The progress of the Greek Regions in relation to the Sustainable Development Goals (SDGs): 2024 edition

Table of Contents

Contents

1. Executive Summary 6
2. Introduction 7
3. Methodology 13
   Step 1. Identification of SDGs indicators at a regional level 13
   Step 2. Data Collection 13
   Step 3. Determination of targets for Goal Achievement 15
   Stage 4. SDG Dashboards by Indicator and by region 15
4. Results and discussion 16
   4.1. Aggregate performance heatmap 16
   4.2. Performance by Region 20
   4.2.2. Region of Ionian Islands (EL62) 21
   4.2.3. Region of Eastern Macedonia and Thrace (EL51) 22
   4.2.4. Region of Western Macedonia (EL53) 23
   4.2.5. Region of Epirus (EL54) 24
   4.2.6. Region of Peloponnese (EL65) 25
   4.2.7. Region of Northern Aegean (EL41) 26
   4.2.8. Region of Central Greece (EL64) 27
   1.1.9. Region of Western Greece (EL63) 28
   4.2.10. Region of Central Macedonia (EL52) 29
   4.2.11. Region of Crete (EL43) 30
   4.2.12. Region of Southern Aegean (EL42) 31
   4.2.13. Region of Attica (EL30) 32
5. Conclusions and ways forward 33

References 34

Annex I - Indicators description 35

Annex II – Methodology Index & Dashboards 38

A2.1 Indicators 38

A2.2 Setting the Bounds 39

A2.3 Rescale Indicators - Normalization 41

A2.4 Dashboard Ratings 41

A2.5 Aggregate Scores and Thresholds 43

Acronyms and abbreviations

EEA – European Environmental Agency

EUROSTAT – European Statistical Office

GDP – Gross Domestic Product

SDSN – Sustainable Development Solutions Network

SDG – Sustainable Development Goal

ELSTAT – Hellenic Statistical Agency

EEA – European Environmental Agency

KPI – Key Performance Indicator

NUTS – Nomenclature of territorial units for statistics

OECD – Organisation for Economic Co-operation and Development

Acknowledgements

The outcome for the assessment of the 13 Greek Regions on the Sustainability Agenda (2030) is derived by the current report. The 17 Sustainable Development Goals (SDGs) were being acceptable by the world leaders in September 2015, during the United Nations Summit for Sustainable Development.

The report was conducted by interdisciplinary scientist group at the SDSN Greece. The co-authoring was led by **Professor Phoebe Koundouri** (AUEB, ATHENA RC). The team includes **Assistant Professor Conrad Landis** (AUEB, ATHENA RC), **Dr. Theofanis Zacharatos (**AUEB, ATHENA RC), **Dr Aggelos Plataniotis** (AUEB, ATHENA RC), **Dr Kostas Dellis** (AUEB, ATHENA RC)**, Mrs. Monika Mavragani** (AUEB, ATHENA RC), **Mr. Efstathios Devves** (AUEB, ATHENA RC), **Ethan Chandler.**

The maps "https://arcg.is/SHHL0", produced by **Alice Guittard** (AUEB, ATHENA RC) in partnership with **SDGs Today** and **ESRI** using **ArcGIS Online**, depict the outcomes of the current report.

Conclusions, comments, approaches discussed by the current report do not reflect the the opinion of any agent or actions of the United Nations as well as the global Sustainable Development Solutions Network. Additionally, they may not reflect the view of the any institution hosting the Lead authors.

Data collection, analysis and results were derived by the current reports, while several organisations from Europe and abroad have provided the relevant data resources, including the EU Commission (Eurostat), the European Environmental Agency (EEA), the Hellenic Statistical Agency (ELSTAT). The main data collection was implemented by Athens University of Economics and Business (AUEB).

Please cite this report as:

Koundouri, P., Landis, C., Devves, E., Zacharatos, T., Chandler, E., Plataniotis, A., & Dellis, K. (2024). *The progress of the Greek regions in relation to the Sustainable Development Goals (SDGs): 2024 edition*. Sustainable Development Solutions Network (SDSN) Greece

December 2025.

1. Executive Summary

In 2015, States around the world choose a universal approach for sustainable development to result into the achievement of several Goals and specific indicators, setting the milestone for the year 2030. (Agenda 2030, SDGs, Paris Climate Agreement). This decision was taken under the clear vision for the importance of the role played by regional and municipal authorities to implement the relevant targets.

The current report follows the previous one, created in 2022, being essentialy the next step for a broadening and the deepening of the SDG's monitoring across the 13 Greek regions. This report also based on the literature created by the SDSN (Lafortune et al., 2019; Lafortune et al., 2021), which uses data from official statistics, academic research, and expert assessments to provide a total scoreboard per nation and target. The 2019 edition of the SDG Index which was launched at the United Nations High-level Political Forum on Sustainable Development in July 2019 in New York, has been audited by the EU Joint Research Centre (JRC) has audited the SDG index created in 2019 (New York, UN High-level Political Forum) issuing the relevant methodology and the validity of the results (Papadimitriou, E., Fragoso Neves, A. and Becker, W., 2019).

The current report performs the scoreboards in detail regarding SDG's and Indicators that are relevant for the achievement of sustainable development in the 13 Greek regions. Thessaly and the Eastern Macedonia & Thrace are holding the top of the score for 2023. Yet, major challenges remain in order to achieve all 17 SDGs.

- The 2023 SDG Index and Dashboards for Greek regions produce the following significant outcomes:
- No region has achieved the goal for SDG 1 up to 13 and 16, while most of the regions have to overcome significant challenges.
- Four (4) regions have already achieved the goal for SDG 15, while the other regions are facing moderate to mild challenges.
- Two (2) regions have already achieved the target for SDG 14, while the other ones present moderate to mild challenges, holding a significant heterogeneity in their performance.
- The regions of Attica, Southern Aegean and Crete will have to make more efforts to improve the scores that are now presenting significant and major challenges for the implementation of the SDGs by 2030, given that more than 3/5 of the Greek population lives in these areas (Eurostat, 2023).
- There is a remarkable lack of reliable data at regional level for many of the indicators regarding SDG 12 and SDG 17, therefore it is necessary to improve data availability a at the level of Greek regions. One (1) region has seen to meet the goal for SDG 17, but seems to be normal since it is about the Capital of the country.

2. Introduction

Description of Agenda 2030 framework

The Agenda 2030 framework and the Paris Climate Agreement serve as a global roadmap for moving beyond the traditional "business as usual" approach and adopting new patterns of production, consumption, and social action. Governments and signatory countries have committed to a comprehensive policy agenda built around 17 goals that tackle the world's most urgent societal challenges.

Agenda 2030 outlines a vision for a more sustainable future, grounded in the balance between social wellbeing, environmental sustainability, and economic wealth. The Sustainable Development Goals (SDGs) are designed to be implemented across all nations, reflecting the shared challenges faced by both developed and developing countries. These goals emerged from an extensive, participatory process involving stakeholders such as Institutions, private companies, and several branches of public sector. The 17 goals are accompanied by 169 targets and 231 indicators. According to the 2020 SDG report, substantial efforts are still required to meet the 2030 targets—especially in the aftermath of the COVID-19 pandemic and the global recovery that followed.

As we approach the midpoint of this decade, societies worldwide continue to confront overlapping crises, from the pandemic's lingering effects to energy volatility, food insecurity, and ongoing conflicts. In this context, the vital role of local communities in achieving Agenda 2030 has become clearer than ever. The Sustainable Development Solutions Network (SDSN) estimated in 2016 that up to 65% of the SDG agenda cannot be fully achieved without the active participation of cities and local stakeholders.

Given the wide-ranging and global scope of the SDGs, their effective implementation relies on the engagement of international, national, and especially subnational actors.

The purpose of this study is to underscore the critical need for action by local governments at both Regional and Municipal levels to advance the implementation of Agenda 2030. It also provides essential insights into Greece's current progress toward the SDGs and aims to serve as a practical tool for policymakers working at the local level.

The necessity to monitor the SDGs performance at a regional level.

In 2015, global leaders committed to a shared vision for sustainable development through Agenda 2030, the SDGs, and the Paris Climate Agreement. Although these goals were formally adopted by national governments, it was immediately recognized that regions and municipalities would be central to their implementation.

National authorities cannot meet the ambitious targets of the 2030 Agenda by themselves. Estimates show that roughly 2/3 of SDG targets require action from regional and local stakeholders. This is particularly critical given that most people live and work in urban areas—a share expected to reach 70% of the global population by 2050. OECD data also highlights that 63% of total GDP is generated in the 327 metropolitan areas with more than 500,000 residents.

Cities and regions in many countries have direct authority over key policy domains tied to the SDGs, including water management, housing, transport, infrastructure, land use, and climate action. According to the OECD, regional governments accounted for nearly 60% of public investment in 2016 in OECD countries, and about 40% worldwide. Beyond SDG 11, which focuses specifically on cities and communities, approximately 65% of all SDG targets cannot be met without strong engagement from local and regional authorities.

Efforts to "localize" the SDGs are ongoing, ranging from studies and awareness initiatives to incorporating local perspectives into national reviews and developing regional SDG strategies. The SDG framework also offers flexibility, allowing goals and indicators to be adapted to local conditions and specific territorial challenges.

Assessing SDG progress in Greece at the regional level is essential for several reasons. First, significant regional disparities within the country mean that localized monitoring is necessary to identify where targeted support is needed. Second, regional-level measurement allows for tailored strategies, acknowledging that each area has distinct strengths and vulnerabilities. Third, involving local governments and communities in monitoring increases awareness, engagement, and ownership of the SDG agenda. Finally, regional data enables more informed and effective policymaking by highlighting the specific challenges and opportunities in each locality.

Literature Review

In order to complete background research to inform improvements to the second Greek Regions Sustainable Development Report, similar audits carried out by the UN Sustainable Development Solutions Network (SDSN) on a regional, continental and global scale were consulted. Moreover, a number of sub-national reports published by other SDSN branches and academic organisations across Europe were considered, including the 2022 Voluntary Subnational Review (VSR) conducted in Italy and a 2019 audit of progress towards Agenda 2030 across autonomous communities in Spain. From this literature review, it can be concluded that most reports of this kind use a quantitative assessment of SDG practices which measure distance to/from pre-defined performance thresholds. Almost all reports also measured current SDG performance and trends over time, signified by green, orange or red arrows to show progress, stagnation or decline when comparing average annual growth rate since the year of SDG adoption. This is important, as the 2022 Europe Sustainable Development Report showed that progress had stalled since 2020 with Europe further from attaining the 2030 Agenda than it was one year ago, primarily due to the impact of COVID-19 and the War in Ukraine. The 2023 Global Sustainable Development Report also highlights the concept of four levers (governance, economy and finance, science and technology, and individual and collective action) and key entry points in order to accelerate progress towards the goals. All reports emphasise the crucial role played by local administrations and public-private partnerships, as global development that does not touch individual realities cannot achieve the paradigm shift required to meet Agenda 2030 (Cavalli, 2018). All reports observed also aim to inform policymaking and prompt high-level political dialogue, urging political entities to adopt a common approach across municipalities, regions and countries for monitoring SDGs that identifies areas where delays continue to persist. SDGs were adopted by national authorities with a strong point for the regional and local authorities to be key to their implementation, with an estimated 65% of targets requiring involvement of local

administrations. Despite the obvious importance of a quantitative approach to measuring SDG progress, the importance of qualitative data was also emphasised in the Italian VSR, which included examples of best practice in the form of multi-stakeholder projects in specific regions. Although this data cannot be standardised or reproduced easily, it provided a useful way to fill gaps in data for various SDGs. In addition, this report points out that SDGs can be achieved organically by the third sector. In terms of data sources, almost all reports had common attributes, utilising statistical data from UN partner agencies, Eurostat, the European Environment Agency, the World Health Organisation (WHO) and the OECD. Sub-national reports used data from national statistical bodies, such as ELSTAT in Greece or ISTAT in Italy. Others complemented government data with research conducted by academics, although it must be noted that 70% of indicators came from official statistics in the 2022 European Sustainable Development Report. All in all, the common thread through all reports observed was a desire to draw attention to delays in achieving the SDGs, encourage local governments to engage and disseminate policy achievements and promote the Agenda 2030 of the United Nations.

