



Concept

Belarus Green Economy

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Introduction

"...Put sustainable development and the well-being of citizens at the centre of economic policy and make sustainable development goals the basis for policy and action..." European Green Deal Communiqué 11 December 2019.

The European Union¹, the USA² and other developed countries have set ambitious goals to achieve climate neutrality by 2050. Understanding the global nature of the climate change problem, leading countries are not only systematically shifting their economies towards green development, but also encouraging other countries to move to a higher technological level of development through financial programmes, environmental standards and carbon levies. States that develop their economies without considering green technologies will not be able to keep their goods globally competitive in the long term³.

The Belarusian economic model based on state-owned enterprises and cheap Russian energy does not create incentives to improve energy efficiency and environmental friendliness of production. Apart from a decade of economic stagnation, this model leads to a loss of economic and political sovereignty. Liberalisation and greening of the economy are necessary for sustainable economic development and a European future for Belarus.

The development of a green economy in Belarus is artificially constrained by a de facto moratorium on the development of renewable energy sources, ineffective emission reduction policies, investments in non-environmental projects, and underdeveloped green finance. At the same time, Belarus has great potential in wind and solar energy generation, biogas and hydrogen production, introduction of circular business models and organic farming, biodiversity conservation and ecotourism development⁴.

A green course for Belarus will help overcome the economic crisis and technological lag, reduce energy and resource costs, increase competitiveness and sustainability of the economy, improve the environmental situation and people's well-being. The development of green business models will create new jobs in industry, recycling, farming, construction, energy, IT, ecotourism, education and science. The resolution of the political crisis, reforms and improvement of the investment climate will help to attract the necessary financing from foreign and domestic capital, and the resource savings from green technologies will pay back the investment in the long term.

The green transition in Belarus will face a number of challenges, the main ones being the lack of qualified personnel, limited access to technology and finance, the oil and gas lobby and low public demand for environmental change. The political will of the democratically elected leadership of the country, ambitious goals to achieve climate neutrality and energy independence, the interest of business, civil society and citizens, and international technical and financial support are the necessary conditions for building a green future for Belarus.

¹ [A European Green Deal](#)

² [The Leaders Summit on Climate 22-23 April 2021](#)

³ [Pilipchuk A. Sustainable development: trends and factors.](#)

⁴ Proposals for the development of a green economy in Belarus are discussed in Section 5.

Impact of the European Green Deal on Belarus

The European Green Deal is one of the key policies of the European Union (EU) that aims to ensure sustainable and environmentally friendly growth of the EU economy. It was presented by the European Commission in December 2019 and has been adopted as the EU's priority policy for the next decade.

The European Green Deal Communiqué and Roadmap⁵ of 11 December 2019 presents the main objectives, measures and strategies, as well as sources of funding and a list of legislation and directives that will be developed to implement the policy.

Directions and objectives of the European Green Deal

1. **Climate.** Raising the EU's climate ambitions for 2030 and 2050. The goal is a climate-neutral Europe by 2050.
2. **Energy.** Delivering clean, affordable and secure energy. Aiming for clean energy and decarbonisation of the energy sector.
3. **Industry.** Mobilising industry for a clean and circular economy. Aim for sustainable industry and cleaner, greener production cycles.
4. **Construction.** Construction and renovation in energy and resource efficient ways. The goal is a cleaner building sector and improved energy efficiency of buildings.
5. **Mobility.** Accelerating the transition to sustainable and smart mobility. The aim is to promote more sustainable vehicles.
6. **Agriculture:** from farm to fork. Building an equitable, healthy and sustainable food system. Aiming for more sustainable food systems.
7. **Biodiversity.** Conservation and restoration of ecosystems and biodiversity. The aim is to introduce measures to protect the fragile ecosystem of the EU.
8. **Zero Pollution.** The ambition of zero pollution for the sake of a toxic-free environment. The aim is to reduce environmental pollution quickly and efficiently.

To achieve these objectives, the Green Deal includes a number of measures:

- Implementation of new standards and regulations aimed at reducing greenhouse gas emissions and shifting to cleaner energy sources.
- Financing sustainable investments, including in innovative technologies and environmental projects.
- Promoting a shift to more environmentally friendly modes of transport, such as electric cars and public transport.
- Supporting the development of the circular economy and increasing resource efficiency.

⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN>

At least €1 trillion of public and private investment is planned to finance the Green Deal during 2021-2027, which will come from the EU budget (about 30% of the €503 billion per year allocated to climate change projects), national structural funds (about €114 billion for climate and environment related projects), through InvestEU (€279 billion of private and public investment)⁶.

The EU leadership sees the green transformation as an **opportunity for growth and regaining its place as a global economic leader**. In doing so, much attention is being paid to ensuring social justice and the protection of citizens' rights in the transition to a more environmentally sustainable economy.

The European Green Deal is not only a priority policy of the EU, but also an important factor that influences the development of the economy and the EU's relations with other countries. The European Union can influence other countries through trade restrictions, carbon charges, and by financing or promoting investments in renewable energy, energy efficiency and the circular economy, both in Europe and beyond.

Thus, the Green Deal is aimed at overcoming the challenges of climate change and sustainability and is intended to be a catalyst for changes in the economy and society as a whole. To remain part of the global economy and take its rightful place among European states, Belarus needs to meet new environmental requirements and standards and commit to reducing emissions. The earlier Belarus starts building a low-carbon economy, the better chances it has to restore trade cooperation after the lifting of sanctions, gain access to technology and investment, and start the process of integration into the European Union.

Impact of the European Green Deal on the Belarusian economy

Even under sanctions, more than 26% of Belarus' exports go to Western countries, while more than 20% go to the EU⁷. By introducing "carbon taxes" and increased environmental requirements for imported products, the new EU environmental policy will have a significant impact on the Belarusian economy. With the increased interest in environmentally friendly products and sustainable development, the competitiveness of products and services will be determined not only by price, but also by their impact on the environment and society.

It is important to bear in mind that the European Green Deal sets standards not only within the EU, but for all countries that trade with it.

- Companies that produce products that are uncompetitive in terms of carbon footprint can face a number of challenges, including reduced demand for their products and services, increased energy costs and penalties for environmental violations.
- When calculating the carbon footprint of a product, the entire cycle - raw materials, transport, production, recycling or disposal - is taken into account, which will force the environmental factor to be taken into account when choosing suppliers of raw materials, goods and services.
- The requirements for disclosure of non-financial reports of enterprises will limit cooperation and access to financial markets for companies with low ESG ratings (environmental impact assessment, social responsibility and corporate governance).

To successfully adapt to the Green Deal Belarus needs ambitious emission reduction targets, implementation of European environmental standards into Belarusian legislation, lifting of restrictions on renewable energy development and a long-term strategy to attract international assistance, mobilise Belarusian business, civil society and citizens to create a green Belarus.

⁶ N. Batova, I. Tochitskaya. Green Economy Monitoring: [Boundary Adjustment Carbon Mechanism](#).

⁷ Share of European Neighbourhood Policy East Countries in European Union trade
https://ec.europa.eu/eurostat/databrowser/view/enpe_ext_intro/default/table?lang=en

Despite limited government policy, and often in spite of it, the **green transition is already taking place in Belarus**: solar and wind power plants are being built, separate waste collection and recycling policies are being implemented, a network of electric public transport and charging stations is being developed, eco-industrial parks are being created and companies are switching to cleaner and more energy efficient production, biodiversity restoration and ecotourism projects are being successfully implemented. Belarusian experts have developed documents on the energy revolution and Belarus' adaptation to the European Green Deal. Belarus has adopted a national plan for a green economy, and social surveys show that businesses and citizens of Belarus are interested in more environmentally friendly production and care for the environment.

The removal of artificial restrictions and Belarus' access to scientific, technical and financial opportunities of the global green economy will allow Belarus to overcome the lag and become one of the leaders of green transformation.

Risks and opportunities for Belarus in connection with the European Green Deal

The energy crisis caused by the war in Ukraine has accelerated Europe's transition to a Green Deal. The EU sees the Green Deal as an opportunity to become a world leader in environmental technologies, to ensure economic growth and energy security. For Belarus, following the EU's green policy provides opportunities for reform and development, otherwise the lag will accumulate every year and will require much more investment to overcome it.

1. To achieve the goals of the Green Deal, the EU is developing **cooperation programmes with the Eastern Partnership countries**. For Ukraine, the EPC support was a "locomotive" of European integration in 2019-2022 and allowed to attract international investments. For democratic Belarus, announcing support for the EPC and developing a national green economy strategy can be a pass to participate in the most important events of world politics and economy, such as the Eastern Partnership Summit or the Davos Economic Forum.
2. The EU is introducing a **Carbon Border Adjustment Mechanism (CBAM)** to protect its market from non-environmental products. From 2023, all goods imported into the EU will be required to provide a CO₂ certificate, and if a country does not have its own emissions trading system, importers will be forced to buy EU emissions certificates from 2026. In the first stage, the ITUR will affect exports of cement, steel, aluminum, nitrogen fertilisers, and electricity. According to UNCAD for Belarus, already in 2026 the "carbon levy" will lead to a drop in exports by at least 6.8% with a decrease in revenues by \$200 million.⁸
3. The EU introduces measures to reduce emissions and **raise environmental standards of products**. A plan to reduce transport emissions by 90% and a full transition to green transport by 2050 will reduce demand for Belarusian oil products, and access to MTZ, BELAZ, MAZ will be restricted due to non-compliance with environmental requirements and EU standards if Belarus fails to follow the trend and switch to more environmentally friendly fuels and transport.

The Circular Economy Directive⁹ introduces new requirements on the repairability, reuse and recyclability of products and the content of toxic substances for a wide category of goods: computer and household appliances, batteries, vehicles, textiles, packaging, building materials, foodstuffs.

The increase in organic farming in the EU and plans to reduce fertiliser use by 20% and pesticide and antibiotic use by 50% will limit the market for fertilisers, pharmacology and conventional farming products.

4. Belarus and Belarusians can get significant **benefits from reforming and greening the economy**: job creation, development of new economic sectors, reduction of raw material costs due to circular business models, reduction of energy dependence on Russia, improvement of ecology, and development of tourism.
5. Belarus has human, production and natural resources for the development of **new industries** that will be in demand in the world for at least the next 30 years: production of batteries, solar panels, wind turbines, renewable energy, electric transport, biofuels, biogas, bioplastics, hydrogen, meat substitutes, drinking water, IT.

⁸ A European Union Carbon Border Adjustment Mechanism: Implications for developing countries, June 2021

https://unctad.org/system/files/official-document/0sginf2021d2_en.pdf

⁹ Circular economy action plan

https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

Developed Western economies are interested in Belarus as a **country for investment**, logistics, expansion of the market and production sites, investment in Belarusian enterprises, and a point of access to the markets of Ukraine and other CIS countries.

6. European **biodiversity restoration programmes are being** extended to neighbouring countries. Once the political crisis is resolved, existing programmes will be renewed, and sound national policies will help to increase international cooperation. Increasing the area of national parks and reserves, agro-estates and eco-hotels, fishing and hunting, a developed network of electric petrol stations, bicycle paths and hiking trails could turn Belarus into one of the best ecotourism destinations in Europe.
7. **Belarus' green transition will be financed through** EU funding programmes, loans from the EIB, EBRD and the World Bank, foreign business investment, as well as by raising domestic funds from businesses and individuals. The European Union and its countries remain the largest donor of aid for green transition programmes in the world, providing more than 40% of climate change investments¹⁰.

The European Commission (EC) will develop support programmes for neighbouring countries, including technical assistance, grants and loans. Within the Neighbourhood, Development and International Cooperation Instrument - Global Europe (NDICI), 30% of the funds are planned to be allocated to climate change projects (around €24 billion over 2021-2027)¹¹.

Thus, for our country the European Green Deal is both a serious challenge and a huge opportunity. The economy of the new Belarus needs to be transformed on new principles: innovation, energy efficiency, environmental friendliness, sustainability and human capital development.

¹⁰ https://unfccc.int/sites/default/files/resource/CP2019_02R.pdf

¹¹ [NDICI Budget for 2021-2027](#)

Reducing emissions, developing alternative energy and green technologies will require huge economic investments. According to various estimates, the world's transition to a low-carbon future and the prevention of warming above 1.5°C by the end of the century will require between \$1.6 trillion and \$3.8 trillion of additional investment each year until 2050¹². While the sum is enormous, it must be realised that

- trillion dollars - that's about 1% of global GDP. The EU estimates a 1% increase in its GDP just by implementing the circular economy;
- According to the World Bank, a quarter of the world's GDP - about 25 trillion - is made up of investments, so in order to realise the ambitious plan of green transformation of the world economy, about 10% of all global investments should be redirected to sustainable projects;
- The EPC investment plan will mobilise public investment and help release private funds through InvestEU of at least €1 trillion¹³ over 10 years. The European Commission has estimated the share of public investment needed in green transformation at 30%, with a further 70% coming from private capital;
- The European Investment Bank (EIB) has become "Europe's climate bank". In 2022, the share of investments allocated to climate change and environmental sustainability projects was €36.5 billion, or 58%¹⁴.

In 2018, Belarusian environmental organisations in cooperation with German experts developed a plan for an "Energy [p]evolution", according to which a complete transition to green energy in power, heating and transport by 2050 would require investments of \$120 billion. To estimate this amount, one should take into account that the current level of financing of these spheres implies investments of \$36 billion, and the possible savings on energy carriers during the transition to renewable energy sources may amount to \$63 billion by 2050, which is more than the necessary additional investments in the green power industry. In the opinion of some Belarusian experts, the plan requires adjustment and revision, but it can be used to understand the general direction of development and the approximate cost of the green transition for Belarus.

Most green investment projects - solar and wind power plants, biogas plants, waste reuse and recycling technologies, electric transport, thermal insulation of buildings, water heating collectors or heat pumps - have a payback period of 3 to 10 years, after which they start to bring profit, practically requiring no additional investments and saving resources. With a service life of 25-30 years, investing in green technologies is beneficial for both nature and the country's economy.

An integrated approach creates a synergy effect, when the development of one sphere brings profit and develops others. Thus, an effective waste management system not only solves the issue of landfills, but also produces biofuel, electricity and heat energy, saves resources in industrial production, increases the profitability of agriculture, reduces harmful CO₂ and methane emissions, prevents toxic contamination of land, water and air, preserves biodiversity and develops ecotourism.

Successful implementation of the plan in Belarus requires the use of both the country's domestic resources and the attraction of foreign investment and aid programmes.

¹² <https://www.un.org/sustainabledevelopment/climate-change/>

¹³ [The European Green Deal Investment Plan and Just Transition Mechanism](#)

¹⁴ [EIB climate and environmental sustainability financing](#)

Green economy resources

Green technologies can reduce economic losses caused by poor ecology and climate change, save energy and raw materials, increase investment attractiveness and attract tourists.

1. Reducing damage from natural disasters, which in Belarus, according to World Bank estimates, cause 1% of GDP losses annually, and 40% of the economy is weather-dependent.
2. Reducing economic losses due to air pollution, which account for 8.3% of global GDP and about 5% of Belarusian GDP¹⁵.
3. Belarus' own CO2 emissions trading system will allow Belarusian companies not to pay about \$200 million a year in "carbon tax" to the EU budget after 2026, but to replenish the national budget to invest in sustainable technologies and compensate affected industries.
4. The development of green energy and decentralised grids will reduce losses in the transit of energy and heat, which currently amount to 8-9%.
5. Savings on energy purchases for power generation could be up to \$ 60bn by 2050 through the development of renewable energy sources.
6. Waste reuse can generate up to 1% of GDP growth.
7. Reducing energy consumption and improving energy efficiency can generate GDP growth of 0.25-1%.

Internal sources of funding

Reforming the economy and public administration will reduce costs and redirect resources towards the green transformation of the country.

Successful implementation requires the active participation of private businesses, non-governmental organisations and citizens. A solar power plant does not necessarily require public investment, any business or homeowner can install it on their own roof and connect to the grid. The task of the state is to create the legal framework and infrastructure.

1. Partial privatisation of the public sector, refusal to subsidise unprofitable enterprises, sale of the property of the Presidential Property Management Directorate.
2. Digitalisation and optimisation of production and management processes, elimination of corruption schemes in the public sector of the economy.
3. Stop investing in "dirty" production and redirect funds to the development of environmentally friendly technologies.
4. Investments of Belarusian business and private individuals should become the basis for financing the green transition. According to the calculations of Belarusian economists, the amount of funds "under the cushion" of Belarusians can amount to about 15 billion euros.
5. Introducing a funded part of pensions and investing these funds in long-term green projects.
6. Own production will help reduce imports of expensive technologies and create additional jobs.
7. Adoption of green technologies by private individuals: installation of solar panels and collectors, insulation of buildings, heating with heat pumps and water floors from solar installation, waste sorting, installation of electric petrol stations, use of green transport, etc.
8. Creation of a green finance system: department at the Belarus Stock Exchange, preferential lending and leasing programmes, methodology of environmental assessment of projects for financial institutions.

¹⁵ Slimate Action Network. <https://canecca.org/dyim-unosit-vvp/>

9. A national system of certification of environmentally sustainable activities in accordance with international norms will increase exports to Western countries.
10. Reforming the insurance system and investing part of savings in long-term green projects.

