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MASTER'S FINAL QUALIFICATION THESIS
(Master's Dissertation)

HOW SOUTH KOREAN MULTINATIONAL CORPORATIONS RESPOND TO CLIMATE
CHANGE CHALLENGES

Field of studies: 38.04.02 – Management
“International Management”

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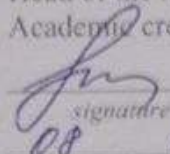
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THE TASK

of completing the final qualification work of a bachelor / specialist / master to a student

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in the direction of training Code Name of the direction of training 38.04.02 , main
educational program(profile) "International Management"

1 Topic of the thesis

How South Korean multinational corporations respond to climate change challenges

2 The deadline for student to complete the thesis:

a) to the academic office /
dean's office –

20.06.2024

b) to State Examination
Commission –

25.06.2024

3 Initial data for work:

The object of the study – use of techniques and the application of "green" strategies, with an
emphasis on the impact of the competitiveness of companies

The subject of the study – activities of the largest South Korean corporations related to
climate change

The aim of the study – Study how South Korean corporations overcome the challenges of
climate change and sustainability, striving for competitiveness and
market leadership

Tasks:

1. To track the current state of the global environment and identify international
measures, laws, and regulations that exist to address the environmental crisis
2. To compare South Korea's position with other countries in terms of environmental
legislation and policies
3. To examine the annual reports, official websites, and activities of South Korean
companies regarding their environmental practices, including investments in green
technologies, participation in environmental initiatives, sustainable development
efforts, and investment in renewable energy
4. To compare the performance of South Korean companies with those of American and
Japanese firms in key areas such as technology and automobile manufacturing
5. To analyze the impact of environmental regulations on South Korean businesses and
evaluate the results.
6. To identify additional steps that need to be taken to prevent a potential crisis.

Research methods:

observation, comparison, method of case studies, and method of generalization
and analyzing of results

The organization or industry on which the work is being carried out –
MaxMoll – an exporter of innovative products from China

4 Summary of the work:

This work explores how South Korean multinational corporations address climate change challenges. It investigates the impact of climate change on these corporations and analyzes the strategies they employ to adapt and promote sustainable development. Research methods such as observation, case studies, and generalization were utilized to assess existing measures, corporate social responsibility practices, and competitive environments. Various sources including annual reports, articles, books, and legal literature were consulted to gather data and insights. The thesis aims to provide a comprehensive understanding of how South Korean companies are tackling climate change issues and integrating sustainable practices into their operations.

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Abstract

This work explores how South Korean multinational corporations respond to the challenges of climate change by integrating sustainable development methods and environmental transformation initiatives. The research focuses on the analysis of environmental practices, investments in renewable energy sources and participation in environmental initiatives. It compares the performance of South Korean companies with American and Japanese firms, assesses the impact of environmental regulations and identifies steps to prevent potential crises. The scientific novelty lies in the analysis of the reaction of South Korean companies to climate change, covering economic, social and political aspects. Recommendations are based on factors such as government policy, financial incentives, and technological innovation. The study highlights the importance of sustainable business practices in the global market and the strategies adopted by South Korean companies to address climate change. The research methods used include observation, comparison, case studies and analysis of results from various sources and literature to assess the response of South Korean companies to climate change, considering economic, social and political factors.

The study examines the concept of problems related to climate change, their impact on the global economy and, in particular, on the activities of the largest South Korean corporations. An analysis of adaptation strategies and environmental transformation initiatives sheds light on the relationship between sustainability, competitiveness and market dynamics. Exploring the role of corporate social responsibility and innovation, the author emphasizes the role of South Korea as a key player in the global market, emphasizing the importance of sustainable business practices. The results provide insight into the strategies adopted by these corporations, identifying key factors influencing them, such as government policy, consumer preferences, and technological innovation. The practical value of this research lies in developing optimal strategies for companies to respond to climate change, enhance their reputation and attract investors. In general, the dissertation is intended to contribute

to understanding how South Korean corporations solve the problems of climate change and implement sustainable methods in their activities.

Аннотация

В этой работе исследуется, как южнокорейские транснациональные корпорации реагируют на вызовы изменения климата, интегрируя методы устойчивого развития и инициативы по экологическим преобразованиям. Исследование посвящено анализу природоохранной практики, инвестициям в возобновляемые источники энергии и участию в экологических инициативах. В нем сравниваются результаты деятельности южнокорейских компаний с американскими и японскими фирмами, оценивается влияние экологических норм и определяются шаги по предотвращению потенциальных кризисов. Научная новизна заключается в анализе реакции южнокорейских компаний на изменение климата, охватывающем экономические, социальные и политические аспекты. Рекомендации составляются на основе таких факторов, как государственная политика, финансовые стимулы и технологические инновации. В исследовании подчеркивается важность устойчивых методов ведения бизнеса на мировом рынке и стратегий, принятых южнокорейскими компаниями для решения проблем, связанных с изменением климата. Используемые методы исследования включают наблюдение, сравнение, тематические исследования и анализ результатов из различных источников и литературы для оценки реакции южнокорейских компаний на изменение климата с учетом экономических, социальных и политических факторов.

В исследовании рассматривается концепция проблем, связанных с изменением климата, их влияние на мировую экономику и, в частности, на деятельность крупнейших южнокорейских корпораций. Анализ стратегий адаптации и инициатив по экологическим преобразованиям проливает свет на взаимосвязь между устойчивостью, конкурентоспособностью и динамикой рынка. Исследуя роль корпоративной социальной ответственности и инноваций, автор подчеркивает роль Южной Кореи в качестве ключевого игрока на мировом рынке, подчеркивая важность устойчивых методов ведения бизнеса. Полученные результаты дают представление о стратегиях, принятых этими корпорациями, выявляя ключевые факторы, влияющие на них, такие как

государственная политика, предпочтения потребителей и технологические инновации. Практическая ценность этого исследования заключается в разработке оптимальных стратегий реагирования компаний на изменение климата, повышении их репутации и привлечении инвесторов. В целом, диссертация призвана способствовать пониманию того, как южнокорейские корпорации решают проблемы изменения климата и внедряют устойчивые методы в свою деятельность.

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Introduction

The global landscape is witnessing a significant shift towards sustainability and environmental responsibility, driven by the pressing challenges of climate change. In this context, South Korean corporations are navigating a transformative journey to address these challenges while striving for competitiveness and market leadership. This document delves into the strategies and initiatives undertaken by major South Korean companies to overcome the hurdles posed by climate change and embrace sustainable practices. By exploring the interconnectedness between green initiatives, competitiveness, and market dynamics, this study sheds light on the evolving role of corporations in fostering environmental stewardship and sustainable development. Through a lens of social responsibility and innovation, South Korea is positioning itself as a key player in the global market, emphasizing the importance of sustainable business practices in the face of modern challenges.

In recent years, South Korea has witnessed a transformation of its corporate landscape, marked by an explosive growth in mergers and acquisitions. This change indicates a favorable environment for business integration and cooperation, thereby accelerating the pace of innovation in the country. As global trends increasingly prioritize issues of sustainability and mitigation of climate change, South Korean companies are building their strategies to address these pressing issues. With a focus especially on sectors such as technology and automotive, South Korea is aiming to take a key position in the global market. In addition, the country's strong focus on social responsibility and collective efforts underscores its commitment to sustainable development.

The aim of the study is how South Korean corporations overcome the challenges of climate change and sustainability, striving for competitiveness and market leadership.

The object of the study is the use of techniques and the application of “green” strategies, with an emphasis on the impact of the competitiveness of companies.

The subject of the study is the activities of the largest South Korean corporations related to climate change.

To achieve the goal of this study, we have set the following tasks:

1. To track the current state of the global environment and identify international measures, laws, and regulations that exist to address the environmental crisis.
2. To compare South Korea's position with other countries in terms of environmental legislation and policies.
3. To examine the annual reports, official websites, and activities of South Korean companies regarding their environmental practices, including investments in green technologies, participation in environmental initiatives, sustainable development efforts, and investment in renewable energy.
4. To compare the performance of South Korean companies with those of American and Japanese firms in key areas such as technology and automobile manufacturing.
5. To analyze the impact of environmental regulations on South Korean businesses and evaluate the results.
6. To identify additional steps that need to be taken to prevent a potential crisis.

The scientific novelty of this work lies in its analysis of South Korean companies' responses to climate change. The study covers not only environmental factors, but also economic, social, and political aspects. It focuses on South Korea's specific economic model, government regulations, cultural values, and challenges related to climate change. Key factors influencing companies' responses were identified and analyzed, such as government policy, financial incentives, consumer preferences, technological innovations, and social responsibility. Based on these factors, the results of South Korean company activities were identified, and recommendations were made.

The practical value of this work is justified by the identification of the most optimal strategies to respond to climate change based on the provided information. This information can also help to understand trends and best practices in climate change, which can help companies stand out in the market and gain a competitive advantage. The use of green strategies based on scientific research can enhance a company's reputation and

attractiveness to investors and consumers. The dissertation may also provide valuable information about areas that are promising for investment in sustainable development and the green economy.

The work is divided into three chapters and conclusion. The first chapter covers the concept of climate change challenges and their impact on the activities of South Korean corporations. This part delves into the broader implications of climate change on the global economy, specific challenges faced by corporations in adapting to climate change, and how climatic factors directly impact the operations of major corporations in South Korea.

The second chapter focuses on South Korean companies and their climate change adaptation strategies. This part explores how South Korean companies are integrating sustainable development practices, reducing their carbon footprint, and implementing green transformation initiatives to adapt to climate change. Additionally, the chapter may discuss the role of corporate social responsibility in addressing climate change challenges within the business context.

The third chapter delves into green transformation and the prospects for South Korean corporations, this chapter discusses how green initiatives impact the competitiveness of South Korean companies, analyze the competitive landscape with international corporations, and explore the future trends in sustainable development strategies for South Korean corporations.

Conclusion of this study contains the main findings as well as recommendations for improving ecological strategies of South Korean companies and results of these measures.

The following research methods were used in the work: observation, comparison, method of case studies, and method of generalization and analyzing of results. These methods are used to assess the existing measures to reduce the carbon footprint and adapt to climate change, research on corporate social responsibility practices in the context of climate change, analysis of the competitive environment with the participation of

corporations from the South Korean, USA, Japan, and other countries, forecasting future trends in sustainable development strategies of South Korean corporations.

Various sources and literature were used in the work. Basic information such as statistics, performance of various companies, their future plans and financial statements were taken from the annual reports of the companies. In general, it can be noted that not all reports could contain complete information about all data from companies; some of this data is closed from public access. Various articles and books were also used for the theoretical part of the work, which relates to the description of environmental problems. In general, it can be noted that researchers agree that in recent years the topic of environmental problems has become increasingly important. Legal literature was also used in the form of acts, international treaties, international agreements and laws of South Korea in the context of the environment.

The aim of this work is to examine the challenges and impacts of climate change on South Korean corporations, as well as to explore the strategies and initiatives these companies are undertaking to adapt to climate change and promote sustainable development. For this were studied many aspects such as the interconnectedness between green initiatives and competitiveness, the relevance of green strategies in the context of technological wars and sanctions, and the forecasted future trends in sustainable development strategies for South Korean corporations. Overall, the work aims to provide insights into how South Korean companies are addressing climate change challenges and integrating sustainable practices into their operations.

Chapter 1: The concept of climate change challenges and their impact on the activities of the South Korean Corporation

1.1. Concept the challenges of climate change and their impact on the global economy

Climate change refers to long-term changes in global weather patterns caused primarily by human activities that lead to increased emissions of greenhouse gasses into the atmosphere¹. The main greenhouse gasses contributing to climate change are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). These gasses trap heat in the atmosphere, causing global temperatures to rise².

Climate change and the challenges that come with it: extreme weather events, sea level rise, ocean acidification, supply chain disruption, agricultural losses, impact on tourism and recreation, health issues, etc. are one of the most pressing issues of our time³.

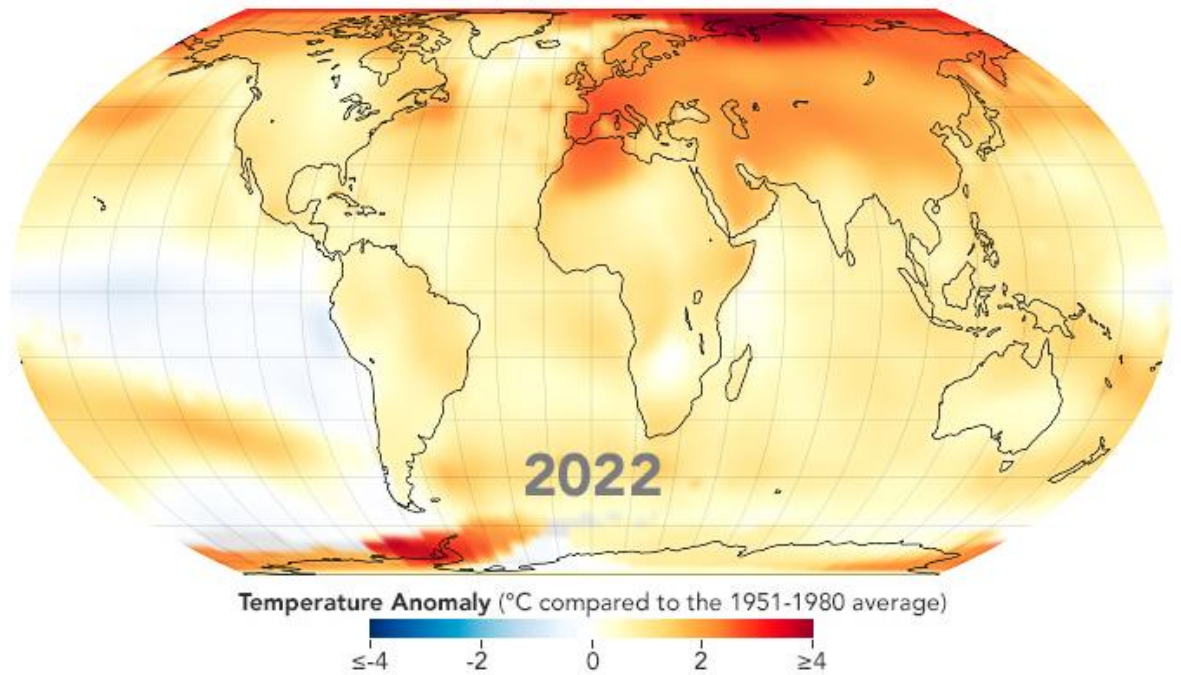
According to NASA's Goddard Institute for Space Studies (GISS) observations⁴, the average global temperature on Earth has increased by at least 1.1° Celsius (1.9° Fahrenheit) since 1880. The majority of the warming has occurred since 1975, at a rate of roughly 0.15 to 0.20°C per decade.

¹ What Is Climate Change? // United Nations URL: <https://www.un.org/en/climatechange/what-is-climate-change> (date of the application: 02.04.2024).

² Climate change: the greenhouse gases causing global warming // European Parliament URL: <https://www.europarl.europa.eu/topics/en/article/20230316STO77629/climate-change-the-greenhouse-gases-causing-global-warming> (date of the application: 02.04.2024).

³ The Challenge of Climate Change // Global Network URL: <https://globalnetwork.io/perspectives/2017/07/challenge-climate-change> (date of the application: 02.04.2024).

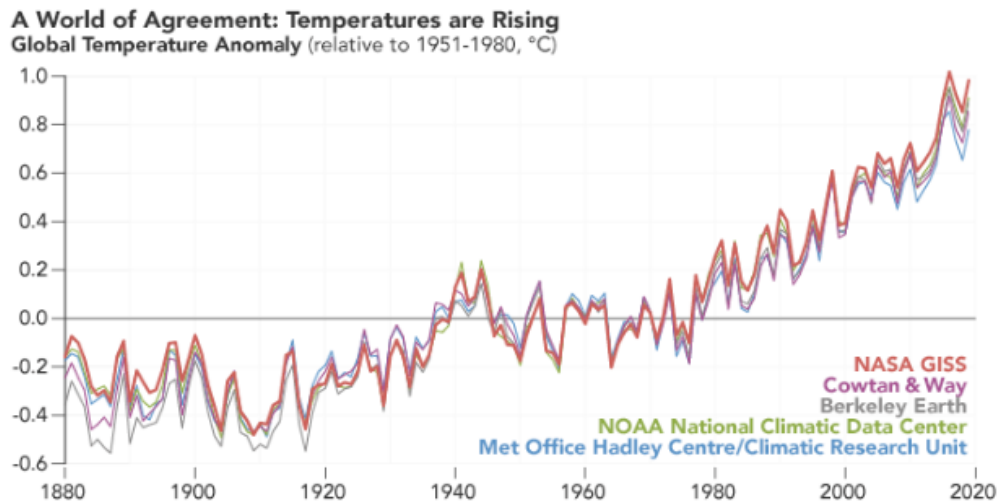
⁴ GISS Surface Temperature Analysis (GISTEMP v4) // NASA URL: <https://data.giss.nasa.gov/gistemp/> (date of the application: 02.04.2024).



