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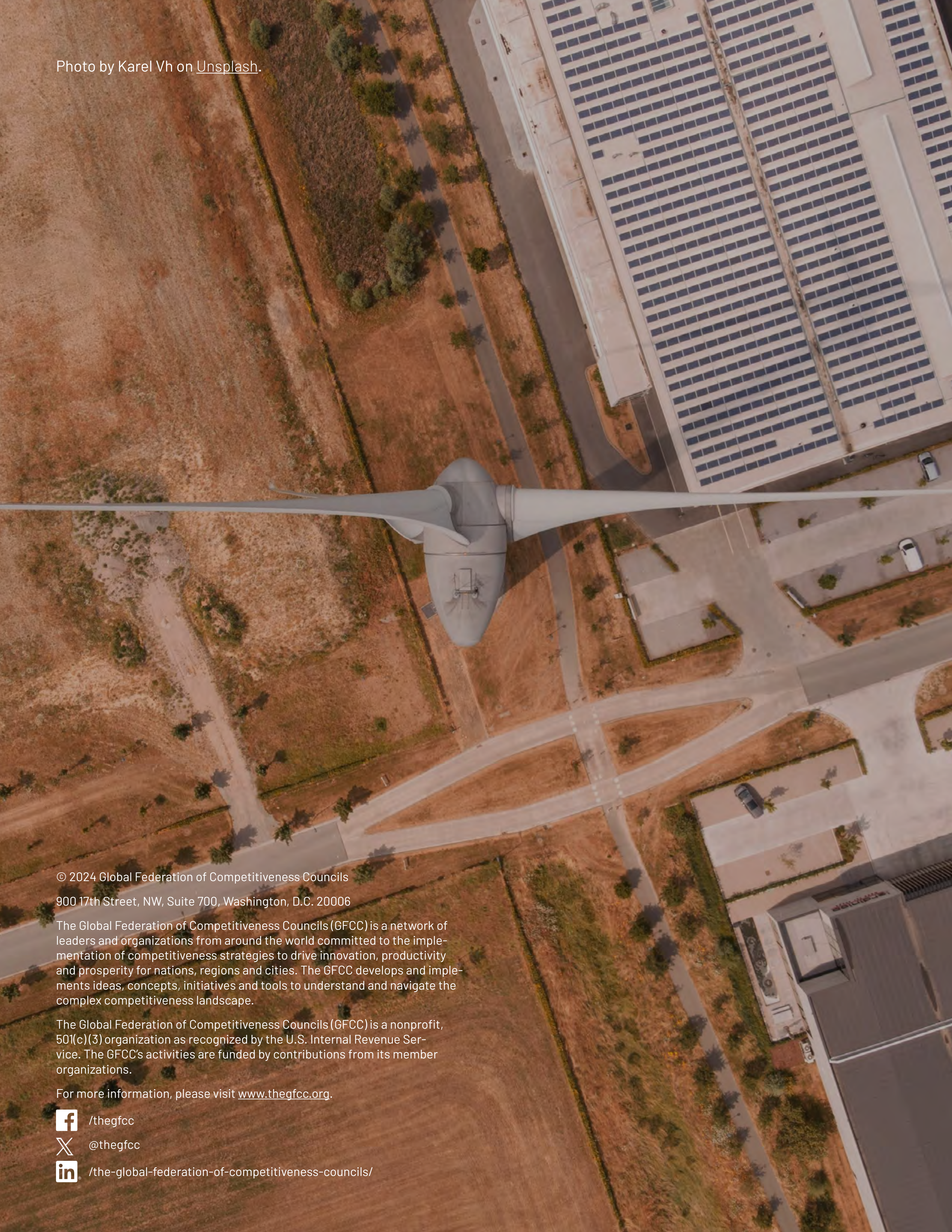
Understanding the Hydrogen Economy: Opportunities and Challenges



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The Global Federation of Competitiveness Councils (GFCC) is a network of leaders and organizations from around the world committed to the implementation of competitiveness strategies to drive innovation, productivity and prosperity for nations, regions and cities. The GFCC develops and implements ideas, concepts, initiatives and tools to understand and navigate the complex competitiveness landscape.

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Introduction

The hydrogen economy holds extraordinary promise for a cleaner, more sustainable energy future. In March 2024, the GFCC convened an exclusive Hydrogen Economy Expert Session on the hydrogen nascent industry. This session explored how nations are positioning themselves within the hydrogen market and shared the latest advancements in the field.

