

# European Union Climate Policy — the Local Dimension

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## Abstract

*This paper aims to provide an insight into the opportunities and shortcomings with regard to the implementation of the European Green Deal (EGD) at the local level. Based on the example of Poland, the article centres around the main points, objectives, as well as financing sources of the EGD. Furthermore, the article assesses the possibilities of employing existing and new local planning instruments, with particular emphasis on municipal climate change adaptation plans. In order to elucidate the implementation of the EGD, the paper also indicates some practical transformation actions in the local economy in the field of energy and urban transport.*

**Keywords:** sustainable development, European Green Deal, local planning instruments, renewable energy, sustainable transport

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## Introduction

Sustainable development is a widely recognized paradigm for social and economic development, which was first propounded in 1987 in the Our Common Future report of the United Nations World Commission on Development and Environment.<sup>1</sup> The definition included there describes sustainable development as development that meets “the needs of the present without compromising the ability of future generations to meet their needs.” Such development signifies the necessity to integrate political, economic and social activities while maintaining the natural balance and sustainability of basic natural processes in order to ensure the possibility of satisfying the basic needs of particular communities or citizens, of both the present generation and the future generations. Sustainable development, however, does not mean a rapid development that is spatially balanced but rather a development that is lasting (stable) and self-sustaining. It is:

- a type of socio-economic development stimulated in the technosphere, which is part of the natural environment;
- an intergenerational concept, a process integrating human activities in the ecological, social and economic spheres, which also has spatial implications; and
- an egalitarian concept, assuming the maximum satisfaction of the individual needs of all inhabitants of the earth (Kistowski and Kałamucka 2021, 16).

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1. See: “Report of the World Commission on Environment and Development: Our Common Future.” <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf> (accessed 2022-06-27).

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In order to specify the concept of sustainable development, on 25 September 2015, the United Nations General Assembly adopted a resolution, entitled “Transforming our World: the 2030 Agenda for Sustainable Development,” containing 17 goals set to be achieved by 2030.<sup>2</sup> These goals are as follows:

1. End poverty in all its forms everywhere.
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
3. Ensure healthy lives and promote well-being for all at all ages.
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. Achieve gender equality and empower all women and girls.
6. Ensure availability and sustainable management of water and sanitation for all.
7. Ensure access to affordable, reliable, sustainable and modern energy for all.
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
10. Reduce inequality within and among countries.
11. Make cities and human settlements inclusive, safe, resilient and sustainable.
12. Ensure sustainable consumption and production patterns.
13. Take urgent action to combat climate change and its impacts.
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Accordingly, 169 concrete actions were put forth. Since the resolution was approved, 3,164 events have already taken place, 1,322 publications have been created and 6,059 actions have been undertaken. The UN, the European Union, and individual countries monitor the implementation of the goals.<sup>3</sup>

Apart from monitoring progress towards the sustainable development goals in particular member states, the European Union has also adopted the European Green Deal as an integral part of the current European Commission’s strategy to implement the UN 2030 Agenda for Sustainable Development. The European Green Deal is a new development-oriented strategy that aims to transform the EU into a just and prosperous society within a modern, resource-efficient and competitive economy. In line with the strategy, the EU is to achieve zero net greenhouse gas emissions by 2050 and decouple its economic growth from the exploitation of natural resources. It also aims to protect, preserve and enhance the EU’s natural capital, as well as shield the health and well-being of citizens from environmental risks and negative impacts.<sup>4</sup>

The aim of the article is to outline the opportunities and problems connected with the implementation of the European Green Deal (EGD) at the local level, based on the example of Poland. The article discusses the objectives, main points and financing sources of the EGD, as well as makes an assessment of the opportunities to use both the existing and new local planning instruments.

2. See: “Transforming our World: the 2030 Agenda for Sustainable Development.” A/RES/70/1. United Nations. <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf> (accessed 2022-06-27); see also: “Do you know all 17 SDGs?” <https://sdgs.un.org/goals/> (accessed 2022-06-27).

3. See: “The Sustainable Development Goals Report 2021.” United Nations. <https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf> (accessed 2022-06-27); see also: “Statistics for the SDGs — global indicators” website at <https://sdg.gov.pl/>.

