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The Collision of Climate Narratives and Green Goods Production Cost

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ABSTRACT

Context. Key factors in limiting the negative impact of human society on the planet's climate include the availability of cost-effective low-carbon technologies and manufacturers' ability to shift mass consumer demand from traditional to environmentally friendly products. Private companies, focused on maximizing profits, face a dilemma: follow a reactive logic of minimizing regulatory risks or develop proactive strategies that turn climate challenges into a source of competitive advantage. **The aim** of the study is to find a way to improve the internal operational efficiency of green goods producers to achieve price parity with conventional analogs, that, all other things being equal, will provide the mass consumer with the opportunity to realize an environmentally sound purchasing model. This work is conceptual and analytical in nature and focuses on developing a **methodology** for managing value creation in the production of green products, applicable under conditions of confidentiality of cost data specific to each company. **Results.** The article argues that mass demand for green products can only be ensured by increasing a company's internal operating efficiency to bring their production costs closer to those of traditional counterparts. The use of an internal carbon price (ICP) is proposed as a tool for achieving this goal. **Conclusions.** Unlike the traditional approach focused on hedging regulatory risks, the authors position the ICP as a tool for strategic financial planning. This allows for the a priori integration of future environmental risks' cost in target markets into project performance calculations, creating internal sources of innovation funding and establishing economic incentives to achieve price parity with traditional counterparts. The article demonstrates that this approach not only reduces strategic risks but also creates conditions for market share and company capitalization growth through proactive adaptation to changing market terms.

Keywords: internal carbon pricing; strategic management; environmental regulation; price competitiveness; green goods; financial planning; climate change

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ОРИГИНАЛЬНАЯ СТАТЬЯ

Коллизия климатических нарративов и стоимости производства зеленых продуктов

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АННОТАЦИЯ

Контекст. Одними из ключевых условий ограничения негативного влияния человеческого общества на климат планеты являются наличие финансово- эффективных низкоуглеродных технологий и способность производителей переключить спрос основной массы потребителей с традиционной на экологически чистую продукцию. Частные компании, озабоченные максимизацией прибыли, стоят перед дилеммой: сле-

довать реактивной логике минимизации регуляторных рисков или разрабатывать проактивные стратегии, превращающие климатические вызовы в источник конкурентного преимущества. **Целью** исследования является поиск способа повышения внутренней операционной эффективности производителей зеленых товаров для достижения ценового паритета с конвенциальными аналогами, который при прочих равных предоставит массовому потребителю возможность реализовать экологически обоснованную модель покупок. Работа носит концептуально-аналитический характер и сосредоточена на разработке **методологии** управления созданием стоимости при производстве зеленых продуктов, применимой в условиях конфиденциальности данных о затратах, специфичных для каждой компании. **Результаты.** В статье аргументируется, что массовый спрос на зеленые товары может быть обеспечен только повышением внутренней операционной эффективности компании для приближения себестоимости их производства к традиционным аналогам. В качестве инструмента достижения этой цели предлагается применение внутренней цены на углерод (ВЦУ). **Выводы.** В отличие от традиционного подхода, ориентированного на хеджирование регуляторных рисков, авторы позиционируют ВЦУ как инструмент стратегического финансового планирования. Это позволяет априори интегрировать стоимость будущих экологических рисков на целевых рынках в расчеты эффективности проекта, создавая внутренние источники финансирования инноваций и формируя экономические стимулы для достижения ценового паритета с традиционными аналогами. В статье показывается, что такой подход не только снижает стратегические риски, но и создает условия для роста доли рынка и капитализации компании за счет проактивной адаптации к меняющимся рыночным условиям.

Ключевые слова: внутренняя цена на углерод; стратегическое управление; экологическое регулирование; ценовая конкурентоспособность; зеленые товары; финансовое планирование; изменение климата

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1. Introduction

The stable temperature on the Earth's surface during the pre-industrial era (1850–1900) began to rise steadily and rapidly in the 1970s, exceeding this level by 1.5 °C in 2024.[1] According to the European agency Copernicus, the regions of intensive industrial development located between 20 and 60 degrees north latitude have the greatest impact on the increase in global temperatures. The carbon dioxide and methane they produce are the main contributors to the greenhouse effect, trapping solar heat within the Earth's atmosphere. Remaining in the atmosphere for a long time, their concentration reached its highest level in 2023: carbon dioxide over the last 2 million years and methane over the last 800,000 years.[2]

The already noticeable negative consequences of this development for the planet's climate, humans, and the economy have led the international community to a consensus, recorded in the 2015 Paris Agreement, on the need to take measures to reduce the content of carbon dioxide and other environmentally harmful substances in the atmosphere to prevent the global average temperature from rising above 2 °C. According to the United Nations (UN), more than 75% of global greenhouse gas emissions and almost 90% of carbon dioxide emissions come from fossil fuels used in the production of energy, goods, and services.[3]

To address this challenge, it was decided to take steps to increase the production of renewable energy sources and gradually replace fossil fuels with them, reduce energy and natural resource consumption, and preserve biodiversity. Certain successes have already been achieved in this direction. For example, in October 2024, the International Energy Agency (IEA) stated that the transition to clean energy, shaped by government policy and corporate strategies, has accelerated sharply in recent years.[4] Investment in clean energy projects is approaching $2 trillion per year, which is almost double the total amount spent on new oil, gas, and coal supply projects. China is the most active country in this regard, accounting for 60% of new renewable energy ca-

[1] 2024 was the hottest year on record, scientists say. Reuters. January 10, 2025. URL: https://www.reuters.com/business/environment/2024-was-first-year-above-15c-global-warming-scientists-say-2025–01–10/ (accessed on 31.01.2025).

[2] The 2023 annual climate summary. Global Climate Highlights 2023. The European Union. URL: https://climate.copernicus.eu/global-climate-highlights-2023 (accessed on 31.10.2024).

[3] Causes and Effects of Climate Change. The United Nations. URL: https://www.un.org/en/climatechange/science/causes-effects-climate-change (accessed on 31.10.2024).

[4] World Energy Outlook 2024. International Energy Agency. 398 p. (15–17, 46). URL: https://iea.blob.core.windows.net/assets/5e9122fc-9d5b-4f18–8438-dac8b39b702a/WorldEnergyOutlook2024.pdf (accessed on 31.10.2024).

pacity added worldwide in 2023. Solar power generation in China is expected to exceed the total electricity demand in the US today by the early 2030s. At the same time, EIA notes that despite the growth since 2010 of the installed capacity of solar power plants worldwide by 40 times, wind power by 6 times, bioenergy by 2.5 times, and hydropower by 1.4 times, the demand for electricity has increased faster than the production of clean energy. The resulting deficit is being covered by fossil fuel generation, which is the carbon footprint of the electricity sector.

The widening gap between renewable energy generation and demand requires both government action to encourage green energy production and business initiatives to reduce demand for non-renewable energy. In addition to the specifics of energy production, the planet's climate is also negatively affected by the growth in energy consumption as a whole, and the task of reducing this consumption makes it important to motivate enterprises to introduce energy-saving technologies. In addition, it is necessary to produce products with a smaller carbon footprint, which also pollute the environment during their use and disposal.

