Unlocking Clean Hydrogen in Vietnam

Hanoi

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Going clean is hard but feasible

H_2 production & consumption in Vietnam

Currently almost grey H_2 used internally

Until now, most brown & grey H_2 used internally

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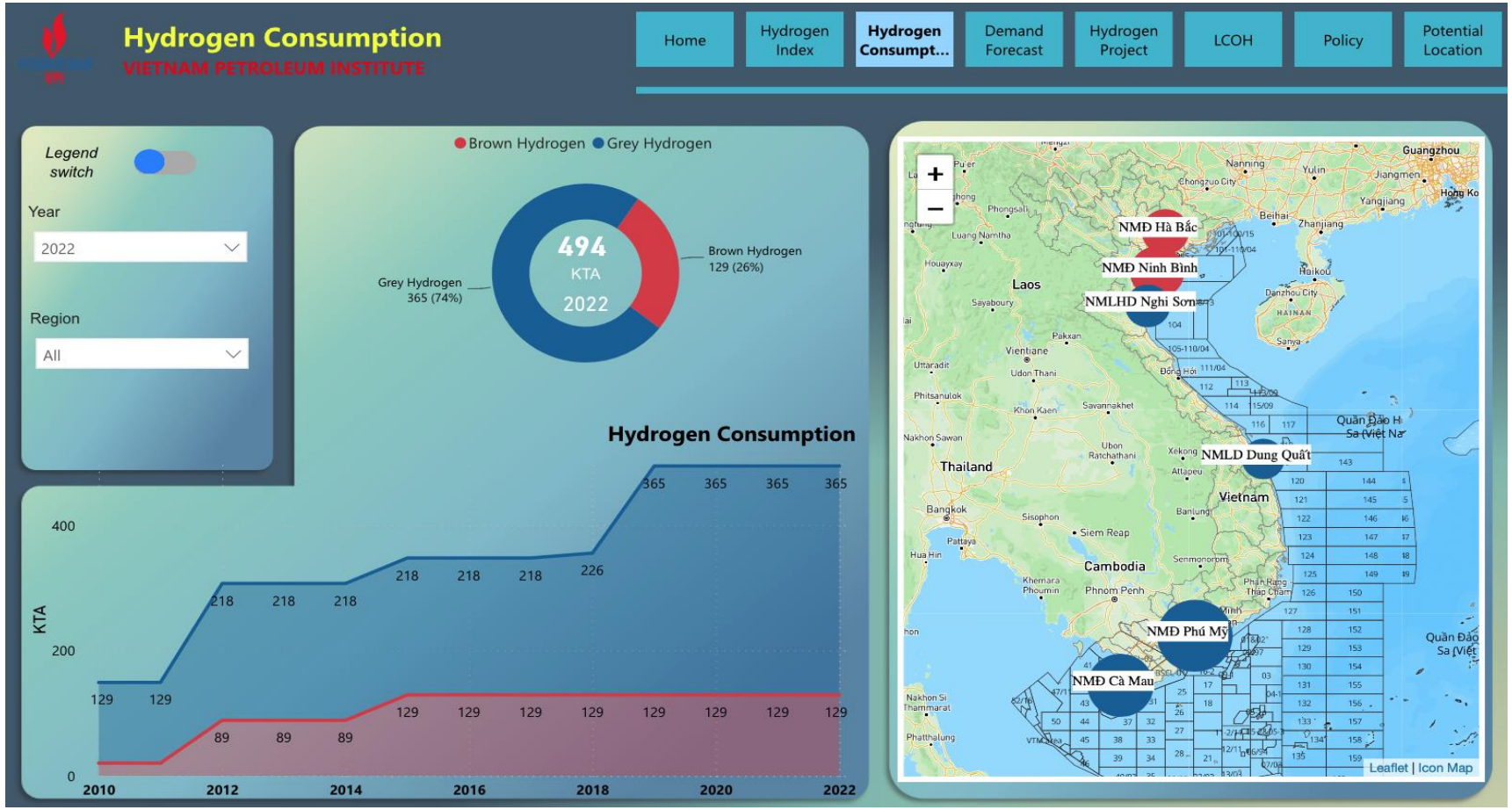

- Most of H_2 produced using reforming, cracking & gasification, & used internally (refineries, fertilizers).
- Negligible H_2 produced from electrolyzers using grid electricity, transported by trucks (short distance) to industrial consumers.

