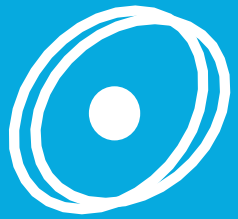

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Boosting eMobility Anywhere


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Boosting eMobility Anywhere

EV revolution is in the fast lane

EV mass adoption factors

PRICE: same as ICE cars

RANGE: 400km and above

CHARGE TIME: 15 minutes and below

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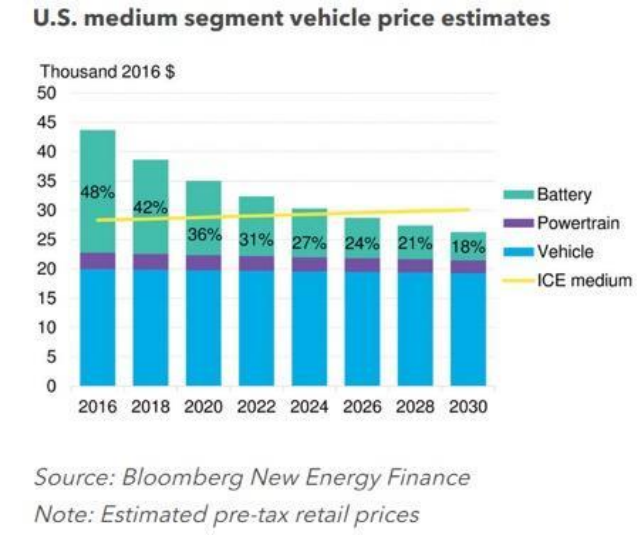
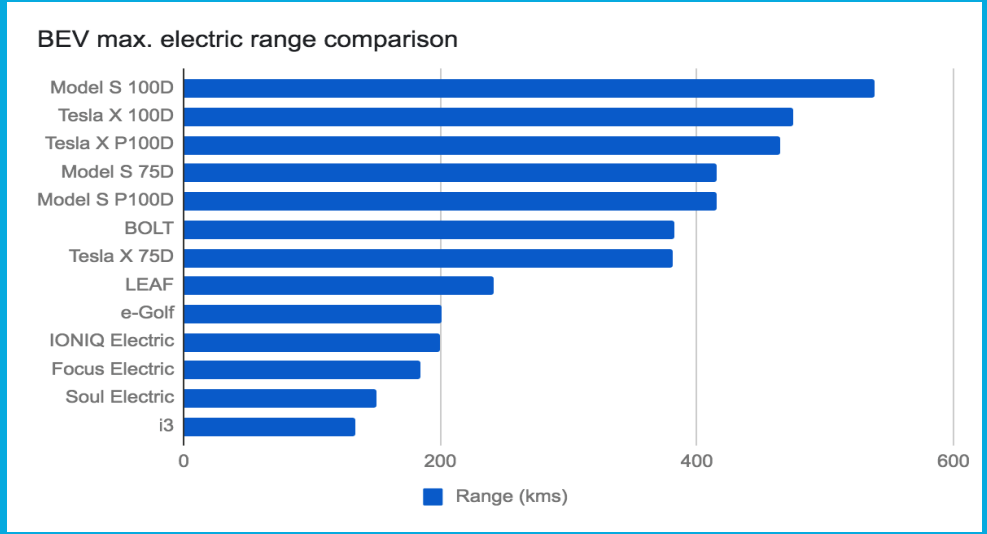
2024: Tipping Point