It is clear that many governments have limited capacity to support the green economy, a number of technologies do not provide price parity between environmentally friendly products and their conventional counterparts, which prevents companies from bringing them to the mass market, and the efficiency of wind and solar energy generation is highly dependent on weather conditions and the still imperfect ability to store electricity for later use. According to McKinsey,[5] only 10% of the technologies needed to meet global emission reduction commitments by 2050 have been implemented. The development, industrialization, and commercialization of the remaining 90% are still pending.

To reduce emissions to zero between 2021 and 2050, it will be necessary to spend US$ 275 trillion on physical assets alone, or approximately US$9.2 trillion per year. About $2.8 trillion of this will go toward reducing the carbon footprint of critical high-emission assets that cannot be completely phased out. The remaining $6.4 trillion will go towards financing the creation of new low-emission green assets or assets transitioning to less carbon-intensive technologies: $2.7 trillion will be needed in economically developed countries, $1.5 trillion in China and India, and $2.2 trillion in other developing economies. It is expected that 55% of the required funds will be provided by private investors and commercial banks, and only 17% by governments and related institutions.[6]

Governments are using a variety of economic measures to achieve progress toward carbon neutrality, which are very similar to carrot-and-stick policies. These include fines for companies that pollute excessively, bans on the production of certain goods or the use of certain materials, and incentives for manufacturers to develop and implement new technologies, produce environmentally friendly goods, and provide relevant services. The state encourages consumers to purchase certain environmentally friendly goods. The state may ban the import of goods that exceed the carbon footprint standards of local manufacturers of similar products or impose higher import taxes on them. There is also the opposite practice, where the authorities restrict the import of overly environmentally friendly and competitively priced foreign goods, thereby protecting not consumers and nature, but local manufacturers of less environmentally friendly alternatives.

Despite government incentives, compliance with sustainable development principles in the production of green goods is not a primary goal for businesses, as maximizing profits is their priority. If environmental protection, in terms of regulating their activities and consumer preferences, is consistent with the achievement of this goal, they will take appropriate measures to reduce the consumption of non-renewable natural resources and energy, making their products more environmentally friendly in terms of production, consumption, and use. However, when environmentally responsible practices, such as the introduction of resource-saving technologies or

[5] McKinsey Global Institute: 2024 in charts. McKinsey Global Institute. December 2024. 18 p. (6). URL: https://www.mckinsey.com/mgi/our-research/mckinsey-global-institute-2024-in-charts (accessed on 11.11.2024).

[6] Financing the net-zero transition: From planning to practice. McKinsey & Company in cooperation with the Institute of International finance. 2023. 60 p. (4, 6, 19). URL: https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/financing-the-net-zero-transition-from-planning-to-practice (accessed on 25.08.2025).

the reduction of harmful emissions, conflict with economic efficiency and the goal of maximizing profits, companies tend to limit their environmental activities. This occurs in cases of technological unavailability, high implementation costs, or low effective demand for green products. Under such conditions, corporate strategy primarily focuses on complying with mandatory regulatory requirements, without taking proactive steps to prevent environmental degradation.

In other words, the only way to get manufacturers to actively participate in reducing their carbon footprint and environmental pollution is to show them that the relevant technologies are available and accessible to them, and that using these technologies will enable them to create new products or add new properties to traditionally manufactured goods at a price that is acceptable to consumers in both cases. The lack of effective demand for environmentally friendly products is a fundamental constraint on their commercial production. In this context, government regulation measures do not always correlate with corporate profit maximization goals. When compliance with increasingly stringent environmental standards or competition with foreign counterparts undermines the economic viability of companies, two scenarios are possible: relocation of production to jurisdictions with less stringent regulations or complete cessation of operations, as illustrated by examples of a number of European companies in 2024.[7] Both scenarios lead to negative socio-economic consequences: rising unemployment, declining tax revenues, and a decline in consumer welfare due to weakened competition, rising prices, and a narrowing of the supply of goods on the domestic market.

As a result, there is a dissonance between the ability and desire of governments to reduce the negative impact of the economy on the environment and compliance with the principles of economic globalization, which are based on the international division of labor, market openness, and free competition to provide consumers with goods that offer the best value for money. In a more pragmatic sense, there is a conflict between society's desire to reduce environmental pollution and companies' obligation to maximize profits while producing goods that are acceptable to society in terms of quality and price, as well as in volumes that allow the company to increase shareholder returns on investments in this production and satisfy the interests of other stakeholders. Accordingly, the purpose of this article is to find a way to mitigate this conflict by satisfying both sides.

To resolve this contradiction, the article is structured as follows. The subsection "Public policy and environmental regulation" of the section with a review of the literature critically assesses the effectiveness of traditional carrot-and-stick measures. The subsection "Attitudes of retail and corporate buyers toward green products" in the same section examines a key market condition: achieving price parity. The section "Corporate behavior and incentives" identifies systemic barriers to green investment. On this basis, the section "Internal carbon pricing as a strategic tool" proposes a proactive management model that transforms climate risks into a source of financing for innovation and competitive advantage.

2. Literature review and institutional context

2.1. Public policy and environmental regulation

The transfer of production capacity from developed to developing countries and the focus of developed countries on knowledge-intensive and high-tech industries as part of the process of economic globalization have led to an increase in environmental pollution in developing countries and a decrease in developed countries. Absolute indicators confirm this trend, which, if all other factors are equal, should facilitate the transition to carbon neutrality for developed countries while making it more challenging for developing countries. However, if we take into account that energy consumption largely depends on the ability of the corporate sector and the population to pay for it, the picture of the associated environmental pollution looks somewhat different.

According to International Monetary Fund experts, carbon dioxide emissions per capita are the highest in the world in the United States (14 tons per person in 2021), while in China this figure is about 8 tons, in the European Union about 5 tons,

[7] European companies cut jobs as economy sputters. Reuters, November 5, 2024 URL: https://www.reuters.com/business/european-companies-cut-jobs-economy-sputters-2024–07–15/ (accessed on 05.11.2024).

and in developing countries, which account for half of the world's population, about 2 tons [1, p. 3]. The UN concludes in this regard that the most affluent segment of the population in economically developed countries bears the greatest responsibility for environmental pollution, given the scale of their consumption: 1% of the world's population accounts for more greenhouse gas emissions than 50% of the poorest population.[8]

Three-quarters of global greenhouse gas emissions in 2021 were related to energy production (25% for electricity and heat generation, 19% for industrial operations, 14% for transport fuel, 7% each for construction and other purposes), 15% to agriculture, and the rest to emissions from industrial processes and waste. By type of fuel used for energy generation, emissions are primarily associated with the use of coal (45%), oil (30%) and natural gas (25%) [1, p. 7].

These figures largely explain the difference between developed and developing countries. Richer countries require more energy, which they are able to pay for, to provide themselves with electricity, increased mobility, comfortable living conditions, and energy-intensive industries, particularly for data storage and processing. In this context, the climate narratives initiated by developed countries, which require significant costs, can also be interpreted as their desire to reduce the competitiveness of manufacturing companies in developing countries in terms of added value compared to high-tech products from developed countries.

