Options for Hydrogen development in Viet Nam

VEPG Technical Working Group 5, 24th of April

Ministry of Industry and Trade

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Contents

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Background

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Green Hydrogen globally and Vietnam's role

Global perspective on Green Hydrogen

- Key pillars of Net Zero to achieve the objectives of the Paris Agreement are **energy efficiency, direct use of RE and sector coupling/green hydrogen**
- For a global energy transition, green hydrogen is needed in **hard-to-electrify sectors**, such as steel, cement, fertilizers, etc.
- Green hydrogen development on global level is still in **its initial phase**

Vietnam's role in the global context

- **Fast-growing economy** with an increasing energy demand of 10 % p.a.
- Industry consumes more **than 50 % of energy** in Vietnam
- Due to **good RE resources and existing infrastructure** in a good position to roll out green hydrogen
- **Technical expertise** from the oil, gas and electricity sector
- **Proximity** to Hydrogen markets like Singapore, Japan, etc.

Vietnam's current objectives

- Vietnam committed to **Net Zero in 2050** at COP26 and coal phase-out for 2040's
- Power Development plan (PDP8) defines **goals for the power sector**
- PDP8 "Dedicated RE for PtX production can be developed **without limits** to meet domestic and export demands"
- Developing a **carbon market by 2028** focusing on designated energy users
- **Hydrogen Strategy** and Implementation plan is published.

Todo’s for Viet Nam

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Todo’s for Viet Nam

Enabling frameworks

Advice on the development of **regulations and incentive systems** for green hydrogen based on international experience

Develop **long-term scenarios** for production and use of green hydrogen

Advise on **coordination mechanisms** (e.g., inter-ministerial, private sector involvement)

Capacity building

Capacity needs assessment and development of a roadmap for skilling

Development of **modules for training** on green hydrogen

Networks and exchange formats with research institutions or the private sector

“Internship” programme for Vietnamese experts

Develop and implement **demonstration project**

Economic Development:

Develop **techno-economic models** to analyze the feasibility of different green hydrogen production

Identify **potential for job creation** and local value creation

Advice on cooperation between **associations and companies**

Matchmaking formats to connect project developers, investors, producers and off-takers

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Hydrogen Demand in Viet Nam

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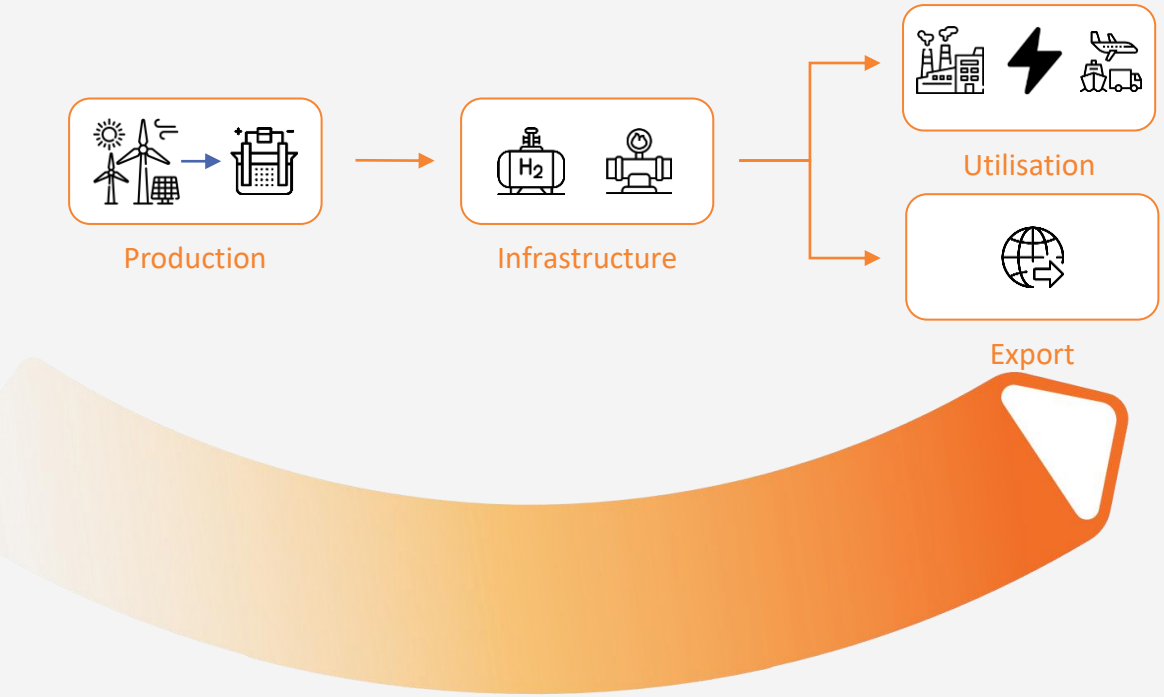
Introduction
Hydrogen value chain



