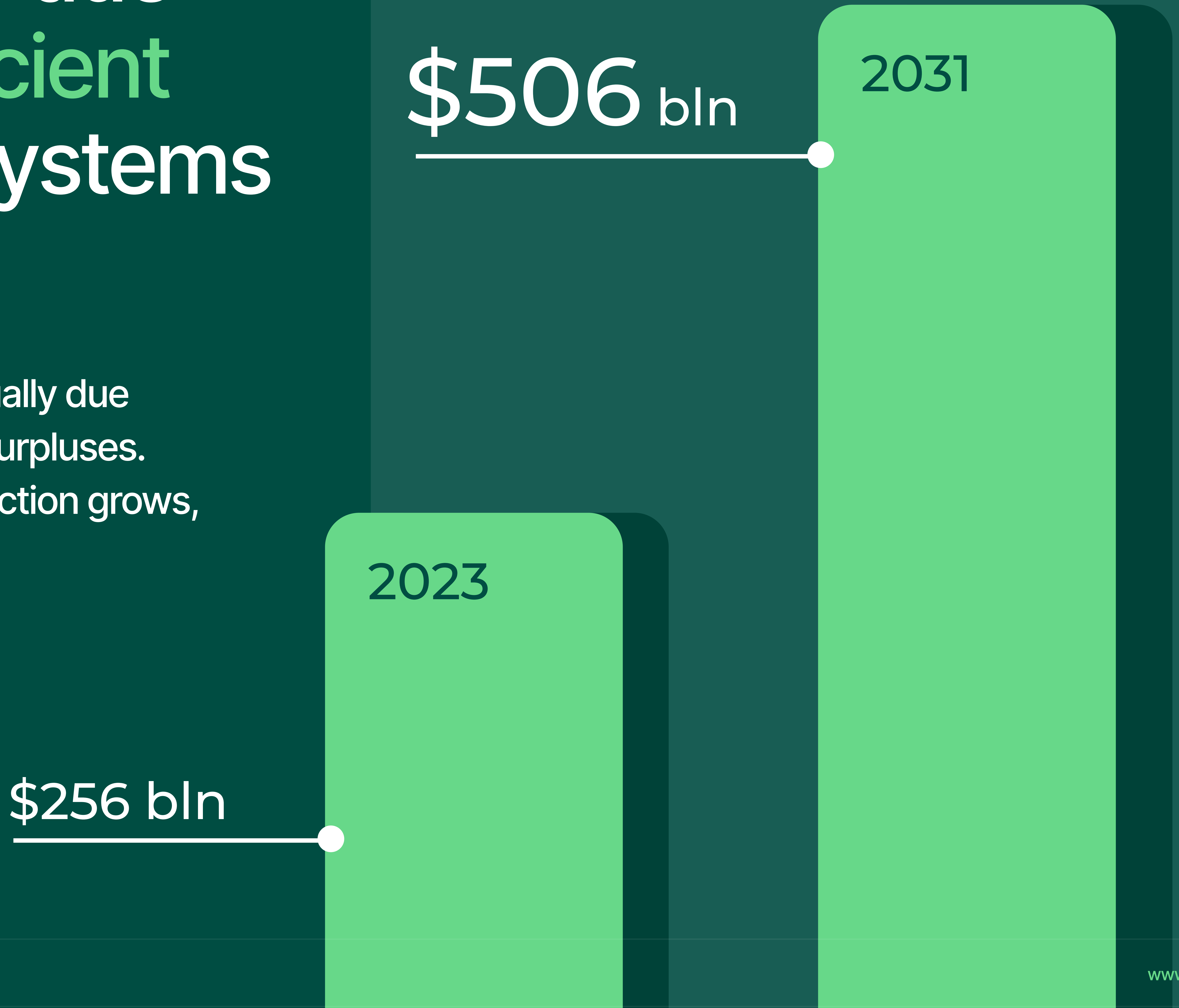
Water in Salt

# Energy storage has never been so safe, efficient, and affordable

# Increasing losses due to the lack of efficient energy storage systems

The world loses billions of dollars annually due to inefficient management of energy surpluses. Each year, as renewable energy production grows, this problem will intensify.

Source: Statista



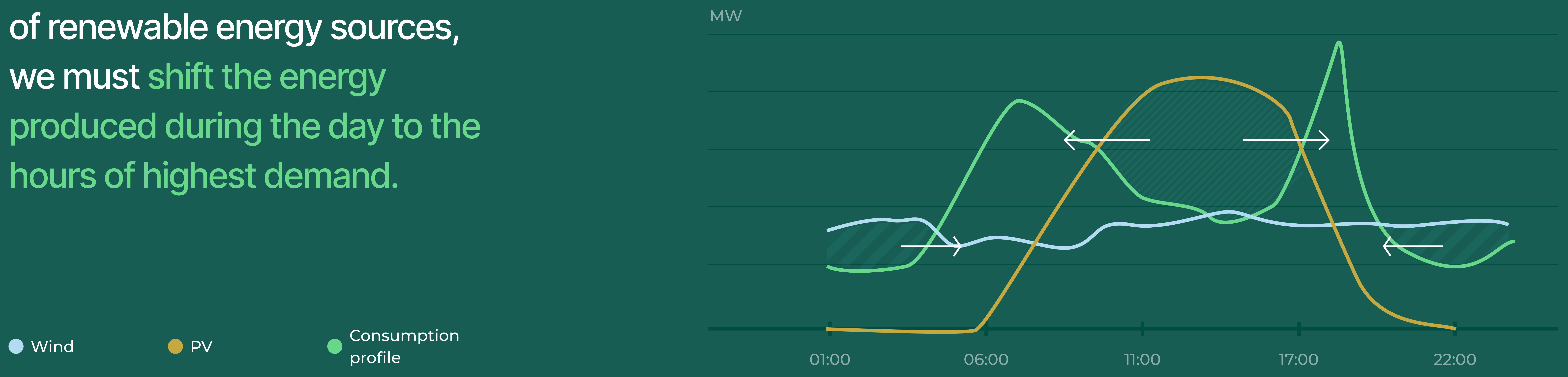
# Why is energy storage crucial for renewable energy stability?

Solar and wind energy are intermittent sources—they produce the most energy during the day, when energy demand is low, while peak consumption occurs in the evening and morning.

Without effective energy storage capabilities, the excess energy produced will be wasted.

# Energy storage is the only viable solution to balance supply and demand and ensure grid stability.

To fully utilize the potential of renewable energy sources, we must shift the energy produced during the day to the hours of highest demand.



