The Green Transition of Vietnam's maritime industry: reality and the implementation roadmap for Hai Phong Port toward Green

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Abstract: *The 2023 World Maritime Day adopted the theme "Marpol at 50 - Our Commitment Goes On" to highlight the International Convention for the Prevention of Pollution from Ships. As the world shifts towards developing green industries, Vietnam's maritime sector also faces the critical task of reducing greenhouse gas emissions and reducing environmental pollution. This article presents the criteria for Green Ports, the Green Transition plan as well as the roadmap for the development of green seaports of Vietnam's maritime industry, while also analyzes the case of the development of Hai Phong Green Port as a testimony to Vietnam's maritime sector's determination and efforts in the Green Transition.*
Keywords: Green Port, Green Transition, Energy Efficiency, Information Technology, Hai Phong, Vietnam Maritime Corporation, Hai Phong Green Port

1. Introduction

According to the United Nations Environment Programme (UNEP) and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the Green Transition is a strategy aimed at maximizing economic output while minimizing ecological burdens, ensuring harmony between economic growth and environmental sustainability through fundamental changes in social production and consumption patterns. This transition aims at low emissions/carbon neutrality, resource conservation, improved human living standards, enhanced social equity, and a significant reduction in environmental risks and ecological deficits. The concept of green transition is very broad and is becoming more well-defined, focusing on the process of "greening" across a broadening array of social production and consumption sectors, including green technology, green jobs, green industry, green agriculture, green energy, green transportation, green cities, green ports, green lifestyles, green consumption, green housing models, green public spending, and so on.

Since 2013, the Government of Vietnam has approved the Strategy for sustainable exploitation and utilization of marine natural resources and environmental protection until 2020 and vision towards

2030 (Prime Minister's Decision No. 1570/QĐ-TTg dated September 6, 2013). As the strategy goes into implementation, a series of documents and decisions have been issued reflecting the determination for the Green Transition, including important decisions related to the development of Green Ports in the maritime sector[1]. In this regard, the Vietnam Maritime Administration has also issued numerous implementation documents, notably Decision No. 710/QĐ-CHHVN dated June 2, 2021, which introduced the Scheme for Developing Green Ports in Vietnam, and Decision No. 1909/QĐ-CHHVN dated December 29, 2022, which announced the basic criteria for Green Ports in Vietnam.

This article presents the criteria for Green Ports and the Green Transition plan, as well as the roadmap for developing green seaports of Vietnam's maritime industry. It also analyzes the case of the development of Hai Phong Green Port to signify the determination and efforts of Vietnam's maritime sector in the Green Transition.

2. The criteria for Green Ports and the Green Transition plan of Vietnam's maritime industry

2.1. The criteria for Green Ports

The basic standards for "Vietnam's criteria for Green Ports", coded TCCS 02:2022/CHHVN, were issued by Vietnam's Maritime Administration according to Decision no.1909/QĐ-CHHVN on 29/12/2022[2]. The standards stipulate that:

- A green port is a seaport that meets the Green Port criteria set forth in this standard and is evaluated and announced by the port enterprise.
- Green Port criteria: These criteria aim to encourage and guide businesses in investing, operating, and managing seaports sustainably, promoting the conservation of natural resources, improving management capacity, and developing seaports in a sustainable manner.

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[1] See: Decision No. 876/QD-TTg dated July 22, 2022 of the Prime Minister approving the Action Program on green energy transformation, reducing carbon and methane emissions in the transport sector; Document No. 9116/BGTVT-MT dated August 17, 2018 of the Ministry of Transport on implementing the Prime Minister's direction on developing environmentally friendly Green Ports; Decision No.78/QD-BGTVT dated January 14, 2019 of the Ministry of Transport on approving the explanatory outline and cost estimate of the environmental protection task to develop a Green Port development project in Vietnam; Decision No. 780/QD-BGTVT dated May 6, 2019 of the Ministry of Transport on approving the adjustment of the implementation time of the environmental protection task "Developing a Green Port development project in Vietnam"; Decision No. 2027/QD-BGTVT dated October 29, 2020 of the Ministry of Transport approving the Project on developing Green Ports in Vietnam;...

