



# AQUABATTERY

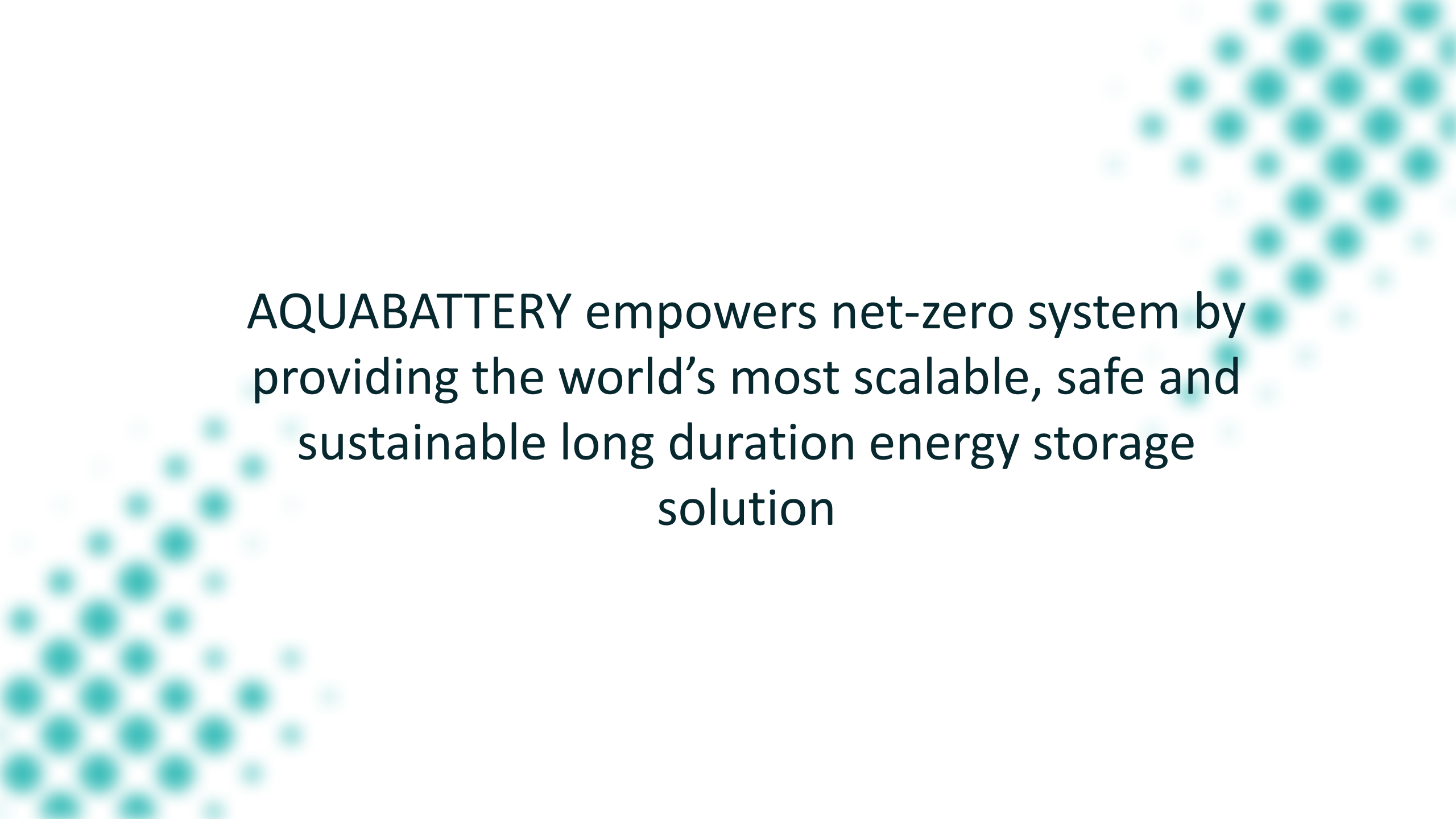
Introduction

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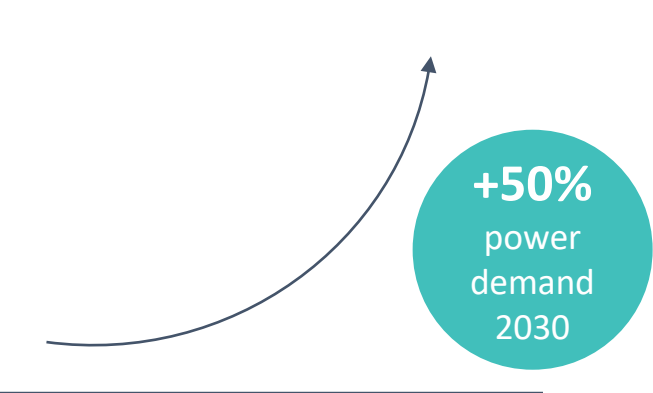
Strictly private & confidential

The image features a white background with decorative clusters of teal dots in the top-right and bottom-left corners. The dots vary in size and opacity, creating a soft, abstract pattern.

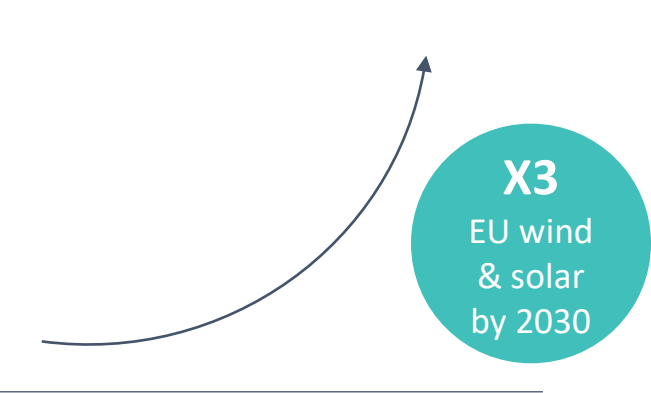
AQUABATTERY empowers net-zero system by providing the world's most scalable, safe and sustainable long duration energy storage solution