4. See: Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. The European Green Deal. Brussels, 11.12.2019, COM(2019) 640 final.

This evaluation is carried out with a particular emphasis on municipal climate change adaptation plans and some local economy transformation practices in the field of energy and urban transport, which bring the implementation of the European Green Deal closer.

## 1 Objectives, main points and financing sources of the European Green Deal

The material and temporal scope of the European Green Deal includes ambitious climate targets for 2030 and 2050—i.e., reducing net greenhouse gas emissions by at least 55% before 2030, as compared to the 1,990 levels, and achieving climate neutrality in 2050. Actions to achieve this goal<sup>5</sup> include the following:

- the reduction of GHG emission limits for trucks, vans and cars, so that new cars and vans cut emissions by respectively 37.5% and 31.0% before 2030 (compared to 2021), and for trucks and other heavy vehicles: 15.0% by 2025 and 30.0% by 2030 (compared to 2019)
- an Emissions Trading System (ETS) reform consisting in several measures, such as reducing the cap on total emissions by 2.2% each year; setting the percentage of allowances to be auctioned at 57.0%; allocating free emissions in full to sectors most at risk of production relocation and allocating 30.0% of free emission to sectors less exposed to relocation, with a gradual phase-out after 2026 for the less exposed sectors, except for the heating sector; and linking the EU and the Swiss ETS
- the provision of clean, affordable and secure energy through policies like decarbonizing energy and harnessing offshore renewable energy and hydrogen, and integrating the EU energy system
- the mobilization of industry for the transition to a clean, closed-loop economy, which implies undertaking modernization measures (especially within resource-intensive industries, such as textiles, construction materials, electronics or plastics), and, in the case of energy-intensive industries such as steel, chemicals or cement production, vital to the European economy due to the supply of several key value chains, undertaking modernization measures to decarbonize them
- construction and renovation in a way that saves energy and resources, for instance by using modern technologies in erecting new buildings and renovating existing ones, both state-owned and private
- the acceleration of the shift towards sustainable and intelligent mobility, for examples, by the development of multimodal transport, as well as the development and propagation of alternative transport fuels
- the establishment of a fair, healthy and environment-friendly “farm to fork” food system by reducing the use of chemical pesticides, antibiotics and fertilizers, as well as promoting affordable, healthy food for all
- the protection and restoration of ecosystems and biodiversity, in particular by improving the quality and extent of forested areas in the EU
- zero emissions for a non-toxic environment, which can be achieved by means of restoring the natural functions of surface and groundwater, reducing emissions from large industrial installations and protecting against hazardous chemicals

The sources of EGD funding include the following (*The EU’s 2021–2027 Long-Term...* 2021):

- the EU Multiannual Financial Framework (MFF) 2021–2027 with a total budget of EUR 1,210.9 billion,<sup>6</sup> of which the Cohesion Policy accounts for EUR 372.6 billion, the Common Agricultural Policy EUR 378.5 billion, and the new priorities (outside the SP and CAP) EUR 377.3 billion (most of it earmarked for research and innovation: Horizon Europe—EUR 86.1 billion and Neighbourhood, Development and International Cooperation Instrument—Global Europe—EUR 79.5 billion)
- the Next Generation EU (NGUE) funding package, which aims to help address the socio-economic impact of the COVID-19 pandemic while transforming EU member states’ economies to become greener, more digital, more resilient and more capable of meeting current and future

5. See: Communication from the Commission to..., op. cit.

6. As in American usage, a thousand million.

challenges, with a budget of EUR 806.9 billion, consisting of EUR 338.0 billion as grants, EUR 385.8 billion as loans, and the remaining EUR 83.1 billion as shares in other EU programs. The innovation of the IFF 2021–2027 and NGEU budgets are as follows (*The EU's 2021–2027 Long-Term...* 2021):

- More than 50% of their total amount will be dedicated to the modernization of the European Union through such policies as research and innovation, climate and digital transformation, building preparedness and resilience to challenges.
- 30% of the EU budget will be earmarked for fighting climate change.
- 20% of the NGEU will be invested in digital transformation.
- In 2026 and 2027, 10% of the IFF annual budget expenditure will be dedicated to halting and reversing biodiversity decline.
- For the first time in the EU's history, new and reinforced priorities represent the largest share of the IFF budget at 31.9%.

