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EXTERNAL REPORT

MONITORING THE SDGs IN WESTERN MACEDONIA REGION

GREECE

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ABSTRACT

The present report compiling and analysing data for indicators regarding the monitoring of the Agenda 2030 Sustainable Development Goals for the Region of Western Macedonia, Greece, was developed under the expert contract nr. CT-EX2015D230484-102 between the European Commission and the expert Mr. Nikolaos Koutsomarkos in the framework of the pilot project "Monitoring the SDGs in the EU regions - Filling the data gaps - REGIONS2030". The pilot project "Region2030" is implemented by the European Commission's Joint Research Centre, in collaboration with EC's Directorate General for Regional and Urban Policy and Eurostat, supported by the European Parliament and the European Committee of Regions.

The expert worked during the last six (6) months, since December 2022, under the supervision and guidance of the Urban and Territorial Development Unit (B.3) of the JRC, to support the Region of Western Macedonia to develop, test and improve a framework of indicators proposed by the JRC for monitoring the achievement of the SDGs at regional level. The work of the expert comprised extensive desk research and statistical analysis of data and metadata regarding the indicators, technical meetings with the B.3 Unit of the JRC and experts from other pilot regions for coordination and inspiration, and meetings for collaboration and consultation with the administration of the Region of Western Macedonia.

Currently there are no published Voluntary Local Reviews (VLR) of regional authorities in Greece, even though there are many local and regional authorities in Europe that have prepared VLRs in the recent years, with a growing interest from even more to conduct VLR. This interest is also expressed by the Region of Western Macedonia, which aspires to put in place a system to monitor its progress towards the dimensions of sustainability; economic, environmental and social, even more so as the Region is in a path of just development transition. However, the Region currently lacks a methodological framework to identify and measure relevant indicators, with consistency, replicability and comparability.

The SDGs and its targets provide such a framework for the Region. Thus this report explores the availability and suitability of indicators developed by institutions and organizations, as well as the availability of the data required to enable the monitoring of SDGs at the local level. Furthermore, the report suggests additional indicators for SDGs monitoring particular to the characteristics, needs and priorities of the Region of Western Macedonia, derived through consultations of the expert with the decision-makers of the Region. Overall, in this report, seventy-seven (77) indicators are identified as suitable for monitoring the SDGs in the regional context of Western Macedonia.

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EXECUTIVE SUMMARY

The report presents the results of the expert's research activities in relation to the JRC proposed indicator set and approach to monitor the SDGs, and especially the availability and accessibility to the necessary data. Moreover, for the instances that sufficient data were collected the according indicators were analyzed for trends and benchmarking against sustainability objectives of the development and territorial strategies of the Region of Western Macedonia. For particular needs and priorities of the Region, not covered by the JRC proposed framework, additional indicators were formulated in collaboration with the regional administration of Western Macedonia.

POLICY CONTEXT

The 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals were adopted by the UN in September 2015. Following that the European Commission published the Communication "Next steps for a sustainable European future" in November 2016. The Greek government published in July 2018 the Voluntary National Review (VNR), while recently in July 2022 Greece presented its 2nd VNR addressing all the SDGs and the progress towards the targets since 2018. Despite the European and National efforts in accommodating the SDGs in their policies no Greek Region has conducted a VLR until now.

A multitude of Strategies and financing Programmes for the 2021-2027 period, that are relevant to the SDGs, concern the Region of Western Macedonia and support its development path from a former lignite region to become the greenest Region of Greece. Most notably the Territorial Just Transition Plan Western Macedonia[1] and the Programme Western Macedonia 2021-2027[2] will make available an unprecedented flow of financial resources exclusively for the Region to address almost all of the 17 SDGs. Additional funds available for promoting actions towards sustainability in the Region will come from the European Investment Bank[3], the Green Fund[4] Programme for areas in transition, and the national Public Investments Regional Development Programme 2021-2025[5]. On top of that the Region will benefit from actions of the sectoral - national level - Programmes[6] of the European Structural and Investment Funds (ESIF) and the Recovery and Resilience Facility[7].

Even though those resources will have a profound effect on the sustainable development horizon of the Region for the following decades, the regional administration is responsible for the programming and management only for a fraction of them. Thus, the Region as an organization, prioritizes the improvement of its capacity to shape, guide, formulate and monitor the actions that will be implemented in its territory through the above complex planning and financing framework. A key enabler towards this, is the development of a monitoring system for all aspects of sustainability, that will allow evidence-based decision-making by the regional administration as well as evidence-backed promotion of local priorities to other levels of governance. The proposed indicator system in this report for monitoring the SDGs in the regional context of Western Macedonia is considered as an important milestone.

KEY CONCLUSIONS

Nevertheless, there are important challenges in the process of turning the proposed SDGs indicator system into an operational decision-making tool for the Region. The main challenge has to do with the availability of data, not only in EU-level but also at the national and regional one. In EU-level a prominent issue is the frequency of data collection and update of environmental indicators for land use, land cover, protected areas and water quality. The update intervals, which have a cycle of 6-7 years seem more suitable for evaluating the impact of policy choices and strategies, rather than the monitoring of progress due to the implementation of actions. To

[1] https://www.sdam.gr/index.php/node/431

[2] https://www.pepdym.gr/index.php/%CE%BF%CE%BB%CE%BF%CE%BA%CE%BB%CE%B7%CF%81%CF%89%CE%BC%CE%AD%CE%BD%CE%B5%CF%82-%CF%87%CF%89%CF%81%CE%B9%CE%BA%CE%AD%CF%82-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4%CF%8D%CF%83%CE%B5%CE%B9%CF%82/%CE%B5%CF%80%CE%B9%CF%87%CE%B5%CE%B9%CF%81%CE%B7%CF%83%CE%B9%CE%B1%CE%BA%CF%8C-%CF%80%CF%81%CF%8C%CE%B3%CF%81%CE%B1%CE%BC%CE%BC%CE%B1-newwwwww

[3] https://www.eib.org/en/projects/pipelines/all/20220027

[4] https://prasinotameio.gr/wp-content/uploads/2023/02/%CE%9C%CE%95%CE%A4%CE%91%CE%9B%CE%99%CE%93%CE%9D%CE%99%CE%A4%CE%99%CE%9A%CE%9F-2023-2025.pdf

[5] https://ppa.pdm.gov.gr/

[6] https://www.espa.gr/el/Pages/programs_21-27.aspx

[7] https://greece20.gov.gr/en/

this end, the relevant indicators are useful for setting concrete baselines regarding the current status of achievement of SDG targets, and to steer the efforts of the Region towards the achievement of targets where bigger gaps or lag are identified. At the national level a wealth of data are available and used for monitoring the SDGs in Greece, however the disaggregation at regional level is not possible in many instances. The Hellenic Statistical Authority (ELSTAT) is proposed to examine the adaptation of its surveys in order to cater to the needs of the regional monitoring of SDGs. At the regional and local level data are not provided in an organized way for information and monitoring purposes, but they are rather calculated and used in the context of specific studies (i.e. waste management plan). Specific cooperation protocols can be developed to enable the provision of structured data from regional organizations that produce and possess such to the Regional Authority with the specifications outlined in the regional indicator system for monitoring the SDGs.

Moreover, at the national level in Greece, a deeper involvement of the Regions in the process of developing the NVR could better highlight not only the role of the Regions and the local level in achieving the SDGs but as well as the need of producing homogenized, official data that can be disaggregated at NUTS2 scale for the purpose of monitoring the SDGs regionally and to facilitate the conduct of Voluntary Local Reviews. The Region of Western Macedonia, in cooperation with the second pilot region from Greece, North Aegean, through the experience gathered from the REGIONS2030 project, and on the basis of the present report, can lead the way in promoting in national policy-making the creation of an enabling environment for localizing the SDGs. Thus, it is worth reminding that "*many of the investments to achieve the sustainable development goals will take place at the subnational level and be led by local authorities*[8]".

The lack of experience in the Greek Regions and State in SDGs localization facilitation calls for a cautionary approach to a monitoring system, that would take into account, not only the challenges in data availability, but also the challenges in the awareness and capacity of administrations (officials and staff) to manage and operate such a system. According to the views of the expert and the regional administration of Western Macedonia a limited number of indicators, relevant to the development level of the Region and focused on its priorities, is preferable in order to ensure the system's manageability and maintenance.

During the process of developing this report the lacking capacity, at least of regional and local authorities in Greece, in monitoring policies and strategies as well as using hard evidence in decision making emerged. Even though there are services and departments with substantial experience in monitoring projects and actions, mainly in terms of outputs and results, as a consequence of managing and implementing programmes of the ESIF, competences in strategies and policies monitoring and review remain at a lower level. In that aspect SDGs can provide an overarching framework to accommodate the multi-level governance and sectoral policies that shape the regional development strategies and enable the monitoring at a strategic level.

However, methodological support is needed not only for linking the National Voluntary Review to regional strategies (and possibly VLRs) but also for linking regional strategies and policies with the SDGs and selecting the appropriate indicators for monitoring their progress. The outcomes of the REGIONS2030 project from the two pilot Greek regions can serve as the foundation for institutionalizing the above recommendations in the governance system of SDGs in Greece.

Bearing in mind the above bottlenecks and limitations, at least for the case of Greek regions, this report recommends the formulation of a dynamic (a la carte) indicator set at EU level for monitoring the SDGs in the Regions, that will consist a) of a common basic set covering EU-policies and targets, and b) an additional indicators catalog that the regions can choose from according to their needs and priorities.

MAIN FINDINGS

The JRC put forward an indicator set that contained 83 indicators, covering all SDGs and 54 targets, from various sources. The research conducted by the expert for the Region of Western Macedoniaconcluded in the selection of 70 of those indicators, in collaboration with the regional administration, that are meaningful to be measured for indicating the progress of the Region towards the SDGs. These 70 indicators cover 16 of the SDGs, with the exclusion of SDG 14 - as RWM is an inland region, and 45 targets. It should be noted that the Region chose to retain 8 indicators for the monitoring system proposal, even though there are no available data for them, in order to highlight their importance and the imperative to address the challenge of disaggregation of national data at regional (NUTS2) level. Furthermore, the proposed indicator system for the Region is extended with 7 additional new indicators on one hand to improve the coverage of SDGs targets and on the other hand to address the priorities and particularities of the region, mainly in energy transition.

[8] The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet. Synthesis report of the Secretary-General on the post-2015 Agenda. A/69/700. 4 December 2014

The 70 selected indicators corresponding to the JRC framework have official sources (Eurostat and other EU bodies, ELSTAT) for 74% of the cases and EU-wide coverage for 69% of them. The data collection is annual for the 60% of them, while 86% of the datasets have recent datapoints covering the years after 2019. It is worth noting that for the 82% of the indicators available datasets going back at least to 2015 covering the year of SDGs official adoption by the UN.

Overall, the statistical analysis of the 77 indicators of the regional SDGs monitoring system, for the last 5 years of available data, reveals positive trends and improvement towards sustainability targets in 33 instances. Contrary, for 21 indicators the trends in the recent years are negative, whereas for 9 of them the situation remains stable. Improvements appear mainly in SDG1 for poverty, SDG2 for zero hunger, SDG5 for gender equality and SDG13 on climate action. On the other hand, negative trends appear mainly in SDG8 and economic growth, but a reversal is already evident after the end of COVID19 pandemic.

1. INTRODUCTION

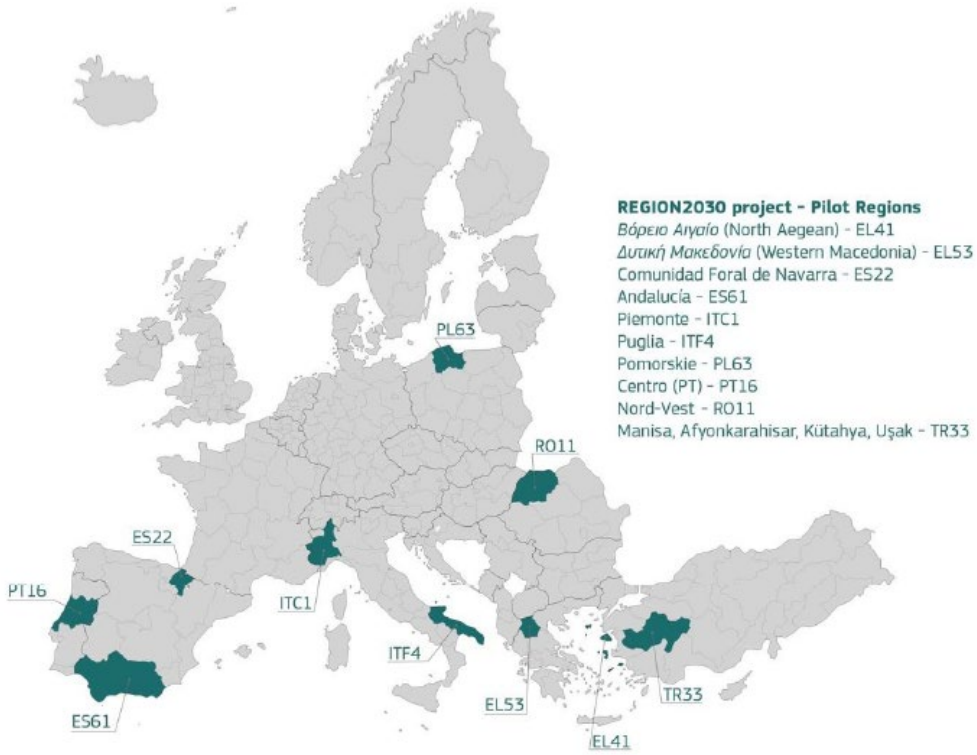
1.1 REGIONS2030 Context

"Monitoring the SDGs in the EU regions - Filling the data gaps - REGIONS2030" is a pilot project of the European Commission's Joint Research Centre, in collaboration with EC's Directorate General for Regional and Urban Policy and Eurostat, supported by the European Parliament and the European Committee of Regions.

One of the main objectives of the project is the engagement of EU regions in the monitoring process of the Sustainable Development Goals (SDGs) to provide a framework for regional authorities to monitor the SDGs in their territory, and to support and enhance regional statistical capacities in the collection of data, the monitoring, and the evaluation process. The second objective is to increase local ownership of the SDGs and openness and transparency in achieved results. Finally, REGIONS2030 aims to provide tailored training to regional authorities for the proper collection and analysis of data, to ensure their quality, and make all the data available to the public.

Ten pilot regions participate in the project in order to design a monitoring system for the SDGs at their territorial level. Region of Western Macedonia constitutes one of the two regions participating from Greece.

Figure 1. REGIONS2030 Participating Regions



Source: JRC, 2022

The project will conclude in December 2023, with four expected results:

- Define and test a harmonised set of indicators for EU regions to monitor the achievement of the SDGs.
- Increase the knowledge and capacities of EU regions on monitoring and reporting of the SDGs.
- Engage EU regions in a participative process of localising the SDGs.
- Improve the regional data and knowledge base in support of the EU's regional and urban policy.

The participation of Western Macedonia in the REGIONS2030 pilot programme will enable the regional administration to have an evidence-based approach in policy making towards economic, environmental and social sustainability but also to monitor the strategic alignment and objectives of the various funds and programmes available to Western Macedonia, but managed outside its competence, to its "Green" vision.

More specifically through the project and the support of the JRC the Region would like:

- to compile data sources relevant to sustainability issues and goals from other governmental organizations and institutions,
- to create the necessary multi-governance links to regularly feed a monitoring dashboard for selected indicators that are idiosyncratic to Coal Regions,
- to raise awareness within the Region, organizations as well as citizens, of the Agenda 2030 and the progress towards the SDGs.

Overall, the participation in the REGIONS2030 will demonstrate the dedication and leadership of RWM in sustainable development.

1.2 Methodology of the expert work

The JRC had identified a set of 83 indicators covering 54 targets from all the 17 SDGs. Each indicator is accompanied by the following characteristics: type, coverage, availability, year, source, reference, visualization, unit, time coverage, frequency.

The expert tested the proposed indicator set of the JRC regarding the availability and accessibility to the necessary data. Moreover, for the instances that sufficient data are collected the according indicators were analyzed for trends and benchmarking against sustainability objectives of development and territorial strategies of the region. Furthermore, in close collaboration with the Region, the expert identified:

- SDG targets not covered by the JRC proposed indicator set but of interest to the RWM and its strategies.
- SDG targets covered by the proposed set but with difficulties in their quantification for the region.
- Alternative indicators that have availability and accessibility of data.
- Additional indicators that are particular to the designation of RWM as a Coal Region and Just Transition Region and according strategies.

For the above instances the collected data were also analyzed to establish trends, benchmarking and to facilitate the establishment of goals towards sustainability targets. The methodological steps followed by the expert to analyse and compile SDGs monitoring indicators for the RWM comprise:

1. For indicators with "official" sources and coverage "EU27" checked the availability for Greek regions in Eurostat, and then Hellenic Statistical Authority (ELSTAT).
2. For indicators with "official" sources and other coverage checked the availability in ELSTAT.
3. For indicators with "experimental" sources checked the availability in the designated JRC sources and then in other studies/reports for Greece and RWM.
4. Identified synthetic indicators (i.e. Gini index, GVA per worker etc) and checked for official availability of data for their components.
5. Identified indicators with time coverage before 2018 (>5-year lag) and checked for other official more updated sources.
6. Checked with the Programme Western Macedonia 2021-2027 for relevant updated data used during the drafting of the programme.
7. Checked for updated data from the monitoring of relevant result indicators in the Regional Operational Programme of Western Macedonia 2014-2020.
8. For proposed alternative indicators to the JRC framework, checked for homogeneity in the description and measurement methodology.
9. For selected indicators with available and accessible data for the RWM (JRC or alternatives proposed) evaluated relevance to regional priorities using a relevance matrix.

10. Cooperated with the regional administration to identify particular priorities and needs to be covered by indicators.
11. Iterated metadata checks for the new additional indicators.

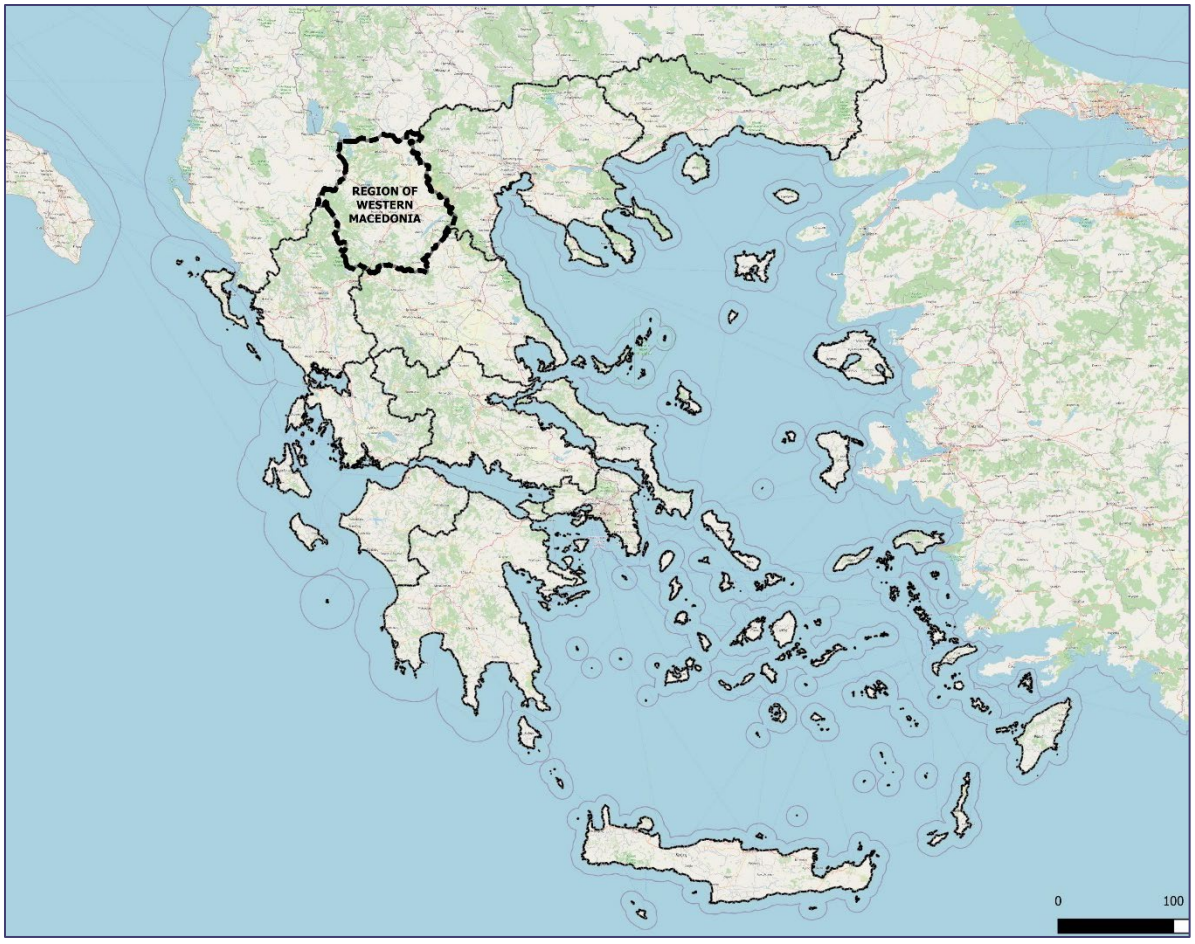
Overall, the expert, taking into account the needs and aspirations of the Region, drafted specific proposals for the monitoring of the SDGs at the regional level through a specified indicator set and particularly the incorporation of the system to the development planning and decision making of the regional administration and relevant stakeholders.

2. SHORT PROFILE OF THE REGION

2.1 Socioeconomic situation

The Region of Western Macedonia is a border region in Greece with a population of 254.595 inhabitants (2021) and a surface of 9.451 sq.m. It is the only enclosed region of Greece with no access to sea.

Figure 2. Region of Western Macedonia in Greece



Source: geodata.gov.gr/, own elaboration

The Region is an administrative unit of 1st degree, according to the Greek legislation of local self-government organizations. It is further divided in 12 Municipalities with a total of 226 settlements. Two (2) cities with population of more than 30.000 inhabitants are located in the Region.

The Region of Western Macedonia (RWM) constitutes the energy centre of Greece. Until recently, around 30% of its economic activity[9] was based around lignite mining and subsequent energy production in a large concentration of power plants located in the territory (6 lignite thermoelectrical plants). Thus, decarbonization policies, with the gradual decommissioning of lignite power plants, already have a great development and employment impact in the region. It is estimated that around 11.000 work places[10] will be lost in mining, energy production and complementary activities. In addition, the Region of Western Macedonia faces the challenges of high unemployment (19,8% in 2021) and poverty rates (29,9% of population in risk of poverty or social

[9] 2018 Hellenic Statistical Authority
[10] Territorial Plan for Just Development Transition RWM

exclusion in 2021), population decline (-10% since 2011) and ageing and low GDP 14.100€ p/c (44% of EU average pcGDP) and competitiveness.

Nowadays the Region has put forward a vision to "Become the Greenest Region of Greece, based on the hydrogen economy" in order to signal a new development path, based on clean and green energy, tapping on its workforce skills in energy sector, its rich natural environment (24 Natura sites, 2 National Parks, 1 UNESCO geopark, important water bodies and resources), quality and PDO agri-products and good accessibility by the TEN-T axes.

The installation of large photovoltaic parks is undergoing[11], green hydrogen projects are greenlighted[12], energy storage facilities and technologies are currently planned, and all these are accompanied by specific land development and spatial organization plans[13]. The vision and efforts of the Region are boosted by the commitment of substantial financial resources by the Greek government (Green Fund) and the EU to facilitate the just transition to a sustainable future.

2.2 SDGs monitoring current status

2.2.1 Region's activities towards SDGs monitoring

The Region currently lacks a single monitoring system to accommodate indicators for all the SDGs. However, disconnected monitoring activities that are currently performed in or by the Region include data and indicators that are relevant to the SDGs targets, such as:

- The implementation of the objectives of the Regional Operational Programme 2014-2020 through result indicators.
- The water chemical and ecological status of all water bodies under the WFD.
- A dedicated RIS3 Structure in the Regional Development Fund, monitoring RIS3 indicators (innovation, extroversion, entrepreneurship etc).

An overall mechanism for monitoring is expected to be installed in the short-term, through the creation of the Just Transition Observatory, which has already been announced in the framework of the Just Development Transition Programme 2021-2027. However, its scope is not exclusively the Region of Western Macedonia but also other territorial units in Greece, and its management and implementation is also planned to be outside the responsibility of the Region.

From 2015 in the Region of Western Macedonia a number of actions related to the achievement of SDGs have been implemented, through its Reginal Operational Programme and the Sectoral Programmes "Environment and Sustainable Development", "Competitiveness" and "Human Resources and Lifelong Learning". More specifically, within the framework of SDGs the following relevant action were being implemented:

1. No Poverty: Actions to support vulnerable groups (community centres, social groceries, pharmacies, etc.) are implemented by the region, municipalities and social partners, while at the same time important actions to support employment are implemented.
2. Zero Hunger: Actions for food and/or basic material assistance to the most deprived (FEAD).
3. Good health and well-being: Actions to enhance primary health and improve equal access to health services.
4. Quality education: A long-term programme for school infrastructure and services is implemented based on mapping needs and vulnerable groups of students are supported with actions such as school meals or the subsidy for the purchase of educational equipment.
5. Gender Equity: Actions are implemented by the region and municipalities for the empowerment of women, the prevention and protection of victims of domestic violence, such as the Women's Counseling Centres.

[11] 200MW installed by PPC SA and more than 1GW granted permission
[12] Green HiPo project (IPCEI Hydrogen)
[13] Feasibility Study for Innovation Zone for clean energy and environmental technology, Action Plan for the Development of Business Parks, Feasibility Study for the Development of a Circular Economy Business Park

6. Clean water and sanitation: Water supply and sewerage projects are being implemented within the framework of the WFD.
7. Affordable and clean energy: District heating networks in 3 cities are operating and supporting the transition to the post-lignite era, investment plans are being promoted for the transformation of the Region into a RES production area of European importance.
8. Decent work and economic growth: Specialized interventions are implemented to enhance entrepreneurship and employment for young people, for disadvantaged areas, etc.
9. Industry, innovation and Infrastructure: Actions have been developed in the last decade and are expected to further strengthen important research infrastructures in the context of the development of the University of Western Macedonia.
10. Reduced inequalities: Support programs for vulnerable and vulnerable groups, such as people with disabilities, Roma, etc., are implemented by the region and municipalities.
11. Sustainable Cities and Communities: Sustainable Urban Development Strategies are implemented in the 5 cities of more than 10,000 inhabitants of the Region.
12. Responsible consumption and production: Through the Waste Management of Western Macedonia Enterprise, circular economy is promoted, resulting in the Region being a model for the proper management of waste at national level.
13. Climate action: The implementation of a particularly important Regional Plan for the Just Transition begins. The Region has also in place a Regional Plan for Climate Change Adaptation.
14. Life on Land: There are 3 national parks, more than 30% of the area that includes mountain ecosystems, rivers and lakes has been included in the NATURA2000 network the region among others hosts one of the last populations of brown bears in Europe as well as an UNESCO Geopark. The Region has also in place a Regional Plan for Biodiversity.
15. Peace, justice, and strong Institutions: The HELIOS project is implemented in the region
16. Partnership for the Goals: The Region participates in numerous cross-border cooperation projects.

2.2.2 National SDGs monitoring

The Greek government published its first Voluntary National Review in July 2018 and presented its 2nd VNR in July 2022. The second Voluntary National Review (VNR) of Greece provides a comprehensive account of the overall progress made between 2018 and 2021. This progress pertains to various aspects such as policy measures, legislative initiatives, financial instruments, partnership schemes, and institutional reforms. These efforts were undertaken to expedite the complete implementation of the Sustainable Development Goals (SDGs) and to recover from the adverse economic and social impacts caused by the COVID-19 pandemic.

The Greek VNR not only serves as a guiding document for achieving the SDGs but also encompasses an extensive range of policies aligned with each of the 17 Goals. Most of these policies were initiated between 2018 and 2021 and are currently in progress. Ongoing policies are continually monitored and evaluated by the Presidency of the Government. Additionally, the VNR includes the country's key forward-looking policies, which are anticipated to be launched in 2022. It also outlines some of the policy milestones and funds associated with these initiatives. According to the “Executive State” law in August 2019 the responsibility to coordinate the planning and to monitor the implementation of SDGs in Greece lies with the Presidency of the Government.

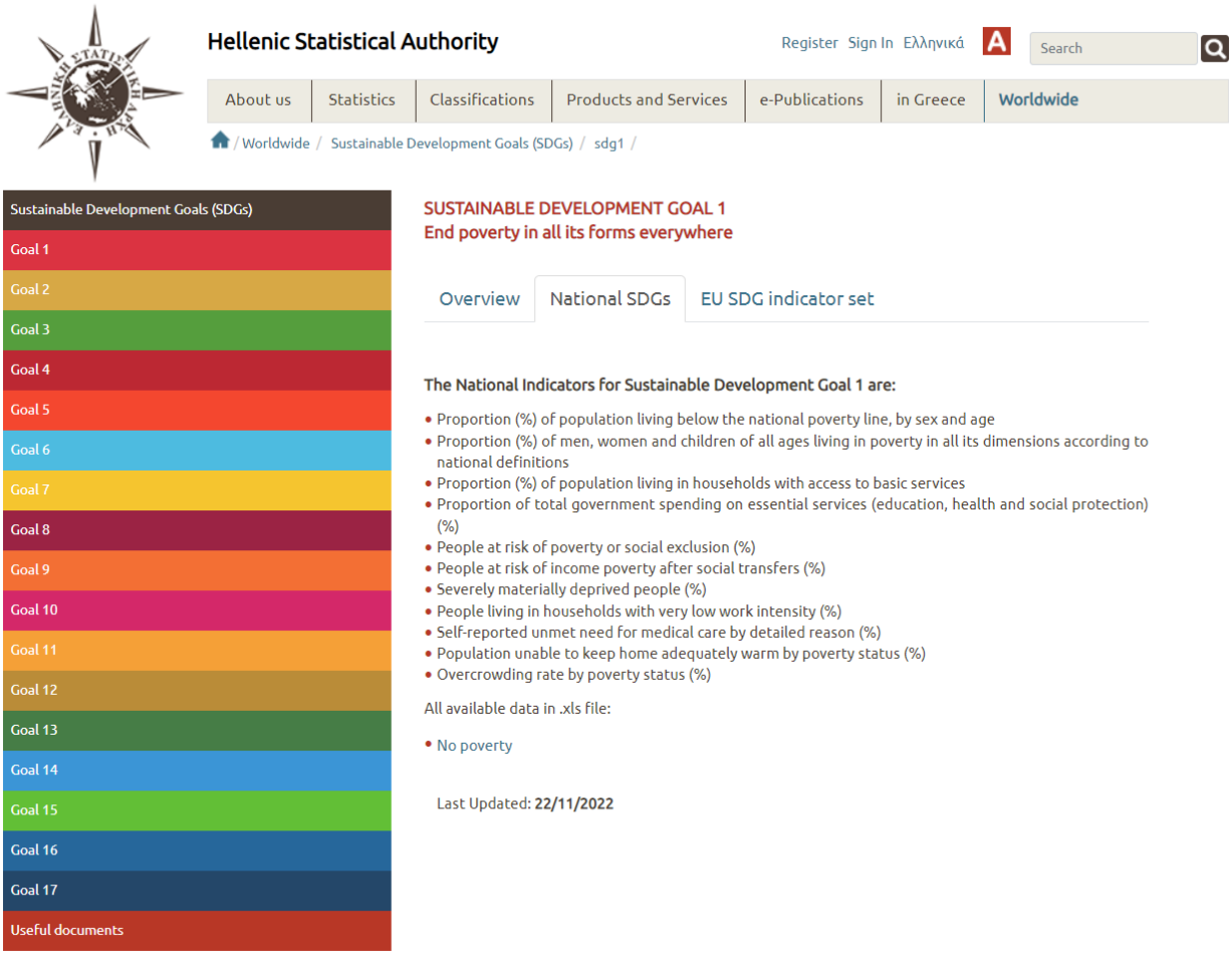
The Greek government had endorsed a system of national indicators to monitor the progress of the implementation of the SDGs, derived from the 232 UN indicators and the framework of the 100 indicators of Eurostat, based on the following:

- Compatibility with the existing conditions and needs of Greece.
- Relevance to the 8 National Priorities for the SDGs.
- Availability of statistical data from ELSTAT, the Ministries and all the Bodies of the Hellenic Statistical System.

Overall, the National SDGs Indicator system comprise 145 indicators. 88 of them are indicators from the UN framework addressing 78 of the SDGs targets and 57 from the EUROSTAT framework (covering all the SDGs but not linked to targets one-to-one).

The Hellenic Statistical Authority (ELSTAT) has a dedicated section in its website for the SDGs, providing for each goal, information about its targets, datasets for the National Monitoring Indicators and integrated visualization of the Eurostat datasets (SDGs&me tool). The datasets of the National Monitoring Indicators have a time coverage from 2010 to 2020/2021.

Figure 3. ELSTAT SDGs page



Source: www.statistics.gr/sdgs

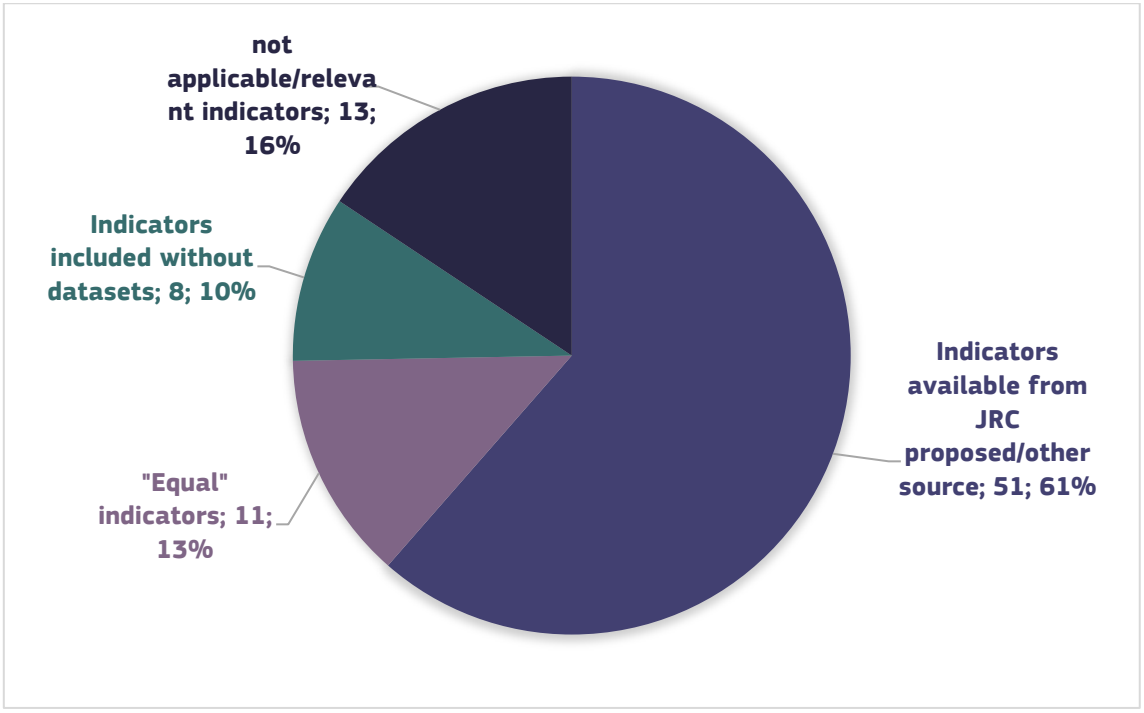
3. ANALYSIS OF THE JRC PROPOSED INDICATOR SET

3.1 Data availability for RWM

The preliminary indicator set put forward by the JRC contained 83 indicators covering 54 targets from all the 17 SDGs. Overall, the results of the data availability analysis conducted are presented in Figure 4. Regarding the Region of Western Macedonia, the expert reached the following conclusions for the JRC framework:

- 36 indicators have available datasets from the JRC proposed sources (mostly Eurostat).
  - 4 of them, however, have obsolete time-series for the RWM (older than 5 years) (nr.6, 18, 23, 50).
  - 32, overall, of the JRC proposed indicators and sources can be used for RWM.
- 15 indicators are available from national/regional or other sources identified by the expert.
- 11 indicators are replaced by an alternative "equal" one.
- 8 indicators are considered meaningful for monitoring and relevant to the development priorities of the Region, even though there is no availability of data
- 5 indicators are not applicable to the particularities of the Region (indicators of SDG14 and nuclear power production)
- 8 indicators are considered not relevant to the regional level and/or the challenges of the region.

Figure 4. Indicators data availability



Source: Author's own elaboration

In the case of RWM the expert, in cooperation with the Region, identified:

- 51 indicators (61% of the total) with data available for the Region from the JRC proposed and/or other sources (European, national and regional)
- 11 indicators (13% of the total) as "equal" alternatives to the initial JRC proposed indicators (e.g. the 80-20 income distribution instead of the Gini index).
- 8 indicators (10% of the total) that are proposed to be included to the regional SDG monitoring system, even though datasets are not available in regional level (i.e. indicators for gender violence in SDG 5)
- 13 indicators (16% of the total) that are not applicable to the Region of Western Macedonia (i.e. all indicators of SDG 14 and nuclear power production of SDG 7), not relevant to its priorities/challenges (i.e. overweight rate and imports from developing countries), or not available from any official sources (i.e. patent applications).

The overall availability of data for the proposed JRC indicators per SDG is presented in Table 1. SDG 14 "Life below water" was not examined as the RWM is an inland region. Most issues of data availability were found in SDG 17, due to the lack of competences of the Regions in Greece in the objects of the JRC proposed indicators (i.e. development assistance). SDG 10 "Reduced inequalities" is also noted due to the fact that "equal" alternative indicators had to be found, due to the lack of data availability of the 2 proposed ones.

Table 1. Data availability for the JRC proposed indicators

SDG	Indicators available from JRC proposed/ other source	"Equal" indicators	Indicators included without datasets	not applicable/ relevant indicators	SUM
Overall	**51**	**11**	**8**	**13**	**83**
1. No Poverty	3	1			4
2. Zero Hunger	3			1	4
3. Good health and well-being	5				5
4. Quality education	5	1	1		7
5. Gender Equity	3	1	3		7
6. Clean water and sanitation	2		1	1	4
7. Affordable and clean energy	1	1	1	1	4
8. Decent work and economic growth	9	1			10
9. Industry, innovation and Infrastructure	3	1		1	5
10. Reduced inequalities	0	2			2
11. Sustainable Cities and Communities	6	2		1	9

SDG	Indicators available from JRC proposed/ other source	"Equal" indicators	Indicators included without datasets	not applicable/ relevant indicators	SUM
12. Responsible consumption and production	1		1	1	3
13. Climate action	3		1		4
14. Life below water	0			3	3
15. Life on Land	4				4
16. Peace, justice, and strong Institutions	3			1	4
17. Partnership for the Goals		1		3	4

Source: Author's own elaboration

3.2 Updated data sources

The expert identified alternative data sources with updated data for the RWM for 20 cases of the 49 indicators used from the initial JRC proposed set:

- 5. *Gross Value Added (GVA) of agriculture, livestock and fishing*: Eurostat dataset Gross domestic product (GDP) and Gross value added (GVA) in volume by NUTS 2 regions (NAMA_10R_2GVAGR) with time coverage 2000-2019
- *6. Organic farming: areas with different crops:* ELSTAT data with time coverage 2011-2019
- 7. *Productivity (Gross Value Added per worker) in agriculture, forestry and fishing*: derived from Eurostat dataset "Employment by sex, age, economic activity and NUTS 2 regions" with time coverage 2008-2019 by combining with the data from indicator nr.5.
- 9. *Deaths due to Covid-19*: third party apps reporting on National Public Health Organization's data with time coverage 2020-2023
- 14. *Women 30-34 years old with higher education level:* Eurostat, Regional statistics by NUTS classification. Table: EDAT_LFSE_04
- 25. *Women in parliament and government*: Region archives and data for women elected in the Regional Council with time coverage 2010, 2014, 2019.
- 28. *Water bodies that exceed a standardized quality rating*: data available from river basin management plans, aggregated by European Environmental Agency for 2015.
- 29. *Groundwater that exceed a standardized quality rating*: can be found from river basin management plans.
- *33. Electricity production that comes from renewable sources:* Administrator of Renewable Energy Sources and Guarantees of Origin SA (DAEEP SA) with time coverage 2016-2022
- 35. *People affected by energy poverty*: Ministry of Environment and Energy 2019,2020
- 36. *Occupational accidents*: ELSTAT with time coverage 2000-2020

- 45. *Young people neither in employment nor in education and training*: Eurostat dataset Young people neither in employment nor in education and training by sex and NUTS 2 regions (NEET rates) (EDAT_LFSE_22) with time coverage 2000-2021
- 46. GVA of the industry with respect to the GVA of the total sectors (current price): Eurostat dataset Gross value added at basic prices by NUTS 3 regions (NAMA_10R_3GVA)
- 53. *Households expenses dedicated to housing costs*: ELSTAT dataset on Household budgets with time coverage 2008-2021
- 60. *Household and commercial waste generation per inhabitant*: Regional Waste Management Plan with time coverage 2012-2022
- 64. *Hazardous Waste*: Regional Waste Management Plan with time coverage 2012-2020
- *67. Greenhouse Gas Emissions:* OECD Regional database, variable 'Greenhouse gas emissions' withtime coverage 2001-2018
- 72. *Terrestrial protected areas as a percentage of total area*: European Environmental Agency data for 2012
- 75. *Forest area over total surface area*: Copernicus/EEA data with time coverage 2000, 2006, 2012, 2018
- 77. *Participation in the last elections*: Ministry of Interior dataset with time coverage 1996-2019

3.3 Fit of proposed indicator set with Western Macedonia region

The proposed indicator set presents a fit rate of 84% for Western Macedonia. That means there are 70 indicators that are meaningful for monitoring and relevant to the development priorities of the Region, regardless of the availability of data at the regional (NUTS2) level.