The hydrogen value chain can be considered in the four key segments included in the Vietnam Hydrogen Energy Strategy:

1. Hydrogen energy production
2. Hydrogen energy use
3. Hydrogen energy storage, transportation and distribution
4. Hydrogen energy export

It is critical to examine the hydrogen energy use within Viet Nam first:

The location, type and scale of hydrogen production is dependent on the hydrogen use.

Hydrogen infrastructure (storage, transportation and distribution) can then be designed to support the production and utilisation segments.

The hydrogen export market is projected to be highly competitive (e.g. Australia, Middle East). Hydrogen export can be considered if there is excess production relative to consumption.

Hydrogen demand - Priority sectors

Hydrogen has a wide array of potential uses. However, the economic and technical feasibility of these uses relative to alternative decarbonisation options (e.g. electrification) is highly dependent on the specific utilisation case.

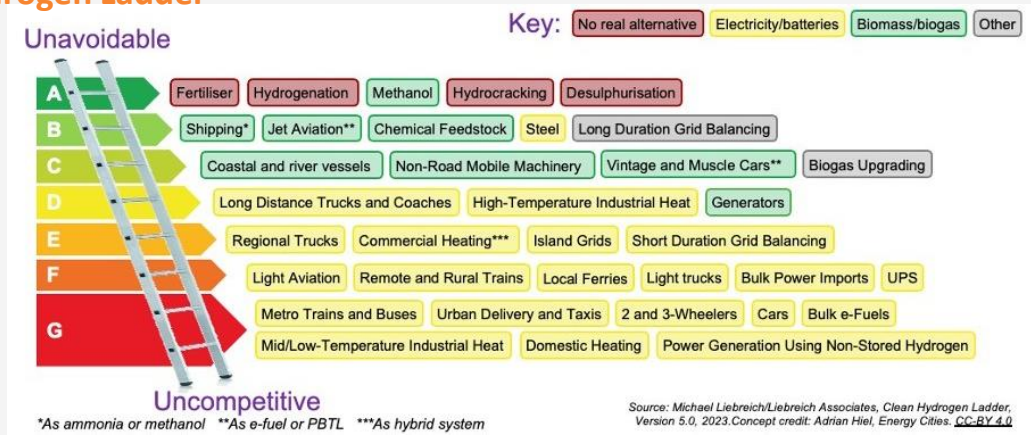
The Hydrogen Ladder (1) and Hydrogen priorities (2) provide guides as to which demand sectors should be prioritised for hydrogen use.

For Viet Nam following sectors were annalysed:

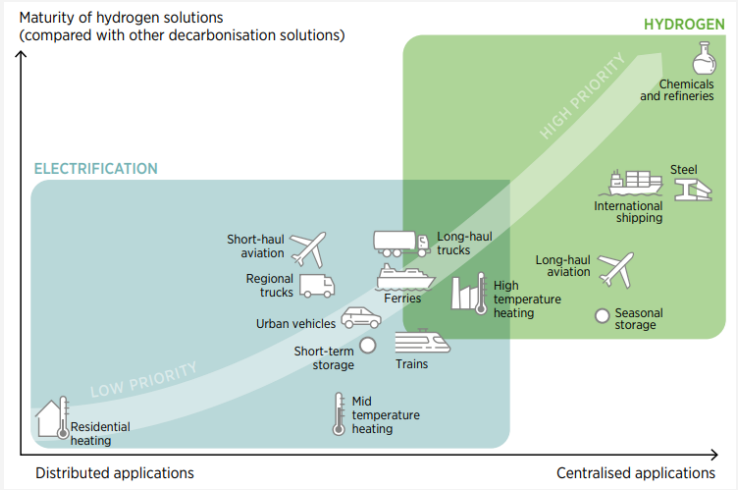
1. Steel
2. Cement industry
3. Fertilisers
4. Refining
5. Chemicals
6. Power generation
7. Shipping fuels
8. Aviation fuels

Domestic consumption

Hydrogen Ladder[1]