[2] See: Decision No. 1909/QĐ-CHHVN dated December 29, 2022, by the Director of the Vietnam Maritime Administration on the Announcement of the Basic Criteria, https://cangvuhanghaitphcm.gov.vn/images/uploads/attach/3.TCCS%20C%E1%BA%A3ng%20Xanh.pdf; Announcement No. 49/TB-BGTVT dated February 21, 2022, by the Ministry of Transport regarding the Conclusions of the Meeting on the Development of the Action Plan to Implement Vietnam's Commitments at COP26 and the Action Program on the Green Energy Transition, Reduction of Carbon and Methane Emissions in the Maritime Sector, https://thuvienphapluat.vn/van-ban/Giao-thong-Van-tai/Thong-bao-49-TB-BGTVT-2022-cam-ket-chuyen-doi-nang-luong-xanh-linh-vuc-hang-hai-504072.aspx; Anh Tu (2022), "The Roadmap for the Transition of Ships and Port Equipment to Green Energy by 2050", *VnEconomy*, October 17, 2022, https://vneconomy.vn/lo-trinh-chuyen-doi-tau-bien-thiet-bi-cang-bien-su-dung-nang-luong-xanh-den-nam-2050.htm

- The Green Port criteria are based on three main components: Commitment and Readiness; Action and Implementation; Effectiveness and Efficiency.

2.2. Roadmap for the Green Transition in the maritime industry and the development of Green Ports

** Roadmap for the Green Transition*

- 2022-2030:

+ Encourage Vietnamese ships operating domestically to fully comply with the provisions of Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL)[1] regarding energy efficiency and the International Maritime Organization's (IMO) Strategy for Reducing Greenhouse Gas Emissions from Ships[2] starting from 2025.

+ Encourage the conversion of vehicles and equipment to use electricity, green energy, or adopt equivalent measures at newly invested ports, as well as additional investments in existing ports.

- 2031-2050:

+ Vietnamese ships operating domestically must fully comply with the provisions of Annex VI of the MARPOL Convention on energy efficiency and the IMO's Strategy for Reducing Greenhouse Gas Emissions from Ships.

+ New ships, as well as those retrofitted or imported after 2035, must use electricity or green energy; by 2050, 100% of domestic vessels must transition to using electricity or green energy.

+ From 2031: Invest in vehicles and equipment using electricity, green energy, or equivalent measures at newly invested ports, as well as additional investments in existing ports.

+ From 2040: Convert vehicles and equipment at existing ports, including maritime signaling devices, to use electricity, green energy, or adopt equivalent measures.

+ From 2050: All vehicles, equipment, and maritime signaling devices at ports must use electricity, green energy, or adopt equivalent measures.

** Roadmap to develop Green Ports*

- 2020-2025:

+ Develop and issue the basic standards for Green Port criteria; pilot the Green Port model at several seaports in Vietnam and assess the results of implementation.

+ Promote awareness-raising, dissemination, and communication efforts to enhance understanding and capacity for implementing Green Port criteria in Vietnam at all levels, across industries, and among port operating enterprises.

+ Strengthen inspection, supervision, and enforcement to ensure compliance with legal regulations on environmental protection, energy conservation, and efficiency, as well as climate change adaptation in port construction, investment, and operations; take strict action against violations.

+ Research and propose amendments or additions to regulations related to the management of port planning, investment, construction, and operation to align with Green Port criteria in Vietnam.

+ Research and propose policy mechanisms to encourage and support enterprises

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[1] https://vibonline.com.vn/wp-content/uploads/2018/05/MARPOL-73-78-Viet.pdf

[2] In July 2023 (MEPC 80) IMO adopted the 2023 IMO Strategy on Reduction of GHG Emissions from Ships in accordance with the agreed programme of follow-up actions which now replaces the Initial IMO Strategy on reduction of GHG emissions from ships, https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/annex/MEPC%2080/Annex%2015.pdf

in implementing the green seaport development process in Vietnam.

+ Research, apply, and transfer clean, low-carbon, and environmentally friendly technologies in port operations to reduce emissions, save energy and improve energy efficiency, as well as protect the environment, providing the foundation for applying the Green Port model in Vietnam.

+ Strengthen international cooperation with other countries and non-governmental organizations to learn from their experiences and seek international support for the development of Green Ports in Vietnam.

