



Consultation Workshop | Hanoi, October 25-26, 2023

FUTURE SCENARIOS AND ORIENTATION FOR THE VIETNAMESE NATIONAL HYDROGEN INDUSTRY

Welcome

Ngo Thuy Quynh

Deputy General Director, Department of Oil, Gas and Coal, MOIT

Introduction

Markus Bissel

Agenda | Wednesday – October 25, 2023

09:00 **Welcome**

Ms. Ngo Thuy Quynh, Deputy General Director, Department of Oil, Gas and Coal, MOIT

09:10 **Introduction**

Mr. Markus Bissel, Project Director, “Promoting the Transition of the Energy Sector in Vietnam” (TEV), GIZ Vietnam

Ms. Mascha Kuzay, Advisor, International PtX Hub, Berlin

09:30 **Topical Introduction:** Towards a Green Hydrogen Strategy for Vietnam

Ms. Dang Thi Thuy Hanh, Vietnam Petroleum Institute (VPI), Hanoi

10:30 **Break**

10:50 **Methodological Introduction | Sectoral PtX Visions 2050**

11:45 **Lunch Break**

13:00 **Nudging the Future:** Envisioning Sectoral H2 Futures

Breakout Groups 1-4

14:30 **Break**

14:45 **Presentation** of Breakout Groups’ findings

16:00 Wrap-up Day 1 | Outlook Day 2

16:15 **Group Picture | End of Day 1**

Agenda | Thursday – October 26, 2023

- 09:00 Welcome and Outlook Day 2 | Recap Day 1 and Open Questions
- 09:30 **Morning Task I:** Explaining the Doom of the Old System
Breakout Groups 1-4
- 10:30 **Break**
- 10:50 **Morning Task II:** Identifying Seeds of the New
Breakout Groups 1-4
- 11:45 **Lunch**
- 13:00 **Afternoon Task:** Defining Pathways into PtX futures
Breakout Groups 1-4
- 14:15 **Break**
- 14:30 **Presentation** of Breakout Groups' Findings, Discussion
- 15:30 Wrap up and Next Steps
- 15:45 **Quiz Winner Ceremony** with Photo Session
- 16:00 End of Workshop

Introduction PtX Hub

Mascha Kuzay

The International PtX Hub



Set-up 2019 at COP 25 in Madrid on the basis of a decision of the German Federal Parliament (Bundestag)

Supported by



Supported by:
Federal Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag



Currently: 40 staff members
active in 13 partner countries and emerging economies

Implemented by



Partnering i.a. with



PtX.Academy 50+ pros and experts form **train-of-trainers network**
800+ alumni successfully achieved **PtX.training certificate**

W H 4700+ women experts in Green Hydrogen fostering expertise among women
• Exchange
• Speakers Database
• Mentoring Program

8 Our partner countries



Updated: Sept 2023

Legal disclaimer: This geographical map is for informational purposes only and does not constitute recognition of international boundaries or regions; GIZ makes no claims concerning the validity, accuracy or completeness of the maps nor assumes any liability resulting from the use of the information therein.

The International Power-to-X Hub is a **knowledge and exchange platform** working on the breakthrough of **sustainable Power-to-X, incl. green hydrogen** around the globe

We work with ministries and governments, industry, NGOs, think tanks and experts



We focus on



International networks & cooperations



Sustainability



Capacity building & knowledge exchange



Ramping up local and global markets for Power-to-X

We offer



[Cutting-edge research and insights on Power-to-X](#)



[A global network of 120 partner countries](#)



[Training workshops on green hydrogen & Power-to-X](#)



[Expertise on the sustainability of green hydrogen & Power-to-X](#)



[Advisory on partnerships and financing for Power-to-X projects](#)

Our floating setup

Vision

A fossil-free global economy by 2050

Foundation for PtX to fully defossilise economies and reach net-zero globally is built.

Outcome / Vision

Outcome

PtX.Policy

The foundation to shape international policy development towards defossilisation has been built.



- **PtX.Sustainability:** Reference framework and metric on PtX sustainability
- **Global hydrogen standard:** supporting global initiatives (G7, GH2, IPHE)
- **PtX.Certification:** informing partner countries and reality check of EU regulations (e.g. briefing & workshops on [REDII](#) and [certification](#))
- **PtX.Invest:** analyse potential financial frameworks / instruments

PtX.Knowledge

An ever-growing number of decision-makers, stakeholders and general public is knowledgeable on PtX's role in defossilisation.



- **PtX.Academy:** [Renewable PtX Basic Training](#), [Train-of-Trainer programme](#), [add-on modules](#) (e.g. certification, PtX project finance, sustainable chemistry, shipping) & [web-based PtX training](#)
- **PtX.Shipping:** [Webinar series](#) on technologies, policies and fossil-free fuels
- **PtX.Aviation:** Joining ICAO's ACT-SAF programme
- **PtX.Ammonia:** Executive summaries on green ammonia
- **PtX.BusinessOpportunityAnalyser:** supporting the development of targeted policies to stimulate investment
- **PtX.Scoping:** Methodology for bottom-up country scoping

PtX.CountryWorks

Partner countries are prepared to initiate PtX strategy building and project development



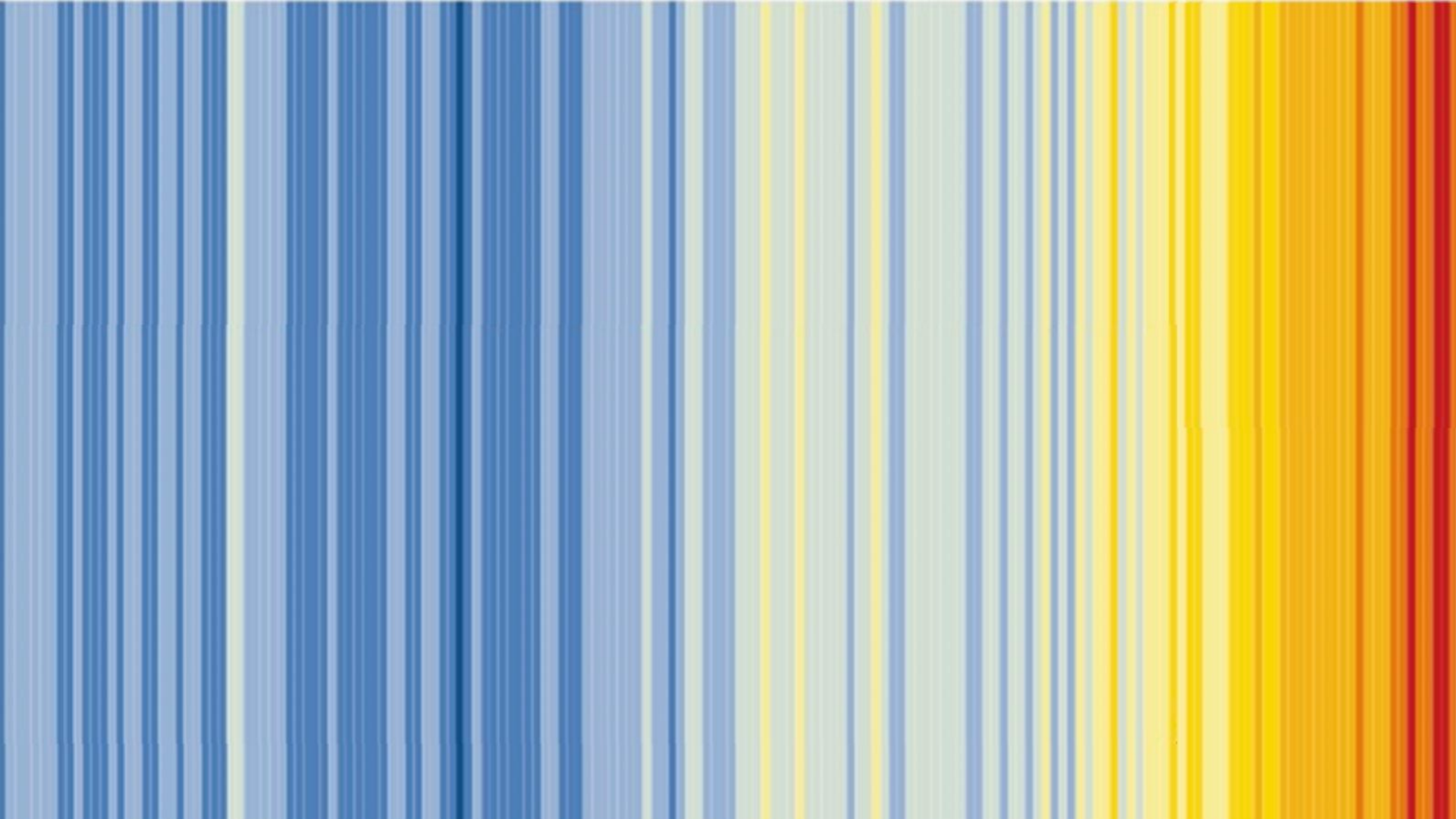
- **Trainings and capacity sharing**
- **Strategy development** and regulatory frameworks
- **Analysis and technical studies** e.g. [PtX skills assessment in Namibia](#), socio-economic analysis, carbon sources)
- Build **local PtX structures** and networks
- **Catalysing cooperations** with the private sector (e.g., [with the chemical sector in Argentina](#))
- **Foster South-South cooperation** (e.g., [between Chile & Uruguay](#))

Outputs

Fields of action

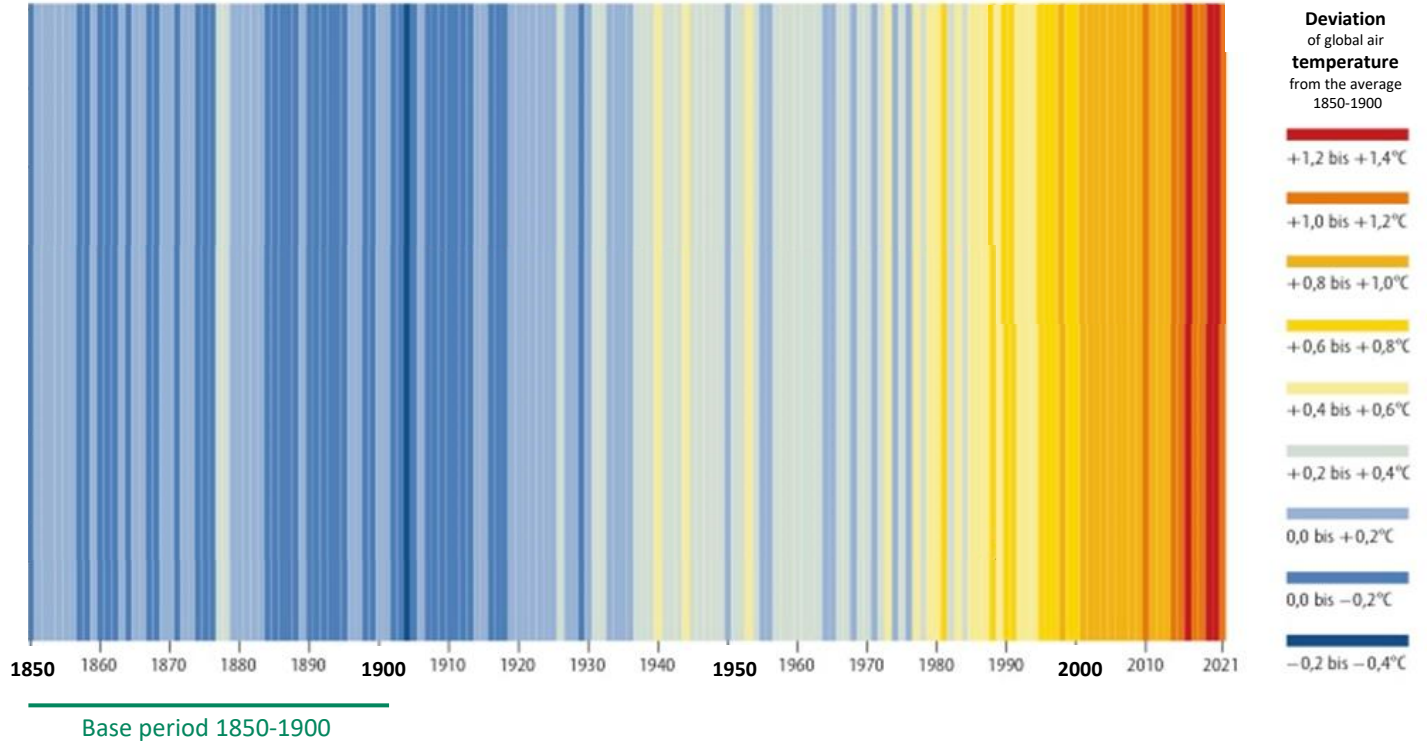
Activities

PtX – Why and How?



