



H2



The hydrogen revolution: Driving our tomorrow

Though invisible and untouchable, hydrogen is the most plentiful element in the universe and will transform our planet.

Why Hydrogen?

Hydrogen will soon transform everything. Since it is the most plentiful element in the universe, transforming our energy sources and lowering emissions depends on it. It's not surprising that it's causing such buzz in the energy industry and outside as well.

Hydrogen: The Green Energy of the Future

Hydrogen has great power to help our earth to become decarbonized. A major step toward a better Earth, it might reduce up to 60 gigatonnes of CO₂ emissions by 2050. The fact that hydrogen offers consistent power distinguishes it. Hydrogen can fill in when the sun is not shining, and the wind is not blowing to maintain the lights on.

Tough to decarbonize, heavy sectors such steel and chemicals are also set to be transformed by hydrogen. Furthermore, illustrating that zero-emission mobility is feasible in transportation are hydrogen-powered trains, ships, and buses. For example, Germany is extensively funding hydrogen fuel stations and including hydrogen trains into its rail system. Apart from reducing emissions, this provides a strong model for the rest of the globe.

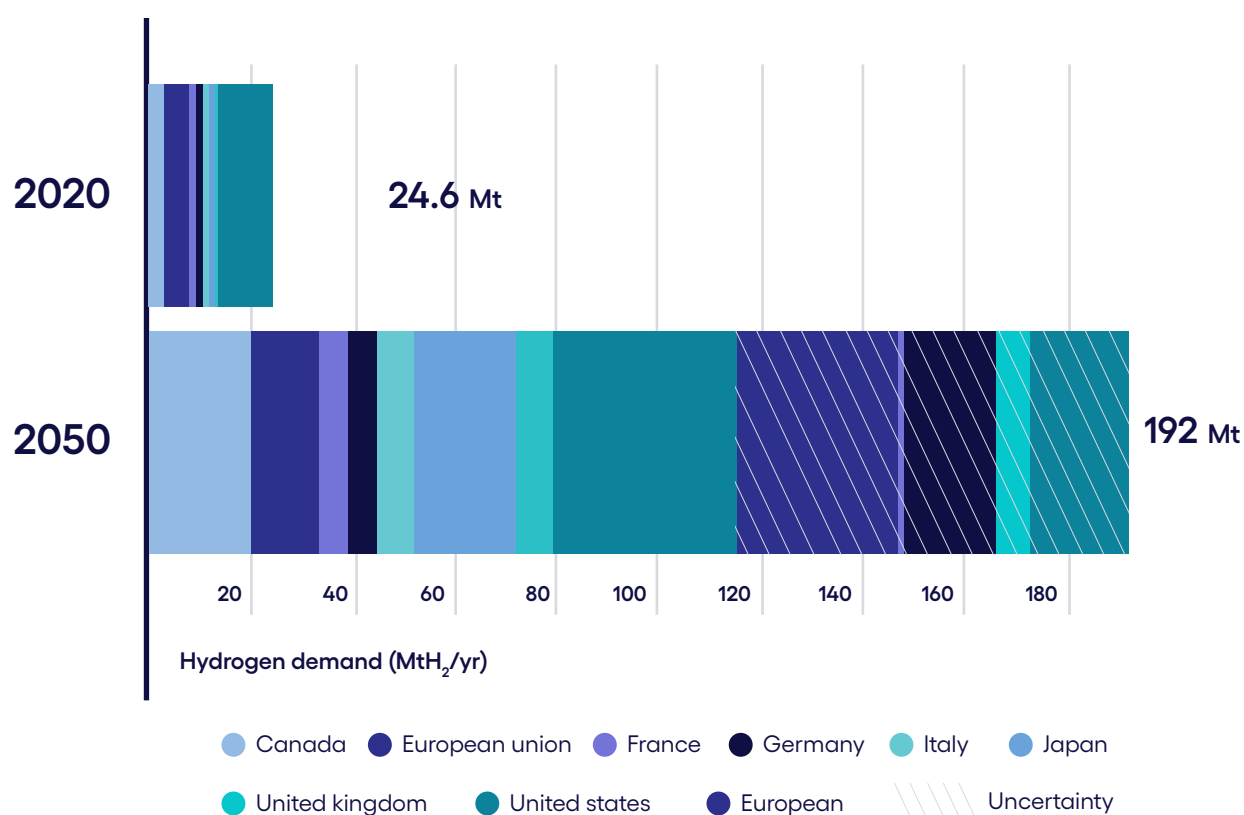


Image IRENA: Hydrogen demand from G7 members from 2020 to 2050.

