

# Green technologies are an integral element in environmental protection

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**Abstract.** Currently, there is a large-scale transformation in all areas of activity, including through changes in the field of approaches to the anthropogenic impact of humans on nature. Unfortunately, today the environment is in a critical condition, therefore environmental protection activities based on increasing environmental safety are one of the priority areas of development. The purpose of the work is to consider the main types of green technologies and the prospects of investing in sustainable development.

## 1 Introduction

The problem of climate protection is becoming increasingly urgent. To ensure people's well-being in the long term, it is necessary to “green the economy.” The coronavirus epidemic has brought the world to a standstill. However, global problems such as climate change or resource shortages cannot simply be put on hold. To remain resilient, long-term goals must not be lost sight of. Problems that may make themselves known tomorrow force us to act today. Today, green transformation is no longer an academic theory, but is becoming a reality. In response to emerging issues, impact investing (IFSI) is an investment strategy in which investors invest their money in causes that promote positive change in the environment and society.

## 2 Materials and Methods

In the course of this article, materials and methods obtained from the study of scientific articles, books, magazines and other works were used.

## 3 Results and Discussion

Green technologies are a major trend on a global scale today. Their distribution is gaining momentum. Green technologies include all technological innovations that develop smart, intelligent and at the same time climate-friendly solutions for the economy. The European Green Deal plays a primary role in this direction, providing for a transition to a modern, resource-efficient and competitive economy.

Ecological modernization using low-emission technologies assumes that Europe will become climate neutral by achieving its goals in ensuring a safe and affordable energy supply in the EU, increasing energy efficiency and promoting alternative energy sources, developing green technologies in accordance with modern challenges, reducing transport challenges, reducing the environmental footprint of the EU food system, etc.

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In terms of climate protection, the European Environmental Concept is the strongest in the world. A total of €1.8 trillion is invested in the Green Deal from the NextGenerationEU development package and the EU's 7-year budget. This is the largest stimulus package ever financed from the EU budget. The measures focus on financing modernization through programs such as:

Horizon Europe is the EU's program for research and innovation around the world. The focus is on healthcare, sustainable development and digitalization.

The Digital Europe program supports the green and digital transition and promotes green technologies in areas such as high-performance computing, artificial intelligence, cybersecurity, etc.

Let us take a closer look at the essence of EU climate policy and its possible impact on production and markets in Europe, as well as beyond.

The climate policy of the European Union is a main component of the new EU development strategy, which is called the “European Green Deal” (EGD). For the first time, the main and “main task of the current generation” was recognized as the need to preserve the environment and prevent the negative consequences of climate change, and this is now the main direction of development of the European Union.

The European Green Deal will strategically mean developing activities in the following eight areas:

1) Biodiversity or “blue economy” - increasing the role of seas and oceans in economic development, conservation and restoration of ecosystems.

2) Smart mobility - transition to environmentally friendly modes of transport (including bicycles, electric cars), reducing emissions of harmful substances from internal combustion engines, expanding the use of carbon-free fuels.

3) Modernization of industry - decarbonization of energy-intensive industries, maximum reduction of waste, increasing the share of waste-free production, introducing the principles of a circular economy, introducing a border carbon tax.

4) Climate improvement – reducing emissions by 55% from 1990 levels by 2030, ensuring carbon neutrality by 2050,

5) Energy efficiency – development of renewable energy sources, efficient integrated energy systems.

6) Innovations in construction - reducing the consumption of electrical and thermal energy during the construction of new buildings and structures by increasing energy efficiency, renovation of old buildings and structures.

7) Development of organic agriculture “From farm to table” - supporting healthy eating programs, reducing the use of harmful chemicals, reducing waste.

8) Zero pollution: reducing the use of harmful chemicals in all industries, in private business, in everyday life.[5]

The EZK is not just aimed at solving environmental problems. First of all, this is a course to change economic, social and trade policies in the new conditions of the modern world: environmental destruction, climate change, emissions of greenhouse gases into the atmosphere as a result of human activity. The mission of the EZK is to make environmental conservation and reduction of negative impacts on the climate an integral part of the development of the global economy.

