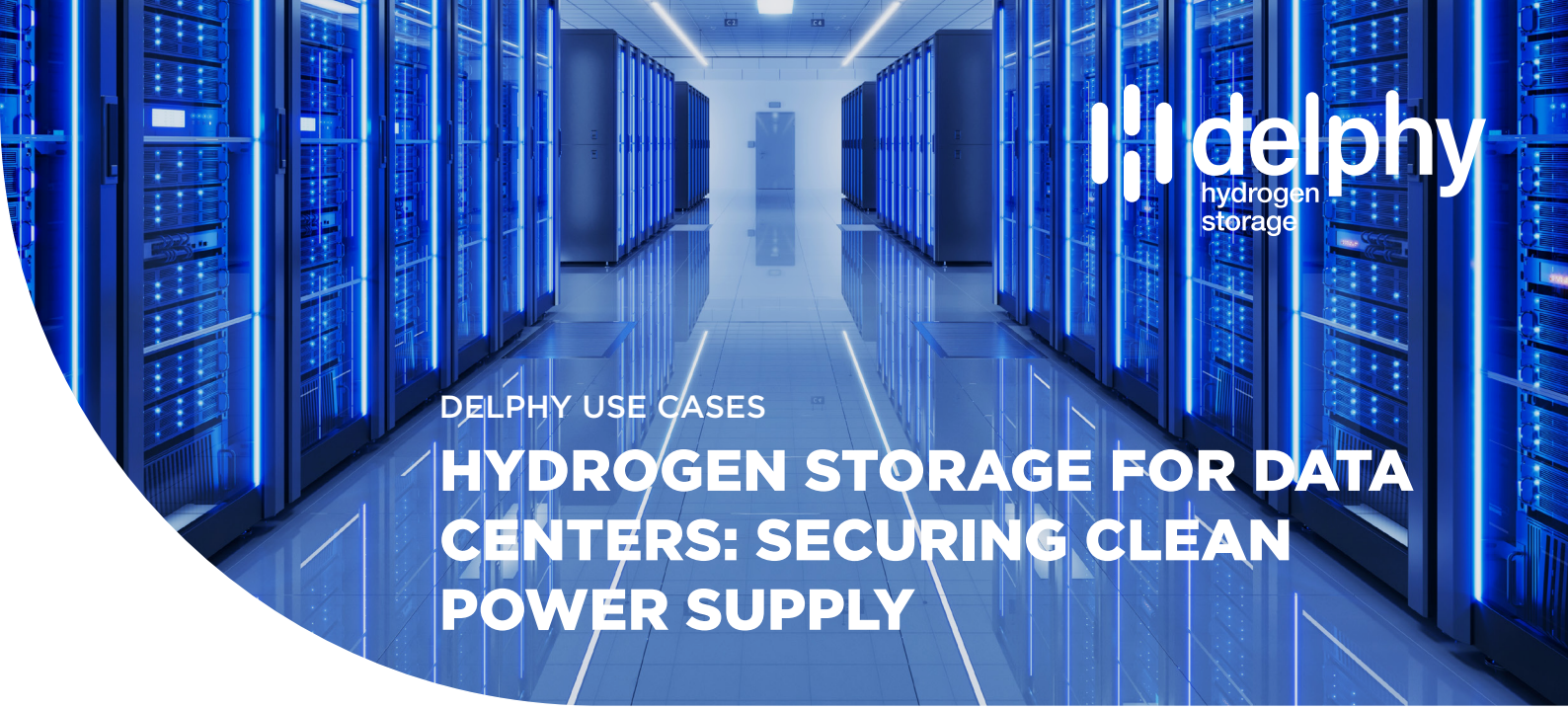

delphy hydrogen storage

DELPHY USE CASES

HYDROGEN STORAGE FOR DATA CENTERS: SECURING CLEAN POWER SUPPLY

Overview

The growing need for data centers in business

Data centers form the critical infrastructure of our digital economy. Every organization relies on these centralized hubs to house their computer systems and associated components.

However, the high demand for electricity, accelerated by cryptomining and artificial intelligence, has increased strain on local electric grids and increased electricity prices in some markets.

A typical 60 MW data center in a developed country emits around 26 tons of CO_2 annually, a figure that rises to 270 tons when using the global average, and even more for gigawatt-scale facilities. This makes decarbonization a critical priority, requiring both the securing of clean electricity for baseload operations and the elimination of diesel generators for backup power.

Low-carbon hydrogen can help turn intermittent renewables into a stable power supply for behind-the-meter projects and serve as a clean fuel for backup generators. Both applications will require large-scale hydrogen storage.

