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Australian Maritime College

Port Strategy in Navigating the Hydrogen Economy

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Bell Bay Power Fuels. Credit: ABEL Energy

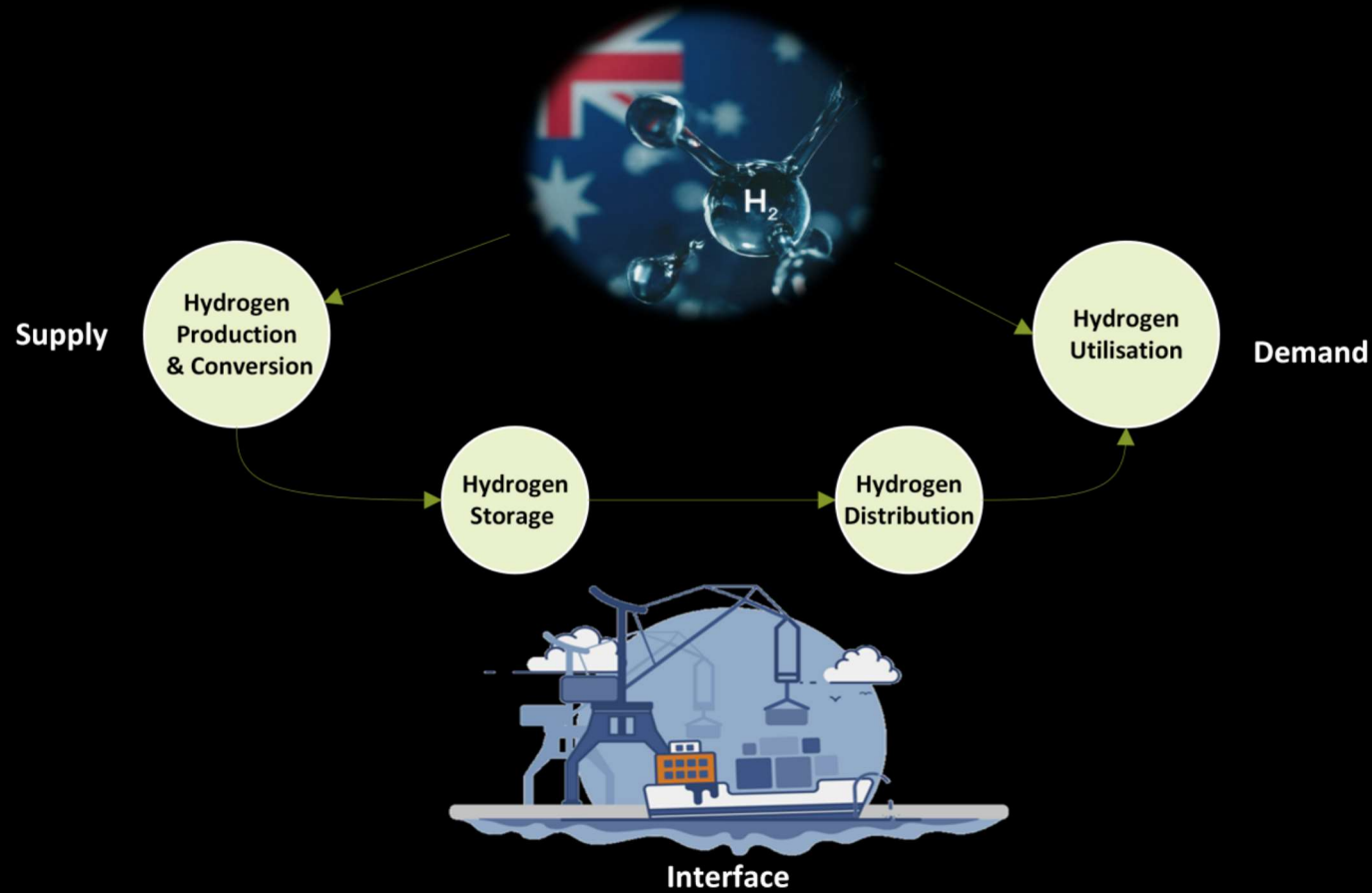
Hydrogen Economy and Ports



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Purpose



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This presentation is preliminary study of doctoral thesis with topic **‘Australian Ports Strategy in the Hydrogen Economy’**.

Purpose: To build upon lessons learned from port management and energy industries, gathering potential strategies for ports to manage the hydrogen supply chain successfully.