The Hydrogen Rainbow: Not All Hydrogen is the Same

Not all hydrogen is created equal:

H2 Grey: Made from natural gas, but it emits CO2.





H2 Blue: Also, from natural gas but uses carbon capture tech to cut emissions.

H2 Green: The cleanest, made using renewable energy and emitting zero CO2.

Cognizant Business Consulting's Approach to Transforming Key Industries with Hydrogen

Cognizant Business Consulting is at the forefront of helping industries unlock the full potential of hydrogen as a trans-formative energy source. Our tailored approach focuses on driving value across Manufacturing, Logistics, Energy, and Utilities, (MLEU) enabling clients to embrace sustainable practices, optimize operations, and stay competitive in an evolving market.

Hydrogen's value across manufacturing, logistics, energy, and utilities

			
Manufacturing	Logistics	Energy	Utilities
<ul style="list-style-type: none">• Decarbonization: Replacing fossil fuels to reduce carbon emissions.• Process efficiency: Suitable for high-temperature processes.• Innovative Materials: Key in producing advanced materials like ammonia and methanol.• Example: Hydrogen-based steel production eliminating CO2 emissions from coke.	<ul style="list-style-type: none">• Clean fuel: Zero-emission alternative for trucks and forklifts.• Range & refueling: Longer ranges and faster refueling than battery-electric vehicles.• Energy storage: Backup power for logistics hubs and warehouse.• Example: Adoption of hydrogen fuel cell trucks in long-haul transportation.	<ul style="list-style-type: none">• Energy storage: Store surplus renewable energy for use during low output periods.• Grid stability: Provides a stable and flexible power source.• Diverse energy carrier: Transportable and convertible to electricity or fuel.• Example: Large-scale electrolyzers converting wind and solar energy to hydrogen.	<ul style="list-style-type: none">• Decarbonizing gas networks: Blending or replacing natural gas with hydrogen.• Backup power: Hydrogen fuel cells as backup during peak demand or outages.• Water management: Oxygen from electrolysis used in wastewater treatment.• Example: Utility companies blending hydrogen into natural gas pipelines.