The present report aims to:

- ✓ Respond to the challenge of localising SDGs and encourage government action
- ✓ Highlight the implementation progress,
- ✓ Direct attention to any lack in data,
- ✓ Establish a yearly monitoring system,
- ✓ Provide information to policymakers and citizens to support the local governments in affecting transformational changes,
- ✓ Measure and analyse the impact of the SDGs progress on local, national and international crises regarding environment, society and economy,
- ✓ highlight - through the use and processing of data - the performance among Greek Regions concerning the SDGs and to conduct comparisons between Regions (in Greece and beyond) that exhibit similar characteristics.

Quick overview of the performance of Greece at a National level

Having a fast overview of the regional results, it is seen that there are further margins to improve the path towards SDG's achievements. The analysis derived from the data indicates an obvious lagging as far as the achievement of most of the Goals is concerned. Especially the Greek regions present several challenges as far as the implementation of Sustainable Development Goals is concerned. Most of regions perform major challenges in order to achieve in the following goals:

- ☹ SDG 1 "No Poverty"
- ☹ SDG 3 "Health and Well - being "
- ☹ SDG 4 "Quality Education "
- ☹ SDG 9 "Industry, Innovation and Infrastructure"
- ☹ SDG 10 "Reduced Inequalities"
- ☹ SDG 8 "Decent Work and Economic Growth"

- ☹ SDG 14 ““Life on Water”

However, the majority of the regions made progress for:

- ☺ SDG 5 “Gender Equality”
- ☺ SDG 6 “Clean Water and Sanitation”
- ☺ SDG 11 “Sustainable cities and communities “
- ☺ SDG 13 “Climate Action”
- ☺ SDG 15 “Life on Land”

Following the necessary methodology and the calculations, it is seen that the Region of Thessaly performs the leading transformation position to implement the SDG’s and the Agenda 2030, while the Region of West Macedonia is the last one.

Meanwhile, at the National Level, according to SDSN SDR Report (2023), Greece faced major challenges to succeed in the achievements for 13 SDGs: SDG 2, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17.

However, Greece succeed in improving the targets for SDG 6 “Clean Water and Sanitation “and SDG 10 “Reduced Inequalities “.

The following text of this report presents the full scores for every region, goal and target.

3. Methodology

The purpose of this report targets to offer to the policymakers of the regional and central administration, a detailed level of information, quantitative and qualitative data about the achievement of the SDGs.

The measurement of the performance at a regional level needs to adopt the SDSN's methodology, getting the monitoring of the SDG progress. Therefore, the methodology included the following steps:

Step 1. Identification of SDGs indicators at a regional level

As a first step, it is necessary to choose the appropriate indicators that are reliable to calculate the SDGs achievements, according to the UN Agenda 2030.

The criteria are dealing to: ***Relevance***, i.e., the indicators have to be profound with a great significance for the regions themselves and also to offer comparison options when assessing across regions, ***Coverage***, i.e., data to be available for at least half of the regions under consideration, and ***Quality***, i.e., the data to be derived by recent time series, taken from official and reliable information resources.

The procedure to select and identify the indicators includes the reference of the Global Sustainable Development Report 2023[1] and the European Sustainable Development Report 2023 [2] . From those sources, these indicators who are making sense at the level of Greek Regions can be isolated. The additional source to identify the appropriate indicators was the ESPON tool of the localized SDG.[3] For any proposed indicator that was proposed in each SDG case, the available data for the calculation was under thorough review. Another useful tool was the European Handbook for SDG Voluntary Local Reviews. Last, the authors being in line with the indicators used in SDSN Sustainable Development Reports, used any available and relevant data to calculate some of the indicators.

Step 2. Data Collection

Indicators were produced by several official or non-official data sources. Data collection became mainly by publicly available data. The main official sources were **EUROSTAT**, the **Hellenic Statistical Authority (ELSTAT)** and the **European Environmental Agency (EEA)**.

Additional data derived from other reliable international organizations and private companies that provide information and comparative assessments (benchmarking) for geographical, governmental, and institutional units, such as:

Economic Indicators: Data related to economic performance and growth.

Industrial Indicators: Data concerning production, innovation, and infrastructure.

Social Indicators: Data on social factors such as health and education.

Energy Indicators: Data related to energy consumption and efficiency.

Health Indicators: Data associated with the health and wellbeing of citizens.

Educational Indicators: Data concerning education and lifelong learning.

Apart from the above – mentioned publicly available data, data collection came by the additional sources such as:

[1] https://files.unsdsn.org/sustainable-development-report-2023.pdf

[2] https://sdgtransformationcenter.org/reports/europe-sustainable-development-report-2023-24

[3] https://www.espon.eu/explore

International Data Providers: We used data from international organizations and private companies that supply comparative assessments and reports for various indicators and objectives.

Specialized Reports: We gathered data from specialized reports focusing on specific sectors such as the economy, industry, society, energy, health, and education. These reports provided additional information and analyses that helped form a comprehensive picture of regional performance.

Overall, the methodology we followed ensures the selection of indicators relevant to the SDGs, adequately covering the regions under study and based on high-quality data. This enables us to assess performance at the regional level with accuracy and reliability.

Table 1 categorizes the indicators per data source. An extended analysis of the methodology we used for the targets is provided in Annex I.

Table 1 Indicators per data source

Eurostat
● Severe material deprivation rate in cities (%)
● People at risk of poverty or social exclusion (%)
● People (0-59 years) living in households with very low work intensity (%)
● Fertility rates
● Area under organic farming (utilised agricultural area (%))
● Utilised agriculture area (by hectare) **given as percentage per Total Land Area (TLA)
● Animal populations (thousand heads of live bovine animals) **given as percentage per Total Land Area (TL
● Traffic fatalities (Number) *
● Infant mortality rate (under 1) per 1.000 births
● General practitioners per (100.000 pop)
● Life expectancy (years)
● Available beds in hospitals (per 100.000 inhabitants)
● Self-reported unmet needs for medical examination by main reason declared and NUTS 2 regions (Too exp
● Death due to cancer rate
● Death due to ischaemic heart diseases rate
● Fertility rates
● Early leavers from education (%. 18-24)
● Adults with upper secondary education (% 25-64)
● NEET rate (% 15-24) (Not in Education. Employment. or Training)
● Four-year-olds in early childhood education (%)
● Adult participation in learning (%)
● Tertiary educational attainment. age group 25-64 (%)
● Students enrolled in tertiary education (% males)
● Employment rates of young people not in education and training (females/males ratio)
● Gender employment gap (measured in %)
● Cooling degree days
● Heating degree days
● GDP per capita
● Long term unemployment Rate (%)
● Income of households (in m euros)
● Real labour productivity (per person. index. 2015=100)

• Nominal labour productivity (per person. measured in euro annually)
• Economically active population (thousand persons. 15-74 years)**per total population 15-74 yrs
• NEET rate (% 15-24) (Not in Education. Employment. or Training)
• People (0-59 years) living in households with very low work intensity (%)
• R&D expenditure (%)
• Human resources with tertiary education or in science and technology (% of population in the labour force)
• Maritime transport of passengers (1000 passengers)
• Air transport of passengers (1000 passengers)
• Maritime transport of freight (1000 tonnes)
• Air transport of freight (1000 tonnes)
• Disposable income of private households
• Persons at risk of poverty or social exclusion - EU 2020 strategy
• Income quintile share ratio S80/S20 (index)
• GDP per capita
• Population change - Demographic balance and crude rates at regional level (Net migration plus statistical a
• Rail network by NUTS 2 regions (total railway lines klm)** per Total Land Area (Km2)
• Nights spent at tourist accommodation establishments (total number)
• Number of bed-places (number)**per capita
• Maritime transport of passengers (1000 passengers)
• Air transport of passengers (1000 passengers)
• Stock of all vehicles (except trailers and motorcycles) (number)**. passenger vehicles per 1000 inhabitans*
• Stock of motorcycles (number)**powered two wheelers per 1000 inhabitans**
• Victims in road accidents (number killed)
• Severe material deprivation rate in cities (%)
• Number of recovery and disposal facilities (waste management operations | recovery. recycling and backfil
• Maritime transport of freight (1000 tonnes)
• Air transport of freight (1000 tonnes)
• Utilised agriculture area (by hectare)
• Nights spent at tourist accommodation establishments (total number)
• Number of bed-places (number)**per capita
• Cooling degree days
• Heating degree days
• Land covered by artificial surfaces
• Ratio of forestry to total land use
• Severe estimated soil erosion by water. (Agricultural areas. forest and semi natural areas (excluding beache perpetual snow) (%)
ELSTAT
• Total cultivated agricultural and fallow land per Capita
• Cereals for grain. total area of production (in stremmas. 1 stremma = 0.1 ha) **given as percentage per Total Land Area (TLA)
• Irrigated areas (total irrigated crops in stremma) **given per (ha) of utilised Agriculture areas
• Ratio of bathroom inside the house / total residential houses (%)
• Ratio toilet or WC with hydraulic installation inside the house / total residential houses (%)

• Irrigated areas (total irrigated crops in stremma) **given per (ha) of utilised Agriculture areas
• Petroleum consumption per capita
• Work Accidents
• Consumption of petroleum products per capita
• Total Penal Code Offenses per 100.000 inhabitants
• Crimes against life per 100.000 inhabitants
• Injuries per 100.000 inhabitants
• Crimes against sexual freedom per 100.000 inhabitants
• Property crimes per 100.000 inhabitants
• Violations of Special Criminal Laws per 100.000 inhabitants
European Environmental Agency (EEA) – Regional Growth Conference- EDGAR- Entso-e
• Water use per capita
• Water abstraction per capita
• Ratio of Power Plant Capacity (MW) from sustainable sources
• Total greenhouse gas emissions per year
• Perception of inhabitants on how easy is it to find a good job in the city they live today (% of satisfaction)
• Perception of inhabitants on happiness to live in this city today (% of satisfaction)
• Perception of inhabitants on how easy is to find good housing in the city where they live at a reasonable price today (% of satisfaction)
• Perception of inhabitants on happiness to live in this city today (% of satisfaction)
• Perception of inhabitants regarding safety on walking alone at night in the city they live today (% of satisfaction)
• PM2.5 (ug/m3)
• PM10 (ug/m3)
• O3 (ug/m3)
• Surface (ha) of marine sites designated under NATURA 2000 (1 hectares = .01 km2) per capita
• Bathing sites with excellent water quality per 10.000 citizens
• Surface (ha) of terrestrial sites designated under NATURA 2000 (1 hectares = .01 km2) per capita

Step 3. Determination of targets for Goal Achievement

An "optimal" target value was determined for each indicator, holding the criteria of judging the performance of each indicator and region.

In general, the Global Sustainable Development Report reference values were mainly used, unless chose an alternative strategy was chosen:

- For indicators related to gender equality, the target value was set at **50%**. For indicators concerning poverty, crime, insecurity, health conditions, accidents, and deaths, the target value was **0%**. For indicators related to access to water, education, and health services, the target value was established at **100%**.
- Where available, **scientific targets** were used. In other cases, the **average of top performances** at the national, European, or global level was applied.
- When top performances were used to determine the upper benchmark, the **five best-performing regions** from the dataset were selected, excluding outliers. These targets are ambitious and highlight the areas requiring improvement. Thus, the five top-performing

Regions in the sample represent the highest achievable performance for Greek municipalities. In some instances, the best performers from the **EU, OECD, or global** datasets were used instead.

A more detailed analysis of the methodology we used for the targets is provided in Annex II.

Stage 4. SDG Dashboards by Indicator and by region

The fourth step includes the coloring (green, yellow, orange, red) based on the performance of each region / KPI, followed by the aggregation of results in the final scoreboard.

his process begins with defining the indicator boundaries, considering the "direction" of each indicator—whether a higher value reflects better performance or the opposite. The Upper Bound (UB) corresponds to the "optimal" value (as described in Step 3 above), while the Lower Bound (LB) is set according to the SDSN methodology as the 2.5th percentile of the cross-sectional distribution, ensuring that extreme outliers do not distort the assessment.

