

Various Measures for Reducing Greenhouse Gas Emissions by Vietnamese Shipping Companies from 2025 to 2030 in Accordance with the International Maritime Organization and Vietnam Register Regulations

Nguyen Dinh Thuy Huong*, Nguyen Thanh Le, Do Thi KhanhNgoc, and Hoang Thi Ngoc Quynh

Abstract: The maritime industry must face to a big challenge focused on the compulsory green energy in 2050. In case of Vietnam, the government has promulgated the national master plan, national strategy climate change and action plan on green energy transition in the transport sector, vision toward 2050, according strictly to Vietnam ‘s commitment to cut the carbon dioxide emissions to 0% under the engagement at the 26th United Nations climate change conference. At the period of warm-up, the non greenhouse gas (GHG) fuel has still been accepted. Nevertheless, under the pressure of the International Maritime Organization (IMO) and Vietnam Register regulation, especially the energy efficiency existing ship index (EEXI) and carbon intensity indicator (CII), different solutions have been taken to cut temporarily the GHG emissions by many shipping companies in Vietnam such as buying new vessels; using offshore electricity, decrease significantly the speed and cut down the number of operating machine. This articles aims to analyse advantages and weaknesses of these measures in a perspective of alternative energy at warm-up phase for green marine energy.

Keywords: Alternative energy, energy transition, EEXI, offshore electricity, Vietnam Register.

1. INTRODUCTION

The EEXI and CII have been operating challenges for Vietnamese shipping companies for international voyage. In terms of legal requirements, the Vietnamese flagged ships must respect strictly many international engagements such as the International Safety Management (ISM) code and International Ship and Port Facility Security (ISPS) code and a part of Maritime Labor Convention (MLC) 2006, International Labor Organization (ILO) 92,133; ILO 32,152 when voyaging international [1]. The Vietnam Register is mandated to control the Vietnamese standard and normative related to sea going vessel and the conformity of required vessels to these international conventions that Vietnam had engaged [2]. The implementation of EEXI and CII have come into force since 2023 [3] [4]. Actually, Vietnam Register informed the technical information of EEXI and CII testing, these regulations are compulsory and the Vietnamese shipowner must have various methods to cut the GHG emissions [5]. Three methods including slow steaming, onshore power supply and new built vessel purchase will be analyzed to indicate their efficiency and

the interest of different stakeholders in the carriage of goods by sea.

2. METHODOLOGY

The research summarized different methods in real life which are actual applied in many Vietnam shipping companies. Since 2023, facing to the requirements of EEXI and CII, many short-term and long-term measures have been taken by Vietnamese shipping companies. There are two measures solemnly indicated: navigation with lower speed and purchase of new vessels under the *IMO’s green and sustainable development guidelines*. Apart from onboard energy supply, the port service has started to provide onshore power supply (OPS). These methods are analyzed in this research in order to indicate their impacts to marine stakeholders such as crew, shipowner, cargo-owner, marine administration, who play vital role in shipping operations. The Ackerman & Eden model is employed to structure this case study framework with two factors in the model: the power and interest of each stakeholder. This analysis would indicate the sustainability and feasibility of the three methods

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Nguyen Dinh Thuy Huong and Do Thi KhanhNgoc are with the Faculty of Navigation, Vietnam Maritime University, Haiphong, Vietnam (e-mails: huongndt.hh@vimaru.edu.vn and ngocdtk@vimaru.edu.vn). Nguyen Thanh Le is with Maritime Law Education and Consultants Center, Vietnam Maritime University, Haiphong, Vietnam (e-mail: nguyenthanhle@vimaru.edu.vn). Hoang Thi Ngoc Quynh is with the Faculty of Law, Victoria University, Wellington 6011, New Zealand (e-mail: quynh.hoang@vuw.ac.nz).

* Corresponding author.

Table 1. List of promulgated documents toward green energy from 2020–2025.

