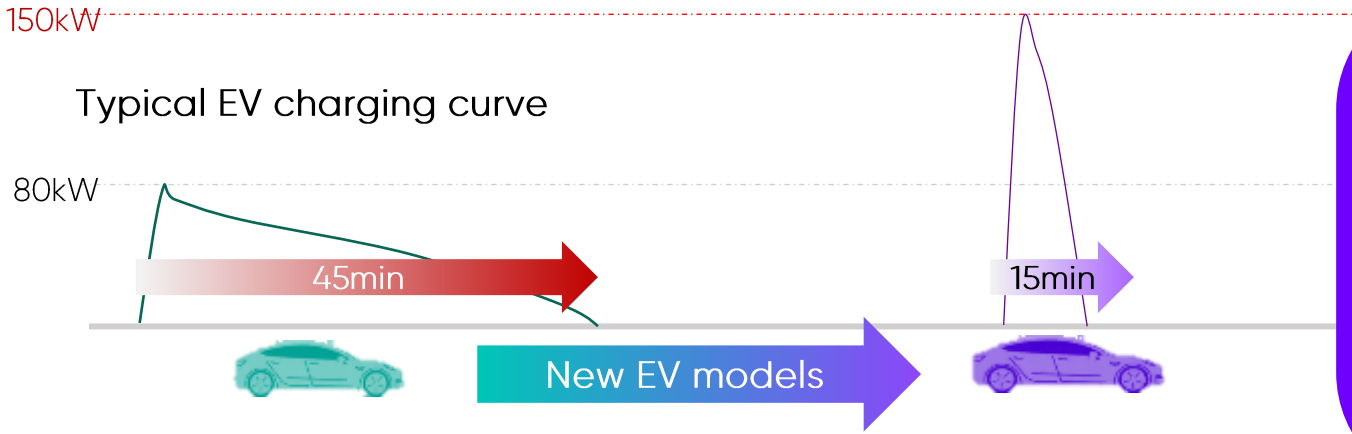
THE GAP

Ultra-fast charging requires **HUGE** power surge, but existing grid is power-limited.

Grid upgrades are costly, complex and cannot be executed at required pace

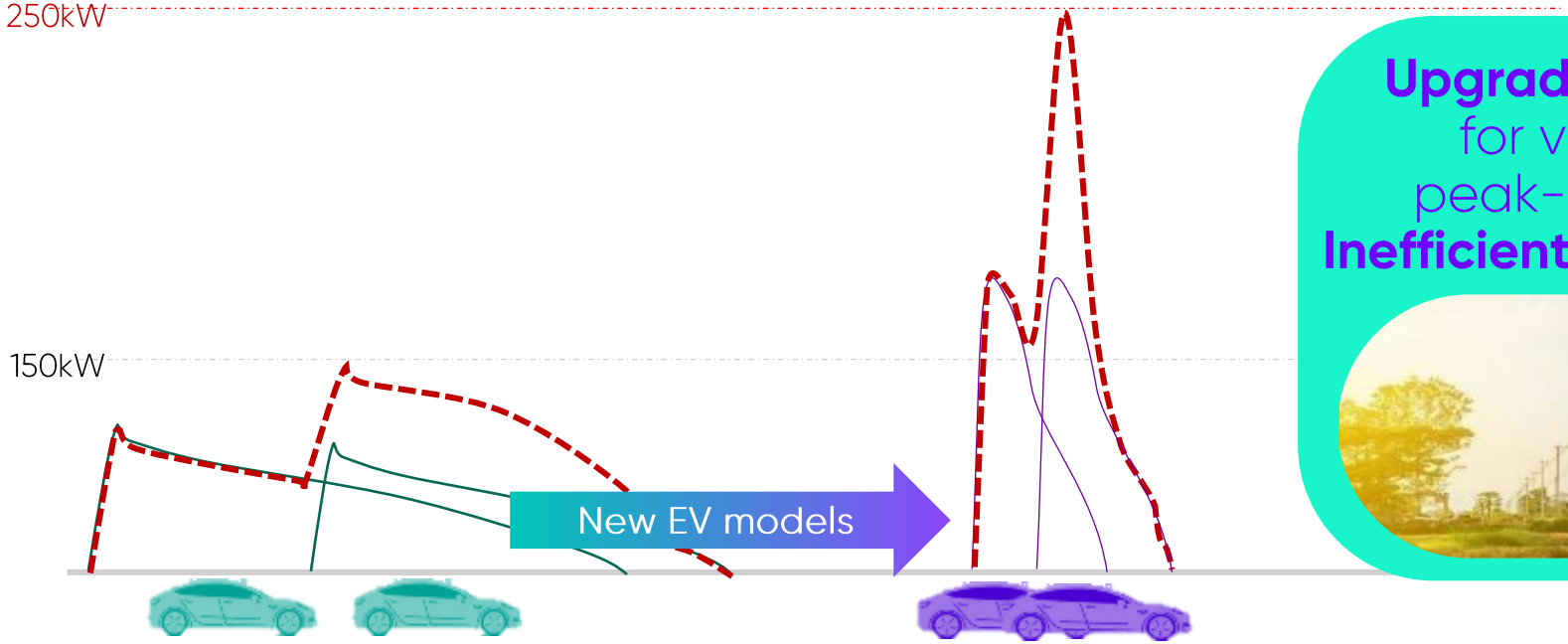
New EV Models Are Changing the Demand Profile

