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**“HYDROGEN IN THE CONTEXT OF
THE AGENDA 2030”**

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Hydrogen in the Context of the Agenda 2030

This presentation explores the critical role of hydrogen in advancing the United Nations' Agenda 2030 for Sustainable Development. We will examine how hydrogen, as a clean energy carrier, can accelerate progress toward achieving the Sustainable Development Goals (SDGs) and fostering a more sustainable future for all.

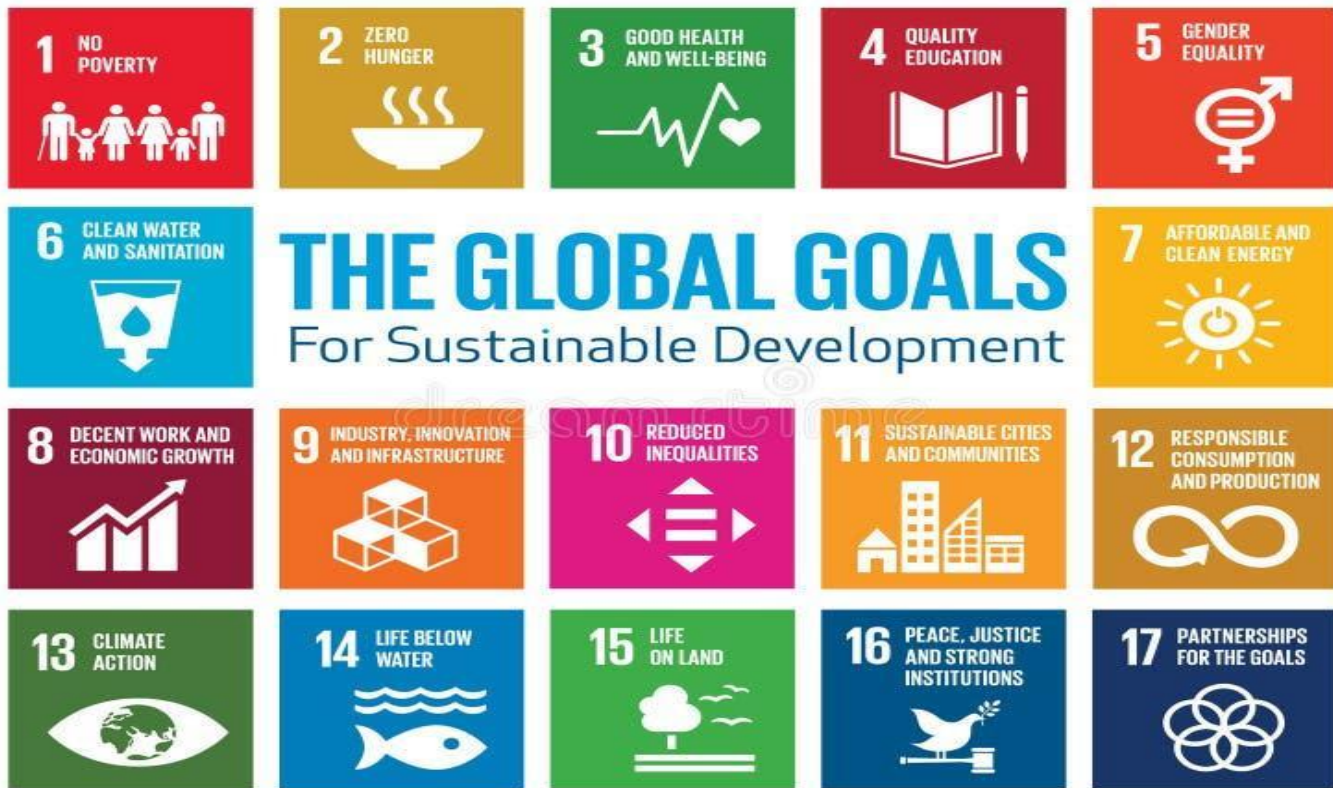




Overview of Agenda 2030 and the SDGs

Agenda 2030 is a universal call to action adopted by all United Nations Member States in 2015.