Problem

# Why is energy storage the key to the future?

Renewing the global energy infrastructure requires flexible management of energy surpluses. Renewable energy sources, such as solar and wind, do not operate continuously, creating a need to store surplus energy and shift it to times of increased demand.

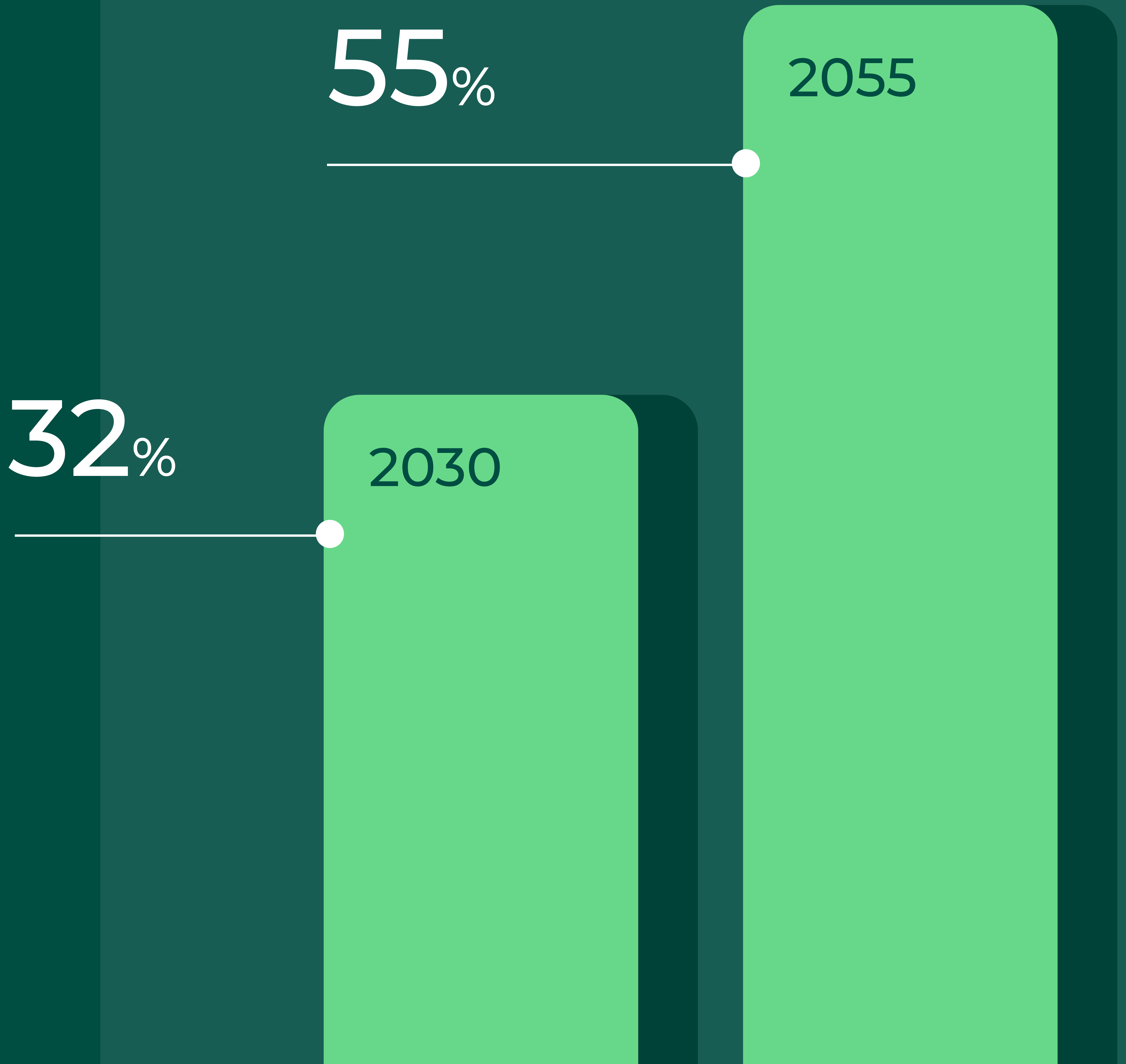
## Without effective energy storage systems, the development of renewable energy is impossible.

# Europe focuses on renewable energy sources

The European Union has set ambitious goals for reducing emissions and increasing the share of renewable energy (RES) in the energy mix.

By 2055, at least 55% of energy production in the EU should come from renewable sources, which will require significant investments in solar, wind, and energy storage technologies.

Renewable energy is the foundation of the EU's energy policy, aiming to reduce CO2 emissions and dependence on fossil fuels.



# Challenges with connecting renewable energy sources - grid infrastructure cannot keep up

In Europe, the number of refusals to connect new renewable energy installations to the power grid is increasing. The lack of energy storage capacity causes infrastructure overload.
In Poland and many other countries, this problem is growing, leading to an increasing number of projects being rejected due to the lack of adequate storage solutions.


Source: URE

Problem

# Key technological challenges

Current energy storage technologies are not keeping pace with market needs. Issues with raw material procurement, high costs, and short battery lifespan are the main barriers to advancing energy storage technologies.

# Critical battery materials – a climate & economic challenge

Today's batteries depend on scarce and geopolitically sensitive raw materials such as lithium, nickel, cobalt and graphite.

- Extracting these materials is **energy-intensive**, water-consuming and causes **high $CO_2$ emissions** and ecosystem damage.
- Supply chains are **highly concentrated geographically**, increasing exposure **to price volatility, trade restrictions and geopolitical** risk.
- Rapid growth in battery demand is putting structural pressure on availability, threatening both economic stability and the scalability of clean energy.

**Material dependency has become a bottleneck** for the energy transition.


Water In Salt

# 🔥 Thermal runaway – a hidden risk of Li-ion batteries (LFP included)

Lithium-ion batteries, including LFP, carry an inherent risk of thermal runaway —an uncontrolled chain reaction leading to overheating, fire, or explosion.

- ⚠️ Thermal runaway can be triggered by overcharging, internal short circuits, mechanical damage, or manufacturing defects.
- ⚠️ Once initiated, the reaction is self-accelerating and extremely difficult to stop.
- ⚠️ Fires reach temperatures above 600–1,000°C, often re-igniting hours or days later.
- ⚠️ Even LFP— considered safer — still requires complex cooling, fire suppression systems, and strict safety marggins.


As energy storage scales to grid-level deployments, safety becomes a systemic risk — not just a technical detail.

# Short lifespans, growing battery waste

Current lithium-ion batteries **last only 3–7 years**, leading to frequent replacements and a **rapid increase** in electronic waste.