The structure of greenhouse gas emission sources explains the focus of governments' environmental policies on energy generation, production processes, transport, and construction. At the same time, the most common instruments of such policies in these sectors of the economy are, as in the G-20 countries, regulatory bans and restrictions, followed by subsidies and schemes for paying for carbon emissions above the established norm in the form of a tax or within the framework of trading systems [1, p. 7]. It should be noted that the very idea of "using [government] market incentives, including pollution taxes… and tradable permits" to reduce the negative impact of industry on nature was first put forward by M. Porter and K. van der Linde in 1995, who argued that "firms can actually benefit from well-designed environmental regulations, which, by stimulating innovation, can actually increase competitiveness" [2, p. 98, 111].

In many cases, government restrictions work in conjunction with a carbon trading system, whereby companies whose greenhouse gas emissions are below the government-set standard are issued certificates for the difference between their actual emissions and the standard. Companies that exceed this limit, which is usually constantly decreasing, are forced to purchase such certificates in order to formally comply with it; otherwise, they will be required to pay the corresponding tax. At the same time, this structure motivates companies to invest in green technologies that will allow them to comply with regulatory restrictions on their own. The European Union reports that this system and bans have reduced greenhouse gas emissions in the region by 47% between 2005 and 2023.[9]

Regarding another tool for reducing environmental pollution, government subsidies that target both consumers of green goods and their producers, there is disagreement in academic circles about their effectiveness in achieving their stated goal.

For example, C. Zhang, C. Wang, and H. Zhao argue [3] that consumer subsidies can always be beneficial to the environment, while under certain conditions they can encourage excessive consumption. At the same time, subsidies for green products indirectly undermine the financial performance of companies that produce less environmentally friendly but more affordable conventional alternatives, due to a decrease in demand for the latter. Looking at the electric vehicle industry, the authors argue that even with consumer subsidies, the major inconveniences associated with the imperfect infrastructure for their operation push buyers towards less environmentally friendly cars. This consideration points to the advisability for governments to direct subsidies toward the development of appropriate infrastructure for the use of technically complex green goods, along with encouraging their production.

[8] Causes and Effects of Climate Change. The United Nations. URL: https://www.un.org/en/climatechange/science/causes-effects-climate-change (accessed on 31.10.2024).

[9] What is the EU ETS? URL: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/what-eu-ets_en (accessed on 03.11.2024).

J. Bian, G. Zhang, and G. Zhou, comparing environmental subsidies to consumers and producers, find [4] that by stimulating an increase in production volume, the former leads to higher industrial emissions using existing technology than subsidies to producers, which are aimed at improving production technology to reduce environmental pollution, which is the goal of the state's environmental policy. The authors show that consumer subsidies also represent a higher financial burden for the government than subsidies to producers.

S. Saha, S. Majumder, and I. Nielsen conclude [5, p. 169817] that when producers are subsidized, consumers receive a more environmentally friendly product at an affordable price. In addition to short-term benefits, technological innovation or product development through producer subsidies can help ensure future sustainable development.

A comparative analysis of the profit-maximizing behavior of green product manufacturers and retail chains led Y. Yi, Y. Wang, C. Fu, and Y. Li to conclude [6] that manufacturers and the entire supply chain can be more profitable with the introduction of environmental regulations, including emissions taxes and green subsidies, but only with the right combination of parameters, than without them.

It appears that, in addition to the above consequences of its application, consumer subsidies, by guaranteeing certain sales volumes using existing technology, do not motivate manufacturers to further develop it, since profit maximization is ensured by sales growth. At the same time, government subsidies can be canceled at any time due to a budget deficit or a change in preferences by a new political force that has come to power. Under these conditions, it is difficult for companies to rely on consumer subsidies in the long term when planning business development and investments. Moreover, the market may prefer not the subsidized product but the offering of a competitor who has developed a greener product that consumers, due to their environmental preferences, may want to purchase even at a higher price.

The environmental taxes being introduced mostly ensure that companies reactively participate in reducing their carbon footprint but do not motivate them to engage in proactive innovation, because the basis for such taxes is the ability of the worst companies in environmental terms to pay them in order to avoid creating employment problems (in Russia, for example, in 2025, only a few of the 300 largest industrial facilities, which account for 60% of all pollution in the country, will be subject to a multiple (100 and 25 times) increase in environmental payments, which experts explain by relatively lenient requirements).[10] In addition, high environmental taxes artificially increase final prices for consumers, thereby reducing their purchasing power. And although some consumers, as revealed in a global survey conducted by PwC in 2024, are willing to accept such costs in the form of a 9.7% surcharge on the price of a non-green alternative, 64% of respondents to the same survey cited price increases as their biggest problem.[11] This is particularly true for the end-user energy market, where prices are artificially kept high in some markets to make renewable energy production profitable, as its cost without subsidies is higher than that of energy generation from fossil fuels. As M. Frondel, S. Sommer, and K. Vance [7] state, the financial support provided by the Renewable Energy Sources Act in Germany is necessary to increase the share of green electricity. Without it, the high cost of most renewable energy technologies would make it impossible for them to compete with traditional electricity generation.

Investment bank Lazard and consulting firm Roland Berger found[12] that the average cost of a megawatt of energy from renewable sources (sun and wind) at the end of the 2009–2024 period was significantly lower than that of coal and gas (without steam generation). However, when the cost of energy storage is taken into account, the total cost of one megawatt of industrial production (including capital, fixed and variable costs, as well as the cost of fuel, where required) without subsidies is in the range of $ 60–210 for

[10] The top 300 industrial polluters in Russia will hardly be affected by the increase in environmental payments. Kommersant. 04.02.2025 (In Russ.). URL: https://www.kommersant.ru/doc/7478390 (accessed on 15.08.2025).

[11] Shrinking the consumer trust deficit. PwC's Voice of the Consumer Survey 2024. Pw C. May 15, 2024. URL: https://www.pwc.com/gx/en/issues/c-suite-insights/voice-of-the-consumer-survey.html (accessed on 04.11.2024).

[12] Levelized Cost of Energy. Lazard with support from Roland Berger. June 2024. 48 p. (16, 33, 34, 37, 38). URL: https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf (accessed on 19.08.2025).

solar panels, $45–133 for wind power, coal-fired power plants — $69–168, and gas-fired power plants — $45–108.

W. Scott found [8, p. 1, 10–11] that the reduction in carbon emissions is largely due to the choice of raw materials rather than improvements in production processes. For example, multi-level government incentives for biofuel production in the US exceed the social benefits of its use. He concludes that this discrepancy requires a reassessment of biofuel policy to ensure its economic and environmental soundness.

This problem also affects electric cars, whose CO2 emissions, when taking into account the entire production cycle, are twice as high as those of diesel cars, due to the high carbon intensity of batteries, aluminum, which reduces the weight of the car, and the large number of electronic components.[13] In other words, estimates of emissions during production and operation, where electric cars come out on top, vary greatly. If we also take into account carbon emissions and environmental pollution during the disposal of these types of cars, the overall result may not be so favorable for electric cars, the purchase of which is often subsidized by the state.

