

Altech Advanced Materials AG



Innovative battery technology Made in Germany

Hansjörg Plaggemars, board member

27. November 2023

Altech: Innovative batteries and battery materials

Ceramic expertise in 2 business areas



Silumina anodes®

- Coated anode material
- Lithium-ion battery
- Use for e-mobility
- User benefit: at least 30 % increase in performance
- Industry advantage: harmonizes different graphite / can coat any known anode material
- Drop-in technology
- Coating technology enables the use of silicon



Cerenergy®

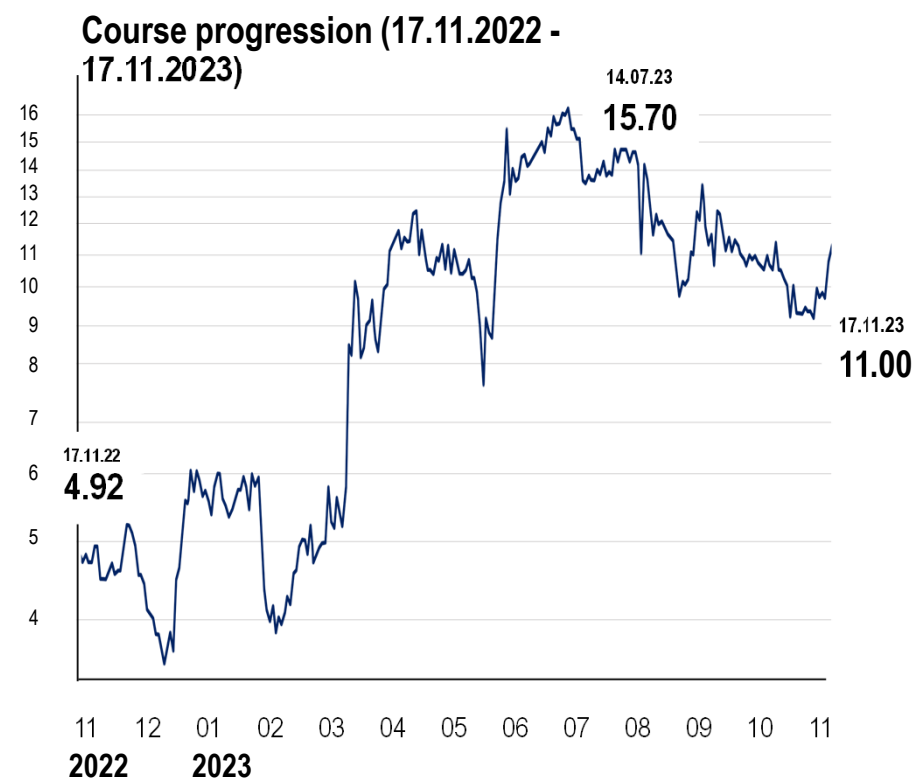
- Complete ceramic solid-state battery for stationary operation based on common salt
- Temporary energy storage for renewable energy, grid stability, peak shaving, industrial and charging infrastructure
- Inexpensive, environmentally friendly, recyclable, without critical substances, non-flammable