charging pattern of a single EV



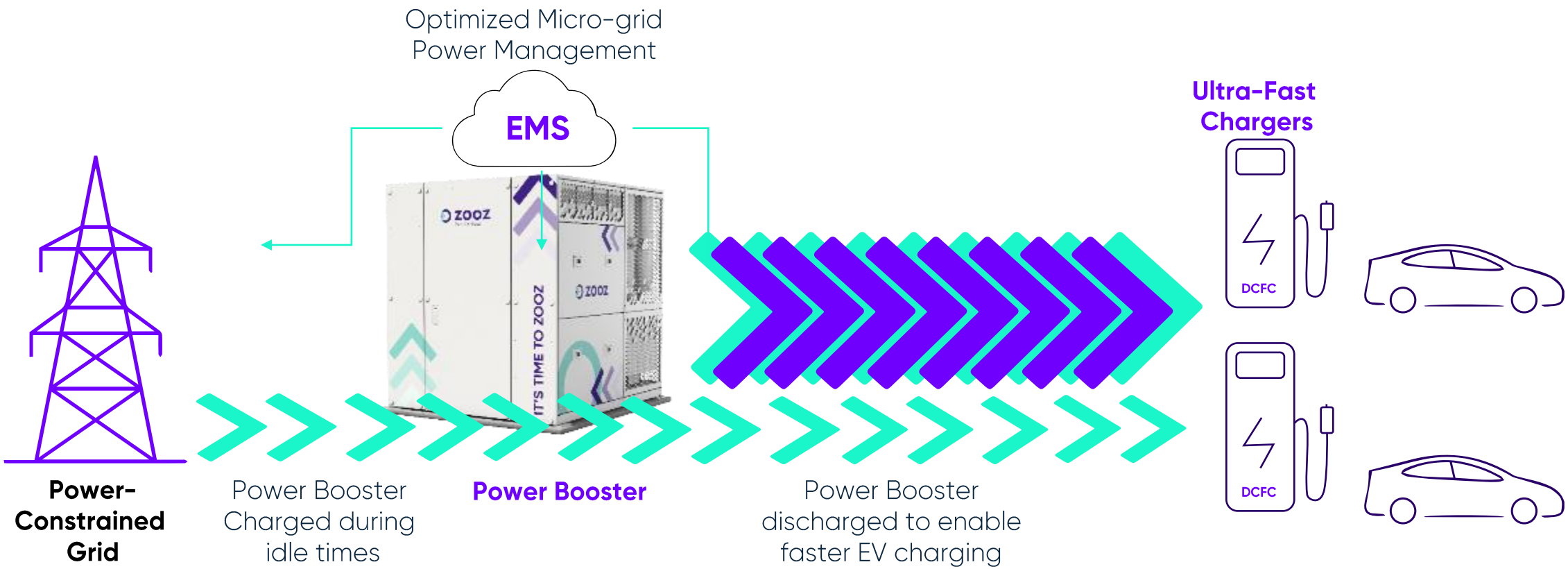
Ultra-Fast Charging – A power challenge
(rather than energy-limited)

