

Security Aspects of Implementing the Circular Economy: Advancing Sustainability within the Czech Republic's Strategic Priorities

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ABSTRACT:

The article (prepared by combining an interdisciplinary, multidisciplinary and transdisciplinary approach of interested social sciences with the application of analytical methods) follows the current issues of implementing circular technologies in security contexts using the example of the Czech Republic. It points out the reduction of environmental risks and, at the same time, within the framework of the requirements of diversification and decentralization, draws attention to the possibilities of partially strengthening the energy security of the state through the use of waste as a renewable resource. The established economic policy of the state for the implementation of circular technologies is in line with the calls to fulfil the interrelated environmental, economic and security goals of NATO, the European Union and the Organization for Economic Cooperation and Development.

Keywords: circular economy implementation, sustainable development, environmental and energy security, renewable energy sources

1. Introduction

The lessons learned from the crisis synthesis from 2020 to 2022 force every economic entity (enterprise, region, state) to analyse the situation and react across the entire spectrum of the functioning of the monitored system. One of the possible ways to contribute to rationalisation and efficiency within the system of interest is the application of exactness. It can be understood in a much broader sense than usual, primarily as correctness, transparency, definition, expertise and communication. The essential attributes of the exactness of processes are established order, depth, pace and quality, technological culture, efficiency, and adequate use of quantification and formalised procedures. The order established in this way primarily consists of basic dimensions, namely economic and planning, logistical, etc. (Jalava & Pohjola 2002). The

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aforementioned basic dimensions are thus followed by the connection with the human factor and work style in the position of systemic, organisational, morphological, design, technological and personal exactness. Within these ideas, we cannot ignore all sectors of the economy, where, according to the theory of the Copenhagen School, each occupies its own specific strategic position in ensuring national security. This school, whose origins date back to the turn of the 1980s and 1990s, expanded the then concepts of military security to include political, economic, energy, environmental and social areas (Buzan 2003). Since the aforementioned period, a "broader" (five-sector) concept of security can be traced in the history of security sciences, which also corresponds to the "architecture" of Maslow's pyramid of human needs (Maslow 1943). This is applicable not only to individuals but also to society.

The first half of the 2020s (especially 2024) will be marked by milestones in contemporary history for the Czech Republic: 35 years since the Velvet Revolution, 25 years since joining NATO, 25 years since membership in the Organization for Economic Cooperation and Development, and 20 years of integration into the structures of the European Union. The aim of the Czech Republic's integration within these international organisations is also to confront crisis events and potential risks in all areas of human life associated with them. It cannot be ruled out that this period (as a result of crisis synthesis) may for a certain period, mark a turning point in the development of the world economy and society. In this context, it is necessary to carry out an analysis, forecast, and strategy at the highest professional level for the maximum reduction of potential risks (based on the principle of a sliding scale, when a specific forecast for the monitored period is further divided into shorter time periods), the concept of which is significantly more complex in the mentioned period.

In connection with the reduction of economic, environmental and social risks, the integration of Industry 4.0 with the principles of circular technologies, whose priority is sustainability, waste minimisation and efficient use of resources, appears to be relatively effective. Industry 4.0 can thus represent support for circular economy innovations, as digitalisation, robotisation, artificial intelligence and automation can enable better management of materials, design of products for disassembly, reduction of unnecessary waste and minimisation of emissions. At the same time, Industry 4.0 technologies can be optimised for the circular economy outside the areas of industrial production, i.e. in sectors such as agriculture and the service sector. They are also of considerable importance within regions and municipalities. In particular, artificial intelligence can be used to optimally set up "smart" technologies within circular projects, the basis of which is the interconnection of all interested stakeholders, from business sectors in all economic spheres, consumers and service users, to state administration and local government bodies. The end result is not only efficiency (in economic, social and ecological dimensions), but also strengthening the competitiveness and resilience of a municipality or region. In this context, the implementation of circular technologies in the economy, according to the theoretical concepts of the Copenhagen School, means strengthening environmental and resource security. With increasing environmental challenges (climate change, depletion of natural resources), the circular economy seems to be a necessary step towards transforming traditional linear models in all sectors, areas and branches of the national economy (McDonough & Braungart 2002).

2. Methods and approaches to processing the justification of circular economy implementation tendencies in security contexts

Changes The beginning of the third decade of the 21st century, accompanied by the onset of the era of Industry 4.0 technology and, at the same time, significant potential risks of a military and non-military nature, justifies the importance of applying new scientific knowledge within security activities. Without appropriate theories based mainly on interdisciplinarity, multidisciplinary, and transdisciplinarity, all resources (financial, material, informational, human) to ensure the security of interest systems are spent inefficiently. At the same time, the absence of an adequate security theory based on high-quality standards of theoretical and methodological foundations means the danger of random decision-making based on erroneous information. Therefore, it is necessary to create appropriate model ideas for the acquisition, expansion, implementation, and transformation of scientific knowledge into security practice. This means an appropriate analysis of the methodological and conceptual foundations of the transformation process of scientific knowledge into the basic structures of the national security organisation of the Czech Republic, integrally linked with the Euro-Atlantic one.