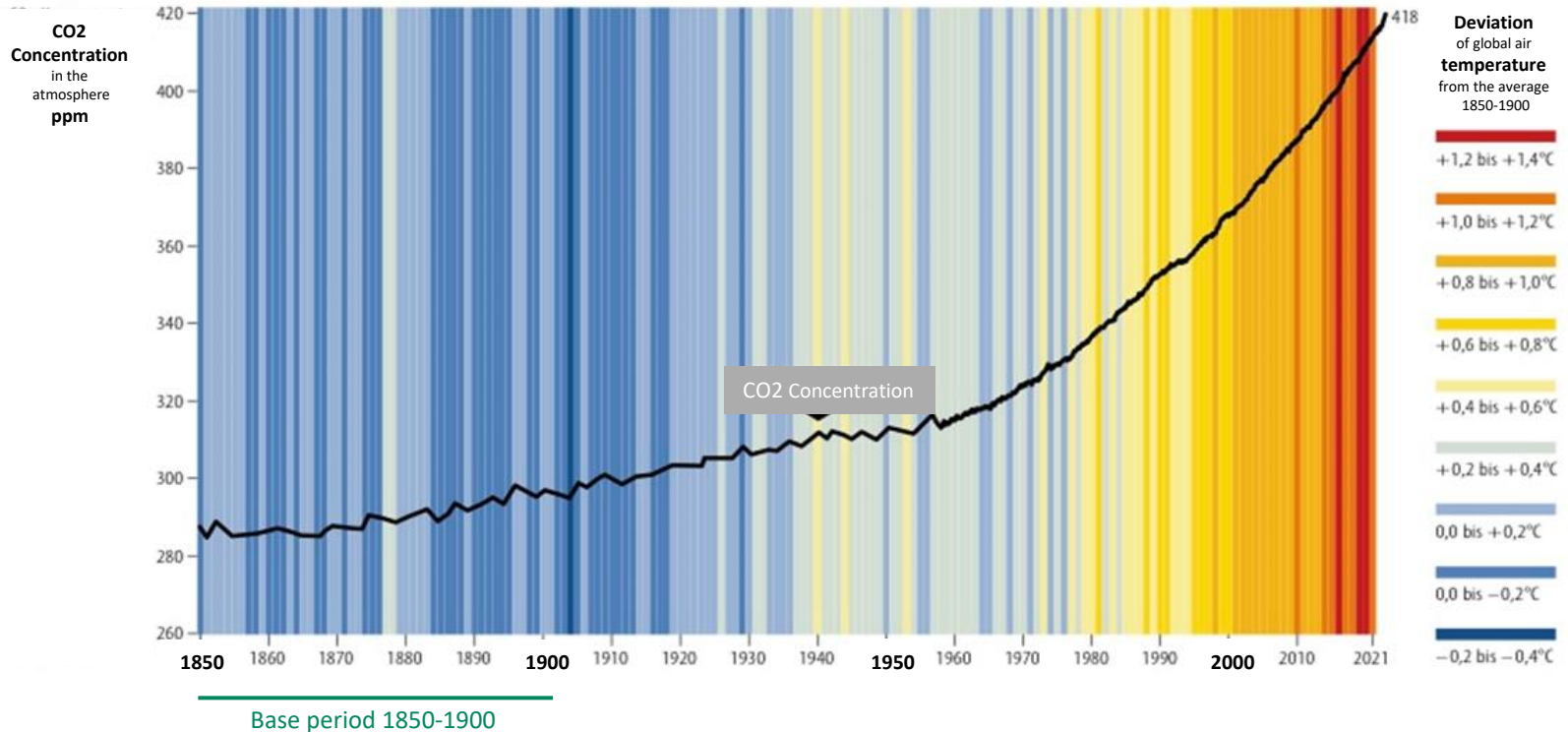
The Climate Challenge

-- *warming and CO2*



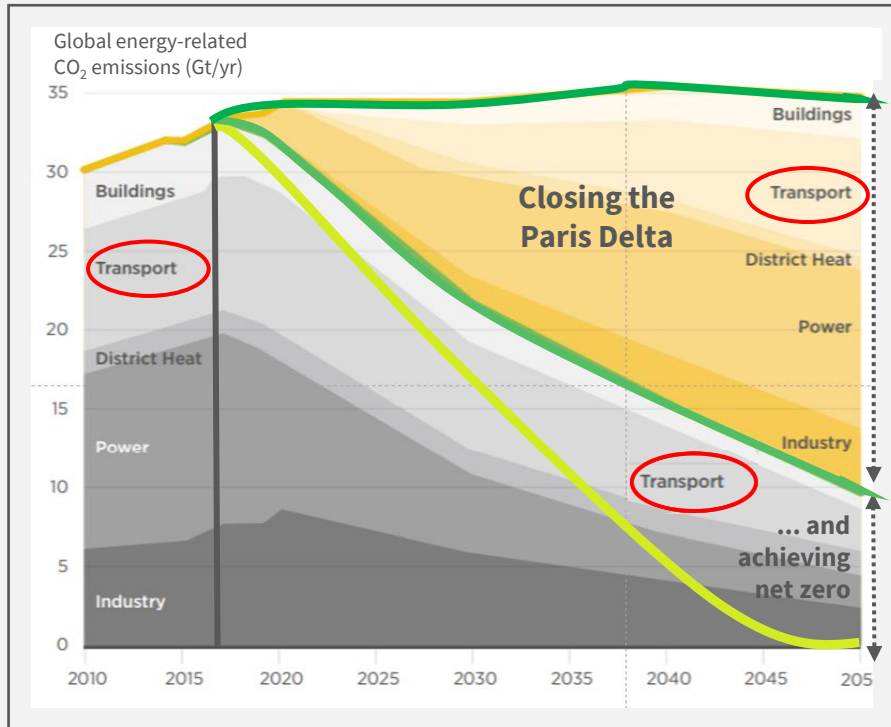
The Climate Challenge

-- global warming and CO2



The Climate Challenge

-- reaching Net-Zero



Energy efficiency
improvement in all sectors



Renewable energy
towards 100 %



Electrification
whenever possible



Green Hydrogen and Power-to-X
for the sectors of industry and transport
that cannot directly electrify

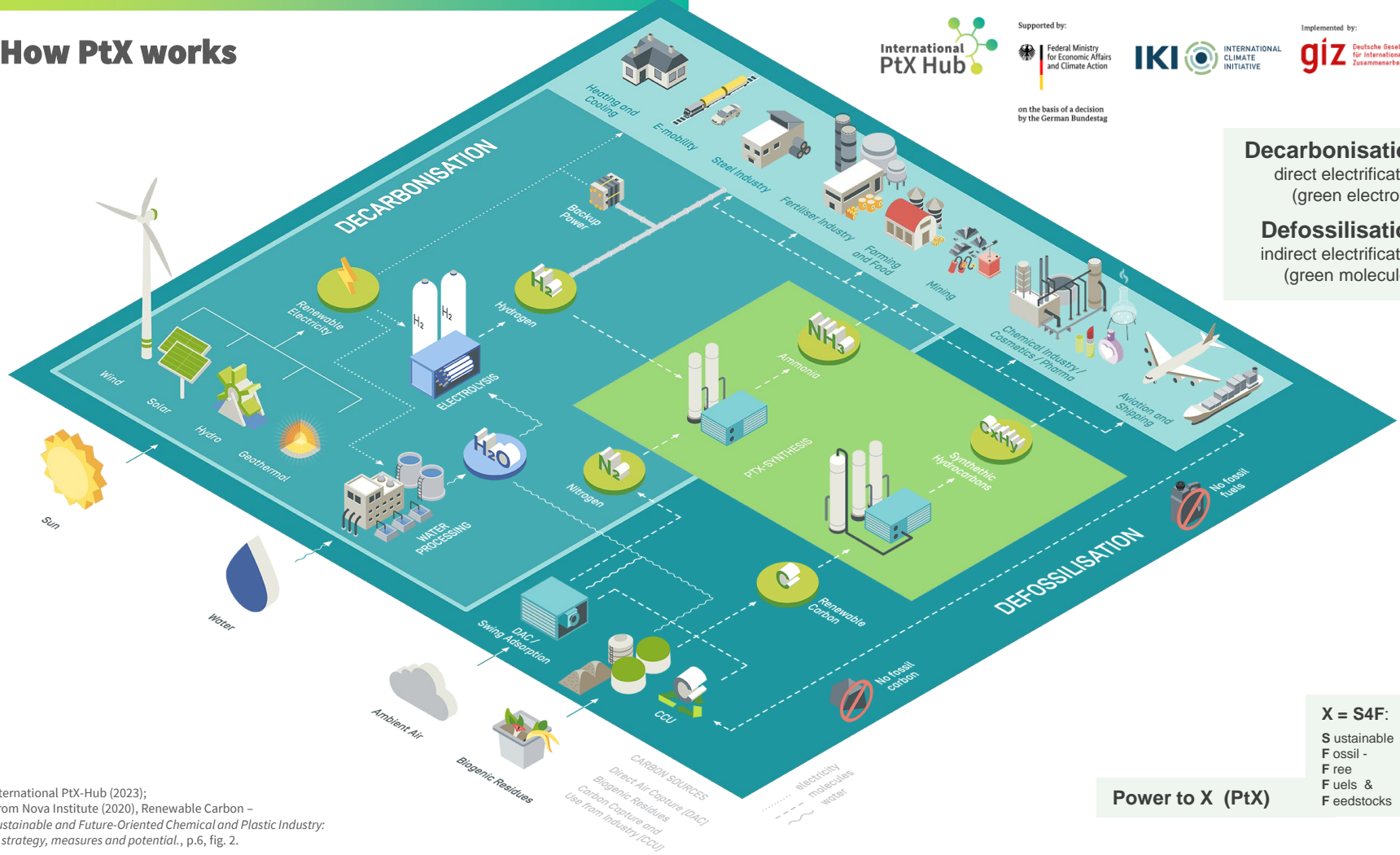
How PtX works



Supported by:
Federal Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag



Implemented by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH



Decarbonisation
direct electrification
(green electrons)

Defossilisation
indirect electrification
(green molecules)