Hydrogen priorities[2]



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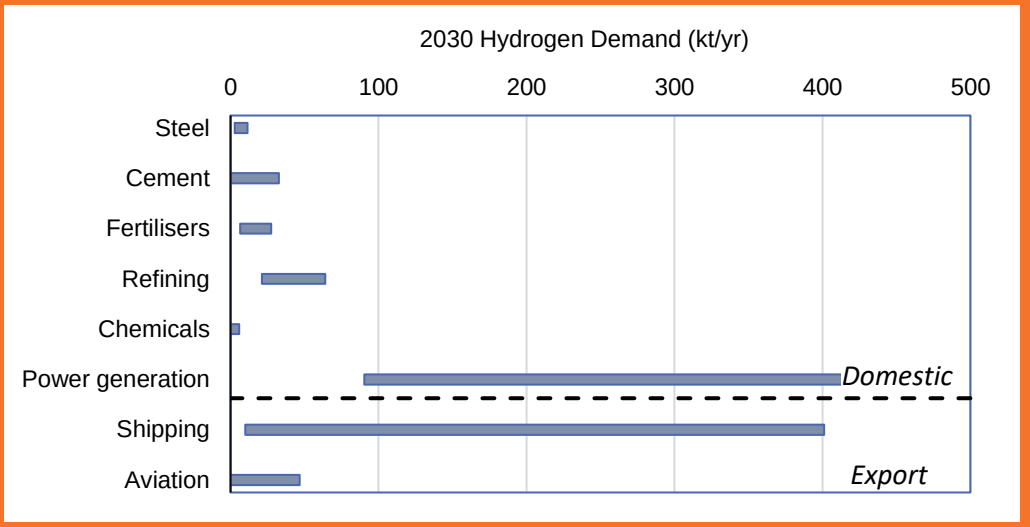
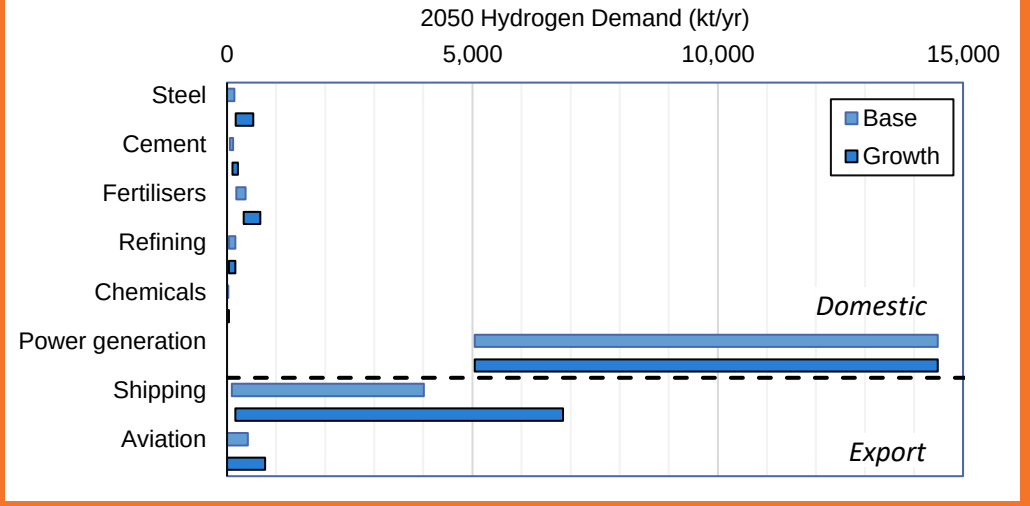
1. Liebrich Associates, Clean Hydrogen Ladder, Version 5.0, 2023. Concept credit: Adrien Hiel, Energy Cities.
2. IRENA (2020), Green Hydrogen: A guide to policy making, International Renewable Energy Agency, Abu Dhabi.