Overview of Research Project



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Australian Ports Strategy in the Hydrogen Economy

Literature
Review



Mixed
Method
Study

Qualitative study

- Data collection: Semi structure interview
- Thematic analysis

Quantitative study

- Developing decision support tools for determining infrastructure and operation strategy for ports

Case Study (Northern Tasmanian Ports)

- Testing and refining decision support tools

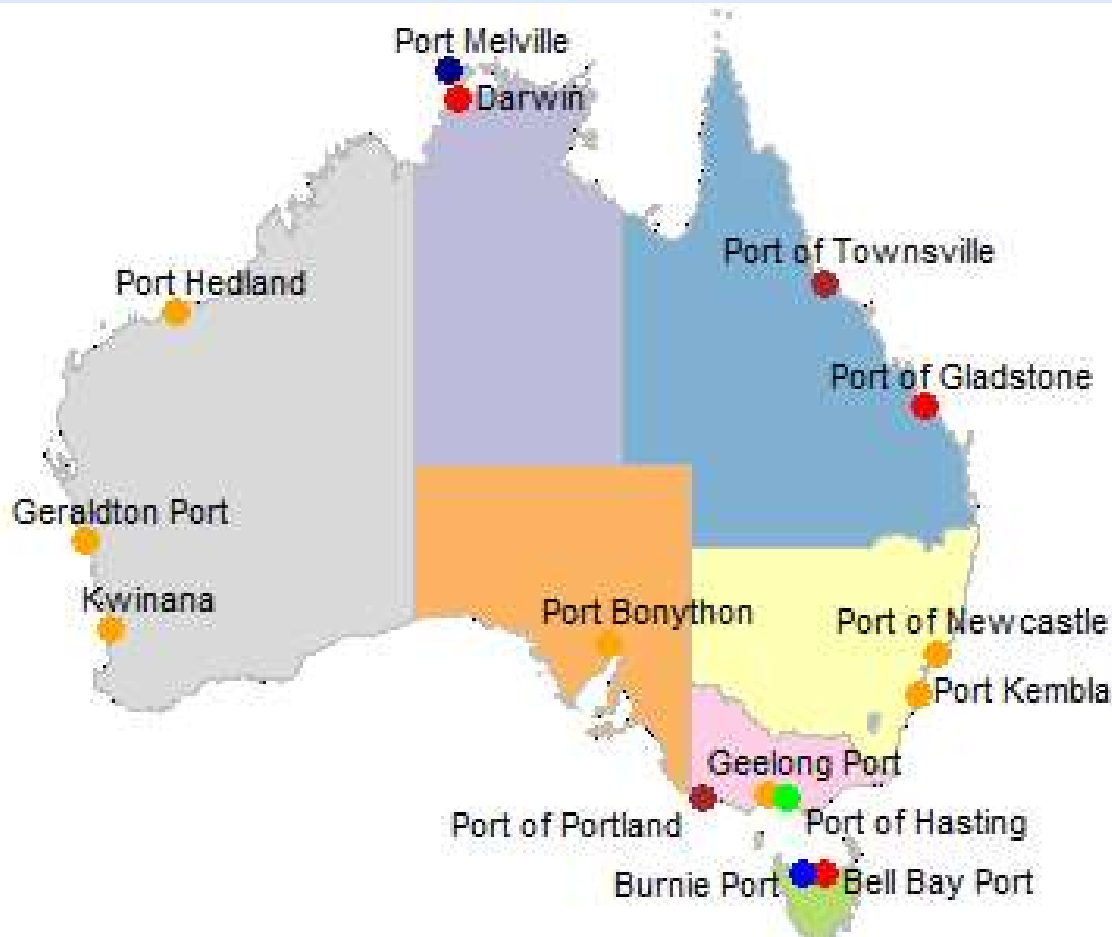
Opportunities for Australian Ports



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Export / Domestic Trade

Products

- ammonia
- CH2
- e-fuels
- LH2
- methanol
- various

Import

Critical equipment for Hydrogen Infrastructure:
storage tanks, electrolyzers, compressor and pumps, fuel cells, specialised pipeline, advanced materials, etc.