Through the application of various methods (especially analysis, synthesis and generalisation), the implementation tendencies of circular technologies are evaluated. From the point of view of the important economic interests of the state, it is an issue of strengthening the environmental and energy security of the state within the framework of renewable energy sources. The concept of the circular economy model thus represents an innovative way of thinking focused on several main concepts, which are sharing, renting, reusing, repairing, renovating, and then recycling until the last stage of the product's life is completed. Therefore, it is the creation of a comprehensive system whose target behaviour is to extract the maximum from resources and produce a minimum of waste for disposal.

The theory of circular economy in the role of a scientific discipline presents evidence of the capabilities of the evolutionary development of natural systems in a positive direction. When talking about the biomimetic aspect of the circular economy, nature is imitated in terms of the efficiency of the use of resources and the creation of sustainable ecosystems (MacArthur 2013). Understanding the system is key within the framework of planned changes, as ignoring and misinterpreting trends, processes, the functioning of things and the extent of real human impacts on the socio-environmental system can lead to catastrophic results (Wawrosz *et al.* 2019).

Based on the above facts, the article is a combination of an interdisciplinary, multidisciplinary, and transdisciplinary approach of interested social science disciplines (primarily economics, economic policy, sociology, environmental studies, political science, etc.), focused on the security aspects of the implementation of circular technologies in the economy on the example of the Czech Republic in the third period decades of the 21st century.

3. Default philosophy to the issue

Historical development shows a natural way of developing economic relations and cooperation. Due to resource limitations, the economy was rather circular in nature.

People in the position of producers and consumers were forced to take into account the rarity and demandingness of labour; therefore, they were motivated to use resources efficiently and repeatedly consume available materials (Wawrosz et al. 2019). The history of the entire traditional society can be characterised by the use of the natural law of the cycle, which states that when water and all living organisms (flora, fauna) come and go, the soil naturally regenerates. The turn of the 18th and 19th centuries, associated with the transformation process of a traditional society into an industrial one, was accompanied by completely different economic, social and civilisational conditions, with apparently sufficient resources and space to ensure unlimited growth in consumption and the subsequent creation of waste. With the beginning of the Industrial Revolution, fundamental changes occurred in the foundations of the organisation of society, as the growth of capital accumulation and the technological development of industry led to an exponential increase in the consumption of raw materials and energy resources, with subsequent plundering of nature, enormous waste production, and overall environmental pollution (Lelek & Volejníková 2011). As a result of technical, physical, and chemical interventions, the biological circulation is disturbed, the plant cover of the planet is devastated, and the climate often worsens. Thus, a few generations have forever consumed the wealth created over thousands to millions of years without giving due thought to whether future generations will be faced with empty storehouses and huge piles of waste.

In the aforementioned type of modern industrial society, the linear economy model began to emerge, which overwhelmingly stood out, especially in the established trend of the consumer society of the second half of the 20th century. Raw materials are increasingly mined in areas that are resource-rich and mining is prevalent. After production, the products are transported in large quantities over long distances to their destinations, where they are already used by people, and after the end of the product's useful life, they are thrown away and become waste. (Blažek 2022). The linear economy represents an economic concept based on the principle of "mining, producing, consuming, and discarding" (Beverley, 2023). In its essence, this is a production model in which there is no recycling or other continuous activities aimed at closing production cycles. The result of a linear economy is that resources are depleted at the same rate as production. In this model, natural resources are mined, processed and used to produce products that are then consumed and ultimately turned into waste (Gardetti 2019).

Linear business activities are characterised by the following factors: use of nonrenewable resources, prioritisation of new product sales, lack of collaboration, and need for innovation and adaptation (Julianelli et al. 2020). Most industrialised economies have applied this concept, which is assessed as unsustainable due to the depletion of natural resources and environmental devastation (Matysik-Pejas et al. 2023).

On the contrary, the circular economy represents the closing of the cycle, which will eliminate the need to extract new raw materials. Instead of disposal, products and materials are reused, so the cycle can start with recycled or refurbished materials instead of new (Corvellec, Stowell & Johansson 2022). A cycle itself can be defined as a sequence of repeated events or situations in the same order, often leading back to the starting point. Each stage of this cycle has its own characteristics and is called a cycle phase (Kislingerová et al. 2023). All materials are regularly decomposed, melted, or otherwise transformed into the same or completely different products through technological means. These materials

then go through a closed recycling loop over and over in an endless cycle, minimising waste. The circular economy and the reduction of climate change are interconnected, as the implementation tendencies of circular principles could be helpful in the reduction of carbon dioxide emissions that arise as a result of the extraction of raw materials, production, construction, transport, services, and other sectors (Gardetti 2019). The energy use of waste as a renewable resource is also an integral part of the basic strategic guidelines of the state's established energy policy. The aim is to produce the cleanest possible energy commodities (electricity and thermal energy) according to the Green Deal document.