# THE WORLD IS WORKING TOWARDS NET-ZERO

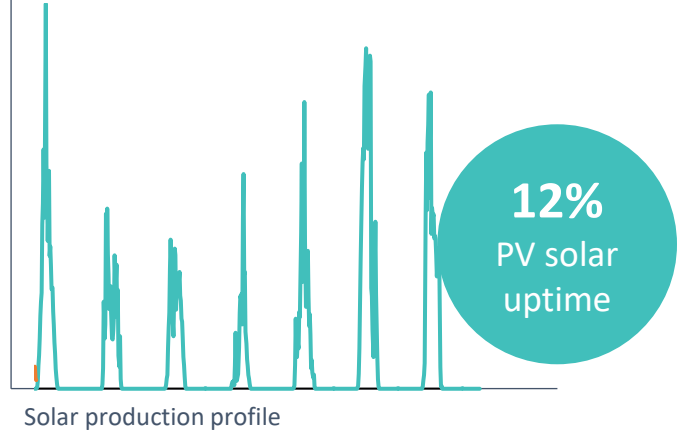
Electrification drives power demand



Net-zero ambitions drive high renewables growth



Meaning more power demand with intermittent supply

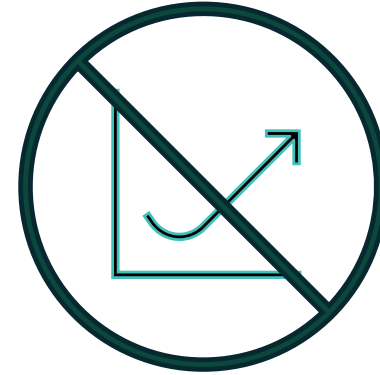


## THIS AMBITION DRIVES CHALLENGES FOR BUSINESSES TODAY



### Security of supply issues threaten business continuity

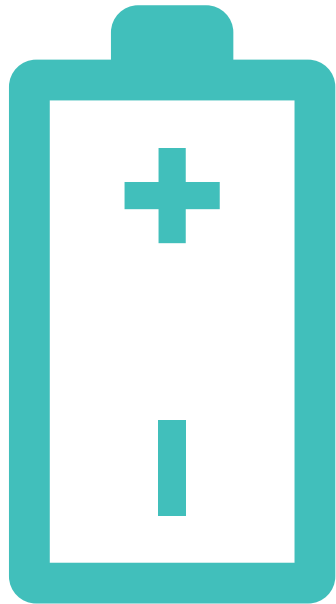
High reliance on intermittent renewables raises security of supply concerns, and with that business continuity