Year	Promulgated documents	Reference number
2020	Orientation of the national energy development strategy of Vietnam to 2030	Resolution no 55NQ/TW
2021	COP26 & National green transition strategy plan for the period of 2021–2030 with a vision to 2050	Decision no 1658/QĐ–TTg
2022	Action plan on green energy in the transport sector by Vietnam's ministry of transport	Decision 876/QĐ–BGTVT
2023	Hydrogen energy development strategy of Vietnam until 2030 with a vision to 2050	Decision no 165/QĐ–TTg
2025	Amendments to the 8th national power development plan for the 2021–2030 period with a vision to 2050	Decision no 768/QĐ–TTg

taken. In detail, the model “Power and interest grid” developed by Ackerman & Eden in 2011 would be used to focus on the objectives and changes of various stakeholders affected by the cutting GHG emission methods [6]. Their reaction would be presumed and specific solutions would be suggested when applying these manners. The framework of Ackerman & Eden is well-known as it can evaluate the impact of various management strategies. In general, the grid is divided into four parts: High interest with low power stakeholder (suggestion for continuous information); High interest with high power stakeholder (suggestion for closer management); Low interest with low power (suggestion for continuous observation); Low interest with high power (suggestion for making satisfaction). The objective of the research aims to determine the exact position of the three GHG emission reduction methods taken by shipping companies. The power and interest grid is considered as suitable in this study where all three methods came from the private sector in shipping companies. In comparison with SWOT model (Strengths, Weaknesses, Opportunities and Threats), the Power and Interest grid provides a multilateral vision by two important axes: the degree of stakeholders’ power and the level of stakeholders’ interest.

3. LITERATURE REVIEW

On the subject of cutting dioxide carbon emission, the Vietnam Government has engaged highly to cut the GHG emission up to 0% by 2050 under the circumstances of the United Nations Climate Change Conference in

Glasgow (COP 26). From this reliable international engagement, the Vietnam Government has promulgated many executive documents and national plan to achieve this target as depicted in Table 1.

In these fundamental strategical documents, the development of different green energy sources, including ammonia, hydrogen, biofuel, and wind power has been planned. Thus, there are many researches analyzes the advantages and disadvantages of these renewable energies in maritime industries. Majority of researches focus on this technical aspect. Besides, many forecasts and reports from international organizations and companies such as UNCTAD, BIMCO, Lloyd’s, and Allianz have mentioned the necessity in policy implementation and challenges in legal framework to maintain an ongoing global maritime market which must become greener. Therefore, it is necessary to review the current practice in maritime industry, especially in case of Vietnam in order to internalize the international conventions into governmental regulations. By the way, the Government in considering these market reactions, could amend their energy ambition and action plan toward a public value: cutting the GHG emissions.

This research aims to clarify and analyze the actual reaction of the Vietnamese ship-owners, main stakeholder exploiting directly marine transport, facing to different pressures toward a green energy transition. In order to develop the maritime energy market toward a green future, it is important to take into account the law of supply and demand of this market. On the one hand, the Government plays the major role to foster the market. Actually, the Government has determined the national energy development in long term, including the maritime energy sector. In 2030, “*all sea-ports strategically in Vietnam must go green*”. This requirement is considered as demand to the maritime energy market. On the other hand, the objectives of the Government must be correspondent with the actual supply capacity of the market. If the policy idea is not encouraged enough or it is so difficult to be fulfilled, evidently, these negative externalities can lead to the failure of the plan. A compulsory demand in future from the Government cannot make sure that all Vietnamese-flagged ships could have zero GHG emission in 24 years later. The support from the shipping companies and their own operational capacities take an important part in implementation of decarbonization in Vietnam.

4. ACTUAL METHODS OF CUTTING GHG EMISSIONS

As Vietnam has been in warm-up phase of green energy transition, law and policy stops at encouragement and orientation towards many stakeholders in order to bear in their mind and to set up a long term green plan up to 2050. At the beginning period, green energy is not compulsory. Therefore, the marine stakeholders can have a large flexibility of energy choice. Actually, there have been three cutting GHG emission manners from Vietnamese ship-owners, including offshore electricity (M1); navigation with lower speed (M2) and purchase of new vessels (M3) [7]. The price and productivity of these three methods would be analyzed under the grid below as

