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DEVELOPMENT SCENARIOS IN THE 2050 PERSPECTIVE

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INTRODUCTION

The country development scenarios are intended to test the provisions of the Poland 2050 Vision and to indicate the need for its modification. They do not forecast possible variants of the country's development, nor do they predict the future. Instead, they outline the paths towards achieving the Poland 2050 Vision, to the extent that this is possible under different contextual scenarios.

The country development scenarios are not a stand-alone strategic document, but rather one of the elements of preparing Poland for the challenges of the future. Therefore, the recommendations and pathways have been formulated in a way that suggests an initial direction for intervention, while not limiting the possibility of further refining the objectives, actions or methods of implementation in subsequent stages of the strategic planning process.

The pathways towards the Poland 2050 Vision presented here are certainly not the only ones possible. They should be regarded as a starting point for further reflection and the search for more effective, efficient and resilient alternatives that will minimise risks and make full use of the opportunities associated with a changing environment.

SCENARIO 1.
POLAND IN A WORLD EMBRACING FURTHER GLOBALISATION

It is 2050. The world has not changed as much as some had predicted. Humanity has managed to achieve a higher level of socio-economic development. Universal access to public services exists thanks to the advanced digitalisation of service delivery. International cooperation has helped slow down the pace of global warming, and alternative energy sources have overtaken fossil fuels. Yet the world still faces immense challenges. The impacts of climate change remain tangible, and some areas have become uninhabitable. This has resulted in growing population movements, further driven by inequalities between developed and developing countries.

Globalisation remains strong, but the effects of climate change have increased the importance of short supply chains in agriculture. They have also contributed to the gradual decline of areas with agricultural functions. The number of megacities is increasing worldwide, and those that already held this status in the 2020s have expanded even further.

The slower-than-anticipated progress of automation has led developed countries to compete for workers, while at the same time remaining heavily dependent on resources from developing countries. Transnational virtual communities are gaining influence, giving rise to new identities, while the role of supranational organisations is diminishing. In this world, the power and significance of corporations have grown – both due to their control over vast amounts of citizen data and their crucial role in attracting talent.

The economy of the future - innovative, responsible and resilient to shocks and crises

Efforts to strengthen the Polish economy and its resilience began with the introduction of regulations encouraging the wider use of strategic foresight by the administration, as a complementary measure to existing mechanisms. This supported both the diagnosis of key economic trends and the early detection of opportunities and risks, while also helping to identify the most important sectors around which public policies should be focused. At first, one of the main goals of this initiative was to identify those economic sectors where supply chains could be shortened and those where this was not possible. In the latter case, the priority was to ensure diversified sources of supply, thereby increasing resilience to future shocks and crises.

Already in the 2020s, further measures were introduced to strengthen the Polish economy. New solutions were implemented to enhance the effectiveness of innovation policy and the innovation system, particularly in fostering cooperation between science and business. This included strengthening the financing system and providing incentives to increase private investment in research, development and innovation. The promotion of study programmes requested by business, specific industries or local authorities – and developed in cooperation with them – was also reinforced. To boost the country's competitive advantages, a strategic debate was launched on reforming the incentive system to attract foreign investors, as well as on developing programmes to promote Polish technologies abroad (e.g. equipment and technologies for space exploration, tissue engineering, photonics, biomedicine, including clinical research).

Conditions were also created for a deeper integration of science and business, with a focus on strengthening human capital in advanced technology fields. These areas were expected to flourish in Poland under the model of supporting so-called smart specialisations, which were to provide a basis for innovation and R&D, and to improve the competitiveness of the country and its regions. Ultimately, these measures aimed to identify sectors in which Poland could become a key economic player coordinating networks of cooperation. An important element of this was collaboration with developing countries. Poland shared technologies in which it held an advantage, in exchange for access to labour markets in selected partner countries. A crucial criterion for selecting such partners was the ability to supply workers in less technologically advanced industries where automation had not occurred or had only taken place to a limited extent.

At the same time, Poland placed priority on increasing the labour market participation of working-age people outside employment. A range of interventions was undertaken, some of which complemented pension reform, such as adapting the calculation of benefits to different work models and improving access to pension schemes for people in non-standard forms of employment.

Poland also advanced the circular economy and strengthened energy security. In the field of circular economy, this was driven by legal changes transferring recycling obligations and most associated costs to producers, as well as through programmes for landfill analysis and resource recovery. A deposit-return system was introduced to promote recycling and reuse of packaging. Over time, further measures included a ban on the production and use of multi-material packaging. With these regulations, the circular economy became embedded in industrial production, agriculture, construction and housing.

In terms of energy security, successive governments consistently pursued measures to enhance it. In the early 2020s, legislative barriers to onshore wind farms and distribution networks were removed. Legal frameworks were introduced for offshore wind, rules on the minimum distance between onshore turbines and residential buildings were relaxed, and mechanisms were created to promote prosumer and distributed energy (including group and virtual prosumers, as well as citizen energy communities). A legislative hydrogen package was adopted, including incentives for the production of renewable low-carbon hydrogen, while barriers to energy storage technologies were lifted. Regulations were also introduced to stimulate the growth of the biogas market.

During the 2020s, attention was also given to improving energy efficiency in construction, transport and industry; building and upgrading transmission and distribution networks; smart energy infrastructure; renewable energy sources; energy storage; and the construction of nuclear power plants. Poland ensured sufficient interconnections within the EU energy market, thereby strengthening both national and European energy security. Work also began on organising the framework for micromobility and promoting its widespread use. These steps laid the groundwork for the following decade's actions, including the transition to low- and zero-emission transport. The coal sector was gradually phased out, accompanied by retraining programmes for miners and industries dependent on coal, and by adaptation measures for entire regions, such as promoting tourism or attracting sustainable energy investments. These measures, implemented in the spirit of Just Transition, continued until the full decarbonisation of the economy. By 2050, Poland was close to achieving carbon neutrality.

Poland also pursued policies for agriculture over several decades, adjusting them to the effects of climate change. Broadly, these measures aimed at three objectives: expanding the scale of sales of products from organic and local farms; developing agricultural production in areas with favourable climatic conditions (alongside the development of new functions in areas losing their agricultural role); and reducing agricultural imports through legislative measures, given the high risk that climate change in other world regions could undermine Poland's food security. These objectives were supported by the development of modern farming practices that improved efficiency and enabled the cultivation of new varieties under changing climatic conditions (e.g. hydroponics).

Economic progress was further reinforced by the adoption of regulations on social responsibility for both the public and private sectors. These were accompanied by public campaigns and educational projects. A debate was also launched on introducing financial liability for legislation. This discussion was supplemented by a pilot programme integrating Artificial Intelligence into public decision-making processes, where AI was tasked with assessing the potential consequences of decisions taken by officials and politicians, offering them a broader understanding of their choices, and even taking over some of the simplest administrative decisions.

In the broader public debate on social responsibility, particular attention was devoted to issues concerning products and services, job creation, health, the environment and human rights. This debate incorporated the perspectives of businesses, public institutions and civil society, aiming both to create an environment conducive to the voluntary assumption of social responsibility by enterprises and institutions, and to safeguard the public interest. Minimum standards for identifying, preventing and mitigating potential negative impacts of business and public sector activity were introduced into law, inspired by internationally recognised principles and guidelines forming the global framework for social responsibility (including the OECD Guidelines for Multinational Enterprises, the Ten Principles of the UN Global Compact, ISO 26000 Guidance Standard on Social Responsibility, the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy, and the UN Guiding Principles on Business and Human Rights).

Modern society – social capital, new teaching and learning, demographic change, equality, migration

Increased migration accelerated the development of a comprehensive migration policy. In the first half of the 2020s, public education campaigns were launched to create space for knowledge-based social dialogue. The public debate helped crystallise the main premises of the new migration policy. It was agreed that as Poland was becoming an attractive country for migrants, the focus should be on regulating the volume of inflows and on integration.

In a world where competition among developed countries for specialists in shortage sectors was becoming increasingly evident, Poland decided that migration policy would serve to build incentives in this area. It was also assumed that the policy would target specialists with skills in shortage occupations (both due to the skills gap and in the context of an ageing population), as well as refugees seeking a new place to live for climatic and political reasons. This laid a stable foundation for migration policy, its development and subsequent changes in the following decades. Once social consensus emerged around this issue, it became possible to integrate and improve settlement, integration and employment, to systematically implement migration policy and to counter demographic challenges. Programme procedures for social inclusion measures were also simplified.

Poland also addressed the improvement of the education system. By the end of the 2020s, it had implemented a reform aimed at orienting the system towards the needs of the economy and the skills of the future, while fostering individual talents. It was based on a socio-political consensus on expectations for the education of the future and proposals for how to achieve it. Its main assumptions included, alongside the core curriculum, education focused on social competences; the use of modern technologies to support learning; modernisation of educational facilities to meet accessibility standards; and learning oriented towards synthesising knowledge across disciplines, critical thinking, problem-solving and communication with Artificial Intelligence. The definition and scope of key competences were reformulated (through a participatory process) to include the knowledge, skills and attitudes necessary for self-fulfilment and personal development, employability, social inclusion and active citizenship, leading to lifestyles that are both healthy and environmentally friendly. Implementation guidelines covered the whole system, from pre-school to higher education. Teachers were also affected by the reform: salaries were raised and the public perception of the profession improved, supported by higher entry criteria for teacher education and the creation of a comprehensive offer of professional development and career progression. Emphasis was placed on differentiating teaching approaches and styles according to learner needs and on the use of new technologies in teaching.

In the following years and decades, the education system continued to evolve without radical change. International cooperation and technological progress encouraged more individualised learning, while school structures and processes remained intact. A significant shift was the further flexibilisation of the system, making it more open to commercial services. National authorities remained the main decision-makers but, influenced by expanding international cooperation in digital learning systems, opened up to international providers. New technologies enabled the analysis of teaching dynamics and the assessment of student effort. Digitisation and data analytics were introduced more widely to plan and allocate resources more effectively. Teachers and educators continued to design educational content and activities, but educational robots increasingly supported their delivery.

The changing demographic situation – an ageing population – became a serious challenge for social and economic policy. Insufficient automation put pressure on some retirees to remain in the labour market. To encourage this, legislative changes were passed in the 2020s to extend working lives; their impact on the labour market was monitored and necessary adjustments were made. Fiscal incentives were also introduced to provide services for senior citizens. To safeguard the health of an ageing society, conditions were created to encourage medical graduates to remain in the country, and efforts were made to increase the number of geriatricians.

By the end of the 2020s, disease-prevention programmes had been expanded to improve population health and reduce the per-patient cost of hospitalisation. New working models tailored to retirees (flexible forms of employment) were also introduced. Efforts were made to promote the right to work after reaching retirement age and flexible retirement, while rights to early retirement were curtailed. To address the needs of older people requiring care, as well as those raising children, social campaigns highlighted the advantages of multigenerational families. Programmes for such families were created, focusing primarily on better housing conditions, tax relief and preferential access to the public healthcare system (the Multigenerational Family Card). Technological progress

expanded access to telemedicine and automated treatment and care. Poland built a remote health-monitoring system accessible to all citizens and increased the scope of e-health services.