Specifically, there are 8 out of those 70 indicators that don't have available and/or up-to-date data but should establish the necessary multi-governance collaborations to be calculated in the future.

- 18. Early leavers from education and training: Eurostat has available data for the country level for 2000-2021. Regional data for RWM are available until 2015. For 2016-2021 RWM data are not publicized due to reliability issues. The indicator is available also disaggregated by sex. The indicator is included in the National Monitoring Indicators for SDG4.
- 21. Fatal victims of gender-based violence at the hands of their partners or ex-partners: Data are available at country level in the Yearly Report of Violence Against Women of the General Secretariat of Family Programming and Gender Equality. Data are sourced from Hellenic Police.
- 22. Victims of violence against women: Data are available at country level in the Yearly Report of Violence Against Women of the General Secretariat of Family Programming and Gender Equality. Data are sourced from Hellenic Police.
- 23. Female research and development personnel: Data are available at national level by the National Documentation Centre and in NUTS2 level by OECD till 2011.
- 30. Population served by safely managed drinking water supply services: No data are available. Liaison with water providers is needed to identify settlements that are not linked sufficiently to drinking water networks and those who have in place Water Safety Plans. According to the National Operational Plan for Drinking Water, all water providers should have in place a Water Safety Plan by 2024.
- 34. Energy intensity: ELSTAT has available data until 2012 at regional level. Eurostat has available data until 2020 at national level. The indicator is included in the National Monitoring Indicators for SDG11.
- 63. Food waste: Liaison with the Waste Management of Western Macedonia S.A. to provide data of organic waste per inhabitant from the Sorting at Source (brown bins) program.
- 67. Greenhouse Gas Emissions: OECD has available data for 2001-2018 at regional level.

The expert considered 13 indicators, from the initial list, in collaboration with the Region, to be not suitable for monitoring SDGs at the regional level and specifically for the RWM.

— 5 of them are not applicable to the Region:

- 32. Electricity production that comes from nuclear power: There are no nuclear power plants in Western Macedonia and in Greece.
- 69. Estuarine with high/very high water quality: The RWM is an inland, enclosed region with no coasts.
- 70. Protected coastal area as a percentage of total coastal area: The RWM is an inland, enclosed region with no coasts.
- 71. Coastal areas with good/very good water quality: The RWM is an inland, enclosed region with no coasts.
- 80. Official Development Assistance: Official Development aid in Greece is a responsibility of the central government. Regions don't have relevant budget lines.

— 8 of them are not relevant to the regional level and challenges:

- 8. Overweight rate: The indicator seems to be of low relevance to the Target 2.2 "End malnutrition". Overweightness is mostly a health problem of developed countries and not so much a proxy for malnutrition. Furthermore, overweight rate is not part of the National Monitoring Indicators for SDG2.
- 31. Population connected to wastewater with at least secondary treatment: According to the National Operational Plan for Urban Wastewater Management there were only 3 settlements of Priority C in 2019, with missing secondary treatment facilities. However, funding is secured and construction works are under way and/or completed. Target 6.3 "water quality" is covered by 2 other indicators of the SDG. Furthermore, Population connected to wastewater with at least secondary treatment is not part of the National Monitoring Indicators for SDG6.
- 50. Patent applications to the EPO: The indicator is collected only at national level by Eurostat. Target 9.5 "promote innovation" is covered by the other 3 indicators of the SDG. Furthermore, Patent applications is not part of the National Monitoring Indicators for SDG3.
- 62. Carbon footprint: There are no available data at regional level to calculate the carbon footprint of all consumption and production in the region. It is not part of the National Monitoring Indicators for SDG12.
- 76. Transparency index: The indicator is available only at country level by Transparency International. Target 16.6 "effective institutions" is covered by 2 other indicators of the SDG. Transparency is not part of the National Monitoring Indicators for SDG16.
- 81. Imports from developing countries: Imports of products and services for consumption or production processes cannot be calculated at regional level, as such products and services can be imported by firms located in other regions of the country and then transported to RWM. The indicator is available only at country level by Eurostat and ELSTAT and it is not part of the National Monitoring Indicators for SDG17.
- 82. PCT co-patent applications that are done with foreign regions. There are no available data at regional level. It is not part of the National Monitoring Indicators for SDG17.

Additionally, the expert identified 11 indicators that can be replaced with an "equal" alternative one.

— 2. Affected people due to disasters replaced by 2a. Population exposed to at least one forest fire.

— 20. Distribution of pupils and students enrolled in general and vocational programmes replaced by 20a.Participation rate in education and training (last 4 weeks).

— 24. Inactive population rate due to caregiving responsibilities replaced by 24b.Unemployment rate of women.

— 33. Electricity production that comes from nuclear power replaced by 33a. Installed power that comes from renewable energy sources.

— 39. Firm creation replaced by 39a. Number of firms.

- 49. Employment in high-technology manufacturing as a percentage of total manufacturing employment replaced by 49b. Personnel on high-tech knowledge-intensive service as a percentage of total services employment.
- 51. Unemployment of people with disabilities replaced by 51a. Disability employment gap.
- 52. Gini index of disposable income (after taxes and transfers) replaced by 52a.S80/S20 income distribution.
- 54. Transport performance replaced by 54a. Household expenses dedicated to public transport means to total transportation costs.
- 58. Land use replaced by 58a. Artificial Surfaces
- 83. Individuals who used the internet for interaction with public authorities replaced by 83a.Households with internet access.

3.4 Statistical analysis of trends

Overall, the initial monitoring indicator set for the SDGs in the Region of Western Macedonia, presented in Table 2, **consists of 70 indicators**, **that address 16 SDGs,** with the exception of SDG14 as the Region is inland without any coasts, and **45 out of the 169 targets of the Agenda 2030.**

Table 2. SDG Targets coverage by the initial indicator set

SDG	SDG Target(s)	Nr of indicators
1	1.1 (extreme poverty)	1
	1.2 (reduce poverty)	2
	1.5 (exposure to vulnerability)	1
2	2.3 (agricultural productivity)	2
	2.4 (sustainable food production)	1
3	3.2 (preventable death of newborns)	1
	3.3 (epidemics and diseases)	1
	3.8 (universal health coverage)	1
	3.c (health financing and recruitment)	2
4	4.1 (primary and secondary education)	1
	4.2 (access to early childhood education)	1
	4.3 (vocational and tertiary education)	3
	4.5 (gender and other disparities in education)	1
	4.6 (youth and adult literacy)	1
5	5.1 (gender discrimination)	1
	5.2 (gender violence)	2
	5.4 (unpaid work)	1
	5.5 (women participation and leadership)	3
6	6.1 (universal access to water)	1
	6.3 (water quality)	2
7	7.1 (access to energy)	1

SDG	SDG Target(s)	Nr of indicators
	7.2 (share of renewable energy)	1
	7.3 (energy efficiency)	1
8	8.1 (economic growth)	1
	8.2 (economic productivity)	1
	8.3 (job creation)	1
	8.5 (productive employment)	5
	8.6 (youth not in employment, education or training)	1
	8.8 (labour rights)	1
9	9.2 (sustainable industrialization)	1
	9.5 (promote innovation)	3
10	10.2 (inclusion irrespective of status)	1
	10.4 (greater equality)	1
11	11.1 (access to housing)	1
	11.2 (access to transport systems)	4
	11.3 (sustainable urbanization)	1
	11.6 (environmental impact)	2
12	12.3 (reduce food waste)	1
	12.4 (chemical management)	1
13	13.2 (climate change measures into policy)	4
15	15.1 (restoration of ecosystems)	2
	15.5 (degradation of habitats)	2
16	16.5 (reduce corruption)	1
	16.6 (effective institutions)	2
17	17.8 (enabling technology)	1

Source: Author's own elaboration

The overall list of the JRC indicators used for monitoring SDGs in the Region of Western Macedonia is analyzed in Table 3.

Table 3. Analysis of the fitness of the JRC indicators for Western Macedonia

SDG	nr.	Indicator Name	Fit for purpose	Non-fit for purpose	Fit-no data	Alternative indicator	Comments	National SDG Monitoring Indicator
1	1	Persons living in households with very low work intensity	X				OK	X
1	2	Affected people due to disasters				X	2a.Population exposed to at least one forest fire	
1	3	Material and social deprivation	X				OK	
1	4	Persons at risk of poverty or social exclusion	X				OK	X
2	5	Gross Value Added (GVA) of agriculture, livestock and fishing	X				OK	
2	6	Organic farming: areas with different crops	X				OK	X
2	7	Productivity (Gross Value Added per worker) in agriculture, forestry and fishing	X				OK	
2	8	Overweight rate		X			available in NUTS1 - can't disagregate not relevant	
3	9	Deaths due to Covid-19	X				OK	
3	10	Self reported unmet needs for medical examination	X				OK	X
3	11	Health personnel	X				OK	
3	12	Hospital beds	X				OK	
3	13	Infant mortality	X				OK	X
4	14	Women 30-34 years old with higher education level	X				OK	
4	15	Students enrolled in tertiary education	X				OK	
4	16	Participation in education	X				OK	
4	17	Pupils enrolled in early childhood education	X				OK	
4	18	Early leavers from education and training			X		2016-2021 not published (unreliable) data for the RWM	X
4	19	Participation rates in selected education levels	X				OK	X
4	20	Distribution of pupils and students enrolled in				X	20a.Participation rate in education	X

SDG	nr.	Indicator Name	Fit for purpose	Non-fit for purpose	Fit-no data	Alternative indicator	Comments	National SDG Monitoring Indicator
		general and vocational programmes					and training (last 4 weeks)	
5	21	Fatal victims of gender-based violence at the hands of their partners or expartners			X		available at national level in the Yearly Report for Gender Equaltiy (sourced from the police)	
5	22	Victims of violence against women			X		available at national level in the Yearly Report for Gender Equaltiy (sourced from the police)	
5	23	Female research and development personnel			X		available at National level by the National Documenation Centre (and NUTS2 by OECD till 2011)	
5	24	Inactive population rate due to caregiving responsibilities				X	24b.Unemployment rate of women 5.5	X
5	25	Women in parliament and government	X				OK	
5	26	Female achievement/disadvantage index	X				OK	
5	27	Gender gap in part-time employment incidence	X				OK	X
6	28	Water bodies that exceed a standardized quality rating	X				OK	
6	29	Groundwater that exceed a standardized quality rating	X				OK	
6	30	Population served by safely managed drinking water supply services			X		Liaison with water providers	
6	31	Population connected to wastewater with at least secondary treatment		X			Not relevant. Target covered from nr.28&29	
7	32	Electricity production that comes from nuclear power		X			No nuclear plants in Greece	
7	33	Electricity production that comes from renewable sources				X	33a. Installed power that comes from renewable energy sources	X
7	34	Energy intensity			X		Available at country level (ELSTAT)	X

SDG	nr.	Indicator Name	Fit for purpose	Non-fit for purpose	Fit-no data	Alternative indicator	Comments	National SDG Monitoring Indicator
7	35	People affected by energy poverty	X				OK	X
8	36	Occupational accidents	X				OK	X
8	37	Economic activity	X				OK	
8	38	Unemployment	X				OK	X
8	39	Firm creation				X	39a. Number of firms	
8	40	Employment	X				OK	
8	41	GDP at current market prices	X				OK	X (p/c)
8	42	GVA at basic prices	X				OK	
8	43	Long-term unemployment (12 months and more)	X				OK	
8	44	Compensation of employees	X				OK	X
8	45	Young people neither in employment nor in education and training	X				OK	X
9	46	GVA of the industry with respect to the GVA of the total sectors (current price)	X				OK	X
9	47	Gross Domestic Expenditure on R&D	X				OK	X
9	48	R&D personnel and researchers	X				OK	X
9	49	Employment in high-technology manufacturing as a percentage of total manufacturing employment				X	49b.Personnel on high-tech knowledge-intensive service as a percentage of total services employment	
9	50	Patent applications to the EPO		X			No regional data from (Eurostat, ELSTAT or OECD) Target 9.5 already covered by 3 indicators	
10	51	Unemployment of people with disabilities				X	51a. Disability employment gap (available only at national level)	
10	52	Gini index of disposable income (after taxes and transfers)				X	52a.S80/S20 income distribution	X
11	53	Households expenses dedicated to housing costs	X				OK	

SDG	nr.	Indicator Name	Fit for purpose	Non-fit for purpose	Fit-no data	Alternative indicator	Comments	National SDG Monitoring Indicator
11	54	Transport performance				X	54a.Household expenses dedicated to public transport means to total transportation costs	
11	55	Daily accessibility	X				OK	
11	56	Stock of vehicles (passenger cars)	X				OK	
11	57	Difference between built-up area growth rate and population growth rate		X			Target 16.6 already covered by indicator 58	
11	58	Land use				X	58a.Artificial Surfaces	
11	59	PM2.5 Emissions	X				OK	
11	60	Household and commercial waste generation per inhabitant	X				OK	
11	61	Victims in road accidents	X				OK	X
12	62	Carbon footprint		X			No data available	
12	63	Food waste			X		Liaison with Waste Management Company	
12	64	Hazardous Waste	X				OK	
13	65	PM10 Emissions	X				OK	
13	66	CO2 Emissions	X				OK	X
13	67	Greenhouse Gas Emissions			X		No recent data, till 2018 (same indicator as nr.66)	X
13	68	Cooling and heating degree days	X				OK	
14	69	Estuarine with high/very high water quality		X			enclosed region	
14	70	Protected coastal area as a percentage of total coastal area		X			enclosed region	X
14	71	Coastal areas with good/very good water quality		X			enclosed region	
15	72	Terrestrial protected areas as a percentage of total area	X				OK	
15	73	Estimated soil erosion	X				OK	
15	74	Land Abandonment	X				OK	
15	75	Forest area over total surface area	X				OK	X

SDG	nr.	Indicator Name	Fit for purpose	Non-fit for purpose	Fit-no data	Alternative indicator	Comments	National SDG Monitoring Indicator
16	76	Transparency index		X			No Data. Target 16.6 already covered by 2 indicators	
16	77	Participation in the last elections	X				OK	
16	78	Quality of Government Index	X				OK	
16	79	Extract from QGI an indicator on corruption	X				OK	
17	80	Official Development Assistance		X			Central government competence	
17	81	Imports from developing countries		X			Only available at national level	
17	82	PCT co-patent applications that are done with foreign regions		X			No regional data from (Eurostat, ELSTAT or OECD)	
17	83	Individuals who used the internet for interaction with public authorities				X	83a Households with internet access (initial indicator available at NUTS1 level)	X

Source: Author's own elaboration

3.4.1 SDG 1. NO POVERTY

Table 4. SDG 1 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
1.1 (extreme poverty) & 1.2 (reduce poverty)	3	Material and social deprivation	↓↓
1.2 (reduce poverty)	1	Persons living in households with very low work intensity	-
1.2 (reduce poverty)	4	Persons at risk of poverty or social exclusion	↓
1.5 (exposure to vulnerability)	2a	Share of population exposed to at least one forest fire 2001-2021	↓

Source: Author's own elaboration

SDG Target: 1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions

As it is evident from the indicators for monitoring the Target 1.2, poverty levels in the Region of Western Macedonia are diminishing from 2018 to 2021, as the labour market in the region improved in those years and unemployment rates were also singificantly reduced. Moreover the Region has been implementing a programme for food and basic material assistance to the most deprived (FEAD). Public investments from the increased implementation rate of the Regional Operational Programme and the energy sector investments induced in the region in the framework of its green transition can also be considered as beneficiary to the reduction of poverty by creating employment opportunities. The Regional Strategy for Social Cohesion sets the priorities and actions to combat poverty and social exclusion.

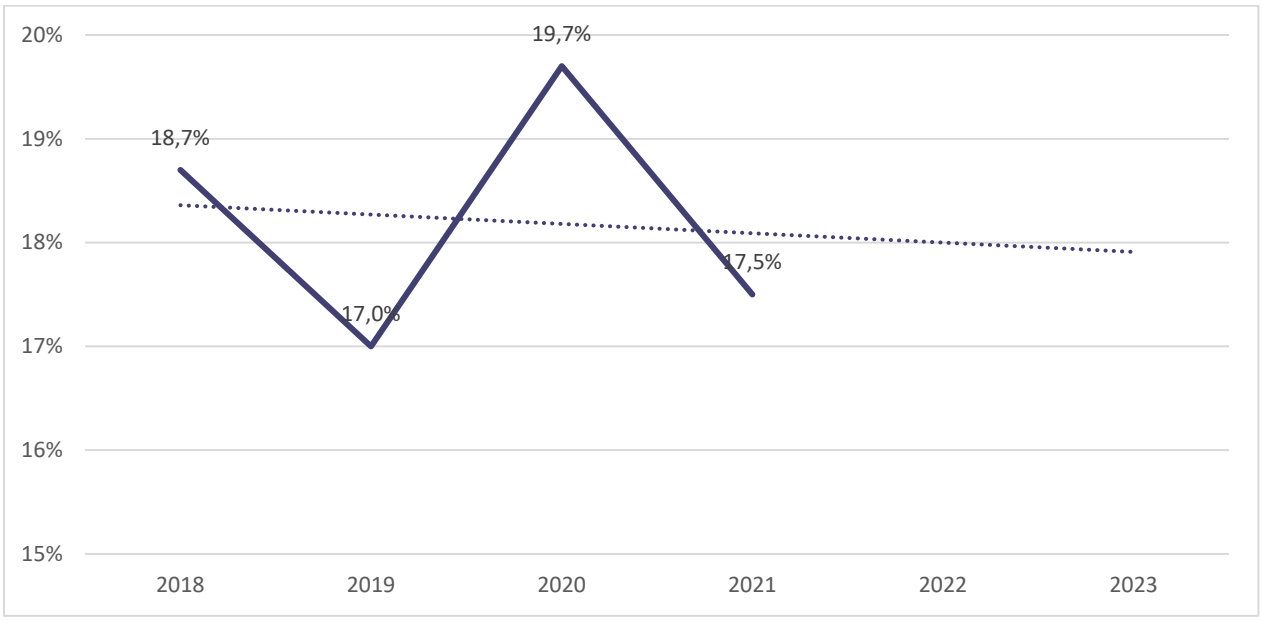
Table 5. Indicator Nr.1 Persons living in households with very low work intensity

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_ilc, code LVHL21	Percentage	2018-2021	Annual

Source: Author's own elaboration

According to the data presented in Figure 5, the percentage of persons living in households with very low work intensity shows a decline from 2018 to 2019, while the COVID-19 resulted in an increase from 2019 to 2020, which fell again towards 2019 levels in 2021, as the labour market conditions improved along with the economic recovery after the pandemic.

Figure 5. Persons living in households with very low work intensity



Source: https://ec.europa.eu/eurostat/databrowser/view/ilc_lvhl21/default/table?lang=en

Table 6. Indicator Nr.3 Material and social deprivation

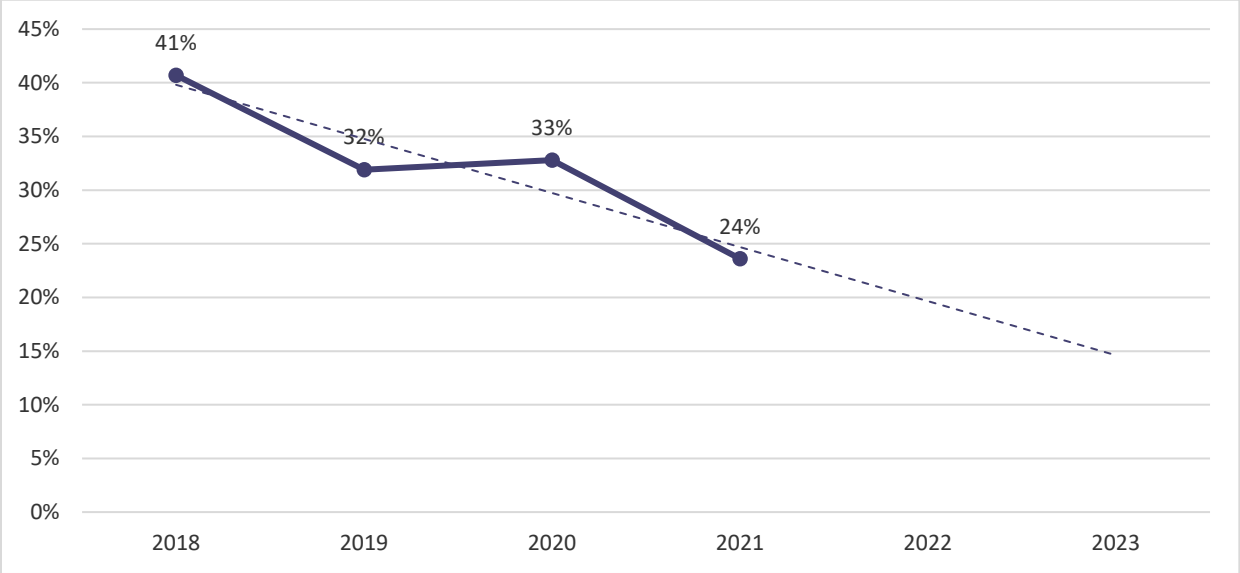
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency

2021	European Union Statistics on Income and Living Conditions (EU-SILC)	Eurostat, Regional statistics by NUTS classification. Table: ilc_mdsd, code: ILC_MDSD08	Rate	2018-2021	2021

Source: Author's own elaboration

The percentage of population in material and social deprivation almost halved from 2018 to 2021, as it is evident in Figure 6 reaching 24%.

Figure 6. Population in material and social deprivation



Source: https://ec.europa.eu/eurostat/databrowser/view/ilc_mdsd08/default/map?lang=en

Table 7. Indicator Nr.4 Persons at risk of poverty or social exclusion

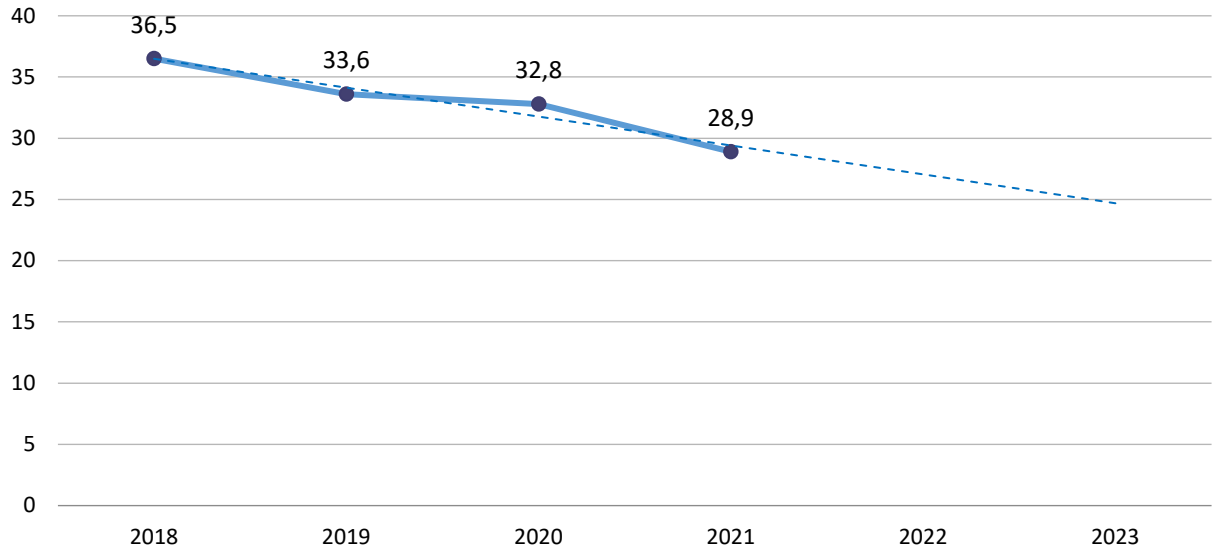
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_ilc, code ILC_PEPS11N	Rate	2018-2021	Annual

Source: Author's own elaboration

The trend in the percentage of persons at risk of poverty or social exclusion, showed in Figure 7, is downward for the last 3 years of available data. Increased employment levels in the region. The increase of employment levels in the region during those years contributed in lowering poverty.

The indicator follows the impact on the social fabric of the Region of the coal plants decommission and also the ageing of the population.

Figure 7. Persons at risk of poverty or social exclusion (%)



Source: https://ec.europa.eu/eurostat/databrowser/view/TGS00107/default/table?lang=en

SDG Target: 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

Table 8. Indicator Nr.2a Share of population exposed to at least one forest fire 2001-2021

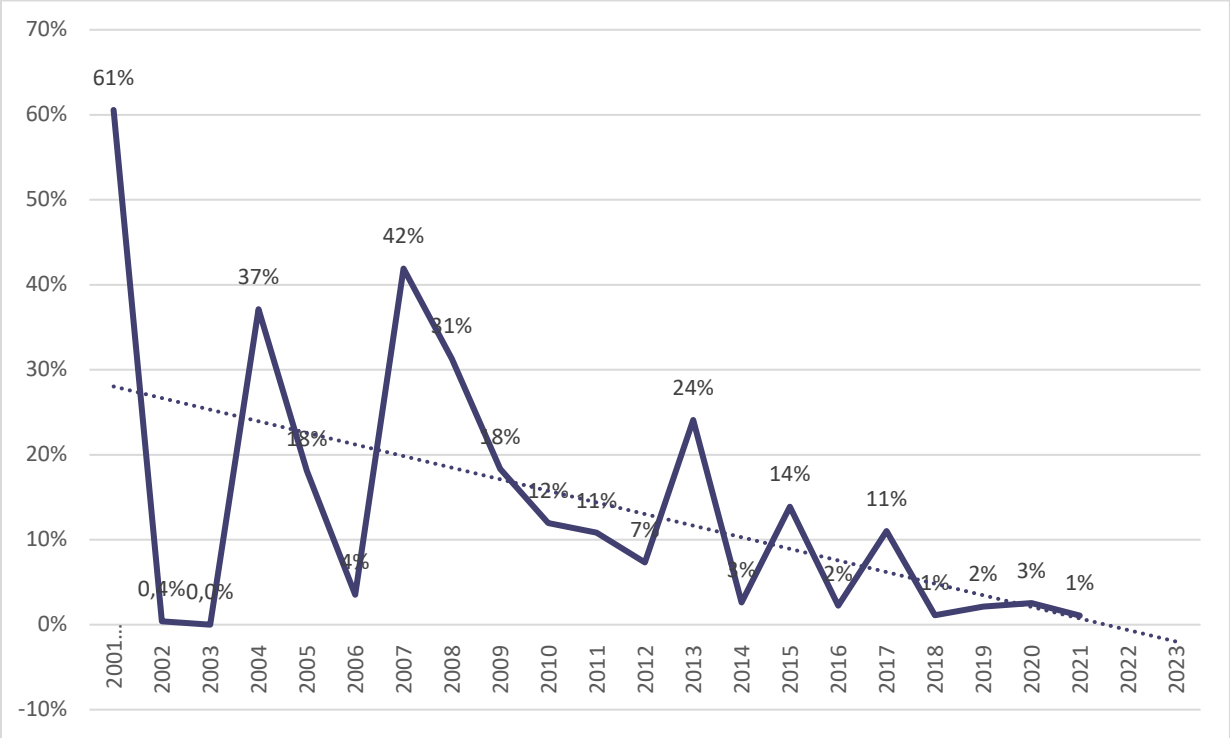
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	OECD	OECD, Regional database, variable 'Share of population exposed to at least on forest fire	Ratio	2001-2021	Annual

Source: Author's own elaboration

As it is evident from Figure 8, the affected people due to disasters of forest fires over the years varies a lot (an expected fact due to the unpredictability of natural disasters). It is clear though that the yearly number shows a constant decline.

The indicator follows a major climate related risk for Greece and Western Macedonia, that is forest fires, intensified by climate change and hotter summers. RWM is covered by forest and semi-natural areas at about 59% of its surface, thus investments in forest fire prevention and combat are foreseen by the measures of the Regional Plan for Adaptation to Climate Change.

Figure 8. Share of population exposed to at least one forest fire



Source: https://stats.oecd.org/ -> Regions and Cities -> Climate and environment in regions

3.4.2 SDG 2 ZERO HUNGER

Table 9. SDG 2 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
2.3 (agricultural productivity)	5	Gross Value Added (GVA) of agriculture, livestock and fishing	↑
2.3 (agricultural productivity)	7	Productivity (Gross Value Added per worker) in agriculture, forestry and fishing	↑
2.4 (sustainable food production)	6	Organic farming: areas with different crops	↑↑

Source: Author's own elaboration

SDG Target 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

As it is evident from the indicators for monitoring Target 2.3, agricultural production in the region has been improving in the last 5 years, not only in terms of value, but also in terms of productivity per person employed in the sector. The Regional Authority undertook from 2019 and is implementing a significant public investment measure for improving road accessibility to agriculture and livestock holdings their connections to the power grid, and reparcelling to support the competitiveness of the sector

Table 10. Indicator Nr.5 Gross Value Added (GVA) of agriculture, livestock and fishing

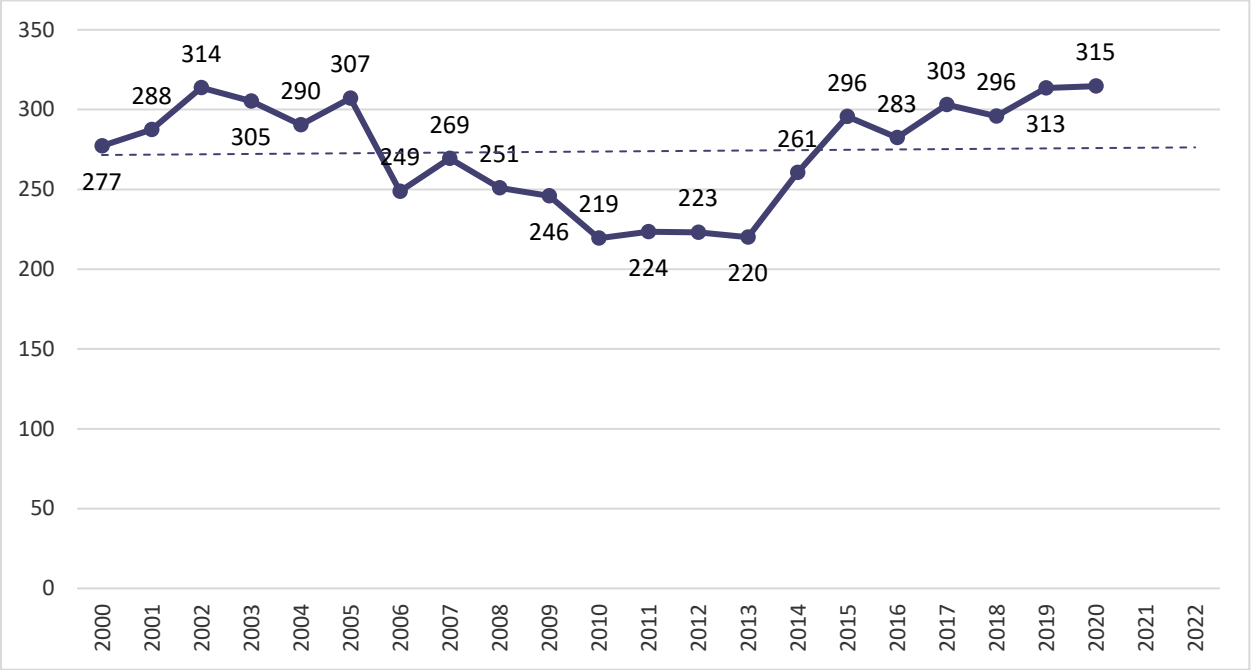
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat	Eurostat, Regional statistics by NUTS classification. Tables NAMA_10R_3GVA	Number	2000-2020	Annual

Source: Author's own elaboration

The GVA of agriculture, livestock and fishing in 2020, depicted in Figure 9, was equal to 314.67€ million. The GVA had a downward trend from 2000 to 2013 (-20,6%), from 2013 to 2021 though, the GVA rose 43%, surpassing 2000 levels.

The indicator can be used to gauge the effects of the initiatives of the Region in the agri-food sector, such as the re-activation of the agri-food partnership that aims to couple quality products and their processing with local culture and tourism for increased extroversion and added value.

Figure 9. GVA at basic price in millions



Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3gva/default/table?lang=en

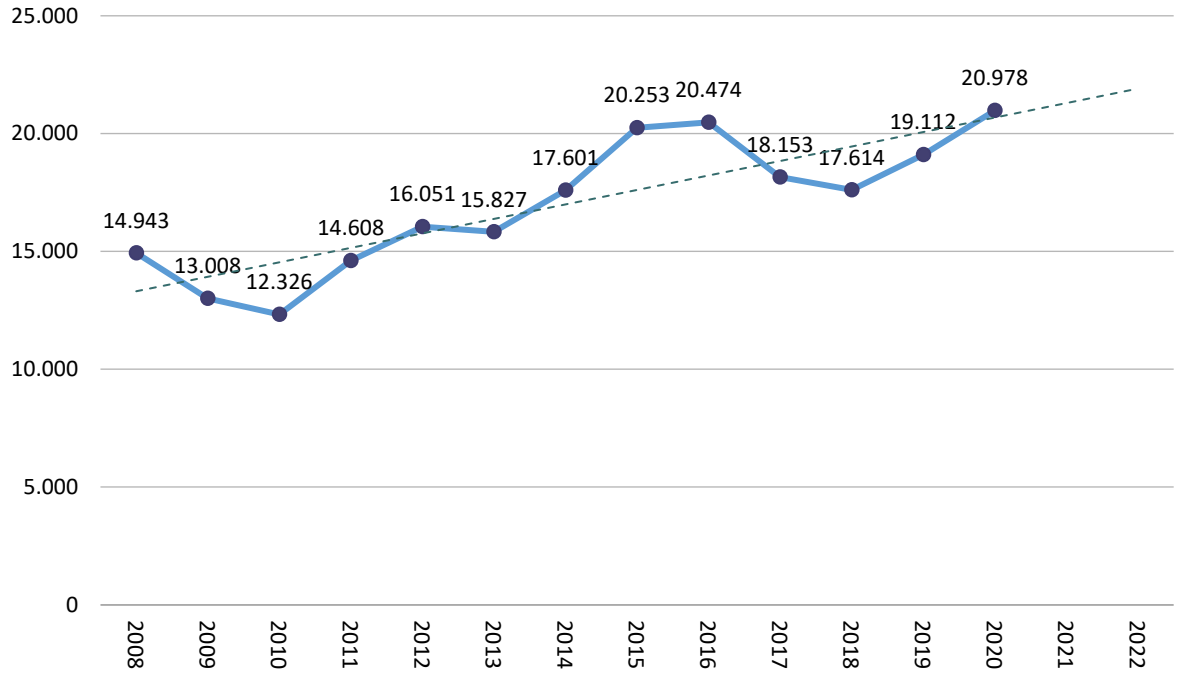
Table 11. Indicator Nr.7 Productivity (Gross Value Added per worker) in agriculture, forestry and fishing

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat	Eurostat, Regional statistics by NUTS classification. Tables GVA in volume by NUTS 2 regions (NAMA_10R_2GVAGR) as the numerator and Employment by sex, age, economic activity and NUTS 2 regions (LFST_R_LFE2EN2) as the denominator	Number (€)	2008-2021	Annual

Source: Author's own elaboration

Productivity in agriculture -GVA per worker (15 to 64 years old)- has a constant upward trend from 2010 to 2020 (70% increase), while it reached an all-time high in 2021. The indicator can gauge the competitiveness of the sector, which constitutes one of the priorities of the Regional Authority.

Figure 10. Productivity (Gross Value Added per worker) in agriculture, forestry and fishing (mil.€)



Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3gva/default/table?lang=en,
https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EN2__custom_4778734/default/table?lang=en

SDG Target 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

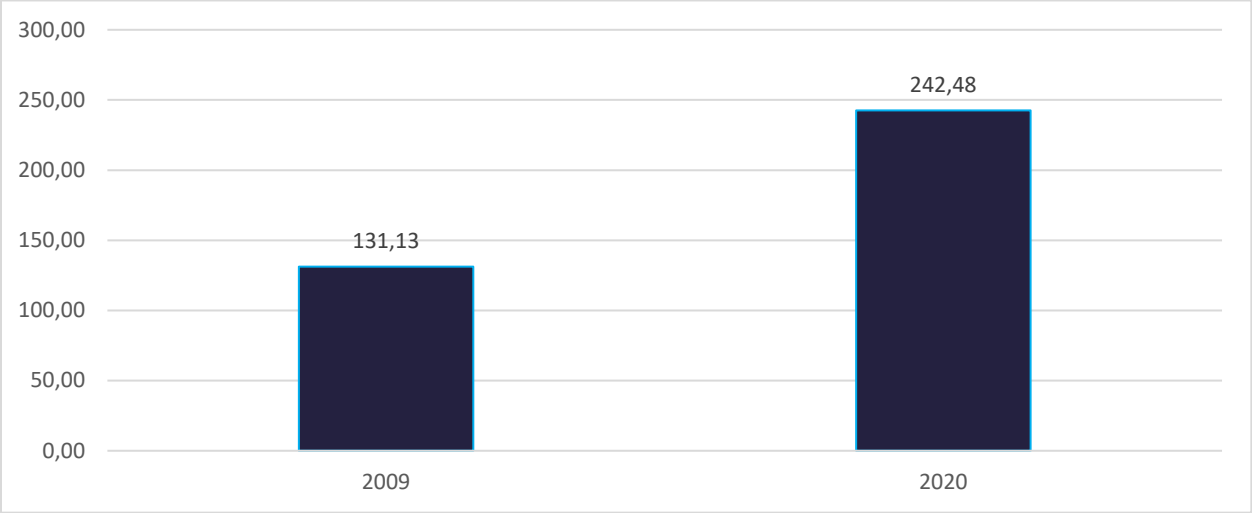
Table 12. Indicator Nr.6 Organic farming: areas with different crops

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	ELSTAT	ELSTAT, Agriculture Census	Area (ha)	2009, 2020	Irregular

Source: Author's own elaboration

Organic farming agricultural area rose by 85% in Western Macedonia during the last decade, according to the agriculture census data presented in Figure 11 The indicator can gauge the introduction and adoption of methods for producing higher quality and higher value products of the sector, in coherence with the efforts of the Region to improve the competitiveness and incomes of farmers.

Figure 11. Organic farming: areas with different crops (ha)



Source: https://ec.europa.eu/eurostat/databrowser/view/EF_SO_MPORG__custom_3464927/default/table?lang=en
https://elstat-outsourcers.statistics.gr/apografi_georgias_21_FINAL_web.pdf

3.4.3 SDG 3 GOOD HEALTH AND WELLIBEING

Table 13. SDG 3 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
3.2 (preventable death of newborns)	13	Infant mortality	↓↓
3.3 (epidemics and diseases)	9	Deaths due to Covid-19	↑
3.8 (universal health coverage)	12	Hospital beds	-
3.c (health financing and recruitment)	10	Self-reported unmet needs for medical examination	↓
3.c (health financing and recruitment)	11	Health personnel	↓

Source: Author's own elaboration

SDG Target 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

Table 14. Indicator Nr.13 Infant mortality

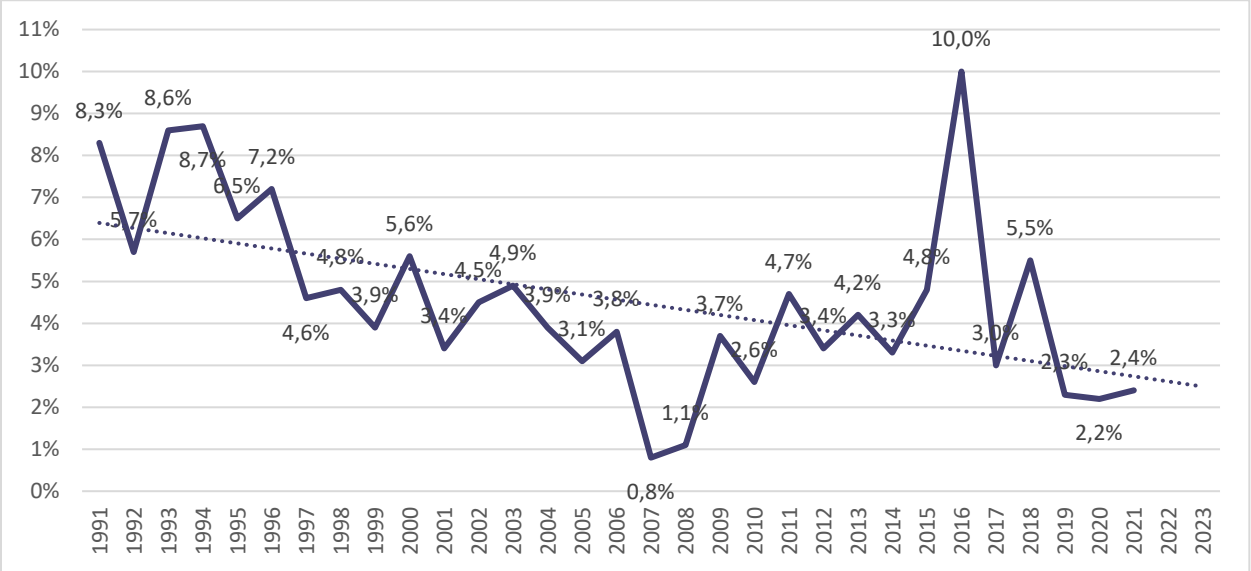
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency

2017	Eurostat, Regional Statistics	Eurostat, Infant mortality rates by NUTS 2 region. Table: DEMO_R_MINFIND	Rate	1991-2021	Annual

Source: Author's own elaboration

Infant mortality in Western Macedonia from 1991 to 2021, as well as during the last five years, shows a steady downward trend, as it is evident in Figure 12. Compared to 1991, in 2021 infant mortality decreased by 71%. This positive development is attributed to improvement in health care infrastructure, equipment and services in the Region. It should be noted that health policy is a central government competence, however it is also funded by the Regional Operational Programmes of the EU Structural Funds.