Consumption of 10-20 MTA of H_2 ~5-10% energy demand by 2050

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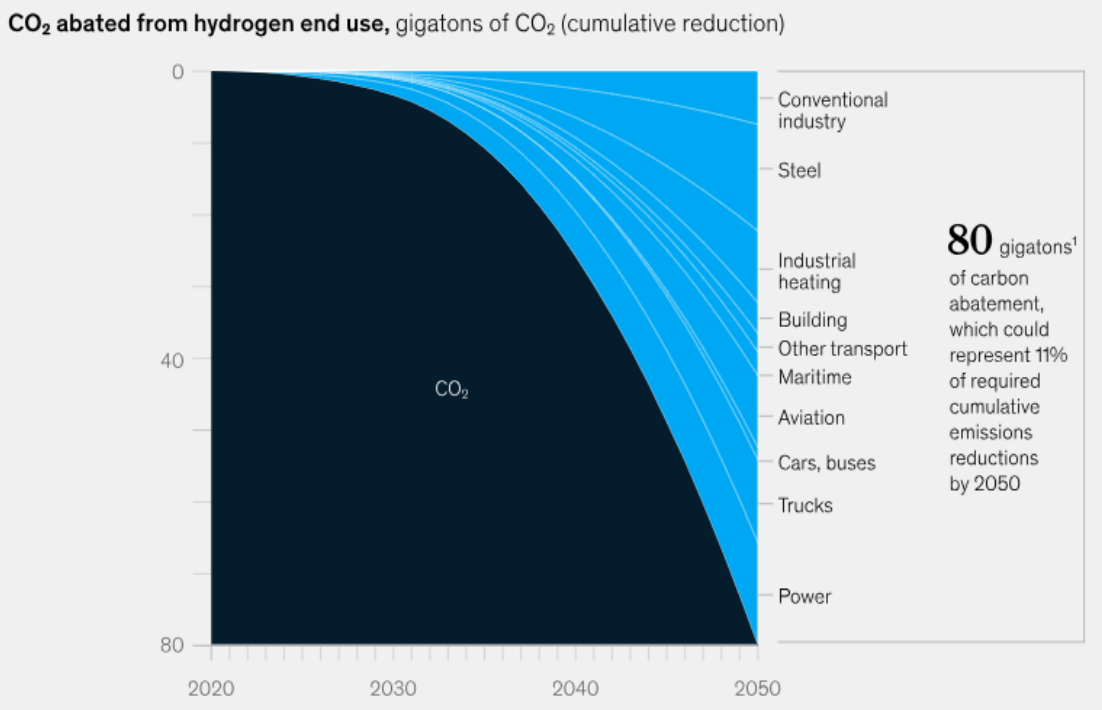
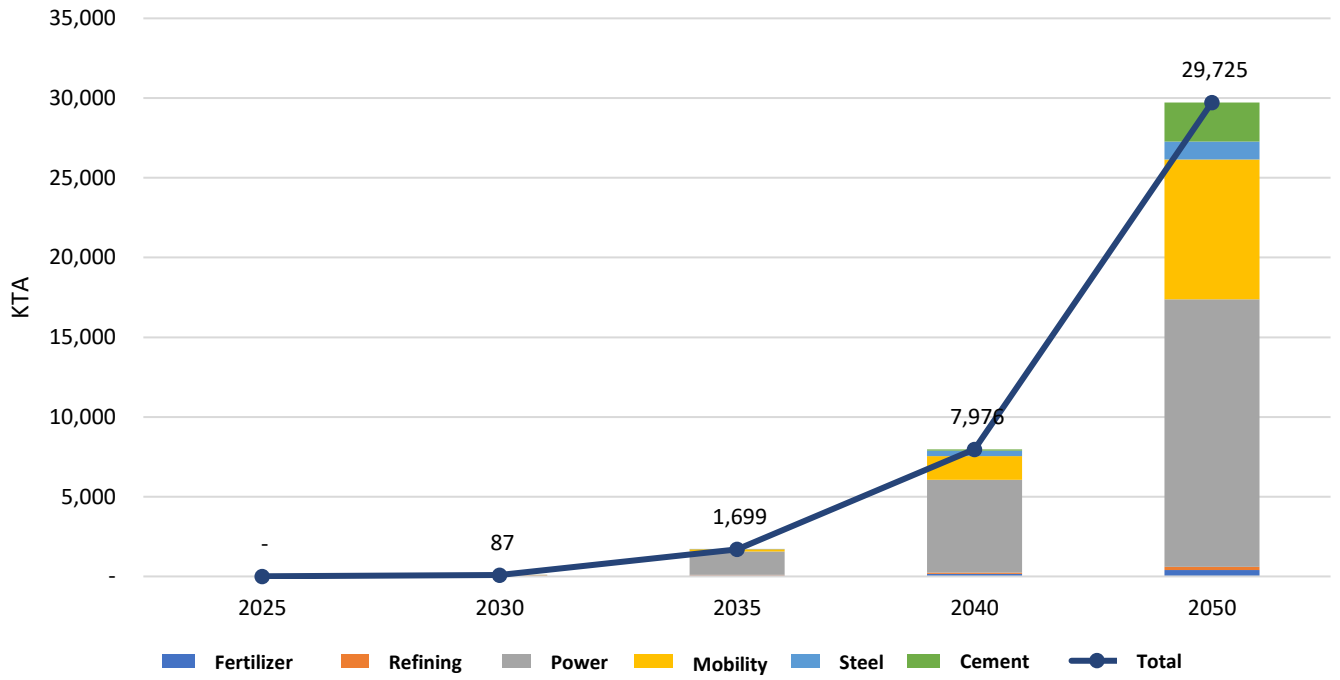
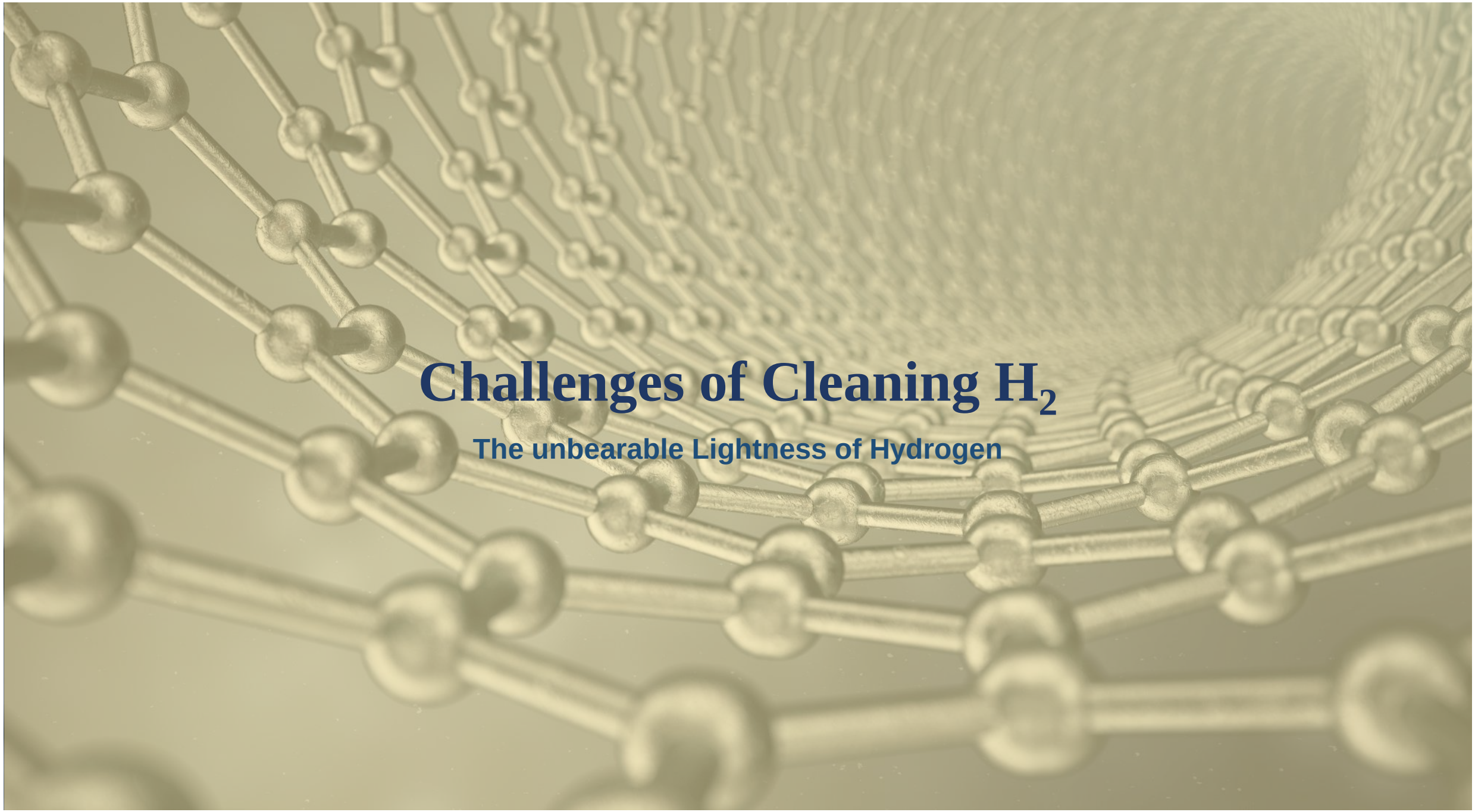
- Decarbonization of sectors: power, transportation & industries (steel, ammonia, etc.);
- Contribution to 10-20% of CO_2 emission reduction by 2050;
- Most potential applications in transportation & industries.