- It comprises **17 Sustainable Development Goals (SDGs)** addressing global challenges, including **poverty, inequality, climate change, environmental degradation, peace, and justice.**
- The SDGs are **interconnected** and require collaborative efforts from **governments, businesses, and individuals** to achieve them by 2030. Clean energy and innovation (linked to **SDGs 7 and 9**) are critical enablers for achieving several other SDGs.



Why Hydrogen Matters for Sustainability

Hydrogen stands out as a versatile energy carrier with the potential to revolutionize various sectors and significantly contribute to decarbonization.

- It can be produced from **diverse sources**, including **renewable energy**, and used in **transportation, industry, and power generation**.
- As a **clean-burning fuel**, hydrogen produces only **water** as a byproduct, making it an environmentally friendly alternative to **fossil fuels**.
- Its role in **energy storage** provides flexibility to manage **variable renewable energy sources**.

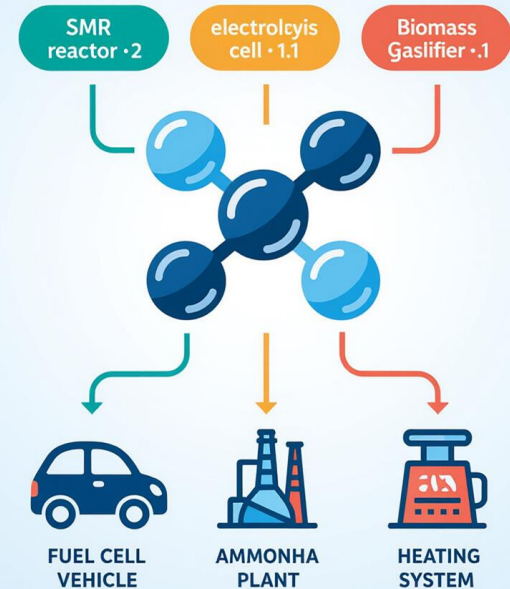


The Science of Hydrogen: Production and Uses

Hydrogen (H_2) is the most abundant element in the universe, yet it rarely exists in its pure form on Earth.

- It's a **colorless, odorless**, and **highly flammable gas**.
- Hydrogen is primarily produced through **steam methane reforming (SMR)**, **electrolysis of water**, and **biomass gasification**.
- Key applications include **fuel cells** for vehicles, **industrial processes** (e.g., **ammonia production**), and **heating**.

