

A wide-angle photograph of a city street. In the foreground, a road with white dashed lines and yellow markings runs through the center. Lush green trees line both sides of the road. In the background, a dense skyline of modern skyscrapers is visible under a clear sky. A traffic light and a street sign are visible on the left side of the road.

skeleton<sup>+</sup>

Rebuilding industry  
for a **net-zero** future.

The high power energy storage company.



# A Pan-European Company

European value chain, European energy storage innovation

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## Tallinn, Estonia

- Software development
- Electronics engineering
- Module & system development



## Berlin, Germany

- Sales & application engineering
- Grant & IP management
- Solid-state battery development



## Großröhrsdorf, Germany

- SuperBattery R&D and production
- Supercapacitor research & development center
- Main production location from cells to systems



## Varkaus, Finland

- SuperBattery pilot production
- Electrode manufacturing



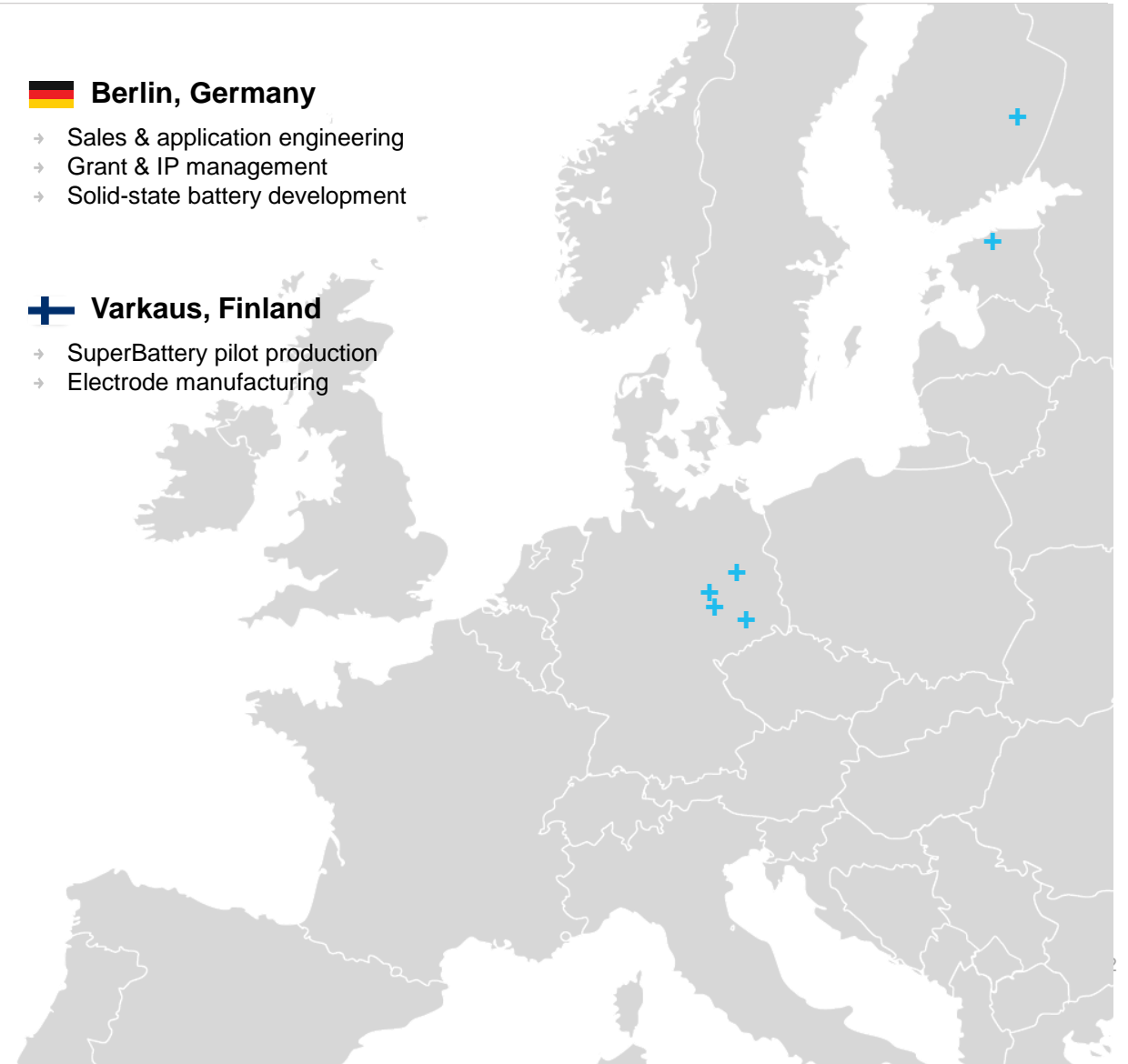
## Markranstädt, Germany

- The largest and most modern supercapacitor factory in the world
- Start of production in 2024