Then, the results must be transformed, and the normalization of the range [LB, UB] to a [0,100] scale, is being through the use of the equation:

$$x' = 100 \frac{(x - LB)}{(UB - LB)}$$

For next step, the border values are determined, based on the possible change of the color representing the performance of the specific region to an specific indicator. The Yellow-Orange Limit (YOL) is the average (LB; UB) / 50, in the [0.100] scale. For the Green and Red Limits, the YOL ± 1 cross sectional standard deviation was used.

The final step includes the aggregation per SDG's for the indicators and limits and that means taking the average scores and limits. The overall score was calculated by the aggregation of this performance (for these KPIs under each one SDG).

A more detailed analysis of the methodology is provided in Annex II.

4. Results and discussion

4.1. Aggregate performance heatmap

The Greek regions (**Figure 1**) perform a large number of challenges for the achievement of the overall Sustainability (**Table 2**).

On the progress heat map (**Table 3**), it is seen that the majority of the regions face major challenges for the these SDG's:

- **SDG 1 "No Poverty":** No region has met the goal, whereas ten (10) regions face major challenges.
- **SDG 10 "Reduced Inequalities":** No region has met the goal, whereas 7 regions face major challenges.
- **SDG 9 "Industry, Innovation and Infrastructure":** No region has met the goal, whereas 4 regions face major challenges.
- **SDG 3 "Good Health and Well-Being":** No region has met the goal, whereas 3 regions face major challenges.
- Regarding **SDG 2, 4, 7, 8**, no region met the goal with 2 regions facing major challenges and the other regions facing minor (significant or some challenges remained).
- **SDG 14 "Life Below Water":** Two (2) regions have already met the goal, whereas 5 regions face major challenges.
- **SDG 16 "Peace, Justice and Strong Institutions":** No region has already met the goal, whereas, 1 region faces major challenges and 7 regions face minor challenges.
- **SDG 5 "Gender Equality":** One region has already met the goal, whereas another seven only face minor challenges.
- **SDG 13 "Climate Action":** No region has already met the goal, whereas another 5 regions only face minor challenges.
- **SDG 6 "Clean Water and Sanitation":** No region met the goal, whereas 1 region faces major challenges and another 4 regions only face minor challenges.
- **SDG 11 "Sustainable Cities and Communities":** No region met the goal, whereas another 3 regions only face minor challenges.

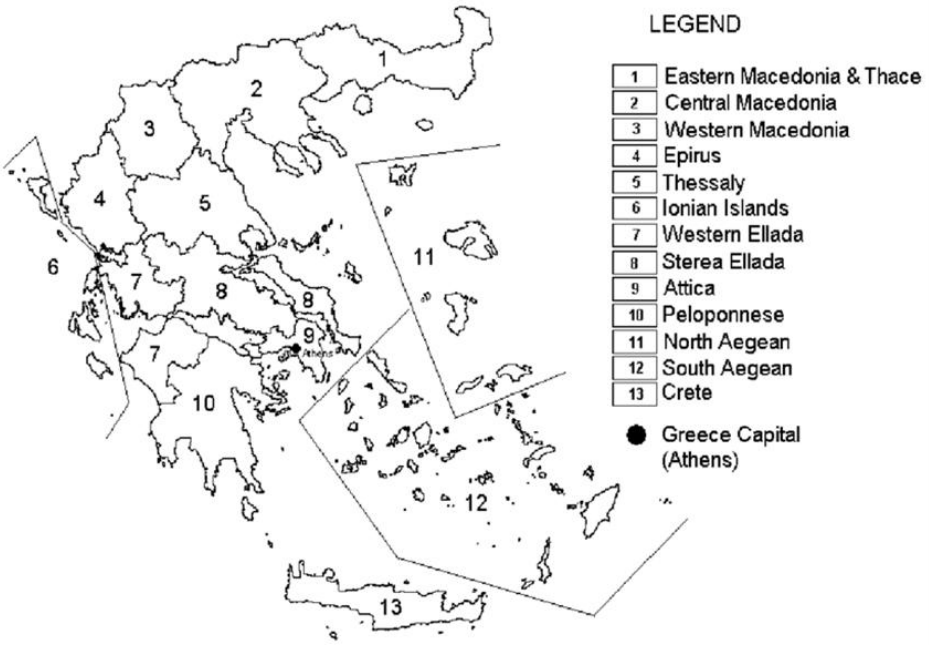


Figure 1 The regions of Greece (NUTS 2). Source: ResearchGate.com

On the other hand, some of the regions have managed to improve a lot in terms of achieving the following goals, hence dealing with fewer obstacles (Table 2):

- **SDG 15 "Life on Land":** 4 regions has already met the goal, whereas another nine only face minor challenges.

SDG 1 "No Poverty": Ten (10) Regions—Eastern Macedonia and Thrace, Attica, North Aegean, Western Greece, Western Macedonia, Epirus, Thessaly, Central Macedonia, Peloponnese, and Central Greece—face **Significant Challenges** (red). The remaining three (3) Regions—Ionian Islands, Crete, and South Aegean—face **minor Challenges** (orange).

SDG 10 "Reduced Inequalities": Seven (7) Regions—Eastern Macedonia and Thrace, South Aegean, Western Greece, Western Macedonia, Ionian Islands, South Aegean, and Peloponnese—face **Significant Challenges**. The other six (6) Regions—Attica, Epirus, Thessaly, Central Macedonia, Crete, and Central Greece—face **minor Challenges**.

SDG 9 "Industry, Innovation and Infrastructure": Four (4) Regions—Western Macedonia, Thessaly, Peloponnese, and Central Greece—face **Significant Challenges**; eight (8) Regions—Eastern Macedonia and Thrace, North Aegean, Western Greece, Epirus, Ionian Islands, Central Macedonia, Crete, and South Aegean—face **minor Challenges**; and only one (1) Region, Attica (traditionally the country's industrial hub), performs **relatively well** with **Challenges** (yellow).

SDG 3 "Good Health and Wellbeing": Three (3) Regions—Eastern Macedonia and Thrace, Peloponnese, and Central Greece—face **Significant Challenges**; nine (9) Regions—Attica, North Aegean, Western Greece, Western Macedonia, Thessaly, Ionian Islands, Central Macedonia, and South Aegean—face **minor Challenges**; and only two (2) Regions—Epirus and Crete—perform **relatively well** with **Challenges** (yellow).

SDG 8 "Decent Work and Economic Growth": Two (2) Regions—Western Macedonia and Epirus—face **Significant Challenges**; ten (10) Regions—Eastern Macedonia and Thrace, North Aegean, Western Macedonia, Thessaly, Ionian Islands, Central Macedonia, Crete, South Aegean, Peloponnese, and Central Greece—face **minor Challenges**; and only one (1) Region, Attica (traditionally with a concentrated number of businesses), performs **relatively well** with **Challenges** (yellow).

SDG 4 "Quality Education": Two (2) Regions—North Aegean and Central Greece—face **Significant Challenges**; eight (8) Regions—Eastern Macedonia and Thrace, Western Greece, Western Macedonia, Epirus, Thessaly, Ionian Islands, South Aegean, and Peloponnese—face **minor Challenges**; and three (3) Regions—Attica, Central Macedonia, and Crete—face **Challenges** (yellow).

SDG 7 "Affordable and Clean Energy": Two (2) Regions—Western Macedonia and South Aegean—face **Significant Challenges**; nine (9) Regions—Eastern Macedonia and Thrace, Attica, North Aegean, Epirus, Ionian Islands, Crete, Peloponnese, and Central Greece—face **minor Challenges**; and three (3) Regions—Western Greece, Thessaly, and Central Macedonia—face **Challenges** (yellow).

SDG 14 "Life Below Water": Five (5) Regions—Attica, Western Greece, Western Macedonia, Epirus, Thessaly, and Central Macedonia—face **Significant Challenges**; four (4) Regions—Eastern Macedonia and Thrace, Thessaly, Crete, and Central Greece—face **minor Challenges**; and two (2) Regions—North Aegean and Peloponnese—face **Challenges** (yellow). Additionally, two (2) Regions—the Ionian Islands and South Aegean—**have achieved the Goal** (green). Therefore, this SDG shows strong contrasts across Regions.

On the other hand, certain SDGs present **relatively good or very good performance** in several Regions. In particular:

SDG 15 "Life on Land": Four (4) Regions—Eastern Macedonia and Thrace, Western Macedonia, Thessaly, and Central Greece—**have achieved the Goal**; six (6) Regions—North Aegean, Western Greece, Epirus, Central Macedonia, South Aegean, and Peloponnese—face **Challenges**; while three (3) Regions—Attica, Ionian Islands, and Crete—face **minor Challenges** (orange).

SDG 12 "Responsible Consumption and Production": Twelve (12) Regions—Eastern Macedonia and Thrace, Attica, North Aegean, Western Greece, Epirus, Thessaly, Ionian Islands, Central Macedonia, Crete, North Aegean, Peloponnese, and Central Greece—face **Challenges** (yellow) and are close to achieving the Goal, while Western Macedonia faces **minor Challenges** (orange).

SDG 11 "Sustainable Cities and Communities": Ten (10) Regions—Eastern Macedonia and Thrace, North Aegean, Epirus, Thessaly, Ionian Islands, Central Macedonia, Crete, South Aegean, Peloponnese, and Central Greece—face **Challenges** (yellow); while three (3) Regions—Attica, Western Greece, and Western Macedonia—face **minor Challenges** (orange).

SDG 13 "Climate Action": Eight (8) Regions—Eastern Macedonia and Thrace, Attica, North Aegean, Western Greece, Epirus, Thessaly, Ionian Islands, Central Greece, South Aegean, and Central Greece—face **Challenges** (yellow); while five (5) Regions—Attica, Western Macedonia, Epirus, Crete, and Peloponnese—face **minor Challenges** (orange).

SDG 6 "Clean Water and Sanitation": Eight (8) Regions—Eastern Macedonia and Thrace, Western Greece, Western Macedonia, Epirus, Thessaly, Central Macedonia, Peloponnese, and Central Greece—face **Challenges**; four (4) Regions—Attica, North Aegean, Ionian Islands, and Crete—face **minor Challenges**; and one (1) Region—South Aegean—faces **Significant Challenges**.

SDG 5 "Gender Equality": Seven (7) Regions—Eastern Macedonia and Thrace, Attica, North Aegean, Western Greece, Western Macedonia, Thessaly, Central Macedonia, Peloponnese, and Central Greece—face **Challenges**; while six (6) Regions—Epirus, Ionian Islands, Central Macedonia, Crete, South Aegean, and Peloponnese—face **minor Challenges**.

For the SDG 12 and SDG 17; hence, there is a lack of data for many indicators of them. The methodology used to assess the progress of each region towards achieving any given SDG takes into account the region's score in the corresponding index and/ or indices. The final score of each region is the normalized mean of all indices for all SDGs and given on a scale of 1-100.

Table 2 Score ranking of the Greek regions

Rank	Region	Score
1	Thessaly (EL61)	53.27
2	Eastern Macedonia and Thrace (EL51)	47.58
3	Central Macedonia (EL52)	47.10
4	Attica (EL30)	46.17
5	Northern Aegean (EL41)	46.02

6	Crete (EL43)	45.22
7	Epirus (EL54)	44.80
8	Western Greece (EL63)	44.52
9	Central Greece (EL64)	43.71
10	Ionian Islands (EL62)	43.65
11	Peloponnese (EL65)	42.94
12	Southern Aegean (EL42)	41.36
13	Western Macedonia (EL53)	40.69

The Region of Thessaly ranks first both in the quantitative assessment of Sustainable Development Goal (SDG) achievement and in the qualitative classification of these goals. It is followed by the Regions of Eastern and Central Macedonia, and then by the Region of Attica, which shows strong performance in the quantitative evaluation, mainly due to improvements observed in recent data series. However, Attica ranks among the bottom three regions in the qualitative classification of SDG achievement.

This occurs because, although Attica performs well overall in the quantitative scoring of SDG achievement, the qualitative analysis of the indicators composing each SDG reveals that its average qualitative performance remains at low levels. According to the methodology, the score for each SDG is categorized based on the thresholds of the color-coded zones—Red, Yellow/Orange, and Green. Placement in a given zone, especially when leaning toward Red, signals significant challenges and negatively affects the region's "representative" ranking across all SDGs.