External sources of funding

1. A comprehensive economic assistance plan for Belarus.
2. Lending to the EIB, IMF, EBRD, AIIB and other investment banks and financial organisations.
3. Eastern Partnership programmes, 25% of whose funds are planned to be spent on climate-resilient projects.
4. Financing of environmental programmes: "EU Green Cities, environmental programmes under the Aarhus Convention, etc.
5. Foreign business investment in manufacturing and buying shares in green companies.
6. Issue of "Belarus Green Bonds", the proceeds from the sale of which will be used to finance environmental transformation.

The key to success in attracting investment for green transformation is the political will of the new leadership of the country, clear "rules of the game" enshrined in legislation, the creation of a national infrastructure and investment plan for sustainable development.

The brand of green Belarus

The creation and development of a green Belarus brand is necessary to define the directions and principles of the country's economic transformation, to obtain foreign policy support, to create a favourable investment climate, to attract financing and to popularise environmental solutions among the population of Belarus.

The main idea is that after the restoration of the rule of law and democracy, Belarus should become a platform for the introduction of modern innovations and environmentally friendly technologies to turn a country with an inefficient economy into a "success story" of green transformation.

When building a brand, you need to develop clear messages and action plans on several fronts:

Foreign Policy

1. A statement of support for the European Green Deal.
2. Developing a national strategy, plans and roadmaps to combat climate change and develop a green economy.
3. Continued participation in the Eastern Partnership and fulfilment of the undertaken obligations under international conventions and agreements.
4. Participation in the EU Energy Partnership and other international programmes.
5. Bringing legislation in line with EU norms and standards.
6. Statement of ambition to create a climate-neutral economy by 2050.

International investments

1. Creation of a "Free Ecological Zone" where companies using green technologies receive tax incentives.
2. Creation of clusters of green energy, ecological transport, agriculture, construction technologies, circular economy, IT solutions, to target inviting companies and create a full cycle of green economy.
3. At the legislative level, the conditions necessary for the development of a green economy should be fixed without the right to change them until a certain year: a green tariff for the purchase of electricity, credit rates, tax incentives, etc.
4. Development of investment plans for global financial institutions: EIB, IMF, EBRD, EB, AIIB, etc.
5. The issuance of "green government bonds".

For businesses and individuals in Belarus

1. Creation of a system of green finance for projects in the field of green economy: Green Bank, support for the creation of green credit and leasing programmes in Belarusian banks and financial institutions.
2. Infrastructure development plan: for RES, waste management, transport.
3. Legislative incentives: environmental requirements for production, emission quotas, subsidies for electric transport and RES energy.
4. Widespread adoption of ESG business principles.

Education and human capital development

1. Organisation of the international conference "Green Economy of Belarus".
2. Regular organisation of Eco Festival and other polarising events
3. Creation of an idea bank, a support platform for startups, hackathons, accelerators.
4. Establishment of a training system for management and business.
5. Environmental programmes in universities, schools and kindergartens
6. Demonstration of new technologies on existing "green" pilot projects: RES polygon, eco-school, eco-farm, eco-plant, eco-city.

The work on the development and promotion of the green Belarus brand should be carried out in cooperation with the Green Belarus Association, which unites expert communities and environmental organisations. The main task of the association is to develop a vision of a green Belarus, prepare a roadmap and a package of reforms for the future green transition.

1. Combating climate change and reducing emissions

The EU has set a target to reduce CO₂ emissions by 40% by 2030 and 55% by 2050 (compared to 1990). In the EU, emissions are regulated through the sale of emission allowances (EU ETS). This charge is built into the price of the product, and the entire carbon footprint from production to transport is taken into account. The exchange price has risen from €30 per tonne of CO₂ at the beginning of 2021 to €96 in January 2023.

In 2023, the Carbon Border Adjustment Mechanism will come into force, with the main objective of reducing the risk of carbon leakage and incentivising EU trading partners to make their production more environmentally friendly. The CBAM will equalise the carbon burden of EU-produced and imported goods. From 1 January 2023, all declarants importing goods into the EU must provide a quarterly report on the quantity imported, direct and indirect emissions and the carbon price in the country of origin. From 2026, importers will be obliged to buy CO₂ certificates at European exchange prices or provide proof of payment of a carbon fee in their country¹⁶.

It is advantageous for EU trading partners to set up a national emissions trading and verification system in line with international requirements and standards, so that the fees remain in the national budget.

Initially, the CBAM will affect the most carbon-intensive areas: cement, steel, aluminium, nitrogen fertiliser and electricity production. By 2035, the EU plans to both phase out free emission allowances in its countries, such as for transport, shipping and buildings, and reduce free allowances in the import sector.

Challenges for Belarus

The European Union is Belarus' second trade and economic partner. Despite the sanctions policy, the share of trade with the EU is, according to various estimates, from 18 to 25%; at the end of 2021, exports from Belarus to the EU totalled USD 9.5 billion¹⁷.

The first stage of the Carbon Border Adjustment Mechanism will cover nitrogen fertiliser, cement, steel, aluminium and electricity. Subsequently, the expansion of the mechanism to other carbon-intensive industries is considered: woodworking, paper-pulp, chemical and oil refining industries, glass production, which will affect a number of export positions of Belarusian industry¹⁸.

Based on data from the UNCTAD report¹⁹ on the effects of the Green Deal on developing countries, for Belarus in 2026 it is planned that exports will fall by 6.8% and revenues will decrease by \$200 million (at the cost of a CO₂ certificate of \$88 per tonne). It should be noted that the figures refer only to direct losses and will increase by at least 10% per year due to the gradual cancellation of free quotas, and products for which no reporting has been done from 2023 to 2026 will find it difficult to enter the European market.

¹⁶ [EEAS, Transboundary Carbon Regulatory Mechanism in Questions and Answers.](#)

¹⁷ https://belgium.mfa.gov.by/ru/bel_eu/economy/

¹⁸ Final fuel consumption of the manufacturing sector accounts for about 32% of country consumption, including sectors falling under ITUR 25% (metallurgy 2.1%, wood and paper products 2.3%, chemical products 5.2%, non-metallic mineral products 6.2%, refined petroleum products 9.3%).

¹⁹ A European Union Carbon Border Adjustment Mechanism: Implications for developing countries, June 2021 https://unctad.org/system/files/official-document/osginf2021d2_en.pdf

There are a number of other risks associated with the European Green Deal:

1. The carbon tax rate for EU imports has not yet been named and is steadily rising.
2. Ambitious plans to reduce emissions by 90% and fully switch to green transport by 2050 are sharply reducing EU demand for petroleum products and internal combustion engine vehicles, and demands are increasing for sustainable batteries in electric transport.
3. Attracting investment in carbon-intensive areas of production will be extremely difficult as sustainable technologies are prioritised.

Level of CO₂ emissions in Belarus

According to Belstat, CO₂ emissions in Belarus in 2020 amounted to 88.8 million tonnes. The distribution by sector is as follows: energy and transport (56.7 million tonnes), agriculture (20.4 million tonnes), industry (5.9 million tonnes), waste (5.8 million tonnes). 38.2 million tonnes are absorbed by the forestry and land use sector.

Belarus became a member of the Paris Climate Agreement and in 2021 made a commitment to reduce CO₂ emissions by 35% of 1990 levels (145.46 million tonnes according to Belstat) by 2030. This figure takes into account the absorption of greenhouse gases by forests and agricultural land and can be increased to 40% if international funding is provided. The problem is that the 35% reduction is the excess of emissions in 2020, i.e. the actual increase.

There is also a question of confidence in the official data on emissions: according to Belstat, emissions in 1990 were 146.46 million tonnes, while the figure of 137.76 million tonnes is accepted for the calculation of emission reduction commitments; the level of greenhouse gas absorption for 2019 "increased" from 31.76 million tonnes according to the 2020 report to 35.63 million tonnes in 2022.²⁰

In order to meet the EU emission reduction target, Belarus needs to reduce 28 million tonnes of CO₂ by 2030 and 60 million tonnes by 2050. The most promising economic sectors for emission reductions are energy and waste.

Necessary changes to reduce emissions

1. Raising emissions reduction ambitions for 2030 and 2050.
2. Development of a National Strategy, which will include the sale of emission quotas, state support for carbon-intensive sectors of the economy, green investment and tax policy, adjustment of investment plans of enterprises, a programme to improve energy efficiency in the industrial and residential sectors, development of renewable energy sources, circular economy and green production areas.
3. Establishment of a National Carbon Trading System, including a methodology for monitoring, reporting and verification of the carbon footprint in accordance with EU requirements and standards.
4. Implementation of emission reduction targets across all policies in Belarus.
5. Systemic information and educational work.

²⁰ [National Statistical Committee of RB, greenhouse gas emissions.](#)

Successful implementation of ambitious emission reduction plans requires engaging all segments of the population, creating awareness of the need for ecological transformation and building trust in green policies.

- Information campaign for politicians, public, officials, businesses to increase confidence in green reforms.
- Training new staff for green management and business.
- Formation of "eco-consciousness" in preschool and school children and, through them, in parents.
- Informing about economic benefits and opportunities for private business.
- Participation in international research programmes like Horizon Europe.

Examples of climate projects

"Green City"

As the successful experience of Ukraine has shown, in order to promote the ecological approach, it is necessary to show their effectiveness on small but tangible examples. Creation of a green city will allow to attract funding, public attention, calculate the necessary investments and payback, assess the problems and risks. The creation of a green city is possible in cities that have joined the network of European green cities, such as Novopolotsk and Baranovichi.

Belarus Green City:

- Obtains power and heat from local renewable energy sources: solar farm, wind farm, biogas plant. Uses smart lighting, smart grids and other innovations in the energy sector.
- Sorting and recycling rubbish. Organic waste is used to produce biogas and natural fertiliser; paper, plastic, metals, wood are recycled.
- Stimulates the transition to electric transport: a network of electric petrol stations, special car parks for electric cars, environmentally friendly public transport, a network of bicycle lanes, a developed system of sharing electric cars, scooters, bicycles.
- Manufactures in the city reduce CO₂ and harmful emissions and use clean energy.
- Provides tax incentives and subsidies for innovative and green technologies.
- Purchases products from "green farms" for catering and schools, develops green spaces and supports biodiversity in cities.
- In the field of education, it introduces a course on ecology, conducts experience exchange and PR campaigns.
- It is part of the European Network of Green Cities.

Promotion of the "European Climate Pact"

An awareness campaign is needed so that everyone can assess their carbon footprint and take action to reduce it.

2. Green energy

Energy is a key area in the green transformation of Belarus:

1. According to Belstat, the share of CO₂ emissions from the heat and power generation sector was 42.75 million tonnes in 2019, or 38% of all emissions.
2. Green energy is the basis for the transformation of other sectors: industry, electric transport, agriculture, waste treatment, construction, ecotourism, urbanism.
3. It can create new sectors of the Belarusian economy by exporting green energy and developing its own production: solar batteries, wind turbines, inverters, batteries, hydrogen and biogas production, computerised control systems, etc.

Heat and power system of Belarus

The energy sector in Belarus is based on thermal power plants, which generate more than 95% of all electricity. According to the International Energy Agency 2020, about 90% of electricity and 80% of heat energy in the country is produced by natural gas.

The construction of the nuclear power plant should provide about 40% of the country's electricity, but there is no data on the actual share of the plant in the country's energy balance. The latest available data on the country's energy balance is the Belstat report for 2020.

- The installed capacity of Belarus' power plants in 2020 was 11,338 MW, of which the capacity of renewable energy sources (solar, wind, hydro) was about 368 MW, or about 3.24% of the total capacity.
- The share of solar and wind power generation in 2020 was 3.45%. Another 4% of RES generation is biofuels, mainly firewood. For comparison in Ukraine - 12.4, Poland - 16.1%, Lithuania - 26.8%, Latvia - 42.1%²¹.
- The energy sector accounts for 25% of all investments in fixed industrial capital.
- Energy transport losses are 8.16% in the electricity network and 9.05% in the heating network.
- Belarus spends about \$6 billion a year on energy supply²².
- Energy imports make a significant contribution to the country's trade deficit - energy imports account for about 5.5% of the country's GDP. Supplies of electricity, gas, steam and hot water account for only 3% of the national GDP (3.95 billion rubles, 1.9 billion USD, Belstat).

Energy balance of Belarus in 2020

Heat production accounts for the largest share (30%) of final energy consumption in Belarus, but only 10.6% of heat production comes from renewable energy sources - mainly biomass.

Belarus is implementing a state programme to improve energy efficiency and renovating the housing stock. Buildings in Minsk and regional cities use solar power plants and collectors, heat pumps and other modern technologies, which can reduce consumption to 25 kWh/m² per year, but 60% of the country's dwellings use up to 200 kWh.

²¹ Europe's renewable energy consumption https://energy.ec.europa.eu/energy-explained/interactive-infographics/infographic-renewables_en

²² Energy [R]evolution. <https://energy2050.ecohome.ngo/>

	Electricity	Heat energy
Produced	38,658 million kWh	73,212 million kWh
- RES (solar, wind, hydro, geothermal)**	755 million kWh	12.8 million kWh
Consumed in Belarus	38,168 million kWh	67,771 million kWh
-Organisations	31,458 million kWh	40,908 million kWh
-Population	6,728 million kWh	26,863 million kWh

*Translated from thousand Gcal for comparison ** Excluding installed SMEs

Challenges for the Belarusian energy sector

1. Total dependence on Russian energy supplies

Belarus buys 20,261 million m³ of gas for \$2.6 billion a year, at a price of \$128.5 per thousand cubic metres. The price of gas for Belarus is a subject of personal agreements with Lukashenka and may change significantly with a change of power in the country. As the experience of Moldova shows, Russia can raise gas tariffs to the European level (an average of \$650 for long-term contracts, while the market price can be many times higher) or completely block supplies. The Belarusian government should be prepared to diversify gas supply sources and significantly (2-4 times) increase the costs of energy purchases.

The construction of BelNPP has only increased dependence on Russia due to its monopoly right to supply nuclear fuel, maintenance of the plant, and the need to repay the loan. Cheap gas makes the development of renewable energy sources uncompetitive, which poses an additional threat to the country's energy security.

2. Centralisation and monopolisation of the energy market.

In Belarus, the Ministry of Energy is in charge of heat and electricity generation, transmission and sales, pricing policy, infrastructure development and grid connection. This monopoly leads to artificial restrictions on RES development and entry of new players into the market, excessive tariffs for grid connection, inefficient budget spending and corruption, while centralisation leads to high heat and energy losses.

3. Cross-subsidisation

The price of electricity and heat in Belarus is different for individuals, the public sector and private businesses. This system does not motivate citizens to reduce energy consumption, while for businesses it is a hidden tax affecting their competitiveness.

4. Limitations for RES development

The decision to build a nuclear power plant in Belarus, which will generate about 40% of all energy, entailed a de facto moratorium on RES development. Quotas for connecting new wind and solar power plants to the grid were introduced, with the number of applications for connection exceeding the quotas by 5-7 times. In 2017-2019, applications received totalled 770 MW of installed capacity, while the allocated quotas amounted to 117.42 MW. The quotas for 2022-2023 were cancelled, which effectively prohibits RES development.

The RES target stated in the Concept of Energy Security of Belarus is unambitious. It amounts to 9% of gross energy consumption, while in 2020 the figure was already 7.3%. Belenergo's policy of connecting wind and solar power plants to the general grid is also a constraint to development - the connection tariff may exceed the cost of installing a power plant.

There are also objective reasons for the slow development of RES: the need for energy storage and balancing, modernisation of power grids to connect a large number of small energy producers and creation of a management system for them. All this requires significant investments and international co-operation, which is impossible in the context of sanctions.

In order to build an efficient, independent green economy in Belarus, it is necessary to reduce dependence on Russian energy resources, which for our country has turned into a threat of losing state independence and support for the Lukashenko regime. Belarusian environmental activists and energy activists have developed a number of **recommendations for reforming the energy system** and increasing energy independence.

1. Long-term strategic planning.

The creation of a national energy security strategy should be based on the principles of Belarus' national interests, sustainability, and maximising investment efficiency. Belarus needs more ambitious plans to reduce CO2 emissions in the energy sector and transition to green energy, as well as a roadmap with measurable indicators.

2. Energy security.

As we can see from the energy balance table of Belarus, heat generation is almost twice as high as electricity generation, and a significant part of heat consumption is consumed by the population. A strategy similar to the European RePowerEU is needed to reduce dependence in this area:

- reducing heat and electricity consumption by changing the behaviour of citizens and businesses, improving the energy efficiency of public and residential buildings;
- development of renewable energy sources, cancellation of restraining quotas;
- diversification of energy supplies.

3. Changing the energy balance.

The main task will be to significantly reduce the consumption of gas, primarily Russian gas, and to diversify the sources of energy supplies.

- It is necessary to develop a plan to decommission fuel oil and other low-efficient and unecological plants, replacing them with RES.
- Modern gas-fired power plants can effectively balance the energy system during peak loads and cloudy windless days. Power plants can be converted to biogas and can be used to create cogeneration complexes for electricity, heat and biogas, which significantly increases their efficiency.
- Develop and implement a programme to increase energy consumption for heating buildings, cooking, and technological processes.