### Grid congestion & reliability hinder business growth

~**10% curtailment** and ~**€600bln** needed grid expansion in EU impossible – making the grid unreliable to support business growth

## ENERGY STORAGE SOLUTIONS ADDRESS THESE ISSUES AND MORE



Ensure security of supply & autonomy

- Lower reliance on grid
- Own back-up facilities

Optimize value from own renewable assets

- Reduced energy & grid costs
- Additional revenue streams

Reduce business' carbon emissions

- More renewable energy consumed

# OUR STORAGE SOLUTION: STORING ENERGY IN TABLE SALT & WATER

## POWER MODULE

Consisting of membrane stacks

determines amount of electricity deliverable at discharge (expressed in KW / MW)

## ENERGY MODULE

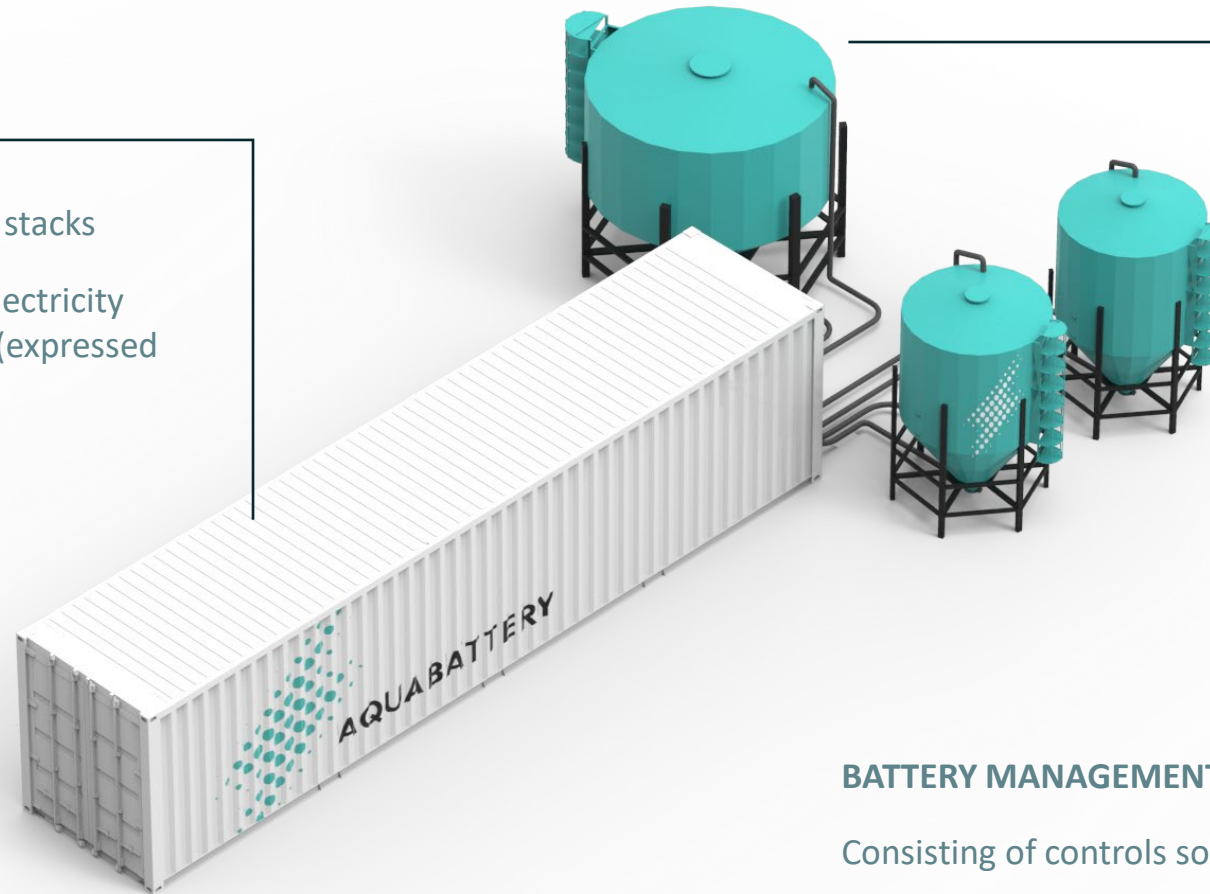
Consisting of reservoirs with saltwater, base and acid solutions