Conversely, the Region of Western Greece, despite having a lower overall quantitative score in SDG achievement, ranks higher in the qualitative classification. This is because, in the qualitative evaluation of the individual SDGs, its indicators place it in zones with lower levels of challenge regarding the achievement of these goals. As a result, it ranks higher in the qualitative assessment overall, showing an average indication of fewer challenges compared with Attica. The weighting of the color zones (Red, Yellow, and Green) plays a key role due to the emphasis placed on shortcomings in specific domains.

Therefore, in the qualitative ranking of average SDG achievement, Thessaly, Central Macedonia, and Eastern Macedonia–Thrace lead, while the Regions of Peloponnese and South Aegean lag behind, both in the qualitative and the quantitative evaluation of goal achievement.

Table 3 The SDGs heat map for the Greek regions

SDG Dashboard													
ΣBA	**Eastern Macedonia and Thrace (EL51)**	**Attica (EL30)**	**Southern Aegean (EL41)**	**Western Greece (EL63)**	**Western Macedonia (EL53)**	**Epirus (EL54)**	**Thessaly (EL61)**	**Ionian Islands (EL62)**	**Central Macedonia (EL52)**	**Crete (EL43)**	**Southern Aegean (EL42)**	**Peloponnese (EL65)**	**Central Greece (EL64)**
ΣBA1	1	1	1	1	1	1	1	2	1	2	2	1	1
ΣBA2	3	1	2	3	2	2	3	2	3	2	1	2	2
ΣBA3	1	2	2	2	2	3	2	2	2	3	2	1	1
ΣBA4	2	3	1	2	2	2	2	2	3	3	2	2	1
ΣBA5	3	3	3	3	3	2	3	2	2	2	2	2	3
ΣBA6	3	2	2	3	3	3	3	2	3	2	1	3	3
ΣBA7	2	2	2	3	1	2	3	2	3	2	1	2	2
ΣBA8	2	3	2	2	1	1	2	2	2	2	2	2	2
ΣBA9	2	3	2	2	1	2	1	2	2	2	2	1	1
ΣBA10	1	2	1	1	1	2	2	1	2	2	1	1	2
ΣBA11	3	2	3	2	2	3	3	3	3	3	3	3	3
ΣBA12	3	3	3	3	2	3	3	3	3	3	3	3	3
ΣBA13	3	2	3	3	2	2	3	3	3	2	3	2	3
ΣBA14	2	1	3	1	1	1	2	4	1	2	4	3	2
ΣBA15	4	2	3	3	4	3	4	2	3	2	3	3	4
ΣBA16	3	1	3	2	3	3	3	2	2	2	2	2	2
ΣBA17	3	4	3	3	3	3	3	2	2	3	2	3	3

M.O.	2,41	2,18	2,29	2,29	2,00	2,24	2,53	2,24	2,35	2,29	2,12	2,12	2,24

Target achieved
Significant challenges
Minor challenges
Major challenges

4.2. Performance by Region

4.2.1. Region of Thessaly (EL61)

The Region of Thessaly, with Larissa as its capital and a total area of 14,036.64 square kilometers, has a population of 688,255 residents according to ELSTAT's 2021 census.

As shown by the analysis, the Region of Thessaly faces Significant Challenges (Red Zone) in achieving SDG 1 and SDG 9, as presented in the table below (Table 10). Indicatively, for the indicators that make up SDG 9 (Industry, Innovation and Infrastructure):

The share of employment in high-technology sectors (indicator 9.6) is only 1%, compared to an optimal value of 10% (based on the average of top European performers according to Eurostat). This indicator therefore faces Significant Challenges.

Similarly, Thessaly faces Significant Challenges in other SDG 9 indicators such as:

- investment in Research and Development (indicator 9.1),
- passenger and freight transport per 100 inhabitants and per 1,000 tonnes (indicators 9.10 and 9.12),
- maritime freight transport per 1,000 tonnes (indicator 9.11).

Additionally, regarding SDG 1 (No Poverty), the data show:

- Indicator 1.1, which measures the rate of severe material deprivation in cities, stands at 12%, facing Challenges.
- Indicator 1.2, which measures the proportion of the population at risk of poverty or social exclusion, is 27.4% and faces Significant Challenges.
- Indicator 1.3, concerning the percentage of people up to 60 years old with very low work intensity, stands at 10.3%, facing minor Challenges.
- Indicator 1.4, which measures the birth rate (growth rate), is 1.36%, compared with 2.1% observed in the top-performing countries internationally, and thus faces Significant Challenges.

Finally, according to the data, the Region of Thessaly faces minor Challenges (orange zone) regarding the following five SDGs: 3, 4, 8, 10, and 14. At the same time, it is relatively close to achieving SDGs 2, 5, 6, 7, 11, 12, 13, and 16.

Table 4 The SDGs status for the region of Thessaly

Sustainable Development Goals	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	

SDG8: Decent Work and Economic Growth

SDG9: Industry, Innovation and Infrastructure

SDG10: Reduced Inequalities

SDG11: Sustainable Cities and Communities

SDG12: Responsible Consumption and Production

SDG13: Climate Action

SDG14: Life Below Water

SDG15: Life on Land

SDG16: Peace, Justice and Strong Institutions

Target achieved
Minor challenges
Significant challenges
Major challenges

4.2.2. Region of Easter Macedonia and Thrace (EL51)

The Region of Eastern Macedonia and Thrace, with Komotini as its capital, covers the northeastern part of mainland Greece and has a total area of 14,157.76 square kilometers. According to ELSTAT's 2021 census, the Region has a population of 562,000 residents.

According to the data, the Region of Eastern Macedonia and Thrace face **Significant Challenges** in achieving **three (3) SDGs**—specifically SDGs **1, 3, and 10**.

Regarding **SDG 1**, **35.2%** of residents are at risk of poverty or social exclusion (indicator 1.2), while **17.9%** of those living in urban areas experience severe material deprivation (indicator 1.1).

For **SDG 3**, which also faces Significant Challenges:

- Infant mortality per 1,000 births (indicator 3.2) presents Significant Challenges, measured against international SDG benchmarks based on the annual ESDR reports.
- Life expectancy (indicator 3.1) also faces Significant Challenges compared with the annual ESDR reports.
- Access to health services (indicator 3.6) is limited due to distance, cost, or long waiting lists, and thus faces Significant Challenges.
- Deaths from very severe diseases (indicators 3.7 and 3.8) are unfortunately high, and these indicators show Significant Challenges.
- The birth rate (indicator 3.9) is low and also faces Significant Challenges.

The Region is close to achieving **SDGs 2, 5, 6, 11, 12, and 13**.

- The indicator measuring cereal production share (indicator 2.4) records the **highest value among all 13 Greek Regions**, and the target has been achieved.
- Similarly, the share of irrigated land over total agricultural land (indicator 2.7) is also achieved.
- Gender balance in tertiary education participation (indicator 5.1) is optimal at **50–50%**, meaning the target is achieved.
- Finally, labor productivity (indicator 8.5) is one of the highest in the country.

Regarding **SDG 13**, the Region faces **Challenges**, due to:

- **Indicator 13.3**, measuring atmospheric ozone concentration, which shows good levels with no critical issues.
- **Indicator 13.4**, monitoring greenhouse gas emissions, which faces Challenges.

For indicator 13.3, the benchmark is the best international SDG performance levels reported in the ESDR annual reports; for indicator 13.4, the benchmark is the emission reduction targets set by the European Commission.

Finally, **SDG 15 has been achieved**, as:

- Three indicators show strong performance (green):

- share of land covered by artificial surfaces (indicator 15.1),
- share of land covered by forests (indicator 15.2),
- soil erosion in agricultural and forest areas caused by water (indicator 15.4).

One indicator shows Challenges (yellow): the extent of land designated under NATURA 2000 (indicator 15.3).

Table 5 The SDGs status for the region of Easter Macedonia and Thrace

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved
Minor challenges
Significant challenges
Major challenges

4.2.3. Region of Central Macedonia (EL52)

The Region of Central Macedonia, with Thessaloniki as its capital, stretches from Greece's northern borders to the northern coasts of the Aegean Sea and covers a total area of **18,810.52 square kilometers**. According to the latest ELSTAT census (2022), the Region of Central Macedonia has a population of **1,795,669 residents**.

• The Region faces **Significant Challenges** in achieving **two (2) SDGs**, specifically **SDG 1** and **SDG 14**.

• **Regarding SDG 1:**

- **17.6%** of those living in cities experience **severe material deprivation** (indicator 1.1).
- **31.5%** of residents are **at risk of poverty or social exclusion** (indicator 1.2).

• **Regarding SDG 14:**

- The indicator measuring the **coastal area designated under the NATURA 2000 network** (indicator 14.1) faces Significant Challenges.
- The indicator counting **beaches with good water quality for swimmers per 10,000 residents** (indicator 14.2) also faces Significant Challenges.

• **For SDG 3**, which shows **minor Challenges**, the following indicators stand out:

- **Indicator 3.6**, measuring **access to medical examinations**, is problematic due to cost, distance, or long waiting lists, and has a value of **12.4**, indicating minor Challenges.
- **Birth rates** (indicator 3.9) are low at **1.25**, compared with the optimal value of **2.1**.

Table 6 The SDGs status for the region of Central Macedonia.

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

4.2.4. Region of Northern Aegean (EL41)

The Region of North Aegean, with Mytilene as its capital, extends across the northern part of the Aegean Sea and covers a total area of **3,835.91 square kilometers**. According to the latest ELSTAT census in 2021, the Region of Northen Aegean has a population of **194,943 residents**.
According to the data, the Region faces **Significant Challenges** in achieving **three (3) SDGs**, specifically **SDG 1, SDG 4, and SDG 10**.

More specifically:

- **33.1%** of residents are at risk of poverty or social exclusion (indicator 1.2),
- while nearly **19%** of urban residents experience severe material deprivation (indicator 1.1).

Regarding **SDG 4**, the Region of Northen Aegean shows low values compared with the annual reports and sustainability targets of the ESDR for:

- **Indicator 4.2**, representing the percentage of adults who have completed high school,
- **Indicator 4.4**, measuring the share of children up to 4 years old enrolled in early childhood education,
- **Indicator 4.5**, which reflects the percentage of adults participating in lifelong learning.

The Region has **not yet achieved any SDG**, but it is **quite close** to achieving **six (6)** of them before 2030 (specifically SDGs **5, 11, 12, 13, 14, and 15**).
Regarding gender balance in tertiary education (indicator 5.1), the percentage is very close to **50–50**, meaning the optimal value is already achieved. Additionally, the gender gap in employment is narrower than in many other Regions, facing only **Challenges** and approaching the target. For this reason, **SDG 5 overall is moving toward achievement** in this Region.