The implementation and financing of the European Green Deal includes Cohesion Policy, Common Agricultural Policy, as well as instruments such as Horizon Europe, Instrument for Supporting Reconstruction and Resilience, Life Programme, and Connecting Europe Facility. One of the novelties in this group is the Fair Transformation Fund operating within the framework of the Fair Transformation Mechanism, dedicated primarily to regions dependent on traditional fossil energy resources, especially coal.

It has to be emphasized that in the current budget perspective (2021–2027) Poland may be the largest beneficiary among the EU member states and in the history of its membership in the EU. The available amount totals around PLN 770 billion.<sup>7</sup> This is probably the last such opportunity for the country. In the next perspective, after 2027, the main beneficiaries among the current EU members will certainly be Romania and, among the future ones, Ukraine. The problem, however, is that the conflict with the European Commission concerning Poland's non-compliance with the rule of law resulted in the freezing of these funds and their gradual diminution by penalties imposed on Poland in connection with its non-implementation of the judgments of the Court of Justice of the EU (CJEU). Another contentious issue was Poland's extending the concessions for its coal mines until 2026. The move provoked a backlash, as it was made without consulting and informing the Czech side; the disputed Turów lignite mine is located on the territory of Poland close to the Polish-Czech border. The Czech side (the Liberec Region) has complained for years about dust from the mine and the lowering of groundwater levels in the border area. Poland's failure to respond prompted the Czech Republic to lodge a complaint with the CJEU, which imposed penalties of EUR 0.5 million per day from September 2021 to February 2022 for the failure to comply with the safeguard provisions. In February 2022, an agreement was reached with the Czech side, which withdrew the CJEU claim. Poland pledged to pay the Czech side EUR 35 million in compensation and an additional EUR 10 million in the form of investments in the Liberec Region. The Polish-Czech dispute shows that the current development model based on coal is becoming increasingly expensive and thus less profitable, and that the internalization of local external costs has taken on an international dimension.

A new impetus for the acceleration of the EGD is the war triggered by Russia in Ukraine. On the one hand, Russia is taking steps to stop supplying Russian fossil fuels to countries supporting Ukraine, including Poland. On the other hand, as part of the sanctions against Russia, the EU has decided to become independent of Russian raw materials by the end of 2022, with the exception of two countries, Slovakia and Hungary, which will have longer adjustment periods. Particularly important in this matter are not only international measures to create a single energy system within the EU, which will make the process of purchasing and distributing energy resources more flexible, but also local measures related to the development of energy independent of fossil fuels and, at the same time, based on commonly occurring resources, in line with the well-established principle: think globally—act locally.

7. See: "Polska w Zielonym Ładzie — korzyści, możliwości i ocena SWOT." Opinie i ekspertyzy OE-307. Biuro Analiz, Dokumentacji i Korespondencji, Kancelaria Senatu, Warszawa 2020, page 20. [https://www.senat.gov.pl/gfx/senat/pl/senatekspertyzy/5619/plik/oe\\_307.pdf](https://www.senat.gov.pl/gfx/senat/pl/senatekspertyzy/5619/plik/oe_307.pdf) (accessed 2022-06-27).

## 2 Local planning instruments in the implementation of the European Green Deal

Among the local planning instruments in Poland by means of which it is possible to fulfill the objectives of the European Green Deal, the following can be distinguished:

- studies of conditions and directions for spatial development of communes
- local spatial development plans (local plans)
- municipal development strategies
- municipal climate change adaptation plans