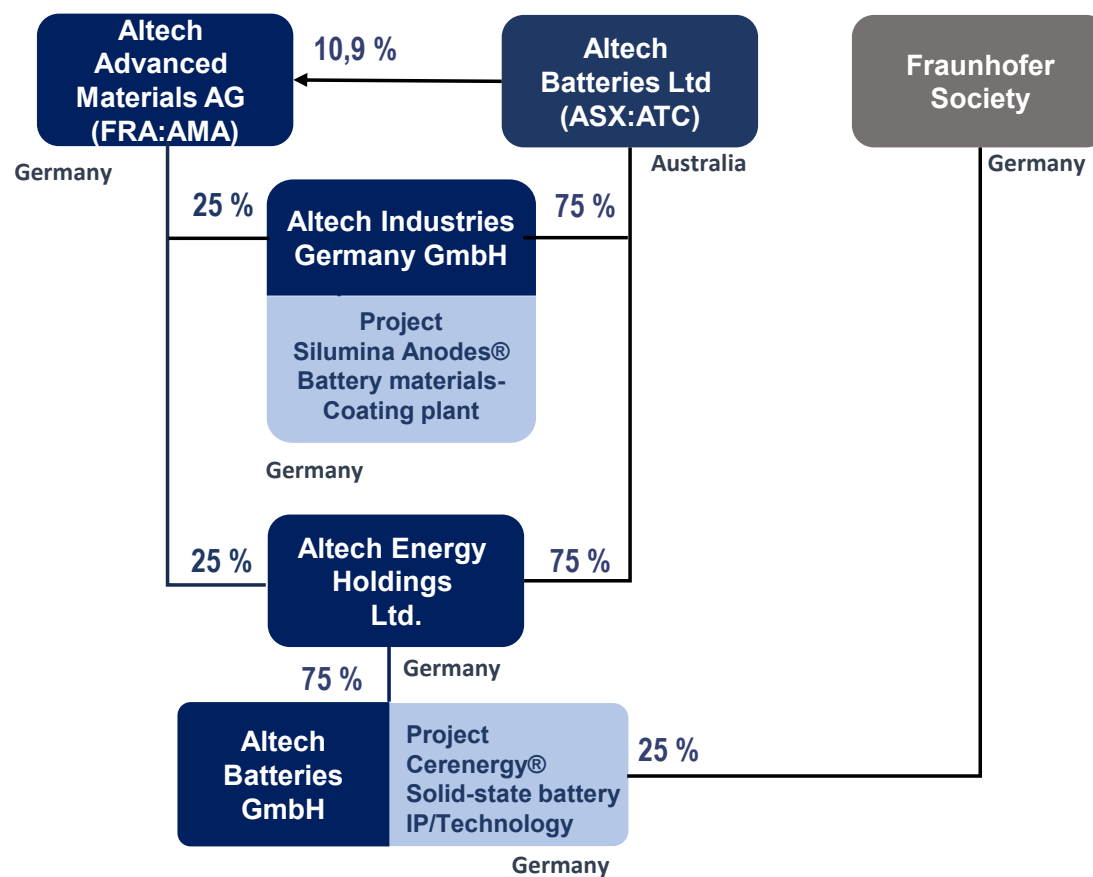
Altech Advanced Materials at a glance

Share	Altech Advanced Materials AG
Number of shares listed	2,825,000 (ISIN: DE000A31C3Y4, WKN A31C3Y)
Segment	Frankfurt Stock Exchange (Regulated Market - General Standard)
Number of shares not listed	4,237,500 (ISIN: DE000A31C3Z1, WKN: A31C3Z)
Share capital / Number of shares	7,062,500 EUR / 7,062,500
Shareholder structure	62 % German Balaton 11 % Altech Batteries Ltd, 7 % Meleware Acquisition Ltd. 20 % free float





The current structure of the Group





Silumina Anodes[®]

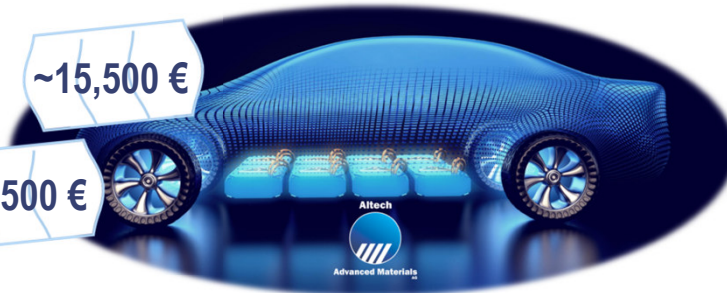
Coated anode material for
increasing the performance of
lithium-ion batteries



E-mobility: the price must fall - performance must increase

Cost of batteries for different vehicle types

- Dacia Spring ~6,700 €
- VW ID.3 and ID.4 10,000 € to 15,000 €
- BMW i3 ~12,000 €
- Nissan Leaf (62 kWh) ~15,500 €
- Mercedes EQC ~18,500 €



Goal ➤ **Energy density** (more power per volume/weight)
Fast charging capability (charging power per time)

The transformation to e-mobility is characterized by cost and performance parameters of the battery

Charging time: **max. 20 minutes** for 80%

Range: **Comparable with combustion engine** (~600 km)

Safety: **Flammability** factor



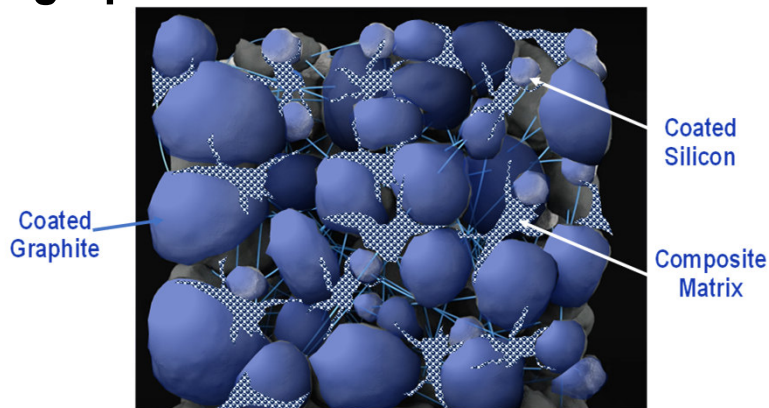
Only then broad acceptance for consumers



Game changer silicon:

Coating technology can be used in the anode

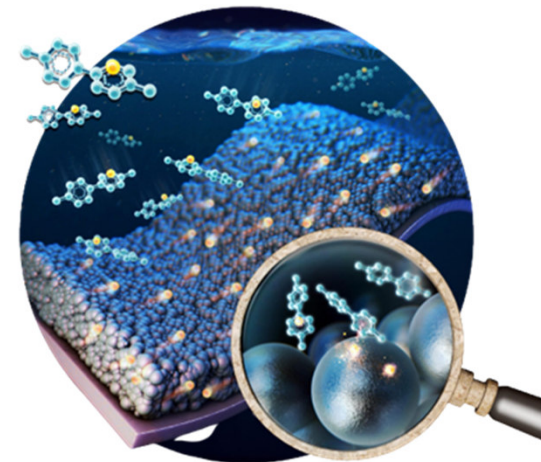
- Silicon has 10 times the capacity of graphite



Silicon = increases power and energy density



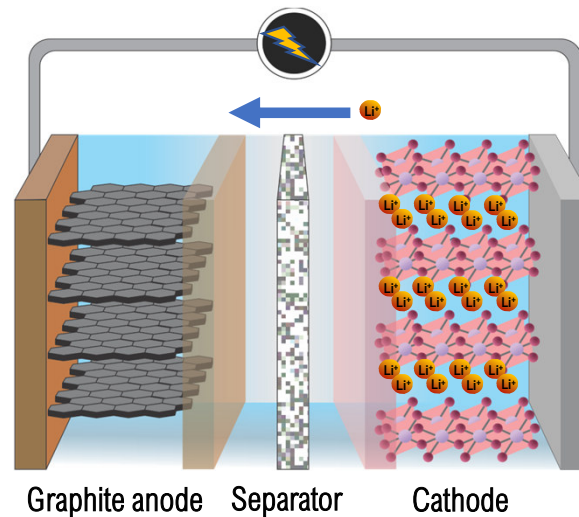
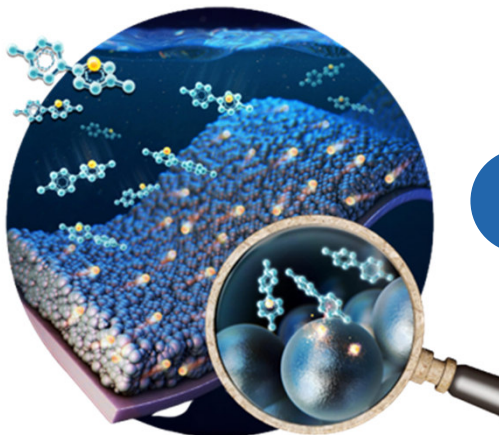
Silicon Si (3,579 mAh/g)
Graphite C (372 mAh/g)