Hydrogen demand – Demand summary

Scenario			Base		Growth	
Year	2030		2050		2050	
Sector	Lower	Upper	Lower	Upper	Lower	Upper
Steel	3	12	0	150	178	533
Cement	0	33	61	122	111	222
Fertilisers	6	28	190	381	338	677
Refining	21	64	43	171	43	171
Chemicals	0	6	6	29	8	40
Power generation	90	451	5,050	14,500	5,050	14,500
Shipping*	10	401	100	4,010	171	6,850
Aviation*	0	47	0	421	0	778
Domestic only	121	593	5,350	15,300	5,720	16,100
Total	131	1,040	5,450	19,800	5,890	23,700

- Shipping fuels and aviation fuels are sold into international markets and are considered as exports for the purposes of this analysis.
- The 2030 projected domestic demand for hydrogen (131 – 1040 kt/yr) corresponds reasonably well to the hydrogen strategy supply target (100 – 500 kt/yr). There is some scope for export depending on the intended use of shipping fuels.
- The 2050 projected domestic demand for hydrogen (5.4 – 19.8 Mt/yr in base case) also corresponds quite well with the hydrogen strategy supply target (10 – 20 Mt/yr). Large scale export (e.g. ammonia for bunkering fuel in Singapore) could therefore be considered as a viable option for excess hydrogen supply beyond the domestic consumption capacity.





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Policy Recommendation

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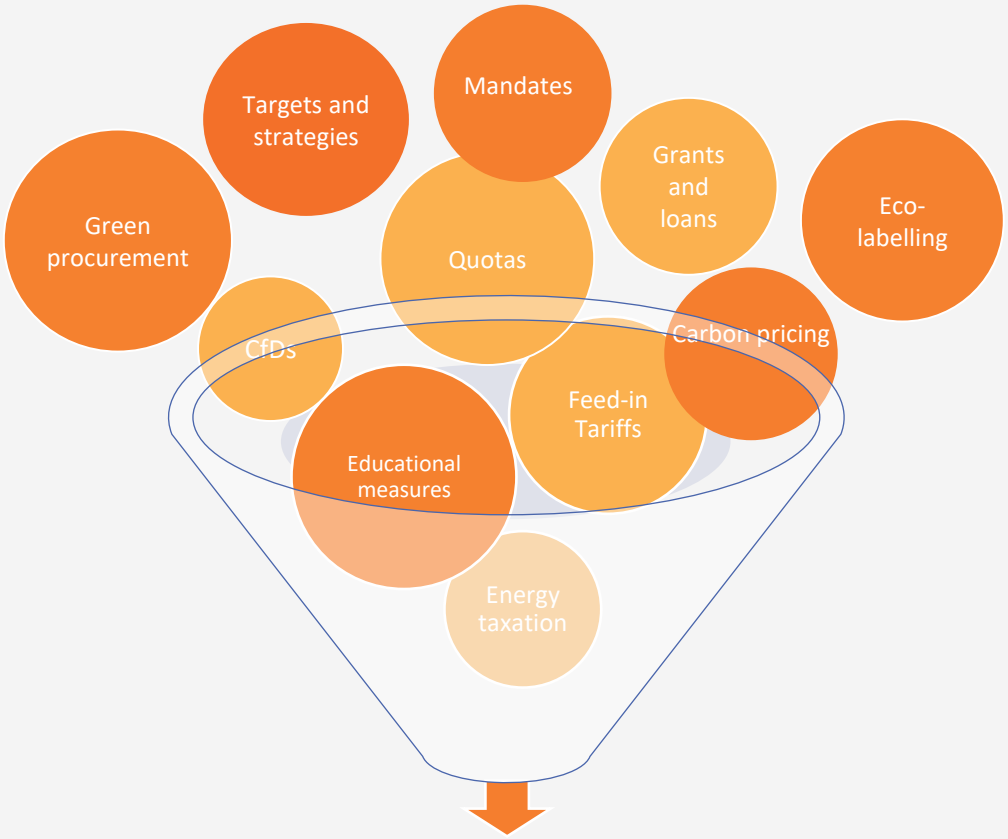
Selecting the right policy interventions for Viet Nam

- Early market policy interventions are crucial for meeting these targets
- Appraising different interventions to determine the most appropriate option to grow GH2 as part of a pathway to Viet Nam
- There are various policy options that could be deployed in Viet Nam to achieve targets



The right policy to supporting green hydrogen market development

Demand for low-emission hydrogen

- Policies that put an economic value on hydrogen for use in new applications or from new sources, growing hydrogen demand across different applications in an integrated way.
- Scale up commercial deployment using demand-side policies that “pull” investment throughout the value chain, making projects bankable.
- Could include portfolio standards; CO2 and pollution pricing; mandates and bans; performance standards; public procurement rules; electricity and gas market rules; tax credits; reverse auctions.