Navigating Market Uncertainty and Investment Risk in the Hydrogen Economy

Challenge

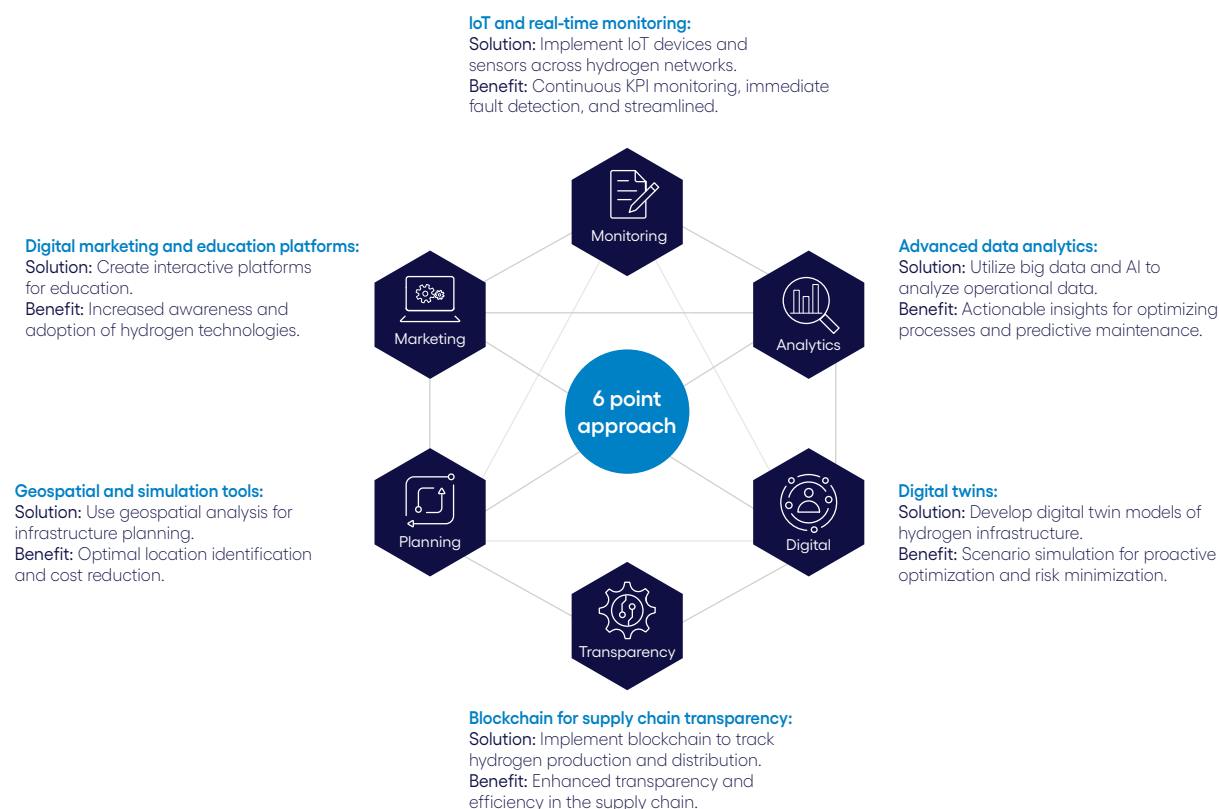
The emerging hydrogen market faces significant uncertainties, from fluctuating demand projections to evolving regulatory landscapes. This creates investment risks for businesses and stakeholders, making it challenging to commit capital toward hydrogen projects. Without robust monitoring, strategic planning, and transparent supply chains, companies face the risk of inefficiencies, compliance issues, and operational setbacks that could deter potential investors.

Cognizant's approach

Cognizant leverages advanced data analytics and market intelligence to provide businesses with deep insights into market trends, regulatory developments, and competitive landscapes. By utilizing digital twins, Cognizant can simulate various market scenarios, enabling businesses to make informed investment decisions, thereby reducing risk and fostering confidence in the hydrogen economy.

At Cognizant, we have developed a comprehensive 6-point strategic framework designed to help businesses effectively navigate the hydrogen revolution. By integrating cutting-edge technologies and strategic consulting, we empower organizations to capitalize on hydrogen's potential while driving operational excellence and sustainability.

Cognizant's 6-point strategic framework



1. IoT and Real-time Monitoring for Operational Efficiency

By implementing IoT devices and sensors across hydrogen networks, we provide real-time insights into operational performance. This allows clients to continuously monitor KPIs, detect faults immediately, and streamline maintenance processes. As a result, businesses experience reduced downtime, improved asset management, and increased operational efficiency, ensuring smooth scalability of hydrogen operations.

2. Advanced Data Analytics for Informed Decision-Making

Harnessing the power of big data and AI, we enable clients to analyze vast operational data sets and extract actionable insights. This empowers organizations to optimize hydrogen production, drive predictive maintenance, and mitigate operational risks. With data-driven decision-making, clients can enhance process reliability, minimize downtime, and reduce long-term operational costs, while staying ahead of market changes.

3. Digital Twins for Proactive Infrastructure Optimization

Through the use of digital twins, we create virtual models of hydrogen infrastructure that simulate real-world operations. These models enable clients to proactively identify inefficiencies, test different scenarios, and optimize infrastructure performance. This approach leads to better safety, cost-effectiveness, and maximum returns on investment by continuously refining processes and anticipating potential issues.

4. Blockchain for Transparent and Secure Supply Chains

Blockchain technology provides the transparency and traceability needed for secure hydrogen supply chains. By enhancing visibility across production and distribution networks, clients can improve operational trust, streamline processes, and ensure compliance with stringent regulations. This builds a more resilient and reliable supply chain, critical for scaling hydrogen adoption and meeting global sustainability goals.

5. Geospatial and Simulation Tools for Strategic Infrastructure Planning

Using geospatial analysis and simulation, we help businesses make informed decisions on site selection and infrastructure development. These tools allow clients to optimize location identification based on cost efficiency and logistical constraints, improving access to resources and reducing operational risks. With this strategic planning, businesses can ensure that their hydrogen infrastructure is scalable and adaptable to future growth.