Altech Silumina Anodes: Simple application in the existing battery architecture

Drop-in technology enables fast application



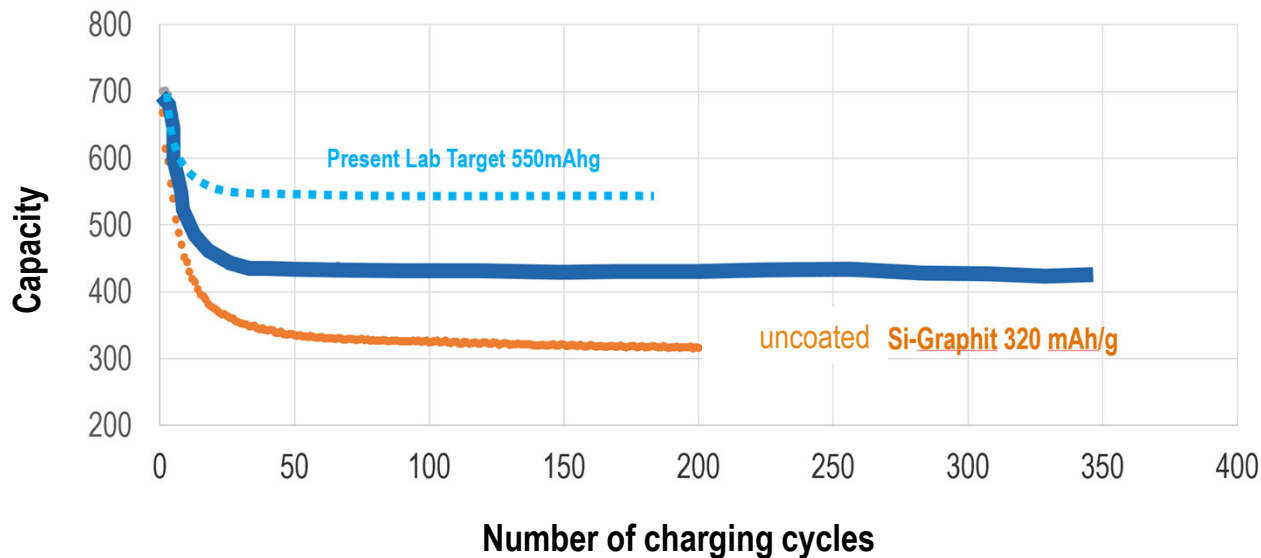
- Anode material is ceramic coated (graphite and/or silicon, ...)
- One anode material is simply replaced by another
- Battery architecture and manufacturing process do not need to be changed



Altech Silumina Anodes:

Increased performance through the addition of Silumina Anodes

Successfully tested in half cells with 1000 cycles



100% technology verified

100% process verified

Aiming to double output

Enormous EV added value

Security

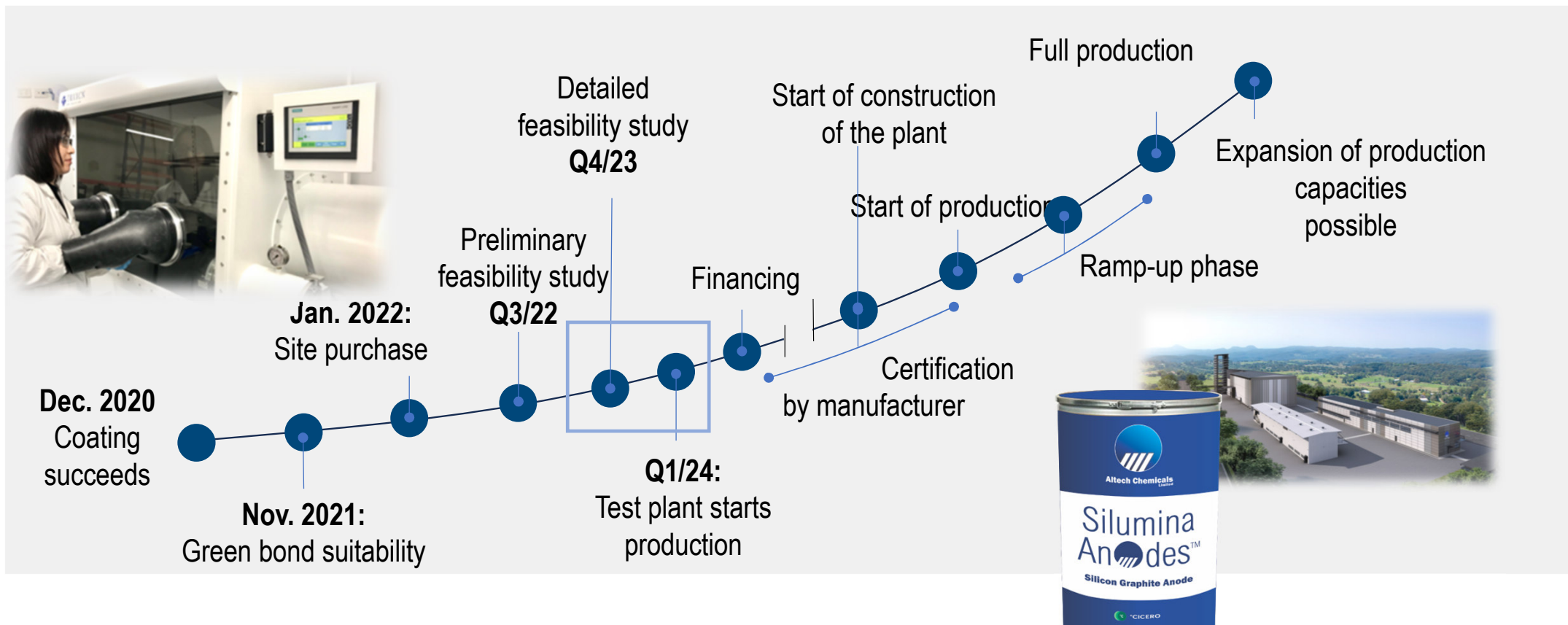


>30 %

performance increase with 10 %
silicon content and graphite
coating



Silumina Anodes: planned development

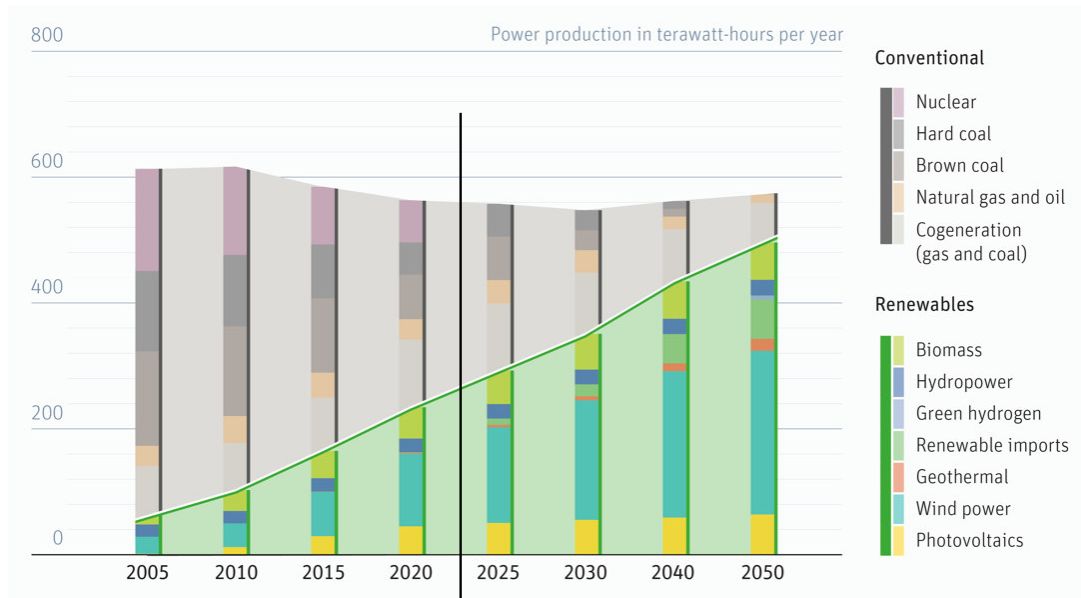


Cerenergy®

A complete, ceramic solid-state
battery for stationary operation based
on common salt

The energy transition needs new energy storage systems

Electricity generation in Germany 2005-2050, scenario

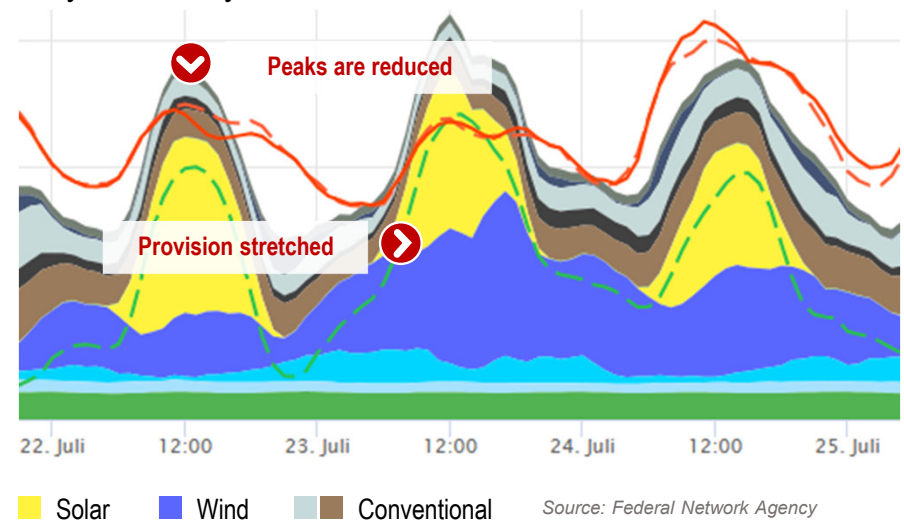


Source: DLR and Fraunhofer IWES

Today 2023

- Time lag between supply and demand for energy makes temporary intermediate storage indispensable
- Daily margin electricity trading from -8ct to +80ct (€)