This Expert Session is directly aligned with the GFCC's 2023 Call to Action, *Innovate the Sustainable Future*, a document that provides actionable recommendations for government, industry, academia, and civil society to drive sustainability through innovation.

This report presents the key takeaways from our Expert Session. The GFCC hopes these insights fuel your understanding of this emerging area!

The Experts

- Professor Richard J Parker, CBE, FREng, FRAeS, FIMechE, FInstP, GFCC Distinguished Fellow, Consultant for A*STAR, Singapore, and Chairman of the Singapore Low Carbon Energy Research Programme.
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- Justin Riemer, CEO of Emissions Reduction Alberta (ERA)
- Professor David Rooney, Professor of Chemical Engineering at Queen's University Belfast and Director for the Research Centre for Sustainable Energy
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The Hydrogen Economy: A Path to Sustainable Competitiveness

The hydrogen economy offers a compelling path as the world confronts the necessary transition away from fossil fuels and towards a decarbonized future. In addition, it presents significant potential for job creation, technological innovation, and economic growth. With the goal of reaching net-zero emissions by 2050, societies must drastically reduce their reliance on coal, oil, and natural gas. While carbon capture and sequestration (CCS) will play a role in the hydrogen economy, emerging technologies that enable carbon neutral hydrogen production hold enormous promise.

Hydrogen stands out as a versatile energy carrier. It can effectively store excess electricity generated from renewable sources, addressing the challenges of intermittent power supply. Furthermore, hydrogen already has extensive applications in industrial processes, including refining fossil fuels. Valued at USD 19.86 billion in the year 2023 in the United States alone, the hydrogen generation market is dominated by "gray" hydrogen, produced through fossil-fuel-based processes, according to a Grand View Research analysis.

A recent study published by Deloitte predicts that the global hydrogen economy has the potential to reshape the global energy landscape by 2030 and create a USD 1.4 trillion market by 2050. This includes USD 280 billion in interregional trade and the creation of approximately 1.5 million jobs annually. This surge highlights how hydrogen can significantly enhance national and regional competitiveness by attracting investment, creating high-skilled jobs, fostering clean energy exports, and enhancing national energy security and independence.

Nations with abundant supplies of green electricity and existing fossil fuel export infrastructure, such as Australia, Arab states, and Norway, are well-positioned to become hydrogen exporters. Nevertheless, due to the lower volumetric energy density of hydrogen in comparison to hydrocarbon fuels, logistical costs have a higher share in the hydrogen value structure than in oil and gas industry, for instance. Thus, to assume a competitive position in global markets, hydrogen exporters will likely need to convert the hydrogen into a more transportable form, such as ammonia or other hydrogen carriers. Additionally, adopting new technologies and logistic models will be crucial to increase efficiency and achieve cost-competitive operations, particularly in long-haul operations.

Conversely, countries heavily relying on fossil fuel exports but lacking substantial renewable energy resources face greater challenges. They must invest in nuclear energy or CCS technologies to maintain their existing economic models. Some notable examples include:

- **Indonesia:** The country is a major coal exporter and consumer and must explore nuclear, renewables, and hydrogen exports to maintain economic growth.
- **Japan:** Japan remains a pioneer in hydrogen technologies with transportation and power generation applications.
- **India:** Holds the potential to become self-sufficient in energy by harnessing its renewable resources and developing a domestic hydrogen industry.

The hydrogen economy offers a pathway to a more sustainable and competitive future. However, its development requires significant investments in infrastructure, technology, skills, and business models. Collaboration between governments, industries, and researchers will be vital for accelerating innovation and bringing down costs to make hydrogen solutions widely accessible.

4 Ways to Produce Hydrogen and Why They Matter

Hydrogen is emerging as a key element in the transition to cleaner energy sources.

The choice of hydrogen production method directly influences its environmental impact and economic viability. To significantly reduce global emissions, transitioning towards blue and green hydrogen is crucial. As technology advances, the cost of green hydrogen will decrease, potentially making it competitive with fossil-fuel-derived options. Countries with ample renewable resources or existing carbon capture, utilization, and storage (CCUS) infrastructure are well-positioned in the developing hydrogen market. Additionally, establishing efficient logistics and supply chain/value chain networks will be essential for the widespread adoption of hydrogen.