4. Sociological-political and psychological aspects of the transformation of linear technologies into circular ones

Experts The consumer society style, formed since the mid-20th century, was transformed by the globalisation phenomenon in the early 1980s. From an economic point of view, this type of society is characterised by an excess of supply over demand. In this situation, companies produce large quantities with minimal fixed costs, which do not increase the price of the final product. The offer of manufacturers is not set based on a proper examination of consumer willingness, but according to the amount of products they can tolerate. The advantage for manufacturers lies in the consumer's ability to consume more than the actual need. This is the basis of the strategy of volume discounts during sales. This creates pressure on manufacturers, who are forced to reduce prices and constantly improve the value of their products for the sake of their prosperity. The set marketing strategy based on manipulative persuasive practices of social engineering is followed by the phase of advertising campaigns. The standard economic understanding of the production factors of labor, land, and capital is enriched by a new production factor represented by information due to its interweaving with the information society. This production factor, with the development of digital processing, means for consumers the opportunity to find the best product and constantly move towards the better. Competition is, therefore, quite extensive in the market, operating along the lines of identical, substitutable, and completely substitutable commodities.

From a sociological perspective, consumer society can be interpreted by the attitude or behaviour of an individual. This can be characterised by the "great wolf syndrome", with insatiable and greedy characteristics (Eriksen, 2010) or the behaviour of a game hunter without due respect for balance and harmony (Bauman, 2004). As a result of such behaviour, industrial society since the second half of the 20th century, despite all its tense rationality, represents its opposite. This is an irrational threat to man and nature when environmental problems have acquired global dimensions and are difficult to solve at the level of nation-states. Industrial society has gradually acquired other attributes post-industrial, such as abundance, consumption, and information, but it is also risky.

A typical manifestation of a risky society is some dramatic accidents that have a significant impact on the population, especially in developing countries, but indirectly also in emotionally developed countries (Beck 1998). After all, in the second half of the 20th century, a number of economically developed countries had their own ecological disasters. Proof of this is the Great London Smog (December 1952), when, according to estimates,

approximately 12,000 Londoners died as a result of extreme air pollution. The result was the adoption of relatively drastic regulatory legal standards. Similarly, industrial areas of the then Federal Republic of Germany were affected by several serious smog situations with an impact on the health of the population at the turn of the 1960s and 1970s. The main feature of a risk society is the dangers (environmental, genetic, chemical, etc.) of nature without temporal, spatial and social boundaries (Kamarýt 1996). As a result, the economy is not responsible for what it causes. At the same time, politics is responsible for what it has no control over, but it is also held responsible for the secondary consequences of ongoing economic processes (Beck 1998).

From a psychological perspective, the "risk" society is viewed in the context of climate and environmental grief. This can be defined as a state of crisis due to the experience of human anxiety due to ecological losses of animal species, ecosystems, and significant landscapes (Beck, 2014). The aforementioned state of crisis is comparable to the fear of death, i.e. the experience of grief through its five stages – denial, anger, bargaining, depression, and reconciliation¹ (Uher 2018). Similarly, Kriss Kevorkian (an American thanatologist specialising in biocentric thanatology) defines this event as an anxiety reaction stemming from the loss of ecosystems due to natural and human-caused events (Rosenfeld 2016). At the end of the twentieth century, the context of environmental impacts on the formation of the human psyche became the subject of environmental psychology, which was defined in 1992 by the American social historian and sociologist Theodore Roszak (Roszak 1993; Roszak, Kanner & Gomes 1995). In his definition, he presents a call to awaken humanity with a focus on the ruthless psychoanalysis of civilisation, which at the end of the 20th century found itself in a dramatically exacerbated crisis situation. Thus, he examines human madness and attempts to present a proposal for a possible therapy. The American psychologist James Hillman (founder of the archetypal school of Jungian psychology) is of the opinion that Roszak, within the framework of the aforementioned study, laid the foundations of the theory and practice of psychotherapy of the century, which humanity should complete (Hillman 1992).

Experience and knowledge from environmental issues of the second half of the 20th century in national, transnational and global dimensions mean appropriate reflection within the framework of political decision-making. Clear proof of this is the election results from 2019 to the European Parliament. At that time, five out of seven political factions of the aforementioned institution listed sustainability of life and environmental issues, with the importance of renewable energy sources among their program priorities. Compared to the previous election periods, a significant shift can be noted in the growth of the number of factions emphasising this interest (essentially double). It can also be recalled that the Greens group won a total of 23 seats in 2019 and became the fourth-strongest formation in the European Parliament. In a number of individual European countries, it also happens that, under the pressure of growing electoral support for environmental parties (for example, the Greens in Germany), some of their themes and phraseology are adopted by other political parties. Such a development clearly occurred in Scandinavia, Germany, the Benelux countries and Switzerland (Kislingerová et al. 2023).

¹ A definition from 1969 by the prominent American psychologist Elisabeth Kübler-Ross in her famous book *On Death and Dying*.