The cost of implementing the European Green Deal is estimated at €1 trillion over the next decade. The main sources of funds are expected to be private business, investments, and capital released through the elimination of outdated “dirty” technologies.

To achieve the EU's climate and energy goals, it is vital to channel investment into sustainable projects and activities. COVID-19 has increased the need to redirect money towards sustainable projects to make economies, businesses and societies more resilient to climate and environmental shocks.

This requires a common language and a clear definition of what is “sustainable”. This has led to the need to create a common classification system for sustainable economic activities or the “EU taxonomy”.

The main feature of the EZK is mandatory emission reduction targets. This differs from the Green Deal, for example, from the Paris Agreement, which does not impose specific requirements on countries.

Some experts and politicians consider the specific goals set by the EZK to be too soft, such as the Green Coalition of the European Parliament, which states that dumping should be reduced to 65% by 2030. For others, on the contrary, they seem too stringent, since for countries with high-carbon economies - Poland, Germany and the Czech Republic - reducing emissions means an inevitable decrease in economic growth. Also, rapid transformation will be difficult and painful for Eastern European countries.

Therefore, the EZK involves not just reducing emissions, but also doing this in the format of a “just transition”. Economic restructuring must take place in stages, with traditional industries being replaced by new ones. In the coal regions of Germany and Poland, projects to transform them are already being implemented.

Despite the active declaration of “green” strategies in European countries, the European Union is forced to import a large amount of resources and goods from other countries that are not affected by the “green” course. This contributes to the emergence of additional risks in the implementation of the EZK. Therefore, one of the EU's tasks is to ensure the synchronization of the standards of foreign importing companies with European standards.

This means that the EBC will affect not only the European Union, but also all countries that have economic ties with the EU, in particular Russia.[11]

According to the Paris Agreement, which was signed and ratified by the Russian Federation, it must reduce emissions by 2030 to 70% of 1990 levels, and in fact by 2018 this figure in Russia was 52%. Thus, the emissions plan has already been exceeded. But the EU's declared policy of abandoning fossil fuels and decarbonization could have a strong impact on the Russian economy, which is heavily dependent on oil and gas exports.

Not only Russia, but also European countries themselves may find themselves in such a situation, where not all energy companies will be able to comply with too strict environmental standards. This may lead to an outflow of such companies from the European market. To avoid such risks, the European Union provides mitigating factors and various transition periods for dependent economies. Accordingly, relations with Russia will also be built depending on specific conditions and the current agenda.

The transition to a resource-intensive, climate-friendly and sustainable economy is a necessary development not only because of internationally agreed climate protection commitments, a growing world population and increasing pressures on the environment (eg biodiversity, toxicity, genetic modification). Raw material shortages and associated rising material costs are increasingly becoming a driver of change, even in sectors that have hitherto shown enormous inertia. This primarily concerns fossil resources and energy carriers. Their replacement promises economic independence and environmental protection. Thus, the demand for new technologies, processes and products will increase worldwide, especially in emerging and developing countries.

However, rare metals and earths also cause sensitive interference in many industries. A Swiss study, in which the Wuppertal Institute participated, recently showed how much the technologies of the future depend on rare metals: mobile phones, flat screens, digital cameras, cars and wind farms could hardly be produced today without these raw materials. The scarcity

of resources, including in comparison with previous innovation cycles, will give rise to a completely new quality and quantity of basic innovations of environmentally friendly technical progress ("GreenTech") and create rapidly growing new markets. Digital cameras, cars and wind farms today would hardly be possible without these raw materials. The scarcity of resources, including in comparison with previous innovation cycles, will give rise to a completely new quality and quantity of basic innovations of environmentally friendly technical progress ("GreenTech") and create rapidly growing new markets.[1]

What are green technologies?

Green technology or "Greentech" obviously refers to technologies that do not pollute the environment. In a broader sense, the term also refers to technologies that help reduce environmental impact—through energy conservation, waste prevention, and essential features such as remote monitoring and maintenance of carbon-neutral devices. Examples of environmental technologies include a wide range of industrial applications, as well as sustainable products, services and infrastructure.