Here's a breakdown of common hydrogen production methods and their significance:

Gray Hydrogen

Process: Methane (natural gas) or coal is broken down to extract hydrogen.

Upsides: Currently the cheapest method, readily available technology.

Downsides: Releases significant carbon dioxide and some methane into the atmosphere, contributing to climate change.

Blue Hydrogen

Process: Similar to gray hydrogen, but carbon dioxide emissions are captured and stored through carbon capture use and sequestration (CCUS).

Upsides: Significantly reduces carbon emissions compared to gray hydrogen. Still cheaper than green hydrogen despite CCUS costs.

Downsides: Still relies on fossil fuels, CCUS technology required long term stage, or conversion of the CO_2 storage.

Green Hydrogen

Process: Water is split into hydrogen and oxygen using renewable electricity (solar, wind, nuclear) in a process called electrolysis.

Upsides: Truly zero-carbon emissions if renewable energy is used.

Downsides: Currently more expensive than gray or blue hydrogen, efficiency improvements needed.

White Hydrogen

Process: Extraction of naturally occurring underground hydrogen deposits.

Upsides: Zero-carbon emissions, potential for large-scale production.

Downsides: Deposits are geographically limited, technology for extraction is still under development

Note 1: Taxonomies that use colors to make a reference to other types of processes to generate hydrogen exist, such as pink (nuclear-powered electrolysis) and turquoise (methane pyrolysis). For more information, please refer to this report launched by the Det Norske Veritas group (DNV).

Note 2: Some countries (like Canada) are shifting away from hydrogen color schemes, as they don't fully capture lifecycle greenhouse gas intensity. For instance, blue hydrogen might sometimes have lower lifecycle emissions than green hydrogen, and significant variations exist within each color category. Instead, these jurisdictions are setting lifecycle emissions intensity thresholds. A leading example of this approach is the CertifHy program in Europe.

Carbon Sequestration and Storage

Carbon sequestration is the process of capturing carbon dioxide (CO_2) from the atmosphere and storing it to prevent its release as a greenhouse gas. This can be done through natural or technological methods:

- **Natural sequestration** occurs in forests, soils, and oceans, where plants and organisms absorb CO_2 during photosynthesis or other biological processes.
- **Technological sequestration**, also known as carbon capture and storage (CCS), involves capturing CO_2 from industrial sources like power plants and storing it deep underground in geological formations or converting it into other products.

Although CCS technologies are still evolving, they offer a potential pathway to reducing the carbon footprint of industries that rely heavily on fossil fuels. The primary benefit of carbon sequestration is its role in mitigating climate change. By removing CO_2 from the atmosphere, sequestration slows down the pace of global warming, helping to combat the climate crisis. Additionally, some sequestration methods can lead to enhanced oil recovery or the creation of valuable byproducts, adding potential economic incentives.

It's important to note that pre-combustion capture, used in blue hydrogen production, is significantly easier than post-combustion capture, which is retrofitted onto existing fossil fuel facilities. This is because pre-combustion capture, during the hydrogen production process, results in a much purer carbon dioxide stream, making it easier to capture.

Despite their importance and recent advancements, CCS still faces many issues:

- **Cost:** Capturing, transporting, and storing CO_2 adds significant costs to energy production, or industrial processes.
- **Energy Intensity:** The process of capturing carbon dioxide requires substantial energy. This can decrease the overall efficiency of a power plant and may even increase emissions if the energy source isn't clean.
- **Technical Challenges:** CCS involves complex technologies operating at large scales. Scaling up these technologies and ensuring their reliability presents engineering hurdles.
- **Storage Risks:** The long-term safety of storing CO_2 underground is a concern. Potential risks include leakage and induced seismicity (small earthquakes).
- **Public Perception:** There's often public skepticism or resistance to CCS, stemming from concerns about safety, its association with continued fossil fuel use, and doubts about its effectiveness as a climate solution.

While CCS can reduce emissions from certain industries, it's not a silver bullet for climate change. A comprehensive approach involving renewable energy, energy efficiency, and changes to consumption patterns to reduce carbon emissions is crucial.