Pic 1: Earth temperature in 2022

Global temperature records start around 1880 because observations did not sufficiently cover enough of the planet prior to that time. The line plot above shows yearly temperature anomalies from 1880 to 2020 as recorded by NASA, NOAA, the Berkeley Earth research group, the Met Office Hadley Centre (United Kingdom), and the Cowan and Way analysis. Though there are minor variations from year to year, all five records show peaks and valleys in sync with each other. All show rapid warming in the past few decades, and all show the last decade as the warmest⁵.

⁵ World of Change: Global Temperatures // NASA Earth Observatory URL: <https://earthobservatory.nasa.gov/world-of-change/global-temperatures> (date of the application: 02.04.2024).



Pic 2: Temperature rising 1880 - 2020⁶

Just a few years ago, scientists sounded the alarm about the depletion of the ozone layer⁷, but according to today's research, thanks to the measures taken, the ozone layer is gradually being restored⁸. If current policies continue, the ozone layer is expected to recover to 1980 levels (pre-ozone hole) by about 2066 over Antarctica, by 2045 over the Arctic, and by 2040 over the rest of the world⁹. Fluctuations in the size of the Antarctic ozone hole, especially from 2019 to 2021, were mainly due to meteorological conditions. However, since 2000, the Antarctic ozone hole has been slowly improving in terms of area and depth.¹⁰

⁶ World of Change: Global Temperatures // NASA Earth Observatory URL: <https://earthobservatory.nasa.gov/world-of-change/global-temperatures> (date of the application: 02.04.2024).

⁷ Scientists Sound Alarm on Climate // The New York Times URL: <https://www.nytimes.com/2014/03/18/science/scientists-sound-alarm-on-climate.html> (date of the application: 02.04.2024).

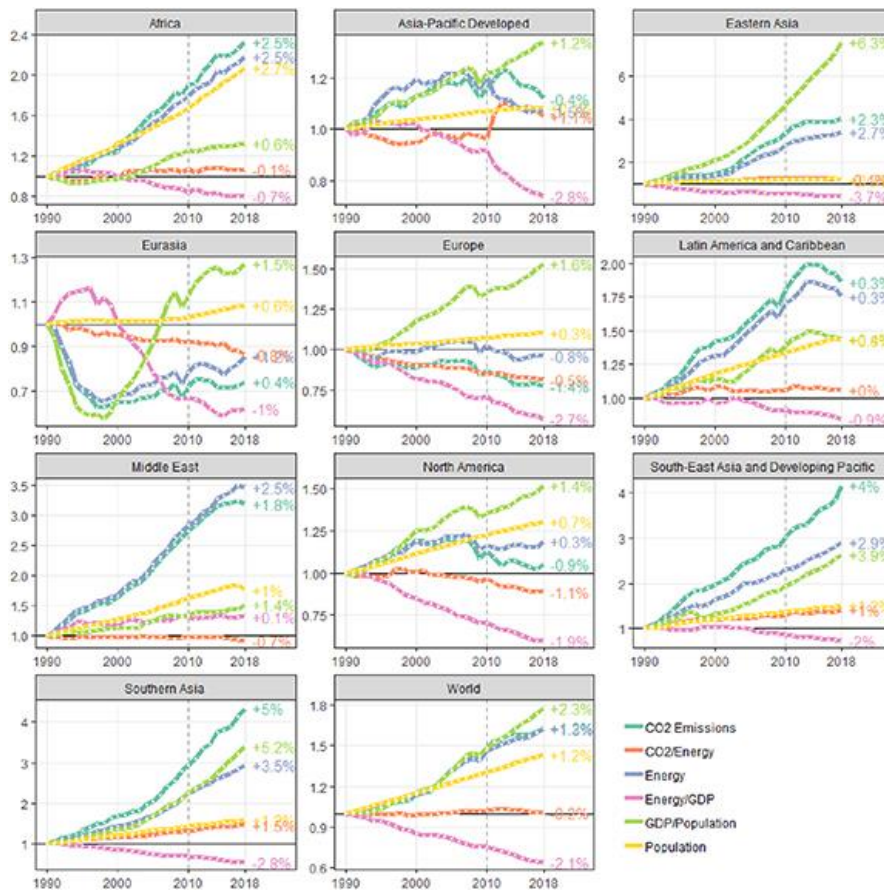
⁸ The ozone layer is on the right path to recovery: Here's how the world made it happen // The World Economic Forum URL: <https://www.weforum.org/agenda/2023/09/ozone-layer-hole-update-nasa/> (date of the application: 03.04.2024).

⁹ Ozone Layer on Track to Recovery: Success Story Should Encourage Action on Climate // United Nations URL: <https://www.unep.org/news-and-stories/press-release/ozone-layer-track-recovery-success-story-should-encourage-action> (date of the application: 03.04.2024).

¹⁰ Ozone's, Volume XXIV, 15 May 2024 issue <https://www.unep.org/ozonaction/resources/ozonews/ozonews-volume-xxiv-15-may-2024-issue>

Global greenhouse gas emissions continue to rise steadily after more than a century and a half of growth. Emissions have increased across all sectors and sub-sectors, from power generation, industrial sources, land use and management, and transport, to relatively small sources such as fugitive emissions, waste incineration and aviation. Among the top emitting regions, recent trends show a picture of stable emissions in North America and modest declines in Europe as the transition from coal to gas and the build-out of renewables begin to take hold. The huge growth in emissions in East Asia (China) is also now slowing due to fewer new coal-fired power plants in recent years. Taken together, these trends led to slower growth in 2010–2018 compared to previous decades. With developing regions - Africa, South Asia and Southeast Asia - now poised to accelerate economic growth and build high-emission infrastructure, it remains unclear whether global greenhouse gas emissions will peak anytime soon. However, recent growth has secured much of the infrastructure that will continue to drive emissions in the future, in the absence of strong climate policies¹¹

¹¹ Lamb W. F. et al. A review of trends and drivers of greenhouse gas emissions by sector from 1990 to 2018 //Environmental research letters. – 2021. – T. 16. – №. 7. – C. 073005.



Pic 3: trends in CO 2 emissions from fuel combustion ¹²

European Environment Agency identifies climate change as one of humanity's biggest challenges today¹³. Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates. These changes have a broad range of observed effects that are synonymous with the term.¹⁴ Climate change is the significant variation of average weather conditions becoming, for

¹² Lamb W. F. et al. A review of trends and drivers of greenhouse gas emissions by sector from 1990 to 2018 // Environmental research letters. – 2021. – T. 16. – №. 7. – C. 073005.

¹³ Climate change is one of the biggest challenges of our times // European Union Agency URL: <https://www.eea.europa.eu/themes/climate/climate-change-is-one-of> (date of application: 03.05.2024).

¹⁴ What Is Climate Change? // NASA URL: <https://science.nasa.gov/climate-change/what-is-climate-change/> (date of application: 03.05.2024).

example, warmer, wetter, or drier—over several decades or longer. It is the longer-term trend that differentiates climate change from natural weather variability.¹⁵

The main reason, according to many scientists, is the activities of companies and factories¹⁶. The scientific evidence supporting climate change is compelling and based on multiple lines of evidence, including

- Global average temperature has increased by about 1.1 degrees Celsius over the past 100 years¹⁷.

- Glaciers and sea ice around the world are melting rapidly, causing sea levels to rise¹⁸.

- climate change is causing more frequent and intense extreme weather events such as hurricanes, floods and droughts.¹⁹.

- climate change affects the distribution of plants and animals as they adapt to changing temperatures and precipitation conditions²⁰.

Many scientists point out that it was human exposure that influenced accelerated climate change and increased greenhouse gas emissions.²¹

Climate change has significant impacts on the global economy. This includes losses in agriculture, namely a decrease in crop yields and livestock production²². Also, extreme

¹⁵What is Climate Change? // World Bank URL: <https://climateknowledgeportal.worldbank.org/overview> (date of application: 03.05.2024).

¹⁶ Causes and Effects of Climate Change // United Nations URL: <https://www.un.org/en/climatechange/science/causes-effects-climate-change> (date of application: 20.05.2024).

¹⁷ Lindsey R., Dalman L. A. Climate change: Global temperature //Climate. gov. – 2020. – T. 16.

¹⁸ Allison I. et al. Ice sheets, glaciers, and sea level //Snow and ice-related hazards, risks, and disasters. – Elsevier, 2021. – C. 707-740.

¹⁹ Ebi K. L. et al. Extreme weather and climate change: population health and health system implications //Annual review of public health. – 2021. – T. 42. – №. 1. – C. 293-315.

²⁰ Mashwani Z. R. Environment, climate change and biodiversity //Environment, climate, plant and vegetation growth. – 2020. – C. 473-501.

²¹ Mikhaylov, Alexey, et al. "Global climate change and greenhouse effect." *Entrepreneurship and Sustainability Issues* 7.4 (2020): 2897.

²² Ebi K. L. et al. Extreme weather and climate change: population health and health system implications //Annual review of public health. – 2021. – T. 42. – №. 1. – C. 293-315.

weather events caused by climate change can lead to the destruction of urban and other infrastructure, such as the destruction of roads, bridges and buildings. This in turn can lead to disruption of supply chains, as extreme weather events and other effects of climate change affect production and transportation. An important factor is the impact of climate change on health problems such as respiratory diseases, heat stroke and water-borne diseases.

Assessing the effects of climate change is, at best, an extremely complex undertaking, fraught with uncertainty both about the extent of future global warming and about the subsequent impact on global activity. It is obvious that warming on the planet brings both benefits and costs. It is also unknown how technological progress will react and possibly change the direction of global warming. Any assessment also involves the use of a very long-term approach that goes far beyond what is usually used by financial market participants. However, the growing awareness of the issue means that there is a growing demand for the opinion of shareholders who are either concerned about how the companies they own affect the environment, or concerned about the impact of climate change on the value chain of these companies, or a combination of both²³. According to a new study, the global economy could lose 10% of its total economic value by 2050 due to climate change²⁴.

Climate change has a significant impact on the global economy, which is manifested in various sectors such as supermarkets and transport. Countries around the world are struggling to meet their emission reduction targets, and projections predict an increase in global greenhouse gas emissions by 2030. The top ten sources of emissions, including

²³ Keith Wade, Chief Economist and Strategist and Marcus Jennings, Economist The impact of climate change on the The impact of climate change on the global economy. - Schroders, 2017. - 12 c. (URL: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://mybrand.schroders.com/m/01053abe732aa4a1/original/The-impact-of-climate-change.pdf)

²⁴This is how climate change could impact the global economy // The World Economic Forum URL: <https://www.weforum.org/agenda/2021/06/impact-climate-change-global-gdp/> (date of application: 20.05.2024).

China, the United States and the European Union, account for the majority of global emissions. However, progress is being made in the business sector, and many firms are setting their own climate change targets to combat this problem. Closed-loop economy strategies are being implemented in various sectors to improve resource efficiency and reduce emissions, offering a way to combat climate change. Life cycle assessment is necessary to optimize these new systems and ensure sustainable practices. The transition to a closed-loop economy, as seen in the examples of the port and railway industries, can help reduce carbon dioxide emissions, costs and ensure proper use of resources to effectively mitigate the effects of climate change²⁵.

Recently, issues of sustainable development and environmental protection have been mentioned as key factors encouraging companies to act. Companies are increasingly integrating sustainability into their business strategies to reduce risks and take advantage of opportunities ²⁶. The transition to a more sustainable economy creates new market opportunities for companies. For example, investments in renewable energy sources, eco-friendly packaging and green technologies can help companies not only reduce their environmental impact, but also take advantage of the growing consumer demand for environmentally friendly goods and services²⁷. It is worth noting that companies face pressure from customers, investors and regulators to address environmental issues. Failure to comply with this requirement may result in damage to reputation and financial losses²⁸. Currently, companies are realizing that environmental responsibility is not only a moral imperative, but also a reasonable business decision.

²⁵ Yang, M., Chen, L., Wang, J. et al. Circular economy strategies for combating climate change and other environmental issues. *Environ Chem Lett* **21**, 55–80 (2023). <https://doi.org/10.1007/s10311-022-01499-6>

²⁶Integral Business Integrating sustainability and business strategy // PWC URL: <https://www.pwc.com/gx/en/sustainability/integralbusinessreport.pdf>

²⁷ Wright, C. and Nyberg, D., 2017. An inconvenient truth: How organizations translate climate change into business as usual. *Academy of management journal*, 60(5), pp.1633-1661.

²⁸ Wright, C. and Nyberg, D., 2017. An inconvenient truth: How organizations translate climate change into business as usual. *Academy of management journal*, 60(5), pp.1633-1661.

Companies face criticism for both supporting and opposing actions on climate change. The climate change debate is polarized, which affects corporate reactions as they try to align conflicting positions of stakeholders. Climate change is described as an "overcomplicated" problem that exacerbates the limitations of corporate responses to it ²⁹. Long-term strategies beyond the commitments of individual leaders are needed. Despite being considered the organizations best equipped to address climate change through innovation, corporations are also major sources of climate change with significant revenues and greenhouse gas emissions. Public recognition of climate change as a danger leads to more effective corporate actions in mitigating emissions. The process of transforming knowledge about climate change into action is influenced by public debate, the political activities of fossil fuel companies, the media and think tanks.

1.2. Analysis of the challenges associated with climate change and their impact on the activities and creation of corporate strategies

The main impact of climate change on companies is increased exposure to various risks that can affect both their long-term sustainability and financial stability and business continuity. Failure to address climate change issues can damage a company's reputation among consumers, investors, and other stakeholders. Companies that are considered to be not serious about their environmental responsibilities may face negative publicity and backlash. On the other hand, climate change can also stimulate innovation and create new business opportunities for companies that adapt to sustainable practices, develop green technologies and benefit from the growing demand for environmentally friendly products and services³⁰.

²⁹ Wright, C. and Nyberg, D., 2017. An inconvenient truth: How organizations translate climate change into business as usual. *Academy of management journal*, 60(5), pp.1633-1661.

³⁰ Terent'ev, N.E. Climate Change as a Factor in the Development of Companies: Corporate Strategies and Guidelines for State Industrial Policy. *Stud. Russ. Econ. Dev.* 32, 485–491 (2021). <https://doi.org/10.1134/S1075700721050130>

The physical risks associated with climate change relate to the direct impacts of climate change on the company's operations and assets. These risks include: extreme weather events (hurricanes, floods and droughts can damage or destroy company facilities, disrupt supply chains and lead to loss of revenue); sea level rise can lead to flooding of coastal facilities and infrastructure, which can lead to loss of assets and disruptions; Rising temperatures can affect work efficiency, productivity, and employee health, especially in industries involving manual labor or outdoor work.

The transitional risks associated with climate change relate to the risks associated with the transition to a low-carbon economy. These risks include: policy and regulatory changes, namely the adoption of stricter measures to combat climate change; consumers and investors are becoming more aware of climate issues and may prefer companies that take measures to mitigate their environmental impact; The transition to a low-carbon economy requires new technologies and innovations, which can lead to the risk of obsolescence for companies that do not adapt quickly enough.

Strategic risks related to climate change are long-term risks that can affect the competitiveness and viability of a company. These risks include:

- Supply chain disruptions
- Loss of reputation
- Changes in the competitive environment.