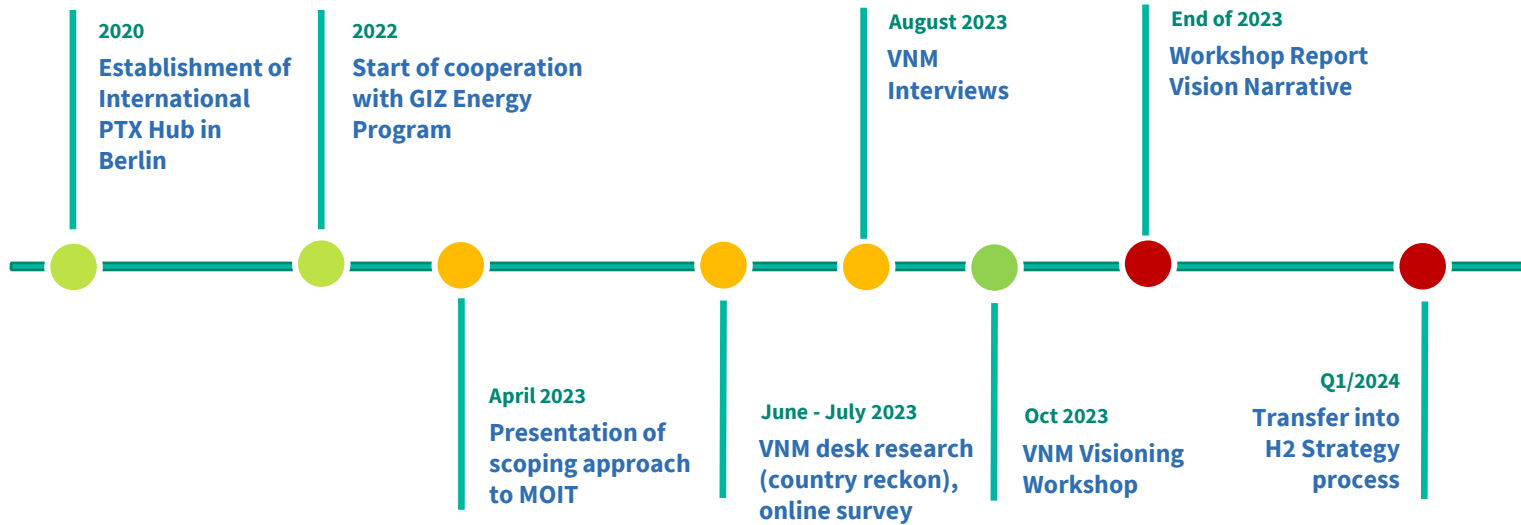
Power to X (PtX)

X = S4F:
S sustainable
Fossil -
Free
Fuels &
Feedstocks

Figure: International PtX-Hub (2023); adapted from Nova Institute (2020), Renewable Carbon – Key to a Sustainable and Future-Oriented Chemical and Plastic Industry: Definition, strategy, measures and potential., p.6, fig. 2.

PtX – Viet Nam Scoping Process

Milestones



Topical Introduction Status Quo of Viet Nam's H2 Strategy

Vietnam Petroleum Institute (VPI), Hanoi

Coffee break (15‘)

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Three Horizon Methodology

Managing transformative change

From Strategic Foresight to Political Planning

- Foresight is **neither prognosis nor prediction**, but thinking in **plausible alternative futures** in a structured way
- **Scenarios are not an end in themselves**: overcoming linear thinking based on current experiences/patterns to understanding emerging change and new patterns
- **Legitimacy base scenarios**: Deep analysis form the foundation of scenarios (trend analysis, scenario workshops)
- **Biggest challenge**: transfer of scenarios into **policy and strategy formulation**

Foresight | Structured Communication on the Future

- Analysis of different qualities of societal change:
- Megatrends are long-lasting patterns that permeate and change all societies equally.
- Drivers of change. While megatrends are long-lived, global, and complex, the scope and impact of "drivers of change" are more limited.
- Emerging trends. Emerging drivers of societal change (Weak Signals) whose impact and scope are not yet fully known.
- Key actors are those with legitimacy, resources, access to networks and partnerships, and the will to advance their interests.
- Elephants in the room are structural barriers to positive change that are known but tacitly accepted.

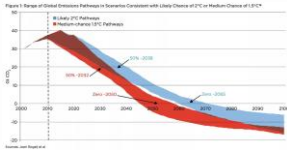
Strategic Foresight | Scenario Methods

Strategic foresight and scenario development is "thinking ahead" (anticipation):

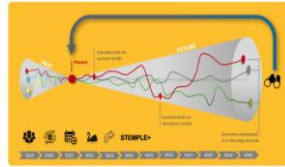
- **Normative scenarios:** What do we want our future to look like?
- **Explorative scenarios:** What is in store for us?
- **What-if scenarios:** Are we prepared for shocks and path changes?
- **System Dynamics Modelling:** Do we grasp interdependencies and feedback loops?

Strategische Vorausschau | Anticipatory Governance

Normative Scenarios Where do we want to go?



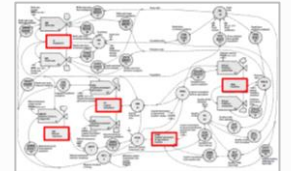
Explorative Scenarios What could happen?



What if-Scenarios Are we prepared?



System Dynamics- Modelling Understanding Interdependencies



Horizon 1



Horizon 2



Horizon 3



Dominant System

Business
as usual

What are the **main features** / characteristics of the current system?

Why do we think that the current system is becoming **dysfunctional**?

Which interventions / innovations could **enhance** transformative change?

Societal
Innovation

Emerging
Future

Which elements of the envisioned PtX Future can already be seen in the here and now? (**Seeds of Change**)

What are the main **features** / characteristics of **PtX futures** / visions?

Which **other actors** have a different vision of the future?

Which features of the current system **should be sustained** in the new system?

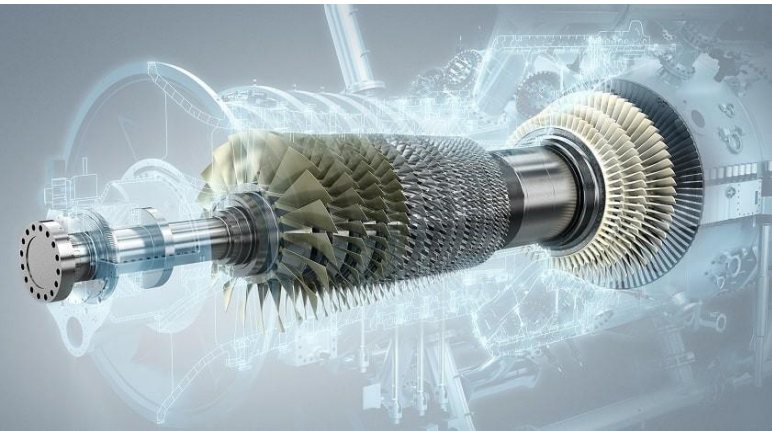
Time

Sectoral Visions 2050

Division of Sectoral Breakout Groups

Electricity Do Thi Lan Anh	Fuels & Transportation Nguyen Duc Minh	Steel Vo Thanh Tung	Chemicals Nguyen Thi Thu Phuong
<p>Pham Thi Thu Ha, EVN</p> <p>Nguyễn Văn Thọ, Insitute of Energy</p> <p>Trần Trung Đức, Dept. of Economy Industry, MPI</p> <p>Dr. Phạm Hoàng Lương, HUST</p> <p>Đình Quang Trí, VINAPITCO</p>	<p>Nguyễn Ngọc Hiếu, Dept. of Oil, Gas and Coal, MOIT</p> <p>Trần Thế Hiền, The Green Solution Group</p> <p>Pham Le Hoang, Vietnam Chemical Agency, MOIT</p> <p>Vũ Thị Thanh, Civil Aviation Authority of Viet Nam, MoT</p> <p>Luu Van Ban, CECO</p>	<p>Vũ Xuân Hoàn, Dept. of Oil, Gas and Coal, MOIT</p> <p>Lê Việt Cường, Insitute of Energy</p> <p>Đặng Thị Thúy Hạnh, Vietnam Petroleum Institute</p> <p>Trần Hoài Phương, Industry Agency, MOIT</p> <p>Vũ Thanh Tùng, Civil Aviation Authority of Viet Nam, MoT</p>	<p>Nguyễn Tuấn Nghĩa, Insitute of Energy</p> <p>Nguyễn Văn Đạt, Vietnam National Chemical Group</p> <p>Nguyễn Văn Kiên, Vietnam Chemical Agency, MOIT</p> <p>Nguyễn Thanh Hằng, Civil Aviation Authority of Viet Nam, MoT</p> <p>Nguyen Thanh Nhan , CECO</p>

Electricity Production 2050



Vision 2050: PtX-based Energy Production

(to be developed by participants)

Key Considerations:

- **Infrastructure Investments:** Prioritizing investments in green hydrogen production facilities, storage, and transportation, alongside efficient electricity transmission lines.
- **Policy Framework:** Establishing supportive policies for green energy producers and exporters, ensuring safety, standardization, and competitiveness.
- **Skill Development:** Creating a skilled workforce through training and education, equipped to manage advanced green hydrogen technologies.
- **Geopolitical Diplomacy:** Engaging in diplomatic efforts to foster trade relationships and navigate geopolitical complexities, ensuring favorable trade agreements.

Trajectory A: The Green Powerhouse Model (GPM)

2025-2030: Vietnam focuses on massive green hydrogen production infrastructures, capitalizing on its abundant renewable resources like wind and solar. Co-fueling technologies are integrated into existing and new power plants.

2030-2040: As domestic demands are met and stabilized, Vietnam eyes the international market, exporting surplus electricity and establishing itself as a power trade hub in Southeast Asia.

2040-2050: With strategic partnerships and international collaborations, Vietnam competes on the global stage, offering competitive electricity rates, thus attracting energy-intensive industries and boosting its economy.

Trajectory B: Sustainable Self-reliance Model (SSM)

2025-2030: Vietnam channels investments to cater to its rapidly growing domestic electricity demand. Green hydrogen production and co-fueling technologies are adopted with an aim to drastically reduce fossil fuel dependency.

2030-2040: While becoming self-reliant, Vietnam also starts small-scale electricity exports to neighboring countries, leveraging its green energy production capabilities.

2040-2050: The country ensures that domestic needs are always prioritized but maintains a modest export portfolio, ensuring energy security and economic stability without aggressive international competition.

Trajectory C: Strategic Partnership Model (SPM)

2025-2030: Vietnam collaborates with advanced economies and global corporations to build state-of-the-art green hydrogen and co-fueling infrastructures, aiming for technology transfer and shared investments.

2030-2040: With advanced technologies and practices in place, Vietnam emerges as a green electricity hotspot. The nation enters into strategic power trade agreements with countries looking for clean energy sources.

2040-2050: Vietnam, with its partners, dominates the green electricity market in the region. It exports not just electricity but also green hydrogen technologies and expertise.

Trajectory D: Diversified Energy Portfolio Model (DEP)

2025-2030: Beyond just focusing on green hydrogen, Vietnam diversifies its renewable portfolio, integrating solar, wind, and hydroelectric power, with green hydrogen and co-fueling acting as supplementary sources.

2030-2040: As a result of this diversification, Vietnam enjoys a robust and resilient energy mix, allowing it to navigate global market fluctuations with ease.

2040-2050: Leveraging its diversified portfolio, Vietnam offers a mix of electricity products in the international market, making it highly competitive as it caters to varying demands of importing countries.

Green Ammonia and Methanol



Vision 2050: PtX-based ammonia and methanol production (to be developed by workshop participants)

Key Considerations:

- **Infrastructure and Investment:** It's vital to ensure a consistent supply of green hydrogen and integrate it effectively into the chemical production process.
- **Policy and Regulations:** Government support in terms of favorable policies, incentives, and a clear regulatory framework will be pivotal.
- **R&D and Collaborations:** Strategic partnerships with academic institutions, global chemical giants, and research bodies can accelerate Vietnam's ambitions.
- **Trade and Diplomacy:** Building strong trade relationships, understanding international market dynamics, and ensuring competitive pricing will be key to success in the export market.