Figure 12. Infant mortality



Source: https://ec.europa.eu/eurostat/databrowser/view/demo_r_minfind/default/table?lang=en

SDG Target 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

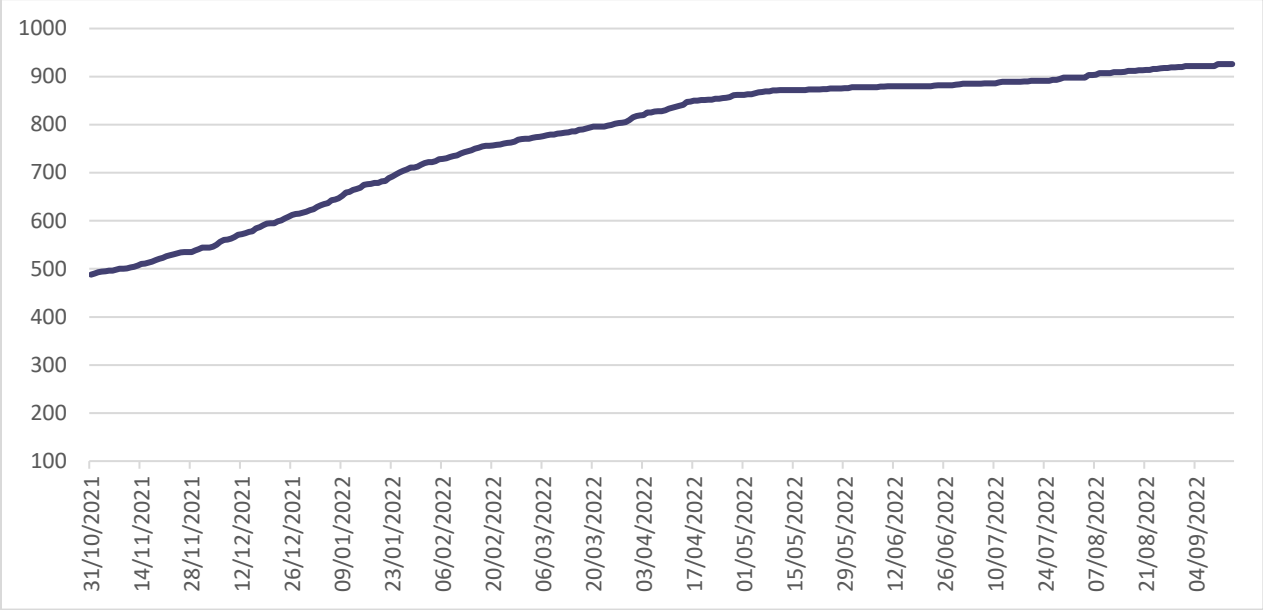
Table 15. Indicator Nr.9 Deaths due to Covid-19

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2023	National Public Health Organization Data	https://github.com/Sandbird/covid19-Greece/blob/master/workbench.csv	Number	2020-2022	Daily

Source: Author's own elaboration

On 30/10/2021, deaths from coronavirus, in the region of Western Macedonia, amounted to 488, from then on and by 14/9/2022, these numbers had risen to 926, i.e. 438 more deaths or 90% increase. The evolution of the COVID deaths, as seen in Figure 13, can be attributed to the national measures to combat the epidemic, the local population attitude towards vaccination, and the ageing population of the Region. During the COVID crisis the Region allocated resources of the Regional Operational Programme 2014-2020 to urgent needs of support of health services.

Figure 13. Deaths due to Covid-19 (cumulative)



Source: https://github.com/Sandbird/covid19-Greece/blob/master/workbench.csv

SDG Target 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

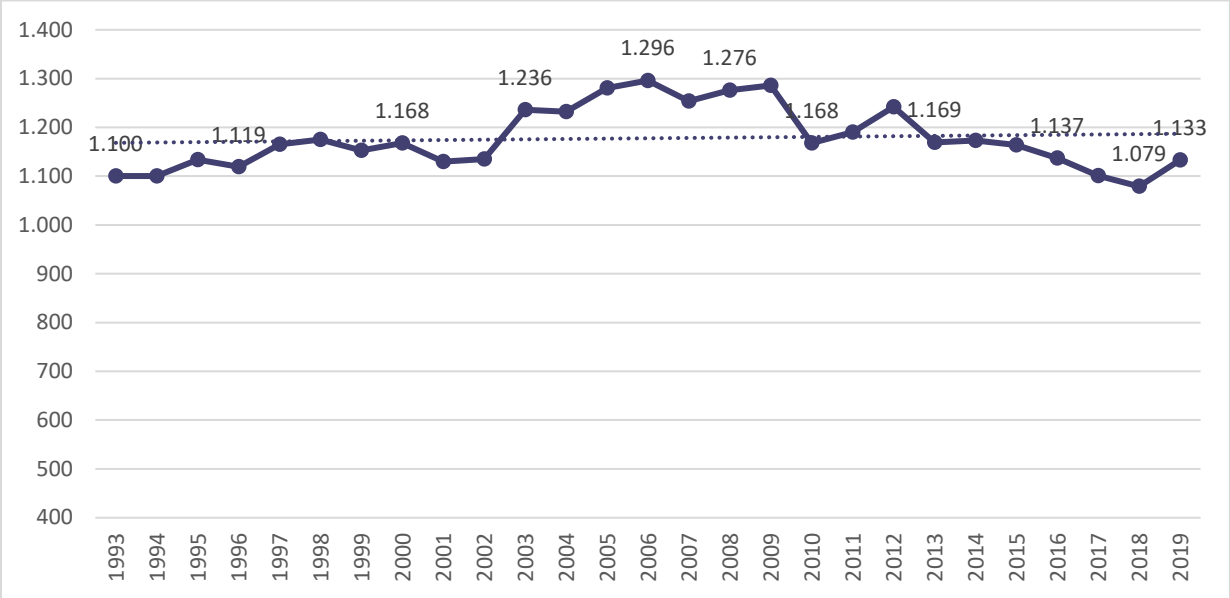
Table 16. Indicator Nr.12 Hospital beds

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2019	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_hlth_care, code BDSRG	Number	1993-2019	2019

Source: Author's own elaboration

Hospital beds during the last five years remain rather stable around the historical average, in Figure 14.. Only during the expansionary economic policies of 2003-2008 did the number exceed 1.200 beds. The Region invests in health infrastructure through the Regional Operational Programmes of the EU Structural Funds according to the regional needs and the National Health Policy and action plans.

Figure 14. Hospital beds



Source: https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_bdsrg/default/table?lang=en

SDG Target 3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

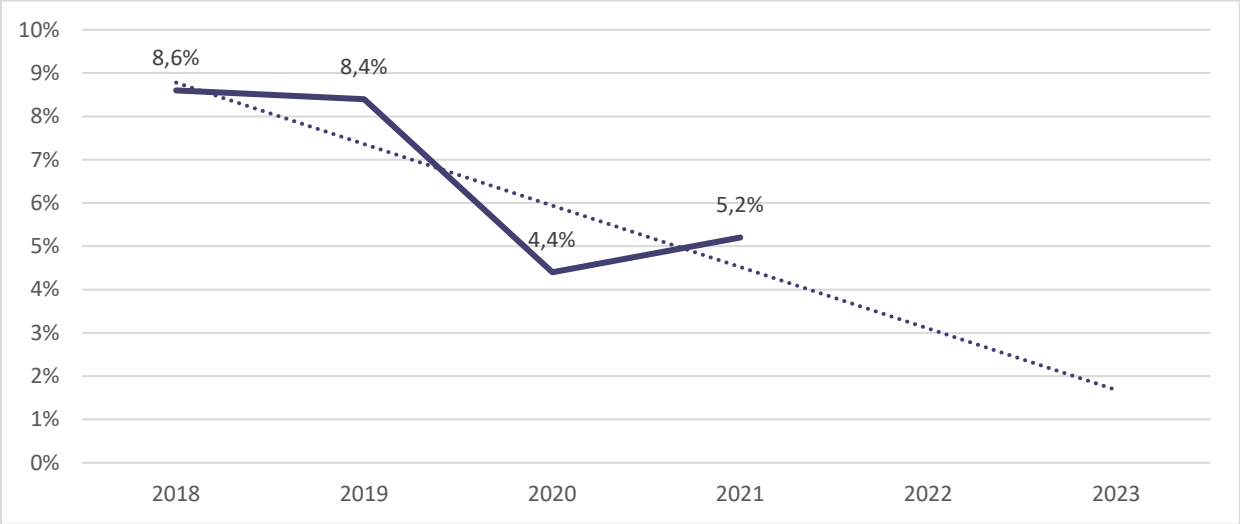
Table 17. Indicator Nr.10 Self-reported unmet needs for medical examination

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	European Union Statistics on Income and Living Conditions (EU-SILC)	Eurostat all data, population and social conditions, health, health care, unmet needs for health care, code: HLTH_SILC_08_R	Percentage	2018-2021	Annual

Source: Author's own elaboration

The percentage of people who have unmet needs for medical examination and particularly due to the following reasons: "too expensive or too far to travel or waiting list", decreased by 40% in the last four years. This sign of improved access to health services should be reflected upon the impacts of the COVID19 pandemic during 2020 and 2021, as well as the investments in health infrastructure, equipment and services from the Regional Operational Programme.

Figure 15. Self-reported unmet needs for medical examination (% population)



Source:
https://ec.europa.eu/eurostat/databrowser/view/HLTH_SILC_08_R__custom_600040/bookmark/table?lang=en&bookmarkId=12aa09d8-ef57-4bfc-b8fb-97db5dd0d8a5

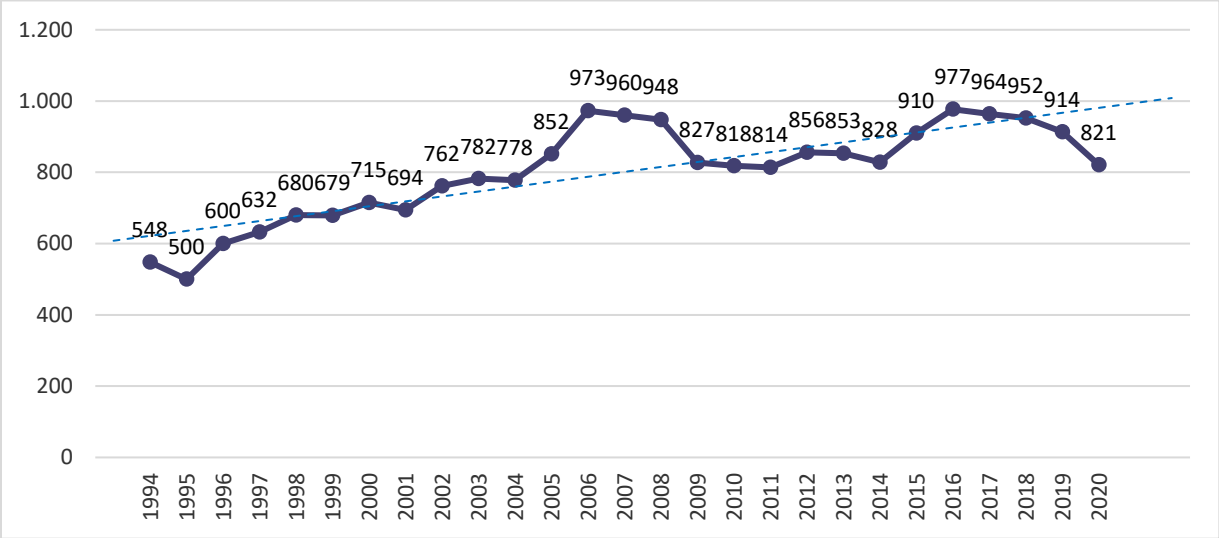
Table 18. Indicator Nr.11 Health personnel

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_hlth_care, code PRSRG	Number	1993-2020	2020

Source: Author's own elaboration

On the long-term health personnel (medical doctors) had seen an increase from 1994 to a peak in 2006 with 973 doctors. A slump followed the austerity policies until 2014 and an upward trend to 2006 levels in 2016, evident in Figure 16. During the last 5 years the health personnel in the Region showed a 16% decline. The recruitment of permanent health personnel for public hospitals is not among the Regional Authority's competences.

Figure 16. Number of medical doctors



Source: https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_prsrg/default/table?lang=en

3.4.4 SDG 4 QUALITY EDUCATION

Table 19. SDG 4 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
4.1 (primary and secondary education)	19	Participation rates in selected education levels	↑↓
4.2 (access to early childhood education)	17	Pupils enrolled in early childhood education	↑
4.3 (vocational and tertiary education)	15	Students enrolled in tertiary education	-
4.3 (vocational and tertiary education)	16	Participation in education	↓
4.3 (vocational and tertiary education)	20a	Participation rate in education and training (last 4 weeks)	↓
4.5 (gender and other disparities in education), 4.6 (youth and adult literacy)	14	Women 30-34 years old with higher education level	↑↑
4.6 (youth and adult literacy)	18	Early leavers from education and training	↓

Source: Author's own elaboration

SDG Target 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

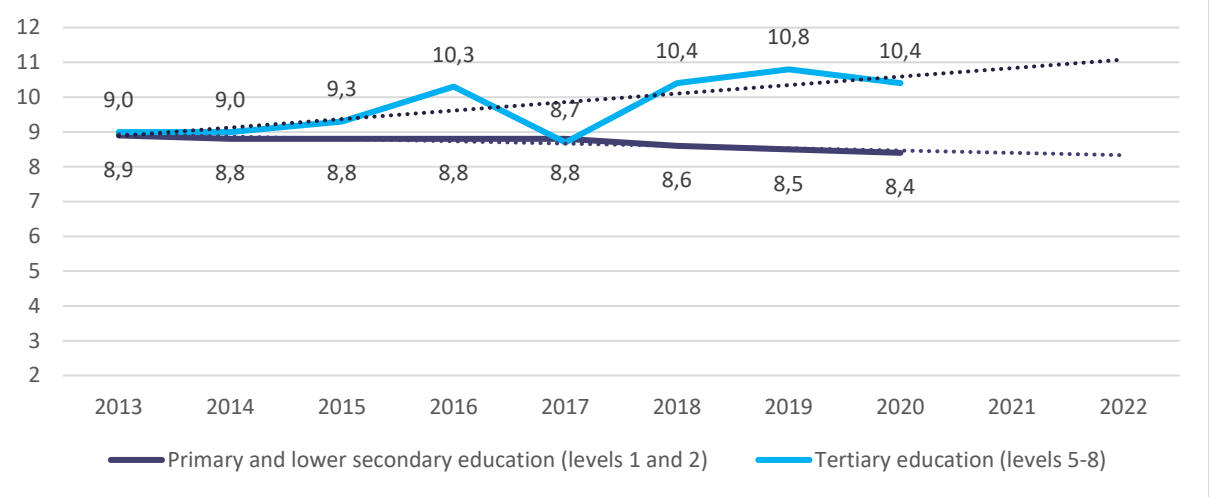
Table 20. Indicator Nr 19. Participation rates in selected education levels

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_educ_11, code EDUC_UOE_ENRA15	Rate	2013-2020	Annual

Source: Author's own elaboration

Participation rates in primary and lower secondary education show a constant slight decrease from 2013, as well as during the last five years (-4,5%), seen in Figure 17. On the other hand, participation in tertiary education shows an upward trend from 2013. However, in the last 5 years participation remains stagnant. Recently, the flagship project of the University of Western Macedonia new campus in Kozani was completed, that can attract more students, local and other.

Figure 17. Participation rates in selected education levels



Source: https://ec.europa.eu/eurostat/databrowser/view/educ_uoe_enra15/default/table?lang=en

SDG Target 4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

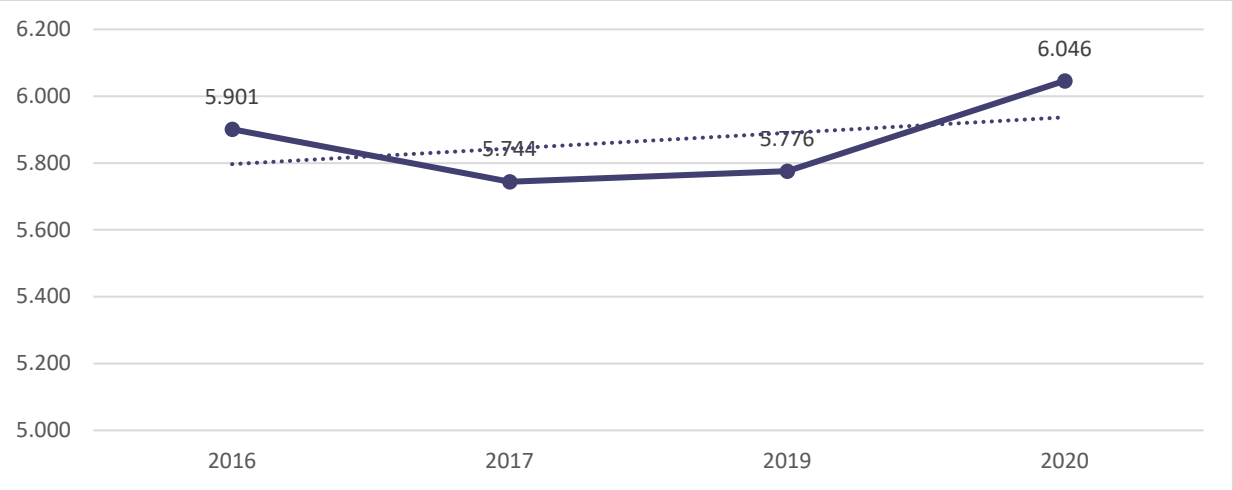
Table 21. Indicator Nr 17. Pupils enrolled in early childhood education

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_educ_11, code EDUC_UOE_ENRP03	Number	2013-2020	Annual

Source: Author's own elaboration

Pupils enrolled in early childhood education rose by 2,4% during the last five years, from 2016 to 2020, as Figure 18 shows. The Region partly financed through the Regional Operational Programme 2014-2020 the national policy measure of vouchers (financial support to families) to improve access to early childhood education and care.

Figure 18. Pupils enrolled in early childhood education



Source: https://ec.europa.eu/eurostat/databrowser/view/educ_uoe_enrp03/default/table?lang=en

SDG Target 4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

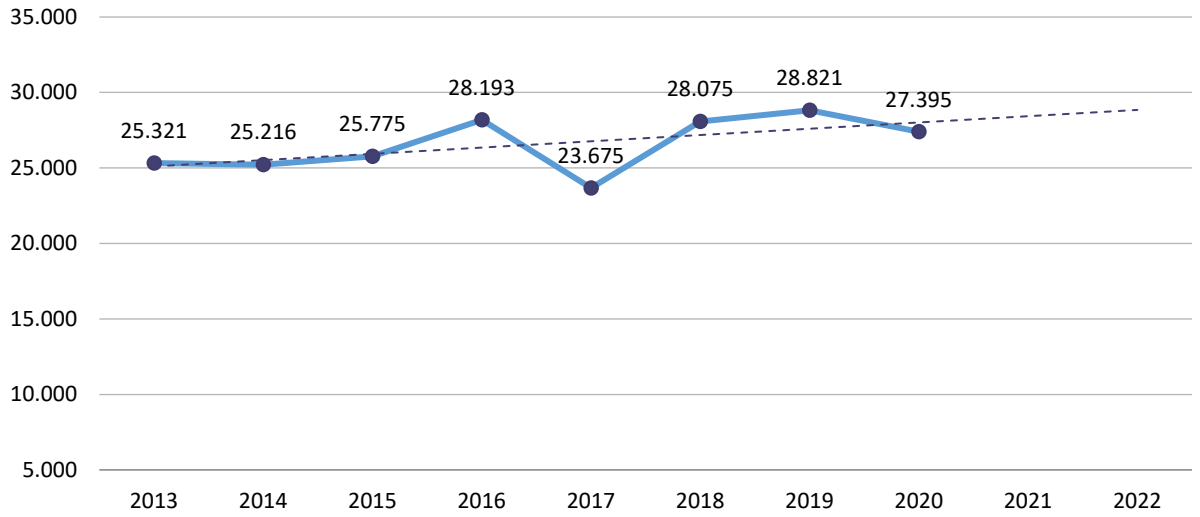
Table 22. Indicator Nr 15. Students enrolled in tertiary education

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_educ_11, code: educ_uoe_entrt06	Number	2013-2020	Annual

Source: Author's own elaboration

Students in tertiary education show an upward trend from 2013, in Figure 19, rising by 8% from 2015 to 2020. However, in the last 5 years participation remains stagnant. The new University of Western Macedonia campus, as well as investments by the Region to other tertiary education infrastructure could help attract more students.

Figure 19. Students enrolled in tertiary education



Source: https://ec.europa.eu/eurostat/databrowser/view/educ_uoe_enrt06/default/map?lang=en

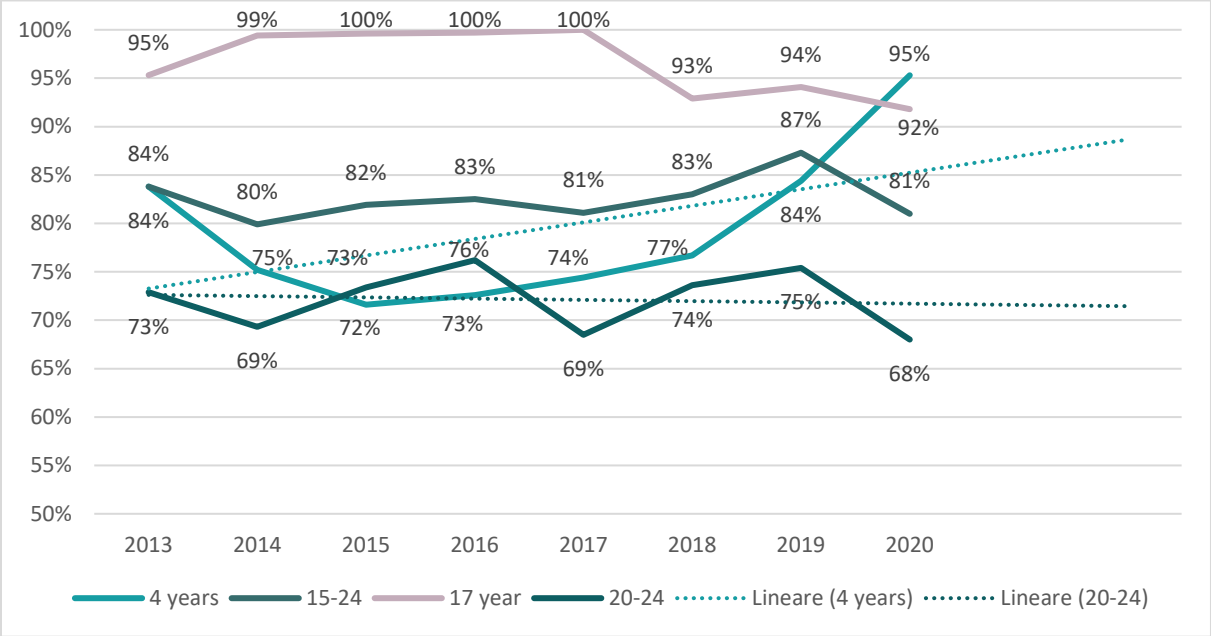
Table 23. Indicator Nr. 16 Participation in education

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_educ, code: educ_uoe_enra14	Rate	2013-2020	Annual

Source: Author's own elaboration

Participation rates of 4-year-old children in primary education is analysed in Figure 20. Rates show a significant upward trend during the last five years, rising by 30%. On the contrary participation of 17-years-olds in secondary education is declining, by 8%, falling below full participation that was achieved for 2015-2017. Young people between 20-24 years-old is the group with the lowest participation rate in education, with declining trends, - 7% in the last five years. The Region promotes measures of inclusive education according to national policy and the National Action Plan for the Rights of Persons with Disabilities.

Figure 20. Participation rates of selected age groups in education



Source: https://ec.europa.eu/eurostat/databrowser/view/EDUC_UOE_ENRA14__custom_3868425/default/table?lang=en

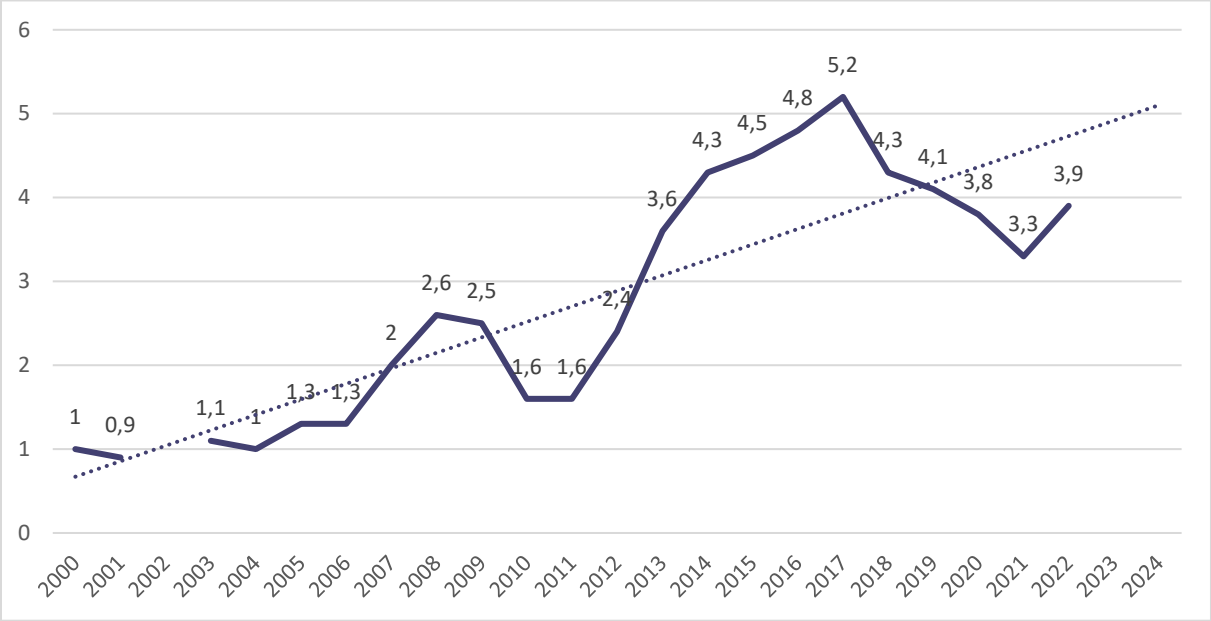
Table 24. Indicator Nr 20a. Participation rate in education and training (last 4 weeks)

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: TRNG_LFSE_04	Rate	2000-2022	Annual

Source: Author's own elaboration

Participation rates of the age class 25-64 in formal and non-formal education and training in RWM have an upward trend since 2000, reaching a peak of 5,2% in 2017. In the last five years a decline was noted, by Figure 21 data, mainly due to COVID19 in 2020-2021, followed by a recovery in the rates in 2022 with 3,9%.

Figure 21. Participation rate in education and training (last 4 weeks) 25-64 years old



Source: https://ec.europa.eu/eurostat/databrowser/view/trng_lfse_04/default/table?lang=en

SDG Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations

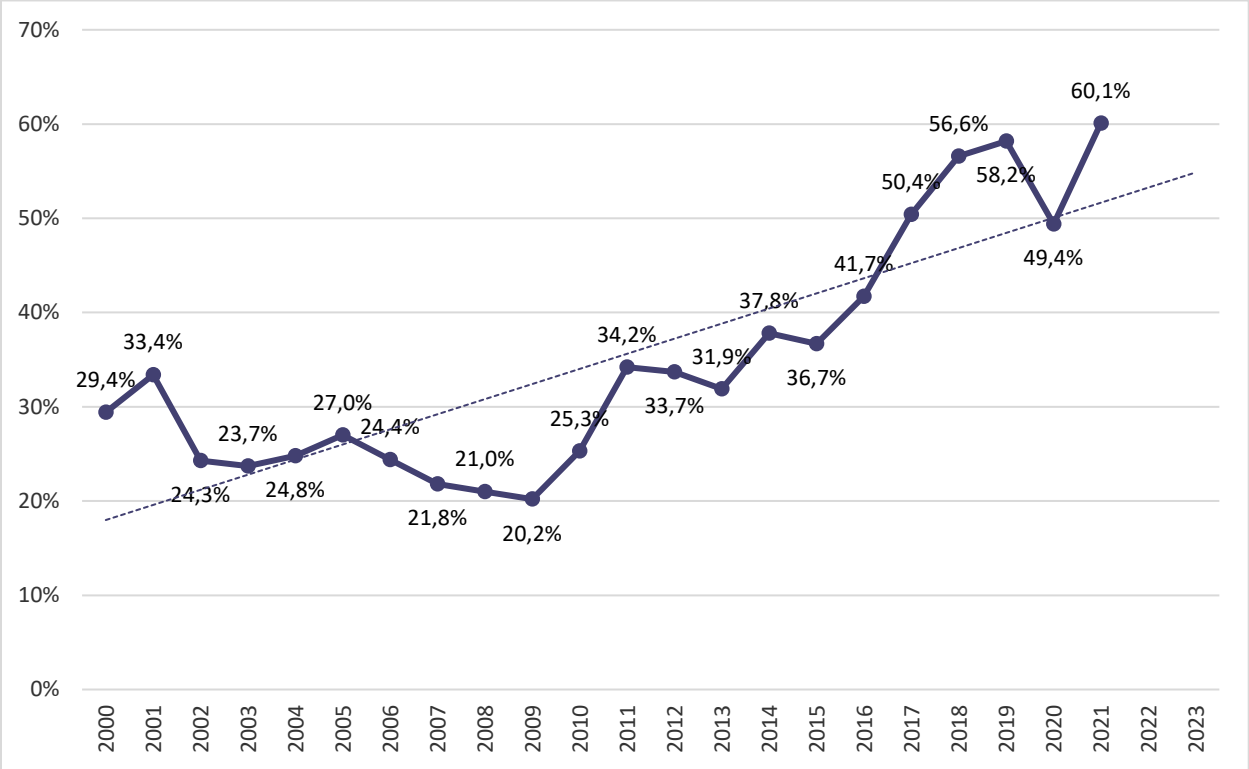
Table 25. Indicator Nr 14. Women 30-34 years old with higher education level

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, Regional Statistics	Eurostat, Regional statistics by NUTS classification. Table: EDAT_LFSE_04	Percentage	2010-2021	Annual

Source: Author's own elaboration

The percentage of women (30- 34 years old) with higher education level shows a significant upward trend since 2000, evident in Figure 22, reaching a peak in 2021 with 60%. During the last five years this change amounts to an increase of 19% of the percentage of women with higher education.

Figure 22. Women 30-34 years old with higher education level



Source: https://ec.europa.eu/eurostat/databrowser/view/EDAT_LFSE_04__custom_5365448/default/table?lang=en

SDG Target 4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

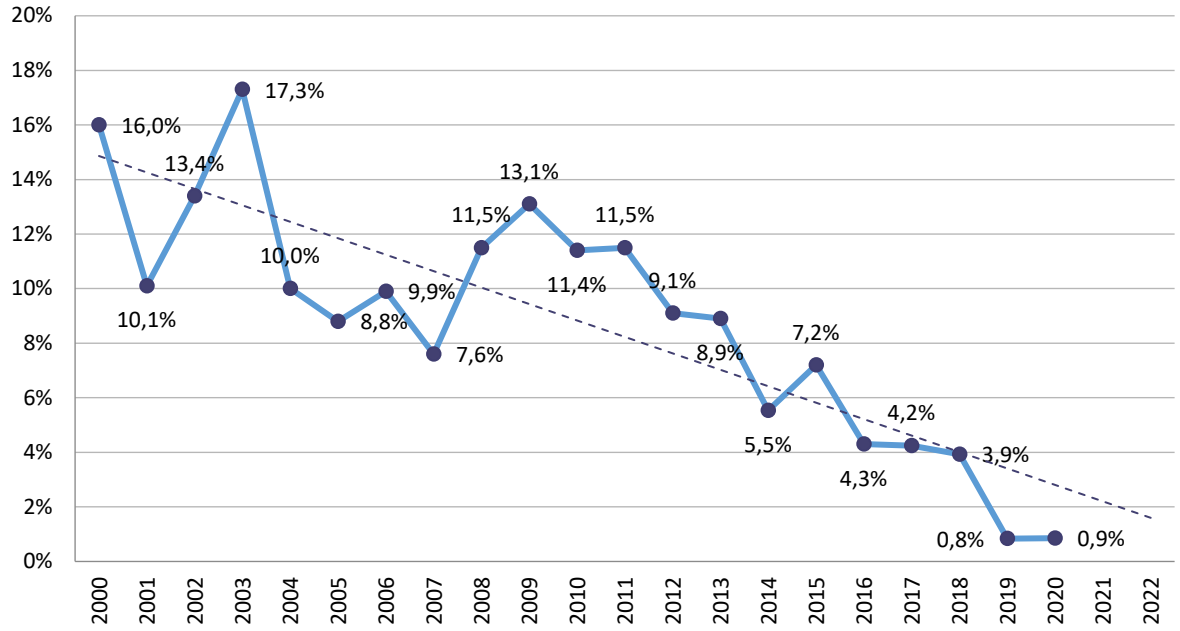
Table 26. Indicator Nr 18. Early leavers from education and training

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	ELSTAT (upon request)	ELSTAT, Labour Force Survey (LFS)	Percentage	2000-2020	Annual

Source: Author's own elaboration

The percentage of early school leavers decreased significantly and steadily from 2000 to 2020 ranged from 7.6% to 17.3%. The change in the last five years amounts to a decline of 79%, evident in Figure 23, reaching an all-time low of early school leavers in 2020 with 0,9%. It Is noted however that due to the small sample data are characterized as unreliable (especially for 2015-2020). The Region implements measures for equal access to and completion of education according to the National Strategy and Action Plan for Roma Social Inclusion and the National Action Plan for the Right of Persons with Disabilities.

Figure 23. % Early leavers from education and training



Source: ELSTAT

3.4.5 SDG 5 GENDER EQUALITY

Table 27. SDG 5 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
5.1 (gender discrimination)	26	Female achievement/disadvantage index	*(1 data point)*
5.2 (gender violence)	21	Fatal victims of gender-based violence at the hands of their partners or ex-partners	n/a
5.2 (gender violence)	22	Victims of violence against women	n/a
5.4 (unpaid work)	24b	Unemployment rate of women	↓↓
5.4 (unpaid work)	27	Gender gap in part-time employment incidence	↓↓
5.5 (women participation and leadership)	23	Female research and development personnel	n/a
5.5 (women participation and leadership)	25	Women in parliament and government	↑↑

Source: Author's own elaboration

SDG Target 5.1 End all forms of discrimination against all women and girls everywhere

Table 28. Indicator Nr 26. Female achievement/disadvantage index

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	JRC	Norlén H., Papadimitriou E., Dominicis l.,Dijkstra L.(2021). Mapping the glass ceiling: The EU regions where women thrive and where they are held back. Monitoring EU regional gender equality with the female achievement and disadvantage indices. European Commission doi:10.2776/07411	Percentage	2021	n/a

Source: Author's own elaboration

The Female Achievement Index (FemAI), presented in Figure 24, assesses the extent of female accomplishments in comparison to the region with the most notable female achievements. It ranges from 0 (indicating the lowest level of achievements) to 100 (representing the highest level of achievements). A higher index value indicates

that women are performing at par with their counterparts in the region with the most exemplary female achievements. FemAI is constructed based on 33 indicators encompassing seven domains: Work and Money, Knowledge, Time, Power, Health, Safety and Trust, and Quality of Life. For 2021 the Female Achievement Index (FemAi) for RWM is equal to 33,60 with lower performance in the dimension of work and money and time.

The Female Disadvantage Index (FemDI) gauges the disparity in outcomes between men and women within a specific region. It quantifies this difference using a scale ranging from 0 to 100, where a score of 0 indicates no disadvantage (best performance) and a score of 100 represents the greatest disadvantage (worst performance). FemDI comprises 30 indicators encompassing seven domains: Work and Money, Knowledge, Time, Power, Health, Safety and Trust, and Quality of Life. Accordingly, the Female Disadvantage Index is equal to 47,92 with lower performance in work and money.

Figure 24. Female achievement/disadvantage index (2021)

Source: https://urban.jrc.ec.europa.eu/regional-gender-equality/?lng=en

SDG Target 5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation

Indicators Nr 21. Fatal victims of gender-based violence at the hands of their partners or ex partners and Nr 22. Victims of violence against women are considered relevant and appropriate to be included in the regional SDG monitoring system, even though at the moment there are no published data at regional level in Greece. Data at national level are available by the Hellenic Police and published in the Yearly Report on Violence against Women of the General Secretariat of Demography, Family Programming and Gender Equality. It is estimated that it is feasible to collect and publish data from Regional General Directorates of Police.

SDG Target 5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate

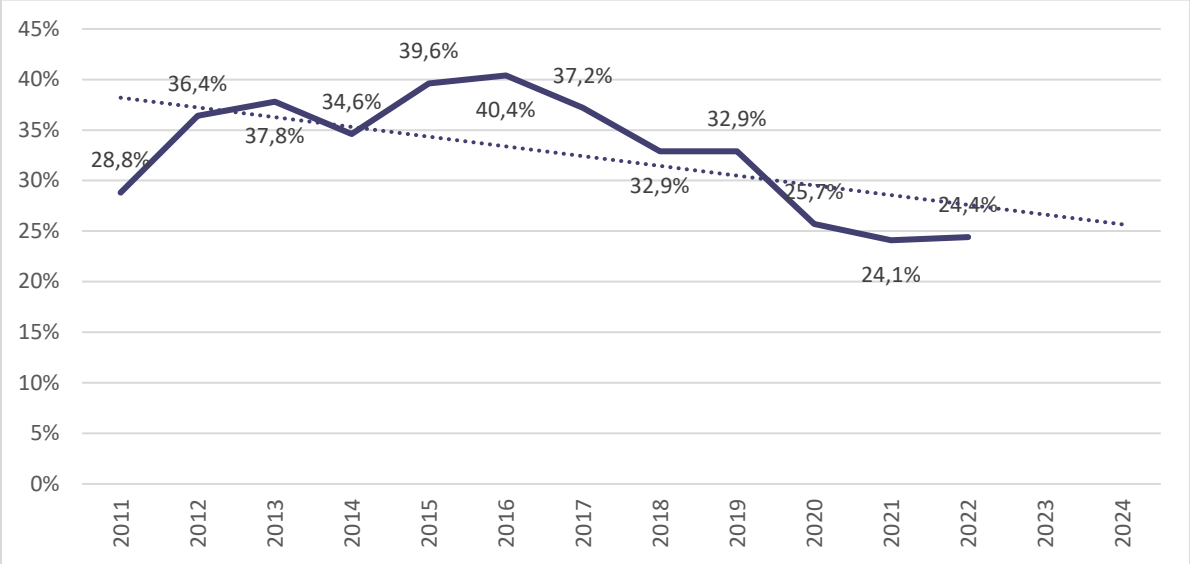
Table 29. Indicator Nr 24b. Unemployment rate of women

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2022	Eurostat	Eurostat, Unemployment rate by NUTS 2 regions, Table: LFST_R_LFU3RT	Percentage	2011-2022	Annual

Source: Author's own elaboration

Unemployment rate of women has a downward trend since 2011, shown in Figure 25, while the decline in the rate during the last five years was 26% and the unemployment of women hit an all-time low in the Region at 24%. The improvement in women unemployment follows the improvement of the labour market and the economic performance of the region since 2020. Additionally, the Region implemented through the Regional Operational Programme measures to promote gender equality and to combat discriminations based on gender, i.e. through structures enabling work – life balance.

