Haffner Energy

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Patrick Haffner, a pioneer of modern AI, joins Haffner energy

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Patrick Haffner brings more than 35 years of expertise to Haffner Energy's technologies. A trailblazer in approaches now known as "human-in-the-loop", he will help harness AI to transform the performance of Haffner Energy's installations.

Haffner Energy is entering a new phase in its technology strategy, aimed at progressively expanding the use of artificial intelligence across the operation, control and optimisation of its technologies, with the involvement of Patrick Haffner.

Patrick Haffner will act as a consultant to Haffner Energy, working closely with the Company's technical and operational teams.

The ambition is clear: harness AI to enhance the performance of Haffner Energy's systems and make it a new driver of technological and industrial differentiation.

Patrick Haffner, a pioneer of modern AI

A graduate of École Polytechnique and Télécom Paris, with a PhD in signal processing, Patrick Haffner has been working on machine learning and neural networks since the late 1980s, long before the current AI boom. He played a direct role, alongside two of the three future recipients of the 2018 Turing Award, in research that helped lay the technological foundations of AI as we know it today.

At Bell Labs and later AT&T Labs in the United States, he was among the select group of modern AI pioneers who developed the first large-scale industrial applications of neural networks. He worked for many years alongside Yann LeCun, considered as one of the godfathers of AI. Patrick Haffner also collaborated with Yoshua Bengio, who received the Turing Award with Yann and is a pioneer of deep learning.

In 1998, Patrick Haffner co-authored with Yann LeCun, Léon Bottou and Yoshua Bengio the landmark paper on convolutional neural networks (CNNs), one of the foundational technologies of modern AI. Entitled Gradient-Based Learning Applied to Document Recognition, it was published in Proceedings of the IEEE.

From Research to the Large-Scale Industrial Deployment of Neural Networks

Patrick Haffner led the deployment of what is considered the first use of a neural network for an industrial automation task: the automatic recognition of amounts written on bank cheques, a technology deployed on a large scale in the United States from the late 1990s onwards.

In 1995, this achievement marked the first large-scale demonstration of the ability of neural networks — which would later become the driving force behind today's artificial intelligence revolution — to move beyond the laboratory and perform a real-world industrial task. It was also an early example of a system in which AI could refer difficult tasks to human operators, following what is now known as a "human-in-the-loop" approach.

After more than three decades dedicated to AI and its practical applications, including at Amazon Web Services (AWS), where he most recently held the position of Principal Applied Scientist, Patrick Haffner is now able to devote his expertise fully to Haffner Energy. He recently visited the company to meet its teams, with whom he will work closely to integrate artificial intelligence into Haffner Energy's industrial technologies.

Keeping Humans at the Heart of an AI-Accelerated Learning Loop

It is this pioneering expertise in human-in-the-loop AI that Patrick Haffner, brother of Haffner Energy's co-founders, will now bring to the operation of the Company's industrial technologies, working alongside its teams.

The aim is not to replace operators with AI, but to significantly enhance their analytical capabilities while enabling AI to learn from human experience.

"Every hour, our thermolysis process generates thousands of data points that are already analysed using conventional AI. However, the most significant gains will come from our ability to integrate AI more closely with the experience of our operators — an interaction that conventional LLM-based models still struggle to capture effectively," emphasised Philippe Haffner, co-founder, Chairman and CEO of Haffner Energy.

He added: "This is precisely where Patrick's unique expertise in human-in-the-loop AI makes all the difference. By building on existing AI technologies while developing algorithms specifically tailored to our processes, capable of incorporating our operators' actions, decisions and operational feedback, Patrick's contribution will enable us to dramatically accelerate our learning curve.

Our objective is to translate these insights into improvements in equipment performance and reliability as quickly as possible, delivering two key benefits to our customers: increased availability and substantial savings in operating and maintenance costs."

An industrial installation continuously generates vast amounts of data: temperatures, pressures, flow rates, compositions, biomass characteristics, operating parameters, equipment performance and the quality of the products obtained. Across a single installation, and subsequently an entire fleet, this quickly amounts to millions of data points and combinations of parameters that AI can analyse and compare.