Trajectory A: Domestic Green Chemistry Shift Model (DGCS)

2025-2030: Vietnam focuses its efforts on transitioning its domestic ammonia and methanol production facilities to use green hydrogen. This serves to reduce carbon emissions and meet the growing domestic demand for these chemicals.

2030-2040: Majority of chemical plants have been converted or built to utilize green hydrogen, establishing a sustainable supply chain to serve Vietnam's industrial and agricultural sectors.

2040-2050: Vietnam achieves complete transition in its ammonia and methanol production processes, with high-efficiency green hydrogen-based plants serving the local market.

Trajectory B: Green Export Vanguard Model (GEVM)

2025-2030: Vietnam takes a bold stance to become a major exporter of green ammonia and methanol in the global market. Significant investments are made in establishing state-of-the-art production facilities.

2030-2040: Vietnam starts to dominate certain segments of the international market, exporting to countries keen on sourcing green chemicals.

2040-2050: Leveraging its geographical advantages, competitive production costs, and green credentials, Vietnam emerges as a leading global supplier of green ammonia and methanol.

Trajectory C: Balanced Green Hub Model (BGHM)

2025-2030: A dual-focused approach is adopted, aiming to fulfill domestic demand sustainably while also tapping into the potential of the export market.

2030-2040: As domestic requirements stabilize, the balance shifts slightly in favor of exports, with Vietnam establishing a reputation as a reliable supplier in both regional and global markets.

2040-2050: With a robust infrastructure in place, Vietnam remains flexible, adjusting its production based on domestic industrial growth and global market trends.

Trajectory D: Green Synthesis Innovator Model (GSIM)

2025-2030: Beyond just production, Vietnam also invests in R&D to become a leader in innovative technologies and methods related to green hydrogen-based ammonia and methanol synthesis.

2030-2040: The country becomes a hub for research and patents several breakthrough technologies, drawing global attention and fostering international collaborations.

2040-2050: Vietnam is not only a key producer but also a sought-after partner for technology transfer, consultancy, and setting up green synthesis plants in other parts of the world.

Green Fuels



Vision 2050: PtX-based Fuels Production in Vietnam until 2050

(to be developed by workshop participants)

Key Considerations:

- **Infrastructure Investments:** Building comprehensive infrastructure for green hydrogen production, storage, transportation, and refueling is vital.
- **R&D and Collaboration:** Collaborating with global institutions, corporations, and research bodies to stay at the forefront of hydrogen application technologies.
- **Policy and Incentives:** Formulating policies that incentivize both domestic industries to adopt green hydrogen and foreign partners to engage in trade.
- **Geopolitical & Trade Diplomacy:** Nurturing trade relationships and navigating geopolitical intricacies to ensure favorable trade terms and sustained demand.

Trajectory A: National Green Mobility Model (NGMM)

2025-2030: Prioritizing domestic transformation, Vietnam heavily invests in developing green hydrogen infrastructure for its transportation sector. Hydrogen refueling stations emerge across major cities and highways, focusing initially on buses and trucks.

2030-2040: Mass adoption of hydrogen-powered vehicles begins. Manufacturing and imports of hydrogen cars increase, while research and pilot projects for ships and planes take off.

2040-2050: Vietnam achieves significant hydrogen integration in its transportation sector, with roads, ports, and even airports accommodating hydrogen-powered transport.

Trajectory B: Green Hydrogen Export Powerhouse Model (GHPEP)

2025-2030: Vietnam, leveraging its favorable geographic and resource conditions, focuses on becoming a major producer of green hydrogen for the international market.

2030-2040: Infrastructure for large-scale hydrogen production, storage, and export is established. Vietnam begins exporting hydrogen fuel to neighboring countries, mainly for road transportation needs.

2040-2050: Establishing itself as a leading exporter, Vietnam forges strategic partnerships globally, catering to demand in developed economies and emerging markets alike.

Trajectory C: Balanced Dual-Demand Model (BDDM)

2025-2030: Vietnam balances its efforts between domestic fuel transition and establishing a footing in the global hydrogen fuel market.

2030-2040: Domestic industries, including automotive and shipping, collaborate with the government to innovate and produce vehicles optimized for green hydrogen. Simultaneously, export volumes increase steadily.

2040-2050: While fully serving its domestic needs, Vietnam also ensures consistent growth in its hydrogen export volumes, striking a balance between internal and external demands.

Trajectory D: Technological Leadership & Licensing Model (TLLM)

2025-2030: Vietnam focuses not just on hydrogen production but also on R&D, aiming to lead in technological advancements related to hydrogen fuel applications for transportation.

2030-2040: The country emerges as a hub for innovation in green hydrogen application techniques, leading to the development of advanced vehicles and transportation systems.

2040-2050: Vietnam's strength isn't just in the export of green hydrogen fuel but also in licensing its cutting-edge technologies and solutions, making it a global frontrunner in the hydrogen-powered transportation revolution.

Green Steel



Vision 2050: PtX-based Steel Production in Vietnam until 2050

(to be developed by workshop participants)

Key Considerations:

- **Infrastructure Investments:** Robust infrastructure for green hydrogen production, storage, and transportation, along with integrating these into metal production facilities, will be crucial.
- **R&D and Collaboration:** Investing in research and forming partnerships with global players will aid in keeping Vietnam at the forefront of green metal production technology.
- **Policy Support:** Government policies incentivizing sustainable production, reducing bureaucratic hurdles for exporters, and fostering a conducive environment for **innovation**.
- **Trade Strategies:** Building relationships with countries and industries that prioritize sustainable sourcing, while also ensuring a diversified portfolio of trade partners.

Trajectory A: Domestic Infrastructure Boom Model (DIBM)

2025-2030: Vietnam concentrates on deploying green hydrogen in its steel and aluminum industries to cater to the domestic infrastructure and construction boom. This reduces import dependencies and caters to the rapid urbanization and development needs.

2030-2040: Vietnam achieves self-sufficiency in steel and aluminum production using green hydrogen. The focus remains on local industries, construction projects, and infrastructure development.

2040-2050: The emphasis continues to lie on domestic utilization with only surplus production being considered for exports to neighboring markets.

Trajectory B: Green Metal Export Powerhouse Model (GMEP)

2025-2030: Recognizing the global shift towards sustainable industrial production, Vietnam channels investments to position itself as a major exporter of steel and aluminum produced using green hydrogen.

2030-2040: The country, with its enhanced production capabilities, starts exporting to major markets globally, leveraging its sustainable production methods as a key selling point.

2040-2050: Vietnam becomes a dominant force in the international steel and aluminum market, drawing industries that prioritize green production, thus boosting its economy.

Trajectory C: Balanced Domestic-Export Model (BDEM)

2025-2030: Vietnam equally divides its focus between domestic needs and potential export opportunities, ensuring a steady growth trajectory.

2030-2040: While the domestic market remains a priority, Vietnam aggressively explores and expands to international markets, ensuring a balanced growth in both domestic consumption and exports.

2040-2050: With a robust infrastructure in place, Vietnam dynamically adjusts its production based on global demand and domestic requirements, ensuring economic stability and resilience.

Trajectory D: Technological Pioneer Model (TPM)

2025-2030: Vietnam collaborates with global leaders in technology to pioneer new methods in steel and aluminum production using green hydrogen.

2030-2040: The country becomes an innovation hub, not only producing steel and aluminum but also exporting technology and expertise to other nations seeking to transition to green hydrogen-based production.

2040-2050: Beyond being a production powerhouse, Vietnam positions itself as a global leader in R&D and technological advancements in the sector, driving international standards and practices.

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Lunch break (until 13.00 hrs)

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Nudging the Future: Envisioning Sectoral H2 Futures

Division of Sectoral Breakout Groups

Electricity Do Thi Lan Anh	Fuels & Transportation Nguyen Duc Minh	Steel Vo Thanh Tung	Chemicals Nguyen Thi Thu Phuong
<p>Pham Thi Thu Ha, EVN</p> <p>Nguyễn Văn Thọ, Insitute of Energy</p> <p>Trần Trung Đức, Dept. of Economy Industry, MPI</p> <p>Dr. Phạm Hoàng Lương, HUST</p> <p>Đình Quang Tri, VINAPITCO</p>	<p>Nguyễn Ngọc Hiếu, Dept. of Oil, Gas and Coal, MOIT</p> <p>Trần Thế Hiền, The Green Solution Group</p> <p>Pham Le Hoang, Vietnam Chemical Agency, MOIT</p> <p>Vũ Thị Thanh, Civil Aviation Authority of Viet Nam, MoT</p> <p>Luu Van Ban, CECO</p>	<p>Vũ Xuân Hoàn, Dept. of Oil, Gas and Coal, MOIT</p> <p>Lê Việt Cường, Insitute of Energy</p> <p>Đặng Thị Thúy Hạnh, Vietnam Petroleum Institute</p> <p>Trần Hoài Phương, Industry Agency, MOIT</p> <p>Vũ Thanh Tùng, Civil Aviation Authority of Viet Nam, MoT</p>	<p>Nguyễn Tuấn Nghĩa, Insitute of Energy</p> <p>Nguyễn Văn Đạt, Vietnam National Chemical Group</p> <p>Nguyễn Văn Kiên, Vietnam Chemical Agency, MOIT</p> <p>Nguyễn Thanh Hằng, Civil Aviation Authority of Viet Nam, MoT</p> <p>Nguyen Thanh Nhan , CECO</p>

Your Task | Write an ambitious vision 2050

In sub-groups per 2 or 3: Project yourself into the year 2050

- Based on the four different trajectories: **Define your end goal** within the sector (domestic sufficiency, export and trade technological leadership, regional cooperation and complementarity) – or a combination thereof
- Describe the main **features and characteristics of PtX visions** for each sector
- Make sure you consider **key considerations and key actors** who brought the change about
- Describe **how PtX has cleaned up your sector** and consider **spill-over-effects** into other sectors

Template | Vision 2050 (Horizon 3)

What is the strategic end goal of your sectoral PtX vision 2050?

Vision 2050 title

Key features and characteristics of sectoral PtX vision 2050

Describe how PtX has cleaned up your sector and consider spill-over-effects into other sectors

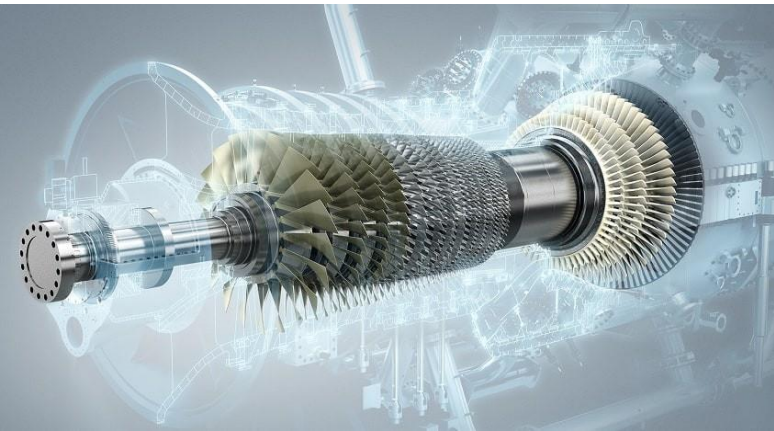
Key success factors & enablers (key considerations)

Key actors (change agents)

Green Electricity

PtX Vision 2050

Electricity Production 2050



Vision 2050: PtX-based Energy Production

(to be developed by participants)

Key Considerations:

- **Infrastructure Investments:** Prioritizing investments in green hydrogen production facilities, storage, and transportation, alongside efficient electricity transmission lines.
- **Policy Framework:** Establishing supportive policies for green energy producers and exporters, ensuring safety, standardization, and competitiveness.
- **Skill Development:** Creating a skilled workforce through training and education, equipped to manage advanced green hydrogen technologies.
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2030-2040: As a result of this diversification, Vietnam enjoys a robust and resilient energy mix, allowing it to navigate global market fluctuations with ease.