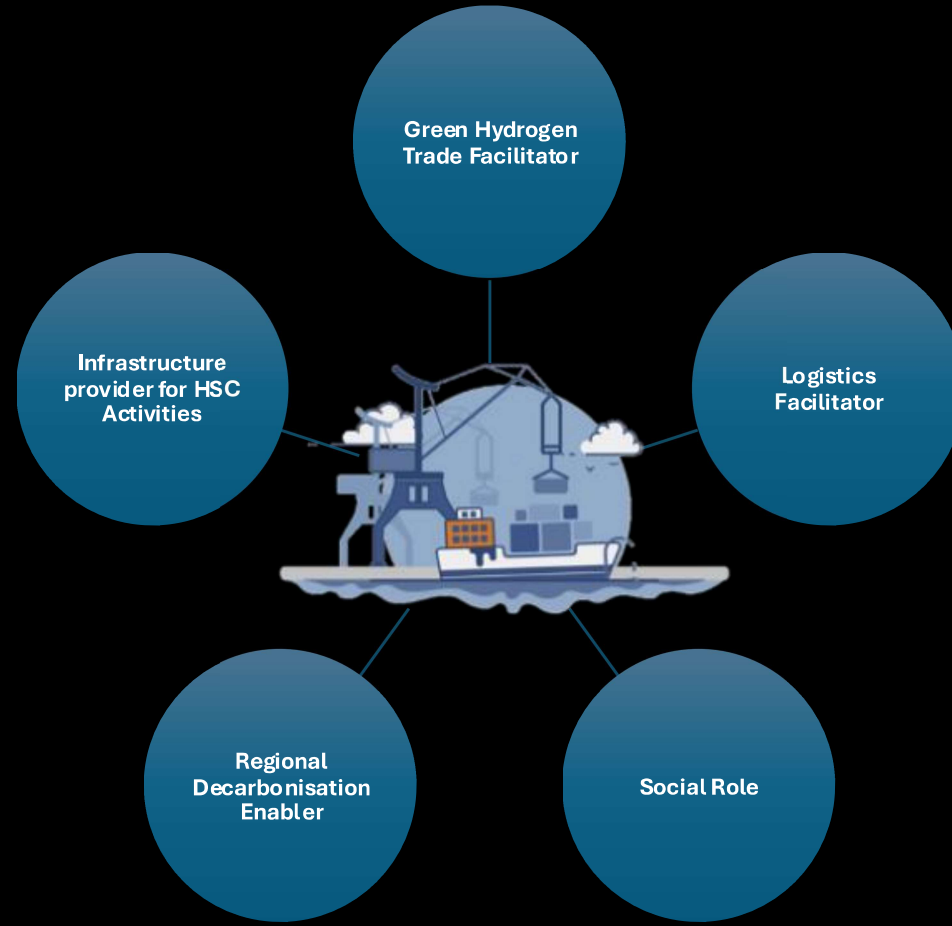
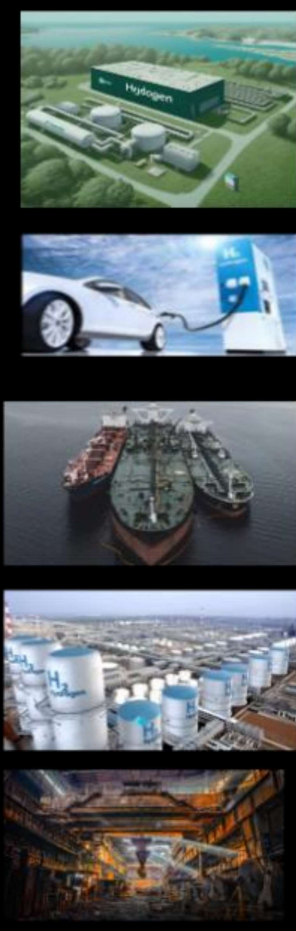
Ports' Role in the Hydrogen Economy



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Challenges for Australian Ports