To ease pressure on the pension system, the private sector was allowed to participate in social insurance – for example, by regulating the creation of company pension schemes. Corporations were also engaged (through corporate pensions) as part of efforts to attract highly qualified staff. These achievements ultimately enabled statutory retirement age to be aligned with rising life expectancy without major social resistance.

A large-scale programme to build a mentoring and talent-development system, implemented across organisations and with strong participation by retirees, also played an important role. To raise fertility, existing family-support measures were expanded and complemented by new, comprehensive programmes that removed barriers to having children. These initiatives improved families' financial security, supported housing needs, promoted a family-friendly labour market, expanded childcare provision, and developed the infrastructure and services families require.

In the social sphere, responses were also developed to the challenges posed by modern technologies. The growing influence of virtual communities was becoming an increasingly serious concern. Already in the 2020s, cyberactivism – until recently focused mainly on protests and whistleblowing – became increasingly coordinated. Communities around the world, seeking to defend their rights and advance shared (including transnational) interests such as combating climate change, made ever more effective use of virtual media and Artificial Intelligence tools to advocate for political, social and economic change. These developments also reached Poland.

In response, by the late 2020s Poland took steps to facilitate free access to information and the flow of content and knowledge; to increase the openness of decision-making processes in public institutions and business; and, over time, to ensure the permanent representation of the most established virtual communities in these institutions. The third sector was also engaged in these processes. Civil-society organisations continued virtual activities to disseminate knowledge about technological opportunities, participatory democracy and civic advocacy, enabling even the most disadvantaged groups to participate in virtual communities. At the same time, harmful online activity (hate speech, disinformation, hacktivism) was addressed, and work began on a system to strengthen resilience against the negative effects of the growing importance of virtual communities. Measures were taken to ensure that aggregated data from digital platform users would not be used or sold to create profiles of their preferences, behaviours, beliefs, political views or personal details. The aim was to prevent unethical practices by, for example, marketing entities or organisations intent on harming or persecuting cyberactivists (such as intelligence agencies or fundamentalist religious groups). Efforts also focused on developing open, decentralised and non-archiving platforms. Another strand of action involved developing solutions to limit attacks on the democratic process using social media and other modern technologies.

The environment as the basis for national development

Poland had long been preparing to provide its citizens with access to the highest-quality environment. Implementation of this goal began at the start of the 21st century, and in the 2020s with the adoption of appropriate legislation. The law introduced definitions of ecosystem services and blue-green infrastructure, as well as requirements for their inclusion in development planning and investment decisions. A habitat area indicator was also created as a spatial planning tool. In cooperation with local governments, a multi-year process was launched to improve the share and accessibility of green spaces in cities and to strengthen urban environmental protection, including the establishment of mandatory clean transport zones.

Effective solutions were introduced to systematically reduce the impact of low-stack emissions, through investment in zero-emission heating, energy efficiency and sustainable mobility. Blue-green infrastructure was inventoried and implemented, spatial planning regulations for its protection were reinforced, and methods for valuing ecosystem services were developed. These measures raised public awareness of the benefits of a high-quality environment and enabled local communities to capture those benefits through financial mechanisms. Ultimately, this resulted in broad support for stronger environmental protection, both in terms of expanding protected areas and tightening protection regimes. New provisions included, among others, enhanced protection and restoration of peatlands, natural floodplains and ecological corridors, which supported water retention and allowed the free migration of plants and animals.

Recognising the links between the environment and agricultural development, measures were taken to integrate river basin management plans with the promotion of extensive farming at local level. Information and education

campaigns were launched – some to emphasise the importance of environmental quality for agriculture, others to raise awareness of the need to save water.

In the years that followed, Poland pursued further environmental protection efforts. Continuous evaluation, updating and monitoring of the implementation of measures under the Strategic Adaptation Plan for Sectors and Areas Vulnerable to Climate Change until 2020, with a perspective to 2030, was carried out, including sectoral adaptation strategies for agriculture (particularly in drought-prone areas), construction, energy, forestry and tourism (in mountain regions). Poland subsequently developed and implemented adaptation strategies for coastal areas, designating zones at risk from sea level rise, reviewing investment plans in coastal areas and waters, and preparing regulations to protect the coast and limit construction there (including preliminary plans in case parts of the coastal population needed to be relocated inland due to climate change). Directions were also established for protecting natural areas and endangered species such as pollinators, which were especially affected by climate change. Poland continued to coordinate adaptation in water management, focusing on drought prevention and minimising flood risk, supported by the development of blue-green infrastructure, small-scale retention, catchment management and comprehensive monitoring of climate change and losses from extreme weather events. An adaptation strategy was also developed for the public health sector, preparing the healthcare system to respond to heat stress and extreme climate events, adapting health promotion and disease prevention, protecting vulnerable groups against heat waves, training medical personnel on climate-related, tropical and vector-borne diseases, and supporting epidemiological, clinical and climate-physiological research. Poland also reformed (including through decentralisation) its crisis management system, incorporating issues such as food reserve management in case of crop failure and energy supply during blackouts. At the international level, it engaged in supporting adaptation in Global South countries.

By the late 2020s, Poland launched procedures to monitor inequalities in access to a high-quality environment, expanded the list of critical infrastructure in urban areas, and introduced guidelines for energy-efficient (nearly zero-energy) and zero-emission buildings. These were not the only changes that reshaped housing and construction. Regulations required every new house to include environmental protection infrastructure and for buildings to be adapted to use grey water. By 2030, incentives were also in place for food production through urban gardening (such as community gardens or apiaries). The use of new water-saving technologies in agriculture was initiated. These efforts were complemented by anti-food-waste legislation, including a framework for large-scale agreements between shops, restaurants and food-sharing companies, incentives for consumers to use their services, and awareness campaigns. A number of biodiversity protection measures were undertaken, consistent with the EU Biodiversity Strategy for 2030 adopted in 2020. Equally important, however, was the adaptation policy's focus on ecosystem protection – river renaturation, wetland restoration, and the preservation and development of blue-green infrastructure.

Between 2030 and 2040, environmental action continued. A system of financial benefits for local communities and municipalities was developed and implemented to reward nature conservation, including funding programmes for environmental protection in protected areas. Regulations were introduced requiring every new building to generate energy (energy-plus buildings), while district heating and electricity became based on renewable energy sources and nuclear power, which had been developed over time. The system's stability was supported by the rollout of smart energy infrastructure and the widespread use of energy storage. Strong emphasis was placed on improving the energy efficiency of the economy. At the same time, transport shifted towards electromobility and hydrogen. This transition was also reinforced by the systemic development and support of a circular economy, which by 2050 had become widespread, encompassing industry, agriculture, water management, construction, housing and waste management.

Shared space – towns, villages, cooperation, spatial planning

Efforts to design resident-friendly spaces began in the first half of the 2020s. Poland introduced urban planning standards into legislation, based on which plans were prepared to guarantee good access to services, including public ones (such as health, education, transport and cultural services), as well as multifunctional spatial development, in line with the then-popular concept of the 15-minute city. Activities were also undertaken to raise public awareness of the role of space and the impact of its development on quality and cost of living, and these issues were incorporated into educational programmes. A debate was also launched on fare and ticket integration in public transport in Poland's largest cities.

In subsequent years, an urban regeneration programme was implemented, focusing on blue-green infrastructure, access to public services and transport networks, with micro-mobility, walking and public transport becoming priorities. Poland also introduced a support system and streamlined procedures for changing the function of real estate, mainly by converting service buildings abandoned due to flexible forms of employment into housing. This facilitated the implementation of housing policy, taking into account the growing scale of population inflows. Housing needs estimates were made more realistic to optimise policy, while changes in mortgage loans helped reduce price pressure and support the creation of more affordable housing. Over time, observing the rapid growth of home-sharing platforms and their effects on local communities (displacement of residents from city centres, changes in neighbourhood character, noise, congestion, tax avoidance) and on housing affordability, short-term rental controls were introduced to free up long-term rental supply and make the housing market more efficient and accessible. No less important, especially in the context of attracting migrant workers, were measures launched in the 2030s to increase the attractiveness of cities. City networks and cooperation were strengthened to facilitate the attraction of large corporations. Another significant change, aimed both at improving quality of life in cities and at environmental protection, was the introduction of incentives to promote blue-green infrastructure elements in new buildings, including, for example, vertical gardens.

Poland also created favourable conditions for returning to medium-sized and small towns and villages by supporting local communities and improving quality of life. For this purpose, a system of scholarships, grants and programmes was developed to support the local economy and identity, as well as access to public services (continued in subsequent years through programmes such as cittaslow, focusing on local community development). To complement these efforts, legislation strengthened opportunities for teleworking and distance learning, and analysis was initiated on implementing a package of basic services in smaller towns and rural areas. Smaller towns underwent revitalisation, and modular housing adapted to changing climatic conditions was promoted in residential areas. Expanding access to housing and social infrastructure in smaller towns was intended to support their development and relieve pressure on the largest cities, including for settling people arriving from abroad.

A package of new solutions was also adopted as part of spatial planning reform, aiming to take greater account of environmental and social factors, to counteract suburbanisation and the development of vacant land (including areas with natural functions), and to reduce the external costs of urban growth.

Poland also improved the territorial redistribution of income by increasing the share of PIT and CIT revenues going to small towns and rural areas. Equally important was improving transport accessibility between large cities and smaller towns and villages. Public transport became partially free of charge, and local transport hubs with fast interconnections were established.

A spatial challenge that Poland had to address in the decades before 2050 was the partial loss of land suitable for cultivation or agricultural functions. This problem particularly affected peripheral areas and those most exposed to the effects of climate change. Measures were taken to partially renaturalise such areas in line with new climatic conditions. Agriculture and forestry were adapted to climate change, with new crops and production technologies introduced. Some areas that had lost their original functions were designated for new purposes such as tourism or energy production, while others, especially those closer to cities, were incorporated into urban territories as new residential districts.

A democratic, open, solidarity-based and secure in international relations Poland

Already in the first half of the 2020s, Poland worked more actively than ever to strengthen its position among democratic states, to build stable relations with developing countries, and to present itself as a responsible partner in international affairs. This included intensified development aid and raising issues important to developing countries at international forums. Efforts were also made to enhance the capacity for long-term thinking and planning in public administration, including identifying megatrends and drivers of change, and developing scenarios, visions and contingency plans from the local to the national level. These activities were supported by a government-appointed group of foresight experts and strategic planners. A requirement was also introduced for government administration to publish regular reports on the future. Individual ministries and local governments prepared their own foresight reviews to complement government reports. In the Sejm, a standing committee on the future was established.

Poland developed tools to counter disinformation, protect privacy, regulate the operation of Artificial Intelligence, control algorithms and assign legal responsibility for them, and to ensure the security of transactions and communications – not only through domestic legal regulations, but also by making these issues priorities of its EU membership. In the context of changing international conditions, particularly the intensifying competition among developed countries for workers, Poland's activity in the EU evolved towards building strategic alliances with individual states and groups of countries. A national debate was also held on joining the monetary union. Furthermore, drawing on its experience in combating disinformation, Poland effectively promoted a positive narrative presenting the country as an attractive place to live.