determines amount of electricity contained within the system, and constitutes the duration of electricity delivery (expressed in KWh / MWh)

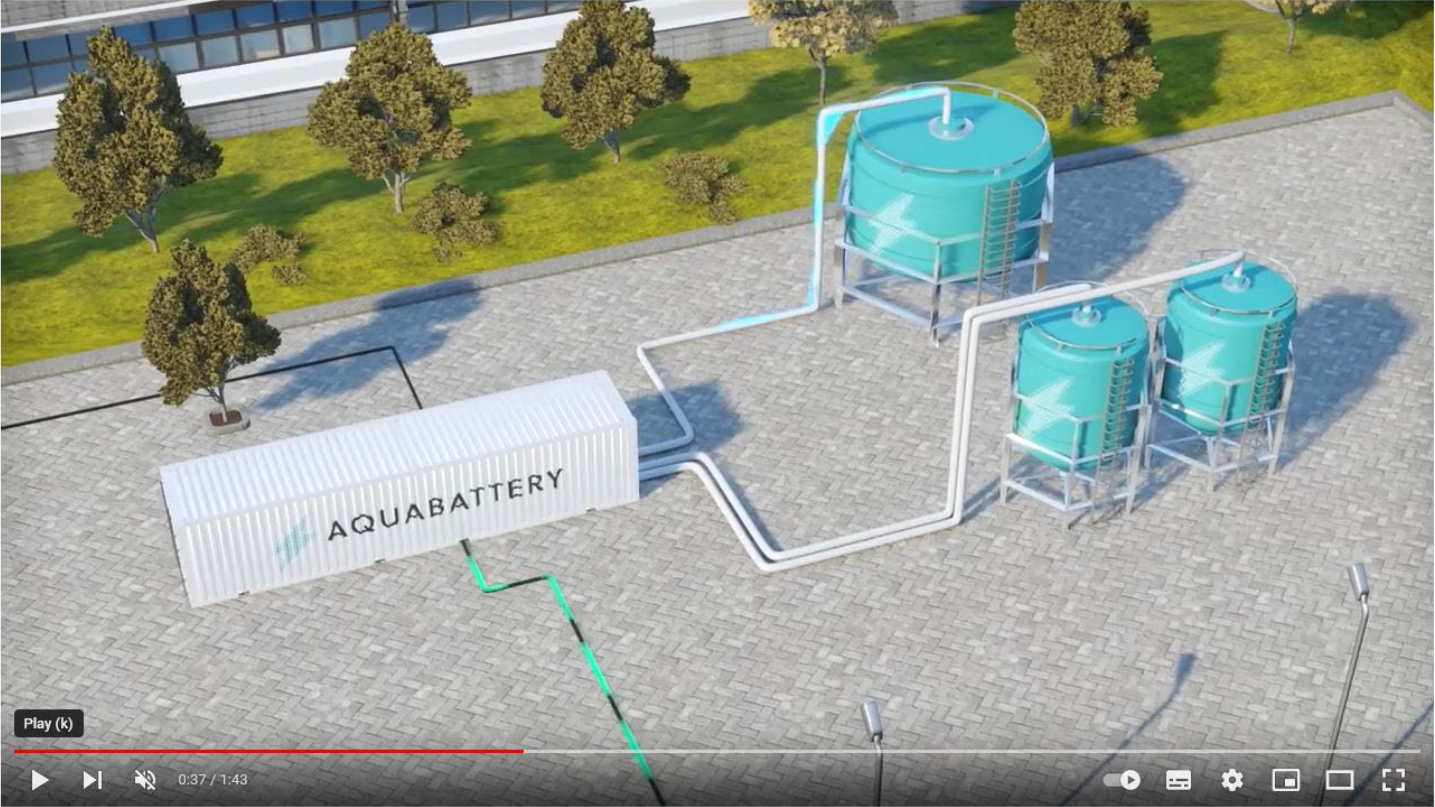
## BATTERY MANAGEMENT SYSTEM (BMS)