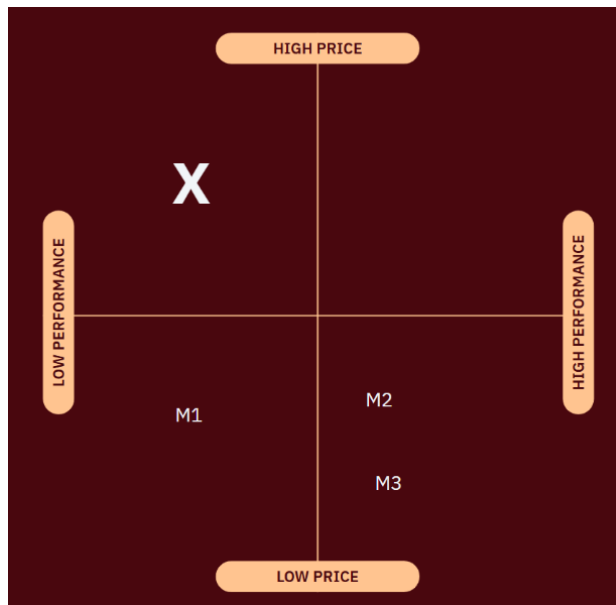


Fig. 1. Price and performance to cut GHG emissions of the three methods.

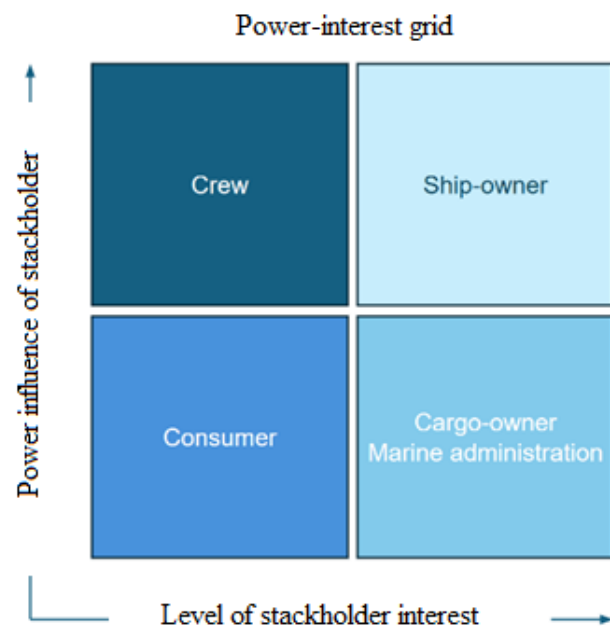


Fig. 2. Power and interest of stakeholder in carriage of goods by sea.

seen in Fig. 1.

Firstly, as the green energy transition is not compulsory, the ship-owner do not have strong ambition to pay high costs for the green projects. Their objective remains in a green attempt, an adaptation to the EEXI and CII in the light of the fact that saving money is highly appreciated under the circumstances of global inflation and earning as much as possible the annual profit. Therefore, all the methods at this moment are not at high price. Consequently, their efficiency is estimated not too high. The M1, M2 and M2 are applied for the

carriage of goods by sea. This is the reason why the stakeholders in three methods are common such as consumer, crew, ship-owner, cargo-owner and marine administration. Using the power and interest grid of Ackerman & Eden, the correlation among these 5 stakeholders would be indicated as the illustration below (Figure 2).

The crew is at low interest-high power because the seafarers are direct monitor and exploiter of the ship; however, they must obey strictly various requirements from the ship-owner. As indicated by the power-interest grid, the crew must be satisfied enough to navigate in the new circumstances. Therefore, the ship-owner must focus on crew training; wage and salary and other welfare to persuade seafarer follow seriously the IMO guidelines. The consumer has low interest and low power in case of cutting GHG emissions at this time as they do not practice directly the shipping operations and they do not focus so much on green shipping. That is the reason why the label green shipping company has not existed in Vietnam. As suggestion from the framework, it is necessary for the consumer to be observed continuously. The ship-owner is at the centre of problem when having the high interest and high power. Therefore, they need to have closer, adequate management in the green energy transition. Finally, the cargo-owner and marine administration have the same position: high interest and low power. Cutting GHG emission is administrated by public power, but the shipping company is the main stakeholder in implementation. Thus, the marine administrator has high interest but low power in implementation the cutting GHG emissions. The cargo-owner and consumer have the same position of low power because of indirect marine exploitation and navigation. Nevertheless, the cargo-owner has higher power than the consumer due to their direct pressure on ship-owner. According to Ackerman& Eden grid, the marine administration and cargo owner should keep them enough information as possible.