- Potential sectors for hydrogen applications in Vietnam: refining, fertilizer, power, transportation, steel & cement;
- Consumption of hydrogen starts from 2030 with pilot projects, accelerated by 2035 & ~10-20 MTA by 2050 (~5-10% of energy demand);
- Power & Transportation will consume most of hydrogen (>85%).



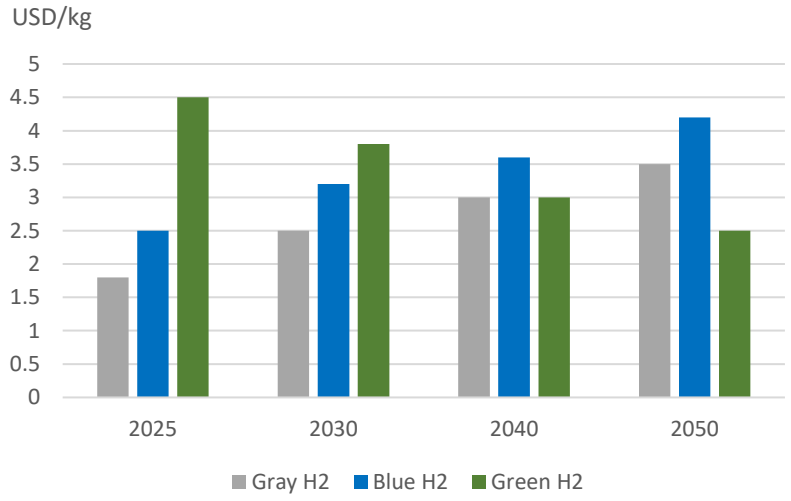


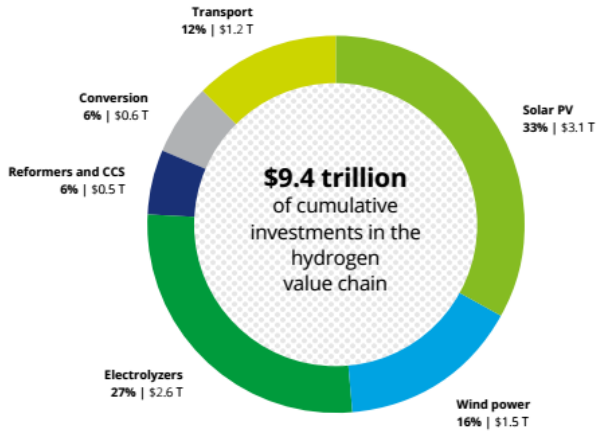
Challenges of Cleaning H_2

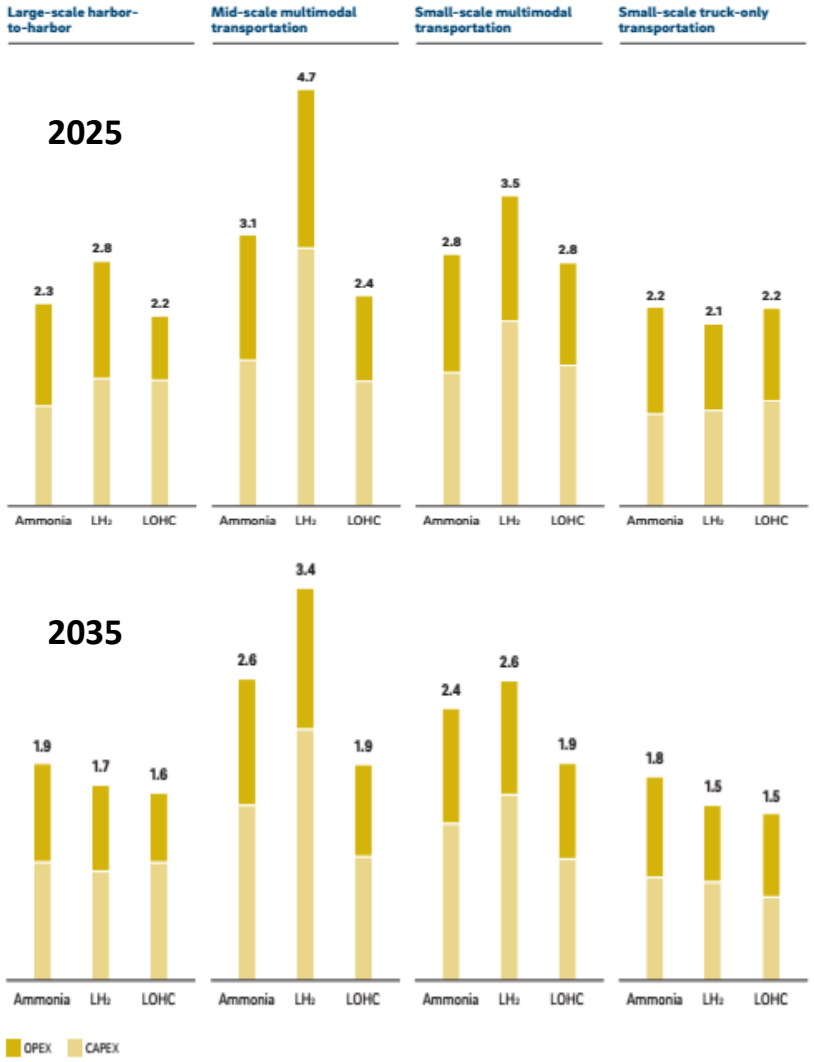
The unbearable Lightness of Hydrogen

Significant cost gap clean H_2 vs grey H_2 or vs gas/LNG/LPG hindered clean H_2 adoption

Production cost easier to reduce than logistic cost







- Current LCOH of green H_2 is more than double grey H_2;
- LCOH of green H_2 is decreasing with time & can compete with grey H_2 after 2030 → reduce ~16% in 5 years via lower costs in RE & electrolyzers!
- Transport can increase H_2 cost by 2.5-3.5 times by 2025 & 2-3 times by 2035 → reduce ~20% in 10 years!
- 1.8 trillion USD required for transport & conversion investment by 2050.