Thus, it can be concluded that government practices to combat environmental pollution yield mixed results, promoting the development of green technologies and their implementation in everyday life, but not always taking into account the full scale of their impact on the environment. At the same time, such subsidization of green products may result in the closure of traditional industries that do not receive government support and a decline in consumer purchasing power due to the generally higher price of green goods. In addition, the state often has more pressing problems to solve with limited budgetary resources, which require funding. Therefore, it can be assumed with a high degree of certainty that further progress in reducing greenhouse gas emissions and environmental pollution depends to a large extent on the behavior of retail consumers, often determined by non-economic factors, as well as corporations that are interested in reducing the carbon footprint of raw materials and components, production processes, operation, and disposal of their products only when it becomes financially beneficial for them.

2.2. Attitudes of retail and corporate buyers towards green products

Experts in behavioral economics pay a lot of attention to the reasons that influence the preferences of retail buyers. V. D'Angelo, F. Kappa, and E. Peruffo argue [9, p. 1908] that the tendency to purchase green goods is a consequence of awareness of the seriousness of environmental problems, and that involvement in solving these problems gives people a sense of satisfaction because such purchases can benefit the environment and society as a whole. In other words, such decisions are based on an altruistic rather than a selfish approach to spending one's own money. However, this preference is not absolute. C. Wang, M. Shen, and M. Chu note [10, p. 7] that the positive influence of attitudes on the greening of consumer intentions can become insignificant when, for example, consumers face problems such as high prices and uncertainty about the significance of their actions.

Empirical research confirms these findings. For example, a global Boston Consulting Group (BCG) survey of consumers in developed and developing countries reveals[14] that although 80% of them consider the need to promote sustainable development in their decisions about purchasing everyday goods and services, including utilities, clothing, household appliances, and cars, only 20% believe that their actions can influence the direction of this development. Far fewer shoppers are willing to pay more for green products than for conventional alternatives, and 70% of them are skeptical of corporate claims about progress toward sustainability. High-profile accusations of corporate greenwashing only reinforce this attitude. It is noteworthy that products with zero or low carbon footprints are not among the key priorities of the mass consumer. Characteristics such as the naturalness of materials, product durability, and the recyclability of packaging and the product itself come to the fore. Moreover, a comparative analysis has shown that consum-

[13] Mastering the dual mission: Carbon and cost savings. McKinsey & Company. June 2022. 6 p. (2). URL: https://www.mckinsey.com/capabilities/operations/our-insights/mastering-the-dual-mission-carbon-and-cost-savings

[14] Consumers are the key to taking green mainstream. Boston Consulting Group. September 2022. 25 p. URL: https://www.bcg.com/publications/2022/consumers-are-the-key-to-taking-sustainable-products-mainstream (accessed on 05.11.2024).

ers in developing countries are more willing to pay for the environmental friendliness of goods and services than buyers in developed economies.

In some cases, retail consumers themselves set the requirements that must be met in order for them to be able to afford a green product. For example, a 2024 BCG study shows[15] that in the US, the desire to buy an electric car is realized if the charging time is no more than 20 minutes; travel time to a fast charging station and waiting time there should not exceed 30 minutes; range on a single charge should be at least 350 miles (560 km); and the price should not exceed $ 50,000. They also demand greater variety in such vehicles. Otherwise, it is difficult to expect a transition to mass purchases of such cars. How to meet these requirements and remain profitable is now up to the manufacturer. At the same time, Chinese electric vehicles, which largely meet these requirements, are not available to American buyers, as their import into the US is virtually prohibited.

Research by L. Lorenzoni and M. Hulme shows [11] that retail consumers' own experiences and beliefs are equally important, namely that climate change has or will soon have a direct negative impact on their lives and is not some distant problem whose consequences will not affect them.

The natural priority for retail consumers is their ability to afford green goods and services, both directly and indirectly through green taxes. Thus, S. Sommer, L. Mattauch, and M. Pale found in a survey of 6,000 German households [12] that respondents who prefer green spending are likely to support a carbon tax, but support decreases significantly at higher tax rates.

For corporations, the attitude towards green products is primarily shaped by procurement policy, which is based not on an emotional component that determines preferences for greener raw materials, materials, or components, but on the company's ability to generate additional profits by using such products. Another aspect of applying environmental practices is the development and implementation by a company of technologies that reduce the consumption of energy, raw materials, and materials from non-renewable sources, as well as create new green products. The main driver of environmentally friendly behavior by companies is the demand for the green goods they produce. At the same time, government regulations on environmental pollution force companies to adapt to them but rarely motivate them to perform significantly better than these requirements. Thus, companies are only willing to improve their environmental performance if they can improve their financial results by reducing their operating costs and increasing the volume and margins of their green product sales.

In other words, it is possible to purchase green components of a product, as well as to create a new green product, and thus satisfy environmental narratives and requirements, but this will be done if there is demand for such a product and the corresponding costs are recouped. Accordingly, there is a problem of balancing environmental and financial efficiency, only a successful combination of which, as S. Hart and M. Milstein [13] point out, can ensure an increase in shareholder wealth, which they define as the creation of sustainable value. At the same time, according to I. Miroshnichenko, R. Barontini, and F. Testa [14, p. 340], internal environmental practices (pollution prevention and green supply chain management) are the main environmental factors affecting financial performance, while external environmental practices (green product development) play a secondary role in determining financial performance. They also doubt that the implementation of the international standard ISO 14001, which defines general requirements for environmental management systems, has a positive impact on financial performance. This skepticism, however, can be partly explained by the fact that, as noted by P. Arozena, R. Orcos, and F. Zuagi, "the economic benefits of ISO 14001 are most significant for large companies in countries with a high level of environmental awareness" [15], which points to the importance of contextual variables.

The attitude of companies towards the transportation of raw materials, components, and finished products by shipping companies, whose activities, as part of the global transport business, contribute significantly to atmospheric pollution, is indicative. In 2022, 82% of corporate customers of maritime transport expressed their willingness to pay a 3% premium for zero-carbon transport, which corresponds to $ 10–20 billion in addition-

[15] Can OEMs Catch the Next Wave of EV Adopters? Boston Consulting Group. March 2024. 12 p. (2). URL: https://www.bcg.com/publications/2024/can-oems-catch-the-next-wave-of-ev-adopters (accessed on 21.10.2024).

al income for shipowners. However, this amount is not enough to cover all the costs of decarbonizing such transportation, which requires a premium of 10–15%. It is noteworthy that the key motivation for customers to pay for zero-carbon transportation in 2022 was pressure from regulators (such as EU Regulation 2023/1805 on the use of renewable and low-carbon fuels in maritime transport[16]) — 47% of all possible answers, 34% of answers related to the corresponding requirements of the customers' product buyers, 16% to the requirements of banks financing the customers' activities, and only 3% to the customers' ability to cover these costs at the expense of buyers. However, more than half of international transport customers believe that even more expensive transportation will help them win the competition in the market for their finished products due to a smaller carbon footprint.[17] A similar situation regarding willingness to pay a premium for decarbonization is observed in the production of electric cars and washing machines, as well as in relation to its sufficiency to cover the corresponding costs and improve competitive position.[18]

Based on the above, it can be concluded that the willingness of both individual and corporate consumers to purchase environmentally friendly goods and services is shaped by two key conditions: affordability and (or) the material benefits of using them. Thus, economic feasibility remains the decisive factor determining consumer choice in favor of green alternatives.