Regarding **SDG 11**, the Region is close to achieving it, with **Challenges**. Specifically:

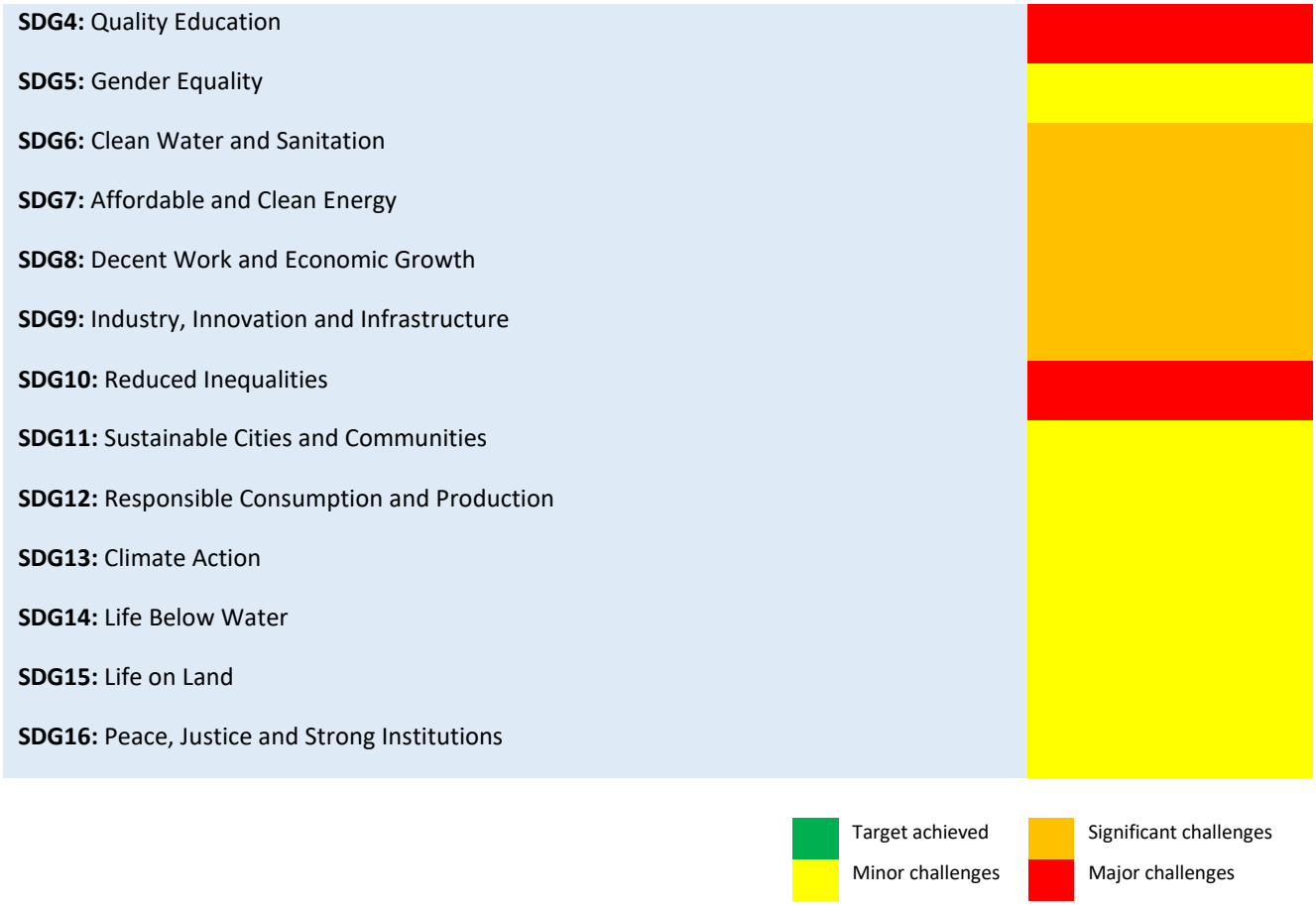
- The **resident satisfaction rate** (indicator 11.2) stands at **94%**, one of the highest in Greece.
- The **number of available beds per permanent resident** (indicator 11.6) is also among the highest in the country, suggesting the Region can accommodate significant visitor flows.
- Vehicle use per 1,000 residents (indicator 11.8) is reasonable, moving toward a sustainable level.
- Road accident victims (indicator 11.10) remain relatively limited, with the desired target always being zero.

Finally, **SDG 11** also shows **Challenges** thanks in part to:

- **Indicator 16.2**, which measures crimes against human life and remains low,
- and **indicator 16.5**, which refers to property crimes, also relatively low.

Table 7 The SDGs status for the region of Northern Aegean

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	



4.2.5. Region of Crete (EL43)

The Region of Crete, with Heraklion as its capital, is located at the southernmost part of Europe and has a total area of **8,336 square kilometers**. According to the latest ELSTAT census (2021), the Region of Crete has a population of **624,408 residents**.

Based on the available data, the Region of Crete faces **minor Challenges** (orange zone) in many SDGs. More specifically, it faces minor Challenges in **SDGs 1, 2, 5, 6, 7, 8, 9, 10, 13, 14, and 15**, while it is **close to achieving SDGs 3, 4, 11, and 12**. We also note that **no SDG shows Significant Challenges** (red zone), but **none has yet been fully achieved** (green zone).

In more detail, for SDG 1:

- The percentage of residents at risk of poverty or social exclusion (indicator 1.2) reaches **27.3%**.
- The share of people living in urban areas who experience severe material deprivation (indicator 1.1) is **16.3%**.

For **SDG 8**, the productivity per worker (indicator 8.6) is well below the optimal values (which are based on the average performance of the best European regions). Likewise, the economically active population (15 to 75 years old, indicator 8.7) is **61%**, compared with the optimal value of **75%**. Both indicators show **Significant Challenges** and hinder the achievement of SDG 8, which overall faces minor Challenges (orange zone).
For **SDG 9**, the Region faces overall minor Challenges. The share of the workforce with tertiary education (indicator 9.4) is low and near the red threshold. Moreover, employment in high-technology sectors (indicator

9.6) is **very low at 1.7%**, compared with **10%**, which is the optimal value derived from international benchmarks.

SDG 10 (Reduced Inequalities) also presents minor Challenges, as the disposable income per household (indicator 10.1) is quite low—**€11,400 per household**, compared with the optimal value of **€30,000** (based on ESDR annual reports).

For **SDG 11**, the share of residents who find quality housing at an "affordable price" (indicator 11.1) is **20%**, significantly lower than in other Regions and below ESDR benchmark levels.

Regarding **SDG 13 (Climate Action)**, the Region faces minor Challenges. However, some indicators show Significant Challenges, such as:

- fine particulate matter concentrations (PM2.5 – indicator 13.1),
- coarse particulate matter concentrations (PM10 – indicator 13.2),
- and the absence of data on ozone concentration (indicator 13.3).

On the other hand, the annual measured greenhouse gas emissions (indicator 13.4) show **Challenges** (yellow zone).

SDG 16 also exhibits minor Challenges, as:

- crimes against human life (indicator 16.2),
- and violations of special criminal legislation (indicator 16.6) have high values relative to ESDR benchmarks, while
- the indicator measuring citizens' sense of insecurity when walking on the street (indicator 16.7) is low.

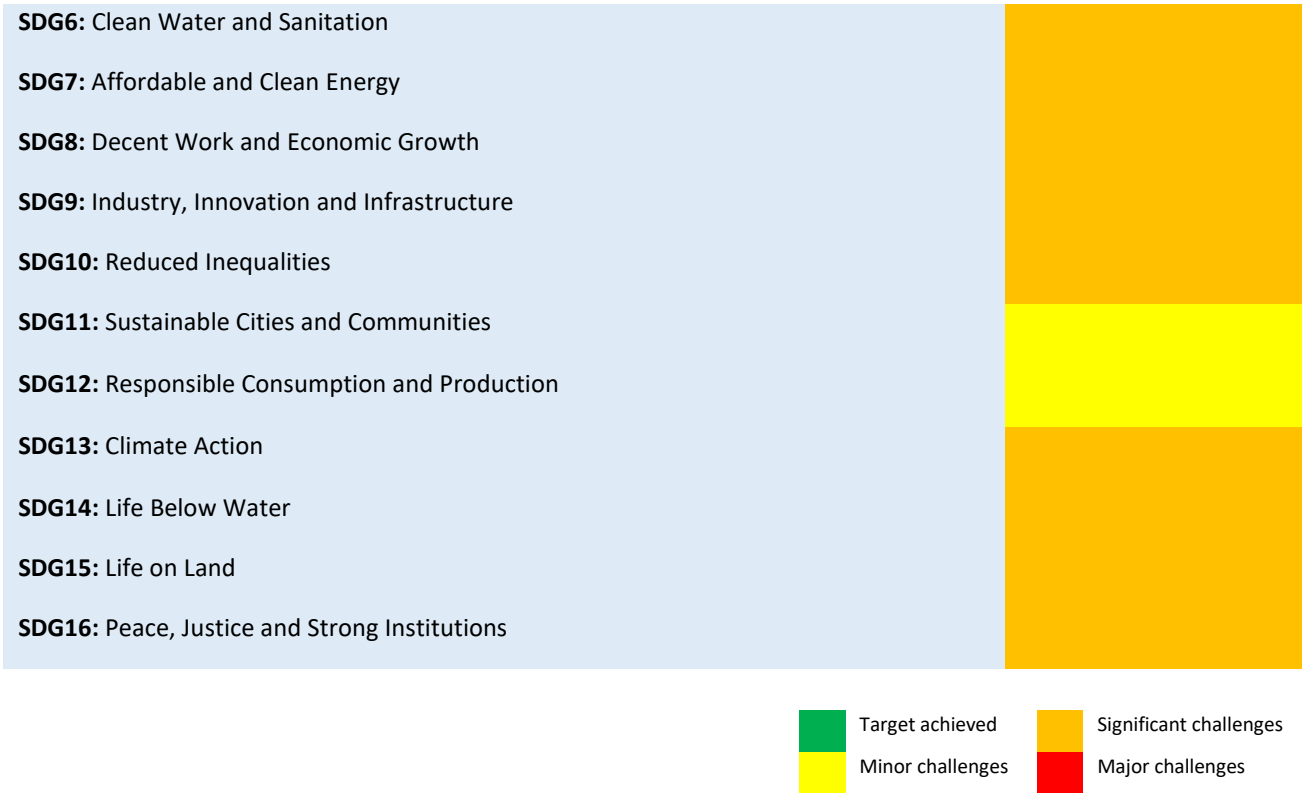
Therefore, all three indicators present Significant Challenges.

Finally, several important indicators show strong performance and contribute positively to the SDGs in which they belong. For example:

- **SDG 2:** share of cultivated land (indicator 2.3) and cereal production for food (indicator 2.4).
- **SDG 4:** share of children entering early childhood education at age 4 (indicator 4.4).
- **SDG 5:** gender balance in tertiary education (indicator 5.1).
- **SDG 8:** low long-term unemployment rate (3.2%) (indicator 8.2).
- **SDG 9:** high Internet usage rate (indicator 9.7).
- **SDG 10:** inequality ratio between very high and very low incomes (indicator 10.3), which reaches **3.7**, compared with **3.3**, the average of top European performers.
- **SDG 11:** very high levels of air passenger transport per 1,000 residents (indicator 11.7), among the best at the national level.

Table 8 The SDGs status for the region of Crete

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	


SDG6: Clean Water and Sanitation
SDG7: Affordable and Clean Energy
SDG8: Decent Work and Economic Growth
SDG9: Industry, Innovation and Infrastructure
SDG10: Reduced Inequalities
SDG11: Sustainable Cities and Communities
SDG12: Responsible Consumption and Production
SDG13: Climate Action
SDG14: Life Below Water
SDG15: Life on Land
SDG16: Peace, Justice and Strong Institutions
Target achieved
Minor challenges
Significant challenges
Major challenges

4.2.6. Region of Western Greece (EL63)

The Region of Western Greece, with Patras as its capital, extends across the entire western part of the Peloponnese peninsula as well as the western part of Central Greece, covering a total area of **11,350.18 square kilometers**. According to the latest ELSTAT census (2021), the Region has a total population of **648,220 residents**.

According to the data, the Region of Western Greece faces **Significant Challenges** (red zone) in achieving **SDGs 1, 10, and 14**.

Regarding **SDG 1**, the indicator showing the percentage of residents at risk of poverty or social exclusion (indicator 1.2) reaches **42.4%**, while the share of urban residents experiencing severe material deprivation (indicator 1.1) reaches **25.6%**.

SDG 10, which monitors the reduction of inequalities, also presents Significant Challenges, based on the following indicators:

- Household disposable income (indicator 10.1) is **€10,500 per household**, far below the optimal **€30,000** benchmark reported in the ESDR annual surveys.
- Per capita income (indicator 10.4) ranges between **€9,000 and €9,100**, much lower than the average **€33,000** observed among top-performing European countries.
- The rate of improvement in demographic balance (indicator 10.5) is also low compared with international improvement rates reported in UN statistics.

On the other hand, within SDG 10, one indicator shows **Challenges**:

- The income inequality ratio between very high and very low incomes (indicator 10.3) scores **4.3**, compared with **3.3**, the average of the top European performers.

SDG 7 (Affordable and Clean Energy) faces **Challenges**; however, indicator **7.2**, which measures the percentage of installed energy capacity from clean and renewable sources, **has achieved its target**. Western Greece has exclusively installed Renewable and Clean Energy capacity, without polluting power plants or other high-emission energy facilities in previous years.