Within the framework of a common macroeconomic policy, the European Union (EU) must find the appropriate optimum between environmental interests and economic growth, price stability, employment and competitiveness. It is almost certain that individual EU states cannot have identical environmental policies, and therefore, neither can the transformation process of a linear economy into a circular one. This is due to several factors, such as the structure of the industrial, agricultural and service sectors, etc. However, a certain balanced integration of environmental and economic priorities within international agreements is necessary (including in the context of solving global problems). The set priorities depend on the level of strategic planning in the time horizon of a minimum period of 10 years (Jordan & Lenschow 2010)

One of the main features of planning is its adaptation to expected and especially unexpected changes in the form of potential risks of threatening macroeconomic stability in the context of environmental security. The basis of successful planning lies in a certain consensus within the framework of creating economic, environmental, foreign and security policies. One of the main conditions for consensus is the elimination of discrepancies between the set government goals, such as e.g. State Environmental Policy and State Energy Concept.

In order to accelerate the transition to a circular economy, the Ellen MacArthur² Foundation was established in 2010 (Kirchherr *et al.* 2023). The foundation's efforts consisted in working with institutions (public administration, business entities, civil society and academia) to create an economic system that guarantees higher standards of quality of human life without negative impacts on the environment (Luu Chromjaková & Nguyen, 2023). In 2013, the foundation produced a report "Towards a Circular Economy" containing a report by the European Commissioner for the Environment, which dealt with the transformation process from linear to circular technology from a political perspective of the European Union. With the aim of sustainability and minimising the impact on the environment, the aforementioned transformation process within the industrial system represents a fundamental shift from the traditional concept of waste disposal at the end of a product's life. In essence, it consists of a regenerative intention and design with due emphasis on the use of renewable energy sources and prevention in the handling of toxic materials (MacArthur 2013). In 2014, the circular economy was officially recorded within the economic policy intentions of the European Union when presenting the plan "Towards a Circular Economy: A Zero-Waste Agenda for Europe", which contained three resource productivity scenarios. The first scenario aimed for a slight improvement in resource use, the second assumed a return to the level of productivity growth before the crisis period of 2008, and the third acceleration scenario counted on a faster increase in efficiency through technological innovations.

² Ellen MacArthur originally an English sailor, a successful long-distance yachtsman, the world record breaker for the fastest solo circumnavigation of the globe in 2005, after retiring from professional yachting in 2010, a charity and foundation activist.

5. Circular economy in the contexts of resource, environmental and energy security of the state

As a result of the formulated term "peak oil – tipping point", as a state of depletion of mineral resources (especially fossil fuels) in the world economy, the concept of energy security was used in the world economy and security strategies in the early 1970s (Wittenberger, Pinka & Sidorová 2006). According to the formulation of the American geologist King Hubbert, the above-mentioned reality is depicted by the so-called Hubbert curve. It points to the achievement of the peak state of energy raw material reserves with a subsequent decrease in extraction (Schroder et al. 2020). At the same time, in 1973, an armed conflict took place in the form of the so-called Yom Kippur War, which, as a result of the use of oil and natural gas (as part of the energy sector of developed countries), represented a historical milestone in energy security. The increase in the price of these strategic commodities in the world economy brought significant negative consequences, as some major exporters used these commodities as a "coercive tool" as part of their established foreign policy. As a result, the security of the state was no longer determined only by military potential, but also by the ability to ensure a continuous flow of supplies of strategic raw materials to its economy. The aforementioned reality is also evidenced by the theoretical concepts of the aforementioned Copenhagen School from the turn of the 1980s and 1990s. In order to protect producers and consumers from undesirable potential risks (outages and unavailability), which can cause energy poverty in households, etc., a state economic policy strategy has been established based on the above-cited facts, which also represents the starting point for creating the state's energy security. From a macroeconomic point of view, one of the basic assumptions is the reduction of the possible potential risk of price instability within the functioning of the economic system (a typical sharp increase in energy prices in the Czech economy that began in the second half of 2021 and was exacerbated by the military conflict in Ukraine since February 2022, i.e. the energy crisis), with the greatest impact on producers of energy-intensive industries.

A similar problem in the aforementioned period also accompanied the European energy sector, which had been undergoing significant changes since the early 1990s. First, it was the adoption of liberalisation changes associated with new regulatory regulations for free access of suppliers to networks. This was followed by issues of increasing dependence on imports, low levels of diversification of sources and routes, high and fluctuating energy prices and growing global demand for energy. Over time, it became a subject of addressing security risks affecting producer and transit countries, growing threats related to climate change, decarbonisation, slow progress in the field of energy efficiency, challenges associated with the growing share of renewable energy sources and the need for greater transparency, integration and connectivity of energy markets (Ocelík & Černoch 2012).

A fundamentally strong emphasis on energy and raw material security emerged between 2002 and 2008. It was an appropriate response to several years of continuous growth in energy consumption during the extensive modernisation of some of the former developing countries. This growth in global consumption of the entire spectrum of commodities has been accompanied by a dramatic increase in their prices on world markets. The significant volatility of mineral prices, together with several crises in the supply of energy raw materials and the ever-increasing competitive struggle for these raw

materials, have clearly led to the growth of the importance of energy and raw material security today. The much higher demand for raw materials has caused and is causing systemic changes in the global market for mineral raw materials, consisting primarily in the fact that a number of traditional producers and exporters of mineral raw materials are gradually becoming their significant consumers and, in some cases, importers. These trends have fundamental causes and are causing intense competition for raw materials for minerals, especially strategic fuel and energy raw materials, as well as many special raw materials, such as highly strategic metals. The struggle for access to strategic raw materials, which has already begun, is leading to changes in the position and influence of individual actors in international relations, such as the emergence of new "energy alliances".