On the other hand, the policy of economic deglobalization pursued mainly by the governments of developed countries makes it difficult for many retail and corporate consumers to access the most environmentally efficient solutions, thus undermining the very idea of free competition and open markets in the context of the movement towards a cleaner environment worldwide.

3. Corporate behavior and incentives

Currently, environmental issues do not take precedence over social and corporate governance issues in any region of the world in terms of ESG (environmental, social, governance) compliance. However, environmental protection receives slightly more attention in the EU, as well as in international companies with annual revenues exceeding $ 1 billion, compared to smaller organizations.[19]

A global survey of companies in various industries conducted by BCG in 2024 showed that only 9% of them report on Scope 1, 2, and 3 emissions, only 16% set targets for these indicators,[20] and less than 10% of companies have reduced their emissions by more than 4%.[21] K. Jansson points out [15, p. 93] that this largely depends on the choice of environmental strategy. If a reactive approach is chosen, the main focus will be on compliance with environmental standards and emission control, leaving the original production process untouched. If a reactive approach is chosen, the focus will be on compliance with environmental regulations and emission control, leaving the original production process untouched. When choosing a proactive approach, the goal is to improve the efficiency of the production process by investing in new technologies that reduce costs and prevent pollution, leading to a significant reduction in environmental risk.

[16] Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU; Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC. Official Journal of the European Union. L 234. English edition. Vol. 66 Legislation 22 September 2023. 211p. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ: L:2023:234: FULL (accessed on 22.10.2024).

[17] Customers' willingness to pay can turn the tide toward decarbonized shipping. Boston Consulting Group. 2022. 12 p. (2, 5, 6). URL: https://www.bcg.com/publications/2022/customers-willingness-to-pay-to-decarbonize-shipping (accessed on 22.10.2024).

[18] Green Awakening: Are consumers open to paying more for decarbonized products? Boston Consulting Group. December 2023. 15 p. URL: https://web-assets.bcg.com/fa/44/8abcfccf430ca039a3a1417ac690/green-awakening-are-consumers-open-to-paying-more-for-decarbonized-products.pdf (accessed on 22.10.2024).

[19] ESG momentum: Seven reported traits that set organizations apart. McKinsey & Company. May 26, 2023. 17 p. (4, 13). URL: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/esg-momentum-seven-reported-traits-that-set-organizations-apart (accessed on 22.10.2024).

[20] Boosting your bottom line through decarbonization carbon emissions. Survey Report 2024. Boston Consulting Group. September 2024. 15 p. URL: https://web-assets.bcg.com/09/68/8b0f9c5c4dea8c37f757b87705f3/why-climate-leaders-are-seeing-bottom-line-results-sep-2024-edit-04.pdf (accessed on 17.10.2024).

[21] To inspire action on net zero, set a price for carbon. Boston Consulting Group. November 03, 2023. 10 p. (3). URL: https://www.bcg.com/publications/2023/benefits-of-carbon-pricing-to-inspire-net-zero (accessed on 17.10.2024).

Companies that do not take a proactive approach to green manufacturing may end up complicating their financial situation. According to BCG, most electric vehicle manufacturers in developed countries are currently losing around $6,000 on each vehicle they sell for $50,000, after taking into account tax incentives for customers. At the same time, they can only close half of this cost gap by making the right technology choices and economies of scale. But we must also take into account competition from Chinese imports, which (in the case of open markets and free competition promoted by Western countries over the past 50 years — authors) will likely drive market prices down even further, exacerbating the profitability problem. At some point, it will become unprofitable for such manufacturers to lose money on every car they sell.[22] It is highly likely that they will abandon the production of electric vehicles or demand strict protection of the domestic market, as is the case in the US, where electric vehicles from China are effectively banned, or state subsidies. But in any case, strategically, they may lose out to new manufacturers of these new means of mobility. The implementation of the relevant European regulations poses significant challenges for traditional industries. By the deadline initially set by the regulator, only a limited number of companies had achieved the target share of new vehicles with a minimal carbon footprint. The other market participants, who form its core, failed to meet the requirements at the end of the reporting period. In the long term, this could have significant financial consequences for a number of large industrial groups.[23] According to expert estimates, the potential total amount of possible sanctions for the sector could be in the tens of billions of euros, with a significant portion theoretically attributable to the leading market players.

One can hardly challenge the view of McKinsey's industrial and sustainability practice experts, who argue[24] that "the single most effective way for companies to scale climate technologies is to strive for cost parity with carbon-intensive alternatives." And the CEO of British energy major BP has stated outright that "we want to expect the same level of returns from our energy transition projects as we have from our historical businesses".[25]

High production costs encourage many companies involved in climate technology to add a "green premium" to the price of their products, which can deter many potential buyers. At the same time, non-price factors that are important to consumers who prefer environmentally friendly products can help increase sales, which in most cases account for a smaller share of sales in the relevant product class.

Many countries would like to switch to cleaner energy sources, but their high cost makes projects involving their use financially unviable. The IEA points out[26] that developed and developing economies importing liquefied gas generally need prices of around $3–5 per MMBtu (million British thermal units) to make gas attractive as a large-scale alternative to coal, but for liquefied natural gas producers in most new export projects, an average price of around $8/MMBtu is acceptable to cover investment and operating costs.

It is evident that the untested nature of many green technologies and products, combined with their high cost, creates increased business risks, which generally hinders the rapid return on investment of such projects, despite their anticipated long-term financial efficiency. At the same time, green goods and services are in demand among retail consumers motivated by environmental awareness, as well as corporate buyers seeking to reduce the carbon footprint of their production in the context of tightening government regulatory requirements. The combined

[22] Can OEMs Catch the Next Wave of EV Adopters? Boston Consulting Group. March 2024. 12 p. (3). URL: https://www.bcg.com/publications/2024/can-oems-catch-the-next-wave-of-ev-adopters (accessed on 21.10.2024).

[23] Europe's carmakers discount EVs, hike petrol car prices as new emissions rules loom. Reuters. December 17, 2024. URL: https://www.reuters.com/business/autos-transportation/europes-carmakers-discount-evs-hike-petrol-car-prices-new-emissions-rules-loom-2024–12–17/ (accessed on 11.01.2025).

[24] A radical approach to cost reduction at climate tech companies. McKinsey & Company. June 18, 2024. 9 p. (1). URL: https://www.mckinsey.com/capabilities/sustainability/our-insights/a-radical-approach-to-cost-reduction-at-climate-tech-companies (accessed on 21.12.2024).

[25] European oil giants step back from renewables path. Reuters. November 18, 2024. URL: https://www.reuters.com/business/energy/european-oil-giants-step-back-renewables-path-2024–11–18 (accessed on 21.12.2024).

[26] World Energy Outlook 2024. International Energy Agency. 2024. 398 p. (19). URL: https://iea.blob.core.windows.net/assets/5e9122fc-9d5b-4f18–8438-dac8b39b702a/WorldEnergyOutlook2024.pdf (accessed on 21.10.2024).

effect of these factors can have a mixed impact on companies' operating costs while creating potential for revenue growth through a shift in market share in favor of green producers at the expense of suppliers of conventional alternatives. M. Sato, T. Kruse, J. Burke, M. Mohnen, and P. Pope [17] conclude that the high operating margins of green goods production are combined with low asset turnover and accounting profits due to increased innovation costs, which negatively affects return on investment. In other words, achieving the desired financial results requires significant investment in working capital and continuous innovation in order to increase operational efficiency and gain a competitive edge in the product market.