4. Creation of an electricity market.

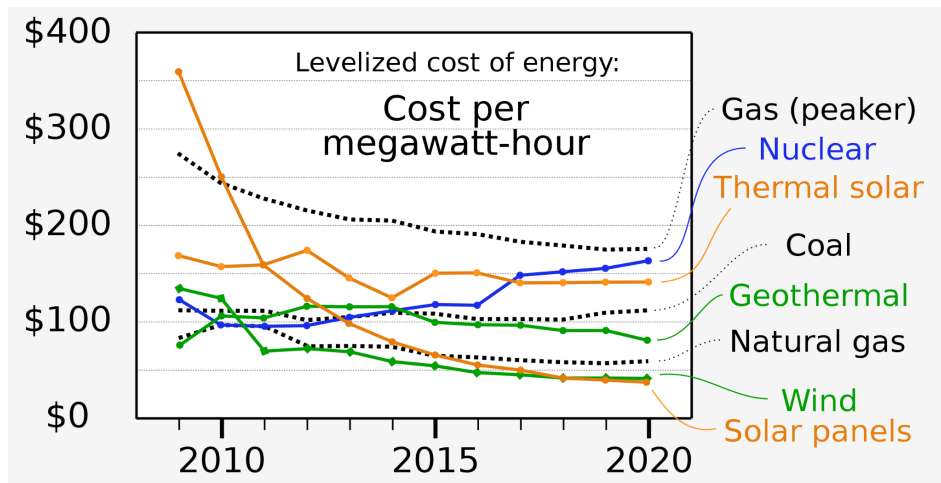
The strategy of the EU countries for RES development and energy security is a transition to a large number of small energy producers managed by smart grids according to the principle "everyone can become an energy producer".

To attract domestic and foreign investment, Belarus needs to move away from the rigid centralisation and monopoly of Belenergo, abolish cross-subsidies, create an independent regulator and a level playing field for all energy producers. Belenergo should continue to develop networks and provide energy services.

5. Development of renewable energy sources.

Belarus has great potential for the development of solar and wind energy, biogas, biofuel and hydrogen production. The development of different renewable energy sources, construction of cogeneration parks, production of hydrogen from renewable energy sources and the creation of a demand management system to smooth consumption peaks will successfully balance the energy system.

In 2020, the cost of generating solar and wind electricity globally falls below gas, coal and nuclear for the first time²³.



Source: Wikipedia²⁴

The cancellation of quotas, clear tariff policy and the procedure of connection to the common grid are necessary for RES development. Both international business and Belarusian enterprises and individuals can invest in RES development.

6. Investing in infrastructure.

It is necessary to stop investing in new TPPs and redirect resources to the development of power transmission lines, development of smart grids, increase of storage and balancing capacities, and development of demand management systems. Modern technologies effectively solve the problems of energy storage: lithium-ion energy banks make it possible to create independent energy supplies for buildings, electric car batteries can power a house, hydro storage systems store energy during peak generation, and Tesla storage complexes with a capacity of 300-600 MW can balance the energy system of entire regions, replacing gas-fired power plants.

7. Belarus Nuclear Power Station (BelNPP).

It is necessary to audit and independently assess the safety of BelNPP and develop a plan to include it in the energy consumption: hydrogen production, charging of electric transport, electrification of industry. Determine the timing and sources of funding for future shutdown of the plant.

8. International co-operation.

The energy system of Belarus should be restructured to be included in a common grid with neighbouring countries - Poland, Lithuania, Latvia, Ukraine, which would allow balancing different sources of energy generation at the national level. For electricity trade, it is necessary to create a system of confirmation of energy origin in accordance with European standards.

Necessary steps to stimulate green energy development

1. Development of a state plan for RES energy development.
2. Incentivising the installation of RES power plants in the private sector and enterprises: green tariff for electricity, which will not be abolished until 2030, reduction of connection costs, tax incentives for businesses, green lending, introduction of ESG assessments and ratings.

²³ <https://about.bnef.com/blog/cost-of-new-renewables-temporarily-rises-as-inflation-starts-to-bite/>

²⁴ https://en.wikipedia.org/wiki/Levelized_cost_of_electricity

3. Investment programme in own production of necessary elements for green energy production: solar panels, wind turbines, generators, accumulators, solar collectors, heat pumps, etc.
4. Conducting educational events for businesses and individuals on RES implementation: legislation, financing, costing, producers, companies, etc.

2.1 Solar energy

Solar power is one of the most popular and affordable sources of green energy:

- Modern solar panels have a high efficiency of 16-20% with the maximum potential of current technologies up to 30%
- The panels are virtually maintenance free and have a life expectancy of 20-30 years with a 20% reduction in efficiency towards the end of their life.
- Low cost and payback period of 6-7 years for solar power plants and 3-5 years for water heating collectors allows for widespread use in the private sector and consideration as additional income.
- The variety of panels allows them to be used as architectural elements of buildings: solar tiles for roofing, double-sided panels for balcony fences, terraces and sheds, coloured panels for facades and roofs.
- Installing water heating elements on roofs will help to reduce the costs of hot water supply and increase the efficiency of the installation. The cost of equipment for a 200l collector. - 1500-2000 euros.

The disadvantages include dependence on the season and weather conditions, as well as difficulties in storing excess energy. The solution to the problem could be:

- Creation of cogeneration complexes combining solar and wind power generation, biogas production and hydrogen electrolysis.
- Feeding back surplus household generation to the grid, using energy banks or electric car batteries for storage.
- Installation of solar power plants on administrative buildings in cities where maximum consumption occurs - schools, libraries, administrations.

As of 2020, 55 industrial solar power plants with a capacity of 156 MW have already been built in Belarus. The first phase of the Smorgoni power plant was commissioned in February 2017, while construction of a 100 MW solar power plant in the Cherikov district of the Mogilev region began in January 2019. In 2020, solar plants generated 170 million kWh, or only 0.44% of all electricity in Belarus.

The installation of solar panels on private homes is becoming increasingly popular, despite a number of obstacles, such as the high cost of grid connection (sometimes can exceed the cost of a power plant by 1.5-2 times) and the cancellation of increased tariffs for the purchase of green energy. One of the main obstacles to the use of solar energy in the private sector is cross-subsidisation of payments for electricity and heat, as a result of which residents of Belarus pay 80% less than their real cost for heat.

A widespread myth about the lack of sunshine in Belarus has been disproved by the calculations of scientists from the National Academy of Sciences of Belarus: the efficiency of solar panels in Belarus is 17-20% higher than in Germany and 10% higher than in Poland²⁵.

²⁵ Kilowatts of Light: Pros, Cons and Prospects of Solar Energy in Belarus
<https://www.belta.by/comments/view/kilovatty-sveta-pljusy-minusy-i-perspektivy-solnechnoj-energetiki-v-belarusi-7643/>

In Central Europe, the energy of a 5 kW solar power plant installed on the roof of a private house is enough to supply a family of 3-4 people with rational consumption. The cost of equipment for such a power plant is 5000-7000 euros.

In Belarus, it is also favourable to use solar collectors for hot water supply and heating. Monitoring results in the Mogilev region have shown that a solar collector fully provides hot water to the residents of a house 7-8 months a year, saving up to 80%.

In autumn and spring, the solar system fully heats the house, reducing gas consumption by 20-30%. In Central Europe, solar energy provides 60% of the hot water supply²⁶.

Solar power plants and water heating collectors can be installed on public buildings, covering not only their own needs but also those of nearby homes, while significantly reducing energy losses on delivery. For commercial enterprises, investing in their own solar power plant will increase profitability, reduce the carbon intensity of their products, improve their environmental performance (ESG) and provide them with energy that is stable in price and quality. Land in the Chernobyl zone, which is unsuitable for living and agricultural activities, can be used for the construction of solar power plants. Construction of solar parks there will allow to use part of the 50,000 km² of the country's area taken out of economic use and to obtain more energy due to better insolation than in other regions of the country.

In Belarus, solar energy can be used to create autonomous energy systems in rural areas and at remote sites where it is too expensive to extend power grids. Panels on electric vehicles can increase the autonomy of travel, and panels on carports over parking spaces can be used to charge cars with clean energy. In urban environments, solar panels power traffic lights and lighting, and charge mobile devices in benches and even bags.

²⁶ Weiss, W. et al. (2011): Solar heat worldwide - markets and contribution to the energy supply 2009. IEA Solar Heating And Cooling Programme, May 2011. International Energy Agency (IEA), Paris, France.

2.2 Wind energy

The use of wind is the oldest way of generating energy and in recent years has become one of the symbols of the green transition. Wind power is now the fastest growing and one of the cheapest sources of electrical energy in the world. The main advantages of wind power:

- Wind turbines are the leader in energy efficiency: while coal has an energy efficiency of 29%, wind turbines have an energy efficiency of 1160%.
- One 2 MW turbine can produce up to 5 million kWh, which meets the household needs of the district centre (600-800 houses). In 2021, construction of a 16 MW wind turbine began, and this is not the limit.
- Long service life: 20-25 years.

But there are also a number of difficulties with the introduction of wind turbines:

- High initial cost and complexity of installation.
- Requirements for the installation site, which should be located on an elevated site, without forests, preferably away from settlements and conservation areas.
- Need for regular maintenance: 2-3 times a year.
- Danger to birds, vibration, noise.

The efficiency of wind generation depends directly on the height of the installation and the blade spread, so large wind farms are more economically viable. However, small wind turbines are also available, which can be installed on the roof of residential or administrative buildings or used in agricultural areas.

The technical wind potential of Belarus is estimated at 300-400 billion kWh/year²⁷, but due to the prevalence of low-speed winds, the economic potential is much lower.

In Belarus, wind energy is developing slowly, as well as the whole RES sector. The main reasons for the lag are disinterestedness of the state, lack of an electricity market, restrictive connection quotas, poor investment climate, and low cost of electricity due to cheap Russian gas. As of 2020, the capacity of wind turbines in Belarus totalled 112 MW, which generated 0.48% of the country's total energy. Wind power plants were planned to be commissioned in Smorgon (15 MW), Oshmian (25 MW), Liozna (50 MW) and Dzerzhinsky (160 MW) districts by 2020.

²⁷ WindAtlas <https://globalwindatlas.info/en/area/Belarus>

2.3 Hydropower

The main difficulty in utilising water energy is the small capacity due to the relief of Belarus and the need to flood part of the territory for the construction of HPPs. The solution may be the use of small hydro installations that do not require large investments and construction works and provide energy to an enterprise, a farm or a settlement²⁸.

- Mini and micro HPPs that can be used on rivers and reservoir discharges (capacity from 3 to 100 kW). For example, radial two-chamber flow turbines of the Ossberger system (Germany) solve the problem of inconsistent water flow and have an efficiency of about 80%.
- Generating sets for small rivers RiverStar (USA), with a capacity of one module of about 50 kW. A capsule with float and impeller is installed with cables across the river and uses the water current. Several modules are installed to increase the power.
- Zotlöterer's (Austria) whirlpool-gravity hydroelectric power plant with a capacity from 10 kW. During construction, part of the water is diverted into a concrete channel, where a special turbine with blades receives water tangentially, spiralling. This system is considered to be the most environmentally friendly, does not harm fish and promotes water aeration.

The hydropotential of all watercourses in the Republic of Belarus is officially estimated at 850 MW, of which 250 MW is considered economically feasible. According to Belstat, as of 2020, the capacity of all hydropower plants in Belarus totalled 96 megawatts, which generated 400 million kilowatt-hours.

On the basis of existing reservoirs and hydroelectric power plants, hydro storage systems can be developed to balance renewable energy sources. During peak green energy generation, water is pumped into the upper basin and used for power generation during peak hours or small-scale wind and solar generation. This method is more efficient and environmentally friendly than burning gas.

2.4 Biogas and biofuels

The use of biomass for energy is traditional for our country, about 9% of the residential sector is heated with wood. Besides wood burning, there are other technologies and raw materials that can be efficiently used in Belarus for biofuel, heat and electricity production.

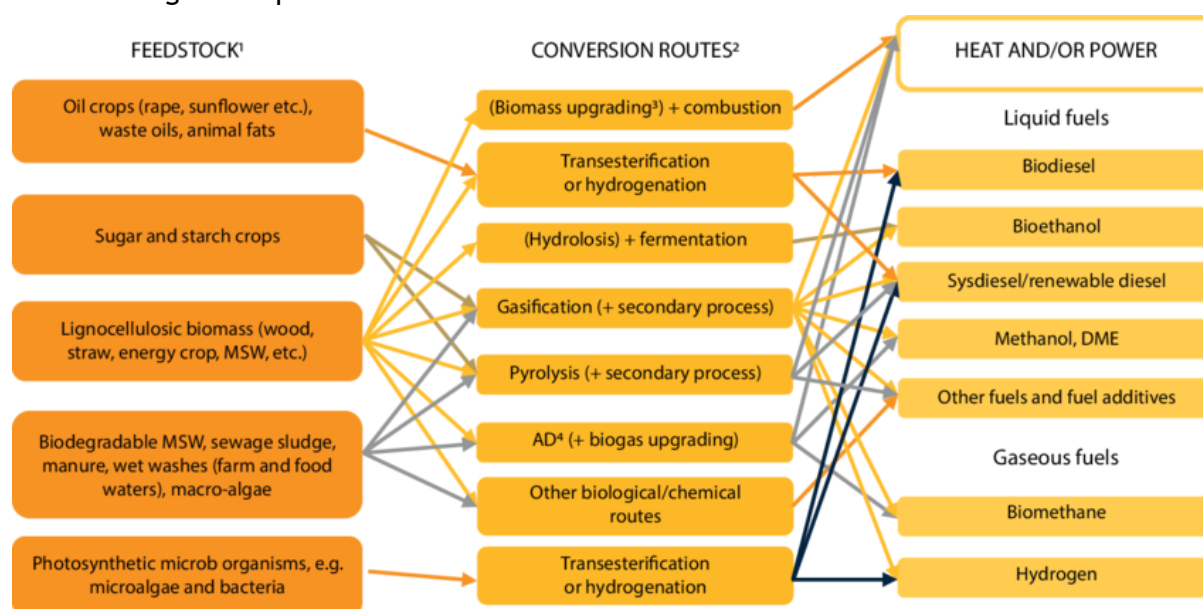
Modern environmental regulations prescribe the use of fully or partially recycled agricultural and forestry raw materials for production, rather than specialised crop cultivation.

The production of biofuels will reduce the amount of waste in the country and its pollution of the environment, increase the profitability of agriculture and the housing and utilities system.

1. **Production of pellets and fuel briquettes**, which have a higher energy capacity due to pressing. Pellets and briquettes are also more convenient to use, modern furnaces have automatic feeding and are more energy efficient. Sawdust, bark, trimmings and other forestry waste can be used to produce fuel briquettes. Equipping forestry enterprises with pellet and fuel briquette production lines can increase the profitability of production and solve the problem of waste, which is now often simply burnt.

²⁸ The big future of small hydropower plants. <https://www.energovector.com/energoznanie-bolshoe-budushee-malyh-ges.html>

2. **Gasification and synthesis gas production.** Compared to direct combustion, gasification produces more electrical and thermal energy, as well as associated chemicals and fuels, and reduces CO₂ emissions.
3. **Biodiesel and synthetic diesel** can be produced from secondary waste from agriculture and food industry, municipal waste. Biodiesel is blended with conventional diesel, if its share does not exceed 20% (B20), the mixture can be used in conventional engines. For Belarus, as a transit country with a predominance of road freight transport and high diesel consumption in agriculture, the production of liquid biofuels will be in demand and will reduce CO₂ emissions.
4. Anaerobic digestion technology allows to **produce biogas from biomass:** manure, straw, liquid municipal waste. Under the influence of bacteria in an oxygen-free environment, organics decompose into methane (65%), carbon dioxide and water. Biogas complexes can both use the gas to produce heat and electricity and sell the gas for use in industry and traditional CHP plants. The efficiency of such gas is 95% of natural gas, but it does not require long transport times, which reduces emissions into the atmosphere and also solves the problem of organic waste, which now mostly goes to landfills, polluting the air, water, soil and releasing dangerous methane during decomposition.



Schematic of commercial bioenergy solutions²⁹

5. **Bioethanol production** is possible from secondary raw materials: sugar, oil and starch-containing crops from food industry waste, waste oil and animal fats. A by-product of bioethanol production from cereals is protein-rich animal feed (dry granulated bard), which makes up about one third of the feedstock used.

Achieving the goal of a climate-neutral Europe will require a minimum 10-fold increase in biogas production. According to various estimates, biogas production could cover 25% of the world's fuel and energy needs. Biogas production could become an alternative to natural gas, reduce CO₂ emissions, and provide additional income to agriculture.

At the same time, biogas should not be regarded as the basis for future energy, but as an intermediate stage in the energy transformation of mankind and a supplement to other sources of green energy.

²⁹ https://www.researchgate.net/figure/Schematic-view-of-commercial-bioenergy-routes-135_fig14_331629495

Biogas production is actively developing in Ukraine, in which the EBRD and other financial organisations are investing. According to Oleksiy Kormchit, head of the Association of energy service companies, the country is capable of replacing 10bn m³ of Russian gas with biogas. It is already planned to build 9 bioCHPs, with a total generation capacity of 250 MW of heat and 52 MW of electricity.

Belarus has a great potential in biogas production due to its developed agriculture.

- Biogas is produced from any kind of biomass: manure, food waste, straw, sugar beet cake, corn stalks, sawdust, etc.
- Can recycle 100% of municipal and agricultural bio-waste.
- A biogas plant can be multifunctional: it can produce electricity, supply hot water, serve as a fuelling station for motor and agricultural transport, and produce hydrogen.
- The use of blue-green algae for biogas production contributes to the purification of rivers and reservoirs, the restoration of fish populations, and the production of organic fertilisers.

The country produces 89 million tonnes of organic waste annually, of which only 2% is reused. According to Belstat, biogas production in Belarus in 2020 amounted to 74 thousand tonnes of fuel equivalent; in 2019, the installed capacity of biogas power plants was 26.8 MW.