Additionally, developing and deploying innovative technologies to "reuse" carbon are essential. As highlighted in the 2021 GFCC Frame the Future session on Natural Assets, releasing carbon into the atmosphere squanders its potential. By reframing carbon as a valuable resource and integrating it back into our value chains, we can create new opportunities. Numerous options are being explored, such as converting carbon dioxide back into useful fuel by combining it with green hydrogen (achieving carbon neutrality). Mineralization, transforming carbon dioxide into stable carbonates for safe storage or use in industries like construction is another promising alternative. In addition, some processes can capture carbon in solid form (e.g. black carbon from methane pyrolysis) offering both stability and economic value.

By developing innovative ways to capture and reutilize carbon in a productive and cost-effective manner, we can transform it from a climate liability into a source of new materials, fuels, and chemicals. This strategic approach not only addresses the urgent issue of climate change but can also unlock significant economic opportunities, giving nations and industries that embrace carbon utilization a competitive edge in the growing green economy.

Hydrogen Economy's Challenges and Opportunities

The transition to a cleaner energy future that includes hydrogen power as a key element promises significant benefits, but also requires overcoming many hurdles. The world currently lacks the infrastructure to produce, store and distribute hydrogen at the necessary scale and cost level, production being a particularly relevant topic when we think about green hydrogen. Additionally, technological challenges with safe storage and cost-effective transportation present roadblocks.

Key Challenges

- **Cost:** Production, storage, and distribution are expensive. Significant investment is needed to achieve affordability.
- **Storage:** Hydrogen's storage as a gas requires extremely high pressure (350–700 bar tank pressure) or as liquid at cryogenic temperatures (boiling point of -252.8 ºC), presenting logistical challenges.
- **Infrastructure:** Existing gas distribution networks may be incompatible, and new fueling stations are expensive.
- **Safety Concerns and Public Perception:** Fears of leaks and the need for stringent safety protocols must be addressed as well as consumer education to address public trust and perception.
- **Energy Density:** Hydrogen occupies significantly more space than conventional fuels (3x more) or current EV battery alternatives. This poses a challenge for passenger cars, but it could be more viable for heavy-duty transport where large battery packs would otherwise compromise payload capacity.

Main Opportunities

- **Decarbonizing Transport:** Hydrogen (and potentially ammonia) could transform heavy transport like shipping, long-distance trucking, trains, and potentially aviation.
- **Ammonia Blending:** Ammonia can facilitate the transport of hydrogen energy, especially to markets like Asia.
- **Alternative Fuels:** Blended hydrogen fuels offer a potential pathway to gradually decarbonize energy-intensive sectors.

Unlocking the potential of the hydrogen economy requires effort to:

- Create a supportive regulatory environment that streamlines the shift to low carbon hydrogen production while simultaneously fostering demand for hydrogen energy solutions.
- Implement incentives to stimulate investment, accelerate research and development, and drive down the cost of green hydrogen to achieve market competitiveness.
- Promote widespread awareness of the benefits and safety of hydrogen technologies. Address concerns and build public support for essential hydrogen infrastructure development.

Selected National Hydrogen Strategies

This section of the hydrogen economy report focuses on strategies adopted by various countries to leverage hydrogen as a low-carbon solution for clean energy. The countries featured here were selected based on representation within our network, but it's important to note that many other nations and regions are also actively developing their own approaches to the hydrogen economy. The following information is derived directly from presentations by experts during our online event.

Prof. Ric Parker, GFCC Distinguished Fellow, Consultant for A*Star, Singapore, and Chairman of the Singapore Low Carbon Energy Research Programme gives a lecture via Zoom on hydrogen's energy potential in the net-zero economy, during the GFCC Expert Session in March 2024.

Singapore's Path Towards Energy Transition and Decarbonization

Singapore has the world's second-largest container port (in cargo tonnage) and a remarkably high GDP per capita of approximately $67,000 USD (ranking 9th globally). With a population of 5.92 million, it faces unique energy challenges. Currently, 98 percent of electricity generation comes from gas, and 65 percent of the city's dwellings rely on methane. Despite these hurdles, there's a strong commitment to decarbonization. A forward-thinking resilience strategy (Charting Singapore's Low-Carbon and Climate Resilient Future), initially introduced in 2020 and updated just two years later, now aligns with global net-zero carbon goals. The *Singapore's National Hydrogen Strategy* published in 2022 focuses on importing renewable energy sources.