5. LOWER SPEED – LOW COST AND LOW EFFICIENCY METHOD

Facing to the lower speed requirement from the ship-owner, the crew has to change their habit instead of maintain the normal speed like the previous voyages. In case of Vietnam Maritime Corporation (VIMC), in respect of the requirements of EXCII and CII, all VIMC old ships must reduce navigation speed. Some of them must reduce up to 50% of designed capacity speed [8]. The problem provokes not only the navigation speed but also the training demand and the marine management. The speed changes slowly in the same marine voyage can lead to many potential risks such as lost (due to heavy weather), incident in crowded zones. The shipping company and the master must have a concrete voyage plan to navigate at a lower speed. That could bring negative reaction in case of no change in salary.

As the voyage is lengthened, the most interested question for crew is whether the wage is augmented. Their interest is different from the green objective of the ship-owner. At the Oy axe – the power capacity, the crew is placed at high position because they are the

Table 2. Number of ordered or new building ship of some shipping companies in Vietnam.

Shipping company	Quantity	Size/ Type
Hai An	1	Toro container ship
Global Pacific shipping	5	1 tanker 4 ordered at 26 000 DWT
Vietnam ocean shipping sompany	3	2 Suparamax – 1 MR oil tanker
Gemadept	2	1800TEU
Phuong Dong Viet shipping snd logistics corporation	1	Oil tanker or bulk ship
Gas shipping	2	LPG
PVTrans Pacific	2	1 Afframax 1MR

direct navigator. Nevertheless, their interest is at low position in term of cutting GHG emissions. The NIMBY (not in my backyard) is clear in case of crew. They will support the green energy goal if this process brings back to them direct lucrative objective. Higher paid job for the same voyage but longer duration should be considered evident despite of the situation of business profit. Otherwise, green energy transition could be seen as a hindrance for crew to save money.

At the ship-owner position, they are at high power and high interest in following strictly the EEXI and CII. It is obligatory for ship-owner to maintain the IMO requirement in order to exploit international voyage. Slower speed makes the voyage more longer but it's difficult for the ship-owner to increase the freight at the moment of deflation. As they must cut the GHG emissions, the ship-owner will choose the lowest cutting-cost methods. The decreased quantity of diesel oil SII 0.05 will be one of lucrative savings that ship-owner can earn. Nevertheless, there is no denying that this amount cannot perfectly cover the higher amount of crew wages and the decreased freight due to later lay time.

The consumer, the cargo-owner and marine administration stay at lower power as they are indirect stakeholder of carriage of goods by sea. The consumer has the lowest position in comparison with the other stake holder because they receive the goods from the end point of the supply chain. If the price of goods is high, the potential reaction from consumer is to buy less and to claim. The power of purchase is menaced and it will be decreased. The consumer has the same level of interest as the one of crew. While the crew focuses on wages, the consumer concentrates on goods price. They would be happy if their goal was achieved at lower price in addition of the achievement of common goal: cutting GHG emissions. The consumer of goods carried by sea is

the mass public. It is difficult to apply the Pareto principle 80/20 for the crowd toward a green future.

The cargo-owner has a further position in the Ox axe than the one of the consumer. In fact, as the voyage could be longer, the higher freight can be considered as dead freight paid by cargo-owner. Before EEXI and CII, the same distance in a shorter duration demanded the lower freight. The cargo-owner should be the first protestor when ship-owner increases the freight with a later lay time once the lower speed method is applied.

If the ship-owner doesn't want to lose the relationship with cargo-owner, the negotiation is vital. Under the circumstances of EEXI and CII implementation for all, cutting GHG emissions is not considered as an added value from the carrier. Cutting the fixed cost and variable cost, smart and flexible management become consequently a solution for ship-owner. In the light of the fact that freight paid by cargo-owner and wage of crew will be increased, it is clear that the ship-owner will seldom choose the lower speed method.

Last but not least, the marine administration plays the observant role in order to fulfill their public mission. Therefore, they don't have strong power to decide the methods applicable but their public management gives their interest a high position as the one of cargo-owner.