charging pattern of multiple EVs



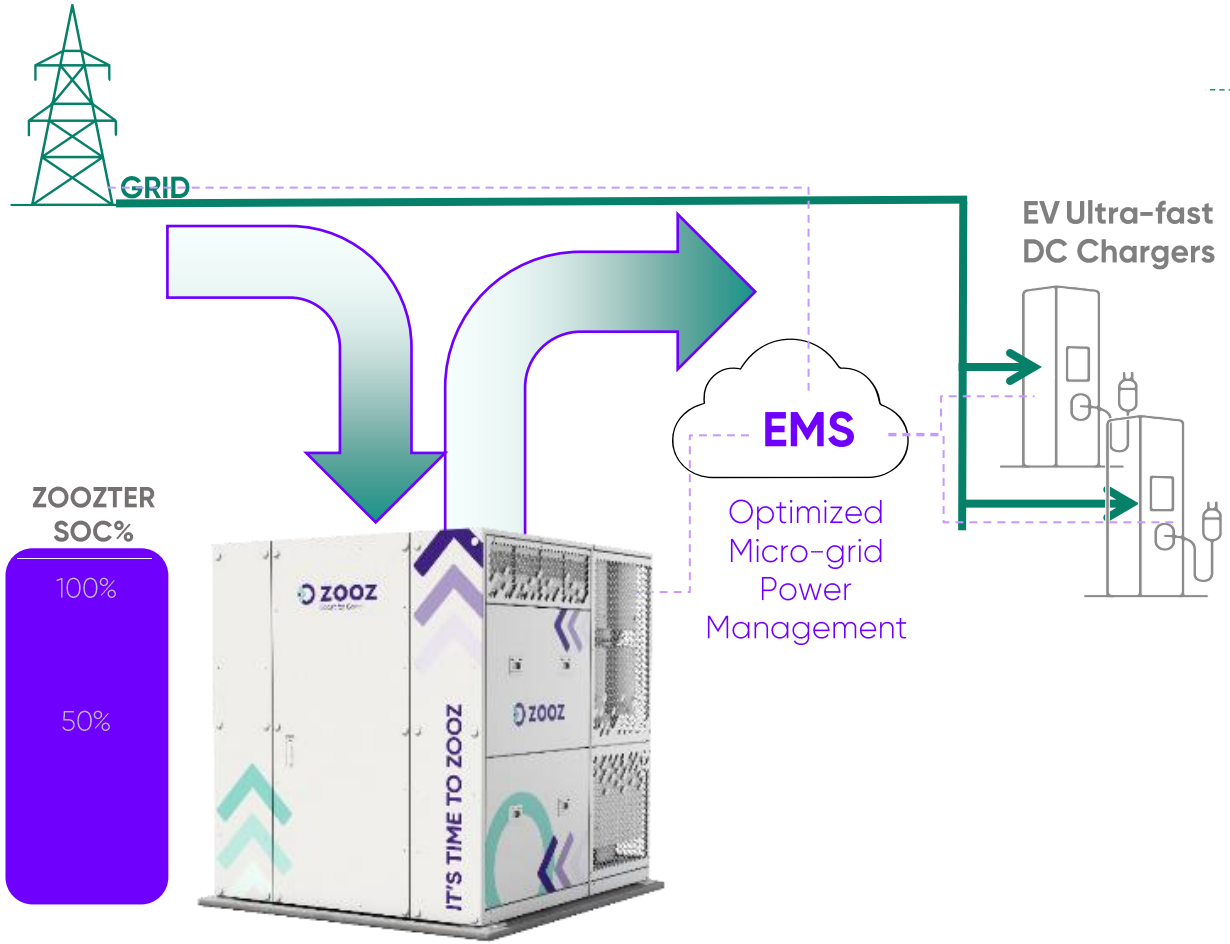
Upgrading the grid for very short peak-demand is **Inefficient & Impractical**