## Bitterfeld-Wolfen, Germany

- Curved Graphene synthesis and production
- Material pilot & development plant
- Solid-state material research



# Technological Advantage Through Superior Carbon Raw Material

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Backed by the largest R&D team in the industry

## Li-ion Batteries

use a chemical reaction to store energy

 Slow

- + Limited power density (0.5 kW/kg)
- + **High energy density** (205 Wh/kg)
- + Limited cycle life (<3000)
- + Slow charge rate (1.5 C)
- + Safety concerns
- + Lithium, nickel, cobalt

## Supercapacitors

use an electric field to store energy

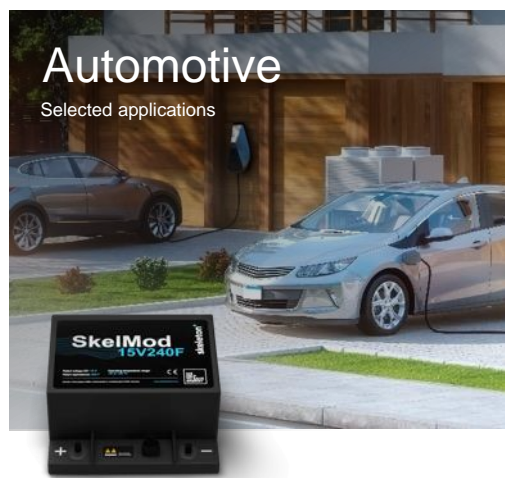
 Fast

- + **High power density** (up to 60 kW/kg)
- + Limited energy density (up to 16 Wh/L)
- + Extreme cycle life (>1 million)
- + Extremely fast charge rate (2000 C)
- + High inherent safety
- + No rare metals

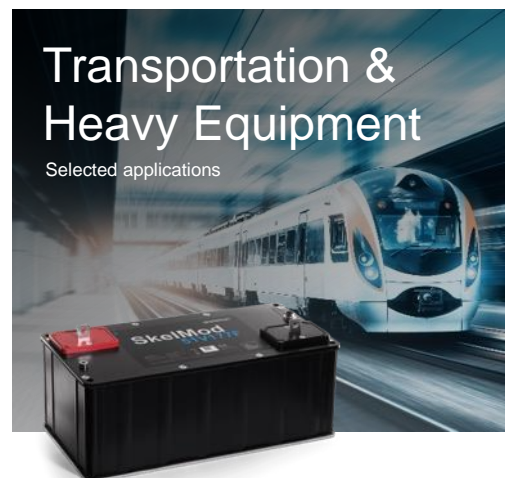
# Key Enabling Technology to Power Electrification Across Industries

A qualified supplier & system provider to industry leaders

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- Fuel cell power support solutions
- 48V active suspension
- KERS / Push-to-pass
- 12V board net stabilization & back-up solutions



- KERS for light rail
- Engine start
- Mild hybrid bus energy storage
- Fuel cell power support solutions for rail and bus transportation



- Wind turbine pitch control
- Virtual inertia / Grid forming in STATCOMs
- Microgrid power back-up and quality
- Backup power for medical equipment



- Peak load shaving to cover short-term peak power demands
- KERS for port cranes, forklifts, and elevators
- Fast-charging for warehouse AGVs and shuttles



Hitachi Energy



MITSUBISHI

MEDCOM

ATTABOTICS



# Backed by a Strong Investor Base – Over 300M EUR of Capital Invested

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Committed to supporting the company becoming a global market leader by 2024

**Marubeni**

**SIEMENS**

**HARJU ELEKTER**

**eit** InnoEnergy  
Knowledge Innovation Community

FIRSTFLOOR CAPITAL

**MMG**  
MM GRUPP

Co-founder of

**adyen**

Founder of

**CTEK**  
MAXIMIZING BATTERY PERFORMANCE

Co-founder of

**wise**

“Enabling carbon-neutral electrification is a key priority for us and Skeleton Technologies fits in our portfolio perfectly. The company has **validated its competitive advantage** in real-life applications and has shown **strong commercial traction.**”