Cities and organizations use clean technologies for many reasons, including better environmental management, including reduced costs and risks. For example, mining can be extremely dangerous for workers, but the development of clean technologies can lead to significant positive changes in safety, supporting more sustainable and environmentally friendly practices.

Examples of green technologies

Green technologies can help cities and businesses achieve net-zero emissions goals. Here are some examples that show what is meant by "green technologies":

**Wind Energy:** Wind turbines for generating electricity are among the most prominent new clean energy technologies on the landscape, and wind farms produce green energy from an infinitely renewable source.

**Solar Energy:** Solar panels use photovoltaic cells to harvest energy directly from sunlight. The cost of rooftop solar panels has decreased over the past few decades, and their use is increasing in both commercial and residential applications.

**Hydropower.** Hydroelectric power plants are another example of how energy and clean technology go hand in hand. Hydroelectric dams, one of the oldest forms of clean energy, power cities around the world.

**Smart Cities:** Cities have enormous potential to reduce carbon emissions by optimizing critical services such as lighting, water/wastewater treatment and waste collection. Many smart cities are investing in low-carbon technologies to become cleaner, more livable and more sustainable.

**Smart Grid:** Utilities use tools and financial incentives to reduce peak loads and shift consumption to off-peak hours, thereby reducing energy consumption. In addition, utilities are increasingly turning to renewable energy sources to meet demand.

**Electric vehicles (EV) and charging systems.** With cars being the world's largest source of greenhouse gas emissions, electric vehicles and electric vehicle charging stations are among the fastest-growing forms of clean technology.

**Sustainable infrastructure:** From smart lighting and smart poles to better traffic management and smarter construction practices, infrastructure projects can go a long way in reducing environmental impact.

**Precision farming:** Clean farming solutions help conserve water and reduce the use of pesticides and herbicides by applying them only where they are needed.[8]

How do green technologies help us in our home and personal life? Consumer applications such as smart devices and thermostats help make everyday life more energy efficient. In addition to improving quality of life, clean technologies also save money by reducing

household energy consumption through more efficient heating and cooling.

Cities and organizations use clean technologies for many reasons, including better environmental management, including reduced costs and risks. For example, mining can be extremely dangerous for workers, but the development of clean technologies can lead to significant positive changes in safety, supporting more sustainable and environmentally friendly practices.

Autonomous vehicles (AVs) and drones can now reach places that would be risky or labor-intensive for humans. We can more closely monitor conditions and assets in extreme environments, allowing operators to quickly gain information and resolve ambiguity while minimizing environmental impact.

The importance of clean technology in promoting a greener planet cannot be overstated. Today, businesses and governments must use clean technologies to achieve efficiency, reduce carbon emissions and create a greener planet.

Industry and urban infrastructure offer many opportunities for low-carbon technologies that can significantly reduce emissions.

Charging infrastructure makes it easy for residents to find charging stations, providing additional incentive to switch from fuel-guzzling vehicles to electric vehicles.

Smart street lighting offers cities a great opportunity to reduce energy consumption and carbon emissions through the use of sensors and automation.

Waste management is increasingly using technologies that optimize the planning and use of vehicles to improve energy efficiency and reduce costs.

Cities in cold climates are looking for ways to reduce the amount of salt used on roads during the winter to reduce pollution.

Public transport systems are increasingly switching to clean technologies, including hydropower and electricity, to reduce emissions.

The incentives for adopting clean technologies are broad and include the need to move away from polluting non-renewable energy sources, reducing business risks (such as oil spills and other environmental disasters), and obtaining energy credits. In addition, clean technologies are opening up new job opportunities for developers, data analysts, equipment installers, maintenance personnel, and other professionals in new clean technology industries [3].

More and more companies are starting to pay more attention to circular business models. Unlike the conventional linear model, cyclical models focus on recycling strategies and extending product life. In the past, early initiatives have largely focused on reducing packaging waste, especially if it consists of plastic. There has been a lot of interest among consumers and companies since it became known how much plastic is floating in the world's oceans.

