



Technical study –

The needs for a green transition and the development of sustainable tourism in the South-East region

2026

The project is co-funded by the European Union and by National Funds of the participating countries

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Project:	Green for Good (G4G)
Programme:	Interreg VI-A IPA Programme “Greece - North Macedonia 2021 – 2027”
Implementation period:	2025 - 2027
Contracting Authority:	Centre for development of the South-East planning region Blvd. Marshal Tito no.1-1, 2400 Strumica, North Macedonia
Prepared for the needs of the:	Green for Good (G4G) Project
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Disclaimer: This publication is co-funded by the European Union. Its contents are the sole responsibility of the Project partners and do not necessarily reflect the views of the European Union, the partner countries and the Managing Authority.

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GHG	Greenhouse Gases
IED	Industrial Emissions Directive
SMEs	Small and Medium-sized Enterprises
EMS	Environmental Management Systems
SCIP	Substances of Concern in Products
EPR	Extended Producer Responsibility
EIP	Economic and Investment Plan
IPARD	IPA Rural Development
EIT	European Institute of Innovation and Technology
cross-KIC	Cross-Knowledge and Innovation Community
WBIF	Western Balkans Investment Framework
TEN-T	Trans-European Transport Network
IRENA	International Renewable Energy Agency
LNG	liquefied natural gas
CBAM	Carbon Border Adjustment Mechanism
CDP	Italian Development Bank
MEMO	National Electricity Market Operator
EECS	European Energy Certificate System
CdTe	Thin-film modules made of cadmium telluride
EPBD	Energy Performance of Buildings
NECP	National Energy and Climate Plan
WHO	World Health Organization
OECD	Organization for Economic Co-operation and Development
REEP	Regional Energy Efficiency Program

The Green for Good (G4G) Project: Advancing a Greener Cross-Border Future

The Green for Good (G4G) initiative is a part of the efforts aimed at the development of a greener European society, which promotes the transformation of local economies into low-carbon production and sustainable consumption patterns. North Macedonia, within the framework of the Green Agenda for the Western Balkans and in accordance with the European Green Deal adopted on 6 October 2020, has made ambitious commitments on climate issues. In April 2021, the Government adopted the Enhanced Nationally Determined Contribution (ENDC) under the Paris Climate Agreement, setting a strong vision for climate action. However, there has been uneven progress, with very little done to address wastewater, solid waste, air pollution and disaster risk reduction. Particularly concerning is the level of sulfur dioxide, nitrogen oxides and particulate matter, which, as in other Balkan states, is above acceptable limits and has been a major contributor to health problems in the region.

The aim of the project is to encourage the emergence of a greener cross-border society based on the principles of the Sustainable Development Goals and the Green Deal Agenda, where economic growth is decoupled from resource use. The project will help to ensure investments in green technologies in a region that is still very reliant on fossil fuels, while encouraging active consultation and participation of local authorities and civil society organizations in the implementation of strategies across energy, environment and transport sectors. Grassroots organizations, environmental NGOs, women's and youth organizations will be encouraged to actively participate in public debate at the municipal level and to enhance their cooperation at the regional level. The project will particularly target local communities in the municipalities of Strumica, Gevgelija, Valandovo, Radovish, Dojran and Novo Selo in North Macedonia, as well as in Thessaloniki and Themi in Greece, to ensure that cross-border cooperation is at the core of the project's activities.

The overall objective of the action is to promote the transition to a circular and resource-efficient economy in the North Macedonia - Greece cross-border region. The specific objective of the action is to contribute to the provision of services by local authorities, civil society organizations and educational and research centers active in South-East North Macedonia and Central Macedonia in Greece, aiming at a low-carbon economy and climate change resilience, including awareness-raising activities. The G4G project integrates infrastructure/equipment investments with soft actions, of which an innovative activity will engage school students in encouraging a greener and environmentally responsible society. In this manner, the project not only tackles the pressing environmental issues but also establishes a long-term capacity for sustainable development and regional cooperation. More information about the project is available on the official website: <https://southeast.mk/en/green4good/>.

The project is under the implementation of the Interreg VI-A IPA Programme "Greece - North Macedonia 2021 – 2027" as a cross-border cooperation Programme co-financed by the European Union under the Instrument for Pre-Accession Assistance (IPA III).

Summary

The technical study offers a thorough examination of the needs for promoting the green transition and sustainable tourism in the South-East region of North Macedonia, with a prominent focus on the Green Deal of the European Union and the Green Agenda for the Western Balkans. The study begins by placing the region in a wider European context, highlighting that the European Union has pledged to be the first climate-neutral continent by 2050. This commitment is facilitated by the Sustainable Europe Investment Plan, which foresees annual investments of approximately €260 billion to achieve the climate and energy goals for 2030. In the case of candidate countries, such as North Macedonia, the alignment with EU legislation is not only a part of the accession process but also a way to achieve the UN 2030 Sustainable Development Goals.

The importance of simplifying environmental laws to promote sustainable development is stressed in the study. The European Commission has proposed changes to minimize administrative burdens and simplify reporting obligations. This will help save billions of euros for businesses every year while ensuring that high environmental and health protection standards are maintained. The comments from stakeholders show that there is a need to simplify the process of obtaining permits and make reporting simpler, especially for small and medium-sized enterprises. In the South-East region, where SMEs play a vital role in the economy, such reforms could significantly enhance competitiveness and resilience while supporting the green transition.

At the regional level, the Green Agenda for the Western Balkans, adopted in 2020, offers a framework for aligning with EU climate and energy objectives. With the support of the Economic and Investment Plan, the Green Agenda leverages significant financing for clean energy, sustainable transport and private sector engagement. The plan envisions investments of up to €9 billion in the period from 2021 to 2027, accompanied by guarantees that could trigger an additional €20 billion. These investments are channeled into renewable energy, energy efficiency, waste management and sustainable transport. In the case of North Macedonia, the flagship projects include solar and wind energy, hydropower rehabilitation and the modernization of electricity transmission. The Regional Energy Efficiency Program also supports building renovations, while the Coal Regions in Transition platform helps to exit the coal sector.

The study identifies solar energy as one of the most important opportunities in the South-East region. One of the biggest projects is the Bitola 3 solar power plant, which will be the biggest solar energy plant in the country with a capacity of 134 MW. Solar potential simulations in municipalities such as Strumica, Gevgelija, Valandovo, Radovish, Dojran and Novo Selo confirm the existence of important opportunities for rooftop solar and utility-scale solar energy. The region has optimal solar irradiation conditions, making it suitable for the development of renewable energy sources. Suggestions include increasing investment, enhancing the legal framework for the development of renewable energy sources and promoting cross-border cooperation with Greece to better exploit regional synergies.

Air pollution is still one of the most urgent issues. Concentrations of sulfur dioxide, nitrogen oxides and fine particulate matter are always higher than acceptable levels. The report urges the need for immediate action to lower emissions, such as building retrofits to enhance energy efficiency, more stringent enforcement of air quality standards and development of cleaner transport options. Building retrofitting is recognized as a key action, especially in the South-East region, where old buildings are a major factor in high energy use and emissions. Climate resilience in urban planning and disaster risk reduction is also highlighted.

Tourism is examined both as a factor that adds to environmental pressures and as a factor that could trigger the green transition. The South-East region has a variety of tourism resources: lake and spa tourism in Dojran, Negorci and Bansko; mountain tourism; cultural and gastronomic events such as Rakijada and Kestenijada; and health tourism infrastructure. Strategic priorities for 2026-2030 are in line with the Green Agenda, emphasizing digitalization, energy efficiency and the circular economic approach. The European Tourism Indicator System (ETIS) is proposed as a governance and monitoring framework to ensure sustainability, transparency and accountability. By using ETIS, the region can enhance the sustainability of tourism, build trust among tourists and investors and promote the local economy through local procurement. Environmental pressures caused by tourism activities will be minimized by monitoring water, energy, waste and emissions.

Another important sector is waste management. The startup analysis for remediation of waste at the Buchim mine tailings in Radovish is given as an example of best practice, showing how environmental clean-up can be used to achieve circular economy and sustainability goals. Conclusions highlight the importance of integrated waste management, recycling and the implementation of extended producer responsibility. Water quality management, biodiversity protection and civil protection are also mentioned as important elements of the green transition. Natural disaster protection and ecosystem protection are important for long-term resilience.

Digitalization is highlighted as a cross-cutting requirement. The research highlights that digital solutions can improve governance, increase transparency and enable cross-border cooperation. Digitalization can also enable the monitoring of environmental indicators, optimize resource use and improve stakeholder engagement. In the tourism sector, digital solutions can market destinations, control tourist flows and offer real-time information on sustainability activities. In the energy and environment sector, digital solutions can enhance efficiency, minimize costs and enable improved decision-making.

The overall conclusion of this study is that the green transition and the sustainable development of tourism in the South-East region need a coordinated approach. It is necessary for the local authorities, civil society, educational institutions and cross-border partners to work together in order to implement strategies and projects. This will enable the South-East region to become a model for green transition and sustainable tourism in the Western Balkans. The study emphasizes that, although the financial support of the EU is essential, it is also important to have local commitment and innovation. The South-East region can become a model for green transition and sustainable tourism in the Western Balkans by using its natural resources, human capital and cross-border partnerships.

1. Introduction to the Foundations for Action in the EU Green Transition

At the European Union level, a dedicated tool together with financial means has been created in order to promote the accelerated social turnaround and digital and green transition in EU countries in favor of more sustainable development, the resilience of society and economic preparedness for the future challenges in relation to crises.

Consequently, the European Commission proposed a plan for a recovery in Europe during the month of May 2020. Later in July 2020, the European Union member countries agreed upon a plan for the recovery of Europe, which is denoted by the 'Next Generation EU' instrument and the Multi-annual Financial Framework for the period of 2021-2027.

One of the basic characteristics of the European Union is that it has integrated the UN 2030 Agenda for Sustainable Development under its legal framework and one of the leading international actors for the implementation of the said Agenda. In the above framework, the current European Commission has already defined, as part of the political guidelines for its work, six priorities, with the ambition of the European Continent to become the first climate-neutral continent.

These ambitious objectives, however, cannot be achieved by the EU alone, as challenges transcend borders of economies. Hence, a comprehensive and coordinated policy response is indispensable with a view to maximizing benefits related to health, quality of life, resilience and competitiveness.

To enable the achievement of these objectives, it is essential for there to be substantial investment initiatives that will be achieved through the EU Green Deal Investment Plan, also known as the Sustainable Europe Investment Plan⁶. As the investment component in the EU Green Deal plan, this investment plan aims to meet the substantial investment needs. To meet the 2030 climate objectives and energy objectives (reduced 40% in GHG emissions and 32% share in renewable energies and 32.5% in improved energy efficiency) will require additional investment in the range of 260 billion euros per year.

Taking into view this systemic approach of the EU to the 2030 Sustainable Development Agenda through the lenses of the accession process of the Republic of North Macedonia towards this international organization, it could be noticed that there is strong synergy between EU accession and achieving sustainable development goals. Alignment of legislation, on one hand, with the EU is, in fact, compliance with the requirements of the Sustainable Development Goals Agenda 2030. The so-called European Green Deal is also part of the strategy of sustainable development in the European Union. The European Union Strategy on Sustainable and Sustainable Consumption Patterns is based on a green economy approach based on a transition to a circular economy in Europe.

The European Green Deal is another response aimed at working towards climate change issues. It also tackles different environmental problems. It is a wide policy framework that combines different policy areas that include Internal Market Regulation, Climate, Energy, Industrial Policy & Circular Economy, Construction, Pollution, Biodiversity, Agriculture, & Transport. In line with the UN's sustainable development goals, the sustainability goal will be incorporated in policy formulation across the globe. Sustainability issues and the green agenda will permeate public administrations at different levels of governance.

The areas covered by the Green Deal are air quality, waste policy, climate objectives, energy saving and renewable energy sources. The role of public bodies in the EU member states and candidate countries must also be considered in the form of responsibilities to the Green Deal agreement by public as well as private actors. Awareness about practical solutions for dealing with challenges due to targets of reducing CO2 emissions is necessary, as well as information about available financing from the EU for programs and projects at a national level under the Green Deal.

The European Green Deal will trigger a wave of building renovations and create an opportunity to develop a new common architectural aesthetic, improving the energy efficiency of buildings.

2. Promoting sustainable growth with simpler and smarter environmental legislation

On 10 December 2025, a set of proposals was presented by the European Commission aimed at making environmental laws simpler in terms of industrial emissions, circular economy, environmental assessments and geospatial data. In 2024, in the Flash Eurobarometer survey (No 549), SMEs were asked about intentions regarding “greening” of activities based on resource efficiency, renewable energy, among other initiatives, in relation to the complexity of legislation.

These proposed changes will help reduce the administrative burden on businesses, at the same time setting ambitious goals for protecting the environment and health within the EU. These reforms will speed up the permitting procedure for all projects, especially in strategic areas such as strategic digital projects, critical raw materials projects and affordable housing schemes, to help achieve the transition to a clean and digital economy in the EU.

Under this proposal, it's estimated that firms will achieve savings of around €1 billion per year; this will mean that the total annual administrative savings brought about by omnibus and other simplification proposals put forward by the Commission will be close to €11 billion per year. The EU will be on target to meet the total target for such savings by 2029. The target for that period stands at €37.5 billion per year.

This effort is a part of a wider initiative that is also working towards meeting the requirements set by the Competitiveness Compass proposed by the EU. This will also help to ensure a reduction in red tape and will contribute to competitiveness and resilience, together with green growth in the EU.

The simplification package includes six legislative proposals. The proposed simplifications include targeted legislative changes and consider the input received because of the call for evidence that was announced on 22 July 2025, exceeding 190,000 responses.

The European Commission will continue to strive for a simplification of existing legislation following the implementation of this new package, based on the views expressed during the call for evidence.

2.1. Key elements of the proposal

The most important aspects concerning the streamlined assessments in the decision of permits will result in simplified and faster procedures, such as single points of contact, digitalization and faster procedures. In this case, the proposals enhance the toolbox containing further acceleration measures, including decarbonization, resource efficiency and affordable housing, with respect to the relevant strategic sectors and projects. The steps outlined enhance key projects in the EU economy, which will take shorter timelines in the future.

The simplified emissions standards for industry and farmers will give industry more flexibility in meeting the Industrial Emissions Directive (IED) on the implementation of Environmental Management Systems (EMS).

- For example, it shall no longer be mandatory to include transformation plans.
- More time will be allowed for the preparation of Environmental Management Systems for operators.
- The requirement for independent audits for EMS will cease.

Farmers and aquaculture operators will have some of their obligatory reports waived, which will reduce the administrative workload for them. In addition, the scope of farmed enterprises will become simplified and less duplicitous for organic farming concerns.

Better digital solutions are expected in hazardous substances in products. The cost of the Substances of Concern in Products (SCIP) database was exorbitant and the tasks it performed are going to be replaced with better digital solutions such as the Digital Product Passport, as well as the so-called One Substance, One Assessment package. This explains why the Commission wants to modify the Waste Framework Directive to repeal the SCIP database.

Under current legislation for batteries, packaging, electronic equipment, single-use plastics and waste, EU-based companies are obliged to appoint an authorized representative for them to meet the obligations of Extended Producer Responsibility (EPR) in each Member State where they are not established but in which they sell products. This requirement will be suspended by European producers by suspension pending further streamlining of EPR schemes under the Circular Economy Act. This will cut the cost of doing business in the EU and is a Simplified Extended Producer Responsibility - EPR.

The technical requirements of geospatial data, as required by the INSPIRE Directive, will be harmonized with the legislative requirements for geospatial data as provided by the horizontal

legislation of high-value data. This simplification will lower compliance costs for public authorities and facilitate access to high-value geospatial datasets for all public and private users.

2.2. Future simplification

In the next few years, further simplification will center on stress-testing, guidance and enhancement of the existing rules and regulations.

For example, the Commission will shortly publish guidance to facilitate a smooth and timely transition to the Packaging and Packaging Waste Regulation by providing further clarity and harmonized implementation on issues raised in the call for evidence.

The review and revision of the Water Framework Directive have also been scheduled for 2026, as already announced in the RESourceEU Action Plan. The revision of the Marine Strategy Framework Directive is pending and it is expected that with this review, a greater degree of equivalence with the EU freshwater acquis will be achieved. As part of its plan concerning a Water Resilience Strategy, a series of Structured Water Dialogues will take place, possibly leading to additional improvements.

Furthermore, the Circular Economy Act that will come into effect in 2026 will provide simplified and harmonized terms and costs of compliance for cross-border circular economic activities. The legislative proposal will now go to the European Parliament and Council to adopt.

2.3. Stakeholder feedback

Complex administrative or legal procedures and complex environmental reporting have been cited in previous consultations by companies of all sizes. Engagement of stakeholders in recent months has allowed for feedback on difficulties and bottlenecks in ensuring that companies are following the laws and where there may be an opportunity to streamline administrative and reporting requirements without undermining the purposes of the legislation. The need for faster and easier permitting processes was also emphasized by stakeholders.

3. Green transition activities in the Western Balkans

The European Green Deal is a tool launched by the European Commission on 11th December 2019 and is a comprehensive guide to ensure a sustainable economy by meeting all the imminent climate change issues by turning them into opportunities, while keeping in mind that this process is accomplished through a fair procedure. The supreme goal of this new approach to growth is to have net-zero greenhouse gas emissions by 2050, while also promoting a high level of economic growth that is decoupled from resource use.

Furthermore, it also strives to protect and upgrade natural capital, as well as ensuring the health of citizens through protection from any environmental risks and impacts. Noting the complexities and interrelations involved in these issues, the European Green Deal highlights

the need for cooperation between citizens, the economy level, the region level and the local level, civil society and industry.

The European Green Deal provides a roadmap for joint action in response to the challenges of green transition, climate change, biodiversity loss and excessive use of resources and pollution, decoupling economic growth from resource use and environmental degradation. Attention will be paid to the EU commitment to reach climate neutrality by 2050. Given that ambition and their future in the EU, the countries of the Western Balkans-with support from the EU-will also need to reinforce efforts in this area.

The Western Balkans will have to commit to implementing the agenda of sustainable development goals for 2030, as well as implementing and aiming for full achievement of the Paris Climate Agreement and global biodiversity goals. With ambitious and concerted action towards this agenda, it is a fact that it will give a first-mover advantage to both the EU and the Western Balkans in international economic competition, increasing their competitiveness in the growing global markets for sustainable and green technologies.

In view of these factors, the Green Agenda for the Western Balkans, as a framework of orientation and activities accompanied by a financial package, is in essence the backbone of the transformation process within the Republic of North Macedonia, which is anticipated to further intensify in strength through the middle part of this century. In turn, this technical study replicates this specific course of activities.

However, to achieve these far-reaching goals, it is not only necessary to depend on actions taken by the EU because these challenges exceed the borders of economies. Thus, to reap as many benefits as possible pertaining to health, quality, resilience and competitiveness, a comprehensive approach is a must.

The Green Agenda for the Western Balkans, adopted during the Western Balkans Sofia Summit on 10 November 2020, represents a crucial tool for aligning the Western Balkans region with the goals of the EU Green Deal. Considering special conditions in the region and some delay in the implementation of respective EU policies and alignment processes, the development of Action Plan⁸ was necessary. The present Action Plan is tailored according to the region's specifics to contribute to the reversal of negative environmental practices and to the green transition of all economic sectors.

The application of the Green Agenda in the Western Balkans is further supported by the Economic and Investment Plan for the Western Balkans. The Economic and Investment Plan for the Western Balkans is a comprehensive one and aims at achieving the support of the long-term recovery of the region by enabling the green and digital transition of the region itself in the direction of achieving the economic growth of the Western Balkans by integrating it further with the EU Single Market. It is well understood by the EU the importance of the Western Balkans in terms of being a major market for them and being a very important location for the transit routes.

To this end, the Plan outlines an investment package of substantive proportions for the Western Balkans region. The Commission has proposed to mobilize up to EUR 9 billion in

the period 2021-2027 for productive investments and sustainable infrastructure, increased competitiveness and inclusive growth, sustainable connectivity and the stimulating of the twin green and digital transition. Moreover, this investment capacity will be further complemented, among other things, by mobilizing a new Western Balkans Guarantee facility, which could add up potentially investments of up to EUR 20 billion.

It is to be pointed out at this point that, without such financial support, the countries of the Western Balkans would not be able to follow and implement the Green Transition of the EU; furthermore, even this financial support is not enough to achieve the ultimate goals of the green transition.

The EIP for the Western Balkans is a prominent initiative by the EC with an expected contribution to advancing the implementation of the Green Agenda based on four flagships: 1) Environment and climate; 2) Clean energy; 3) Sustainable transport; 4) Private sector development.

The Environment and Climate flagship receives support, for instance, through the EU4Green program aims for the region, which works within the pillars of the Green Agenda. The flagship aims at enhancing awareness and communications for the Green Agenda, strategic planning for financing the Green Agenda and greening skills.

Furthermore, IPARD (IPA Rural Development) schemes also support agribusiness and farming in their green and digitization transition and in the application of sustainable models of food production. The Republic of North Macedonia is a country where the EU4Prespa project aims at ensuring the support and implementation of the Green Agenda in and around the Prespa transboundary lake area, prioritizing its greening and also support for local enterprises and greening of agriculture and biodiversity. EIT Climate-KIC, EIT Raw Materials, EIT Health, EIT Food, EIT Manufacturing, EIT Digital and EIT Urban Mobility have come together with a common aim of implementing a Cross-Knowledge and Innovation Community (cross-KIC) activity. The main aim of this activity is to improve collaboration and maximize the application of circular economic ideas and approaches at a wider level in the region of Western Balkans. To date, a total of 700 actors has taken part in it and over 460 actions in the circular economic sector have been identified.

The Clean Energy Flagship is prioritizing investments in renewable energy, energy efficiency and facilitating the coal transition, which all help to achieve decarbonization objectives outlined within the Green Agenda and 2030 climate and energy goals. The Western Balkans Investment Framework (WBIF) is also helping to support 17 flagship investment projects, such as the development of solar and wind energy production capacity, improvement of existing hydropower plants and the upgrade of electricity transmission infrastructure. Moreover, the Regional Energy Efficiency Programme²⁰ leads to the renovation wave by scaling up comprehensive energy efficiency measures in public, residential and private buildings across the region. It further supports the transition away from coal through the platform for Coal Regions in Transition in the Western Balkans. The Sustainable Transport Flagship is tangibly related to connectivity at the very heart of the EU's Economic and Investment Plan (EIP) for the region. In the Western Balkans, its implementation is also tackling the expressions of the Sustainable and Smart Mobility Strategy. The implementation of this latter Strategy and the modernization of existing infrastructure are supported by the Safe and Sustainable Transport Programme. The aim of this program is to promote intelligent

and sustainable mobility solutions in the field of decarbonization and digital initiatives. The priority projects in this field of transportation will target an extension of the Trans-European Transport Network (TEN-T), where one of the main goals is to promote a shift towards using more green modes of transportation. The private sector development flagships emphasize the growth of small to medium-sized enterprises (SMEs), which have an extremely important role in making a shift towards a sustainable, circular, energy-efficient and renewable energy-based and climate-neutral economy. The EIP pays particular attention to this area and directs substantial investments to innovation in this sector for green growth.

It has mobilized funds to build solar power plants and rehabilitate hydropower plants, strengthen the transmission network to facilitate renewable energy sources' development, retrofit healthcare facilities to reduce public sector electricity consumption, implement regional waste management systems and construct interconnections in rail and road with the EU. All those planned activities have been valued at a total investment worth €4 bn. It has also contributed 504 miles. WBIF contribution.

3.1. Solar projects in North Macedonia

A financing scheme valued at 87 million euros (\$102.5 million) was signed between the European Bank of Reconstruction and Development and Germany's development bank KfW for a 134 MW solar farm project in Republic of North Macedonia; this is currently the largest solar energy project being developed in that country.