The first half of the 2020s was, however, dominated by security issues. Poland implemented an armed forces modernisation programme and developed a civil defence programme, which by the end of the decade had become compulsory for the entire population. It also strengthened public engagement, competence and trust in volunteer formations operating in the field of security. During this period, the concept of a universal defence system was developed, to be implemented in the following decade. At the same time, a strong civil society was built to enhance state resilience, particularly amid intensifying global rivalry between democratic and authoritarian states. Therefore, as early as the 2020s, reforms in the education system were introduced to focus more on cooperation for the common good and teamwork, as well as on preparing for the "threats of the future", such as disinformation and cognitive warfare. These processes were supported by the creation of a cooperation platform linking the third sector with public institutions.

In subsequent years, modern mechanisms of participation and co-creation of law were developed, making use of advanced technologies. All these measures were intended to strengthen Polish democracy and expand citizens' opportunities for meaningful participation, thereby reinforcing state cohesion in an era when virtual networks were becoming more significant and generating identities that sometimes competed with state identity. The reform of local government, aimed at strengthening its independence from central authorities, also contributed to building a stronger and more resilient Poland. A key element of this reform was ensuring that local governments received a level of funding adequate to their new competences, enabling them to meet the developmental needs of their residents.

Poland began to play an important role in shaping EU development, working to ensure coherence between the visions and actions of Member States. A broader approach to security was also implemented within the North Atlantic Alliance. While continuing to emphasise the fundamental importance of collective defence, Poland placed growing emphasis on NATO cohesion and the need for the Alliance to adapt to new threats. It also supported processes to strengthen NATO's innovation capacity, including by promoting closer cooperation with the private sector. Polish diplomacy contributed to the expansion of NATO's rapid reaction forces. Poland also became more engaged in European defence projects, while continuing to uphold the principle of avoiding duplication between the EU and NATO.

A key challenge for the state was shaping relations with corporations, whose influence was steadily growing. Poland sought to create an investment climate encouraging global corporations, especially high-tech firms, to expand their presence on the Polish market. At the same time, it relied on regulations – including those adopted at EU level – and on mechanisms of access to the public procurement market. International corporations, particularly big tech, were widely engaged in the processes of digitalisation and the development of virtual worlds. Privacy protection, ethical use of algorithms and the security of strategic infrastructure were safeguarded. The state, in a spirit of partnership, enabled the private sector to access basic research developed by scientific institutions. At the same time, working within the EU framework, efforts were launched to develop a model for making corporate data accessible to the state. The objective was to balance the benefits of data access, reversing the situation in which the private sector benefitted from free public data, and enabling the state to use aggregated private-sector data for development purposes. To foster more partnership-based cooperation, Poland also encouraged corporations to contribute to several areas crucial for state functioning. They were allowed to participate in the pension system, which reduced its cost for public finances, and were engaged in shaping so-called smart cities and smart villages.

SCENARIO 2
POLAND IN A WORLD OF INTENSIVE USE OF TECHNOLOGY AND GRADUAL ATOMISATION OF SOCIETY

It is 2050, and the world is reaping the full benefits of technological progress, which has driven socio-economic development. An unprecedented level of automation and digitalisation, the growth of biotechnology and Artificial Intelligence, a guaranteed basic income, the shift of life into the virtual world, and widespread openness towards others – this, in short, describes the reality.

A guaranteed basic income – financed by revenues from the taxation of automation – makes it possible to meet basic needs. Social advancement is possible, but difficult. New dividing lines have emerged within societies along technological lines, with competences determining social position and prospects for development. As a result, highly skilled workers dictate the terms on the labour market. They alone have access to the highest-quality services. It is hardly surprising that, under such conditions, many choose to live in virtual reality. The outcome of this shift is stagnation and weakening social bonds. In this situation, some seek new ideas. Transhumanism and space exploration are seen as the new goals, increasingly within reach thanks to unprecedented progress. At the same time, however, techno-sceptics are making their voices heard more often, highlighting the flaws of the prevailing development model.

The negative impact of humanity on the environment has been reduced, among other things, through the implementation of a circular economy and the abandonment of fossil fuels. This transition has been supported by modern energy solutions, in particular advanced, clean and safe energy. Nevertheless, the effects of climate change shape patterns of land use – some areas are no longer suitable for settlement. At the same time, the demand for land has fallen due to the application of modern technologies in agriculture. With automation, the extent of rural areas has diminished, and these areas now serve additional functions. Large cities – dominated by technologically advanced buildings with minimal environmental impact – are inhabited exclusively by the wealthiest, while the rest of the population resides in small and medium-sized towns.

The economy of the future – innovative, responsible and resilient to shocks and crises

In the 2020s, measures were implemented to strengthen the economy, including support for business–science cooperation and the creation of favourable conditions for the development of new technological solutions, including those that were risky but ambitious in terms of potential achievements, with very high long-term returns. This was the first step in a long-term process of building and strengthening collaboration between business and the scientific sector, which within a decade resulted in the establishment of new technology companies, the development of innovative technological solutions, and a marked increase in the number of innovative products and services entering the market. Expenditure on research and development grew, both in public budgets and in enterprises, enhancing the competitiveness of the Polish economy. These measures helped set the pace of technological progress.

At the same time, all political forces in Poland agreed that the country's foreign policy should give greater weight to economic interests. This included efforts to identify and support, on the basis of transparent criteria, key actors and sectors of the economy that could generate internationally recognisable brands, including start-ups. Poland worked intensively to join the technological race as a partner of global leaders, and in some areas aspired to become a leader itself. In the 2020s, the state was not yet competitive in creating new technologies, but it absorbed them intensively. However, the focus of education on ICT, robotics, biotechnology and engineering attracted international corporations to Poland. The concept of smart specialisation was continued at both national and regional levels. The idea of entrepreneurial discovery – bottom-up identification, verification and modification of priority areas of innovation – made it possible to recognise emerging industries with competitive potential in advanced technologies. In the 2030s, Poland continued to profile its technological activities, supporting primarily those sectors with the

greatest potential to raise its international standing. The country became a regional leader in biomedicine, including clinical research, thanks to the launch of a targeted therapy drug on the global market. The potential of the aviation valley was also tapped, with intensive support for the aviation and space sector – by the 2040s, Poland had become a visible player internationally in this field, contributing to the development of satellite and planetary technologies. These processes were carried out through international cooperation. A wave of systemic public investment in infrastructure modernisation, combined with a package of financial instruments, paved the way for the decarbonisation of the Polish economy.

Already in the 2020s, Poland began taking steps towards a moderation-based economy, first through educational campaigns and then through legislation aimed at embedding a circular economy. A deposit system was introduced, the costs of packaging and its disposal were shifted to producers, and product prices were linked to packaging methods so that non-ecological products became more expensive. Equally important were educational programmes, both formal and non-formal, raising environmental awareness and changing consumer behaviour. Consumer protection was strengthened by transparent systems of mandatory non-financial reporting. A standard for product and service labelling was also introduced, supplemented with information on social responsibility and ecological footprint. Broader application of the circular economy became possible in the 2030s as a result of technological progress, a high level of automation, science–business cooperation and changes in social attitudes. The circular economy was implemented particularly in industry, agriculture, water management, construction and housing, and waste management. The process was supported by the introduction of a tax on excessive consumption and by bringing previously unused raw materials into the economy.

In the 2020s, Poland also began improving the legal and financial framework for distributed energy, and launched an advisory system for citizens. Efforts to ensure energy security intensified. Diversification measures, including those unlocking the potential of renewable energy, encompassed collective investment funds, tax incentives, the construction of a smart grid and nuclear power plants, including small modular reactors. In the 2040s, Poland sought to join projects in fusion energy development to secure early access once it became viable. Community energy and energy storage were actively supported. Transmission networks were modernised, greatly expanding capacity for new users, and significant progress was made in electrifying heat generation. Efforts to enhance energy security and carry out a fair energy transition continued and were expanded in the following decades. By the late 2040s, Poland had succeeded in building a zero-emission energy system.

Pension funds were further developed, with private companies, including corporations, participating in their creation and management. To improve living conditions, the government began reforming the pension system, launching a pension fund support programme. These measures laid the groundwork for later reforms. By the end of the 2020s, previously developed policies had begun to be implemented, and a public debate was launched on adopting the euro. Regulations simplifying the tax system and introducing automation-based taxation were also adopted. Economic policy addressed the challenge of structural unemployment, including technological unemployment resulting from advancing automation. Measures included diversifying economic activity in areas threatened by structural unemployment, targeted public investments, dedicated financial support for enterprises and social economy organisations, and adult education programmes.

A fundamental change for the Polish economy came at the turn of the 2030s and 2040s with the introduction of a guaranteed basic income. It was financed through three main instruments: taxation of income from automation, a luxury goods tax, and a higher share of corrective taxes in the fiscal system, applied to environmental pollution and the burden on public healthcare caused by harmful goods and services. This also led to stricter enforcement of high fees and penalties for activities such as the use of environmentally damaging technologies, reliance on emission-intensive energy sources, noise pollution (e.g. air carriers, mass events in urban and natural areas), the use of harmful substances in food production, resource extraction and excessive risk-taking in the financial sector. Guaranteed basic income supported that part of society excluded from work in a highly automated world. The rest consisted of highly skilled workers who enjoyed significantly higher earnings.

Modern society – social capital, new teaching and learning, demographic change, equality, migration

Poland managed migration by implementing a comprehensive migration policy. The authorities also conducted social research to verify the degree of migrants' integration and their spatial distribution. In the 2020s, large-scale public

campaigns were launched across all available media, and schools introduced educational and integration programmes.

With technological progress and the growing influence of corporations, it became crucial to develop, as quickly as possible, legal regulations on privacy protection and the development of Artificial Intelligence. The scope of data on citizens, employees, patients, consumer preferences and beliefs that corporations could access was codified. Encryption technologies then advanced rapidly. Limits on content profiling reduced manipulation and corporate (and other actors') influence on social attitudes. Children were protected from harmful content, for example by facilitating the creation and deployment of parental-control applications and by introducing appropriate teaching and pastoral programmes from early education onwards. In the 2030s, the next step was to regulate AI, with a primary focus on anonymising the data it processes. Public concern over ongoing robotisation and AI led to increased liability for manufacturers for harm caused by robots (accidents) and software using AI algorithms (e.g. discrimination, disinformation, manipulation). Ethical issues linked to AI and cyborgisation were addressed in legislation, followed by the introduction of compliance-assessment tools to verify systems against the guidelines.

By the end of the 2020s, Poland had held a public debate on citizens' basic needs, culminating in a new social contract governing cooperation between society, the state and corporations. In the following decades, as AI and robotisation developed rapidly, working hours were gradually reduced and a basic income was introduced, fuelling the growth of creative industries and leisure. Poland leveraged the potential of international corporations to move selected public services and leisure activities into the virtual realm. In the 2030s, this digital transition accelerated and, in the next decade, became everyday reality. The state therefore took measures to ensure safety in the metaverse and to limit its potentially negative effects on real-world social contact. Poland actively joined international discussions on these topics and was among the first signatories of the conventions regulating them. To raise social participation, a legal basis for online voting was introduced; falling costs and burdens enabled binding local and national referendums to be held effectively. Social policy funded programmes to counter loneliness and social isolation. Investments were made in social activity, culture and dialogue, and conditions were created for participation in collective and intergenerational initiatives. Additional neighbourhood-support programmes for older people enabled regular time with young people in homes, hospitals and care facilities. Support programmes were introduced for those struggling with the new reality to build social skills, including volunteering, opportunities for additional income, talent development in interest-based groups, and education in critical thinking. They also included adaptation programmes to improve understanding of modern technologies and their social impacts, and to build digital competences.