Figure 25. Unemployment rate of women



Source: https://ec.europa.eu/eurostat/databrowser/product/view/tgs00010?lang=en

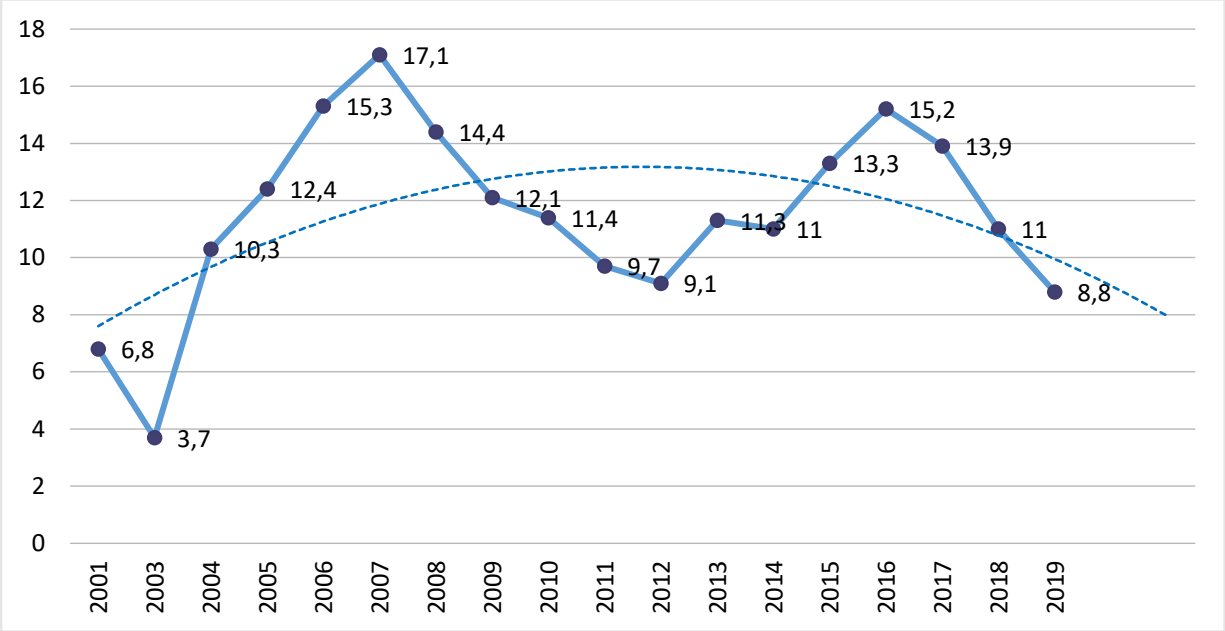
Table 30. Indicator Nr 27. Gender gap in part-time employment incidence

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2019	Organisation for Economic Cooperation and Development (OECD)	OECD, Regional database, variable 'Gender gap in part-time employment incidence'		Percentage	2001-2019

Source: Author's own elaboration

The gender gap in part-time employment incidence has a long-term downward trend (Figure 26) and a sharp decline of 34% during the last five available years (2015-2019) reaching 8,8%. The gender gap in part-time employment reached a peak in 2016, that can be also attributed to the impacts of the financial crisis, while the reduction that follows in the next years can be attributed to improvements in the labour market and measures in the Region that supported work-life balance.

Figure 26. Gender gap in part-time employment incidence



Source: https://stats.oecd.org/ -> Regions and Cities -> Gender gap in part-time employment incidence

SDG Target 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

Indicator Nr 23. Female research and development personnel is considered relevant and appropriate to be included in the regional SDG monitoring system, even though at the moment there are no published data at regional level in Greece. Data at national level are collected and published by the National Documentation Centre. It is estimated that it is feasible to collect and publish data at regional level.

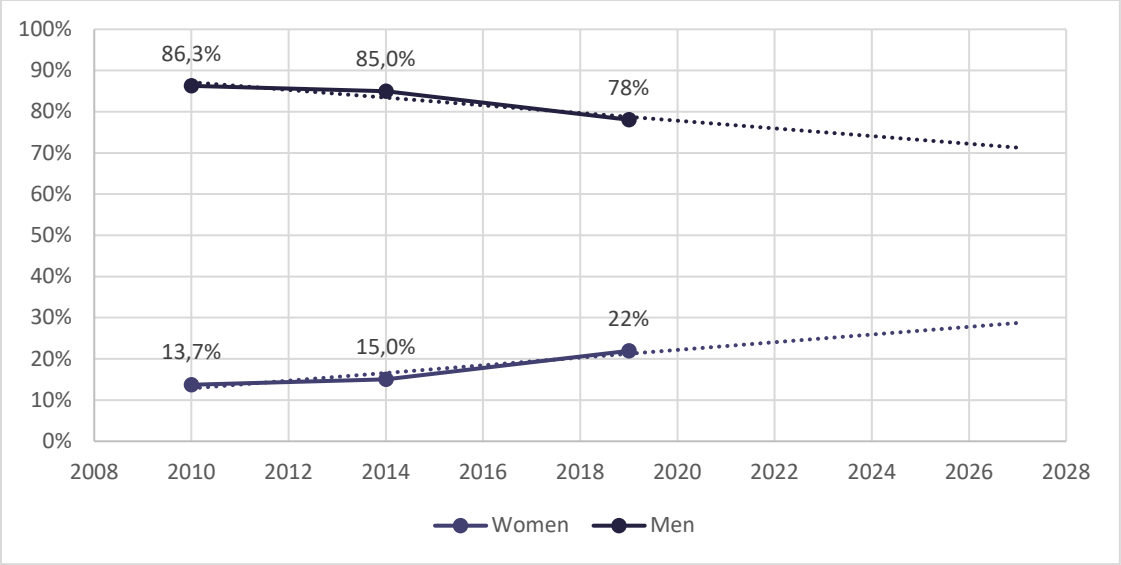
Table 31. Indicator Nr 25. Women in parliament and government

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2019	Region of Western Macedonia	Regional Council composition	Percentage	2010-2019	4-year (local elections cycle)

Source: Author's own elaboration

The percentage of women in the Regional Council improved in the last 3 elections improved by 60%. Thus, the current Regional Council of the RWM consists of 32 men (78%) and 9 women (22%). The introduction of Law 4604/2019 increased the minimum mandatory percentage of women candidates in regional elections for each electoral combination from 30% to 40%. However, the representation of elected women in the Regional Council remains low. Actions to improve women participation in governance and leadership are provided in the Action Plan for Gender Equality 2021-2025 at national level.

Figure 27. Gender representation in the Regional Council of Western Macedonia (%)



Source: Minutes of Meetings of the Regional Council of Western Macedonia

3.4.6 SDG 6 CLEAN WATER AND SANITATION

Table 32. SDG 6 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
6.1 (universal access to water)	30	Population served by safely managed drinking water supply services	n/a
6.3 (water quality)	28	Water bodies that exceed a standardized quality rating	-
6.3 (water quality)	29	Groundwater that exceeds a standardized quality rating	-

Source: Author's own elaboration

SDG Target 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

Indicator Nr 30. Population served by safely managed drinking water supply services is considered relevant and appropriate to be included in the regional SDG monitoring system, even though at the moment there are no published data at regional level in Greece. It is estimated that relevant data at regional level is feasible to be collected from the competent water providers (Municipalities and Municipal Water Companies) and published in the framework of the monitoring mechanism of the National Operational Plan for Drinking Water.

SDG Target 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

Table 33. Indicator Nr 28. Water bodies that exceed a standardized quality rating

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2015	European Environmental Agency	Water Framework Directive River Basin Management Plans	Percentage	2010, 2016	6 years

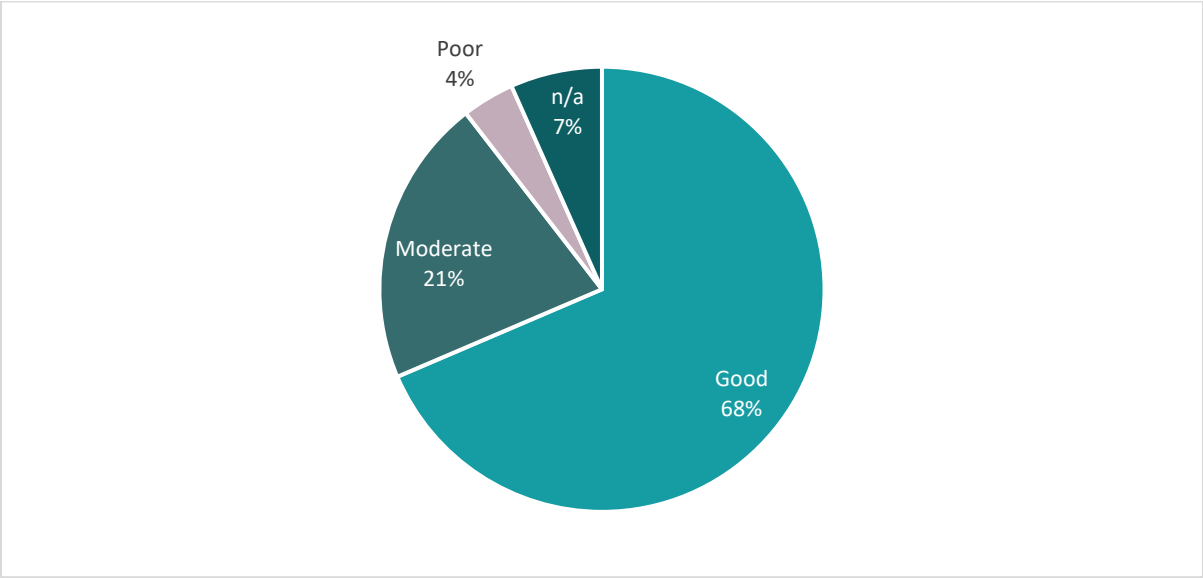
Source: Author's own elaboration

The administrative borders of the RWM include 105 surface water bodies of the Western Macedonia River Basin, which extents also to parts of neighbouring administrative Regions. According to the 2016 River Basin Management Plan (RBMP), 68% have good ecological status, shown in Figure 28, with no change of status since the 2010 RBMP.

The indicator calculates the surface water bodies with good or high ecological status from the first and second River Basin Management Plans (RBMP) of the Water Framework Directive. The RBMP for the river basin district of Western Macedonia includes all the surface of the administrative borders of the Region of Western Macedonia, as well as parts of the Region of Epirus and Central Macedonia. The reported value of the indicator

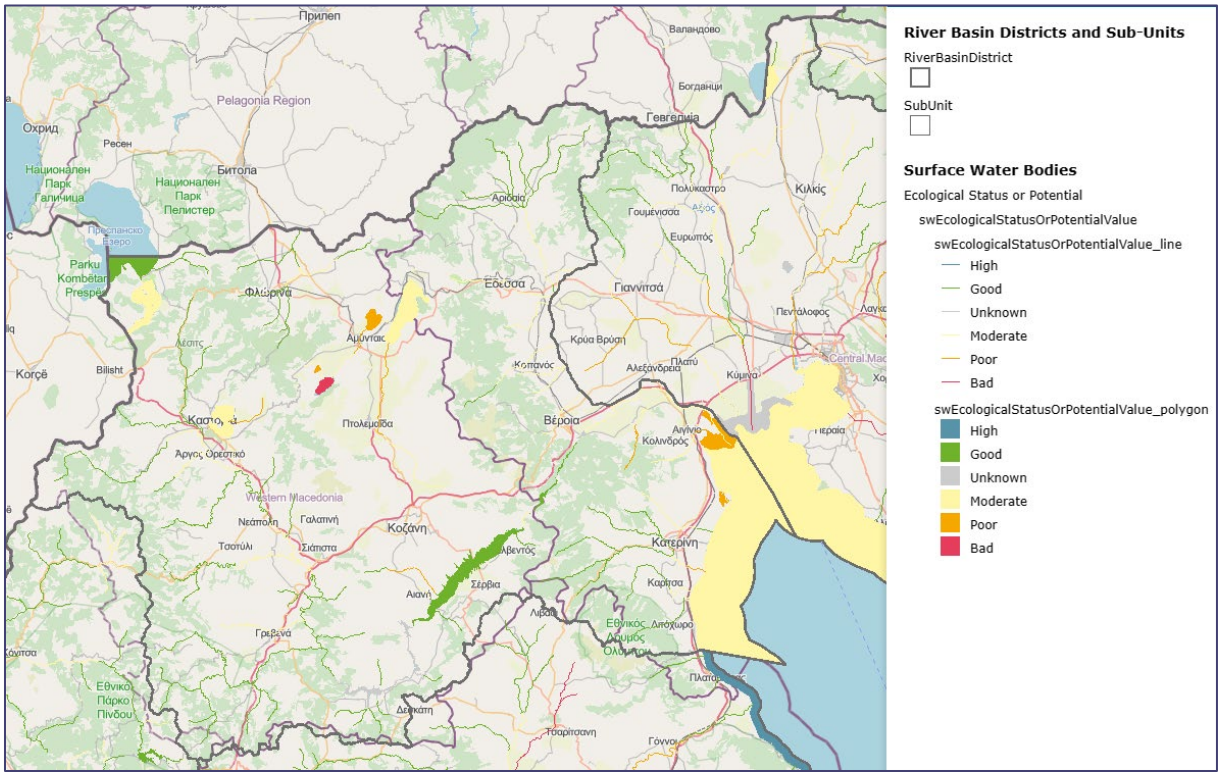
corresponds only to the water bodies of the river basin district of WM that fall within the administrative borders of the Region.

Figure 28. Ecological status of surface water bodies in RWM (%)



Source: own elaboration, https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-framework-directive-2nd-rbmp

Figure 29. Ecological status of Western Macedonia River Basin District surface water bodies



Source: https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-framework-directive-2nd-rbmp

Table 34. Indicator Nr 29. Groundwater that exceeds a standardized quality rating

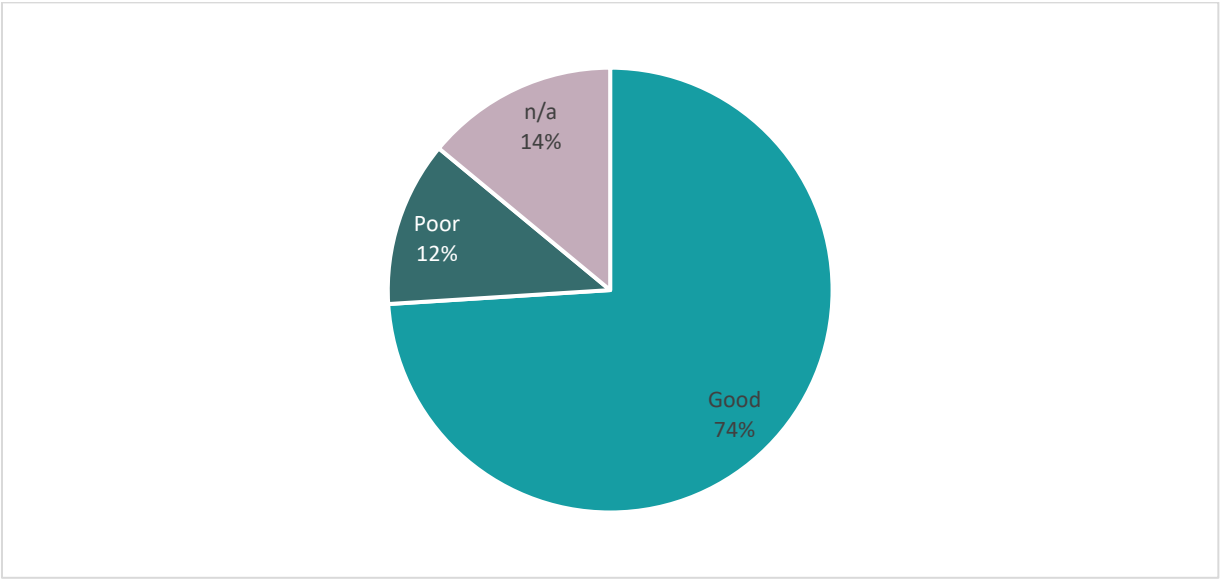
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2015	European Environmental Agency	Water Framework Directive River Basin Management Plans	Percentage	2010, 2016	n/a

Source: Author's own elaboration

Likewise, according to the 2016 RBMP, there are 50 groundwater bodies and 74% of them have good ecological status, according to Figure 30.

The indicator calculates the surface water bodies with good or high ecological status from the second River Basin Management Plans (2016)) of the Water Framework Directive. The RBMP for the river basin district of Western Macedonia includes all the surface of the administrative borders of the Region of Western Macedonia, as well as parts of the Region of Epirus and Central Macedonia. The reported value of the indicator corresponds only to the groundwater bodies of the river basin district of WM that fall within the administrative borders of the Region.

Figure 30. Ecological status of groundwater bodies in RWM (%)



Source: own elaboration, https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-framework-directive-2nd-rbmp

3.4.7 SDG 7 AFFORDABLE AND CLEAN ENERGY

Table 35. SDG 7 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
7.1 (access to energy)	35	People affected by energy poverty	↑
7.2 (share of renewable energy)	33a.	Installed power that comes from renewable energy sources	↑↑
7.3 (energy efficiency)	34	Energy intensity	n/a

Source: Author's own elaboration

SDG Target 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services

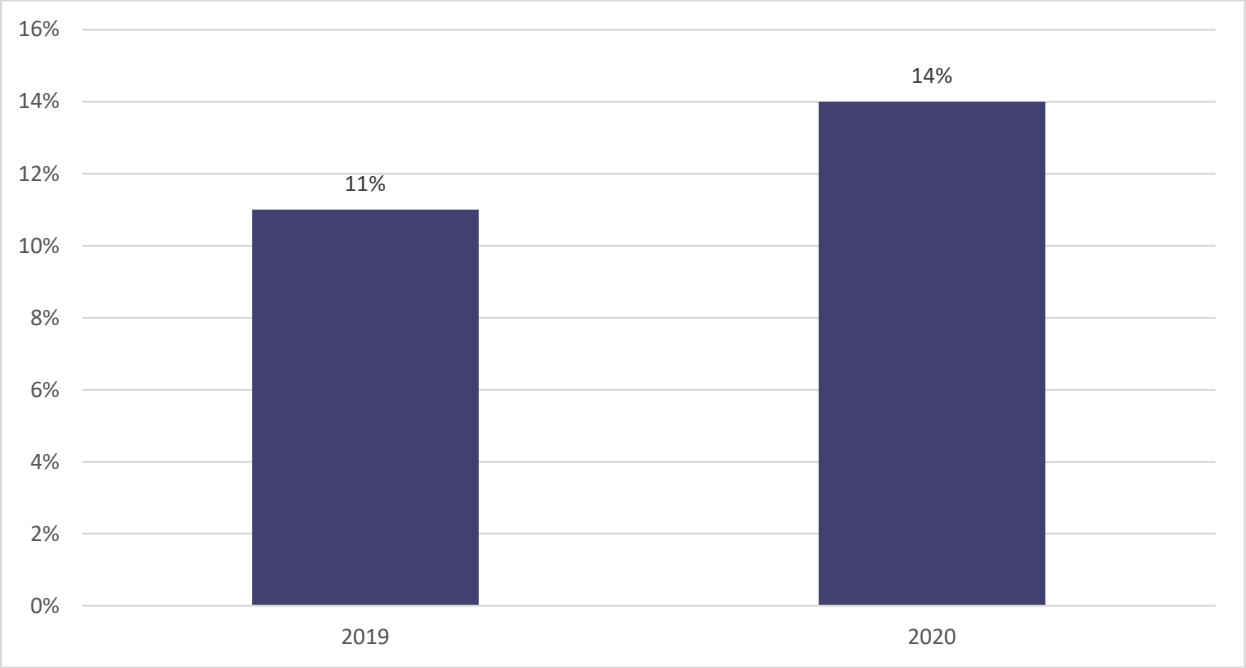
Table 36. Indicator Nr.35 People affected by energy poverty

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Ministry of Environment and Energy	Action Plan to Combat Energy Poverty and Annual Progress Reports	Percentage	2019, 2020	Annual

Source: Author's own elaboration

According to the (national) Action Plan to Combat Energy Poverty and the Annual Report 2021, the percentage of households affected by energy poverty in the Region reached 14%, an increase by 27% from 2019 to 2020. Households in the RWM will also be affected by the decarbonization of its energy sector, in terms of lost jobs and incomes, possibly exacerbating their energy difficulties. Thus, prevention and addressing of energy poverty will be promoted through actions of the Territorial Plan for Just Transition Development of the Region, mainly through energy upgrades of residential buildings and self-consumption from RES.

Figure 31. Households affected by energy poverty



Source: https://ypen.gov.gr/wp-content/uploads/2021/08/%CE%A3%CE%94%CE%95%CE%95_03.08.2021.pdf

SDG Target 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

Table 37. Indicator Nr.33a Installed power that comes from renewable energy sources

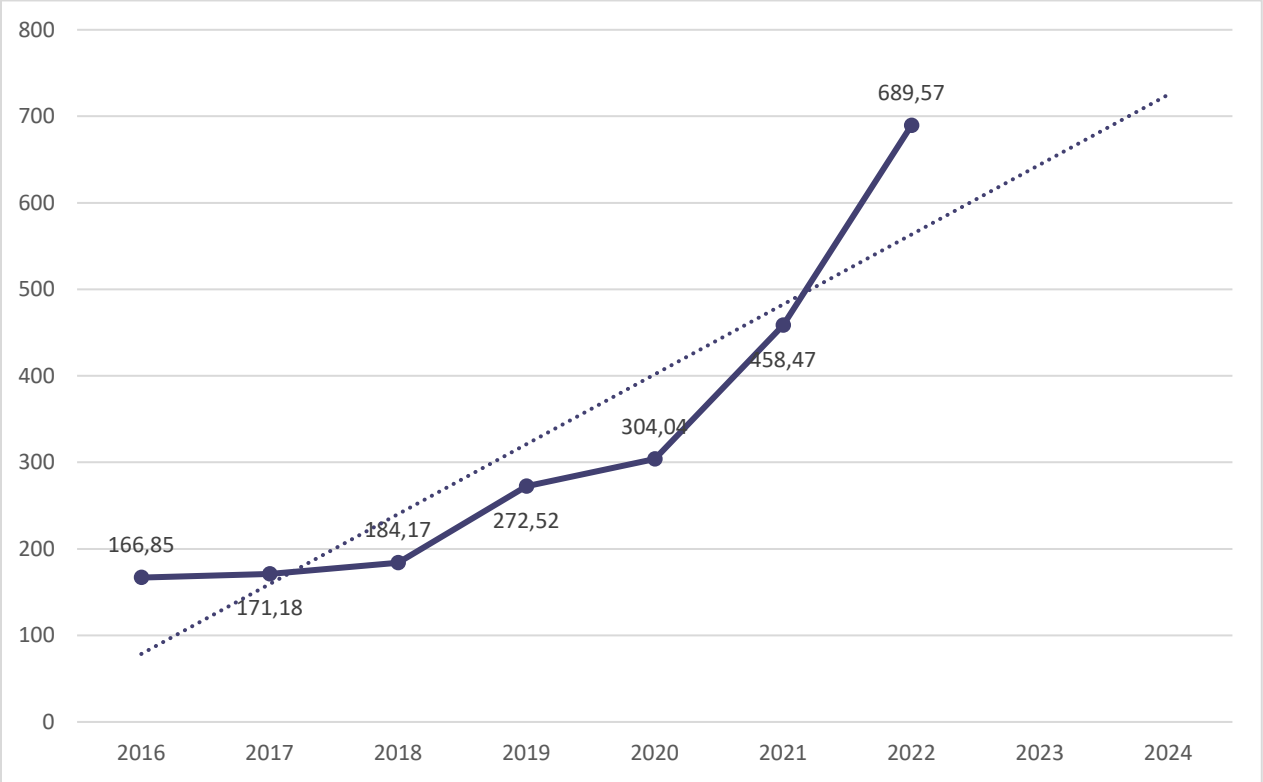
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2019	Administrator of Renewable Energy Sources and Guarantees of Origin SA (DAEEP SA)	DAEEP SA, RES Summary information bulletin	Number (MW)	2016-2022	monthly

Source: Author's own elaboration

Given the fact that the Region of Western Macedonia was the main electricity producer of the country (using lignite), great emphasis has been placed on the transition of production from fossil fuels to renewable energy sources. Thus, as it becomes clear from Figure 32, the installed capacity of RES (in MW) follows an increasing trend over the years. Specifically, in 2016, the installed capacity from RES amounted to 167 Mw, while in 2022 (until May) to 690 Mw, an increase of 313%.

The indicator is calculated from the monthly summary information bulletin by adding the data on installed power capacity from different RES per region (P/V, biomass, wind, small hydroelectric, cogeneration of electricity-heat).

Figure 32. Distribution of installed power from RES (in Mw)



Source: https://www.dapeep.gr/dimosieuseis/sinoptiko-pliroforiako-deltio-ape/

Figure 33. Distribution of Electricity Production from RES (in Mw)

Technology	2021	2022 (until May)
Photovoltaic Cells	**16.939** MWh	**63.828** MWh
Onshore wind farm	**53.362** MWh	**18.905** MWh
Small Hydroelectric Plants	**9.053** MWh	**6.636** MWh
Biogass/ Biomass	**1.143** MWh	**1.038** MWh

Source: Author's own elaboration

SDG Target 7.3 By 2030, double the global rate of improvement in energy efficiency

Indicator Nr 34. Energy intensity is considered relevant and appropriate to be included in the regional SDG monitoring system, even though at the moment there are no published data at regional level in Greece. Data at national level are calculated and published by ELSTAT in the framework of the National SDGs Monitoring System.

3.4.8 SDG 8 DECENT WORK AND ECONOMIC GROWTH

Table 38. SDG 8 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
8.1 (economic growth)	41	GDP at current market prices	↓
8.2 (economic productivity)	42	GVA at basic prices	↓
8.3 (job creation)	39a	Number of firms	↓
8.5 (productive employment)	37	Economic activity	↓
8.5 (productive employment)	38	Unemployment	↓↓
8.5 (productive employment)	40	Employment	↑
8.5 (productive employment)	43	Long-term unemployment (12 months and more)	↓↓
8.5 (productive employment)	44	Compensation of employees	↓↓
8.6 (youth not in employment, education or training)	45	Young people neither in employment nor in education and training	↓↓
8.8 (labour rights)	36	Occupational accidents	↓

Source: Author's own elaboration

SDG Target 8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

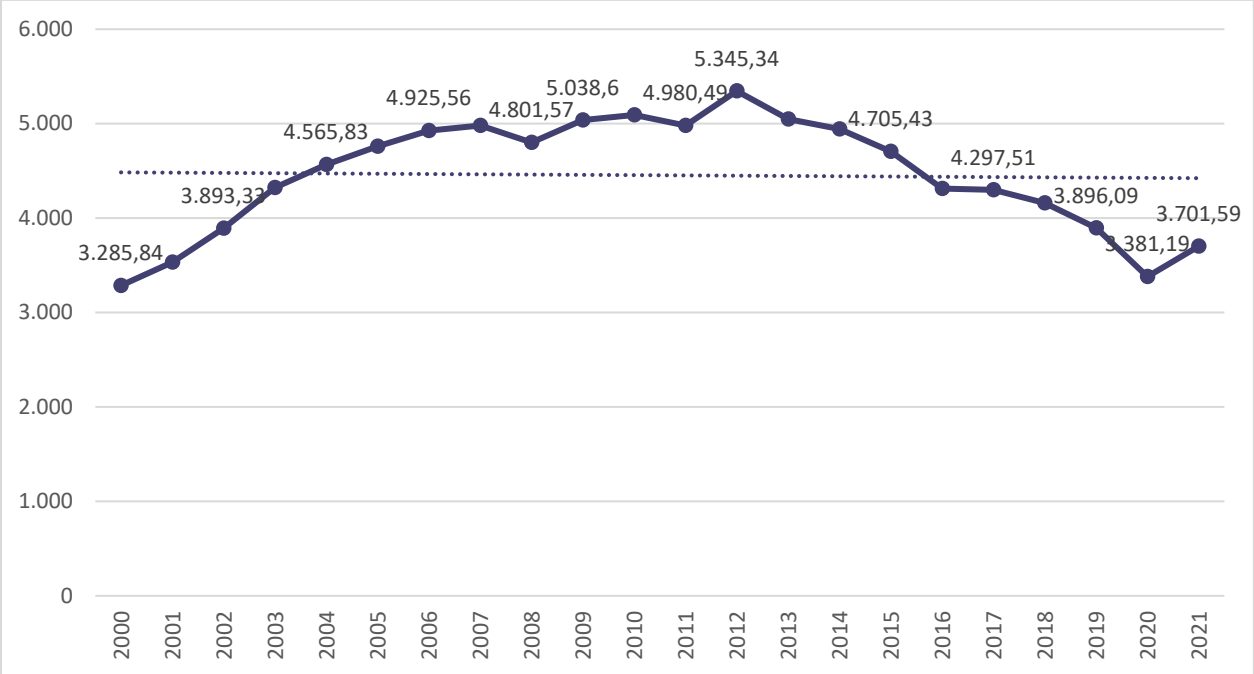
Table 39. Indicator Nr.41 GDP at current market prices

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_eco10gdp, code NAMA_10R_2GDP	Number (million €)	2000-2021	Annual

Source: Author's own elaboration

GDP of Western Macedonia had an upward evolution from 2000 until reaching a peak in 2012, mainly due to the economic benefits and spillover effects of its lignite energy production sector. Since then, however, the economic crises and austerity policies in Greece, followed by the EU and national energy policy decisions for decarbonization, dealt a heavy blow to the economy, evident from the decrease of the GDP by 55% from 2012 to 2020, in Figure 34. However, from 2020 to 2021, even though the pandemic dampened economic activity, there are signs of economic recovery, while the GDP rose by 9.5%.

Figure 34. Gross domestic product (GDP) at current market prices (million €)



Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_2gdp/default/table?lang=en

SDG Target 8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

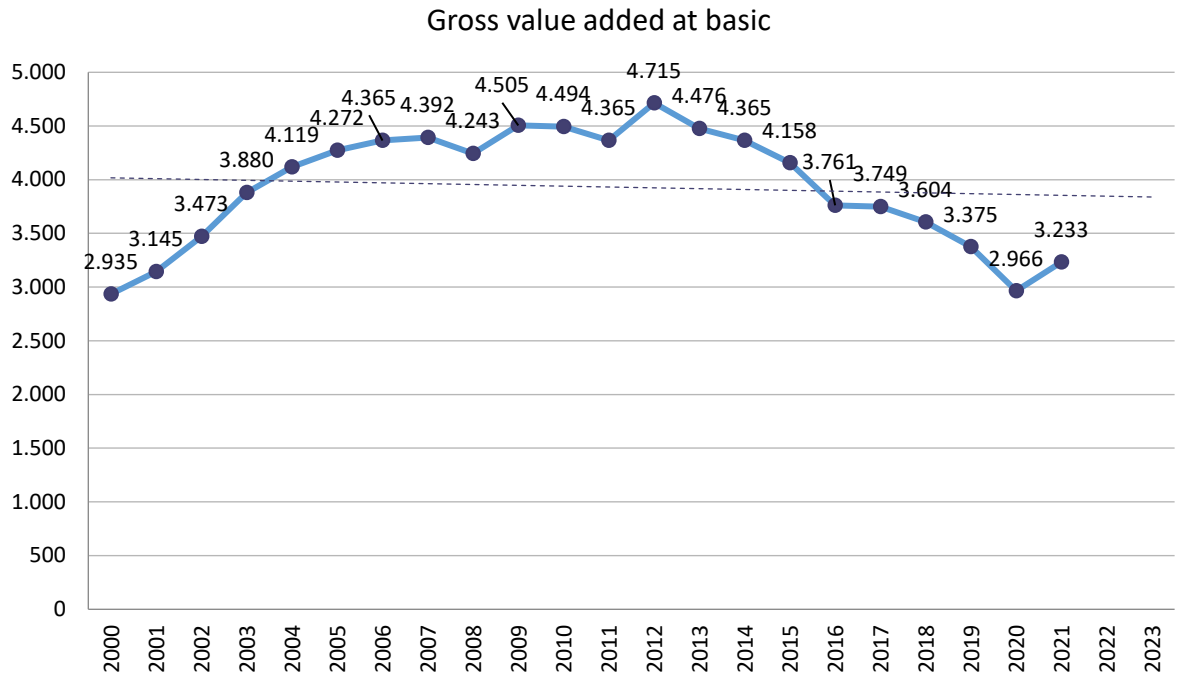
Table 40. Indicator Nr.42 GVA at basic prices

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_eco10brch, code NAMA_10R_3GVA	Number (million €)	2000-2021	Annual

Source: Author's own elaboration

The trend and evolution of the GVA of the Region follows that of the GDP, depicted in Figure 35. From the peak of 2012 till 2020 the GVA fell by 37%, then similarly to GDP, the GVA rose by 9% in 2021. The RWM development priorities for 2021-2027 (as expressed in the Territorial Just Transition Plan and the Regional Operational Programme) include the diversification of its economy base and the energy sector towards digital technologies, green hydrogen, energy storage, circular economy, agro-food, materials, creative industries, culture and sustainable tourism, through RDTI investments.

Figure 35. Gross value added at basic prices (million €)



Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3gva/default/table?lang=en

SDG Target 8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

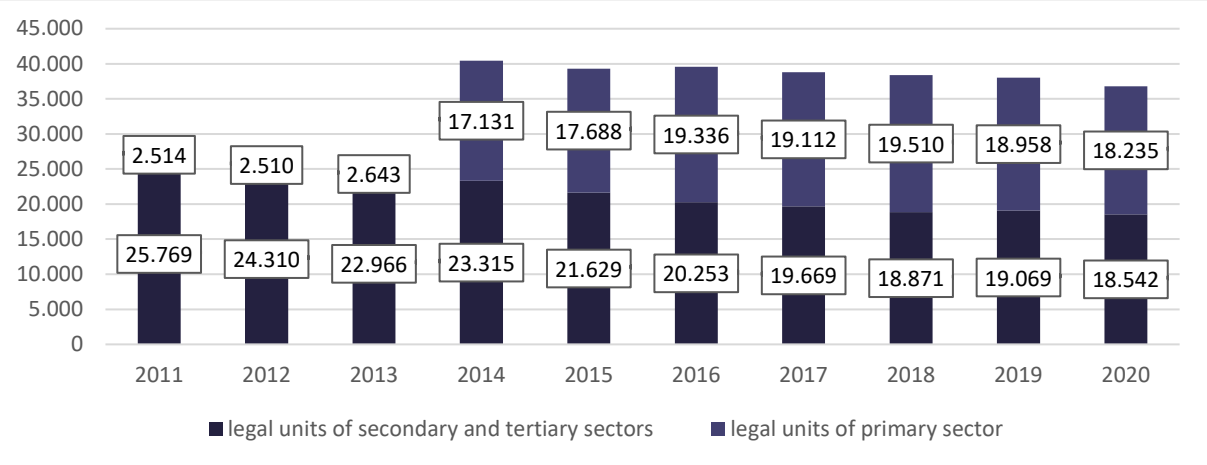
Table 41. Indicator Nr.39a Number of firms

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	ELSTAT	ELSTAT, Statistical Business Register	Number (legal units)	2011-2020	Annual

Source: Author's own elaboration

Business demography in the RWM seems to have a negative sum each year, as the total number of firms is steadily diminishing since 2011, evident in Figure 36. As long as it regards the primary sector, there is a significant change in legal units between 2013 and 2014 (from 2,643 in 2013 to 17,131 to 2014, i.e., an increase of 548%) mainly due to the change in the way legal units of the primary sector are being recorded. On the other hand, secondary and tertiary legal units have been steadily declining over the years, with a reduction of 8% during the last five (2016-2020) reaching 18.542 units. The Region supports SMEs competitiveness and creation with state aid actions through grants of the Regional Operational Programme and the JTP.

Figure 36. Number of firms (legal units)



Source: https://www.statistics.gr/el/statistics/-/publication/SBR01/-

SDG Target 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

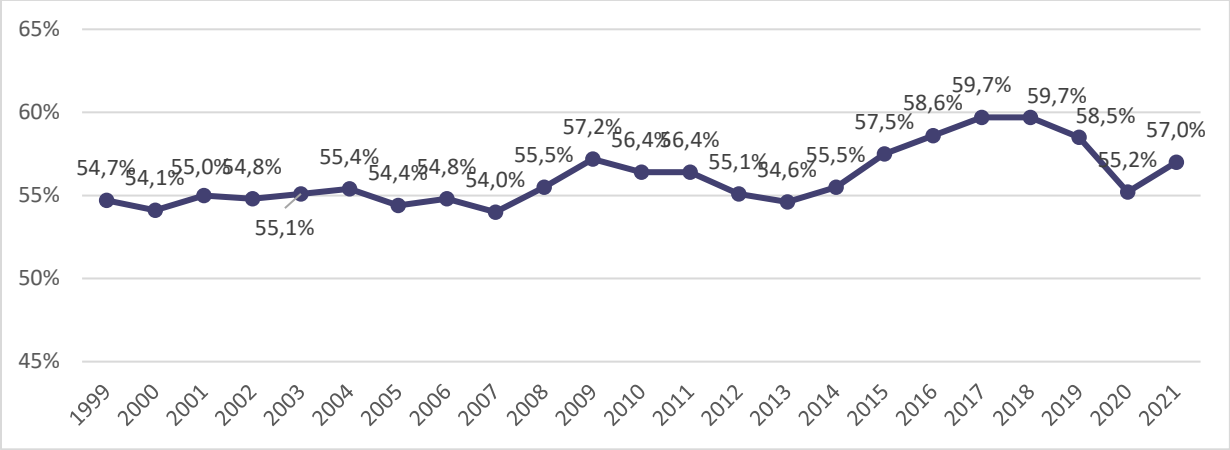
Table 42. Indicator Nr. 37 Economic activity

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: LFST_R_LFP2ACT	Rate	1999-2021	Annual

Source: Author's own elaboration

Economically active population in the RWM remained stable from 1999 to 2014 at around 55% following an increase to 59,7% be 2017, as shown in Figure 37. In the last five years economic active population saw a slump in 2020, due to the COVID19 pandemic and a rebound in 2021 to 57% or 111,6 thousand people. The implementation of the Territorial Just Transition Plan and of the Programme Western Macedonia 2021-2027 in the following years, with the availability of significant funds for investments, support the positive outlook for the regional economy.

Figure 37. Economic active population (%)



Source: https://ec.europa.eu/eurostat/databrowser/view/lfst_r_lfp2act/default/table?lang=en

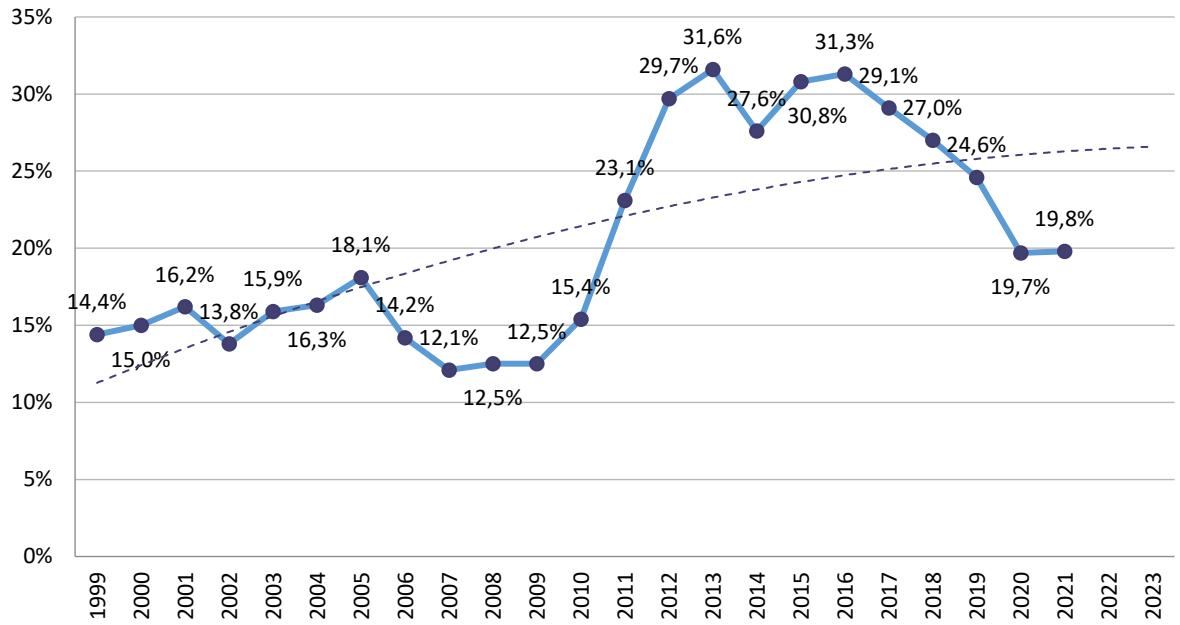
Table 43. Indicator Nr.38 Unemployment

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat	Eurostat, Unemployment rate by NUTS 2 regions Table: LFST_R_LFU3RT	Rate	1999-2021	Annual

Source: Author's own elaboration

The RWM faces high unemployment rates, in the aftermath of the economic crisis of 2009 and the recession of the Greek economy in the following years. After reaching a record high of 31% in 2016 there is a sharp decline of unemployment rates in the last five years reaching 19,8% in 2021, emphasized in Figure 38. However, still the Region ranks first in the country and among the regions with the highest unemployment in EU. The impact of the decarbonization process and the decommissioning of lignite power plants on unemployment is estimated to be significant[14]. Mitigation measures funded be the Territorial Just Transition Plan and of the Programme Western Macedonia 2021-2027 are estimated to stabilize further impacts in unemployment.