Lithium-ion batteries are **difficult and costly to recycle** — today, **only 5% of lithium-ion battery materials** are recovered.

Without better recycling solutions, the growth of battery waste will worsen **resource scarcity, pollution, and supply chain disruptions**.

**Long lifespan and easy recyclability** are essential to **reduce waste** and sustain the **green economy**.

Water In Salt

Our innovative solution

# Zinc-manganese membrane-free battery

Our solution combines safety and low cost, marking a breakthrough in energy storage.


## Low cost and scalability

By using widely available materials, our battery **is cheaper to produce and easily scalable**, enabling rapid expansion on a large scale.

## Safety

The technology is based on **non-toxic and non-flammable materials**, minimizing the risk of fires and reducing the negative impact on the environment..

# Operating mechanism of our zinc-manganese membrane-free battery

Cathode:

$Mn^{2+} + 2H_2O - 2e^- \leftrightarrow MnO_2 + 4H^+$, 1.23 versus (SHE)

Anode:

$Zn^{2+} + 2e^- \leftrightarrow Zn$, -0,76 V versus (SHE)

## Charging

During the charging process, metallic zinc is deposited on the zinc electrode (anode) through the reduction of zinc ions from the electrolyte. Simultaneously, on the carbon electrode (cathode), an oxidation process occurs, resulting in the formation of manganese dioxide ($MnO_2$).

## Discharging

During battery discharge, these processes are reversed—metallic zinc from the anode dissolves back into the electrolyte, and manganese dioxide on the cathode is reduced, generating an electron flow, which means electrical energy.

# What makes our innovative battery stand out

## Membrane-free design
The absence of a membrane reduces production costs by 40% and simplifies technological processes.

## Safety & environmental resilience
Non-toxic, non-flammable materials eliminate fire risk and enable safe outdoor operation across extreme temperatures, minimizing environmental impact.

## Low cost and scalability
By using widely available materials, our solution is significantly cheaper than competing technologies.

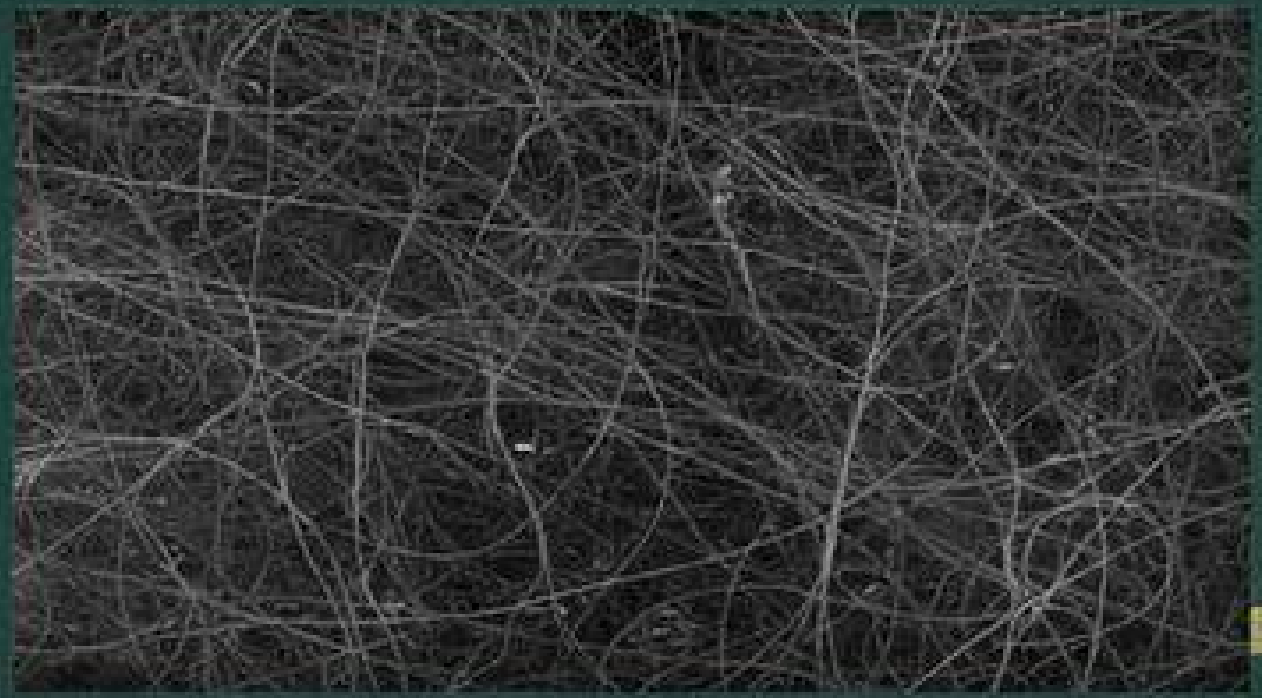
## Performance and lifespan
A high number of charge and discharge cycles ensures durability and efficiency, even under intensive use.