Planned approach — **Market driven**

- **European Commission, Council and Parliament**: Political agreement to adopt mandatory targets for member states on hydrogen demand in industry and transport, and mandates for synthetic fuels in aviation. In addition, the FuelEU Maritime initiative includes the possibility of introducing a target for 2% of Renewable Fuel of Non-Biological Origin (RFNBO) in maritime fuels from 2034 if these fuels have not reached a 1% share by 2031.
- **India:** The Indian government has introduced a Hydrogen Purchase Obligation (HPO) as part of its National Green Hydrogen Mission. The HPO mandates certain industries, primarily refineries and fertilizer manufacturers, to purchase a specified proportion of their hydrogen consumption from green hydrogen producers.
- **Romania**: In June 2023 the parliament pass a law that sets mandates for renewable hydrogen use in industry and transport, including penalties for non-compliant companies.
- **Germany:** In 2023, the Commission approved a EUR 550 million (~USD 579 million) direct grant and conditional payment mechanism of up to EUR 1.45 billion (~USD 1.53 billion) to support ThyssenKrupp Steel Europe in decarbonising its steel production and accelerating renewable hydrogen uptake.
- **Netherlands:** In June 2023, the Netherlands announced plans to introduce subsidies on the demand side during 2024 and obligations for renewable hydrogen in industry (by 2026) and transport (by 2025)
- **USA:** IRA also supports the development of demand sectors for clean hydrogen through additional programs such grants and loans for auto manufacturing facilities to manufacture clean vehicles.
- **China** has released a revised fuel cell vehicle (FCV) subsidy policy which focuses on technological development, reducing costs and improving regulatory support across the FCV value chain.
- **South Korea:** In August 2023 South Korea announced a hydrogen power bidding market. The market will be divided into one for general hydrogen power generation and another for clean hydrogen power generation. The clean market will open in early 2024 after a clean hydrogen certification system and relevant laws are enacted.
- **Japan** announced capacity auctions for low-carbon technologies, including hydrogen and ammonia co-firing at fossil fuel power plants, with the first auction expected by Jan 2024.
- **Australia** encourages the development of centres of high demand called “Hydrogen Hubs” in regional Australia. The aim is to accelerate large-scale hydrogen industry development. The program is part of the government’s $40 billion investment to transform Australia into a powerhouse of green energy generation and innovation.

Existing policy framework in Viet Nam

Use Case: Hydrogen in power generation

Electricity Law

Mentioned: Promoting the exploitation and use of new energy sources and renewable energy for power generation; having preferential policies (investment, electricity prices, taxes according to the guidance of the Ministry of Finance) for investment projects in developing power plants using new energy sources and renewable energy.

→ PDP 8 Decision No. 500/QĐ-TTg, 2023

Petroleum Law No. 12/2022/QH15

not mentioned renewable energy, and hydrogen

→ Promoting to reduce reliance on fossil fuels, towards renewable feedstock,

Chemical Law No. 06/2007/QH12,

Chemical industry development strategy, Decision No. 726/QD-TTg

not mentioned renewable energy, and hydrogen

Environmental Protection Law No. 72/2020/QH14,

It mentions the development of clean energy and renewable energy; the use of renewable energy, supporting the development of vehicles using renewable energy, supporting preferential treatment: public transport services using electricity, renewable fuels; clean energy production, renewable energy

→ Supporting green production

"Electricity generation: Research and pilot co-firing of gas with hydrogen and coal with ammonia in gas-fired and coal-fired power plants in preparation for implementing the fuel conversion roadmap towards hydrogen-based energy. (1)"

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Decision 165 PM: Approving Vietnam's hydrogen energy development strategy until 2030, with a vision toward 2050

Use Case: Hydrogen in power generation

Government's direction and related lans

- Directions of the Government and Prime Minister
- Plans related to hydrogen in gas pipelines and current status

Summary of information on hydrogen in natural gas pipelines in the world

Difficulties in deploying in natural gas pipelines

- Identification of suitable locations for hydrogen blending pilot
- Assessment and certification of pipeline suitability
- ……..