The order of the presentation of the instruments is based on the chronology of their emergence. The oldest instruments related to local management are the study of spatial development conditions and directions along with local plans. Their functioning is regulated by the Act of 27 March 2003 on spatial planning and development.<sup>8</sup> The former is of obligatory character and covers the area of the entire municipality. It takes into account the existing land use, development and utility infrastructure, spatial order and requirements for its protection, and a diagnosis of the social as well as economic and spatial situation, including functional areas such as urban functional areas. The diagnosis encompasses the needs of the municipality's development strategy, the condition of the environment, including the condition of agricultural and forest production space, the size and quality of water resources, requirements for the protection of the environment, nature and landscape, including the cultural landscape, threats to the safety of the public and property, as well as the needs and opportunities for the development of the municipality. The study contains directions for changes in the spatial structure of the municipality and land use, areas and principles of the protection of the environment and its resources, areas and principles of the protection of cultural heritage, directions for the development of communication and technical infrastructure systems, areas where public purpose investments of local and supra-local importance will be located, areas with a particular risk of flooding and landslides, areas for the location of devices generating energy from renewable sources with a capacity exceeding 100 kW, as well as their protection zones related to restrictions on building and development and land use.

As a consequence of the adoption of the municipality's spatial development conditions and directions, it is possible to draw up local plans in order to specify land use and delimitation lines, including public purpose investments, determining the principles of protecting and shaping spatial order, protecting the environment, nature and landscape, as well as cultural heritage, establishing specific conditions for the development of land and restrictions on their use, including those where development is prohibited, delimiting the boundaries of areas for the construction of facilities generating energy from renewable sources with a capacity exceeding 100 kW, and boundaries of their protection zones associated with restrictions on building, development and land use.

Local plans, which constitute the local law and are the basis for issuing administrative decisions, generally do not cover the entire area of a municipality. Their obligatory character may apply to areas of protected landscape, cultural parks, agricultural and forest areas, which the municipality intends to designate for investment purposes, mining areas, areas where public purpose investments are to be located, areas subject to the land consolidation process, and special economic zones and their subzones.

The basic planning instrument both in the conceptual and implementary aspect should be the development strategy, which is a mandatory document in the case of voivodeship self-government units, whereas communes and counties are not obliged to (but may) prepare such documents. The amended Act of March 8, 1990 on communal self-government,<sup>9</sup> contains articles 10e, 10f and 10g,

8. See: Ustawa z dnia 27 marca 2003 r. o planowaniu i zagospodarowaniu przestrzennym. As published in: Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 28 stycznia 2022 r. w sprawie ogłoszenia jednolitego tekstu ustawy o planowaniu i zagospodarowaniu przestrzennym. Dz. U. z 2022 r. poz. 503.

9. See: Ustawa z dnia 8 marca 1990 r. o samorządzie gminnym. As published in: Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 6 kwietnia 2020 r. w sprawie ogłoszenia jednolitego tekstu ustawy o samorządzie gminnym. Dz. U. z 2020 r. poz. 713.



defining the scope and procedure of drawing up the commune development strategy. This strategy can be seen as a document:

- directing and securing the continuity of the development policy, taking into account the changing conditions;
- being the basis for applying for external development-oriented funding when the unit's own resources are insufficient; and
- integrating and mobilizing the local community to co-implement development plans (Hoinkis et al. 2021, 6-9).

According to the mentioned Article 10e of the Act on Municipal Self-Government, the development strategy should contain:

- conclusions from the diagnosis of the social, economic and spatial situation of the municipality, in which a territorially oriented approach and the concept of territorial capital may prove useful;
- strategic development objectives in the social, economic and spatial dimension;
- directions of actions taken to achieve the strategic objectives;
- expected results of planned actions, including the spatial dimension, and indicators of their achievement;
- a model of the functional and spatial structure of the municipality;
- findings and recommendations in the area of shaping and conducting spatial policy in the municipality;
- areas of strategic intervention specified in the voivodeship development strategy along with the scope of planned activities;
- if identified, strategic intervention areas crucial for the municipality alongside the scope of planned activities;
- a strategy implementation system, including guidelines for the preparation of implementation documents; and
- a financial framework and sources of financing.