- 2025-2030:

+ Develop and issue national technical standards for Green Port criteria; implement voluntary adoption of Green Port criteria at seaports in Vietnam.

+ Develop and issue policy mechanisms, as well as review and amend regulations related to the management of planning, investment, construction, and business operations of ports to align with Green Port criteria in Vietnam.

+ Continue efforts in awareness-raising, dissemination, and training to enhance understanding and capacity for implementing Green Port criteria in Vietnam; accelerate the application and transfer of clean, low-carbon, environmentally friendly technologies in port operations.

+ Assess the results of voluntary implementation of Green Port criteria at seaports; propose the development and issuance of mandatory regulations for applying Green Port criteria across the seaport system in Vietnam.

- Post 2030:

Mandatory implementation of the Green Port criteria in the planning, construction investment and business operation of seaports in Vietnam.

Green Ports in Vietnam will be developed based on six groups of criteria, including: green port perception, resource usage, environmental quality management, energy use, IT application, emission reduction and response to climate change and rising sea levels.

3. Objectives and roadmap for the development of Hai Phong Green Port, and some suggestions[1]

With the guiding principle of developing Hai Phong Port not only for the city of Hai Phong itself, the National Assembly and the Politburo have issued resolutions[2] emphasizing the role and position of Hai Phong as the largest port city in the Northern region. The city has set the goal of becoming a pioneering city in industrialization and modernization; a driving force for the development of the Northern region; and a highly developed city within the group of leading cities in Asia and the world. The Hai Phong City Master Plan for the period 2021-2030, with a vision towards 2045, states that Hai Phong will become a major seaport city in the region and globally and grow in a green direction, based on the foundations of science and technology.

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[1] Reference: Hai Phong Port, referenced from the website of the Hai Phong Port JointStock Company, https:/haiphongport.com.vn/vi/gioi-thieu; Hai Phong Port Joint Stock Company (2024), Proposal for building a green port system at Hai Phong Port Joint Stock Company (For internal use), June 2024.

[2] Reference: Decision No. 1516/QĐ-TTg dated 2/12/2023 of the Prime Minister to approve Hai Phong City Planning for the period of 2021-2030, with vision to 2045.

3.1. Introduction of the Hai Phong Port

Hai Phong Port[1] is a major brand that owns the largest and most modern seaport system in Northern Vietnam. It is capable of receiving vessels with a capacity of over 145,000 tons and has direct connections to major seaports in Europe and the Americas. Hai Phong Port Joint Stock Company (commonly known as Hai Phong Port) is headquartered at 8A Tran Phu Street, Ngo Quyen District, Hai Phong City. Established in 1874, Hai Phong Port has played a key role for over 140 years as the most important "gateway" for exchange in northern Vietnam. It serves as the primary port for the import and export of goods for 17 northern provinces, as well as for the transit cargoes from northern Laos and southern China, connecting these goods with international markets and vice versa.

Currently, Hai Phong Port employs more than 2,500 workers and consists of five subsidiaries:

- Hoang Dieu Port Single-Person Limited Liability Company;
- Chua Ve Port Branch;
- Tan Vu Port Branch;
- Hai Phong Port Medical Center Single-Person Limited Liability Company;
- Hai Phong Port Technical Training Single-Person Limited Liability Company.

The company's main business activities include:

- Loading, unloading, handling, and storing of cargoes;
- International container transshipment

- Other support services related to transportation: ship chartering and brokerage; maritime agency services; sea freight forwarding services; cargo handling, counting, loading and unloading services, etc.;
- Direct support services for inland waterway transport: tugging and assistance for sea vessels;
- Road and river maritime transportation and packaging services.
- Specialized logistics services for the Hai Phong - Lao Cai container route via railway.

Hai Phong Port currently has 19 wharves with a total length of 3,214 meters, and the water depth in front of the berths ranges from -8,4 meters to -9,4 meters (See: Table 1).

Table 1: Statistics on the Current Condition of the Quay System

Port	Number of quays	Total length	Depth	Weight (DWT)
Chua Ve Port	5	848	-8,4 mHĐ	20,000
Tan Vu Port	5	981	-9,4 mHĐ	20,000 ÷ 40,000

Source: Hai Phong Port Joint Stock Company, *The Wharf System*, https://haiphongport.com.vn/vi/cau-tau/he-thong-cau-ben.html, accessed 6/2024.