Realized electricity generation in Germany July 22 to July 24, 2023

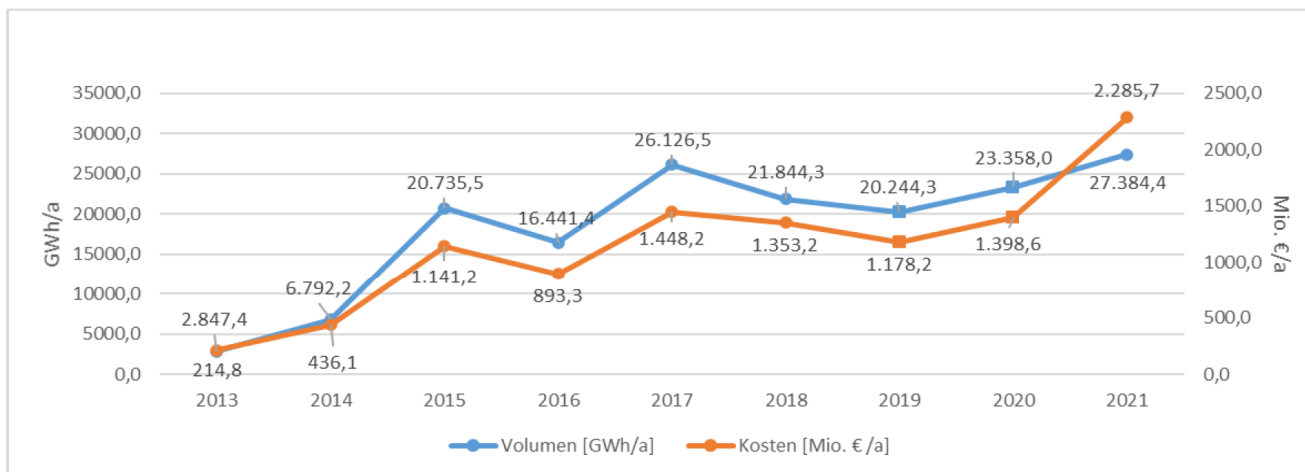


Source: Federal Network Agency



Lack of grid capacity already led to billions of euros of renewable energy being „wasted“ in 2021

Volume and costs of congestion management - with a strong upward trend



Development of the total costs of congestion management (source: BNetzA)

Costs of the congestion management (2021)

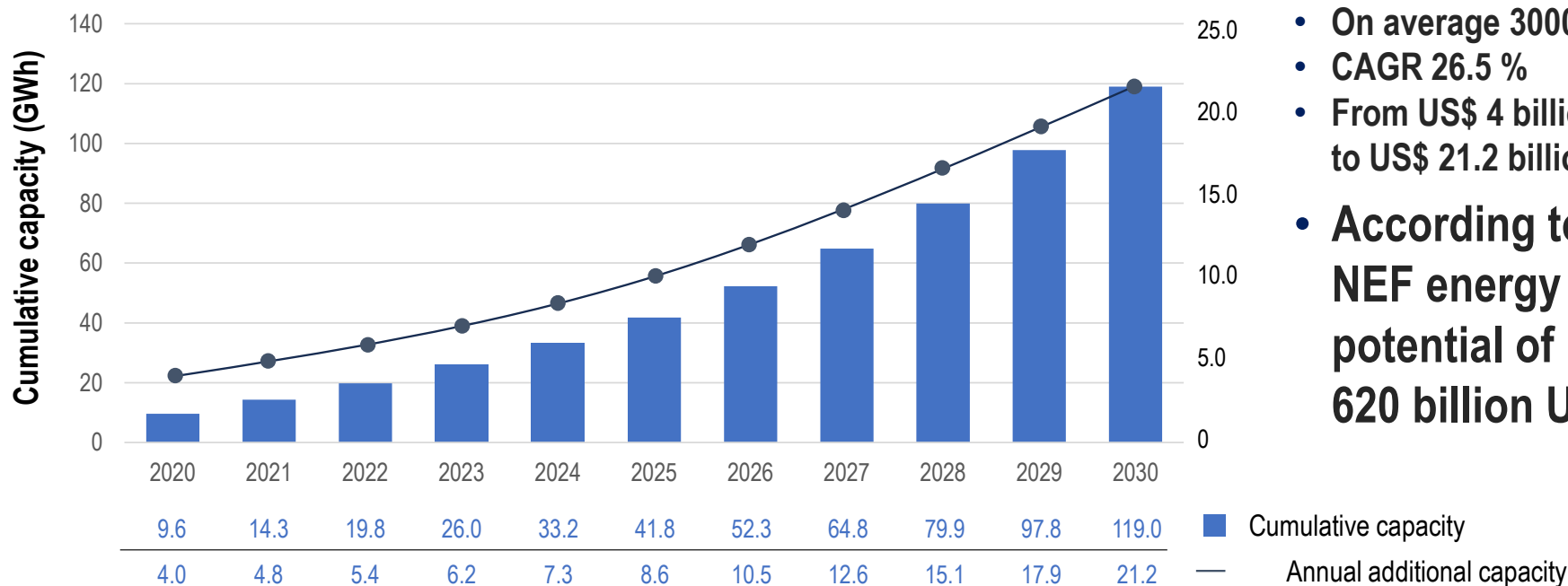
2,285 billion €

- a) Energy is not needed at the time of production (**time**)
- b) Energy cannot be routed or temporarily stored (**grid capacity**)



The battery market is growing enormously

Expected annual storage capacities and expansion for stationary battery storage systems