Ensuring raw material and energy security is also related to innovative technological trends, infrastructure and human resources. Its level is determined by the political, economic, and legislative environment of a given state, region, or community, and it must also be based on the global environment. For the Czech Republic, as an industrial country, support for the diversification of raw materials and energy sources is essential in the future, including with the help of the most modern circular technologies. In this context, the energy use of waste as part of the energy mix and decentralisation as part of a source increasing the energy security of the national economy also plays a significant role. Within the framework of circular technologies, there is talk of a wide technological use of renewable resources. In essence, it is about using the entire range of waste within the national economy for energy purposes and thus replacing fossil resources in the production of energy commodities. From the point of view of economic efficiency, conditions are created for technological cogeneration, i.e. combined production of electricity and heat energy in regions of interest. Therefore, the deployment of circular technologies in the production of energy commodities within the region depends on the technological dependence of local business entities.

Energy security is very closely related to environmental security. The latter, in the context of reducing negative externalities in the production, use and disposal of products, represents one of the basic strategic pillars of the transformation tendencies of linear technologies to circular ones. The main implementation tool of circularity in the energy sector is the creation of a competitive environment through technological innovations, the basis of which is decentralisation with diversification (Grafström & Aasma 2021; Shennib & Schmitt 2021). Decentralisation of energy means the creation of a system of small and medium-capacity sources that are located directly at the point of consumption or in its vicinity. Decentralised sources, compared to large-capacity sources (such as nuclear, thermal and hydroelectric power plants), reduce transmission systems. However, the fact is that they create different demands on this system. Diversification is an established business and trade strategy by which an entity (in this case, in the creation of economic, energy and security policies) seeks to reduce the economic and political risks arising from trade. In the case of energy commodities and their routes, diversification is one of the dominant state needs of the first half of the 21st century (McKenna 2018).

Through the innovative circular trend established above, it is possible to contribute to the creation of the concept of "smart" energy, the subject of which is also the use of renewable energy sources elements of smart networks in the electricity distribution system in the region. The justification for "smart" technologies in the energy sector can be demonstrated

by the attitude in the crisis situation (in 2021-2023) in the Czech Republic. The crisis situation significantly increased the interest of producers and households in "smart" solutions. Specifically, for producers, this reality was reflected in the current changes in the preferences of their investment activities. In order to reduce production costs, they are clearly oriented towards energy-saving solutions, such as the energy recovery of waste within the framework of circular technologies from 2022. The same is true for households in order to reduce energy costs. This also opens up space for structural changes to more quickly implement the Industry 4.0 concept for maximum openness and optimal use of information flows.

6. Circular economy in reflection of the national economic and security interests of the Czech Republic

The current definition of a state based on the Westphalian arrangement is that a sovereign state is defined by its government, territory and population. One of the main priorities of the state economic policy of the Czech Republic with the advent of Industry 4.0 is to ensure comprehensive support for innovative trends in circular technologies within all areas of the national economy to support sustainable development with appropriate reflection in ensuring national security. According to political science, international law and security studies, a modern territory of a sovereign democratic state governed by the rule of law with a market economy mechanism can rely on appropriate guarantees and a standardised form of external recognition on which an entire international system of equal and internally similar entities is built (Buzan, Waever & de Wilde 2005). The implementation of a circular economy, without which the support of sustainability in both the national and global dimensions is not possible, can also contribute to ensuring these standards due to its multifunctionality. Technological progress is one of the key prerequisites for the development of a circular economy. This is because, while circularity brings higher efficiency, its implementation is expensive, places demand on overburdened public budgets, and long-term implementation is almost impossible. However, with appropriate technological progress (especially in connection with the prices of primary raw materials and material inputs), the situation is changing significantly in favour of the circular economy.

The greatest threat to a state has always been the threat to its sovereignty, the principle of which, together with non-interference in internal affairs, is valid and enforceable in the international legal environment. During the 1970s and 1980s, the phenomenon of economic, energy and environmental security gained importance, and in the 1990s, interest in the issue of international organised crime (including environmental aspects) emerged. However, the greatest fundamental changes in security concepts occurred in the early 1990s. After forty years of (relatively stable) bipolarity, the world has transformed into a (less predictable) multipolar system permeated by ubiquitous globalisation. A number of new threats and risks, as well as many new state and non-state actors, have begun to appear on the scene. The penetration of the development of a market economy and the increasing tendency of the influence of global financial, investment and production processes in the world economy make the expanded concept of the security agenda increasingly relevant. (Buzan, Waever & de Wilde 2005).