"Elektrani na Severna Makedonija" (ESM), the state-owned power production company, has arranged a funding package of €87 million (\$102.5 million) for a 134 MW solar farm.

The Bitola 3 solar powerplant will be located on top of an exhausting coal mine in Bitola, in Southwest North Macedonia.

The financial package will enable ESM to fund the development, construction and operation of Bitola 3. When completed and commissioned, the project will come up as the largest solar portfolio in the nation and will have a production capability of about 180 GWh per year.

The public utility firm is on course to add domestic capacities from renewable energy by a cumulative total of more than 200 MW in the coming two to three years with a number of solar and wind initiatives underway. In addition to a stable energy source, this also goes a long way to assist the environment by cutting down annual carbon emissions by over 260,000 tons.

This investment marks an important milestone in the energy sector in the Republic of North Macedonia. With this plan to convert the existing infrastructure in the country from coal to renewable energy, not only will this help achieve the country's aim to reduce its climate change goals, but it will also ensure an inclusive, fair and sustainable green economy.

The country aims to end coal and reduce its greenhouse gas emissions by 82% in 2030, according to its National Energy and Climate Plan. The plan provides for a 38% share of renewable energy in its final gross consumption of energy at the end of the decade, from roughly 22% this year.

The country's cumulative solar capacity was 833 MW at the end of last year, according to data from the International Renewable Energy Agency.

4. Transition and Alignment with the European Green Deal and the Green Agenda in the Republic of North Macedonia and its South-East Region

The green transition/symbiosis with the European Green Deal is rooted in findings concerning the framework including law instruments, strategies, action plans, et cetera. The Economic Investment Plan for Western Balkans (EIP) is one of the most important initiatives of the EC to support the green agenda in their implementation of four flagships:

- 1) Environment and Climate
- 2) Clean energy.
- 3) Sustainable Transport.
- 4) Private sector development.

The EU finances hundreds of projects in one way or another and helps the lives of many people all over the European Union, as well as helping the transition and development in the Western Balkan countries. The EC has already allocated EUR 1.25 billion to support the implementation of the GAWB since 2021 in technical assistance and investment in energy efficiency, renewable energy support, the transition from coal, as well as investment in environmental management. More such investments and grants through the Western Balkans Investment Framework will help the transition towards a “green future,” along with the adopted “Energy Support Package for the Western Balkan countries.”

To ensure easy implementation of the objectives presented in the Sofia Declaration, the RCC, together with the Western Balkan countries and the European Commission, identified seven action paths: Climate action; Energy; Sustainable transport; Circular economy; Depollution; Sustainable agriculture and Nature protection and biodiversity protection

These pathways offer an organized way to achieve commitments listed in the Sofia Declaration, thus promoting sustainability. The quantified results were retrieved from the assessment approach used in the Policy Report for the Green Transition in Western Balkans (Edition 2024).

4.1. Survey Findings

Generally, it is noted that there was a lack of cooperation between previous administrations and the non-governmental sector and citizens with respect to enhancing green activities, although there were some opportunities concerning international project funds employed for developing and harmonizing economy-level legislation. The administrations have not devoted enough resources to these activities. As a result, no positive progress has been made in terms of its implementation.

There is a need for the implementation of existing legislation, which for many years now is compatible with European standards. The general evaluation is that in the Republic of North Macedonia, the implementation level, especially regarding the circular economy, is very low. The above remarks are, in a way, supported by the findings from carrying out a public opinion survey among more than one thousand respondents, namely 1,021.

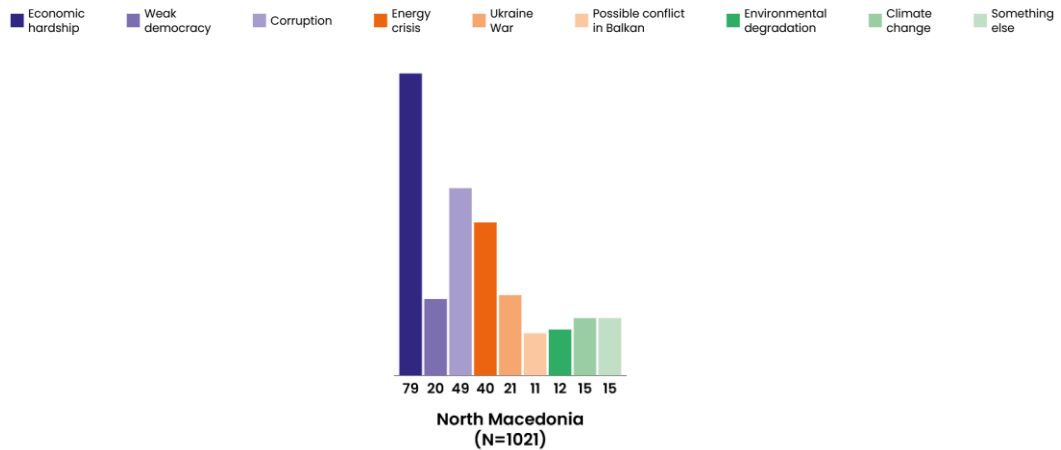


Figure 1. The most concerning problems for the green transition. Source: Prelec et al. (2023)

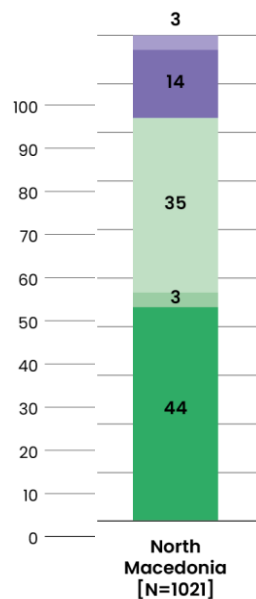


Figure 2. Assessment of EU requirements to reform the WB energy systems. Source: Prelec et al. (2023)

The results of the survey show that economic hardship, corruption and energy crisis are considered most relevant to Slovenian citizens (Figure 1). What is even more surprising is that environmental and climate aspects did not appear as important concerns. Certainly, this represents a threat to public support for renewable energy sources. There exists a common perception of this energy shift as highly priced policy that might negatively impact a broad public.

The region is further challenged by other matters pending. The conflict in the Western Balkans is among issues most relevant for this region.

The evaluation of the EU demands regarding the reform of the energy sectors within the economy, presented in Figure 2, illustrates that a considerable part of the respondents believe that the EU demands are excessive. 44% of the respondents from the Republic of North Macedonia have that opinion, while 38% of the respondents find the EU demands sufficient or less than sufficient.

4.2. Investing in Clean Energy

Cleaner energy by means of funding support from the EU will be strengthened by the Green Transition Programme for the Western Balkans. Energy market integration, decarbonization and green energy, transition, a high degree of system digitalization and smart grids and energy efficiency, including district heating and energy security will be strongly emphasized. Decarbonization is a major priority area in support of the Economic and Investment Plan and aligns with Clean Energy Transition within a green Economic and Investment Plan. The improvement and Enlargement of Energy Union with a potential membership of the Western Balkans is of major importance for a successful Clean Energy Transition.

The use of renewable energy sources will be encouraged, in keeping with what the region can offer and strategies for adjusting to changes in climate. This sector's environmentally sustainable investment plan embraces water, solar, wind and geo-energy. The promotion of clean and novel energy technologies must go hand in hand with a better investment environment in a wide-ranging regulatory system based upon competitive procurement procedures. Thus, it can be prevented that the economy of the Republic of North Macedonia is locked into highly pollution-generating, non-sustainable and ever costlier energy based upon coal.

The shift towards sustainable and renewable energy sources from coal will be essential, with the aim of lowering carbon emissions and air pollution. The platform titled “Coal Regions in Transition Platform in the Western Balkans and Ukraine” is being developed, just like in the EU. The platform will ensure that no one is left behind in their transition strategies and also ensure that alternatives to coal exist.

In fact, for a country that is so dependent on coal, a transition away from coal in the short to medium term may very well be achieved if there is a transition towards new, low-carbon gas infrastructure. This will give them access to a reliable, affordable and abundant supply of energy that will ensure that this country is competitive globally, while at the same time reducing emissions until the remaining potential from renewable and clean sources is fully tapped.

This new gas infrastructure must be based on the core of new pipelines. Any new pipeline to be developed in the Western Balkans has to fully respect EU rules, including under the Energy Community Treaty and prove its long-term viability. The developing global role of liquefied natural gas should also be seized as an opportunity for diversification of gas supplies to the region through LNG terminals in Greece, also with investment by our country.

In the longer term, these investments in gas infrastructure will create the foundation for a next step in environmental protection, as they will allow for the introduction of decarbonized gas

when it becomes available and competitive, further reducing carbon dioxide and the impact of air pollution.

Consequently, these investments will provide for the future energy needs of the state and the Southeast European region.

Through the above action, increased energy efficiency will also benefit because they will have an opportunity to be implemented, which would also take a longer period under our conditions and can thus be regarded as delayed. On the other hand, on a broader aspect concerning the Green Deal, it is proposed that “EU Renovation Wave” will also cover the Western Balkans because an upgraded and renovated infrastructure will indeed play a fundamental role in opening a new window to a decarbonized and “clean energy system” – because buildings are one of Europe’s largest energy consumers – by using, among others, already established platforms such as “Green for Growth Fund and Regional Energy Efficiency Programme,” which have made possible so far green investments to a total amount of EUR 700 million.

4.2.1. Legal Framework for the Green Transition

The draft of the new “Energy Law,” worked out by the Ministry of Energy, Mining and Mineral Resources, is now not only a regulative document but also a ground for creating stability in the energy sector and the sustainable development of the country. It was thanks to the new law that the country managed to fully harmonize its legislation with the European directives as well as introduced new mechanisms in the country to enhance the security of the energy sector and the conditions for the country’s inhabitants.

This is how the preparation of the draft law was made: through an inclusive process by state institutions, energy companies, including AD ESM, business representatives, experts and the civil sector. The process lasted for several months, with a focus on creating a flexible, predictable and regulated energy framework. Such organization and drafting of the law in this form, with the participation of all stakeholders, found wide acceptance and was set as an opportunity for exchange and harmonization of views, needs and interests of all concerned. This approach, as an innovation, meant a real tool for transparency and participation of each stakeholder, serving as an example of a consensual model that can be applied to other areas too.

The last twenty years have seen European Union energy packages provide a basis for modernization and integration in the European energy market. The fourth European energy package - “Clean Energy for All Europeans” - implements a variety of regulatory tools that promote the development of renewable energies and create a more competitive energy market. The adoption of this package through transposition by the state will enable it to meet European Union norms and create a more sustainable and integrated energy market.

The law guarantees security and stability in electricity supplies. It also guarantees stability in prices due to good investment conditions in new capacity sources in the field of electricity and electricity storage, reducing the risk associated with insecurity in electricity supplies in our country. Market coupling also marks progress in fulfillment of the responsibilities regarding the application of the Carbon Border Adjustment Mechanism CBAM. The Carbon Border Adjustment Mechanism is a policy tool designed to promote the use of more environmentally friendly sources by incorporating further costs of electricity produced from

coal. The application of market coupling in our country and the country of Greece guarantees the ease of fulfillment of the responsibility to be risk-free regarding the introduction of the CBAM.

In addition, there are more favorable terms for investments in renewable sources of energy, like solar, wind, or hydropower plants, under this new Energy Law. In this respect is also the provision for citizen energy communities, through which citizens may collectively produce, transport, or consume electricity. This solution is very useful for the local communities, which in this way will have lower costs for electricity consumption, in addition to being included in the energy market. Energy will no longer just be a cost for them, but a new area for earning extra funds. Producers/consumers are also included in this new legislation. Producers/consumers are understood to be consumers who are generating their own electricity. Through this provision, households or companies will have the opportunity to consume or sell any excess produced electricity, thus achieving more independence in matters concerning their energy consumption.

For the first time, there is regulation in this area of electricity storage as an energy activity. Storage will ensure that irregularities in production, especially in renewable energy resources, will be stabilized and that there will be no need to import electricity during peak consumption periods. Market prices and safeguards for sensitive groups of people, of which over 20% live in energy poverty, will become even more important in ensuring the energy transition in the future.

The adoption of the Energy Law by the state paves the way for a new European energy future: green and just.

4.2.2. Projects Towards the Green Transition

AD “Power Plants of North Macedonia” signed agreements with the leading company Siemens Gamesa Renewable Energy for the implementation of the project for the “Bogdanci” Wind Park – Phase 2. This project is part of the ongoing investment cycle and it also will be the base for further development of the company. A total financial framework of EUR 37.6 million has been secured for the realization of the project. Thanks to excellent relations with KfW Bank, a favorable loan of EUR 25.7 million has been provided; around EUR 8.9 million is a grant from the EU through the Western Balkans Investment Framework, while EUR 3 million are the company’s own funds.

The second phase of the “Bogdanci” Wind Park makes it possible to continue paving the way towards energy security for the country and for the region of South-East Europe. The agreement represents a strengthening of a strategic partnership that will raise the level of renewable energy and improve the energy independence of the state. The extension of the wind park is a large investment in renewable energy in South-East Europe.

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Figure 3 Renewable wind and solar installations in South-East region

The second stage of the “Bogdanci Wind Park Project envisages the construction of four wind turbines with a capacity of 3.4 MW each. The project would further decrease the reliance on the country’s imports of electricity in addition to enhancing the country’s energy stability system. The project would further augment the existing capacity of the Bogdanci Wind Park by 13.6 MW, apart from the annual generation of 46 GWh of electricity, which would be able to power 6,000 households. A total of over 22,000 households would be provided with a sustainable electricity source due to the project.

As per the timeline already set in the project schedule, the preparation work in the field as well as the construction of the infrastructure for the reception and connection of the wind turbines to the power grid has already begun this summer and will be completed in 13 months. After this, the final installation of the wind turbines will begin and will be completed in summer 2027. Now that phases 1 and 2 have already been completed, the wind park will have an installed capacity of 50 MW and will be able to expand further by 50-80MW in the future. KfW has already agreed to support AD ESM in further promoting the entry of green and renewable energy.

With the entering into action of the first phase in 2014, the “Bogdanci” Wind Park is a bright example in the meaning that the wind energy has a very big potential within the green transition process in trying to obtain the carbon neutrality. The park has 16 wind turbines ranging in capacity to 36.8MW and produces every year 100GWh of fully sustainable power adequate for 60,000 people at the same time reducing the level of the CO2 emissions. Parallel activities also exist in the South-East region for other projects, namely: the construction of the new “Miravci” Wind Park with a capacity of 100 MW in cooperation with the EBRD and the Italian Development Bank (CDP); the development of the potential third phase of the “Bogdanci” Wind Park; the “Bogdanci Solar Parks” with 30-40 MW of installed batteries; and if completed by the construction of the Gradec Dam over the Vardar River in the mega project “Vardar Valley,” the region would be presented as the most “powerful green energy hub in the country,” with hydropower capabilities due to the Vardar Mega Hydroelectric Complex with a capacity of 315 MW.

In its efforts to promote investments in the field of renewable energy, the national electricity market operator, MEMO LLC Skopje, formally awarded AD ESM with the first guarantees of origin in electricity. With such a certificate, it is confirmed that the electricity for which these guarantees of origin are provided comes from a renewable energy source, meaning it can be traded on regional markets. These guarantees will make way for a transparent and

sustainable energy market and will also act as proof to energy users that they derive energy from renewable resources. All in all, this signals an advancement in the fulfillment of the green transition because it aligns with European standards for sustainable energy development.

Regulations regarding the treatment of guarantees of origin, developed by MEMO, are harmonized with Energy Law, Regulation regarding Guarantees of Origin, principles of the Association of Issuing Bodies (AIB), principles of the European Energy Certificate System (EECS) and in connection with MEMO's pursuit of full membership in AIB, are aimed at obtaining a full acceptance in the European market.

4.2.3. The region's potential for utilizing rooftop areas for solar energy installations

The Energy Performance of Buildings Directive (EPBD) came into force. The deployment of the new EU Rooftop Solar Standard could trigger the deployment of between 150 and 200 GW of additional rooftop solar power in the EU between 2026 and 2030, as indicated by Solar Power Europe.

A preliminary assessment by Solar Power Europe indicates that the EPBD can unlock the rooftop solar capacity of 150 to 200 GW in the next years by exploiting the potential of rooftops in the EU. The assumption in the study was made based on the suitability of 60% of the public buildings that would be covered by the EU Solar Rooftop Standard. The EPBD would exploit the very large potential of the rooftop solar capacity valued at 560 GW by the EU Joint Research Centre in the earlier part of the year.

The Solar Power Act ensures that all new constructions are solar-ready and this makes it simpler and more attractive to pursue solar energy use. According to Bloomberg NEF, forward-looking solar policies, such as those adopted in the EU, could increase the return on investment by 8 to 11% when compared with a backward-looking approach to solar panel installations. Second, the Solar Standard aims to enable a greater percentage of society when it comes to simplifying the adoption of solar energy in multiple-apartment complexes.

4.2.4. SOLAR IRRADIATION FOR GREEN TRANSFORMATION

The intensity of solar radiation in the upper region of the Earth's atmosphere remains relatively constant. The unit of solar radiation for an area of one square meter gives an estimate of the intensity of sunlight and is known as the solar constant. The solar constant undergoes minor variations in value in terms of solar activity (sunspots) and Earth-Sun distance. These variations are large in the UV region and to an extent of less than 5%; therefore, it plays no important role in solar applications. The solar constant is normally quoted as an average of $S = 1.367 \text{ W/m}^2$.

Solar radiation in the atmosphere is highly variable and depends on the following: the state of the atmosphere, expressed by season, time of day and geographic latitude. Another factor groups meteorological influences according to the clarity of the atmosphere without clouds and the extent of cloud coverage.

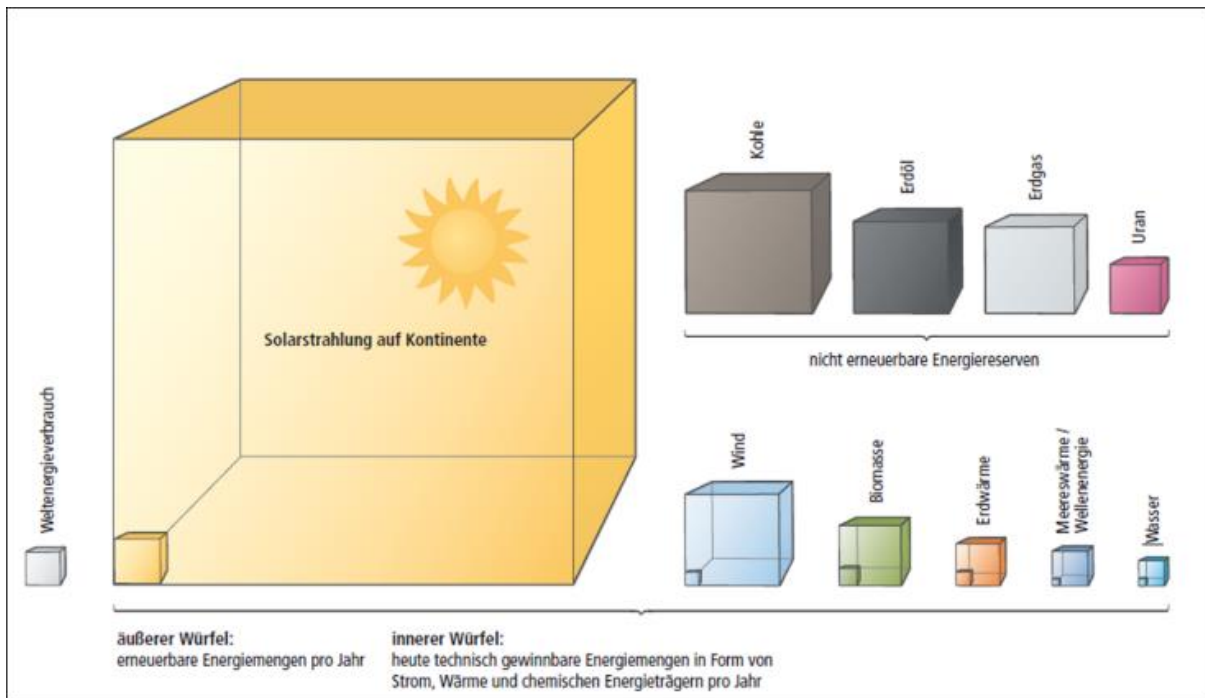
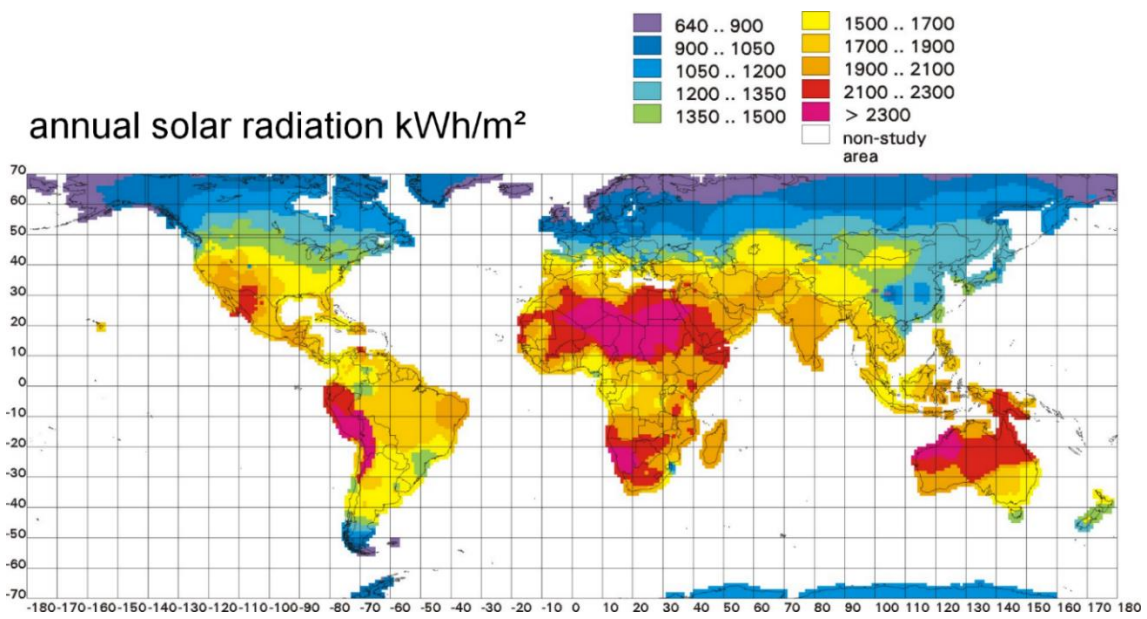


Figure 4 Annual solar radiation compared to other energy sources



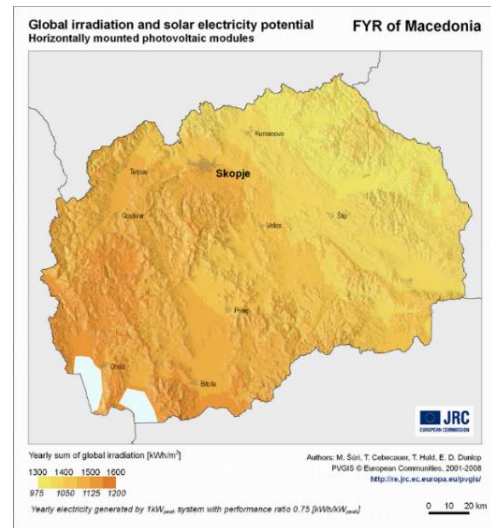
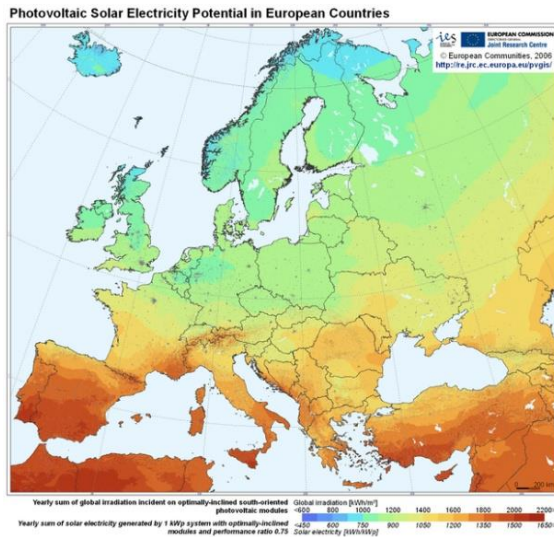


Figure 5 Annual Solar Radiation in the World and Europe Figure 6 Annual Solar Radiation in the Republic of North Macedonia

The intensity of solar radiation on the surface of the Earth differs considerably, even because of the orbit of the Earth around the Sun, or because of the angle of tilt of the axis of the Earth. In fact, it depends not only on the time of year, or on the time of day, but it also depends on the latitude; thus, the further south, in terms of latitude in the northern hemisphere, the higher in the sky the Sun will be at noon, or the more intense the radiation will be. Because of the angle of tilt of the axis of the Earth, the length of days in summer differs from that in winter, or the Sun's altitude in the sky during summer differs from that in winter. There are many other variables that have been included in solar radiation maps, developed over many years of data, for calculations in the production of electricity in photovoltaic systems all over the world.