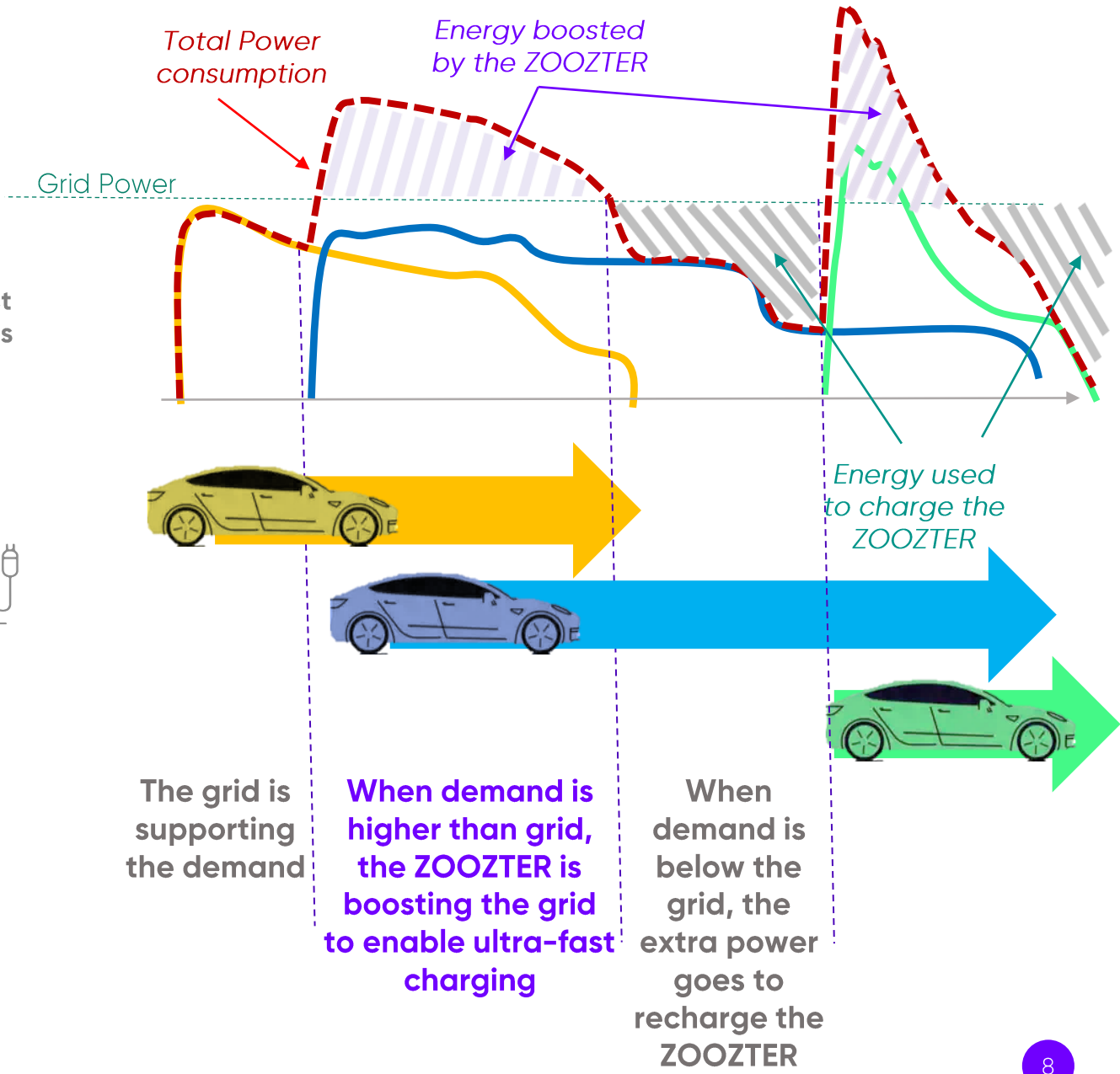
Enabling Widespread Ultra-Fast Charging. Today.



Enables Ultra-Fast Charging, even at power-limited grid

The Boosting Cycle





ZOOZTER™-100 – All-in-one Integrated System

- Complies with CE and UL applicable standards
- Agnostic to grid and charger vendor
- Quick site integration
- Flexible re-deployment

Flywheel-based Power Boosters vs. Li-ion Batteries Energy Storage

Performance & Cost over lifetime

Li-ion suffer from rapid aging, and performance degradation & significant variation in different environment conditions

ZOOZ FW allows >200,000 cycles, over 15 years lifespan, and operates agnostically to wide range of env. conditions.

