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Streamline H2 operations across the lifecycle

Transform project delivery, reduce operational costs, and deliver more predictable outcomes using a digital lifecycle excellence approach

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The **H2 industry** is expanding rapidly

Clean hydrogen and hydrogen-based fuels have significant potential for decarbonization, making them a sustainable energy source for asset-heavy industries. According to McKinsey, the demand for clean hydrogen could account for up to 73 to 100 percent (125 to 585 Mtpa) of total hydrogen demand by 2030.[1]

As a hydrogen plant owner-operator, you may face challenges on multiple fronts. These can include setting up sustainable infrastructures, investing in emerging technologies, and maintaining compliance while driving innovation and growth. Additionally, economic volatility, rising energy prices, and complex supply chains require adaptability and flexibility to facilitate efficient H2 production. Managing large-scale hydrogen projects can indeed be daunting, but with the right approach those ambitious blueprints can become tangible realities.

This ebook explores the bumpy road many businesses find themselves in, and the digital solutions available to streamline workflows and processes, helping organizations deliver projects on time, and within budget. The future of clean energy isn't far off. The technologies to enable a profitable H2 economy are available today. What's needed is an integrated lifecycle approach—one that connects people, processes and technologies to enable real-time collaboration and seamless flow of data across the entire value chain.

Key industry trends

Decarbonization and rising demand

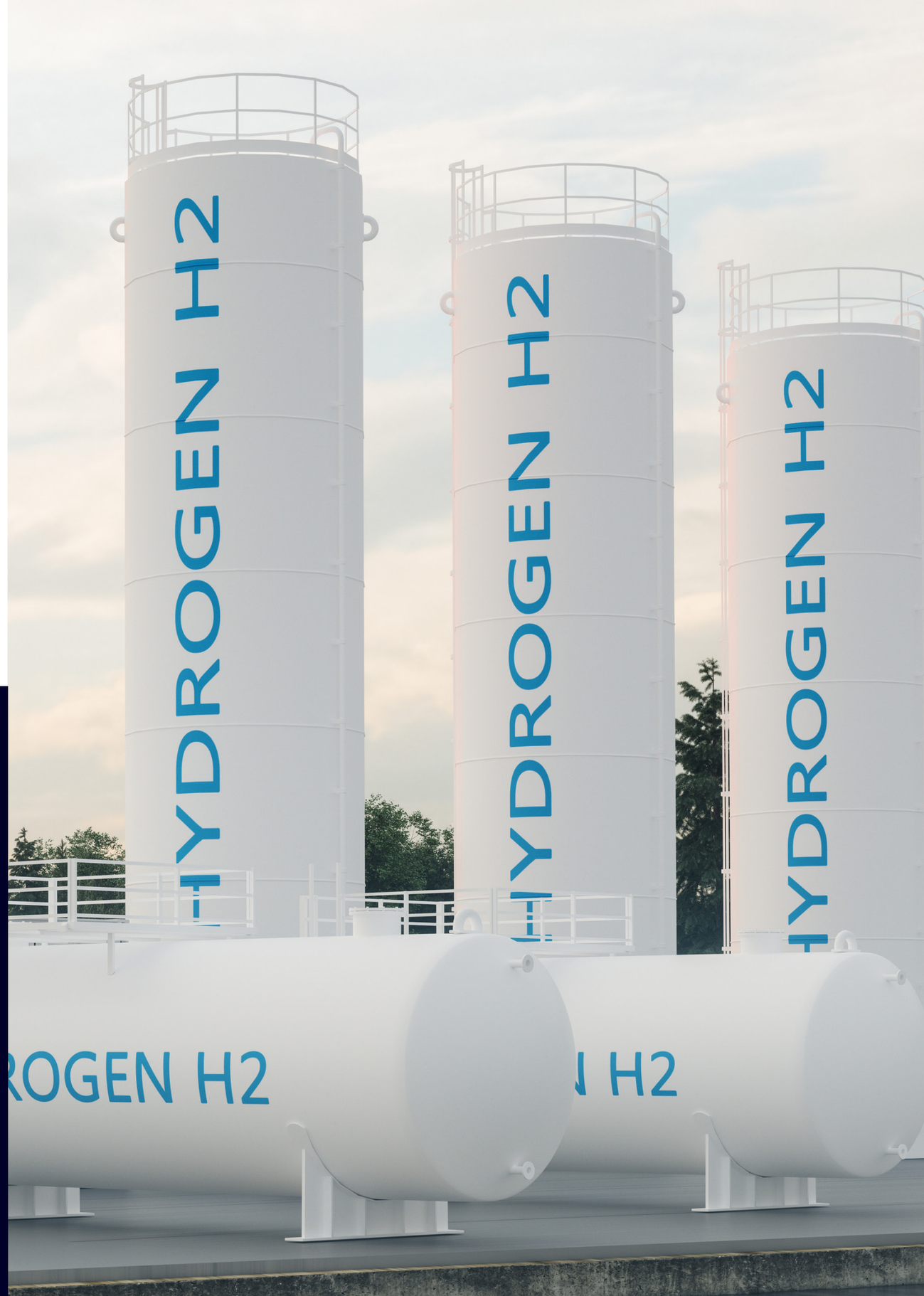
Leading organizations are setting ambitious targets to reduce emissions. Plant operators who invest in clean hydrogen stand to gain a competitive edge over others.