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Regulatory Aspects

- Policy inconsistencies
- Limited certification scheme



Financial Consideration

- Port investment dilemma
- Trade off on the scalability of infrastructures



Environmental Impact

- Surrounding infrastructure
- Local ecosystem



Social concern

- Social license to operate



Technical and Operational Concern

- Complexity in port infrastructure planning
- Increase the operational risk

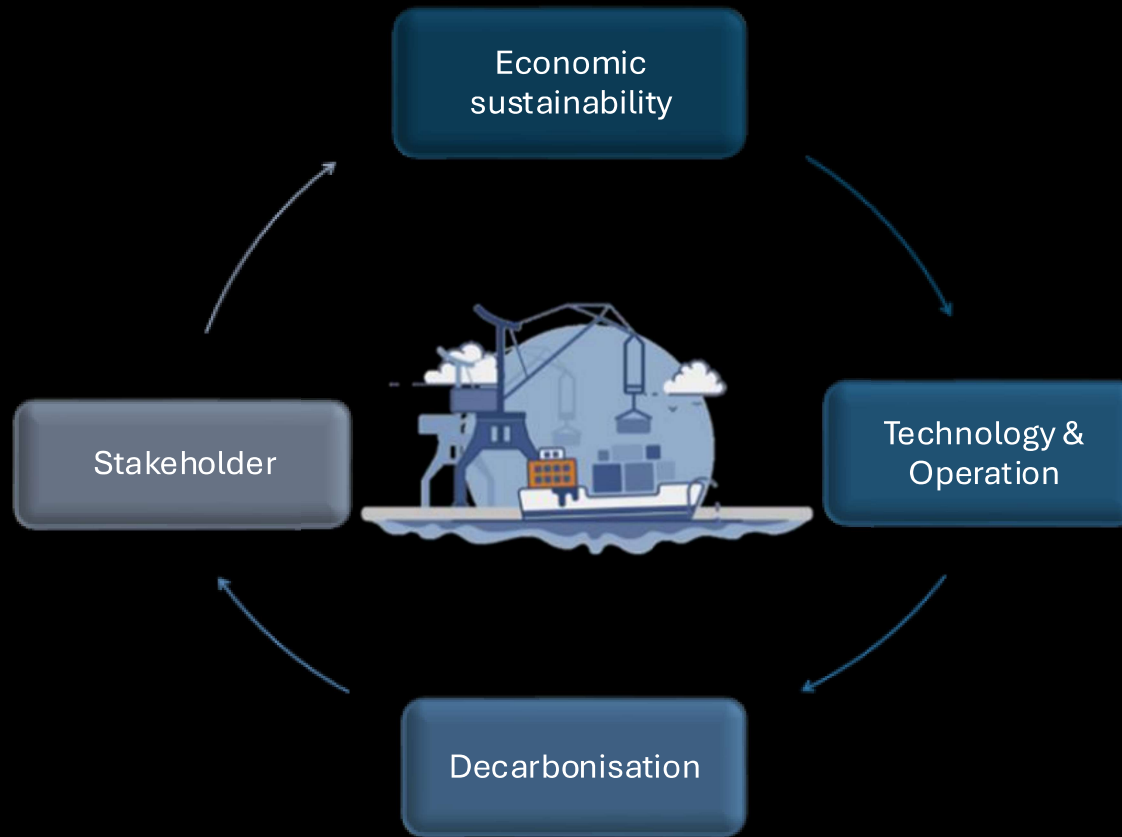
Port Strategy Development



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Economic Sustainability



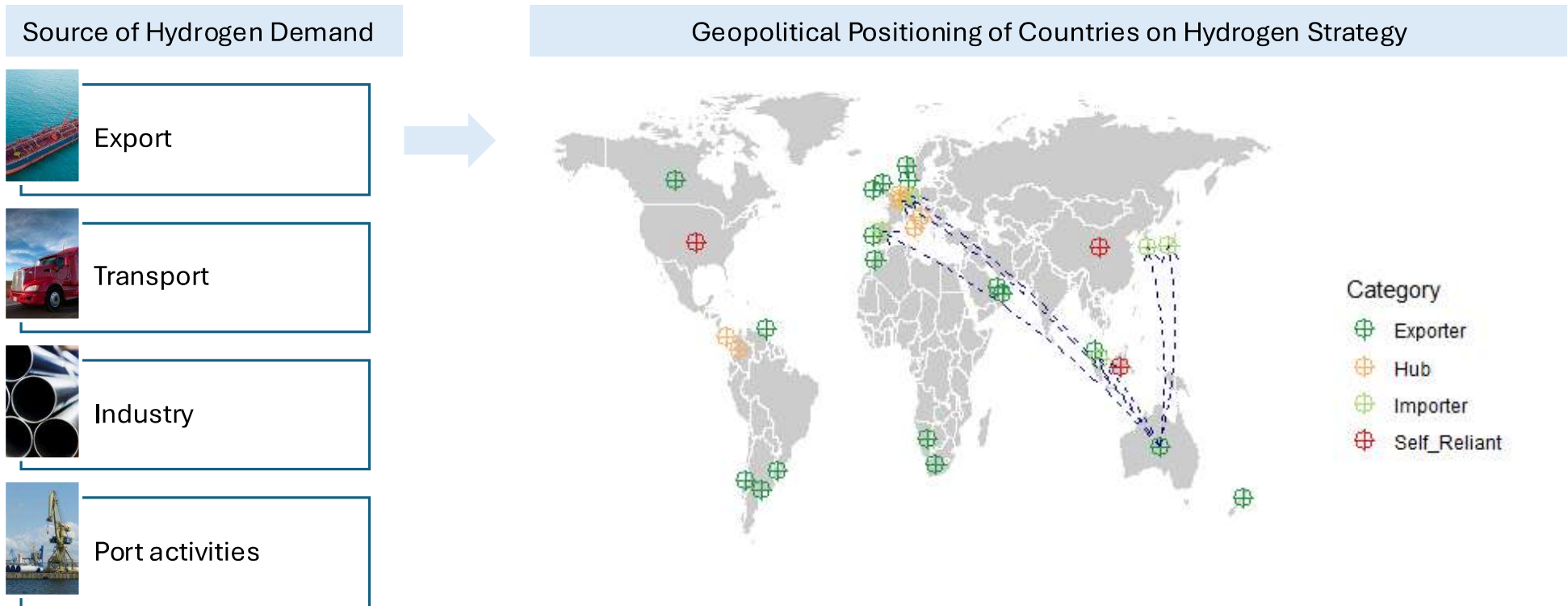
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✓ Port as Green Hydrogen Trade Facilitator

Ports need **proactively forecast hydrogen demand** for adaptive planning.



Technology and Operation



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✓ Port as Infrastructure Provider for HSC Activities