AI can identify complex correlations and detect subtle early warning signals that are extremely difficult for human analysis to discern, potentially indicating a deviation or malfunction before it becomes apparent. Operators, in turn, contribute their knowledge of the process to interpret and assess this information and determine the appropriate course of action.

This approach will also make it possible to capture the experience of the most skilled operators and progressively make it available to others. By learning from situations encountered, how they were analysed and the decisions made by experts, AI will be able to make part of this accumulated expertise available through a genuine intelligent copilot. This will help less experienced operators understand situations, identify issues requiring their attention and make informed decisions, while retaining full control over those decisions.

The human-machine interface can thus progressively evolve from a conventional monitoring and control tool into a genuine intelligent operational copilot, drawing on installation data, the experience accumulated at Marolles and across the installed fleet, and the insights of the most experienced operators.

AI will therefore become not only a powerful accelerator of industrial learning and continuous improvement, but also a means of capturing and disseminating operational know-how much more rapidly.

This human-machine learning loop is expected to optimise operating parameters, detect anomalies earlier, anticipate certain maintenance requirements, reduce unplanned downtime and continuously improve equipment availability and performance, while lowering operating and maintenance costs.

The objective is therefore not simply to add general-purpose AI to existing systems, but to develop intelligence deeply embedded in the industrial process, drawing simultaneously on real-world equipment data, an understanding of the underlying physical processes and the experience of operators.

Harnessing Fleet-Wide Experience to Benefit Every Installation

AI should also significantly accelerate the feedback loop and continuous improvement of equipment throughout its operational life.

Haffner Energy's technologies are designed and qualified to achieve their expected performance levels from the moment they are commissioned. However, as the installed fleet expands, the diversity of biomass feedstocks, operating conditions and situations encountered will considerably enrich the collective experience available.

Each installation will therefore be able to benefit not only from its own operating history but also from the insights gained from other installations and their operators.

An installation delivered today will thus continue to benefit in the future from improvements made possible by the experience accumulated across Haffner Energy's entire fleet.

The combination of human-in-the-loop approaches, AI and fleet-wide operational data should enable Haffner Energy to transform operating experience into actionable knowledge and technological improvements much more rapidly.

Haffner Energy intends to make this combination of human expertise, industrial data and AI a new and lasting technological competitive advantage for the benefit of its customers.

Patrick Haffner comments:

"I have followed Haffner Energy's development very closely for many years and have been a committed shareholder since 2017 through Haffner Participation. I am therefore particularly pleased to now be able to contribute directly to its development.

I fully share Haffner Energy's vision and mission, firmly believing that decarbonization is a critical challenge for future generations. Putting my AI expertise to work for technologies that provide concrete solutions to this challenge gives special meaning to my commitment alongside Haffner Energy's teams."

AI Will Not Be Used in Safety-Critical Functions

The safety functions of the installations will continue to be managed by dedicated control systems operating independently of AI. AI will therefore not replace programmable logic controllers or programmed safety loops. However, the analysis of operational data and experience may help identify potential improvements to these systems, with any changes remaining subject to the oversight and approval of the engineering teams.

About Haffner Energy

Haffner Energy designs and supplies innovative solutions for the production of cost-competitive renewable fuels from biomass. Drawing on more than 33 years of experience in converting all types of biomass into valuable resources, the Company has developed proprietary thermolysis and gasification technologies enabling the production of renewable gas, hydrogen, renewable methanol, renewable diesel and sustainable aviation fuel (SAF).

Beyond supplying technologies, Haffner Energy supports its customers in developing industrial projects aimed at accelerating the decarbonization of the energy, industrial and transport sectors. Its solutions also contribute to the production of biogenic CO_2 and biocarbon (biochar), supporting the energy transition and the sustainable valorization of biomass.

Haffner Energy is listed on Euronext Growth (ISIN: FR0014007ND6 – Ticker: ALHAF)**.**

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