Consisting of controls software

to monitor and control system operations



# THIS IS HOW IT WORKS



Watch the video by clicking the image  
(opens in YouTube)

Watch How AQUABATTERY Empowers a Net-Zero Power System

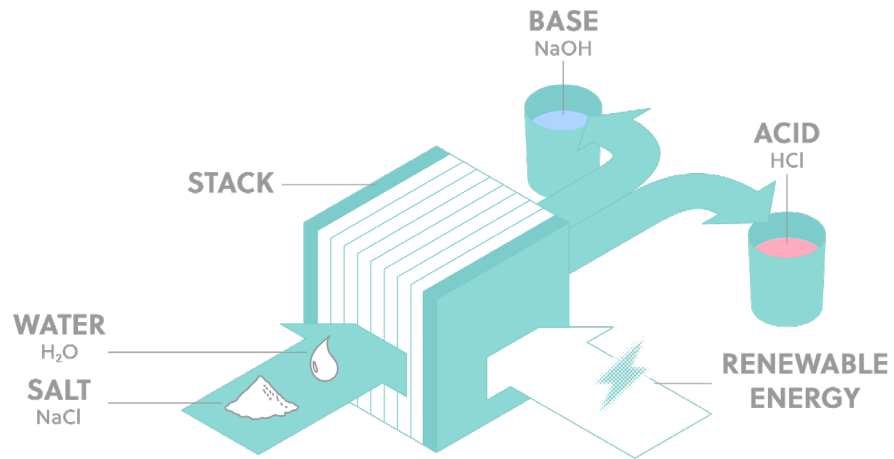
 AquaBattery BV  
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# CHARGING AND DISCHARGING IN THE AQUABATTERY EXPLAINED