No studies have been conducted to assess the resource potential of biogas from these waste sources, but some rough calculations have been made³⁰. In particular, we are talking about the production of 2.3 million tonnes/year of biogas from animal manure and 0.3 million tonnes/year from municipal solid waste. According to the ALC ENECA consulting company, up to 982 biogas complexes with a total capacity of 670 MW could be built in Belarus, 940 of which would be in rural areas. A simple calculation shows that the use of waste for biogas production could replace about 5 billion m³ of natural gas, which is about a quarter of the total consumption³¹.

The use of biogas plants can help develop agriculture, the circular economy, green fuels, and reduce the carbon footprint of production. Biogas plants can be either industrial scale or "mobile".

³⁰ IRENA https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jul/IRENA_RRA_Belarus_2021.pdf?rev=a02ddc2cf2c44517a69a92cb9ae1f863

³¹ From one tonne of manure 50-65 m³ of biogas is produced, from plants 150-500 m³. The efficiency of biogas is 95% of natural biogas.

2.5 Hydrogen

Hydrogen production is one of the most promising energy sectors. Hydrogen is intended to replace fossil fuels in sectors that cannot be electrified and to balance RES-based energy. The EU plans to invest around €450 billion in hydrogen projects by 2050³², and global investment could reach \$2.5 trillion. Hydrogen will accelerate industrial production and economic growth in the coming decades, more than 30 countries in the world have already developed national hydrogen strategies.

The European Commission's strategy on hydrogen, which is one of the key elements of achieving carbon neutrality, places great emphasis on co-operation with the Eastern Partnership countries and Ukraine. Belarus could co-operate with the EU both in hydrogen production and in its gas pipeline transit, made possible by the development of a membrane that allows green hydrogen and natural gas to be transported through a single pipe³³.

Advantages of hydrogen production in Belarus:

1. Due to its environmental friendliness and energy intensity, it can also be used in industry, e.g. in the production of steel and glass, and as a fuel for various types of transport.
2. Will increase the energy security of Belarus, which is dependent on Russian gas.
3. Will create a new industry and an export product that is competitive in the EU and the world.
4. Will increase the profitability of chemical and metallurgical enterprises.
5. Hydrogen production by electrolysis in peak RES generation is a way of daily and seasonal balancing and energy storage.
6. Hydrogen transit could solve the issue of gas pipeline utilisation in the event of a reduction in the decline of natural gas transit.
7. Utilising the capacity of BelNPP will allow the plant to be included in the energy consumption system, as well as a more painless decommissioning of the plant in the future.

Production of the most environmentally friendly green hydrogen is very energy intensive, so it should be developed together with other RES sources and used in cogeneration complexes.

2.6 Nuclear power

The construction of a nuclear power plant in Belarus is a very ambiguous project, and there can be no simple answer to the question "What to do with BelNPP?". In order to make a decision on BelNPP it is necessary to:

1. Carry out an independent investigation of irregularities in the construction process and the current safe operation of the power plant, eliminate the observations identified during the stress tests.
2. Organise a public discussion and possibly a national referendum on the closure of BelNPP.
3. Analyse whether Belarus could receive international assistance in case of a decision to shut down BelNPP. The cost of safely shutting down the power plant could be commensurate with the cost of construction and take about 10 years.

³² A hydrogen strategy for a climate-neutral Europe. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0301>

³³ Hydrogen supply project in Germany HYPOS <https://www.hypos-eastgermany.de/>

If BelNPP is recognised as safe, it could, at least in the next 10-20 years, help the country's transition to renewables

- Reduce the amount of natural gas flared at CHP plants and reduce CO2 emissions.
- Compensate for the lack of energy from the sun and wind at night and in windless weather.
- To be used for charging electric vehicles.
- Use water from the reactor's second cooling circuit for heating and hot water supply to the nearest settlements and industry.
- To give enough energy to produce hydrogen.
- By supplying electricity to industries to reduce their carbon footprint and tax when imported into the EU.

The debate over the "environmental friendliness" of nuclear energy continues unabated in Europe. While Germany is actively closing nuclear power plants, France, Slovenia and a number of other EU countries propose to classify nuclear power as "green" energy. Nuclear power does not burn hydrocarbons with high CO2 emissions, but the issue of safe storage of spent nuclear fuel and consequences of accidents remains open.

The Fukushima and Chernobyl disasters and more than 20 other radiation accidents in 70 years³⁴, as well as the danger of man-made disasters during military conflicts and nuclear blackmail, as in the case of the Zaporizhzhya NPP in Ukraine, show the enormous potential damage. In addition, nuclear energy is one of the most expensive forms of energy, especially if we consider the cost of decommissioning plants after the end of their lifetime.

In order to build a green Belarus, we will have to gradually abandon the use of nuclear energy and solve a number of related problems.

- Even if a power market is established, such a large power producer, especially one owned by the state, will make it difficult for demonopolisation and a level playing field for all players.
- The need to pay back the \$10bn loan obtained for construction will not allow electricity prices to fall while solar and wind power become cheaper.
- Nuclear energy is not considered green energy and is seen by many EU countries as a temporary solution to move away from hydrocarbons on the way to green energy. Additional restrictions and charges may be introduced to incentivise the abandonment of nuclear power.
- Belarus will need to set a deadline for decommissioning BelNPP (decommissioning), find funds and provide a huge energy reserve for the time of the plant shutdown.
- The problem of buying nuclear fuel and storing spent waste in case of Russia's unfriendly policy is also topical.

³⁴ Major radiation accidents and disasters in the world. <https://ria.ru/20110312/347505544.html>

Examples of energy projects

"Green Schools"

Use school roofs to install solar panels. This will make it possible to utilise space in cities to generate green energy and create eco-consciousness among schoolchildren and their parents.

- A rough calculation gives the following figures: a school with 25 classrooms and a total roof area of 1600 m². allows the installation of a power plant of up to 250 kW, which would generate about 312 MW per year. The installation would require an investment of about 180,000 USD (at market prices), while the cost of energy generated per year (at state prices for public organisations) would be about 40,000 USD.
- The average annual electricity consumption of a school is 35 MW. Surplus of 277 MW. Can be used for heating, hot water supply or electricity supply to 154 flats.
- The entire education sector in Belarus consumes 460 million kWh per year, which would require the placement of solar power plants at 1,475 schools (out of 3,009). The cost of such a project would be about \$265 million, with a payback period of 5 years.
- Installing energy-saving light bulbs in the school reduces electricity consumption by 20%.
- The production of panels, batteries and inverters in Belarus will reduce the cost of the equipment, and the reduction of the cost of connection to the power grid will reduce the cost of the entire project.
- In addition to solar panels, water heaters can be installed to reduce heating costs.
- As part of the "open days" in schools, it is possible to talk about the construction of the power plant and thus popularise the installation of solar power plants among teachers and parents.

With appropriate revision of the legislation, it is possible to try to attract private investment, including parents and teachers. If a school has 550 students and 20 teachers, a one-time investment could be \$315 per person. The payback period of the project is 5 years, each "investor" can return the investment after this period. Data on energy production, consumption and sales are available in the app, the funds are managed by the PTA and spent on repairs, increased teacher salaries and other school needs.

RES polygon and the Green Way route

Make a site (or a route through a small "Green Way" area) where all the ways of green energy production are presented: industrial wind turbine (it makes sense to make a polygon where it is already installed), mobile wind turbine, solar panels, solar water heaters, biogas production, geothermal plant, hydroelectric power plant. In addition to demonstration, provide there information on energy efficiency, installation costs, tariffs, payback period, etc.

- If you involve equipment manufacturers, there will be advertising for them, and visitors will be able to immediately make an approximate calculation and contacts.

3. Industry

Once the rule of law is restored in the country and elections are held, economic development will be the main task for the new government of Belarus. Private business has every chance to grow rapidly if laws are enforced, artificial restrictions are lifted, hidden taxes and fees are removed, and access to affordable credit is provided. Unprofitable, inefficient, corrupt, subsidised and unecological industrial enterprises seem to be one of the main problems.

Belarus has no other option but to transform the existing industrial production on the principles of environmental friendliness, innovation and energy efficiency. Most large state-owned enterprises are unprofitable, use outdated approaches and equipment, employ excessive staff and produce products that the EU and other Western countries plan to completely abandon or significantly restrict imports by 2030: energy-intensive machine building, transport with internal combustion engines, chemical fertilisers, oil refinery products, goods made of non-recyclable materials, etc.

Any plan for the recovery of Belarusian industry must take into account

- Introduction of a cross-border carbon mechanism in 2023-2026, which will affect the price of certain categories of goods exported to the EU.
- Protecting the EU market from non-environmental goods: imported products should be reusable, repairable and recyclable, products and packaging should contain recycled materials.
- The global trend towards environmental friendliness - most of the industrial goods of Belarus will not be in demand in Europe and other Western countries in the next 20-30 years.
- ESG summons³⁵. ESG ratings are important for export-oriented companies and their raw material suppliers because of the need to report on their carbon footprint in many countries, and as a prerequisite for entering stock markets and access to finance. Investments in companies with high ESG ratings have increased by 23% in the last 2 years by refusing to finance companies without ESG ratings³⁶.

To invest in Belarusian industry without transforming it on the principles of environmental friendliness, circularity, innovativeness and energy efficiency is to throw money into the landfill, literally and figuratively.

Europe is dependent on imports in a number of critical sectors necessary for industrial development and economic security. Dependence on China is of particular concern, so the EU aims at creating its own production and co-operation with reliable partners. For Belarusian business, this is an opportunity to develop research and innovation, create its own production, stimulate economic growth, and conquer the EU market.

Belarus has the potential to move towards more environmentally friendly production: the use of gas instead of coal in production, a modern oil refinery complex and pipelines, a chemical industry, skilled workers and engineers, and a developed IT industry.

³⁵ See pg. 34

³⁶ [A. Pilipchuk. Sustainable development: trends and factors](#)

Belarusian experts have launched the initiative "Cleaner and Energy Efficient Production"³⁷, in the framework of which they advise enterprises on opportunities to save resources and use secondary raw materials. There are already dozens of successful examples, and the initiative plans to open representative offices in all regional and large industrial centres.

Belarus has adopted an action plan to improve energy efficiency in industry and is implementing an initiative to create eco-industrial clusters in Minsk and Mogilev. However, as in many other sectors, there is a lack of strategic documents and programmes for industrial policy.

Industrial strategy for Belarus

The industrial strategy should be developed with the involvement of economists, ecologists, technologists and foreign experts and become a comprehensive solution for the creation of green production in Belarus.

1. Changes in the form of ownership and management of state-owned enterprises

As of 2021, fully or partially state-owned enterprises account for 43% of employment in Belarus and 69% of the country's industrial production. The plan to privatise state-owned enterprises in Belarus will include various options: retaining state management or selling them, attracting domestic or foreign investment, modernisation or bankruptcy. The transition of enterprises to "green growth" and attraction of investments is impossible without private ownership, fair competition, eradication of corruption and ineffective management covered by state subsidies.

2. Individual plan for Top 100 companies

The largest and strategically important for the Belarusian economy enterprises should be audited in order to draw up a plan including:

- optimisation of lighting, water supply, energy consumption, recycling of waste and secondary resources;
- implementation of circular business models;
- opportunities for industrial symbiosis with other industrial enterprises;
- introduction of chemical gasification and biogas production technologies for heat and electricity generation;
- accounting of pollutant emissions and waste production;
- improving the environmental friendliness of the enterprise: use of RES, installation of solar panels and water heating systems, use of green roofs and facades, creation of green areas on the territory, use of railway and electric transport for passenger and cargo transportation.

The implementation of such a plan will make it possible to reduce expenditures on raw materials and resources and make Belarusian products more competitive on Western markets.

3. Creation of eco-industrial parks and clusters

An eco-industrial park consists of several enterprises that use shared infrastructure, associated resources, and incorporate industrial waste into production.

³⁷ Centre for Resource Efficient and Cleaner Production in the Republic of Belarus
<http://recp.by/?fbclid=IwAR0MkaL7GpIn4EMkDK08oL8rDPU5ybCbaKgdoxXgLdNOI7boviHpCNJ3i0>

Example of eco-park infrastructure: waste from one company is a raw material for another; heat from production heats buildings; common water and air purification system, rainwater harvesting; green energy generation from roof panels or wind turbines; biogas production from sewage sludge and organic waste; rental of unused space; shared transport for employees; shared contracts for delivery, computer services and internet; sharing of electric cars, bicycles, scooters, station wagons, and other equipment; and the use of electric cars, bicycles and scooters.

The first step in establishing an eco-industrial park is to analyse the resources:

- unused secondary resources - heat, industrial waste, water;
- opportunities for the production of related goods, services or works;
- vacant or not 100% utilised premises or facilities;
- non-production infrastructure - logistics, electricity, water and air treatment, waste disposal, employee services.

Detailed record keeping and open data will enable the most successful finding of co-operative and cost saving opportunities.

Eco-industrial parks can be created both on the basis of existing industrial enterprises and new ones based on innovative green technologies. To maximise synergies, a comprehensive cluster plan and investment policy should be developed to interest global industrial leaders to open branches in Belarus.

3. Use of circular processes in industry

According to the survey of Belarusian businesses conducted by BEROCC³⁸ in 2021, the main reasons for the weak development of circular processes in production are the lack of information and the absence of stable sources of supply of secondary raw materials. At the same time, about 40% of surveyed entrepreneurs see potential in the development of circular economy in Belarus and are interested in waste reduction and greater involvement of waste in their production.

For circular utilisation of resources by Belarusian industry it is necessary:

- Create a **Secondary Raw Materials Exchange** for free access to resources, integrate it into the European system;
- Inform entrepreneurs about circular business models - product as a service, circular supply, resource recovery, product lifecycle extension;
- Support the creation of industries for recycling of secondary resources: improvement of material quality, functional recovery of qualities and materials.

5. New industrial sectors

Own production and development of green industries will create new jobs, reduce transport costs and import duties, and lower the overall costs of the green transition.

- **Biogas production.** There is enough agricultural and wood waste in the country to operate biogas plants. Separate collection of organic waste by the population is also necessary.
- **Biofuel production.** Refineries like Naftan could switch to producing more environmentally friendly biofuels from heavy crude oil using bacteria, fungi, etc.

³⁸ Circular Economy Development Potential in Belarus: Results of Enterprise Surveys
<https://beroc.org/upload/iblock/c40/c4001cfb3f44988ebb5db88ed63399a5.pdf>

- **Production and utilisation of hydrogen, synthesis gas and methanol** at large industrial plants, e.g. GrodnoAzot. The introduction of new lines for chemical gasification of production can pay off in 7-8 years.
- Using Belarusian enterprises as a testing ground for the implementation of **Industry 4.0**. For example, the creation of "digital twins" of plants like MAZ for Scania or MAN, which will allow to keep jobs for skilled workers, train specialists, and use the IT industry.
- **Bioplastic production**. The niche of bioplastic production is not yet occupied: there are technologies for the production of degradable plastic, which are comparable in price to conventional plastic, but there is also quite a strong lobby for traditional production. If there is political will for such production in Belarus, bioplastics could become a breakthrough technology for our country.
- **Development of own production** for green energy: solar panels and water heaters, wind generators, batteries, inverters, equipment for biogas and small hydropower. This will create new jobs and reduce the cost of green energy in Belarus. It is envisaged both to develop own technologies and to build factories of world leaders.
- **Production of electric transport**. Creation of investment attractiveness for world leaders like Tesla and VW, creation of a line of electric vehicles at the Geely plant, development and production of urban transport, municipal and agricultural machinery powered by electricity and hydrogen on the basis of MAZ, MTZ, etc. The creation of mini-tractors with a wide range of attachments will stimulate the development of farming, the introduction of "green" transport in cities - the creation of pedestrian zones and the development of tourism.

6. Diversification of energy sources

Belarusian industry is dependent on imported gas, which is used to produce heat and electricity, in high-temperature technological processes, and as a raw material in the production of, for example, nitrogen fertilisers. Gas is considered more environmentally friendly than coal, but it is still not a green energy source and creates a strong dependence on Russia. Opportunities for replacing natural gas:

- Own generation or purchase of electricity from renewable energy sources, water heating and heating with solar collectors.
- Biogas production by anaerobic digestion of organic waste. Biogas can be used to produce heat and electricity for own consumption, replace gas in technological processes and in transport.
- Hydrogen production by electrolysis. The process can be fuelled by nuclear power or renewable energy sources. Due to its high energy content, hydrogen can be efficiently used in high-temperature processes.
- Fuel briquettes made of low-grade wood or waste from the wood processing industry and agriculture - sawdust, branches, wood chips, straw, etc.
- Chemical gasification of non-recyclable waste to produce methanol and hydrogen for industrial needs.
- Waste incineration in high-tech incineration plants. A modern WTE plant with a 6-stage purification system will produce electricity and heat from non-recyclable solid municipal waste, separate metals, ceramics, glass for reuse, incinerate and filter all toxic and hazardous substances, emitting only water vapour and CO₂ into the atmosphere.

The production of RDF-fuels by waste treatment plants for combustion by industrial enterprises, e.g. cement plants, is not considered environmentally friendly due to insufficient purification of combustion products and a large amount of toxic waste.

The production of biofuels from valuable wood species or specially planted crops cannot be considered environmentally friendly either, because of the high pressure on nature and threat to biodiversity.

Investments in energy efficiency and green energy pay for themselves in 5-7 years and help to save significantly on energy costs in the long term.