6. Compliance Management for Navigating Regulatory Landscapes

Navigating the complex regulatory environment is key to hydrogen's success. Our consulting services focus on developing dynamic compliance systems that keep businesses aligned with evolving local and global regulations. This ensures organizations remain future-proofed against potential policy changes while minimizing legal risks and avoiding penalties, helping them maintain a competitive edge in the green energy transition.



Future Trends: Shaping the Hydrogen Economy with Cognizant's Vision

As the hydrogen economy advances, several trends will reshape industries. Cognizant is strategically positioned to help clients capitalize on these shifts, ensuring they remain leaders in the green energy transition.

1. Hydrogen as a Global Energy Carrier

Hydrogen will emerge as a critical global energy carrier, with increasing investments in production and infrastructure. Cognizant will help clients navigate this shift with expertise in infrastructure planning and supply chain optimization.

2. Decarbonizing Heavy Industries

Sectors like steel, cement, and chemicals will turn to hydrogen for high-temperature processes. Cognizant's digital twins and advanced analytics will enable clients to decarbonize efficiently while optimizing operations.

3. Hydrogen-Powered Mobility

Hydrogen-powered vehicles will grow, particularly in heavy transport. Cognizant will support clients with IoT-driven fleet management and logistics solutions to stay competitive in this expanding market.

4. Integration with Renewables

Hydrogen will play a crucial role in storing renewable energy, making grids more resilient. Cognizant's simulation tools will help utilities integrate hydrogen efficiently into energy systems.

5. Scaling Green Hydrogen

As green hydrogen production scales, Cognizant's expertise in process optimization will help clients increase output, reduce costs, and contribute to a sustainable future.

6. Regulatory Advancements

As global regulations favour hydrogen adoption, Cognizant will guide clients through compliance management, ensuring smooth integration of hydrogen technologies and reducing risks.



Cognizant's Acquisition: Enhancing Hydrogen Market Capabilities

Cognizant is strategically acquiring companies to bolster its capabilities in driving the green energy transition. Through targeted acquisitions like Belcan for engineering services and TQS Integration for industrial data solutions, Cognizant is enhancing its expertise in renewable energy, hydrogen technologies, and sustainable industrial practices.

These acquisitions enable Cognizant to deliver pioneering, end-to-end solutions that support clients in transitioning to green energy. By integrating advanced technologies such as IoT, AI, and digital engineering, Cognizant is helping industries optimize operations, reduce carbon footprints, and lead the way in the global shift towards a sustainable energy future.

What's in for you?

As you embark on the trans-formative journey of harnessing the potential of hydrogen and other emerging technologies, Cognizant stands ready to work collaboratively with you on your path with unparalleled expertise. Together, we will craft a strategic road-map tailored to your unique goals, integrating advanced capabilities like digital twins for predictive modeling, cutting-edge data analytics for informed decision-making, and block-chain for transparent, secure supply chains. Our comprehensive approach extends beyond technology-streamlining operations, reducing emissions, and enhancing resilience in the face of evolving market dynamics and regulatory landscapes.

Partnering with Cognizant means driving not only operational excellence but also shaping a future defined by sustainability and competitive differentiation. Let us lead this journey step-by-step, empowering your organization to thrive in the green energy revolution and beyond.

View from our Leadership

As we continue to navigate the evolving landscape of the energy sector, Cognizant Business Consulting remains at the forefront of driving the green energy transition. Our strategic acquisitions and focused investments in digital engineering, advanced analytics, and sustainable industrial practices uniquely position us to deliver trans-formative solutions. We are not merely participants in the shift towards renewable energy; we are shaping the future of this transition.



Our commitment is clear

“To empower our clients to lead in sustainability, optimize their operations, and achieve long-term success in a world increasingly defined by green energy. Together, we are paving the way for a more sustainable and resilient global economy.”

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Cognizant (Nasdaq-100: CTSH) engineers modern businesses. We help our clients modernize technology, reimagine processes and transform experiences so they can stay ahead in our fast-changing world. Together, we're improving everyday life. See how at www.cognizant.com or follow us [@Cognizant](https://twitter.com/Cognizant).

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