Regarding **SDG 14**, the Region faces Significant Challenges, as:

- The coastal area (in hectares) covered by the NATURA 2000 network per inhabitant (indicator 14.1) has a value of **0.05**, compared with the benchmark **1.24**, according to ESDR data.
- The number of beaches suitable for swimming per 10,000 inhabitants (indicator 14.2) has a value of **1.25**, far below the benchmark **6.93** reported in the ESDR surveys.

Although no SDG has been fully achieved, several indicators included in **SDGs 11, 13, 15, and 16** show **Challenges**, contributing positively toward their achievement.

For example:

- For **SDG 11**, the indicator on the number of overnight stays related to tourism (indicator 11.4) shows a relatively high score.
- For **SDG 13**, particulate matter concentrations (indicator 13.1 – PM2.5) are low compared with optimal values reported in the ESDR.

- For **SDG 15**, land covered by artificial surfaces (indicator 15.1) is low compared with national best-performing averages.
- For **SDG 16**, crimes of gender-based violence (indicator 16.4) are lower than ESDR benchmark levels.

However, regarding **SDG 16 (Peace, Justice and Strong Institutions)**, the Region faces **minor Challenges** (orange zone):

- **Indicator 16.1** (offenses per 100,000 residents)
- **Indicator 16.6** (violations of special criminal legislation per 100,000 residents)
- **Indicator 16.7** (citizens' sense of insecurity when walking in public spaces)

all show **minor Challenges**.

Additionally:

- **Indicator 16.3** (injuries per 100,000 residents) shows **Significant Challenges**.
- **Indicator 16.5** (property crimes) shows **Challenges**.

Table 9 The SDGs status for the region of Western Greece

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved Significant challenges


Minor challenges
Major challenges

4.2.7. Region of Epirus (EL54)

The Region of Epirus, with Ioannina as its capital, covers the northwestern part of mainland Greece and has a total area of **9,203.22 square kilometers**. According to the latest ELSTAT census (2021), the Region of Epirus has a total population of **319,991 residents**.

According to the data, **SDGs 1, 9, and 14** face **Significant Challenges**, due to indicators such as:

- The share (**16.5%**) of the urban population experiencing **severe material deprivation** (indicator 1.1),
- and the **29%** of people at **risk of poverty or social exclusion** (indicator 1.2).

Additional indicators contributing to these challenges include:

- The **low volume of passengers and freight transported by air**, compared with optimal values.
- The **very low ratio of coastal NATURA 2000 area per capita** (indicator 14.1), which is **0.09**, and faces Significant Challenges compared with ESDR annual reports.
- The **indicator for beaches with good bathing water quality** (indicator 14.2), which shows minor Challenges: for Epirus, the value is **1.58**, whereas the optimal value is **6.93**, according to ESDR reports.

The data also show that **SDGs 2, 4, 5, 7, 9, 10, and 13** face **minor Challenges**.

The remaining SDGs (**3, 6, 11, 12**) face **Challenges**, with **SDG 3** being close to achievement, mainly due to:

- The **low rate of fatal traffic accidents** (indicator 3.1), compared with ESDR benchmarks,
- and the **high number of healthcare workers per 100,000 inhabitants** (indicator 3.3).

Table 10 The SDGs status for the region of Epirus

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	

SDG14: Life Below Water **SDG15:** Life on Land **SDG16:** Peace, Justice and Strong Institutions	

4.2.8. Region of Ionian Islands (EL62)

The Region of the Ionian Islands, with Corfu as its capital, extends across the entire Ionian Sea and has a total area of **2,306.94 square kilometers**. According to the latest ELSTAT census (2021), the Region has a population of **204,532 residents**.

Based on the available data, the Region of the Ionian Islands faces **Significant Challenges** in achieving **SDG 10**. This is mainly due to the performance of the following indicators:

- Household disposable income (indicator 10.1) is quite low at **€14,700 per household**, compared with the optimal value of **€30,000** (according to ESDR annual surveys).
- The per capita income indicator (indicator 10.4) is extremely low—barely above one-tenth of the optimal benchmark (based on top European values reported in EU statistics).
- The population growth rate (indicator 10.5) is negative, falling below the improvement rates observed in regions with stronger demographic performance, according to United Nations data.

For **SDGs 1 to 9**, the Region faces **minor Challenges**. More specifically, Significant Challenges are observed in indicators such as:

- Birth rate (indicator 1.4),
- Total agricultural land per capita (indicator 2.1),
- Share of agricultural land under organic cultivation (indicator 2.2),
- Life expectancy (indicator 3.4),
- Number of available hospital beds (indicator 3.5),
- Access to healthcare services (indicator 3.6), affected by distance, cost, or long waiting lists.

According to the data, the Region faces **Challenges** in achieving **SDGs 11 to 13**. In particular:

- Tourism-related activity (indicator 11.4) and available accommodation capacity (indicator 11.5) have achieved their targets.
- The indicator for agricultural land coverage (indicator 12.6) also performs well.
- The annual measured greenhouse gas emissions (indicator 13.4) are low compared with EU targets and relative to other Greek Regions. This is the only available indicator for SDG 13 in this Region (as particulate-matter indicators are missing). However, this indicator is representative enough to reflect the main measurement for SDG 13 until additional data become available.

Regarding **SDG 14**, the Region of the Ionian Islands **has achieved the target**. This is due to:

- A high ratio of NATURA 2000 coastal area per inhabitant (indicator 14.1), which has a value of **1.49**, compared with the ESDR benchmark of **1.24**.
- A high number of beaches suitable for bathing per 10,000 inhabitants (indicator 14.2), with a value of **8.03**, compared with the benchmark **6.93** from ESDR surveys.

Table 11 The SDGs status for the region of Ionian Islands

Sustainable Development Goal	Status
SDG1: No Poverty **SDG2:** No Hunger	

SDG3: Good Health and Well-Being

SDG4: Quality Education

SDG5: Gender Equality

SDG6: Clean Water and Sanitation

SDG7: Affordable and Clean Energy

SDG8: Decent Work and Economic Growth

SDG9: Industry, Innovation and Infrastructure

SDG10: Reduced Inequalities

SDG11: Sustainable Cities and Communities

SDG12: Responsible Consumption and Production

SDG13: Climate Action

SDG14: Life Below Water

SDG15: Life on Land

SDG16: Peace, Justice and Strong Institutions

1.1.9. Region of Central Greece (EL64)

The Region of Central Greece, with Lamia as its capital, extends across the entire eastern part of mainland Greece, including the island of Euboea, and has a total area of **15,549.31 square kilometers**. According to the latest ELSTAT census (2021), the Region of Central Greece has a population of **508,254 inhabitants**.

Based on the data, the Region faces **Significant Challenges** in achieving **SDGs 1, 3, and 4**.
Indicatively, the indicator representing the share of people at risk of poverty or social exclusion (indicator 1.2) is quite high (**28.8%**) compared with the ESDR annual reports. Furthermore, the birth rate (indicator 1.4) is low (**1.37%**) compared with the optimal value of **2.10%**, which corresponds to the average of the best-performing European regions according to the European Regional Yearbook. These indicators illustrate the **Significant Challenges** the Region faces in achieving SDG 1.
SDG 3 also presents **Significant Challenges**, as several associated indicators show considerable difficulties, including:

- Number of available healthcare workers per 100,000 inhabitants (indicator 3.3)
- Number of available hospital beds (indicator 3.5)
- Quality of access to healthcare services due to distance, cost, or waiting times (indicator 3.6)
- Deaths from serious diseases (indicators 3.7 and 3.8)

Regarding SDG 4, which also shows **Significant Challenges**, several indicators contribute to this outcome:

- The percentage of people who leave compulsory education early (indicator 4.1)
- The percentage of adults who have completed secondary education (indicator 4.2)
- The percentage of children up to age 4 enrolled in early childhood education (indicator 4.4)
- The percentage of adults aged 25–65 completing tertiary education successfully

SDG 7 presents **minor Challenges**. This is due to the following:

- Fossil fuel consumption (indicator 7.1) is particularly high, facing Significant Challenges.
- The share of installed renewable energy capacity relative to total installed capacity (indicator 7.2) is low compared with the ESDR annual reports.
- The duration of very hot days (indicator 7.3) is notably high.
- The number of established Energy Communities faces Significant Challenges, while their installed capacity also faces minor Challenges.

Finally, SDG 11 faces **relatively Challenges**. However, the analysis reveals that:

Indicators showing **minor Challenges** include:

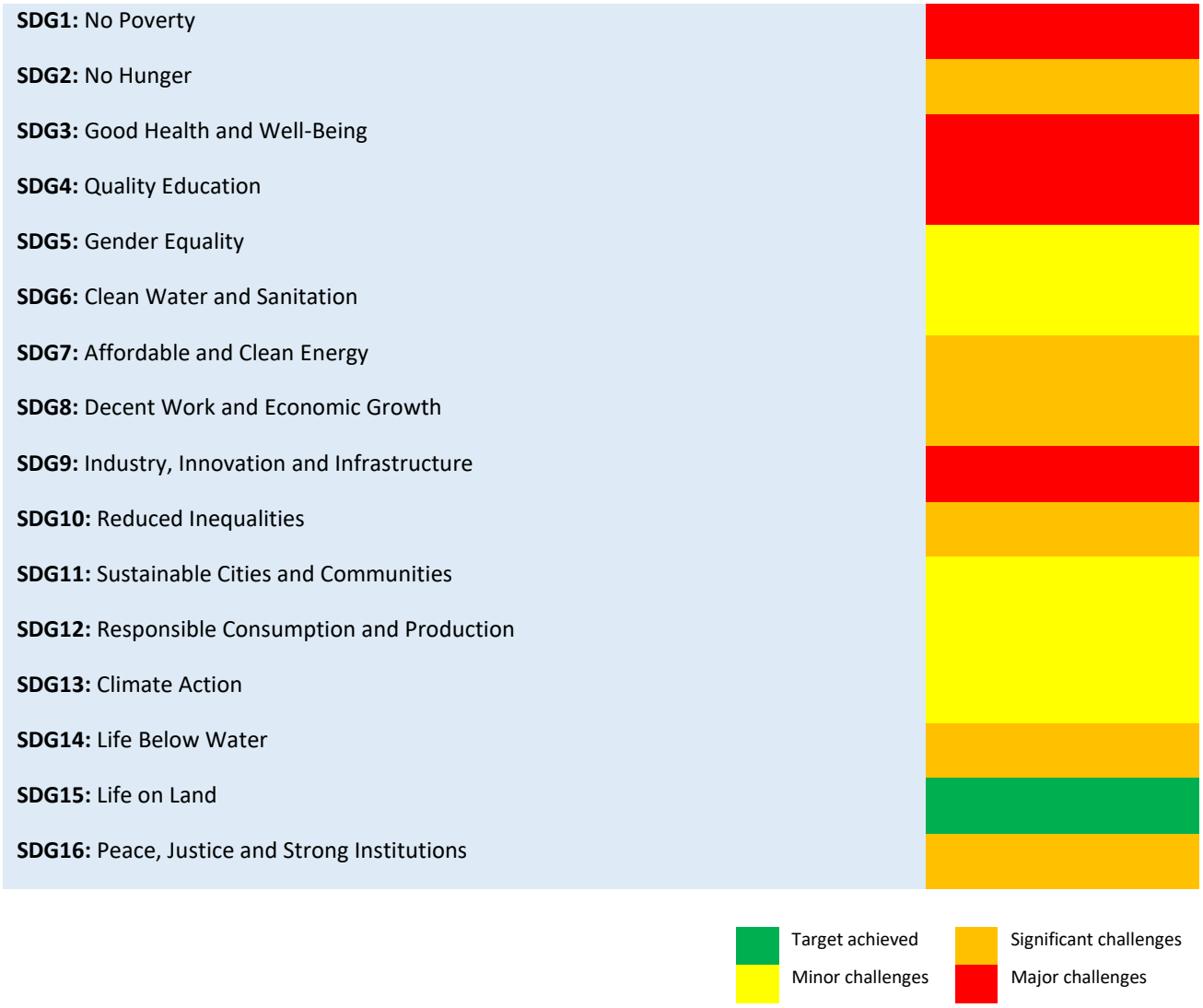
- The percentage of residents satisfied with the quality of life in their area (indicator 11.2)
- The extent of the railway network (indicator 11.3)

Indicators showing **Challenges** and nearing achievement include:

- The number of available accommodation beds (indicator 11.5)
- The availability of resources, services, and activities accessible to all social groups (indicator 11.6)

Table 12 The SDGs status for the region of Central Greece

Sustainable Development Goal	Status


SDG1: No Poverty
SDG2: No Hunger
SDG3: Good Health and Well-Being
SDG4: Quality Education
SDG5: Gender Equality
SDG6: Clean Water and Sanitation
SDG7: Affordable and Clean Energy
SDG8: Decent Work and Economic Growth
SDG9: Industry, Innovation and Infrastructure
SDG10: Reduced Inequalities
SDG11: Sustainable Cities and Communities
SDG12: Responsible Consumption and Production
SDG13: Climate Action
SDG14: Life Below Water
SDG15: Life on Land
SDG16: Peace, Justice and Strong Institutions
Target achieved
Minor challenges
Significant challenges
Major challenges

1.9.10. Region of Attica (EL30)

The Region of Attica, with Athens as its capital, includes the metropolitan area of Athens, the island of Kythera, and the island complex of the Saronic Gulf. It has a total area of **3,808.10 square kilometers**. According to the latest ELSTAT census in 2021, the region has a population of **3,814,064 inhabitants**.