EV price as ICE





Battery Range Increasing

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Fast Charging – Key Factor

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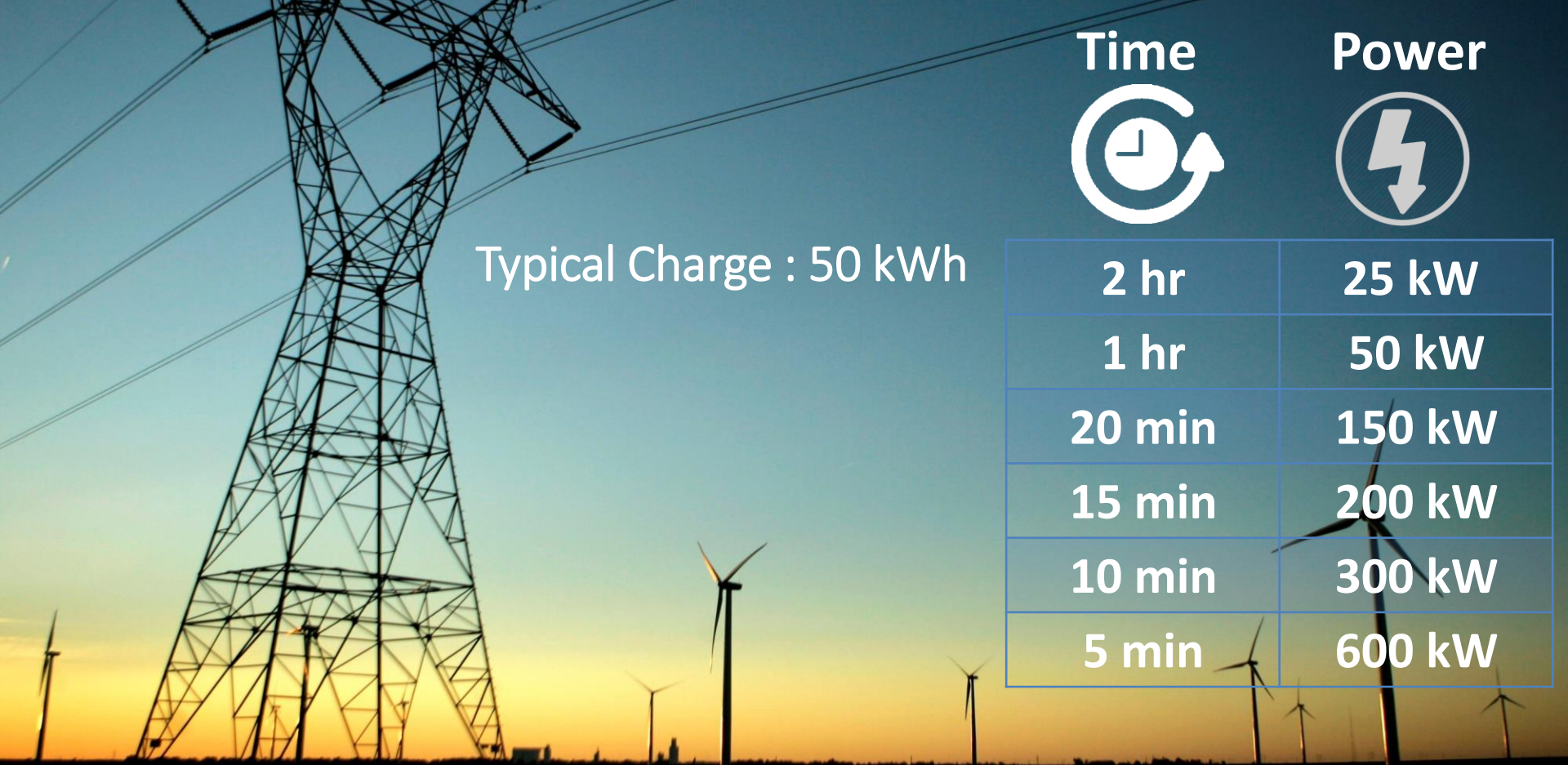

Typical Charge : 50 kWh

Time	Power
2 hr	25 kW
1 hr	50 kW
20 min	150 kW
15 min	200 kW
10 min	300 kW
5 min	600 kW

Fast Charging in Numbers

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You won't find a fast charger here
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DISTRIBUTION GRID CANNOT SUPPORT FAST CHARGING

Fast Charging create large peaks in electrical power demand

- Existing distribution infrastructure cannot support fast charging
- Causes disturbances in the local power grid

Fast Charging is possible only where enough power is available

- near high voltage lines (transmission grid)
- leaving most roads without viable fast charging options

The Solution - Local Energy Storage

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Local Water Power Booster

Slow Charge = Weak Grid

Storage

Fast Release

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ENERGY STORAGE FOR EV CHARGING

A KEY ENABLING TECHNOLOGY

- Reduces charging times and lowers customer “range anxiety”
- Improves grid stability
- Defers infrastructural upgrades to the utility
- Improved business case for EV owners and CPO
- Reduces demand charges incurred by the customer
- Reduces the carbon footprint of the charging station