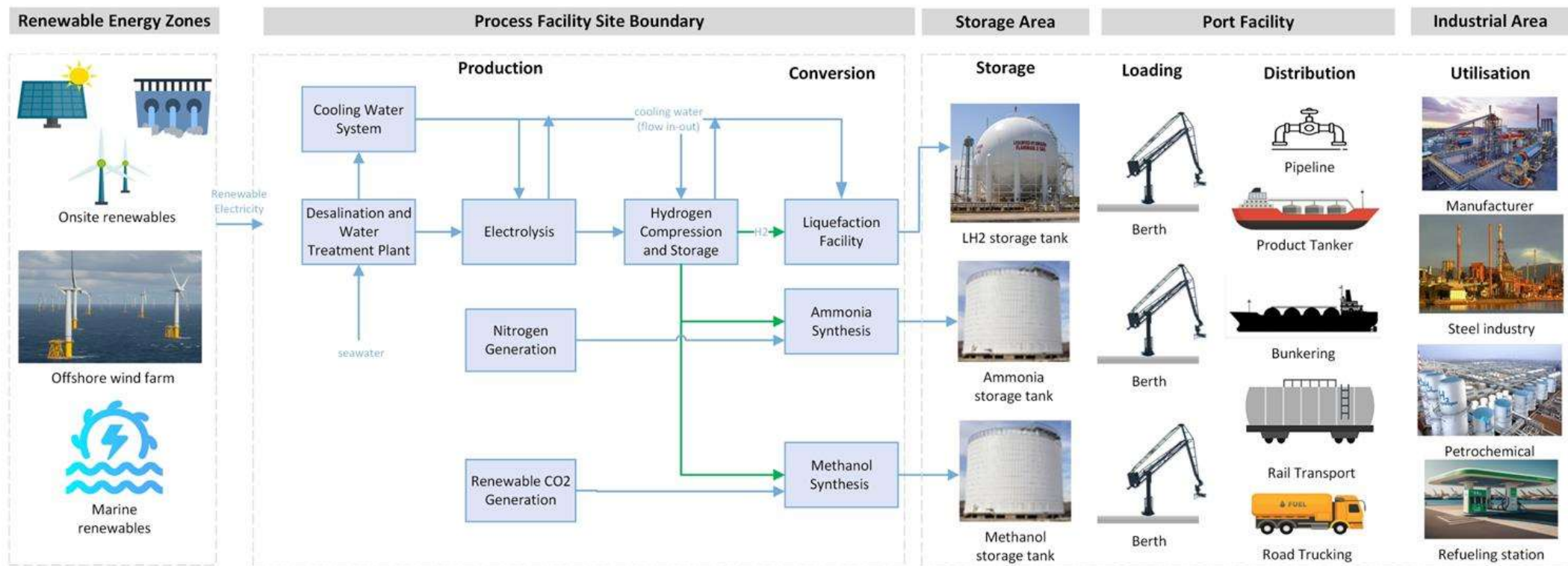


Illustration adapted from Chen et al. (2024)
 Chen, P.S.-L., Fan, H., Enshaei, H., Zhang, W., Shi, W., Abdussamir, N., Miwa, T., Qu, Z., & Yang, Z. (2024). Opportunities and Challenges of Hydrogen Ports: An Empirical Study in Australia and Japan. *Hydrogen*, 5(3), 436–458.
<https://doi.org/10.3390/hydrogen5030025>