4.2.5. Solar Potential in the Municipalities of the South-East Region

With an average of 280 sunny days per year and daily radiation ranging from 3.4 kWh/m² in the north to 4.2 kWh/m² in the southwest, North Macedonia has ideal conditions for solar energy production.

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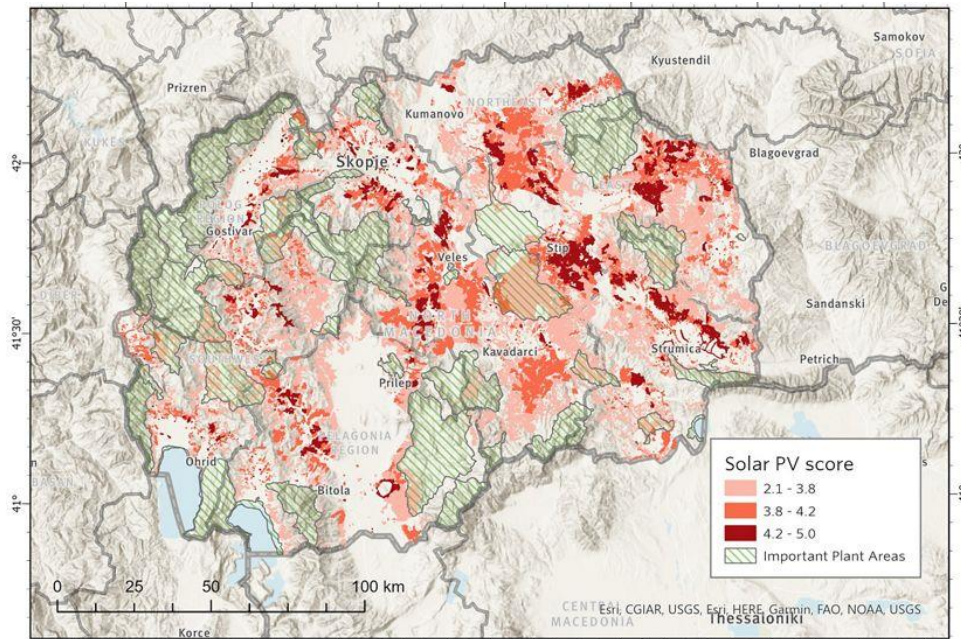


Figure 7 Solar potential An estimated 50 GW of solar PV installed capacity could be developed in areas with a score higher than 4.2 outlined in dark red, or 11 GW if considering only areas outside Important Plant Area and Important Bird Area sites.

The increase in solar capacities has resulted in the country drastically reducing its reliance on imported electricity. Against the 33.2% imported electricity consumed in 2021, the share went down to 20.77% in 2022. Net imports of electricity for the first time came down to 2.75% in 2023.

Besides the reduction of greenhouse gas emissions, solar energy also has an economic contribution in terms of new jobs in installation, maintenance and manufacturing sectors. This region has enormous potential with regards to solar energy. Further investments being made, simplification of regulations and modernization of the grid will lead to the strengthening of energy independence and achievement of renewable energy targets set by the region.

Based on the analysis of the former solar potential map from the report of the Macedonian Academy of Sciences and Arts and the NGO “Eco-svest” concerning smart spatial planning, it is obvious that:

The south-east region possesses an immense potential that is yet to be tapped with regard to the development of renewable energy sources; About 25% of those potentials are to be found precisely in the South-East region and this presents an opportunity to be included in the “EU plan named REPowerEU” that shall focus on applying an integral approach that involves zones with accelerated procedures (so-called “renewable energy acceleration areas”).

4.2.6. Defining Solar Potential by Municipalities

For determining the framework potential in the ten municipalities: Gevgelija, Bogdanci, Valandovo, Dojran, Novo Selo, Bosilovo, Vasilevo, Konche, Radovish and Strumica, the photovoltaic geographic information system PVGIS24 EU – solar calculator was used; it offers the chance to investigate various areas in order to compare them one by one regarding their features.

PVGIS operates with four different solar radiation databases with a hourly time base. Currently, there are three satellite databases:

- PVGIS-SARAH3 (0.05° x 0.05°): Created by CM SAF to substitute SARAH-2 (PVGIS-SARAH2). Projection area: Europe, Africa, America, Asia
- PVGIS-NSRDB (0.04° x 0.04°): Outcome of collaboration with NREL (USA), offering the NSRDB solar radiation dataset to PVGIS.
- In the process of estimating solar energy production, one point was chosen in each municipality from the urban area for a facility with established and registered coordinates in order to simulate production by taking into consideration such key factors as:
 - Proposing a specific address that can be traced by PVGIS based on geolocation in order to analyze the climate and solar exposure in the region, including solar radiation as one of the factors.
 - The roof inclination for panel laying and evaluation for production. In the analysis, it is considered that the inclination is 25%, since this is the average inclination for roofs of individual housing construction, mainly prevalent and common in the region.
 - selection of the type of solar panel – model/power capacity of the solar panel that needs to be installed to obtain reliable results. For this critical study, silicon cells were considered.
 - Power losses caused by shading or high temperature in solar panel systems.

The maximization of the performance of solar photovoltaic installations must consider different parameters and technical details of solar panels, climatic conditions and specific properties of the place: tilt angle, orientation and possible shading. In this way, it will be possible to obtain an accurate assessment adapted to the selected situation-location.

The process involved in photovoltaic modules is dependent on temperature, solar irradiation and spectrum intensity of sunlight. However, this dependence is different based on varying photovoltaic modules. The calculations also consider losses incurred due to temperature and radiation effects. The modules are also selectable on varying levels:

- Crystalline silicon cells – CdTe
- Thin film modules, CIS or CIGS Technology
- Amorphous modules
- Thin film solar modules based on cadmium telluride

In this analysis, the cell modules of crystalline silicon cells were chosen, where the performance calculations consider the temperature dependence of the technology used. Also, for this cell module, the computation for the spectral variation effect for the crystalline silicon cell CdTe is considered.

Monocrystalline solar panels are still more efficient compared to polycrystalline solar panels and the efficiency is usually 1% to 3% better than that of polycrystalline solar panels. Monocrystalline solar panels produce more power compared to polycrystalline solar panels due to better absorption of sunlight, including diffuse sunlight. Monocrystalline solar panels are therefore suitable for temperate climates that receive less sunlight. Polycrystalline solar panels are most efficient when the sunlight is intense and the climate is hot.

These calculations also take into account the peak output power of the PV system, which is confirmed to be attained by the solar PV system under standard test conditions when there is a steady solar radiation intensity of 1,000 W/m² in the plane containing the solar system, in addition to a temperature value for the solar system being 25°C. This is measured in kilowatt peak.

The calculations include the estimated losses of the system, which account for all losses and thus the actual amount of energy put into the system by the photovoltaic cells will be lower than that of the cells. Many are the causes of these losses, which include losses due to cables, the inverter, dirt that accumulates on the cells and sometimes snow, among others. As time passes by, the cells depreciate with power and thus the average annual production will be lower than that of the initial years by a few percent each year.

The azimuth or orientation refers to the angle of the photovoltaic panel with respect to the direction, ranging from South 0, North 180, East -90, West 90, Southwest 45, Southeast -45, Northwest 135 and Northeast -135. In this study, only Northwest 135, North 180 and Northeast -135 were left out of consideration, while the other five were included in the total consideration for each location-municipality.

Climatic conditions also have an important effect on photovoltaics. By assimilating local and past meteorological conditions, this PVGIS evaluation gives a practical insight into annual performances for all the above-listed communities. It is possible in this manner to find critical production periods, as well as possible reductions based on these conditions in annual variations in the location with given latitude, longitude and altitude.

All these aspects are incorporated into the system. The technical details of the equipment, including the nominal power, type of panel and the like, as well as the changes in electricity production per month, shall be fully reflected in the Annex of this Analysis.

4.2.7. Results from simulation of Solar Potential by Municipalities

In the context in which solar energy is one of the leading factors in the energy transition of Europe and the world in general, it also plays a priority role in our current transition to reach the long-term objective of becoming carbon neutral. Furthermore, energy and energy resources are selling for a high price in the common market of energy in the EU. Our country

faces strong IMF and European Union pressures to gradually lower the extent of subsidies for consumer electricity prices covered by the state.

In the context in which solar energy plays one of the central roles in the energy transition of Europe and the world, also in achieving the sustainable buildings, it represents a priority factor in our transition toward the long-term objective: carbon neutrality. But that is not all: energy and energy resources reach high prices on the common EU energy market and our country is under constant pressure from the IMF and the EU to decrease the level of subsidies for household electricity prices provided by the state.

In the Republic of North Macedonia, a considerable amount of the electricity price for households is subsidized by the Government. According to a statement by Prime Minister Kovachevski in December 2023, more than 600,000 households are subsidized for up to 90% of the price of electricity. That is, the price of electricity for households is much lower compared to the market price. Similarly, the statement by the Deputy Prime Minister for Economic Affairs, Fatmir Bytyqi, in January 2024 showed that the subsidy in electricity bills is 84%. These indicators illustrate that the percentage of subsidization could differ for several reasons and that the Government pays for a considerable amount of electricity for households.

However, if reduced to a substantial 20%, as called for by international organizations, there will be a direct socio-economic effect on families. Thus, in addition to solar energy for generating electricity, one of the ways to overcome such a problem is by considering solar energy.

The data supplied from the PVGIS simulations is an accurate forecast of the expected energy output for the 1m² system on an annual basis. Firstly, it is important that the aim of the analysis is primarily based on the identification of the solar potential for the installation of photovoltaic systems on the rooftops of existing building stock, both within the public and private residential sectors.

The PVGIS system, with its accuracy because of the local and up-to-date data used regarding climatic conditions, further refines these forecasted values, also considering the meteorological details of South-East Europe, with respect to solar exposure in an average of five possible orientations (South 0°, North 180°, East -90°, West 90°, Southwest 45°, Southeast -45°, Northwest 135° and Northeast -135°), thus targeting altogether different possibilities of intended orientations under the domain of solar intensity with positive values to generate electricity in PV systems.

The results shown in the table and graph, as well as in further calculations in the Annex, give an exact estimate for power that will be produced in a year, in total and for each month separately. Therefore, there is a plan to express the power production of a 1m² solar panel installation with a tilt of 25%, that is, with the most traditionally common value for the slopes of roofs in this region.

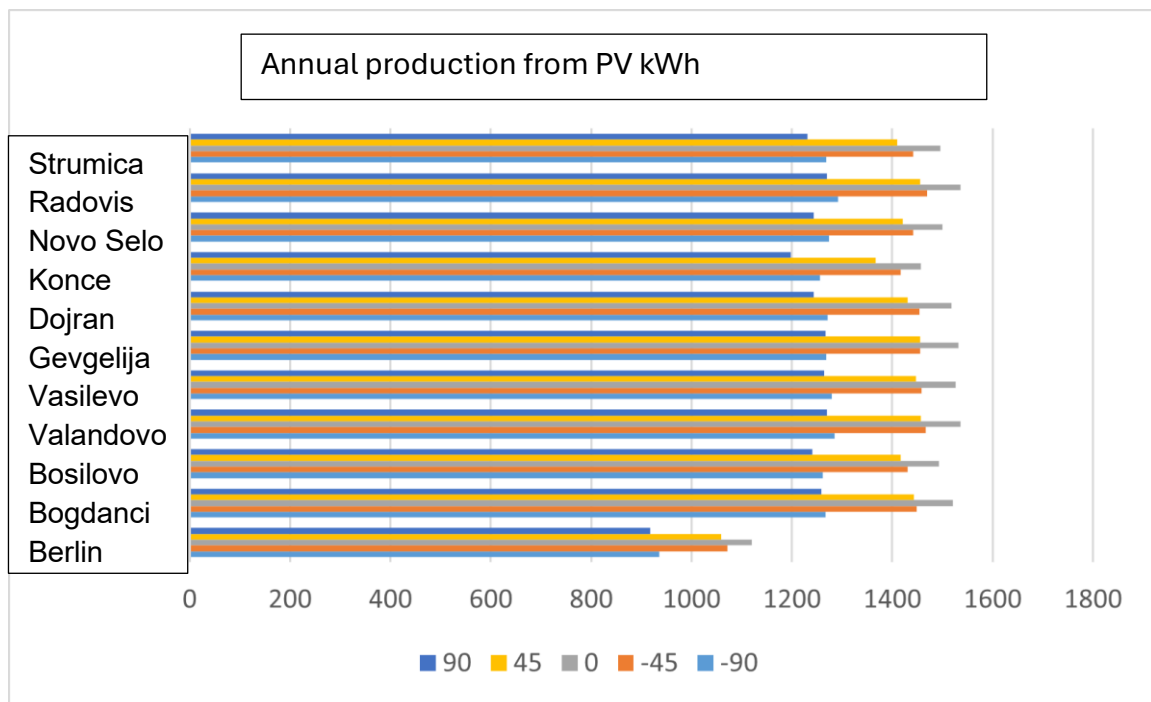


Figure 8 Annual production from PV kWh in the Sout- East region

The data provided by the PVGIS simulations is an accurate prediction of the energy yield for a 1m² installation per year. It must be noted that the scope of this analysis is essentially the identification of the solar potential for the installation of photovoltaic systems on the rooftops of existing buildings, in the public as well as the residential sector.

The PVGIS calculator, with its high accuracy owing to the incorporation of regional and up-to-date climatic information, further refines these forecasts in consideration of regional climatic details of the South-East region, such as mean solar insolation and seasonal changes in orientations for eight different possible orientations (South 0°, North 180°, East -90°, West 90°, Southwest 45°, Southeast -45°, Northwest 135°, Northeast -135°), thus accounting for all possible orientations in the region of positive and usable solar radiation for electricity production from PV installations.

The data in table 1, the graphical representation, as well as all calculations in the annex, will offer an exact indication of power output for this installation in total, as well as per month, for each year. In this respect, it is planned to determine the power output of an electric current generated by a 1m² installation, inclined at an angle of 25%, which represents, in practice, the classic angle of roofs in our region.

In this all-inclusive method, it is also possible to test other scenarios for different conditions by varying some parameters, like tilt angle or panel layout, to determine the best possible options for maximum production. However, as clarified, the values related to a single surface area of 1m² could be multiplied based on the supposed installation area for different locations of insolation for variations of annual production levels. In addition, based on information provided by the Annex for monthly values, production levels for the whole year can be calculated.

In the South-East region, solar radiation per year varies between the lowest – 1744.21 [kWh/m²] and the highest – 1848.30 [kWh/m²] for southern exposure (0°), with a variation of 5.9%. The solar energy production variation in this region varies around 5.3%, where the lowest production per year is 1456.39 [kWh] and the highest production is 1535.70 [kWh]. The data shows that solar energy production and solar irradiation in this region vary in an almost-uniform manner, where solar irradiation per m² of solar panel per year compared to Berlin's data of solar energy production over there is up to 37% greater. solar energy used per year in this region of either 1848.30 [kWh/m²], solar energy production capacity per year in Germany's installed capacity is documented and in recognition; this solar energy production per year in this region largely promotes use.

The European Union Directive on the Energy Performance of Buildings (EPBD) has been revised in May 2024 to promote the use of renewable energy sources and curb greenhouse gas emissions. According to the revised directive, it has been made mandatory for the new building stock to be zero-emission in 2030 and the existing building stock to attain the same status by 2050. This implies that newly built structures must solely depend on renewable energy sources for the purposes of heating, cooling and hot water generation.

For existing buildings in residential sector, there shall be an obligatory reduction of 16% of the average primary energy consumption in 2030 and from 20-22% in 2035, of which at least 55% shall be achieved in existing buildings of lowest energy efficiency. For non-residential buildings, at least 16% of the lowest energy-efficient buildings shall be renovated in 2030 and 26% in 2033.

In addition, since 1st January 2025, Member States are banned from granting financial incentives for the promotion of individual fossil fuel boilers in an effort to end such systems completely by 2040. This ensures that renewable sources in buildings are encouraged, thereby reducing dependence on fossil fuels.

These changes to the EPBD signal an important step towards decarbonizing buildings in the European Union, binding specific timelines and targets for the use of renewable energy and energy efficiency in the construction industry and also represent our duty in keeping with our commitment to implement this directive into our national legislation.

4.2.8. Conclusions and recommendations

According to the last census, in 2021, carried out by the State Statistical Office in Republic of North Macedonia, there were 598,632 households in the country.

Additionally:

- The number of occupied dwelling units is approximately 837,255.
- The total permanent population is 1,836,713 people.

Of this, in the South-East Region of the Republic of North Macedonia, there are:

- ◆ Number of inhabitants (total population): 138,722 inhabitants

- ◆ Number of households (families): 43,414 households
- ◆ Number of dwellings: 69,690 dwellings

In Municipalities in the South-East Region, the figures are as follows:

Total: 138,196 inhabitants and 52,414 households.

The above findings indicate that the South-East Region has many households and housing units, though the population has reduced compared to previous census figures. This reflects a decline in average household size, just like in the rest of the country.

Based on the 2021 Census data, according to the State Statistical Office, there is no direct data on electricity consumption per household. The 2021 Census included data on population, households, dwelling, economic activities and others, but there is no data included on electricity consumption.

Nevertheless, going by information from EVN Macedonia and the Energy Regulatory Commission (ERC), a general overview of domestic consumption can still be derived:

- ◆ Average electricity consumption per household: around 450 to 500 kWh monthly throughout the year, with increased consumption in winter.
- ◆ Annual average consumption per household varies between: 5,000 and 6,000 kWh depending on the type of heating and number of household members.

Data from Energy and Water Services Regulatory Commission of the Republic of North Macedonia (ERC) for 2021 show that the total consumption of household electricity was 4,171 GWh. As there were 598,632 households according to the census in 2021, this would mean the average annual consumption per household is about 6,965 kWh. To put it into words, this means that the average monthly consumption per household is about 580 kWh. These figures are higher than those previously mentioned estimates, perhaps for the following reasons:

- Increased use of appliances that run on electricity
- Changes in consumer habits
- Weather conditions that determine the demand for heating and cooling

It is noteworthy to mention that these consumptions could vary with household size, type of dwelling, energy efficiency and other individual parameters.

According to the figures above, around Valandovo, with the highest energy production, for an average family to cover its annual needs in electricity, it would need an installation of 4.53 m² in full southern orientation or 5.5 m² for eastern or western orientation. These areas appear quite easily accessible for every family, considering that in 90% of the urban environment there is individual housing construction.

The lowest productivity for a certain installation is found in the municipality of Bosilovo. The average electricity consumption need will then be satisfied by the installment of 4.6 m². From the above result, it therefore concludes that the changes are negligible. The range of 4.53-5.5 m² may then be considered as the standard.

On taking the number of families and the average consumption that could be met through the installation of a PV panel of 4.53 m², it would produce 365 GWh per annum, which would account for 8.75% of total domestic use of electricity, totaling 4,171 GWh.

As for the statistics concerning average monthly consumption per house of about 580 kWh, it means that demand would be satisfied with a southern-oriented position from February to November. Only two months have not been satisfied in terms of monthly consumption. These remaining months can be fully satisfied if the solar area is increased by a mere 15%.

The population share of the region (138,196) relative to the population of the Republic of North Macedonia (1,836,713) is 7.5%. The population that constitutes families has a greater potential for electricity generation per family by 1.25%.

The significance of this isolation in terms of contribution is further exemplified in comparison to the best insulation in the south of Berlin, with a production capacity of 1,120.5 kWh, being 14% lower than the lowest production for this type of southwestern-southeasterly insolation in the region.

This gives an overall view of how solar energy production in the region makes a positive impact, which in fact varies from year to year in terms of consumption and production, which is a normal occurrence.

Recommendation: The recommendation is to include detailed maps with links to cadastral information and values of the actual rooftop surface area of buildings in cadastral units. The possible output of electricity from PV systems will be determined by a more complicated assessment process carried out with available computer packages. In this way, future updates of North Macedonia's Energy Planning and Strategy and the National Energy and Climate Plan (NECP) will be provided with a realistic foundation for reaching their targets.

These map-plans should not only demarcate the potential areas for construction rooftops for alternative energy sources but produce a realistic scenario for energy and its development in practical ways on ground. Through their amalgamation, the government shall be able to produce informed policies for practical scenarios in the field concerned. The government must also do away with all legal obstacles to the installation of renewable energy capacities on rooftops without restricting the installed capacity.

4.3. Environment, Climate change and air quality

Climate change, especially the result of the release of greenhouse gases, is a critical factor that affects the level of PM_{2.5} air pollutants through multiple channels, especially the contribution of the smoke of wildland fires and the role of pollen aeroallergens. CO₂

emissions generated by fossil fuel emissions amount to 65% of the total emissions of this gas globally and it also contributes largely to the deaths of people affected by PM2.5, thus proving the relationship between environmental considerations related to the two aspects of concern.^{4,5,6} Both considerations can be achieved at the same time for a healthy environment.

Climate change may bring about changes to weather, such as changes to wind and precipitation. Consequently, this can influence PM2.5 dispersion and its removal from the atmosphere. Climate change projections predict that air quality problems will worsen and intense heat events will increase and become more severe.

Many regions observe extreme levels of pollution during extreme heat, made worse by air stagnation events where low wind patterns prevent ground-level ventilation. As climate change advances, these events will become more frequent. Long periods of low rainfall and high temperatures have also resulted in an increase in wildfires in many areas of the globe. Wildfires emit gases and particulate matter that pose hazards to human health, causing mortality, respiratory illnesses such as asthma and health problems. The emitted forest fire smoke can travel up to several hundred miles, causing detrimental effects to people who reside at different geographic locations from where the forest fire occurred.

The health effects caused by the allergic airway disease are further worsened by the simultaneous presence of allergens and air pollutants such as PM2.5 in the air.

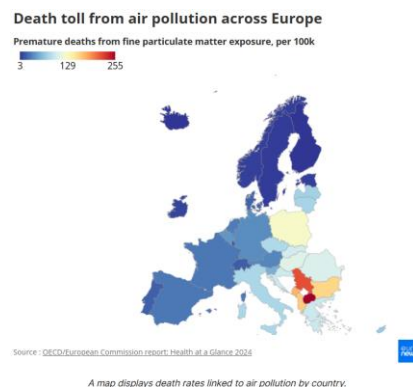


Figure 9. A map displays death rates linked to air pollution by country

The link between climate change and air pollution calls for an immediate and collective response to contain emissions and their effects on health and the environment. To address such issues, there is a collective need to focus on cleaner air and addressing climate change through the use of clean and non-fossil fuel-based energy.

