Regulatory Frameworks for Green Hydrogen: Opportunities & Challenges

ASIA PACIFIC GREEN HYDROGEN 2024 CONFERENCE & EXHIBITION

10 - 12 JUNE 2024

BORNEO CONVENTION CENTRE KUCHING, SARAWAK

Robert Judd
DNV

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Ministry of Energy and Environmental Sustainability Sarawak

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DNV in the Hydrogen Sector

15,000 experts
across the Maritime, O&G, Renewables & Power markets providing local access to global best practice

160 years
serving the maritime & energy industries, including early engagement in the oil and gas, wind and solar, hydrogen & CCUS sectors

5%
total revenue invested in R&D each year to support the development of next generation technologies

170+
industry standards, guidelines and recommended practices

30+
joint industry projects per year collaborating with industry and our customers to develop the next generation of standards

24
laboratories and test centres including the World's first full-scale hydrogen testing facility supporting safety, infrastructure and policy

200+
carbon capture and utilisation projects delivered in the past 10 years including development of the first international standards

150+
hydrogen projects delivered in the past 12 months spanning production, transportation, utilisation and policy

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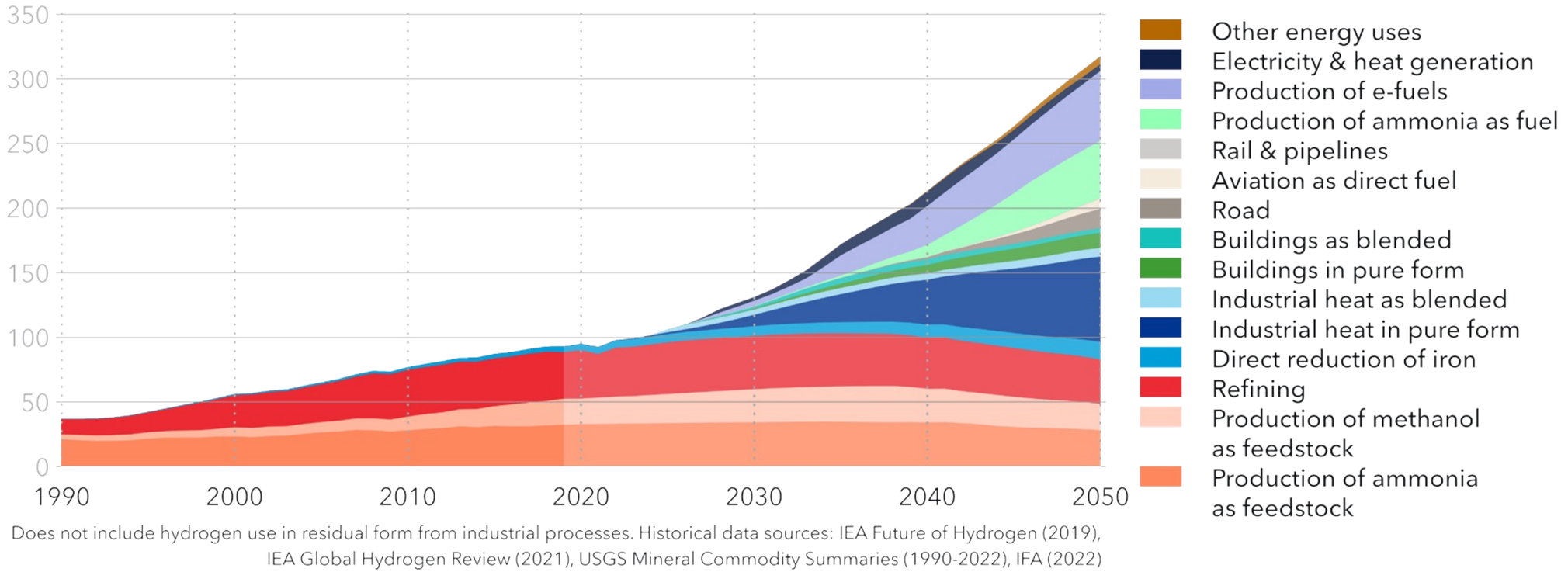
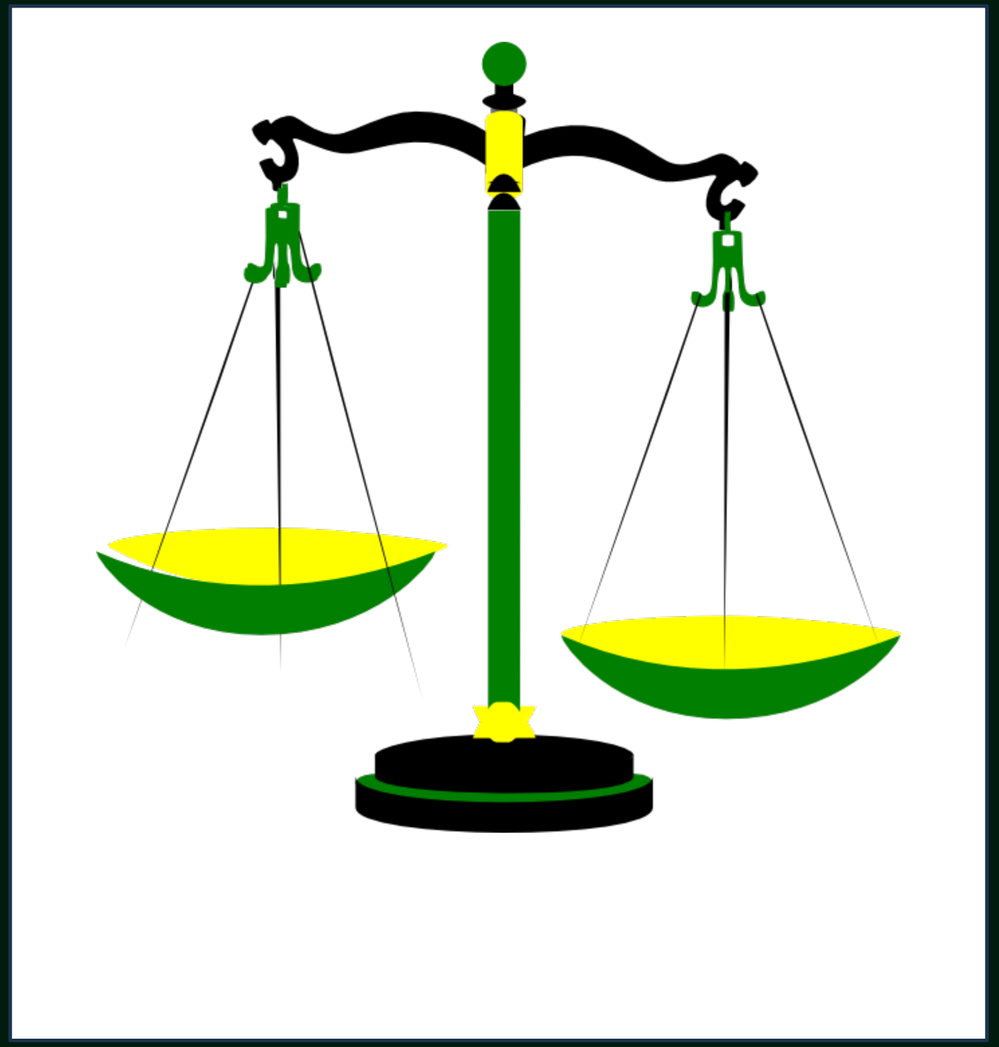
DNV ETO–H2 will supply 5% of primary energy by 2050