Social polarisation intensified as a by-product of technological divides. The rise of transhumanism sparked major controversy and tensions. In response to growing needs, the state launched a broad debate and public information campaign on the opportunities and risks of further technological progress. The transhumanist movement gained real momentum in the early 2040s. Wealthier groups embraced technological innovations to augment physical and cognitive capabilities and to deepen engagement in the metaverse. Because such solutions were not financially accessible to all, debates escalated and polarisation widened. Regulating access to transhumanist advances became a pressing challenge for the state.

In the 2020s, the education system was modernised by introducing a flexible learning pathway. It was tailored to new market needs, including those signalled by corporations operating in the country and by sectoral demand identified by enterprises, including SMEs. In the second half of the decade, the system was further deconcentrated, granting local actors greater autonomy while setting minimum requirements for cooperation with international organisations (NGOs and global corporations). At the first stage, their involvement took the form of co-financing scholarship schemes (talent-development scholarships and scholarships for special cognitive or financial needs, as well as study-and-work programmes offering part-time employment during the school year) and extracurricular activities focused on developing pupils' individual talents and early career planning. As rapid automation gathered pace in the 2030s, a new approach to education became necessary. Steps were taken to ensure schooling was comprehensive and grounded in a culture of experimentation and diversity. Individualised teaching and learning paths were strengthened through teamwork and self-assessment. Traditional assessment practices were phased out, and organisational changes in teaching and learning became flexible and continuously adapted. Teacher training was overhauled to prepare educators for integrated teaching and to develop learners' skills such as complex problem-solving, critical thinking, creativity, entrepreneurship, people management, collaboration, emotional intelligence, reasoning and decision-making, negotiation and cognitive flexibility. Over time, teachers became "engineers" of continuously evolving educational practice, enjoying high professional trust. Those with strong pedagogical expertise

and well-developed local cooperation networks were most valued. Partnerships were expanded to make systematic use of external institutions (museums, libraries, corporations, technology centres, etc.).

Over time, pilot programmes applied best practices from countries with the most advanced education systems. A wide range of learning sources came to be recognised and valued, and the boundary between formal and non-formal learning blurred. This opened the way for programmes run by local authorities, corporations and their educational organisations. It required a shift in knowledge-and-skills certification towards micro-credentials (certificates issued by accredited institutions outside the formal system). School activities moved beyond the classroom, making greater use of contact with nature and new technologies. Cooperation with local "learning ecosystems" was established, aiming to build an interconnected network of educational spaces. In this way, diverse individuals and institutions could offer a variety of skills and knowledge in multiple formats (e.g. themed workshops, local events, forest excursions, visits to places of interest, hobby development). Together, these measures helped reduce social inequalities in access to work and to development prospects more broadly. To ensure continued social progress and expand opportunities for young people to acquire social (counteracting atomisation, fostering tolerance) and civic competences, the authorities promoted both domestic and international exchanges. This was followed by a series of expert debates to determine how to remove barriers between work and learning and to create smooth development pathways linked and unlinked to employment (personal and professional development). This enabled local governments to introduce programmes that build motivation for lifelong learning and support individuals in their development as people, citizens and workers, including seniors. These programmes were developed jointly with formal and non-formal learning organisations, offering an ever wider range of content and formats.

With automation advancing across all sectors and social structures shifting, a pension reform was implemented in the 2030s, making retirement more flexible and placing greater emphasis on extending healthy life expectancy (including easier access to disability benefits). The reform also addressed the growing demographic burden on future generations of workers, fair treatment of those entering the labour market early, redistributive capacity across income groups, protection for family-related career breaks, and the gradual phasing-out of preferential pension schemes. The healthcare system began to be decentralised with the use of new technologies, alongside programmes to train doctors, medical engineers and, more broadly, social and health-care staff. By offloading bureaucratic procedures to Artificial Intelligence, doctors were able to devote adequate time and attention to patients. Access to day medical care centres was expanded; over time, it was decided that such facilities must operate in every county with a high share of older residents. Digitisation efforts prioritised health education, while a long-term programme to develop the healthcare system was launched (continuous health monitoring for those in need, prevention programmes built on real-world data, and the expansion of remote services). The application of nanotechnology in medicine revolutionised diagnostic and treatment capabilities.

The natural environment as the basis for national development

At the beginning of the 21st century, Poland launched efforts to ensure a sound state of the environment. The authorities facilitated green investments, particularly in renewable energy sources, introduced sustainable public procurement (including measures to eliminate low-stack emissions in construction, promote healthier public nutrition, and support pro-social on-demand transport in areas of transport poverty), and continued the transformation and decarbonisation drive by rolling out a programme for the systematic elimination of low-stack emissions and for the development and protection of blue–green infrastructure. A series of initiatives to "de-concrete" cities was launched. In parallel, adaptation measures in water management were implemented to prevent drought impacts and minimise flood risk (blue–green infrastructure, catchment-based management, monitoring). These steps advanced biodiversity protection, as did the implementation of the EU Biodiversity Strategy for 2030, which enabled environmental condition and resilience to improve by incorporating ecosystem-services valuation into all economic activities. Corporations also joined biodiversity efforts, building their "eco-image" in the process. Investment in wind energy was unlocked. A climate-protection programme based on afforestation (artificial afforestation, natural succession, rational land use, reduced forest fragmentation) was initiated and expanded in subsequent years. Over time, it was complemented with measures to adapt forestry to climate change, including diversified forest management and the restructuring of stands (species diversification, habitat alignment). Work also began on programmes to develop alternative forms of tourism (ecotourism, rural tourism, agritourism) and to channel visitor flows appropriately in protected areas to relieve destinations under the greatest pressure. Environmental initiatives extended to agriculture: environmental and nutrition education was introduced, paired

with certification of hormone- and antibiotic-free food. Poland initiated a European debate on legal frameworks and further research for cellular (cultivated) food, which was gaining support. To enhance food security, an urgent programme to expand agri-food infrastructure was launched.

By the end of the 2020s, environmental-liability solutions were in place, including effective enforcement of the "polluter pays" principle. A large-scale energy retrofit of buildings was initiated, robust ecological compensation was introduced, and the programme to eliminate low-stack emissions continued. As a result, by 2030 net greenhouse-gas emissions in Poland, as in Europe, fell by 55% compared with 1990.

Transformation accelerated in the following decade, partly thanks to technologies transferred by increasingly powerful corporations. Poland met the EU's climate-policy objectives. Moreover, new legal solutions made the environment a priority in decision-making and strengthened enforcement of environmental-protection rules. Despite this, climate-change impacts intensified. It became necessary to develop and implement a coastal-zone adaptation strategy, including the review of investment plans in coastal areas and waters and restrictions on coastal development. Urban infrastructure was expanded to be more bicycle- and micromobility-friendly. Poland continued programmes to restructure forest stands and implemented a drought-prevention agenda to restore natural ecosystem processes. Given deteriorating global climate conditions and risks to achieving the Paris Agreement goals, Poland supported adaptation efforts in countries of the Global South. It was decided to prepare and implement an adaptation strategy for the public-health sector and to reform (including decentralise) crisis-management systems. Climate-sensitive areas received special attention, with sectoral strategies for agriculture (particularly drought-prone regions), construction, energy, forestry and tourism (including mountain and coastal areas and lake districts). A sharp rise in air-travel costs, together with advances in augmented and virtual reality, shifted a significant share of tourism into the metaverse. Poland ensured that rural local-tourism industries benefited from these changes.

The subsequent decade, up to the late 2040s, was no less ambitious. A nationwide ban on solid fuels in buildings was introduced, the power-generation mix was diversified, smart grids were deployed, and energy-storage capacity was expanded. An ecosystem-focused adaptation policy was implemented – finalising programmes to ensure adequate water levels through retention, river renaturation and information campaigns. Blue–green infrastructure in cities came to be treated on a par with technical infrastructure. A decision was taken to expand the area under strict nature protection to 10% of Poland's territory. Food production underwent a genuine transformation, adopting cutting-edge technologies such as insect-based protein, cell-cultured (cultivated) meat and GMOs, while guaranteeing access to traditional food – albeit as a luxury good. These solutions reduced land and environmental pressures from food production, whose condition had been weakened by climate change and land-use practices in the early decades of the century.

By 2050, Poland achieved climate neutrality, yet climate-change impacts continued to intensify and became increasingly tangible. The areas hit hardest were those prone to drought – Greater Poland, Central Poland and the Lublin region – with significant losses also in the coastal zone, mountain and foothill areas, and river valleys. Some of these areas became hostile to life and virtually uninhabited. Technological progress reduced the negative impact of anthropogenic pressures on the environment, but the costs of past human activity could not be avoided.

Shared space – towns, villages, cooperation, spatial planning

Dynamic changes were also observed in Poland's spatial development. In the 2020s, work was undertaken to adapt housing policy to current conditions so that it more fully and effectively accounted for: energy efficiency; affordability—particularly for middle- and lower-income households and for vulnerable people and areas; integration of renewable energy sources; minimising buildings' carbon footprints through efficient resource management and a circular approach (including promoting blue–green infrastructure and using bio-based construction materials capable of storing carbon dioxide); meeting the twin challenges of ecological and digital transitions—deploying smart technologies where possible; and respect for aesthetics and architectural quality, heritage and the preservation of public space.

In addition, an initiative was launched to clarify the division of responsibilities between central and local authorities for organising public transport, and to adopt standards for access to collective transport. A reform of the spatial planning system was also initiated, integrating social, economic and environmental aspects. The focus was on maintaining a polycentric settlement pattern based on small and medium-sized towns. The concept of 'smart cities' began to be widely implemented, and the development of blue–green infrastructure—across large, medium and

small cities—was prioritised to support climate adaptation and improve residents' quality of life. Access to basic public services in smaller centres gradually increased thanks to digitalisation, with more and more services available in digital or mobile form. Universal spatial education was introduced, and ecosystem services were mainstreamed.

Measures aligned with the ideas of the compact city, green city, productive city, digital city, accessible city and efficient city were rolled out gradually. A coherent network of pedestrian and cycling routes was developed. With fully autonomous vehicles expected to reach the mass market by the late 2020s, infrastructure was prepared to enhance road safety, enable intelligent traffic management and provide advanced navigation assistance. A guarantee scheme for building energy retrofits for individual projects was introduced, and the requirements of the directive on the energy performance certification of buildings were fully implemented. The goal was to bring the vast majority of buildings in Poland up to the nearly zero-energy standard by the late 2040s. Furthermore, a dedicated support system was created to build local governments' internal capacity for resident communications. To this end, appropriate regulations were adopted and financial solutions introduced, with a particular focus on strengthening weaker local governments. Legal measures were also enacted to level regional development opportunities. A polycentric network of centres and balanced territorial development were supported through preferential taxes and other financial incentives for people choosing to stay in—or relocate to—smaller towns and rural areas. Convenient connections between local centres were prioritised. E-services were deployed at scale, mainly to raise living standards in smaller towns and rural areas. Technological progress and increasing automation in agriculture gradually shifted the functions of rural areas towards health-promoting landscapes.