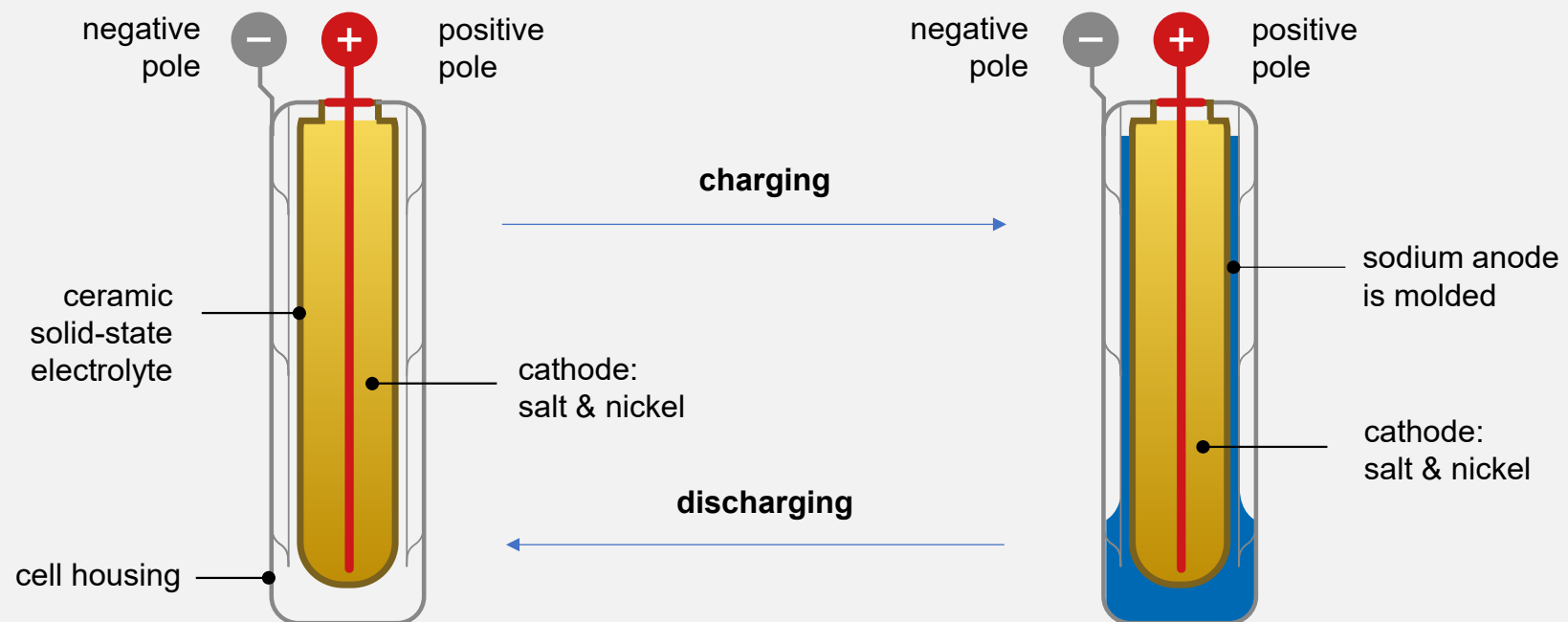


- On average 3000 GWh/year
- CAGR 26.5 %
- From US\$ 4 billion per year to US\$ 21.2 billion per year
- According to Bloomberg NEF energy storage has a potential of 620 billion US\$ by 2040

Source: Bloomberg NEF, 2022. Note: Figures rounded. Base year 2021 Source: Frost & Sullivan



How the battery works





The solution: a ceramic solid-state battery based on common salt

Known challenges are solved by Altech with Cerenergy



No rare or critical metals such as cobalt, lithium, copper or rare earths



Can be used in all climatic zones without external cooling or heating



Production with renewable energy, complete recycling at the production site



All primary raw materials come from Europe (nickel and common salt)