Technological advancements

Hydrogen production is becoming more cost-effective and efficient thanks to advanced technologies and innovations in electrolysis, such as proton exchange membrane (PEM) electrolysis.

Infrastructure development

New hydrogen facilities and clean hydrogen hubs are being planned across the US to centralize the production, storage, and distribution of clean hydrogen, pushing H2 businesses to scale capacity.



Challenges in large project delivery

Your enterprise data is an asset and a critical part of your digital transformation strategy. Effectively using this data can optimize operations and help teams make faster and more informed decisions. However, managing large-scale hydrogen plants and facilities' design, construction, and operation requires more than a bunch of spreadsheets and tools.

Exceptional capital project delivery comes down to how organizations remove barriers to innovation and streamline workflows to improve visibility and collaboration across the enterprise. Based on our research, most organizations face the following challenges when managing capital-intensive projects:

- Large volumes of complex, interdependent data
- Inability to aggregate, visualize, and reuse data at the enterprise level
- Poor program planning, execution and handover
- Margin eroding errors and omissions
- Inability to capture and integrate requirements
- Stringent safety and industry protocols

Demand for hydrogen could **increase** from **125** and **585** million tons per year by 2050.[1]

H_2

CO_2

The **decarbonization goals** of governments and organizations will only drive this industry **forward**.

Accelerate **digital transformation**

Digital transformation promises improved efficiency and cost reductions. However, many of these 'transformation' initiatives fail due to ineffective communication and lack of an effective data strategy. For many capital project leaders, the challenges mentioned above may be business as usual. However, they come at a significant business cost. For example, cost overruns approach $1.2 billion on the average capital project—79 percent of the initial budget—and delays run six months to two years.[2]

Without an end-to-end digital solution, your teams can miss out on meaningful insights and fail to derive true value from the digital twin. It is imperative to synchronize the digital twin of your capital assets with the physical instance to visualize, navigate, and analyze operational performance in real time. How can hydrogen companies break free from the status quo and move forward?

Siemens has helped companies across diverse industries, including oil and gas, chemicals, hydrogen, mining and infrastructure. We recommend a Digital Lifecycle Excellence approach that helps you connect the entire lifecycle of your capital assets to unleash new levels of productivity, performance, and sustainability across the enterprise. This entails adopting a suite of integrated digital solutions designed to streamline operations, enhance collaboration, and ensure regulatory compliance across all phases of your hydrogen operations.