The last, yet very important and innovative from the point of view of the article, local planning instrument is the urban climate change adaptation plan (MPA).<sup>10</sup> In the years 2017–2019, the Ministry of Environment implemented the 44MPA project, which aimed to prepare municipal climate change adaptation plans (MPAs) in 44 of the largest (more than 100,000 inhabitants) cities in Poland. Warsaw devised such a plan as part of a pilot program of the Union of Polish Metropolises, referred to as ADAPCITY. Consequently, MPAs have been introduced in 45 cities where most of Poland's human, service and creative potential is concentrated. At the same time, these metropolitan areas may experience climate change in a more onerous way. Hence, temperature changes may cause the so-called “heat island effect”—i.e., an increased demand for cooling, energy shortages, reduced air quality, disruptions in transport, an inflated demand for water and problems with its quality, an increased risk of heat-related mortality, in particular among the elderly, chronically ill, very young and marginalized, deterioration of the quality of life, especially for people living in substandard housing, and extreme conditions for urban greenery. In turn, an increase in the frequency and intensity of precipitation and droughts can lead to a lower quality of surface and groundwater, contamination of water supplies and disruption of sewage disposal, and disruption of urban infrastructure due to flooding. On the other hand, increased storm activity may result in power outages, threats to urban infrastructure, a higher risk of death, injury, stress disorders, post-traumatic stress disorders, as well as an increase in the number of fires, greater losses in tree stands and unsuitable facilities (Kassenberg et al. 2019, 17).

The project is comprised of diagnosis, vision, objectives, a list of actions to be taken, an implementation schedule, a budget, and monitoring of the results. The diagnosis should also include an analysis of the following:

10. Between 2014 and 2020, low-carbon economy plans were also developed in municipalities, containing an overall strategy (strategic and specific objectives, current state, problem areas, organizational and financial aspects), the results of a baseline carbon inventory, and actions and measures to decarbonize the local economy. A properly prepared low-carbon economy plan is also a good instrument for the implementation of the EGD not only in cities but also in rural municipalities, including agricultural ones. Cf. Kistowski and Wiśniewski (2017).

- the city's exposure to climate change, carried out in the form of a climate change forecast for the city
- the city's susceptibility to climate change, based on past experience and a climate change forecast
- the city's adaptation to climate risks as determined by the exposure and vulnerability analysis
- the city's resilience to climate change, treated as a balance between threats and adaptation to them (Kassenberg et al. 2019, 27–30)

The diagnosis should also define the sectors of the city, indicating the degree of their exposure, sensitivity and resilience, which will allow for the risk assessment of their functioning in changing climate.

The vision is a somewhat future projection of the state of the city that should be the outcome of the process of social participation. This process should also accompany the other stages of MPA development. For it to be effective, stakeholders (NGOs, businesses, residents) should be identified and various communication techniques should be applied, such as public meetings and hearings, the use of representative groups, e-consultations, focus groups, questionnaire interviews, citizen panels, deliberative polling, participatory planning, and the Future City Game.<sup>11</sup>

The overarching objective of the MPA is to make the city more resilient to climate change. This objective should be followed by specific objectives, on the basis of which adaptation options will be prepared. Four such options can be distinguished, all of which will be linked to lists of actions taken.<sup>12</sup> The first option is the so-called no-regrets approach—i.e., solutions that are cost-effective and, at the same time, have measurable and immediate adaptation benefits. Examples might include avoiding construction in floodplains, building with water-resistant materials or changes in the local law. The second option, the low-regrets approach, combines relatively low financial investment with high adaptive efficiency. Typical actions under this option could be the creation of restrictive building codes in areas prone to flooding, the construction of adequate infrastructure in the face of upcoming climate change or extreme event monitoring. The third option, called win-win, consists in bringing benefits to other spheres in addition to reducing vulnerability to climate change effects. Examples of actions under this option include creating green infrastructure, such as green roofs or green walls, protecting green areas, conducting educational activities concerning the need to adapt to climate change. Lastly, the fourth option, called the flexible approach, involves a gradual implementation of less complex adaptation measures, avoiding large-scale actions aimed at addressing several problems at once, such as phasing out investments from areas prone to flooding.