State power is considered an integral part of the national interest, which in modern society must be based on internal stability with due care for economic security by expanding access to resources, finance, and markets, but also to ensure sustainable development. It is, therefore, not only about macroeconomic stability with an appropriate quantitative reflection in performance indicators (growth of gross domestic product, price level, employment, etc.), but also about the legacy of the state of society and the environment to future generations. A necessary supporting goal of these plans within the national economy of the Czech Republic and the Euro-Atlantic area to achieve a sustainability strategy is to address the issue of the devastation of natural capital as a result of the waste of energy resources and the ecological burden on nature with waste. The transformation of linear technologies into circular ones, when the position of waste changes into a production resource, can significantly contribute to the fundamental reduction of these undesirable phenomena. In this situation, the circular economy represents a concept of innovation for a completely better processing of not only valuable materials but also of the possibilities of shared services and new consumption models. As a result, the pressure on the use of primary resources (especially natural ones) will be significantly reduced.

In 2020, the Czech Republic completed 25 years of membership in the Organization for Economic Cooperation and Development (OECD). By gaining membership in this organisation, the demanding political, economic and legislative conditions for participating in the strategy and tactics of 38 member countries were met, and thus taking steps in all economic areas, from energy security to food security, from logistics and transport to the future of the global climate. The OECD works with this aspect in its efforts to connect all continents into a more inclusive platform of the world economy for the future of the world and humanity. In this way, it participates in the creation, protection and development of a global economic system focused on democracy, human rights, a market economy and fair trade rules (Zakari & Oluwaseyi Musibau 2024). A similar position results from the completion of the 30th year of the Czech Republic's membership (in 2023) in the Council of Europe, which includes the protection of biodiversity and landscape among its environmental priorities within spatial planning. It also focuses on prevention and protection in the event of major natural and technological disasters (Sola 1992).

In 2024, Czech society commemorated the 35th anniversary of the events of November 17, 1989, which is associated with a return to the "family" of traditions of the democratic Western community - to Euro-Atlantic civilisation (so-called Western Christianity), which emerged from the principles and traditions of Roman law. The determination to fulfil the spirit of these traditions within the framework of the transformation of Czech society in the first half of the 1990s consisted in defining the national interest. The economic policy of the Czech Republic has clearly focused on supporting economic growth, price stability and significantly increasing the transparency of the economic environment and all social relations, which significantly contributes to the creation of a liberal, competitive market economy and its involvement in international economic relations and structures.

Practical manifestations of the return to the "family" of traditions to ensure the joint protection of national interests were also confirmed by other significant anniversaries

in 2024. These are 25 years of Czech membership in the political and military structures of NATO and 20 years in the European Union. By participating in these international organisations, the Czech Republic participates in joint responses to national, regional and global risks within the Euro-Atlantic area. One of the main common national interests in relation to the above-mentioned anniversaries is participation in joint resistance to risks of a military, social, political, natural and ecological nature. Since the early 1960s, NATO has considered the phenomenon of environmental security to be part of its strategy and also guarantees its members the provision of assistance in the event of ecological and natural disasters. Moreover, in its 2010 Strategic Concept, NATO identified climate change and other environmental challenges as key factors that will affect security in areas of its strategic interest (Lepeltier 2013). In this context, the Czech Republic participates in reducing environmental risks from military activities, including environmental factors affecting energy security (Demir 2022). At the same time, it is looking for ways to enhance efficiency through innovative technologies (Chitadze, 2021).

Climate change was assessed in the new NATO Strategic Concept for 2022 as one of the main security threats of the next decade (Szenes, 2023). A similar position was taken by the European Union (EU), where the origins of environmental policy date back to the European Council meeting (Paris 1972). The then heads of state and government (after the first United Nations Conference on the Environment) made the so-called declaration on the creation of a "Community policy on the environment in support of national economic policies" and called for the development of an action program. After the European Council (Cardiff 1998), the integration of environmental issues became an integral part of EU policy and thus represented an important aspect of European policies (Skovgaard 2014). In this context, it is worth mentioning the inclusion of environmental issues in the field of energy policy and security, which was reflected in the EU climate and energy package that was being prepared in parallel or in the plan for the transition to a competitive low-carbon economy by 2050 (Skjarseth 2021). With the ultimate goal of achieving climate neutrality by 2050, the European Commission launched the European Green Deal in December 2019, which should make the European region the first climate-neutral continent in the world (Szpilko & Ejdyś, 2022). In 2021, the EU adopted a climate legal framework with a binding target of achieving a reduction in net greenhouse gas emissions by at least 55% by 2030 compared to 1990 and climate neutrality by 2050 (Sikora, 2021). An integral part of the above-mentioned strategic goal is a program for the production of energy from renewable sources, where the use of waste energy is also possible as one of the priority objectives for the introduction of circular technologies into the national economy.