Private sector financing of green projects is influenced by conflicting factors. On the one hand, their appeal is reinforced by the dominant environmental discourse, government support in the form of incentives, and growing consumer demand, including the willingness of a segment of the market to pay a "green" premium. On the other hand, many green products remain fundamentally uncompetitive in the mass market without ongoing government subsidies and regulatory restrictions on traditional counterparts, creating high risks and uncertainty regarding the financial returns on projects.

In terms of capital sources, equity financing for such projects is often motivated by investors' long-term ESG expectations, while debt financing is driven by lenders' desire to diversify and "green" their portfolios by reducing the concentration of assets with a high carbon footprint. However, financial institutions (both commercial and investment banks) simultaneously perceive green projects as risky ones due to the immaturity of technologies and the volatility of the regulatory environment and fear conflicts of interest that may arise when refusing to finance traditional "brown" clients. In 2025, this attitude was reflected in the withdrawal of the world's largest banks from the Net Zero Banking Alliance. Among them were Britain's HSBC, America's Goldman Sachs and JPMorgan Chase, and Japan's Mitsubishi UFJ Financial Group Inc.[27] In January 2025, the largest investment fund, Black Rock, withdrew from a similar alliance of asset managers.[28]

The above analysis shows that, despite growing social and regulatory demand for environmentally friendly products, companies remain skeptical about their financial effectiveness. This position is due to a number of constraints:

- Uncertainty and volatility of government support: Government incentives (subsidies, tax breaks) and regulatory pressure (bans, quotas) are unstable. The lack of long-term guarantees in this area creates significant risks for the profitability of green projects that require long investment horizons.
- Limited effective demand: High price sensitivity among consumers (both retail and corporate), despite growing demand, makes the premium price of environmentally friendly goods the main barrier to their mass distribution, even with subsidies.
- Increased discount rate: Taking into account increased technological, market, and regulatory risks forces companies to apply a higher discount rate to green projects, which directly reduces their estimated net present value (NPV) and investment attractiveness.
- Inconstancy of monopoly rents: Pioneer companies can temporarily extract excess profits from their monopoly on new green technologies. However, with the emergence and growth of competition, these monopoly rents quickly disappear, leveling out the exceptional profitability for the industry as a whole.
- Tendency toward symbolic compliance: In conditions of high uncertainty, many companies choose a risk minimization strategy, limiting themselves to formal compliance with regulatory requirements or shifting the focus toward less capital-intensive components of the ESG agenda (social policy, corporate governance) at the expense of real environmental investments.

Despite these circumstances, objective reality shows that the climatic conditions in which companies operate are changing, and quite rapidly. Therefore, the conclusion by T. Noordewier and M. Lucas that "economic activity can no longer be separated from the realities of the biophysi-

[27] HSBC exits banks' climate coalition abandoned by Wall Street. Bloomberg. July 11, 2025. URL: https://www.bloomberg.com/news/articles/2025–07–11/hsbc-exits-bankers-climate-coalition-abandoned-by-wall-street (accessed on 22.08.2025).

[28] BlackRock quits climate change group in latest green climbdown. Financial Times. January 10, 2025. URL: https://www.ft.com/content/f0fb9841-db1d-442e-a757–1a1327497fb1 (accessed on 22.08.2025).

cal environment" [18, p. 11] requires investment in reducing environmental pollution, creating products with zero carbon footprint, or giving traditional products new environmentally friendly properties.

4. Internal carbon pricing as a strategic tool

4.1. The concept of internal carbon pricing

Given the inevitable tightening of environmental regulations in various forms, as well as the instability of potential government support on both the demand and supply sides, companies should primarily rely on their own strategic capabilities to develop competitive products.

For the purposes of this study, key concepts are defined as follows:

• Internal carbon price (ICP) is a management parameter voluntarily set by a company for strategic planning and investment assessment purposes. It is a monetary valuation of a ton of CO_2 equivalent emissions used to model future costs associated with carbon regulation and to incentivize internal operational efficiency.

• The effectiveness of green investments is the achievement of financial return targets (such as net present value or internal rate of return) while meeting strategic goals of reducing the carbon footprint and improving the environmental performance of a product or process. In the context of this work, effectiveness is assessed primarily through the prism of achieving price parity with traditional analogs as a condition for entering the mass market.

• A corporate climate strategy is a comprehensive action plan that integrates decarbonization goals into a company's business model with a focus on creating long-term value. Under the proposed approach, such a strategy is transformed from a defensive one (risk minimization) to a proactive one, where instruments such as ICP are used to finance innovation and capture new market segments.

In this context, the internal carbon price is a key tool for managing environmental risks. This voluntary mechanism allows companies to model and internalize carbon costs at the planning stage, thereby assessing the economic feasibility of producing a green product given its higher cost relative to its traditional counterpart. If the carbon footprint is successfully reduced and the cost is equalized, the use of ICP can directly improve the financial performance of the project. The use of ICP is a relatively new phenomenon, the types and examples of which are given in [19, p. 35, 36].

Theoretical ideas about ICP and its relationship with environmental regulations external to companies are quite diverse.

I. Dao, T. Ronkalli, and R. Semet note [20, p. 6, 35–37] that in 2024, external regulation of carbon emissions by companies was distributed worldwide as follows: exchange-traded carbon credit and certificate schemes accounted for 38% of all programs, including 8% in the implementation phase, while carbon taxes accounted for 62%, of which 26% are still only planned. Internal corporate carbon regulation programs were dominated by shadow pricing schemes (68%), with implicit pricing and internal commission schemes each accounting for 13% (these figures are confirmed in a study by M. Desjardins, J. Gianfrate, M. Gitti, and B. Sinclair-Desgagne [21]).

The factors determining the level of internal carbon pricing are compliance with emissions trading schemes or carbon tax systems (35% and 26%, respectively), as well as the cost of achieving emission reduction targets and the cost of voluntary carbon offsets (approximately 20% each). The results of the study by these authors show that domestic carbon pricing mainly covers Scope1 and 2 emissions, while the focus on reducing Scope 3 emissions through carbon pricing in the production and distribution stages is significantly lower.

The motivation of companies to voluntarily implement ICP is linked, as W. Ben-Amar, M. Gomez, H. Khurseed, and S. Marsat [22] find, primarily to their exposure to external regulatory risks related to carbon emissions, but not to physical shocks related to climate change. C. Lyu, P. Yang, and C. Zhang argue [19, p. 5] that the implementation of ESG may indicate companies' desire to reduce their carbon footprint, thereby enhancing their credibility and appeal to customers, investors, and other stakeholders who are increasingly aware of environmental issues.

Scientists' opinions on the consequences of using internal carbon pricing vary. P. Demirel and E. Kesidou indicate [23] that companies that use voluntary self-regulation are more likely to

participate in environmental innovation. J. Ma and J. Kuo believe [24] that the use of internal carbon pricing can increase the return on assets by 1.1%. Companies that use ICP are more likely to reduce the cost of goods sold, which can lead to increased profitability.