When analyzing climate change challenges and their impact on corporate operations and strategy creation, it's essential to consider various aspects that influence how businesses respond to environmental shifts. Companies need to conduct a thorough risk assessment to understand how climate change can affect their operations, supply chains, and financial performance. This involves identifying both direct (physical) risks, such as extreme weather events, and indirect (transition) risks, like regulatory changes and shifting consumer preferences. For an example of how companies can build an environmental risk assessment, you can consider the recommendations on the websites of the United States Environmental Protection Agency and the European Environment

Agency. Due to the European Environment Agency, companies can assess environmental risks by following the following steps:

1. Hazard identification and exposure assessment

Identification of substances or processes that may pose a threat to the environment;
Determination of the ways in which these substances or processes affect the environment;

Assessment of impact levels based on monitoring, modeling or other methods.

2. Assessment of the consequences

- Study of potential impacts on living organisms, ecosystems and natural resources;
- Using toxicological data, field studies and expert assessments to predict the effects;
- Consideration of both acute and chronic exposures, as well as cumulative and synergistic effects.

3. Risk assessment

- Comparison of exposure levels with predicted consequences;
- The use of qualitative or quantitative risk assessment methods to determine the likelihood and severity of potential impacts;
- Consideration of the uncertainties and assumptions made in the assessment.

4. Risk management

- Development and implementation of measures to reduce environmental risks;
- This may include the introduction of the best available technologies (BAT), process changes, or the use of more environmentally friendly materials.;
- Monitoring the effectiveness of risk management measures and adjusting as necessary.

Companies can use various tools and methodologies to assess environmental risks, such as:

- Life Cycle Analysis (LCA)³¹
- Environmental Impact Assessment (EIA)
- Environmental audit
- Toxicity tests
- Risk modeling

Environmental risk assessment should be integrated into the overall management of the company's business. This includes: identifying environmental risks as part of the decision-making process, setting goals and environmental performance indicators, communicating the results of risk assessment to stakeholders, and continuously improving the environmental risk management system³².

3. Prioritization of environmental risks that may affect the reputation, compliance with regulatory requirements or financial stability of the company.

4. Development and implementation of risk management strategies, for example:

- Changing processes or technologies;
- Improved waste and emissions management;
- Reducing the use of hazardous materials;
- Investments in environmentally friendly technologies.

5. Regularly monitor and evaluate the effectiveness of risk management strategies, adjusting as necessary to ensure continuous risk reduction.

6. It is important to transparently communicate the results of risk assessment and management to stakeholders, including investors, customers and regulators, thereby demonstrating the company's commitment to environmental responsibility and risk management.

Companies can use various tools and resources to assess environmental risks, including:

³¹ Cabeza, L.F., Rincon, L., Valerio, V., Pérez, G. and Castell, A., 2014. Life cycle assessment (LCA) and life cycle energy analysis (LCEA) of buildings and the building sector: A review. *Renewable and sustainable energy reviews*, 29, pp.394-416.

³² Chapter 6: Ecological Risk Assessment // European Environment Agency, 23 Nov 2020

- Risk management software;
- Industry guidelines and standards;
- Consultations with experts and consultants;
- Databases on environmental impacts³³.

Engaging with stakeholders, including investors, customers, employees, and communities, is key to understanding their expectations for climate change initiatives. Building strong relationships with stakeholders can ensure coherence and support for sustainable development efforts. The development of scenario planning models can help companies assess various climate scenarios and their potential impact on business operations. By modeling various future conditions, organizations can better prepare for uncertainties and develop strategic responses to climate risks.

Taking climate factors into account in a corporate strategy is essential for long-term viability. Enterprises should align their operational goals with sustainable development goals, set emission reduction targets, and integrate environmental principles into their core business practices. Given the dynamic nature of climate change, companies need to constantly monitor environmental trends, update risk assessments and adapt their strategies accordingly. Flexibility and responsiveness to changing climatic conditions are the key to sustainability.³⁴

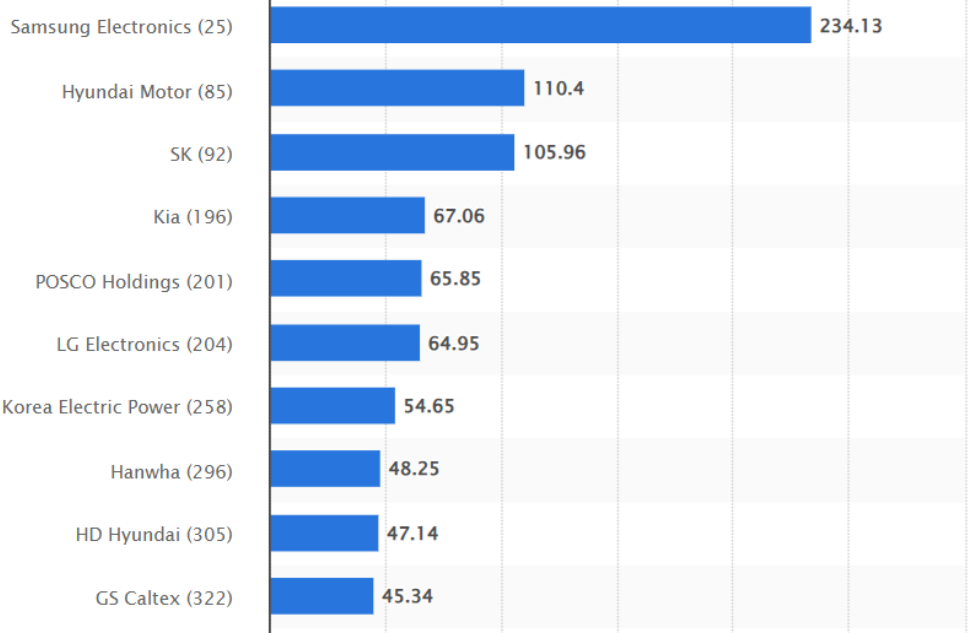
1.3 The influence of climatic factors on the activities of the largest corporations in South Korea

To begin with, it is worth noting some of the major TNCs in South Korea, which will serve as examples of how the largest corporations are adapting their strategies in response

³³ Ecological Risk Assessment // United States Environmental Protection Agency URL: <https://www.epa.gov/risk/ecological-risk-assessment> (date of application: 28.05.2024).

³⁴ Abhijeet Ghadge, Hendrik Wurtmann & Stefan Seuring (2020) Managing climate change risks in global supply chains: a review and research agenda, *International Journal of Production Research*, 58:1, 44-64, DOI: 10.1080/00207543.2019.1629670

to climate change. Based on the Fortune Global 500 ranking in 2023, some of the largest corporations that stand out for their profit in 2023 include Samsung Electronics, Hyundai Motor, SK Inc., Kia Corporation, POSCO, and LG Electronics. etc.³⁵.



Pic 4: Top 10 South Korean Companies by revenue (in billion U.S. dollars)

Additionally, it is worth mentioning the Forbes Global 2000 ranking, which lists the 2,000 largest publicly traded companies in the world. The Forbes list considers a variety of factors when ranking companies, including revenue, net income, total assets, and market value. Each factor is weighted according to its importance in determining the overall ranking. Based on this ranking, the largest companies include Samsung Electronics, Hyundai Motor, Kia Corporation, KB Financial, Shahan Financial Group, and Hana Financial etc.³⁶.

³⁵ Leading South Korean companies on the Fortune Global 500 ranking in 2023, by revenue(in billion U.S. dollars) // Statista URL: <https://www.statista.com/statistics/944811/south-korea-fortune-500-leading-companies/> (date of application: 30.05.2024).

³⁶ Forbes 2024 Global 2000 List - The World’s Largest Companies Ranked // Forbes URL: <https://www.forbes.com/lists/global2000/> (date of application: 30.05.2024).

RANK ^	NAME	COUNTRY/TERRITORY	REVENUE	PROFIT	ASSETS	MARKET VALUE
21	Samsung Electronics	South Korea	\$202.38 B	\$14.92 B	\$349.79 B	\$388.02 B
93	Hyundai Motor	South Korea	\$125.43 B	\$9 B	\$219.82 B	\$47.34 B
234	KIA	South Korea	\$77.53 B	\$7.17 B	\$62.12 B	\$32.59 B
250	KB Financial Group	South Korea	\$36.75 B	\$3.02 B	\$543.91 B	\$22.63 B
304	Shinhan Financial Group	South Korea	\$28.64 B	\$3.12 B	\$527.21 B	\$18.55 B
411	Hana Financial Group	South Korea	\$21.48 B	\$2.43 B	\$452.29 B	\$13.33 B
412	Posco	South Korea	\$57.43 B	\$1.15 B	\$76.71 B	\$22.29 B
465	Hyundai Mobis	South Korea	\$44.29 B	\$2.61 B	\$45.15 B	\$15.13 B
493	Samsung C&T	South Korea	\$32.16 B	\$1.72 B	\$51.5 B	\$17.46 B
538	LG Chem	South Korea	\$39.99 B	\$758 M	\$61 B	\$22.99 B

Pic 5: Forbes Global 2000, South Korean companies

It is also worth considering the industries in which these companies operate. The largest South Korean corporations are active in technology, automotive, steel, utilities, finance, and IT services, among others. According to research, technology, automotive, fuel, and energy industries have the greatest impact on the environment and climate change³⁷. South Korean companies are actively developing in these industries and therefore they need to introduce new initiatives, tighten production regulations in order to have less impact on the environment, thereby affecting climate change.

South Korea, being an active actor in the international arena, is also exposed to the main risks associated with climate change. These are also the economic risks associated with disrupting the supply chain. Extreme weather events can disrupt transportation and logistics, affecting production and distribution in South Korea's TNCs. Hurricanes, floods

³⁷ Kriti Davida Top 10 Most Polluting Industries in the World (2024) // Ouzo Redefining Resources. - February 6, 2024

and earthquakes can damage roads, bridges, railways and ports, leading to disruptions in transportation and delays in cargo delivery. Extreme weather conditions can delay or cancel flights, which will affect the timely delivery of goods, especially if they are perishable or have a limited shelf life. This can also lead to increased transportation costs, as carriers have to bypass damaged areas or use alternative routes, which increases the time and cost of delivery. In addition, extreme weather conditions, such as heavy rain or hail, can damage goods during transportation, resulting in loss of products and additional costs. For example, in 2020, torrential rains caused floods in the central part of South Korea, which led to disruptions in rail and road transport³⁸. This disrupted the transportation of raw materials and finished products for large TNCs such as Samsung and Hyundai³⁹. In 2021, typhoon Chengdu struck the southern coast of South Korea, damaging ports and transport infrastructure. This has led to delays in the delivery of goods and increased transportation costs for export and import MNCs. If we look at the current state of the environment in Korea, the situation can be described as disappointing. According to the 2022 Environmental Performance Index (EPI) study, South Korea ranks 63rd in terms of environmental performance, sharing this position with Montenegro. Countries such as Albania and Cuba rank higher, while Chile, Ecuador, and Venezuela rank lower in the index⁴⁰. EPI provides a quantitative basis for comparing, analyzing, and understanding environmental performance for 180 countries. The higher the EPI score (to 100), the better a country's environmental performance. South Korea's score is 46.90, which is not great. South Korea is part of the OECD (Organization for Economic Cooperation and Development), an organization that monitors the performance of member countries on a regular basis.

³⁸South Korea floods: Dozens die in flooded tunnel and landslides // BBC URL: <https://www.bbc.com/news/world-asia-66209578> (date of application: 01.06.2024).

³⁹ Companies pitch in to help flood victims, restoration // Korea JooAng Daily URL: <https://koreajoongangdaily.joins.com/2023/07/20/business/industry/relief/20230720181421038.html> (date of application: 01.06.2024).

⁴⁰ 2022 EPI Results // Environmental Performance Index URL: <https://epi.yale.edu/epi-results/2022/component/epi> (date of application: 01.06.2024).

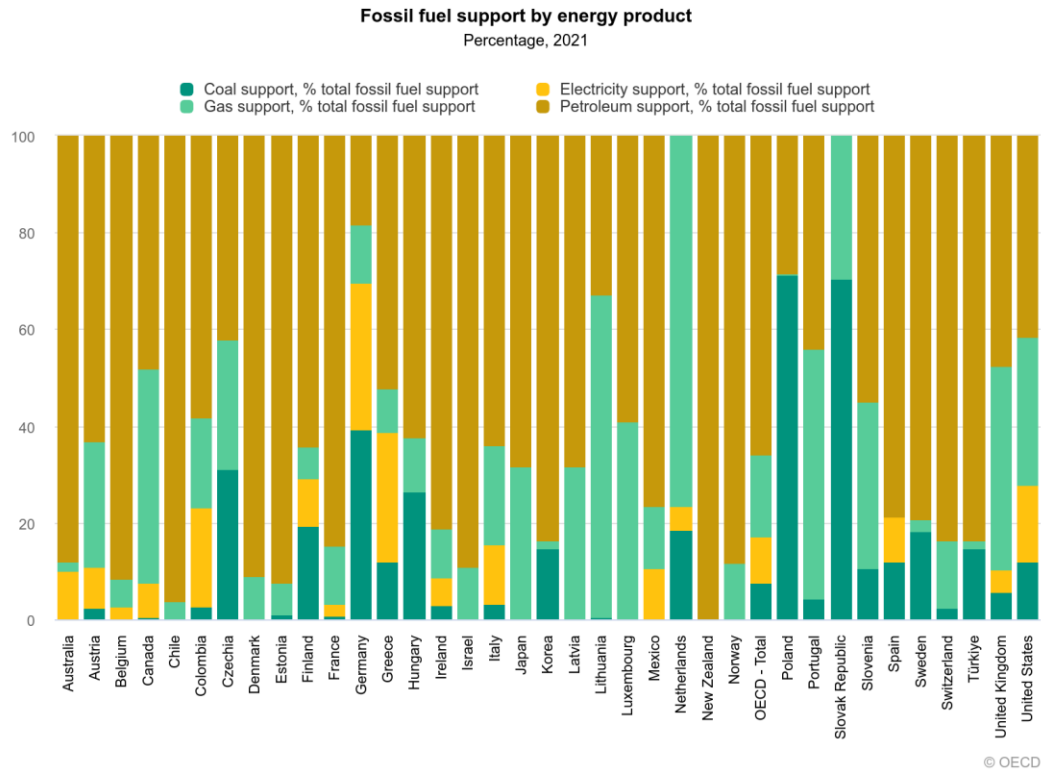
Korea has been one of the fastest-growing economies in the Organization for Economic Co-operation and Development (OECD) over the past decade. This growth has been driven by its large export-oriented manufacturing sector, but it has come at a cost in terms of pollution and resource consumption. As energy demand has increased, greenhouse gas emissions have risen significantly, and air pollution remains a major concern for public health. Despite improvements in wastewater treatment, diffuse pollution continues to affect scarce water resources, particularly in urban areas. Industrialization and urbanization are also putting pressure on biodiversity, exacerbating environmental challenges. Korea's population density is among the highest in the OECD, which further compounds environmental issues. Access to environmental goods and services, as well as exposure to environmental risks, varies significantly by region within the country⁴¹.

With an energy mix dominated by fossil fuels, **Korea's greenhouse gas emissions rose by 39%** from 2000 to 2013, the second-highest growth rate of OECD countries.



Pic 6: OECD Korea greenhouse emissions

⁴¹ OECD (2017), OECD Environmental Performance Reviews: Korea 2017, OECD Environmental Performance Reviews, OECD Publishing, Paris, <https://doi.org/10.1787/9789264268265-en>.



Pic 7: Fossil fuel by OECD countries

To mitigate the impact of extreme weather events, South Korean TNCs are taking measures such as: investing in sustainable transport infrastructure, development of alternative transport routes, using tracking technologies to monitor shipments and optimize delivery, cooperation with logistics partners to ensure smooth supply chains., carbon emissions regulations: Governments are tightening regulations on greenhouse gas emissions, which could increase compliance costs for corporations.