Hydrogen Molecule (H_2) with Three Production Method

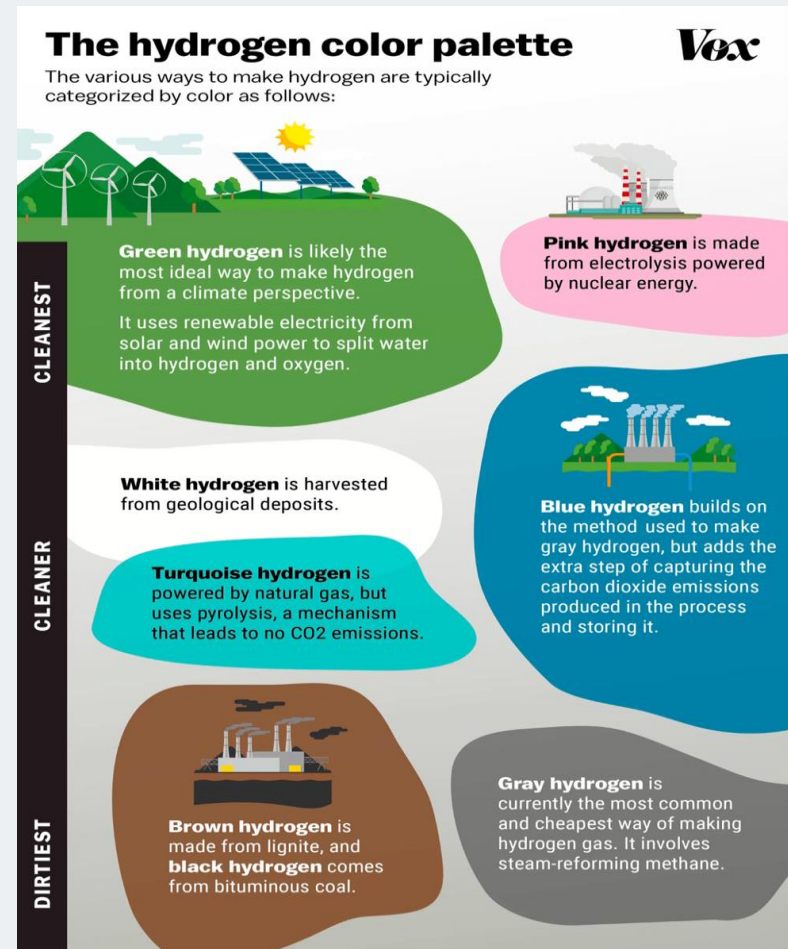


Types of Hydrogen: Grey, Blue, and Green

Hydrogen production methods are classified based on their carbon footprint:

- **Grey Hydrogen:** Produced from natural gas via Steam Methane Reforming, releasing CO₂ into the atmosphere.
- **Blue Hydrogen:** Also produced from SMR, but with carbon capture and storage (CCS) technologies to reduce emissions.
- **Green Hydrogen:** Produced through electrolysis of water powered by renewable energy sources (e.g., solar, wind), resulting in zero emissions.

Green hydrogen is the most sustainable option and is critical for achieving long-term decarbonization goals.





Hydrogen and the Energy Transition

Hydrogen is vital in facilitating the global transition to a clean energy economy.

- It provides a means to store excess renewable energy, addressing the intermittency challenges associated with solar and wind power.
- Hydrogen can be transported via pipelines or trucks, enabling energy distribution across regions.
- It can be used in fuel cells to generate electricity, providing a clean and efficient power source for various applications.

Hydrogen and SDG 7: Affordable and Clean Energy

SDG 7 aims to ensure access to affordable, reliable, sustainable, and modern energy for all.

- Hydrogen contributes by expanding the availability of clean energy sources and promoting energy diversity.
- It can be used to power off-grid communities, providing access to electricity in remote areas.
- Investing in hydrogen infrastructure and technologies helps create jobs and stimulate economic growth in the clean energy sector.



Hydrogen and SDG 13: Climate Action



SDG 13 focuses on taking urgent action to combat climate change and its impacts.

- **Hydrogen** plays a crucial role in reducing greenhouse gas emissions in transportation, industry, and power generation.
- Fuel cell vehicles powered by **hydrogen** offer a zero-emission alternative to traditional combustion engine vehicles.
- **Hydrogen** can replace fossil fuels in industrial processes, such as steel and cement production, reducing their carbon footprint.

Hydrogen and SDG 9: Industry, Innovation, and Infrastructure

SDG 9 promotes building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation.

- **Hydrogen**-related technologies drive sustainable industrial development by creating new value chains and business opportunities.
- The development of **hydrogen** infrastructure, including pipelines and refueling stations, requires innovation in materials and engineering.
- Investments in **hydrogen** research and development foster technological advancements and accelerate the transition to a **hydrogen** economy.





European Union and Global Hydrogen Strategies

Several countries and regions have developed comprehensive hydrogen strategies to support the growth of hydrogen economies.

- The **European Union's Hydrogen Strategy** aims to deploy **hydrogen** technologies across various sectors and establish Europe as a global leader in **hydrogen** production and utilization.
- **Japan's Hydrogen Society** initiative promotes the widespread adoption of **hydrogen** in transportation, power generation, and industrial applications.
- **Germany's National Hydrogen Strategy** focuses on promoting green **hydrogen** production and establishing a **hydrogen** infrastructure network.