(source: Navigant Research)

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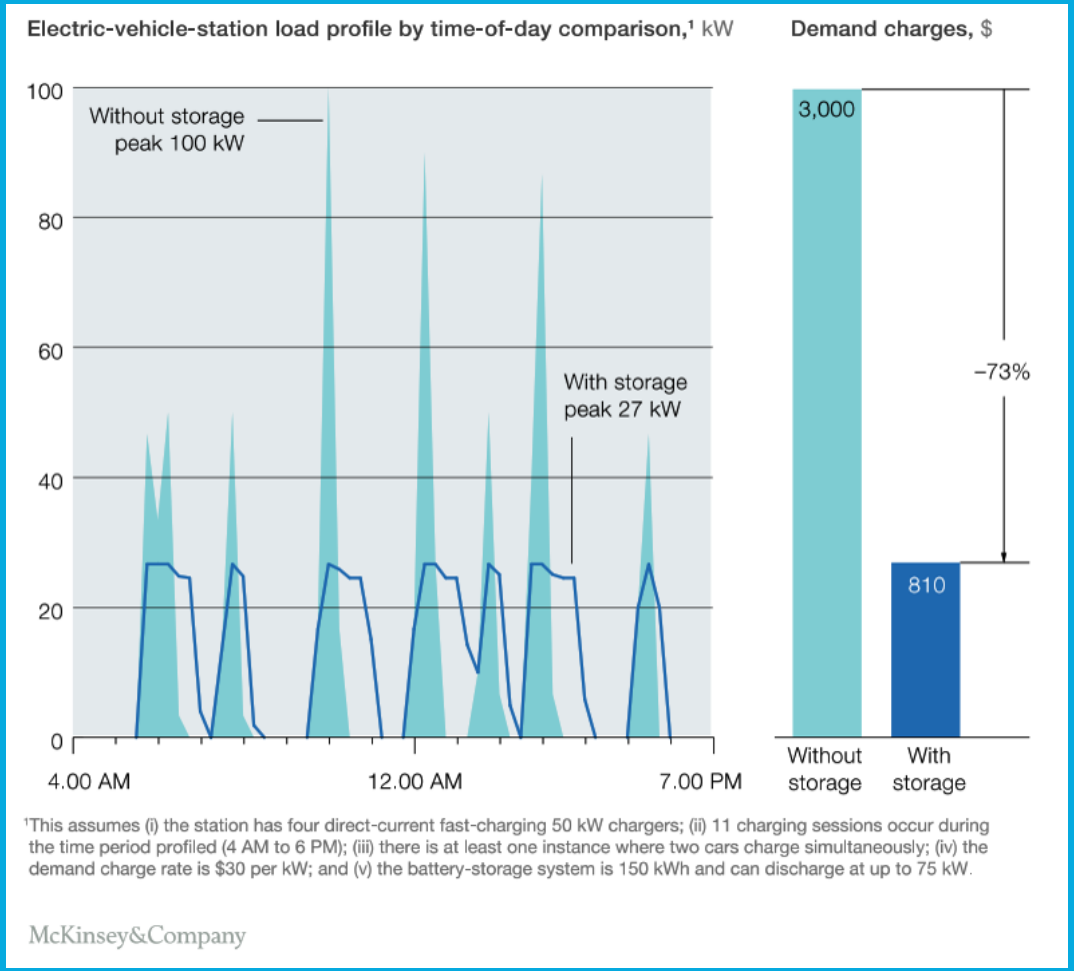
EV CHARGING w. local Storage

No storage – 100kW from grid

With storage – 27kW from grid

- **No upgrade is needed**
- **No demand charges**



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Which Storage Technology

Batteries or Flywheels

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Chakratec’s Kinetic Storage Technology

- Patented flywheel concept
- Unlimited charging cycles
- Low cost per cycle
- High power to energy ratio
- Sustainable, no chemicals
- 20 years lifespan with no degradation

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Chakratec Kinetic Battery - Superior Economics

Positioning Chart

Most of the market is here !