## Ease of recycling
The simple design of the battery enables easy and efficient recycling, reducing the issue of waste.

# What have we achieved so far?

## Meet our MVP

### Breakthrough electrode materials



1,4 m²/g → >200 m²/g

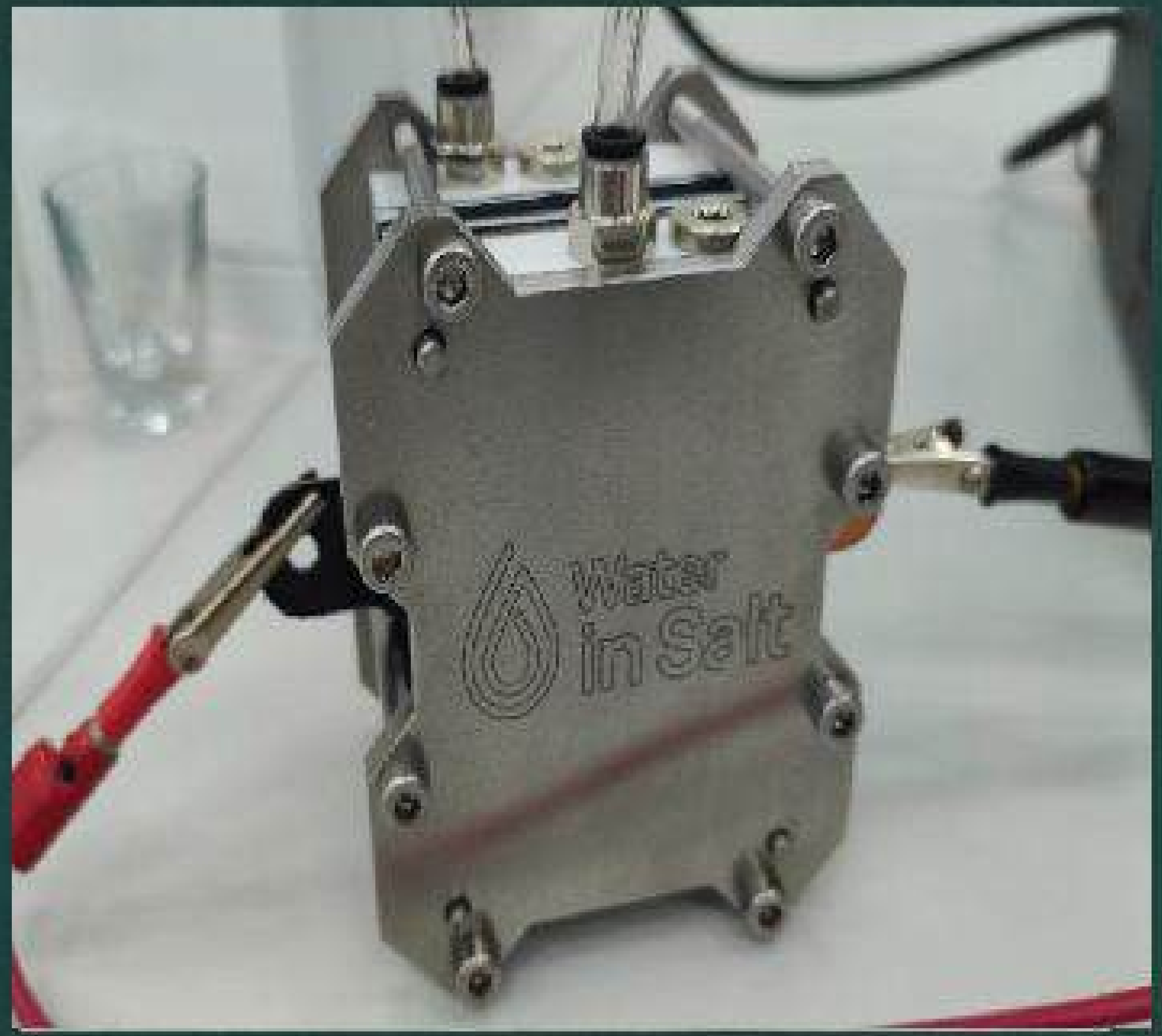
> 150× surface area increase

**Through in-house R&D**, we developed **proprietary** carbon-based **electrode materials** with ultra-high surface area.

This know-how significantly improves electrochemical **performance** while enabling the use of **low-cost, widely available** raw materials.

A core technological asset underpinning both performance and cost advantage.

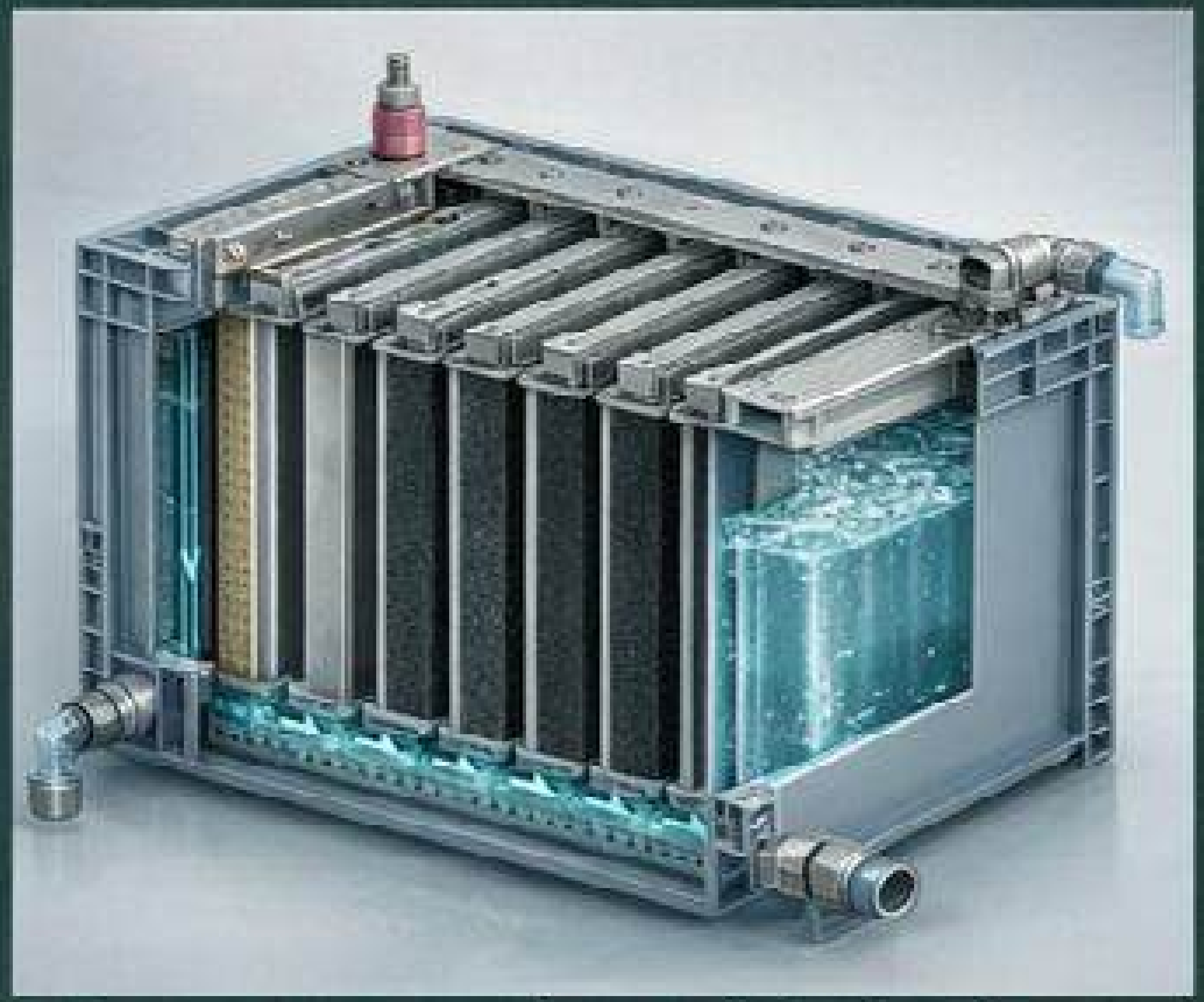
### Fully functional Zn–Mn cell (-2V)




We have **successfully built** and tested a **working Zn–Mn battery cell** operating at ~2V, validating the core elements of our platform:

- membrane-free cell architecture
- proprietary electrode materials
- aqueous, non-flammable electrolyte

### Next-generation cell – in fabrication



The next-generation cell design is **currently under fabrication,** incorporating improved manufacturability and further material cost optimization.