To support these efforts, the government has established a $5 billion Future Energy Fund to invest in infrastructure supporting renewables, CCUS, and hydrogen. A hydrogen plant, initially operating on a mix of gas and hydrogen, is slated for completion in 2026. Additionally, a carbon tax of $25 USD per ton has been implemented, along with a mandate for airlines to use at least 1 percent synthetic aviation fuel (SAF). It has also committed that in its ports, no new harbor craft (ferries, tugs, bunkering vessels, tenders, etc.) may be introduced after 2030 unless they are fully electric, and all existing ones must be replaced, or converted to zero-carbon fuels as soon as possible thereafter).

Singapore, constrained by its limited space, faces challenges in generating renewable energy domestically, with only 2-3 gigawatts of solar potential and no viable wind resources (there is growing interest in floating offshore wind generation). Green hydrogen generation, therefore, emerges as an important solution for Singapore's decarbonization efforts, with a focus on two key areas. First, decarbonizing the massive maritime industry, a significant economic pillar, is paramount. Second, leveraging the existing large-scale petrochemical industry and 'gray' hydrogen production creates the potential for refining processes and transitioning to a cleaner alternative.

Led by Prof. Ric Parker, the Low-carbon Energy Research Program has received $184 million in funding from the Singaporean government. Recently, six new hydrogen projects were announced for phase two, with an additional $43 million in investment.

Canada's Hydrogen Roadmap: Technology, Collaboration, and Decarbonization

Canada demonstrates a strong national commitment to shaping the global hydrogen economy. Its National Hydrogen Strategy outlines a vision for a clean, accessible, and inclusive energy future built upon the country's abundant natural resources and deep technological expertise. This commitment is further solidified through collaborative efforts across provinces, such as Alberta's investments in low carbon hydrogen production from natural gas as well as heavy-duty transport, British Columbia's focus on renewable hydrogen, and Quebec's significant investments in green hydrogen production.

The strategy aims to scale up hydrogen production in diverse sectors—transportation, industry, and heating—with the dual goals of reducing carbon emissions and creating new economic opportunities. Canada's active participation in international collaborations like the Mission Innovation Hydrogen Challenge (alongside 23 other countries and the European Union), the European Clean Hydrogen Alliance, and the International Partnership for Hydrogen and Fuel Cells in the Economy reinforces its leadership role in accelerating clean hydrogen solutions.

Alberta, traditionally known for its robust carbon economy, is rising as a key player in the hydrogen economy. Established in 2009, Emissions Reduction Alberta (ERA), a government agency, plays a crucial role by investing in late-stage technology demonstrations designed to decarbonize the economy while stimulating economic growth and job creation. This initiative is funded by a carbon levy on large industrial emitters.

Alberta is exceptionally well-positioned to produce blue hydrogen. This process combines hydrogen production from natural gas with carbon capture and sequestration (CCS) to minimize emissions. The province's unique geological structure makes it an ideal location for CCS projects. ERA has invested heavily in hydrogen technologies across the value chain, totaling approximately $80M in funding for new projects.

Alberta boasts a rich history in carbon management. It was the first North American jurisdiction to implement a carbon pricing mechanism 15 years ago. The province currently generates roughly 2.5 million tons of hydrogen, making it Canada's leader in hydrogen production. The Air Products Net Zero Hydrogen Complex, which relies on autothermal reforming of natural gas plus CCS is a $1.6 billion investment and will be one of the world's first net-zero hydrogen production facilities when it becomes operational, showcasing the province's commitment to CCS technologies.

Canada's extreme weather, with temperatures ranging from 40ºC to -50ºC, creates a unique testing ground for the robustness of hydrogen-powered transportation vehicles and industrial processes. Initiatives like Canadian Pacific Kansas City Rail's hydrogen locomotive conversions and exploring hydrogen blends for home heating (potentially up to 10 percent in existing natural gas lines) further demonstrate Canada's dedication to innovation in the hydrogen sector.

UK's Hydrogen Push: 10 Gigawatts by 2030

The UK has set ambitious goals for low-carbon hydrogen production, outlined in the UK Hydrogen Strategy, launched in 2021. The strategy targets 10 gigawatts of low-carbon hydrogen production capacity by 2030. To support this vision, the government has launched the Green Industries Growth Accelerator program with £960 million in funding (which also supports nuclear initiatives) and dedicated £150 million specifically to hydrogen development.