2040-2050: Leveraging its diversified portfolio, Vietnam offers a mix of electricity products in the international market, making it highly competitive as it caters to varying demands of importing countries.

Critical Thinking | Why is the current pathway no longer sustainable?

- **Coal-fired power plants** have been the dominant mode of energy production in Vietnam. The country has experienced rapid economic growth and urbanization, leading to significant increases in energy demand. To meet this demand, Vietnam has turned to its abundant coal reserves and has been building and commissioning coal-fired power plants, especially in the 2010s.
- **Hydropower:** Traditionally, hydropower was the major source of electricity generation in Vietnam. While it still contributes a substantial share, its proportion has been declining relative to coal.
- **Renewable Energy Push:** Vietnam has seen a surge in solar power investments in recent years, particularly after attractive feed-in tariffs were introduced for solar energy. The country has witnessed rapid installation of solar projects, making it one of the fastest-growing solar markets in the region.
- **Natural Gas:** Vietnam is also looking to increase its natural gas capacity, partly to diversify its energy sources and to use cleaner fuels. There are plans to develop gas-fired power plants and import liquefied natural gas (LNG). Most likely, natural gas deposits will be exhausted by 2030.
- **Energy Strategy:** Vietnam's government has been considering its future energy strategy, balancing between the immediate affordability and availability of coal and the longer-term environmental implications. Future strategies may prioritize reducing coal dependency and increasing the share of renewables and gas.
- **International Influence:** Due to concerns about climate change and international pressures, Vietnam may also seek to adapt its energy mix in the coming years. International partnerships, agreements, and funding might influence the direction of the country's energy policy.
- **Energy Efficiency:** The country is also working on improving energy efficiency in various sectors, reducing the overall energy demand growth..

Key Drivers of Change | Global, Regional, Domestic, Sectoral

Global Trends:

- **Decarbonization Efforts:** The global shift away from carbon-intensive energy sources will influence Vietnam's choices in electricity production.
- **Technological Advancements:** Innovations in energy storage, smart grids, and renewable energy technologies can reshape the energy landscape.
- **Energy Price Fluctuations:** Global trends in energy commodity prices, especially coal, oil, and gas, can influence Vietnam's energy choices.
- **Investment Dynamics:** Global investment trends, especially the shift from coal and other fossil fuels towards renewables, might impact funding availability for different energy projects.
- **Climate Agreements:** International commitments, like the Paris Agreement, place pressure on countries to adopt cleaner energy sources.

Regional Trends:

- **Regional Energy Trade:** There's potential for increased energy trade within the ASEAN region, affecting Vietnam's electricity production and consumption dynamics.
- **South China Sea Disputes:** Territorial issues can impact offshore oil and gas exploration, which in turn can influence energy security and electricity production dynamics.
- **Neighboring Countries' Energy Decisions:** The energy choices of nearby countries, especially large ones like China and India, can influence regional energy markets and trends.

Domestic Trends:

- **Economic Growth:** As Vietnam's economy grows, its electricity demand will also rise, influencing production decisions.
- **Domestic Energy Resources:** The availability and exploration of domestic energy resources, such as coal, hydro, and offshore gas, will shape the energy mix.
- **Infrastructure Development:** Investments in transmission lines, grid upgrades, and energy storage will determine the feasibility and integration of various energy sources.
- **Policy and Regulatory Framework:** Vietnamese government's decisions, incentives, and regulations can either promote or hinder specific energy sources.
- Vietnam approved national system for greenhouse gas inventory for designated energy users.
- **Public Sentiment:** As seen in the past, public opposition or support can influence energy projects, especially in the context of environmental impacts.

Sectoral Trends:

- **Industrial Growth and Decentralization:** The growth of industries and their locations can influence electricity demand patterns. Decentralized industries might require grid expansion or promote off-grid solutions.
- **Agricultural Energy Needs:** Advanced agricultural practices might require more energy, influencing electricity demand.
- **Urbanization:** Rapid urban growth can lead to higher energy consumption, influencing electricity production decisions.
- **Electrification of Transport:** If Vietnam moves towards electric vehicles; this would increase electricity demand.
- **Digitalization:** As Vietnam becomes more digitally advanced, data centers and digital infrastructures will require reliable electricity sources.
- **Building and Construction:** Modern buildings might incorporate smart grids, renewable energy, and energy efficiency measures, influencing overall electricity demand patterns.

Driving Actors | Domestic, Veto Players, Regional Global

Main Domestic Actors / Key Stakeholders

- **Vietnamese Government:** Central to the transition, its ministries like the Ministry of Industry and Trade (MOIT) and Ministry of Natural Resources and Environment (MONRE) set out and implement policies on energy, climate change, and environmental sustainability.
- **Vietnam Electricity (EVN):** As the national power utility, EVN's role in developing, managing, and distributing power is crucial. It is directly affected by energy policies and has a significant role in implementing **them**.
- **Private Sector Companies:** Domestic corporations, invest in and develop green energy projects, playing an increasing role in the country's energy landscape.
- **Local Communities:** Especially important in areas proposed for energy projects, their support or opposition can determine the fate of specific initiatives.
- **Local and Provincial Governments:** These entities often have a say in approving or rejecting infrastructure projects and can have different priorities from the national government.
- **Research and Academic Institutions:** They provide data, studies, and innovation, informing both policy and implementation strategies.
- **Civil Society and NGOs:** These groups, from grassroots organizations to more established entities, advocate for environmental and social concerns related to energy projects.

Potential Veto Players:

- **Certain Factions within EVN:** Historically invested in conventional power sources, parts of EVN might resist rapid changes or transitions that threaten their established assets and infrastructure.
- **Landowners and Affected Communities:** Resistance from those directly impacted by green energy projects, especially if they perceive negative consequences, can slow down or halt projects.

Regional and Global Actors:

- **ASEAN:** As a member of ASEAN, Vietnam participates in regional energy dialogues and initiatives. The organization's policies and frameworks can influence Vietnam's green transition.
- **China:** As a major regional power and Vietnam's neighbor, China's investments, especially through the Belt and Road Initiative, can shape Vietnam's energy infrastructure.
- **International Financial Institutions:** The World Bank, Asian Development Bank, and others can influence Vietnam's energy policies through funding, projects, and technical assistance.
- **Multinational Corporations:** Companies like Siemens, GE, and Vestas, which provide technology and expertise in renewable energy, play a role in Vietnam's energy landscape.
- **Transcontinental cooperation:** Glasgow Financial Alliance for Net Zero (GFANZ) in the framework of Just Energy Transition Partnership (JETP)
- **International NGOs and Environmental Groups:** They can exert pressure, provide expertise, and influence public opinion on green energy issues.
- **Bilateral Partners:** Countries with strong ties to Vietnam, such as Japan, South Korea, Germany, or Australia, can influence Vietnam's green transition through trade agreements, direct investment, or technical cooperation.

Template | Vision 2050 (Horizon 3)

What is the strategic end goal of your sectoral PtX vision 2050?

Vision 2050 title

Key features and characteristics of sectoral PtX vision 2050

Describe how PtX has cleaned up your sector and consider spill-over-effects into other sectors

Key success factors & enablers (key considerations)

Key actors (change agents)

Green Ammonia & Methanol

PtX Vision 2050

Green Ammonia and Methanol



Vision 2050: PtX-based ammonia and methanol production (to be developed by workshop participants)

Key Considerations:

- **Infrastructure and Investment:** It's vital to ensure a consistent supply of green hydrogen and integrate it effectively into the chemical production process.
- **Policy and Regulations:** Government support in terms of favorable policies, incentives, and a clear regulatory framework will be pivotal.
- **R&D and Collaborations:** Strategic partnerships with academic institutions, global chemical giants, and research bodies can accelerate Vietnam's ambitions.
- **Trade and Diplomacy:** Building strong trade relationships, understanding international market dynamics, and ensuring competitive pricing will be key to success in the export market.

Trajectory A: Domestic Green Chemistry Shift Model (DGCS)

2025-2030: Vietnam focuses its efforts on transitioning its domestic ammonia and methanol production facilities to use green hydrogen. This serves to reduce carbon emissions and meet the growing domestic demand for these chemicals.

2030-2040: Majority of chemical plants have been converted or built to utilize green hydrogen, establishing a sustainable supply chain to serve Vietnam's industrial and agricultural sectors.

2040-2050: Vietnam achieves complete transition in its ammonia and methanol production processes, with high-efficiency green hydrogen-based plants serving the local market.

Trajectory B: Green Export Vanguard Model (GEVM)

2025-2030: Vietnam takes a bold stance to become a major exporter of green ammonia and methanol in the global market. Significant investments are made in establishing state-of-the-art production facilities.

2030-2040: Vietnam starts to dominate certain segments of the international market, exporting to countries keen on sourcing green chemicals.

2040-2050: Leveraging its geographical advantages, competitive production costs, and green credentials, Vietnam emerges as a leading global supplier of green ammonia and methanol.

Trajectory C: Balanced Green Hub Model (BGHM)

2025-2030: A dual-focused approach is adopted, aiming to fulfill domestic demand sustainably while also tapping into the potential of the export market.

2030-2040: As domestic requirements stabilize, the balance shifts slightly in favor of exports, with Vietnam establishing a reputation as a reliable supplier in both regional and global markets.

2040-2050: With a robust infrastructure in place, Vietnam remains flexible, adjusting its production based on domestic industrial growth and global market trends.

Trajectory D: Green Synthesis Innovator Model (GSIM)

2025-2030: Beyond just production, Vietnam also invests in R&D to become a leader in innovative technologies and methods related to green hydrogen-based ammonia and methanol synthesis.

2030-2040: The country becomes a hub for research and patents several breakthrough technologies, drawing global attention and fostering international collaborations.

2040-2050: Vietnam is not only a key producer but also a sought-after partner for technology transfer, consultancy, and setting up green synthesis plants in other parts of the world.

Critical Thinking | Why is the current pathway no longer sustainable?

- **Carbon Emissions:** Traditional production of ammonia and methanol predominantly relies on natural gas as a feedstock, leading to significant CO2 emissions. As the world shifts toward decarbonization, industries with high greenhouse gas footprints are under increasing pressure.
- **Dependency on Imports:** Vietnam, like many other countries, depends on importing significant quantities of natural gas. This dependence can expose the country to global price volatility, geopolitical tensions, and supply chain disruptions.
- **Resource Depletion:** Continued extraction of finite fossil fuels, like natural gas, is not sustainable in the long run. Over-reliance on these resources without diversifying can pose economic and energy security risks.
- **Environmental Impacts:** Beyond carbon emissions, the extraction, transportation, and use of fossil fuels can lead to other environmental issues like oil spills, habitat disruption, and water pollution.
- **Economic Vulnerability:** Being heavily reliant on global markets for feedstocks or for selling the final product can expose Vietnam's ammonia and methanol industries to global economic fluctuations.
- **Water Intensiveness:** The traditional methods, especially for ammonia production, require substantial amounts of water, leading to potential stress on local water resources.
- **Health Concerns:** Emissions from these industries can contribute to air pollution, which is linked to a range of health problems, from respiratory issues to more chronic conditions.
- **Regulatory Pressures:** As Vietnam moves to fulfill its international environmental commitments and local sustainability goals, stricter regulations could be imposed on polluting industries, requiring significant changes or upgrades for compliance.
- **Evolving Global Standards:** The international community's push for greener ammonia, especially for uses like hydrogen production or direct application in agriculture, means that traditional production methods might become less market-competitive over time.
- **Local and Global Demand:** As the world transitions to cleaner energy and product sources, demand patterns for traditionally produced ammonia and methanol might shift. Countries or industries prioritizing green products might look elsewhere if Vietnam doesn't adapt.