**Masayuki Omoto**

COO, Next Generation Business Development  
Marubeni Corporation



# Led by a World-class Management Team of Industry Veterans

Energy storage experts, entrepreneurs, and experienced leaders

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## Oliver Ahlberg

Chairman of the Board

- Co-Founder of Skeleton Technologies
- Successful exits in e-commerce and digital marketing



## Taavi Madiberk

CEO

- Co-Founder of Skeleton Technologies
- Member of the board in the European Innovation Council
- Former Chairman of the Supervisory Board of Estonian Railways



## Dr. Linus Froböse

CTO

- PhD in solid-state batteries from Technische Universität Braunschweig
- Previously Head of operations at Vitesco Technologies, and Head of Manufacturing Technology Battery and Electric Engines at Continental



## Tobias Hüppe

COO

- Long experience in the automotive and battery manufacturing industries
- Formerly Senior Director of Manufacturing at Northvolt, Plant Manager at Faurecia Interior Systems



## Grischa Sauerberg

CCO

- 23 years at Shell, most recently as VP of Sectoral Decarbonization & Innovation, driving the decarbonization of the mining sector, new sector development, and Shell's innovation roadmap.
- As General Manager Customer Operations at Shell, Grischa lead ca. 1000 staff across Europe, Russia, and Africa in sales & marketing



## David Arsenault

SVP Business Development

- 15+ years of experience with supercapacitors and heavy-duty vehicle hybridization and electrification as founder of Effenco, acquired by Martinrea
- PhD in Mechanical Engineering from École de Technologie Supérieure in Montréal, Canada



## Arnaud Castaignet

VP Government Affairs & Strategic Partnerships

- Previously Head of Public Relations for the Republic of Estonia's e-Residency programme and as a Communication Officer for the French President François Hollande.
- French Foreign Trade Advisor, appointed by the French Prime Minister, a senior fellow at Open Diplomacy, a French think tank where he contributes on European affairs, innovation, industry, and energy issues.



## Dr. Jaan Leis

Materials Science Consultant

- Co-founder of Skeleton Technologies  
PhD in Theoretical and Computer Chemistry from University of Tartu, Estonia
- 20+ years in nanomaterials research and co-author of more than 65 peer-reviewed research articles and 20+ patents in the fields of nanoporous carbon and energy storage.



## Dr. Anti Perkson

Materials Science Consultant

- Co-founder of Skeleton Technologies
- PhD in Theoretical and Computer Chemistry from University of Tartu, Estonia
- 20+ years in nanomaterials R&D, co-author of 20+ peer-reviewed research articles and 10+ patents in nanoporous carbon and energy storage.
- Previously CEO and R&D Director of Silmet AS

# From Single Cells to Full Energy Storage Systems

The only full value-chain manufacturer on the market

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## Raw Material

Curved Graphene

## Single Cells

300-5000F  
Industrial supercapacitors

## Industrial Modules

From low to high voltage needs  
Supercapacitor modules with smart  
balancing and management systems

## Systems

MWs of immediate power  
Modular, supercapacitor-based  
energy storage systems

# Technology Advantage Throughout the Entire Energy Storage Industry

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Highest performance and quality for every energy storage application, powered by Curved Graphene



## SkelCap supercapacitors (Gen 1)

- 4x power density compared to competitors
- High power (up to 60x compared to batteries)
- 1,000,000+ lifecycles
- Ultrafast charging times (<1 s)



## Graphene supercapacitors (Gen 2)

- +72% increase in energy (16 Wh/L), while maintaining high power
- 1,000,000+ lifecycles
- Ultrafast charging times (<1 s)
- Increased efficiency & lower footprint



## SuperBatteries

- High energy density (65 Wh/kg)
- 50,000+ lifecycles
- Fast charging (60s)
- Extremely competitive cost-base compared to similar energy storage technologies



# Addressable Energy Storage Application Space

High power from sub-second to up to 15 minutes duration

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Skeleton products provide **high power energy storage** for applications with **<5-minute charge / <15-minute discharge** cycle durations

**Lower cost** compared to **Li-ion batteries** in this application space

Supercapacitors



SuperBatteries



Lithium-Ion batteries



<1s to 60s

1-5 min

1-15 min

>15 min

Fast charging

# Independent 3<sup>rd</sup> Party Verified Advantage

Superior power and energy densities in energy storage

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“Your cells have very low resistance so are truly high-power devices. I think **they are the best in the world of the carbon/carbon type.**”

Dr. Andrew F. Burke

**UC DAVIS**  
UNIVERSITY OF CALIFORNIA

“One property **that stands out is the ESR of the Skeleton capacitor**, which is significantly less than the others.”