Based on the data, the Region of Attica faces **Significant Challenges** in achieving **four SDGs**—specifically SDGs **1, 2, 14, and 16**. At the same time, it faces **Considerable Challenges** in achieving **seven SDGs**—namely SDGs **3, 6, 7, 10, 11, 13, and 15**. Additionally, as shown in the table below, the Region of Attica faces **Minor Challenges** in achieving **four SDGs**, while **one SDG**, specifically **SDG 9 (Industry, Innovation and Infrastructure)**, is **on track to be achieved**.

Regarding the SDGs for which Attica faces **Significant Challenges**, this is due to the performance of the following indicators:

- The share of people in cities experiencing severe material deprivation (indicator 1.1) is **14%**, differing from the optimal value of **0%**.
- The share of people at risk of poverty or social exclusion (indicator 1.2) reaches **23.20%**, compared with the optimal value of **0%**.
- The percentage of people aged 0–59 living in households with very low work intensity (indicator 1.3) is **8.7%**, far from the optimal **0%**.
- The fertility rate (indicator 1.4) is **1.2**, compared with the optimal **2.10**, which reflects the average of Europe's top-performing regions.
- Total cultivated agricultural land per capita (indicator 2.1) is **0.06**, compared with the optimal **10**.
- Organic farming area as a percentage of total agricultural land (indicator 2.2) is **1.70**, far below the optimal **17**.
- Agricultural land (hectares) as a share of total land area (indicator 2.3) stands at **0.07**, compared with the optimal **0.25**.
- Cereal production area (indicator 2.4) is **0.01**, far from the optimal **0.07**.
- Livestock population per hectare (indicator 2.5) is **0.52**, below the optimal **0.82**.
- Irrigated land per hectare of cultivated area (indicator 2.6) scores **0.198**, compared with the optimal **0.59**.
- Total penal code violations per 100,000 inhabitants (indicator 16.1) reach **2,492.61**, compared with the optimal **0**.
- Crimes against life per 100,000 inhabitants (indicator 16.2) stand at **10.13**, against the optimal **0**.
- Property crimes per 100,000 inhabitants (indicator 16.5) are **1,566.31**, far from the optimal **0**.
- The share of residents feeling safe walking alone at night (indicator 16.6) is **0.50**, with the optimal being **0**.
-

On the other hand, the Region of Attica **has achieved SDG 9**, and the data indicate that this is due to the progress of the following indicators:

- The percentage of the labor force with tertiary education or employment in science and technology (indicator 9.3) is **53%**, close to the optimal **65%**.
- The percentage of the labor force employed in research and development (indicator 9.4) is **1.78**.
- The share of total employment in high-technology sectors (indicator 9.5) is **6.3%**.

- The percentage of the population using the internet (indicator 9.6) is **98.8%**, very close to the optimal **100%**.
- Long-term internet users (indicator 9.7) score **55.60**, close to the optimal **60%**.
- Passengers transported by maritime transport (indicator 9.8) reach **19,125 thousand**.
- Passengers transported by air (indicator 9.9) reach **24,366 thousand**, close to the optimal **25,000 thousand**.
- Total cargo volume transported by sea (indicator 9.10) is **71,882 thousand tons**, compared with the optimal **80,000 thousand tons**.
- Total cargo transported by air (indicator 9.11) is **115 thousand tons**, against the optimal **100 thousand tons**.

Table 13 The SDGs status for the region of Attica

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved
Significant challenges
Minor challenges
Major challenges

4.2.11. Region of Southern Aegean (EL42)

The Region of South Aegean, with Ermoupolis as its capital, includes the island complexes of the Cyclades and the Dodecanese and has a total area of **5,286 square kilometers**. According to the latest ELSTAT census (2021), the region has a population of **327,820 inhabitants**.

Based on the data, the Region of South Aegean faces **Significant Challenges** in achieving **three (3) SDGs**—specifically SDGs **1, 4, and 10**. At the same time, it faces **Considerable Challenges** in achieving **six (6) SDGs** (2, 3, 6, 7, 8, 9), and **Minor Challenges** in achieving **seven (7) SDGs** (5, 11, 12, 13, 14, 15, and 16).

More specifically, regarding **SDGs 1, 4,** and **10**, where the Region faces Significant Challenges, this is due to the performance of the following indicators:

- Severe material deprivation in cities (indicator 1.1) at **20.9**, far from the optimal value (**0**) according to the ESDR.
- People at risk of poverty or social exclusion (indicator 1.2) at **30.8**, significantly distant from the optimal value (**0**).
- People aged 0–59 living in households with very low work intensity (indicator 1.3) at **3.9**, with the desired value being **0**.
- Fertility rate (indicator 1.4) at **1.63**, below the optimal **2.10** based on the average of Europe's top performers.

SDG 4 indicators:

- Adults with upper secondary education (indicator 4.2) at **68.80**, compared to the optimal **100**.
- Adult participation in lifelong learning (indicator 4.5) at **2.10**, compared to the optimal **2.80**.
- Adults with tertiary education (indicator 4.6) at **20.10**, far from the optimal **45** (best European performers).

SDG 10 indicators:

- Disposable household income (indicator 10.1) at **€13,600**, less than half the optimal **€30,000**.
- Income inequality ratio S20/S80 (indicator 10.3) at **5.20**, compared to the optimal **3.20**.
- GDP per capita (indicator 10.4) at **€6,736.74**, far from the optimal **€33,000**.

On the other hand, for SDGs **5, 11, 12, 13, 14, 15, and 16**, the Region of South Aegean faces **Minor Challenges**. This is due to the values of indicators such as:

SDG 5 (Gender Equality):

- Youth employment outside education/training (female/male ratio, indicator 5.2) at **0.83**, optimal **1**.
- Women's representation in regional councils (indicator 5.3) at **21.6**, optimal **50**.

SDG 11 (Sustainable Cities):

- Residents' satisfaction with their city (indicator 11.2) at **0.93** vs. optimal **1.00**.
- Number of accommodation beds per capita (indicator 11.5) at **0.91** vs. optimal **0.1**.
- Maritime passenger transport (indicator 11.6) at **9,942**, optimal **3,100**.
- Air passenger transport (indicator 11.7) at **14,055**, optimal **6,000**.

SDG 14 (Life Below Water):

- Area of coastal NATURA 2000 sites per capita (indicator 14.1) at **1.43**, optimal **1.24**.
- Excellent quality bathing waters per 10,000 inhabitants (indicator 14.2) at **9.42**, optimal **6.93**.

SDG 15 (Life on Land):

- Land covered by artificial surfaces (indicator 15.1) at **4.40**, optimal **2.17**.
- Soil erosion by water (indicator 15.4) at **3.87**, optimal **1.00**.

SDG 16 (Peace, Justice and Institutions):

- Property crimes per 100,000 inhabitants (indicator 16.5) at **662.4**, optimal **0**.
- Violations of special criminal laws per 100,000 inhabitants (indicator 16.7) at **0.84**, optimal **0**.

Table 14 The SDGs status for the region of Southern Aegean

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

4.2.12. Region of Peloponnese (EL65)

The Region of Peloponnese, with Tripoli as its capital, covers the southeastern part of the Peloponnesian peninsula and has a total area of **15,489.96 square kilometers**. According to the latest ELSTAT census, the Region of Peloponnese has a total population of **539,535 inhabitants**.

According to the data, the Region of Peloponnese faces **Significant Challenges** (red) in **four SDGs**, specifically SDGs **1, 3, 9, and 10**. At the same time, it faces **Considerable Challenges** in SDGs **2, 4, 5, and 7**, while in SDGs **5, 11, 12, 14, and 15** the Region faces **Minor Challenges** in achieving them.

Regarding **SDG 1**, the Region of Peloponnese shows **Significant Challenges** (red) in the following indicators:

- Severe material deprivation among urban residents (indicator 1.1)
- Percentage of individuals at risk of poverty or social exclusion (indicator 1.2)
- Fertility rate (indicator 1.3)

For **SDG 2** (Zero Hunger), the Region faces **Considerable Challenges**. However, in terms of indicators, **Significant Challenges** appear in:

- Area under organic cultivation as a percentage of utilized agricultural land (indicator 2.2)
- Total cultivated area of cereals for grain, expressed as a percentage of total land area (indicator 2.4)
- Total number of live cattle (in thousands of heads), expressed as a percentage of total land area (indicator 2.5)

Next, the achievement of **SDG 3** shows **Significant Challenges**, with the following indicators far from the desired values:

- Number of hospital beds per 100,000 inhabitants (indicator 3.5)
- Percentage of people whose medical needs were unmet due to cost, distance, or long waiting lists (indicator 3.6)
- Mortality due to cancer (indicator 3.7)
- Mortality due to ischemic heart diseases (indicator 3.8)
- Total fertility index (indicator 3.9)

Furthermore, for **SDG 4**, several indicators also show **Significant Challenges**, such as:

- Percentage of adults aged 25–64 who have completed upper secondary education (indicator 4.2)
- Percentage of adults participating in educational or learning programmes (indicator 4.5)

Meanwhile, the indicator on preschool participation of four-year-olds (indicator 4.4) is **close to achievement**, whereas the indicator on early school leaving among young people aged 18–24 (indicator 4.1) faces **Minor Challenges**.

Regarding **SDG 7**, the data show that the Region of Peloponnese faces **Considerable Challenges**. More specifically, several indicators show **Significant Challenges**, such as:

1. Share of installed energy capacity (MW) from sustainable energy sources (solar, wind, hydro).
2. Number of energy communities established to promote sustainable and renewable energy.
3. Total installed energy capacity of energy communities (MW).

All remain far from optimal performance.

Finally, regarding **SDGs 9 and 10**, the Region of Peloponnese faces **Significant Challenges**, with indicators such as:

For SDG 9:

- Share of the labour force with tertiary education or employment in science and technology (indicator 9.4)
- Share of the labour force employed as research personnel (indicator 9.10)
- Share of total employment in high-technology sectors (indicator 9.11)

For SDG 10:

- Disposable household income (indicator 10.1)
- People at risk of poverty or social exclusion (indicator 10.2)
- Income inequality ratio S80/S20 (indicator 10.3)

All of the above indicators show **Significant Challenges**

Table 15 The SDGs status for the region of Peloponnese

Sustainable Development Goal	Status
SDG1: No Poverty	
SDG2: No Hunger	
SDG3: Good Health and Well-Being	
SDG4: Quality Education	
SDG5: Gender Equality	
SDG6: Clean Water and Sanitation	
SDG7: Affordable and Clean Energy	
SDG8: Decent Work and Economic Growth	
SDG9: Industry, Innovation and Infrastructure	
SDG10: Reduced Inequalities	
SDG11: Sustainable Cities and Communities	
SDG12: Responsible Consumption and Production	
SDG13: Climate Action	
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved
Minor challenges
Significant challenges
Major challenges

4.2.13. Region of Western Macedonia (EL53)

The Region of Western Macedonia, with Kozani as its capital, covers the northern part of mainland Greece and has a total area of **9,451 square kilometers**. According to the latest ELSTAT census (2021), the Region of Western Macedonia has a total population of **254,595 inhabitants**.