What is a Regulatory Framework?

A regulatory framework enables achievement of government's objectives through the use of regulations, laws, and other instruments to deliver better economic and social outcomes and thus enhance the life of citizens and business.

- Manage safety and risk and incentivize production, transport and demand
- Needs to define the roles and expectations of all stakeholders
- Both restrictive and permissive
- Needs to balance requirements of all stakeholders and not be overly conservative in approach
- Needs to recognize the need for alignment with strategic and market partners



Elements of a H2 regulatory framework

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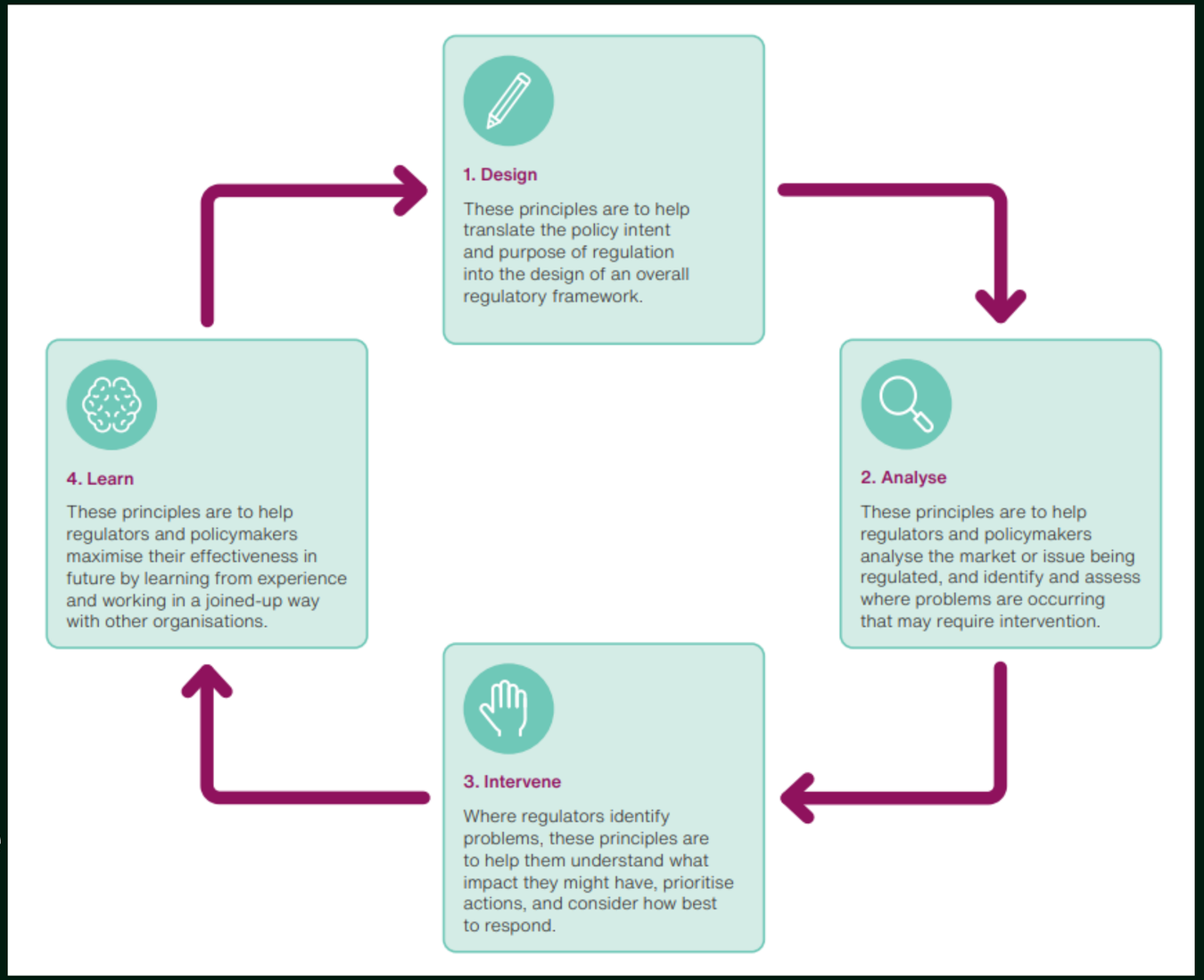
For example

- Market Rules
- Safety management
- Technical Standards
- Permitting and Approval
- Environmental Management
- Taxonomy and certification standards
- Carbon intensity estimation and guarantees of origin