The UK's approach strategically focuses on a balanced combination of green hydrogen (produced from renewable energy sources) and blue hydrogen (where carbon emissions from production are captured and stored). Investments under the Hydrogen Allocation Round 1, closed in 2023, supported 11 projects across the UK with a combined capacity of 125 megawatts.

Recognizing the importance of infrastructure, the UK launched Project Union which is investing in a network of approximately 2,000 kilometers of hydrogen transport lines to connect hydrogen production centers to industrial, heat, transport, and power consumers. This network will play a crucial role in delivering and distributing hydrogen from both green and CCUS-enabled blue hydrogen projects across the country.

The initial Hydrogen Allocation Round (HAR1) allocated more than US$ 2.5 billion in subsidies to eleven projects in England, Wales, and Scotland. Those projects combined account for 125 megawatts production at the strike price of approximately US$ 12 per kilogram of hydrogen. The second round (HAR2), already announced by the government, aims to support a further 875 megawatts of green hydrogen production capacity by 2025, underscoring the UK's continued commitment to advancing its hydrogen economy.

Malaysia Embraces Hydrogen Future

Malaysia's hydrogen sector is rapidly expanding, with extensive research underway and forecasts for significant job creation. The government, through a multi-agency collaboration led by the ministries, is strongly committed to hydrogen development in Malaysia, as outlined in documents such as the National Energy Policy, the National Energy Transition Roadmap, the New Industrial Master Plan and the Hydrogen Economy and Technology Roadmap.

The Hydrogen Economy and Technology Roadmap led by Ministry of Science, Technology and Innovation (MOSTI) and created in partnership with strategic partners from Nano Malaysia, the Academy of Sciences Malaysia, the National Nanotechnology Centre (NNC), Malaysian Green Technology, and the Climate Change Corporation (MGTC), guides the nation's strategic long-term approach to hydrogen development and explicitly highlights hydrogen as a future opportunity for Malaysia to embrace new economic generation and move towards the decarbonization effort.

Based on two plausible scenarios—Business as Usual (BAU) and Emission-Driven Scenario (EDS)—the Government of Malaysia aims to achieve RM 7.4 billion (BAU) or RM 21.2 billion (EDS) of revenue generation from the hydrogen economy agenda in 2030 by adopting the "Buy-some and Build-some" strategy. Meanwhile, it is projected to create jobs at 168,000 (for BAU) and 229,000 (for EDS) based on the targeted hydrogen production of 1 million tonne (for BAU) and RM 2 million tonne (for EDS), respectively.

There are currently hydrogen projects being implemented by key players and stakeholders in Malaysia, focusing on hydrogen production, transportation, storage, hydrogen stations, and utilization by end users. The projects span industry, academia, and government sectors. The Sarawak state government is coming out with a mega hydrogen project in Sarawak via collaboration with international partners.

PETRONAS, a national oil company, is venturing into the hydrogen business and is actively involved in research activities for technology development. In addition, local universities, and Centres of Excellence (COEs) are participating in research and development activities to advance hydrogen technology applications. This commitment is evident in over 1,560 publications from the Malaysian research institution, encompassing more than 120 hydrogen-related research activities. To realize the full potential of this research, strategic government facilitation is crucial to foster collaboration between academia and industry, driving commercialization and innovation in the hydrogen sector.

While regulatory frameworks are evolving, Malaysia recognizes the need for policy instruments to drive demand, establish clear standards, and provide guidance for private sector investment. In addition, to achieve its hydrogen ambitions, the country will need to further develop supportive fiscal measures, innovative business models, increased public awareness, and investment in hydrogen appliances to drive down the cost of green hydrogen production.

Hydrogen from Ethanol—Initiative in Brazil

Brazil is at the forefront of developing innovative processes to extract hydrogen from ethanol, a readily available and renewable resource within the country. The process typically involves steam reforming, where ethanol and water are mixed and heated in the presence of a catalyst. This reaction breaks down the ethanol molecules, producing a mixture of hydrogen, carbon dioxide, and other gases. The hydrogen is then separated and purified using techniques like pressure swing adsorption (PSA), a process that separates single gases from a gas mixture, to achieve the desired purity levels for various applications. Brazil's significant ethanol infrastructure and expertise in biomass processing position the country as a leader in this promising technology. Ethanol is also a safe and convenient way to ship hydrogen around the world (preferable to ammonia), so it could become an important export for Brazil.