Environment

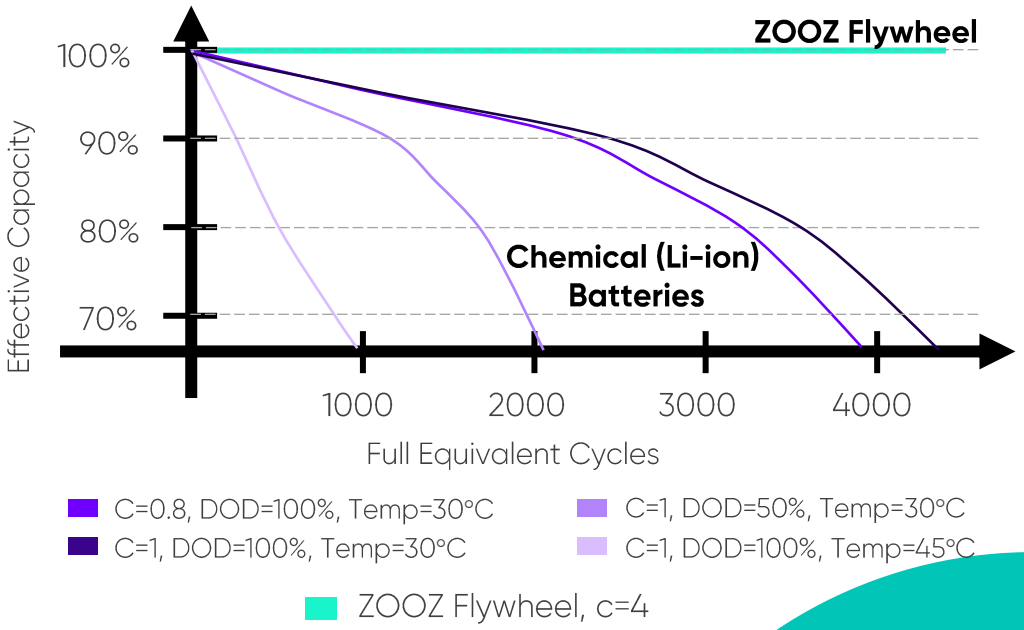
Li-ion – generates recycling Costs & Environmental footprint

ZOOZ Flywheel is environment-friendly and recyclable

Safety

Li-ion is flammable, based on toxic materials, causing safety hazards & limitations,

ZOOZ Flywheel is inherently safe, non-toxic, non-flammable



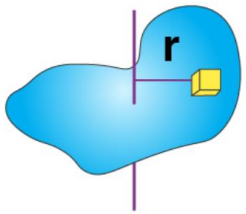
ZOOZ Flywheel technology – Optimized & a better fit (than Li-ion Batteries) **to EV ultra-fast charging use case**

ZOOZ

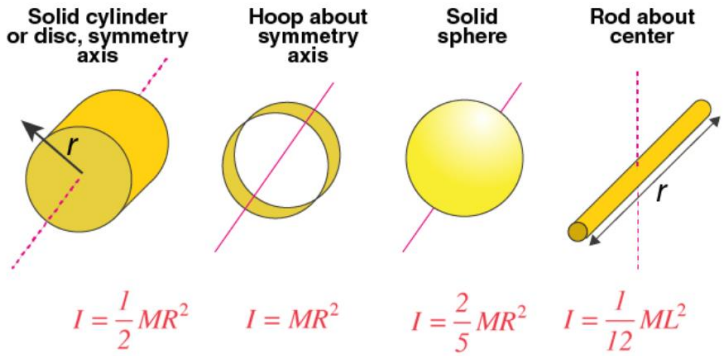
Intro to flywheels

$$E = \frac{1}{2} I_z \omega^2$$

$$I_z = \iiint \rho(x,y,z) \|r\|^2 dV$$



Typical Moment of Inertia



Few misconceptions…

1. Use heavy material (tungsten , depleted uranium…)
2. Ring is better than a solid cylinder

The real answers :

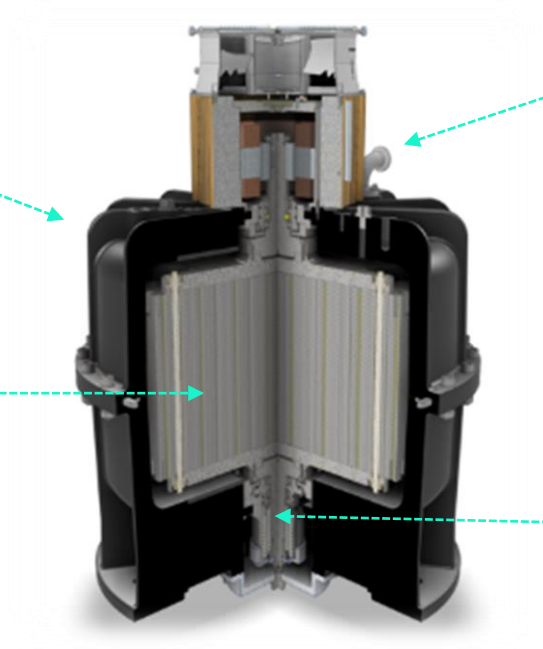
1. The important number is specific strength: strength/density
2. Stress in a ring is much higher (~ factor of 2.5) compared to a cylinder. Using a ring is advantageous only in highly anisotropic materials