It should

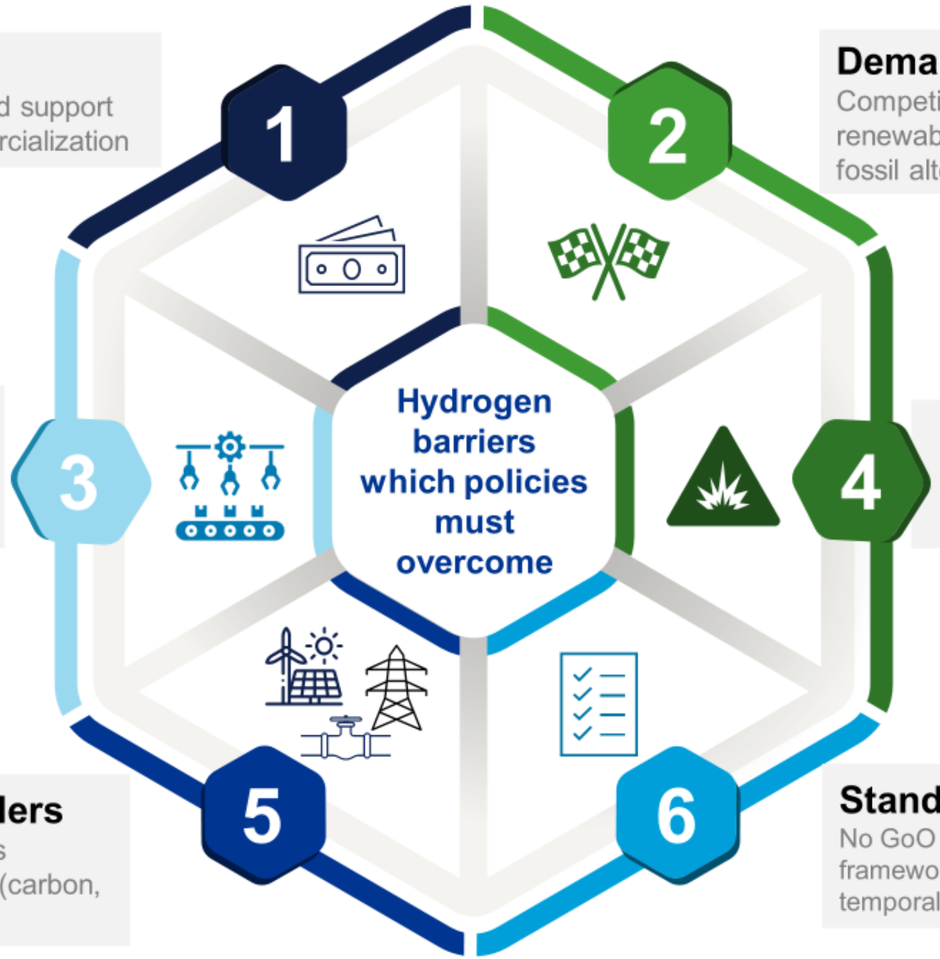
- be foundation for robust policy
- establish market confidence
- be open to revision from new knowledge and innovation



Barriers and Policies

Costs and financial support
No carbon cost internalization and limited support for the first phase of scaling and commercialization

Demand and competition
Competition between 1) low-carbon blue and renewable green hydrogen, 2) electrification, and 3) fossil alternatives



Technology and manufacturing
Limited manufacturing for green and blue H2 technologies, and offshore PtX needs maturing

Safety and hazards
Acceptance criteria and documentation varying from country to country

Infrastructure and indirect enablers
Renewable power production with robust grids onshore and offshore, and CCS value chains (carbon, capture and storage)

Standards & Certification
No GoO certification with traceability and LCA frameworks, no agreement on additionality and temporal matching

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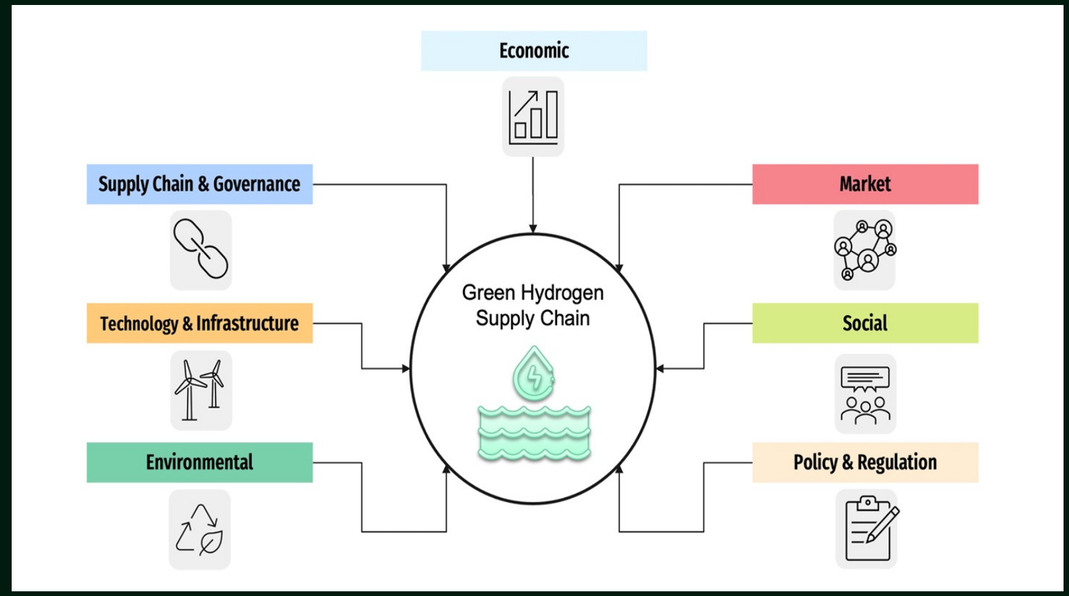
Challenges