Figure 38. Unemployment rate (%)



Source: https://ec.europa.eu/eurostat/databrowser/view/tgs00010/default/table?lang=en

Table 44. Indicator Nr.40 Employment

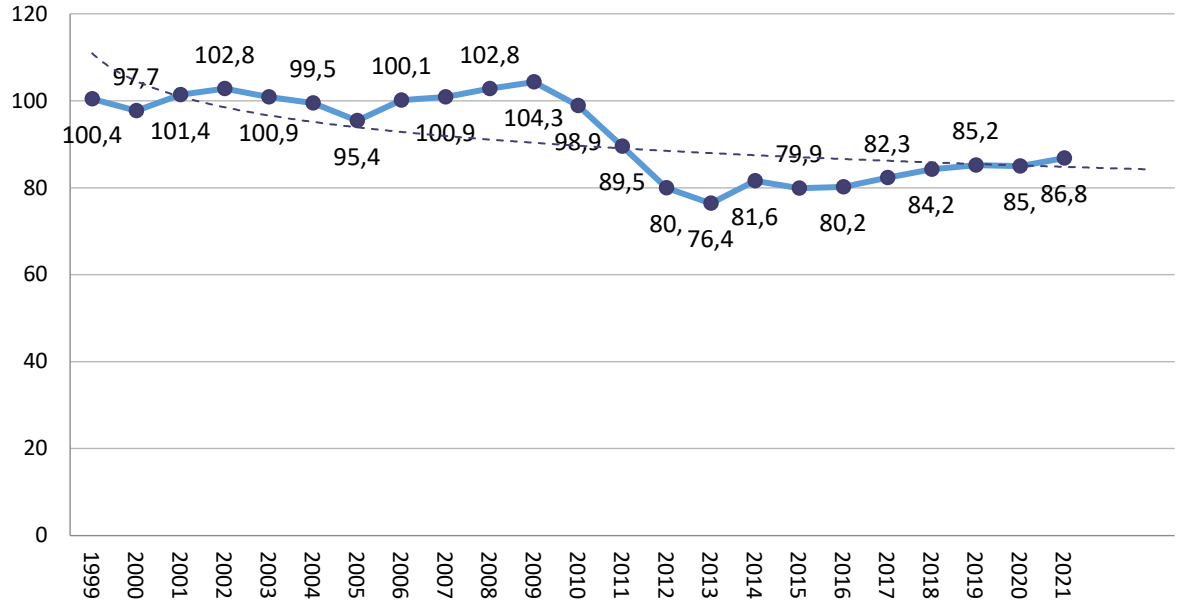
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_lmk_lfst_r_lfemp, code LFE2EMP	Number (1.000 persons)	1999-2021	Annual

Source: Author's own elaboration

The number of employed people in the Region was in a declining trend from 1999 to post economic crisis 2013. However, an upward trend begins to show since 2016 and the increase of the last 5 years (2017-2021) is 5,5%, as shown in Figure 39. The improving regional economy as well as investment in SMEs and human resources by the Regional Operational Programme 2014-2020 are relevant to the increase in employed people.

[14] Loss of 11.000 work places according to the Territorial Plan for Just Development Transition RWM

Figure 39. Employment (1.000 persons)



Source: https://ec.europa.eu/eurostat/databrowser/view/lfst_r_lfe2emp/default/table?lang=en

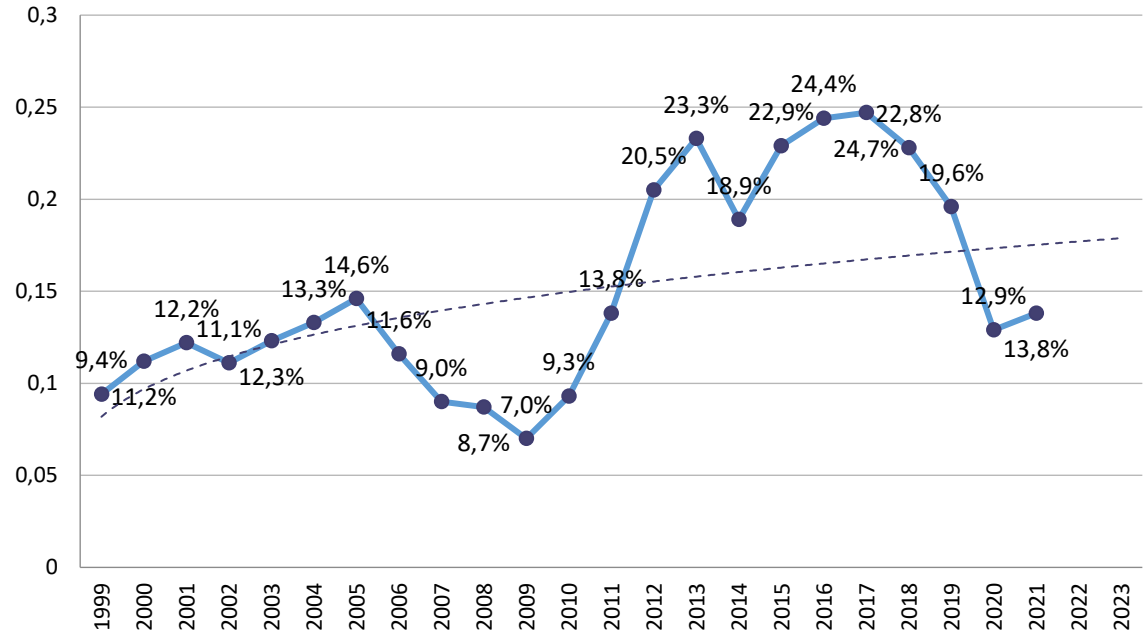
Table 45. Indicator Nr. 43 Long-term unemployment (12 months and more)

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_lmk_lfst_r_lfu, code LFU2LTU	Rate	1999-2021	Annual

Source: Author's own elaboration

Long- term unemployment, depicted in Figure 40, follows the pattern of unemployment rates in the RWM. It rose exponentially after 2009 as a consequence of the economic crisis. After 2017 though the percentage followed a downward trend from 24.7% to 13,8% in 2021, still in high levels.

Figure 40. Long-term unemployment (12 months and more) (%)



Source: https://ec.europa.eu/eurostat/databrowser/view/lfst_r_lfu2ltu/default/map?lang=en

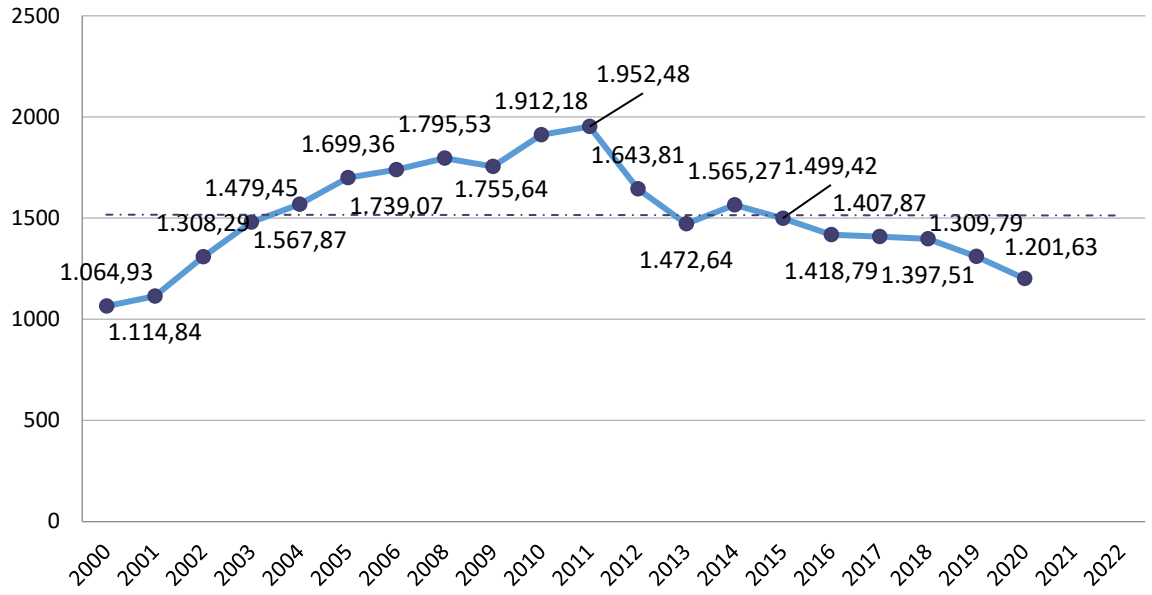
Table 46. Indicator Nr.44 Compensation of employees

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_eco10brch, code: NAMA_10R_2COE	Number (million €)	2000-2020	Annual

Source: Author's own elaboration

Compensation of employees rose during the economic development of the 2000's, reaching a peak of mil. € 1.952 in 2011. Then after the economic crisis and the implementation of economic austerity measures in Greece the compensation had a constant downward trend reaching mil. € 1.201 in 2020, a decline of 17% in the last five years.

Figure 41. Compensation of employees (million €)



Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_2coe/default/table?lang=en

SDG Target 8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training

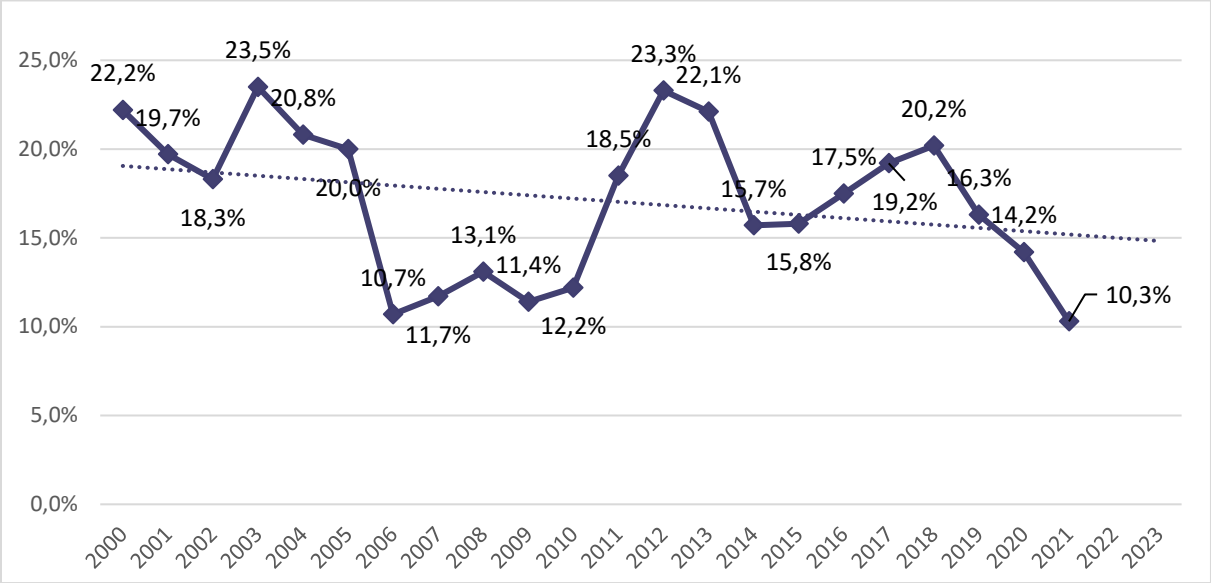
Table 47. Indicator Nr. 45 Young people neither in employment nor in education and training

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Young people neither in employment nor in education and training by sex and NUTS 2 regions (NEET rates) (edat_lfse_22)	Rate	2000-2021	Annual

Source: Author's own elaboration

The indicator "Young people neither in employment nor in education and training" refers to individuals between 15 and 24 years old who are not currently engaged in any form of employment or participating in any educational or training programs. These young people are not actively pursuing further education, vocational training, or employment opportunities. It is used to assess the extent of youth disengagement in the Region and to highlight potential challenges or barriers faced by young people in transitioning into the workforce or continuing their education. As Figure 42 shows, from 2017 to 2021 the percentage of young people neither in employment nor in education fell by 46% and reached a level of 10%, close to the EU-level target of a share of young people neither in employment nor in education or training less than 9 % by 2030.

Figure 42. Young people neither in employment nor in education and training



Source: https://ec.europa.eu/eurostat/databrowser/view/edat_lfse_22/default/table?lang=en

SDG Target 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

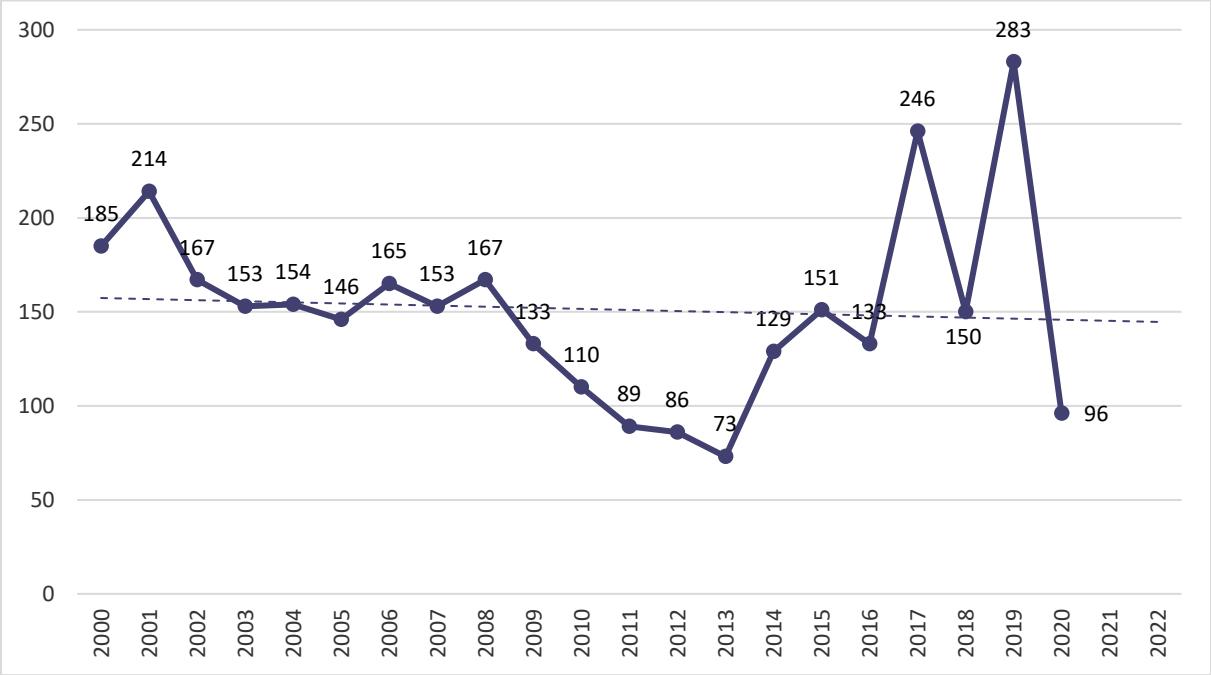
Table 48. Indicator Nr 36. Occupational accidents

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	ELSTAT	ELSTAT, Accidents at work	Number	2000-2020	Annual

Source: Author's own elaboration

The Occupational Accident Survey is a census and concerns the annual collection of data on fatal and non-fatal accidents at work of employees. According to Figure 43 data, occupational accidents, dropped by 28%, after an all-time peak in 2019, from 2016 to 2020 to 96. This trend should be taken with caution as 2020 was a COVID year with businesses shut down and other working arrangements that led to absences from working environment.

Figure 43. Occupational accidents



Source: https://www.statistics.gr/el/statistics/-/publication/SHE03/-

3.4.9 SDG 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Table 49. SDG 9 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
9.2 (sustainable industrialization)	46	GVA of the industry with respect to the GVA of the total sectors (current price)	↓↓
9.5 (promote innovation)	47	Gross Domestic Expenditure on R&D	↑
9.5 (promote innovation)	48	R&D personnel and researchers	↑
9.5 (promote innovation)	49b	Employment in knowledge-intensive service as a percentage of total services employment	↓↓

Source: Author's own elaboration

SDG Target 9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed counjtries

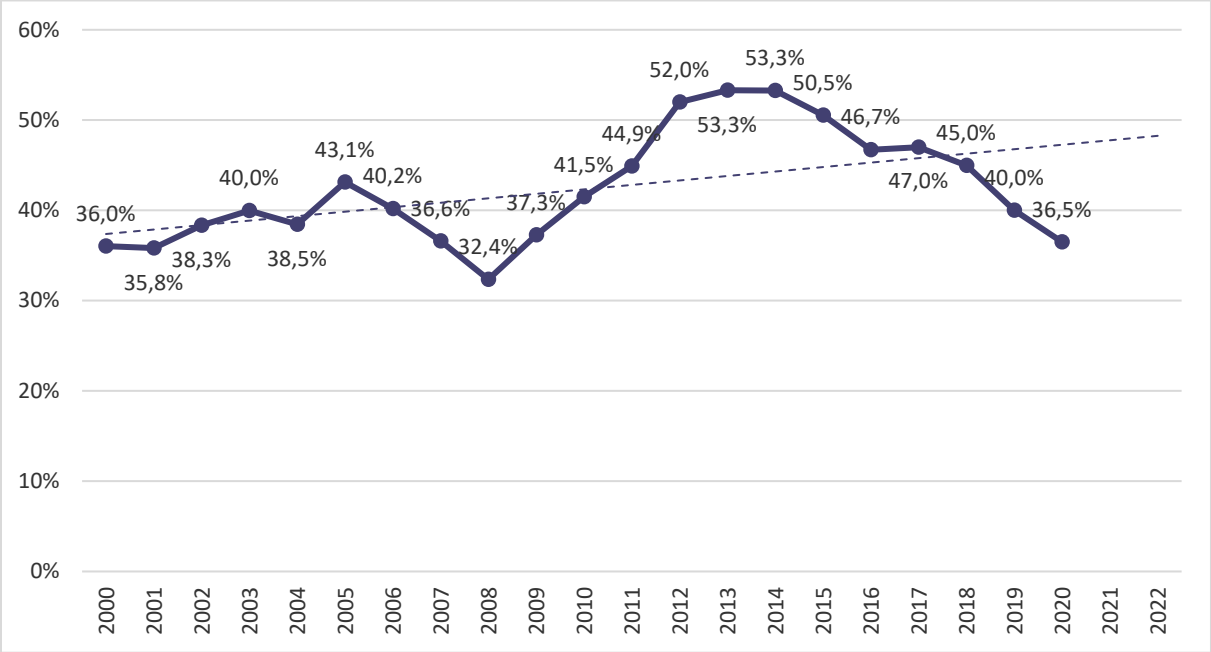
Table 50. Indicator Nr. 46 GVA of the industry with respect to the GVA of the total sectors (current price)

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_sct_rd, code E_GERDREG	Rate	2000-2020	Annual

Source: Author's own elaboration

The industry sector of the Region of Western Macedonia, consists almost solely of the lignite energy production activities. Specifically, the Region was traditionally the energy production centre of Greece and this specialization of its economy is evident in the share of industry in the total GVA, which is constantly above 35% in the last 20 years. The share of industry GVA to total reached an all-time high during the economic crisis years 2011-2015, partly due to the fall of other economic activities and the relative inelasticity of energy demand. As can be seen from Figure 44, after 2016 and the start of lignite phase-out, the percentage of industry's GVA to total GVA declined by 24% and reached 36,5%. However, the RWM remains the Greek region with the highest share of industry in the GVA.

Figure 44. Share of industry GVA



Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3gva/default/table?lang=en

SDG Target 9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

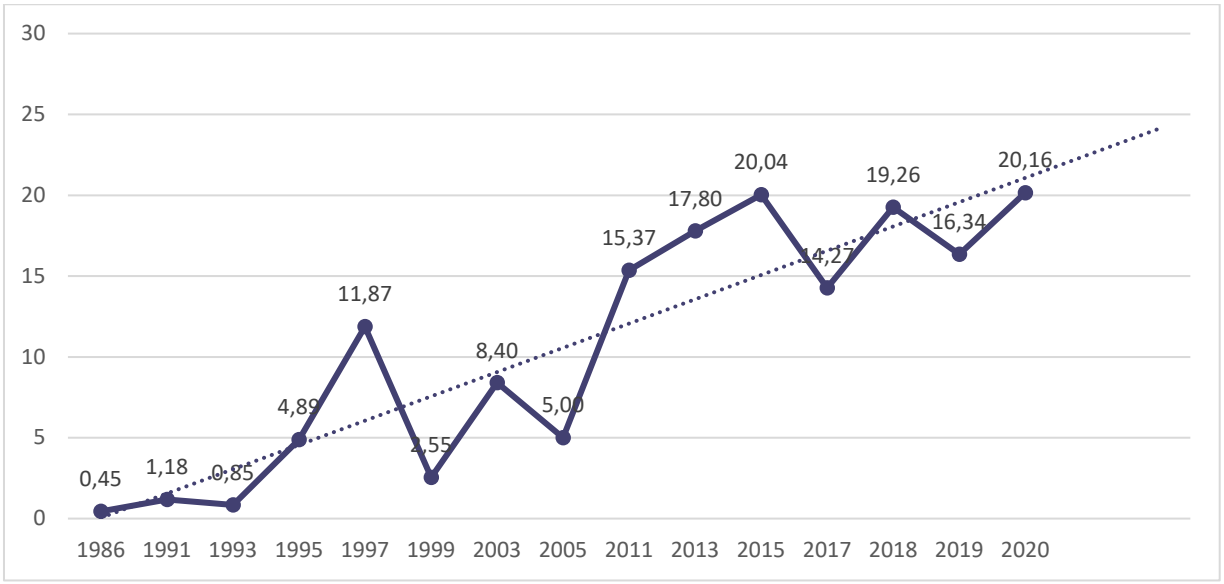
Table 51. Indicator Nr. 47 Gross Domestic Expenditure on R&D

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_sct_rd, code E_GERDREG	Number	1986-2020 (with gaps)	Annual

Source: Author's own elaboration

The Region of Western Macedonia constitutes one of the less dynamic regions of Greece in terms of RDTI. Over the years gross R&D expenditures rose constantly, reaching €20,16 million in 2020, but the levels of expenditures between 2015 and 2020 remained stable, as Figure 45 shows. However, the Region is actively seeking to improve its position and invest in innovation, in the framework of the just development transition. The Region had developed a Smart Specialization Strategy in 2015 and was among the first regions of Greece to set-up a RIS3 Support Structure in 2020. Moreover, the institutionalization of an innovation zone is underway by the University of Western Macedonia.

Figure 45. GERD by sector of performance million euros



Source: https://ec.europa.eu/eurostat/databrowser/view/rd_e_gerdreg/default/table?lang=en

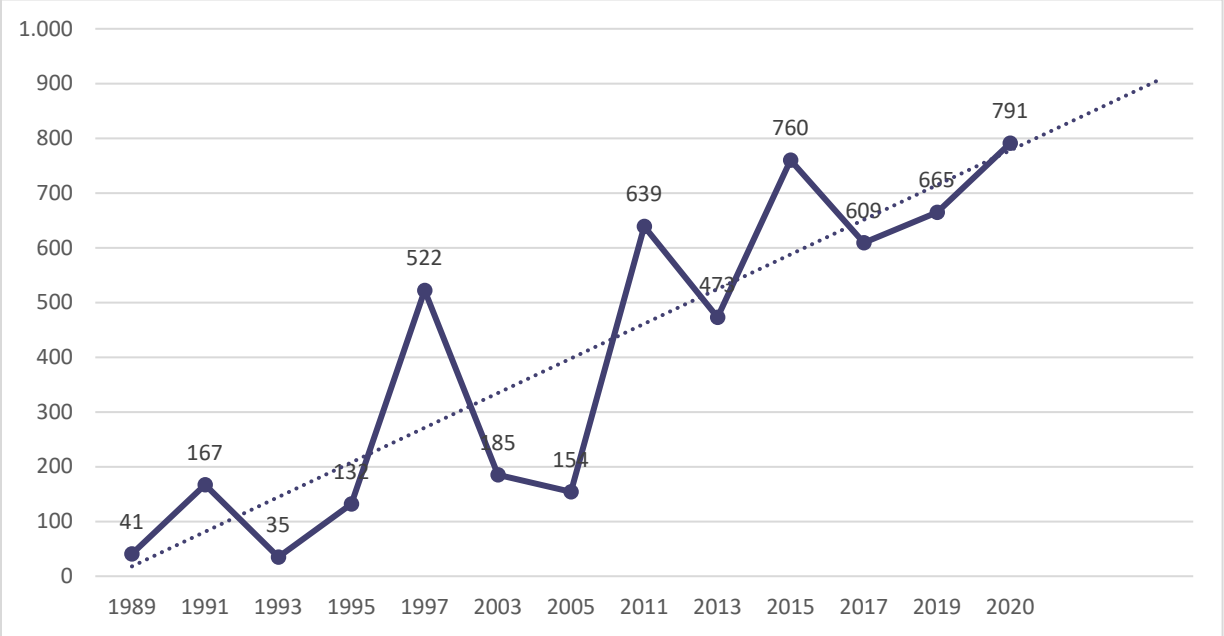
Table 52. Indicator Nr.48 R&D personnel and researchers

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat, regional statistics	Eurostat, Regional statistics by NUTS classification. Table: reg_sct_rd, code P_PERSREG	Number	1986-2020 (with gaps)	Annual

Source: Author's own elaboration

Along with expenditures for R&D, the personnel and researchers of the sector rose as well through the years, as Figure 46 depicts. In the last 5 years (2015-2020) the increase was 67%. The newly inaugurated campus of the University of Western Macedonia and the innovation zone are estimated to contribute to a sustained increase in R&D personnel and researchers in the region.

Figure 46. R&D personnel and researchers (full time equivalent)



Source: https://ec.europa.eu/eurostat/databrowser/view/rd_p_persreg/default/table?lang=en

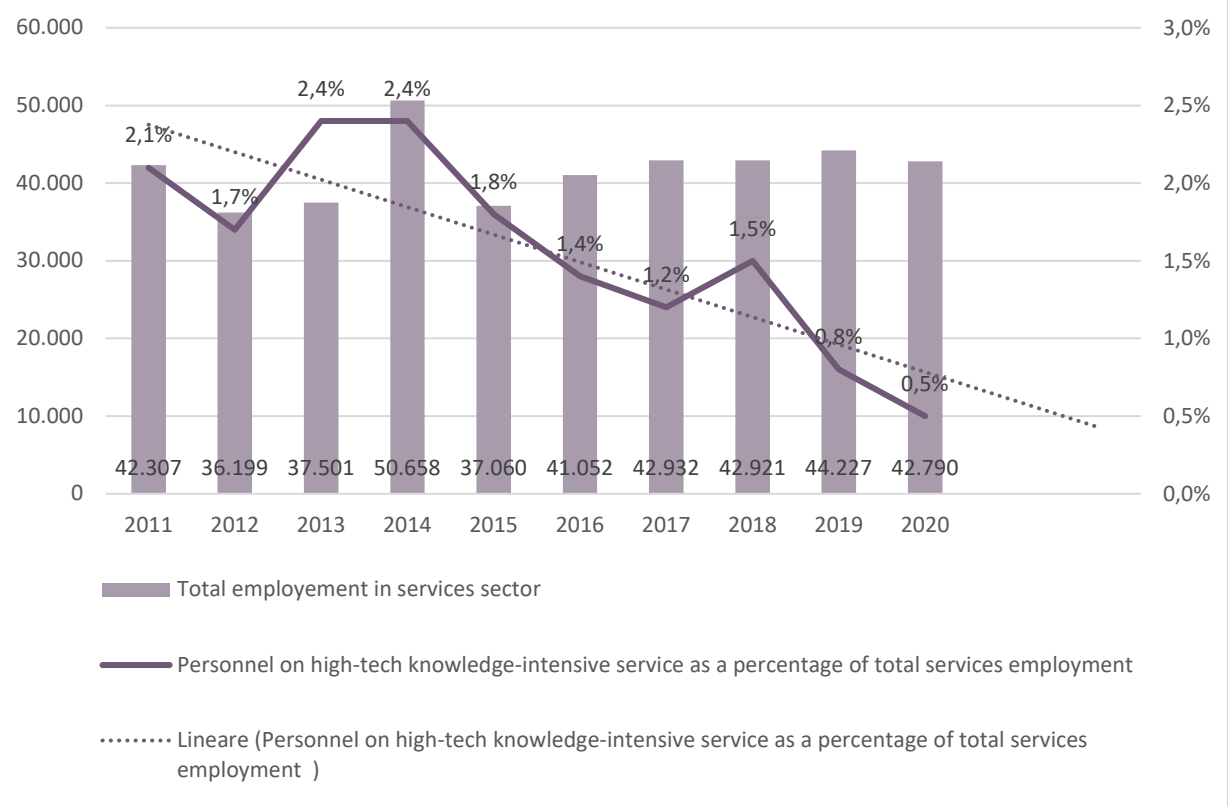
Table 53. Indicator Nr 49b. Personnel on high-tech knowledge-intensive services as a percentage of total services employment

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	ELSTAT	ELSTAT, Statistical Bussines register	Percentage	2010-2020	Annual

Source: Author's own elaboration

The indicator "Personnel on high-tech knowledge-intensive services as a percentage of total services employment" measures the proportion of workers involved in high-tech knowledge-intensive services compared to the overall employment within the services sector. High-tech knowledge-intensive services refer to sectors that heavily rely on advanced technology and specialized knowledge (motion picture, video and television programme production, sound recording and music publish activities; Programming and broadcasting activities; Telecommunications; computer programming, consultancy and related activities; Information service activities; Scientific research and development). This indicator provides insights into the level of technological sophistication and knowledge intensity within the services sector of the regional economy. According to Figure 47, personnel on high- tech knowledge intensive sector as a share of total services employment is low and has a steady downward trend (starting from 2.1% of total and ending in 0.5%) while in the last five years (2015-2020) the decrease amounts to 72%.

Figure 47. Personnel on high-tech knowledge-intensive service as a percentage of total services employment



Source: https://www.statistics.gr/el/statistics/-/publication/SBR01/-

3.4.10 SDG 10 REDUCED INEQUALITIES

Table 54. SDG 10 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
10.2 (inclusion irrespective of status)	51a	Disability employment gap	n/a
10.4 (greater equality)	52a	S80/S20 income distribution	↓

Source: Author's own elaboration

SDG Target 10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status

Indicator Nr 51a. Disability employment gap is considered relevant and appropriate to be included in the regional SDG monitoring system, even though at the moment there are no published data at regional level in Greece. Relevant data are published by Eurostat at national level collected in the Labour Force Survey.

SDG Target 10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality

Table 55. Indicator Nr. 52a S80/S20 income distribution

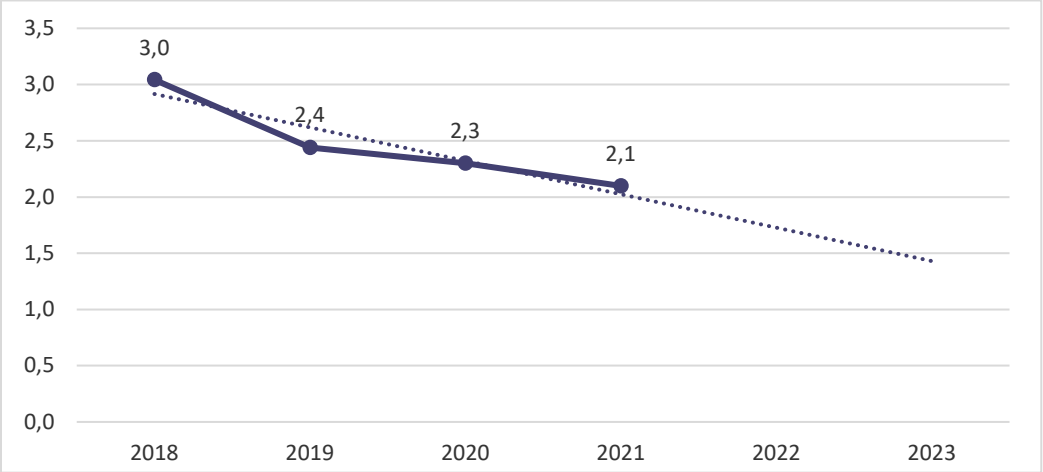
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	ELSTAT	ELSTAT, Statistics on income and living conditions microdata	Percentage	2018-2020	Annual

Source: Author's own elaboration

The indicator S80/S20 compares the total income held by the richest 20% with that held by the poorest 20% of the population. Figure 48 shows, that in 2021, the richest 20% had 2,2 times the income of the poorest 20%. From 2018 to 2021, the income disparities between those two groups decreased by 31%.

The indicator is not published by ELSTAT for regions, but only at national level. However, access to the Household Budget Survey microdata is free and can be derived from the variables of NUTS1 Region, equivalised income and income quantile.

Figure 48. S80/S20 income distribution



Source: https://www.statistics.gr/public-use-files

3.4.11 SDG 11 SUSTAINABLE CITIES AND COMMUNITIES

Table 56. SDG 11 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
11.1 (access to housing)	53	Households' expenses dedicated to housing costs	↓
11.2 (access to transport systems)	54a	Household expenses dedicated to public transport means to total transportation costs	↓
11.2 (access to transport systems)	55	Daily accessibility	↑
11.2 (access to transport systems)	56	Stock of vehicles (passenger cars)	↓
11.2 (access to transport systems)	61	Victims in road accidents	↓
11.3 (sustainable urbanization)	58a	Artificial Surfaces	↑
11.6 (environmental impact)	59	PM2.5 Emissions	↓↓
11.6 (environmental impact)	60	Household and commercial waste generation per inhabitant	↑

Source: Author's own elaboration

SDG Target 11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

Table 57. Indicator Nr. 53 Households' expenses dedicated to housing costs

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	ELSTAT	ELSTAT, Household Budget Survey	Rate	2014-2021	Annual

Source: Author's own elaboration

The indicator "Households' expenses dedicated to housing costs" refers to the portion of a household's income or expenditure that is allocated towards housing-related expenses. It measures the financial burden placed on households in terms of housing costs. Housing costs typically include expenses such as rent or mortgage payments, property taxes, utility bills (such as electricity, water, and heating), insurance, and maintenance fees. The indicator helps assess the affordability and financial strain that households experience in meeting their housing needs.

According to Figure 49, households' expenses on housing costs, as a percentage of total expenses, has decreased in the last five years by 25%.

The indicator is calculated from the Household Budget Survey of ELSTAT as the ratio of mean monthly expenditures for housing, water, energy of primary and secondary residence to the mean total monthly purchases of the RWM households.

Figure 49. Mean monthly housing expenses as a percentage of total expenses (€)

Source: https://www.statistics.gr/en/statistics/-/publication/SFA05/2021

SDG Target 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Table 58. Indicator Nr. 54a Household expenses dedicated to public transport means to total transportation expenses

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	ELSTAT	ELSTAT, Household Budget Survey	Rate	2014-2021	Annual

Source: Author's own elaboration

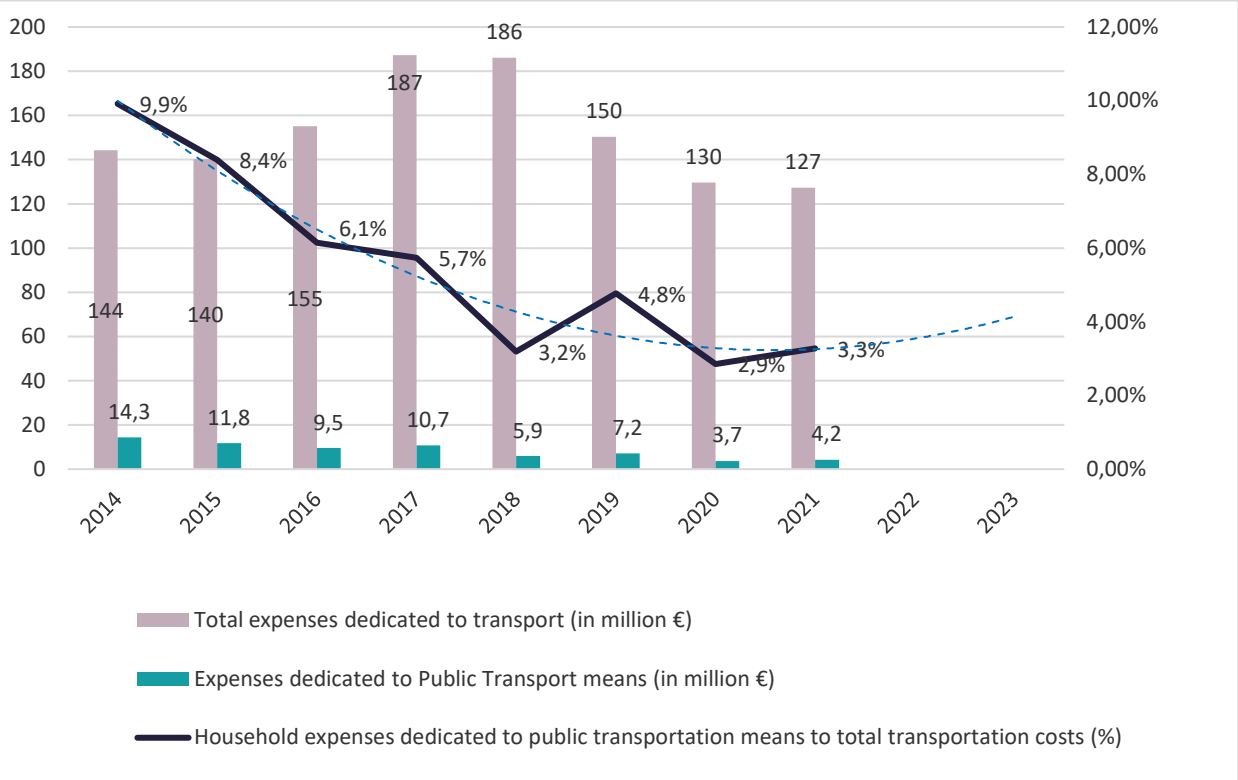
The indicator "Household expenses dedicated to public transport means to total transportation expenses" refers to the proportion of a household's transportation expenditure that is allocated specifically to public transportation. It provides insights into the relative importance and usage of public transportation in relation to other modes of transportation.

Transportation expenses encompass various costs associated with commuting and traveling, such as fuel, vehicle maintenance, parking fees, tolls, public transportation fares, and other related costs. By specifically examining the portion of these transportation expenses dedicated to public transport, this indicator helps gauge the reliance on public transportation services within the population of Western Macedonia.

Mean monthly household transport expenses for public transport in RWM shows a downward trend, in Figure 50, in the last five years, reduced by 60% to only €4,2 per month. This means that the transport expenses of RWM households for public transport is only a minor fraction of their total transportation expenses, at 3,3% in 2021, signifying rather under-developed public transport infrastructures and services.

The indicator is calculated from the Household Budget Survey of ELSTAT as the ratio of mean monthly expenditures for transportation by public transport to the mean total monthly transportation expenditures.

Figure 50. Mean monthly household expenses dedicated to public transport means to total transportation expenses (€)



Source: https://www.statistics.gr/en/statistics/-/publication/SFA05/2021

Table 59. Indicator Nr. 55 Daily accessibility

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	European Commission, Joint Research Centre	Urban Data Platform Plus, LUISA reference scenario	Number (index)	2015-2050	Decade

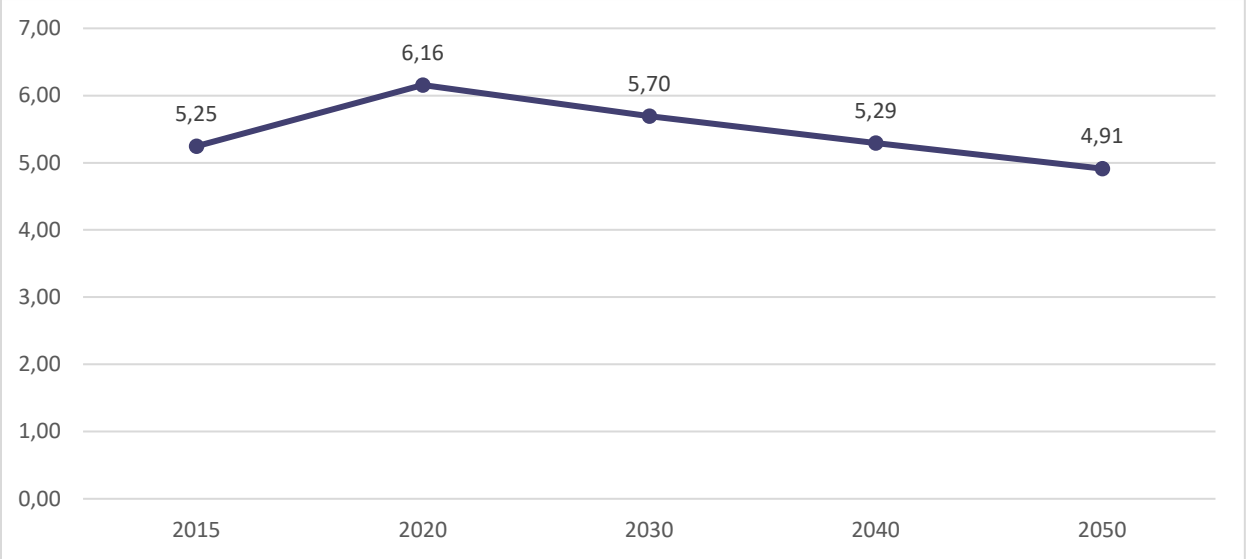
Source: Author's own elaboration

The Daily Accessibility Index developed by the Joint Research Centre (JRC) is a measure that quantifies the accessibility of different locations within a region or territory on a daily basis. It assesses how easily individuals can access various services and opportunities, such as schools, hospitals, employment centers, or public transportation, on a daily basis. The index takes into account factors such as transportation networks, travel times, and the distribution of amenities or services across the area of analysis. It considers both the spatial distribution of destinations and the efficiency of the transportation system.

This indicator is useful for understanding transportation patterns, promoting sustainable mobility options, and assessing the accessibility and affordability of public transport within the region.

The daily accessibility index in RWM was calculated by the JRC to improve by 17% from 2015-2020 and then to fall back to 2015 levels by 2040 and even lower by 2050.