Not only do the effects of climate change affect companies' operations, but also the concomitant tightening of government regulations. For example, the most important thing is to tighten regulation on carbon dioxide emissions. This may affect the activities of South Korean TNCs, as compliance costs will increase. TNCs should invest in technologies and processes that reduce carbon dioxide emissions, which can lead to increased operating costs. For example, they may have to switch to renewable energy sources or implement energy-efficient measures. But at the same time, stricter regulations may encourage TNCs

to invest in innovative low-carbon technologies. This can lead to the development of new products and services that increase the competitiveness of companies in the global market. In addition, government regulations may lead to a change in consumer demand for more environmentally friendly products and services. TNCs must adapt to these changing preferences in order to remain competitive. Failure to comply with the rules on carbon dioxide emissions can lead to negative consequences for the company's reputation and loss of trust on the part of consumers and investors. South Korea's largest corporations, such as Samsung, Hyundai and SK Telecom, are vulnerable to various impacts of climate change. This is a vulnerability to extreme weather events, especially floods and typhoons, which can disrupt supply chains and damage production facilities. Dependence on water supplies for semiconductor manufacturing, which makes the company vulnerable to droughts and other water resource disruptions related to climate change. Increasing demand for renewable energy sources may create opportunities for Samsung in the field of solar panels and other environmentally friendly technologies. This can also include dependence on the supply of raw materials from countries vulnerable to climate change, which can lead to supply disruptions and price increases. For SK Telecom, vulnerability to extreme weather events, especially typhoons, which can damage telecommunications infrastructure. Opportunities for SK Telecom in sustainable technologies such as smart grids and energy efficiency solutions that can help customers reduce their carbon footprint. SK Telecom's role in advancing digital transformation can help reduce emissions by increasing efficiency and optimizing resources.

Understanding the specific vulnerabilities of South Korea's largest corporations to climate change is crucial for developing effective corporate strategies for risk management and adaptation to a changing climate.

Therefore, many TNCs are applying new measures to comply with regulatory laws. To give a specific example, for example, Samsung has invested in renewable energy sources and energy-efficient technologies to reduce carbon dioxide emissions and comply

with stricter standards⁴². Samsung is also developing low-carbon technologies⁴³, such as low-power semiconductors. Hyundai Motor Group develops zero-emission vehicles⁴⁴, such as electric vehicles and hydrogen fuel cell vehicles to meet stricter emission standards. LG Corporation invests in the production of solar panels and batteries⁴⁵ to expand its business in the field of renewable energy sources.

Thus, South Korean TNCs are taking various measures to manage the impact of stricter carbon dioxide emission regulations. This is an improvement in energy efficiency: Reducing energy consumption through the introduction of energy-saving technologies and processes. Switching to renewable energy sources, namely investing in solar, wind and geothermal energy to reduce greenhouse gas emissions. Improving water resource management, such as developing strategies for efficient water use, such as the application of water-saving technologies and rainwater harvesting. It is also climate risk management through collaboration with suppliers and contractors to increase the sustainability of the supply chain.

In general, it is important that companies align their strategies with environmental goals in order to remain competitive and sustainable in a rapidly changing world. By actively addressing environmental issues, companies can not only reduce risks, but also promote innovation and create value for all stakeholders.⁴⁶ It is also recommended that companies have long-term strategies to overcome climate change, reconcile conflicting

⁴² Samsung Electronics Announces New Environmental Strategy // Samsung Newsroom URL: <https://news.samsung.com/global/samsung-electronics-announces-new-environmental-strategy> (date of application: 01.06.2024).

⁴³ Climate Action // Samsung URL: <https://www.samsung.com/global/sustainability/planet/climate-action/> (date of application : 01.06.2024).

⁴⁴ Hyundai Motor Reveals Vision for Hydrogen Energy and Software Solutions Beyond Mobility at CES 2024 // Hyundai URL: <https://www.hyundai.com/worldwide/en/newsroom/detail/hyundai-motor-reveals-vision-for-hydrogen-energy-and-software-solutions-beyond-mobility-at-ces-2024-0000000394> (date of application: 01.06.2024).

⁴⁵ LG Energy Solution LG Energy Solution Announces U.S. Market Strategies for ESS // LG URL: <https://www.lgcorp.com/media/release/26750> (date of application: 01.06.2024).

⁴⁶ Wright, C. and Nyberg, D., 2017. An inconvenient truth: How organizations translate climate change into business as usual. *Academy of management journal*, 60(5), pp.1633-1661.

positions of stakeholders and consider the public and global context of translating climate change issues when acting.⁴⁷

Climate change adaptation measures have a positive impact on the activities of South Korean TNCs, for example, cost savings - improving energy efficiency and water management. Acting mitigates climate risks such as production disruptions, damage from extreme weather events, and supply chain disruptions. Contributes to the improvement of the ability to withstand climatic influences and ensures the long-term sustainability of the business. Taking measures to adapt to climate change improves the image and reputation of corporations, attracts socially responsible investors and consumers. TNCs implementing advanced climate technologies and practices gain a competitive advantage over enterprises lagging behind in this area. In general, the climate change adaptation measures taken by South Korean TNCs are crucial to ensure their sustainability and competitiveness in a changing climate. These measures help to reduce risks, save costs, improve reputation and provide a competitive advantage in the face of growing global attention to climate issues.

⁴⁷ Wright, C. and Nyberg, D., 2017. An inconvenient truth: How organizations translate climate change into business as usual. *Academy of management journal*, 60(5), pp.1633-1661.

Chapter 2: South Korean Companies and Climate Change Adaptation Strategies

2.1. The connection between sustainable development, climate change and the competitiveness of companies

The competitiveness of companies in the context of adaptation to climate change consists of corporate social responsibility of the company, compliance with laws and regulations of the state on environmental regulation.

South Korea's environmental regulation regime consists of charters, enforcement orders, ministerial regulations and rules that relate to the general environment, including:

- Nature conservation
- Maintaining air quality
- Preservation of water quality
- Water supply/sewerage management
- Waste treatment / recycling
- Green technologies.

The core fund is established by the Framework Law on Environmental Policy (FAEP), which contains the main objectives of environmental policy, including pollution prevention and the rational use of natural resources for sustainable use.⁴⁸

The Ministry of the Environment of South Korea (MOE) classifies the laws in general into the following categories⁴⁹:

1. General Terms and Conditions, including:
 - FAEP;
 - The Law on Environmental Protection;

⁴⁸ M., Schluep, C., Hagelueken, R., Kuehr, F., Magalini, C., Maurer, C., Meskers, E. Mueller, and F. Wang, Recycling: from e-waste to resource [Online], United Nations Environment Programme, 2009

⁴⁹ L. Seunghae, P. Hae Sun Korean household waste management and recycling behavior/ Building and Environment, issue 46, 2011, pp. 1159

- Toxic Chemical Control Act;
- The Law on Sustainable Development;
- The Law on Special Measures to Combat Environmental Crimes.

2. Nature conservation, including:

- The Law on the Preservation of the Natural Environment;
- The Law on Environmental Impact Assessment;
- The Law on assistance with asbestos.

3. Maintaining air quality, including:

- Clean Air Conservation Act (CACA);
- Special Law on improving air quality in the Seoul Metropolitan Area;
- The Law on the Prevention of Minors.

4. Water quality conservation, including the Law on Water Quality Conservation and Ecosystem Conservation (WQECA).

In total, South Korea currently has 42 environmental-related laws and policies, as well as 8 documents under the United Nations Framework Classification for Resources (UNFC)⁵⁰.

Responsible organizations of the Ministry of Emergency Situations (including its divisions, regional offices and state-owned enterprises) is the main government organization responsible for the development of environmental policy and compliance with environmental legislation. In addition, each city or provincial government (local government) plays an important role by enacting local environmental regulations, managing environmental permits and enforcing environmental legislation as a statutory delegate of the Ministry of Emergency Situations. Environmental issues also include the following bodies: The Ministry of Food, Agriculture, Forestry and Fisheries (MFAFF), which regulates the use, development and conservation of agricultural land and forestry. It is also the Ministry of Land, Transport and Maritime Affairs (MLTM), which deals with

⁵⁰ South Korea // Climate Change Laws of the world URL: <https://climate-laws.org/geographies/south-korea> (date of application: 01.06.2024).

the use, development and conservation of river and South Korean territorial waters and environmental zoning issues. The Prosecutor's Office and the police, who are responsible for investigating and bringing charges of criminal violations of environmental legislation⁵¹

South Korea has developed an extensive strategy to reduce greenhouse gas emissions and transition to a low-carbon economy⁵². This strategy includes the adoption of a number of large-scale plans and policies, such as:

1. Energy Supply Plan (2009-2020)
2. The Korean New Green Course (2020)
3. The Law on Climate Neutrality (2021)

The key policies and objectives of the plan are:

- A reduction of emissions by 30% compared to the "business-as-usual" level in 2009.⁵³

- Updating the target by 2030 to a 37% reduction from the BAU level from 2015⁵⁴

- Updated in 2021 commitment to reduce emissions by 40% from 2018 levels by 2030⁵⁵.

Also, the transition to renewable energy sources is important:

- Increasing the share of renewable energy sources to 20% by 2030.

- A plan to increase the capacity of solar and wind power plants.

It is worth noting the program of stopping and early decommissioning of coal-fired power plants. to reduce dependence on coal

⁵¹ L. Seunghae, P. Hae Sun Korean household waste management and recycling behavior/ Building and Environment, issue 46, 2011, pp. 1159

⁵² WANG B., GOPAL M. CLIMATE ACTION BRIEF SOUTH KOREA //Asia Society Policy Institute. – 2023.

⁵³ ASIA SOCIETY POLICY INSTITUTE // ASPI Climate Action Brief: South Korea URL: <https://asiasociety.org/policy-institute/aspi-climate-action-brief-south-korea> (date of application: 06.06.2024).

⁵⁴ Submission under the Paris Agreement The Republic of Korea's Update of its First Nationally Determined Contribution December 30, 2020

⁵⁵ S.Korea commits to 'challenging goal' of cutting emissions to 40% of 2018 levels by 2030 // Reuters URL: <https://www.reuters.com/business/environment/skorea-commits-challenging-goal-cutting-emissions-40-2018-levels-by-2030-2021-10-18/> (date of application: 06.06.2024).

Under the leadership of the new President, Yun Seok-Yeon, South Korea has shifted its focus to strengthening research ties and international cooperation, particularly with the United States, as part of a new policy direction beginning in 2022. Plans and initiatives aim to increase electric vehicle production to 3.3 million units by 2030, while South Korea encourages corporate use of renewable energy to reach 100% clean energy usage by 2050. Phase 4 includes setting limits, allocating quotas, and conducting auctions, along with an emphasis on international cooperation through initiatives such as the Global Climate Fund. Collaboration with international partners to improve climate and energy security is a top priority.

As can be seen from the above, the South Korean government has a keen interest in improving the climate situation through the adoption and tightening of measures and controls. This is why corporate social responsibility (CSR) plays a significant role in the battle against climate change. Companies have the potential to use their resources and influence to reduce greenhouse gas emissions, adapt to the consequences of climate change, and foster sustainable development.

Sustainable business practices can bring companies a number of benefits, including:

- Reducing the risks associated with climate change
- Improving customer reputation and loyalty
- Attracting and retaining talented employees
- Gaining access to new markets and opportunities
- Reducing operating costs

Recognizing the relationship between sustainable development, climate challenges and company competitiveness is crucial for developing effective corporate strategies to adapt to a changing climate and gain a competitive advantage.

South Korean companies demonstrate a number of sustainable practices that range from environmental responsibility to corporate social responsibility.⁵⁶ Environmental responsibility includes:

- Actively investing in energy-saving technologies, solar panels and wind farms;
- Implementation of recycling and waste reduction;
- Development and use of environmentally friendly products and materials;
- Application of technologies to reduce greenhouse gas emissions;
- Investing in renewable energy sources.

However, South Korea still faces some challenges in the field of sustainable development. High levels of air pollution in large cities associated with industry. Despite these challenges, South Korean companies are demonstrating an increasing commitment to sustainable development, and their examples can serve as an inspiring example for other companies.

South Korean companies demonstrate various sustainable practices in many areas, from business to culture. Here are some of them⁵⁷:

- Many companies are investing in improving the energy efficiency of their operations and switching to renewable energy sources such as solar and wind energy.
- Companies are implementing recycling, waste reduction and composting programs.
- Development and production of environmentally friendly products, technologies and solutions for sustainable development.
- Construction of buildings using environmentally friendly materials, energy-efficient systems and landscape design.

According to the "Mobility Innovation Roadmap 2022", South Korea plans to increase electric vehicle production to 3.3 million units by 2030, representing 12% of the

⁵⁶ Joo J., Shin M. M. Building sustainable business ecosystems through customer participation: A lesson from South Korean cases //Asia Pacific Management Review. – 2018. – T. 23. – №. 1. – C. 1-11.

⁵⁷ Roh S. et al. The best practices of port sustainable development: a case study in Korea //Maritime Policy & Management. – 2023. – T. 50. – №. 2. – C. 254-280.

global electric vehicle market. This is a significant increase compared to the 254,000 vehicles produced in 2021. Almost 30 large South Korean companies have joined the RE100 initiative, which involves a commitment to switch to 100% renewable energy by 2050. The government promises support in the form of tax breaks and other measures in the amount of about 95 trillion won (approximately 66 billion US dollars) by 2026 to stimulate the production of electric vehicles⁵⁸. Technologies such as green hydrogen and carbon capture, utilization and storage (CCS) systems are receiving significant attention in South Korea. Despite current challenges such as hydrogen sources and the economic feasibility of CCUS, these technologies are seen as key to decarbonizing the industrial sector. At the international level, South Korea is actively involved in international climate initiatives. President Yoon Seok-yolo has established five carbon neutrality strategies involving the active use of international funds such as the Global Climate Fund and the Global Green Growth Institute, both based in South Korea. In 2021, South Korea and the United States agreed to coordinate their responses to global climate challenges and international efforts to finance climate resilience international efforts to finance climate sustainability⁵⁹. This cooperation was confirmed by the visit of President Joe Biden to South Korea in May 2022.

South Korean companies are also investing in research and development to create new products and services that can compete globally. Work is underway to create and improve transparent and sustainable supply chains that ensure responsible business conduct for suppliers.

⁵⁸ WANG B., GOPAL M. CLIMATE ACTION BRIEF SOUTH KOREA //Asia Society Policy Institute. – 2023.

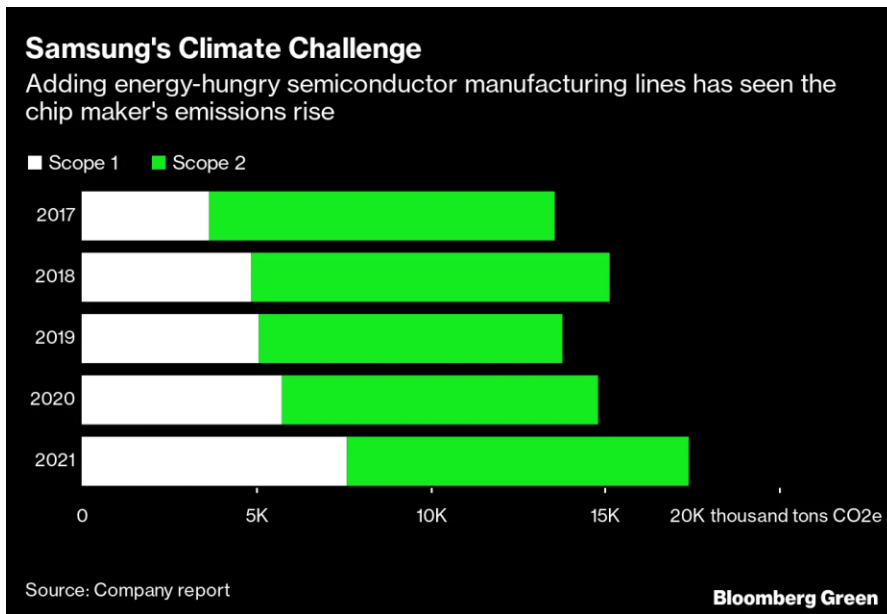
⁵⁹ FACT SHEET: United States – Republic of Korea Partnership // The White House URL: <https://www.whitehouse.gov/briefing-room/statements-releases/2021/05/21/fact-sheet-united-states-republic-of-korea-partnership/> (date of application: 06.06.2024).