Public Charging Requires A Lot Of Charge Cycles

	Li-Ion	Chakratec
COST	300 $ / kWh	2,000 $ / kWh
Cycle Life	2,000	100,000
Cost / Cycle / kWh	0.15 $	0.02 $

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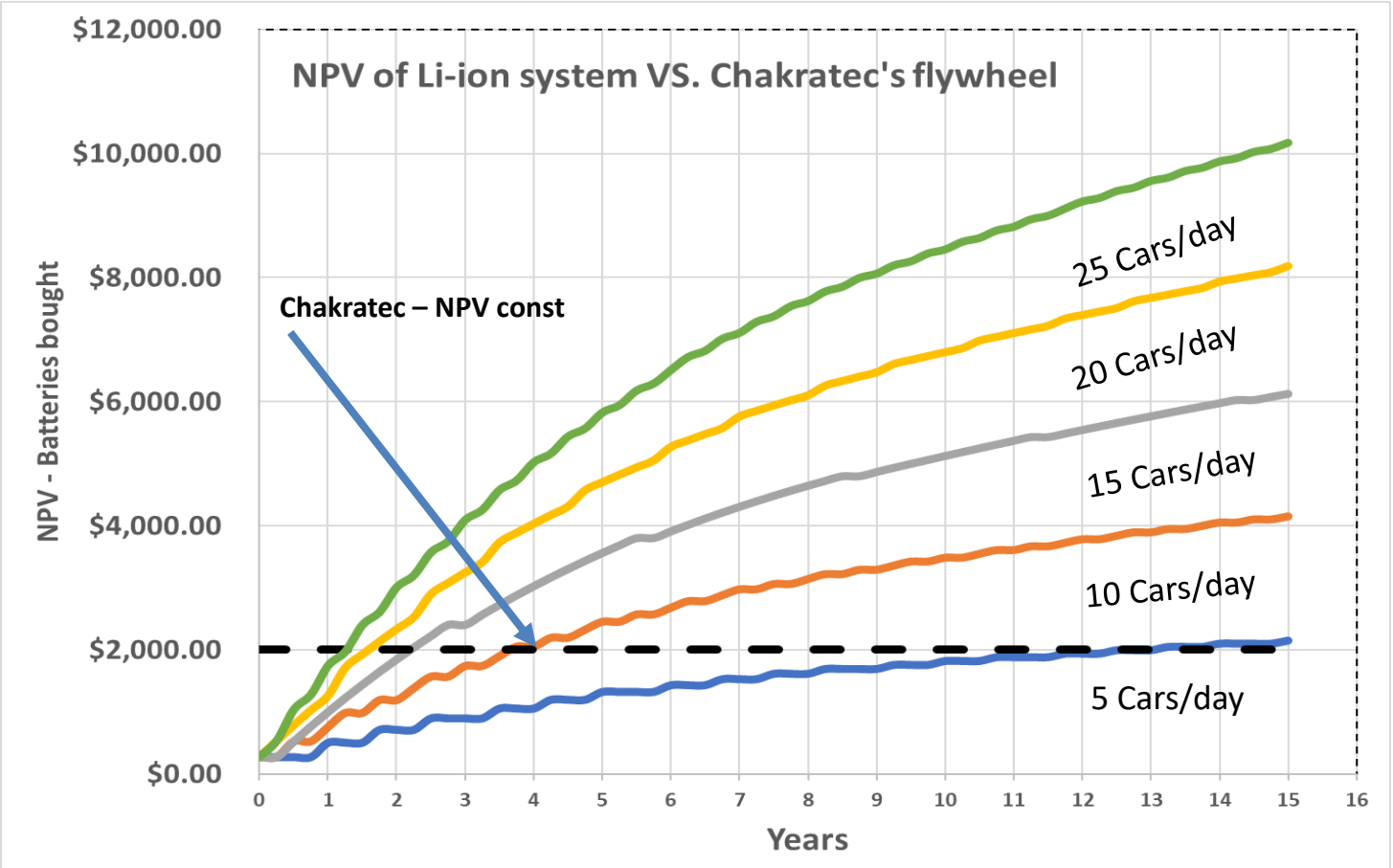
A full NPV model (included interest and battery cost reduction over time)