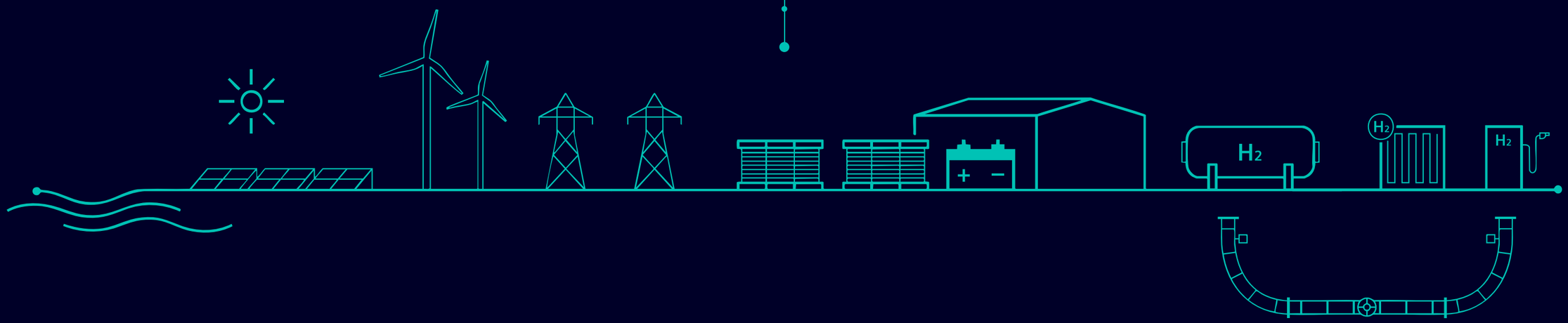
"Implementing a fully digital way of working right from the beginning is of utmost importance. The synergy between Siemens' NX, Teamcenter X, and Teamcenter Share helps us to streamline digital work, making it more efficient than ever before."

Stephan Hillebrand, CTO of REJOOL

Rejool

Discover how this hydrogen compression startup uses Siemens Teamcenter X to achieve seamless collaboration and data management capabilities.

Learn more



A **unified digital platform** to transform project delivery

The Digital Lifecycle Excellence approach can transform the way hydrogen businesses manage their operations. Powered by the high-performing Teamcenter software, the solution enables organizations to build a unified digital foundation for consolidating engineering and project information—creating an industrial ecosystem that utilizes the collective intelligence of all stakeholders. The solution can be deployed to:

Manage data at the enterprise level

Build a robust digital foundation for consolidating engineering and project information. Integrate with other enterprise asset management systems to establish a closed-loop change management process that keeps data in-sync as changes are made to the asset and new modernizations completed.

Execute better projects, faster

Transform project delivery and handover, as well as reduce the cost, time, and risk of project delivery. Define and configure a comprehensive Work Breakdown Structure for your project, comprising work packages, tasks and deliverables. Integrate cost, schedule and risk within a fully resourced and budgeted project execution framework.

Establish a systems-driven approach

Integrate requirements across the complete lifecycle of your assets, manage change more effectively, and remain continually compliant as industry standards evolve. Use a systems-driven approach to keep people, processes and data in-sync across the lifecycle of your capital assets.

A Secure Cloud PLM

Now, you can get started quickly and cost-effectively with Siemens Teamcenter X, a secure cloud product lifecycle management (PLM) system with built-in best practices and reduced cost of ownership. Start with the essential features you need today and then add more applications and users as your requirements grow.

Teamcenter X cloud PLM software | Siemens Software

References

1. Global Energy Perspective 2023: Hydrogen outlook, McKinsey & Company, January 2024.
2. Capital investment is about to surge: Are your operations ready?, April 2022.

Siemens Digital Industries Software helps organizations of all sizes digitally transform using software, hardware and services from the Siemens Xcelerator business platform. Siemens' software and the comprehensive digital twin enable companies to optimize their design, engineering and manufacturing processes to turn today's ideas into the sustainable products of the future. From chips to entire systems, from product to process, across all industries, Siemens Digital Industries Software – Accelerating transformation.

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