One of the key initiatives related to green hydrogen in Brazil is the Research Center for Greenhouse Gas Innovation (RCGI), which was launched as a partnership between Shell, the University of São Paulo, and FAPESP, a Brazilian research funding agency. It now includes several other partners such as Braskem, Total Energies, Petrobras, Imperial College London, and others. RCGI is developing technology to produce hydrogen from sugarcane biomass and aims to achieve a cost of $1 per kg of green hydrogen in 5 years. In 2023, in partnership with the Brazilian National Industry Confederation (CNI), the GFCC co-hosted a high-profile industry-university forum in São Paulo, Brazil, where RCGI's experience was presented and discussed. Information about RCGI is included in the *Universities in Action: Building Cross-sector Alliances and Making Impact on Society* report.

U.S. Department of Energy's Hydrogen Hub Initiative

In 2021, the United States launched an ambitious initiative named Hydrogen Shot aimed at significantly reducing the cost of green hydrogen (hydrogen produced using renewable energy sources) to $1 per kilogram within a decade. This effort seeks to accelerate the adoption of clean hydrogen production and make it a more competitive energy source for various applications.

To further this goal, the U.S. Department of Energy (DOE) is spearheading a nationwide effort to establish regional clean hydrogen hubs (H2Hubs) as part of its commitment to decarbonization and achieving net-zero emissions by 2050. These hubs aim to create integrated networks for hydrogen production, processing, delivery, storage, and end-use applications. Funded through the Bipartisan Infrastructure Law, the DOE's ambitious goal is to develop at least four geographically diverse H2Hubs that demonstrate the viability of clean hydrogen across multiple sectors, including transportation, power generation, and industrial processes.

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The Global Hydrogen Landscape: Shared Ambitions with Diverse Strategies

A strong global movement towards hydrogen as a clean energy solution is underway, with countries like Singapore, Canada, the UK, Malaysia, and the United States, represented in the GFCC Expert Session, actively shaping their hydrogen economies. Many nations have set very ambitious targets, such as the UK that aims for 5 gigawatts of low-carbon hydrogen production capacity by 2030, and the U.S. initiative to reduce the cost of green hydrogen to $1 per 1 kilogram in 1 decade launched in 2021.

While united in their goals, these countries are pursuing diverse strategies tailored to their unique strengths. The UK focuses on a balanced mix of green and blue hydrogen, Canada leverages its abundant natural resources for blue hydrogen production, and Brazil pioneers innovative methods of extracting hydrogen from ethanol.

A consistent theme across these strategies is strong government commitment, demonstrated through policy frameworks, robust funding initiatives, and investments in essential hydrogen infrastructure. Collaboration is also crucial, exemplified by Malaysia's multi-agency roadmap and Canada's combined regional efforts.

Innovation plays a central role, with countries like Malaysia and Brazil emphasizing research and development to advance hydrogen production technologies that leverage their unique natural assets and research capabilities. All strategies recognize the need to develop robust hydrogen storage and transportation networks to realize the full potential of this energy carrier.

To accelerate the transition, governments are focusing on creating supportive policies and business models to foster private sector participation. While challenges remain in terms of cost reduction, demand creation, and regulatory clarity, these nations acknowledge hydrogen's vast potential to decarbonize various economic sectors while driving job creation.

A hydrogen plant refinery under construction (Photo: Shutterstock)

About the GFCC

The GFCC is a global multi-stakeholder membership organization founded in 2010 with a footprint spanning more than 30 nations. The GFCC is committed to disseminating best practices to accelerate productivity, growth, and prosperity for countries, regions, and cities. We do that through high-level networking and events, in-depth conversations, analytical tools, advice, and education.

GFCC members include private sector councils on competitiveness and industry organizations, government agencies, global corporations, and leading research universities. All members pay membership dues yearly to secure their placement in the network. Currently, the GFCC hosts 44 members from 21 countries.

Besides its members, the GFCC network also includes experts invited to participate as fellows. Members and fellows have different roles. Fellows contribute by sharing their specialized knowledge and expertise with the community and participating in project development and strategies. Currently, the GFCC hosts 60 fellows from 24 countries.

Learn more about the GFCC at: www.thegfcc.org

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