In 2021, a new guide for air quality developed by the World Health Organization (WHO) has decreased thresholds for annual mean concentrations for nitrogen dioxide and particulate matter (PM2.5) like dust, smoke, or soot emitted through exhausts.

Last year, in December, the European Union set tougher air quality standards. The move was to ensure that air standards set by the EU meet those of the World Health Organization by 2030. The set standards ensure that there is regular measurement of particulate matter, carbon, as well as ammonia released into the atmosphere. According to Euronews, all European Union countries show higher levels of nitrogen dioxide compared to those set by the World Health Organization.

Figure 4.25. Premature deaths attributable to PM_{2.5} exposure,

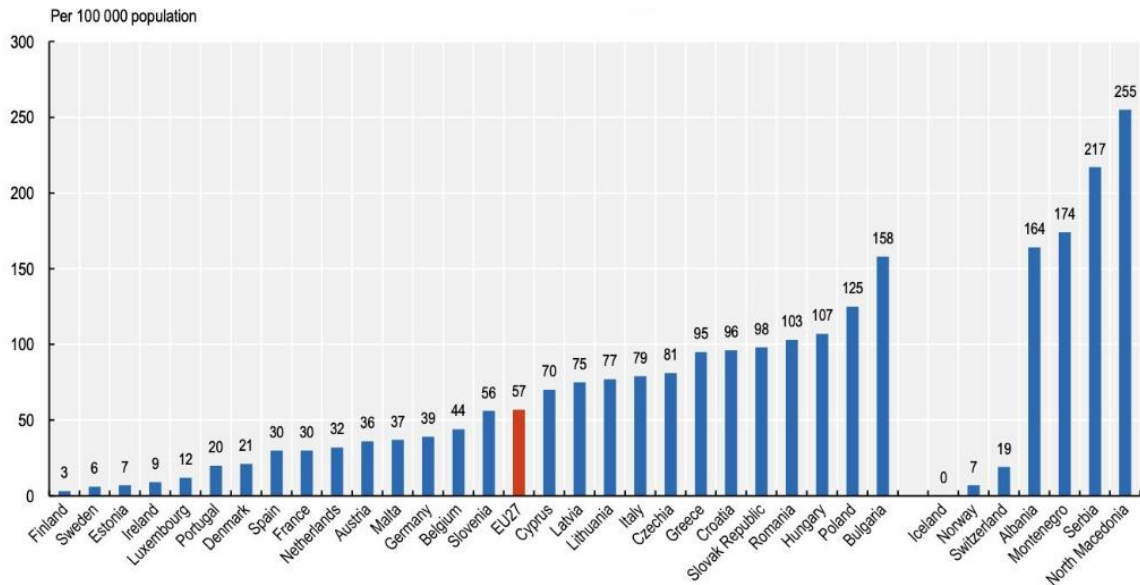


Figure 10. Premature deaths attributable to PM_{2.5} exposure

According to reports from the European Environment Agency, about 239,000 early deaths in Europe in 2021 were due to exposure to PM_{2.5} particles, while another 48,000 people died because of exposure to nitrogen dioxide. Air pollution is the greatest environmental threat to human health worldwide, with seven million deaths annually. Air pollution is responsible for triggering and exacerbating a wide array of diseases—from asthma to cancer, from lung diseases to heart conditions. PM 2.5 particles and smaller ones can penetrate through the lungs, acting as an entry point and their first effects include coughing, chest tightness and shortness of breath. Once they enter systemic circulation, they literally invade and affect all tissues and organs. Blood vessels, especially those in the heart and brain, suffer the most, as do peripheral blood vessels.

At significant levels, all types of air pollution pose a risk for adverse health effects. The extent of the risk for health complications depends on an individual's overall health, the type of pollutant, its concentration and the duration of exposure to polluted air. Air pollution is described as a "silent killer" because it is rarely a direct cause of death. Instead, air pollution is the fourth leading cause of premature death globally, responsible for:

- 29% of all deaths and illnesses from lung cancer
- 17% of all deaths and illnesses from acute lower respiratory infections

- 24% of all deaths from stroke
- 25% of all deaths and illnesses from coronary heart disease
- 43% of all deaths and illnesses from chronic obstructive pulmonary disease (COPD)

A great majority of PM_{2.5} particulate matter with a diameter of less than 2.5 microns is anthropogenically produced, that is, it stems from human activities. The main contribution to the concentration of PM_{2.5} has been identified coming from road traffic and energy production. Small emissions of PM_{2.5} could come from burning agricultural waste, for example, in what are commonly referred to as developing countries. Ambient air pollution and particulate matter are considered one of the main ingredients of air pollution. They have been shown by the International Agency for Research on Cancer to be carcinogens for human beings. In the region of Europe, it has been found that nearly every single person has been influenced by air pollution. More than 90% of the population in the region is subject to annual concentrations of fine suspended matters in the air exceeding that exceed WHO Air Quality Guideline limits.

4.3.1. Air pollution in the Republic of North Macedonia and South-east region

Compared to their neighbors in Western Europe, people living in the Republic of North Macedonia and the Balkans and Eastern Europe breathe more toxic air, polluted with suspended particles. The Balkan region is home to numerous coal and lignite units, in addition to 7 of the 10 most polluting coal-fired power plants in Europe. Nine out of ten people breathe air which is above the WHO guidelines because of high levels of pollutants. Writing for Euronews, referring to a report by the European Commission and the Organization for Economic Co-operation and Development (OECD), writes that the Republic of North Macedonia is a country most affected by air pollution, while Serbia comes second. North Macedonia has the highest mortality rate due to air pollution. Albania, Bulgaria and Montenegro are also listed among countries with high levels of pollution.

The concentration of PM_{2.5}, fine particulate matter with a diameter of up to 2.5 microns, represents the central air quality parameter in the 2023 World Air Quality Report. Given in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), air pollution represented by the concentration of PM_{2.5} is the sixth most frequently measured air pollutant, having the most significant effect on human health and the environment and subsequently being regulated worldwide by environmental protection organizations. The summary of the air quality of PM_{2.5} in the report includes 7,812 cities in 134 countries and territories worldwide. The air quality measurements included in this report were provided by over 30,000 air quality monitoring stations, including research institutions, governing organizations and educational, non-profit, commercial and citizen-operated stations.

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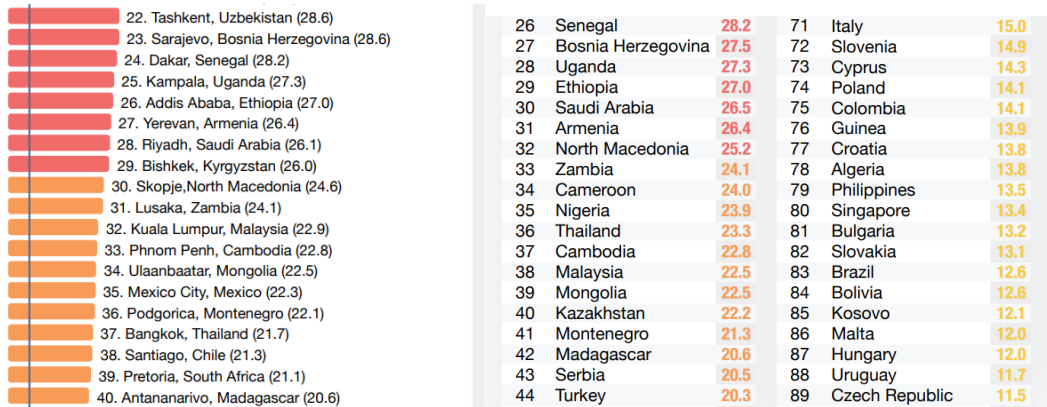


Figure 11. Level of pollution by country in the World from 7,812 cities

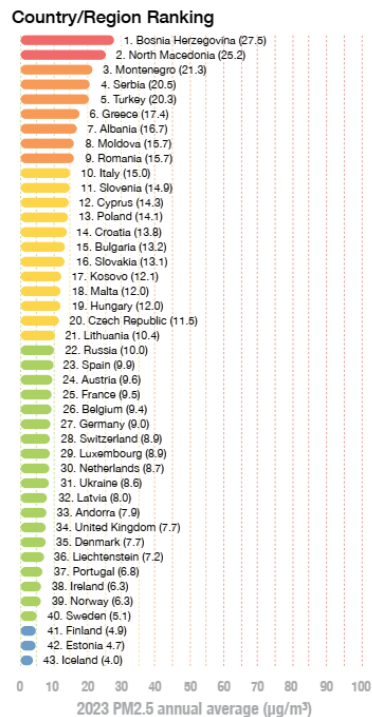


Figure 12. Level of pollution from PM2.5 particles in EU countries

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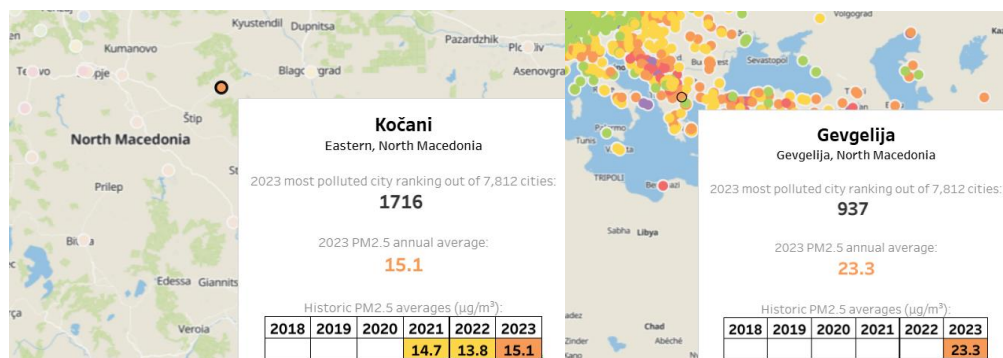
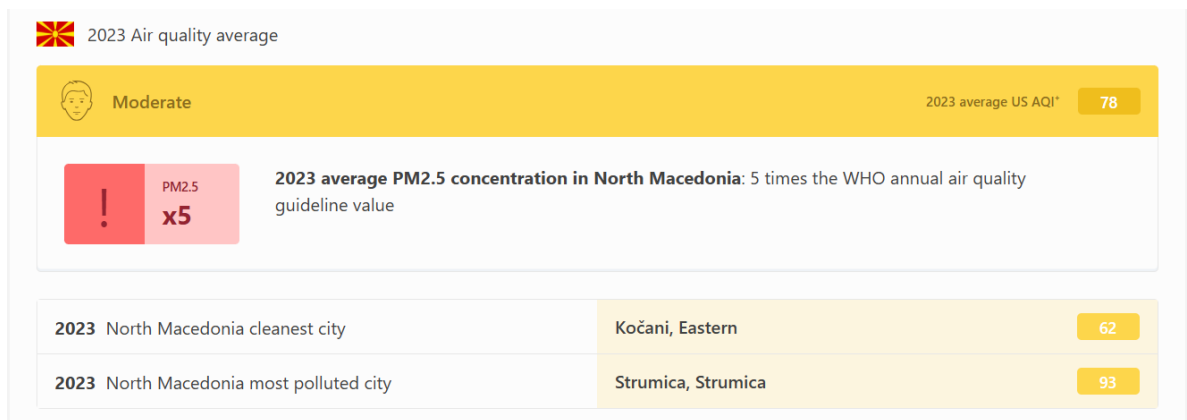
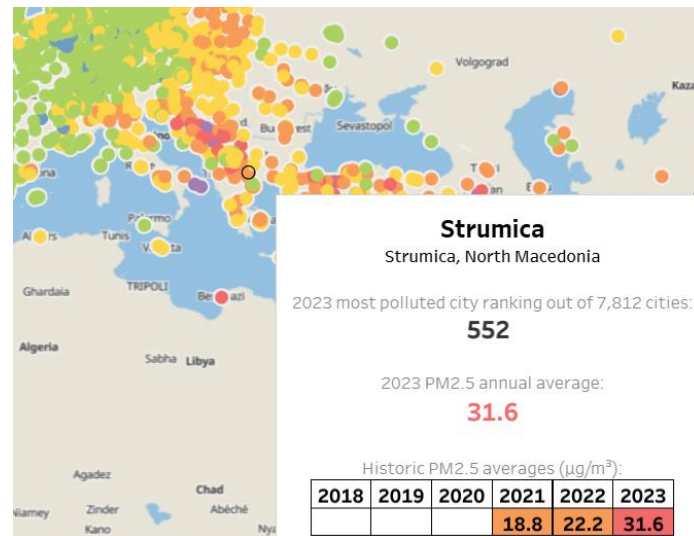


Figure 13 Pollution of PM2.5. Annual average for Strumica Kocani and Gevgelija in the South-east region

Based on the average annual pollution level, the Republic of North Macedonia is ranked 32nd globally, whereas Skopje is in 30th place and Strumica from the South-East region is ranked 552nd, while Gevgelija is 937th. According to the same report, the least polluted city in North Macedonia is Kochani, whereas the most polluted one is Strumica. On the European level, the Republic of North Macedonia is the second most polluted country, right after Bosnia and Herzegovina.

4.3.2. Actions in built environment - priority of retrofitting

Regional Energy Efficiency Program (REEP), Western Balkans – European Bank for Reconstruction and Development Project overview and objective The Regional Energy Efficiency program (REEP) was established in 2012 as a joint collaborative program between IFIs (EBRD since 2012, KfW since 2017), the European Commission and bilateral donors under the Western Balkans Investment Framework (WBIF). It is delivered in the closest possible cooperation with the Energy Community Secretariat (EnCS). The key development aim throughout the entire period has been the promotion of a sustainable energy efficiency market in the Western Balkans, with full alignment with the terms set out in the Energy Community Treaty.

The operative model proved that the financing from the IFIs and the grants from the EU and the individual donors can be cleverly combined into an integrated package with targeted policy dialogue, technical, as well as financial, assistance provided both through direct channels and through local partners in the banks, so that the full round can be delivered and the sectors targeted can be multiple: from the commercial sectors, through the residential ones, to the public ones and project types. This integrated approach leverages reforms in the sector whilst providing at the same time targeted finance to stimulate sustainable growth. OECD BLENDED FINANCE GUIDANCE FOR CLEAN ENERGY, OECD 2022. It also adds to: Market catalyst for residential energy efficiency investments; development of green markets; demonstrations of new forms of behavior to be replicated; and dissemination of skills, including distribution of skills to local partner banks and homeowners/and in technology supply chains, to sellers/providers of technologies.

Overall, to date, the program has successfully rolled out financing rounds and has expanded its focus area to address evolving demands. The program has marked a collective signing volume of EUR 297 million credits and EUR 143 million of direct lending to private and public projects, thereby supporting over 1,000 SMEs, 12,700 families and 290 public buildings in 700 cities and towns across the region. As of mid-2022, the mitigation impact of the underlying portfolio amounts to 842 000 MWh/year energy savings, 540,000 CO₂/year avoided and 120 MW new renewable energy capacity installed. Identify the finance gap, market failure(s), risks and barriers to commercial investment The region is characterized by relatively high energy, resource and carbon intensity. High early-adoption costs for green solutions, low awareness of market participants of the benefits of green investments, lack of capacity with energy and resource efficiency technologies and lack of effective regulatory frameworks obstruct energy efficiency progress, particularly in the residential sector.

It is for this reason that it has become inevitable to further accelerate public, private and residential investments for renovation as well as new construction. It has been identified that the greatest challenge for the region is the task of decarbonization and the green transformation of the buildings sector. This is because the region has been showcased to have a comparatively low penetration ratio for green technology by market barriers related to cost constraints, lack of proper regulatory follow-through and lack of awareness about green investment in the market have been prevalent. It is because of this reason that there is a need for blended financing that can help offset risks for first movers and encourage first movers to invest in more performing buildings and technology that have better energy performances. It would have been a much more time-consuming task through pure public and commercial financing structures.

4.3.2.1. Retrofitting in South-East region

For retrofitting actions undertaken in the South-East Region within a particular year of the past decade, there are no available official statistics. The State Statistical Office and Energy Regulatory Commission do not issue such annual statistics for retrofitting actions on a regional level.

Taking into consideration the accessible reports regarding energy efficiency efforts on a national basis, an approach to creating an estimated table concerning the renovation efforts within the South-East Region has been provided, stemming from the accessible data on a national level and general tendencies concerning the past decade.

This being stated, it must be noted that, lacking official data provided on an annual basis concerning the different regions, the above assumption constitutes an analysis, which could be used with a view to provide a planning framework or approach.

Estimated Number of Retrofitting Interventions on Buildings in South-East Region, 2015–2024

Year	Individual Buildings (houses/apartments) ~	Public Buildings (schools, kindergartens, municipal) ~	Total Retrofitted Buildings ~	Note
2015	120	15	135	Initial projects financed through IPA funds and local subsidies
2016	150	20	170	Increase through municipal energy efficiency programs
2017	180	25	205	First regional projects for schools and kindergartens included
2018	220	30	250	Supported by EU projects for public buildings
2019	260	35	295	Increased application in individual houses (subsidies for facades)
2020	300	40	340	Energy efficiency programs within the “Green Agenda”
2021	350	45	395	Alongside the census, municipalities received additional grants
2022	400	50	450	Intensification due to rising energy prices
2023	450	55	505	More public buildings included through national programs
2024	500	60	560	Projects within the EU Green Deal and NECP targets

Around 80 to 85% of the modernization in Individual buildings is related to residential buildings like houses and apartments because of facade subsidies and energetical modernization. Every year, between 15 and 60 so-called public buildings are modernized (Schools, Kindergartens and administrative buildings).

It can be observed that there is a gradual rise and then particularly since 2019, with the rising energy prices and the green agenda, the demand for energy efficiency increased significantly. It is estimated that about 3,300 buildings have been upgraded in the South-East

Region over the last 10 years. This must be scaled up significantly if the demands of the green agenda are to be met.

4.3.3. Direction of Actions

A vital area for change in achieving a reduced carbon footprint for energy is enhancing the use of renewable energy resources for a significant increase in power generation. Nowadays, "electrification through renewables is increasingly viewed as the key to solving" energy transformation.

In the energy transformation case, the use of renewable energy to produce electricity is estimated to be at 57% by 2030, as opposed to 25% in 2017.

The share of electricity, an energy carrier, would also increase from the current 20% in 2017 to almost 30% by 2030, with the total consumption of electricity increasing to 35,900 TWh by the end of the next decade. A third of the world's electricity, in the year 2030, would be from solar and wind energy.

Most countries also agree on the need to enhance the use of renewable energy resources. To date, a total of 135 countries has included renewable electricity targets within their national and sub-national energy planning documents, while 140 NDCs refer to the use of renewables within the energy sector. Yet the number of NDCs specifying the targets for the use of renewable electricity is 105.

To catalyze the changes required to ensure a climate-safe future, the level of the NDCs must become more ambitious after 2020 and must reach a level necessary to achieve climate objectives. It must cover end-use sectors such as direct heating and transport.

Renewables are a readily available solution to support climate change mitigation and adaptation. At a time when such goals are paramount, there are current opportunities offered through the NDC Targets of 2020 to improve goals on renewable energy.

We must radically transform the way we generate energy, the way we behave in the agricultural sector, the manner in which we travel and the way we produce and consume, alongside efforts to remove carbon dioxide from the atmosphere.

4.4. Tourism as Contribution to Climate Change and the Green Transition

Tourism represents one of the most dynamic sectors of the global economy, but simultaneously it is a significant factor in processes that sharpen the climate crisis. Dependence on fossil fuels, intensive use of resources and unsustainable consumption patterns result in increased greenhouse gas emissions, pollution and biodiversity loss. The COVID-19 pandemic underlined even more the link between these impacts with risks for human health and the requirement for a new balance between people and nature.

This restoration of nature and redefinition of our relationship with it go hand in hand with recovery but also with the future of the tourism sector. Tourism-which is based on healthy ecosystems-can become a driver of the green transition if it is channeled toward sustainable practices in the reduction of its carbon footprint.

The Glasgow Declaration provides a starting point on the way to such a shift, issuing a call for collaborative action on the part of all stakeholders, from the state, institutions, business and civil society, through to academia, with the target of cutting emissions in half by 2030 and reaching net zero by 2050.

As per recent findings from UNWTO & ITF, the growth in total CO₂ emissions in the travel sector was at least 60% between 2005 and 2016, of which transport was responsible for about 5% in 2016. But unless we enhance decarbonization, total CO₂ emissions in this sector are expected to increase at least 25% more in 2030 than in 2016.

As has been described in "One Planet Vision for a Responsible Recovery of Tourism – Tourism and the Paris Agreement," we have a unique opportunity to rebuild our industry in a responsible manner according to the goals of the Paris Agreement.

For well-orchestrated and efficient action on the climate crisis, the declaration sets down five ways of action:

- **Measurement:** systematic monitoring and disclosure of emissions related to tourism.
- **Decarbonization:** speeding up reductions in emissions through transport, infrastructure, accommodation and waste management.
- **Regeneration:** It promotes the restoration and conservation of ecosystems and helps in carbon absorption and biodiversity and food and water sustainability. It is critical to ensure tourism supports and helps affected and vulnerable communities in adapting to the change because tourism is partly based in countries and areas most affected by change. It helps tourists and locals to coexist with nature in a balanced way.
- **Integration:** improving partnerships, sharing solutions, or collaboration among all stakeholders.
- **Financing:** mobilizing funds and capacities for the fulfillment of climate and green policies.

This strategy embodies the vision for tourism as a force for a blue-green transitional sector not only rendering economic value for growth but also play an active role in the renewal of nature and climate stability.

The UNFCCC only provides guidance for measurement and reporting for national governments. However, tourism is normally not singled out in the national inventory. In February 2024, the United Nations Statistical Commission adopted the Statistical Framework Measuring the Sustainability of Tourism (SF-MST) which provides an internationally agreed standard to measure the impacts of tourism beyond GDP, including its social and environmental footprint and encompassing energy and GHG emissions as key pillars.

For non-State actors, there are internationally recognized approaches to the estimation of emissions and their verification, as well as to reporting, which UNFCCC welcome, for instance, GHG Protocol Corporate Accounting and Reporting Standards, ISO 14064 or France's Bilan Carbone.

In 2023, UN Tourism issued Climate Action in the Tourism Sector – An overview of methodologies and tools to measure greenhouse gas emissions, which has encapsulated the methodologies being used, a guideline for GHG measurement and tools for practitioners to follow to measure emissions. To validate or to confirm GHG emissions for further verification, The ISO 14064 series provide a process for verification of GHG footprints. It is currently the

international standard. In addition to the international process for verification of GHG emissions to which conformity is sought through testing or testing a process or product to determine its conformity to a standard or set of standards that is applicable to a specific industry or task or activity, another process followed is based on either national or international standards that match either the location or region of the signatory to the Declaration.

4.4.1. Tourism in Nationally Determined Contributions to climate change

Concerning tourist destinations, the circular economy represents an opportunity for the improvement of the sustainable development impacts of tourism, in that it succeeds in creating well-being for the local community through the creation of new jobs and inclusive local value chains, hence creating a positive and self-reinforcing cycle.

For the tourist, there is also the aspect of creating a positive footprint because this new economy brings the aspect of traveling with purpose. There is also the potential for multiplier effects in the change that occurs in the whole tourism sector.

The broad and inclusive value chain of the tourism sector provides plenty of room to reflect on the question of how we could use the materials or products we use to provide our service to a better extent, thus providing value, partnerships, as well as reducing the amount sent to the landfill to the closest to zero. Achieving a successful shift towards a sustainable and resilient tourism sector, adopting the principles of the circular economy, will require public-private collaboration, partnerships, as well as cooperation between governments.