Empirical data study of global companies made by A. Trinks, M. Mulder, and B. Scholtens shows [25] that the impact of external carbon pricing systems increases the likelihood of using ICP by 10–13 percentage points but did not find a significant impact of factors related to government environmental policy on internal carbon pricing levels, the use of which is closely and positively related to company size and carbon emissions. ICPs may exceed external carbon prices, reflecting companies' concerns about future carbon emission restrictions. Accordingly, the spread of ICP programs in large, high-emission, and capital-intensive companies, especially in multinational enterprises (MNEs), with the aim of accelerating investment in low-carbon projects is determined by the significance of future carbon costs. B. Zhu, C. Xu, P. Wang, and L. Zhang believe [26] that ICP programs can be as effective in reducing emissions as external constraints. In sectors with low carbon dependence, which are typically end-user-oriented, there is great potential for green innovation, to which buyers of finished products are highly sensitive.

The assessments by C. Lyu, W. Xin, and C. Zhang are less positive [27]. Using data on the adoption of science-based targets by companies and their direct carbon emissions within a study of corporate carbon transition risks, they found limited evidence of its influence on the relationship between internal carbon pricing and corporate performance. In their view, the implementation of ICP is associated with a future decline in companies' financial performance, manifested by a decrease in net profit of 1.1% in the following year. At the same time, the price level of ICP does not have a significant impact on firms' future profitability. They also did not find that the adoption or price level of ICP substantially affects future risk-adjusted stock returns, but they observed significant variations in the relationship between ICP and performance across different industries and countries. Furthermore, the adoption of ICP reduces the growth rate of carbon emissions over the next two years, although the overall effect on emission abatement remains ambiguous.

M. Desjardins, J. Gianfrate, M. Gitti, and B. Sinclair-Desgagné observe [21] that by integrating the elevated cost of carbon emissions into their cost structures, companies prepare for stricter regulatory requirements, thereby mitigating the risk of future shocks. Companies such as ExxonMobil exemplify the use of an internal carbon price set above the market rate. Microsoft, Renault, and Danone, in turn, use ICP to manage their capital expenditures, primarily directing investments toward sustainable projects.

An analysis of the existing research on ICP implementation reveals its predominant focus on issues of environmental regulation and on mitigating risks associated with the volatility of government policy. At the same time, the question of this instrument's direct impact on increasing corporate profitability remains understudied. However, if the analytical framework is expanded to include not only regulatory pressure but also the emerging consumer demand for green products (provided they are price-competitive), the focus of the problem shifts. In this context, a company's key task becomes developing solutions in procurement and production processes aimed at achieving target cost indicators that meet market expectations. It is quite plausible that the margin on green goods will lag behind that of conventional alternatives due to high R&D and new technology implementation costs. Nevertheless, a shift in market demand towards eco-friendly alternatives could lead to an increase in sales volume sufficient for the absolute profit figure to exceed that achievable through the production of conventional goods. In other words, with increased production costs for green products and their sale at the price of a conventional equivalent, the total profit of their manufacturer may be higher than that of sellers of traditional goods due to a shift in demand toward environmentally friendly products and a loss of consumer interest in traditional ones. A graphical comparison of these parameters and outcomes is presented in *Figure*. Moreover, with further growth in sales, the cost of green products will decrease due to the distribution of fixed costs and innovation expenses across a larger number of goods manufactured.

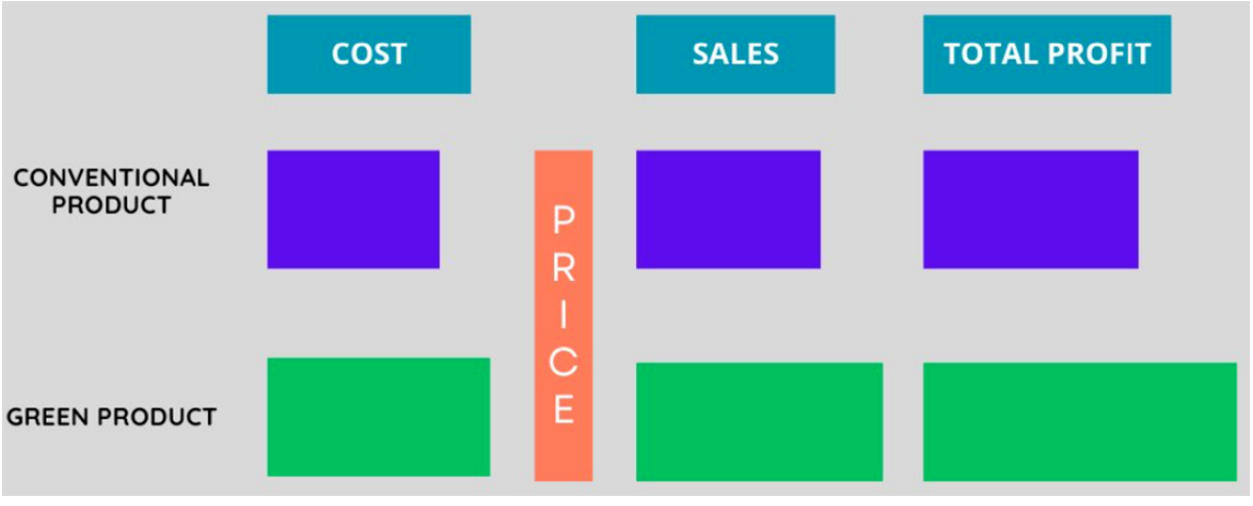

Fig. **Financial performance of green and conventional product manufacturing and sales**

Source: Compiled by the authors.

4.2. A strategic model for the proactive management of carbon risks and opportunities

From a practical standpoint, applying a financial approach entails integrating all associated costs into the green project's planned performance model. These include expenses related to the use of eco-friendly raw materials and supplies, renewable energy sources, and low-carbon production technologies. Given the difficulty in calculating these costs directly, it is advisable to employ simulation modeling. This involves adding a forecasted internal carbon price, relevant to the target markets and accounting for its potential increase, to the cost of a conventional product. In this model, government subsidies may be intentionally excluded to ensure a conservative assessment, thereby fostering a proactive design stance independent of the prevailing tax regime or demand-side support measures.

The rationale for this approach lies in the a priori inclusion in financial projections of future expenditures related to:

1. Reducing the carbon footprint.
2. Hedging financial risks arising from the tightening of carbon regulations.
3. Ensuring competitive readiness for entering markets with stringent environmental legislation.

Consequently, the company develops an internal motivation to seek innovative solutions aimed not only at regulatory compliance but also at enhancing operational efficiency. The virtual reserve (or "phantom" costs) formed in this way creates a funding source for future environmental innovations. Thus, at the planning stage, a more realistic assessment of the project's economic viability from the standpoint of its market acceptability is achieved. The allocated reserves are either directed towards financing "greening" initiatives or, if unused, directly increase the final product's margin.

Furthermore, by adhering to the requirement of price parity with conventional alternatives (which is key for the mass consumer), the manufacturer can reasonably project a significant increase in sales volumes. This, in turn, even with a reduced margin, can lead to growth in the absolute amount of profit due to the economies of scale effect.