The timetable for action is specific to each city. In terms of obtaining funding for the implementation of MPAs, the EU funds earmarked for the implementation of the European Green Deal may prove to be an effective source. With regard to the monitoring, though, it is advisable to use a standardized set of indicators (Kassenberg et al. 2019, 38–39) such as

- the size of impervious surface in the city (in ha) and its share in the city's or individual district's area (in %),
- the size of biologically active area in the city (in ha) and its share in the area of the city or individual districts (in %),
- the number of people living in flood-prone areas,
- the cubic capacity of buildings at risk of flooding,
- the number of people living in heat island areas,
- the average annual losses due to floods and flooding (in PLN million),
- the average annual losses due to strong wind (in PLN million),
- the average annual number of fire brigade interventions in connection with rainfall and strong wind,
- the average annual number of failures and disruptions in transport resulting from extreme weather events,

11. See: "Podręcznik adaptacji dla miast. Wytyczne do przygotowania Miejskiego Planu Adaptacji do zmian klimatu." Ministerstwo Środowiska, 2015, pages 13–14. Handbook (in Polish) available at [http://www.rpo.wzp.pl/sites/default/files/podrecznik\\_adaptacji\\_dla\\_miast\\_20191126.pdf](http://www.rpo.wzp.pl/sites/default/files/podrecznik_adaptacji_dla_miast_20191126.pdf).

12. Ibid., pages 32–41.

- the average annual number of failures in drinking water supply resulting from extreme weather events,
- the average annual disruption of wastewater discharge resulting from extreme weather events measured with the volume of untreated wastewater,
- the annual average electricity blackouts resulting from extreme weather events (expressed in minutes), or
- the annual average increased mortality rate due to heat waves and tropical temperatures (for the whole city).

The monitoring of these indicators should take place every five years, starting from the time the MPA is developed. The preparation and implementation of MPAs is one of the best local instruments to achieve climate neutrality as set out in the European Green Deal.

To ensure the effectiveness in the EGD's implementation of the planning instruments mentioned in the article, it is necessary to combine and coordinate them in accordance with the conceptual innovation of integrated planning, which in the analytical and decision-making process combines economic, social and environmental (spatial) connections and interdependencies (Markowski 2016, 115). It should be based on the integration of socio-economic and spatial planning, while in terms of regulatory mechanisms it should take place both at the stage of planning and implementing the policy. The aspects of integrated development planning should pertain to planning levels (local, regional, national and European), planning objects (sectoral and territorial) and planning documents (unification and coherence). The objective of integrated planning is sustainable development, made up of economic, social, spatial, environmental and institutional-political dimensions. Its importance on the local scale is central, as it facilitates the programming and implementation of development policies based on the resources of territorial capital (Churski 2018). In practice, this should translate into the integration of the local development strategy with the MPA, as well as the study of conditions and directions for the spatial development of the municipality in the diagnostic part and, additionally in the directional part, local plans.

### 3 Some spheres of the local activities targeted at counteracting climate change

One practical manifestation of the decarbonization of the local economy, linked to the provision of secure and affordable energy, is the development of biogas and biomethane plants.<sup>13</sup> There are 335 biogas plants, but in Poland no plant of this type has been built yet. Biogas plants can be divided into the following:

- agricultural biogas plants
- biogas plants connected to sewage treatment plants, in which primary sludge is directed to gravitational thickeners and then to fermentation chambers, in which carbon dioxide and biogas are produced as a result of anaerobic processes
- biogas plants associated with municipal landfills, where the degasification of the landfill heap is required at the end of its life

The last two types, amounting to 219 biogas plants with a total capacity of 138 MW, are part of the technological process of wastewater treatment and the operation of municipal waste landfills, and are an integral part of municipal companies. At the same time, an untapped opportunity is identified with 116 agricultural biogas plants, with a total capacity of 118 MW. Agricultural biogas plants use approx. 4.4 million tons of raw material annually, mainly dung, and, to a lesser extent, manure, fruit and vegetable residues, or the so-called targeted crops. According to experts, Poland has about 150 million tons of waste to manage annually, from which about 15 billion cubic meters of biogas and about 8 billion cubic meters of biomethane, after purifying it (e.g., of sulfur compounds or carbon dioxide), could be obtained. Bearing in mind that approximately 20 billion cubic meters of natural gas are consumed annually in Poland while only 4 billion cubic meters are produced, an