Key Drivers of Change | Global, Regional, Domestic, Sectoral

Global Trends:

- **Energy Transition:** The move towards greener energy sources impacts the feedstocks and processes for ammonia and methanol production.
- **Green Ammonia and Methanol:** Emphasis on producing ammonia and methanol from renewable energy sources (like wind and solar) and water through electrolysis is increasing.
- **Climate Agreements:** Commitments under global climate agreements may require the reduction of greenhouse gas emissions from ammonia and methanol production.
- **Technological Advancements:** Innovations may provide more efficient and cleaner methods of production.
- **Global Demand Patterns:** As methanol becomes an important feedstock for other chemicals and as an energy carrier, its global demand patterns can influence its production.

Regional Trends:

- **Regional Trade Dynamics:** ASEAN and Asia-Pacific collaborations can influence trade agreements, tariffs, and standards related to chemicals.
- **Feedstock Availability:** Regional availability of natural gas, a common feedstock for both ammonia and methanol, will impact production dynamics.
- **Regional Competitors:** The decisions of major producers in nearby countries can shape the market for ammonia and methanol.

Domestic Trends:

- **Economic Growth and Industrialization:** A growing economy may demand more ammonia (for agriculture) and methanol (for industrial uses).
- **Domestic Policies:** Government policies related to industry, agriculture, and environmental standards will impact production.
- **Infrastructure Development:** Infrastructure in terms of ports, transportation, and storage can influence production and export capacities.
- **Local Feedstock Sources:** Exploration and development of domestic natural gas reserves or alternative feedstocks will directly impact production.

Sectoral Trends:

- **Agriculture:** Ammonia is a key component for urea-based fertilizers. The agricultural sector's growth, policies, and practices will influence ammonia demand.
- **Transportation:** Methanol's potential as an alternative fuel for vehicles or in fuel blending can shape its demand.
- **Energy Sector:** Methanol and ammonia's role as energy carriers or for energy storage can influence their production.
- **Chemical Industry:** Methanol is a feedstock for many chemicals. The growth and direction of the chemical industry in Vietnam will impact methanol production.
- **Emerging Technologies:** The potential of ammonia as a hydrogen carrier for fuel cells or other new technologies can affect its production dynamics.

Driving Actors | Domestic, Veto Players, Regional Global

Domestic Actors / Key Stakeholders:

- **Government Ministries & Departments:** Ministries such as the Ministry of Industry and Trade (MOIT) and the Ministry of Natural Resources and Environment (MONRE) would be key in setting regulations, providing incentives, and facilitating the transition to green hydrogen.
- **Local Producers:** Existing ammonia and methanol producers in Vietnam, who would need to adopt or integrate green hydrogen technologies.
- **Research Institutions:** Universities and dedicated research institutions focused on chemical production technologies and innovations.
- **Private Sector and Industrial Groups:** Organizations representing the interests of large-scale industrial consumers of ammonia and methanol, such as the petrochemical sector and agribusinesses.
- **Financial Institutions:** Local banks, credit unions, other financial entities that would facilitate loans, investments, or funding for transitioning to green tech.
- **Workers' Unions:** Representing the interests of workers in the chemical production industry.
- **Local Communities:** Especially those living in proximity to production facilities, they would be concerned about job opportunities, environmental safety, and infrastructural developments.
- **Environmental NGOs:** Groups emphasizing sustainable production, minimizing environmental footprints, and advocating for green transitions.

Potential Veto Players:

- **Legacy Chemical Producers:** Producers heavily invested in traditional production methods might resist the transition to green hydrogen due to the potential cost implications.
- **Certain Political Factions:** Groups within the government or opposition that might oppose extensive investments in green technology for economic, ideological, or other reasons.

Regional and Global Actors:

- **ASEAN Member States:** Given the integrated nature of Southeast Asian economies, ASEAN countries can be potential markets, competitors, or collaborators.
- **China:** China's stance on green chemicals and its own production capabilities will impact Vietnam's strategies.
- **Multinational Chemical Corporations:** Giants like BASF, Dow, or SABIC might have interests in setting up green ammonia or methanol production bases in Vietnam, or they might offer technological partnerships.
- **International Financial Institutions:** Entities like the World Bank, Asian Development Bank, or private equity funds focused on green investments can be significant sources of funding and expertise.
- **Global Environmental Bodies:** Organizations like the UN Environment Programme (UNEP) or the International Renewable Energy Agency (IRENA) can offer guidance, set standards, and provide platforms for international collaborations.
- **Major Importing Nations:** Countries, especially in Europe, with strict environmental standards that prioritize green imports will be critical players in Vietnam's export strategy.

Template | Vision 2050 (Horizon 3)

What is the strategic end goal of your sectoral PtX vision 2050?

Vision 2050 title

Key features and characteristics of sectoral PtX vision 2050

Describe how PtX has cleaned up your sector and consider spill-over-effects into other sectors

Key success factors & enablers (key considerations)

Key actors (change agents)

Green Fuels

PtX Vision 2050

Green Fuels



Vision 2050: PtX-based Fuels Production in Vietnam until 2050

(to be developed by workshop participants)

Key Considerations:

- **Infrastructure Investments:** Building comprehensive infrastructure for green hydrogen production, storage, transportation, and refueling is vital.
- **R&D and Collaboration:** Collaborating with global institutions, corporations, and research bodies to stay at the forefront of hydrogen application technologies.
- **Policy and Incentives:** Formulating policies that incentivize both domestic industries to adopt green hydrogen and foreign partners to engage in trade.
- **Geopolitical & Trade Diplomacy:** Nurturing trade relationships and navigating geopolitical intricacies to ensure favorable trade terms and sustained demand.

Trajectory A: National Green Mobility Model (NGMM)

2025-2030: Prioritizing domestic transformation, Vietnam heavily invests in developing green hydrogen infrastructure for its transportation sector. Hydrogen refueling stations emerge across major cities and highways, focusing initially on buses and trucks.

2030-2040: Mass adoption of hydrogen-powered vehicles begins. Manufacturing and imports of hydrogen cars increase, while research and pilot projects for ships and planes take off.

2040-2050: Vietnam achieves significant hydrogen integration in its transportation sector, with roads, ports, and even airports accommodating hydrogen-powered transport.

Trajectory B: Green Hydrogen Export Powerhouse Model (GHEP)

2025-2030: Vietnam, leveraging its favorable geographic and resource conditions, focuses on becoming a major producer of green hydrogen for the international market.

2030-2040: Infrastructure for large-scale hydrogen production, storage, and export is established. Vietnam begins exporting hydrogen fuel to neighboring countries, mainly for road transportation needs.

2040-2050: Establishing itself as a leading exporter, Vietnam forges strategic partnerships globally, catering to demand in developed economies and emerging markets alike.

Trajectory C: Balanced Dual-Demand Model (BDDM)

2025-2030: Vietnam balances its efforts between domestic fuel transition and establishing a footing in the global hydrogen fuel market.

2030-2040: Domestic industries, including automotive and shipping, collaborate with the government to innovate and produce vehicles optimized for green hydrogen. Simultaneously, export volumes increase steadily.

2040-2050: While fully serving its domestic needs, Vietnam also ensures consistent growth in its hydrogen export volumes, striking a balance between internal and external demands.

Trajectory D: Technological Leadership & Licensing Model (TLLM)

2025-2030: Vietnam focuses not just on hydrogen production but also on R&D, aiming to lead in technological advancements related to hydrogen fuel applications for transportation.

2030-2040: The country emerges as a hub for innovation in green hydrogen application techniques, leading to the development of advanced vehicles and transportation systems.

2040-2050: Vietnam's strength isn't just in the export of green hydrogen fuel but also in licensing its cutting-edge technologies and solutions, making it a global frontrunner in the hydrogen-powered transportation revolution.

Critical Thinking | Why is the current pathway no longer sustainable?

- **Limited Domestic Reserves:** Vietnam's domestic crude oil reserves are limited. As the reserves deplete, the country becomes more dependent on imports, making it susceptible to global oil price fluctuations.
- **Environmental Impact:** Oil extraction and refining have significant environmental footprints. The processes can result in the release of greenhouse gases and other pollutants, contributing to global warming and local pollution.
- **Local Pollution:** The refining process releases pollutants like sulphur dioxide, nitrogen oxides, and volatile organic compounds. When burned in vehicles, petrol also releases pollutants that contribute to smog, respiratory problems, and other health issues.
- **Climate Change Concerns:** Vietnam is among the countries most vulnerable to climate change, with a long coastline susceptible to rising sea levels and frequent typhoons. Continued reliance on and promotion of fossil fuels exacerbates the climate challenges the country faces.
- **Economic Instability:** Heavy dependence on oil imports for energy needs can expose the country to economic instability due to volatile global oil prices. This volatility can lead to unpredictable energy costs for consumers and businesses.
- **Potential for Spills:** Oil exploration, extraction, and transportation come with the risk of spills, which can have catastrophic environmental and economic consequences, as they impact marine ecosystems, fisheries, and tourism.
- **Resource Depletion:** Fossil fuels, including crude oil, are finite resources. Over-reliance on these resources without diversification can pose long-term economic risks as these resources become scarcer and more expensive.
- **Global Shifts:** The global trend is moving towards cleaner energy and reduced reliance on fossil fuels. This trend might lead to regulatory pressures, decreased demand for fossil fuel-based products, and potential reputational risks for countries and companies heavily invested in traditional oil production.
- **Water Consumption and Pollution:** Oil extraction and refining can be water-intensive processes and can lead to water pollution if not managed properly. Given Vietnam's challenges with water management and periodic droughts, this adds another layer of complexity.
- **Socio-economic Impacts:** Oil exploration and extraction can sometimes lead to the displacement of local communities, land disputes, and other socio-economic challenges.
- **Stranded Assets:** As the global energy market shifts towards renewables and cleaner technologies, investments in traditional oil infrastructure risk becoming obsolete or "stranded," resulting in potential economic losses.

Key Drivers of Change | Global, Regional, Domestic, Sectoral

Global Trends:

- **Energy Transition:** The worldwide shift away from fossil fuels to renewable energy sources impacts the demand for liquid fuels.
- **Climate Agreements:** International agreements like the Paris Agreement can impose carbon emission targets, affecting fossil fuel usage.
- **Technological Advancements:** Developments in alternative energy, battery technology, and fuel efficiency can reduce global demand for petrol and other liquid fuels.
- **Rise of Electric Vehicles (EVs):** Global adoption rates of EVs can significantly reduce the demand for petrol.
- **Oil Price Volatility:** Geopolitical tensions, OPEC decisions, and global supply-demand balances will influence oil prices.

Regional Trends:

- **Regional Energy Integration:** Cooperation within the ASEAN region and broader Asia-Pacific can influence energy policies and trade dynamics.
- **China's Energy Decisions:** Being a dominant player in the region, China's energy choices can have ripple effects on neighboring countries' energy sectors.
- **South China Sea Disputes:** Territorial conflicts can impact oil exploration and production activities.
- **Infrastructure Connectivity:** Regional infrastructure projects such as pipelines and roads can influence the transportation and supply of liquid fuels.