Circular economic approaches bring awareness to resource constraints in economic activity and help reduce emissions. This includes, for example, reducing the use of chemicals, purchasing renewable energy sources and restructuring the company's processes towards a green value chain.

Removing environmentally harmful products from the market is an effective way to protect the climate. For this reason, the European Green Deal—the EU's program for carbon reduction and growth—emphasizes the importance of circular economy programs and models [10].

The World Economic Forum's 2020 Global Risks Report identified water scarcity as one of the top five social risks of the next decade. The UN also predicts that water availability will decline by 40 percent by 2030. Businesses can no longer afford to ignore their water consumption. Instead, in the future they will have to become more involved in purification processes and create new sets of rules to use water more consciously. For example, it is necessary to check water consumption in production. It is also important to reconsider the choice of production sites if they are in drought-prone regions or if local wildlife is

particularly worthy of protection. Companies that engage in water stewardship early on improve their image and value.

In recent years, the rapid development of smart technologies has given rise to many new business models. Some of them could radically change the energy industry. There are two types of technologies involved: physical and virtual.

Examples of physical technologies include wind turbines, photovoltaics, electric vehicles, electrical grids, batteries, and other energy sources. The performance of these technologies continues to improve while their costs continue to decrease. In addition, the Internet of Things creates the possibility of intelligently connecting all these technologies with each other through sensors. This contributes to the decision of many end consumers to rely on renewable energy sources and smart grids. On the one hand, to have better control and cost security, and on the other hand, to benefit from greater reliability of complex networks.

Virtual technologies such as big data, robotics and artificial intelligence are also helping organizations operate more sustainably by providing faster access to high-quality information and streamlining knowledge-based decision-making processes. Artificial intelligence, for example, can predict when devices and machines will fail, saving companies time, money and resources. Blockchain-based platforms have also spread throughout the world. They can change the way end users interact with energy networks, as well as with each other. Blockchain-based activities include, for example, local energy markets that regulate exchanges between end users. But crowdsourcing, financing and trading of renewable energy shares and trading of green electricity certificates are also processed through the blockchain.

Electric and automated vehicles are available as everyday technologies. Their impact on the global economy over the next decade could be enormous.[2]

Many countries have already significantly reduced their use of fossil fuels for cars over the past 25 years, and with increasing user interest in car sharing, cities will have to further change their infrastructure and people their mobility habits in the future. The OECD makes an interesting prediction: fleets of driverless cars could replace up to 90 percent of cars on city roads in the not-too-distant future.

Of course, these changes in traffic have implications for company employees and supply chains. They require significant investment in new vehicle fleets, charging stations and electrical networks. However, in the long term, a well-managed transition to shared mobility and alternative transport systems could bring great benefits and, of course, provide fresher air in German cities.

Regenerative agriculture is another dynamic change. As climate change occurs, biodiversity is lost and agricultural soils begin to lose nutrients. However, new techniques can improve soils so that they store carbon while producing nutrient-rich crops. This includes, for example, growing two or more plants together and using insects instead of chemical pesticides.

Thanks to the development of the Internet of Things, remote sensing systems and artificial intelligence, data-driven automated agriculture could also gain a foothold in Germany in the long term. In the UK, 60 percent of farmland is already managed using precision methods such as sensor systems, cameras, drones, microphones, virtual field maps, analysis tools and GPS-guided tractors.

Investing in sustainable companies

Investor interest around the world in sustainably managed companies is growing. As more founders engage with the sustainability theme, there is growing interest among financiers in avoiding investments in companies that pose a high risk from a sustainability perspective. The EU is also increasingly putting sustainability issues on its agenda. And in its Action Plan for Financing Sustainable Growth, the EU Commission obliges companies to disclose climate-related risks in order to finance a zero-CO2 economy [13]

Environmental protection is becoming an increasingly important economic factor. This demonstrates the development of ecological economics and green future markets such as clean energy production, energy efficiency, raw materials and materials, sustainable mobility, sustainable water management, waste management and recycling management. Therefore, progressive environmental policy is also necessary from an economic point of view. Thus, green technologies can be found in many sectors and can be characterized as a set of environmental technologies and services. The goal is always to protect the climate, the environment and resources, which sustainable technologies also achieve during the use phase.[4]

Environmental protection has long established itself as an important economic factor. This indicates the development of the environmental economy, which, as an intersectoral industry, includes all companies offering goods and services in the field of environmental protection. Green economics includes areas such as waste management and recycling, water conservation and wastewater treatment, air pollution control, noise reduction, renewable energy, green products, energy efficiency, climate protection, and metering technologies. , control and regulation [12].