Extremely long service life without complex maintenance

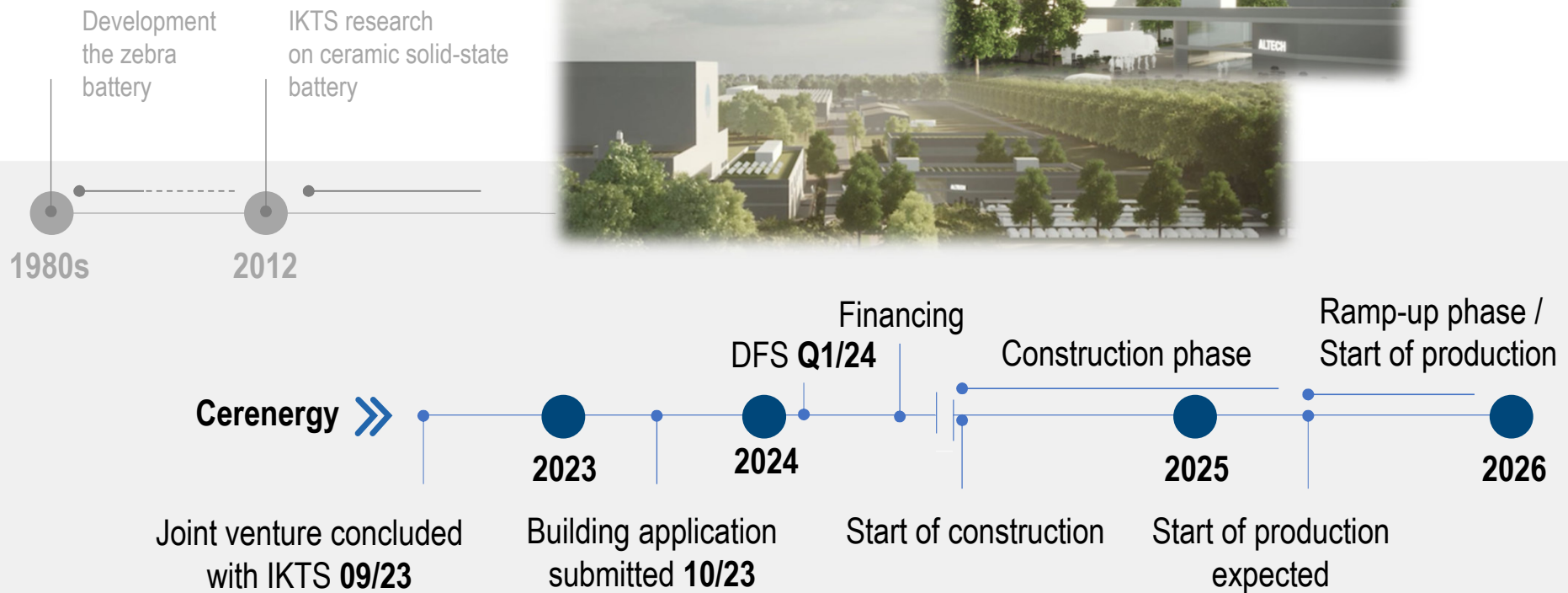


Non-flammable, stackable, easy to transport



Installation, maintenance and operation possible without effort

Cerenergy®



Scaling of the **CERENERGY[®]** technology

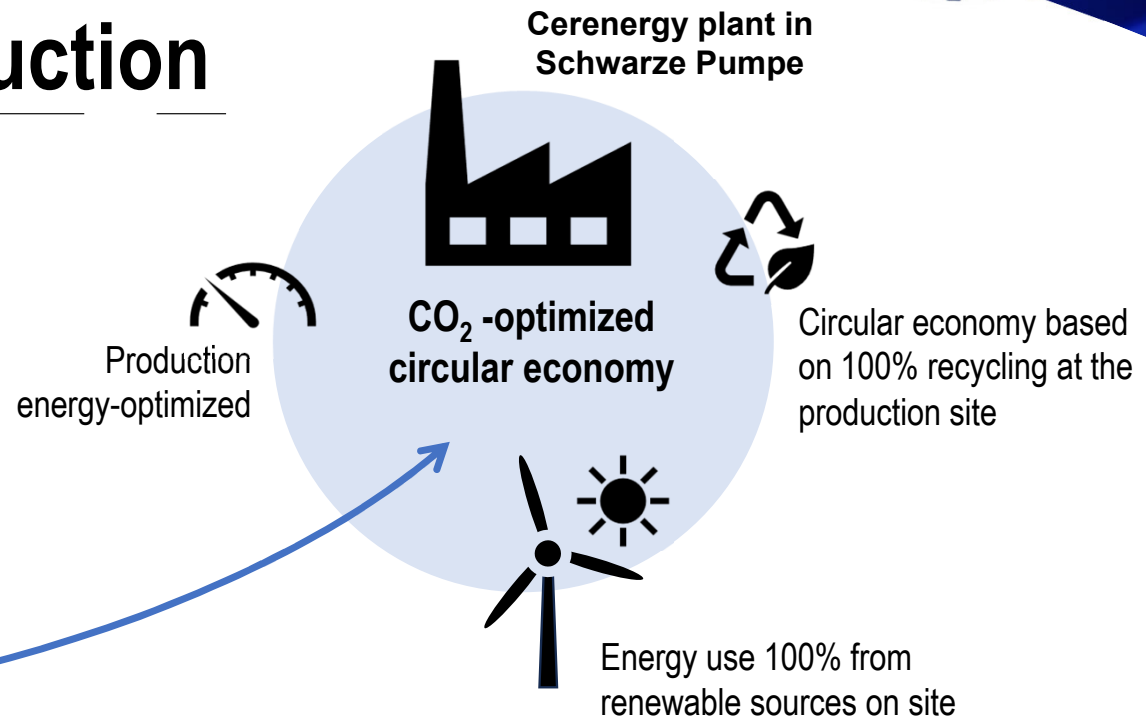
Development from laboratory scale to industrial series production

Scaling the CERENERGY® technology

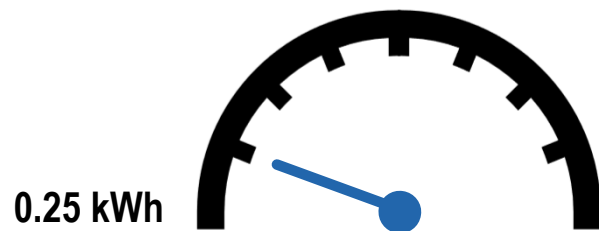
What criteria must be met?

- Minimal CO₂ footprint
- Minimum throughput times
- Maximum quality → Service life
- Highest possible cost optimization

Test facility IKTS
Fraunhofer



Structure of a CERENERGY® cell



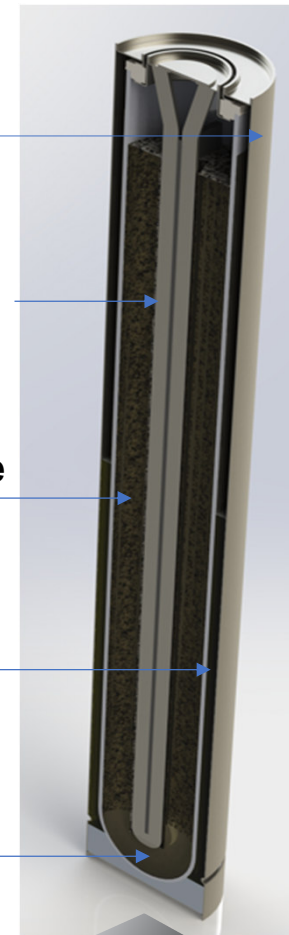
metallic
cell housing

secondary electrolyte

sodium nickel chloride
(cathode)

electrode
self-forming

carbon flow



- Common salt and nickel powder form the cathode material
- Housing and electrode are made of metal
- Low cost, robust, extremely durable, as no active material is lost or residues form