Additionally, Hai Phong Port is investing in the construction of Berth No. 3 and Berth No. 4 at the Hai Phong International Gateway Terminal (located at the Lach Huyen port area), which is expected to commence phase I operations in the first quarter of 2025, with full operations projected by the end of 2025. The total length will be 750 meters, with a depth

[1] Hai Phong Port was built by the French in 1874. In 1965, it became an enterprise under the Vietnam Maritime Transport Department. In 1978, Hai Phong Port was under the Vietnam Maritime Administration. In 1995, it became part of the Vietnam Maritime Corporation. In 2007, Hai Phong Port transitioned to operate as a single-member limited liability company under the Vietnam Maritime Corporation, and later shifted to a joint-stock company model in 2014.

of -16 meters at the berths, designed to accommodate container ships of 100,000 DWT and six STS cranes with a lifting capacity of 65 tons, 24 RTG cranes with a lifting capacity of 40 tons, 50 specialized truck tractors, two container forklifts with a lifting capacity of 45 tons, and one container spreader with a lifting capacity of 8 tons (See: Table 2, Table 3).

ships will also impose requirements on the ports they visit. At the same time, shipping companies will prioritize ports with good environmental quality, modern technology and equipment, such as shore power supply, waste collection and treatment from vessels, application of information technology, etc. Therefore, the implementation of a Green Port model will

Table 2: Storage system

Port	Name	Area (m^2)	Type of freight
Chua Ve Port	Container yard	202,110	Container freight
	Container Freight Station (CFS)	3,300	Less-than-container load
Tan Vu Port	Container yard	510,000	Container freight
	Container Freight Station (CFS)	4,230	Less-than-container load

Source: Hai Phong Port Joint Stock Company, *The Storage System*, https://haiphongport.com.vn/vi/kho-bai/he-thong-kho-bai.html, accessed 6/2024.

Table 3: Main Equipment for Operations

Equipment	Load / Capacity	Chùa Vẽ	Tân Vũ	Total
Pedestal Crane	40-45 tons	4	6	10
Quay crane (QC)	35.6-40 tons	4	8	12
Rubber tyred gantry crane (RTG)	35.6-40 tons	8	26	34
Various types of forkliffts	3-45 t tons	11	23	34
Container contractor and trailer	40 feet	14	46	60
Tug Support Vessels	1,300CV			3
Rubber-Tyred Crane	40-70 tons	1	1	2
Excavator and Bulldozer	0.5-0.75 m^3	1		1
Electronic Weighing Scale	80-120 tons	2	2	4
Automated Crane Frame	35.6-42 tons		18	18
Semi-Automated Crane Frame	36-50 tons	23	9	32

Source: Hai Phong Port Joint Stock Company, *Technology and appliances*, https://haiphongport.com.vn/vi/thiet-bi-xep-do/cong-nghe-thiet-bi.html, accessed 6/2024.

3.2. The necessity of developing Hai Phong Green Port and the role of the Vietnam Maritime Corporation

The requirements set forth by the International Maritime Organization (IMO) for the maritime industry are becoming increasingly stringent. As such, enhance the competitiveness of the Hai Phong port cluster.

Furthermore, when Hai Phong Port adopts and meets the criteria of a Green Port, it will maximize the benefits in port operations, thereby reducing operational costs and cargo handling fees. This will enhance

the competitiveness of ports in the region. The adoption of the Green Port model will also help Hai Phong Port enhance seaport environmental quality, thus alleviating the burden of addressing environmental issues arising from port operations.

It could be said that the transition to Green Ports is an inevitable trend and a mandatory requirement that Hai Phong must focus its resources on and prioritize through policies for development.

The Vietnam Maritime Corporation (VIMC) is recognized as one of the pioneering entities in diligently implementing the Government's directives on developing Green Ports and reducing greenhouse gas emissions. VIMC has carried out numerous projects related to energy efficiency, including the conversion of energy-consuming loads to low-energy alternatives, the transformation of port systems into smart ports (EDI, smart gates, smart ports), and the implementation of several green energy solutions as substitutes for traditional or fossil energy. This specifically includes the use of solar energy or wind power at certain locations; the optimization of technical and commercial management processes to meet the requirements for green logistics and efficient energy usage; among other initiatives.