Challenges and Barriers to Hydrogen Adoption

Despite its potential, widespread hydrogen adoption faces several challenges:

- High production costs, particularly for **green hydrogen**, remain a significant barrier.
- The lack of established **hydrogen infrastructure**, including pipelines and refueling stations, hinders market development.
- Technical challenges related to **hydrogen storage and transportation** need to be addressed to ensure safety and efficiency.
- **Regulatory frameworks and standards** for hydrogen production, distribution, and utilization need to be developed and harmonized.

Case Studies: Successful Hydrogen Projects

Several successful hydrogen projects demonstrate the potential of hydrogen technologies:

- **Germany's H2 Mobility:** A joint venture deploying hydrogen refueling stations across Germany to support the adoption of fuel cell vehicles.
- **Japan's Hydrogen Society:** A national initiative promoting the use of hydrogen in various sectors, including transportation, power generation, and industry.

These projects provide valuable lessons learned and best practices for scaling up hydrogen technologies globally.



The Future of Hydrogen and Global Cooperation

Realizing the full potential of hydrogen requires international collaboration and innovation.

- Countries need to work together to develop **common standards**, share **best practices**, and promote **cross-border hydrogen trade**.
- Increased investment in **research and development** is essential to drive down production costs and improve the performance of hydrogen technologies.
- **Public-private partnerships** can play a crucial role in accelerating the deployment of hydrogen infrastructure and scaling up hydrogen projects.



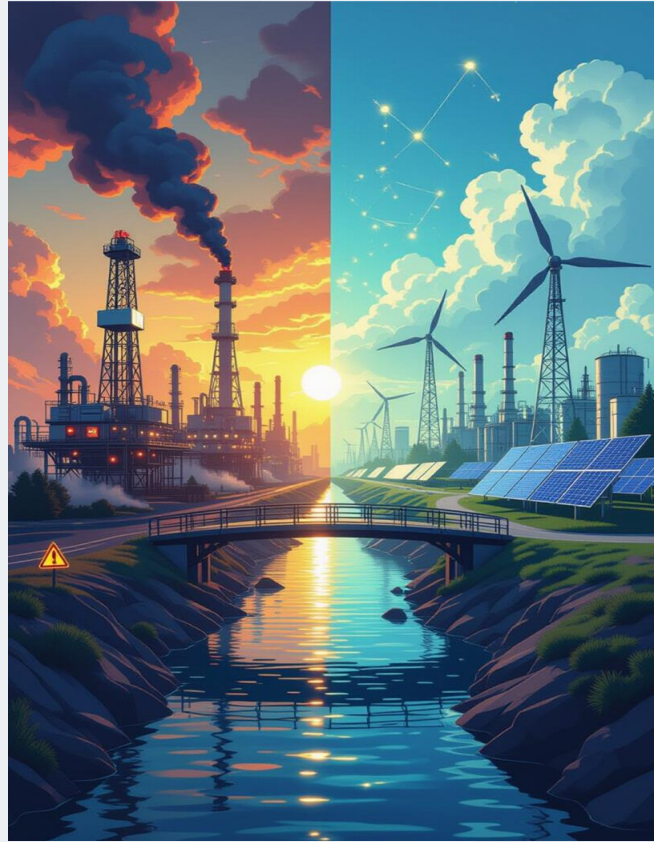
Conclusion and Call to Action

Hydrogen holds immense promise for achieving Agenda 2030 and creating a sustainable future for all. By embracing hydrogen as a clean energy carrier, we can:

- **Decarbonize** our economies and mitigate climate change.
- **Promote sustainable industrial development** and innovation.
- **Ensure access to affordable and clean energy** for all.

Let us all work together to unlock the full potential of hydrogen and accelerate progress toward the Sustainable Development Goals.





Thank you