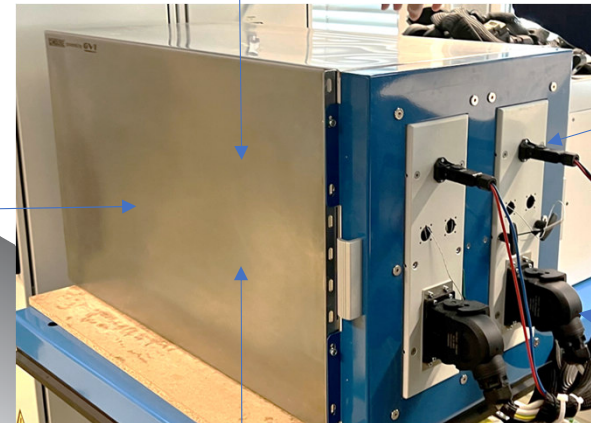
Structure of a CERENERGY[®] module



48 cells are connected to form a single unit



thermal
starting
system
integrated



48 cells
connected

connection cable

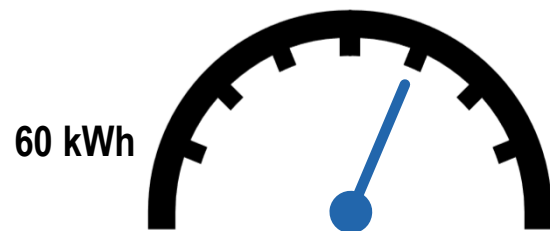
power
connection

module frame

Structure of a CERENERGY[®] battery pack



5 modules are combined into one unit



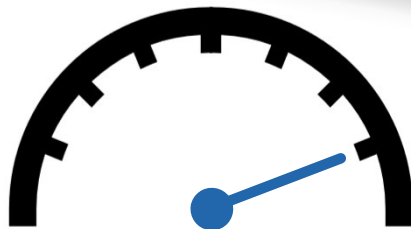


Altech GridPack - 1 MWh energy storage: plug and play in 5 minutes



20-foot container without
moving parts

18 BatteryPacks / 4,320 cells



1,080 kWh

- No cooling / heating
- Can be transported risk-free when loaded
- Not flammable
- Without manual service disconnect (MSD)
- No pressure equalization valves
- No waste heat cogeneration
- No water connection
- Long service life (>15 years)
- 100 % recyclable
- Several charging cycles per day possible
- Cost leadership per kilowatt hour in the life cycle



Comparison of operating costs with other systems shows superiority in the application

Operating costs	Estimated cycle costs = 0.06€/kWh			
	Altech GridPack	NGK NaS	Tesla MegaPack2	Redox flow
Valuation basis, 100% cycle in 24h	1.80	1.30	1.41	1.75
	€/kWh	€/kWh	€/kWh	€/kWh
Total costs per stored kWh (power) - pure storage	0.124	0.195	0.218	0.174
Levelized cost per storage				
Total costs per stored kWh (power) - grid service & storage	0.060	0.164	0.149	0.132
per stored kWh (power)				
Costs at the end of life	-	0.005	0.005	0.005
Maintenance/inspection costs	-	0.02	0.015	0.020
Costs for renewal during use	-	0.03	0.055	0.050
Energy losses per cycle	0.007	0.014	0.018	0.007
Amortization	0.053	0.095	0.057	0.050

- More charging cycles per day possible
- Cost per kilowatt-hour over the life cycle significantly lower
- No operating costs due to almost maintenance-free operation

Source: Own calculations based on market data

Current capital measure



Current capital increase by Altech Advanced Materials AG of EUR 3.6 million

Key points of the capital increase Altech Advanced Materials AG

Subscription price	EUR 7.60 per share
Subscription period	November 30, 2023 to December 14, 2023
Subscription ratio	29 subscription rights :1 new share
Beneficiaries	Listed shares: ISIN: DE000A31C3Y4 Shares not listed: ISIN: DE000A31C3Z1 Convertible bond: ISIN: DE000A30V6D9 Warrant: ISIN: DE000A30V6E7
Rights trading	Subscription rights traded under ISIN DE000A3EX2B3
Share delivery	Following the registration of the capital increase, listed shares with ISIN: DE000A31C3Y4 will be delivered as part of a securities lending transaction

- Discount to the share price at the closing price of EUR 11.50 / share on 23.11.23: 34%.
- The aim is to expand the shareholder structure through attractive subscription rights.
- Major shareholder Deutsche Balaton AG has issued a backstop declaration for all unsubscribed subscription rights.



Use of funds and source of funds

Use of funds		Source of funds	
Final purchase price payment AIG (Silumina Anodes)	EUR 1.6 million	Cash inflow from capital increase (backstop)	EUR 3.6 million
Co-financing obligation AIG (Silumina Anodes) / ABG (Cerenergy)	EUR 2.1 million	Cash on hand	EUR 1.6 million
Working capital	EUR 1.5 million		
Total	EUR 5.2 million	Total	EUR 5.2 million

Thank you for your attention!



Disclaimer / Forward-looking statements

Forward-looking statements

This presentation contains forward-looking statements that are characterized by words such as 'anticipates', 'predicts', 'may', 'will', 'could', 'potential', 'estimates', 'targets', 'expects', 'plan' or 'intentions' and other similar words that involve risks and uncertainties. Statements and guidance or outlooks regarding future earnings, distributions or financial condition or performance and targets, estimates and assumptions regarding production, prices, operating costs, results, capital expenditures, reserves and resources are also forward-looking statements. These statements are based on an assessment of current economic and operating conditions and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as of the date of this announcement and likely to occur, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of our company, directors and management. We cannot and do not guarantee that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur, and readers are cautioned not to place undue reliance on these forward-looking statements. These forward-looking statements are subject to various risk factors that could cause actual events or results to differ materially from those projected.



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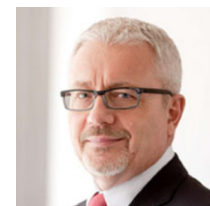
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