

Multiverse Computing Pioneers Quantum Digital Twin Project to Boost Green Hydrogen Production

Multiverse increased production of green hydrogen and total revenue by 5% with quantum digital twin, collaborating with IDEA Ingeniería and AMETIC

SAN SEBASTIAN, SPAIN, November 29, 2023 /EINPresswire.com/ -- [Multiverse Computing](#), a global leader in value-based quantum computing and machine learning solutions, has used a digital twin and quantum optimization to boost the efficiency of green hydrogen production. This work could change the economics of hydrogen production and reduce a significant source of greenhouse gas.



Multiverse's partners in this work are IDEA Ingeniería, an engineering firm that specializes in renewable projects and digital twins, and AMETIC, Spain's digital industry association. IDEA developed the digital twin ecosystem for optimizing the generation of green hydrogen. AMETIC is coordinating the overall project.

The quantum digital twin numerically simulates a green hydrogen production plant by using operating parameters of the plant as inputs. By using quantum algorithms to optimize the electrolysis process used for green hydrogen generation, the developed solution achieves a 5% increase in H₂ production and associated revenue delivered by the quantum solver compared to the classical solver.

"Electrolysers are currently deployed at a small scale, making hydrogen production costly, so they require significant scale up in an affordable way," said Enrique Lizaso Olmos, CEO of Multiverse Computing. "This project demonstrates how quantum algorithms can improve the production of green hydrogen to make renewable energy more cost-effective today and in the future."

Using a classical solver to optimize hydrogen production, the virtual plant delivered 62,579 kg of



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*Enrique Lizaso Olmos, CEO,
Multiverse Computing*

green H₂ and revenue of 154,204 euros. By using quantum-inspired tensor networks with Multiverse’s Singularity, the quantum approach delivered 65,421 kg and revenue of 160,616 euros. This represents a 5% increase in hydrogen production and a 5% increase in revenues produced.

“Green hydrogen will play a significant role in the transition towards a more sustainable and ecological energy landscape,” said Emilio Sanchez, Founder and CEO of IDEA Ingeniería. “The consortium’s continued progress in developing quantum solutions alongside other green

technologies can help alleviate the effects of global warming.”

Currently, it's more expensive to produce green hydrogen than traditional grey hydrogen.¹ The traditional method uses electricity—usually generated by coal or natural gas—to separate water into hydrogen and oxygen. Green hydrogen is produced from renewable sources.

About 70 million tons of hydrogen are produced every year and used to refine oil and make ammonia-based fertilizer. The grey hydrogen production process generates between 9 and 12 tons of carbon dioxide for every one ton of hydrogen produced.² Green hydrogen created from renewable sources is a clean-burning fuel that could reduce emissions from heating and industrial processes such as the production of steel, cement, and fertilizer.

Green hydrogen also could enable more efficient energy storage, as compressed hydrogen tanks can store energy for long periods of time and weigh less than lithium-ion batteries. In addition, it could make the transportation industry greener by decarbonizing shipping, aviation, and trucking.

Multiverse’s future plans for the initiative include increasing the input parameters to create a more realistic quantum digital twin and working with an energy company to validate the digital model, and continue working on the improvement of the quantum solution developed.

Footnotes

[A wake-up call on green hydrogen: amount of wind, solar needed is immense](#)

[Green Hydrogen to Undercut Gray Sibling by End of Decade | BloombergNEF](#) (bnef.com)

Multiverse Computing is a leading quantum software company that applies quantum and quantum-inspired solutions to tackle complex problems in finance, banking, manufacturing, energy, and cybersecurity to deliver value today and enable a more resilient and prosperous economy. The company's expertise in quantum algorithms and quantum-inspired algorithms means it can secure maximum results from current quantum devices as well as classical high-performance computers. Its flagship product, Singularity, allows professionals across all industries to leverage quantum computing to speed up and improve the accuracy of optimization and AI models with existing and familiar software tools. The company also has developed CompactifAI, a compressor which uses tensor networks to make large language models more efficient and portable. In addition to finance and AI, Multiverse serves enterprises in the mobility, energy, life sciences and industry 4.0 sectors. The company is based in San Sebastian, Spain, with branches in Toronto, Paris and Munich. For more information about Multiverse's software contact Victor Gaspar at victor.gaspar@multiversecomputing.com

Christian Balzora
HKA Marketing Communications
+1 714-422-0919
[email us here](#)

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