ZOOZ Revolutionary Flywheel Technology

Cast Steel Housing
- Sealed to hold vacuum

High-Strength Steel Rotor
- 0.5 Ton rotor balanced at a precision level of a small Gyro.
- Inherently safe by design
- Cost-effective, recyclable
- Proprietary manuf. process geared to high-efficiency mass production

ZOOZ Flywheel



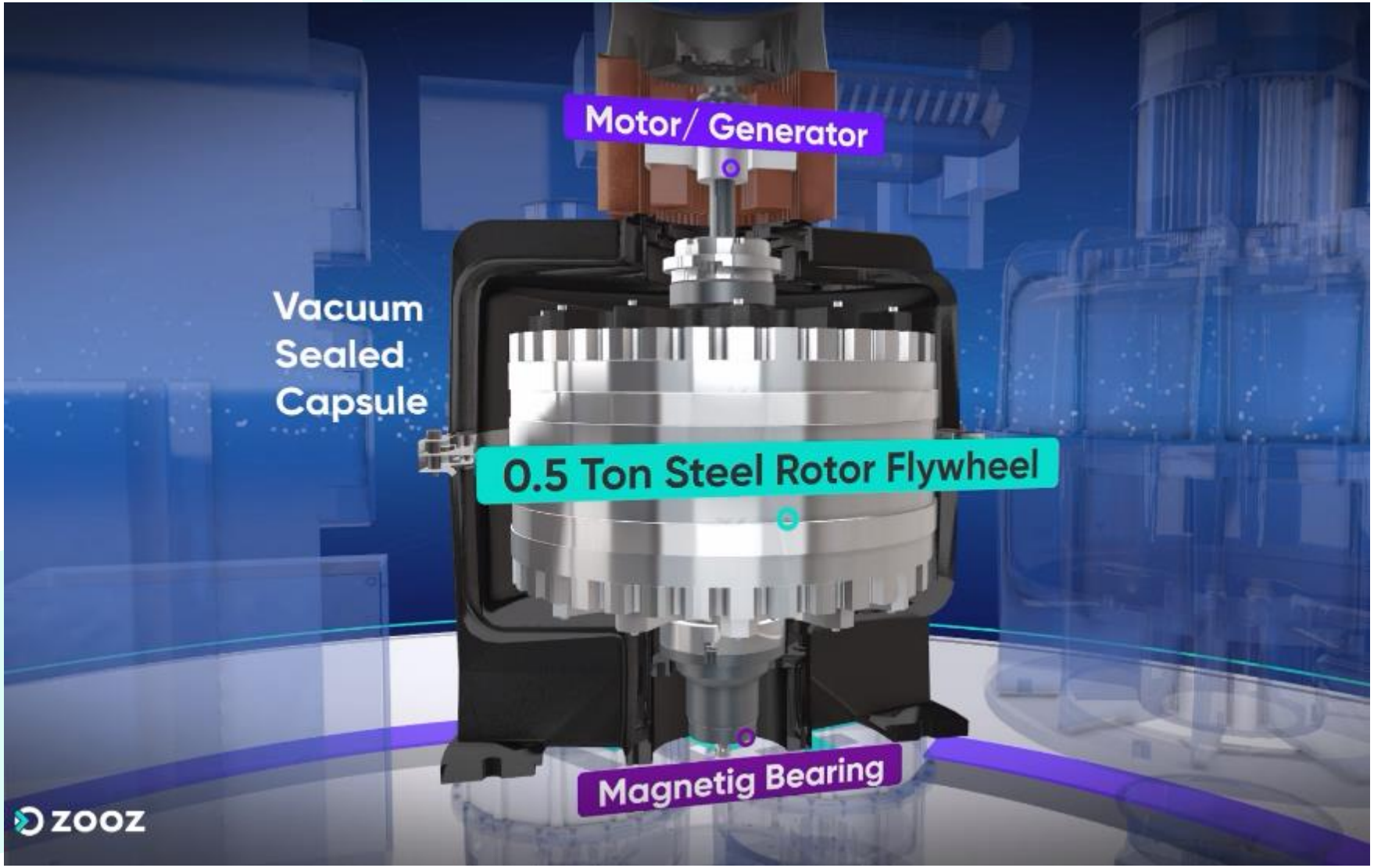
Proprietary Motor/Generator
- Unique high-speed, high-power, air-cooled, running in vacuum
- High efficiency, High reliability

