GLOBAL LEADER IN ULTRACAPACITOR-BASED ENERGY STORAGE
COMPANY OVERVIEW
Skeleton Technologies Group

ULTRACAPACITORS
+ Ultracapacitors are an energy storage technology that offers high power density, almost instant recharging and very long lifetimes.

PRODUCTS
+ Our patented “curved graphene” delivers twice as much energy storage capacity and four times higher power performance
+ Ultracapacitor-based energy storage solutions:
  + Full energy storage systems
  + Industrial modules
  + Ultracapacitor cells

PEOPLE
+ 70 employees, 5 phDs

FUNDING
+ 26.7 M EUR invested by UP Invest, Harju Elekter, KIC InnoEnergy and FirstFloor Capital
ENERGY STORAGE
WHAT IS AN ULTRACAPACITOR?

FAST
ULTRACAPACITORS USE AN ELECTRIC FIELD TO STORE ENERGY
+ high power density
+ almost instant charging and discharging
+ lifetime of up to 1 M cycles

SLOW
BATTERIES USE A CHEMICAL REACTION TO STORE ENERGY
+ high energy density
+ slow charge and discharge rate
+ lifetime counted in thousands of cycles
Lower internal resistance and 4x higher power density achieved in cost-efficient product design.
COMPLETE VALUE CHAIN

MATERIALS

Curved Graphene

SINGLE CELLS

SOLUTIONS
COMPETITIVE ADVANTAGE EXAMPLES

How do we help to save energy?
Skeleton’s advantages:
+ Lower cost and volume
+ Higher power density

Electric Turbochargers: lower fuel consumption, better performance

<table>
<thead>
<tr>
<th>Power</th>
<th>Mass (g)</th>
<th>Volume (l)</th>
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<tbody>
<tr>
<td>5.7 kW</td>
<td>178</td>
<td>0.124</td>
</tr>
<tr>
<td>5.5 kW</td>
<td>510</td>
<td>0.4</td>
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TRANSPORTATION USE CASE
Hybrid Electric Buses: lower fuel consumption

SKELETON’S ADVANTAGE:
LOWER INTERNAL RESISTANCE KEY
ENABLING TECHNOLOGY FOR HOT CLIMATES
ALLOWS AMBIENT TEMPERATURE 45°C

OTHER ULTRACAPACITOR MANUFACTURERS
MAXIMUM AMBIENT TEMPERATURE 25°C
GRID & RENEWABLES USE CASE
Pulse Power Supply 2.5 MW to support diesel generators: lowers diesel consumption

Skeleton’s advantage:
TWO TIMES LESS ULTRACAPACITORS FOR THE SAME PERFORMANCE
INDUSTRIAL EQUIPMENT USE CASE

Hybrid Excavators: lower fuel consumption, less hydraulics

Benefits:

**HIGHER LIFETIME**

**LOWER COST**

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<tr>
<th>CONTINUOUS CURRENT</th>
<th>MS</th>
<th>CYCLE LIFETIME</th>
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<tbody>
<tr>
<td>160 A</td>
<td>280 000</td>
<td>520 000</td>
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<tr>
<td>220 A</td>
<td>89 000</td>
<td>298 000</td>
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SkelCap
ULTRACAPACITORS, NOT BATTERIES, WILL BE THE BREAKTHROUGH

Elon Musk
GENERAL PROBLEMS WITH FINANCING A CLEANTECH COMPANY

+ Remember the Cleantech boom?
+ Long development cycles, long lead times in sales
+ Capital requirement much higher than in IT
GENERAL PROBLEMS WITH FINANCING A CLEANTECH COMPANY

+ Complicated industry:
  + Investors apply rules from internet businesses to cleantech
  + 10x better internet business or 20% better clean technology?
+ Loosing hurts the entire industry
GENERAL PROBLEMS WITH FINANCING A CLEANTECH COMPANY

+ Golden rules:
  + Can I touch it?
  + Is it 3rd party tested?
  + Is it scalable?
SKELETON’S EXPERIENCES

+ 27 M EUR raised

+ It’s hard, and takes a lot of time and effort

+ You’re not an IT company → find more conventional ways
  + Find family offices, strategic investors
SKELETON’S EXPERIENCES

+ Don’t be afraid of government and EU incentives
  + Think of Tesla’s success

+ We needed manufacturing – investors allergic to CAPEX
  → we needed to find the right partners
SKELETON’S EXPERIENCES

Capital raising has to be a structured process
+ Don’t underestimate the bandwidth it takes
+ If it’s not well-structured, it will not be successful

Deals take time,
12 months is not extraordinary
+ Technological DD needed
SKELETON’S EXPERIENCES

+ Don’t go after every investor – find the fit in mandate, stage, attitude

+ We learned the easy way
  + Manage expectations
  + Don’t overpromise

+ Excel-planning is actually important
  + Investors understand the realities of the business
    → They evaluate your planning skills
WE ARE
SKELETON TECHNOLOGIES

WE HELP TO SAVE ENERGY