Technology and Operation

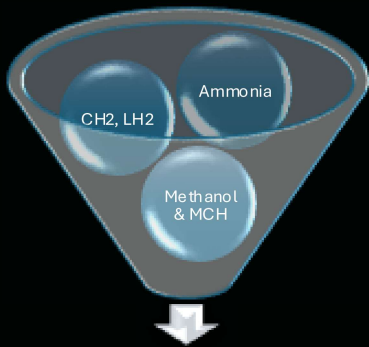


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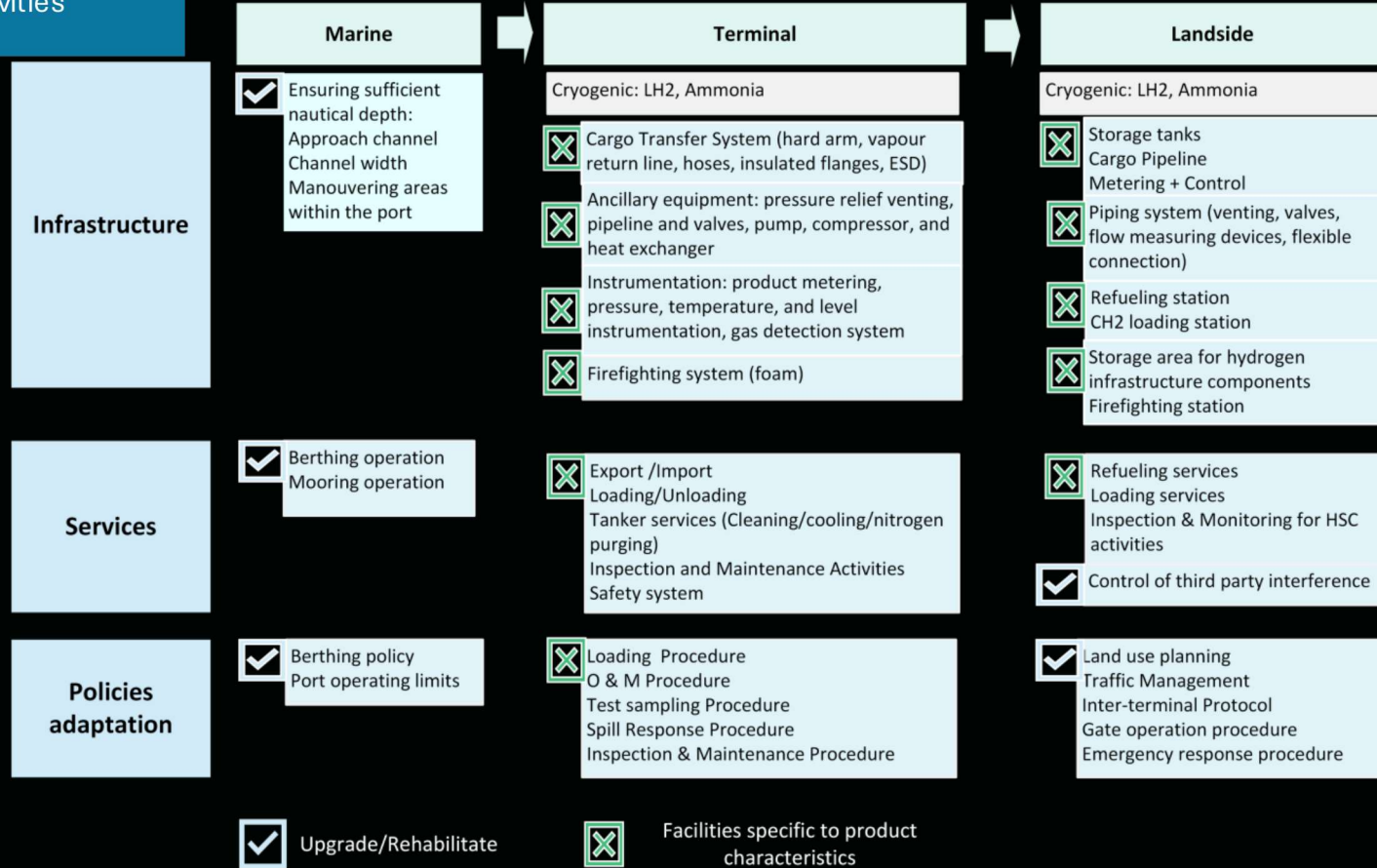
- ✓ Port as Infrastructure Provider for HSC Activities
- ✓ Ports as Logistics Facilitator



Hydrogen derived fuel products

Port Hydrogen Infrastructure Design priorities (Sunarko and Warwick, 2023):

- Safety
- Reliability
- Flexibility
- Constructability



Technology and Operation



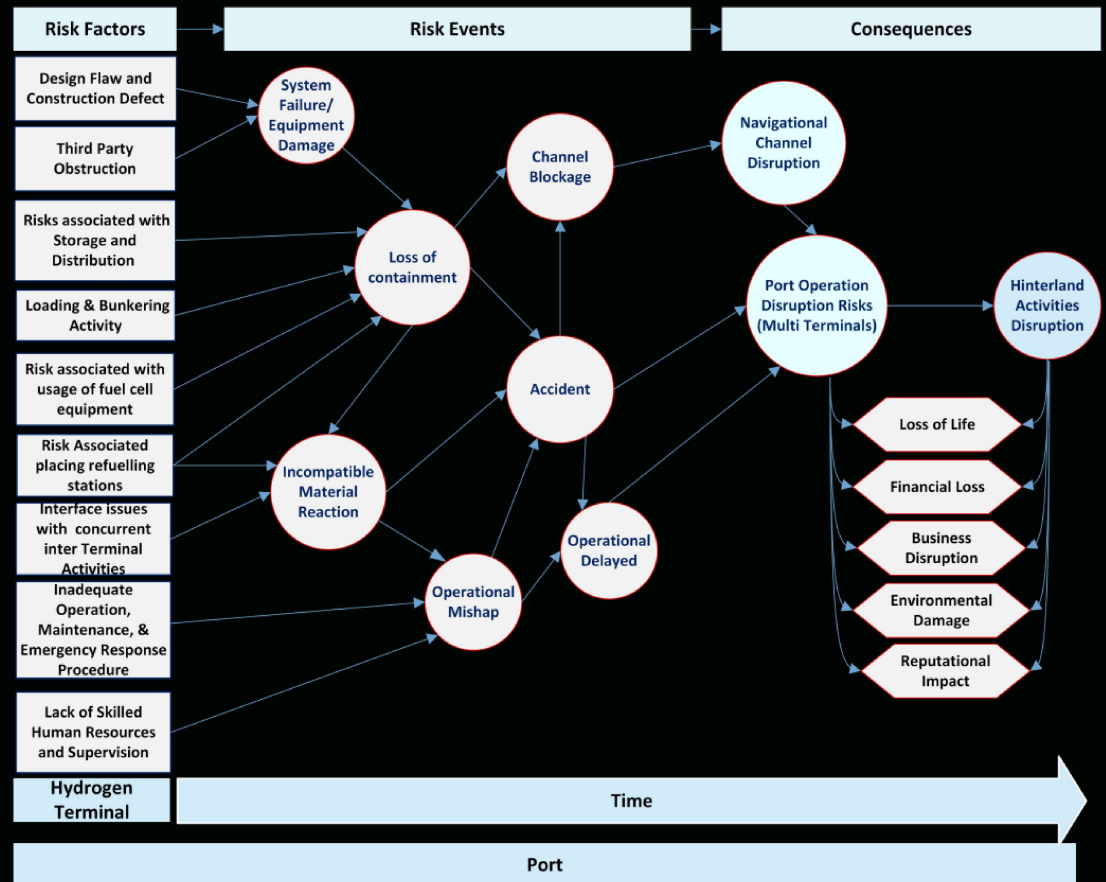
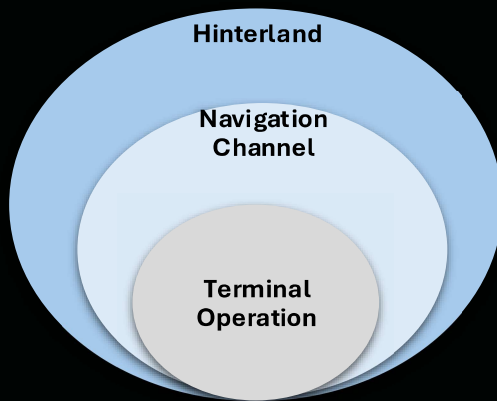
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- ✓ Port as Green Hydrogen Trade Facilitator
- ✓ Port as Infrastructure Provider for HSC Activities
- ✓ Ports as Logistics Facilitator