Negligible Friction Configuration
- Magnetic Bearing - 3rd generation Halbach array
- Rotation in vacuum environment – minimizing air friction

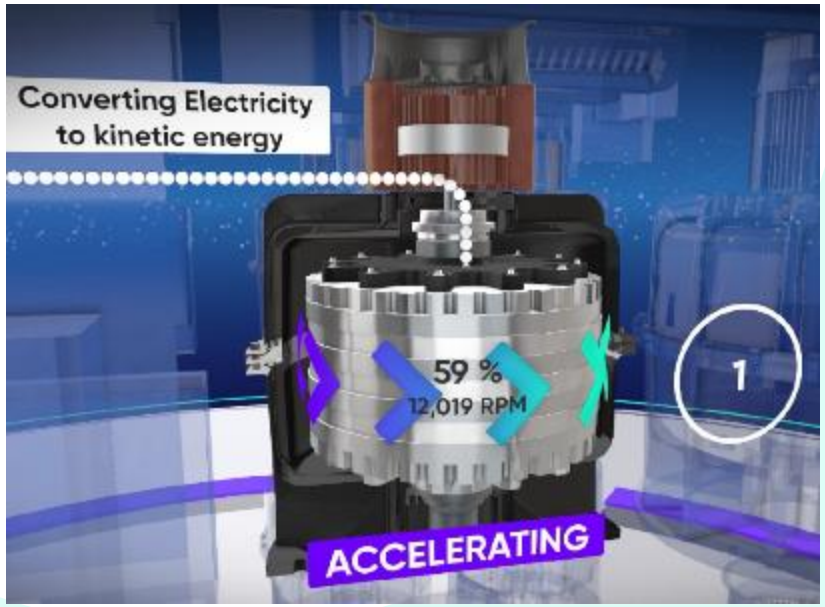
Energy: 4.7kWh
Power: 12.5kW/15 min.
Weight: 650 kg
Speed: 17,000 RPM

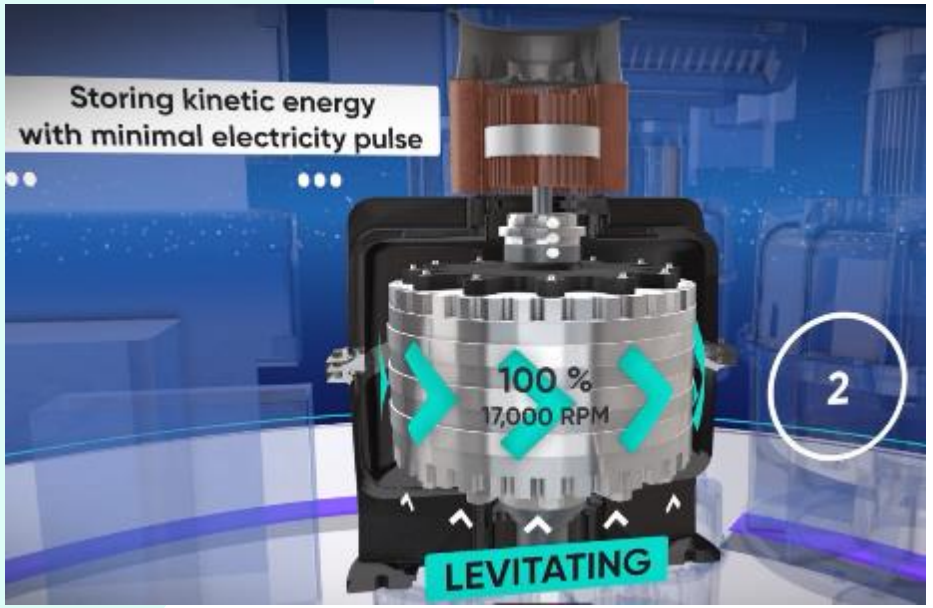
Highly-mature, proven, unique Flywheel
- 26 registered patents + 2 pending