Domestic Trends:

- **Economic Growth:** A growing economy will demand more energy, including liquid fuels, especially if industrialization and urbanization continue at a rapid pace.
- **Government Policies:** Vietnam's energy policies, environmental regulations, and investment incentives will shape the country's energy landscape.
- **Infrastructure Development:** Expansions in transport infrastructure, refineries, and storage facilities will directly impact liquid fuel production and distribution.
- **Local Exploration Activities:** Discoveries or depletion of domestic oil and gas reserves can influence the production of liquid fuels.
- **Domestic Consumer Preferences:** A shift in consumer behavior towards green transportation options can affect petrol demand.

Sectoral Trends:

- **Transportation:** Expansion in road networks, vehicle ownership trends, and public transportation initiatives will play a major role in determining petrol and diesel demand.
- **Agriculture:** Mechanization trends and the type of machinery used in agriculture will influence diesel demand.
- **Aviation:** Growth in the aviation sector can increase the demand for aviation fuels.
- **Maritime:** The choice of fuels in the shipping industry, with potential shifts towards cleaner options, can impact demand for traditional marine fuels.
- **Industry:** Energy-intensive industries' expansion or modernization can drive demand for various liquid fuels, depending on the technologies adopted.

Driving Actors | Domestic, Veto Players, Regional Global

Main Domestic Actors / Key Stakeholders:

- **Vietnamese Government:** Key ministries, especially the Ministry of Industry and Trade (MOIT) and the Ministry of Transport, will play pivotal roles in policy formulation, regulation, and support for green fuels.
- **PetroVietnam:** As the national oil and gas company, it would have significant influence in the direction and adoption of green fuels in Vietnam.
- **Vietnam National Petroleum Group (Petrolimex):** As a major distributor of petroleum products in Vietnam, its role in the distribution and adoption of green fuels is significant.
- **Domestic Automotive, Shipping, and Aviation Industries:** These industries are primary consumers of fuels, and their willingness to adapt to green fuels is crucial for the transition.
- **Research and Development Institutions:** These entities are essential for driving innovation in green fuel technologies and their adaptation to the Vietnamese context.
- **Local Environmental and Energy NGOs:** These groups can advocate for cleaner energy sources, raising public awareness and pushing for regulatory change.
- **Transport Associations:** Organizations representing the interests of drivers, shippers, and airlines can influence the adoption rate and set industry standards related to green fuels.
- **Consumers:** The Vietnamese public, as consumers of transportation services, will play a role in driving demand for cleaner transportation options.

Potential Veto Players:

- **Traditional Fuel Lobby:** Companies and groups heavily invested in conventional fuels might resist transitions that could disrupt their business models.
- **Some Transportation Sectors:** If green fuels are perceived as less efficient, more expensive, or less available, certain transport sectors (like long-haul trucking or certain airlines) might be hesitant to adopt them.

Regional and Global Actors:

- **ASEAN:** Given the interconnected transportation and energy markets, ASEAN can influence VN's green fuel policies through regional initiatives and agreements.
- **China:** As a dominant regional player with significant influence in the global energy market, China's policies, investments, and technological innovations in green fuels can have implications for Vietnam.
- **International Financial Institutions:** The World Bank, ADB, and others can provide funding and technical expertise for green fuel initiatives.
- **Global Energy and Transportation Corporations:** Companies like Tesla (electric vehicles), Shell (biofuels and hydrogen), and Airbus (green aviation initiatives) can influence Vietnam's transition through investments, partnerships, and technology transfers.
- **International Environmental NGOs and Consortia:** Organizations such as the International Renewable Energy Agency (IRENA) can offer expertise, lobby for sustainable practices, and provide platforms for international cooperation.
- **Bilateral Partners and Trade Blocs:** Countries and groups with strong ties to Vietnam, such as Japan, South Korea, the European Union, or the U.S., can influence the green fuel transition through trade agreements, direct investments, joint research, and technology cooperation.

Template | Vision 2050 (Horizon 3)

What is the strategic end goal of your sectoral PtX vision 2050?

Vision 2050 title

Key features and characteristics of sectoral PtX vision 2050

Describe how PtX has cleaned up your sector and consider spill-over-effects into other sectors

Key success factors & enablers (key considerations)

Key actors (change agents)

Green Steel

PtX Vision 2050

Green Steel



Vision 2050: PtX-based Steel Production in Vietnam until 2050

(to be developed by workshop participants)

Key Considerations:

- **Infrastructure Investments:** Robust infrastructure for green hydrogen production, storage, and transportation, along with integrating these into metal production facilities, will be crucial.
- **R&D and Collaboration:** Investing in research and forming partnerships with global players will aid in keeping Vietnam at the forefront of green metal production technology.
- **Policy Support:** Government policies incentivizing sustainable production, reducing bureaucratic hurdles for exporters, and fostering a conducive environment for **innovation**.
- **Trade Strategies:** Building relationships with countries and industries that prioritize sustainable sourcing, while also ensuring a diversified portfolio of trade partners.

Trajectory A: Domestic Infrastructure Boom Model (DIBM)

2025-2030: Vietnam concentrates on deploying green hydrogen in its steel and aluminum industries to cater to the domestic infrastructure and construction boom. This reduces import dependencies and caters to the rapid urbanization and development needs.

2030-2040: Vietnam achieves self-sufficiency in steel and aluminum production using green hydrogen. The focus remains on local industries, construction projects, and infrastructure development.

2040-2050: The emphasis continues to lie on domestic utilization with only surplus production being considered for exports to neighboring markets.

Trajectory B: Green Metal Export Powerhouse Model (GMEP)

2025-2030: Recognizing the global shift towards sustainable industrial production, Vietnam channels investments to position itself as a major exporter of steel and aluminum produced using green hydrogen.

2030-2040: The country, with its enhanced production capabilities, starts exporting to major markets globally, leveraging its sustainable production methods as a key selling point.

2040-2050: Vietnam becomes a dominant force in the international steel and aluminum market, drawing industries that prioritize green production, thus boosting its economy.

Trajectory C: Balanced Domestic-Export Model (BDEM)

2025-2030: Vietnam equally divides its focus between domestic needs and potential export opportunities, ensuring a steady growth trajectory.

2030-2040: While the domestic market remains a priority, Vietnam aggressively explores and expands to international markets, ensuring a balanced growth in both domestic consumption and exports.

2040-2050: With a robust infrastructure in place, Vietnam dynamically adjusts its production based on global demand and domestic requirements, ensuring economic stability and resilience.

Trajectory D: Technological Pioneer Model (TPM)

2025-2030: Vietnam collaborates with global leaders in technology to pioneer new methods in steel and aluminum production using green hydrogen.

2030-2040: The country becomes an innovation hub, not only producing steel and aluminum but also exporting technology and expertise to other nations seeking to transition to green hydrogen-based production.

2040-2050: Beyond being a production powerhouse, Vietnam positions itself as a global leader in R&D and technological advancements in the sector, driving international standards and practices.

Critical Thinking | Why is the current pathway no longer sustainable?

- **Carbon Emissions:** Traditional steel production is a significant contributor to carbon dioxide emissions. As countries move towards meeting global climate goals, high-emission industries like traditional steel production are under scrutiny.
- **Dependency on Imported Raw Materials:** Vietnam has historically depended on importing key raw materials for steel production, especially coking coal and iron ore. This reliance on imports can be economically challenging and expose the industry to global price fluctuations.
- **Energy Intensiveness:** The BF-BOF process is energy-intensive, often relying on coal as an energy source. As Vietnam grapples with energy security and seeks to reduce coal dependency, this becomes a concern.
- **Air and Water Pollution:** Traditional steel plants can contribute significantly to air and water pollution. Emissions of sulfur dioxide, nitrogen oxides, and particulate matter can have detrimental health and environmental effects.
- **Waste Generation:** Slag, a by-product of the steel-making process, can pose disposal challenges. While there are methods to repurpose slag, not all of it gets recycled or reused, leading to waste management issues.
- **Water Usage:** Steel production requires significant water, leading to potential stress on local water resources, especially in areas already facing water scarcity.
- **Land Degradation:** Mining activities associated with extracting iron ore and coal can lead to deforestation, habitat destruction, and soil erosion.
- **Evolving Consumer Preferences:** Globally and within Vietnam, there's a growing demand for "green" or sustainably-produced products. Industries failing to adapt to these preferences may lose market share over time.
- **Regulatory Pressures:** Vietnam, as part of its commitment to global environmental and sustainability goals, is imposing stricter regulations on pollution and emissions. The traditional steel industry may face challenges in complying without significant upgrades or changes.
- **Economic Viability:** With advancements in technology, newer methods of steel production, such as Electric Arc Furnaces (EAF) using recycled scrap or Direct Reduced Iron (DRI) methods using natural gas or hydrogen, are becoming more economically competitive.

Key Drivers of Change | Global, Regional, Domestic, Sectoral

Global Trends:

- **Decarbonization and Green Technologies:** Global emphasis on carbon reduction may lead to the development and adoption of greener steel production methods, such as hydrogen-based reduction.
- **Global Economic Growth:** The health of the global economy, particularly in industrial and developing nations, can influence steel demand and prices.
- **Technological Innovations:** Advances in steel production technology might offer more efficient and sustainable methods.
- **Trade Dynamics:** International trade agreements, tariffs, and trade wars can impact the global steel trade.
- **Resource Scarcity:** Global availability and prices of raw materials like iron ore and coking coal influence steel production costs.

Regional Trends:

- **Regional Cooperation:** ASEAN and Asia-Pacific cooperation can influence trade, tariffs, and standards related to steel.
- **Infrastructure Projects:** Large-scale infrastructure projects in the region can drive steel demand.
- **Regional Competitors:** Steel production decisions in nearby major producers like China, India, and Japan can influence market dynamics.

Domestic Trends:

- **Economic Growth:** Vietnam's economic trajectory will influence domestic steel demand, particularly in construction and manufacturing sectors.
- **Policy & Regulations:** Governmental policies related to infrastructure development, environmental regulations, and domestic industries can impact steel production.
- **Domestic Resources:** Availability and quality of domestic raw materials can influence the cost and scale of production.
- **Investment:** Foreign and domestic investments in Vietnam's steel industry can affect production capacity and technology adoption.
- **Local Infrastructure Development:** Vietnam's own infrastructure initiatives, like transportation networks, urban development, and industrial zones, will influence steel demand.

Sectoral Trends:

- **Construction:** As urbanization continues in Vietnam, the demand from the construction sector will play a pivotal role in steel consumption.
- **Automotive:** Growth in the automotive industry can influence the demand for high-quality steel.
- **Energy:** Vietnam's choices in energy infrastructure, especially in renewable energy structures like wind turbines, can impact steel demand.
- **Shipbuilding:** If Vietnam's shipbuilding industry sees growth, it can contribute to increased steel consumption.
- **Consumer Goods:** The production of appliances, tools, and other consumer goods in Vietnam can drive steel demand.

Driving Actors | Domestic, Veto Players, Regional Global

Main Domestic Actors / Key Stakeholders:

- **Vietnamese Government:** Ministries such as the Ministry of Industry and Trade (MOIT) and the Ministry of Natural Resources and Environment (MONRE) are central to policy formulation and regulation in the steel industry and its environmental impact.
- **Vietnam Steel Corporation (VnSteel):** As the national steel company, its decisions, investments, and direction are crucial for the industry's future.
- **Major Steel Producers:** Apart from VnSteel, private entities and conglomerates involved in steel production will play an important role, given their market share and influence.
- **Research and Development Institutions:** Domestic institutions involved in metallurgy and material science research will be important in bringing innovations in green steel production to Vietnam.
- **Vietnamese Construction Industry:** Being one of the main consumers of steel, the construction sector's willingness to adopt and pay potentially higher prices for green steel will influence its market demand.
- **Environmental and Industrial NGOs:** These groups will likely advocate for cleaner production methods and might monitor and report on the environmental impacts of the steel industry.
- **Local Communities:** Populations living near steel plants will be stakeholders given the direct environmental impact of production on their surroundings.