## Charging



**CHARGING**

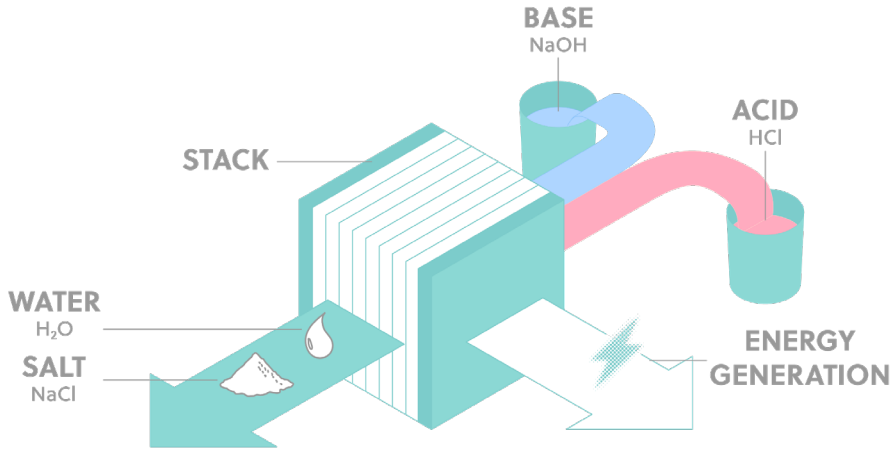


Breaking the bonding by electricity



Ions sorted in the stack to form Acid and Base

## Discharging



**DISCHARGING**

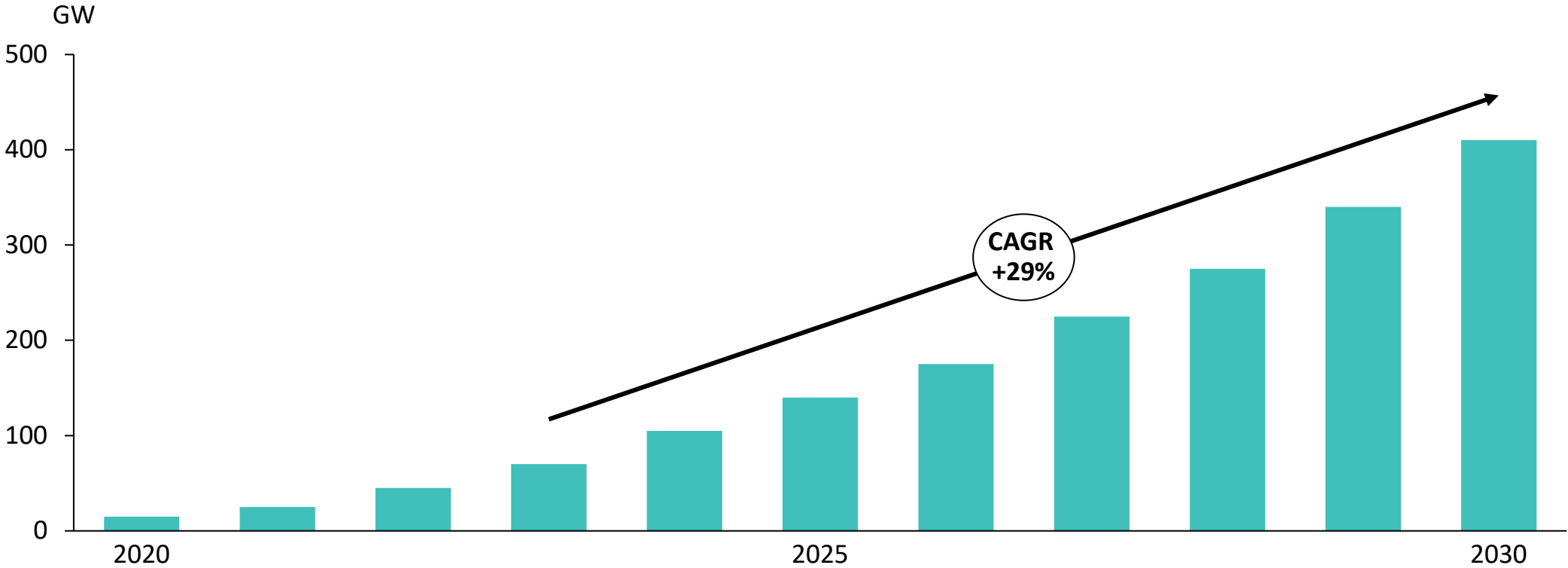


Combining Acid and Base together in the stack creates electricity



# AS HUGE AMOUNTS OF STORAGE CAPACITY ARE NEEDED ... (1/2)

Global installed storage capacity<sup>1)</sup>



1) Global cumulative energy storage installations, published by BloombergNEF

# ... IT'S CRUCIAL TO MAKE RESPONSIBLE STORAGE CHOICES (2/2)

Current storage technologies face safety ...

... and supply chain issues <sup>2)</sup>

## Tesla 'big battery' fire fuels concerns over lithium risks

Latest incident comes as utilities around the world increasingly rely on lithium-ion to store renewable energy

Financial Times

## Illinois EPA Asks For Legal Action Against Business at Center of Morris Battery Fire

Nearly 100 tons of lithium batteries were involved in the large industrial fire in Morris Tuesday that led to emergency evacuations and a large-scale response as authorities warned of "highly poisonous" and "very deadly" fumes.

NBCChicago

## Rising deployment of clean energy technologies is set to supercharge demand for critical minerals

International Energy Association

**Mineral demand for storage in the SDS grows by over 30 times between 2020 and 2040, with demand for nickel and cobalt growing by 140 times and 70 times respectively**

International Energy Association



# WHAT MAKES STORING ENERGY IN TABLE SALT AND WATER SO POWERFUL?

## **Affordable**

Competitive levelised cost of storage (LCOS) due to low material cost, combined with 20-year durability without degradation

## **Safe**

No fire and explosion hazards to people, operations and environment. Our reliance on non-flammable and non-toxic materials makes it highly suitable for use in close proximity to populated areas, critical infrastructure and industrial operations.