13. Biogas plants produce biogas which as a rule contains around 55% methane and is not suitable for pumping through natural gas pipelines due to its different physical and chemical properties, whereas the biomethane produced in biomethane plants is similar in composition to high-methane natural gas with a methane content of up to around 98%.



additional 8 billion cubic meters would result in a decrease in imports and greater diversification of supplies, which is particularly important in the conditions for reorientation of the gas system in Poland in response to the embargo on Russian gas which was imposed by European countries against Russia after its invasion of Ukraine. At the same time, Poland would also see a reduction in greenhouse gas emissions, and the problem with organic waste storage and disposal would be mitigated (Furman 2021). Furthermore, access to cheap energy would accelerate the replacement of the so-called *kopciuchy*—i.e., obsolete solid fuel cookers and boilers, which are the main source of the so-called low emissions. Irrespective of the fact that fuel and energy companies are interested in the development of the biogas and biomethane sector, local governments are given free rein to encourage local energy companies to build and operate biogas plants.

Another practical measure that can be taken to ensure the EGD on the local level is the transformation of public transport as a chain of movements of people, carried out on foot, by individual means of transport and/or by public transport. The movement should fulfill the condition of completeness (i.e., lead to the final destination). It can be made by car, bicycle, on foot or by means of public transport. From the passenger's point of view, it is important that the movement does not require a large number of transfers, takes place in a relatively short time and is cost-efficient. The use of multiple modes of transport to move passengers, however, requires appropriate coordination measures (Szołtysek 2016, 58–59). In the case of urban transport, there is a phenomenon of demand imbalance of a temporal (daily, hourly) and spatial (directional and sectional) nature, which increases the costs of providing services, as makes it necessary to maintain the capacity of transport means adjusted to the maximum demand (Grzymała 2011, 89–93).

In order to achieve sustainable and intelligent mobility, which is one of the priorities of the EGD, at the same time minimizing the negative effects of urban transport (e.g., greenhouse gas emissions, noise, operational waste management), the following principles should be implemented:

- rationalization of travel needs, which implies the need to reduce the distance between places of residence, work or services and to ensure their accessibility through public transport, as well as the use of the Internet (e-government, e-business, etc.) to run errands instead of travelling for that purpose
- economizing passenger car use, which should be achieved by including in the price of the vehicle all the externalities generated by its use, and by the activity of public authorities to reduce the use of passenger cars in urban areas and replace them with more efficient means of transport
- promoting more energy-efficient and eco-friendly means of transport through improving the functioning of public transport (railways, trams, buses, trolleybuses), creating conditions for the development of non-motorized traffic (cycling and walking), using alternative fuels in combustion vehicles (ethanol, biogas, LPG, natural gas, biodiesel), maximizing the use of vehicle efficiency, which should entail a flexible vehicle adjustment to the number and frequency of transport needs that change in time and space, as well as full utilization of vehicle capacity without impairing the efficiency and comfort of traveling
- charging companies that manufacture vehicles for both public and private use for the costs of disposing the vehicles and the waste associated with their use (Miszczuk and Miszczuk 2021, 171–172)

The transport model in a particular city is determined by numerous conditions and factors:

- geographical conditions (vertical relief, layout of rivers and water bodies, climate, etc.)
- the size of the city both in population and spatial terms, its location within the settlement system (central area of an agglomeration, satellite city, city within a conurbation, etc.) and the ensuing spatial connections with other cities and the suburban zone, related to the intensity of the suburbanization phenomenon
- the socio-demographic conditions connected with the demographic structure of the population, its educational and professional activity, and the wealth of the inhabitants,
- the spatial structure of the city, possibly being an effect of the urban planning approach popular in the 20th century, related to the zoning of functions within the city, which caused a longer distance between places of work and places of residence
- the level of motorization and car use (Miszczuk and Miszczuk 2021, 169–170).

