Hydrogen

Modular fuel cell platforms advance Europe's hydrogen economy

An interview with Dr.-Ing. Carsten Pohlmann, Chief Technology Officer at VINUITY

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VINUITY introduction

Founded in 2024 and based in Chemnitz, Saxony, Germany, VINUITY specializes in the development and manufacturing of metallic and graphitic fuel cell stacks, complete fuel cell modules (5–250 kW), and integrated energy systems up to the megawatt range. As part of the Vision Group, VINUITY leverages established production capacities and the deployment experience of over 600 applications to offer cost-effective, reliable hydrogen-to-power solutions across Europe. Dr.-Ing. Carsten Pohlmann serves as Chief Technology Officer at VINUITY. In this interview, we discuss VINUITY's origins, its dual-stack approach, challenges in scaling from stacks to full energy systems, and the company's vision for Europe's net-zero transition.

Tell us the story behind VINUITY's founding? What gaps in the clean-energy market were you aiming to fill, and how did your team's background shape that ambition?

VINUITY was founded in 2024 with the clear aim of supporting the European transition towards a net–zero economy. We are focusing on fuel cell technology as part of a larger scheme in which renewable energy, hydrogen, batteries and other forms of clean energy will contribute to a sustainable, safe, reliable and also cost-effective energy supply. We are not doing this alone. Yes, we are a start-up, but we benefit from a larger group—Vision Group—that supports company growth financially but even more importantly via technology. Through Vision Group, we have production capacities readily available and benefit from a huge experience background, as Vision's fuel cell systems are already deployed in more than six hundred applications.

This is a large benefit for us: we are flexible and agile as a small company but can directly offer reliable and well-tested technology. Based on this, we offer our products as a cost-efficient contribution to the above-stated overall scheme, while building a strong European support network and allowing our clients easy access through a German entity.

Personally, I have been in hydrogen since my diploma thesis and have worked in several start-ups in France, the UK, and Germany on hydrogen storage, fuel cells and integration. I am also active as a board member of HZwo, the Saxonian hydrogen innovation cluster, and served for a longer time at Hydrogen Europe as a Technical Committee leader. This combination of relevant hydrogen technology experience, intercultural start-up knowledge as well as networking, business development and political skills is the basis of how we can make VINUITY a success in these sometimes challenging times. Additionally, administrative support, engineering support and general strategy is well-supported by Vision Group, for which we also rely on strong intercultural exchange and interfaces built on a common goal and vision. This combination is enabling us to develop into a successful German company.

How has Vision Group's production capacity influenced your decisions around product range and market entry?

Vision Group originally came from lead-acid and lithium iron phosphate (LFP) batteries and still makes most of its revenue in this field. It has production capacities in Asia but also, for example, operates Vision Europe in Paris to support European customers. In 2016 Vision Group decided to add fuel cell technology as an integral pillar to its product portfolio. Back then the business was driven by incentives in China for city bus applications, and this became the backbone of our technology development. Based on these developments, activities in trucks and forklifts were launched. Today, another important focus is stationary power supply, whether as gensets or back-up power.

This product portfolio, the experience behind it and the engineering, as well as production capacities, shape what we contribute to Europe. We can base our offer on this foundation, using existing products and capacities to enable reliable yet cost-effective fuel cell solutions—from fuel cell stack to modules and gensets—for our customers. In the entry phase, we leverage this to build reputation and references in a highly regulated European market. In the next stage, as we grow customer engagements, we will add R&D capacities and later introduce production for systems, keeping stack production in current facilities to achieve scale and further reduce costs. We use our mobility expertise (buses, trucks, forklifts) but for Europe we also strongly focus on stationary applications, which we see adopting faster due to hydrogen refueling infrastructure constraints.

A VINUITY fuel cell stack using graphitic bipolar plates.

What were the biggest technical or organizational hurdles when moving from fuel cell stacks to full energy systems?

Building a fuel cell stack means managing many repeating subcomponents that must be stacked in a clean environment with high precision. A stack can have up to three hundred cells, each with a membrane electrode assembly, sealing frames and more. The challenge is to understand all materials and production requirements to achieve a functional, high-performance stack while controlling costs. This process takes time and experimentation with material selection, test-cell testing, single cell testing, short stack testing, full-stack testing and iterations under real-world conditions. The hurdle is the overall process, having test benches, hydrogen supply and pilot customers that allow in-depth monitoring and improvement.

We met these challenges with endurance and vision. It was imperative to take the time for design iterations and thorough testing. All of this was possible through Vision Group's commitment, ensuring we didn't rely solely on fuel cell products for revenue. Today we have two stack types ready for mass production that meet quality, cost, and performance targets.

Europe's hydrogen sector is highly competitive—what obstacles did you encounter in establishing your R&D center in Germany, and how did local networks or regulations shape your strategies?

We began with strong motivation to build something here in Chemnitz, Germany. Yet Europe's highly regulated environment means significant administrative tasks and lengthy processes, which can distract from product and market development. These regulations serve a purpose—ensuring quality and safety for end users—but we'd welcome more streamlined procedures. Recent political shifts, such as the breakup of the late German government and ongoing tariff conflicts, have also introduced uncertainty. Innovation needs some predictability in regulation and trust in long-term commitments.