In the 2030s, despite spatial-planning reforms, urban sprawl continued—albeit at a slower pace. Access to public services was facilitated by the high level of digitisation and the continually expanding public transport system. The decade was devoted to another modernisation goal: significantly expanding rail connections. Major changes affected the entire transport sector, and mobility began to be treated as a service powering the sharing economy. In the 2040s, construction began on maglev lines along key corridors. Autonomous transport became widespread—even beyond large cities—and flexible vehicle rental and sharing schemes became commonplace. The commercial introduction of passenger drones required new regulations and initiated a process of urban redesign. Advanced Artificial Intelligence was integrated into traffic management and control, reducing emissions, enabling better-designed infrastructure and significantly cutting noise.

In the 2040s, the impact of technological progress in agriculture on rural areas became particularly evident. The high level of automation in agricultural production reduced both the land needed for cultivation and animal husbandry and overall employment. New functions and occupations emerged in rural areas, while freed-up agricultural land was used for energy production and, in line with programmes to improve water retention, for climate-adaptation purposes.

By 2050, the largest urban centres offered comfortable, modern living—especially for the wealthiest. They were dominated by technologically advanced multifunctional buildings and infrastructure integrated with the natural environment into a coherent system through smart-city technologies. Research and development spending in major cities enabled the growth of strong university hubs. At the same time, interventions over recent decades meant that smaller centres—enhanced in terms of access to public services and blue–green infrastructure—also became attractive places to live. Villages, by contrast, served as an escape for techno-sceptics, becoming spaces for alternative lifestyles and self-sufficient local-community therapies. Rural areas opened up to nature: forest cover increased, with new complexes diversified and adapted to climatic conditions, and wetland areas expanded, mainly through restoration and protection programmes. The government, together with corporations, city authorities and NGOs, launched intensive efforts to counter spatial fragmentation, social segregation and ghettoisation. Questions of fragmented urban, social, labour-market, environmental and institutional functions (overlapping decision-making competences) were addressed. The focus fell on rationalising new organisational and spatial-planning models to improve flows between cities and non-urbanised areas, ensure service accessibility and limit peripheralisation. New forms of urban mobility, circular-economy-based planning and social innovation were developed.

A democratic, open, solidarity-based and secure in international relations Poland

Poland began its efforts to ensure security by modernising its armed forces and launching a strategic debate, which concluded that existing political and military alliances should be maintained. At the same time, it was decided to

strengthen them in areas that would address security challenges arising from a lack of social cohesion. This included measures to combat disinformation—becoming increasingly effective thanks to Artificial Intelligence—as well as steps to preserve the technological superiority of Western states over their global competitors.

Technological progress and automation enabled the modernisation of the military in the 2020s and 2030s, reducing the reliance on soldiers in favour of drones, autonomous vehicles and automated defence systems. Poland decided that its armed forces would employ autonomous weapons but also adopted the principle that final decisions on matters of life and death must remain with humans. In the following decade, rules were established to regulate the cyborgisation of soldiers to enhance their physical performance, with the stipulation that such measures must respect the principles of military ethics.

In an effort to increase citizens' attachment to the state in a world dominated by corporations, new standards for public consultation were introduced. Local government was also reformed to strengthen its independence. The tax system was changed to increase the share of local governments in income tax revenues and to link local investments more directly to taxpayers' places of residence. Local referendums became increasingly common, with modern technologies facilitating wider participation in voting.

In the 2030s, tax authority in the area of personal income tax was devolved, and local governments gained broader powers to enact local laws, particularly to protect local markets from corporate monopolisation. The competences of local and regional governments in setting building and spatial planning standards were also reinforced. Principles and mechanisms for cooperation between the state, public administration and corporations were developed. Corporations were obliged to co-deliver certain services, including basic healthcare, education, waste management, maintenance of green areas, management of real estate used by service providers and social education institutions, transport and housing. To oversee compliance with these obligations, special state bodies and separate social oversight authorities were established to ensure that services provided by corporations met consistent quality standards across locations and populations.

SCENARIO 3.
POLAND IN A WORLD OF BROKEN SUPPLY CHAINS AND SHORTAGES

It is 2050, and reality can be summed up in just a few words: a world of shortages. In some places, there are no jobs; in others, there are no workers. Raw materials, energy and technology are in short supply, but above all there is a shortage of willingness to cooperate globally. Humanity has closed itself off to "otherness." Migrants are sometimes admitted, but only under very restrictive conditions. Providing services to ageing populations has become a challenge – in developed countries because of the lack of generational replacement, and in developing countries because of the outmigration of young people.

Humanity is attempting to deal with these shortages in familiar ways – by closing borders and relying on local ties. Each country does so in its own way, resulting in incompatible solutions across different regions. This situation has a negative impact on the economy. International trade and the flow of resources and technology are restricted, and the problem is compounded by high energy prices caused by resource shortages and rising demand. The focus has shifted towards using local resources and tightening economic linkages.

In this world, many conflicts arise, mainly over resources. New alliances are formed around these disputes as well as around ideological affinities. Acting differently – less selfishly or with greater respect for the interests of others – is difficult. Even when the intention exists, the balkanisation of the internet makes understanding other perspectives extremely hard. The global network has splintered, leaving "national internets" as the dominant reality. International organisations that once mediated between states now play only a marginal role.

As a result of severely limited international cooperation, the world has failed to curb emissions or halt global climate change. The complete energy transition has also ended in failure. Problems of water and food scarcity remain unresolved, ecosystems are under severe pressure, and environmental degradation is worsening in many places. These developments have left a strong imprint on space: fragmented due to varying environmental conditions and ghettoised due to growing migration, particularly internal flows. Physical barriers once again dominate borders, and infrastructure development is highly uneven.

The economy of the future – innovative, responsible and resilient to shocks and crises

Poland began building a stronger and more resilient economy by launching legislative changes, including in the areas of renewable energy, energy communities, transmission and distribution networks, and wind farms. It also made intensive efforts to improve energy efficiency.

In the 2020s, the Polish authorities actively pursued an economy of moderation, using fiscal instruments among other tools. Steps were taken to internalise environmental costs and link them to specific activities. In addition, to facilitate doing business in the country, legal regulations for the creation and operation of enterprises – including the tax system – were simplified. Poland also increasingly developed clusters of domestic companies, enhancing the capacity of Polish business to meet internal needs and boosting competitiveness in a world of increasingly limited international ties. As a result, a new model of state–business cooperation emerged, which included strong state support for innovation and greater involvement of domestic firms in co-designing education programmes tailored to the needs of the economy. These efforts aimed to strengthen public–private partnerships and investment in this formula in the context of resource shortages, the need to shorten supply chains and improve the ability to meet local and regional demand. At the same time, Poland worked hard to ensure that domestic standards underpinning national solutions and technologies were recognised at the supranational level, thereby maximising the limited opportunities for Polish companies to operate abroad. In return, domestic firms were required to commit to co-

developing the circular economy. To stimulate the local labour market, work patterns were also made more flexible through modern technologies enabling remote work, which improved employment opportunities for people with limited mobility and boosted productivity.

The legislature also undertook measures to bring into the labour market people excluded from it due to various barriers to employment. Flexible forms of work were developed for those caring for dependants, alongside improvements in the care services sector. Programmes for gradual entry, re-entry and exit from the labour market, as well as retraining – particularly for sectors facing labour shortages due to limited migration – were introduced. Egalitarian solutions in parental and care leave were adopted. The pension system was reformed: privileged groups were abolished, and the system was redesigned to encourage longer participation in the labour market. To strengthen energy security, the construction of a distributed and stable energy network began. This was supported by the promotion of energy cooperatives with the active involvement of local governments, communities and NGOs, as well as support schemes for energy storage facilities. The expansion of the power grid, prosumer energy, nuclear energy and offshore wind farms were the key objectives set by the authorities for this decade and the beginning of the next. At the same time, Poland invested more intensively in food security, including by promoting regenerative agriculture and measures to ensure equal access to water and food for all citizens. In healthcare, growing emphasis was placed on prevention, while the planetary diet gained popularity. Restrictions on the production of cell-cultured meat and GMOs helped to strengthen the brand of Polish organic farming. The substitution of some animal products with plant-based alternatives also spread, bringing economic benefits for farmers.

By the end of the 2030s, major economic decisions had been made. A tax on robotisation and automation of work was introduced. As these processes advanced, career guidance systems and the adaptation of professional skills and qualifications were modernised. Public funds were invested in technologies for capturing and utilising emission gases, as well as in boosting the country's own access to raw materials. A comprehensive plan to ensure Poland's maximum energy and technological self-sufficiency – especially in industries previously served by foreign or international companies – was implemented. It included measures to further improve energy efficiency, develop nuclear and renewable energy, increase the share of biogas in the energy mix, expand domestic gas production (including from shale formations) and obtain concessions abroad, introduce underground coal gasification, build up energy storage (including pumped-storage plants and hydrogen use), construct waste incineration plants and recover energy resources such as uranium from waste heaps. Smart metering and dynamic tariffs were also introduced, encouraging reduced electricity consumption during peak demand. Recognising growing localist trends, the authorities also launched work on supporting local currencies tied to local product markets. The system entered into full operation in 2050, after decades of preparation: establishing the legal framework for local currencies, integrating them into revitalisation programmes, and designing mechanisms for local governments. The system was complemented by the introduction of local climate bonds as a financial tool to support local climate action and strengthen the competences of self-governments.

Modern society – social capital, new teaching and learning, demographic change, equality, migration

Over the past thirty years, Poland has prepared itself well to function in a world increasingly closed to "otherness" and cooperation. A government migration policy was implemented that defined the scale, limits, purpose and direction of migration, tailored to social needs and the labour market. Various stakeholders were involved in its design, and a special cooperation platform with the participation of civil society organisations was created to ensure equal voice. Similar goals were served by the adoption of a package of good practices in public consultation, modelled on solutions used in countries with well-developed local democracy tools. In subsequent years, migration policy focused on securing the inflow of specialists in shortage occupations within an economy characterised by scarcity and low automation. In addition, a restrictive citizenship policy was introduced.

In the 2020s, efforts also began to radically improve public health, including through the implementation and development of the National Health Programme 2021–2025. In response to the growing problem of childhood obesity, the number and types of physical education classes were increased and their quality improved, while campaigns were launched to raise awareness of healthy eating. Lawmakers also introduced incentives for schools to cooperate with local sports centres and initiated a campaign to promote greater physical activity among both children and adults. Work was also launched on prevention and coordinated care programmes, particularly for

middle-aged people, to improve health outcomes while reducing future healthcare costs from advanced diseases. At the same time, work began on access to data and integration of citizen health monitoring systems. In later years this enabled a healthcare system based on advanced e-consultations (combining doctors' expertise with Artificial Intelligence analytics and precise measurements). This enhanced the efficiency and accessibility of healthcare, including for senior citizens, and accelerated clinical decision-making. The digital transformation of healthcare began with the implementation of the e-health development programme for 2022–2027.

By the end of the 2020s, Poland had reformed its education system to focus on labour market skills and the development of individual talents. A key part of the reform was stimulating creativity and teamwork, based on the recognition that in an increasingly apparent world of shortages, creativity would be decisive for both success in the labour market and more effective use of national potential. Education also placed greater emphasis on resource stewardship, the natural environment, spatial awareness, and skills of synthesis and critical analysis.