C. N. Nybeck, D. A. Dodson, D. A. Wetz and J. M. Heinzel, "Characterization of Ultracapacitors for Transient Load Applications," in IEEE Transactions on Plasma Science, vol. 47, no. 5, pp. 2493-2499, May 2019



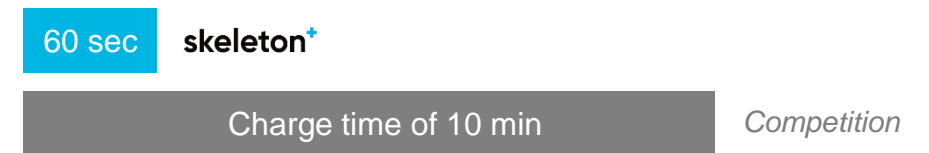
## Supercapacitors

**4X** power density vs competitors



## SuperBattery

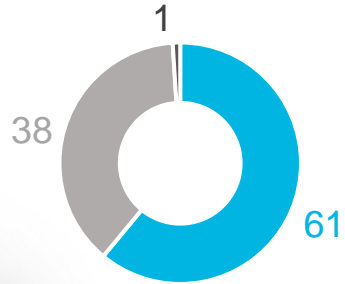
Uniquely fast charge times with high energy density



# Increased Safety Compared to Lithium-ion Batteries

Lower cost due to Curved Graphene and abundance of other raw materials

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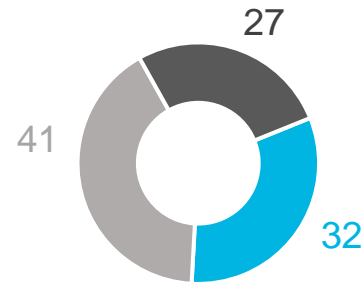


- Organic components
- Aluminum
- Other

## Supercapacitor

Composition

- Mostly carbon and aluminum – easy to recycle
- Contains no heavy metals



- Organic components
- Aluminum
- Other

## SuperBattery

Composition

- Safer to handle than Li-Ion batteries (no lithiated graphite)
- Contains lower cost elements compared to Li-Ion



## Curved Graphene

- Proprietary carbon, produced without any rare earth materials
- Synthesis byproducts re-usable – zero waste created



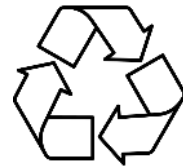
# Sustainable Products And Production Process

From supercapacitors to SuperBatteries



## Little to no rare earth metals used

- ✓ The only metal content in supercapacitors is aluminum
- ✓ SuperBattery uses no graphite, nickel or cobalt, and very little lithium (<5% of weight)



## Easy and affordable to recycle

- ✓ Carbon and aluminum are easy to recycle
- ✓ Products use lower cost elements than in Li-ion



## Sustainable production and processing

- ✓ Skeleton uses water-based process for coating and recycling
- ✓ Products are safer to handle than li-ion batteries due to no lithiated graphite or lithium plating

# Modular, Intelligent Supercapacitor Energy Storage Systems

MWs of power, immediately available

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## Systems

# SkelGrid energy storage system

Supercapacitor-based turn-key energy storage solutions for high-power needs





# High Performance Energy Storage - Made in Europe

Fully integrated production – control over the entire manufacturing chain

**skeleton+**

The largest  
supercapacitor  
factory in Europe  
(Großröhrsdorf, Germany)





# Skeleton Materials

Curved Graphene production facility in Bitterfeld, Germany

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**Skeleton Materials** is Skeleton's material development arm, situated at the Bitterfeld-Wolfen Chemical Park in Saxony, Germany.

Led by world-class material scientists and researchers, Skeleton Materials is already the global leader in synthesizing capacity and scaling up Curved Graphene material production to industrial levels to meet the demand for Skeleton's GEN 2 supercapacitors, SuperBatteries, and solid-state batteries.