In the context of risk reduction (of both military and non-military nature), the Czech Republic considers the Organization for Security and Cooperation in Europe (OSCE) to be an important and integral part of European security (Ibryamova 2013). Supporting the activities of this organisation, as the world's largest regional security platform, has long been one of the main priorities of Czech foreign policy, as there is an interest in creating the OSCE as a flexible institution capable of flexibly adapting to current security challenges of European and global importance. In this context, the Czech Republic supports activities that are included in all three dimensions of the OSCE, i.e., political security, economic environment, and human rights (Zaagman, 1999). Supporting

activities also aim to strengthen the organisation's capabilities in monitoring cases of violations of norms and to provide assistance in negotiating redress. For these reasons, the Czech Republic consistently advocates that the OSCE be able to flexibly and operationally face security challenges, threats and risks (preventing armed conflicts, combating international terrorism, and post-conflict reconstruction) and to adapt its instruments accordingly.

The Czech Republic, therefore sees the position and role of the OSCE in deepening cooperation within the security architecture of Euro-Atlantic organisations in accordance with the principles of the Platform for Cooperative Security, approved by the OSCE Istanbul Summit in 1999. Its efforts to be a full member of the aforementioned security partnership in the environmental field are illustrated by the transformation process from a linear to a circular economy. The transformation from a linear economy to a circular economy represents a fundamental change in the approach to resource use and waste management, see Figure 1. Meanwhile, the linear economy is based on the principle of "take, make, use and waste". The circular economy deals with extending the life cycle of materials and products. The circular economy model includes three key phases: production, which uses renewable or recycled materials and energy from recovery; use, which emphasises reuse repair to extend the life cycle of products. After use, recycling follows, when products or their materials are recycled or reused for energy, thereby minimising waste. The aim of the circular economy is not only to reduce the burden on the environment, but also to create a sustainable economic model. This model is less dependent on the extraction of new raw materials and increases energy security through the energy recovery of waste.

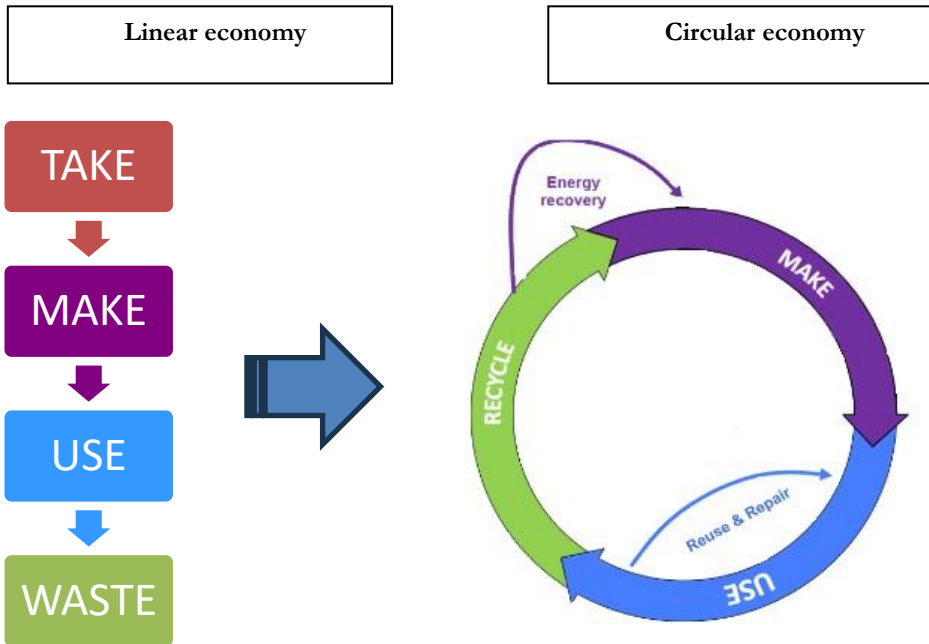


Figure 1: Transition from a linear economy to a circular economy

Source: Own processing

Figure 2 shows the intersection of two basic concepts that represent the main strategic goals of Czech economic, environmental and security policy. These are the circular economy and energy security. The aforementioned conceptual intersection can be called the Energy Transition. It represents a major structural change in the production and distribution of energy commodities. The basic components of the intersection of the aforementioned concepts include alternative materials for energy production (diversification of resources), efficient energy intensity of resource use (energy innovation) and reduced dependence on imports of energy raw materials.