VIMC has implemented campaigns to reduce cost and use energy efficiently. These initiatives have been deployed across the entire system of 16 VIMC seaports and its shipping companies. The efforts to green the ports include: (i) Completing, improving and systematically applying commercial and technical processes in production and business operations; this encompasses activities from contract signing, handling and delivery, loading and unloading at the wharves, inventory management, to incident handling; (ii) gradually upgrading and replacing high-energy-consuming loads and equipment with energy-efficient devices, utilizing new and clean energy sources in place of fossil fuels (e.g., replacing all incandescent lights with LED lights; installing solar panels on warehouse roofs, etc.); (iii) promoting digital transformation and the application of information technology; this involves comprehensive and synchronized implementation of digital solutions and the adoption of new technologies in port operations, such as SMART GATE, SMART PORT, EDI, TOS, etc.

VIMC's fleet has strictly adhered to Annex XI of the MARPOL Convention and IMO regulations concerning energy management, as outlined in the EEXI and CII, which are requirements for efficient energy governance.

VIMC is the entity directly managing Hai Phong Port. Hai Phong Port is one of the first entities to pilot the Green Port model under VIMC's initiative. As a result, it has received significant attention and timely support from VIMC, including policy advocacy at the Headquarter level, resource allocation, the introduction and promotion of technical collaboration partners, investment distribution, etc.

3.3. Goal and development roadmap of Hai Phong Green Port[1]

** Development goal*

The overall objective of developing Hai Phong Green Port is to implement the green port model in compliance with the regulations of state management authorities, while aligning with the actual

[1] See: Hai Phong Port Joint Stock Company (2024), Proposal for building a Green Port system at Hai Phong Port Joint Stock Company (Internal document), June 2024.

development conditions of Hai Phong Port. It also aims to promote the use of clean, low-carbon, and environmentally friendly technologies in the operation of seaport business activities to meet sustainable development requirements, protect the environment and ecosystems, and respond to climate change.

Specific objectives include: (i) Organizing the pilot implementation of the Green Port model, tailored to the conditions of the Hai Phong port cluster; striving to make the Green Port criteria mandatory for the Hai Phong port cluster by 2030. (ii) Raising awareness on compliance with Vietnamese legal regulations and international conventions on environmental protection; enhancing the effectiveness of environmental management in seaport operations; and promoting and joining regional and global ecological seaport association.

In the process of achieving these objectives, it is necessary to: (i) Develop an environmentally efficient seaport: Effectively control pollution sources, use energy efficiently and economically, prevent environmental accidents and risks, limit greenhouse gas emissions, and reduce the impacts of climate change. (ii) Minimize negative impacts on the environment and the seaport ecosystem: Strictly implement environmental measurements, inspections, and audits regarding emissions from vessels; collect solid waste at the port terminals; establish wastewater and runoff collection and treatment systems; prevent and control oil spills and fire hazards that could cause environmental pollution. (iii) Develop sustainable maritime transport infrastructure: Develop a modern and integrated seaport infrastructure system, enhance service quality, utilize clean and renewable energy sources to meet environmental protection requirements, and increase competitiveness among regional ports, while aligning with the actual development needs of Hai Phong Port. (iv) Ensure competitiveness and sustainable economic development for the region.

** Mission and implementation roadmap*

2024-2030 Period: (i) Develop and refine institutional frameworks, policies, and planning; (ii) Conversion to the use of electric vehicles and green energy sources; (iii) Develop green transportation infrastructure; (iv) Enhance energy efficiency and reduce greenhouse gas emissions; (v) Strengthen international cooperation, science and technology, workforce development, and communication efforts.

Post-2030 period: Implement the mandatory application of Green Port criteria in planning, investment, construction, and operational activities at the ports.

3.4. Proposed solutions for the implementation of Hai Phong Green Port in the coming period

With the objectives and roadmap as outlined above, we propose the following solutions for the implementation of Hai Phong Green Port:

** Policy solutions*

To meet the Green Port criteria, the port needs to meet stringent standards regarding the green transition and adopt necessary technical solutions. However, these solutions, especially in the initial stages, will be costly and require a clear roadmap and financial resources. The implementation of Green Port criteria will incur significant initial investment costs, such as infrastructure investment, procurement and installation of new

equipment, shore power supply, waste management and treatment, the use of clean energy, etc. For example, the conversion of maritime vessels from fossil fuels to new energy sources like methanol or ammonia is not an easy task.