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Superior Environmental Edge

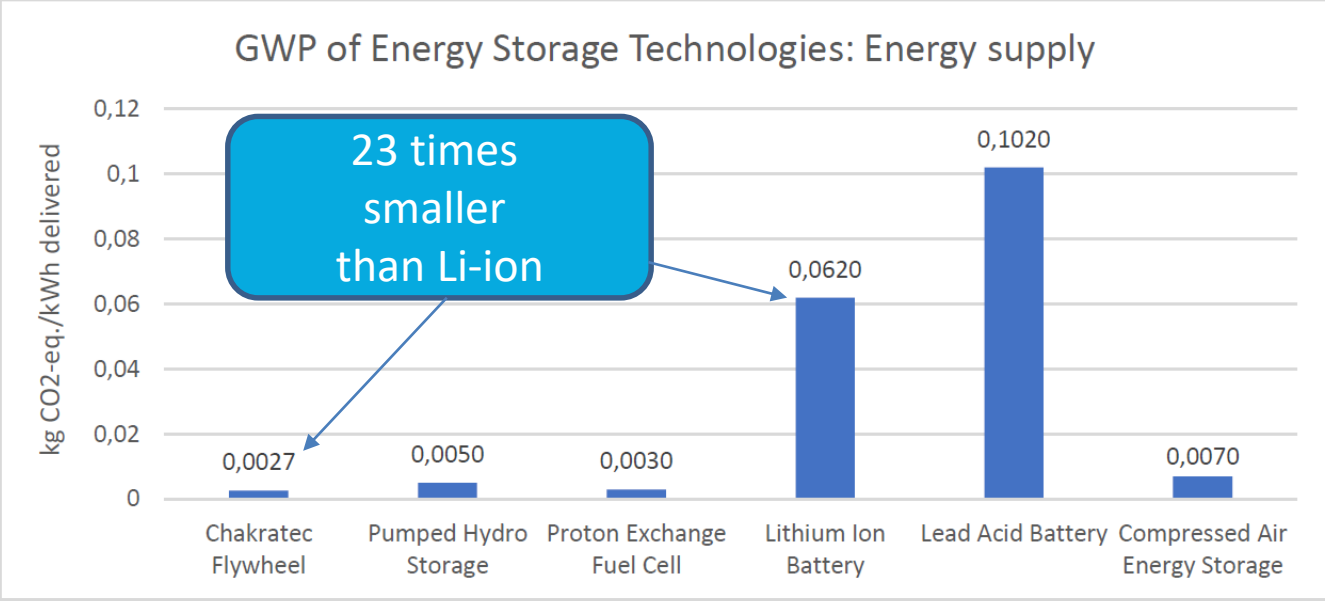
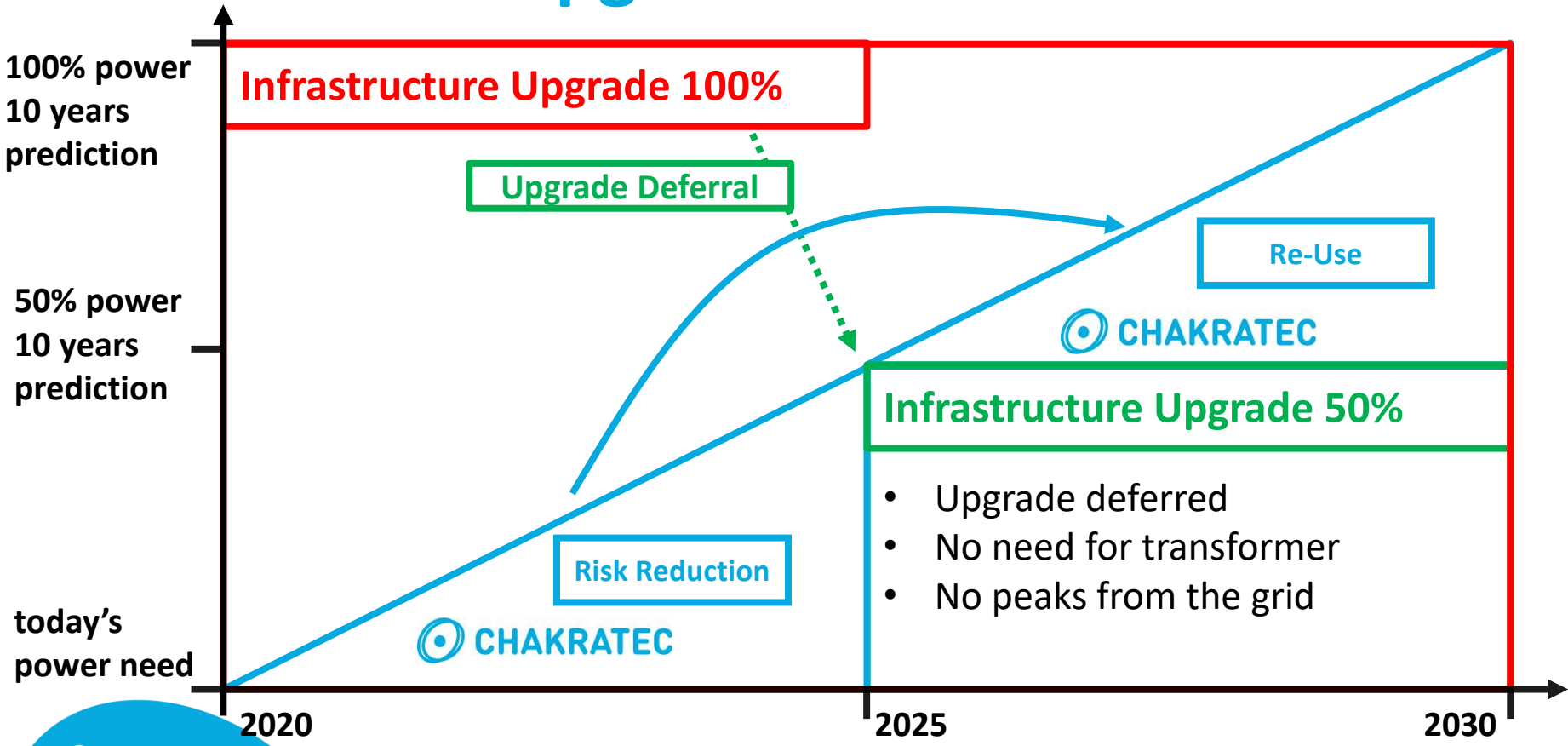