6. OFFSHORE ELECTRICITY - LOW COST AND MEDIUM EFFICIENCY METHOD

The offshore electricity is an alternative energy solution to face to EEXI and CII regulations. The adaptive infrastructure on board and offshore is indispensable to realize this method. The price of electricity is a consideration for ship-owner to decide. Nevertheless, the price of electricity (especially household electricity price) in Vietnam is estimated lower than the one of other countries in the ASEAN such as Singapore, Philippines, Thailand and Indonesia [9]. In June 2025, VIMC and HDF Energy signed an MOU "to deploy HDF's hydrogen fuel cell technologies, including installing fuel cells on board, onshore refuelling stations, and a shore-to-ship power supply system" [10]. When applying this method, the crew needs more training to use the adaptive equipment and to maintain strongly the energy power onboard. This is the most important condition in order to make success the offshore electricity.

The ship-owner must to pay for the adaptive equipment and ship conversion. This costs more than the expense of lower speed. Nevertheless, the price of electricity is estimated lower 5% than the one of RON95 gasoline in Vietnam [11]. Furthermore, the oil and gasoline are usually imported that could not make more profit for the State than the domestic electricity. That's the reason why electricity is encouraged not only for environmental objective. Furthermore, it will lead to another port competition of adaptive infrastructure because the ship-owner will find the amiable point to recharge their ship.

At the same long distance voyage paid with the same freight, the cargo-owner should be satisfied when the speed did not be changed. The alternative fuel for them is not a highlight consideration, their objective is always

the arrival, conditions and order of goods carried.

7. PURCHASE OF NEW BUILT VESSEL - LOW COST AND HIGH EFFICIENCY METHOD

In 2025, there were many shipping companies that had new building ship(s) or ordered in short-term new building as shown in Table 2 [12].

The new built vessels in 2025 will be stopped for ship recycling in 2045. There have been still 05 years before the milestone moment 2050 when cutting GHG emission will come down to 0%. This method requires the ship-owner to pay more attention on global ship building industry and a strong financial power for long-term. At a glance, the financial pressure will be based dominantly on ship-owner. The purchase amount of a new built ship should be taken into account the depreciation for at least 20 years. Therefore, new built vessel is not an expensive solution for the ship-owner for long-term. In comparison with maintaining old vessels, the ship owners should take prudent consideration as

Working in a modern and new ship could grant a convivial ambiance for the crew who needs to be trained in case of new appliance onboard. As the ship has been newly built, the emissions from it is clearly controlled according to the IMO requirement. The GHG emissions will be also decreased by new technologies.

The new built vessel purchase did not be received largely support by ship-owner association because of no favor in loan policy of commercial bank. The period 2004–2010 was witnessed a significant quantity of new built vessels in Vietnam with a very attractive loan interest, intervened by the Government [13]. After the fall of Vinashin and the reform of Vinalines, it is believed that the loan rate could not be down as low as in the past for the ship-owner to order new built ship. Actually, the Vietnamese flagged ship is ranked at top 30 of the world. Nevertheless, the capacity of Vietnamese fleet is moderate [14]. As a global trend in maritime industry, there could be no place for small vessel, the number of vessel decreased year by year but the size of vessel increased obviously [14].

When contracting with ship-owner, there is no guarantee for the bank to assume that the built ship will be at large size (>5000GT in general) while the ship-owner, who want to maximize as much as possible their profit, can order to build 02 small vessels rather than one big. That must a potential risk for the bank.

8. CONCLUSION

The three manners mentioned above demand at a different level the crew training as crew is on group of Low Interest but High-Power group. Salary is a variable that must be re-examined to make satisfaction to this group. The cargo-owner, belonging the group High interest but Low-Power, should be informed frequently regarding to the freight and cargo's position. The ship-owner is at centre of cutting GHG emission plan. Be prudent in planning and asset managing is evident for them. At this moment, the offshore electricity becomes an optimal solution for Vietnamese fleet. This method is one of alternative energy solutions that are applied by the