2.2. Assessment of existing measures to reduce the carbon footprint and adapt to climate change. Examples of successful green transformation

As noted above, South Korean corporations have taken a number of initiatives to reduce emissions and increase resilience to climate change. These initiatives include: setting targets to reduce greenhouse gas emissions; investing in renewable energy sources and energy-efficient technologies; introducing sustainable farming and water management practices; and developing environmentally friendly products and services. Of course, there are concrete examples of such initiatives and measures. One of them is Samsung's initiative to create a "smart forest" to absorb carbon and promote biodiversity⁶⁰. Samsung uses IoT sensors and artificial intelligence systems to monitor forest conditions, analyze data, and optimize carbon sequestration and biodiversity restoration measures. Together with experts in the field of ecology, forestry and sustainable management, the company develops, develops and implements the project. In the future, Samsung plans to create "smart forests" in different regions of the world to increase the area of forests and increase their ability to absorb carbon⁶¹. Such measures are necessary, since according to the latest data for 2021, Samsung ranks first among the largest technology companies in terms of production - more than 20 million metric tons in CO2 equivalent in 2021.

⁶⁰ Environment Strategy // Samsung URL: <https://www.samsung.com/global/sustainability/planet/environmental-strategy/#anchor4> (date of: 06.06.2024).

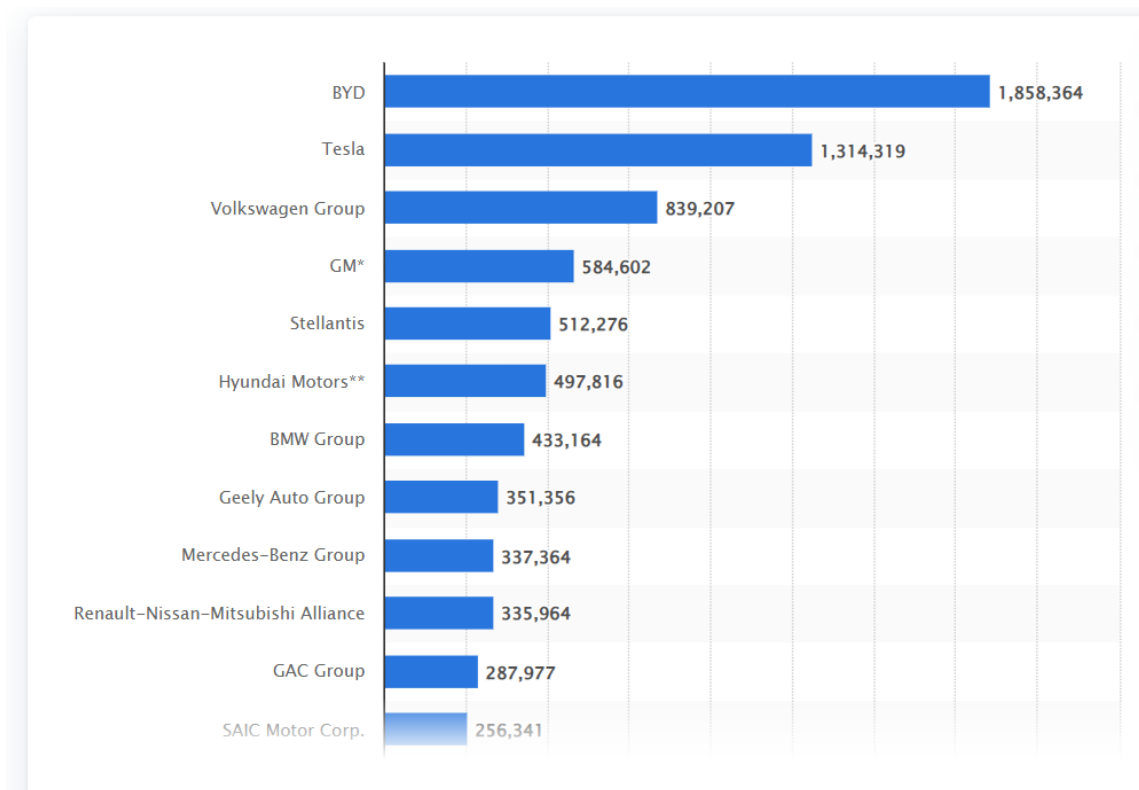
⁶¹ Samsung to Plant Millions of Trees to Fight Climate Change // Samsung Newsroom URL: <https://news.samsung.com/us/samsung-veritree-plant-millions-trees-fight-climate-change/> (date of application: 06.06.2024).



Pic 8: Samsung's Climate Challenge

Hyundai, another of South Korea's largest TNCs, has committed to the production of electric vehicles and the introduction of hydrogen fuel cells. As a result, Hyundai has become one of the leading manufacturers of electric vehicles⁶², with models such as Kona Electric, Ionis 5 and Ionis 6. By 2030, the company is going to enter the top three EV manufacturers.

⁶² Global plug-in electric vehicle production in 2022, by leading automotive manufacturer // Statista URL: <https://www.statista.com/statistics/271013/worldwide-leading-electric-car-manufacturers-based-on-vehicle-production/> (date of application: 06.06.2024).



Pic 9: Global plug-in electric vehicle production in 2022, by leading automotive manufacturer⁶³

Hyundai is launching pilot projects for the introduction of hydrogen vehicles and infrastructure, as well as actively investing in the development of hydrogen fuel cells and hydrogen infrastructure. Hyundai has developed the Nexor hydrogen car and plans to produce new models with hydrogen fuel cells. Such an initiative to switch to electric vehicles and hydrogen fuel cells contributes to reducing greenhouse gas emissions. It is also worth noting an important factor that the development of the production of electric vehicles and hydrogen technologies creates new jobs in various fields, as well as contributes to the investment of large investments in innovation. But there are also some disadvantages associated with the cost. Electric cars and hydrogen cars are still more expensive than cars with internal combustion engines. Also, so far, in many cities, the

⁶³ Global plug-in electric vehicle production in 2022, by leading automotive manufacturer // Statista URL: <https://www.statista.com/statistics/271013/worldwide-leading-electric-car-manufacturers-based-on-vehicle-production/> (date of application: 06.06.2024).

infrastructure for charging electric vehicles and refueling hydrogen cars is developing more slowly than we would like.

Although South Korean corporations have made progress in adapting to climate change, there is still room for further improvement. There is an opportunity for South Korean companies to accelerate the transition to renewable energy sources and energy-efficient technologies. Also, South Korean companies should invest and devote more time to research and development in the field of sustainable technologies. Evaluating existing measures to reduce the carbon footprint and adapt to climate change is crucial to identify areas for improvement and develop more effective corporate sustainability strategies.

As for the manufacturing sector, POSCO is worth noting here. POSCO is committed to reducing CO2 emissions by switching to renewable energy sources, optimizing production processes and introducing new technologies such as carbon capture and storage⁶⁴. The company invests in improving the energy efficiency of its production facilities. The latest technologies are being introduced to reduce energy consumption and increase productivity. The company is also actively developing hydrogen technologies, including the production of green hydrogen, which will be used as fuel for steel production⁶⁵. POSCO also actively collaborates with other companies and research institutes to develop and implement new technologies to reduce environmental impacts. The company strives to ensure that its activities are environmentally sustainable, contributing to the creation of a cleaner and greener future. Despite active efforts to reduce the environmental impact, POSCO's activities, like any large steel company, still have a negative impact on the environment. It is a well-known fact that steel production is an energy-intensive process that leads to emissions of CO2 and other greenhouse gasses

⁶⁴ESG Strategy // POSCO URL: <https://www.posco.co.kr/homepage/docs/eng7/jsp/esg/approach/environmental.jsp> (date of application: 06.06.2024).

⁶⁵ [H2 MEET 2023] Sketching the Blueprint of POSCO Group's Hydrogen Business Value Chain // POSCO Newsroom URL: <https://newsroom.posco.com/en/h2-meet-2023-sketching-the-blueprint-of-posco-groups-hydrogen-business-value-chain/> (date of application: 06.06.2024).

contributing to climate change. The operation of steel mills creates noise that can negatively affect the health of humans and animals. Steel mills emit harmful substances such as sulfur oxides, nitrogen oxides, dust and heavy metals into the atmosphere, which can lead to health problems for people. But as mentioned above, POSCO is actively working to solve problems by introducing technologies to reduce emissions, improve energy efficiency and more sustainable production methods.

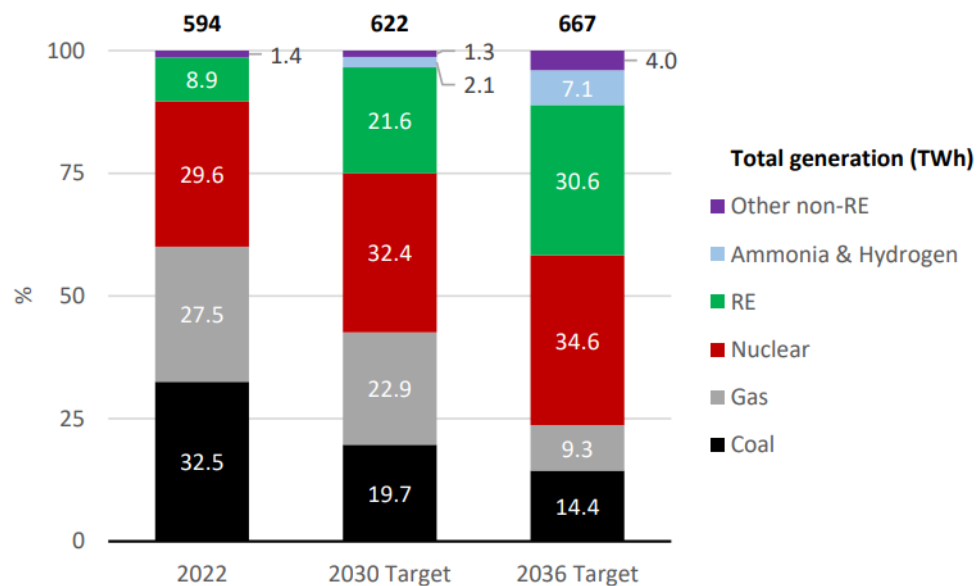
Another major South Korean organization that is actively involved in improving the environmental situation in South Korea is LG. LG, as a global technology corporation, is aware of its responsibility to preserve the environment and actively implements sustainable development strategies. LG focuses on the development and production of environmentally friendly products such as energy-efficient household appliances, electric vehicles, solar panels and energy storage systems. The company actively uses advanced technologies to improve energy efficiency, reduce resource consumption and reduce emissions. LG is committed to reducing CO₂ emissions by switching to renewable energy sources⁶⁶, optimization of production processes and implementation of energy-efficient solutions in their offices and factories. LG is investing in green infrastructure, including green roofs, solar panels and catchment systems, to make its buildings more environmentally friendly.

The results of the efforts of South Korean companies in the fight against climate change are impressive, but require further action. South Korea has seen a marked increase in the share of renewable energy sources in total electricity production. The amount of renewable energy from photovoltaics saw an over 30-fold increase from 2010 to 2022. Further, the number of wind power plants tripled from 2011 to 2022. With these developments, the share of wind and solar energy in electricity production rose from less

⁶⁶ LG Joins RE100 Initiative, Committing to Transition to Renewable Energy // LG URL: <https://www.lg.com/global/newsroom/news/corporate/lg-joins-re100-initiative-committing-to-transition-to-renewable-energy/#:~:text=To%20reach%20this%20goal%2C%20LG,of%20100%20percent%20by%202050.> (date of application: 06.06.2024).

than one percent in 2011 to six percent in 2022⁶⁷. Nevertheless, coal-based electricity generation prevails in South Korea, but by 2030 it is expected to reduce the share of coal in energy production and increase ammonia and hydrogen electricity generation⁶⁸.

Chart 3: South Korea Electricity Generation Mix 2022, and 2030 & 2036 Targets



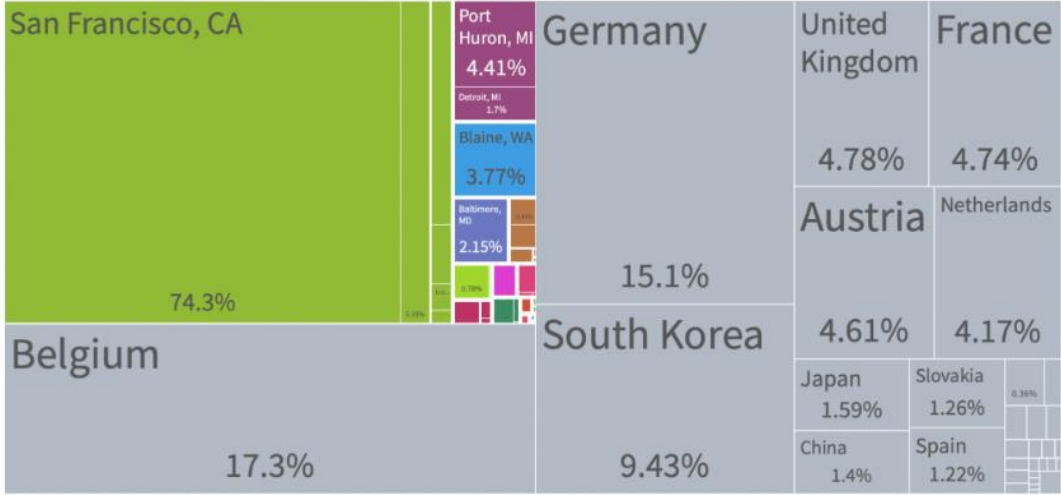
Pic 10: South Korea Electricity Generation Mix 2022, and 2030 & 2036 Targets

South Korea has become one of the world leaders in sales of electric vehicles. The number of cumulative electric vehicle (EV) registrations in Korea surpassed the 500,000 mark in 2023. Due to KAMA (Korea Automobile Manufacturers Association) consumers' preference for high-end models with added safety devices, hybrid cars, and electric vehicles has increased. With the launch of new electric vehicles and increased sales of small electric trucks, eco-friendly vehicles increased by 28.3% cumulatively in November

⁶⁷ Renewable energy in South Korea - statistics & facts // Statista URL: <https://www.statista.com/topics/9842/renewable-energy-in-south-korea/#topicOverview> (date of application: 06.06.2024).

⁶⁸ South Korea Low Renewable Energy Ambitions Result in High Nuclear and Fossil Power Dependencies November 2023

and accounted for 26.7% of total vehicle sales. EVs sold were 151,322 units cumulatively through November, accounting for 10% of total sales⁶⁹.



Pic 11: US total exports: \$8.2B (33% of \$24.9B total market) exports of "Vehicles; with only electric motor for propulsion"⁷⁰

Many companies have implemented programs to improve the energy efficiency of their production facilities and offices, which has led to a reduction in energy consumption. Some companies have switched to using recyclable materials and reduced the use of plastic.

But despite the efforts, South Korea is still heavily dependent on fossil fuels. Although the country is committed to reducing emissions, this is not enough to achieve the goals of the Paris Agreement. Despite the growth in the use of renewable energy sources, investments in infrastructure development to support them, especially in rural areas, are still insufficient⁷¹. Most of the sustainability initiatives are concentrated in large

⁶⁹ Monthly Statistics // KAMA Korea Automobile & Mobility Association URL: https://www.kama.or.kr/BoardController?cmd=V&boardmaster_id=months_e&gubun=eng&board_id=506&menunum=0081# (date of application: 06.06.2024).

⁷⁰ How China & Korea Became Leaders in Electric Vehicle Exports // OEC URL: <https://oec.world/en/blog/electric-vehicle-policies-in-usa-china-south-korea> (date of application: 06.06.2024).

⁷¹ Stangarone, T. South Korean efforts to transition to a hydrogen economy. *Clean Techn Environ Policy* 23, 509–516 (2021). <https://doi.org/10.1007/s10098-020-01936-6>

corporations. It is necessary to expand support and training for small and medium-sized businesses.

Despite the overall success, some industries, such as steel production, have not yet achieved significant emission reductions. Success in the fight against climate change depends on consistent and proactive government policies aimed at stimulating innovation and supporting sustainable practices. South Korea should actively participate in international efforts to combat climate change and share its experience with other countries.

Overall, South Korea is making progress towards achieving the Sustainable Development Goals, but more efforts are needed to achieve significant emissions reductions and adaptation to climate change.

2.3. Research on corporate social responsibility practices in the context of climate change

Corporations can use CSR as a platform for implementing initiatives aimed at mitigating the effects of climate change. These initiatives may include: investments in renewable energy sources and energy-efficient technologies; promotion of sustainable forest management and agriculture; support for climate change adaptation programs in vulnerable communities; raising awareness of climate change and promoting sustainable practices. CSR initiatives related to climate change can have a positive impact on stakeholders. First of all, this can affect employees, their participation in CSR initiatives can increase engagement and loyalty. Here you can share information about goals, strategies and achievements in the field of sustainable development with employees. To provide training on climate change, its causes and consequences, as well as on the role of the corporation in solving this problem. Conduct internal campaigns to raise awareness of the importance of sustainable development and change employee behavior. For even greater involvement, the creation of “green” jobs can contribute, implement waste

recycling and sorting programs at the workplace and at home, and companies can also encourage the use of public transport and bicycles to get to work in order to reduce CO2 emissions⁷².