7. Environmental social and corporate governance (ESG)

In addition to financial reporting, more and more companies, including those in Belarus, are creating and making available environmental and social reporting. Company reports are used to compile special ESG ratings and are taken into account when making decisions on investments or allocating green finance.

The reports specify indicators for a set of parameters:

- environmental: impact on climate change, CO2 emissions, waste generation, utilisation of secondary resources, importance for forest and biodiversity conservation;
- social: working conditions, health and safety, gender composition, use of local resources and staff, impact on local communities.
- management: gender balance of employees and top management, non-discrimination in positions and salaries on national, gender and other grounds, level of corruption, tax strategy.

A high environmental, social and management rating increases the sustainability of the company, increases its investment attractiveness, and is a pass to "green" stock exchanges. In 2023, the European Commission's Directive³⁹ obliged about 50,000 large and medium-sized European companies to provide non-financial environmental and social impact reports.

ESG reporting should become mandatory for state-owned enterprises and large businesses in Belarus, and should be encouraged as much as possible for medium and small businesses.

ESG ratings encourage companies to adopt modern technologies and innovations, conserve and reuse resources (water, heat, electricity, cold, waste), improve competitiveness by reducing carbon footprint, and save money.

8. Transboundary carbon mechanism

The introduction of the Transboundary Carbon Management Mechanism (TCM) will affect the most carbon-intensive industries: cement, steel, aluminium, nitrogen fertilisers and electricity. For the products of these industries, it is necessary to develop a strategy for accounting and reducing carbon footprints, as well as their own quota trading system. This will make it possible to reduce import levies and keep these funds in the budget of Belarus after the carbon regulation mechanism comes into effect in 2026.

9. Investment policy

Establishing a green industry requires large investments in research, staff training, equipment procurement, and technology implementation.

- Public Sector. An important step should be to stop public investment in inefficient and unsustainable production and redirect funds to innovative and sustainable technologies. Public procurement should encourage local and sustainable production.

³⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L2464>

- Private business. An **effective system of green finance** should be an incentive for private business. A system of recommendations and standards should be developed for banks and financial organisations to invest in sustainable projects.
- Foreign investment. For international financial institutions and foreign investors it is necessary to create a brand of green Belarus, including political support and tax incentives for green innovations. The investment plan should include the creation of eco-industrial clusters, a proposal for privatisation of enterprises, and targeted invitations to leaders in various sectors of the green economy.

It is necessary to use the recommendations of international organisations, such as the World Bank, to develop a green economy in Belarus, to resume participation in educational, scientific and technical cooperation programmes.

Examples of projects in industry

"Craft Centre"

The building of an unprofitable state enterprise in the city centre, such as a bicycle factory, can be converted into a crafts centre. Work areas, studios, a product shop, an exhibition centre, co-working and networking spaces are created in the building. The production areas are equipped with equipment for different types of activities:

- Woodworking
- Metalworking
- Sewing workshops
- Ceramic workshop
- Electrical repair shop
- Art workshops
- 3D Printing Centre
- Utilisation of recycled materials

The crafts centre can host workshops, exhibitions, and educational events for children and adults. The use of production areas will be provided by membership cards, the rent of individual workshops - on a competitive basis.

Such a centre will make it possible to create places of work or additional income, to develop traditional Belarusian crafts, to give an impetus to the development of fashion and art.

Industry 4.0 Implementation Cluster

Belarus could become a site for pilot implementation of Industry 4.0 to create smart factories and test new production methods.

Industry 4.0 is a new industrial revolution, primarily based on the full connection of all means of production (both machines and people) to the Web, a new level of interaction between workers and machines, and thus achieving rapid productivity growth and competitiveness.

The world is in the midst of the Fourth Industrial Revolution. According to McKensey, Industry 4.0 will have a potential of \$3.7 trillion by 2025, with only about 30% of manufacturers still participating in the process. Most are stuck in the "pilot project" stage due to the complexity of implementation - projects with full-scale implementation are complicated by the inability to completely shut down production for a rapid, iterative approach of plant redesign and staff training.

Belarusian enterprises at the hardware level do not differ much from Western enterprises, but they operate at a loss. When a specialised cluster is created, they can become a "digital twin" of a similar enterprise in the West, with staff remaining at the enterprise for testing and implementation.

Thus, the Belarusian economy will reduce subsidies to the unprofitable sector, preserve employment and radically increase labour productivity. In addition, we will get a modern production base and successful international partners.

The EU is now actively trying to accelerate the digitalisation of industries, and a platform to accelerate this process could be of great interest to them as part of a Marshall Plan or even a separate investment programme.

4. Circular economy

The circular economy is an economic model based on circular use of resources and minimising waste through eco-design, innovation, maximising the use of industrial by-products and secondary resources.

Resource efficiency is one of the most important conditions for the transition to a green economy. More than 90 countries are already implementing elements of the circular economy in the main areas: waste reduction (Reduce), reuse (Reuse), recycling (Recycle). In the European Union in 2020 the Action Plan on Circular Economy was approved⁴⁰, international standards for certification and financing of circular economy models are being developed. In addition to the obvious environmental benefits, circularity also brings economic benefits by saving resources: the net benefit for Europe is estimated at €1.8 billion by 2030, savings for EU businesses at €600 billion, a 0.5-1% increase in GDP, and the creation of about 700,000 new jobs.

Belarusian industry is one of the most resource-intensive in Europe and is dependent on imports of foreign parts, energy and raw materials. Materials and raw materials in manufacturing firms account for about 40% of costs and 31% of total fuel consumption. Circular processes make it possible to significantly reduce these figures by minimising waste generation, using secondary raw materials, water and heat in the company, and industrial symbiosis. Modern digital technologies - virtualisation, Internet of Things, big data, blockchain - contribute to the dematerialisation of the economy and reduce dependence on raw material supplies.

Belarus needs an ambitious strategy to reduce waste generation and recycling of secondary resources. Following the example of the EU's New Action Plan for the Circular Economy, the plan for Belarus should be comprehensive and make resource saving beneficial for producers, form new consumption patterns, and use the resources of research, innovation and digitalisation.

An example of synergies in the circular economy

Waste management system

- solves the landfill issue
- produces biofuels, electricity and heat energy
- saves raw materials in industrial production
- increases the profitability of agriculture
- reduces harmful CO₂ and methane emissions
- prevents pollution of land, water and air
- preserves biodiversity and promotes ecotourism



⁴⁰ [Circular Economy Action Plan](#)

4.1 Circular Economy Business Models

Different circular business models can be effectively applied in Belarus.

1. Circular supplies

This model can be applied by Belarusian producers of high-tech goods - cars, agricultural machinery, household appliances. Broken or obsolete goods are bought back by the manufacturer, and 80-90% of suitable units, parts, and materials are reused. Such a model has been implemented by Renault and Apple Renew.

2. Resources recovery

This model can be used in the textile, food and other industries where production involves a large amount of waste. Substandard or unsold bakery products become raw materials for beer production, forestry waste is used for building blocks, clothes and furniture are reused after repair thanks to a network of retail outlets or become materials for new production. This business model has been implemented by IKEA, ZARA, H&M.

3. Sharing platforms

This model is applicable for goods that are actively used for a small part of their service time - transport, construction equipment, washing machine, holiday homes.

For Belarus, this model will improve the quality of life of Belarusians who cannot afford expensive purchases. Laundromats in apartment buildings, sharing electric scooters, bicycles and cars, exchanging travel equipment, renting agricultural and construction equipment, and exchanging houses are becoming the norm and can increase the time of use of goods up to 8 times, reducing irrational production. Airbnb and Bird have not only become market leaders, but have also changed consumer habits.

4. Product life extension

This model can be applied to most industries and involves the introduction of ecodesign and services to extend the life of goods or parts of goods. 80% of a product's impact on nature is built into the product design process, and ecodesign enables the creation of resource-efficient and durable products that can be repaired, reconstructed, modernised or refurbished. Manufacturers or service centres can collect used household appliances, cars, smartphones, computers, equipment and gear and then repair, upgrade, upgrade software and sell them with a warranty.

There are still repair shops in Belarus, and centres for fixing bicycles, computers and mobile phones are popular. Just as Patagonia gives a lifetime warranty on its outerwear, and Tesla increases battery mileage by updating software, so Belarusian factories Gefest, Minsk, Horizont can introduce circular processes.

5. Product as a service

This model proposes that instead of selling high-tech goods, manufacturers provide them for use under a rental or leasing agreement, carrying out maintenance and repairs during or after the end of the period of use. Long-term car leasing, residential complexes for rental, IT solutions for subscription-based companies, integrated energy generation services, rechargeable batteries. Siemens offers a lighting service for buildings instead of lighting fixtures, A1 provides telephones with a leasing package.

The circular economy is concerned with preserving the biodiversity of our planet by reducing pollution from rubbish and toxic substances, saving resources - water, forests, minerals - through their reuse, and restoring ecosystems through economic activity. Natura, one of the top five cosmetics manufacturers, is implementing the concept of the "standing forest" economy, which has saved 2 million hectares of Amazonian forests.

This approach can be successfully applied to Belarusian forests and forests: observation of animals, birds and insects, eco-camping and tree houses, use of medicinal plants in pharmaceuticals and cosmetology, cultivation of mushrooms and berries, scientific research, restoration of populations of rare species for the whole Europe, adaptation to climate change can bring much more profit than selling timber.

Implementing a circular economy requires investment, training, changing laws and introducing new technologies.

The transition to a circular economy is incentivised by a mix of restrictive measures and encouragement to move towards greener business practices:

- Increase of fees for landfill disposal, gradual ban on landfilling of different types of waste: plastic, organic waste, glass, paper, wood with the aim to reduce landfilling to 1-2% by 2050;
- extraction tax and quotas on import of raw materials, introduction of mandatory share of secondary waste in products and packaging, packaging deposit;
- tax incentives and deductions for implementing circular processes;
- green lending and leasing, green procurement system in the public sector;
- government support to minimise the burden on people and businesses.
- programme to support innovative initiatives: industrial clusters, science parks, technology transfer offices, incubators and accelerators;
- Establishment of a national Recycling Exchange and participation in European and international exchanges;
- support for the creation of eco-industrial parks.

The reform of local self-government and the granting of broad powers to municipalities will allow them to choose the optimal waste management strategy, establish co-operation with local businesses, and encourage citizens to consume and manage their rubbish rationally through tariff policies and public companies.

4.2 Circular production

For Belarusian business the circular use of resources is an opportunity to save up to 40% of the cost of production on raw materials, to develop research and innovations, to create own production, to stimulate economic growth and to win the market of the EU and other developed countries.

According to a survey conducted by BEROC⁴¹, 84.9% of exporting companies and 71.7% of domestic-oriented companies indicated that there are barriers that hinder the implementation of the circular economy. The most significant barriers are lack of financial resources (confirmed by 62.5% of exporter respondents and 78.6% of non-exporter respondents), lack of necessary technologies (60.5% and 63.1% of respondents, respectively) and lack of information and success stories of circular economy approaches (51.8% of exporters and 53.7% of non-exporters).

⁴¹ N. Batova, I. Tochitskaya, E. Shershunovich. [Circular transformation of enterprises Belarusian](#)

Industries with the greatest potential for circularity

- 1. Electronics, mobile and computer equipment.** The design and manufacturing process allows for the repair, modernisation, battery replacement and reuse of goods, eliminating 'programmed ageing' to ensure that citizens have the right to repair.

Centres for collection, repair and sale of used equipment will help to provide citizens with low-cost and high-quality equipment, reducing the consumption of resources for production, delivery and disposal.
- 2. Packaging.** Development and production of environmentally friendly packaging of different types: one-piece, reusable, recyclable, bio-based and biodegradable.
- 3. Electric vehicles and batteries.** The eco-friendliness of battery production and disposal has been the subject of much debate among environmentalists and electric vehicle sceptics for many years. Battery services perform capacity restoration and software upgrades to improve energy efficiency. Disassembly services recover valuable and rare materials for reuse to prevent toxic substances from entering the environment and reduce the cost of manufacturing new batteries.
- 4. Textiles.** Ecodesign and eco-standards in the Belarusian textile industry will allow to reduce the use of toxic dyes, use monofabrics that are easier to process and traditional for Belarus linen, cotton, wool, create basic models that are not subject to fashionable obsolescence. Second hand shops, including online shops accepting second hand clothes for sale, will allow to import less clothes from abroad. The reuse and recycling of fabrics will reduce the use of resources, as textiles are currently the fourth largest source of raw materials and water, and the fifth largest emitter of CO₂ in the world.
- 5. Construction materials.** The construction sector consumes about half of all extracted materials and generates about 35% of all waste in Europe⁴². Improving the longevity of buildings and their energy efficiency could remedy the situation. Construction waste recycling companies can collect and shred construction waste for reuse in building materials. The production of modern thermal insulation materials and integrated construction solutions will create a market for eco-materials in Belarus and reduce the costs of construction and maintenance of buildings.
- 6. Food and water.** The production symbiosis will allow the use of food waste for the production of products, such as animal feed and alcoholic beverages, or energy - bioethanol, biogas. The rainwater harvesting system and efficient treatment system will allow its reuse in agriculture and industrial processes.

⁴² Hertwich, E., Lifset, R., Pauliuk, S., Heeren, N., IRP, (2020), Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future.

4.3 Waste Management

The green economy is based on the principle of rational use of resources and an important role is played by reducing waste production and maximising the recycling of waste. Waste management not only solves the problem of landfills, but also becomes an economic engine, saving raw materials and energy, creating new jobs and industries, reclaiming land and restoring biodiversity. The development of a zero-waste economy has created around 4 million new jobs in the EU between 2012 and 2018⁴³.

Belarus is implementing the "National Strategy on Solid Municipal Waste and Secondary Material Resources Management" and the "Concept of Establishment of Facilities for Sorting and Utilisation of TKO and Landfills for their Disposal", according to which it is planned to increase the share of waste utilisation to 35% in 5 years and to reduce the amount of plastic production.

A system of separate collection, sorting and reuse of waste is being created in Belarus: containers for separate waste collection are being installed, 7 waste processing plants, 80 solid waste sorting lines and about 2,000 waste reuse enterprises are operating. Nevertheless, 78% of all municipal waste is disposed to landfills, of which there are 160 as of 2021. In comparison, the EU average is about 22% of waste goes to landfills, while in some countries it is only 1%.

Since 2015, a public movement "Goal 99" has been operating in Belarus, popularising separate waste collection and the elimination of landfills. According to the Institute of Sociology of the National Academy of Sciences, "80% of the country's population consider the problem of waste collection and recycling to be topical", and half of the country's residents already sort waste.

In total, the country produced and utilised in 2021:

- 3.95 million tonnes of solid municipal waste, 30% used
- 62.25 million tonnes of industrial waste, 29% used (80% excl. large tonnage waste)
- 89 million tonnes of organic waste, 2% used

Modern technology can utilise up to 99% of all waste, turning a problem into a solution.

Waste Management Strategy

The strategy for Belarus should use an integrated approach, making waste reduction, separate collection and recycling convenient and profitable for citizens and businesses.

1. Tariff policy.

Increasing tariffs for rubbish disposal, especially for unsorted rubbish, should incentivise the reduction of rubbish production and its separate collection. Landfill fees should include environmental damage and greenhouse gas emissions, as well as the cost of future landfill disposal.

2. Ban on landfilling of different types of waste.

Following Sweden's experience, Belarus should gradually introduce bans on landfilling not only toxic waste, but also organics, paper, metal, wood, glass, and plastic to encourage recycling. Non-recyclable rubbish can be used to produce heat and energy.

⁴³ https://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=cei_cie010&language=en

3. Reducing the production of rubbish.

Belarus is already implementing a programme to reduce the use of plastic and disposable tableware in catering outlets, and bioplastic packaging is being used. To continue this strategy, it is necessary to make refuse simple and favourable for consumers: limit the use of excess packaging, create alternatives from organic, paper and reusable packaging, and introduce a ban on multi-component packaging, which is difficult to separate and recycle.

Making tap water drinkable throughout the country will reduce the consumption of bottled water in households, office buildings and catering establishments, and hence the number of plastic bottles.

Digitalisation of utility payments, introduction of electronic document management in government agencies, pharmacies, hospitals, schools, banks, insurance companies will reduce the amount of paper. The use of modern integrated construction solutions will reduce construction debris.

4. Development of the system of separate waste collection.

Equipping public places and residential yards with a sufficient number of bins for separate waste collection will make this process more convenient and habitual for the majority of Belarusians. There is a need for a unified sorting system, with uniform designations and colours of containers for paper, glass, organic waste, packaging, and mixed waste. The schedule of removal of each type of rubbish should be separate and stimulate less waste generation. Municipal transport should be converted to biogas and electricity, the routes of rubbish trucks should be optimised to reduce the number of vehicles, time and fuel consumption.

Sorting should be taught from kindergarten and school, and from children to stimulate parents and the older generation. Refusing rubbish chutes and planning the yard with space for bins in mind have already shown their effectiveness in Belarus.

5. Hazardous waste collection.

Separate containers should be installed for hazardous substances such as batteries, light bulbs, cartridges in shops, kindergartens and schools, public institutions, for medicines - in pharmacies and hospitals.

6. Reuse Centres.

Broken appliances, furniture, construction waste should be taken to a collection centre. Anything that can be repaired can be sold in shops near the collection centres or sent to the city's secondhand shops. Special bins for shoes, clothes and children's toys will make it easier to collect and reuse usable items. Household appliances can be returned to the shop in exchange for a voucher or discount coupon. Furniture, carpets, home textiles, bicycles, prams, car seats and other household items can also be refurbished and put up for re-sale.