Figure 5: GWP of manufacturing and EoL of Chakratec Flywheel (this study) compared to different energy storage technologies (Oliveira et al. 2015). The FU is 1 kWh delivered energy over the life cycle.

Infrastructure Upgrade Deferral



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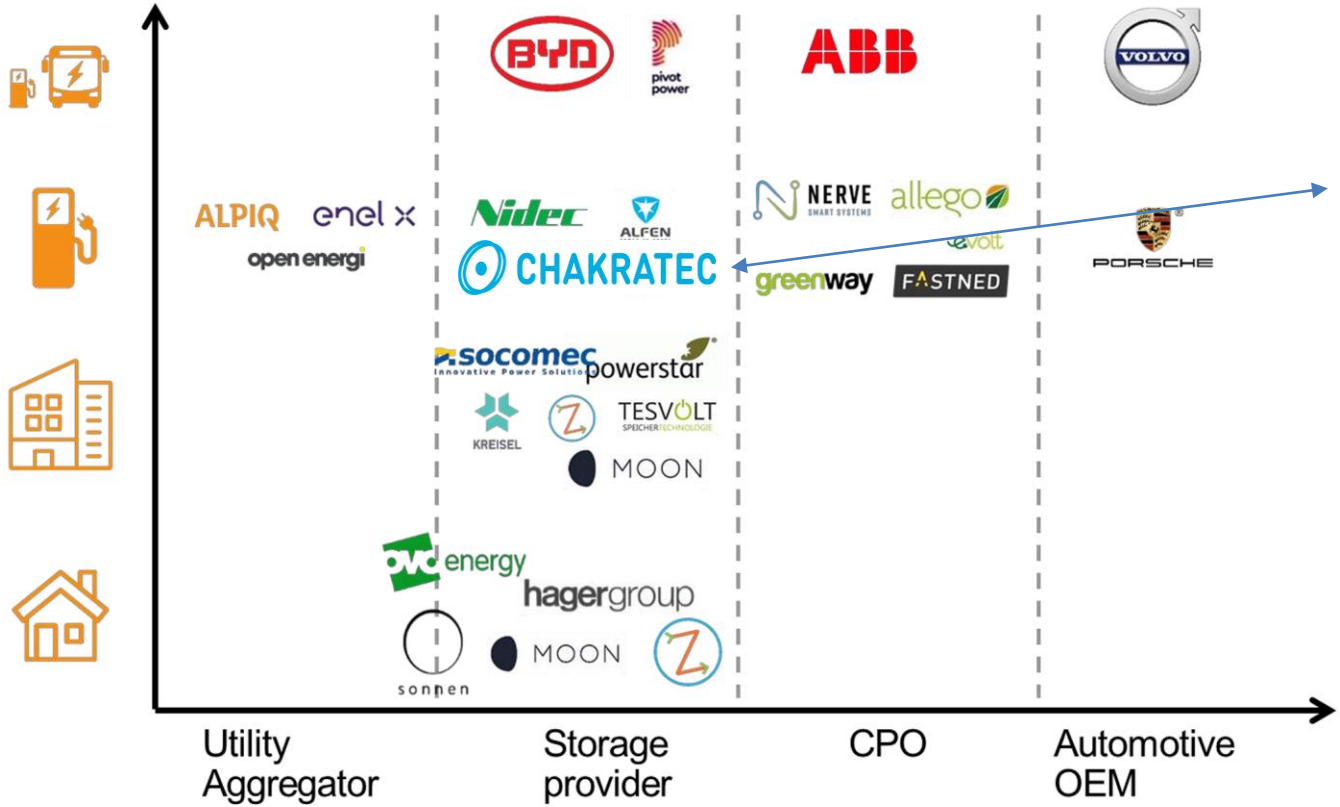
Companies active in co-locating storage and EV charging

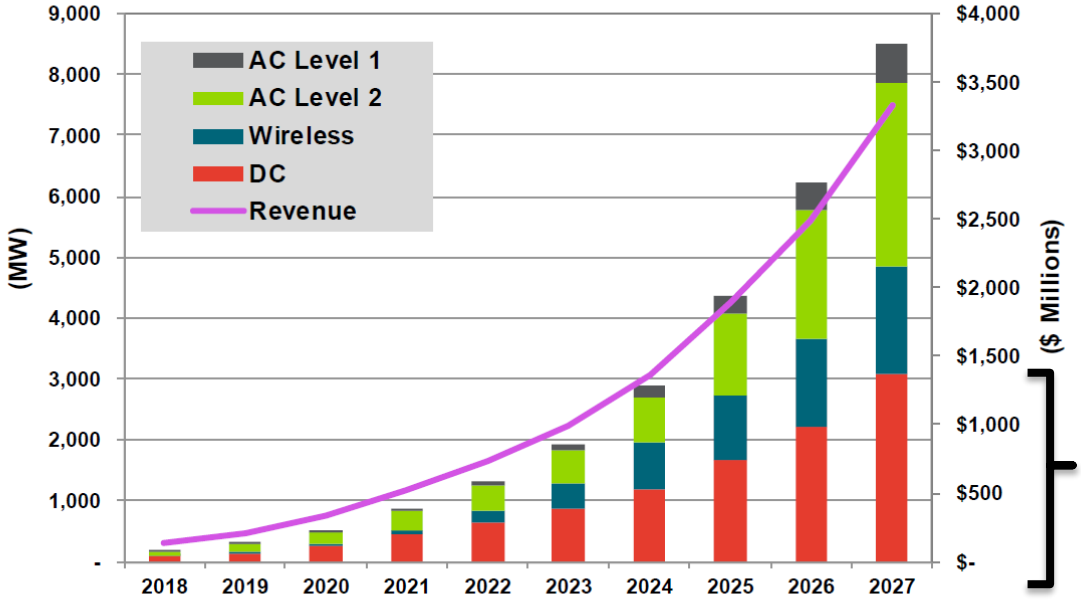


The only Kinetic storage company

(Source: **Delta** Energy and Environment)

Market for Storage for EV charging ~ 1.5B USD in 2027

Chart 4-3. Energy Storage Power Capacity and Revenue by Charger Power Level, World Markets: 2018-2027