It is also worth noting that consumers increasingly prefer companies that demonstrate a commitment to sustainable development. Consumers are increasingly aware of the impact of their purchases on the environment and society. They want to be a part of solving environmental and social problems and believe that supporting companies that pay attention to sustainable development helps them in this. Consumers have more confidence in companies that demonstrate a real commitment to sustainable development and back up their words with actions. They believe that such companies are more reliable and responsible. But it is also worth noting that "greenwashing" (empty or misleading statements about contributions to sustainable development) can undermine consumer confidence in the brand. Consumers are actively studying packaging and looking for information about the sustainable development of the product: "eco-friendly", "fair trade", "vegan", etc.⁷³.

⁷² The Republic of Korea's Adaptation Communication A Report to the United Nations Framework Convention on Climate Change Republic of Korea 2022

⁷³ Frey, S. B. A. J., et al. "Consumers Care about Sustainability and Back It Up with Their Wallets." *Mckinsey and Company* (2023).

Products that make environmental, social, and governance-related claims have achieved disproportionate growth.

Retail sales growth, US, CAGR 2018–22, %



¹Environmental, social, and governance.
Source: NielsenIQ

McKinsey & Company

Pic 12: Products that make environmental, social, and governance-related claims have achieved disproportionate growth

Also, investors are increasingly taking sustainability indicators into account when making investment decisions. Investors understand that climate change, social injustice, and poor management practices pose risks to companies and portfolios. But at the same time, it also creates opportunities for investments in companies that solve these problems. Governments around the world are introducing new rules and standards related to ESG, which encourages companies to be transparent and take these factors into account. Consumers are increasingly interested in supporting companies that act ethically and take care of the environment. This creates pressure on companies to meet these expectations. Research shows that companies that do well with ESG factors tend to have higher profitability in the long run.

CSR initiatives related to climate change can help create a positive public image of corporations. This can lead to increased trust, enhanced reputation, and stronger support from society. Understanding the role of companies in addressing climate change and creating a more sustainable future is essential. South Korean businesses, particularly large conglomerates, actively engage in volunteer programs and philanthropic activities. They organize large groups of volunteers to promote harmony and trust within their organizations. These efforts often focus on improving social conditions and involve

employee participation. Companies place a high value on social contributions and volunteer work, reflecting the significance of collective goals and social progress in Korean culture. These initiatives are closely linked to the Confucian philosophy of promoting social progress through collective efforts' in South Korea is influenced by unique cultural and political norms, which create specific requirements and approaches. South Korean companies emphasize transparency in their CSR efforts, often publicly reporting their financial contributions and initiatives. This is driven by the need to meet international standards and expectations, both domestically and globally. Collectivist values play a significant role, as CSR projects often focus on the long-term improvement of society, reflecting Confucian values that prioritize group interests over individual ones. South Korean companies must also adapt to international standards, such as the UN's Global Compact and the Global Reporting Initiative, as well as ISO 26000, in order to remain competitive and relevant in the global market. This is due to the need to comply with new international standards and regulations, as well as to avoid criticism from international non-governmental organizations such as Greenpeace and World Vision. South Korean companies strive to meet the requirements of valuation systems such as FTSE4Good, Dow Jones Social Index, and Fortune 100 Best Companies to Work For, which also influences their CSR strategies.

South Korean companies must balance short-term economic interests with long-term sustainable development strategies. Prior to the 1997 Asian financial crisis, CSR (corporate social responsibility) was often used to conceal corrupt practices. Subsequently, new regulatory requirements led to increased transparency and redirection of budgets towards more transparent and socially significant initiatives. Companies support the development of social enterprises in order to create jobs for low-income segments of the population. This is combined with government policies such as tax benefits for social enterprises.

If we draw conclusions from this, it is important to note that South Korea is actively developing sustainable practices. The government enacts laws and encourages companies

to incorporate these practices into their operations. However, there are critics who argue that some companies in South Korea may not pay enough attention to social and environmental sustainability. Despite this, South Korea remains one of the countries that promotes sustainable development at a global level.

The competitiveness of Korean companies in terms of sustainable practices is a complex issue that depends on various factors. On the one hand, there are several advantages for Korean companies. By actively implementing sustainable practices, they are integrating them into their operations more and more. This includes waste management, energy efficiency, use of renewable energy sources, development of environmentally friendly products and technologies, and social responsibility. The South Korean government actively supports sustainable development and encourages companies to adopt these practices. They provide financial assistance, tax incentives, and awareness programs. Korean companies are known for their innovative spirit, investing heavily in research and development. This allows them to create products and technologies that meet market demands for sustainable solutions. Many Korean companies have a global presence that allows them to promote sustainable practices and influence global trends in sustainable development. These practices are becoming an important competitive advantage for Korean companies, as they help reduce costs, enhance their image, and increase profits. The use of "green" technologies and social investments, along with ethical principles, helps companies create a more sustainable business model.

Chapter 3: Green Transformation and Prospects for South Korean Corporations

3.1. The interconnectedness between green initiatives and the competitiveness of South Korean companies. Analysis of the competitive environment with the participation of corporations from the USA, Japan and other countries

Green initiatives can have a positive impact on the market share, profitability and innovation of South Korean companies⁷⁴. While some economic studies suggest that investments in environmental management can raise a firm's transaction and coordination costs, resulting in financial sacrifices⁷⁵, there is growing evidence that green initiatives can positively affect profitability in the long term⁷⁶. At the moment, the topic of how green practices affect the profitability of companies is small, since the topic is very new and it is too early to talk about the results. But there are studies on European countries that have concluded that the application of green practices and subsequent innovations lead to uniqueness and, consequently, greater competitiveness of companies⁷⁷. Also, by improving resource efficiency and reducing waste, companies can lower operational costs⁷⁸. Additionally, green innovation can open up new revenue streams and markets, contributing to overall profitability. According to the Porter hypothesis, well-designed

⁷⁴ Roh, Taewoo, et al. "Structural relationships of a firm's green strategies for environmental performance: The roles of green supply chain management and green marketing innovation." *Journal of cleaner production* 356 (2022): 131877.

⁷⁵ Chen, Duan & Leon, Arturo & Gibson, Nathan & Hosseini, Parnian. (2016). Chen et al-2016-Water Resources Research.

⁷⁶ Pham, Cuong & Do, Thi & Doan, Thanh & Nguyễn Thị Xuan, Hong & Pham, Thi. (2021). The impact of sustainability practices on financial performance: empirical evidence from Sweden. *Cogent Business & Management*. 8. 1912526. 10.1080/23311975.2021.1912526.

⁷⁷ Pham, Cuong & Do, Thi & Doan, Thanh & Nguyễn Thị Xuan, Hong & Pham, Thi. (2021). The impact of sustainability practices on financial performance: empirical evidence from Sweden. *Cogent Business & Management*. 8. 1912526. 10.1080/23311975.2021.1912526.

⁷⁸ Ekins, Paul, Nick Hughes, S. Brigenzu, C. Arden Clark, M. Fischer-Kowalski, T. Graedel, M. Hajer et al. "Resource efficiency: Potential and economic implications." (2016)

environmental regulations can drive innovation, leading to increased productivity and profitability. Such advantages are provided by the fact that consumers increasingly prefer companies that are perceived as environmentally responsible. For example, according to the research McKinsey more than 60 percent of respondents said they'd pay more for a product with sustainable packaging⁷⁹. According to the data Nielsen found that 83% of global consumers believe it is important for companies to be environmentally responsible. Additionally, 66% of consumers are willing to pay more for products and services from sustainable brands⁸⁰. There are several reasons for this trend. First, consumers are becoming more aware of the environmental impact of their purchasing decisions. They are realizing that their choices can make a difference in the fight against climate change and other environmental problems. For many people, environmental sustainability is an important value, and they want to support companies that share that value.

The main results of McKinsey research are that:

- Over the past five years, products with ESG-related claims have accounted for 56% of all growth, 18% more than would have been expected⁸¹.
- Compound growth for products with ESG-related claims averaged 28% over the five-year period, compared to 20% for products that did not make such claims⁸²
- Brands that garner more than half of their sales from products making ESG-related claims enjoy 32 to 34% repeat rates, compared to under 30% for brands that receive less than 50% of their sales from ESG-related products.

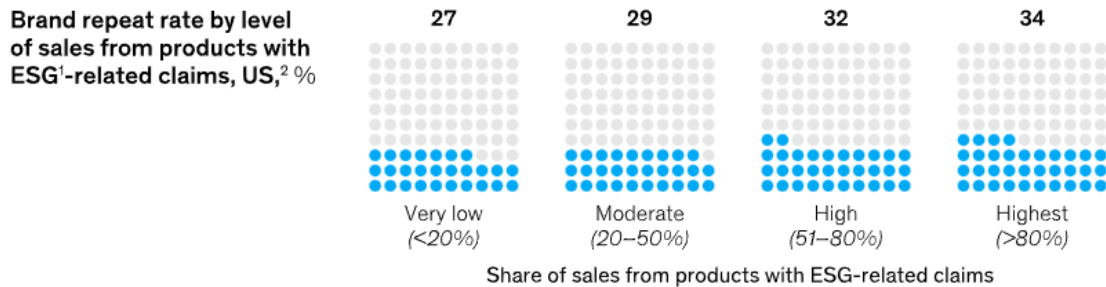
⁷⁹Feber D. et al. Sustainability in packaging: Inside the minds of US consumers //McKinsey & Company. Available online: <https://www.mckinsey.com/industries/paper-forest-products-and-packaging/our-insights/sustainability-in-packaging-inside-the-minds-of-us-consumers> (accessed on 21 October 2020). – 2020.

⁸⁰ Why Investing in Sustainability is a Smart Business Move // FORLIANCE growing climate action URL: <https://forliance.com/news/2023/03/07/why-investing-in-sustainability-is-a-smart-business-move#:~:text=In%20fact%2C%20a%20study%20by%20Nielsen%20found%20that%2066%25%20of,also%20a%20smart%20business%20move> (Date of application: 10.06.2024).

⁸¹ Rokka J., Uusitalo L. Preference for green packaging in consumer product choices—do consumers care? //International Journal of Consumer Studies. – 2008. – T. 32. – №. 5. – C. 516-525.

⁸² Sherry Frey of NielsenIQ and Jordan Bar Am Consumers care about sustainability—and back it up with their wallets // McKinsey & Company. - February 6, 2023

Brands with more sales from products making environmental, social, and governance-related claims enjoy greater loyalty.



¹Environmental, social, and governance.

²Share of households buying a product 3 or more times annually.

Source: NielsenIQ consumer panel, comprising 100,000 households, Sept 2020–22

McKinsey & Company

Pic 13: Brands with more sales from product making environmental loyalty⁸³

In this way, in today's market, consumers and businesses are increasingly prioritizing sustainability. By adopting green initiatives and reducing their environmental footprint, companies can gain a competitive advantage and attract eco-conscious customers.

One more part of green initiatives is that they can lead to lower energy and raw material costs, as well as increased operational efficiency. Green initiatives often involve implementing energy-efficient technologies and practices⁸⁴, such as:

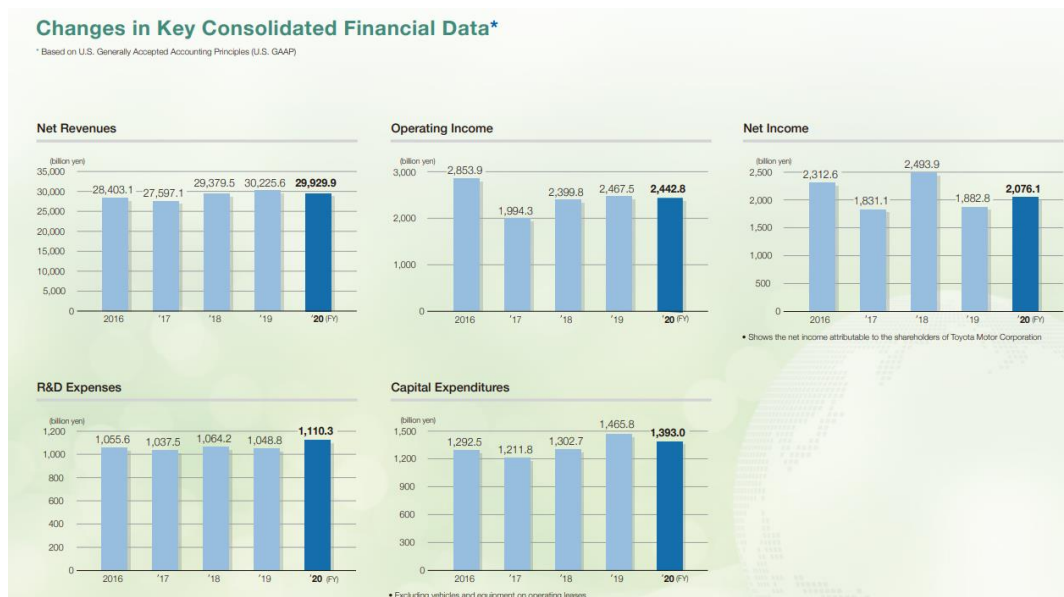
- Upgrading to energy-efficient lighting systems
- Installing solar panels or other renewable energy sources
- Optimizing production processes to reduce energy waste
- Utilizing energy-efficient equipment and machinery
- Using recycled or sustainable materials
- Implementing lean manufacturing principles to minimize waste

⁸³ Sherry Frey of NielsenIQ and Jordan Bar Am Consumers care about sustainability—and back it up with their wallets // McKinsey & Company. - February 6, 2023

⁸⁴ Lui A. K. H. et al. Forced to be green? The performance impact of energy-efficient systems under institutional pressures //International Journal of Production Economics. – 2021. – T. 239. – C. 108213.

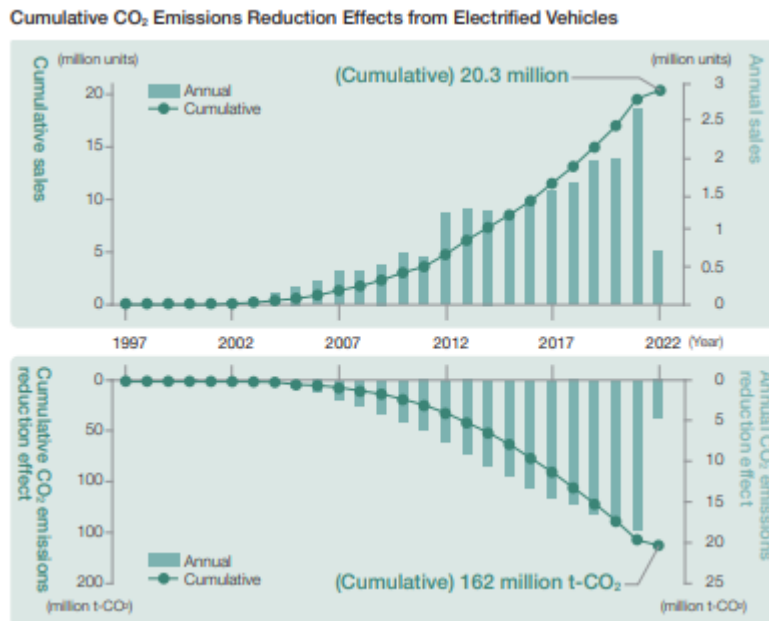
- Designing products for durability and longevity
- Exploring alternative materials with lower environmental impact

In modern scientific works, the term "lean-green" has increasingly begun to appear. This is a concept that combines a set of values and efficiency with regard to operation and environmental protection. It arises from the fact that companies need to rethink their goals and strategies to increase value while promoting social justice and preventing environmental damage. Rapidly increasing competition in global markets and rising raw material costs have also led manufacturing industries to adopt lean manufacturing policies, such as the Japanese company Toyota, as one of the most prominent examples. Toyota's philosophy, known as the "Toyota Way," reflects a proactive approach to sustainability and an unusual relationship with the market and society. This vision of business resonates both internally and externally. Although the total number of vehicles sold has stalled, hybrid vehicle sales are growing, and revenue and income are increasing financially.