In this context, the need to artificially inflate the discount rate becomes redundant, as the carbon price embedded in the model itself serves to quantify climate risks while simultaneously incentivizing the selection of the most cost-effective technologies within the project. Demonstrating serious environmental commitment, as case studies (e.g., Tesla) show, also positively impacts market capitalization and facilitates equity financing, which can, in turn, improve the terms for debt financing. A consistent transition from demand by green enthusiasts to the mass market, driven by achieving price parity, initiates a positive feedback loop. Subsequently, increased production volumes lead to a reduction in unit cost through the distribution of fixed costs, which further strengthens the price advantage and, ultimately, the producer's financial performance.

Given that the company's strategic objective is value maximization, the described proactive approach appears more promising compared to defensive environmental strategies. The growing demand for competitive green products and improved financial metrics directly translates into an increase in market capitalization. Conversely, ignoring the "greening" trend entails significant strategic risks. Insufficient investment in developing environmentally friendly products can lead to the erosion of demand for traditional counterparts and long-term financial difficulties, as illustrated by the ongoing transformation of the European automotive industry. As noted in the literature, "inaction on climate change may prove far more costly, as investments in adaptation… can 'pay for themselves' five- to sixfold through avoided losses".[29]

Thus, although government environmental incentives should be taken into account, relying on their permanence to achieve corporate financial objectives is not rational, as their priorities may not align with the goals of profit and value maximization. The financial success of green products is based on mass-market demand, which, in most cases, is triggered by reaching price parity with conventional alternatives. This target is achieved primarily through the producer's internal operational efficiency.

Over the 30 years since the publication of M. Porter and C. van der Linde's then-revolutionary idea about the benefits for companies of considering well-balanced government environmental regulations, subsequent research has confirmed the correctness of their hypothesis that stricter regulation leads to a greater number of innovations. However, as noted by S. Ambec, M. Cohen, S. Elgie, and P. Lanoie [28, p. 16], their assumption that stricter regulation enhances business efficiency is far from always being corroborated in practice.

The implementation of the proposed strategic mechanism based on internal carbon pricing could provide Russia with a foundation to re-emerge on the global stage with a fundamentally new competitive advantage. Rather than remaining a passive object of extraterritorial regulation, Russian businesses can use this instrument for proactive transformation. Systematically incorporating carbon costs into product pricing at the design stage will stimulate technological modernization, optimization of value chains, and investment in low-carbon innovations.

Consequently, when achieving carbon neutrality becomes a mandatory condition for access to key markets, Russian companies will find themselves not as laggards forced to bear high adaptation costs, but as prepared players offering products that are already competitive both in price and environmental parameters. This will enable Russia to reposition itself from a supplier of raw materials and energy-intensive goods into a supplier of high-tech solutions and industrial products with a low carbon footprint, thereby reclaiming the strategic initiative and establishing a long-term foundation for economic sovereignty in the new climate reality.

5. Discussion

The analysis presented in this work reveals a profound dichotomy between the declared objectives of the green transition and the economic logic of corporate behavior. Despite increasing regulatory pressure and the growing environmental sensitivity of a segment of consumers, the primary deterrent for companies remains the uncertainty regarding the financial return on environmental investments. In this context, the proposed concept of applying an internal carbon price transcends the role of a mere accounting tool, evolving into a strategic management system.

The findings of the study suggest that the key value of ICP lies in its dual nature. First, it formalizes and materializes uncertainties associated with the future tightening of carbon regulations, the volatility of government support, and shifting consumer preferences, thereby allowing for the advance allocation of funds and the adaptation of the business model. Simultaneously, by advocating for the integration of "phantom" carbon costs into the cost structure, ICP creates an internal economic signal that shifts the focus of managerial decisions from mere compliance to the pursuit of the most cost-effective pathways for decarbonization.

It is important to emphasize a methodological feature of this study. It is conceptual and analytical in nature and does not employ econometric

[29] The Cost of Inaction: A CEO Guide to Navigating Climate Risk. World Economic Forum. Annual report. December 2024. 58 p. (4). URL: https://www.weforum.org/publications/the-cost-of-inaction-a-ceo-guide-to-navigating-climate-risk/ (accessed on 25.01.2025).

modeling. This choice is driven by the practice-oriented objective of the work: to propose a management tool applicable in real-world business conditions. The key data required for in-depth quantitative analysis, such as detailed cost structures, specific technological and logistics chains, and internal rates of return, constitute trade secrets and are unavailable from public sources. Moreover, significant variations in these parameters across companies and industries render a universal econometric model less relevant than a qualitative conceptual framework that can be adapted to specific circumstances.

The conclusion that the financial success of green products hinges on achieving mass-market demand through price parity, rather than a green premium, calls into question the effectiveness of purely defensive strategies. The proposed proactive approach, centered on ICP, enables the transformation of an environmental constraint into a driver of operational excellence.

6. Conclusion

The conducted analysis reveals a systemic imbalance between the climate agenda and the economic logic of business. Despite growing pressure from regulators and consumers, companies face high financial uncertainty. Traditional government instruments often fail to create lasting incentives for deep technological transformation. The key to the solution lies in a proactive strategy that shifts the focus from external enforcement to internal efficiency. The widespread adoption of green products requires achieving price parity with conventional counterparts.

The proposed strategic model for applying an internal carbon price serves as the foundation for this transformation. Its value lies in utilizing this instrument not only for risk assessment but also as a mechanism for financing innovation. By incorporating the projected cost of the carbon footprint into the product cost structure at the design stage, a company establishes a clear managerial benchmark. This stimulates the search for the most economical decarbonization solutions and leads to the creation of a competitive product. Consequently, the proposed approach enables the conversion of environmental challenges into drivers of operational excellence, thereby aligning environmental responsibility with the objective of increasing corporate value.

This study contributes to the scientific literature on the role of economic agents in environmental preservation through the following key propositions:

- To our knowledge, this study is the first in the literature to emphasize the importance of mass-producing green goods for improving environmental pollution.
- Companies need to account for existing government environmental incentives, but relying on them in long-term business plans is difficult due to their volatility.
- Both corporate and retail consumers are not averse to purchasing green goods and services under two conditions: if they are financially affordable and/or if their application or use yields tangible benefits.
- One method of managing the risks associated with the tightening of government environmental policies and competition from firms already producing green goods is for a manufacturer to incorporate the cost of the carbon emissions of its products into its planned financial performance calculations, even when not mandated by law.
- Import restrictions on environmentally friendly goods imposed by developed countries hinder the diffusion of effective green technologies and their related products.

7. Limitations

The conceptual nature of this study entails a number of limitations that define promising avenues for future research. First, the proposed model is normative in nature and outlines an optimal decision-making logic. Its practical implementation and effectiveness will depend on specific contextual factors, such as industry characteristics, company size, and prevailing corporate culture. Second, the analysis is primarily focused on the microeconomic perspective of an individual firm, whereas macroeconomic factors, including shifts in the labor market, cross-border carbon regulation, and the geopolitical landscape, can significantly influence the final outcomes. Finally, the absence of empirical testing on extensive data prevents a quantitative measurement of the relationship between ICP adoption and specific firms' financial or operational metrics, leaving this task for future empirical studies.

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