7. Recycling of municipal waste.

Separate collection is a prerequisite for recycling and reuse of waste, it is especially important to separate hazardous substances and organics. Recycling creates 25-60 jobs per 10,000 tonnes of waste, while sorting and incineration create 10 and 5 jobs respectively. Technologies and business ideas for reusing different types of waste are described below.

8. Recycling of production waste.

According to the Ministry of Natural Resources and Environment, production waste generation averages about 60 million tonnes, which is almost 20 times more than municipal waste. Large-tonnage waste from potash fertiliser and phosphogypsum production accounts for about 65% and more than 95% of the total accumulation⁴⁴. About 90% of wastepaper, glass, plastic and worn tyres are reused in production.

⁴⁴ <https://minpriroda.gov.by/ru/news-ru/view/minprirody-sistema-obraschenija-s-otxodami-v-belarusi-postojanno-sovershenstvuetsja-4509/>

Despite the high percentage, it is necessary to develop a strategy for the utilisation of industrial waste and to bring the standards of classification and management of toxic waste in line with international norms.

9. Elimination of landfills.

To solve the problem of landfills in Belarus, a set of legislative and technological measures is needed. An eco-tax on landfilling with a gradual increase in the rate, and a ban on dumping unsorted rubbish will allow to pursue a long-term policy and achieve the ambitious goal of reducing landfilled waste to 10% by 2050. It is necessary to eliminate all mini landfills and equip regional landfills with sorting lines and introduce a system of methane collection and utilisation.

10. Moratorium on the use of non-ecological technologies.

Belarus is trying to develop the technology of RDF-fuel production despite the criticism of eco-activists. RDF-fuel is produced from waste, from which recyclable plastic, paper, glass, and organics are selected. After being shredded and pressed into blocks, the fuel is sent to factories such as cement plants. The problem of the technology is that toxic wastes such as mercury can get into the waste, and an inadequate system does not prevent air and water pollution from the emission and subsequent disposal of large amounts of toxic ash.

The government's proposed incinerator projects are based on outdated and energy inefficient technology for generating electricity without using hot steam for heating and water heating, which reduces the possible efficiency by many times. There are already existing technologies, such as WTE (waste to energy), which use hot steam not only for electricity generation but also for heating and hot water supply, and are equipped with an efficient multi-stage air and water purification system.

4.4 Ways of waste recycling

Organic waste. Food waste accounts for 44% of all municipal waste⁴⁵, which nowadays is almost not recycled and goes to landfills, where the rotting process produces methane, several times more dangerous greenhouse gas than CO₂. Foodstuffs, plants, sewage sludge are raw materials for the production of biogas and bioethanol, which are used to produce heat and electricity and to fuel transport. Organic waste residues are used as fertiliser as they contain a lot of nitrogen and nutrients. In Stockholm, all public transport runs on biogas produced from organic waste.

Wood. About 90 thousand tonnes of wood waste ends up in landfills every year. This valuable resource can be used as raw material for arbolite blocks, insulation and building materials, fuel briquettes, furniture filler, biogas, heat and electricity production. In the logging and woodworking industries, where sawdust and trimmings are often simply burnt, the installation of pellet and fuel briquette production lines will generate additional profits and reduce waste.

Paper. About 80% of paper is collected and recycled in Belarus. The strategy should be based on reducing its use and increasing the amount of recycled paper. Ikea uses recycled cardboard to fill furniture panels instead of using wood.

Metals. The recycling system was inherited by Belarus from the Soviet times and has successfully proved itself. Separate collection of aluminium and metal packaging will allow for more successful recycling. At collection and recycling centres, metals, including non-ferrous metals, can be recovered from household appliances and vehicles. The Odda incineration plant in Norway allows metals to be recovered from the incineration of mixed

⁴⁵ Hereinafter in the section https://bmpz.by/wp-content/uploads/2022/09/%D0%A0%D0%A1%D0%9E%D0%9E_%D0%91%D1%80%D0%B5%D1%81%D1%82_2020-%D0%BD%D0%B0-%D1%81%D0%B0%D0%B9%D1%82.pdf

municipal waste.

Plastics. Plastics account for about 6.5% of all solid municipal waste, about 20% is recycled. All types of plastic recycling can be applied in Belarus:

- mechanical, whereby the plastic is cleaned, shredded and used as recyclable material;
- Chemical, in which new materials are formed using various technologies;
- thermal, during which gaseous and liquid fuels, heat and electricity are produced from unrecyclable plastic at high temperatures, and the remaining ash is used in construction.
- gasification can be applied at Belarusan enterprises, supplementing existing production facilities with purification lines and systems.

Recyclable plastic is now used in absolutely different industries: synthetic fabrics and yarns, home and outdoor furniture, road surfaces and roof tiles, stationery and reusable packaging. For Belarus, this is an opportunity to create new production and jobs, including in the regions. In Germany, automatic machines for accepting plastic bottles bring the company-owner 1,000 euros of profit per tonne.

Glass. In Belarus, the share of glass in municipal waste is 5.6%, and despite a system of glass collection from both citizens and businesses, about 20% is not reused. Glass collected in containers is recycled to create new products, which requires virgin materials, chemicals and energy for high-temperature processes. Incentivising the handing in of whole bottles and reusing them without recycling can help reduce resource use. One of the effective mechanisms is the deposit value of the bottle and the acceptance of containers in shops. In Slovakia, the deposit system applies to both glass and plastic bottles, and special labelling is used.

Textiles. Every year in Belarus about 65 thousand tonnes of textiles are thrown into landfills, being at the same time a source of microplastic pollution of soil and water. Ecodesign in the fashion industry and circular business models can significantly reduce textile consumption, and legislative regulations can limit textiles from entering landfills. A set of measures for textile reuse can be introduced in Belarus:

- Collection for resale. Collection containers for clothes, shoes, home textiles collect clean and dry items which are then resold in second hand shops or donated to charity.
- The products can be cut into pieces and used for sewing new clothes, cleaning products, padding.
- Creation of new materials. After sorting by composition and colour, the textiles are milled for the production of new yarns and fabrics, or used for the production of pellets and fillers.
- Worn or dirty rags that are not recyclable can be thermally treated to produce heat and electricity.

Containers for collecting used clothes, such as Humana, can be found on the streets of almost all European cities, and Stella McCartney, Giorgio Armani, Donna Karan, Levi's, Timberland, Nike, H&M use recovered fabrics in their collections.

Waste oils. Oil and fats must not be discharged into the sewer system to avoid clogging of pipes, to facilitate wastewater treatment and to prevent carcinogens from entering water and soil. There are special containers for the collection of waste oils, which should be available to citizens in cities and waste collection points. The oils and fats are used to produce biodiesel, which can be blended with conventional diesel and used in all types of transport. The Oil Press Machine technology purifies edible oils with water, salt, soda and bleached clay, offering a service to restaurants and snack bars to recover oil for frying and frying.

Construction waste. Modern building materials offer a complete solution for construction - building blocks, insulation, floor and roof slabs, which reduces waste and lowers production costs. Scraps and construction waste are reused in the production of foam concrete and arbolite blocks. Shredded construction waste, earth, straw, sawdust and other wastes are added to adobe bricks and mortar for 3D construction printers. The production of innovative eco-materials GaBlok, Ytong, IsoSpan, JustBiofiber, Fibran, Knauf in Belarus will allow building modern energy-efficient houses, reducing construction waste and utilising secondary waste.

The Government of Belarus and local authorities should support the start-up of new recycling and reuse businesses, create infrastructure for collection and conduct information activities - media campaigns, business forums, specialised exhibitions and seminars - to promote circular business models in all regions of the country.

Examples of projects in waste management

Drinking tap water

Bottled water and beverages are one of the main sources of plastic waste. Raising the standard of tap water purification, creating a network of drinking fountains in cities, and introducing the rule of free tap water in cafes and restaurants will significantly reduce plastic waste. An information campaign about drinking water instead of sweet bottled drinks and using reusable water bottles will also promote healthy lifestyles and reduce the risk of obesity and disease.

Promoting breastfeeding

Strange as it may seem, even the issue of breastfeeding or artificial feeding can be considered in terms of its environmental impact. An information campaign on the benefits of breastfeeding will help:

- **To preserve the health of mother and baby.** Breast milk is an optimal nutrition containing all the necessary ingredients, which is impossible to achieve with artificial formula. Breastfeeding reduces the risk of breast cancer in mothers and allergies in children, strengthens the psychological bond between mother and child, and preserves time and healthy sleep. In the long term, it will reduce the burden on the medical system.
- **Care about the environment.** The production of infant formula uses chemically processed milk, artificial vitamins and nutrients, preservatives, packaging, and the production and delivery of raw materials, electricity, and fuel. The finished mixture is packaged, stored, transported and delivered to retailers, at all stages requiring energy, man-hours and fuel. For preparation and feeding, bottles, warmers, sterilisers, special detergents are used, the production and transport of which also accumulate an impressive carbon footprint. Artificial vitamins and nutrients are less absorbed than natural ones, contaminate water and soil, and packaging and related feeding products are discarded and end up in landfills.
- **Save money.** If you calculate how much is spent on formula, bottles and heating milk for 6-12 months of a child's life, you will get an impressive sum. The popularisation of breastfeeding will save money in the country's economy, because most baby food brands and related products are imported.

Promoting breastfeeding in Belarus is a sustainable solution that takes care of people, the economy and the environment.

5. Sustainable mobility

Transport is one of the main sources of harmful emissions: about 12% of all CO₂ emissions and 64.5% of all pollutants in the world. It is one of the areas most difficult to transform due to the lack of technology, the need for huge investments and changes in the daily behaviour of the majority of the world's population.

The EU has set a target of reducing transport emissions by 90% by 2050 by launching a green and digital transformation of the transport system. Under the Sustainable and Smart Mobility Strategy, the EU will reduce fossil fuel consumption, phase out the sale of internal combustion engine vehicles by 2035, adopt new sustainability standards, create a carbon metering system and introduce additional charges based on the polluter pays principle.

The European mobility policy poses threats to Belarus as an exporter of oil products, tractors and buses, and an organiser of freight transport. However, it is also an opportunity for the development and production of green transport, IT solutions for smart transport and digitalisation of logistics systems, and the inclusion of Belarus in the European transport system.

Belarus is pursuing a policy to create sustainable mobility: incentives for the purchase of electric vehicles are being created, a network of public charging stations is being developed, an electric transport day is being held, bicycle lanes are being created, the fleet of electric vehicles is being expanded, and projects are being implemented as part of international cooperation. The effectiveness of this policy is evidenced by the figures: as of June 2022, the number of electric cars in Belarus reached 10 thousand, 360 charging stations have been installed, and more than 100 electric buses run in cities⁴⁶. With a total of 3.6 million cars registered in Belarus, electric cars account for only 0.3%. For comparison, in Poland the number of electric cars in 2022 is 62 thousand, the number of public charging stations is 5 thousand, in Lithuania there are about 9 thousand electric cars and 600 charging stations.

The development of electric transport and sustainable mobility is hampered by a number of reasons:

1. No ambitious plans to move away from fossil-fuelled transport.
2. Lack of strategic planning for transport and urban environment.
3. High import duties. Even with zero VAT on new electric cars, the final cost of the car is one third higher than in the EU countries. The cancellation of VAT on electric cars not older than 5 years is valid until 2025.
4. Lack of authority and ability to manage the budget of the city and municipal authorities.
5. Weak development of the network of charging stations.
6. Lack of a system of accounting and payment for CO₂ emissions.
7. Inadequate regulation of CO₂ and pollutant emissions in transport.

⁴⁶ Belta. The number of electric cars in Belarus reached 10 thousand <https://www.belta.by/society/view/chislo-elektromobilej-v-belarusi-dostiglo-10-tys-508473-2022/>

5.1 Sustainable mobility

Sustainable mobility is an integrated approach that includes not only the production of sustainable transport, but also a changing approach to the development of transport infrastructure and urban space.

1. Decrease in the use of private transport

The challenge is to give up travelling by private car every day. The car, which pollutes the air, makes noise, takes up a lot of road space and sits idle in car parks or garages, can be replaced by walking, cycling and scooting, and for longer distances or to carry heavy loads, by public transport, carsharing, taxis or electric cargo bikes. A system of interceptor car parks and restrictions on lorry traffic will reduce the influx of motor vehicles into the city, a network of cycleways will improve safety, and extensive pedestrian zones will make the city more pleasant for walking.

2. Sharing transport

Electric scooters, scooters, bicycles and carsharing have become a convenient and environmentally friendly substitute for car transport in the urban environment, reducing pollution, noise and traffic congestion. The creation of rental and carsharing networks should be encouraged in Belarus, and additional infrastructure should be created: parking spaces should be allocated, the network of electric petrol stations should be expanded, dedicated cycle lanes should be built, and traffic regulations should be amended.

3. Environmentally friendly and convenient public transport

A large share of public transport in Belarus is electrified: trolleybuses, trams, electric city buses. One of the most difficult tasks will be to replace the old fleet with modern electric buses, autonomous trolleybuses, and biogas buses, for which it is necessary to stop investing in petrol and diesel vehicles. Public transport will become more user-friendly thanks to elaborate routes and timetables, dedicated lines, a system of tracking arrival times, a single transport card for all types of public transport, and integration with suburban transport.

4. Greener transport

The total amount of harmful emissions from transport in Belarus is twice as high as in the EU, indicating a large number of old and unecological vehicles. It is necessary to create a system of incentives for switching to new, small, energy efficient and environmentally friendly cars: introduction of emission standards and a ban on importing cars exceeding them; a CO₂ levy for car owners; reduced duties and taxes on hybrids, electric, biogas and hydrogen cars; a ban on petrol cars entering city centres and tourist areas. Incentives should be extended to environmentally friendly fuels: switching to biogas, use of biodiesel and bioethanol.

An effective way to reduce emissions is to redistribute transport between transport modes, using more railways for freight and passenger transport.

5. Railway transport

Trains are one of the most environmentally friendly modes of transport for goods, convenient and safe for passengers. Due to its geographical location and investments in infrastructure, Belarus is the region's leader in railway transport.

Unfortunately, the share of electric trains is only 9% in 2020 and this needs to increase.

The strategy for the development of Belarusian railway transport should include electrification and modernisation of rolling stock, increase in freight traffic, inclusion of suburban trains in urban mobility systems, launch of high-speed intercity and international trains, and integration into the European transport system TEN-T.

6. Urban planning and logistics

In order to reduce the use of transport for personal use, it is necessary to create a new urban environment in which most of the necessary infrastructure - schools, kindergartens, hospitals, shops, workplaces, green areas - is within walking distance. City centres, especially those with historic buildings, should be transformed into pedestrian zones with electric substitute transport and underground parking for local residents. The number of car lanes should be reduced to make room for pedestrian pavements and cycle paths. Car parks near houses should be allocated for local residents, large underground car parks and interceptor car parks on the outskirts should reduce the number of cars in cities.

To reduce emissions from freight transport, access to the city should be restricted by tonnage and time of day, and motorway travel should be restricted to weekdays. The supply chain should be changed to be more centred on local producers. Utility vehicles should also be converted to electricity or biomethane, and waste collection and recycling centres moved closer to end users.

7. International co-operation

Belarus is an important transport hub. Investment in infrastructure and logistics should increase, prioritising green and digital technologies. For further development, it is necessary to integrate the transport system of Belarus into the pan-European TEN-T and adopt European norms and standards.

- To develop business, tourism and international cooperation, it is necessary to connect Minsk and other cities with European capitals by high-speed railway service.
- In order to develop air service, it is necessary to remove artificial restrictions for foreign scheduled and low-budget airlines, invest in regional airports, and work out the issue of producing electric aircraft for domestic and international transport up to 500 kilometres.
- The strategy to restore navigation on Belarusian rivers will allow to develop cargo and passenger navigation, attract international tourists, and create jobs in the regions.
- International airports, railway stations and logistics centres should become the hallmark of a green Belarus - using modern energy-saving technologies, renewable energy sources, smart technologies, creating green zones and comfortable spaces for passengers.

5.2 Development of electric transport

Electric cars have become one of the symbols of the green transition in the world. Belarus has the production and human resources to develop its own production of electric cars. The country may also be interesting for investors as a platform for entering the CIS market.

The use of electricity for car charging should be one of the points of BelNPP's strategy to integrate BelNPP into the country's energy system. Advanced car battery technology can feed electricity back into the grid, helping to balance and store energy from RES for households.

Directions for the development of electric transport in Belarus:

1. Attracting electric car manufacturers to the country: Tesla, VW, Volvo.
2. The possibility of producing electric cars at the Geely plant.
3. Production of tractors, loaders, manipulators, golf carts, buses with electric motors at Belarusian enterprises. A promising direction could be the development of a mini-tractor, which, together with a RES mini-power plant, would enable the development of farming.
4. The use of electric cars in city taxi and carsharing programmes. This will also improve urban ecology and relieve pressure on the city centre.
5. Stimulating the transition to electric vehicles by various methods: free parking, a wide network of petrol stations, tax incentives, purchase subsidies, leasing programmes.
6. Formation of car fleets of state and municipal institutions from electric cars.
7. Production and reuse of rechargeable batteries and charging stations.

Electric petrol station network

Mass introduction of electric transport is impossible without a wide network of electric car fuelling stations. It is necessary to create a public or private network of petrol stations and car parks in cities, on highways, near natural and cultural attractions.