- Hydrogen and ammonia are produced at huge scales industrially but not in an energy context.
- We have regulations for energy markets, both gas and electricity but they do not include H2 and Ammonia.
- Hydrogen, particularly green hydrogen, connects both gas and electricity markets in new ways. Power is used to make gas, rather than vice versa.
- Green hydrogen and green ammonia require a revision of regulations for both gas and electricity
- New context for all actors – all need a regulatory role.
- A **whole of government** approach is required to ensure regulatory alignment.
- Social buy-in is needed
- International markets are developing their own frameworks and alignment is needed here.

Risks in establishing a Hydrogen Project



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A hydrogen project contains multiple risks, many of them new and specific and management of these risks requires a robust framework of regulation and policy to give confidence to all actors

Barriers and Policies - Malaysia mapping

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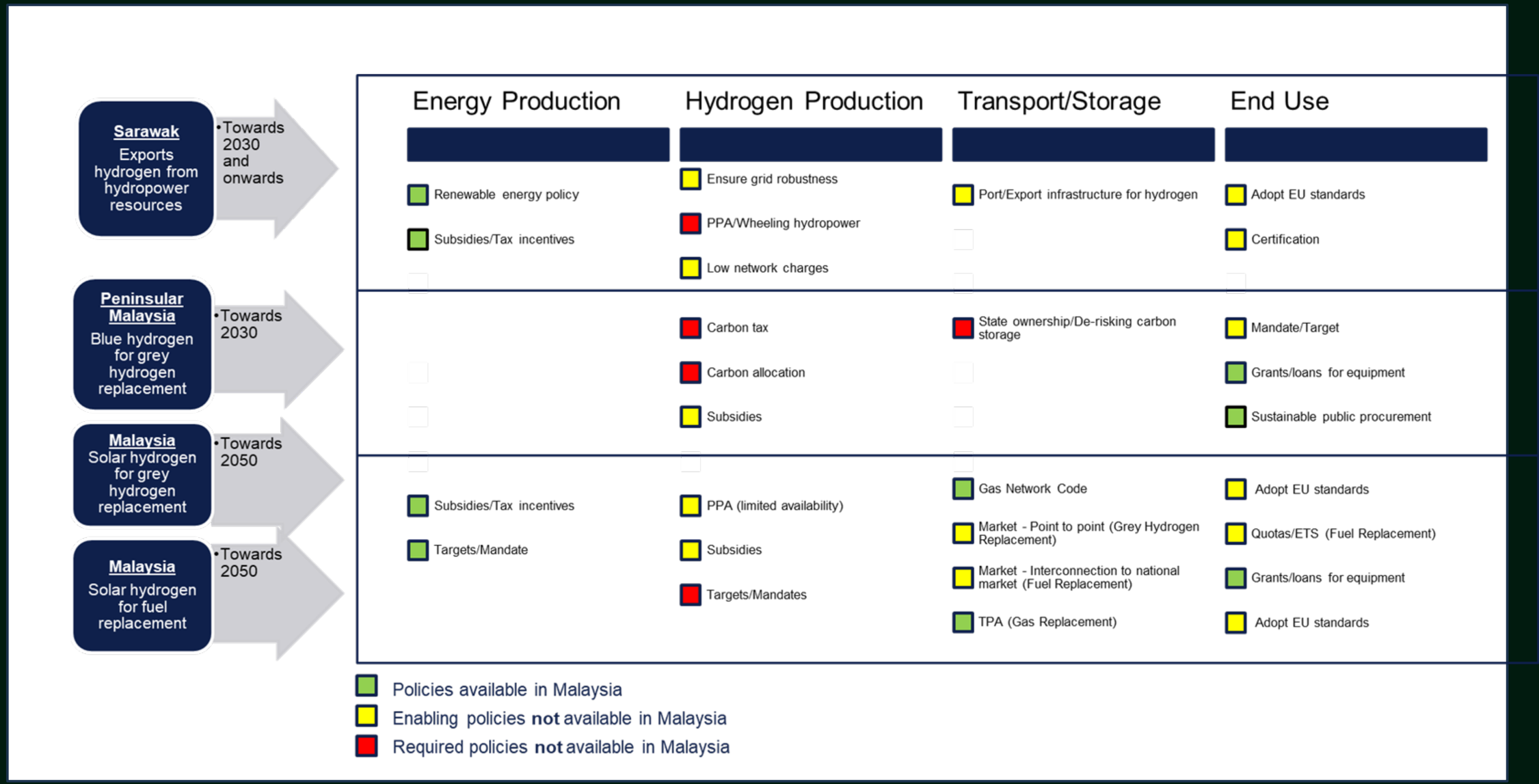