Another element of the reform was opening the system to non-permanent teachers, made necessary by the limited number of people willing to enter the profession. Senior citizens were therefore engaged in working with students. A major achievement in education was also the revival of vocational training. Its renaissance – additionally focused on the creative use and adaptation of available technologies – proved essential in a world of shortages, where striving for maximum self-sufficiency became a priority.

During this decade, reforms also extended to healthcare and elderly care. Artificial Intelligence and other modern technologies were introduced, and partially paid health services linked to income were launched. Initial plans were developed for housing estates tailored to senior citizens' social and health needs. Apartments in these estates were equipped with technologies improving safety and enabling rapid access to telemedicine and assistance.

One of the most important policy goals of the decade was to shift the paradigm of socio-economic progress: quality of life was to replace GDP as the core indicator. To this end, Poland actively engaged in the EU's Beyond GDP initiative and began integrating the most relevant solutions into its economic system. The focus was on developing indicators to address the 21st century's global challenges – climate change, poverty, resource depletion, health, environmental quality, quality of work and quality of life. Once social and economic consensus was reached, the new set of indicators was embedded into planning and programming at all levels of state and regional governance.

The 2040s became a time for adapting integration programmes to a new generation of migrants. At the same time, Poland sought to address the challenges of an ageing society by introducing universal geriatric care, including the development of senior housing estates. It was also a period of change in social services strategy. Poland decided to further strengthen deinstitutionalisation by introducing fiscal incentives and legal measures – including those linked to labour market participation – to favour care within families and local communities. Moreover, to reinforce civil society and citizens' attachment to the state in an increasingly localised world, it was decided to use electronic communication tools for voting in elections and referendums.

The natural environment as the basis for national development

Even in such difficult external conditions, Poland did a great deal to ensure that its citizens could enjoy the best possible quality of the environment. It began these efforts at the start of the 21st century by taking stock of areas of high natural value with a view to their protection, working in parallel on financial support mechanisms for local communities living in those areas, designating blue-green infrastructure and introducing legislation to safeguard it. Work also started on the principles for reforming environmental-protection institutions, covering the coordination of environmental-protection activities, a clear division of competences and responsibilities, and stronger enforcement of environmental law, including legislation aimed at granting legal standing to the environment.

A wide-ranging debate on the introduction of universal climate and environmental education was launched in Poland. Measures were also taken to strengthen the protection of areas of natural value. Blue-green infrastructure was mapped and delineated, and spatial-planning provisions for its protection were reinforced. Methods for valuing ecosystem services were developed and incorporated into decision-making. New protective regulations included, among other things, stronger safeguards for wetlands, natural floodplains and ecological corridors (which helped to maintain adequate retention and enable the free migration of species). Another important step was the introduction of liability mechanisms for the use of the environment, including proper scope and enforcement of the "polluter pays" principle, also with respect to industrial animal husbandry.

Recognising the increasingly urgent need to build a circular economy (CE), Poland began to promote "green clauses" (incorporating CE elements) in public procurement. It assigned higher priority to CE solutions in industry, water management, construction and housing, and waste management. In these areas, it introduced regulations designed to tighten implementation standards for the CE. Changes also affected consumers. Costs were explicitly linked to consumption, including the scale of its environmental impact. At the same time, transparency of consumer charges was ensured through a standard for product and service labelling.

In the second half of the 2020s, as climate conditions became more challenging, adaptation actions proved crucial, including sectoral adaptation strategies for agriculture (especially in areas threatened by drought), construction, energy, forestry and tourism (including coastal and mountain areas). In subsequent steps, Poland developed and implemented adaptation strategies for the coastal zone, identifying areas at risk of sea-level rise, reviewing investment plans in the coastal zone and coastal waters, and preparing regulations for coastal protection and limits on development (including preliminary plans for the possible relocation inland of some populations living in coastal areas due to climate-change impacts). The protection of designated areas was also strengthened, including through support for site management and for endangered species particularly affected by climate change.

In the following years, Poland continued to coordinate adaptation governance in water management to prevent the effects of drought and minimise flood risk. This was achieved in particular through the development—albeit constrained by difficult conditions—of blue-green infrastructure, catchment-based management and the introduction of comprehensive monitoring of climate-change impacts and losses from extreme weather events. Poland developed and implemented an adaptation strategy for the public-health sector. This included preparing the healthcare system to mitigate the effects of heat stress and extreme weather events; adapting health promotion and disease prevention; protecting vulnerable population groups from heatwaves; educating medical personnel about climate-related, tropical and vector-borne diseases; and conducting epidemiological, clinical and climatic-physiological research on climate-related illnesses. It also reformed (including decentralised) the crisis-management system, adding, inter alia, provisions on managing food reserves in the event of poor harvests and ensuring energy supplies during blackouts. The core premise was to make the system more flexible so it could support the fastest possible response to increasingly frequent extremes. Efforts to protect biodiversity were also intensified. The main initiative here was the implementation of the EU Biodiversity Strategy for 2030. Equally important was steering adaptation policy towards ecosystem protection—river renaturation, wetland restoration, and the preservation and development of blue-green infrastructure. In addition, Poland strengthened its nature-conservation instruments, focusing them on areas of high natural value, and introduced legislation requiring the valuation of ecosystem services to be factored into decisions.

Over the subsequent years—through the end of the 2030s and into the mid-2040s—the intensity of nature-conservation efforts did not diminish: new national parks were designated, and mechanisms to support local communities were implemented, including environmental grants for local governments and an increased forest-tax rate. The reform of environmental institutions continued, with expanded competences and higher funding. Extensive training for public administration on the energy transition was rolled out. Given the weakening of international linkages (including a less integrated European energy market), the emphasis shifted to the greatest possible energy self-sufficiency (renewables, increased domestic gas production, energy storage—including pumped-storage plants—and the use of hydrogen). As climate impacts became more pronounced, programmes for water saving and retention were implemented, and initiatives to combat food waste were launched. During this decade, Poland also worked more actively to build alliances securing access to critical raw materials. It additionally decided to ban the registration of internal-combustion vehicles.

In the following decade, it was decided to expand the area under nature protection, including strict-protection zones, while broadening support for local communities managing these areas. Methods and legislation mandating the inclusion of environmental costs in investment decisions were further strengthened and refined.

Shared space – towns, villages, cooperation, spatial planning

Improvements in this area began in the 2020s with the adaptation of housing policy to the needs of all residents, especially those with medium and low incomes. It was assumed, among other things, that the role of local governments would be increased, housing affordability improved, the sharing economy supported, rent control policies introduced, and housing offering better quality of life developed. The policy was consulted and implemented

by the end of the 2020s. A support system was also created for the construction of long-term rental housing (run by public institutions), along with urban models (space recycling) and landscape designs (new patterns to integrate renewable energy sources into the landscape), taking into account environmental and climate protection principles, as well as multifunctionality and the accessibility of public services. This work later brought tangible benefits – it made it easier for the Polish authorities to regulate space once it became clear that, due to environmental conditions, fragmentation was unavoidable.

Seeking to strengthen the importance of local communities and their influence on space, new decision-making methods were developed and implemented, with citizen participation playing a major role. These included deliberation tools, panels and citizen consultations, as well as the implementation of jointly agreed outcomes. At the same time, steps were taken to improve the situation in rural areas. By the end of the 2020s, the authorities had launched a modernisation programme to provide access to high-speed internet infrastructure in rural areas. This enabled the delivery of high-quality digital public services.

In the 2030s, Poland's efforts focused on creating housing infrastructure in such a way as to ensure favourable conditions for the social integration of migrants and to avoid the emergence of separate enclaves. To counteract the ghettoisation of space, Poland continued its programme of revitalising the existing housing stock and introduced regulations requiring that a certain share of new housing units be transferred to the public housing stock. At the same time, in an effort to maintain national cohesion, it sought to manage space in a way that prevented the creation of "elite ghettos" accessible only to the wealthiest citizens. Poland also improved connections between local centres by building an integrated and accessible transport system. In addition, reforms were implemented to fully roll out a circular economy focused on low emissions and resource efficiency, using administrative, legal, economic and social instruments. Limited access to many raw materials accelerated the development of landfill mining and product recycling, which allowed a significant reduction in extraction. Circularity enabled rationalisation in the materials economy and, in many cases, access to recovered critical elements and rare earth metals. Furthermore, Poland began to promote the principles of multifunctionality and resource efficiency in spatial planning, seeking to shape expected behaviours through fiscal incentives and disincentives.

By the end of the 2040s, another modernisation project was launched, closely linked to the development of Poland's electromobility and autonomous vehicle sector. The public transport system was expanded so that it could gradually replace private transport, which was already disappearing in a world of widespread shortages. As a result, city centres were freed from large above-ground car parks, air quality improved, and many hectares of impermeable urban surfaces were removed, increasing green space, improving water circulation and raising retention levels.

A democratic, open, solidarity-based and secure in international relations Poland

The early 2020s prepared Poland well for functioning in a world divided by walls. It became clear that higher spending on security was essential. Poland undertook efforts to modernise its army, basing it increasingly on domestic industry and defence technologies, and expanded dual-use civil–military infrastructure within the framework of military mobility. It also recognised that cybersecurity must be placed high on the list of priorities. The importance of this only grew in the following decades, as it became increasingly evident that the world was heading towards the end of the era of the "global Internet" and its "Balkanisation". In response, Poland introduced institutional, financial and capacity-building solutions as early as the 2020s to strengthen the resilience of society, IT systems and critical national infrastructure (including investments in the development of mesh networks). Some of these measures involved reforms in the education system aimed at enhancing citizens' ability to think critically and filter information. In addition, following EU trends, Poland imposed restrictions on international technology companies. This led to a change in the operating model of some social media services. The ability of algorithms to deliver profiled content was limited, which increased the availability of diverse information and broadened the space for dialogue, while reducing the negative effects of "information bubbles". These early steps towards "normalising" the online environment and shaping good user habits proved useful later, once the Internet had lost its global character.

In subsequent years, Poland's international efforts concentrated on ensuring the broadest possible access to raw materials. To increase its leverage, the state became more active in institutionalising and deepening regional cooperation. On the one hand, this was intended to give Poland wider access to resources, and on the other, to enhance its economic influence by promoting its own standards for products and technological solutions. At the

same time, Poland recognised that, to strengthen its bargaining power, it needed to increase its attractiveness to neighbouring countries. To this end, it pursued the transformation into a "security provider". This is why the modernisation programme of the armed forces continued in the 2030s, with growing emphasis on the development of the domestic defence industry. Polish defence consortia became key partners in the technical modernisation of the region's armed forces, while the experience of the war in Ukraine allowed Poland to establish a service and training hub for allied countries. At the same time, when planning new military units, training grounds and production facilities, the authorities ensured that they were located in areas losing socio-economic functions. This helped stimulate their development and, at the same time, freed up military land in more attractive urban markets, enabling its transfer to developers.

Poland's credibility as a "security provider" was further supported by its proposals for reforming the North Atlantic Alliance. NATO remained the cornerstone of national security, but in discussions about its future, Poland was among the voices emphasising that, in the face of new international challenges, the Alliance should also evolve into an organisation capable of safeguarding its members' access to strategic resources, such as Arctic shelf deposits or ocean-floor reserves.