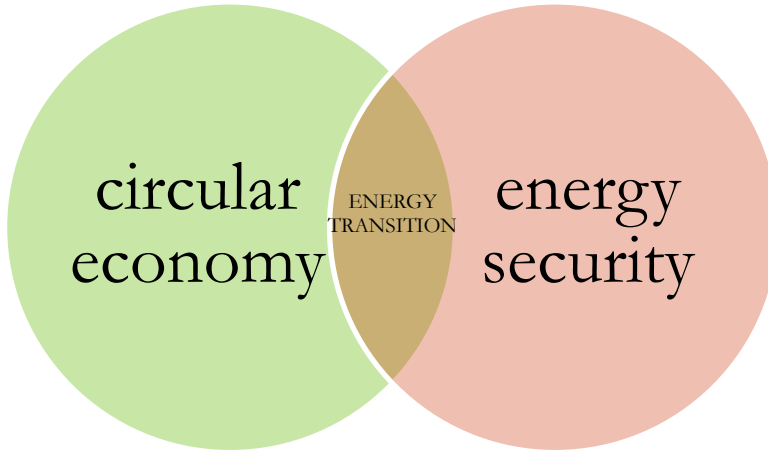
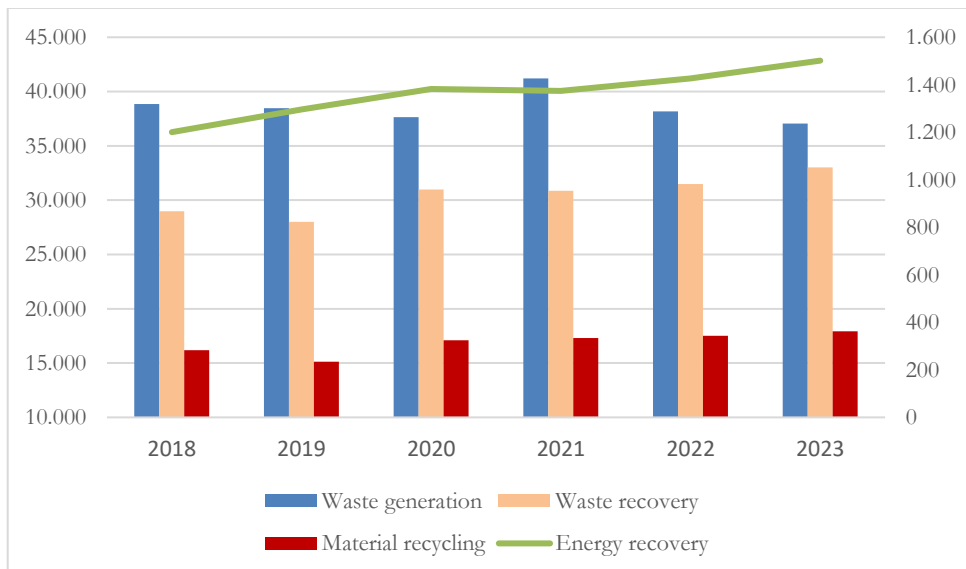


Figure 2: Relation between circular economy and energy security

Source: own processing

The impact of environmental changes on the production and use of waste in the Czech economy is illustrated in Chart 1 below. The exception was in 2021 when waste increased due to the Covid-19 pandemic. The increasing energy use of waste and increasing material recycling are also positive trends. Over the monitored period (2018–2023), the share of recycled waste in the total amount of waste increased from 41% (2018) to 48% (2023). The total waste recovery has already reached almost 90%.



Graph 1: Waste generation and waste treatment in the Czech Republic in thousands of tonnes

Source: Czech statistical office 2024, own processing

7. Conclusion

As an evolutionary phenomenon of the linear economy of the 21st century, the introduction of circular technologies through efficient production (in the economic and social areas) represents a fundamental shift towards improving the quality of the environment and human life. It is not just about finding ways to make the best use of waste, but it is a complex interdisciplinary system. Essentially, it is a change in thinking within the framework of technological innovation when the duration of its use is taken into account when designing a product, including what happens within the production process or consumption after its disposal. It is certain that as a result of innovative technological trends of Industry 4.0, there will be an accelerated depreciation of existing technological equipment. In addition, extensive changes in the industrial base can be expected within the framework of environmental policy (approximately until 2050), especially in the areas of energy (shifting away from coal) and transport (preference for the production of electric cars). As a result of these significant approaches and changes, the importance of circular technologies for the safe disposal, recycling and re-conversion of discarded equipment into raw materials for society as a whole will increase. The transition from linear to circular technologies therefore has significant economic, environmental, social and security implications for the future. For manufacturers with an organisational structure of technological processes based on a linear approach, this process requires significant technological changes related to one-time capital investments, employee retraining and coordination of larger value chains (Gubeladze & Pavliashvili 2020). A detailed survey of these transformational changes in all areas of interest of the national economy with an appropriate comparison with foreign countries could contribute to accelerating global adoption.

From a security perspective, this is an appropriate reflection of the state within the framework of important economic interests to interconnected environmental and energy security, which is an appropriate reflection of the development of the security complex as a result of interaction. Regional security complexes thus dominate primarily the military, political and social sectors. In the economic and environmental sectors, the global level has the strongest position, but the dynamics of globalisation itself continue to stimulate regional tendencies, which is also confirmed by the theoretical concept of the Copenhagen School (Buzan, Waever & de Wilde 2005).

In particular, the events since the beginning of 2020 (COVID-19 pandemic, Russian-Ukrainian armed conflict), accompanied by the aforementioned synthesis of crises, confirm the legitimacy of concerns about non-military risks. This can be demonstrated through the theory of complex interdependence, whose spiritual fathers are Robert Keohane and Joseph Nye (Keohane & Nye 2001). According to this theory, also applied by the Copenhagen School, security issues are interconnected and dependent on each other in such a way that a certain hierarchy is not possible. This theory has thus contributed to the expansion of the sources of potential security threats, an integral part of which are environmental ones. A certain possibility of reducing the above-mentioned risks within the national economy can be seen in the introduction of trends in circular technologies within the framework of compatibility with foreign countries.

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