Many of these conditions are objective in nature, but this does not mean that local authorities, who are responsible for the way urban transport is organized, do not have any influence on its model. The activities of local authorities in this respect may be described as a transport policy aimed at influencing both the volume and the structure of urban traffic. The local transport policy, in accordance with the EGD, can be seen in:

- traffic zoning—i.e., the designation of zones exclusively for pedestrian traffic, zones with public transport only, and (peripheral) zones with dominant individual transport;
- making public transport more attractive than individual transport by increasing traffic speed, improving operational reliability, and increasing frequency, all of which can be achieved through various solutions, such as separate traffic lanes, priority at intersections (especially with traffic lights), etc.;
- proper traffic organization—i.e., the construction of an urban transport system which relies on the most efficient vehicles (underground, urban railway, fast tramway), the remaining vehicles being only complementary; and
- a passenger-friendly tariff policy, favoring passengers who regularly use public transport, up to free transport for selected social groups (school children, students, etc.) or for all passengers.

Treating public transport as a multimedia chain of movements of people, carried out on foot, by individual means of transport and/or by public transport, several model solutions for combined transport can be distinguished, in line with the EGD:

- park & ride, consisting in encouraging car users to limit their travel around the city by enabling them to leave their car at a free or paid (but preferentially associated with a public transport ticket), parking lot located on the outskirts of the city (near underground stations, urban railways, tram or bus hubs) and to continue their journey using public transport
- kiss & ride, which aims to improve safety and avoid congestion during the school transport of children and consists in parents taking their children to specially prepared stops from where they are transported by school buses with high frequency under the supervision of school staff and parent volunteers
- bike & ride—i.e., encouraging the use of bicycles in the city and providing the opportunity to take them on dedicated metro cars, buses, trams and trolleybuses or to use the bike storage facilities located near public transport nodes
- car-pooling—i.e., giving priority to the movement and parking of passenger cars, in which seats are made available to other travelers (e.g., those who work together, live together, take their children to school, etc.)
- car-sharing, which involves the sharing of cars, made available for a fee to users by vehicle fleet operators, who may be different companies, cooperatives, associations or groups of individuals (Szołtysek 2016, 93–102)

The sharing economy in urban transport is also visible in the system of urban public bikes, which operates in Poland in 32 cities, with more than 1,400 stations, and almost 16,000 bikes for hire.

Warsaw, with two underground lines, a rapid urban railway, a tram network with separated tracks, buses, including those with alternative propulsion, and an extensive park & ride and car-sharing system, boasts the most extensive public transport in Poland. Tram networks operate in 15 cities, including Poznań and Kraków, where the so-called fast tramway is being developed, combining the collision-free character of the metro with significantly lower network construction costs. Three cities (Lublin, Gdynia, Tychy) have trolleybus networks. However, in 5 voivodship cities (Białystok, Kielce, Olsztyn, Opole, Rzeszów) and in centers of subregional importance the basis for urban transport are buses, the most environmentally burdensome mode of transportation.

An innovative solution is the use of public transport for urban freight transport, contributing to a reduction of congestion and greenhouse gas emissions. Dresden, for example, has a goods tram (CarGoTram), whose timetable is coordinated with the passenger trams. It replaces around 160–180 lorries per day, and it transports car parts from the logistics center to the Volkswagen factory. In Zurich, for instance, the Cargo-Tram serves residents for waste disposal. In Frankfurt am Main, there is a pilot program for a logistics tram used by the Hermes courier company. This tram carries parcels in larger packages and plays the role of a microhub—i.e., a small buffer warehouse, from

which further distribution takes place by cargo bikes (Janiak 2020). Freight bicycles are already successfully operating in the cities of the Netherlands, Denmark, Austria, Bulgaria, Romania, Italy, and the UK (Szołtysek 2016, 156–165; Tundys 2008, 244–248).

## Conclusion

The concept of sustainable development and, in particular, its goals laid down by the UN in the 2030 perspective are widely accepted and their implementation is being monitored. The EU's response to the UN initiative is the adoption of the European Green Deal, which stipulates a significant reduction of greenhouse gas emissions by 2030 and climate neutrality of EU member states in 2050. These objectives cover activities and financing of the EGD implementation under the Cohesion Policy and the Common Agricultural Policy, to name just two. The pursuit of the EGD goals is possible at various levels of management. The authors showed how the existing and new planning instruments can be used at the local level and indicated actions that can be taken in transforming the local economy with regard to energy and urban transport.

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