(Source: Navigant Research)

In 2027:

- **Total storage market for EV charging ~ 3.5B USD.**
- **Heavy duty/High power storage for DC chargers ~ 1.5B USD**

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Kinetic Charging Anywhere

Unlimited charging cycles
Sustainable – no chemicals
20 years lifespan with no degradation

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Projects Status 2019

ŠKODA **CZE** Fast EV Charging

enel X **ITA** Fast EV Charging

WIEN ENERGIE **AUT** Fast EV Charging

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Let’s have a look inside

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Kinetic Power Booster : KPB 50

Grid	**: 50 kW**
KPB max power	**: 90 kWp**
KPB nom power	**: 50 kW**
EV charge power	**: 100 kW (15 minutes)**
Size (W x L x H)	**: 12’ container**
Availability	**: today**

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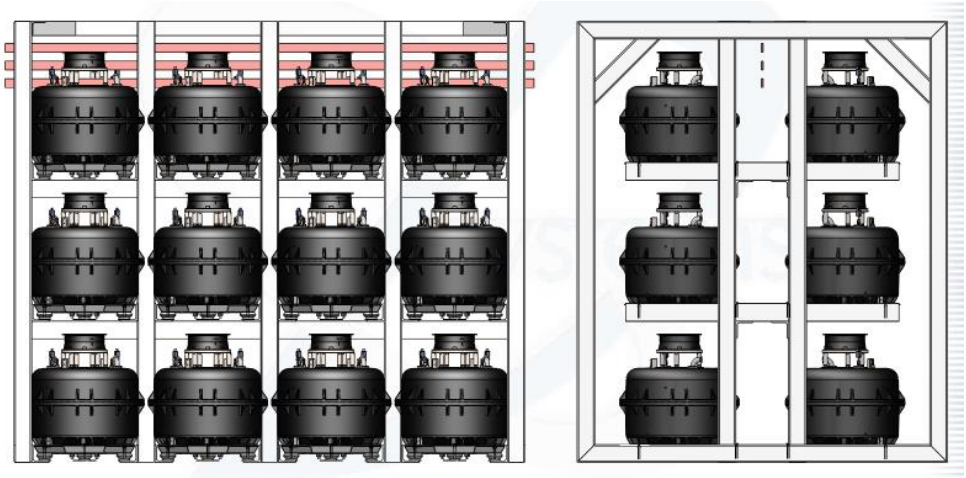
Kinetic Power Booster : KPB 130



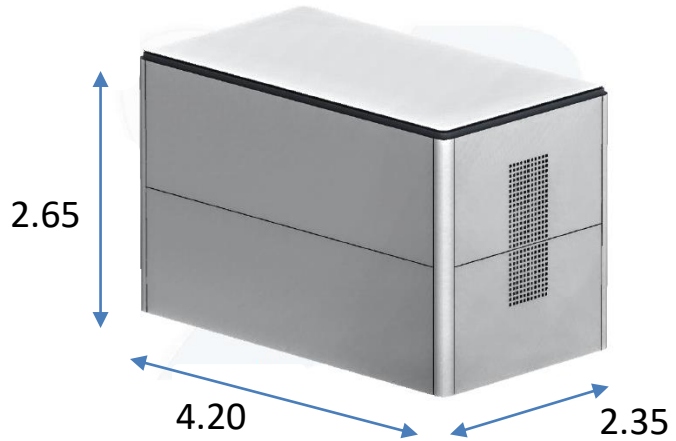
Grid	**: 50 kW**
KPB max power	**: 210 kWp**
KPB nom power	**: 130 kW**
EV charge power	**: 180 kW (15 minutes)**
Size (W x L x H)	**: 10’ enclosure**
Availability	**: Q2/20**

Same volume as current system

2.5 times the power and capacity

L x W x H : 4.50 x 2.35 x 2.65 m

Weight : 10,000 kg



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Who We Are

- Founded in 2013
- Experienced management team
- 20 employees - leading engineers
- Winners of the prestigious NREL prize 2018
- $10M raised
- Now raising $15M ($8M already secured)

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Join the ride…

Projects
Partners
Distributors
Representatives
Funding

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Thank you

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