UN Tourism is participating in the transition towards a circular economy for tourism value chains through plastics under the Global Tourism Plastics Initiative, as well as through food under the Global Roadmap for Food Waste Reduction in the Tourism Sector:

Circularity is an important enabler within the context of the Glasgow Declaration on Climate Action in Tourism and can give impetus to mitigation and adaptation actions by the tourism sector.

All these efforts are carried out within the One Planet Sustainable Tourism Program umbrella.

4.4.2. Basis for Tourism Development in the South-East Planning Region with a Circular Economy Approach

The natural resources and characteristics of SEPR have in view the development of rural tourism and its conversion into other forms: spa, cultural, hunting, fishing, religious and business tourism. During recent years, a developing tourism activity has been noticed, reflected in the growth of the number of accommodation facilities, tourists and overnight stays, imposing the necessity of an orderly management of these potentials.

In this regard, the constitution of the Register of Rural Tourism Values was a basis for strategic planning, promotion and investment. The Register allows for the mapping of relevant localities, the assessment of their tourism value and the definition of an action plan for their use in a sustainable manner. It provides a framework for public-private cooperation and the

setting up of new tourist destinations, through which the local population receives opportunities for economic and social development.

The tourism development of SEPR in a circular economy should be based on:

- Rational use of resources – more extensive and more efficient use of resources and products in tourist services.
- Integration of value chains – incorporation of agricultural products, crafts and the provision of local services within the tourism product itself thereby creating added value and new jobs.
- Sustainable balance - achieving a harmonization of the economic, ecological and social requirements of the area with a view to preserving natural resources and cultural heritage.
- Partnerships and inclusiveness: Active collaboration among municipalities, the tourism organizations, the local community and the international organizations (UNDP, UNWTO) to ensure long-term sustainability.

The previously established Register of Rural Tourism Values provides a basis for a circular approach to tourism – where each locality, resource and activity is treated as part of a broader ecosystem that generates economic benefit, social inclusion and ecological sustainability.

Using its strengths, the management of weaknesses, as well as the realization of opportunities, the South-East Region can become the exemplary of the integrated development of tourism on the principles of the circular economy, a region attractive for investing, visiting and residing.

4.4.3. Tourism Characteristics and Capacities of the Region

The region is in the far South-East part of the Republic of North Macedonia and borders the Eastern and Vardar regions. It covers an area of 3,034 km² (10.9% of the country's territory), with a population density of 63.2 inhabitants per km².

It consists of 10 municipalities with 188 settlements and a total population of 138,722 inhabitants.

Municipalities in the region:

- Bogdanci – 114 km²; 4 settlements (Bogdanci, Stojakovo, Gjavoto, Selemlji).
- Bosilovo – 160 km²; 16 settlements; municipal holiday celebrated on April 10.
- Valandovo – 331 km²; 29 settlements (including Valandovo and surrounding villages).
- Vasilevo – 221 km²; 18 settlements (3 depopulated).
- Gevgelija – 485 km²; 17 settlements (Gevgelija and its surroundings).
- Dojran – 132 km²; 13 settlements (2 depopulated; Old and New Dojran).
- Konche – 237 km²; 14 settlements.
- Novo Selo – 424 km²; 16 settlements (including Koleshino, Smolari, Novo Selo).
- Radovish – 608 km²; the town of Radovish and 35 villages.
- Strumica – 332 km²; the town of Strumica and 25 villages.

4.4.3.1. Main features and potentials

- **Region with diverse natural resources** and significant rural potentials.
- High **diversification of settlements** – from urban centers (Strumica, Radovish, Gevgelija) to rural areas.
- Potential for the **development of various forms of tourism**: rural, cultural, spa, hunting, fishing, religious and business.
- Region with a **strategic position** on the border with Greece and Bulgaria, making it attractive for investment and cross-border cooperation.

The values of tourism are reflected in geographical position, relief, hydrographic and biogeographic features, land use, protected zones as tourist assets, flora and fauna through the opportunities for rural tourism and stimulation of overall development.

The transit character of the region, as an advantage, is visible through its inclusion in International Corridor 10: the E-75 road passing to Greece and through Bogorodica border crossing; road 605 passing to Bulgaria and through Novo Selo border crossing; and road 604 passing to Greece through Star Dojran border crossing. These routes pass through many tourist sites but also cause pressure on the environment, which should be addressed accordingly. The transit tourist sites are the Vardar River, Negorci Spa, Dojran Lake, Smolari Waterfall, Paljurci, the Čuka site near Stojakovo and the Wind Park in Bogdanci. This is because the sites mentioned above are along the main roads and therefore facilitate rural sector services along with transit tourism.

The relief of the South-East Planning Region is mountainous and basin-like. High mountains dominate, with altitudes exceeding 2,000 m. About 46% of arable land belongs to flat terrain (250–300 m altitude), 52% to slopes and 2% to hilly terrain. The mountains Plačkovica, Ograzden and Kozhuf offer excellent opportunities for winter, hunting, sports and recreational tourism. On Mount Kozhuf lies the newest ski resort in the country, covering 2,000 ha.

The Gevgelija–Valandovo Basin (municipalities of Bogdanci, Valandovo, Gevgelija and Dojran) includes 63 rural communities, of which 3 are depopulated. The Strumica–Radovish Basin lies in the southeast of the country along the upper and middle course of the Strumica River, around the towns of Strumica and Radovish. The Damjan Basin lies northwest along the Maden River. These basins are suitable for agricultural activities, with surfaces and altitudes meeting criteria for rural tourism development.

The northwest part of Radovish municipality is characterized by old volcanic centers and rocks containing iron, copper and other minerals, where mining activities are carried out.

There are 11 sources of potable and mineral water, as well as thermal springs. Their heat provides potential for spa tourism, early vegetable production and heating facilities. The region also has 22 rivers, the largest being the Vardar and Strumica, offering opportunities for dams, fishponds, sport fishing and mini-hydropower plants.

Recreational and excursion activities, educational visits and exotic experiences are **enriched by numerous waterfalls**:

- Smolari Waterfall – 39.5 m (Novo Selo)
- Koleshino Waterfall – 15 m (Novo Selo)
- Gabrovo Waterfalls (Strumica)
- Devil's Waterfall – 17 m (Valandovo)
- Prsten Waterfalls – 16.5 m, 16 m and 9.2 m (Valandovo)
- Radičevo Waterfall
- Meden Waterfall
- Plavaja River Waterfalls
- Kozhuf Waterfall

Negorci Spa, 4 km from Gevgelija, is one of the most important tourist-recreational centers in the country. Studies confirm its mineral waters are suitable for treating rheumatism, sterility, gastrointestinal and cardiovascular diseases, inflammations, peripheral system disorders and dermatological conditions. Other notable spas include: Bansko Spa (71°C, 12 km southeast of Strumica), Negorci Spa (two springs, 5 km northwest of Gevgelija), Vrela Spa (40°C) and Studena Spa (38°C).

Lake Dojran lies at 148 m altitude, with a maximum depth of 10 m and an area of 42.7 km² (27.1 km² in North Macedonia, the rest in Greece). Its surroundings offer fishing, recreation, hiking and trail creation opportunities. In addition to this natural lake, there are 11 artificial reservoirs with dams.

The total forest area is 133,964 ha. Forests in the region are moderately open, with deciduous, coniferous, mixed and degraded types. Oak and beech dominate among deciduous, while black and white pine and fir dominate among conifers.

Four sites are listed as protected areas, the largest being Lake Dojran. Eleven sites are proposed for protection and four newly identified sites are on the candidate list.

The richness and heterogeneity of ecosystems define the biodiversity of the region, influenced by geography, climate, soils, geomorphology and geological changes. The Monospitovo Marsh hosts relic species such as the royal fern (*Osmunda regalis*), protected since 1987 and abundant silicate algae. Lake Dojran is notable for aquatic and marsh vegetation, with 12 endemic fauna species. These sites provide opportunities for herbal tourism, education and research.

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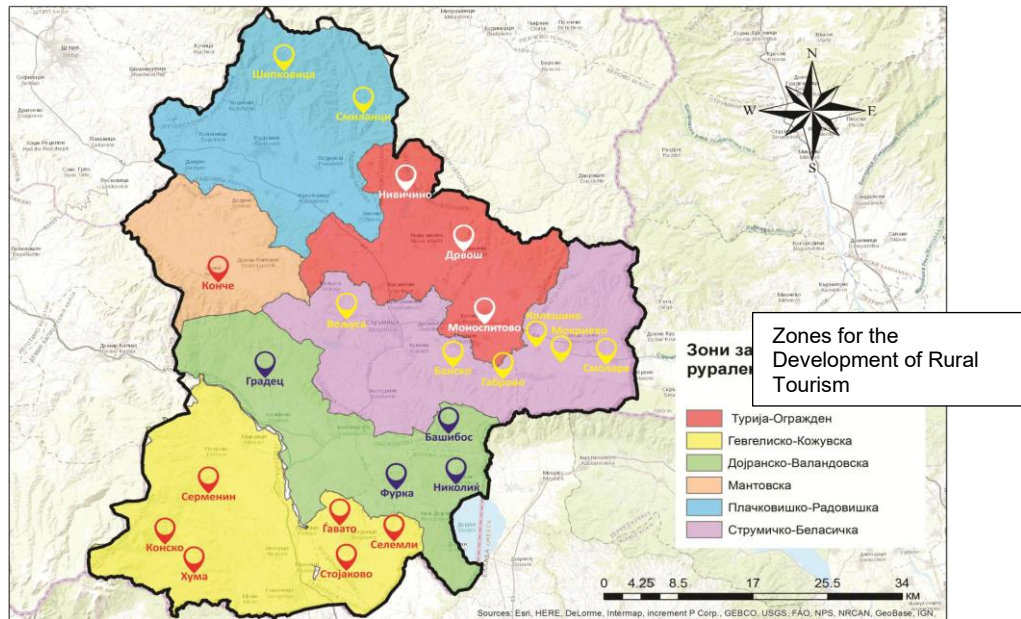


Figure 14. Zones for the Development of Rural Tourism in the South-East Planning Region

Rural-tourism activities **can also include farms and agritourism**, given the livestock population: 2.890 horses, 25.910 cattle, 10.862 pigs, 81.869 sheep, 26.500 goats, 236.002 poultry and 5.991 beehives.

On Kozhuf slopes and around Bogdanci **there are 31 hunting grounds** (18 for big game, 13 for small game). Bogdanci's hunting territory attracts hunters from across Europe. The rich ornithofauna is also appealing for safari tourism.

The local road network is the smallest in the country, 833 km (8.5% of the national total), but well-structured, positively influencing rural tourism.

Preserved village ensembles are attractive with typical houses with old architecture. Villages feature houses with porches, traditional furniture and looms. In Strumica, old urban houses in the former bazaar display neoclassical and neo-baroque styles. Sacred architecture is abundant, especially in rural areas, enriching rural tourism offerings.

Archaeological sites include Neolithic settlement in Angelci (Vasilevo), prehistoric settlement Kanli Chair (Damjan, Radovish), mining settlement Borov Dol (Konche) and 52 other sites, complementing the rural tourism offer.

Tourism is further enriched by numerous religious events, cultural manifestations, sports events, gastronomic festivals, fairs, congresses and conferences, making the region dynamic and frequented by tourists year-round.

4.4.3.2. Tourist Accommodation Capacities

Hospitality in rural areas comprises accommodations and restaurants. This does not belong to the rural area alone. To develop this form of tourism, other facilities that do not relate

directly to rural localities can also be utilized, given that hospitality establishments in urban centers can interact with the rural sphere.

In the region there are 80 accommodation facilities, with a total of 1,926 rooms and 4,639 registered beds. The total number of tourist visitors per year is 135,092, of which 82,907 are domestic tourists and 52,185 are foreign tourists. The total number of overnight stays is 437,607, of which 342,646 are domestic overnight stays and 94,961 are foreign overnight stays. Hospitality is most often linked to tourism activities. In fact, without this segment, rural tourism cannot function. Within hospitality, accommodation capacities and food and beverage establishments are defined as directly important, already affirmed localities and facilities located in these areas. Accommodation capacities at this level of utilization have a complex and complementary character, even though they are not located in immediate rural centers.

In the South-East Region, 176 hospitality establishments operated with 11,672 seats. Most restaurants have a modern ambiance and are oriented toward fast food, barbecue and international cuisine. It is noticeable that the region lacks traditional restaurants with traditional architecture that would fully nurture traditional cuisine and folk music.

The population, as an important factor in the sphere of rural tourism in the region, shows a high degree of active workforce, with relatively high participation in agriculture and agriculture-related services, which are factors for rural tourism development and represent a positive prerequisite for tourism growth in this field.

Relatively good access, transport and travel opportunities are not sufficiently utilized for the development of rural tourism. Hospitality demonstrates a relatively high level in the general sector, while in the rural sphere it is reflected as a potential that can be further improved in line with the activation of resources in rural areas.

4.4.3.3. Pathway towards a green agenda for tourism in the South-East region

Within the framework of the European Commission, in 2022 the document “Transition Pathway for Tourism” was adopted, with 27 areas of action for a green, digital and resilient transformation. This includes circular services, improved waste/water management, labeling and indicators.

The Green Agenda for the Western Balkans (GAWB) was signed with the Sofia Declaration and encompasses five pillars: decarbonization, circular economy, depollution (air/water/soil), sustainable food/rural systems and biodiversity. In 2021, an Action Plan (2021–2030) with 58 measures was adopted. In 2025, the first revision of this plan began.

The EU Circular Economy Action Plan (CEAP 2020) calls for waste reduction, eco-design, reuse/recycling and the inclusion of the tourism ecosystem in “low-footprint products and services.”

Within the EU, the adoption of a Circular Economy Law is planned for 2026. Its aim is to establish a single market for secondary raw materials and increase the supply of high-quality recycled materials to stimulate demand for these materials. It will contribute to the ambition

set in the Competitiveness Compass – for the EU to become a global leader in the circular economy by 2030.

The circularity rate represents one way of measuring how circular our economy is. This figure shows what share of the materials we use are recycled or reused instead of being discarded. At present, the circularity rate in Europe is around 12%, but the goal is to double it to 24% by 2030. This target is part of the EU's Industrial Clean Deal.

In the case of North Macedonia, institutions (the Ministry of Environment and the State Statistical Office) have not published such an indicator. More commonly used are data on waste management, recycling rates and import/export of secondary raw materials. There is no calculated circularity rate as in the EU. According to available reports, municipal waste recycling rates are very low (below 5%). The country is in the process of aligning with EU circular economy policies, particularly through the Green Agenda for the Western Balkans. As part of the EU accession process, North Macedonia is expected to gradually adopt ETIS (European Tourism Indicator System) or similar tools for monitoring sustainability.

The implications are clearly set for the tourism sector in the South-East Planning Region. They must change to low resource intensity and self-contained cycles (water, energy, materials, food) and monitoring using indicators (ETIS). The major issues identified within the sector are the lack of infrastructure related to waste separation, low public awareness and limited investment in secondary raw materials.

In the EU, the “Circular Economy Law will rely on the second Circular Economy Action Plan and will aim to reinforce and extend it to boost the EU's transition towards a resource-efficient, low-carbon and low-waste economy and climate-neutral economy.

Plastic pollution is currently one of the biggest challenges to the environment and tourism is part of the solution to the problem that exists. It is mainly the type of plastic used in tourism that is non-recyclable or is used only once, leading to large amounts of pollution.

- 80% of tourism takes place in coastal areas
- 8 million tons of plastic end up in the ocean each year
- 40% increase during the tourist season
- More than 99% of plastic is made from oil, gas and coal
- Thousands of billions of tons of greenhouse gases originate from plastic production
- By 2050, 20% of oil consumption could be from plastics

The production of more than 300 million tons of new plastic each year also depletes natural resources and contributes to greenhouse gas emissions that cause global warming.

The Global Tourism Plastics Initiative aims to prevent plastics from becoming pollution while reducing the need for new plastic production.

In order for the above vision to be realized, the tourism sector commits to stopping the use of plastic products that are not necessary; innovating in such a way that the plastic products it needs are designed for safe reuse, recycling and composting; and ensuring that all the plastic products it uses are circulated within the economy and out of the environment.

In the efforts to promote plastic reduction within tourism stakeholders, every stakeholder such as the accommodation providers, the cruise and vertically integrated businesses; the suppliers; the destination; the support organizations; and the tour operators, travel agents and platforms has a responsibility to contribute data, action and efforts.

This work should be synthesized in the form of reports that list the results obtained in the five areas of commitment:

1. Elimination of problematic and/or unnecessary plastics.
2. Transition to reuse models or alternatives that can be reused.
3. Engaging the supply chain so that all plastic packaging is reusable, recyclable, or compostable.
4. Increasing the use of recycled plastic content.
5. Collaborating and investing to improve recycling and composting rates.

In the accommodation sector, the EU promotes the EU Ecolabel for tourist accommodations with strict criteria for energy, water, chemicals, waste and food, supported by user guidelines since 2023. The EU Ecolabel ensures that certified accommodations have optimized environmental and waste management, reduced energy and water consumption, lowered transport emissions and minimized food waste. The new proposal has a significantly expanded structure that will comprehensively cover accommodation in seven thematic areas.

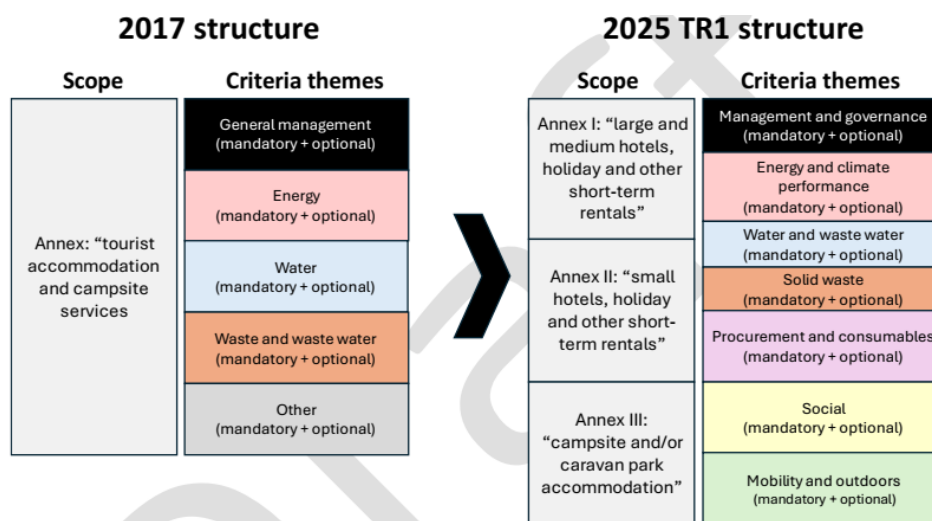


Figure 15 Comparison of the scope and structure of thematic criteria in 2017 and in the TR1 proposals

The new Urban Waste Water Treatment Directive (UWWTD), entering into force in 2025, requires broader collection/treatment, tertiary and quaternary treatment (especially of micro-pollutants), with energy neutrality by 2045. This will be important for spa centers and lake destinations such as Dojran, Bansko and Negorci.

Investment requirements for the tourism sector for delivering utilities can prove to be the cornerstones for the achievement of water accessibility and safety, as well as hygiene and sanitation for all. Water management in the tourism sector, pollution and technological effectiveness can prove to be the niche for ensuring the safety of our greatest assets.

4.4.3.4. Strategic Goals for 2026–2030 aligned with the Green Agenda and Action Plans (GAWB/CEAP/Pathway)

The Republic of North Macedonia should focus on developing a tourism sector that combines the principles of the circular economy and the Green Agenda, within the timeframe of the years 2026-2030. The above goals fit into the European action plan, in an effort to ensure sustainable practice in the tourism sector, within the context of resource use and minimizing wastage.

The emphasis lies in the introduction of new innovative approaches for the management of water, energy, food and materials, besides the application of indicators for sustainability measurement. In this context, tourism will play a key role in transforming with green approaches because it will improve economy competitiveness, conserve the environment and develop quality of life in communities.

4.4.3.4.1. Lake and Spa Tourism – Dojran, Negorci, Bansko

The foresaw circular focus in tourism branches and activities related to lake and spa tourism requires actions linked to the water cycle, like installing greywater systems and reuse in hotels/ spas; pilot locations for retention wetlands/constructed wetlands for seasonal loads; and complete implementation of Integrated Water Resource Management at Lake Dojran.

Solar thermal and photoelectricity system installation in the spa facilities should be installed from the energy viewpoint, with energy management plans toward the energy neutrality of its facilities by 2045.

For waste, the main requirements that arise are compulsory separation, establishment of contracts with recyclers, composting of bio-waste from restaurants and kitchens and reusing glasses and plastics.

As a final stage of previously implemented activities, certification in the “Dojran – EU Ecolabel Corridor” would follow, as a cluster of accommodations meeting criteria for water, energy, chemicals, food and waste.

Through the execution of such activities and the acquisition of data, destination management will be incorporated with ETIS indicators that include water quality, waste per guest per night, local purchasing and CO₂ emission per guest.

The existing need for regulating the lake level of Lake Dojran has been already established and realized through the Gjavato well system, where there is systematic application. In the past, schemes have been developed for walking/cycle paths and lake level management & biodiversity (2019–2024) together with the joint committee from the bought sides.

The circular focus in this area of tourism has to do with the achievement of “Zero Waste Trails,” developing the right framework to support the segregation process with logistics and

pre-arranged rules among those providing and using resources vis-à-vis efficiency and sustainability and responsibility.

Additionally, education about the application of the “pack in and pack out” principle is necessary. This is where the visitor or the hike must remove all the items that have been brought along to the wilderness (food, packaging, equipment), leaving no trace or waste behind.

In mountain tourism, the need for digitalization is most pronounced, through the introduction of QR code markers, which are interactive information points enabling education and raising awareness among visitors. These include:

- Physical signs (boards, posters, trail markers, information panels) placed at tourist sites, trails, or facilities.
- QR codes that visitors scan with their mobile phones.
- Upon scanning, users receive digital content: text, video, interactive guides, educational materials.

Materials used in these spaces should be recyclable, such as wood/recycled composites for trails, repair/reuse of equipment (ski/trek), e.g., rental, donation, or reuse in another context. Circularity here means extending the product life cycle, reducing the need for new production and minimizing waste.

The digitalization of mountain tourism, concerning energy, stands in the form of micro-photovoltaics for info points, so small solar panels that offer energy for information points (boards, kiosks, digital displays). This would ensure the energy autonomy of information points in a natural setting, such as a mountain, in a simply accessible manner through digital maps on apps instead of physical maps, through digital guides available on apps instead of the usual print media.

Tourists get updated information regarding trails, sites and services with less environment interaction. ETIS Indicators. ETIS indicators are a series of indicators developed within the EU to measure the sustainability of tourism.

In cases where these indicators are available digitally, tourists will have access to up-to-date visitor capacity – the number of tourists a site can handle without damaging the environment. Such indicators play a significant role in ensuring safety and security for both tourists and the community.

In this manner, tourism is integrated into a circular economy that utilizes resources rationally, repeatedly and sustainably while effectively ensuring minimal impacts on the environment.

4.4.3.4.2. Digitalization and Energy in Mountain Tourism

Digitalization and the use of energy in mountain tourism are represented by micro-photovoltaics for info points, which involves the use of small solar panels designed to generate energy for info points (board, kiosks, digital screens). This will ensure energy

independence for the info points located in the natural environment and will quickly give access to digital maps or electronic guides for mobile apps/QR codes rather than hard copies, which could easily be updated.

Visitors are provided with real-time updates on trails, attractions and services with little effect on the environment. Indicators of ETIS (European Tourism Indicator System) are a series of indicators penned down and produced by the EU to determine the sustainability of the tourism sector.

If data on these indicators is available in electronic form, then tourists would have updated information about visitor capacity, the number of tourists a site can hold without damaging its natural and cultural environment. It is important for ensuring safety and security for both tourists and residents in the local community.