## **Infinitely scalable**

Increasing storage duration is as simple as adding reservoirs with table salt and water; materials that are cheap and available at any time

## **Flexible (>8 hours)**

AQUABATTERY can be dimensioned flexibly, based on customer needs because power and energy capacity can be scaled separately. Our system is suitable to store energy anywhere from 8 to 100 hours, at KW to MW scale.

## **Sustainable**

Our environmental impact is significantly lower vs. alternative batteries because we rely on abundantly, locally available, non-critical material. Our solution can be recycled at the end of life. Making our supply chain reliable and responsible.



CUSTOMER IMPACT



40-60%

Energy & grid  
cost reduction



up to 80%

extra CO2 emissions  
reduction (vs. PV only)



2x

Self sufficiency  
increase

\* Based on specific customer use cases and applications

“AQUABATTERY is one of Europe’s  
breakthrough technologies and game  
changing innovations”

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European Innovation Council

# OUR PROPRIETARY TECHNOLOGY IS PROVEN AND ROBUST

## Globally Patented

2 patents re. method and process to use bipolar membranes to store energy; 2 more coming<sup>1)</sup>

## 9 years R&D and tech development

3 in-field pilots; 20+ scientific publications on our technology by the founding team & partners

## Award winning


 Nominee Battery Innovation Award 2023
 
 Winner Herman Wijffels Innovation Award
 
 Green Challenge winner


 Winner Accenture Award Circular Economy
 
 Short-listed IChemE Global Energy Award
 
 Runner-up NRG battle


 Emerging Tech Runner-up

## Trusted partnerships







## €10m public funds raised






1) Patent #1 Battery operation with BPM-ED (EP3274078A1); Patent #2 Energy storage method (WO2019160411A1); 2 more subsidies in application process. 2) Winner announced 10<sup>th</sup> May 2023

# DEMONSTRATED IN THREE IN-FIELD PILOTS SO FAR

2017



## Pilot I: Green Village Delft, NL

Size: 1 kW/ 10kWh

- Partner: green Village, TU Delft
- Below par-performance from off-the-shelve stacks drove decision to develop stack in-house
- Energy storage in concentrated salt water and fresh water has low energy density. Decision to store energy in acid and base

2021



## Pilot II: Pantelleria, IT

Size: 1kW/7 kWh (new technology)

- Partner: local energy company S.MED.E. Pantelleria
- Storing energy in acid and base from salt water improved energy density significantly
- Control method not optimal
- 50% of energy components purchased locally at site, showcasing local scalability

2022-2023



## Pilot III: WSRL, Gorinchem NL

Size: 1 KW/30 kWh

- Partner: Waterschap Rivierenland (WSRL, Dutch water board)
- Improved control methodology; power electronics enhancement opportunities identified for better performance
- Pilot ongoing

# AQUABATTERY TECH SPECS\*

Sweetspot duration	>8 hours
Levelized Cost of Storage (LCOS)	€0,05 / KWh (12hr system, 10.000 cycles)
Lifetime	>10.000 cycles
Energy Density	25 KWh/m <sup>3</sup>
Power Density	10 KW/m <sup>3</sup>
Round Trip Efficiency (RTE)	70%
Degradation	None
Core battery elements used	Water, table salt