Evaluate solutions

- Proposed solutions based on international examples
- Recommendations on adapting existing policy in Vietnam and development of new policy

The necessity to issue parliamentary resolutions

- Necessity
- Policy mechanisms in the National Assembly Resolution
- implementation organization
- Check, monitor and evaluate implementation results

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Green Hydrogen Technology & Business Hub

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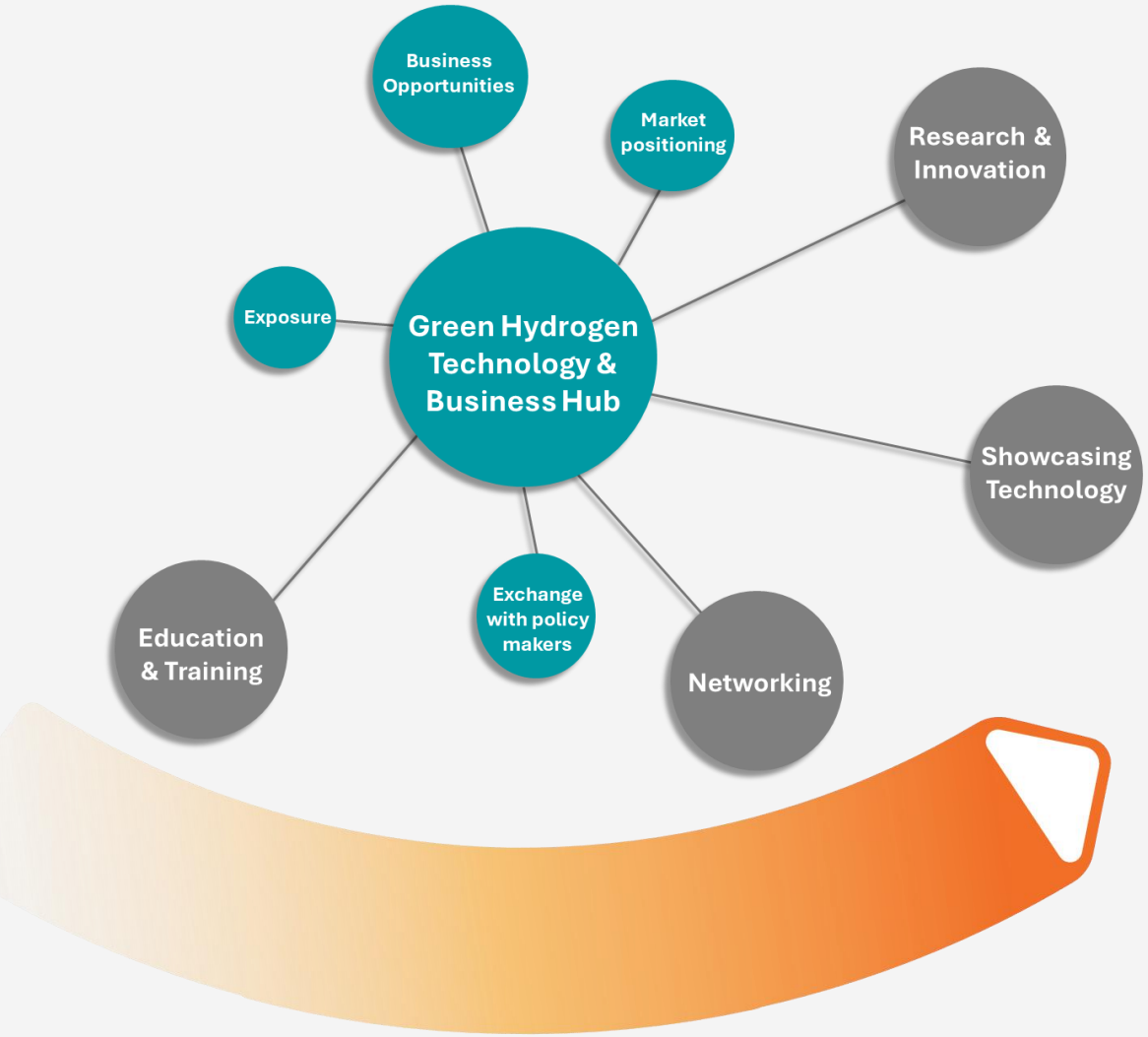
The Green Hydrogen Technology & Business Hub



The project idea

A consortium of private sector partners interested in leading the green hydrogen market development in Vietnam establish **a centre of excellence at the Vietnamese-German University (VGU)** for technology demonstration, research and for developing the future green hydrogen workforce of Vietnam.

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Value Proposition

- Positive brand exposure.
- Access to high-level government officials (e.g. through high-level delegation visits).
- Access to local investors and commercial opportunities.
- Opportunity to shape the curriculum for green hydrogen in Vietnam.
- Access to the best graduates.
- Access to VGU academic and research facilities in Vietnam and to their research network in Germany and beyond.

→ Be part of the furture Green Hydrogen economy in Vietnam!

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