Pic 15: Changes in key consolidated financial data ⁸⁵

⁸⁵ Environmental Report 2020 Toyota



Pic 16: Cumulative CO₂ Emission reduction effect from Electric Vehicles⁸⁶

One approach that has gained significant popularity in recent years is Kaizen, a philosophy that promotes continuous improvement through small, gradual changes. Through the use of Kaizen, companies in the Asia-Pacific region have been able to achieve excellence in processes and operations, as well as lean manufacturing. Toyota was the pioneer of this philosophy and has successfully used it since the 1950s to enhance their manufacturing process.⁸⁷ Toyota implemented the five pillars of virtue, which include "teamwork, personal discipline, improved morale, quality circles and suggestions for improvement" in all its models⁸⁸. The Toyota Kaizen philosophy dictates that if a process can be efficiently performed by a group, they should find ways to do the same task with fewer people. This frees up personnel to move, work on other tasks, and learn. In the early

⁸⁶ 2022 Sustainability Data Book Toyota

⁸⁷ Marksberry P. et al. Management directed kaizen: Toyota's Jishuken process for management development //Journal of Manufacturing Technology Management. – 2010. – T. 21. – №. 6. – C. 670-686.

⁸⁸ Chiarini A., Baccarani C., Mascherpa V. Lean production, Toyota Production System and Kaizen philosophy: A conceptual analysis from the perspective of Zen Buddhism //The TQM Journal. – 2018. – T. 30. – №. 4. – C. 425-438.

1980s, Toyota tried the impossible by creating a bona fide competitor for the European luxury car market with their Lexus LS 400 on their first attempt. Toyota's success with improving the car assembly process is a fascinating case study that has been emulated by other brands.

Technological advance and the development of society are based on the use of energy. This leads to the importance of increasing energy efficiency in organizations. It is obvious that productivity is influenced by increasing energy costs⁸⁹. For example, lower energy and raw material costs directly translate to reduced operating expenses for businesses. This can improve profitability and financial sustainability. The study Lui, Ariel KH, et al. "Forced to be green? The performance impact of energy-efficient systems under institutional pressures.", based on 238 listed firms that have deployed energy-efficient systems (EES), reveals that firms experience an improvement in their return on assets (ROA) after adopting EES. This indicates that implementing energy-efficient technologies and practices positively impacts financial performance⁹⁰

But this does not work in all companies. For example, companies such as Nestle, Google, Apple, Walmart, etc., despite the use of sustainable development goals, have an increase in operating costs. For example, Walmart, the retail giant, has implemented various green initiatives, including installing solar panels, using energy-efficient lighting, and optimizing its supply chain.

⁸⁹ Faiella, I.; Mistretta, A. The Net Zero Challenge for Firms' Competitiveness. *Environ. Resour. Econ.* 2022, 83, 85–113

⁹⁰ Lui A. K. H. et al. Forced to be green? The performance impact of energy-efficient systems under institutional pressures // *International Journal of Production Economics*. – 2021. – T. 239. – C. 108213.

Company	2022	2023	2024
Walmart	117812	127140	130971
Nestle	33176	32179	32258
Apple	43887	51345	54847
Google	178923	207994	223101

Table 1: Annual operating expenses from different companies⁹¹

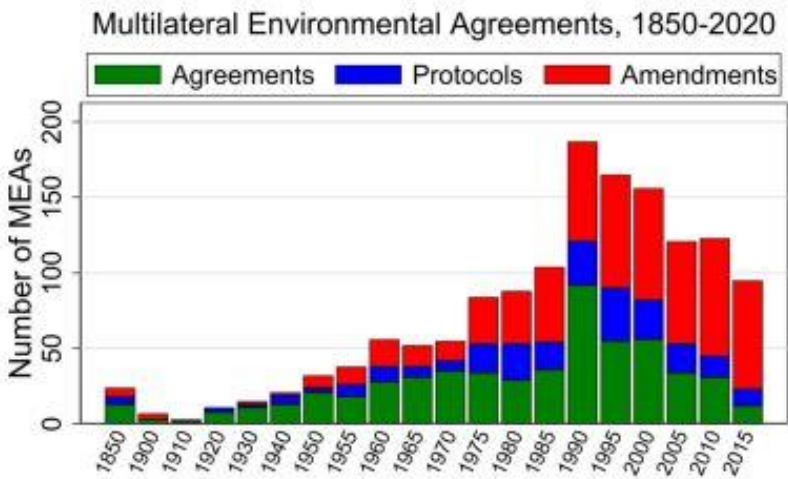
Unfortunately, there is not enough data in open sources to accurately state that environmental measures do not lead to a reduction in operating expenses for companies. But there is also no precise evidence against this fact. In some companies like IKEA it works, in 2022 operating expenses amounted to 3140 thousand euros, and in 2023 - 2993 thousand euros⁹². Most likely, this depends on the unique factors of each company, which cannot be influenced or taken as an example from another company. There are also some examples in the world of green initiatives that have led to lower energy and raw material costs. These measures have resulted in significant energy savings and reduced operating costs. Toyota has focused on reducing raw material consumption through initiatives such as using recycled materials in vehicle production and implementing lean manufacturing principles. These efforts have helped Toyota lower its material costs and improve its environmental performance. Interface manufacturers have developed innovative products

⁹¹Alphabet Operating Expenses 2010-2024 | GOOGL // Macrotrends URL: <https://www.macrotrends.net/stocks/charts/GOOGL/alphabet/operating-expenses> (date of application: 06.06.2024).

⁹² IKEA Sustainability Report FY23

made from recycled materials and renewable resources. By reducing its reliance on virgin materials, Interface has achieved both cost savings and environmental benefits⁹³.

Many countries and regions have implemented regulations to reduce energy consumption and greenhouse gas emissions. Green initiatives can help businesses comply with these regulations and avoid potential fines or penalties. There are more than 3,000 regulatory measures worldwide in the form of agreements, protocols and amendments. Some of the main ones can be identified Kyoto Protocol, 2015 Paris Agreement, The United Nations Framework Convention on Climate Change (UNFCCC), Montreal Protocol 1987, World Heritage Convention 1973, CITES 1974, Convention on biological diversity 1993.



Pic 17: The International Environmental Agreements (IEA) Database⁹⁴

Institutional pressures play a significant role in influencing organizations to adopt green practices. Norms and standards set by professional organizations and industry associations define acceptable behaviors and practices within specific sectors. Organizations may adopt green practices to align with industry norms and enhance their

⁹³ Haleem, A., Javaid, M., Singh, R. P., Suman, R., & Qadri, M. A. Green Technologies and Sustainability.

⁹⁴ The IEA Database // International Environmental Agreements (IEA) Database Project URL: <https://www.iea.ulaval.ca/en> (date of application: 08.06.2024).

legitimacy and reputation⁹⁵. Also, some NGOs advocate for environmental sustainability and push for higher standards beyond regulatory requirements. By lobbying targeted firms and raising awareness through campaigns and protests, environmental NGOs influence organizations to adopt energy-efficient technologies and reduce their carbon footprint⁹⁶.

One important factor is that investments in green technologies could lead to the creation of new products and services that address the growing demand for environmentally friendly solutions. Green technologies refer to any process, technique, or device that helps reduce environmental impact⁹⁷. They can be used to conserve resources, reduce pollution, and improve sustainability. Investing in green technologies can lead to the development of new products and services that are more environmentally friendly and meet the growing demand for sustainable solutions. As examples of new products and services developed through green technology investments include: electric vehicles, solar panels, wind turbines, energy-efficient appliances, water-saving irrigation systems, green building materials, and sustainable packaging.

Benefits of developing new products and services through green technology investments includes increased market share⁹⁸. For example, as was mentioned before, consumers are increasingly looking for environmentally friendly products and services. By investing in green technologies, companies can gain a competitive advantage by meeting this demand. Companies that are seen as being environmentally responsible can improve their brand image and attract more customers. In this case, green technologies can help companies reduce their operating costs, such as energy and water consumption. Investing in green technologies can lead to new innovations that can further improve a

⁹⁵ Lui A. K. H. et al. Forced to be green? The performance impact of energy-efficient systems under institutional pressures //International Journal of Production Economics. – 2021. – T. 239. – C. 108213.

⁹⁶ Lui A. K. H. et al. Forced to be green? The performance impact of energy-efficient systems under institutional pressures //International Journal of Production Economics. – 2021. – T. 239. – C. 108213.

⁹⁷ Barbieri N., Marzucchi A., Rizzo U. Knowledge sources and impacts on subsequent inventions: Do green technologies differ from non-green ones? //Research Policy. – 2020. – T. 49. – №. 2. – C. 103901.

⁹⁸ Ikram M. et al. Assessing green technology indicators for cleaner production and sustainable investments in a developing country context //Journal of Cleaner Production. – 2021. – T. 322. – C. 129090.

company's products and services. Also, many governments offer incentives to companies that invest in green technologies, such as tax breaks and grants.

There are some examples of companies that have developed new products and services through green technology investments. Tesla is a leading manufacturer of electric vehicles. The company has invested heavily in green technology, which has allowed it to develop a range of innovative and environmentally friendly cars⁹⁹. SolarCity is a leading provider of solar energy systems. The company has invested in green technology to develop more efficient and affordable solar panels¹⁰⁰. Philips is a leading manufacturer of energy-efficient appliances. The company has invested in green technology to develop appliances that use less energy and water¹⁰¹. Interface is a leading manufacturer of sustainable flooring materials. The company has invested in green technology to develop flooring products that are made from recycled materials and are recyclable themselves.¹⁰²

One important factor that may be contributing to this trend is the investment in green technologies. These investments can lead to the development of new products and services that are more sustainable and meet the growing demand for environmentally friendly solutions. South Korean companies face intense competition from other countries, such as the United States and Japan, in industries like electronics, semiconductors, and automotive. To remain competitive, these companies must implement green initiatives and invest in sustainable technologies. In the high-tech sector, South Korea is facing a significant challenge from countries like the United States and Japan. These countries have vast resources, extensive experience, and innovative capabilities in areas like smartphones, tablets, computer hardware, and wearable devices. Apple, for example, is a

⁹⁹ Matthews T. et al. Tesla Energy //Innovation Management in the Intelligent World: Cases and Tools. – 2020. – C. 233-249.

¹⁰⁰ Yu Z., Gibbs D. Unravelling the role of green entrepreneurs in urban sustainability transitions: A case study of China's Solar City //Urban Studies. – 2020. – T. 57. – №. 14. – C. 2901-2917.

¹⁰¹ Sustainable Innovation Paper - The Changing Innovation Context (2011)

¹⁰² D'Angelo, Viviana, Francesco Cappa, and Enzo Peruffo. "Green manufacturing for sustainable development: The positive effects of green activities, green investments, and non-green products on economic performance." *Business Strategy and the Environment* 32.4 (2023): 1900-1913.

major player in the smartphone market from the USA, and Samsung is a dominant competitor in South Korea. Additionally, Google dominates search engines, operating systems, and artificial intelligence, among other areas. Microsoft, a major software manufacturer, Windows operating system and cloud service provider; Amazon, the leader in online retail, cloud computing, and artificial intelligence; Tesla, the pioneer in electric vehicles and autonomous driving - these are just a few examples of corporations that have vast experience, resources, and innovative power. These companies dominate various sectors, such as software, cloud technology, artificial intelligence, and electric vehicles. Their global reach, brand recognition, and powerful marketing efforts create significant barriers for South Korean businesses.

Japanese companies are the main competitors of South Korean corporations in the automotive and electronics industries. The main competitors here are: Toyota, a leader in the automotive industry, known for its reliability and hybrid car technology. Sony is a major electronics manufacturer known for its gaming consoles, cameras, televisions and audio systems. Panasonic is a major electronics manufacturer specializing in consumer electronics, car batteries and solar panels. Honda is a leader in the automotive industry, known for its motorcycles, engines and hybrid cars. Canon is a major manufacturer of photo and video cameras, printers and scanners. Japanese corporations are traditionally renowned for their stability, durability of products and focus on quality. They have deep experience in sectors such as automotive, electronics, photo and video technology, as well as in the production of high-quality materials. Their strong position in the Asian market and deep ties with suppliers creates a competitive advantage.

South Korea, as a technological powerhouse, faces fierce competition in the global market. It faces major rivals from the United States, Japan and other countries, all seeking to capture a share of the high-tech market. South Korea boasts a strong innovation drive, particularly in the fields of electronics, semiconductors, and automotive. South Korean companies invest heavily in research and development to create innovative products and services. Samsung, LG, Hyundai, and Kia are some well-known brands that have gained

popularity worldwide. To succeed, South Korean corporations must continue investing in innovation. This means continuing to lead in research, development, and technology. By doing so, they can stay at the forefront of innovation and maintain their competitive edge in the global marketplace.

According to the annual reports of South Korean companies, the following conclusions can be drawn. Samsung, Hyundai, LG, Kia, Posca and LG are taking active steps to overcome the environmental crisis. According to the data from the reports, it can be observed that the number of measures taken by the companies increases annually. Below is a table of approximate results coming from the texts of annual reports. These measures include switching to green energy, introducing new policies within the companies, entering into cooperation with other companies in the field of environment, switching to green products, etc. Examples include 2022 Hyundai established the Biodiversity Protection Policy based on the Convention on Biological Diversity (CBD)¹⁰³, Samsung has established GHG emissions management policy¹⁰⁴, LG Electronics is a member of RBA (The Responsible Business Alliance)¹⁰⁵, Kia has established our environmental policy based on ISO 14001 (environmental management system)¹⁰⁶, POSCO wrote the “2050 Carbon Neutral Basic Roadmap¹⁰⁷ etc. Despite all these measures Samsung has the largest carbon footprint of any major company in tech, emitting 20.1 million metric tons of CO₂e per year¹⁰⁸. Another major company shows disappointing results regarding carbon dioxide emissions in the context of the labor force. SK Hynix, a South Korean company specializing in the production of semiconductor memory such as DRAM and NAND, ranks second among all companies in this indicator - 207,26

¹⁰³ Hmc-2023-sustainability-report-environmental-en-v2

¹⁰⁴ Samsung_Electronics_Sustainability_Report_2023_ENG

¹⁰⁵ 2022-2023_LGE_SR_STORY_BOOK(EN)

¹⁰⁶ Kia 2023 Sustainability Report

¹⁰⁷ POSCO's Initiative for a Clean Earth // POSCO URL: <https://www.posco.co.kr/homepage/docs/eng7/jsp/climate/s91c6000010a.jsp> (date of application: 10.06.2024).

¹⁰⁸ The Carbon Emissions of Big Tech // Electronics Hub URL: <https://www.electronicshub.org/the-carbon-emissions-of-big-tech/> (date of application: 10.06.2024).

MTCO₂e¹⁰⁹. Samsung is also in the top 4 of this ranking with a score of 172.52 MTCO₂e¹¹⁰.

Company	Number of measures (compared to 2022)	CO2 performance (MTCO ₂) latest information	Revenue (in billion US dollars)	
			2023	2022
Samsung	35 (+10)	20.1 million	194	233
Hyundai - Kia	56 (+24)	1,102 million	123	109
Posco	25 (+9)	70,7 million	59	65
LG	29 (+ 7)	0, 927 million	64	66

Table 2: Company performance according to annual reports

In addition, expanding into new markets and strengthening the global presence is essential to increase market share. Establishing partnerships with other companies, including competitors, can assist in solving problems and expanding access to new technologies. The competitive landscape for South Korean companies in high-tech remains challenging. However, their technological prowess, adaptability, and innovation provide them with a strong chance of success in the future.

A few more companies that are an example of the effective application of sustainable development in the context of ecology. Dyson is a manufacturer of high-quality household appliances that has stopped using disposable bags to collect dust in vacuum cleaners and removed unnecessary parts in devices. Uniqlo - a casual clothing brand from Japan that often produces recyclable products. Timberland. A well-known clothing and footwear brand that began to develop its own Path of Service movement. The company's employees

¹⁰⁹ The Carbon Emissions of Big Tech // Electronics Hub URL: <https://www.electronicshub.org/the-carbon-emissions-of-big-tech/> (date of application: 10.06.2024).