# German Quality, Certified According to the Highest Standards

Qualified supplier to some of the largest OEMs in the world

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**Linus Froböse**  
CTO

**“Quality is the bedrock of Skeleton’s success and something we have put an enormous amount of work in – to produce the most robust and long-lasting products for our customers.”**

Certified



Compliance and selected product certifications





# A Qualified Supplier & System Provider to Industry Leaders

To automotive, grid, transportation, and industrial companies, OEMs & Tier 1s

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German automotive  
OEM



North-American  
Truck OEM

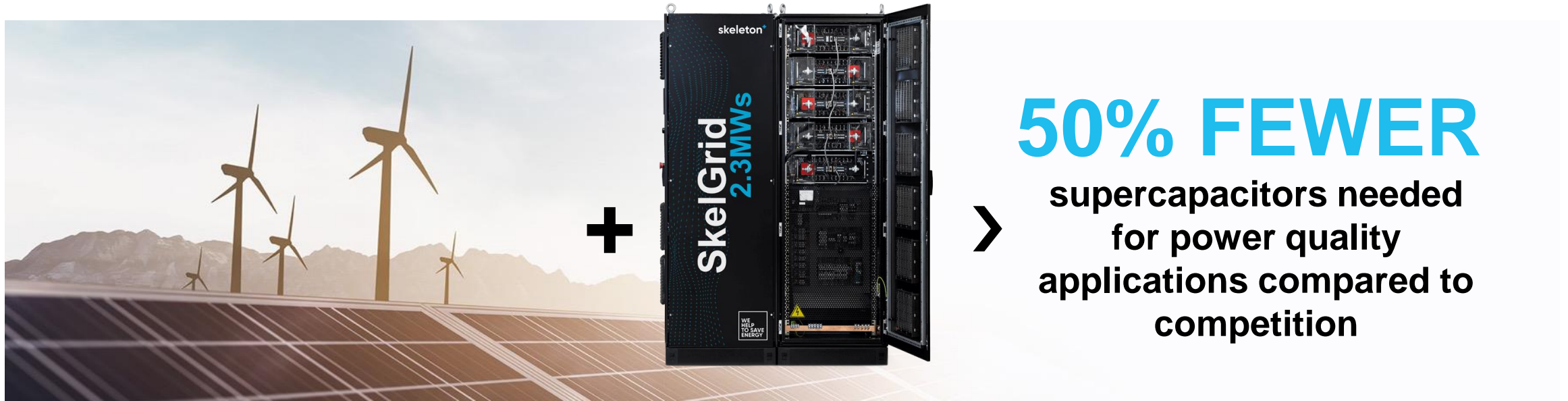




# Enabling Higher Penetration of Renewable Energy & Stabilizing Power Grids

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MWs not, kWh business – 50 MW solution delivered



**50% FEWER**  
supercapacitors needed  
for power quality  
applications compared to  
competition



“Most competitive supercapacitor-based ESS for grid applications.”  
(Virtual Inertia)

# Supercapacitors Electrifying Trams Across Europe

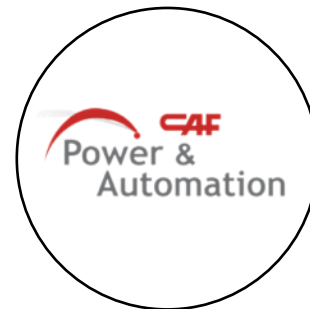
Kinetic energy recovery reduces costs and protects infrastructure

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“Skeleton Technologies brings the necessary quality mindset to critical applications. **The highest power density and efficiency in the industry provides us with a very clear competitive advantage.**”

Stanislaw Wizur  
Škoda Electric



“**Skeleton’s cells are a perfect fit to the rail and tram industry.** Adding them to our energy storage systems will greatly benefit our existing and future customers, **allowing to maximize energy efficiency at an unprecedented level.**”

CAF Power & Automation

# Supercapacitors Kickstarting Fusion Reactors

Enabling technology to create clean energy

skeleton<sup>+</sup>



**120 MW**  
For 3s, enabling plasma  
to be heated to  
**100 million degrees Celsius**



Supercapacitors are used to provide **20 MW of power** for each gram of hydrogen to be heated in less than 1 second. Skeleton is supplying a global leader in fusion energy.



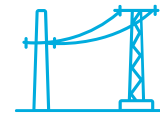
# Key Benefits

To working with us

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IATF-certified & the **largest supercapacitor factory** in Europe



**100+ MWs** of grid & industrial installations, **10 000+** systems & modules in the field



Unique technology & product roadmap with **Curved Graphene**, protected by more than 11 patent families



World-class team of **350+** **professionals** with vast experience in energy storage development & production

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# Thank you!

For more information  
contact us:

[www.skeletontech.com](http://www.skeletontech.com)

Certified

