

EXECUTIVE SUMMARY – EMERALD HORIZON AG

Next-Generation Clean Energy System

- ✓ Dual-income architecture
- ✓ Non-criticality regulatory pathway
- ✓ Tier-1 co-development & manufacturing

Founded 2019 • 51 specialists • Latest valuation €790 million

Emerald Horizon AG is a European deep-tech energy company developing a new class of **inherently safe, modular baseload energy systems**. The company's platform combines:

1. **CALstore** – an industrial high-temperature thermal - molten salt - storage technology that has already achieved full prototype validation and is entering industrial serialisation.
2. **ADES** – an **accelerator-driven thorium-based sub-critical energy source** designed to deliver CO₂-free baseload power with no uranium, no chain reaction, no meltdown risk, and no long-term waste.

The company has transitioned from concept to **validated hardware, audited development, and industrial manufacturing partnerships**, positioning Emerald Horizon as a highly investable deep-tech opportunity at the inflection point toward large-scale deployment.

1. Technology Platform

1.1 ADES – Accelerator-Driven Energy Source (25 MWth ≈ 10 MWe)

ADES is a thorium-based, sub-critical molten-salt energy source driven by a compact proton accelerator. Operating at $k_{\text{eff}} < 1$, it physically cannot sustain a chain reaction and therefore eliminates meltdown scenarios and long-term nuclear waste concerns.

Key features:

- No uranium or plutonium; pure thorium fuel loop
- No pressurization, no water, no explosion risk
- Zero transuranic waste (<300-year fission products only)
- Containerized architecture for industrial serial production
- 20-year operation without refueling, minimal maintenance
- Designed for **global plug-and-play baseload energy**
- ADES Technology Readiness

All major ADES components – including the accelerator sub-system, molten-salt loop modules, thermal interface structures, control electronics, and safety systems – **already exist at small scale and have been successfully demonstrated independently.**

This significantly de-risks the integration program.

- **Industrial TRL9 Roadmap**

ADES will be industrialised jointly with **VDL Groep**, one of Europe's leading high-temperature and precision-engineering industrial groups, through a **structured TRL9 development program.**

1.2 CALstore – High-Temperature Thermal Storage (5 MWh per Unit)

CALstore is a modular, water-free, high-temperature molten-salt storage system providing:

- 5 MWh thermal capacity per module
- 0.5 MW charge/discharge
- 98% heat-to-heat efficiency
- Near-zero degradation over thousands of cycles
- Explosion-free operation
- Standardised 20-foot container footprint
- **Prototype cell Fully Validated**

The first **CALstore_battery cell prototype** is fully assembled and operating on the **Emerald Horizon test bench**, achieving stable high-temperature performance, high-power operation, and full alignment with simulated engineering parameters.

This milestone confirms CALstore is **no longer a concept**, but an industrially scalable energy-storage technology.

- **Linear Scalability**
- 1 CALstore cell → validated
- 30 cells → full CALstore container system
- Dual-site serial production → thousands of 20-ft CALstore units

This modular architecture eliminates scale-up risk and accelerates global deployment.

2. Proof of Reality & Comprehensive De-Risking

2.1 Industrial Manufacturing Partner – VDL Groep

Emerald Horizon has entered a full manufacturing and co-development partnership with **VDL Groep (Netherlands)**, giving access to:

- high-temperature engineering
- precision manufacturing
- semiconductor-grade production quality
- global-scale serial production

VDL will operate **two production sites** (Europe and Singapore/Malaysia), enabling global delivery and supply-chain resilience.

This partnership removes industrialization risk – a critical requirement for institutional investors.

2.2 Scientific & Academic Validation – TU Graz

TU Graz contributes independent partner in:

- thermal dynamics & CFD
- molten-salt corrosion behaviour
- high-temperature cycling
- prototyping & laboratory testing

2.3 Regulatory Affairs – Royal HaskoningDHV

Royal HaskoningDHV serves as strategic partner for:

- Regulatory Affairs
- licensing pathways
- environmental & safety cases
- compliance with European & international frameworks

2.4 FFG Audited Development

CALstore was partially funded by the **FFG**, requiring strict annual audits (CALstore) of all development milestones, costs, and engineering progress – creating an independently verified development history.

3. Market & Application Domains

CALstore and ADES jointly target a **multi-hundred-billion global market**, including:

- Industrial process heat (food, chemicals, materials)
- Baseline electricity for industry, regions, islands, data centers
- Retrofit of coal power plants
- Off-grid power (mining, military, remote regions)
- Hydrogen production & high-temperature processes

4. Business Model & Economics

4.1 CALstore – Stable, Recurring Infrastructure Income (EaaS)

CALstore is commercialised through an **Energy-as-a-Service model**, delivering:

- Zero CAPEX for clients
- Long-term contracted revenue
- Bankable infrastructure cashflows
- Proven SPV architecture with existing €10m project financing
- **DCF-Based Valuation**

The validated model shows:

- **NPV ≈ €1.15 billion** (EaaS cashflows only)
- **Strategic valuation €1.2–1.8 billion**

Even under worst-case assumptions:

- NPV ~€426 million

This confirms CALstore as a **robust, low-risk, recurring-revenue asset class**.

- **4.2 ADES – The Moonshot with Global Impact**

ADES represents the high-upside portion of the business:

- CO₂-free baseload
- no uranium
- no chain reaction
- no long-term waste
- modular, serially manufacturable
- global deployment potential

ADES is designed to become the **first inherently safe, industrially scalable baseload energy source for global deployment**.

5. Investment Case

Emerald Horizon offers a rare combination of:

- **Validated hardware**, not theoretical designs
- **Industrial partnerships** (VDL)
- **Regulatory alignment** (Royal HaskoningDHV)
- **Scientific partners** (f.e. Technical University Graz)
- **Government-audited development** (FFG)
- **High-margin recurring revenue** (CALstore EaaS)
- **Massive long-term upside** (ADES)
- **Global footprint** (EU, US, APAC, Middle East)
- **Strong governance**
- Backing by **Dr. Robert Holzmann**, former World Bank Director, IMF official, Governor of the Austrian National Bank

The company is preparing for the next major expansion phase: scaling CALstore into global serial production and advancing ADES toward TRL9 industrial demonstration.

Conclusion

Emerald Horizon AG is **not a paper concept**. It is a validated, audited, industrially partnered, scientifically backed, and globally scalable energy-technology company – with a dual strategy combining:

- **CALstore** → stable, long-term infrastructure income
- **ADES** → a transformational, global-scale clean baseload energy technology

With 51 experts, multiple global partners, validated technology, and strong institutional support, Emerald Horizon stands as one of the most compelling deep-tech energy investments today.