Figure 51. Daily accessibility index



Source: https://urban.jrc.ec.europa.eu/trends?lng=en&ctx=udp&ts=EU&pil=level-indicator&is=Default&cl=default&tl=2&clc=infrastructure-20-26-20accessibility&i=1&db=1&it=ranking&y=2020&tv=-1&cwt=line-chart

Table 60. Indicator Nr.56 Stock of vehicles (passenger cars)

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat	Eurostat, Regional statistics by NUTS classification. Table: reg_tran_otran, code R_VEHST. Indicator CAR for passenger cars	Number	1990-2020	Annual

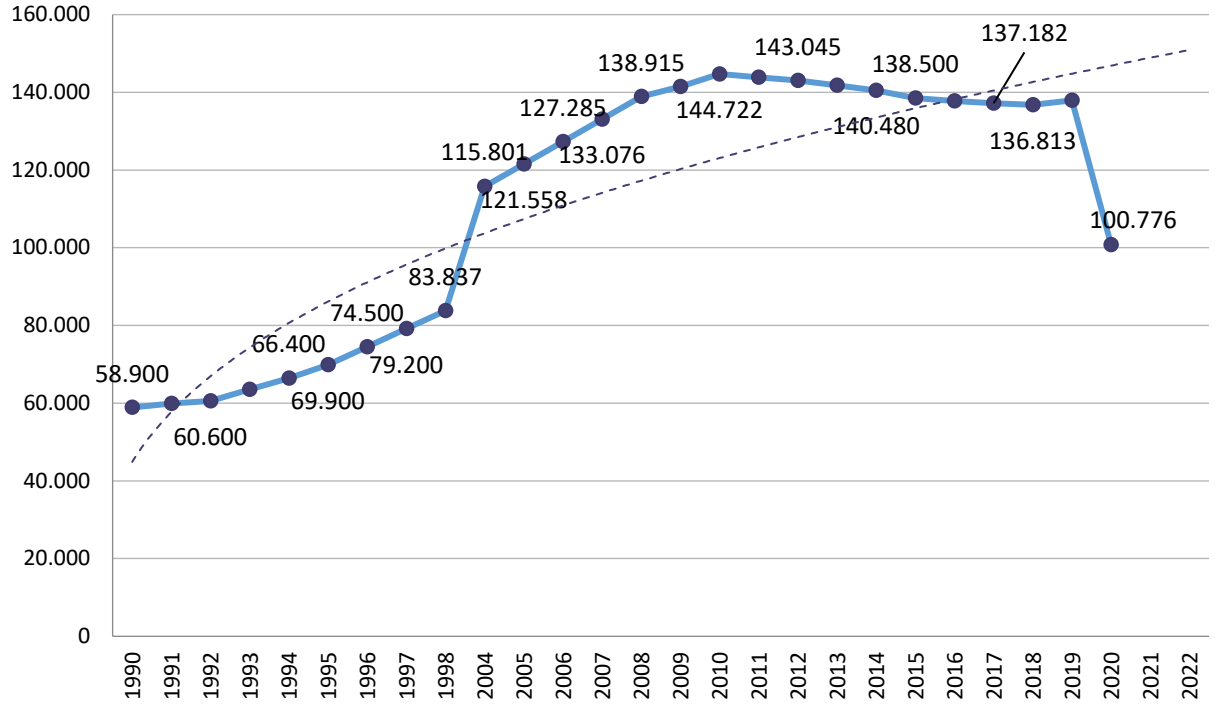
Source: Author's own elaboration

The indicator "Stock passenger cars" refers to the total number of passenger (private) cars, that are registered and in use within the region. It provides an estimation of the total fleet of passenger vehicles that are available for personal transportation.

The indicator is used to assess the level of motorization of the population of the region and to understand the transportation demands, energy consumption, air pollution, traffic congestion, and infrastructure needs associated with the number of vehicles on the road.

The stock of vehicles (passenger cars) in Western Macedonia shows in Figure 52, an upward trend over the years until 2010 and the start of the economic crisis. After 2010 the stock had a steady minor decline until 2019, while from 2019 to 2020 the stock saw a significant reduction (27%), that can be also attributed to the Covid-19 pandemic lockdowns and the removal of vehicles from registration.

Figure 52. Stock of vehicles



Source: https://ec.europa.eu/eurostat/databrowser/view/TRAN_R_VEHST__custom_3430576/default/table?lang=en

Table 61. Indicator Nr.61 Victims in road accidents

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	Eurostat	Eurostat, Regional statistics by NUTS classification. Table: reg_tran_otran, code R_ACCI	Number	1990-2020	Annual

Source: Author's own elaboration

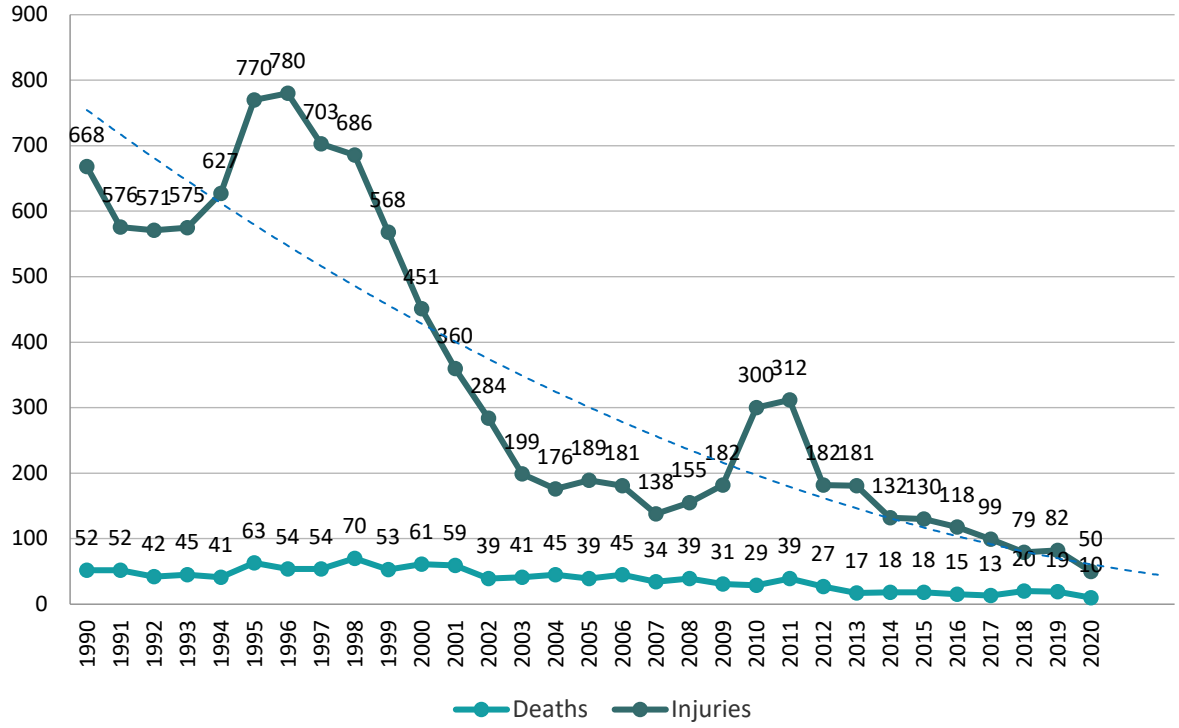
The indicator "Victims in road accidents" refers to the number of individuals who have been injured or killed as a result of road accidents within a year in the region. It includes all individuals involved in road accidents, including drivers, passengers, pedestrians, cyclists, or any other road users.

The indicator provides insights into the risks and vulnerabilities faced by road users and helps identify areas where improvements in road infrastructure, traffic management, enforcement, and education may be needed.

The number of victims in road accidents has a downward trend from 1990 till 2020. From 2016 to 2020, injured persons from road accidents, fell by 80%, and fatal injuries by 65%. The substantial drop in 2020 was largely due to the impact of COVID-19 restrictive measures on passenger transport. Investments in new and improved

road infrastructure in Western Macedonia had an impact to the reduction of accidents and victims and continue to remain an important priority (in financial terms also) in the Programme Western Macedonia 2021-2027.

Figure 53. Victims in road accidents



Source: https://ec.europa.eu/eurostat/databrowser/view/tran_r_acci/default/table?lang=en

SDG Target 11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

Table 62. Indicator Nr.58b Artificial surfaces

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2018	Copernicus	Copernicus , Land cover and land cover changes in European countries in 2000-2018	Percentage	2000, 2006, 2012, 2018	6-7 years

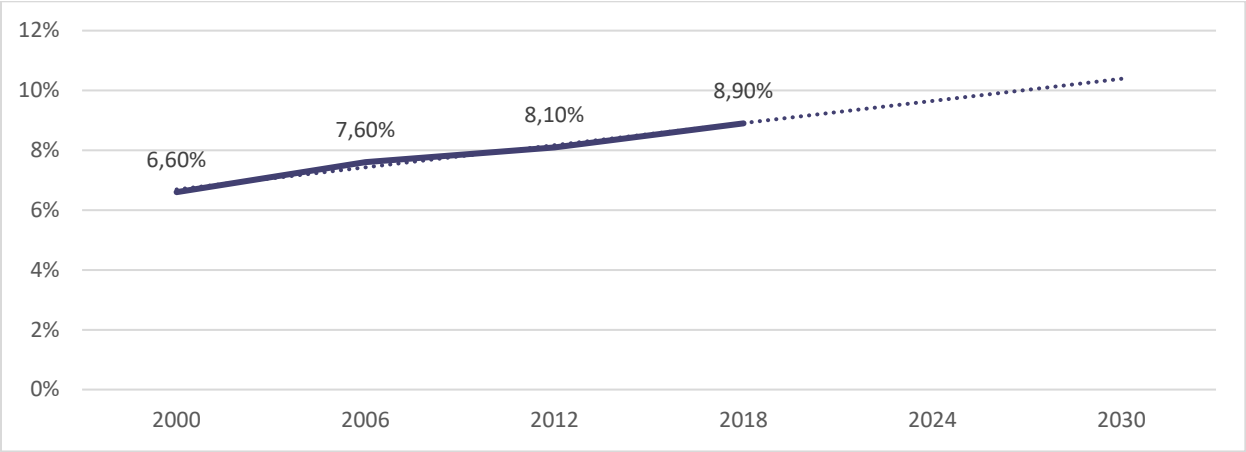
Source: Author's own elaboration

The indicator "Artificial surfaces" refers to the extent or percentage of land in the region that is covered by human-made or artificial surfaces, such as buildings, roads and other types of infrastructure. It quantifies the amount of land that has been transformed or converted from its natural state into artificial or human-built environments.

The indicator helps to assess the level of urban development, infrastructure expansion, and land consumption within Western Macedonia and the impacts on natural ecosystems and environmental processes.

The percentage of artificial surfaces in relation to the total area of the RWM, shown in Figure 54, rose from 6,6% in 2000 to 8,9% in 2018 (35% increase).

Figure 54. Artificial surfaces (%total)



Source: https://land.copernicus.eu/dashboards/clc-clcc-2000-2018

SDG Target 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

Table 63. Indicator Nr.59 PM2.5 Emissions

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	European Commission, Joint Research Centre	Atmospheric emissions of PM2.5, 2010 - 2030 (JRC LUISA Reference Scenario 2016)	Number (tons)	2015-2050	Decade

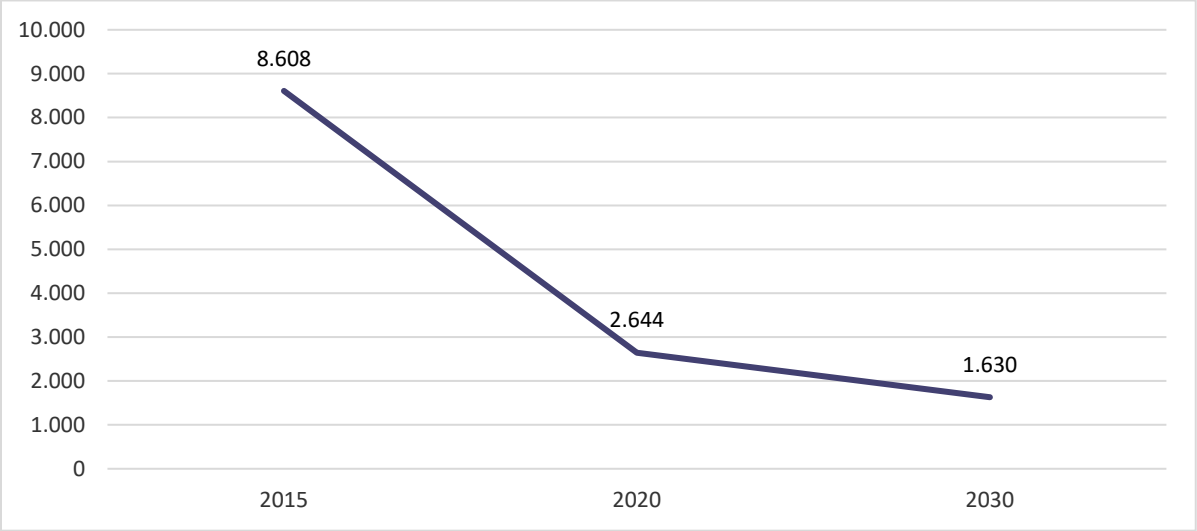
Source: Author's own elaboration

The indicator "PM2.5 emissions" refers to the measurement of particulate matter (PM) with a diameter of 2.5 micrometers or smaller that is emitted into the atmosphere as a result of human activities. PM2.5 emissions are generated from various sources, including industrial processes, power generation, transportation (such as vehicle emissions and exhaust), residential combustion (such as burning of solid fuels for heating), and other anthropogenic activities.

The indicator is crucial for assessing air quality and understanding the potential health risks associated with exposure to fine particulate matter in Western Macedonia.

PM2.5 emissions in RWM according to the JRC calculations, presented in Figure 55, were expected to be reduced by 69% between 2015-2020 and are expected to fall at 1.630 tons by 2030.

Figure 55. PM2.5 emissions in tons



Source: https://urban.jrc.ec.europa.eu/trends?lng=en&ctx=udp&ts=EU&pil=level-indicator&is=Default&cl=default&tl=2&clc=009-environment-climate&i=25&db=44&it=ranking&y=2020&tv=-1&cwt=line-chart

Table 64. Indicator Nr.60 Household and commercial waste generation per inhabitant

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2022	Waste Management Western Macedonia SA	Report of waste generation and management 2022	Number (tons)	2012-2022	Annual

Source: Author's own elaboration

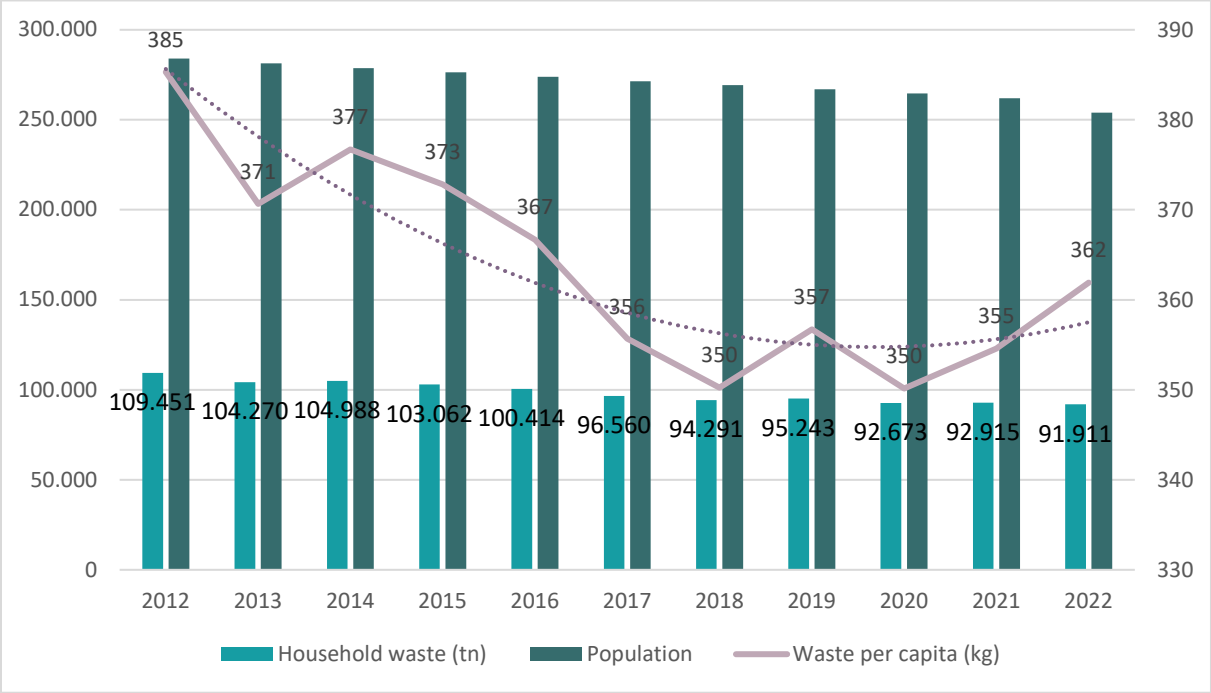
The indicator "Household and commercial waste generation per inhabitant" refers to the waste generated from residential sources, such as food waste, packaging materials, paper, plastics, and other products consumed within households and from non-residential sources like businesses, offices, institutions, and industries.

The indicator is used to assess the effectiveness of waste reduction and recycling efforts and to identify trends in waste generation over time.

The generation of household and commercial waste in the RWM follows a continuous downward trend since 2012 in absolute quantities, shown in Figure 56. During the last 5 years the reduction was 2,5%, while the per capita generation increased, mainly due to the faster decline of the population in that period.

The Regional Waste Management Plan is under review to set targets regarding waste generation and management and measures to achieve until 2030. The design, implementation, and operation of the regional waste management system is the object of the company Waste Management Western Macedonia SA, with stakeholders the Municipalities of the region.

Figure 56. Household and commercial waste



Source: https://diadyma.gr/pesda/

3.4.12 SDG 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Table 65. SDG 12 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
12.3 (reduce food waste)	63	Food waste	tbc
12.4 (chemical management)	64	Hazardous Waste	-

Source: Author's own elaboration

SDG Target 12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

Indicator Nr 63. Food waste is considered relevant and appropriate to be included in the regional SDG monitoring system, even though at the moment there are no published data at regional level in Greece. It is estimated that relevant data at regional level is feasible to be collected from the competent waste management body (Western Macedonia Waste Management SA), when the brown bins program (for organic waste) fully rolls-out.

SDG Target 12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

Table 66. Indicator Nr.64 Hazardous Waste

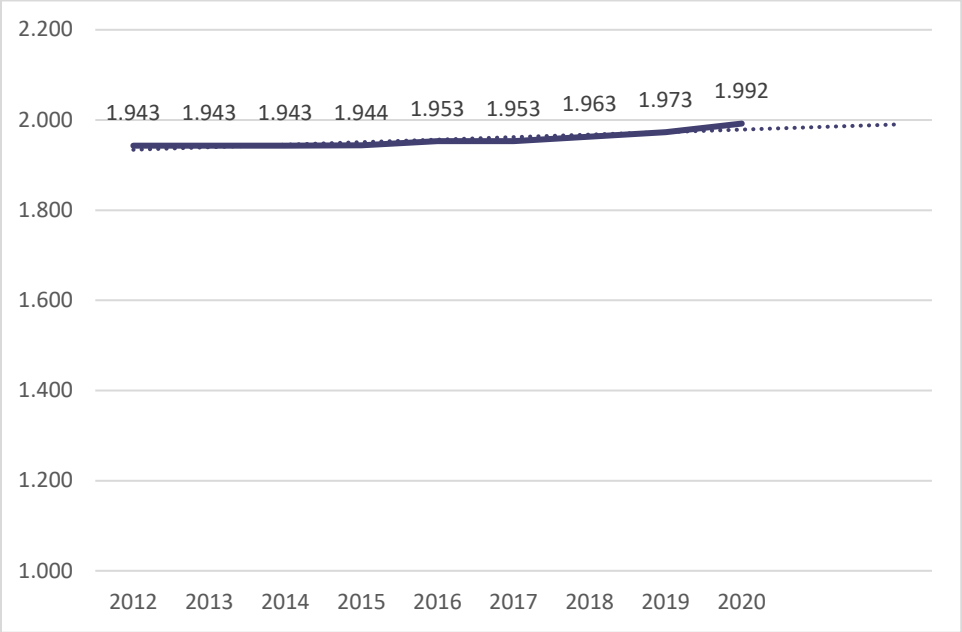
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2012	Region of Western Macedonia	Regional Waste Management Plan	Number (tons)	2012, 2013-2020 forecast	Annual

Source: Author's own elaboration

The indicator measures the hazardous industrial waste in the RWM. An actual value has been calculated for 2012, during the preparation of the Regional Waste Management Plan, while values for 2013-2020 are forecasts, presented in Figure 57, which estimate an increase of 2% from 2015 to 2020.

The Regional Waste Management Plan is under review to set targets until 2030.

Figure 57. Industrial hazardous waste (tn)



Source: https://diadyma.gr/pesda/

3.4.13 SDG 13 CLIMATE ACTION

Table 67. SDG 13 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
13.2 (climate change measures into policy)	65	PM10 Emissions	↓↓
13.2 (climate change measures into policy)	66	CO2 Emissions	↓
13.2 (climate change measures into policy)	67	Greenhouse Gas Emissions	↓
13.2 (climate change measures into policy)	68	Cooling and heating degree days	↓**heating*** ↑ **cooling***

*30-year trend

Source: Author's own elaboration

SDG Target 13.2 Integrate climate change measures into national policies, strategies and planning

Table 68. Indicator Nr. 65 PM10 Emissions

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	European Commission, Joint Research Centre	PM10 concentration, 2010 – 2050 (JRC LUISA Reference Scenario 2016)	Number (index)	2015-2030	Decade

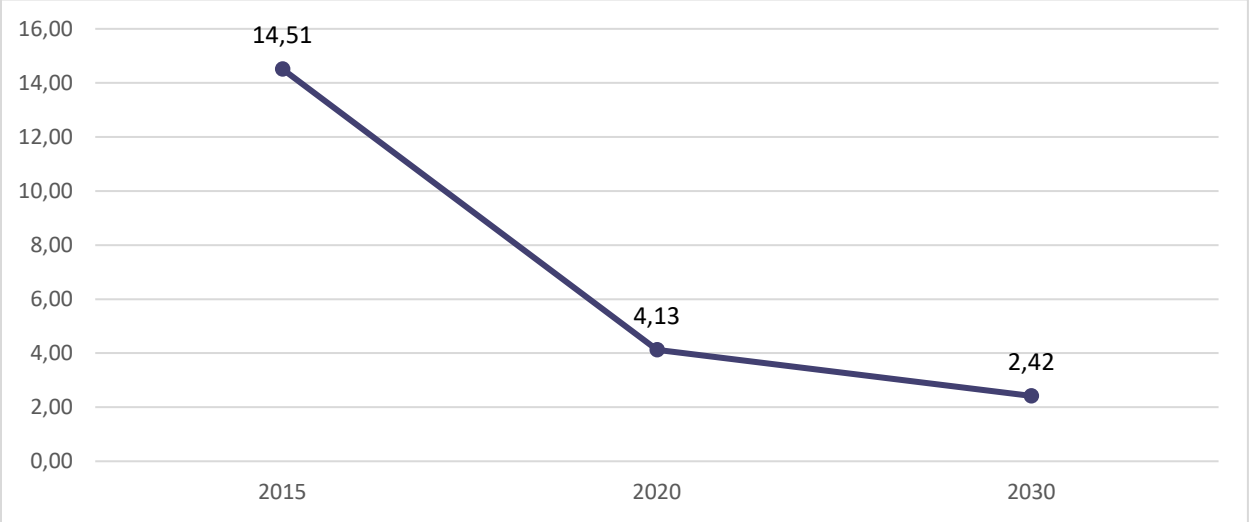
Source: Author's own elaboration

The indicator "PM10 emissions" refers to the measurement of particulate matter (PM) with a diameter of 10 micrometers or smaller that is emitted into the atmosphere as a result of human activities. PM10 particles can be inhaled into the respiratory system, potentially causing adverse health effects, especially for sensitive individuals.

Monitoring and controlling PM10 emissions are vital for improving air quality and protecting public health.

PM10 emissions in RWM according to the JRC calculations, presented in Figure 58, were expected to be reduced by 71% between 2015-2020 to 4,13 tons and are expected to further fall to 2,42 tons by 2030.

Figure 58. PM10 emissions in tons



Source: https://urban.jrc.ec.europa.eu/trends?lng=en&ctx=udp&ts=EU&pil=level-indicator&is=Default&cl=default&tl=2&clc=009-environment-climate&i=15&db=27&it=ranking&y=2020&tv=-1&cwt=line-chart

Table 69. Indicator Nr. 66 CO2 emissions

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	European Commission, Joint Research Centre	Atmospheric emissions of CO2 (LUISA Platform REF2014)	Number (index)	2015-2030	Decade

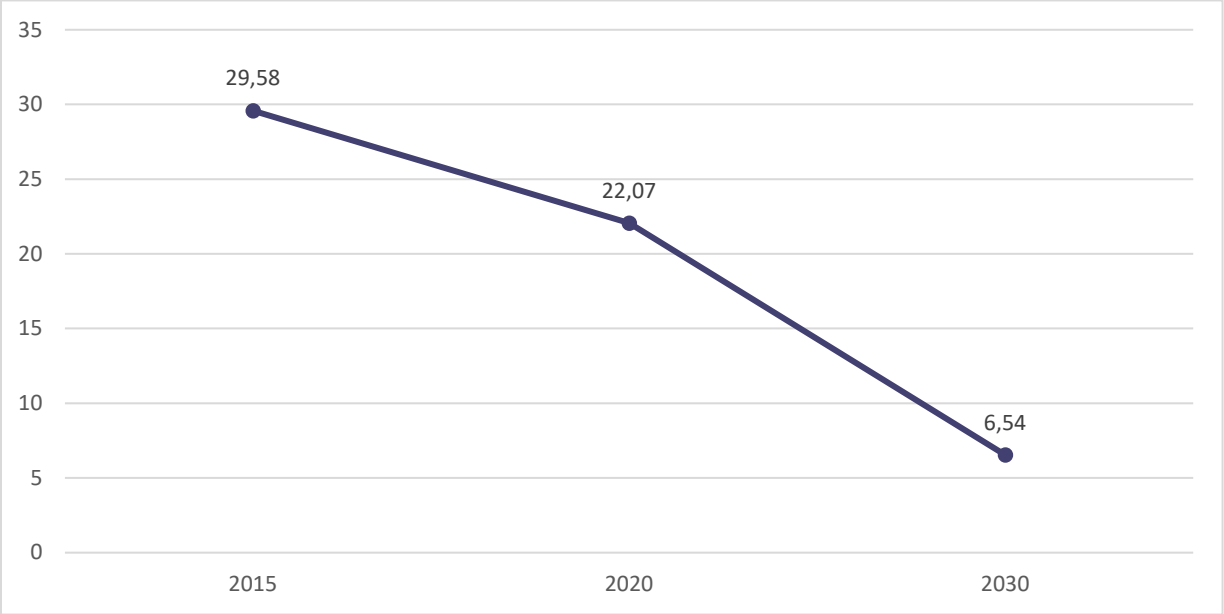
Source: Author's own elaboration

The indicator "CO2 emissions" refers to the measurement of carbon dioxide (CO2) gas emissions released into the atmosphere as a result of human activities. Carbon dioxide is a greenhouse gas that contributes to climate change and global warming. CO2 emissions are primarily generated by the burning of fossil fuels such as coal, oil, and natural gas for energy production, transportation, industrial processes, and residential and commercial activities.

Monitoring CO2 emissions is relevant to (regional) policies and initiatives to mitigate climate change and promote sustainable development.

CO2 emissions in RWM according to the JRC calculations, presented in Figure 59, were expected to be reduced by 25% in between 2015-2020 and are expected to fall in 6,54 tons by 2030, a reduction of 79% from 2015. There is no target for reducing CO2 emissions at regional level.

Figure 59. Co2 emissions in tons



Source: https://urban.jrc.ec.europa.eu/trends?lng=en&ctx=udp&ts=EU&pil=level-indicator&is=Default&cl=default&tl=2&clc=009-environment-climate&i=13&db=25&it=ranking&y=2020&tv=-1&cwt=line-chart

Table 70. Indicator Nr. 67 Greenhouse Gas Emissions

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2018	OECD	Regional database, variable 'Greenhouse gas emissions'	Rate	2001-2018	

Source: Author's own elaboration

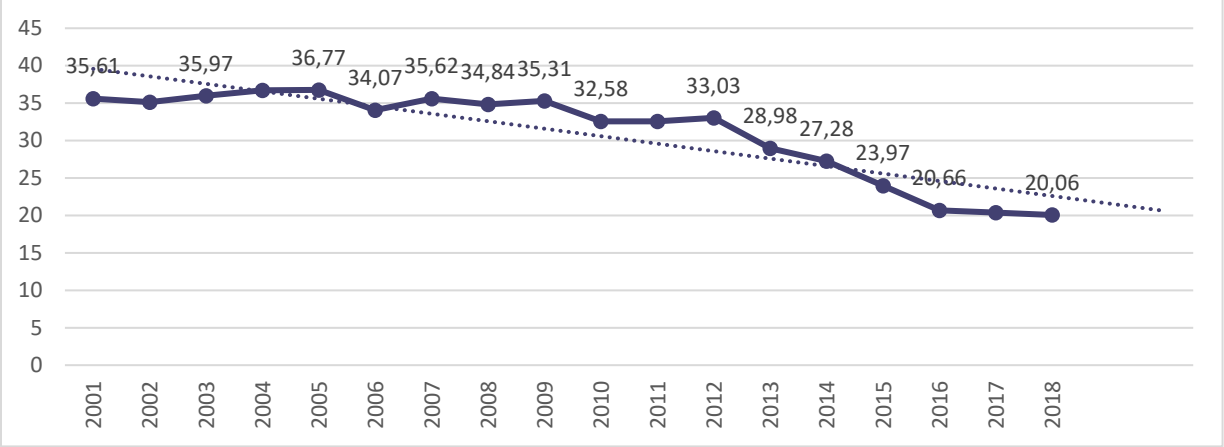
The indicator "Greenhouse Gas (GHG) emissions" refers to the measurement of the total amount of greenhouse gases released into the atmosphere as a result of human activities. Greenhouse gases are gases that trap heat in the Earth's atmosphere, contributing to the greenhouse effect and global warming.

Greenhouse gas emissions include various gases, with the most significant ones being carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and fluorinated gases. These gases are released from numerous sources, including industrial processes, energy production, transportation, agriculture, waste management, and deforestation.

Reducing GHG emissions is a global and EU priority in mitigating climate change. The RWM doesn't have in place a specific target for reducing GHG emissions, however it implements according measures of transitioning to renewable energy sources, improving energy efficiency, implementing sustainable agricultural practices, adopting low-carbon transportation options and promoting waste management and recycling,

Greenhouse gas emissions have a downward trend through the years. Specifically, from 2012 to 2018, as shown in Figure 60, total greenhouse gas emissions declined by 39%. For comparison reasons to the target of the National Energy and Climate Plan for reducing greenhouse gas emissions by 55% until 2030 in relation to 2005, the corresponding reduction in RWM from 2005 to 2018 reaches already 41%.

Figure 60. Total greenhouse gas emissions (in Mt of CO2 equivalent)



Source: https://stats.oecd.org/ -> Regions and Cities -> Climate and environment in regions

Table 71. Indicator Nr. 68 Cooling and heating degree days

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	Eurostat	Eurostat, Regional statistics by NUTS classification. Table: reg_eng_nrg, code CHDDR2_M. Indicator HDD for heating days and CDD for cooling days	Number (index)	1979-2021	Annual

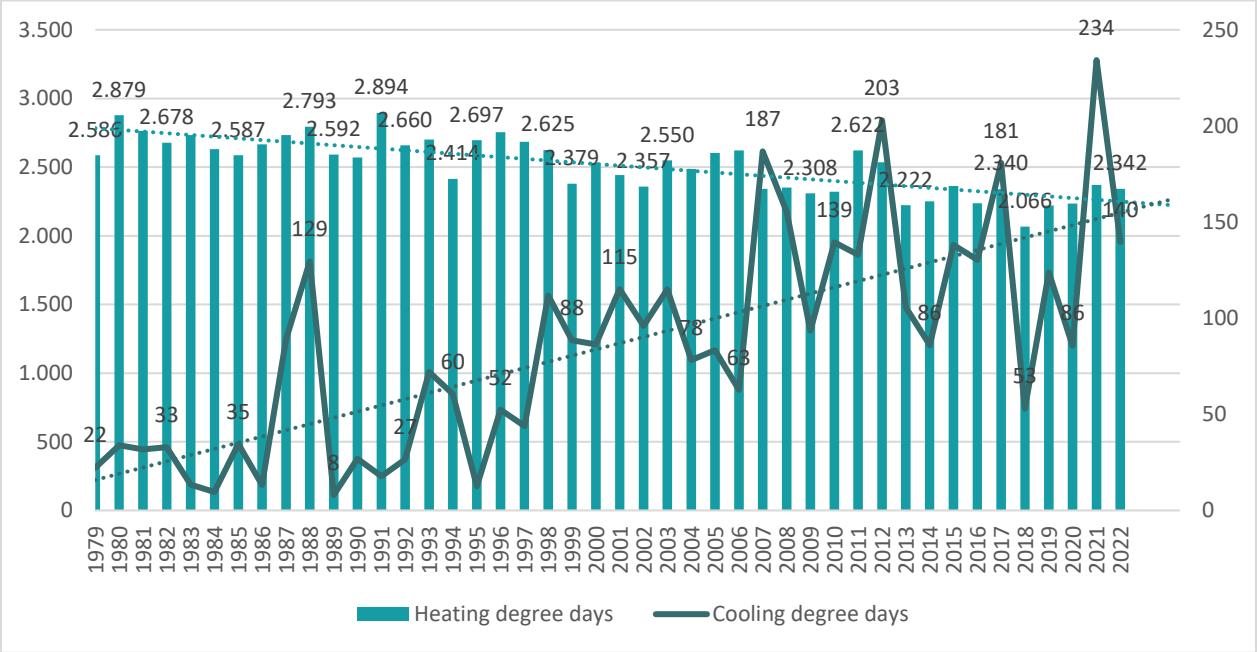
Source: Author's own elaboration

The indicator "Cooling and heating degree days" is a measure used to assess the energy requirements for cooling and heating buildings in relation to the prevailing outdoor temperatures.

The indicator helps to estimate energy needs for cooling and heating purposes and is relevant to the planning of measures of energy efficiency and climate change effects mitigation. The RWM is characterized, over time, by the highest needs for heating among the Greek regions.

However, as it is evident from Figure 61, heating degree days in Western Macedonia show a small decline over the years, while cooling degree days a higher rate of increase. The Region of Western Macedonia has in place since 2019 a Regional Plan for Adaptation to Climate Change, describing actions to address heating degree days in buildings and the urban heat island phenomenon.

Figure 61. Cooling and heating degree days (index)



Source: https://ec.europa.eu/eurostat/databrowser/view/nrg_chddr2_a/default/map?lang=en

3.4.14 SDG 15 LIFE ON LAND

Table 72. SDG 15 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
15.1 (restoration of ecosystems)	74	Land Abandonment	**(1 data point)**
15.1 (restoration of ecosystems)	75	Forest area over total surface area	-
15.5 (degradation of habitats)	72	Terrestrial protected areas as a percentage of total area	-
15.5 (degradation of habitats)	73	Estimated soil erosion	↑

Source: Author's own elaboration

SDG Target 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

Table 73. Indicator Nr.74 Land Abandonment

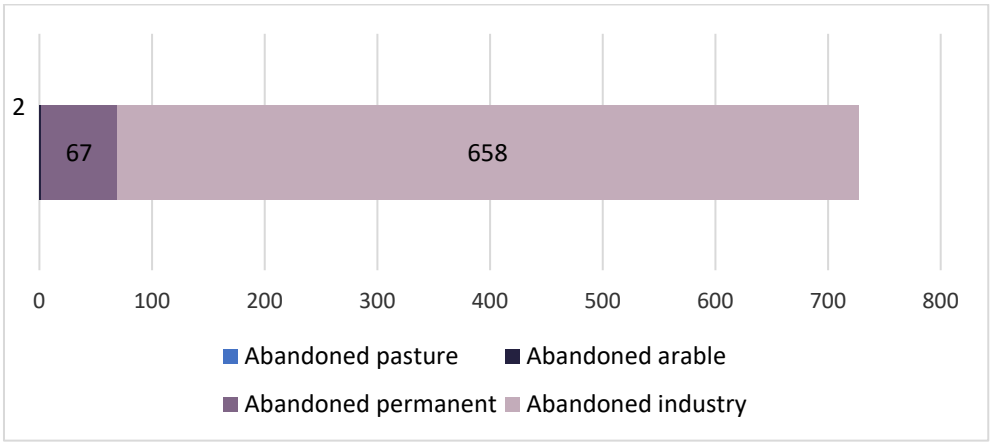
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2018	JRC	Urban Data Platform Plus, Land use (detailed)	Number (Ha)	2018	no time series

Source: Author's own elaboration

The indicator "Land abandonment" refers to abandoned areas with signs or structures of previous use of any kind. Areas belonging to "abandonment" are not in use and can't anymore be used for the original purpose without major reparation/renovation work.

In RWM the vast majority of abandoned land belongs to previous industrial uses (658 ha), while abandoned agricultural areas are only a minor fraction (70 ha). The small agricultural abandoned area shows that there are no problems of decline in farming, on the contrary the sector is growing as it is evident from indicators of SDG2. On the other hand, abandoned industrial sites pose challenges in their environmental rehabilitation and reuse.

Figure 62. Land Abandonment (hectares)



Source: https://urban.jrc.ec.europa.eu/trends?lng=en&ctx=udp&ts=EU&pil=level-indicator&is=Default&cl=default&tl=2&clc=009-environment-climate&i=4&db=5&it=ranking&y=2020&tv=-1&cwt=line-chart

Table 74. Indicator Nr.75 Forest area over total surface area

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2018	Copernicus	Copernicus, Land cover and land cover changes in European countries in 2000-2018	Percentage	2000, 2006, 2012, 2018	6-7 years

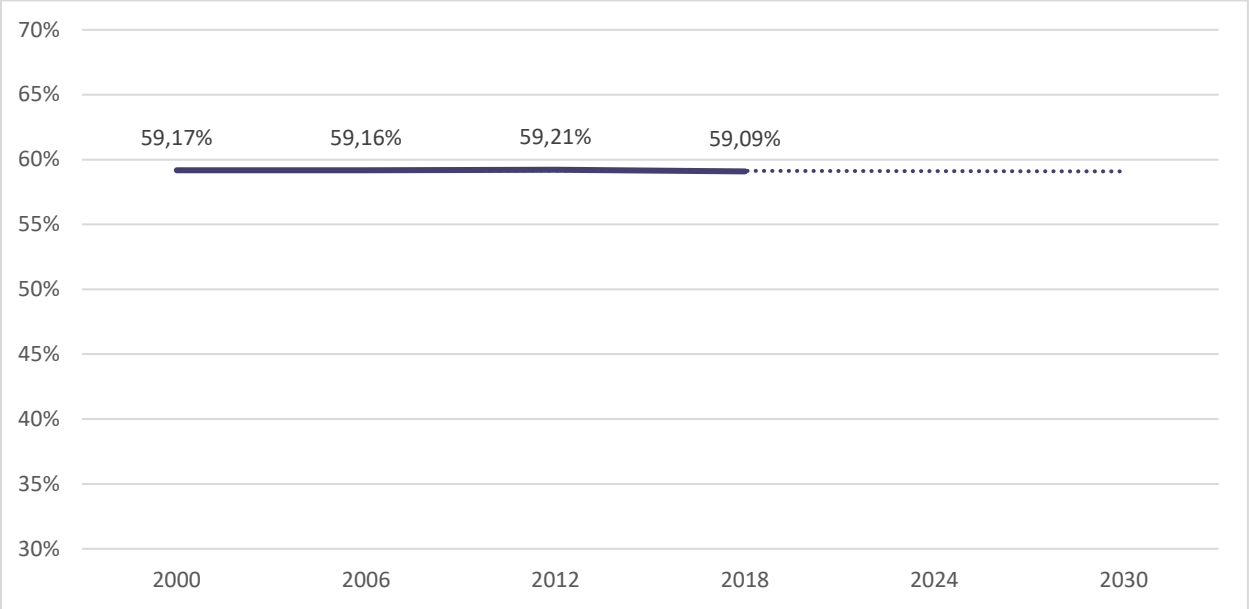
Source: Author's own elaboration

The indicator "Forest area over total surface area" refers to the proportion or percentage of land covered by forests and areas which are in natural / semi-natural state and no signs of any use are visible, in relation to the total land area of the region.

The significance of forests extends beyond their provision of timber for construction or fuel. Forests play a vital role in providing various ecosystem services to society, including recreational opportunities, the purification of air and water by removing pollutants, flood prevention, and carbon storage. The recognition of these essential roles has been growing. The ability of forests to deliver these ecosystem services depends on both the extent of forest area and the overall condition of the forests themselves.

From 2000 to 2018, Figure 63, shows that forest and semi-natural areas have remained at the same level in the region (about 59%). The Region of Western Macedonia has in place since 2017 a Strategy and Action Plan for Biodiversity including measures for forest systems and ecosystems protection. Likewise, the Regional Plan for Adaptation to Climate Change includes actions to address wildfires.