Limited Infrastructure, Immature End-Use Technology, and Insufficient Regulation Pose Key Roadblocks

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Limited infrastructure

- Required investment on storage, transport & distribution;
- Clusters/hubs have not been established.

Immature end-use technology

- Most of hydrogen applications are in the stages of pilot/demonstrations;
- Higher costs for using hydrogen as alternatives in various applications.

Insufficient regulation

- Lack of hydrogen standards on its value chain;
- Lack of applied environment regulations.

It is necessary to establish a full value chain of hydrogen, including its production, storage, transportation, distribution & uses. Suitable regulations are required to create & expanse its supply - demand & make it competitive with fossil fuels in the market.

Solutions to unlock H_2 in Vietnam

Policy framework, technology innovations & infrastructure development

Bridging the Cost Gap: Scaling Up Production, Incentivizing Demand, Driving Technological Improvements to Make Clean H_2 Competitive

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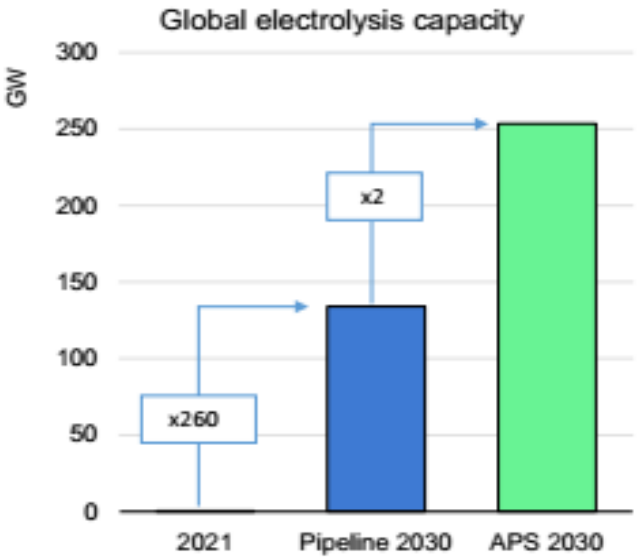
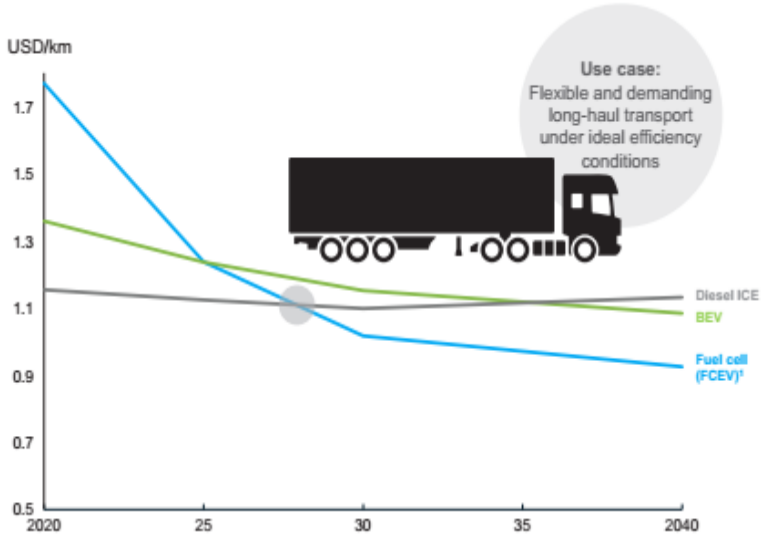
Scaling up production