In this context, local embedment is key. Chemnitz—often overlooked—is emerging as a hydrogen innovation hub with strong research institutions, universities and a well-established supplier network. Hosting one of Germany's four national hydrogen centers, the region drives R&D, education and industrial application of hydrogen solutions. Its collaborative ecosystem and cultural vibrancy, highlighted by its role as European Capital of Culture 2025, complement its technological strengths. We rely on these structures and build eye-to-eye relationships. Though we stand at the beginning of our journey and will face further obstacles, especially in regulations, we are confident we can master them and play a crucial role in European fuel cell technology.

Could you walk us through the key differences between your metallic and graphitic bipolar-plate stacks, and how you decide which technology suits a given application?

We offer two stack types: one based on graphitic bipolar plates, the other on metallic plates. Graphite's nature allows better chemical stability, offering longer lifetimes. Metallic plates can be thinner, achieving higher power density. This guides their applications, where graphitic stacks underpin long-life systems for buses, trucks, forklifts and gensets and metallic stacks suit space– and weight–sensitive areas like cars, vans, and aviation.

Currently, most of our products use graphitic stacks, since many metallic use cases need widespread refueling infrastructure. However, we are developing a hybrid platform we call Paperstack—a graphitic bipolar plate as thin as a metallic one, using similar production processes. We've demonstrated a 130 kW prototype. Challenges include stabilizing raw material production and integrating sealing processes. This is an ongoing development, but it could unlock cost-efficient, scalable stacks with high power density and long life for multiple sectors.

Example of a VINUITY fuel cell module capable of producing 130 kW.

We've read that your modules integrate the entire Balance of Plant (BoP)—could you explain what that means?

A fuel cell stack needs auxiliary devices, including air and hydrogen loops, cooling, and control systems. Key components include air compressors, inter-coolers, hydrogen recirculation, humidification, DC–DC converters, water pumps and various safety and control valves. We design and build complete modules with an optimized architecture to improve overall system efficiency, harmonizing all components across operating points.

This approach lets us adapt modules to space and voltage requirements by adjusting component arrangement. For example, we tailored our 80 kW module to fit a fuel cell bus rooftop, based on our standard architecture. We offer clients a free initial packaging study to evaluate feasibility and refine integration from the start, saving time and cost and ensuring quick viability. We don't just sell products but deliver solutions.

How are VINUITY's fuel cell solutions affecting operations in material handling, data centers or medium-distance trucking—can you share a use case?

Use cases vary. In material handling, electric forklifts rely on batteries that need recharge time or battery swaps, which require charging infrastructure. Hydrogen offers faster refueling and consistent performance until empty, so trucks can run multiple shifts with full power and lift capacity. Depots can install refueling stations to improve ROI and independence from grid constraints.

In data centers, fuel cells replace diesel generators for back-up power, reducing CO_2, NO_x, SO_x, particulates and noise in urban areas. These systems run only when needed, so hydrogen-based generators improve environmental performance while ensuring reliability. In all cases, the optimal architecture is often hybrid: sizing the fuel cell for average demand, operating it at its most efficient point, and supplementing peak power with batteries. By standardizing stack architecture across applications, we achieve scale and share ongoing improvements and maintenance practices.

How do you balance performance, durability and affordability in real-world deployments?

It starts with analyzing the actual need. We tailor solutions around use case, power profile and hydrogen availability, typically in a hybrid design with batteries. This lets us size the fuel cell to mean power demand, run it at its most efficient point, and handle peaks via batteries—reducing CAPEX and extending lifetimes. Using one basic stack architecture across all applications amplifies economy of scale and shares refinements. Together, these approaches allow us to meet almost any power requirement with the right balance.

Looking ahead to megawatt-scale systems, what technical or market challenges do you anticipate?

The foremost challenge is hydrogen availability—regulated supply and practical distribution. Without hydrogen, fuel cells can't operate. Europe needs a hydrogen backbone, domestic production and imports to scale fuel cell technology. Society must leverage re-newables, electrons and molecules for a stable energy infrastructure. Hydrogen will be key for storage, transport and sector coupling beyond electricity, such as steel making and heat.

For VINUITY, the challenge is to align product readiness with market development. We've built a 1 MW unit in a 40-foot container—it's ready for deployment. Further optimization is possible, but local hydrogen supply remains an obstacle. Market opportunities span grid support, islanded systems, EV-charging support, SME power bridging PV seasons, back-up power and mobile generators. We expect stronger demand after 2030, once a hydrogen backbone is established.

How do you envision VINUITY's role in Europe's push toward a net-zero economy over the next five to ten years, and what innovations excite you most?

We will be integral to Europe's energy transition. Our technology is ready, scaled and cost-attractive, and we will advance further with innovations like Paperstack. We're focusing on applications that don't initially require a hydrogen grid, proving European readiness and reliability over the next five years. During this period, we'll build our Chemnitz R&D center to better shape regional demand. Once hydrogen availability expands, we'll supply trucks, trains, ships and power generators, driving decarbonization alongside renewables and electrification.

In short, we're ready to deliver and improve. Now is the time for implementation—that's what excites me most. As an engineer, I'll always embrace innovation, but at this stage let's leverage the potential we already have and get started.

Contact us for more information on our chemicals for hydrogen application

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