Investing to help reduce the burden on the environment, which is investing for sustainable development, is becoming increasingly popular, including by rewarding investors with positive financial performance. Investing for sustainable development involves, among other things, advancing sustainable development goals by investing to influence changes in the behavior of third parties towards promoting environmental performance.[6]

Other methods include impact investing, sustainable investing and ESG. Examples of sustainability investing include carbon reduction investing (Net Zero Asset Managers with \$57 trillion in assets and the Net Zero Asset Owners Alliance with over \$10 trillion in assets).

The purpose of investing in sustainable development is to create the preconditions for changing the behavior of organizations towards reducing the burden on the environment by reducing negative impacts or creating positive impacts.

The difference between sustainability investing and other sustainable investing approaches is that the intention to change existing behavior and achieve positive results may vary in magnitude. Also, when investing in sustainable development, there is a special focus on assessing and measuring impact, unlike ESG, where there is no measurement of the results of sustainable investing.

Sustainable investing can come in two forms:

1. Avoidance of investments in organizations designed to reduce environmental hazards.
2. Avoiding investments in shares of companies that have the potential to harm society, such as those targeting the production of alcohol, tobacco or weapons.

An approach is also taken in the form of avoiding interaction with “malicious” companies, actively investing in “green” companies. When taking this approach, investors look for companies with certain positive ESG characteristics, such as:

1. Related to environmental actions:

- A) reducing carbon emissions;
- B) air and water protection technologies;
- B) energy saving technologies;
- D) saving water;
- D) protection of forests from deforestation;
- E) biodiversity.

2. Related to social efficiency:

- A) protection of human rights;
- B) compliance with labor standards.

### 3. Managerial:

- A) executive compensation;
- B) fight against corruption;
- C) protection of shareholders' rights.

Investing in “useful” activities allows you to invest in areas that attract investors, for example, animal welfare, child protection, environmental protection, etc.[7]

Investors' interest in investing in sustainable development is not limited only to social and environmental factors. As before, there remains an interest in financial returns, which raises the question of whether such investments are effective. When assessing financial performance and investor feedback, a positive answer to this question is formed.

For example, a Global Impact Investing Network survey found that the vast majority of respondents said that both the impact and financial return of their investments met their expectations. A smaller percentage reported earnings that exceeded their expectations, and a smaller percentage reported earnings that fell short of their expectations.

In recent years, there has been an increase in the growth of impact investing, which indicates the effectiveness of such investments not only socially, but also financially.

Thus, worldwide demand for environmental and climate protection technologies, as well as products that are environmentally friendly and resource-efficient, is growing. As a result, the economic importance of environmental protection will increase in the future.

## 4 Conclusions

1. Environmental protection is becoming an increasingly important economic factor. Since the level of negative human impact on nature is increasing sharply, the environment therefore needs to be protected.
2. Environmental economics includes areas such as waste management and recycling, water conservation and wastewater treatment, air pollution control, noise reduction, renewable energy, environmentally friendly products, energy management, climate protection, and measurement, control and regulation. technologies.
3. In the modern world, “green” technologies can be found in many industries, and they can be characterized as a complex of environmental technologies and services. The goal is always to protect the climate, the environment and resources, which sustainable technologies achieve during the use phase.
4. Demand for environmental and climate-protective technologies, as well as for products that are environmentally friendly and resource-saving, is growing throughout the world. As a result, the economic importance of environmental protection will increase in the future.
5. Investing for Sustainability (IFSI) is an investment strategy in which investors invest their money in causes that promote positive change in the environment and society.
6. Sustainability investors must be intentional about their investments, targeting a specific project or behavior change.
7. Sustainable investing has generally shown to be attractive and profitable [9].

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