\* Target specs



# THIS IS US – NICE TO MEET YOU!



**Umut Aktas**  
Manufacturing manager



**Yorick Baljeu**  
Process engineer



**Dr Jiajun Cen**  
CEO & co-founder



**Emil Goosen**  
COO & co-founder



**Samir den Haan**  
Mechanical engineer



**Caroline Hall**  
Office manager



**Eric Hogervorst**  
Software engineer



**Balint Horvath**  
Business development manager



**Rohit Kanungo**  
Product development manager



**Jessica Kolf**  
Office assistant



**Maitry Phukan**  
R&D engineer



**Schao Shang**  
Design engineer



**Janneke Tjon Pian Gi**  
CCO

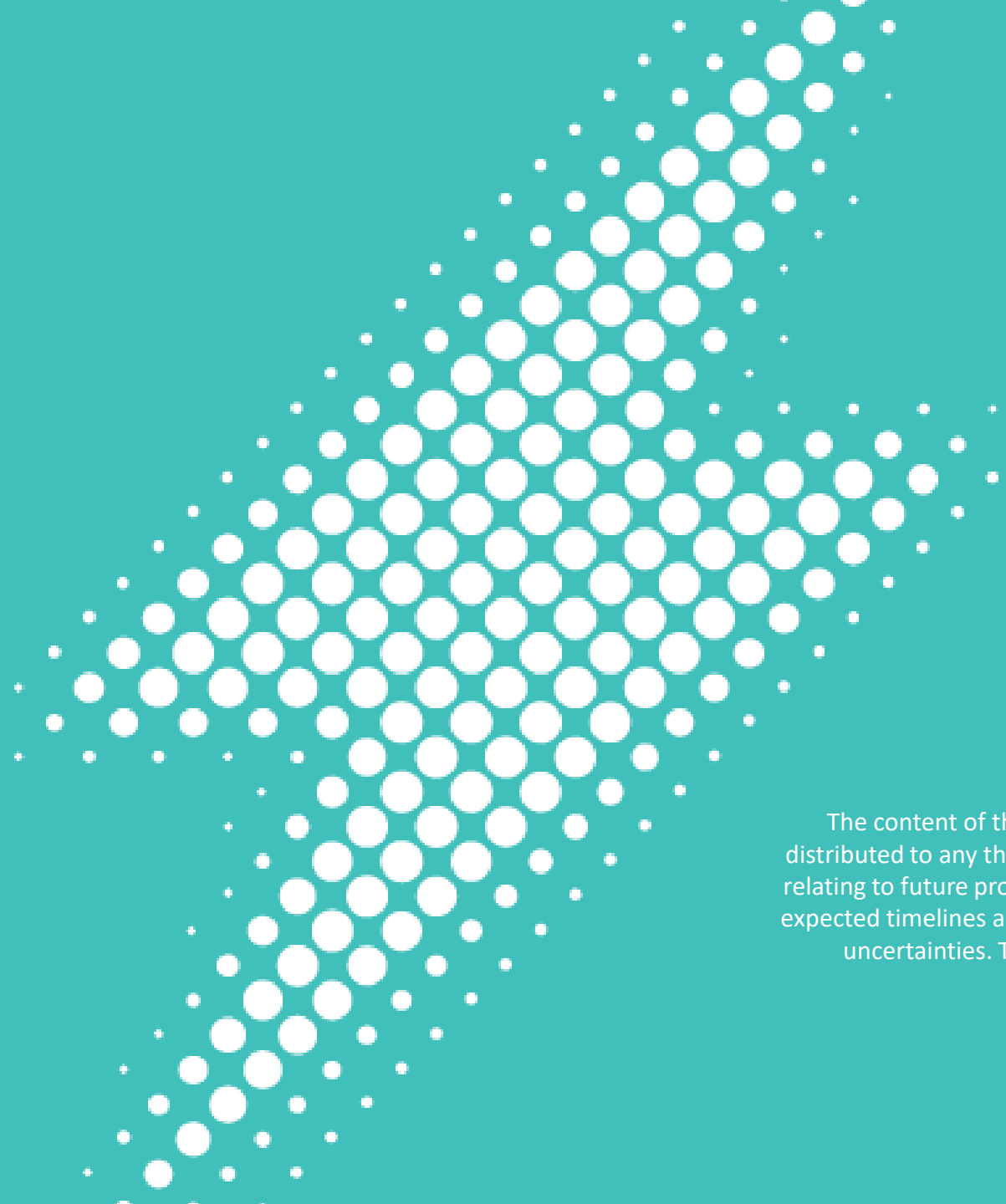


**Jelle Zeilstra**  
Electrical engineer

Our team driven to make the world a better place by  
empowering a net-zero world

**LET'S EMPOWER NET ZERO TOGETHER**





## Disclaimer

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