**< 50 USD / kWh**
(materials target)

Enabled by proprietary electrode materials and simplified cell architecture.

## 96%

### Columbic efficiency

Currently, our battery achieves an energy efficiency of **67%**, with the potential to increase this to **79%** in future phases of development.

## 20Wh/l

### Volumetric Capacity

The current capacity of the battery is **20 Wh/l**, with a target of reaching **80 Wh/l** in upcoming iterations.

## 500

### Verified Charge-Discharge Cycles

Our prototype already withstands **500 charge-discharge** cycles without degradation. Our goal is to achieve **25,000 cycles** in the full-scale solution.

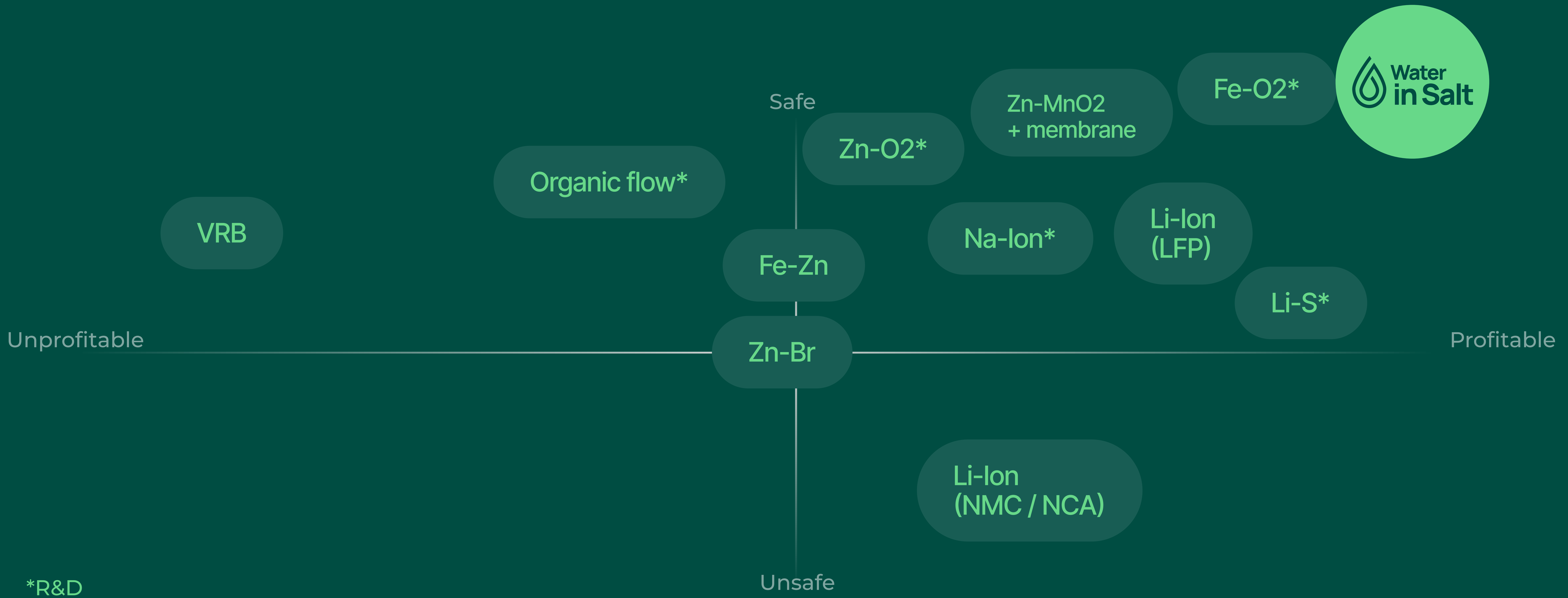
Competition

# How does our technology stand out compared to the competition?

The energy storage market is dominated by lithium-ion technologies and solutions based on rare earth metals.

However, these technologies struggle with high costs, low resource availability, and recycling challenges.

# Our zinc-manganese membrane-free battery offers lower production costs, greater stability, and a simpler recycling process, giving it a significant advantage over existing technologies.




*R&D

# Growing potential of the energy storage market

| | Water in Salt | Li-ion (LFP) | Vanadium flow | Fe-air |
|---|---|---|---|---|
| Safety | ✓ | ✗ | ✓ | ✓ |
| Efficiency | 75-80% | 88-94% | 70-80% | 40-60% |
| Installed system cost | 80-120 $/kWh | 120-180 $/kWh | 200-350 $/kWh | N/A* [20 $/kWh] |
| Best discharge duration | 2-24h | 1-4h | 6-12h | 20-100h |
| Lifetime | 20k–25k cycles ~30 yrs | 6k–10k cycles | 20k+ cycles | 20+ yrs |

# Flow Battery vs. Lithium-ion:
# 30-year usage perspective

## Lifespan and number of cycles:

**Our flow battery**

15k–25k cycles (design target)
20–30 years system life
Efficiency: 70–80% (system-level)

**Lithium-ion**

6k–10k cycles
10–15 years (replacement required)
Efficiency: 88–94% (system-level)

## Total cost over a 30-year perspective:

**Our flow battery**

**650** USD/kWh

**Lithium-ion**

**2 300** USD/kWh

Includes CAPEX, O&M, replacements, auxiliary systems

## Comparision

**Our flow battery**

low O&M, minimal degradation

**Lithium-ion**

higher O&M, thermal management, fire risk, need for replacement

# Our flow battery system
# greater competitiveness

## Lower lifetime energy cost (LCOS / TCO)

Up to 4× lower over 30 years

Thanks to long system lifespan, no replacement cycles and low O&M, our flow battery delivers significantly lower lifetime cost than lithium-ion for grid-scale storage.

## All-climate outdoor operation and operational flexibility

Designed for reliable operation in harsh outdoor conditions,
from sub-zero winters to hot climates (e.g. Middle East),
without energy-intensive cooling or heating systems.

## Inherently safe & non-flammable

Non-flammable aqueous chemistry

No thermal runaway, no fire propagation and no need for complex fire suppression systems. Safe for urban, industrial and critical infrastructure deployments.