Sarawak: Exports of Hydrogen from hydro resources

Energy Production		Hydrogen Production		Transport/Storage		End Use	
Renewable energy policy	Sarawak has renewable energy policies such as Green Energy Agenda and SCORE to attract investments and development.	**Ensure Grid Robustness**	Grid infrastructure/capacity need to be prepared for the upcoming Baleh hydropower plant (1,285MW) which is under construction grids need to be capable for additional loads to be able to transfer electricity from the hydropower plants to the H_2 production onsite.	**Hydrogen pipeline development**	Preparing export infrastructure would be essential in this scenario. This would include finding a suitable site, allocating space for ammonia production, and storage as well as jetties and pipelines needed. If the hydrogen facilities are at the same site as the hydropower generation, proper pipelines infrastructure linkage would be required to transport the hydrogen to the export site. Ensuring alignment of technical stanrds.This requires international cooperation but also a review of existing standards used in Malaysia Ensuring safety standards	**Mirror EU standards**	EU has already established proper framework which can be used as a starting point for creation of framework in Sarawak. Off-takers should also align with the EU standards.
Subsidies/Tax incentives	RECODA has initiated 100% tax exemption for 5 years for pioneer projects and up to 10 years for strategic investments. Additional benefits include preferential land prices as well as cheap electricity and water rates provided by the Sarawak State Government for renewable projects.	**PPA/Wheeling**	The hydrogen production facilities are often not located onsite with the hydropower plant. Hence, it is required to have PPA and wheeling between hydro power plants and hydrogen production plants to purchase of electricity for hydrogen generation.			**Certification**	Proper hydrogen green certification with EU standards are required to prove guarantees of origin and carbon intensity
		Network charges	Charges to transmit energy from hydropower resources to hydrogen production facility should be kept low to encourage activity. At current context, hydrogen production facility is not available onsite with hydropower resources.				

Sarawak – regulatory responsibilities

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Regulation /Policy	Role	Year	Governing Body
Distribution of Gas Ordinance	• Govern the distribution of gas (all types) • Providing licensing and regulation of gas distribution activities, including construction, operation, and maintenance of gas pipelines and related facilities	2016, amendment in 2019	Sarawak State Government (Ministry of Utilities)
Gas Supply Ordinance	• Regulates the supply of gas • Provides for licensing and regulation of companies involved in the supply of gas, as well as technical, safety and environmental standards for safe and efficient supply of gas	2000, amendment in 2018	Ministry of Utilities Sarawak Energy Berhad
Sarawak Corridor of Renewable Energy	• Accelerate development of renewable energy resources and related industries • Development resources include projects such as large-scale hydroelectric power plants, solar farms and biomass power plants • Created opportunity for tax incentives, land acquisition, and infrastructure development	2008	Regional Corridor Development Authority
Natural Resources and Environment Ordinance	• Provide conservation, protection and management of state's natural resources and environment • Enforce environment standards and regulations, conducting environmental impact assessments, and promoting sustainable development practices	1993, amendment in 1998 and 2019	Natural Resources and Environment Board
Electricity Ordinance (Sarawak)	• Provide regulation of the generation, transmission, distribution and supply of electricity • SEB established as the sole licensee for generation, transmission and distribution • Established feed-in-tariff scheme for RE sources, such as solar and biomass to encourage RE projects development • Regulate electricity storage facilities	2014, amendment in 2020	Ministry of Utilities Sarawak Energy Berhad

Opportunities

- South Korea, Singapore, Japan and China are expected to be Malaysia's primary export markets all with substantial import and end use targets and evolving regulatory frameworks – lessons can be learned from strategic partners.

- Geographically, Malaysia is strategically located to become an APAC hydrogen trading hub between the more established hydrogen exporters like Australia and the Middle East.

- Malaysia also plans to build strategic partnerships with hydrogen demand-intensive countries by way of Government-to-Government initiatives focussing on hydrogen export.

- A hydrogen regulatory framework is at the heart of the new Hydrogen Economy and Technology Roadmap (2023)


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4.2.1.2 Strategy 1.2: Strengthen Regulatory Framework, Existing Policies/ Act, and Legislation

Meeting the challenge

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