Comprehensive risks assessment is mandatory to identify potential hazards and risks control measures such hazardous zone design and infrastructure placement (Hansen, 2023)



Decarbonisation

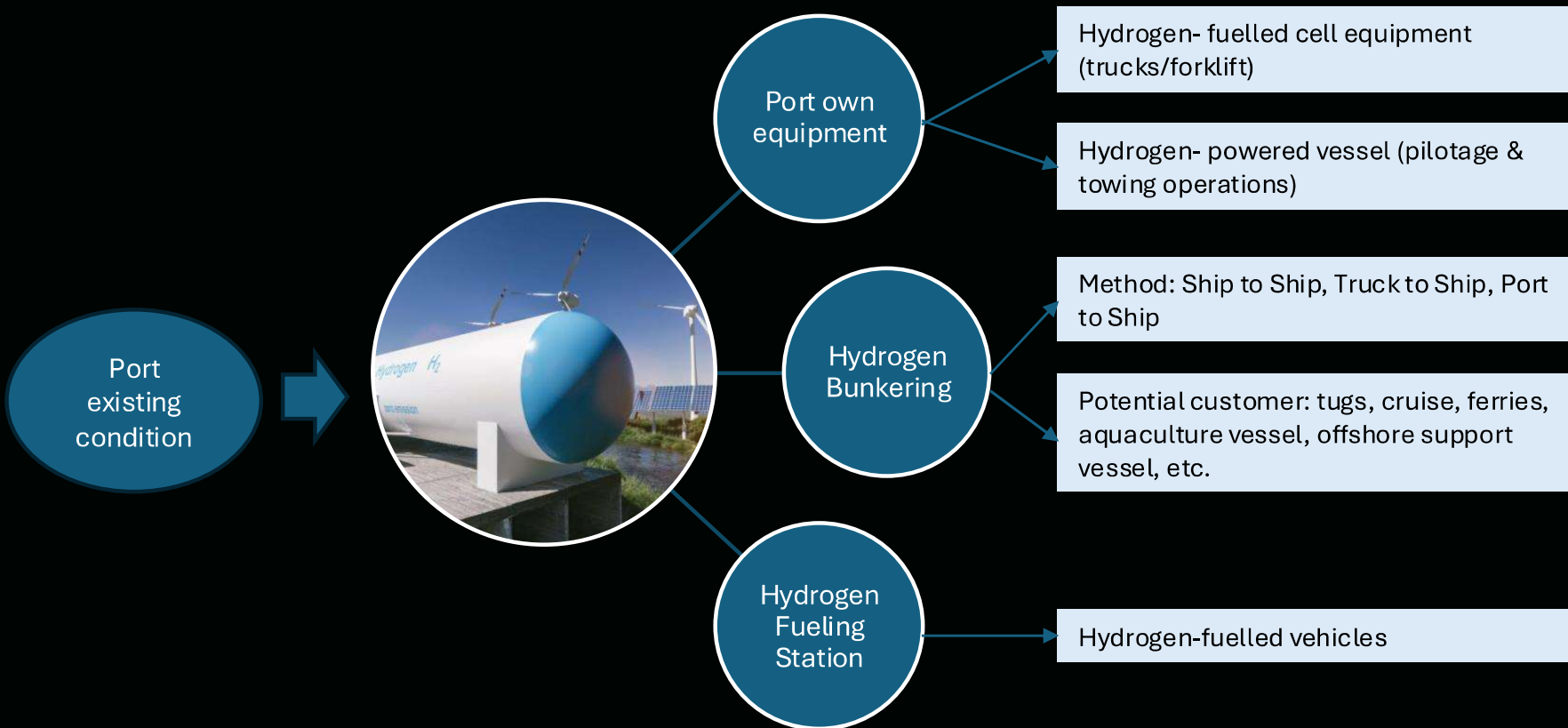


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✓ Port as Regional Decarbonisation Enabler