## Circular & EU-based materials

Recyclability & supply chain

Built from abundant, non-toxic materials with simple end-of-life recycling.
No critical lithium, cobalt or nickel — enabling local EU supply chains and compliance with future battery regulations.

# Why does our flow battery outperforms other technologies at grid scale?

Grid storage economics are defined by lifetime cost and reliability — not peak efficiency.

## No replacement over system lifetime

Using our technology eliminates mid-life battery replacement, reducing CAPEX reinvestment, downtime and service complexity.

## Designed for 20–30 years of operation

Our system maintains stable performance over tens of thousands of cycles, making it suitable for infrastructure-grade, long-duration assets.

## System-level efficiency, not lab efficiency

While cell-level efficiency is slightly lower than lithium-ion, lower auxiliary power, no cooling and longer lifetime result in better net system economics.

# Market

**We are not competing on energy density.**
**We are competing on 30-year cost of ownership.**

## TAM (Total Addressable Market) – Large-scale energy storage market

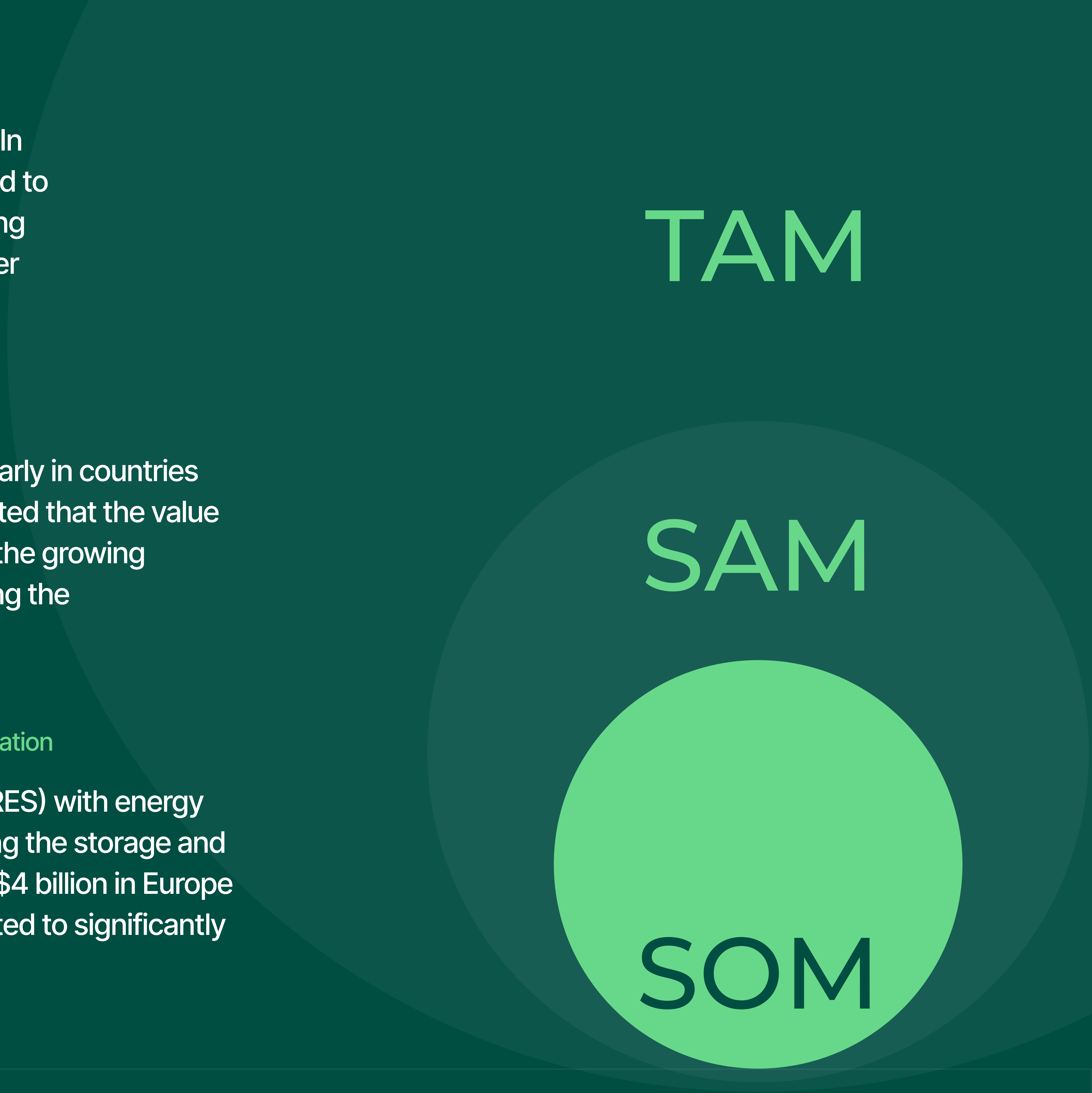
The global market for large-scale energy storage is growing rapidly. In 2024, its value is approximately $21 billion, and by 2031 it is expected to grow to over $70 billion. This significant growth is driven by increasing investments in energy transformation and the need to stabilize power grids worldwide.

## SAM (Serviceable Available Market) – Energy storage market in Europe

In Europe, the energy storage market is growing the fastest, particularly in countries such as Germany, France, Italy, and the United Kingdom. It is estimated that the value of the market in Europe will reach $20-25 billion by 2030, driven by the growing adoption of renewable energy sources and EU regulations supporting the development of renewable energy and energy storage.