other foreign shipping companies. Alternative energy is considered as suitable transition toward net-zero in maritime industry. Purchase of new vessel is financially more economical in long-term. Nevertheless, under the circumstances of no loan encouragement from commercial banks and the uncertainty of global geopolitics, the offshore and onboard infrastructure for green energy uptake remains difficult to be determined. The navigation with lower speed is not a sustainable solution for all stakeholders. Therefore, the government must maintain absolutely the shipping age requirements to eliminate the old fleet. Furthermore, in order to foster the non-dioxide carbon emission, the Government should focus on policies for offshore infrastructure in short-term. Wind power, solar power and different renewable energy can be taken into account as alternative energy replacing fossil fuel. In long-term, the preparation of infrastructure and the possibility of an accessible green energy market with various type of renewable, clean and green energy must be listed in to-do list of the Government. Different policies concerning loan rate, estate, enterprise taxation need to be carefully researched.

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REFERENCES

- [1] D. V. M. Ha and T. T. Hieu, "A general introduction to shipping law in Vietnam", Lexology, published online 18 June 2024, <https://www.lexology.com/library/detail.aspx?g=3f986884-6183-41af-b9ce-f3283c1ccf34>).
- [2] Vietnam Register, "Sea-going ship", Activity fields, published online in 2017, <https://www.vr.org.vn/en-us/activity-fields/sea-going-ship.html>.
- [3] Viet Nam News, "High costs setback to green transition in maritime transportation", Economy, published online at 15 May 2023, <https://vietnamnews.vn/economy/1535880/high-costs-setback-to-green-transition-in-maritime-transportation.html>.
- [4] N. Anh, "Vietnam's Maritime: Efforts to develop green and sustainable maritime", Vietnam Economic News, published online at 26 May 2023, <https://conghuong.vn/hang-hai-viet-nam-no-luc-phat-trien-hang-hai-xanh-va-ben-vung-255626.html>.
- [5] International Maritime Organization, "EEXI and CII – ship carbon intensity and rating system", Media Center, published online in 2023, <https://www.imo.org/en/mediacentre/hottopics/pages/eexi-cii-faq.aspx>.
- [6] Vietnam Register, "Technical information on sea-going ships no 19TI/21TB (VRTB.TI) related to Annex 1 Resolution MEPC.328(76) Amendments to the annex of the protocol of 1997 to amend the International convention for the prevention of pollution from ships, 1973, as modified by the protocol of 1978 relating thereto 2021 registered MARPOL annex VI", Vietnam Register 2021.
- [7] F. Ackerman and C. Eden, "Strategic Management of Stakeholders: Theory and Practice. Long Range Planning", Long Range Planning, Volume 44, Issue 3,

June 2011, Pages 179–196.

- [8] Viet Nam News, “High costs setback to green transition in maritime transportation”, Economy, published online at 15 May 2023, <https://vietnamnews.vn/economy/1535880/high-costs-setback-to-green-transition-in-maritime-transportation.html>.
- [9] S. Chaturvedi, “Vietnam’s EVN raises average electricity prices”, Argus Media group, published online 26 May 2025, <https://www.argusmedia.com/en/news-and-insights/latest-market-news/2692332-vietnam-s-evn-raises-average-electricity-prices>
- [10] HDF Energy, “HDF Energy and Vietnam Maritime Corporation partner to decarbonize Vietnam's maritime sector with green hydrogen solutions and fuel cells”, Financial press releases, published online 13 June 2025, <https://www.hdf-energy.com/en/investors/regulated-information/?ID=ACTUS-0-92243&CLIENT=ACTUS-0-455>
- [11] Tu Kinh, “Shipping enterprises accelerate investment in new fleets”, Vietstock, published online 14 April 2025, <https://vietstock.vn/2025/04/doanh-nghiep-van-tai-bien-tang-toc-dau-tu-doi-tau-moi-737-1292831.htm>
- [12] UNCTAD, “Maritime profile: Viet Nam”, Country Profiles, published online at 2 December 2025, <https://unctadstat.unctad.org/CountryProfile/MaritimeProfile/en-GB/704/index.html>.
- [13] Vietnam Seaport Association, “Report of the 6th term executing committee”, the 7th VPA main meeting 2010, Hai Phong City, 2010
- [14] United Nations Conference on Trade and Development, Review of maritime transport 2024, Geneva, United Nations, 2024.