Stakeholder Management

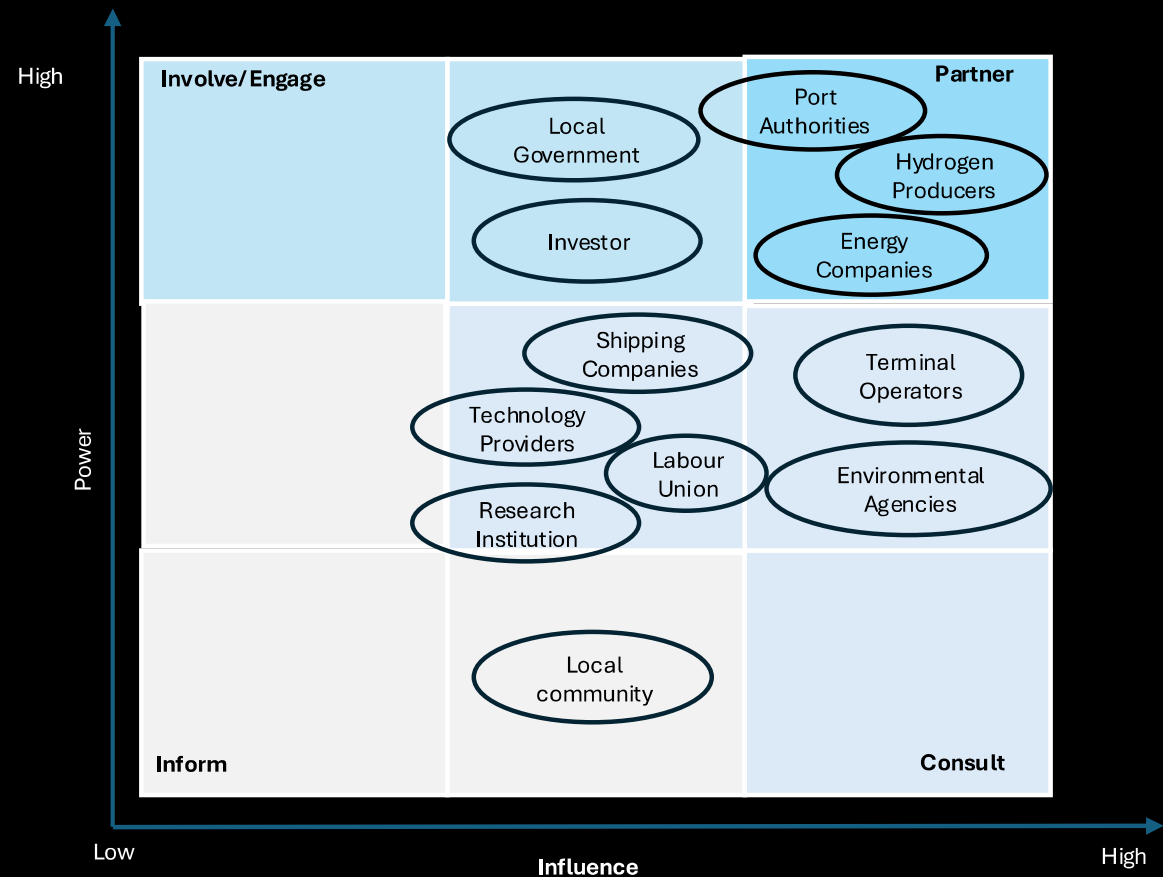


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- ❑ Stakeholder Engagement: Foster strong relationships with diverse stakeholders (Chen et al, 2023).
- ❑ Public Engagement: Prioritize public trust by involving the community in decision-making processes.
- ❑ Policy Advocacy: Collaborate with policymakers to create a supportive regulatory environment for hydrogen projects.
- ❑ Regional Collaboration: Partner with neighbouring ports to share knowledge, resources, and best practices.
- ❑ Effective Communication: Build trust and transparency through open communication, addressing concerns and promoting social acceptance.



Reference: Chen, P., Fan, H., Enshaei, H., Zhang, W., Shi, W., Abdussamir, N., Miwa, T., Qu, Z., & Yang, Z. (2023). A review on ports' readiness to facilitate international hydrogen trade. *International Journal of Hydrogen Energy*, 48(46), 17351-17369. <https://doi.org/10.1016/j.ijhydene.2023.01.220>

Conclusion and Future Research



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Conclusion:

- ❑ Ports can effectively navigate the hydrogen economy by focusing on infrastructure planning, operation management, technological innovation, and stakeholder engagement.
- ❑ Robust decision-making tools are essential for success in this dynamic environment.

Future Research:

- ❑ To develop a Decision Support Tool (DST) to assist ports in scenario planning for infrastructure and risk assessment.
- ❑ To integrate DST with port master planning for a comprehensive approach to hydrogen economy participation.



Acknowledgement



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If you are **interested to participate** in this study,
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