## SOM (Serviceable Obtainable Market) – Market for renewable energy integration

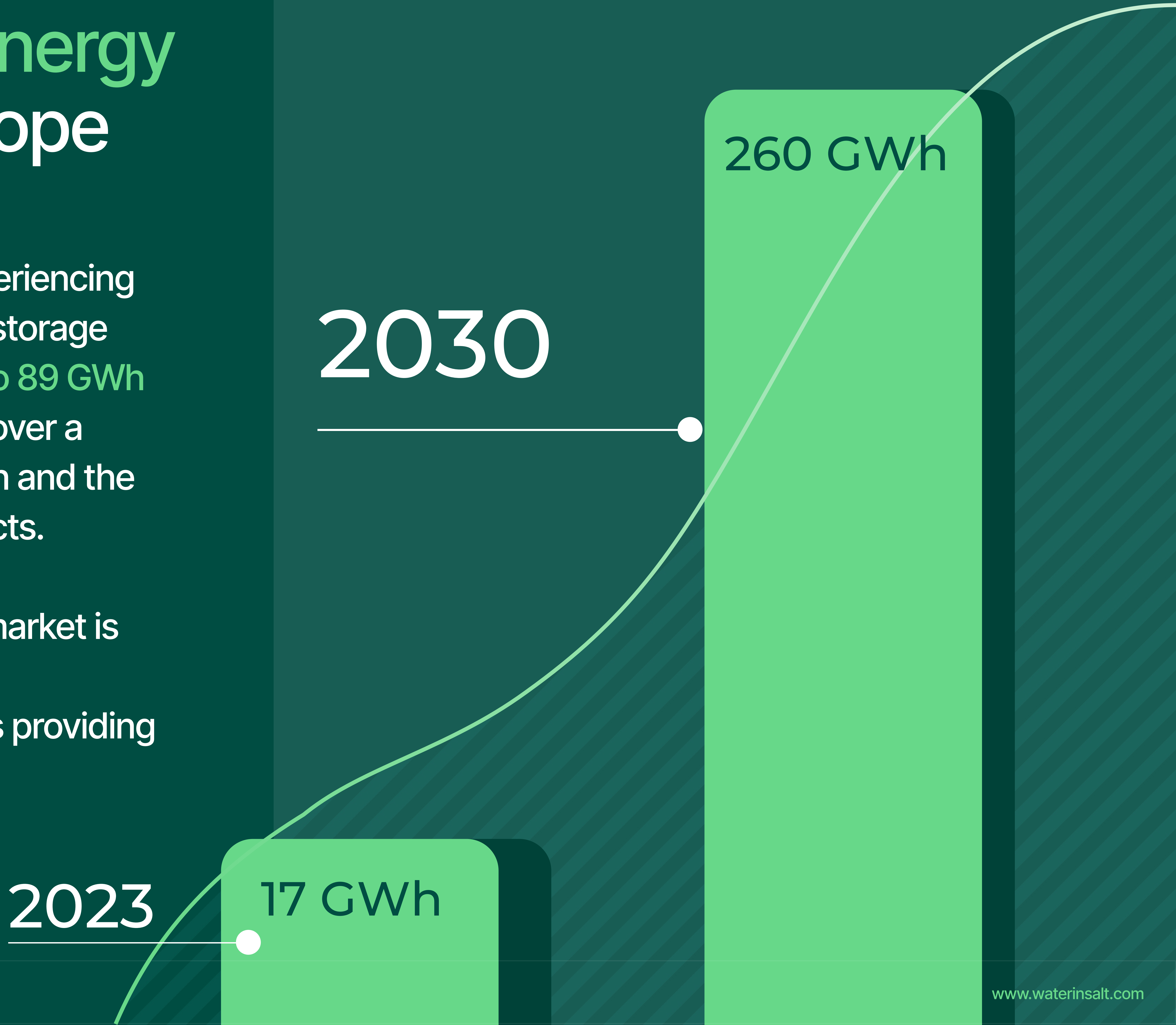
Our target is the market for integrating renewable energy sources (RES) with energy storage. The value of this segment, which includes solutions enabling the storage and management of renewable energy surpluses, is estimated to reach $4 billion in Europe by 2030. The development of solar and wind farm projects is expected to significantly increase the demand for such solutions.



# Rapid growth of the energy storage market in Europe

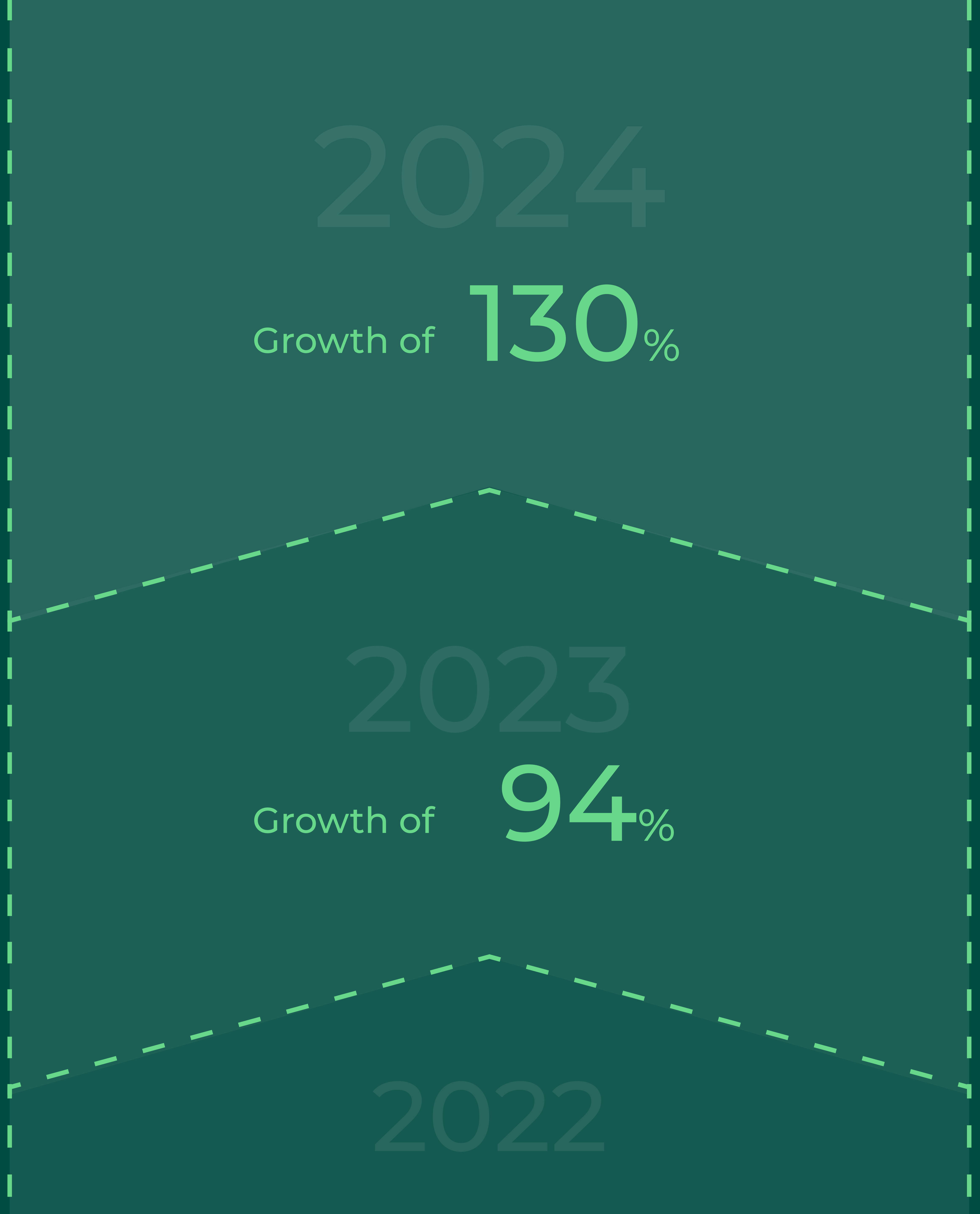
The energy storage market in Europe is experiencing dynamic growth. It is expected that energy storage capacity will increase from 5 GWh in 2020 to 89 GWh by 2030. This is almost an 18-fold increase over a decade, driven by the energy transformation and the growing number of renewable energy projects.