Potential Veto Players:

- **Traditional Steel Manufacturers:** Companies heavily invested in conventional steel production methods may resist changes that could increase costs or require significant infrastructural changes.
- **Certain Business Interest Groups:** If green steel production is perceived as economically less competitive, certain business lobby groups may oppose its rapid adoption.

Regional and Global Actors:

- **ASEAN:** Given the regional interconnectivity in markets, ASEAN's policies and initiatives regarding green industrial processes can influence Vietnam.
- **China:** As the world's largest steel producer and Vietnam's significant trading partner, China's decisions, technological advancements, and market dynamics in green steel will have implications for Vietnam.
- **Global Steel Producers:** Companies from countries with advanced steel industries, like Japan's Nippon Steel or India's Tata Steel, can bring in technology, investments, and partnerships.
- **International Financial Institutions:** Organizations like the World Bank or the Asian Development Bank can provide financial support, expertise, and incentives for green steel initiatives.
- **Global Environmental NGOs and Consortia:** These entities can push for international standards, provide technological expertise, and create platforms for global cooperation on green steel.
- **Bilateral Partners:** Countries with green steel initiatives and strong ties to Vietnam, such as members of the European Union, Australia, or South Korea, can influence the transition through collaborations, trade agreements, and technological exchanges.

Template | Vision 2050 (Horizon 3)

What is the strategic end goal of your sectoral PtX vision 2050?

Vision 2050 title

Key features and characteristics of sectoral PtX vision 2050

Describe how PtX has cleaned up your sector and consider spill-over-effects into other sectors

Key success factors & enablers (key considerations)

Key actors (change agents)

Coffee break (15')

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Working Group Presentations

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End of Day 1

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Consultation Workshop | Hanoi, October 25-26, 2023

FUTURE SCENARIOS AND ORIENTATION FOR THE VIETNAMESE NATIONAL HYDROGEN INDUSTRY

Agenda | Thursday – October 26, 2023

- 09:00 Welcome and Outlook Day 2 | Recap Day 1 and Open Questions
- 09:30 **Morning Task I:** Explaining the Doom of the Old System
Breakout Groups 1-4
- 10:30 **Break**
- 10:50 **Morning Task II:** Identifying Seeds of the New
Breakout Groups 1-4
- 11:45 **Lunch**
- 13:00 **Afternoon Task:** Defining Pathways into PtX futures
Breakout Groups 1-4
- 14:15 **Break**
- 14:30 **Presentation** of Breakout Groups' Findings, Discussion
- 15:30 Wrap up and Next Steps
- 15:45 **Quiz Winner Ceremony** with Photo Session
- 16:00 End of Workshop

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Morning Task I: Explaining the Doom of the Old System

Horizon 1



Horizon 2



Horizon 3



Dominant System

Business
as usual

What are the **main features** / characteristics of the current system?

Why do we think that the current system is becoming **dysfunctional**?

Which interventions / innovations could **enhance** transformative change?

Societal
Innovation

What are the main **features** / characteristics of **PtX futures** / visions?

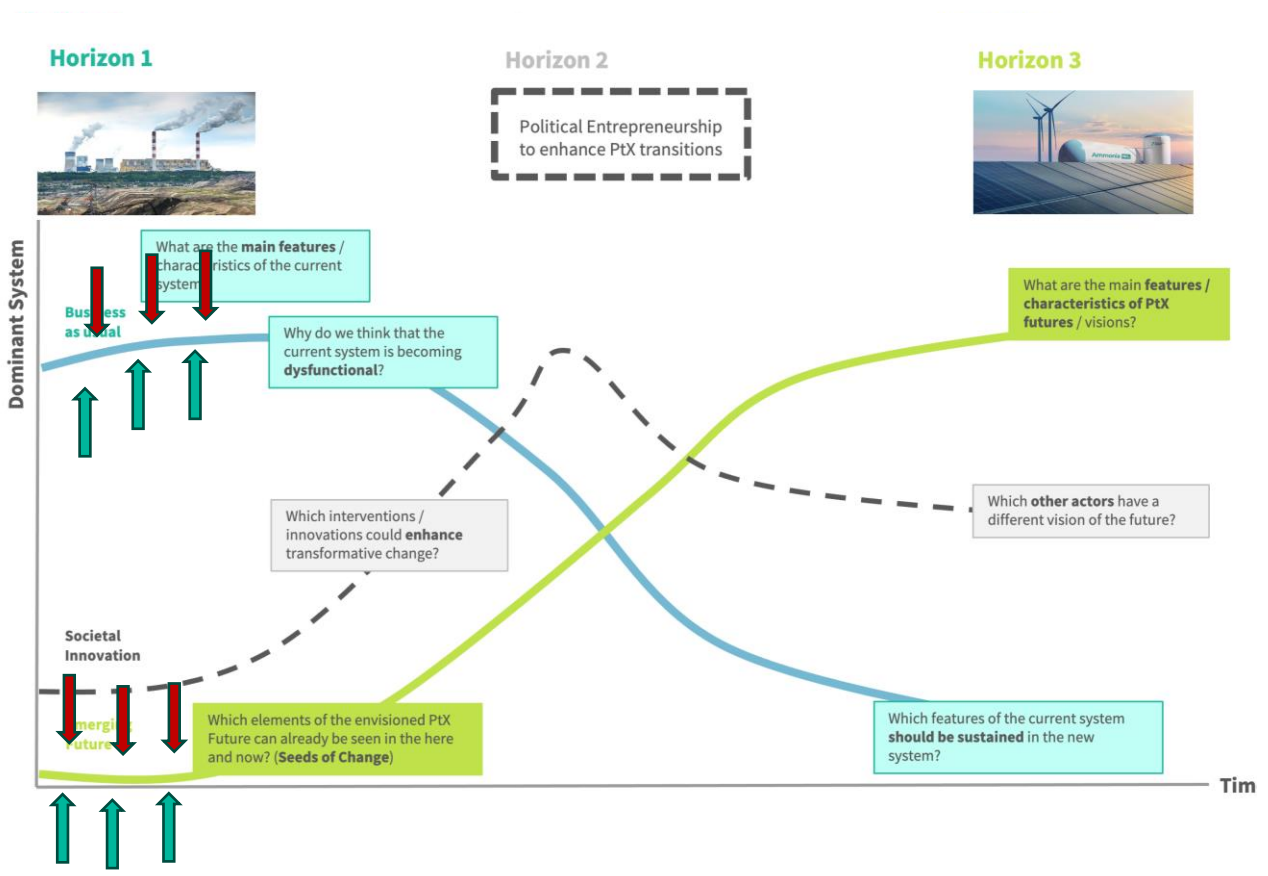
Which **other actors** have a different vision of the future?

Emerging
Future

Which elements of the envisioned PtX Future can already be seen in the here and now? (**Seeds of Change**)

Which features of the current system **should be sustained** in the new system?

Time



Guiding Questions | The Doom of the Old System (Horizon 1)

PART 1

- What are the **main features and characteristics** of the current system?
- Why do we think that the current system is **becoming dysfunctional**?
- Which **actors and vested interests** uphold the current system?
- **Who will lose most** from a PtX transition?

Template |

Doom of the Old System 2050 (Horizon 1)

What are the main features and characteristics of the current system?

Seeds of the New: Which elements of the envisioned PtX Future can already be seen today?

Why do we think that the current system is becoming dysfunctional?

Who will benefit most from a PtX transition?

Who are the change agents?

Which actors / vested interests uphold the current system?

Who will lose most from a PtX transition?

Coffee break (15')

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Morning Task II: Identifying Seeds of the New

Horizon 1



Horizon 2



Horizon 3



Dominant System

Business
as usual

What are the **main features** / characteristics of the current system?

Why do we think that the current system is becoming **dysfunctional**?

Which interventions / innovations could **enhance** transformative change?

Societal
Innovation

What are the main **features** / characteristics of **PtX futures** / visions?

Which **other actors** have a different vision of the future?

Emerging
Future

Which elements of the envisioned PtX Future can already be seen in the here and now? (**Seeds of Change**)

Which features of the current system **should be sustained** in the new system?

Time

PART 2

- **Seeds of the New:** Which elements of the envisioned PtX Future can already be seen today?
- **Who will benefit most** from a PtX transition?
- Who are the **change agents**?

Template | Seeds of the New (Horizon 1)

What are the main features and characteristics of the current system?

Why do we think that the current system is becoming dysfunctional?

Which actors / vested interests uphold the current system?

Who will lose most from a PtX transition?

Seeds of the New: Which elements of the envisioned PtX Future can already be seen today?

Who will benefit most from a PtX transition?

Who are the change agents?



Lunch break (until 13.00 hrs)

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Afternoon Task: Defining Pathways into PtX futures

Horizon 1



Horizon 2



Horizon 3



Dominant System

Business
as usual

What are the **main features** / characteristics of the current system?

Why do we think that the current system is becoming **dysfunctional**?

Which interventions / innovations could **enhance** transformative change?

Societal
Innovation

Emerging
Future

Which elements of the envisioned PtX Future can already be seen in the here and now? (**Seeds of Change**)

Which features of the current system **should be sustained** in the new system?

What are the main **features** / characteristics of **PtX futures** / visions?

Which **other actors** have a different vision of the future?

Time

Guiding Questions | Pathways into PtX futures (Horizon 2)

- What are **preconditions for transformative change** to reach your Vision 2050?
 - Public
 - Private
 - Regional
 - International

- Which **interventions / innovations** could **enhance transformative change**?
 - Public
 - Private
 - Regional
 - International

Template | Pathways into PtX futures (Horizon 2)

What are **preconditions for transformative change** to reach your Vision 2050?

Which **interventions / innovations** could enhance transformative change?

Public

Public

Public

Public

Private

Private

Private

Private

Reg & Int

Regional & international

Reg & Int

Regional & international



Presentation & Discussion Pathways into PtX futures

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QUIZ TIME!

Wrap Up & Next Steps

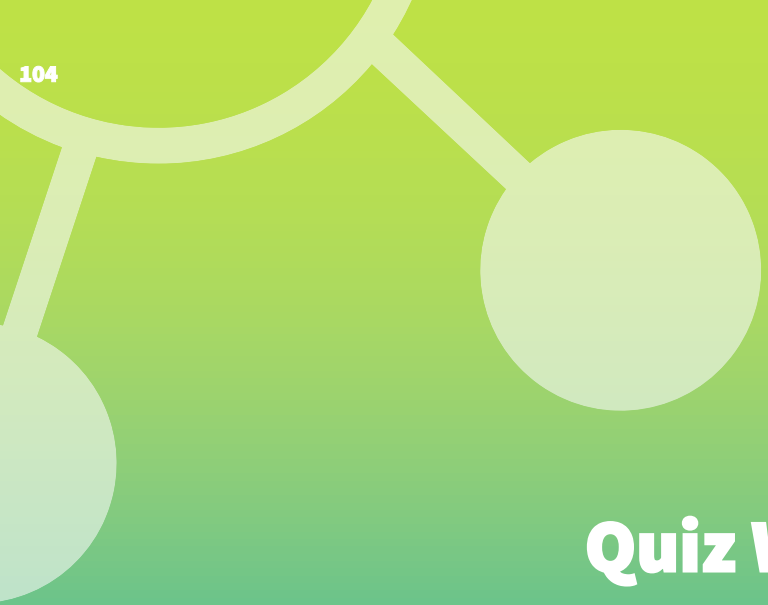
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QUIZ TIME!



Quiz Winner Ceremony

End of Workshop

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