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4.4.3.4.3. Cultural and Gastronomic Tourism (Events: Rakijada, Kestenijada; museums/sites)

In the case of cultural and gastronomic tourism, circular interventions are adopted with the objective of incorporating circularity into the daily functioning of the offers.

- **Supplies from Local Vendors:** By consuming products offered by local farmers and producers, there will be minimal transportation of goods over a long distance, thereby affecting carbon emissions and support to the local economy.
- **Seasonal menus:** Introducing menus based on seasonal products enables rational use of resources and reduces food waste.

- Reducing food waste: Through better planning of procurement and meal preparation, the amount of unused food is minimized.
- Donations: Food that remains unused can be donated to local organizations or communities, thereby reducing waste and supporting social responsibility.
- Composting biomass: Organic food residues are processed into compost that can be used for local agriculture, closing the resource cycle and creating added value.

By implementing all these interventions, gastronomic tourism in the South-East region becomes part of the circular economy, where resources are reused. In fact, tourists not only have the possibility of enjoying the local cuisine but also become part of the process aimed at decreasing raw material consumption and waste and strengthens ecological awareness.

4.4.3.4.4. Spa and Health Tourism (Negorci, Bansko)

Circularity in spa and health tourism in the South-East region (Negorci, Bansko), when referring to the sustainable use of water, should be directed towards the application of:

- Closed systems for spa waters: recirculation and purification of mineral and thermal waters to reduce consumption and avoid unnecessary discharge.
- Heat recovery: utilization of heat from spa waters for heating premises or other energy needs, thereby reducing the use of fossil fuels.
- Monitoring of micro-pollutants: regular monitoring of the presence of cosmetic and pharmaceutical traces in the water, in order to ensure quality and protect health and the environment.
- In relation to the use of chemicals and chemical agents:
- Green cleaning products: use of environmentally friendly agents that do not pollute water and soil.
- Dosing and recording system: introduction of digital systems for precise dosing and monitoring of chemical use, in accordance with EU Ecolabel criteria, to guarantee safety and sustainability.

With the structure of a decarbonized and circular tourism sector outlined above, it will be feasible for energy, water, waste-materials management and food to be fully incorporated within a set of closed cycles while reducing carbon emissions and optimizing resource use.

The collection of information about the indicators with respect to these activities will make it possible for certification according to applied standards:

By 2030, at least 20% of accommodation facilities should hold the EU Ecolabel or an equivalent certification.

- This will ensure that facilities meet strict criteria for energy, water, chemicals, waste and food.
- Protection of water and biodiversity
- Alignment with the new UWWTD directive on urban waste water.
- Introduction of circular water solutions in sensitive destinations such as Dojran and spa centers, to safeguard ecosystems and biodiversity.

- ETIS indicators and digital destination management boards
- Application of the European Tourism Indicator System (ETIS) for measuring sustainability.
- Introduction of digital boards and destination management systems (DMOs/municipalities), providing transparency and timely data on water, waste, CO₂ emissions and local procurement.

As a result of such activities, spa and health tourism of the South-East region would be changed for the better, because it would become a sustainable closed system where resources would be reused rationally and there would be less harm to the environment. It would be very effective for improved quality, preservation of resources and competitiveness of the region in the European tourism market.

4.4.3.4.5. Tables for Planned Activities, KPIs, Deadlines and Responsible Parties

Table A — Package 1: Eco Accommodation and Labeling (Dojran / Strumica / Gevgelija / Radovish)

Activity	Description	KPI (2026 → 2030)	Deadline	Responsible Parties	Funding
Program “EU Ecolabel Ready”	Audit, technical plan, training for 40 facilities; checklists based on criteria (water, energy, chemicals, waste, food)	≥ 20% of beds with eco-label; -25% water/guest; -20% energy/guest	Pilot 2026–2027; scaling 2028–2030	JIPR Center, municipalities, hotel associations	IPA III, EU Ecolabel technical support, Green Growth Funds
Water circular solutions	Greywater reuse, low-pressure showers, monitoring	-30% water consumed per room; 0 incidents of direct discharge	2026–2029	Hotels/WWTP/municipalities	EU/IPA, public funds; UWWTD compliance
Waste and bio- waste	Contracts with recyclers; composting in large facilities; ETIS metrics	-50% mixed waste; ≥70% separation rate	2026–2030	Municipalities/Public Utilities/DMO	CEAP/green procurement

Table B — Package 2: Dojran – Water, Biodiversity and Tourism

Activity	Description	KPI	Deadline	Responsible	Funding
WWTP & wetlands	Commissioning/upgrading WWTP; constructed	≥25% treatment by 2028; tertiary where needed	2026–2029	Ministry of Environment,	IPA III, Interreg GR-MK [

Activity	Description	KPI	Deadline	Responsible	Funding
	wetlands for seasonal peaks			Municipality of Dojran	
Lake co-management	Joint GR-MK protocols; digital monitoring (level, quality)	0 illegal discharges; stabilized water level	2026–2030	Dojran/Kilkis/regions	Interreg IPA CBC
Eco trails/beaches	Circular-use materials; info boards/QR; zero-waste beaches	–70% beach waste; +15% visitor satisfaction	2026–2028	Municipality/DMO	Local/donor programs

Table C — Package 3: Mountains/Waterfalls – “Zero Waste Trails”

Activity	Description	KPI	Deadline	Responsible	Funding
Selection/Logistics	Separate containers, contract with recycler; “pack in/pack out” rule	≥80% separation rate	2026–2027	Municipalities/Parks	CEAP/local public funds
Digital ETIS	Dashboards: visitor numbers, waste/km, incidents	Active ETIS set; quarterly reports	2026	DMO/JIPR Center	EU technical assistance

Table D — Package 4: Events/Gastronomy

Activity	Description	KPI	Deadline	Responsible	Funding
Returnable Containers	Deposit system; ban on single-use plastics	–90% single-use packaging	2026	Organizers/Municipalities	Local/sponsors
Food Waste Reduction	Menus with local/seasonal products; donations	–30% food waste	2026–2027	Restaurants/NGOs	CEAP/local funds

4.4.3.4.1. Activities according to ETIS (European Tourism Indicator System)

With the use of ETIS indicators, the South-East area has a system that is manageable, transparent, as well as measurable, while it also protects the environment, boosts economic power, as well as instills confidence among stakeholders.

4.4.3.4.1.1. Governance and Institutional Structure

The complexity and diversity of tourism require the establishment of a core institutional framework through the creation of a Destination Management Organization (DMO) office for the South-East Planning Region or for key destinations such as Dojran, Strumica, Gevgelija and Radovish.

The DMO office should be responsible for coordinating all activities, collecting data, conducting analysis and reporting.

In this process, the involvement of local municipalities, tourism operators, hoteliers and non-governmental organizations in management and reporting is expected.

4.4.3.4.1.2. Indicators and Monitoring

There is also need for analysis and reporting and this is achieved by applying ETIS indicators. There are 27 core indicators, also known as mandatory indicators, that make up the basis for the reports, as well as 40 optional indicators used for additional analysis and specialized needs.

All the above information is presented in a quarterly dashboard. 'Dashboard' is a tool or interface that provides the most critical information and indicators about a process or system in a single location.

Briefly, a dashboard can be described as a "control panel" for data management enabling transparency, easy monitoring and quick response.

Essential features of a dashboard:

- Data visualization: charts, tables, indicators and figures that provide a quick overview.
- Real-time monitoring: continuous tracking of the situation (e.g., water consumption, energy use, waste).
- Focus on KPIs (Key Performance Indicators): highlights the most relevant measures to assess progress.
- Integration of multiple sources collects data from different systems and presents them in one place.
- Such an interface supports decision-making, helping managers and institutions make informed decisions based on clear and up-to-date information.
- In tourism destination management, a dashboard may display:
 - Water: consumption per guest/night, water quality, percentage of facilities with water reuse systems (greywater, heat recovery), water quality results from monitoring.
 - Waste: amount per guest/night, recycling rate.
 - Energy: consumption per facility, share of renewable sources.
 - CO₂: emissions per guest/night.
 - Satisfaction: surveys of tourists and the local population.
 - Local procurement: percentage of products and services purchased from local suppliers.

4.4.3.4.1.3. Reporting and Transparency

- Public report twice a year:
- Spring report (for the previous tourist season).
- Autumn report (for the current year).
- Reports should be available to the public via a web platform and printed versions.
- Open data: publication of indicators in digital form for transparency, comparison and attracting investment.

In the process of the preparation of the dashboard, the aspect of reporting and transparency is one of the major components which highlights the aspects of trust and visibility of the results that arise from the use of the indicators. Systematic reporting is achieved in a way that all stakeholders can afford a quick overview of the situation of tourism.

The basis of constant observation and communication of development is the publication of reports on a biannual basis. The spring report is made with respect to the previous tourist year, presenting the data from the indicators of water, energy, waste, emissions of CO₂, tourist satisfaction and local procurements. The autumn report deals with the current year and serves to assess ongoing trends and challenges.

To facilitate ease of access, the report should be posted online and as hard copies, ensuring that the public is aware of the details as well as institutions that require the report to be written format.

Finally, the use of the open data concept is also important for transparency and attraction of investment. Using open data, indicators can be viewed online and can help in comparison and analysis by researchers and investors and use by local communities for better planning.

Given this system in place, the “Reporting and Transparency” sector not only serves as a managerial requirement for the region but is also a tool for trust and competitiveness. This in turn gives the South-East region the ability to market itself as a responsible and contemporary tourist region that tracks its sustainability performance and makes these available publicly.

4.4.3.4.1.4. Benefits of Applying ETIS

The general benefits are reflected in improving the image of the region, which can be positioned as an example of sustainable tourism in the Western Balkans. At the same time, integration with European policies is achieved, such as alignment with the Green Agenda and the CEAP (Circular Economy Action Plan), thereby facilitating EU integration. With system implementation, better coordination among institutions is established. ETIS requires regular data collection and sharing, which improves cooperation among municipalities, tourism operators and state institutions. For awareness-raising and education, indicators are crucial both for informing tourists and the local population, encouraging responsible behavior.

4.4.3.4.1.5. Improving the Sustainability of Tourism in the South-East Region

ETIS indicators allow systematic monitoring of the most important aspects of tourism activities in the field of water, energy, waste, emissions and social factors. This makes it easy to establish a clear picture of the impact of tourism on the environment and community. The information thus obtained serves as a basis for corrective measures, improvements in efficiency and policy development by which long-term sustainability would be assured. In this manner, tourism in the South-East region can develop without jeopardizing the natural and cultural environment.

4.4.3.4.1.6. Increasing Trust among Tourists and Investors through Transparency

The indicators for the ETIS are published in public reports and digital dashboards, ensuring transparency and accountability. This provides tourists with the assurance that the destination is taking care of the resources responsibly. Also, the investors will get the right information concerning the status of the region. This will make the South-East region even more attractive as a destination according to the European standards and offering a stable foundation for investment.

4.4.3.4.1.7. Supporting the Local Economy through Promotion of Local Procurement

One of the ETIS indicators is the percentage of local procurement. By monitoring and promoting this, the use of products and services from local farmers, producers and small businesses is encouraged. This directly strengthens the local economy, creates new jobs and increases the region's competitiveness. Additionally, local procurement reduces the need for long-distance transport, which also contributes to lowering emissions.

4.4.3.4.1.8. Reducing the Environmental Footprint through Systematic Monitoring of Water, Energy, Waste and Emissions

ETIS provides specific indicators for water and energy consumption, waste generation and CO₂ emissions. Regular monitoring enables timely identification of problems and the introduction of optimization measures. For example, if high water consumption per guest is identified, greywater reuse systems can be introduced. If waste levels are high, waste separation and recycling can be intensified. In this way, the environmental footprint is reduced and alignment with European climate neutrality goals is achieved.

4.4.4. Concluding Observations

By implementing circular practices and green technologies, it will be possible to achieve a considerable decrease in negative impacts in the South-East region. Furthermore, it is expected to achieve a decrease in greenhouse gas emissions of 15-25%, contributing to alignment with European climate neutrality goals. In addition, it is expected to decrease water

consumption by at least 20% with closed systems and greywater reuse. Moreover, it is expected to increase recycling rates of waste to 40-60% to decrease landfill contributions, which in turn promotes a circular economy. Finally, it is essential to increase the share of RES consumption to decrease fossil fuels and improve the energy efficiency of tourism facilities.

The green transition will bring direct economic benefits to tourism operators and local communities through: increased competitiveness of facilities thanks to lower operational costs from energy efficiency and better resource management, regional destinations will become more attractive for new segments of tourists seeking sustainable and environmentally responsible services. Transparent reporting and compliance with European standards will enable access to new sources of financing, including European funds and private investments.

The application of sustainable practices will make a large positive social impact. This is because the local economy will be affected in a positive way by the generation of new employment opportunities in the sector of eco-services, waste and renewable energy. New knowledge and skills will also be acquired by the local people, particularly in green technologies and sustainable management, making them more capable in the labor market. Moreover, the cultural and natural heritage will be conserved because sustainable principles will be incorporated into tourism products, ensuring the sense of identification with the environment among the local inhabitants and the uniqueness offered by the region.

The establishment of a system based on KPIs (Key Performance Indicators) will create a culture of measurement, monitoring and continuous improvement.

This is because a system of this nature should bring about a sense of transparency and increased cooperation between the institution and tourism operators and local communities, as well as the development of partnerships that will strengthen regional coordination. Moreover, tourists are now seeking destinations that contribute to the preservation of the environment and the local community.

While structuring and implementing sustainable tourism, within the context of the green transition, there are several risks that have been classified and these risks might act as a potential barrier in the accomplishment of the goals set. There should be measures taken for the mitigation of these risks which must be foreseen to ensure stability, predictability and trust among all stakeholders.

Financial risk – It is generally known that there is a lack of financial resources in our country, representing one of the greatest obstacles to the implementation of green projects. Mitigation measures include phasing activities through the combination of different funding sources (state, local, European funds, private investments), as well as the use of guarantees and subsidies to ensure security and continuity of projects.

Technical risk – Non-compliance of equipment or technology with European standards may lead to inefficiency or additional costs. Therefore, it is recommended to prepare precise

technical specifications, conduct pre-qualification of suppliers and pilot testing of equipment before full implementation, particularly in the areas of water use, energy and fire safety.

Organizational risk – Weak engagement of stakeholders (municipalities, tourism operators, local communities) may reduce the effectiveness of green transition activities. To overcome this, participation agreements should be concluded, incentive programs for stakeholders should be developed and visible benefits of the green transition should be clearly presented, raising awareness among all participants in the tourism implementation process.

Regulatory risk – Potential obstacles regarding permits and compliance with standards may delay the process. Early coordination with competent authorities, provision of legal support and timely alignment with European directives and national regulations are essential. If previously it was common practice to expect central authorities to set rules and standards, the initiative for such changes and their active creation should now come from the tourism sector.

Reputational risk – There are dangers of “greenwashing,” i.e., falsely presenting activities as sustainable without real results. To avoid this, verified KPIs must be used, independent audits of results conducted and full transparency in reporting ensured.

By systematically identifying and managing these activities, which in some way also represent fundamental risks, the South-East region can accelerate the green transition and establish a structured framework for sustainable tourism development. This will not only strengthen trust among tourists and investors but also create a stable foundation for economic growth, protection of natural resources and improvement of quality of life in local communities, while also building confidence among central authorities for financial support.

A green transition in tourism represents both a strategic imperative as well as a market opportunity. With emphasis on energy efficiency, resource management, certifications, digital monitoring, or more sustainable transport, destinations can create a strong "green brand" with credible key performance indicators. Governance, financial strategy, or a strategic action plan are key.

5. Climate change, environment and circularity

The complexity of the globalized interrelations among differently developed countries also portrays a complex environment for the human population, as well as for the rest of nature. Due to improperly designed, outdated and un-sustainable solutions and the prevalence of the linear (not circular) economy, business and population waste is inconceivably damaging the ecosystems beyond repair. Nutrient effluents from agriculture and wastewater into the soil and oceans are projected to increase in most world regions, driven in part by the demand for increased agricultural production.

The increasing complexity of chemical mixtures released into the environment is also a concern globally. There is clear evidence of the detrimental effects of pollution on the natural environment, ecosystem services and biodiversity, for example through processes such as eutrophication and acidification. The number of marine dead zones due to eutrophication has

increased markedly in recent years.’ (European Environment Agency, 2015) Similar situation occurs in Doiran Lake - eutrophic lake with excess of biomass, becoming dangerous for the fish and humans, due to emissions of nitrogen, ammonia, phosphorus and other gases. Eutrophication is the process by which water bodies acquire high nutrient concentrations (phosphates and nitrates) and also sediment from the surrounding watershed and become more fertile and shallower. typically followed by excessive growth and decay of plants (algae) in the surface water and death of other organisms. This can lead to the reduction of O₂ because of hypoxia phenomenon, Eutrophication often occurs as a result of pollution related to human activity, such as fertilizer runoff and sewage discharge and the atmospheric deposition of nitrogen compounds.’(Jenkins, Woodward and Hildrew, 2013). Eutrophication or hypoxia is a key problem also for freshwater ecosystems (rivers, lakes) also remains a key challenge (UNEP, 2012) (OECD, 2012).

The current business models are deeply dependent on non-renewable resources, linear economy, externalities and casualties. From local issues to a global problem, environmental pollution rests on complex mix of critical pollutants, frequently transferred externally to less regulated or poor(er) regions. The ‘global distillation’ concentrates the persistent, bioaccumulative and toxic substances in the colder areas of the globe, dispersing global toxicity anyhow. (Swackhamer, Needham, Powell and Muir, 2009). Complementary to the airborne pollutants, water and soil are polluted from direct releases from different sources of waste. Such contextual trend occurs in Doiran Lake region too - due to urbanization, unregulated and unsanctioned acts of pollution of individuals/legal entities, the lake has excessive eutrophication that presents hypoxic environment for the organisms in the Doiran Lake ecosystem.

The European Union continuously emphasizes the importance of strong climate action, sustainable development and environmental protection as fundamental principles for the future economic and social progress of the Western Balkan countries. EU legislation covers a wide range of areas – from climate change, water and air quality, waste management and nature protection, to industrial pollution, chemicals, noise and civil protection. In this context, the Republic of North Macedonia is expected to align its policies and institutional capacities with European standards, but its progress is assessed as limited. The European Commission points out that no significant progress has been achieved. There is a lack of sufficient administrative capacity and the public administration does not have enough qualified staff capable of dealing with the complexity of environmental issues. Reforms for the implementation and enforcement of laws are stalled, creating delays in the process of harmonization with European law. This is particularly relevant for the South-East region, where municipalities such as Strumica, Radovish and Gevgelija face limited resources and insufficient institutional support to apply the directives on environmental impact assessment and strategic assessment.

In the area of climate change, no progress has been achieved in the Republic of North Macedonia during the recent period since the drafting of the Climate Action Law. Efforts to align with the EU climate acquis need to be urgently intensified. The country should adopt the long-awaited Climate Law and then urgently align with and implement the legislation on monitoring, reporting, verification and accreditation (MRVA) for the purpose of introducing carbon pricing and fully aligning with the EU Emissions Trading System (ETS).

Regarding this sector, the country that should meet its goals is North Macedonia. It needs to finalize and adopt its updated National Energy and Climate Plan (NECP). It must establish an environment for the implementation of its updated Nationally Determined Contribution (NDC) and present its new and ambitious Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) in the context of its commitment to keeping global warming below 1.5°C. Additionally, it must finalize its obligation and present its first Biennial Transparency Report.

One of the priorities, therefore, should be that North Macedonia should strengthen its administration in this area to make any progress toward alignment with the EU climate acquis, especially as regards awareness-rising measures, which should be intensified.

In June 2025, Parliament adopted amendments to the Law on Environment and ratified two amendments to the Espoo Convention (Convention on Environmental Impact Assessment in a Transboundary Context – Espoo Convention). The first amendment refers to public participation in procedures, with a particular accent on the involvement of civil society and non-governmental organizations, while the second amendment has the purpose of strengthening the implementation of the Convention itself and developing better synergy with other multilateral agreements. In this regard, for the South-East region, this is of special importance since there exist civic organizations demanding transparency of processes related to constructions of industrial facilities and infrastructure projects. Yet practical application remains limited and the procedures are often insufficiently transparent.

It is important to note that the national report regarding the Aarhus Convention has yet to be produced and the Aarhus Center is not functioning at full capacity. This is becoming a serious issue regarding transparency and public awareness. In South-East region, for example, the public is not exposed to adequate amounts of information concerning air and water quality, when in fact this is related to the health and production outputs of the region. Attempts by social organizations to make demands for legal accountability for environmental concerns are regularly denied by judicial authorities concerning legitimate legal responsibility.

Climate change will continue to pose great pressure despite the mitigation measures in place for the future. It is therefore important to ensure enhancement in activities related to a higher level of resilience and preparedness and measures against actions in the context of developing mechanisms for transferring risks from natural disasters.

A lack of strategic planning for investments concerning the environment and infrastructure is another flaw that can be noticed as a weakness at the regional level. Coming back to the South-East region and given that the primary economic activity for this region is agriculture, the need for well-prepared and quality investments is definitely high.

5.1. Tourism and Environment Reporting Mechanism

TOUERM was developed by the European Environment Agency and is based on the use of indicators. These indicators are policy-relevant, feasible and regularly updated to reflect environmental impacts (baseline conditions and thresholds) and sustainability trends at the European level. Some of the indicators may also relate to specific geographical contexts,

such as coastal zones, rural areas and urban environments. Certain relevant information originating from tourist destinations may also be included, if significant. TOUERM indicators are not applied in our country, even though we have been a member of the EEA since 1996.

5.2. Waste Management

At the national level, no steps have been taken to fully align with the EU Directive on Environmental Liability. Investigations into environmental crime, such as illegal storage of hazardous waste, have not been initiated, despite the new Criminal Code being in force for more than a year. This is particularly relevant for the South-East region, where problems with illegal landfills and insufficient control over industrial waste persist. Municipalities in the region need to establish centers for circular economy and recycling, which would enable the reuse of materials and reduce pressure on the environment. Environmental monitoring in the country, including in the region, does not meet European standards.

In the area of waste management, implementation remains a serious challenge. National strategies for waste management and sludge management have not yet been adopted. The Government submitted a formal request to the European Commission for information related to Annex VIII of the Waste Shipment Regulation, with the aim of enabling the import of 18 categories of waste from the EU's non-hazardous waste list. This is an illogical request given the clear recognition that existing systems are not capable of adequately handling waste. Regional waste management structures are not functioning, meaning no regional landfill has been established, while municipal enterprises demonstrate certain inefficiencies. The process of establishing a regional waste management system is delayed. The lack of ownership and commitment from local authorities, without exerting clear pressure on central authorities, as well as weak inter-institutional coordination, continues to hinder progress.

In the Republic of North Macedonia, the implementation of the circular economy is at a very low level. Municipalities in the South-East region are relatively small in territory and population and are not functional in the sense that they are not prepared to collect waste at local transfer stations within the municipality. This obstacle arises from the fact that local administrations have not centralized waste collection in one place, making it difficult to monitor the amount of waste generated in the municipality.

This indicates that municipalities in the South-East region use standard municipal vehicles for collecting mixed municipal waste, have insufficient coverage in rural areas (a national trend) and lack fully established source-separation systems, as confirmed in national reports on waste and circular economy. The South-East planning region encompasses ten municipalities, each with some form of organized service for managing municipal solid waste, mainly through public utility enterprises. However, management is largely focused on mixed municipal waste, without sufficiently developed systems for separation, reuse and recycling, nor an integrated approach to different waste streams (household, industrial, construction, agricultural, medical waste).

According to national and regional documents, the region is obliged to prepare a Ten-Year Regional Waste Management Plan, which should cover all types of waste, as well as conditions for collection, transport, treatment and disposal. A Regional Plan for an Integrated

Waste Management System in the South-East planning region has already been prepared by the Civil Engineering Institute in Skopje.