The world of shortages also opened the way for a series of reforms in public administration. External conditions, especially restrictions on international trade, made public service more attractive to citizens than employment in the private sector. The authorities seized on this trend to strengthen the administrative apparatus by attracting highly qualified specialists. This made it possible to introduce new regulations eliminating the previous practice of outsourcing parts of public-administration tasks to private entities.

SCENARIO 4.
POLAND IN A WORLD OF DRASTIC TECHNOLOGICAL, ECONOMIC AND SOCIAL DIVERGENCE

It is 2050, and the world is deeply divided. The fortunate live in the 'happiness zones' – territories whose citizens enjoy the highest standard of living. They may work in demanding and well-paid jobs if they wish, but they do not have to – their families have already accumulated enough capital to live comfortably. Paradoxically, this has created serious social problems: mental illnesses and disorders are on the rise, proving to be a negative side effect of not working and lacking purpose.

The rest of the population lives in 'poverty zones'. If they are lucky, they find employment in the few professions that have not yet been automated. If not, they depend on state aid, receiving social benefits that provide only a basic existence. Violence is spreading, and almost everyone lives with a sense of threat.

Space has become clearly divided into areas of prosperity and deprivation. The disparities are vast – in spatial organisation, population density, environmental quality, and access to public services. The 'happiness zones' exploit the 'poverty zones' in order to preserve their own comfort and save their own space.

The lack of global cooperation has made it impossible to solve many of humanity's pressing problems. International tensions continue to threaten escalation into conflict. Supply chains have been shortened due to reluctance to cooperate and the need to ensure self-sufficiency. Capital has concentrated in the 'happiness zones', which benefit the most from technological development. Environmental costs and benefits are unevenly distributed – some regions have access to clean technologies, while others remain technologically backward, including in energy. States and corporations manipulate and control people. International organisations have become merely symbolic, and there is no integration based on shared values.

The 'happiness zones' and the 'poverty zones' are forced to forge alliances – often ad hoc – to pursue their interests. For despite technological progress, the world has not become a place where every problem can be solved alone.

The economy of the future – innovative, responsible and resilient to shocks and crises

The changing economic situation already in the first half of the 2020s required a review of key industries – those with the greatest development potential, the strongest impact on other entities and areas of the economy, and links to the national raw material base – in order to decide whether to shift the focus of support for selected industries at both the national and regional levels. This decision later influenced the orientation of education (at all levels) towards teaching technology and building digital competences. By diversifying regional specialisations in the economy and related education, regional research and development networks with different areas of expertise were created. This reduced competition between regions and prevented it from deepening territorial development disparities. The 2020s also saw the launch of a systemic organisation of the circular economy.

From the 2030s onwards, Poland clearly recognised the need for economic reform, understanding that social inequalities could seriously undermine progress in occupational safety, health, education and innovation, as well as weaken the social consensus necessary to legitimise and implement long-term development plans. Poland withdrew from intensive tax competition between countries and decided to reform its fiscal system. Fiscal policy was oriented towards reducing disparities between different social groups – in particular between the richest and those perceived as 'economically redundant', whose work was increasingly performed by robots or algorithms. To counter the risk of excessive capital concentration in the hands of a very narrow social group, taxes were introduced on capital and

consumption, while labour was given tax relief. At the same time, social policy reform was launched to increase the effectiveness of its instruments, especially social benefits. Based on the assumption that tackling inequality is not only a matter of justice but also crucial for human health, social cohesion, economic stability and the survival of democracy, quality-of-life indicators (going beyond classic economic indicators such as GDP) were elevated to the status of economic indicators and monitored continuously. Changes in the fiscal system also included broadening the corporate tax base, increasing the progressivity of the tax system in relation to both income and wealth, taxing automation of work, and tightening the tax regime.

With the rapid development of Artificial Intelligence and robotisation, working hours were gradually reduced. In the 2040s, a guaranteed basic income was introduced – financed by taxes on robotisation, capital gains and luxury goods – while measures were implemented to counter the decline in innovation and stimulate the creative industries. Efforts were also made to enhance the attractiveness of spending non-working time in less developed areas. Despite this, major disparities persisted between those employed and those living solely on basic income. It became necessary to build a system limiting the effects of social and economic inequalities in order to preserve the principle of social solidarity. Measures were taken to mitigate the negative impacts of advancing automation: wage pressure on workers whose tasks were automated, reduced labour market fluidity, difficulties in job relocation, job losses, and rising unemployment, especially among low-skilled or older workers for whom acquiring new skills in emerging professions was out of reach. Anticipatory actions were introduced before workers became unemployed, based on the premise that the most effective approach was to facilitate job changes while people were still professionally active. The system created for this purpose evolved over time and included several elements: temporary job placement offices in companies planning mass layoffs, state-funded counselling on opportunities and retraining needs, and public employment services supported by Artificial Intelligence to monitor and forecast demand for specific skills. Based on this knowledge, they mediated in forming partnerships between growing companies and education or training providers. The system also offered paid study leave for individuals simultaneously employed and retraining, financed through automation taxes.

The energy sector was also transformed. To strengthen national security in this field, the assumptions of the energy transition were revised as early as the first half of the 2020s. By the end of the decade, important reforms had come into force. They included creating favourable conditions for the development of wind power, prosumer and distributed energy (group and virtual prosumers, energy communities), energy generation from alternative sources as well as biogas, biofuels and hydrogen, transmission and distribution networks (smart grids, shared infrastructure, direct lines), and the construction of pumped-storage power plants. The expansion of renewable energy was later accompanied by the introduction of nuclear power, including small modular reactors (SMRs). Modern transmission infrastructure ensured that heavily industrialised regions had access to electricity from renewable sources, such as small hydroelectric plants. Furthermore, the modernisation of transmission networks enabled the electrification of heat generation. In the 2030s, most buildings underwent comprehensive thermal modernisation. During the transition period, efforts were made to increase access to and use of domestic raw materials (shale gas, biomass), including underground coal gasification and waste incineration. This, however, led to unevenly distributed environmental costs and benefits – for example, poorer regions sometimes hosted waste storage sites or biomass facilities opposed by local communities, while shale gas extraction through hydraulic fracturing caused local environmental degradation. The energy transition was completed by the late 2040s, enabling Poland to move away from coal.

At the same time, economic development remained a priority. Before 2030, Poland supported the EU initiative to relocate the production of strategic components – vital for building the economy of the future – to Europe. The integration of the public procurement market, launched in the 2020s, was expanded through European alliances in key sectors such as natural resources, batteries, semiconductors, hydrogen and cloud technologies. Poland also participated in European microelectronics projects. In the 2030s, growing reluctance towards international cooperation and the rising need for self-sufficiency forced the gradual shortening of supply chains. Incentives were introduced to transfer strategic sectors from Asia to Poland, creating new economic potential based on former industrial areas. This was achieved through the regionalisation of production and supply chains by Western European countries, which saw cooperation with Poland as politically safe and economically viable despite higher labour costs, given their higher quality. The Polish economy focused on sectors where it had developed competitive advantages over other markets, thanks to innovations, R&D activity and skilled labour.

Rapid technological progress also made possible new undertakings. From the 2030s onwards, this included exploring and exploiting parts of the Earth that had previously been inaccessible. At the same time, agriculture was adapted to changing conditions, for example by transforming niche farming and cultivation into leading industries, such as the use of insects in food production. In the 2040s, Poland's horizons broadened further, as it joined projects for extracting raw materials from space and the ocean floor, including from its concession in the Clarion-Clipperton Zone.

Modern society – social capital, new teaching and learning, demographic change, equality, migration

As part of its efforts to build a "society of the future," address the demographic gap, and meet the expectations of Poles, Poland adopted a selective migration policy closely linked to the education system and the labour market, aimed at attracting essential specialists. Talent-attractiveness indicators for in-demand occupations were developed and updated periodically so that migration policy could be adjusted to changing labour-market needs. The policy targeted highly qualified specialists and entrepreneurs—widely recognised as contributors to economic development (business owners and active investors). A public-sector body was established to inform specialists in shortage occupations about opportunities and to assist them in decision-making, negotiations with employers, and settling in the country. Separate procedures were developed for each group, covering issues such as income and taxation, and quality of life. A further premise—updated over subsequent years and decades—was that highly qualified specialists would be drawn to Poland by access to networks of collaboration with other highly skilled workers and by strong opportunities to participate in technological breakthroughs and development. For business owners wishing to operate in Poland, minimum capital-investment requirements were introduced as a condition for obtaining a visa.

The 2020s also saw the start of a review of the healthcare system—a debate on the scope of benefits—accompanied by stronger involvement of private providers. Reform of the social-benefits system sought to balance long-term revenues and expenditures without materially harming beneficiaries and to integrate social-security transfers, supplementary benefits, and healthcare into an interlinked system. As part of fiscal prudence, access to healthcare benefits was optimised and prevention prioritised. Major changes occurred when AI began to be widely used to calibrate transfers across segments of the social system. Client-service systems for healthcare, long-term care, and social benefits were integrated to improve service coordination and information exchange among staff (physicians, social workers, medical assessors). This made it possible to detect and remove organisational, technical, and financial obstacles or irregularities and to avoid duplicative costs (e.g., repeat tests in a short period, missed appointments).

Growing trust in non-public insurance spurred very rapid growth in the private insurance market and in private healthcare (including as an employee benefit). The insurance market gave policyholders greater choice of providers and scheduling, which improved the health system's responsiveness. Concerns nevertheless arose about preferential treatment of privately insured patients within the public system and about low-income groups' access to modern treatments and the most effective therapies. In response, rules for exchanges of services between public and private facilities were standardised. A particular focus was the pricing of publicly subsidised medical procedures performed for privately insured patients. New rules were designed to ensure that private-insurance payments reflected the full economic cost of services delivered within the public system. Contributions to the public system were also revised so that private insurance would be a realistic option for a larger share of the population.

Extensive education reforms were launched, with Polish schools emphasizing creativity and collaboration. The authorities also introduced two programmes: development of IT competencies (aligned with lifelong learning and age-appropriate pathways) and identification of tech talent. These efforts aimed to build strong technological capabilities across society—an asset in a future where intense competition extended into cyberspace. To improve the odds of success, Poland moved early in the 2020s to ensure universal access to broadband internet. Over time, as new technologies advanced and the education system became more flexible, the distinction between formal and informal learning disappeared. Society embraced the next wave of internet development and the digitisation of life—Artificial Intelligence, Virtual and Augmented Reality, the metaverse, and the Internet of Things. Regulations followed to ensure algorithmic transparency, ethical design of educational content, and user-data security, preventing misuse. In modern schools, digitisation enabled deep, immediate assessment and certification of knowledge, skills, and attitudes. Learning became effectively personalised through AI. Corporations linked their recruitment systems with the educational AI ecosystem. Global digital companies came to play a key role in powering learning systems and

new human–machine interfaces. In this context, national authorities broadened the catalogue of recognised pathways for acquiring and certifying knowledge. Infrastructure freed up from the old school model was repurposed for basic care services and supplementary teaching. By the late 2040s, the teaching profession in its current form had effectively ceased to exist.