The value of the European energy storage market is expected to reach $20-25 billion by 2030, representing a huge potential for companies providing innovative storage technologies.



# Future Potential

We are operating in a market that will be worth 225 billion dollars, growing at a rate of 27% annually.



Future Potential

# Our market niche is integration with renewable energy sources (RES).

Service Obtainable Market $4 billion

The market for integrating renewable energy sources (RES) with energy storage systems is a key segment that will drive the energy transformation in Europe. Our technology enable efficient storage of energy from RES, stabilizing the grid and reducing energy losses.

The value of the RES integration market in Europe is expected to grow to $4 billion by 2030, driven by the increasing number of renewable energy projects and the need to optimize energy storage.

# How do we make money?

## Home Energy Storage

5 kW/40 kWh

Estimated production cost 7,540 $

Sale price: 10,400 $
~ 260 $/kWh

## Large-scale Energy Storage

1 MW/4 MWh

Estimated production cost: 325 000 $

Sale price: 520 000 $
~ 130 $/kWh

Business Model

# Production and Service
# our revenue model

Our main source of revenue will be the production and sale of zinc-manganese batteries, followed by a service offering.

Operating profit margin ~ 30%

Business Model

# Planned Revenue

Thanks to the sale of 1 MW / 4 MWh large-scale energy storage systems

# Our goal is to optimize battery parameters and develop a scalable cell that can be integrated into larger battery packs

We are currently working on increasing efficiency, capacity, and the number of cycles, so that our technology will be ready for use in full-scale, high-power energy storage systems.

| Stage | Module | Capacity | R&D budget (stage total) (incl. team, equipment, materials) |
|---|---|---|---|
| **Stage I** IN PROGRESS | Basic **Module** TRL 4-5 | 100 W | ~ 0.7 M USD |
| **Stage II** Estimated duration: 6-12 months | Demonstration **Module** TRL 5-7 | 10 kW | ~ 1.5 M USD |
| **Stage III** Estimated duration: 6 months | Pilot **Storage** TRL 6-8 | 100kW/400kWh | ~ 2.3 M USD |
| **Stage IV** Estimated duration: 18 months | Large-scale **Storage** TRL 8-9 | 1 MW/4 MWh | ~ 4.7 M USD |

# What are the risks?

## Technological Risk

### Threat

The possibility of unforeseen technical challenges during the development and scaling of the technology, which may delay implementation.

### Mitigation Strategy

Regular prototype testing, additional resources for R&D, and collaboration with technology partners.

## Competitive Risk

### Threat

New technologies and competition from large manufacturers may limit our market share.

### Mitigation Strategy

Development of unique product features, strengthening intellectual property protection, and continuous innovation.

## Personnel Risk

### Threat

Difficulty in acquiring and retaining key technical and operational talents, which could impact project execution.

### Mitigation Strategy

Attractive employment conditions, fostering a culture of innovation, and collaboration with technical universities.

## Regulatory Risk

### Threat

Potential changes in regulations regarding energy storage may impact the requirements for our technology.

### Mitigation Strategy

Ongoing monitoring of regulatory changes, active collaboration with industry organizations, and flexibility in adapting the technology.

Stage I | 2024 – 2026

# R&D and Pilot Tests

## Goal

Completion of research and development, conducting initial commercial tests to validate the technology in the market.

## Funding

9-10 million USD

## Outcome

Construction of a pilot 1 MW / 4 MWh storage facility and obtaining preliminary results for the storage system

Stage II | 2027

# Entry into the European market and launch of production

## Goal

Development of production processes and establishment of production capacity to serve the European market

## Funding

~10+ million USD
(commercialisation funding)

## Outcome

Achieving an annual production capacity of **500 MWh.**

Stage III | 2028

# Global expansion and scaling up production

## Goal

Increase production scale and enter global markets by expanding production capacity.

## Funding

~25 million USD

## Outcome

Achieving an annual production capacity of **2 GWh** to meet international demand.

# Intellectual Property (IP) Strategy and Company Ownership Structure

Securing Our Innovations for the Future

The company is currently entirely privately owned, belonging exclusively to the founding members. There are no external investors, which ensures unwavering control over the company's vision, technology, and strategic direction.

# We are preparing patent applications focusing on key elements of our technology, including:

### Membrane-free cell design

Protection of our unique design, which allows for cost-effective and scalable production without the need for expensive membranes.

### Electrolyte composition

Application covering our proprietary electrolyte formula, which enhances safety, stability, and performance under various operating conditions.

### Production innovations

Applications will cover electrode production methods, ensuring a long-term competitive advantage in the market.

Team

# Experts with Passion and Strong Partnerships

## Paweł Bartlewski

CEO

A visionary with 6 years of experience and 5 completed projects. Effectively combines market research with needs, leading the commercialization of innovative energy solutions.

AGH

## Piotr Przybył

COO

Responsible for product implementation and managing sales processes. His experience in innovative products supports the introduction of new technologies to the market.

AGH

## Bartłomiej Cygański

CFO

Constructor and expert in financial optimization. Combines engineering and financial knowledge to support the strategic growth of the company.

## Robert Klaczyński

CTO

R&D Manager specializing in advanced energy technologies. Has introduced and scaled innovative projects in the market, such as Zortrax and Upthermo.

Politechnika Warszawska

UTBM TECHNOLOGY

# Our strength lies not only in knowledge and experience

...but also in close cooperation with the **best scientists from leading universities in Poland**. This gives us access to the latest research and technology, providing us with a competitive advantage and confidence that our technology will succeed in the market.

Instytut Maszyn Przepływowych, Politechnika Warszawska, Toruń UMK Chemia, Krakow AGH Wydział Energetyki

AGH

IMP PAN GDAŃSK

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UNIWERSYTET MIKOŁAJA KOPERNIKA W TORUNIU

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