¹¹⁰ The Carbon Emissions of Big Tech // Electronics Hub URL: <https://www.electronicshub.org/the-carbon-emissions-of-big-tech/> (date of application: 10.06.2024).

pay attention to the problems of the planet with the help of their products. The North Face is an American brand specializing in high-quality sportswear, as well as mountaineering suits. In 2019, The North Face implemented a project using bags from old camping tents. Lego is a Danish brand that produces plastic parts. The company plans to finalize the alternative material by 2030.

Thus, there are currently a large number of organizations that have effectively implemented and continue to improve their green initiatives. The South Korean company has a great competitive environment in this regard, since the main players here are the United States, and Japan in the Asian region. Nevertheless, Korean corporations can learn from the experience of foreign competitors as well as cooperate with companies in the same field to apply the experiences of other companies, which will improve their existing strategies.

3.2. The relevance between the use of green strategies and the advantage in Techwars, sanctions.

Green initiatives can play an important role in reducing the risks associated with trade wars and sanctions. One of the main advantages is market diversification, investments in renewable energy sources and other sustainable technologies can help South Korean companies diversify their markets and reduce dependence on specific countries. Also, reducing dependence on imports and developing and implementing their own environmentally friendly technologies can help South Korean companies reduce dependence on imports of critical materials and components. Green initiatives can improve the brand image of South Korean companies and make them more attractive to customers and investors around the world. In terms of market positioning, companies that use green strategies gain a positive reputation and media advertising. This attracts investments, new employees and partners. Customers, investors and employees have more confidence in companies that demonstrate their commitment to sustainable development.

It is worth considering that governments may introduce stricter environmental standards in the future. Companies with sustainable strategies will be more in an advantageous position. American corporations can be examples of such corporations. For example, Tesla, which actively promotes the ideas of sustainable development. Apple, which has created its own program for recycling and recycling electronics, which attracts customers and improves its environmental footprint. It is also worth noting Google, which actively uses its strategy of "green" computing, which reduces energy consumption and reduces the carbon footprint.

The growing green technology sector presents significant opportunities for South Korean companies. South Korean companies can use their technological capabilities to develop and produce environmentally friendly products and services that are in high demand worldwide. Investments in research and development in the field of environmentally friendly technologies can help South Korean companies become leaders in this fast-growing industry. South Korean companies can collaborate with international partners to share knowledge and technology in the field of environmentally friendly technologies.

From the point of view of sanctions, green strategies, although they may have a positive effect on the long-term sustainability and image of the company, will not directly help in overcoming sanctions. Sanctions are a political tool aimed at restricting the economic activities of specific entities. They are introduced in response to undesirable actions and may include bans on trade, financial transactions, import and export of goods and services. Sanctions are not an environmental issue, sanctions are aimed at political and economic goals, not sustainable development. Even if a company uses green technologies and practices, it may be sanctioned if its activities are seen as supporting undesirable actions. A company that has a good reputation in the field of sustainable development, can receive support from the international community. Green technologies and services can help companies find new markets and partners in countries that are not subject to sanctions. Sustainable practices can help companies reduce the risk of damage

from climate change, which can be an important factor for sustainability in the long term. Green strategies are not a direct means of overcoming sanctions. However, they can indirectly help to improve the company's reputation and expand its business in alternative markets. In any case, sanctioned companies need to focus on compliance with rules and requirements, as well as on developing strategies to minimize negative consequences.

It can be concluded that there is no evidence or direct facts proving the beneficial effect of the use of green practices by companies in the context of technology wars or the sanctions regime. But it is worth noting that, in general, the use of green strategies will help corporations reduce fixed and variable costs. For example, through the use of alternative energy or shortening routes. It also benefits the reputation of the company. As mentioned above, based on surveys and articles, most buyers agree to overpay for products from brands that promote respect for the environment. Also, as noted above, many States, including South Korea, have been adopting and increasingly tightening laws and regulatory measures related to the environment over time. For companies that have embarked on a “green” path, this may mean tax benefits. Federal, regional and city authorities are ready to stimulate environmental initiatives of the business community. Thus, “green” strategies can indirectly affect the consequences of technological wars and the sanctions regime, in the form of spending cuts, increasing reputation, receiving benefits from the state, etc.

3.3. Forecasting future trends in sustainable development strategies of South Korean corporations

Future trends and driving factors in sustainability include increased pressure from investors and consumers. Investors and consumers are increasingly demanding that companies act on sustainable development issues. Regulatory tightening: governments around the world are tightening regulations in the field of sustainable development. This forces companies to implement green practices and use technological advances such as

artificial intelligence and big data to improve sustainability. Climate change is a serious threat that is forcing companies to adapt and mitigate its effects.

Corporate sustainability strategies are expected to continue to evolve in the following areas. Accelerating the transition to zero emissions - companies will strive to reduce their greenhouse gas emissions to zero in order to meet the goals of the Paris Agreement. Sustainability will become an integral part of all aspects of the business, including strategic planning, decision-making and operational activities. Companies will work with their suppliers and customers to create sustainable supply chains. Companies will increase transparency and accountability on sustainable development issues to demonstrate commitment to these issues.

Predicting future trends in sustainable development strategies is crucial to developing effective corporate strategies that can help South Korean companies thrive in a changing global economy.

The future of green strategies and sustainable development of companies is a dynamic and multifaceted space where traditional approaches are being transformed under the influence of new technologies, changing consumer requirements and increased regulatory measures.

ESG as an integral part of a business strategy: it will cease to be a separate unit and will become an integral part of all companies' business decisions. Companies will actively manage the risks associated with climate change and develop adaptation and mitigation strategies. Companies will report on their ESG indicators with even greater transparency and detail. AI and big data will be used to optimize processes, manage resources and reduce emissions. IoT will be used to monitor and manage energy consumption, waste, and other aspects of sustainable development. Blockchain technology will be used to track supply chains, information transparency, and carbon footprint credit management. Companies will actively promote their "green" products and services, considering the growing demand from environmentally conscious consumers. Implementation of circular business models (waste minimization, recycling, reuse) it will become necessary for

success. Companies will be more actively engaged in social entrepreneurship and solve social problems. Governments will introduce stricter standards and sustainability requirements for companies. Tax incentives will be offered to companies that implement sustainable practices. The introduction of carbon taxes will stimulate the reduction of greenhouse gas emissions. A new generation of young riders will develop. Young professionals will play an increasingly important role in promoting sustainable development in companies. Leaders will pay more attention to ethical and social issues related to sustainable development. Solar and wind energy will play an increasingly important role in ensuring energy security. New sustainable materials such as bioplastics and composites will be developed. Development of new chemical processes and products with minimal environmental impact. Sustainable development is not just a fashion trend, but a necessity for the survival of humanity and business. Companies that integrate sustainable development into their business models will have a competitive advantage in the long run. New technologies and innovations play a key role in achieving sustainable development. It is necessary to work closely with the Government, non-governmental organizations and other stakeholders. In general, the future of green strategies and sustainable development of companies is full of opportunities and challenges. Companies that will be able to adapt to these changes and introduce sustainable development into their business models will be more an advantageous position to achieve success in the long term.

Future trends and driving factors in the field of sustainable development of companies are influenced by various factors such as technological advancements, regulatory changes, consumer preferences, and global challenges. Here are some key trends and driving factors shaping the sustainable development landscape for companies. Advancements in technology, such as Industry 4.0 technologies (e.g., IoT, AI, big data analytics), are driving sustainable practices in companies by enabling efficient resource management, waste reduction, and energy optimization. The use of big data analytics and smart communication methodologies is becoming essential for enhancing sustainable

performance in firms. Data-driven decision-making helps companies optimize their operations and reduce environmental impacts. Companies are increasingly focusing on environmental sustainability as a core aspect of their operations. This includes evaluating the environmental effects of manufacturing processes, reducing resource consumption, and implementing eco-efficient practices. Stringent environmental regulations and policies are pushing companies to adopt sustainable practices to comply with legal requirements and reduce their carbon footprint. Growing consumer awareness and demand for sustainable products and services are driving companies to adopt environmentally friendly practices and transparent supply chains. Companies are utilizing tools like life cycle assessment to evaluate the environmental impact of their products throughout their life cycle and make informed decisions on sustainability. Managing vast amounts of data in the manufacturing industry through deep learning and smart manufacturing applications is crucial for enhancing operational efficiency and sustainability. Future studies are recommended to focus on designing a multi-faceted approach and hybrid assessment schemes for evaluating environmental sustainability in the context of Industry 4.0

Based on the findings of the study on sustainable industrial and operation engineering trends and challenges towards Industry 4.0, there are several potential implications for businesses and industries looking to adapt to Industry 4.0. Businesses can leverage Industry 4.0 technologies to enhance their sustainability practices by optimizing resource utilization, reducing waste, and minimizing environmental impacts. Adopting data-driven approaches can help companies make informed decisions regarding sustainable operations, energy efficiency, and environmental sustainability. Embracing technological innovations such as IoT, AI, and big data analytics can drive efficiency improvements and sustainability initiatives within the organization. Industry 4.0 can assist companies in meeting regulatory requirements related to environmental sustainability by enabling better monitoring, reporting, and control of environmental impacts. Implementing smart manufacturing practices based on data considerations and model development can lead to

more efficient and sustainable production processes. Companies may need to invest in developing specialized skills to effectively implement Industry 4.0 technologies and ensure sustainable practices. Industry 4.0 encourages collaboration between production and digitalization to maximize output with minimal resources, fostering a culture of continuous improvement and adaptation to changing market dynamics. There is a need to pay attention to human factors and ergonomics in the implementation of Industry 4.0 to ensure the well-being of employees and optimize performance¹¹¹.

If we consider individual South Korean companies, then it is worth taking a closer look at the largest corporations in various major industries. Samsung will be considered for the telecommunications industry. Samsung's plans for future sustainable development in the context of ecology include achieving zero carbon dioxide emissions by 2050. The company plans to achieve this through the wider use of renewable energy sources. Achieving zero carbon dioxide emissions. The company plans to achieve this through the wider use of renewable energy sources. Improving the cyclical use of resources throughout the product lifecycle. This includes measures at the stages of raw material selection, production, distribution, use and recycling. Development of technologies to reduce energy consumption. For example, the creation of energy-efficient devices for smartphones, refrigerators, washing machines, air conditioners, televisions, monitors and PCs. Recycling old items into new products. For example, the disposal of fishing nets and other discarded items that can potentially harm the environment. Global product return and recycling programs. For example, the Re+ project, which allows you to collect used electronic equipment through Samsung service centers or recycling cooperatives. Creation of the Circular Economy Lab. It conducts research on materials processing technologies and resource extraction processes.

¹¹¹ Tseng, Ming-Lang, et al. "Sustainable industrial and operation engineering trends and challenges Toward Industry 4.0: A data driven analysis." *Journal of Industrial and Production Engineering* 38.8 (2021): 581-598.

Hyundai's plans for future sustainable development in the context of ecology include: Expanding the range of environmentally friendly vehicles. By 2030, 30% of all brand cars sold in the world will be zero-emission models. By 2040, according to the company's calculations, battery electric vehicles and hydrogen fuel cell electric vehicles will account for 80% of total sales. The abandonment of the sale of fossil fuel vehicles in all major markets. By 2040. Reducing carbon emissions at facilities. The company's list of measures includes further reduction of electricity consumption and the construction of "green" plants using such types of "green" electricity as photovoltaic. The transition to the use of electricity from renewable sources. ²³ In July 2021, Hyundai Motor and other members of the Hyundai Motor Group joined the global climate initiative RE100, aimed at a complete transition to the use of electricity from renewable sources. By 2040, the company plans to increase to 90% the share of electricity from renewable sources in its international activities, and by 2045 — to completely switch to this type of energy. The introduction of hydrogen fuel and energy elements in all types of transport — from passenger to industrial. Hyundai is preparing hydrogen fuel cell technology for integration into the production of ships, trams, loaders and even construction equipment.

For South Korean companies, future trends are not much different from global trends. Now climate change will not be able to bypass companies and the agenda of this issue will always be an integral part of planning and editing the sustainable development of companies. Pressure from stakeholders, primarily customers, can contribute to this. Consumers demand environmentally friendly products and services, investors are switching to sustainable investments, and regulators are introducing new and stricter rules in the field of sustainable development¹¹². Investing in technology and innovation will be an important factor. This is necessary not only to overcome climate change and its consequences, but also for the overall development of the company. For instance,

¹¹² Sebastian Gatzert, Steve Hoffman, Nikola Jakic, Bartosz Jesse, Younghoon Kang, Jeongkeun Kim, Bill Mutell, and Daniel Roos Using sustainability to transform food systems in South Korea // McKinsey & Company The state of grocery retail 2023. - March 22, 2023. - №2. - C. 20-30.

investments in semiconductor and secondary battery technologies. These sectors play a significant role in the global supply chain, and investing in cutting-edge research and development makes South Korea an appealing destination for global investors¹¹³. Another consequence of climate change and one of the future trends may be expansion in the manufacturing sector. In particular, in the field of electronics and electrical engineering. This growth demonstrates South Korea's long-established potential in high-tech manufacturing and its continued investment in cutting-edge technological advances¹¹⁴. It is also worth noting that Korea has seen an increase in mergers and acquisitions, indicating the evolution of the corporate landscape in South Korea, which is becoming more favorable for business integration and cooperation, which in turn accelerates the process of innovation¹¹⁵.

¹¹³ South Korea's FDI landscape: Deciphering the 2023 Investment Surge // Pearson & Partners URL: <https://www.pearsonkorea.com/insights/South-Koreas-FDI-Landscape-Deciphering-the-2023-Investment-Surge/> (date of application: 11.06.2024).

¹¹⁴ South Korea's FDI landscape: Deciphering the 2023 Investment Surge // Pearson & Partners URL: <https://www.pearsonkorea.com/insights/South-Koreas-FDI-Landscape-Deciphering-the-2023-Investment-Surge/> (date of application: 11.06.2024).

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Conclusion

In conclusion, it is very important for South Korean companies to align their strategies with environmental goals in today's rapidly changing world in order to remain competitive and sustainable. By actively addressing environmental issues, they can not only reduce risks but also promote innovation and create value for all stakeholders. The document emphasizes the importance of long-term strategies for overcoming climate change and reconciling conflicting interests to achieve sustainable development goals. In addition, the South Korean government's focus on strengthening research ties and international cooperation, especially with the United States, signals a shift towards a new policy direction aimed at increasing electric vehicle production and encouraging the use of renewable energy sources, as well as setting ambitious clean energy goals. Government initiatives, such as the shutdown and decommissioning of coal-fired power plants, demonstrate a commitment to reducing dependence on coal and moving towards cleaner energy sources. In general, the interrelationship between sustainable development, climate issues, and the competitiveness of companies has been emphasized. The role of corporate social responsibility in addressing climate change has also been highlighted, as have the benefits of sustainable business practices, including reduced risks, improved reputation, talent attraction, market access, and cost savings. Recognizing this connection is essential for developing effective strategies for adapting to a changing climate and gaining a competitive advantage in a dynamic business environment. Based on the information presented and the outcomes of South Korean company activities, as well as a comparison with other companies' activities, the following suggestions can be made.

1. South Korean companies should set clear emission reduction targets consistent with the Sustainable Development Goals in order to mitigate the impact of climate change on business operations. Based on annual reports, so far, only vague formulations have been observed to achieve main goals by 2030 and 2050, reducing CO₂ emissions to 0%. There are no specific measures on how this will be achieved.

2. It is necessary to increase investment in renewable energy sources, such as solar panels and wind farms, in order to reduce greenhouse gas emissions and improve energy efficiency. This applies to jobs as well.
3. Develop and implement recycling programs, waste reduction, and composting to minimize environmental impact and promote sustainable waste management.
4. Use CSR as a platform for engaging employees, raising awareness of climate change and promoting sustainable practices within organizations.

So far, it can be said that South Korean companies have just begun to take steps to reduce their environmental impact, and therefore they need to continue improving their strategies and paying more attention to this issue.

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Отчет о проверке

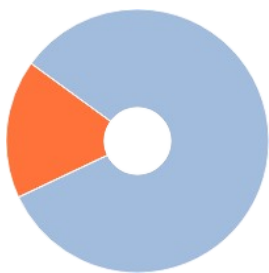
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