Therefore, the implementation of Hai Phong Green Port will require the support of the Government, the Ministries (CMSC, Ministry of Transportation, Ministry of Trade and Industry, Ministry of Foreign Affairs), and relevant specialized agencies to seek incentives for developing countries like Vietnam to improve processes.

The Government should also introduce specific policies to support maritime port and transportation companies in the transition to ensure operational efficiency. These should specifically include: the development of regulations and national criteria related to Green Port and logistics development, the issuance of official criteria, the creation of an appropriate implementation roadmap, financial support to encourage the transition, and support for international cooperation programs to help businesses with expertise and technology exchange.

In addition, there needs to be coordination among the Government, manufacturers, logistics carriers, and consumers in the process of implementing Hai Phong Green Port on digital platforms, with a focus on technological innovation. In the green logistics process, it is necessary to elevate the process to include green transportation and port services, green warehousing, and reverse logistics (the process of collecting, recycling, and reusing packaging in the circular value chain). To expand the model, Hai Phong should consider developing free trade zones to promote the volume of goods, as well as centers for the application of new technologies with preferential policies that support import-export and the development of green logistics.

Moreover, there need to be policies and training programs to develop a workforce capable of meeting the new Green Port standards, a suitable workforce capable of implementing solutions for digital transformation, Green Transition, and reverse logistics processes for recovery and recycling.

** Solutions for ports operating at Hai Phong Port*

The ports currently operating at Hai Phong Port need to: (i) Improve energy efficiency, research and invest in installing solar power systems scaled to meet the unit's usage needs, and transition to using clean energy sources (electricity) as the main energy source in port operations. (ii) Gradually replace the entire lighting system on equipment and vehicles, so that vehicles could easily ignite while going through procedures at the gate and while waiting for cargo from vehicles within the port. (iii) Apply environmental quality management criteria to reduce emissions, minimize environmental pollution, reduce fuel consumption, and enhance criteria for waste segregation, reuse, and recycling of materials and waste. (iv) Regularly strengthen cleaning and maintenance efforts for diesel engines and all equipment, contributing to improved vehicle quality and maintaining a clean working environment based on green - clean - beautiful criteria. This also helps reduce harmful emissions into the environment. Continuously encourage workers to adopt methods, initiatives, and practices that promote fuel efficiency in vehicle operations. (v) Maintain and care for green spaces within the working area.

** Solutions for new development projects at Lach Huyen Port Area*

The new development projects (at the Lach Huyen Port area) should: (i) Adopt appropriate design: Select suitable dock construction (considering the long-term impact of rising sea levels). The design of the buildings for offices and landscapes should take environmental factors into account and leverage clean energy. (ii) Select technologies, management and operations systems, and equipment that utilize clean energy, ensuring environmental quality when the port is operational. (iii) Apply New Generation Information Technology (4.0 Technology) with environmental quality management criteria (optimize processes in port operations to minimize working time, equipment and vehicle operation, as well as external transportation vehicles entering and leaving the port for procedures, payments, and cargo handling). (iv) Apply environmental quality management criteria to reduce emissions, minimize environmental pollution, reduce fuel consumption, and enhance criteria for waste sorting, as well as the reuse and recycling of materials and waste. (v) Approach technologies suitable for actual operational conditions, gradually replacing diesel-powered vehicles with alternative energy sources such as LPG, NPG, electricity, etc.

4. Conclusion

In the current trend of deep and expansive international integration, green technology has become prevalent in the maritime transport industry, representing the sustainable development direction for enterprises. The Vietnamese Government always encourages and calls on businesses to find solutions to reduce fuel consumption, cut carbon emissions, and contribute to mitigating the impact of climate change, with a vision to adopt green technology for the maritime transport sector.

Building a Green Port system in Vietnam with an environmental-friendly approach not only meets environmental protection requirements but also helps seaports integrate internationally. Considering external and internal factors in development, the need for green, clean, and digital growth has created both challenges and opportunities for Hai Phong City in general, and Hai Phong Port in particular. Furthermore, the development of green, clean, and digital practices is compulsory to ensure sustainable development in the future ❑

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