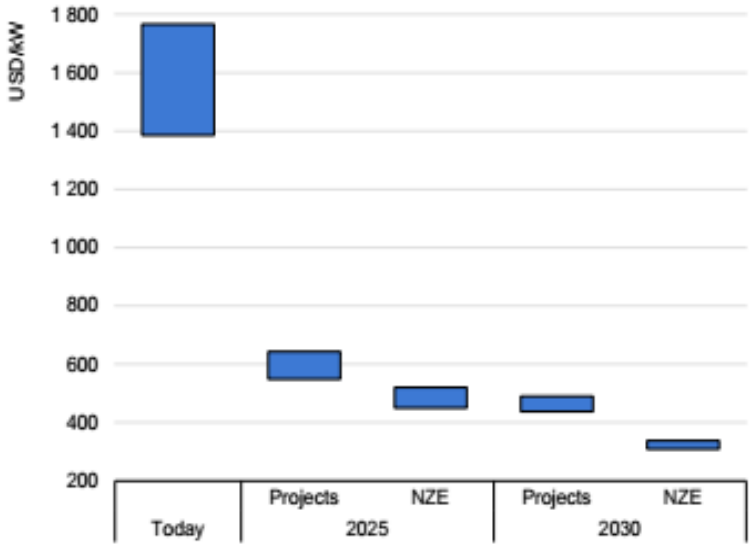
- Electrolysis capacity: increase 520 times to achieve the stated target by 2030!
- Vietnam: 300 Nm^3/h via electrolysis (2022).

Incentivizing demand



- Investment required for using hydrogen as alternative in various sectors;
- Hydrogen cost is higher than fossil fuels.

Driving technological improvements



- Electrolyzer cost to be reduced 80% by 2030;
- New technologies with lower costs (AEM electrolysis)

Building Infrastructure, Advancing End-Use Technology, and Developing Supportive Policies to Unlock the Promise of Clean Hydrogen

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Building infrastructure to develop the value chain of hydrogen at large scale.

- Making uses of existing infrastructure such as natural gas network for hydrogen transportation;
- Investment on new hydrogen infrastructure;
- Establishment of hydrogen clusters/hubs.

Advancing end-use technology to accelerate the hydrogen consumption.

- Pilot/demonstration of technologies to replace fossil fuels by clean hydrogen in various sectors, including refining, fertilizer, power, transportation, steel & cement;
- Development of standards for hydrogen applications;
- Collaboration for R&D, pilot/demonstration projects.

Developing supportive policies to promote hydrogen production and create its demands.

- National master plans & strategy to establish legal framework for hydrogen investment;
- Investment encourage with incentives in RE access, land, taxes,…;
- Subsidies to the value chain of hydrogen;
- Roadmap on hydrogen deployment in various sectors;
- Roadmap on applied environment regulations;
- Carbon pricing to make hydrogen competitive with fossil fuels.

Vietnam's Hydrogen Energy Development Strategy until 2030, with a vision toward 2050 *(Decision 165/QĐ-TTg, issued on 7 February 2024)*

	Period up to 2030	Orientation to 2050
Production  	Deploy application of world-leading technologies of green hydrogen production and (CCS/CCUS) 100 - 500 KTA of hydrogen production capacity	Master world-leading technologies of green hydrogen production and (CCS/CCUS) 10 - 20 MTA of hydrogen production capacity
Domestic Use Ppwer Generation, Industry, Transportation	Gradually develop the hydrogen energy market Pilot application	Form and develop a market for consuming energy derived from hydrogen Strongly promote hydrogen and hydrogen-derived fuel application 10% share of end-use energy consumption
Storage – Transport – Distribution Develop infrastructure in sync with production and use	Research and pilot the use of existing energy infrastructure Pilot specialized facilities for manufacturing equipment Pilot hydrogen energy distribution systems	Develop and complete an infrastructure system Expand and complete distribution systems
Export	Encourage investment in green hydrogen production for export	Export of RE, green hydrogen in the region

Vietnam's Hydrogen Energy Development Strategy until 2030, with a vision toward 2050

(Decision 165/QĐ-TTg, issued on 7 February 2024)

Tasks and Solutions

1. Preferential mechanisms, policies
2. Investment and financial
3. Science and technology
4. Human resource development
5. Environmental protection and sustainable development
6. International cooperation
7. Communication activity

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Thank you