Additional features:

1. Utilising renewable energy sources at charging stations. At petrol stations, solar cells can be installed on roofs and canopies, petrol stations can be located next to solar parks or wind turbines.
2. A national network of high-speed fuelling stations on motorways will attract tourists-owners of electric cars, primarily Europeans.
3. Parks with charging stations near all attractions: in national parks, nature reserves, historical city centres, near castles, beautiful lakes, etc. will help to develop regional tourism.
4. A national network of petrol stations will show serious intentions for investors and electric car manufacturers. The assistance of Tesla in installing its petrol stations will help to start negotiations on the construction of a plant in Belarus.
5. Car refuelling equipment will attract additional customers to the service sector and support small and medium-sized businesses: hotels, restaurants, cafes, hairdressers, shopping centres, etc. A standard 17kw fuelling station costs from 500 euros.

Necessary changes in legislation and taxation:

- a law to phase out internal combustion engine cars by 2040;
- subsidies for the purchase of electric cars;
- reducing import duties and maintaining a zero VAT rate;
- reduction of transport tax;
- control of CO₂ emissions from cars, correlation of emissions and road tolls according to the "polluter pays" principle.

Also in the future we should think about the introduction of electric aeroplanes for short-distance flights within Belarus and to Europe, high-speed train lines and their inclusion in the European system.

5.3 Hydrogen transport

Hydrogen transport is not very widespread yet, despite the fact that it is the most environmentally friendly type of transport. This is due to the complexity of hydrogen production and storage, insufficient number of refuelling stations not only in Belarus, but also in the EU.

Investments in the production or purchase of hydrogen-powered vehicles should only be considered if Belarus develops its own production of low-cost hydrogen.

Areas of use of hydrogen transport:

1. Urban transport. Unlike trams and trolleybuses, it reduces infrastructure construction costs: catenary network, rails, electrical substations.
2. Long-distance transport. With a range of 600-1000 kilometres, hydrogen transport can cover the whole country.
3. Freight transport. The high energy content of hydrogen allows its use in freight transport, thus reducing the carbon footprint and the cost of goods.

Example of a project in the field of sustainable transport

"Green Government."

The idea of the project is to replace the traditional car fleet of state and municipal government institutions with electric cars and carsharing.

Ministries, local authorities, and department heads maintain a huge fleet of vehicles paid for from the budget. The public administration sector spends about 30,000 tonnes of petrol per year, which is more than 10% of the country's total consumption, and 23,000 tonnes of diesel fuel according to Belstat. An expensive official car is often not so much needed for work as to demonstrate the status and privilege of officials at the expense of taxpayers.

These problems can be solved by the Green Government project:

1. Calculation of the required number of "official" cars, taking into account business necessity and safety, as well as sharing (the standard formula of 1 car in a carshare replaces 8 in private ownership can be adjusted).
2. Selling off "status" company cars and gradually replacing them with electric vehicles.
3. Establishment of a carsharing of company cars: the institution's electric car, which is now available, with or without a driver, is used for business trips.
4. Equipping car parks and garages of state and municipal institutions with places for charging electric vehicles.
5. Installation of solar panels and water heating elements on the roof of state institutions to improve the energy efficiency of buildings.

6. Green building

A modern building is a sustainable and resource-efficient building. It is constructed from sustainable materials, consumes almost no energy for heating and cooling due to efficient thermal insulation and ventilation, saves electricity through natural lighting and energy efficient appliances, generates its own green energy and heat through solar panels and collectors, wind or geothermal energy, uses maximum greenery on terraces and roofs, collects rainwater for reuse, and minimises waste production.

Construction of a resource-efficient building is not much more expensive than a traditional building, and investments in technology and modern materials when constructing or renovating an old building pay for themselves within 7-10 years. Modern building technologies can be applied in Belarus both in the private sector and in multi-storey residential buildings, commercial and industrial construction. A private energy-efficient house with its own energy production can be considered as an additional income or "pension", because after the payback period it will start to bring profit by giving surplus electricity to the grid. An industrial resource efficient building will save resources and reduce the cost of construction and operation. A large investment green project will make it easier to attract financing and customers.

6.1 Modern trends in construction and renovation

Environmental friendliness. The design favours ergonomic layouts, guided by the principle of sufficiency and resource efficiency during the construction and operation phases.

- Building materials should not emit toxic substances during production and use, wood is used to replace carbon-intensive cement, natural fillers for concrete, and maximum glazing of buildings.
- Localised materials reduce CO₂ emissions through the delivery of building materials, and fast modern construction techniques do not require heavy machinery.
- In private homes, a rainwater harvesting system will save money on maintaining a swimming pool, watering a lawn or vegetable garden, and in industrial production and agriculture, it will significantly reduce costs.
- EU legislation prescribes requirements for circularity in construction: construction waste and materials after demolition must be reused.

Energy efficiency. Nowadays, buildings account for 40% of the energy consumed. The most efficient system of heating, air conditioning, ventilation, heating, water collection and filtration, separate waste collection and disposal, sewerage, natural lighting and shading is already laid down at the design stage of the house. "Passive house" has no negative impact on the environment and can fully provide itself with energy, water, and often food.

- Construction of walls from insulating blocks or sandwich panels allows to do without additional insulation and reduce heating costs by 80-90%.
- Heat pumps are highly efficient, converting electrical energy to thermal energy at a ratio of 1:4.
- A ventilation system with recovery can reduce heating and air conditioning costs by up to 5 times.
- Designing a water underfloor heating system in the foundation or floor slab with water heating by a solar collector allows you to save money during the construction phase and fully heat your house or flat.
- Hybrid solar panels with a water heating element increase the efficiency of the battery by cooling it and can fully supply a residential or industrial building with hot water.

Modern materials and technologies. Modern building materials help to build quickly, qualitatively and cheaply, due to the economy of material, ease of installation, minimum operations, absence of heavy machinery during construction.

- Arbolite and foam concrete blocks allow you to erect walls and roof 2-3 times faster than brick, without the need for additional insulation.
- Standard frame panels and sandwich panels with layers of wind and vapour protection membranes and thermal insulation material allow to assemble a family house on a ready-made foundation in 2-3 days.
- 3D printers for printing houses use local raw materials such as straw, sawdust, husks, and ground construction waste as concrete mix filler, which reduces transport costs, lightens the structure, improves thermal insulation and saves cement. A family house can be printed in 24 hours.
- Double-glazed windows not only insulate but also help to heat the room through sunlight in winter in passive houses.
- Modern solar panels allow them to be used as roofing material, canopies, balcony and terrace railings.

Vertical landscaping. Vertical landscaping helps to effectively combat the effects of climate change and brings additional comfort to building owners. Greening roofs and terraces reduces air temperature in the heat of summer, keeps warm in winter and cool in summer, retains water during heavy precipitation, reduces pressure on the drainage system, creates additional living space and restores biodiversity. In EU countries, laws are being passed to make it compulsory to green the flat roofs of large commercial buildings in cities.

- To create a green cover, the roof is protected with an anti-germination waterproofing layer, covered with a special drainage layer and a "cushion" to retain moisture, on which plants are planted.
- Specialised companies create a green ground cover of plants that do not require watering and mowing, which can be placed on roofs and building facades.
- In multi-storey urban buildings, terraces and balconies are provided with containers for trees, flowers or home gardens.
- Green roofs on residential and office buildings can be used as additional recreational space. Industrial buildings can significantly save on space heating and cooling, water collection and treatment, offset CO2 emissions from production, and increase investment attractiveness.
- Green spaces can be used effectively in place of traditional fences.

The coronavirus epidemic, the shift to working from home, virtualisation and digitalisation, and the development of rapid transport are driving people's desire to move to live in the countryside. The trend towards living in nature and building smart, resource-efficient and environmentally friendly homes will intensify in the coming decades. Modern technologies and the development of smart grids make it possible to connect a building to a common heat, water and electricity network to not only save resources, but also earn money by producing and selling their surplus.

The EU has adopted a programme to support green building. Individuals and commercial organisations can receive a subsidy for the use of energy-saving technologies: triple-glazed wooden windows, insulation of facades, ceilings and roofs, installation of solar panels, water heating collectors, heat pump and air recovery systems. In Slovenia, if more than three technologies are used, the amount of the subsidy increases and can be up to 30%. The energy efficiency programme helps to reduce energy consumption, invest less in infrastructure, improve the country's energy security, and create comfortable living conditions and lower building maintenance costs for citizens.

In order to effectively manage housing stock and investments, especially in urban areas, it is necessary to reform housing and utility companies and establish management companies. Residents of a building enter into a contract with a management company, which ensures fulfilment of contracts for rubbish collection, sewerage, electricity and heat supply, landscaping, cleaning, scheduled and major repairs, and manages investments. Utility payments are paid to the management company, which also controls contractors, collects and spends money from the house fund. In Belarus, the functions of such a management company can be performed by KOTOS.

Belarus, following the example of the European Union, needs to launch a **"wave of renovation"** of public and residential buildings, which can reduce maintenance costs. Renovation of schools, hospitals, and libraries will help to save on heating and use these funds for basic needs.

A large-scale building renovation programme will create additional local jobs in the construction industry and the production of innovative materials. Improving the energy efficiency of buildings will reduce fuel consumption for heating, which in the long term will recoup the cost of renovation and reduce the country's dependence on imported energy resources.

Necessary conditions for successful mass introduction of modern construction methods in Belarus

1. Establishment in legislation of requirements for energy efficiency of buildings under construction.
2. State programme for renovation of energy inefficient public and residential buildings.
3. Subsidising energy efficiency investments for legal entities and individuals: building insulation, ventilation system with recovery, heat pump, solar panels and collectors, double-glazed windows.
4. Simplifying the certification of new construction technologies, such as 3D printing of buildings, integrated building systems and standard designs.
5. Reform of the housing and utilities system and establishment of management companies.
6. Modernisation of utility infrastructure to enable buildings to be connected to a common network, development of smart grids for management.
7. Holding regular exhibitions on green technologies in construction and energy efficiency.
8. International co-operation, participation in international communities such as the Energy Efficient Mortgages Initiative (EEMI).

Examples of a project in construction

"Green House."

The construction of an "open door" house that could demonstrate the possibilities of a passive house: extensive glazing, heating and air conditioning, energy production, ventilation with recovery, rainwater harvesting, filtration and reuse of sanitary water, heat pump, green roof, waste minimisation system, compost, vegetable garden and housekeeping. Private passive house owners can also open their homes to visitors on certain days.

"Green Building."

A permanent exhibition platform for construction companies and manufacturers of building materials, where modern resource-efficient construction technologies would be presented - on the example of finished houses and all stages of construction. At the exhibition there is an opportunity to compare the cost of construction on the example of a typical house, to consult with the builder.

7. Green agriculture

Agriculture in Belarus is inefficient, unprofitable and unecological. The main reasons for this situation are attributed to the lack of private land ownership and the persistence of inefficient collective farms. Belarusian agriculture is characterised by intensive farming with extensive use of chemical fertilisers and pesticides, as well as a large share of export-oriented livestock farming, high levels of CO₂ emissions and water and land pollution.

Here are some figures that characterise the situation in the agricultural sector in Belarus⁴⁷ :

- Agriculture contributes 6.8% of GDP and consumes 5.8% of the state budget.
- 22.4% of the population of Belarus live in rural areas, 7.8% of the able-bodied population is employed in the agricultural sector, and wages are 69.1% of the national average;
- The share of agricultural products in exports is 16.8%, with only a small share going to the EU.
- 87.9% of land is owned by collective and state farms, 8.5% by citizens, and 2.5% by farmers.
- The share of organic farming is less than 1% and there are 26 organic farms for the whole country.
- Agriculture is the main water polluter in the republic.

In Belarus there has been no land reform and the right to use land is granted by the state. Farms receive land for long-term use by decision of local authorities, but can also lose it for "inefficient use", the criteria for which are not defined. All this hinders the development of farms and limits long-term investments in technology and infrastructure.

Outdated and unecological farming methods lead to reduced crop yields and soil degradation - about 1.5 million hectares of land are threatened by wind and water erosion. Rural areas, where almost a quarter of the population of Belarus lives, are considered depressed, and work in agriculture is considered unpretentious and unpromising.

In order to reduce the negative impact of traditional agriculture on nature, Belarus needs to develop farming and private subsidiary farms, which are more environmentally friendly than the existing large farms in Belarus.

7.1 Organic farming and animal husbandry

Organic agriculture has already proved its efficiency in Belarus, and its products are in demand both domestically and in the EU markets.

The main principles of organic farming.

1. **Ploughless tillage.** As a result of shallower ploughing, moisture loss, CO₂ output, loss of nutrients and useful microorganisms are reduced, and humus formation is improved. For natural regeneration of the soil, the non-valuable part of the crop is left on the fields.
2. **Mulching.** Following the example of nature, where there is no "black earth", the soil is covered with a layer of mulch - hay, straw, sawdust, leaves, peat, crop residues. This helps to maintain optimal soil temperature, preserves moisture, protects plants and roots from pests and bacteria, serves as a breeding ground for microorganisms and worms that turn the soil into humus.
3. **Crop rotation.** By alternating plants that impoverish or enrich the soil with nitrogen,

⁴⁷ [EPC: Opportunities and Challenges for Belarus](#), pp.60-63

phosphorus and other minerals, fertiliser inputs can be reduced, while intermediate crops - permacultures - retain carbon and moisture and control weeds and plant diseases.

4. **Natural fertilisers.** Maximising the utilisation of nutrients and returning them to the soil is of paramount importance. Guided by the principle "fertilise the soil, not the plants", chemical fertilisers are replaced by effective microorganisms, competent crop rotation, application of local natural fertilisers, compost.
5. **Refusal from pesticides.** Crop rotation, use of permaculture, restoration of the population of agricultural insects and birds allows effective control of diseases and pests by refusing pesticides, herbicides, growth regulators.

Organic farming can be successfully developed in Belarus, where sod-podzolic, acidic soils with low organic matter content prevail. Successful implementation of organic practices will help to ensure the use of intercrops, green fertilisers, good manure.

Organic animal husbandry aims to develop a harmonious relationship between land, plants and domestic animals, providing for their physiological and behavioural needs.

The EU regulations and the Food Code⁴⁸ regulate the keeping, feeding and treatment of farm animals and introduce the following requirements for organic animal husbandry:

1. Pastures have not been treated with chemicals for 3 years.
2. The feeds are non-GMO.
3. No antibiotics, growth and lactation stimulants are used in feed.
4. Antibiotics are not used for prophylactic purposes.
5. No force-feeding is used.

Animals and birds should not be kept in cages and on lattice floors, straw, sawdust, shavings, peat, sand and other natural compositions are used as bedding, waterfowl and animals have access to water, milk feeding is used. Organic farms use home-grown or locally produced feed.

Organic farming and animal husbandry will make agriculture more profitable, help restore infertile soils and erosion- and desertification-prone former peatlands, improve the quality of drinking water, reduce environmental pressure, and develop agro- and ecotourism.

Nevertheless, organic farming and livestock breeding is practically not developed in Belarus. According to data for 2023, there are only 26 organic farms in the country with 1600 hectares of land.

According to farmers, the main difficulties in the development of organic agriculture are the lack of good land. Land is allocated by local executive committees for long-term use, and can be confiscated if it is not used properly. Since the criteria for proper use of land are not prescribed, this can include not using the land during the transition period to clean the land of heavy metals, pesticides, mineral fertilisers. Other reasons cited by farmers - low demand for organic products among retail chains of the republic and difficulties with export, expensive certification.

⁴⁸ Codex Alimentarius

https://food.ec.europa.eu/horizontal-topics/international-affairs/international-standards/codex-alimentarius_en#eu-position-papers-under-relevant-codex-committees

7.2 Current Challenges and Trends in Agriculture

It is worth taking into account the global challenges that Belarusian agriculture will face in the near future:

1. By 2030, half of the world's people will be short of freshwater, so additional measures must be put in place to use it efficiently.
2. By 2050, the world's population will reach 10 billion, the need for food will increase by 56% and more efficient technologies will have to be used to meet it.
3. The requirement for emission reduction and decarbonisation will also affect agriculture. Currently, agriculture in Belarus accounts for 21.7 million tonnes of CO₂ per year or about 20% of all emissions.
4. Organic products grown without the use of chemical fertilisers and substances are becoming more and more popular.
5. Many people's food preferences are changing: according to surveys in Germany, more than 50% of people aged 18 to 25 would like to give up eating meat. These are the people who will determine the demand for food in the next 10 to 20 years and shape the eating habits of future generations.
6. Divestment from traditional sectors of the economy and redirecting investment into sustainable and green economies.
7. Conserving biodiversity, increasing protected areas, forests, grasslands and wetlands will lead to a reduction in agricultural land.

Taking into account the tendencies to rational use of resources, bio-products, reduction of carbon footprint, introduction of carbon tax by developed countries, change of food preferences, traditional Belarusian agriculture risks becoming uncompetitive and insufficient to meet the needs of the population.

Modern trends that can be used in agriculture in Belarus

1. Vertical farms that can be placed in cities to reduce costs and emissions from transport.
2. Hydroponics, which helps to significantly increase crop yields and reduce farmland.
3. Production of artificial meat of all kinds: cultivation, imitation from animal protein, use of plant protein and production of protein from insects.
4. Replacement of beef and pork with other types of meat: rabbit, turkey, goose, duck, quail, freshwater fish, crayfish, snails.
5. Expanding the range of mushrooms, berries, fruits, vegetables, legumes.
6. Use of mini-tractors with a variety of attachments, including electric or biogas, instead of traditional large tractors and combines with diesel engines.
7. Use of agricultural waste for biogas and organic fertiliser production.
8. Use of farm buildings for placement of solar power plants, with a payback period of 5-7 years and an additional yield of up to 20% per annum.
9. Bio-production: reduced fertiliser application, free grazing of animals and poultry, organic farming, restoration of traditional crops and breeds, breeding and gene modification for greater resistance to disease and additional nutritional qualities.
10. Reducing the use of organic fertilisers and antibiotics to conserve biodiversity, restoring and returning inefficient land to nature.