On the labour market, particular emphasis in the 2020s was placed on building technological competencies. Incentive schemes were created to retain specialists in the country or encourage their return. Additional incentives prompted employees and employers to keep investing in skills throughout careers. Programmes promoted occupational flexibility—and, thanks to new technologies, role flexibility with respect to age, abilities, and technological aptitudes. Higher-education institutions supported regional specialisations—for example, Subcarpathia (Podkarpacie) in aviation, defence, and space; Pomerania in energy; Masuria in leisure and luxury industries; and Silesia in electromobility.

Further major healthcare changes followed. AI was integrated to support the health system. Broad preventive-care programmes were launched to raise healthy life expectancy and reduce the costs of treating advanced disease. By the 2030s, intervention in mental-health services became urgent, largely due to rising automation and unemployment. Universal access to mental-health care was introduced, and inactive residents were encouraged into activity (volunteering, public works, local employment, seasonal work). The mental-health programme was comprehensive and flexible, to be adjusted continuously to residents' needs. In the first half of the 2020s, a nationwide 24/7 psychological and psychiatric crisis hotline was launched. Around the turn of the 2020s and 2030s, a pilot began using humanoid robots to support people in health crises. Hospitals adopted robotic nurses to deliver patient-specific medication doses and perform basic diagnostics. In the 2030s, advanced limb prostheses—including those using neural implants—entered practice. In the 2040s, exoskeletons—until recently used mainly in the military and on factory floors—were introduced for post-trauma rehabilitation. These and other breakthrough technologies were initially available primarily in the private healthcare system. Consequently, the government partnered with manufacturers and private providers to expand access for patients outside those systems.

Already in the 2020s, steps were taken to strengthen the advocacy capacity of professional NGOs, associations/foundations, social movements, professional bodies, and local governments so they could effectively influence public discourse, and political and business decisions, and shape legislation. Support included skills-transfer and exchange programmes and the sharing of good practices. Cooperation networks in the non-profit sector were also encouraged. In the 2030s, the co-financing system for civil-society organisations was streamlined. To foster openness, tolerance, and young people's social skills—mainly to counter social atomisation—domestic inter-regional exchange programmes were launched. Widening economic inequalities in the 2040s made it necessary to build mechanisms to limit the effects of social and economic disparities while upholding the principle of a socially solidaristic state. Civil society, human-rights defenders, and justice-system practitioners were promoted, alongside public awareness of civil rights. Transparent conditions were created for civil-society organisations to grow and act effectively to combat inequality, protect human rights, strengthen the rule of law, counter disinformation and corruption, and teach media literacy—also to limit the impact of negative global trends on Polish society, especially waning willingness to cooperate and the growing role of state and corporate control.

The natural environment as the basis for national development

Intensive efforts to ensure Polish citizens' access to a high-quality natural environment began in the early 21st century. Authorities started identifying environmental resources that required regulated (permit-based) use and developed methods for valuing ecosystem services. Research on plant proteins became widespread and was broadly applied, contributing to climate and environmental protection and to more efficient use of agricultural land.

In addition, the Polish government adopted a city-greening programme and enacted regulations mandating the inclusion of environmental costs in development planning—among other things, to embed ecosystem-service valuation in decision-making. These measures laid the groundwork for policies pursued in subsequent years. National strategic documents recognised the environment as a core component and reference point for development. Implementation continued on the EU Biodiversity Strategy for 2030 and on sectoral adaptation strategies for agriculture (especially in areas at risk of drought), construction, energy and tourism (notably along the coast and in mountain areas). Forestry was adapted to climate change by introducing diversified forest management and beginning the restructuring of forest stands (greater species diversity, habitat matching). An adaptation strategy for the coastal

zone was developed and implemented, identifying areas at risk from sea-level rise and marine flooding, reviewing investment plans in the coastal zone and adjacent waters, and preparing coastal-protection rules that limit shoreline development. Adaptation governance in water management was coordinated to prevent drought impacts and minimise flood risk (blue-green infrastructure, catchment-level management, monitoring). These reforms were necessary, but over time coordinating environmental policy became increasingly difficult.

Weak international cooperation produced adverse environmental outcomes. The continuity of natural systems was disrupted by broken ecological corridors, threatening ecosystems—even in "prosperity areas." Maintaining environmental quality became challenging: protection costs rose sharply and management barriers increased. Despite this, Poland advanced adaptation policies, including river restoration, the recovery and protection of wetlands, and the preservation and enhancement of blue-green infrastructure. Nature-conservation instruments were strengthened, allowing expansion of strictly protected areas. Methods and data systems for valuing ecosystem services were developed to factor them more fully into decisions. Local climate bonds were also introduced to finance climate action and build local-government capacity.

Environmental education was mainstreamed across all levels of curricula. Ongoing public programmes and campaigns, supported by fiscal incentives, promoted pro-environmental values and lifestyles. Significant technological progress in the 2030s increased their effectiveness by enabling campaigns to be precisely tailored to individual citizens' profiles and views. As extreme meteorological and hydrological events became more frequent and severe, crisis-management reforms were necessary. The guiding principle was flexibility for the fastest possible response to intensifying extremes. The system was decentralised; investment in crisis-management services (staff, data, equipment) was increased; new procedures were developed; and cooperation across actors was deepened. An adaptation strategy for the health sector was prepared and implemented: the healthcare system was readied to mitigate heat stress and extreme-weather impacts; health promotion, disease prevention and the protection of vulnerable groups during heat waves were adapted; medical personnel were trained on climate-related, tropical and vector-borne diseases; and epidemiological, clinical and climate-physiology studies of climate-linked illnesses were launched.

Over time, a positive shift for the environment came as Poland—thanks to the growth of renewables, the deployment of nuclear power, and improvements in energy efficiency (including in industry)—completed an effective energy transition, moved away from fossil fuels and achieved energy independence. Expanded transmission and distribution networks and energy-storage facilities enhanced the security of the national power system. Efforts to foster a cleaner environment were further supported by empowering local governments to require the incorporation of blue-green infrastructure in new investments. A circular-economy approach was implemented, to a meaningful extent, in industrial production, construction and housing, and waste management—via major gains in energy efficiency, frugality-oriented consumption, and strengthened standards for industry and construction. Nonetheless, some critical raw materials from unsustainable sources continued to be used.

Climate change continued to progress and was exacerbated by global-warming impacts in the hydrosphere—including the cryosphere—and the biosphere. In Poland, the most vulnerable areas were the coast, mountainous and foothill regions, and river valleys, while drought hindered socio-economic development across the Central Polish Lowlands and the south-western lakelands. This contributed to growing climate-related migration, including internal movements.

Shared space – towns, villages, cooperation, spatial planning

Efforts to improve spatial organisation began with its reorientation towards decentralisation and spatial planning. A law was also adopted requiring development to be managed at the functional level.

In the 2020s, work began on preparing general municipal plans, making wider use of digital and satellite tools in spatial planning, and expanding the use of big data collected by institutions and companies specialising in spatial information. Steps were taken to strengthen the coordination of spatial management within functional areas so that the country's spatial development could proceed in a planned and coordinated way, while respecting the planning authority of local governments, as provided for by national regulations on safety and spatial order. Based on municipal master plans, urban sprawl was halted, and construction processes had to give greater consideration to the limitations of liveable and developable space, as well as the public interest, including architectural heritage. At the same time, the effects of spatial chaos resulting from the post-socialist transformation were gradually addressed.

To complement scattered development, compact, multifunctional local centres were created to meet residents' basic needs.

The paradigm of 'ordering' space continued to guide the Polish authorities in later years. By the end of the 2020s, reform of the planning system had been completed, from then on taking into account the scarcity of spatial resources, including fiscal constraints. Spatial education was introduced into the school curriculum (among other things, as a tool to strengthen creativity). To address development disparities, the system of equalisation subsidies for local governments with weaker financial positions than the national average was expanded. The aim was to prevent excessive differences in development levels between regions and to ensure that as many residents as possible had access to public services without the need for internal migration. As a result, environmental quality and access to public services were maintained at a sufficiently high level throughout the country.

By the end of the 2030s, spatial management had been optimised, among other things through the recycling of space. Some abandoned areas were renaturalised. Flexible forms of land and facility use were also introduced into the legal system. Despite these measures, Poland remained diverse in terms of quality of life, although the differences were not so pronounced as to suggest internal insularity. Cities and their functional areas, as well as naturally attractive regions, fully fit the definition of 'prosperity areas'. In depopulating areas, inhabited mainly by older, poorer people wishing to remain independent of corporations (e.g. outsiders, artists, freelancers, social activists), the standard of living was lower—still sufficient for a dignified life, though without luxury. The skills and commitment of these people provided potential for the development of such areas, while the high digitalisation of public services made it possible to ensure a good standard of living at lower cost.

A democratic, open, solidarity-based and secure in international relations Poland

The sense of security that had been undermined in the 2020s led Poland to launch a programme to build a modern army, aligning it with the then guidelines of the North Atlantic Alliance. In foreign policy – driven by the decline in the importance of supranational bodies, the uncertain international situation and the need to shorten supply chains – Poland intensified efforts to form local alliances, often ad hoc, that would allow it to address immediate needs. Initially, these focused on security, but later extended to energy, manufacturing and science.

During the 2020s, Poland also began to pursue a more proactive foreign policy. In a world of intensifying interstate rivalry, it strengthened bilateral alliances to safeguard itself should its existing alliance commitments prove insufficient or ineffective, particularly in relation to its new priority of securing access to raw materials. Over time, some of these alliances extended to cooperation with carefully selected 'areas of shortage'. Under these agreements, Poland gained access to their raw material base, labour market and territory for locating its own technologies, in return offering, among other things, security guarantees. Concluding bilateral alliances was also a way of offsetting the growing ineffectiveness of Poland's multilateral alliances, increasingly paralysed by disputes between member states and lacking any overarching values that could provide cohesion.

In subsequent decades, Poland also advocated broader changes at EU level. The goal was to adapt the Union to global conditions by transforming it into an alliance of 'areas of prosperity' that would defend its interests – notably the provision of a high standard of living for its citizens – while ensuring that the instability affecting 'areas of scarcity' did not spill over into EU territory. Data collected on citizens by national authorities was to be governed by uniform EU-wide rules, strengthening the position of states vis-à-vis corporations while guaranteeing greater transparency for citizens. Another key element of EU reform was adaptation to the imperative of shorter supply chains.

In the 2040s, Poland made increasing use of Artificial Intelligence in crime prevention and security monitoring, capitalising on technological advances. This enabled the authorities to respond more rapidly in moments of threat, thereby gaining greater control over public order. The mass deployment of drones and robots patrolling the streets became an invaluable instrument, and their ubiquity contributed to a reduction in crime. During this decade, Poland also initiated another EU reform agenda, with one of its main objectives being the coordination of Member States' activities in space exploration and in the extraction of resources from space and the ocean floor.

As a result of budget cuts, public administration was reduced to a small corps of highly specialised officials who, supported by advanced AI-based technologies, carried out strategic planning and designed operational programmes, which were subsequently implemented by external actors. With corporations exerting increasing influence, it became essential to redefine the relationship between them, the state and citizens. Regulations were introduced to

safeguard privacy and personal freedoms to the greatest possible extent. The emphasis was placed on strengthening democratic mechanisms, including tools for social oversight, in order to limit the potential for corporate surveillance. Restrictions on content profiling reduced the scale of manipulation and the shaping of social attitudes.