Figure 63. Forest and semi-natural areas (%)



Source: https://land.copernicus.eu/dashboards/clc-clcc-2000-2018

SDG Target 15.5 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

Table 75. Indicator Nr.72 Terrestrial protected areas as a percentage of total area

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2012	European Environment Agency	European Environment Agency, EIONET Central Data Repository (CDR)	Percentage	2012	no time series

Source: Author's own elaboration

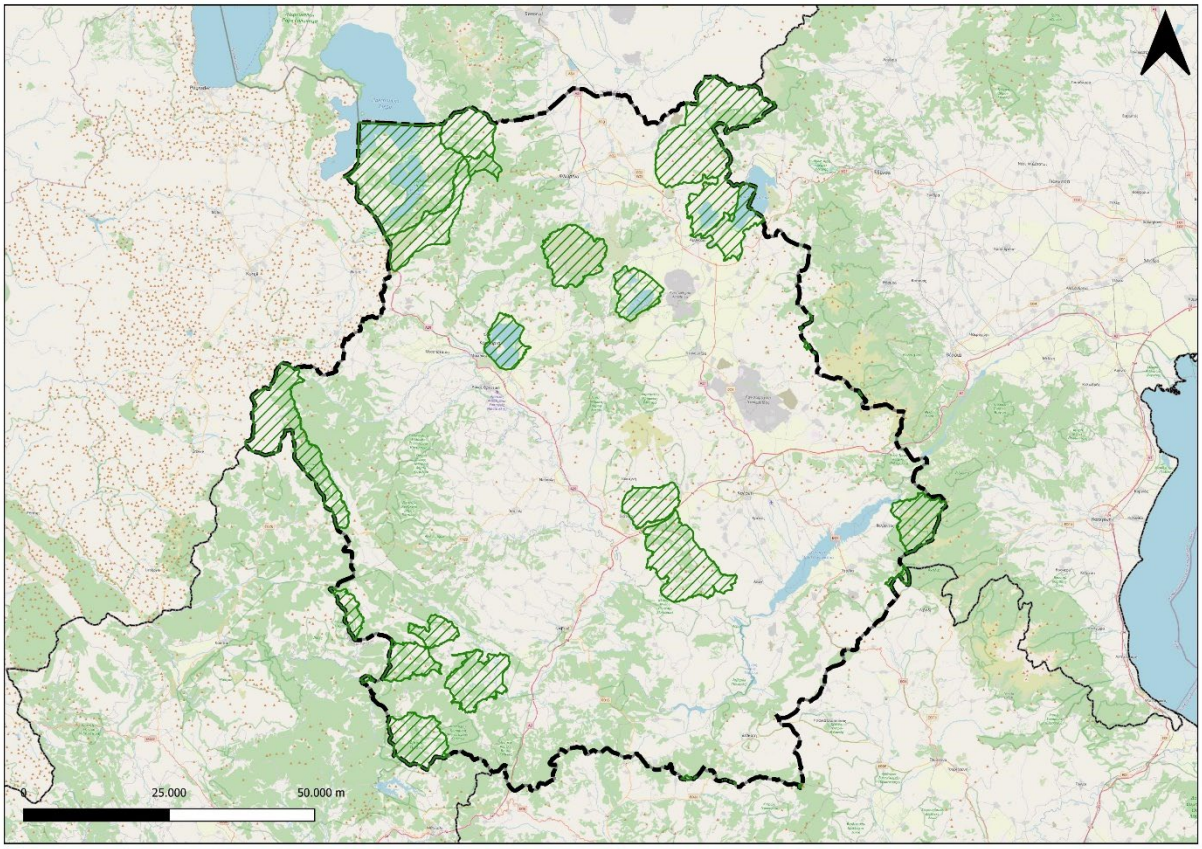
The indicator "Terrestrial protected areas as a percentage of total area" refers to the proportion or percentage of land within the region that is designated as protected areas for the conservation and preservation under the EU Birds and the Habitats Directives.

The Region of Western Macedonia is rich in natural resources and assets with 23 designated protected sites in the NATURA 2000 network, comprising Sites of Community Importance (SCI) according to the EU Directive 92/43 and Special Protected Areas (SPA) according to EU Directive 79/409. Overall, the protected sites area corresponds to 16,1% of the total area of the Region.

The designation of the sites was completed in 2012 and no change occurred since then.

The indicator calculates the area of the NATURA2000 sites for the segments that fall within the administrative borders of the Region, as shown in Figure 64. In instances of overlapping SCI and SPA areas only the greater one is taken into account. The Region of Western Macedonia has in place since 2017 a Strategy and Action Plan for Biodiversity including measures for species and ecosystems protection.

Figure 64. Natura 2000 areas in the RWM



Source: https://natura2000.eea.europa.eu/, own elaboration

Table 76. Indicator Nr.73 Estimated soil erosion

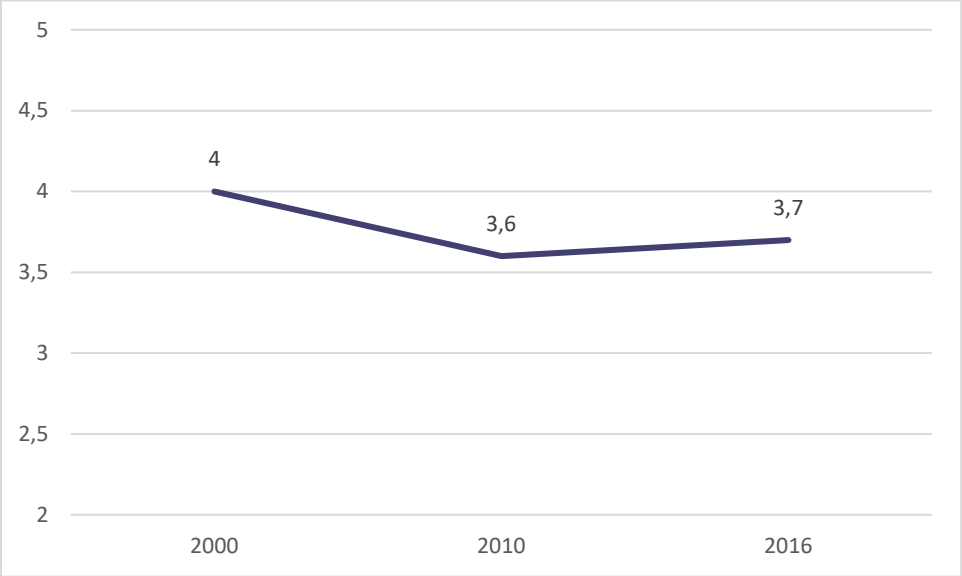
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2016	Eurostat	Eurostat, Regional statistics by NUTS classification. Table: aei_pr_soiler, code AEI_PR_SOILER	Rate	2000-2016	Annual

Source: Author's own elaboration

The indicator "Soil erosion" refers to the process of detachment and movement of soil particles by natural forces such as wind, water, or human activities. It is used to estimate soil loss rates, that can result in decreased agricultural productivity and adverse effect on ecosystem health.

Soil erosion in agricultural areas and natural grassland, accounted for 4 tons/hectare in 2000. In 2010 the erosion was equal to 3,6 ton per hectare and in 2016 was 3,7 tons/ha, increased by 3%, depicted in Figure 65. Soil erosion is addressed in the Regional Plan of Adaptation to Climate Change.

Figure 65. Estimated soil erosion (Tons/hectare)



Source: https://ec.europa.eu/eurostat/databrowser/view/AEI_PR_SOILER__custom_3433609/default/table?lang=en

3.4.15 SDG 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Table 77. SDG 16 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
16.5 (reduce corruption)	79	Corruption pillar of QGI	↑↑
16.6 (effective institutions)	77	Participation in the last elections	↓↓ *
16.6 (effective institutions)	78	Quality of Government Index	↑

*30-year trend

Source: Author's own elaboration

SDG Target 16.5 Substantially reduce corruption and bribery in all their forms

Table 78. Indicator Nr.79 Corruption pillar of QGI

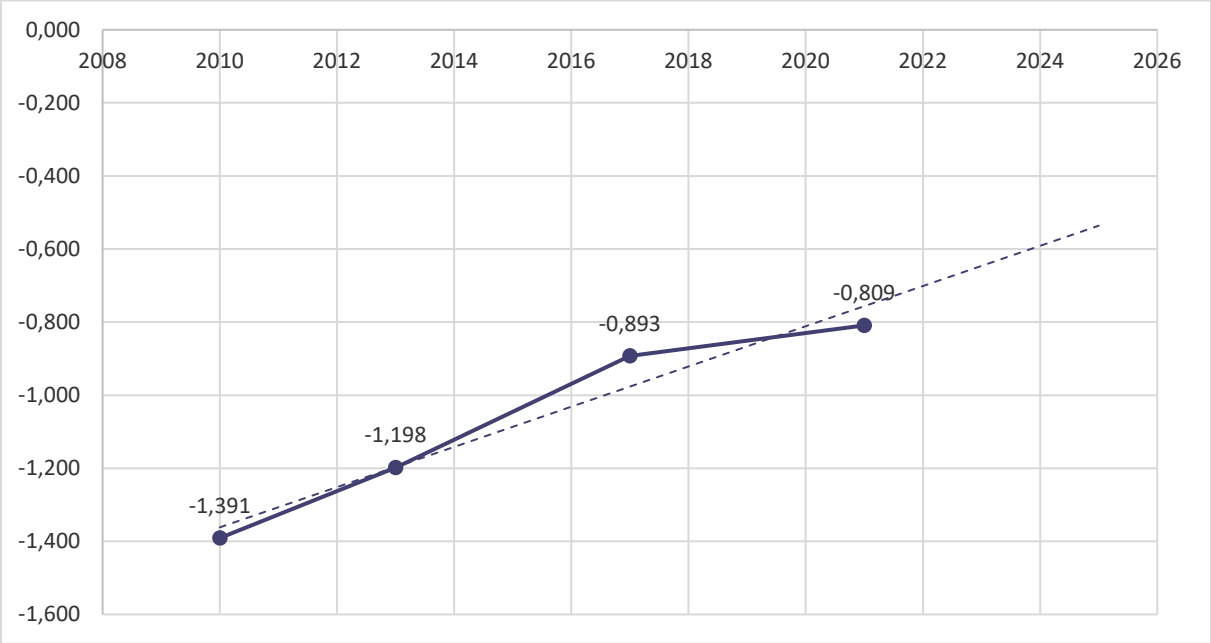
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	University of Gothenburg	University of Gothenburg: The QoG Working Paper Series 2021:4.	Index	2010-2021	Quinquennial

Source: Author's own elaboration

The European Quality of Government Index (QGI) is based on the estimation of people's perceptions in three pillars: quality, impartiality and corruption. The present indicator is based on the scores of the corruption pillar.

Regarding the corruption pillar, Figure 66 shows RWM is below the EU average, hence corruption in the area is in negative prices, even though there is significant progress over the past 12 years with an improvement of 40%.

Figure 66. Corruption pillar of QGI



Source: https://ec.europa.eu/regional_policy/en/information/maps/quality_of_governance

SDG Target 16.6 Develop effective, accountable and transparent institutions at all levels

Table 79. Indicator Nr.77 Participation in the last elections

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2019	Ministry of Interior, Greece	Election results	Percentage	1996 - 2019	Per election cycle

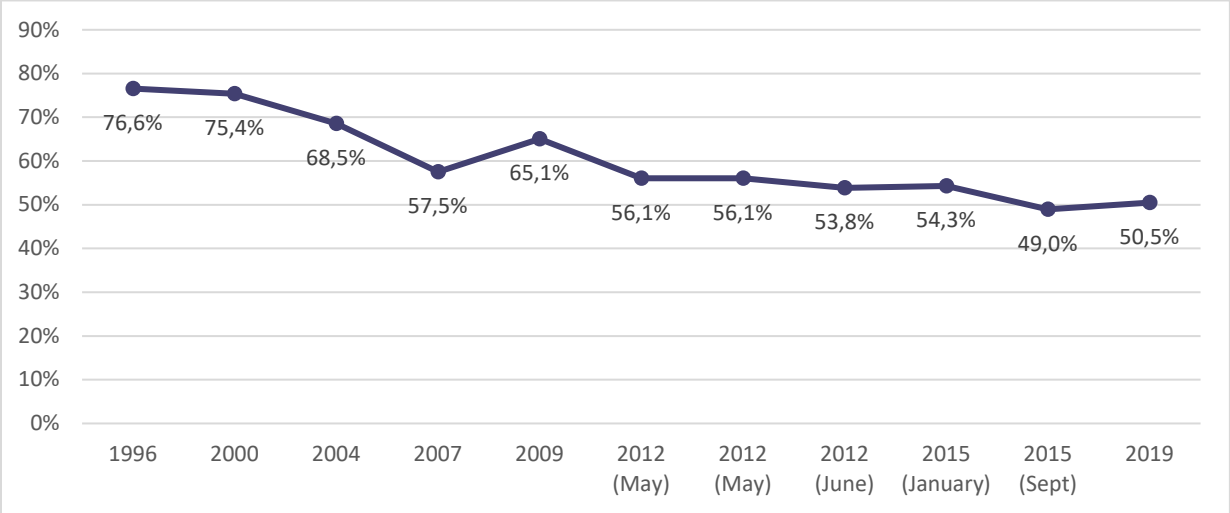
Source: Author's own elaboration

The indicator "Participation rate in the last elections" refers to the percentage of eligible voters who actually cast their votes in the most recent national elections.

It measures the level of voter turnout and helps gauge civic engagement and interest in political affairs.

As Figure 67, the turnout of voters in Western Macedonia in the national elections (from 1996 to 2019) had a steady downward trend. Particularly during the last decade, since 2009, where 7 elections took place, the decrease was 22% and the participation of voters reached 50,5%.

Figure 67. Participation in national elections



Source: https://ekloges.ypes.gr/

Table 80. Indicator Nr.78 Quality of Government Index

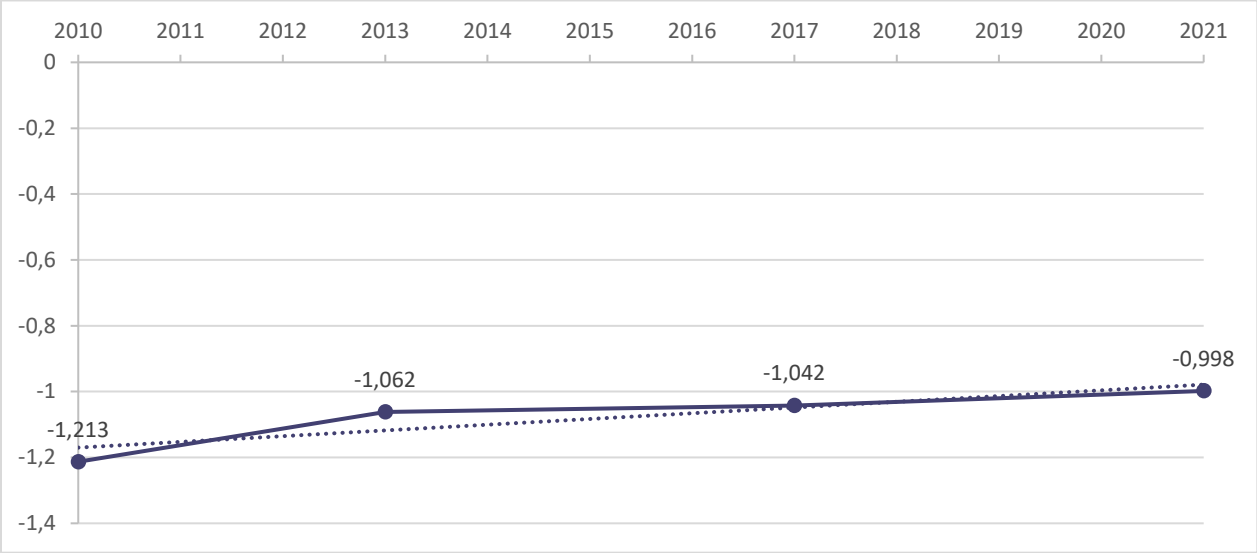
Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	University of Gothenburg	University of Gothenburg: The QoG Working Paper Series 2021:4.	Index	2010-2021	Quinquennial

Source: Author's own elaboration

The European Quality of Government Index (EQI) measures the perceptions and experiences of the general public regarding corruption levels and the quality and impartiality of three key public services: healthcare, education, and policing. The index aims to capture the average citizen's viewpoint on these aspects within their respective region of residence.

The quality of government in RWM, based on the index presented in Figure 68, has shown a steady but slight upward trend in recent years but remains in negative values, that is below the EU average.

Figure 68. European quality of government index



Source: https://ec.europa.eu/regional_policy/en/information/maps/quality_of_governance

3.4.16 SDG 17 PARTNERSHIP FOR THE GOALS

Table 81. SDG 17 Indicators

SDG Target(s)	nr.	Indicator Name	Trend (5-year)
17.8 (enabling technology)	83α	Households with internet access	↑↑

Source: Author's own elaboration

SDG Target 17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

Table 82. Indicator Nr.83a Households with internet access

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	ELSTAT	ELSTAT , Survey on the use of information and communication technologies (ICT) by households microdata	Percentage	2012-2021	Annual

Source: Author's own elaboration

The indicator "Households with internet access" refers to the percentage of households that have access to the internet.

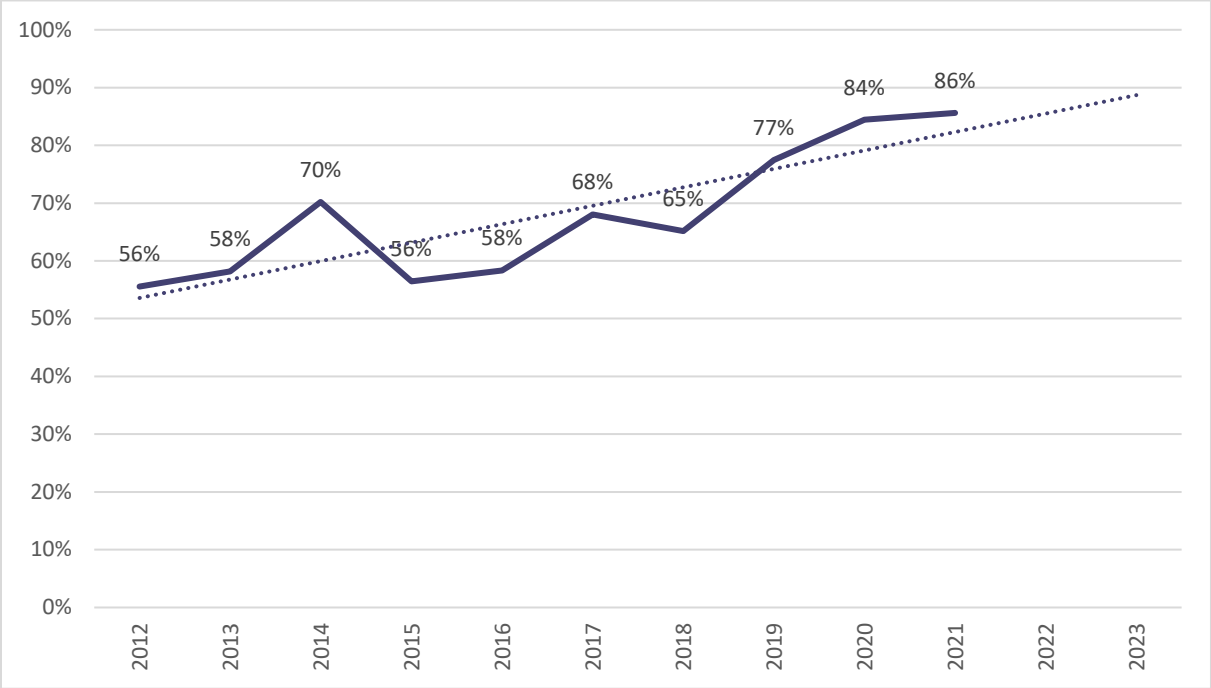
The indicator helps assess the extent of internet penetration and digital connectivity of the population of the region. Moreover, it provides insights into the availability and affordability of internet services, infrastructure development, and the overall level of technological advancement in the region. Regarding digital infrastructure, the EU target set out in the Digital Compass is gigabit connections for every household until 2030.

Internet access constitutes a cornerstone for the Regions priorities for the provision of digital public and social services due to its mountainous geography, the plethora of remote settlements and the low population density.

In the RWM, the percentage of households with internet access, according to Figure 69, follows an upward trend year to year since 2012. During the last five years the percentage of households with internet access climbed from 68% in 2017 to 86% in 2021, an increase of 26%. The COVID pandemic and the lockdowns are estimated to have a contribution in an increased need for internet access. Furthermore,

Investments in broadband infrastructure in the region are funded by the national Programme of Digital Transition 2021-2027, the RRF and the JTF.

Figure 69. Households with internet access (%)



Source: https://www.statistics.gr/public-use-files

3.4.17 TREND ANALYSIS SUMMARY

Overall, as seen in Table 83, the statistical analysis for the 70 indicators of the regional monitoring system, for the last 5 years of available data, reveals positive trends and improvement towards sustainability targets in 30 instances, whereas for 19 indicators the trends in the recent years are negative and for 9 of them the situation remains stable. Improvements appear mainly in SDG1 and poverty, SDG2 for zero hunger, SDG5 and gender equality and SDG13 on climate action. On the other hand, negative trends appear mainly in SDG8 and economic growth but a reversal is already evident after the end of COVID19 pandemic.

Table 83. Trend analysis results for the RWM SDG monitoring indicators

SDG	nr.	Indicator Name	5-year trend	SDG Target(s)
1	3	Material and social deprivation	positive	1.1 (extreme poverty)
	1	Persons living in households with very low work intensity	stable	1.2 (reduce poverty)
	4	Persons at risk of poverty or social exclusion	positive	
	2a	Population exposed to at least one forest fire	positive	1.5 (exposure to vulnerability)
2	5	Gross Value Added (GVA) of agriculture, livestock and fishing	positive	2.3 (agricultural productivity)
	7	Productivity (Gross Value Added per worker) in agriculture, forestry and fishing	positive	
	6	Organic farming: areas with different crops	positive	2.4 (sustainable food production)
3	13	Infant mortality	positive	3.2 (preventable death of newborns)
	9	Deaths due to Covid-19	negative	3.3 (epidemics and diseases)
	12	Hospital beds	stable	3.8 (universal health coverage)
	10	Self reported unmet needs for medical examination	positive	3.c (health financing and recruitment)
	11	Health personnel	negative	
4	19	Participation rates in selected education levels	stable	4.1 (primary and secondary education)
	17	Pupils enrolled in early childhood education	positive	4.2 (access to early childhood education)
	15	Students enrolled in tertiary education	stable	4.3 (vocational and tertiary education)
	16	Participation in education	negative	
	20a	Participation rate in education and training (last 4 weeks)	negative	
	14	Women 30-34 years old with higher education level	positive	4.5 (gender and other disparities in education), 4.6 (youth and adult literacy)
	18	Early leavers from education and training	positive	4.6 (youth and adult literacy)
5	26	Female achievement/disadvantage index	n/a	5.1 (gender discrimination)
	21	Fatal victims of gender-based violence at the hands of their partners or expartners	n/a	5.2 (gender violence)
	22	Victims of violence against women	n/a	
	27	Gender gap in part-time employment incidence	positive	5.4 (unpaid work)

SDG	nr.	Indicator Name	5-year trend	SDG Target(s)
	23	Female research and development personnel	n/a	5.5 (women participation and leadership)
	25	Women in parliament and government	positive	
	24b	Unemployment rate of women	positive	
6	30	Population served by safely managed drinking water supply services	n/a	6.1 (universal access to water)
	28	Water bodies that exceed a standardized quality rating	stable	6.3 (water quality)
	29	Groundwater that exceed a standardized quality rating	stable	
7	35	People affected by energy poverty	negative	7.1 (access to energy)
	33a	Installed power that comes from renewable energy sources	n/a	7.2 (share of renewable energy)
	34	Energy intensity	n/a	7.3 (energy efficiency)
8	41	GDP at current market prices	negative	8.1 (economic growth)
	42	GVA at basic prices	negative	8.2 (economic productivity)
	39a	Number of firms	negative	8.3 (job creation)
	37	Economic activity	negative	8.5 (productive employment)
	38	Unemployment	negative	
	40	Employment	positive	
	43	Long-term unemployment (12 months and more)	negative	
	44	Compensation of employees	negative	
	45	Young people neither in employment nor in education and training	positive	8.6 (youth not in employment, education or training)
	36	Occupational accidents	positive	8.8 (labour rights)
9	46	GVA of the industry with respect to the GVA of the total sectors (current price)	negative	9.2 (sustainable industrialization)
	47	Gross Domestic Expenditure on R&D	positive	9.5 (promote innovation)
	48	R&D personnel and researchers	positive	
	49b	Personnel on high-tech knowledge-intensive service as a percentage of total services employment	negative	
10	51a	Disability employment gap	n/a	10.2 (inclusion irrespective of status)
	52a	80-20 income distribution	positive	10.4 (greater equality)
11	53	Households expenses dedicated to housing costs	positive	11.1 (access to housing)
	55	Daily accessibility	positive	11.2 (access to transport systems)
	56	Stock of vehicles (passenger cars)	positive	
	61	Victims in road accidents	positive	

SDG	nr.	Indicator Name	5-year trend	SDG Target(s)
	54a	Household expenses dedicated to public transport means to total transportation costs	negative	
	58a	Artificial Surfaces	negative	11.3 (sustainable urbanization)
	59	PM2.5 Emissions	positive	11.6 (environmental impact)
	60	Household and commercial waste generation per inhabitant	negative	
12	84	Recovery of urban waste, biowaste and compost like output	positive	12.2 (management of natural resources)
	63	Food waste	n/a	12.3 (reduce food waste)
	64	Hazardous Waste	stable	12.4 (chemical management)
13	65	PM10 Emissions	positive	13.2 (climate change measures into policy)
	66	CO2 Emissions	positive	
	67	Greenhouse Gas Emissions	positive	
	68	Cooling and heating degree days	mixed	
15	74	Land Abandonment	stable	15.1 (restoration of ecosystems)
	75	Forest area over total surface area	stable	
	72	Terrestrial protected areas as a percentage of total area	stable	15.5 (degradation of habitats)
	73	Estimated soil erosion	negative	
16	79	Corruption pillar of QGI	positive	16.5 (reduce corruption)
	77	Participation in the last elections	negative	16.6 (effective institutions)
	78	Quality of Government Index	positive	16.6 (effective institutions)
17	83a	Households with internet access	positive	17.8 (enabling technology)

Source: Author's own elaboration

3.5 Horizontal analysis of indicators metadata

The research carried out on the indicators and the collaboration with the regional administration of Western Macedonia, reaffirmed that an important aspect of an SDG monitoring system is the robustness of the main attributes of the data sources used for the indicators measurement. The main attributes examined for the SDG monitoring system are: a) the type of the indicator source, b) the timeliness of the datasets, c) the type of the data sources, d) the time-coverage of the datasets, e) the measurement units, f) the frequency of data collection and update.

The analysis of the metadata of the initial 70 indicators comprising the SDG monitoring system of the RWM revealed that the majority of them (52 or 74%) come from official sources, while the rest of the available indicators (11 or 16%) come from experimental datasets. The remaining 7 have no data available at the regional level and/or for the Region.

As presented in Table 84, the majority of indicators (43%) have data from the Eurostat database, followed by data from EC and other EU bodies (DGs, JRC, EEA, Copernicus) with 17% and Hellenic Statistical Authority with 13%. The rest of the indicators are calculated from data coming from national (6%) and regional (4%) authorities of Greece, OECD (4%) and other sources (like the University of Goteborg for the quality of government index).

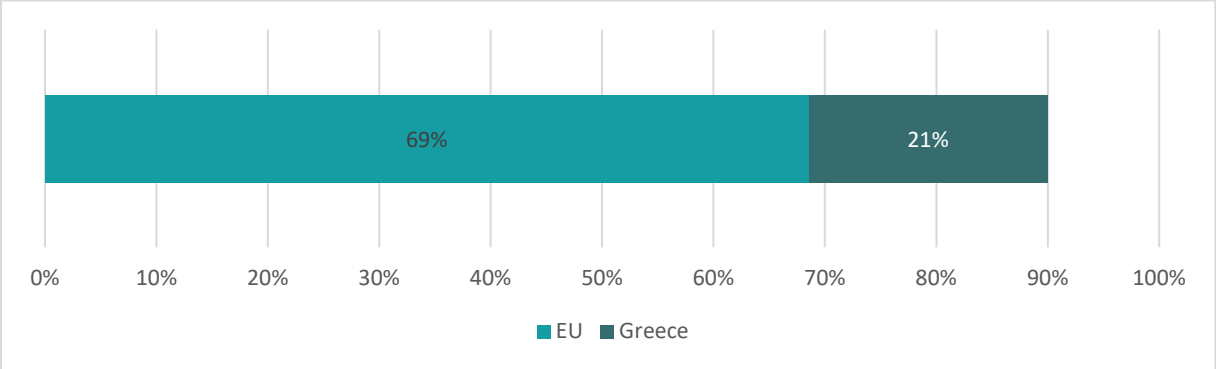
Table 84. Data sources of indicators

Source	Number of Indicators	%
Eurostat	30	43%
European Commission & other EU bodies	12	17%
ELSTAT	9	13%
Greek Ministries & central government organizations	4	6%
Regional and local authorities	3	4%
OECD	3	4%
Other	2	3%
n/a	7	10%

Source: Author's own elaboration

Figure 70 shows, that most of the indicators (69%) have data Coverage for EU member states while 21% of them refer only to Greece.

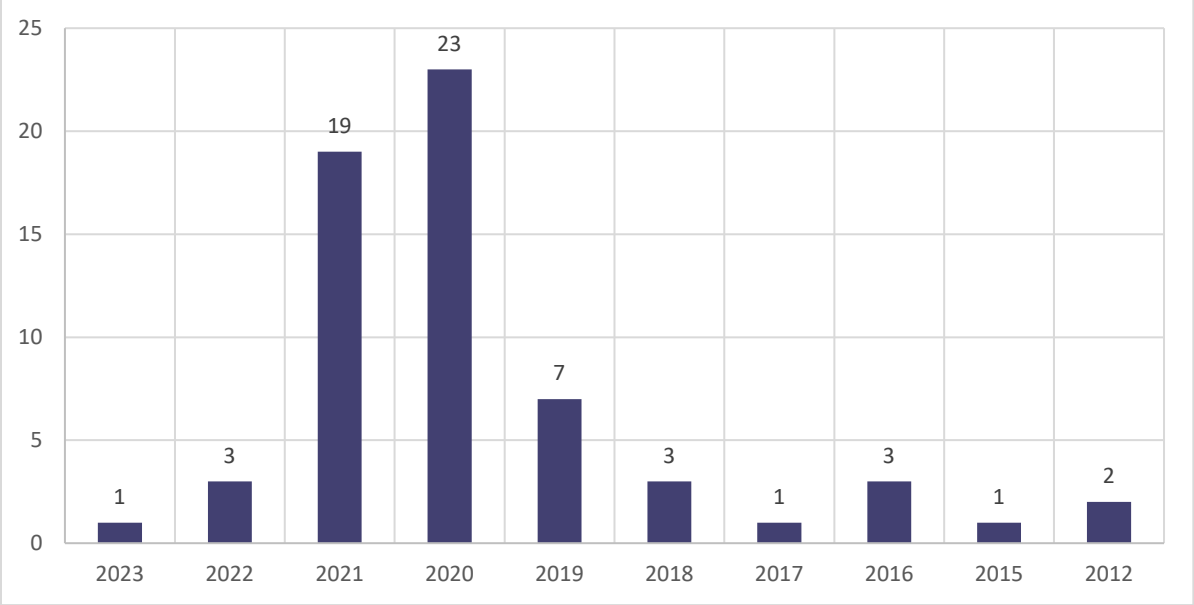
Figure 70. Coverage of indicator data



Source: Author's own elaboration

A crucial issue of the indicator data is the availability of up-to-date data. As seen in Figure 71 the majority of the indicators have data sources with datasets extending until 2020 (33%) and 2021 (26%).

Figure 71. Most recent year of available data of indicators



Source: Author's own elaboration

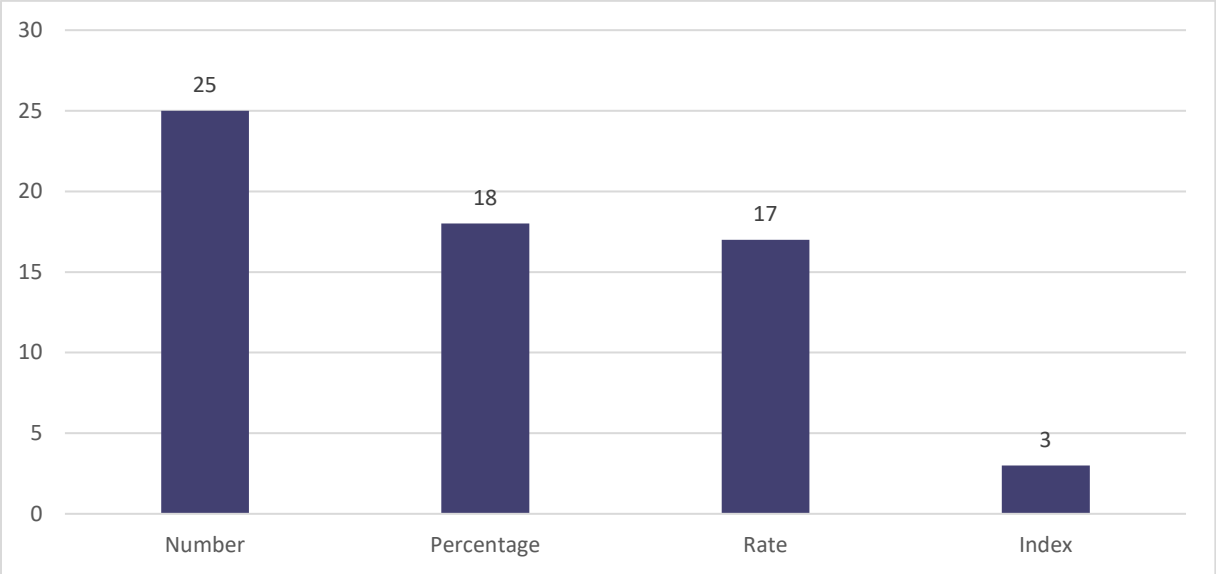
Table 85 shows that the main measurement unit of the indicators are Percentages (26%) and Rates (24%) followed by absolute numbers (36%).

Table 85. Unit of Measurement of indicators

Unit of measurement	Number of indicators	(%)
Number	25	36%
Percentage	18	26%
Rate	17	24%
Index	3	4%
n/a	7	10%

Source: Author's own elaboration

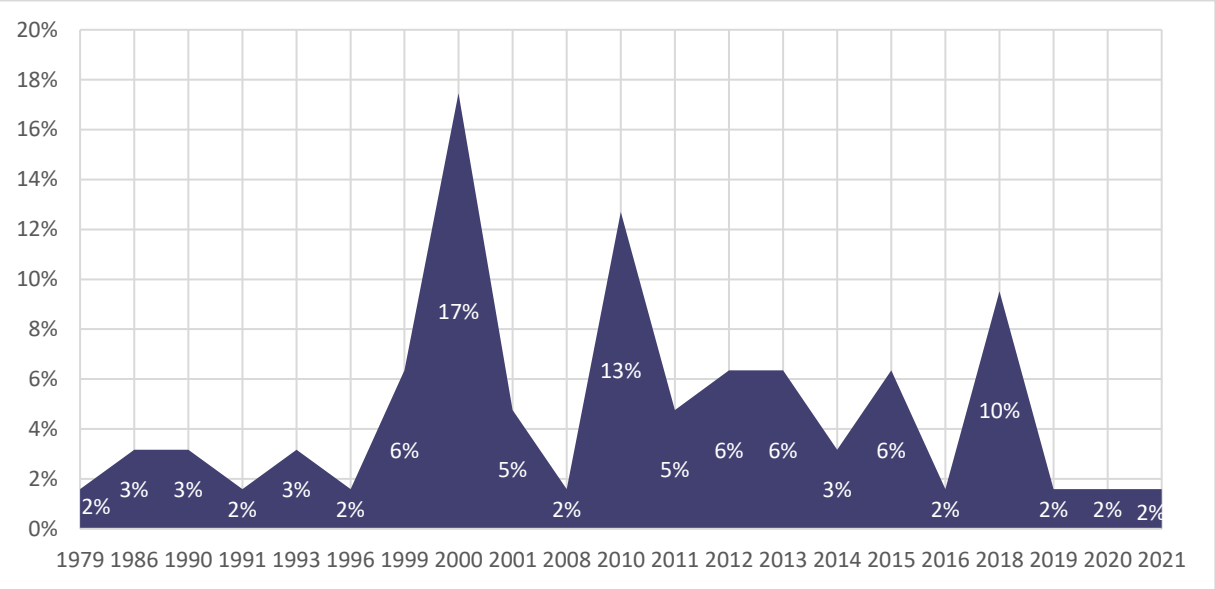
Figure 72. Unit of Measurement of indicators



Source: Author's own elaboration

The majority of the indicators (82%) have time-series starting before 2015, year of SDGs adoption, as it si evident from Figure 73. It should be noted that there are 7 indicators with only one year of data (nr.26, 64, 65, 66 and 74), and 4 of them (mostly indexes from the JRC Urban Atlas) have time-series as forecasts from that starting year.

Figure 73. Oldest data point of the time-series of indicators



Source: Author's own elaboration

Regarding the frequency of data collection and publication, most of the indicators (66%) are updated annually. There are some indicators (11%) that are updated in longer time intervals (4-7 years) mostly connected to election cycles, or updates of studies (such as RBMP or Land use recording). A couple of indicators are updated in shorter time intervals, such as the daily/weekly of COVID19 data and the monthly reporting of RES installed power and energy production.

Table 86. Distribution of SDG Goals based on source and availability year

SDG Number	Official Source	Experimental	n/a	Year of availability
SDG 1	4	0	0	2021
SDG 2	3	0	0	2021, 2020, 2019
SDG 3	4	1	0	2023, 2021, 2020, 2019, 2017
SDG 4	7	0	0	2021,2020,2015
SDG 5	2	2	3	2022, 2021, 2019
SDG 6	2	0	1	2016
SDG 7	2	0	1	2022, 2020
SDG 8	10	0	0	2021,2020,2019
SDG 9	4	0	0	2020, 2019
SDG 10	1	0	1	2020

SDG 11	6	2	0	2022, 2021, 2020, 2018
SDG 12	1	0	1	2012
SDG 13	2	2	0	2021,2020, 2018
SDG 15	2	2	0	2020,2018,2016,2012
SDG 16	1	2	0	2021, 2019
SDG 17	1	0	0	2022, 2021

Source: Author's own elaboration

4. IDENTIFICATION OF SDGS AND SDGS TARGETS THAT REQUIRE CUSTOMIZED APPROACH

4.1 Development priorities of the Region

The main development planning and programming documents of the Region, directly connected to financial sources for implementation are: a) the Programme Western Macedonia 2021-2027, co-funded by the ERDF and ESF+, b) the Territorial Just Transition Plan Western Macedonia, co-funded by the JTF.

The development vision for the RWM in the Programme Western Macedonia 2021-2027 is "*The formation of a new, strengthened and distinct role of Western Macedonia in the national and international environment focusing on the creation of sustainable jobs through: the economic transformation of the regional economy in terms of improving competitiveness and extroversion, supporting clean energy and green sustainable development and integrated development of urban and rural areas, and the creation of a high level of social cohesion.*"

The programme is articulated in six (6) Priorities and twenty-one (21) Specific Objectives of the new Cohesion Policy. The first priority "Strengthening the productive and economic transformation of the Region" will seek to cover needs in Strengthening public RTDI infrastructure, Interconnection of public RTDI structures and results with entrepreneurship, Strengthening business expenditure on RTDI, Creation of support mechanisms for innovative/start-ups and regional business ecosystem, Improving access to finance for businesses, Digital upgrading of public services, enhancing their accessibility to people with disabilities, and utilization of public data, Ensuring high quality broadband access speed in public services and businesses, Improving digital entrepreneurship, competitiveness and extroversion of businesses, Supporting diversification of businesses affected by lignite phase-out, Upgrading the skills of human resources of businesses to support innovation, extroversion and digital transformation.

The second priority "Supporting clean energy and green sustainable development" addresses development needs in Promotion of energy efficiency to address climate conditions in a more economical and ecological way, Strengthening the prevention, response and management of floods, forest fires and other natural hazards, Expansion – upgrading of water supply infrastructure, wastewater management and support of water resources management actions by integrating modern practices and technological tools, aiming at improving the condition of water resources water bodies and the achievement of the objectives of the Management Plan, Promotion of circular economy through integrated management and sorting at source of bio-waste (to be implemented by National Programs), Support mechanisms for the surveillance, management and protection of biodiversity and protected areas and their sustainable local development, Support interventions for the restoration and exploitation of the environment in urban centers and degraded areas and monitoring and recording air pollution and noise through and enhancing mobility options in major urban centres and promoting electromobility.

The development needs in the third priority "Improving the interconnectivity of the Region", include the completion of Trans-european Network Transport Axes, Improvement of road connections of remote and tourist areas of the Region, Upgrading / construction of the intra-regional road network while improving the level of road safety, Differentiation and specialization of the two airports and improvement of their accessibility to passengers with disabilities and / or chronic diseases, Support for the development of freight centers, Creation of a network accessible to all urban and interurban transport.

The fourth and fifth priorities regard "Strengthening the Social Development of the Region" covering needs in Creation of new jobs, especially for young people and women, Promotion and exploitation of the social economy, Support of the labour transition of the workforce affected by lignite phase-out, Training and retraining of the workforce in the new opportunities of the energy transition and the smart specialization sectors of the Region, Strengthening social safety nets especially for those facing gaps in access to social protection, and the most vulnerable, including the economically inactive, Promoting gender equality and reconciling family and professional life, Promoting lifelong learning and widening access to education and training to vulnerable

groups, Enhancing the improvement of the living conditions of marginalized communities and their social inclusion, Supporting remote communities and addressing the difficulties of low population density, Ensuring access to social services for the most deprived and vulnerable groups, including people with disabilities, Development of long-term care services, Strengthening infrastructure and equipment of health units and improving their accessibility to people with disabilities and/or chronic diseases, Strengthening the operation of social care and welfare infrastructure, Completion of the infrastructure of the University of Western Macedonia, Enhancement of equipment and facilities of school units and improvement of their accessibility to students and teachers with disabilities, Promotion, organization and promotion of tourist resources and destinations, Enhancement of accessibility of tourism and cultural resources by all.