All these innovations can be effectively introduced with the removal of artificial restrictions, development of private farming and government support for green agriculture (subsidies, tax deductions, leasing programmes, preferential credit rates, etc.).

The obvious ways to reform agriculture are the elimination of inefficient state administration, disbanding subsidised collective and state farms, introducing private land ownership and removing constraints to the development of farming. Private land ownership is a prerequisite for the development of farming and investment in agriculture.

Proposed measures for the development and greening of agriculture

1. Bring legislation in line with EU standards, create a certification system
2. Introduce public procurement of organic products for medical, preschool and educational institutions.
3. Create conditions for export development
4. Support organic farmers' associations
5. Develop agrarian education and science, create methodology and platforms of advanced agricultural technologies.
6. Proper use of fertilisers and plant protection products
7. Restore degraded land, limit row crop farming on peatlands
8. To balance the structure of livestock production
9. Develop fish farming, collection of mushrooms, berries, medicinal herbs.
10. To convert manure into biogas and environmentally friendly fertiliser.
11. Produce heat and electricity from organic waste for the farm and for sale.
12. Introduce biogas-fuelled agricultural machinery to reduce fuel and petrol costs.

The European Union has developed a plan to support organic farming, and it would be useful for Belarus to take into account these trends in order to introduce its products to the European market. The EU is focusing on the development of organic farming, planning its development to the level of 25% of all agricultural land by 2030. Much attention is paid to the protection of biodiversity, especially birds and pollinators, for which it is planned to reduce the use of chemical pesticides by 50%. Some land is planned to be returned to nature and to increase landscape diversity in rural areas: reforestation, organising ponds and terraces, creating corridors for wild animals.

It is important for Belarus to bring norms and standards in line with European ones, to participate in pan-European programmes in order to stay abreast of environmental trends, to receive technical, expert and financial assistance, and to contribute to the restoration of biodiversity and green transitions in Europe.

Example of a project in agriculture.

"Green Farm."

Creation of a farm where only green technologies would be used: energy production from renewable energy sources, separate waste collection, use of organic waste for fertiliser and biogas production, charging station for electric vehicles and agricultural machinery. Such a farm could be used as a demonstration site for green technologies, as well as for ecotourism.

8. Biodiversity conservation and restoration

Conservation and restoration of biodiversity is still considered in Belarus to be a secondary objective compared to economic growth and agricultural development. Both the country's leadership and citizens do not always understand what the loss of biodiversity threatens, except for additional pages in the Red Book. But biodiversity conservation is not so much a problem of taking care of nature for the sake of comfortable stay, as it is a problem of preserving a planet suitable for human life.

According to estimates by the insurance company Swiss Re Group, 55% of the world's GDP (US\$41.7 trillion) depends on biodiversity conservation and ecosystem services. The World Economic Forum reports identify the loss of biodiversity and the destruction of ecosystems as one of the most serious threats of the next decade. Agriculture, construction, food and beverage production, and tourism will be under threat in different countries.

It is difficult to value what comes for free, so ecologists introduce the term "natural capital" and calculate the value of natural services, e.g. how much it costs for trees to produce oxygen or marine animals to absorb CO₂. Urban lawns and parks retain precipitation and reduce the load on sewage systems, green spaces filter the air and absorb CO₂, wetlands reduce the risk of floods, water bodies regulate the microclimate. The value of all the world's forests for their contribution to climate regulation is 50-150 trillion dollars according to experts from the Boston Consulting Group.

Damage from rising sea levels and other impacts of climate change are being calculated. The World Bank predicts that damage from flooding could reach \$52 billion per year by 2050, and total global damage from ocean rise could reach up to \$1 trillion per year⁴⁹. A 0.5 degree rise in seawater temperature threatens to destroy coral reefs and their inhabitants, which are a source of protein for about a billion people on earth⁵⁰ and provide livelihoods for about half a million people in 100 countries.

Investing in biodiversity conservation and climate change adaptation measures is becoming a profitable investment in the long term. With effective conservation policies around the world, the benefits will exceed the costs by a factor of 100⁵¹.

The ecological value of Belarus' forests is at least \$100 billion, two thirds of which is attributable to environmental protection functions. Similar calculations of ecosystem services for the Yelnya upland bog were estimated at \$291.9 million.

Belarus is implementing a policy to conserve landscape and biological diversity:

- The "National Action Plan for the Conservation and Sustainable Use of Biological Diversity for 2021-2025" was adopted.
- It is planned to expand the National Ecological Network and increase specially protected natural areas to 9.1% of the country's territory. In 2019, the area of protected areas was 8.9% of the country's territory, and the national network includes 93 sites and covers 3.37 million hectares, or 16.2%.
- Invasive species are being controlled, mainly borer.

⁴⁹ Which Coastal Cities Are at Highest Risk of Damaging Floods?

<https://www.worldbank.org/en/news/feature/2013/08/19/coastal-cities-at-highest-risk-floods>

⁵⁰ Why corals are dying on the planet. <https://plus-one.ru/ecology/2021/06/08/pochemu-na-planete-ischezayut-korally>

⁵¹ Balmford et al. (2002), Economic reasons for conserving wild nature. <https://science.sciencemag.org/content/297/5583/950>

- All protected areas account for 22% of the country, with 202 animal species and 303 plant species listed in the Red Book.
- By 2025, it is planned to increase the area of forests to 40.3% of the country's territory and "return inefficient agricultural land" to nature.
- Two international GEF technical assistance projects on the restoration and re-wetting of Polesye peatlands have been implemented.
- Work is underway to maintain the genetic diversity of natural flora and fauna, agricultural plants and animals, and the Genetic Bank of humans, animals and plants is being created and replenished.
- Preparations are underway to implement the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation.

At the same time, monitoring and conservation measures are not consistent, there are no clear indicators of programme success, there is a lack of coordination between government agencies and ministries, biodiversity conservation is not taken into account in planning investments and economic projects, and urban greening regulations are outdated and formal.

Biodiversity restoration requires close international cooperation, and a good strategy for Belarus would be to bring its legislation and methodology in line with European norms, to participate in international technical assistance projects and to join European conservation networks and programmes.

National plan for biodiversity protection and restoration

Belarus needs a national plan for the protection and restoration of biodiversity, based on an integrated approach, following the example of the EU strategy, including economic justification and quantitative indicators.

1. Network of protected areas

Belarus needs to increase ambition and introduce quantitative indicators for the implementation of the biodiversity restoration plan. The EU plans to designate at least 30% of land and seas as protected areas, with particular emphasis on areas of high biodiversity. In Belarus, such areas include the primary forest of Belovezhskaya Pushcha, the water area of the Nyoman River, the Polesky peat bogs and bogs. In the future, they can be included in the Trans-European Nature Network. For the Belarusian economy it is an opportunity to receive additional investments and international technical and financial assistance, to develop ecotourism. It will also create new jobs, for example, the Trans-European Network forecasts up to 500,000 new jobs.

2. Bringing nature back to farmland

Intensive farming, large amounts of fertilisers and pesticides, a bias towards export-oriented livestock breeding, high carbon intensity, low profitability and prestige are typical features of Belarusian agriculture.

The health of agro-ecosystems requires the protection of farm birds and insects, as more than 75% of food crops depend on pollination⁵². Soil degradation is caused by deforestation, urban sprawl, overgrazing, intensive farming and has serious environmental and economic consequences. Soil is an important non-renewable resource, vital for human health, food and medicine.

Uncultivated land, hedgerows, plantings of non-productive trees, and ponds help sequester carbon, prevent soil depletion and erosion, filter water and air, and increase adaptability to climate change and natural disasters.

⁵² IPBES (2019), *Summary for policymakers*, p. 3, A1. <https://ipbes.net/global-assessment>

The EU has set a goal to convert at least 25% of agricultural land to organic farming, reduce the use of pesticides, nitrogen and phosphate fertilisers by 20% by 2030. The development of organic and bio-agriculture, increasing the share of traditional crops and breeds will allow for successful exports to the EU in the future. Organic farming provides 10-20% more jobs per hectare of land and creates added value for agricultural products.

3. Restoring forests and increasing their sustainability

Forests conserve biodiversity, regulate climate, absorb carbon, stabilise soils and water resources, clean the air, provide food, serve as a place for nature study and recreation. In order to preserve the ecosystem of Belarus and the whole of Europe, it is necessary to preserve primary and old-growth forests, which include Belarusian forests.

Once the rule of law is restored in the country, it is necessary to audit the possible damage from the 2020-2022 mass logging, restore international co-operation and participation in the Aarhus Convention, and develop a strategy to protect forests from fires, droughts, pests and other threats that will increase with climate change.

The reforestation and urban greening programme will create additional jobs, including in rural areas of the country.

4. Sustainable solutions for energy production

The bioenergy and circular energy strategy involves maximising the use of secondary raw materials for biofuel production. The EU plans to minimise the use of whole wood, specially grown crops for energy production both within the EU and imported.

5. Restoration of freshwater ecosystems

The European Union plans to restore the free flow of 25,000 kilometres of rivers by 2030 by restoring floodplains and wetland systems. For Belarus, joining international river restoration projects will bring investments in projects, job creation, and economic growth of the regions through tourism and recreation. As a transit country, Belarus can use the restored rivers as important transport arteries, significantly reducing CO2 emissions from land transport.

6. Greening of urban and suburban areas

78% of the population of Belarus lives in cities and is already facing problems caused by global warming, such as abnormal heat, which is exacerbated by dense urban development and lack of greenery. Assessing ecological capital, ecologists have estimated that one square kilometre of green space in different cities provides its residents with environmental services worth between 3,000 and 17,000 USD annually⁵³ Green urban spaces protect against abnormal heat, floods and drought, reduce noise, and purify air and water.

Belarusian cities need a greening strategy that includes modern approaches: creation of urban forests, parks and gardens, urban vegetable gardens, green facades and roofs, hedges and lawns. Belarus can actively engage with the New European Platform for Urban Greening, the LIFE tree planting programme, the European Covenant of Mayors, and the Green City Accord platform to share experience and technical support.

7. Reduction of pollution

In order to preserve biodiversity, it is necessary to reduce soil and water pollution by rubbish, microplastics, pesticides, toxic substances, industrial waste, pharmaceuticals, chemical fertilisers. The development of a green economy will reduce risks to biodiversity in various areas:

- circular economy makes industrial production more resource efficient;
- the development of organic agriculture reduces the use of chemical fertilisers, hormones

⁵³ Explaining the whales: how much is natural capital worth. <https://plus-one.ru/ecology/2021/04/01/obyasnyaem-na-kitah-skolko-stoit-prirodnyy-kapital>

and antibiotics;

- A litter management strategy reduces plastic production, establishes recycling, eliminates landfills, and treats wastewater.

Belarus needs to adopt European experience and methodology on the classification of toxic substances and gradually abandon their use.

8. Control of invasive species

Ecosystem collapse and climate change have accelerated the invasion of alien species that pose a threat to people and wildlife. In Europe, for 354 of the 1,872 species at risk of extinction in Europe, invasive species were the cause⁵⁴.

Belarus has been fighting Sosnovsky's borschweed for many years, but nature knows no borders and international co-operation is needed to reduce the threat of invasive species. Alien and invasive species cause damage to nature and economy and contribute to epidemics. Over the last 10 years, the number of recorded invasive animal species has increased from 110 to 167 species, and the number of invasive plants from 1700 to 2100.⁵⁵ The most dangerous species are listed in the Black Book, which currently contains 13 species of animals and 9 species of plants.

The task of the state will be to confirm and fulfil its international commitments, restore international cooperation, create a system of natural capital assessment and biodiversity monitoring. The tasks of nature conservation should be implemented in state policies, and an integrated approach should be applied in the development of strategic documents, taking into account the interests of biodiversity conservation, agriculture and industry, energy and adaptation to climate change.

School and higher education programmes should include environmental and biodiversity issues, and research and participation in international projects should be encouraged. Biodiversity conservation programmes should take into account the interests of local industries and traditional fisheries for an equitable transition.

Financing of activities will be successful with a combination of government, corporate and international funding. The introduction of ESG reporting, tax incentives, green procurement and green finance will encourage Belarusian businesses to invest in biodiversity restoration projects. The system of environmental fees and fines should be revised in order to reduce the burden on the environment and realise the "polluter pays" principle.

Belarus' rich history of co-operation with the GEF, UNDP, EBRD and EIB should continue after the change of power in the country. Between 2010 and 2020, Belarus received over USD 25.5 million in various projects, of which biodiversity conservation and restoration projects accounted for USD 5.5 million⁵⁶. The European Union is interested in biodiversity conservation worldwide and in 2020 doubled funding in these areas and established the Global Biodiversity Coalition.

⁵⁴ See for example: Hulme P. (2014). *Invasive species challenge the global response to emerging diseases* Trends in parasitology (2014) Vol. 30, Issue 6; Duscher et al. (2017).

⁵⁵ <https://bahna.land/ru/flora-i-fauna/kak-v-belarusi-obstoyat-dela-s-sokhraneniem-bioraznoobraziya-podrobnyj-obzor>

⁵⁶ <https://bahna.land/ru/flora-i-fauna/kak-v-belarusi-obstoyat-dela-s-sokhraneniem-bioraznoobraziya-podrobnyj-obzor>

Example of a project for biodiversity conservation

"Urban vegetable gardens."

In city parks, on the banks of water bodies, wastelands and city outskirts it is necessary to allocate land plots for creation of urban vegetable gardens. City residents will be able to rent these plots for a small fee to grow flowers, cultivate agricultural and garden crops, and spend time in nature.

- The sites should have fresh water, public or bio-toilets, a rubbish collection system and parking for cars and bicycles.
- Buildings for storing stock should be pre-installed or regulated to keep the vegetable garden looking tidy.
- The gardens should promote the idea of organic farming, so the use of chemical fertilisers and pesticides should be banned.
- Organising compost for weeds, food and plant waste can help reduce rubbish disposal costs and provide a natural fertiliser.
- Hedgerows or natural materials should be used to enclose areas.
- Insect houses and honeybee beds should be installed in vegetable gardens to restore pollinator populations and naturally increase crop yields.
- Lectures and masterclasses on organic farming and traditional plant varieties can be organised for tenants and townspeople.
- Organise excursions for kindergartens and schools.

Other forms of urban farming - urban gardens, green roofs, vertical vegetable gardens should also be encouraged and incorporated into the overall urban network.

The project will create green oases in cities, which will regulate temperature and reduce the risk of flooding during heavy rainfall, capture CO₂ and clean the air, become platforms for learning and socialising, and for some, a source of additional income.

Interaction between government, business, NGOs and citizens in building a green economy.

In order to realise a green future for Belarus, cooperation and coordination between government agencies and different sectors of society and groups are necessary. Directive management should be replaced by guidelines and policy recommendations, rigid centralisation of management weakened in favour of municipalities and market mechanisms.

When developing policies and projects, business needs should be taken into account, independent experts and civil society should be involved, media and citizens should have free access to information. Taking into account that 72% of greenhouse gas emissions are related to household activities⁵⁷, green Belarus needs broad support of citizens.

Government

1. Introduction of sustainability principles into all state policies. Implementation of European environmental standards into Belarusian legislation. Removal of barriers in legislation. Compliance and expansion of international obligations and participation in conventions.
2. Creation of infrastructure. Modernisation of electricity networks. Possibility to connect private producers of electricity, heat, biogas and hydrogen to electricity grids and pipelines. Creation of a smart national energy balancing and demand management system.
3. Creation and support of business platforms. Exchanges of electricity, energy carriers and secondary raw materials. Organising exhibitions on green economy sectors, international conferences. Digitalisation of services.
4. Attracting international financing. Improvement of the investment climate. Development of an investment package for the green economy of Belarus.
5. "Green Diplomacy. Promotion of the green Belarus brand for political support of the country, attraction of investments, and tourism development. Popularisation of green economy inside the country for business and citizens.
6. Methodological and scientific support. Development of education and training programmes. Broad education and information campaign.
7. Tracking progress on all fronts.

Civil society

1. Development of a vision of a green Belarus. Preparation of concepts, reform projects.
2. Expert support. Conducting research and scientific studies. Development of methodology. International co-operation.
3. Education and outreach programmes. Staff training.
4. Widespread public involvement. Information campaigns.
5. Monitoring of projects by environmental organisations and media.

⁵⁷ IPSS (2022). Climate Change 2021: Mitigation of Climate Change report. <https://www.ipcc.ch/report/ar6/wg3/downloads>

Business

1. Consultations on business needs and difficulties in developing green projects. Expert evaluation of projects.
2. Investing in green projects. Introducing sustainability into business processes.
3. Cleaner and more energy efficient production. Creation of eco-industrial parks and clusters.
4. Implementation of ESG principles (environmental, social and corporate governance).

Citizens

1. Separate rubbish collection.
2. Choosing sustainable goods and services.
3. Investing in energy efficiency, RES, green transport for own needs.
4. Ecological habits. Support for environmental movement and initiatives.
5. Civic engagement projects in the climate field. Participation in public discussions and policy making.