This points to the need for:

- A functional regional system instead of fragmented municipal solutions
- Alignment with national and EU legislation and applicable waste directives
- Development and efficient use of transfer stations and a regional landfill
- Improved monitoring and record-keeping of generated and collected waste quantities

Currently, municipalities are generally characterized by limited technical and financial capacities, underdeveloped infrastructure for waste separation and a low level of functional regional coordination. This limits the possibility of establishing a sustainable circular economy system and effectively implementing the green transition. The needs of the South-East region align with the national strategic direction, but the realization of concrete infrastructure solutions is yet to follow after the completion of technical documentation preparation. This situation highlights the gap between formal planning obligations (preparation of a regional plan and alignment with legislation) and actual implementation on the ground, particularly regarding functional transfer stations and a regional integrated system.

In line with the second phase of the regional solid waste project, technical assistance should be used to prepare feasibility studies and EIA/SIA analyses, as a basis for financing: a modern sanitary regional landfill, transfer stations, vehicles and equipment for selective collection and record-keeping systems.

Improving collection, separation and monitoring are prerequisites for waste circularity:

- Introduction and expansion of selective waste collection
- Gradual implementation of primary separation systems (dry/wet fraction; separate containers for plastic, paper, glass, bio-waste), starting from urban centers and institutions
- Cooperation with authorized collective operators and the private recycling sector
- Development of a central regional waste information system
- A register of generated and treated waste by municipality, type and source
- Regular reporting and integration with national systems for report preparation (EU alignment and statistics).



5.2.1. Example of Good Practice – Remediation Activities at the Bucim Mine Tailings Site in Radovish Municipality

The long history of intensive copper (Cu) mining in the vicinity of Radovish and in the countries of ESEE (“Eastern and South-East Europe”) with similar geological deposits, using rather outdated technologies, in the past resulted in low utilization rates and the generation of large quantities of various types of tailings. Such tailings cause extreme pollution of groundwater, soil and air.

An activity has been proposed through the RIS-CuRE project, which is based on creating an innovative model that brings together all relevant stakeholders within the so-called knowledge triangle – industry, research and education – taking into account the latest knowledge and the “zero waste” paradigm. This activity received financial support from the European Institute of Innovation and Technology (EIT), a body of the European Union, within the Horizon 2020 program, the EU’s framework program for research and innovation and is currently under implementation.

A holistic and eco-innovative approach to the extraction of valuable minerals (e.g., critical raw materials and other valuable metals) and the utilization of residues after metal extraction (e.g., in the construction industry) provides a guarantee for the successful development of a Regional Innovation Scheme (RIS) based on tailings exploitation and represents, from economic, organizational, technological, environmental and social perspectives, the most sustainable option.

RIS-CuRE — Zero Waste, Copper Tailings Recovery in the ESEE Region is expected to demonstrate to other regions in the country how to treat existing tailings from past mining operations.

This will lead to the development of an encouraging environment for strengthening entrepreneurship and inter-institutional cooperation in the region, based on research into secondary raw material deposits. The final result of the project will be a strong sustainable regional network, based on valid data supported by facts, including a study of the potential economic, technological, organizational (legislative), environmental and social impacts of applying the innovative zero-waste methodology for the exploitation of economically interesting materials.

The project involves numerous institutions and research and university centers, such as: Slovenian National Building and Civil Engineering Institute (coordinator), Geological Survey of Slovenia, IRGO Consulting, Gomez Pardo Foundation, Outotec Oy, Chamber of Commerce of Serbia, Chamber of Commerce of Vratsa, Civil Engineering Institute Macedonia, Bucim DOO Radovish, Ltc, ELEM Macedonian Power Plants, “Goce Delčev” University Shtip, Ekolive s.r.o., University of Belgrade, Technical Faculty in Bor and University of Petroșani.

5.2.2. Conclusions for Waste Management and Circularity

In the broader scope, the Green Agenda is a framework that challenges countries to adopt a circular economy, decarbonization, agriculture that is sustainable and biodiversity. For the South-East region, this means that the agricultural sector must be changed through the recycling of organic waste, construction of biogas plants and implementation of energy efficiency in agriculture. Industry capacities in the South-East region have the potential to invest in the green economy.

The South-East part of North Macedonia has challenges, but it also has the potential of becoming a best practice in the implementation of the Green Agenda. The enhancement of institutions, transparency, the role of civil society, the circular economy and green technologies should be achieved. Being in line with the European directives on waste, overseeing and taking the environmental dimension into account will make the region a dynamic part of the green revolution in North Macedonia and internationally.

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The progress in the implementation of the circular economy in the country and the region has been stagnating. The factors that will limit the progress are the level of low awareness and knowledge of the stakeholders, the level of low financial resources and the level of low infrastructural resources. The EPR approach will continue to face challenges despite the little progress it has made within the country and the region. The number of PROs will continue to increase.

The amount of waste produced has been on the rise due to the development of the economy and increased consumption levels; at the current rate, it stands at 1000 kg per capita. This is still lower than the EU average of 1700 kg per capita, but due to the very low levels of recycling at 3%, which are much lower than the EU average of 44%, the overall per capita level of waste that is not being recycled is higher.

Significant efforts and investments are needed to establish functional waste management centers and recycling facilities, so that existing resources currently ending up in landfills (over 90% landfilling rate in the region) can be utilized. An effective system of separate collection

is required for at least paper, metal, plastic, glass and bio-waste, which are key to quality recycling,

along with economic incentives to reduce waste generation (e.g., pay-as-you-throw schemes) and improve waste treatment (e.g., landfill charges), as well as efficient Extended Producer Responsibility systems.

At the national level, alignment with single-use plastic legislation and full implementation of modernized EU waste legislation, including recycling and landfill reduction targets, is necessary.

The rivers in the country are carrying disproportionate quantities of waste up to the Thessaloniki Bay. Unorganized practices of solid waste disposal, lack of infrastructure, as well as insufficient awareness of its effects, are causing more harm. Treatment of wastewater in that area has just stepped into its first stage.

5.3. Air Quality

In the area of air quality, no significant legislative improvements have been observed. Only limited steps have been taken to improve capacities, which are already very restricted, particularly regarding the maintenance, management and expansion of the existing monitoring system and the institutions responsible for data collection, processing and reporting. Although initial activities have been launched to amend and supplement the legislative and strategic framework in line with new European law, the process remains incomplete. The definition of zones and agglomerations is underway but has not yet been finalized.

To enforce air quality legislation, the region shall ensure that air quality monitoring and assessment are done through a modern and expanded monitoring, management and reporting system, including development and implementation of air quality plans, to reach conformity with air quality limit values in line with the requirements of the Ambient Air Quality Directives.

There is a need for progress on establishing and reporting emission inventories and emission projections, as well as on regional programs for air pollution control in line with the Directive on National Emission Ceilings. In the case of industrial emissions, the region still faces challenges with regard to the effective implementation of the Industrial Emissions Directive, for which additional capacity building and investments are necessary. BATs should be applied, especially when investments in new projects are considered.

Out of the ten municipalities in the region, only Strumica is in the preparation phase of fulfilling the obligation to adopt air quality improvement plans and to prepare air pollution registers. Details with data on pollution levels are presented in Chapter.

In the region, air quality standards are exceeded for at least one pollutant at at least one location (and often for multiple pollutants at multiple locations). This is most evident for

suspended particles (PM), nitrogen dioxide (NO₂) and sulfur dioxide (SO₂). Addressing these exceedances will require urgent action at different policy levels to reduce emissions from key sectors, identified on the basis of harmonized methodologies.

Political commitment, both at central and local levels, will be essential for the successful implementation of the Ambient Air Quality Directives and for ensuring reductions in total national emissions, including air pollutant emissions from energy, transport, agriculture and industry. Greater efforts are needed in certain areas to develop newer and more precise emission assessments. Such an approach would enable the region to implement the latest protocols of the United Nations Economic Commission for Europe (UNECE) Air Convention, should they be ratified.

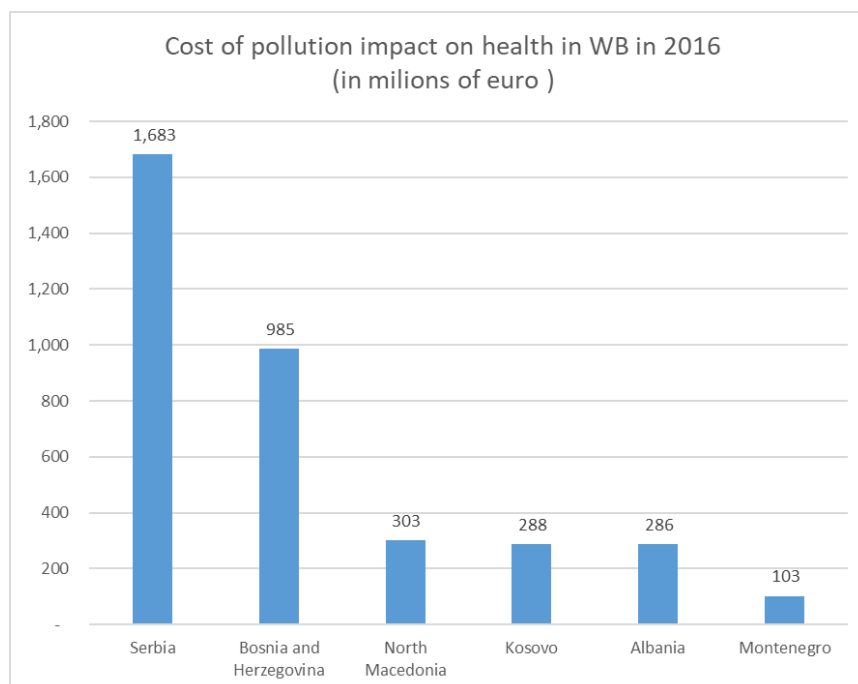


Figure 16. Costs on pollution impact on health in WB countries in 2016 in millions of euros

5.4. Water Quality Management

A large part of the population in rural areas (up to 50%) has only basic sanitary conditions and wastewater collection systems in permeable septic tanks, while urban areas are connected to sewerage networks and most often discharge untreated wastewater, except in Strumica, Gevgelija and Radovish, where functional wastewater treatment plants exist, though still without established public monitoring with results on the level of treatment achieved. The risk of nitrate and pesticide discharge into groundwater requires additional control.

The main burden on water supply comes from the quantities of water used for industry, agriculture and public water supply. The widespread droughts in recent years in the region

have further emphasized the importance of ensuring water availability and long-term resilience across the region.

Transboundary water cooperation will represent a sensitive issue, particularly where water bodies show declining levels due to climate change and over-abstraction, or due to deterioration of water quality downstream along rivers, especially along the Vardar River, which covers about 80% of the water basin of all waters in the Republic of North Macedonia. The main task ahead is the implementation of water-related legislation, which requires more resources for investments in water infrastructure and in the management structure for sustainable water governance (monitoring and reporting, planning, coordination among relevant sectors, capacity for impact assessment, etc.). The initial priority may be directed towards investments in monitoring infrastructure based on mapping of needs at the river basin level, followed by the development and implementation of appropriate measures to reduce pressures on water bodies.

According to data from the State Statistical Office, households in the country are the largest consumers of water, using about 69% of the total supplied water. In the South-East region (which includes Strumica, Radovish, Gevgelija, Valandovo, Bogdanci and Dojran), the average daily consumption per inhabitant is 250–300 liters, significantly lower than consumption in Skopje, where it reaches up to 700 liters. In the EU, the average daily consumption is around 150–200 liters per inhabitant, which means that the South-East region is above the European average but far below Skopje.

The relatively lower consumption in the region compared to larger urban structures in the country is due to infrastructure. Part of the rural population has only basic sanitary conditions and limited access to sewerage systems. In the economic structure, agriculture is dominant, so a large portion of water is used for irrigation rather than households. The use of water in urban areas is higher due to industry and public services. Droughts in the last years in the South-East part of the country highlight that rational water use and better management of the resource are mainly needed through investments in the water supply infrastructure and reduction of losses, improved monitoring and reporting of the consumption and public campaigns for rational water use. The new Water Law needs to be adopted to achieve alignment with the Water Framework Directive and the Groundwater Directive. River basin management plans and the water monitoring strategy have not been adopted, even though detailed studies on the waters in the Strumica basin have already been prepared, which provide a fundamental basis for such plans. There has been no progress in aligning with European law on floods and water reuse, so activities and plans for implementation are also required in this segment.

Weaknesses expressed in administrative and technical capacities at the central level are replicated at the local level, through uneven distribution of functions and strong dependence on donor support for carrying out transformations, which hinders the implementation of requirements under the regulation, even though it has been adopted.

The lack of designation of sensitive areas and the absence of a sludge management strategy obstruct the treatment of wastewater in line with European law. The sustainability of infrastructure in the water sector requires reforms in public utility enterprises and the

application of a financing model based on the principles of “polluter pays” and “full cost recovery.” The system of inspections and sanctions remains continuously ineffective and causes public dissatisfaction.

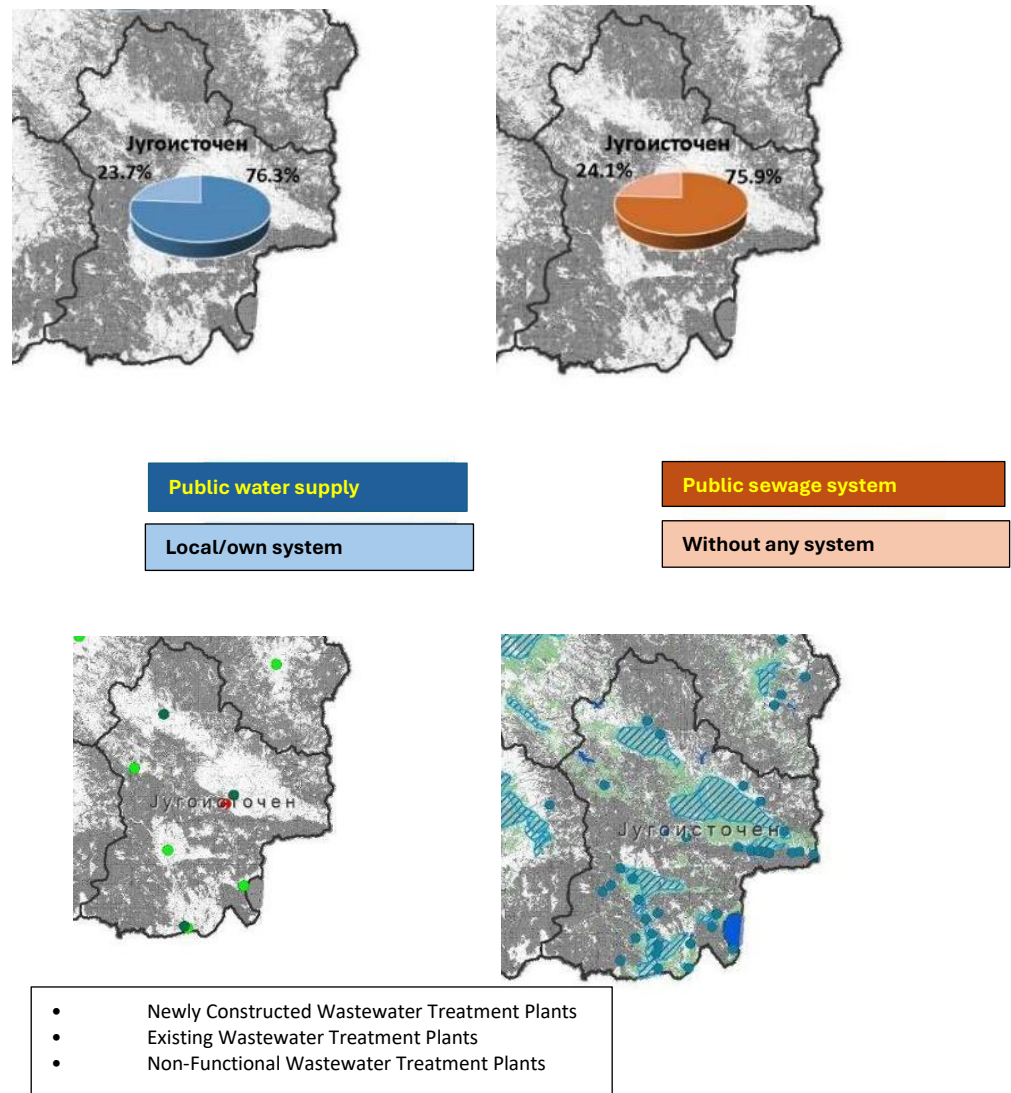


Figure 17. Percentage of Coverage of Public Water Supply and Sewerage Systems with Wastewater Treatment Plants in the South-East Region

5.5. Nature protection - Biodiversity and Biological Diversity

In the National Strategy for Nature Protection (NSNP) for a 10-year period – until 2027 – all components of nature (biological and landscape diversity) have been analyzed and measures for protection and sustainable management of nature have been proposed. The NSNP includes activities arising from the strategic priorities of other sectors (forestry, agriculture, water, mineral resources) and also defines obligations prescribed by international

agreements. Within this framework, the South-East region has proposed numerous protected areas, identified in Chapter 4.4 of this document, as tourism potential.

In the field of nature protection, laws for alignment with the Habitats and Birds Directives, as well as with CITES legislation, have not yet been adopted.

The Ministry of Environment and Spatial Planning in North Macedonia promotes the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) through its government Web site cite.sites.moepp.gov.mk. This Web site constitutes a vital platform for sharing information concerning North Macedonia's obligations toward the Convention and the endeavors put forth by the country for the conservation and protection of endangered species.

Customs software, also known as CITES, is a very useful tool, designed to guide the process of monitoring international trade in endangered species. This software ensures compliance with CITES regulations, reduces administrative burdens and improves the accuracy and speed of data processing for customs authorities and traders. Given that this region hosts three important border crossings with the EU, its implementation in the process of advancing system digitalization represents a significant mechanism for biodiversity protection and control.

Although not of particular importance for this region, it is worth noting that there has been no progress in aligning with the Zoos Directive and zoos lack the capacity for biodiversity conservation.

A dedicated institution for nature protection has not yet been established, even though this is an important goal in the national strategy. The national biodiversity information system is not functioning and the identification of potential NATURA 2000 sites faces institutional obstacles. The process of declaring highly important protected areas has not been finalized and may further endanger biological diversity and natural values. Nevertheless, the Law on Environment and the Law on Nature Protection (LNP) serve as the basis for a series of measures aimed at protecting wild species, their habitats, sensitive ecosystems and the broader natural heritage.

They focus on proactive evaluation of biodiversity threats and the promotion of sustainable use of biodiversity, providing a basis for the establishment and management of protected areas and preventing harmful actions that may pose a threat to biodiversity. Nevertheless, sustainable financial and management capacity to handle protected areas remain a great concern.

In November 2025, at the Public Enterprise National Forests, Branch Kozhuf-Gevgelija, on Mount Kozhuf – Forest Management Unit Uma in the South-East region, the Forestry Information System, i.e., the digital dispatch note, was put into operation. With the launch of the electronic dispatch note, the digitalization of the Macedonian forestry sector has begun. The Integrated Forestry Information System (IFIS) marks the start of a new digital era in Macedonian forestry.

The IFIS system is a component of an EU-funded project and is intended to be used for the monitoring and observation of timber quantities, the tracking of the occurrence of forest fires, the creation of biodiversity maps and the facilitation of effective forest planning. This is a completely new approach, moving away from the outdated and inefficient paper method to a technology-driven approach where the monitoring of timber movements and the effective planning process can be done, thereby ensuring the development of a sustainable and developing forestry sector for the coming generations. In the forestry industry, through the IFIS (Integrated Forestry Information System), more than 100,000 hectares of state forests have received certification for sustainable management under EU funding. This forestry management tool must be preserved to allow further certification of forests.

Harmony with EU legislation is still not attained. There is a need to harmonize Forest Law in consonance with FLEGT regime and Timber Regulation. There must be reforms to define better the role of the relevant authorities to enhance governance and management of forest data along with better governance. Rapid adoption and implementation of these measures would ensure sustainable management and compliance with EU forest regulations.

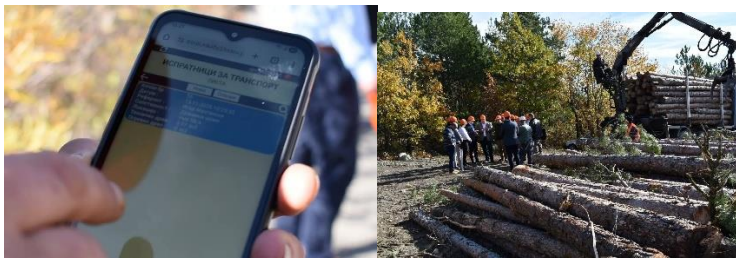


Figure 18. IFIS system with electronic dispatch notes and mapping

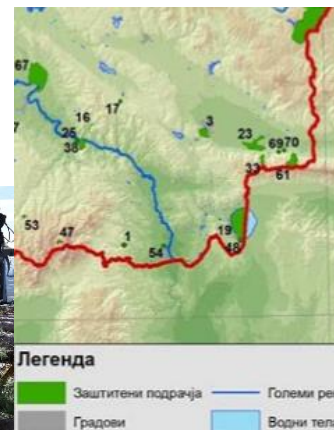


Figure 19. Protected areas in the South-East region

5.6. Civil Protection and Risk Management

In the South-East region, there has been little progress with regards to the implementation of the necessary reforms which will enable effective disaster mitigation and response activities to occur. The municipal authorities of the region, including Strumica, Radovish, Gevgelija, Valandovo, Bogdanci and Dojran, have limited capacities with regards to disaster prevention, preparedness and response activities. Although there is a risk assessment carried out at the national level, the protection and rescue strategy is yet to be finalized, thus creating a gap in regional planning.

The mandatory training program for territorial fire and rescue/civil protection staff in the region has been only partially implemented. Newly recruited firefighters in Strumica and Gevgelija received limited training, reducing their preparedness to deal with large-scale fires and natural disasters. Although an action plan for fire prevention and response has been prepared, including a review of human resources and equipment, its practical application

remains limited due to a lack of modern machinery and insufficient coordination among municipalities.

The regional municipalities mainly face threats from forest fires, floods and earthquakes. However, the impact of climate change makes the situation worse. In July 2025, the forest fires that occurred in the South-East region showed that the region had to be better organized and have clear responsibilities. Lack of communication between the different bodies was one of the factors that hampered the mobilization of resources.

The national emergency communication system has not yet been integrated into the European Commission's Common Emergency Communication and Information System limiting the region's access to European rapid response mechanisms. In addition to that, community awareness and basic skills to handle emergencies in the South-East part of the region are underdeveloped, increasing their vulnerability.

In order to make way for growth, it is imperative to:

- Improve the administrative and technical capacity of municipalities.
- Increase the intensity of fire and rescue training.
- Enhance coordination and communication between institutions.
- Raise public awareness and develop basic disaster response skills.

The South-East region, due to the mix of urban agglomerations and large rural areas, remains particularly vulnerable to natural disasters and must be tackled in a specific way in the matter of resilience and civil protection.

The March 2025 accident occurring at the Toranica mine, which resulted in the pollution of the Kriva River with dangerous substances, showed the inadequacy in law enforcement and the preparedness of the system for dealing with this type of problem. Although this event occurred in the North-Eastern region bordering the South-East region, its consequences and lessons are highly relevant for the South-East region, where numerous industrial facilities (agricultural production, food industry, energy and construction activities) pose risks of water, soil and air pollution.

For the South-East region, this experience is particularly relevant for municipalities such as Strumica, Radovish and Gevgelija, which host industrial facilities that could cause serious environmental risks if clear protocols and coordination are not in place. The lack of monitoring systems and timely reporting could lead to consequences for agriculture, water resources and public health. It is necessary to improve risk management abilities and create plans for prevention in addition to ensuring transparency in the functioning of industrial sites.