Key figures

99.995%
availability is required for a typical tier-4 data center

€500k/hour
financial impact of a power outage for data centers

48-72 hours
of autonomy is needed for back-up power sources

90% less CO_2
when replacing back-up diesel generator by hydrogen fuel-cell with low carbon H_2

15x
lower CAPEX for hydrogen storage vs. battery storage for same power output

Challenges

Hydrogen solutions for clean and cost-effective power

Modern data centers face several critical challenges:

- **Grid Access Bottleneck:** Rapid data center expansion and massive power needs make grid connections a major constraint in many regions.
- **Strong Reliability Requirement:** Hyperscale facilities need 20–100 MW of continuous power and 48–72 hours of backup, typically via diesel generators, making them vulnerable to grid disruptions.
- **High CO_2 Emissions:** Diesel generators produce significant greenhouse gases. Switching to clean electricity storage—batteries or hydrogen—can cut backup emissions by over 90%.
- **Cost and Space Challenges:** A 60 MW site needs 2,880 MWh for 48 hours. Battery storage demands large space and high CAPEX, whereas hydrogen offers a more efficient alternative.

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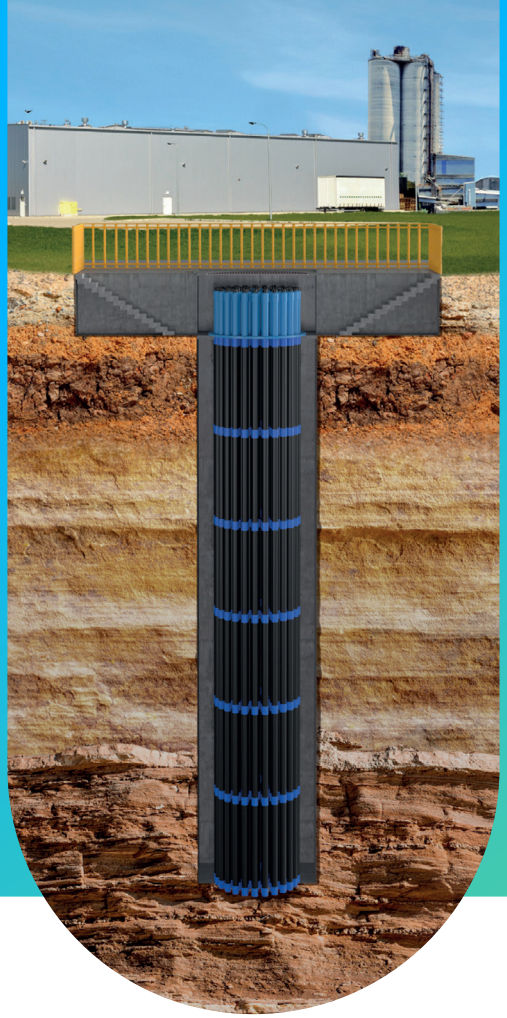

Delphy

A clean, scalable backup power source

Hydrogen-based backup power requires large-scale storage—typically between 1 and 100 tons. For example, a 30 MW data center with 48-hour autonomy would need over 40 tons of hydrogen, posing significant safety and space challenges. The Delphy hydrogen storage system addresses the challenges of data centers through:

- **High Safety Features:** Delphy's subsurface design is engineered with state-of-the-art passive and active safety features. Its safety perimeter is halved compared to above-ground alternatives.
- **Low Footprint:** The underground system achieves up to 30x footprint reduction compared to conventional above-ground storage, significantly improving land utilization and simplifying permit processes.
- **Flexibility & Modularity:** Delphy's modular design enables phased deployment, allowing capacity expansion aligned with facility growth. Each module can be independently maintained without affecting system availability.

Next steps

Fully ready for deployment

Delphy leverages Vallourec's deep expertise and the experience gained since 2023 in designing, building, and operating its demonstrator plant. The technology has undergone rigorous validation, including:

- Certification under the EU Pressure Equipment Directive (PED) by a notified body
- Qualification according to DNV Recommended Practice RP-1-203

Delphy is now ready for industrial-scale deployment, with Vallourec offering a turnkey solution and lifetime service support.

Interested in the Delphy hydrogen storage solution?

Vallourec's team of specialists can help with:

- Technical consultations and system sizing
- Custom configuration development
- Detailed CAPEX/OPEX analysis

Contact us at
delphy@vallourec.com

SCAN THE QR CODE TO FIND OUT MORE ABOUT DELPHY

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