Finally, the sixth priority "Integrated territorial development of urban and rural areas" addressed development needs in Urban regeneration and upgrading of public spaces in cities with access for all including the promotion of accessibility, free mobility for people with mobility problems, protection of vulnerable road users and improvement of urban resilience, Cultural and creative upgrading of public space, branding of cities and organization of their tourism product in connection with their wider area, Green transition of cities with interventions for smart energy, sustainable mobility and promotion of circular economy, electrification of urban transport, Integrated plans to address interdependent challenges at the level of "functional areas", such as lakes, rivers or mountains, Redefinition of the tourism product accessible to all through integrated spatial approaches, networking of areas of tourist interest and networking with others neighboring "popular" destinations.

The TJTP set outs three main development needs and objectives for the Region until 2030. The first and most prominent development need entails the restructuring of the production model within the RWM in accordance with the region's energy identity. This restructuring effort takes into account the favorable global conditions observed in the renewable energy sources and energy storage sector. Furthermore, it leverages the advantages associated with expanding the energy value chain within the region. The ultimate objective is to position the RWM as a prominent Alternative Energy Hub. The second priority regards supporting human resources & communities affected by lignite phase-out. Given the significantly elevated unemployment rate in the RWM, it is imperative to promptly initiate measures aimed at training and retraining both the unemployed individuals and the existing workforce. These efforts should focus on sectors that exhibit potential for job absorption and promising prospects within the region. Moreover, it is crucial to align these training initiatives with the skills possessed by workers who have been impacted by the phasing out of the lignite industry. The third priority for development entails the mitigation of adverse environmental, health, and safety consequences arising from lignite extraction and combustion. It also focuses on preventing the emergence of new sources of pollution. Central to this priority is the rehabilitation of lignite land and the implementation of projects that facilitate the transition to a new production model. This model ensures the avoidance of additional environmental issues through initiatives like the recycling of RES by-products and effective energy storage practices. The revitalization efforts in these areas also aim to showcase the diverse natural environment found in the region, including the development of green spaces, lakes, and forests. Moreover, it involves the establishment of suitable infrastructure to attract and foster new economic activities.

Overall, the development priorities of the Region of Western Macedonia derived from the aforementioned programming documents are well connected to the SDGs and the targets incorporated in the regional SDG monitoring system. The relevance between SDGs targets and regional priorities was controlled by taking into account the indicators rationale for each target and their correspondence to each regional priority. As it is evident from Table 87, social development priorities, co-funded by the ESF+ from the Programme Western Macedonia, seem to have the highest relevance to the selected SDG Targets by far, followed by clean energy and climate change priorities, in both Programme Western Macedonia and the Territorial Just Transition Plan.

Table 87. Relevance matrix of SDGs Targets and Regional priorities

SDG Target(s)	Programme Western Macedonia 2021-2027						Territorial Just Transition Plan				
	1: Strengthening the productive and economic transformation of the Region	2: Supporting clean energy and green sustainable development.	3: Improving the interconnectivity of the Region.	4: Strengthening the Social Development of the Region (ERDF)	5: Strengthening the Social Development of the Region (ESF+)	6: Integrated territorial development of urban and rural areas.	1. Strengthening & promoting entrepreneurship	2. Energy transition - climate neutrality	3. Land use readjustment - circular economy	4. Just labour transition and human capital empowerment	5. Small-scale integrated interventions
1.1 (extreme poverty)					X						
1.2 (reduce poverty)					X						
1.5 (exposure to vulnerability)		X									
2.3 (agricultural productivity)											
2.4 (sustainable food production)											
3.2 (preventable death of newborns)				X	X						
3.3 (epidemics and diseases)				X	X						
3.8 (universal health coverage)				X	X						
3.c (health financing and					X						
4.1 (primary and secondary				X	X						
4.2 (access to early childhood					X						
4.3 (vocational and tertiary				X	X						
4.5 (gender and other disparities in education), 4.6 (youth and adult					X						
4.6 (youth and adult literacy)					X						
5.1 (gender discrimination)					X						
5.2 (gender violence)					X						
5.4 (unpaid work)					X						
5.5 (women participation and											
6.1 (universal access to water)		X									
6.3 (water quality)		X									
7.1 (access to energy)		X						X			
7.2 (share of renewable energy)		X						X			
7.3 (energy efficiency)		X						X			
8.1 (economic growth)	X						X				
8.2 (economic productivity)	X						X				
8.3 (job creation)	X				X		X	X			X
8.5 (productive employment)	X									X	
8.6 (youth not in employment, education or training)					X						
8.8 (labour rights)											
9.2 (sustainable industrialization)	X						X	X			
9.5 (promote innovation)	X						X	X			
10.2 (inclusion irrespective of status)					X						
10.4 (greater equality)					X						
11.1 (access to housing)											
11.2 (access to transport systems)			X			X					X
11.3 (sustainable urbanization)						X					X
11.6 (environmental impact)		X				X		X			X
12.2 (management of natural		X							X		
12.3 (reduce food waste)		X							X		
12.4 (chemical management)											
13.2 (climate change measures into policy)		X			X			X			
15.1 (restoration of ecosystems)									X		
15.5 (degradation of habitats)		X									
16.1 (Significantly reduce all forms of violence and related death rates everywhere)											
16.5 (reduce corruption)											
16.6 (effective institutions)											
17.6 (regional and international cooperation)											
17.8 (enabling technology)	X					X					X
Sum of targets/regional priorities connections	7	11	1	5	19	4	5	8	3	1	5

Source: Author's own elaboration

4.2 Proposal of additional indicators

The expert, in cooperation with the regional administration of the Western Macedonia, proposed 7 new additional indicators to be included in the regional SDG monitoring system. The selection was based on the following criteria: a) on one hand to account for the particular priorities of the Region in relation to just transition and b) on the other hand to improve the coverage of SDGs targets, specifically in those SDGs with a high percentage of not fit for purpose, for Western Macedonia, indicators from the JRC framework. The nea additional indicators are summarized in Table 88.

Table 88. Additional SDGs monitoring indicators proposed for RWM

SDG	Indicator Name	Type	Coverage	Target(s)	National SDG Monitoring Indicator
7	Energy storage capacity	Official	Greece	7.3 (energy efficiency)	No
8	Jobs created	Official	Greece	8.3 (job creation)	No
8	Employment in energy sector	Official	Greece	8.5 (productive employment)	No
12	Recovery of urban waste, biowaste and compost like output.	Experimental	Greece	12.2 (management of natural resources)	No
12	Land use with heavy environmental impact	Official	EU	12.2 (management of natural resources)	No
16	Death rate by homicide	Official	Greece	16.1 (Significantly reduce all forms of violence and related death rates everywhere)	Yes
17	Cooperation projects with neighbouring countries	Experimental	EU	17.6 (regional and international cooperation)	No

Source: Author's own elaboration

4.3 Trends and metadata for alternative/additional indicators

4.3.1 SDG 7 AFFORDABLE AND CLEAN ENERGY

SDG Target 7.3 By 2030, double the global rate of improvement in energy efficiency

Table 89. Indicator Nr. 89. Energy storage capacity

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2022	JTDP Managing Authority	JTDP monitoring system	Number (MWh)	2021-2029	Annual

Source: Author's own elaboration

Energy storage and specifically storage of green H2 are among the linchpins of the restructuring effort of the regional productive system towards an alternative energy hub, based on the inactive lignite fields and the rich water resources and potential of the area, as it is stated in the Territorial Just Transition Plan of the Region.

The indicator is included in the Just Development Transition Programme of Greece. It's a programme specific output indicator with the baseline value being 0 and the target for 2029 estimated at 1.080 MWh.

As the JTDP concerns not only the RWM but also other areas in Greece, the indicator aggregates measurements from interventions in all of them. The regional administration of Western Macedonia would need to liaise with the JTDP to collect the specific data for the region.

4.3.2 SDG 8 DECENT WORK AND ECONOMIC GROWTH

SDG Target 8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

Table 90. Indicator Nr. 88. Jobs created

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2022	JTDP Managing Authority & Programme WM Managing Authority	JTDP monitoring system PWM monitoring system	Number (annual FTEs)	2021-2029	Annual

Source: Author's own elaboration

The loss of workplaces, estimated at 10,6 thousand, is singlehandedly the biggest and most serious impact of the decarbonization in the Region of Western Macedonia. The investment efforts of the EU and national funds in the region aim at the mitigation of the consequences of lost jobs in the regional economy and society.

Thus, it is crucial for the Region to monitor new jobs created to compensate for and support the transition path. The indicator measures the jobs created in supported entities of the JTDP and the Programme Western Macedonia 2021-2027. It's a common result indicator of the Common Provisions Regulation (RCR01) with the baseline value being 0 and the target for 2029 estimated at 5.255 full time equivalents from JTDP investments and 160 from the Programme Western Macedonia investments.

As the JTDP concerns not only the RWM but also other areas in Greece, the indicator aggregates measurements from interventions in all of them. The regional administration of Western Macedonia would need to liaise with the JTDP to collect the specific data for the region.

SDG Target 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

Table 91. Indicator Nr. 87. Employment in energy sector

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2020	ELSTAT	ELSTAT, Statistical Business register	Number (index)	2010-2020	Annual

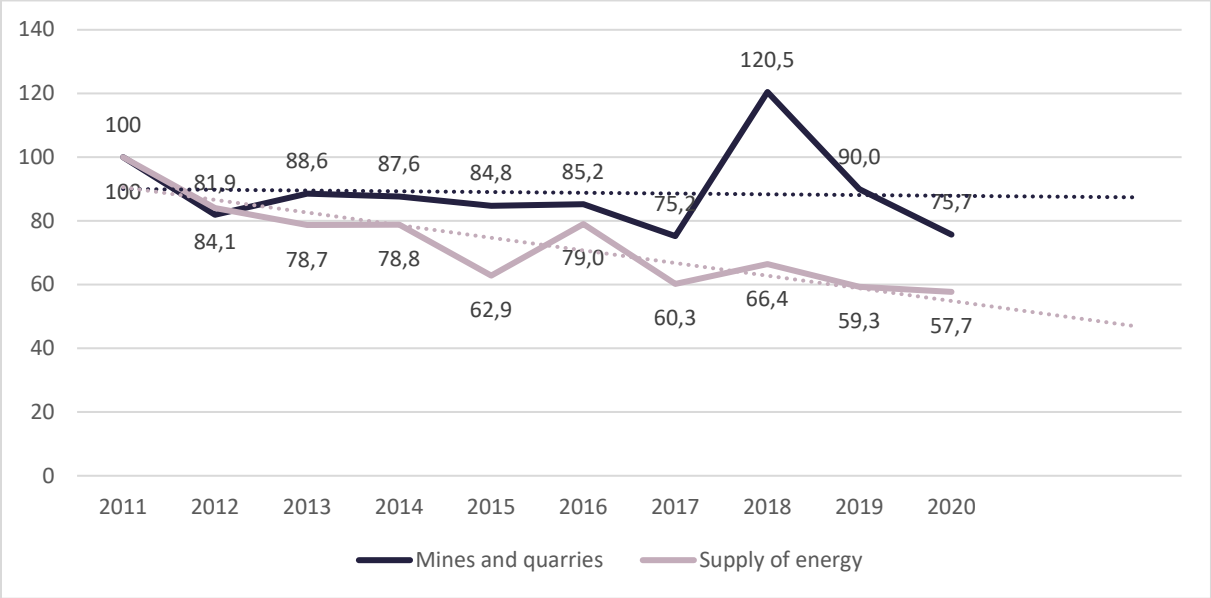
Source: Author's own elaboration

The indicator "Employment in the energy sector" measures the change in the number of employees in the NACE rev.2 categories B (mining and quarrying) and D (Electricity, gas, steam and air conditioning supply) having as starting point the year 2011 = 100.

In the context of the RWM as a coal region undergoing a just transition process it serves as a means to assess the current level of employment and workforce dependency on coal-related activities in the region. A decrease in employment in the energy sector, specifically coal-related activities, may indicate successful efforts in transitioning away from coal. However, it also highlights the need for appropriate measures to support the affected workers in finding alternative employment opportunities or facilitating their retraining and skills development for new job sectors. Conversely, an increase in employment in the energy sector, particularly in renewable energy and other clean technologies, demonstrates progress towards achieving a just transition. It signifies the successful creation of new job opportunities in the sustainable energy sector and the potential for economic revitalization in the region.

Figure 74 shows that during the last decade employment level in the energy sector, and the supporting mining activities, in the RWM showed a downward trend, with a decrease of 48% and 24% respectively. This fall can be attributed to the decommissioning of coal-powered energy units in the Region in 2010 (1 unit), 2011 (1 unit), 2014 (2 units), 2019 (2 units). The programmed decommissioning of further units in the next years (2020, 2022, 2023), will exacerbate the impact in employment levels in businesses of the two sectors.

Figure 74. Employment level index in energy and mining businesses (2011 = 100)



Source: Author's own elaboration

4.3.3 SDG 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

SDG Target 12.2 By 2030, achieve the sustainable management and efficient use of natural resources

Table 92. Indicator Nr.84 Recovery of urban waste, biowaste and compost like output

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2019	Guide for the Regional Waste Management Plan of Western Macedonia	Charalampos Tsokanis, 2021, Analysis of the current state of play for solid waste management by region (DG-REGIO contract)	Percentage	2019-2030	(forecast)

Source: Author's own elaboration

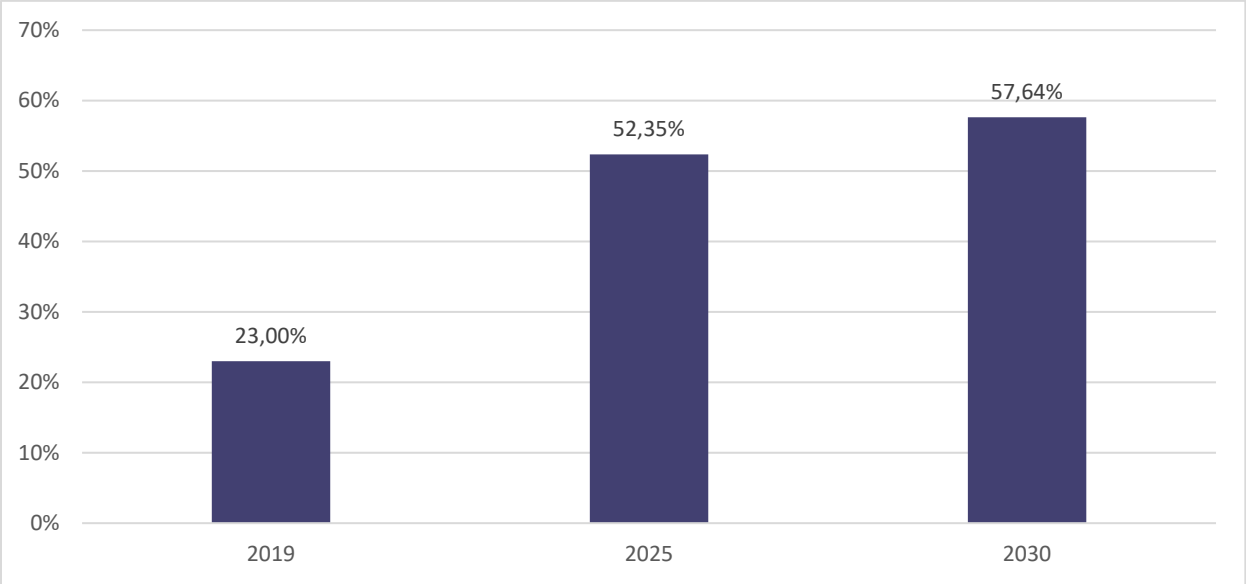
The indicator "Recovery of urban waste, biowaste, and compost like output" refers to the measurement of the amount of urban waste, biowaste and compostable materials included, that is diverted from landfill and undergoes a recovery process. The indicator includes municipal waste streams with sorting at source and recovery (paper, plastic, metal, glass, bulky, textiles and wood, edible fats and oils, household composting).

It can be used by the Region to gauge the effectiveness of the waste management system to reduce landfill volumes, conserve resources, minimize greenhouse gas emissions, and contribution to a circular economy.

Recovery of urban waste, biowaste and compost like output, as Figure 75 depicts, accounted for 23% in 2019. It is expected that the percentage will reach 57,6% by 2030 (151% increase). However, the forecast seems to miss (even though for a couple of percentage points) the targets set by Directive (EU) 2018/851 for preparing for re-use and recycling of municipal waste to a minimum of 55 % by weight by 2025 and to a minimum of 60% by 2030.

The company Waste Management Weste"n Macedonia S.A. is responsible for the design and implementation of the Regional Waste Management Plan, thus the Region would need to liaise with it to collect the specific values for the indicator.

Figure 75. Recovery of urban waste, biowaste and compost like output



Source: https://diktiofodsa.gr/wp-content/uploads/2021/12/%CE%9F%CE%B4%CE%B7%CE%B3%CF%8C%CF%82-%CE%A0%CE%95%CE%A3%CE%94%CE%91-%CE%A0%CE%B5%CF%81%CE%B9%CF%86%CE%AD%CF%81%CE%B5%CE%B9%CE%B1%CF%82-%CE%94%CF%85%CF%84%CE%B9%CE%BA%CE%AE%CF%82-%CE%9C%CE%B1%CE%BA%CE%B5%CE%B4%CE%BF%CE%BD%CE%AF%CE%B1%CF%82.pdf

Table 93. Indicator Nr.90 Land use with heavy environmental impact

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2018	Eurostat	Eurostat Land use overview by NUTS 2 regions, Table: LAN_USE_OVW	Number (sq. km.)	2009-2018	3 years

Source: Author's own elaboration

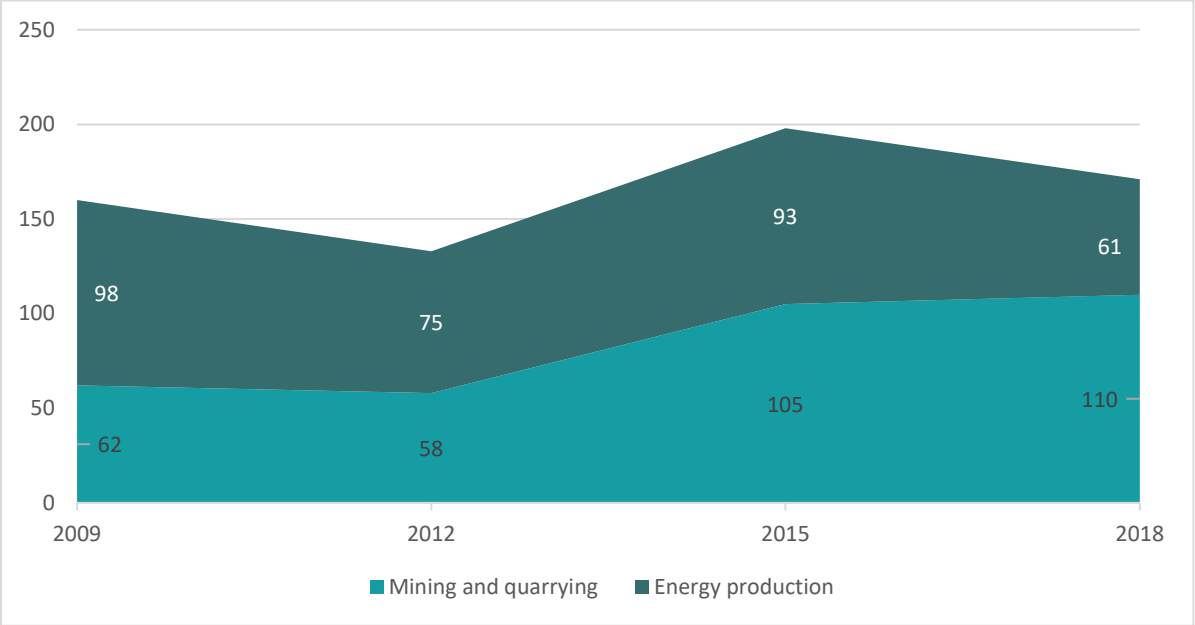
The indicator measures the land surface dedicated to uses fundamental to the past structure of the economy of the Region, based on coal-energy production, which are also considered as having heavy environmental impacts.

The indicator is relevant to the priority of the Region for a green energy transition which entails significant investments in rehabilitating land used for coal energy production.

According to data presented in Figure 76, land use for energy production has seen a decline since 2015, mainly due to the decommissioning of coal-powered energy units. However, the mining and quarrying surface is increasing due to the development of new coal fields.

Through the TJTP a large investment programme is foreseen for the environmental rehabilitation, repurposing and re-use of the inactive coal mines in the Region, towards 2030.

Figure 76. Land use with heavy environmental impact (sq. km.)



Source: https://ec.europa.eu/eurostat/databrowser/view/LAN_USE_OVW__custom_6392490/default/table?lang=en

4.3.4 SDG 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

SDG Target 16.1 Significantly reduce all forms of violence and related death rates everywhere

Table 94. Indicator Nr. 85 Death rate by homicide

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2021	ELSTAT	ELSTAT, Offences committed	Rate	2015-2021	Annual

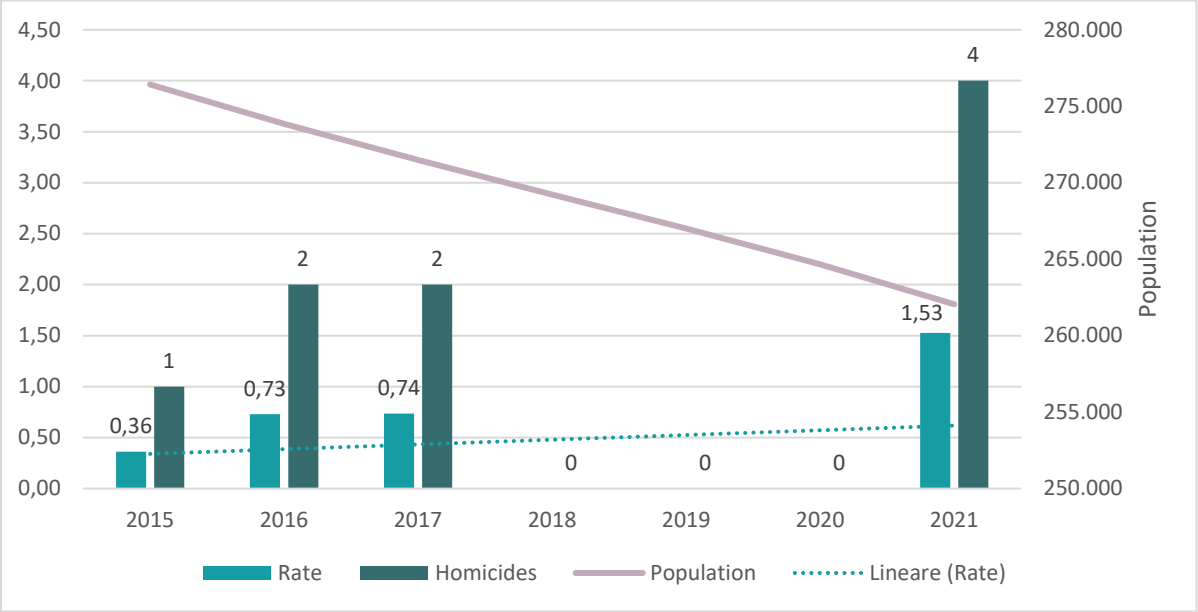
Source: Author's own elaboration

The indicator records the homicides per 100.000 persons in the Region. Figure 77 shows that in 2015, the rate accounted for 0,36 and in 2021 for 1,53. Despite the upward trend, in general, homicides occur very rarely in the region, and this can be deduced from the fact that in 2018, 2019 and 2020 there were no homicides at all.

The indicator is relevant for violence monitoring in the Region. It was selected to improve the coverage of SDG 16 targets, not covered by the initial JRC framework, and it is also included in the National SDG Monitoring System and.

The Regional Authority has no competences in policing and combating crime, however its policies and investments shape the quality of life, wellbeing and social justice in the Region.

Figure 77. Death rate by homicide



Source: https://www.statistics.gr/el/statistics/-/publication/SJU03/-

4.3.5 SDG 17 PARTNERSHIP FOR GOALS

SDG Target 17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

Table 95. Indicator Nr. 86 Cooperation projects with neighbouring countries

Year of availability	Source	Reference	Unit of measurement	Time coverage	Frequency
2022	Interact	Database keep.eu	Number	2000-2022	Annual

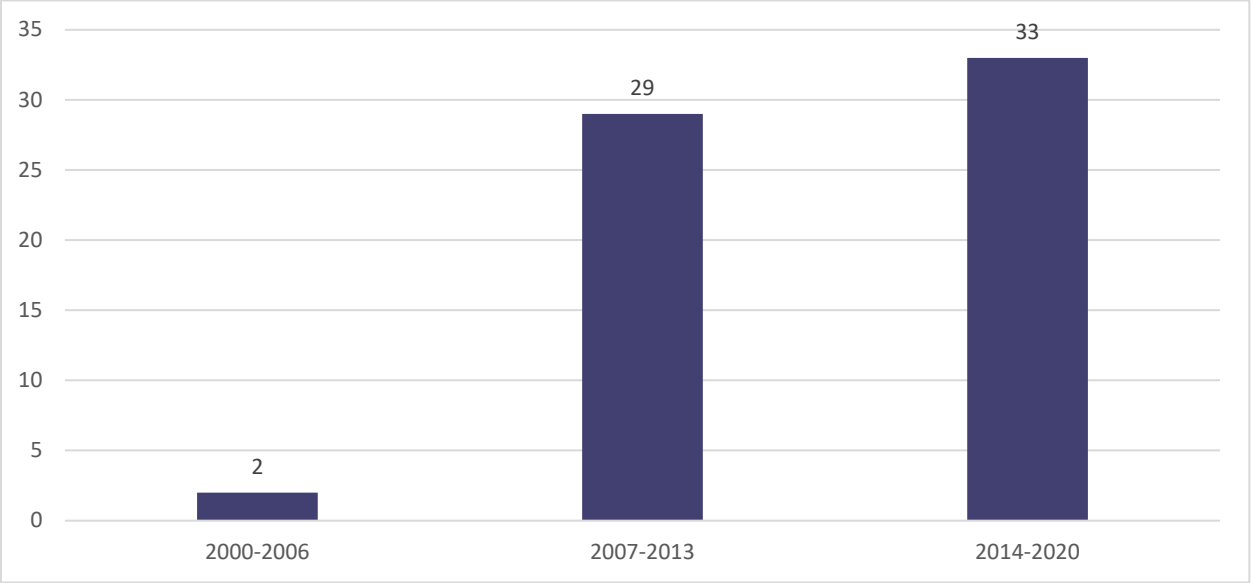
Source: Author's own elaboration

The indicator "Cooperation projects with neighbouring countries" gauges the number of Interreg Cross-border cooperation (CBC) projects that are implemented in the Region. Namely, the indicator measures projects from the following programmes: Greece – Albania, Greece – FYROM/North Macedonia and Balkan-Mediterranean for the last three programming periods.

The indicator was selected to improve the coverage of SDG 17 targets and due to the fact that RWM is a border region eligible in EU cross-border cooperation programmes.

Organizations in the RWM have participated in a growing number of cross-border cooperation projects during the last years. However, the increase should be seen under the light of increased available funds, thus project opportunities, through the programming periods, and also the implementation of the Balkan-Med programme only in the period of 2014-2020.

Figure 78. Interreg CBC projects in RWM



Source: www.keep.eu

4.3.6 METADATA ANALYSIS

The majority of the additional indicators (5 out of 7) have an official data source, which is either a statistics authority (ELSTAT, Eurostat) or a monitoring system of an EU co-funded programme. The other two indicators (nr. 84 recovery of urban waste and nr. 86 cooperation with neighbouring countries) are experimental, that is either included in a one-off study or synthesized by the expert from a database (keep.eu). For 2 of the indicators (nr.86 cooperation with neighbouring countries and nr.90 land use with heavy environmental impact) the geographical coverage is EU-wide, while the rest are available only for Greek regions. It should be noted that indicators nr. 89 energy storage capacity and nr. 87 jobs created are available only for administrative units in Greece included in JTF programme. Data are available for 5 out of 7 indicators, of which 3 have fairly recent values (2020 – 2022). For the 2 indicators included in the Just Development Transition Programme, values are not yet available, but will be calculated after the start of the implementation of the relevant interventions. All except one indicator have datasets with annual frequency, while nr. 84 recovery of urban waste is calculated in the framework of a specific study.

5. CHALLENGES IN DATA AVAILABILITY AND INTERPRETATION

Overall, the research showed that data availability, for planning, programming, monitoring and evaluation purposes remains a challenge in Greece, intensifying as the administrative level diminishes from the national to the regional to the municipal and finally to the city scale. Challenges arise not only from the (lack of) availability per se, but also from the accessibility to data, the update of values, the completeness of time-series, the homogeneity and structure of data and calculations.

Nevertheless, challenges were also found for indicators with EU sources, stemming from the fact that by definition they are either stable over time or have sparse collection frequency. For example, for Indicator 72. Terrestrial protected areas as a percentage of total area, the designation of Natura2000 protected areas was made once, in 2012, with no additions since then. Another example is indicator 28. Water bodies that exceed a standardized quality rating, for which the classification of surface water bodies, through the River Basin Management Plans, according to the Water Framework Directive, was done in 2015, with revisions expected every 6-7 years.

As far as availability of data from national sources is concerned, a challenge regarding SDG Monitoring indicators for the Region of Western Macedonia is its population size which creates reliability problems on data derived from population samples. This was evident in the case of indicator Nr. 18 Early leavers from education and training. The data are collected as part of the Labour Force Survey with datasets covering 2000-2021 for all Greek Regions. However, for RWM data are not published from 2016 onwards due to reliability problems.

Other sampling surveys of ELSTAT, which record the region of residence (NUTS2) of the interviewees are the Household Budgets and the ICT usage by persons and households. However, data and indicators at regional level (NUTS2) are not published by ELSTAT.

Regarding gender violence, data are collected by the General Secretarial of Family Programming and Gender Equality from the Hellenic Police and are only presented at National Level in the Yearly Reports on Violence against Women[15]. ELSTAT publishes crime data from the Hellenic Police at regional level (NUTS2) against sexual freedom and regarding family, among others, however these are not disaggregated by sex or victims.

A significant challenge of data availability arises regarding climate indicators (SDG 7 and 13). Energy production and consumption data from different energy sources, as well as CO2 emissions data are not available at regional level in Greece. However, ELSTAT includes in the National SDG Indicators and publishes data at national level for indicators 66. CO2 Emissions and 33. Electricity production that comes from renewable sources.

The main challenge regarding indicators with regional sources, was that data are not provided in an organized way for information and monitoring purposes, but they are rather data calculated and used in the context of specific studies. For example, data for waste recovery and recycling are present in the Regional Plans for Waste Management but not published as datasets by the competent body, the Western Macedonia Waste Management S.A.

Challenges were also found in the interpretation of the statistical analysis of data vis-à-vis the regional framework. There are instances where policies and strategies are more recent than the last available value of an indicator, or instances where new developments and investments were realized the impact of which are not yet captured depicted in the available data. A major disruption of course was the COVID pandemic, which affected trends and shows a negative picture, especially for indicators with latest data points for years 2020 or 2021.

The interpretation of the statistical analysis is also challenging due to the unclear rationale of some indicators regarding their relevance to the SDGs targets. There are instances where an indicator can relate to two different SDGs and instances where an indicator seems more suited to a different target/SDG than the initial proposed by the JRC framework.

[15] https://isotita.gr/wp-content/uploads/2022/11/3h-ethsia-ekthesi-Via-kata-twn-Gynaikwn-GGDOPIF.pdf

Furthermore, the interpretation of trends and changes were hindered in the case of Western Macedonia due to the lack of an already developed VLR or other document to align SDGs with regional strategies and development priorities.

The redundancy of some indicators can also be seen as a challenge. For example, indicators nr. 66 and 67 measure the same thing; greenhouse gases. Another example is the inclusion of air pollution indicators both from PM2.5 and PM10 emissions. However, they are in different SDGs.

Statistical analysis is also redundant in the cases experimental indicators where the values come from a forecast (i.e. PM emissions, daily accessibility index) or in the case of one or very few data points (i.e.female achievement index, income distribution).

Challenges in the interpretation of statistical analysis arise for indicators that are measured in absolute numbers, especially for the RWM, where a significant change in the demographics happened in terms of population reduction and ageing

The difference in the time-series of the indicators datasets, both for the historical and the most recent values, poses challenges in reaching conclusions for trends for a specific SDG and its targets but most importantly for the progress across different SDGs.

6. TOWARDS THE DEVELOPMENT OF A REGIONAL INDICATOR SET FOR MONITORING THE SDGS

The fundamental conclusion that traverses the objectives of the REGIONS2030 pilot project and the work of the present report, adopted also by the regional administration of Western Macedonia during the meetings with the expert, is that it is a rather difficult exercise to develop a monitoring system in a policy void. Instead, such a monitoring system for sustainability goals has to be grounded to regional/local strategies and development priorities. Values, trends and changes over time, are meaningful when they can be interpreted vis-à-vis stated goals or preferred directions by stakeholders at the regional level, manifested in institutionalized documents and programmes. This is even more true in the SDGs monitoring as they are not legally binding but more so a compass for aligning countries' (and regions') plans with global commitments. Thus, even the selection of relevant indicators for SDG monitoring in regional level, should be based in a sound methodology and constitute the first step towards a monitoring system. This connection is developed, or at least has a sound basis in some countries, where SDGs are taken into account in a structured way in national and regional development strategies, whereas in other cases this interconnectedness and multi-governance scheme for SDGs is institutionalized.

Of course, a regional indicator set for SDG monitoring should also be coherent with any national SDG monitoring set. The assurance of this coherence is needed even more in cases where regions don't have direct competences in some SDG targets or in programming and management of funding for relevant interventions. In sum, the purpose of monitoring the SDGs at the regional level and the selection of indicators should be based on the assurance of and be analogous to the degree of agency of the regional stakeholders.

Taking into account the above remarks, a dynamic indicator set is deemed to be more suitable for monitoring the SDGs at regional level. Regions present diversity in their sustainability dimensions, their geographies and capacities. Thus, they have different starting points, different paths towards sustainable development and different needs on what is essential and representative of their peculiarities to monitor. A basic common set, taking into account the EU main policies and targets, could be proposed as a common basis. Additionally, an open catalogue of auxiliary indicators corresponding to one or many SDG Targets could be given to each Region to structure freely its unique and customized SDG Monitoring System.

Overall, an SDG monitoring system, at least for the Greek regions' case, is preferable to consist of a limited number of indicators. As it was evident from the research of the expert there were difficulties in the uptake of a new indicator system by the regional administration due to the limited human resources but also due to the capacity of existing ones in monitoring and evaluation of policies and strategies.

National indicators systems for SDG Monitoring should also be taken into account in order to establish coherence in SDG Monitoring in the two territorial levels (National and Regional). Furthermore, the designation and publication of datasets for National SDG indicators can act as a catalyst for the provision of data at the regional level and for the revision of survey and sampling methodologies to allow the collection of data or calculation of values for the NUTS2 level.

A specific effort is needed for raising awareness to national administrations competent in coordinating the SDGs about the needs of regional monitoring. Common templates and guidelines for conducting local reviews or setting and describing SDGs indicator systems are needed that would facilitate not only the benchmarking among regions, but also the aggregation and/or disaggregation of data between the administrative or governance levels for improved coordination of the decision making.

Specifically in Greece, a long due update of the content, structure, evaluation and monitoring of the Four-year Operational Programmes of Regional Authorities, according to the provisions of art.268 Law 3852/2010, as amended by Law 4855/2018, could play the role of the SDGs locus at regional level.

Regarding the availability of data from national and regional sources in Greece, the main recommendations revolve around the standardization of processes. The National Statistics Authority (ELSTAT) would be extremely useful to consider to (re)structure its surveys in a way that they can produce and publish data at NUTS2 level,

or at least to provide regionally disaggregated data for the indicators that are also included in the national SDGs monitoring system. Furthermore, cooperation protocols are needed to be set up by the Regional Authority and other regional organization that produce and/or possess data relevant for the SDGs indicators, regarding the access to these.

A dedicated technical support programme, accompanied with relevant funding, developed jointly by the national and regional authorities, could enable the effective and efficient implementation of an SDGs multi-level coordination framework, by addressing issues of capacity building, harmonization of data, development of cooperation protocols, streamlining of indicators, common templates, toolkits and information systems.

Regarding the selection of indicators to be incorporated in the monitoring system a general recommendation concerns the analysis of their metadata. Apart from the availability of actual data, preferred indicators would have up-to-date values, time-series that cover at least the year of SDGs adoption 2015, data that can be disaggregated by gender, geographical/administrative level and frequent updates. Another general recommendation is the depiction of the indicator in a standardized or relative way, that allows benchmarking and comparison over time and among regions / territorial levels. To this end percentages/ratios, per capita units, set of base year indexes are more useful than absolute numbers.

Overall, more effort is needed in the regional/local level in Greece to raise awareness about the SDGs and how they can facilitate the vertical and horizontal coordination of development and sustainability policies. The results of the REGIONS2030 project can provide useful insights into ways of institutionalizing the connection among governance levels, among local stakeholders and of providing and overarching monitoring framework for regional and local sustainable development strategies.

REFERENCES

Bertozzi, C., Siragusa, A., Stamos, I., Proietti, P., Rainoldi, A., Espadas, J., Gallego Garcia, F., Dzurovčinová, P., Hakala, J., Iori, E. and Bertoft, A., European cities localising the SDGs: experiences and lessons learned, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-46206-4, doi:10.2760/74637, JRC127341.

Ciambra A., Siragusa A., Proietti P. and Stamos I. Monitoring SDG localisation: An evidence-based approach to standardised monitoring frameworks, Journal of Urban Ecology, Volume 9, Issue 1, 2023, juad013, https://doi.org/10.1093/jue/juad013

Ciambra A, Stamos I, Siragusa A. Localizing and Monitoring Climate Neutrality through the Sustainable Development Goals (SDGs) Framework: The Case of Madrid. Sustainability. 2023; 15(6):4819. https://doi.org/10.3390/su15064819

Global Taskforce of Local and Regional Governments, *Roadmap for Localizing the SDGs: Implementation and Monitoring at Subnational Level*

Ministry of Environment and Energy, Management and Organization Unit, *National Operational Plan for Drinking Water*, *2022*

Ministry of Environment and Energy, *National Operational Plan of Wastewater Management of Priority Settlements – Region of Western Macedonia*, Technical Secretariat of Wastewater, 2020

Ministry of Environment and Energy, *1st Revision of the River Basin Management Plan of the Water District of Western Macedonia (EL09),* Special Secretariat for Water, 2017

Presidency of the Hellenic Government, *Voluntary National Review 2022 on the implementation of the 2030 Agenda for sustainable development*, 2022

Programme Western Macedonia 2021-2027, C(2022)6507

Regional Development Programme of the Region of Western Macedonia programming period 2021-2025, Government Gazette 5582/B/2021, 2021

Region of Western Macedonia, *Regional Action Plan for the Development of Business Parks in the Region of Western Macedonia*, 2022

Region of Western Macedonia, *Regional Plan for Climate Adaptation of the Region of Western Macedonia,* 2019

Region of Western Macedonia, *Revised Regional Waste Management Plan*, Government Gazette 4151/B/2016, 2016

Region of Western Macedonia, *Regional Strategy for Social Inclusion of the Region of Western Macedonia,* 2015

Siragusa, A., Stamos, I., Bertozzi, C. and Proietti, P., European Handbook for SDG Voluntary Local Reviews - 2022 Edition, EUR 31111 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-53390-0, doi:10.2760/218321, JRC129381

Territorial Just Transition Plan Western Macedonia, C(2022)3943

Vega Rapun, M., Stamos, I., Siragusa, A. and Proietti, P., *REGIONS2030 – European regional SDG indicators*. JRC131581, Publications Office of the European Union, Luxembourg, 2022

University of Western Macedonia, *Feasibility Study for Innovation Zone for clean energy and environmental technology,* 2021

LIST OF ABBREVIATIONS AND DEFINITIONS

CBC	Cross-border cooperation
DG	Directorate General
EC	European Commission
EEA	European Environmental Agency
ELSTAT	Hellenic Statistics Authority
ERDF	European Regional Development Fund
EU	European Union
FEAD	Fund for European Aid to the Most Deprived
GDP	Gross Domestic Product
GERD	Gross Expenditure for research and development
GVA	Gross value-added
ICT	Information and Communication Technologies
IPCEI	Important Projects of Common European Interest
JDTP	Just Development Transition Programme
TJTP	Territorial Just Transition Plan
JRC	Joint Research Centre
NEET	Not in Employment Education or Training
OP	Operational Programme
PWM	Programme Western Macedonia
RBMP	River Basin Management Plan
RDTI	Research Development Technological Innovation
RES	Renewable Energy Sources
RIS	Regional Innovation Strategy
RWM	Region of Western Macedonia
SDG	Sustainable Development Goals
TJTP	Territorial Just Transition Plan
UN	United Nations
WFD	Water Framework Directive
WM	Western Macedonia

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