ZOOZ Flywheel – Mechanism of Action



ZOOZ Flywheel – Mechanism of Action





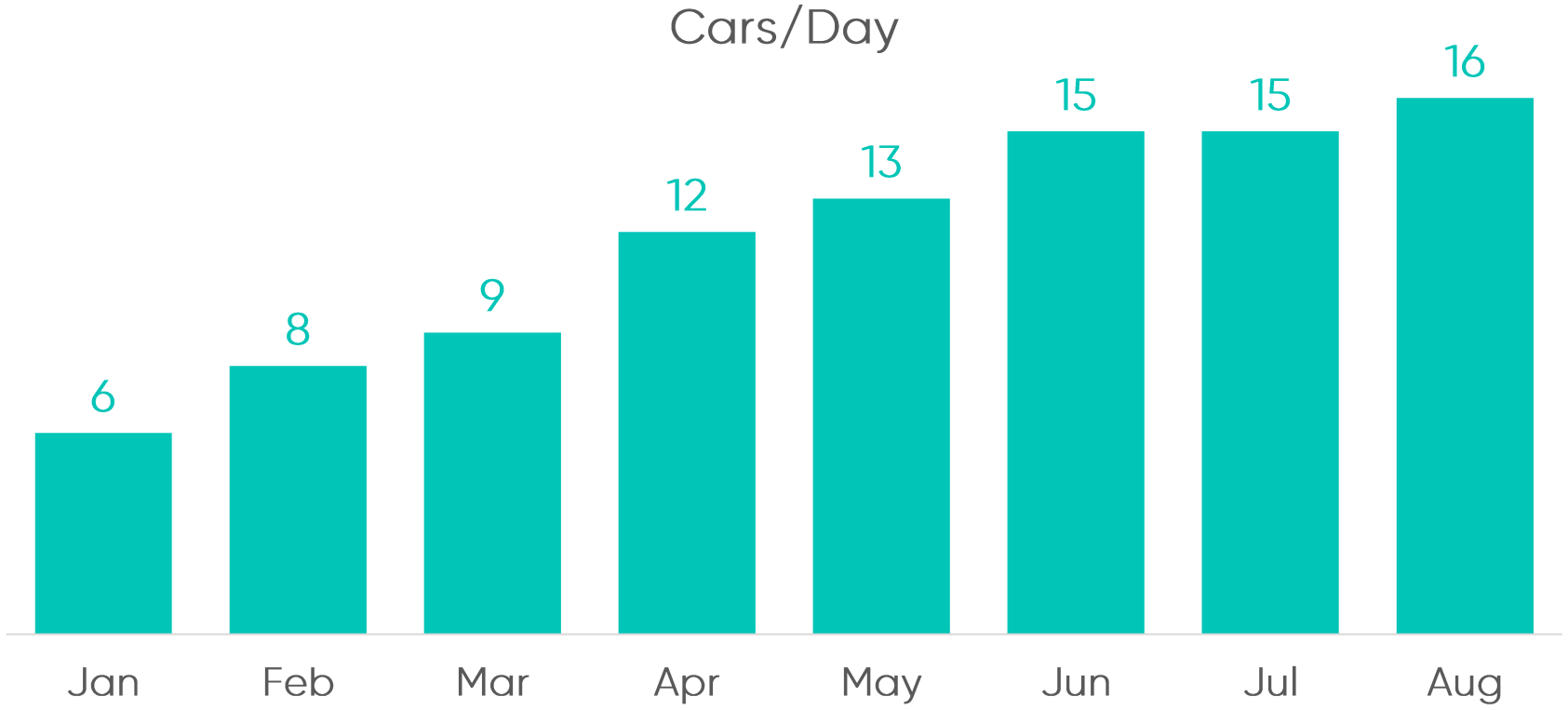
ACCELERATING
=
CHARGING
(converting electricity to)
Kinetic Energy

LEVITATING
=
STORING
Kinetic Energy

DECELERATING
=
DISCHARGING
Kinetic Energy
(converted to electricity)

Enabling Ultra-fast charging and increased utilization

- Operational since late December 2022
- Rapidly growing utilization, in just a few months:
  - Peak of 26 cars/day,
  - Average of 16 cars/day




Thank you !
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