Parliament adopted the Law on Industrial Emissions in September of 2025. The intention behind the legislation was the creation of a firmer framework on controlling industrial pollution. But in the realm of chemical and noise pollution, nothing has been achieved.

Toranica may have become a wake-up call for South-East region regarding the fact that, without proper protocols, organization and the enforcement of laws, even a mere episode related to industry can have serious repercussions for the local economy and the environment.

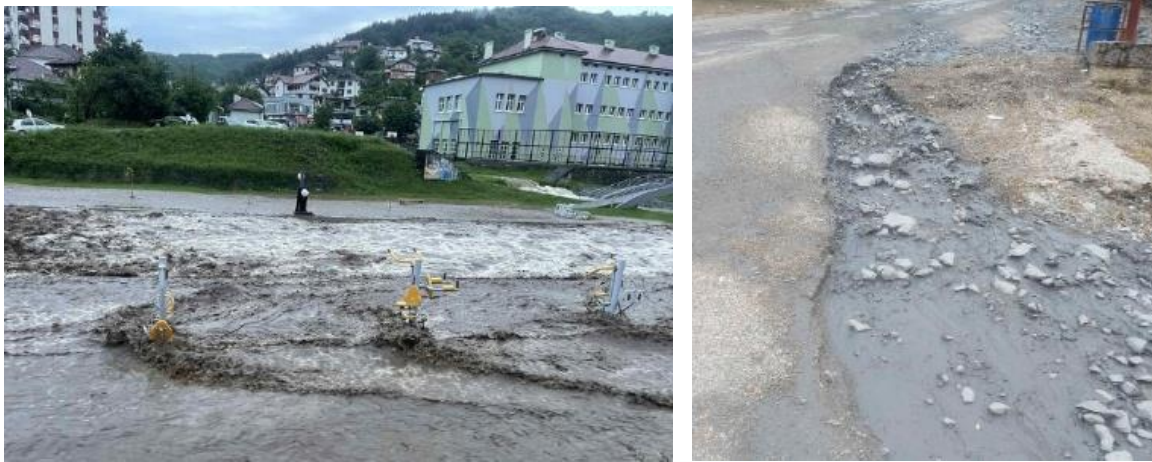


Figure 20. The water contains ten times higher concentration of lead and hundreds of times more cyanide, nitrogen and phosphorus

6. Built environment

The rapid urbanization in global terms has been estimated to reach 68% of the population to live in cities (urban areas) by 2050 (United Nations Department of Economic and Social Affairs Population Division, 2018). The reasons for this trend are numerous - push factors such as the lack of necessary resources and systemic utilities in rural areas, pull factors such as belief for better professional life, extended supply nets where the urban business models are much more stable than agricultural and rural ones, depending a lot on natural circumstances, governmental support, subsidies etc. In Europe, as elsewhere, efforts to manage environmental pressures, economic development and human well-being need to overcome the short-termism currently dominating political and economic thinking and embrace long-term, integrated, global perspectives instead.

This trend is visible in the Republic of North Macedonia. The rapid urbanization separates people from nature, a behavior completely opposite of the past where people cared for every centimeter of arable land and forest. Now, no care is taken in deciding which type of land is to be converted for urban use. These poor decisions manifest themselves by inhibiting the functioning of ecosystems and lead towards degradation of the environment. The industrial capacities and inadequate infrastructure for communal issues, urban and natural areas, systemically supported suburbs create significant problems.

The relatively high urbanization of the country and the increasing trend in urbanization have been noted by diverse institutions (United Nations, 2019) (Central Intelligence Agency, 2020). The urban underprivileged will face greater poverty, as the systemic solutions are not favorable and the capabilities to reach certain level of professional and citizen-life participation in the urban areas are frequently mismatched. This megatrend is not just strong but is also with increasing tendency. On the other side, the systemic solutions and response to urbanization, the planning procedures, as well as all other components and workflows in the country are either not following the pace, nor are the quality up to the necessary level. The lack of big picture approach and proper governance results with even more condensed and unplanned urban areas, cascading even greater pollution, frustration and environmental damage. The pace of introducing Tourist Development Zones (Туристички Развојни Зони -

TP3) through which large sections of the shore are urbanized and transformed into beaches and/or tourist objects, is not what Doiran Lake would need at the moment.

The built environment represents a fundamental medium through which humans connect with space, nature and the socio-cultural context. In the South-East region of the Republic of North Macedonia, which encompasses the cities of Gevgelija, Strumica and Radovish, as well as a large number of rural settlements, specific challenges can be observed that hinder the transition toward the green agenda and sustainable urban and rural living.

The urban areas Gevgelija, Strumica and Radovish are characterized by growing urbanization and increased building density, even though the population numbers are declining. The pressure on space and infrastructure creates multiple problems that directly affect the quality of life and jeopardize the green agenda.

In the central parts of the cities, greenery is often replaced by new residential blocks or commercial facilities. This leads to a reduction in biodiversity and an increase in urban pollution.

Census 2002	population	Households	Flats	Census 2021	population	Households	Flats
Gevgelija	22 988	7 221	9 292	Gevgelija	21 582	8 386	10 833
Strumica	54 676	15 896	18 473	Strumica	49 995	17 400	24 621
Radovish	28 244	8 270	9 833	Radovish	24 122	8 511	11 283
Dojran	3 426	1 021	2 116	Dojran	3 084	1 066	3 147
Konche	3 536	1 057	1 175	Konche	2 725	954	1 048
Valandovo	11 890	3 545	4 050	Valandovo	10 508	3 453	4 273
Bogdanci	8 707	2 597	3 006	Bogdanci	7 339	2 611	3 048
Bosilovo	14 260	3 661	4 036	Bosilovo	11 508	3 801	5 760
Vasilevo	12 122	3 306	3 360	Vasilevo	10 552	3 556	4 317
Novo Selo	11 567	3 131	4 158	Novo Selo	6 972	2 799	6 258

<https://makstat.stat.gov.mk/>

Traffic intensity is increasing and with-it pollution levels are rising. The growing number of automobiles, the absence of a developed public transport system and limited bicycle infrastructure contribute to higher CO₂ emissions and urban stress.

Statistical data, if compared between the 2001 and 2021 censuses, shows that the trend is slowly shifting towards housing overproduction, similar to that of the capital city of Skopje, which has already largely experienced it.

A tendency is also observed here toward rapid construction of housing units without adequate planning for surrounding services such as schools, parks and healthcare facilities. As housing construction expands in urban settlements, the demand for complementary services, streets, hospitals, offices, schools, kindergartens and markets, also grows. This type of development implies expansion of urban areas and the creation of new suburbs. The increase in density occurs in three main ways:

1. **Use of the free spaces in the city and the settlement** at the expense of open spaces, with green spaces being the first to be affected.
2. **Vertical expansion of buildings** as a means of adding to the structure by way of extensions, thus increasing the population density, putting extra load on the urban transport network, thus the need to widen the road, increase the parking lots, as well as provide services to meet the demand. Sometimes this is done by clearing the trees on the road to create extra road lanes as well as to create extra parking lots, thus affecting the flow of air as well as sunlight.
3. **Expansion of the city** by suburban development on free land, at the cost of agricultural land or land like meadows, forests and pastures. Reducing nature in and around the city further worsens the effects of climate change on living in the city, which further risks damaging the health of its inhabitants by disconnecting them with nature.

There are also problems such as air pollution, light/visual pollution, noise, congestion, urban stress and decreased quality of life. These factors contribute to decreased well-being, possible health problems and limited opportunities for individual growth and development. Overstrained infrastructure contributes to decreased democracy, possible harmful activities and deviance, decreased social cohesion, lack of inclusiveness, identity problems, marginalization, poverty, decreased possibilities for cultural and educational activities and decreased accessibility for urban services.

This situation has the consequence of infrastructure deficiencies; these are reflected in the inadequate sewage system infrastructure, waste management infrastructure and the infrastructure of energy-efficient solutions. Such issues impinge on the sustainability of the urban area. In a social context, the speedy growth of the city causes imbalances, marginalized zones in the urban structure and inaccessible dwelling spaces.

Strumica is also among the largest centers in the region; this issue is more evident because of the intensive migration process from villages to towns. As for Gevgelija, it is a border town with challenges regarding the commercialization of space and the lack of protection for natural resources. Radovish is also small in terms of size, with pressure concerning new construction that has ignored public spaces and green corridors.

Rural Challenges

Rural areas, as part of agricultural settlements in the South-East region, experience their own set of challenges that, even if less noticeable, pose threats to the green agenda as well. The two main problems the countryside faces are depopulation and migration, which cause young people to flee to the city or other countries, resulting in empty homes and fallow lands, further promoting disparity between environment and structure.

Intensive agriculture, especially in the Strumica Plain, puts some strain on nature in terms of water consumption, pesticide use and destroying natural ecosystems.

Infrastructure such as sewage systems and effective ways of disposing of waste and utilizing energy are some of the things that some villages lack and can cause soil and water pollution.

Despite the potential that countryside areas have for alternative energy sources such as solar energy and biomass, the strategies used in supporting the adoption of such energy do not contribute much to the green agenda.

Urban and Rural Pathways to Sustainability

The cities, on the other hand, face issues of 'urban stress' as well as a lacking green area. The cities need urban planning, a public transport network, preferably using smaller-scale electric vehicles on a smaller scale and green infrastructure. The rural areas, on the other hand, faces problems of depopulation, but it also represents potential as a driver of the green agenda between sustainable agriculture and the use of renewable energy. The rural areas could also represent a better environment to put the green agenda into practice, as it would not require a huge number of financial resources, being an example for the larger urban environments.

A green agenda in the South-East region requires a process of integrated urban planning which combines construction and nature conservation. This can also involve designing green infrastructure such as parks, tree belts, cycling paths and energy-efficient buildings.

Sustainable agriculture in rural areas should focus on reduced use of chemicals and improved water resource management. Socially inclusive policies must ensure accessible housing and an improved quality of life for all categories of citizens.

The relationship between the built environment and the green agenda is nowhere more complex than in the South-East region. Urban areas stress the burden caused by rapid urbanization, calling for new planning models. Rural areas, too, operate under the need for revitalization strategies that must encompass their integration into sustainable ways. Balanced development, tying urban and rural areas together is not only a mantra but also the only way true sustainability and an improved quality of life can be achieved for all the region's inhabitants.

Public Procurement as a Solution

Leverage of public procurement to foster circularity and climate resilience in built environment – This is one of the solutions to problems in built environment. This is because public procurement is an effective means of revolution in the construction infrastructure sector, which happens to be one of the most material- and carbon-hungry in the world. Even though it is one of the prime drivers of growth and a means of public financing, built environment absorbs close to half of all extracted natural resources, produces more than a third of global greenhouse gas emissions, uses a similar percentage of global energy and produces massive quantities of unreduced non-recycled solid wastes. Given the fact that more than half of buildings in 2050 will require reconstruction, upgrading, or efficient construction, it indeed is at a crossroads. This is not only a challenge but also a need for a sustainable planet. With effective induction of circularity and sustainability in public procurement, we can create a built environment that is low carbon, efficient in resources and social inclusion.

6.1. Sustainable Transport

The country has a good level of preparedness regarding trans-European networks. One of them is the North-South corridors (Corridor X), which passes through the South-East region near the town of Gevgelija. This railway and highway corridor is essential for the economic and tourism development of the region. Across the region, there is a network of regional, magistral and local roads, whose main purpose is to connect the three border crossings and

the towns located along these routes. The intention is for this network to meet the need for sustainable connections between urban and rural areas.

In 2024, a total of 5,211,558 passengers crossed through the border crossings via the road network, which is almost three times higher than the current population of the country. This fact highlights the necessity of future expansion and maintenance of the transport network, but also points to the tourism potential that can be developed in this transit region, while building sustainable resilience of the transport system.

This transport network covers not only urban communities but also suburban and rural ones, which depend on cities for employment, production and services that are not available in smaller and less developed areas. Strengthening rural communities reduces pressure on urban centers and ensures balanced development. Between 2016 and 2020, €869 million were spent in the Republic of North Macedonia to achieve this goal—more than for any other sustainable development objective. Despite the significant financial investments, this goal shows a negative trend and there are serious challenges to its achievement.

Ensuring access to safe, efficient, affordable and sustainable transport systems for all with emphasis on improving road safety, particularly through the expansion of public transport should be the main objective in the next period of regional development. Analyzing past statistics, it can be concluded that public transport is increasingly being replaced by private transport, with privately owned minibuses and taxi vehicles.

The National Strategy for Agriculture and Rural Development 2021–2027 notes that the quality of physical and social infrastructure in rural areas has deteriorated over the past decades due to insufficient investment in development and maintenance. Furthermore, one of the reasons for the limited industrial development across all regions is precisely the quality of the road and business networks.

Border crossings in the South-East region	2024			
	Domestic passengers		Foreign passengers	
	entrance	exit	entrance	exit
Bogorodica	686 686	896 218	1 215 813	1 030 647
Dojran	111 468	156 707	251 801	204 564
Novo Selo	124 640	132 549	198 463	202 002
Total	922 794	1 185 474	1 666 077	1 437 213
	2 108 268		3 103 290	
	5 211 558			

<https://makstat.stat.gov.mk/>

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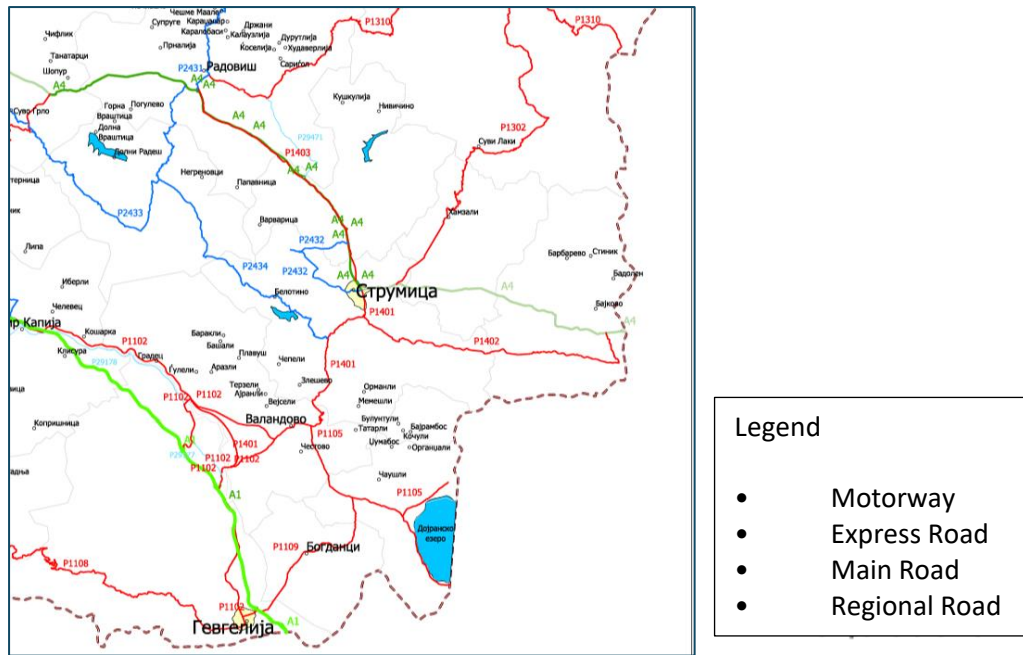


Figure 21. Road map of South-East region

7. Needs for Digitalization in the South-East Region

Digitalization is not only a technological process but a real structural change, which allows the region to fit into European policies for green transition and carbon neutrality. It also emerges from the European Green Deal (COM(2019)640) that digital technologies are drivers for energy efficiency, emission reduction and quality-of-life improvement.

The European integration and alignment with the Green Agenda require modernization in infrastructure, introducing digital systems for emission monitoring, energy management and practices of circular economy.

In the South-East region, energy transition opportunities for solar energy and hydropower are possible; however, without digitization for smart grid networks and energy consumption control, they are not being tapped effectively.

Mobility and transport should be optimized through digitalization and achieve goals such as enhancing public transport and reducing emissions, according to European Strategy for Sustainable and Smart Mobility (COM(2020)789).

Concerning the environment, online platforms for air, water and soil monitoring are essential in combating problems such as Eutrophication and pollution, especially in relation to Lake Dojran.

Social transformation, according to the European Digital Strategy (COM(2020)67), places digitalization as a prerequisite for inclusive growth, new jobs and improved public services. The fact that no transition is easy is well known in these areas for decades, but we must avoid

the socio-ecological collapse of our community, which still represents a real threat and move towards ecologically sustainable and socially just societies.

The transition towards a green and digital economy is already underway, slowly but steadily moving towards decarbonization and digitalization. Processes already taking place in regions affected by the closure of coal mines and thermal power plants show skepticism among citizens, but these will be overcome through concrete regional steps towards:

- Building digital infrastructure such as high-speed internet connectivity and data centres to serve the local community and businesses.
- Implementation of smart systems for the management of wastes and waters based on a circular economy.
- Supporting small enterprises and agricultural production using technology for e-commerce, precision agriculture and energy efficiency.
- Teaching education and digital literacy to society members to help improve the digital divide present between rural and urban areas.
- Integration of digital systems for managing tourism, which will allow for better planning and promoting the region as a transit and tourist destination.

Digitalization can be perceived in the South-East area not only through the perspective of technological modernization, but it can also be seen as an instrument of resilience and competitiveness. In the area, the following can be accomplished through digital solutions:

- reduce dependence on fossil fuels,
- generate new green jobs,
- enhance transparency and efficiency of institutions.
- ensure balanced development among both urban and rural areas.

For the South-East region, transit corridors and the development of tourist areas are very significant, but without the process of digitalization, the region will not be able to contribute to the goals for achieving carbon neutrality through the European Union's project aims for 2050. Digitalization is a prerequisite for the competitiveness of the region regarding the implementation of green policies on the EU level.

8. Conclusions and recommendations

The South-East region of North Macedonia, in partnership with Greece, has great potential in contributing to the green transition and sustainable tourism. This requires a joint effort in eight areas of priority: legislation and awareness, renewable energy, sustainable built environment, climate observation, smart mobility, circular economy, sustainable tourism and digitalization.

The study concludes that financial assistance from the EU is a must but not enough. It is important that local authorities, civil society and communities engage actively and work towards practical solutions implementation. By doing so, the region can achieve a circular

economy that is resource efficient and climate resilient through infrastructure measures and soft measures like awareness creation, education and digitalization.

Based on each of the main items from the Study, eight areas of consequent recommendations are derived.

1. Introduction to the Green Agenda and Principles of Action for Western Balkans countries

The South-East region of North Macedonia, together with its cross-border partner Greece, is placed within the context of the EU Green Deal and the Green Agenda for the Western Balkans. This requires alignment with EU legislation, transformation and ambitious climate goals, facilitated through financial tools such as the Sustainable Europe Investment Plan, WBIF, IPARD and the Economic and Investment Plan for the Western Balkans.

Although the frameworks are well defined, a lack of knowledge and awareness of the obligations and opportunities among the local authorities exists. This leads to an imbalance in the implementation process compared to the EU member states.

Thus, to cover the overhead area, it is required to:

- Set up presentation programs for municipalities and civil society organizations.
- Establish a joint cross-border platform for experience sharing and reporting progress.
- Design communication campaigns to increase awareness among local communities regarding their commitments under the Green Agenda.

2. Clean, Accessible and Secure Energy

The report emphasizes the vast solar power potential in the South-East region. The municipalities of Strumica, Gevgelija, Valandovo, Radovish, Dojran and Novo Selo have the right irradiation conditions and roof space to accommodate solar power plants. Large-scale solar projects, such as the Bitola 3 solar park, prove the viability of shifting from coal to renewable energy sources.

The region has the potential to make it a leader in the use of renewable energy sources, but investment and policies need to be strengthened.

To make this activity easier, the following are needed too:

- Introduction of the potential use of renewables in different sectors with special emphasis on the PV and heating pumps in housing
- Development of municipal solar action plans, including rooftop PV projects and community solar projects throughout the preparation of "Solar cadasters" for each of the municipalities.
- Establish cross border cooperation with Thermi (Greece) for joint applications to EU funding.
- Promote energy cooperatives to ensure accessibility and affordability of clean energy.

3. Built Environment

Buildings are a significant source of emissions and energy consumption. Retrofitting is considered a priority action, such as insulation, heating and cooling systems and the integration of renewable energy technologies. The EU Directive 2024/1275 (EPBD) aims to achieve zero emission buildings by 2050.

Without systematic renovation, the region will not meet the EU targets for energy efficiency and emissions reduction. Therefore, systematic steps and plans are required to be implemented.

- Regional Renovation Plan with milestones to achieve zero emission buildings.
- Promote green building standards and incentives for eco-friendly building methods.
- Develop projects in public buildings to implement energy efficiency measures.
- Develop a support program to implement energy efficiency measures for housing
- Encourage municipalities to adopt strategic approaches for the integration of renewable energy into the built environment.

4. Climate Change Ambitions

Air pollution is still a pressing issue, as sulfur dioxide, nitrogen oxide and particulate matter levels exceed safe limits. There is a need for continuous air quality monitoring systems to monitor levels and make policy decisions.

Without proper monitoring and regional planning, climate goals will not be met and with an action proposed in item 3 - Built environment.

- Install air quality monitoring stations in each municipality.
- Integration of data to create a transparent public platform for citizens to access.
- Create a Regional Climate and Energy Plan with specific measurable targets for emissions reduction and resilience.
- Promote EV mobility

5. Sustainable and Smart Mobility

Transport is a significant source of emissions. Decarbonized mobility options, such as cycling infrastructure and e-mobility, are required.

The region needs to transition to sustainable transport to reduce emissions and enhance the quality of life by:

- Developing a Regional Sustainable Mobility Plan with cycling routes and charging infrastructure.
- Facilitating cross-border connectivity through sustainable transport corridors.
- Supporting municipalities in adopting low-emission public transport systems.

6. Environmental Protection and Circularity

Waste management is a challenge. The principles of circular economy should be applied to waste, construction waste and plastic waste. The existing waste management system is not adequate to achieve the EU's circular economic objectives.

- Establish selective waste collection systems
- Draw up an Action Plan for the recycling of plastic packaging and products
- Establish a regional center for the reuse of construction debris
- Introducing mobile waste balling systems

7. Tourism and Green Transition

Tourism is both a challenge and an opportunity. The South-East region has a variety of tourist resources: lake and spa tourism (Dojran, Negorci, Bansko), mountain tourism, cultural events (Rakijada, Kostenijada) and health tourism. Sustainable tourism must be based on rational use of resources, ETIS indicators for monitoring and promotion of EU Ecolabel criteria.

Tourism can be a driving force in the green transition if it is sustainable, but the current approach may lead to resource depletion and environmental degradation.

- Develop a Regional Sustainable Tourism Strategy based on the principles of the circular economy.
- Support EU Ecolabel certification for accommodations.
- Establish “Zero Waste Trails” in mountain tourism.
- Integrate renewable energy sources into tourist infrastructure.
- Support digitalization of tourist services to improve transparency and visitor experience.

8. Digitalization as a Basis for the Green Agenda

Digitalization is a cross-cutting theme that enables tourism, transport and environmental protection. It increases transparency, monitoring and public participation.

Without digital support, monitoring and governance will continue to be inefficient and fragmented.

Therefore, it is proposed to:

- Establish digital platforms for monitoring air, water and soil quality.
- Develop smart mobility apps for transport planning.
- Encourage digital tourism platforms with sustainability metrics.
- Ensure transparency by making environmental and energy data online for public access

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If these measures are systematically implemented, they will lead to a reduction in emissions and pollution, creation of new economic opportunities, increased resilience and an improvement in the quality of life. The South - East region has the potential to be a model for a green transition and sustainable tourism in the Western Balkans, showing that cross-border cooperation and innovation are essential in meeting the climate neutrality objectives of Europe.

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