According to the data, the Region of Western Macedonia faces **Significant Challenges** (red) in **SDGs 1, 7, 8, 9, 10, and 14**, while SDG 15 has been achieved. Completing the picture, the Region faces **Considerable Challenges** (orange) in **six SDGs**—specifically SDGs **2, 3, 4, 11, 12, and 13**—while it faces **Minor Challenges** (yellow) in achieving **four SDGs**, specifically SDGs **5, 6, and 16**.

At the indicator level for **SDG 1**, we observe that the indicator measuring the percentage of residents at risk of poverty or social exclusion (indicator 1.2) reaches **34.9%**, while the indicator highlighting severe material deprivation among urban residents (indicator 1.1) reaches **19.10%**. Finally, noteworthy is the fertility rate indicator (indicator 1.4). With a value of **1.18**, this is the **lowest** among all 13 Greek regions and shows the **largest deviation** from the optimal value of **2.10**, which represents the average performance of top-performing European regions.

Next, for **SDG 3**, we observe that the indicators related to deaths due to cancer (indicator 3.7), heart diseases (indicator 3.8), and mortality (indicator 3.9) face **Significant Challenges** (red) and are far from optimal levels. Regarding **SDG 8**, the data show that the indicator for per capita income (indicator 8.1) faces **Significant Challenges**, with a value of **€4,551.80**, far below the optimal value of **€33,000** (based on the average of top European performers). Additionally, the long-term unemployment rate (indicator 8.2) is **11%**, the highest among all 13 Greek regions, and significantly above the optimal value of **3%**. Finally, labour productivity (indicator 8.6) also faces **Significant Challenges**, with a value of **€45,500**, well below the optimal **€55,000**.

SDG 11 faces **Considerable Challenges** (orange), with indicators such as 11.2, 11.3, 11.5, and 11.7 performing poorly, while indicators 11.4 and 11.6 are close to achievement (green).

SDG 13 (Climate Action) faces **Considerable Challenges** (orange), although the indicator on particulate matter concentration PM2.5 (indicator 13.1) is **under achievement** (green), while greenhouse gas emissions (indicator 13.4) face **Minor Challenges** (yellow).

Finally, **SDG 16**, which faces **Minor Challenges** (yellow), includes several indicators close to achievement, such as crime-related indicators. Indicator 16.2 (crimes against life) has a value of **2.82**, the lowest among all 13 Greek regions. A similar positive pattern is observed in the indicators for crimes related to sexual freedom (indicator 16.4), property-related crimes (indicator 16.5), and violations of special criminal legislation (indicator 16.6).

The region of Attica faces significant challenges in achieving four SDGs (namely **1, 3, 6** and **7**).

Table 16 The SDGs status for the region of Western Macedonia

Sustainable Development Goal	Status
SDG1: No Poverty	

SDG2: No Hunger

SDG3: Good Health and Well-Being

SDG4: Quality Education

SDG5: Gender Equality

SDG6: Clean Water and Sanitation

SDG7: Affordable and Clean Energy

SDG8: Decent Work and Economic Growth

SDG9: Industry, Innovation and Infrastructure

SDG10: Reduced Inequalities

SDG11: Sustainable Cities and Communities

SDG12: Responsible Consumption and Production

SDG13: Climate Action

SDG14: Life Below Water

SDG15: Life on Land

SDG16: Peace, Justice and Strong Institutions

5. Conclusions and ways forward

This Report aims to monitor progress towards the achievement of the SDGs at regional level and to support the identification of policy priorities, while at the same time detecting significant data gaps on the SDGs at regional (NUTS2) level. Earth observation can be part of the solution to this problem, especially for SDGs 6, 11 and 15. The main findings indicate that Greek Regions face serious difficulties in progressing towards the achievement of the SDGs in most goals. The average score (referring to the progress of Greek Regions towards the SDGs) is **43.72%**, and if the scores are weighted by population, the average drops to **37%**.

Monitoring progress over time (trends)

The Report provides a snapshot of the current situation based on the most recent data from 2022. At the same time, it is important to monitor regional progress trends, as they contribute to the assessment of achievements and commitments to the goals. However, the availability of data at sub-national (NUTS2) level is limited, which is why the Report also aims to create an organised system of data collection from the Regions in order to fill gaps in monitoring.

Overview of Critical Dimensions

Energy

The Report compares data which may initially appear contradictory, but this is sufficiently explained and justified in the text. For example, the indicator representing the share of Installed Capacity from Renewable Energy Sources in total Installed Capacity is at fairly satisfactory levels for **eight (8)** out of **thirteen (13)** Regions, while **three (3)** Regions face **Significant Challenges** and **two (2)** face **minor challenges**.

However, nowadays the availability of energy commodities is constrained by high prices (especially for electricity, which depends on fossil fuels) in international and domestic markets. As a result, electricity appears vulnerable to speculation, and therefore the high share of installed RES capacity is not necessarily reflected in affordable costs for the final consumer.

A criterion such as the number and Installed Capacity of producers operating within Energy Communities reflects the outcome more accurately, because:

- Regions such as **Central Macedonia**, with a high value (green) for the indicator on installed capacity from Energy Communities and a reasonably good indicator for the share of installed RES capacity, end up showing **minor challenges** for SDG 7 overall in this Region.
- In addition, in the Region of Central Macedonia, the indicator on fossil fuel use (petroleum products and natural gas) faces **minor challenges**.
- By contrast, in Regions such as **Western Macedonia**, the score for both the first and second relevant indicators points to **Significant Challenges** (red), and therefore SDG 7 overall faces Significant Challenges there.
-

It is thus concluded that the mere existence of Energy Communities is not sufficient; it is also necessary to license corresponding RES units that will allow them to secure, outside the Wholesale Market (Energy Exchange and Target Model), the required quantities so that the energy transition in the area does not pass the costs on to vulnerable final users (who constitute the majority).

Climate Change and Changes in Average Temperature

As shown in the performance tables, in all Regions the indicator measuring the annual duration of very hot days (i.e. days with elevated cooling demand) faces **Significant Challenges**, whereas the corresponding indicator for very cold days shows Significant Challenges in only one Region, Western Macedonia.
Although these two indicators are not something that Regions themselves can directly improve, they are indicators of Climate Change (especially regarding thermal stress, which may intensify in the coming years), and they should inform where and when energy transition projects are most urgently needed.
Emissions

For **SDG 13**, the availability of performance indicators (KPIs) is limited across all Regions. However, meaningful conclusions can still be drawn from the indicator on total Greenhouse Gas Emissions (GHG Emissions) and from the indicator on ozone concentration.
According to the data, **eight (8)** Regions either face **minor challenges** or no challenges at all with respect to GHG emissions. The Region of **Attica** faces **Significant Challenges**, while **four (4)** more Regions face

Considerable Challenges.
It follows that the transition to a zero-emission economy (for housing, industry, agriculture, transport, etc.) must be a priority for several Regions, including Attica.

Sense of Security, Justice and Strong Institutions
The level of perceived insecurity among citizens in Greek Regions is high, except in two cases where there appear to be **minor challenges**. A serious issue emerging from the data is the number of injuries (due to acts of violence) per 100,000 inhabitants, which is high in most Regions.

The data also show that only one Region performs well in terms of total Penal Code violations, while almost **50%** of the Regions appear to face **Considerable** or **Significant Challenges**.

Poverty, Inequalities and Economic Development Indicators
The data show that per capita income is at low levels in almost all Regions (with the exception of one Region). Household income performs well in **four (4)** Regions, even though in all cases disposable household income faces **Significant Challenges** (due to factors such as the high cost of consumer goods).

On the other hand, labour productivity faces **considerable or significant challenges** in only **three (3)** Regions. Meanwhile, in only **one (1)** Region do citizens report a high level of confidence in their ability to find a job where they live.

Finally, high rates are recorded for the population at risk of poverty in **twelve (12)** out of **thirteen (13)** Regions, and the indicator for material deprivation in cities is high in **eleven (11)** Regions.

Innovation, Sustainable Cities, Responsible Consumption
The share of investment in Research and Development remains low in almost all Regions, with only one exception. At the same time, only in **one Region (Attica)** is the percentage of the labour force with tertiary education satisfactory, and in that same Region the share of employment in high-technology sectors is also at a good level.

Internet usage rates are generally satisfactory, with only two Regions falling behind. However, the percentage of people satisfied with the quality of their housing at a reasonable cost is low in all Regions.
The railway network is satisfactory only in the Region of Attica, and the ratios of cars and motorcycles per 1,000 inhabitants do not indicate progress towards Sustainable Mobility, either within or between cities.

There are no available data on the number of waste disposal facilities, nor on the processes of treatment, recovery, recycling and re-injection into the productive cycle, so that the evolution of the circular economy can be monitored. Finally, fossil fuel consumption is high, and almost **50%** of Regions face **Significant Challenges** in this area.

Agri-food Sector and Primary Production

All Regions face **Significant Challenges** regarding the share of agricultural land under organic cultivation. Cultivated areas as a percentage of each Region's total area show **considerable to significant challenges** in **four (4)** Regions.

Livestock density relative to total land area shows satisfactory performance in **six (6)** Regions, but faces **considerable or significant challenges** in the remaining **seven (7)**. Irrigated areas per hectare of cultivated land perform poorly in **six (6)** Regions. Finally, the share of land used for cereals (intended for food) relative to total area is satisfactory in only **five (5)** Regions.

Increasing the Number of Covered SDGs

In this study, detailed conclusions on **SDG 17** are not presented due to a lack of reliable data. Below are key thematic areas that would be useful to measure in the context of assessing SDG 17 at regional level:

- Existence of partnerships: between regional administrations, businesses, NGOs, as well as cross-border cooperation.
- Mobilisation of available resources: identifying and accessing local, national and international funding to financially support sustainable development initiatives.
- Transfer of technology and know-how: the functioning and organisation of technology and knowledge transfer to promote innovation and sustainable solutions.
- Staffing of structures in regional administrations and Communities, and training of their personnel so they can implement sustainability projects effectively.
- Data and information sharing, so that progress towards the goals can be monitored and decision-makers and policymakers can be adequately informed.

With a view to further improving similar reports and maximising the use of initiatives carried out at these levels, the extension of this Report aims to map the existence of long-term goals and strategies, in order to highlight the consistency and alignment of local and regional efforts with broader sustainable development objectives.

The evaluation of policy actions at regional level should focus not only on short-term performance but also on the capacity of these actions to contribute, over time, to the economic, social and environmental transformations required for achieving the SDGs. Local policies must be designed and assessed with long-term sustainability in mind, strengthening the ability of territories to address the challenges posed by these goals, while promoting cooperation and continuous development.

In this way, the monitoring and evaluation of strategies and policies allows the identification of good practices, the utilisation of successful examples, and the correction of shortcomings, with the aim of improving processes and strengthening efforts for sustainable development at local and regional level.

6. Comparison with 2022 SDG Report for Greek Regions

a. Context

2022 SDG Greek Regions Report and 2023 SDG Greek Regions Report describe two consecutive editions of the SDG Index and Dashboards for Greek regions. Both reports share the same overarching aim: to monitor regional progress towards the SDGs, identify policy priorities, and highlight data gaps at NUTS2 level. Both texts share the same backbone, however **2023 SDG Greek Regions Report is another benchmarking report but with a more mature and expanded edition,** deepening and broadening the analysis.

2022 SDG Greek Regions Report focuses on the **2022 SDG Index**. It reads like a first, relatively compact benchmark: it presents five key findings, a quick national overview, the regional ranking table, and a short "Conclusions and ways forward" section.

2023 SDG Greek Regions Report refers explicitly to the **2023 SDG Index** and clearly builds on the previous work. It starts with similar core findings but then expands considerably, adding a national perspective using the SDSN SDR 2023, giving a more detailed methodological description (data sources, indicator groups), and including a more extensive thematic analysis, with regards to: energy, climate change, emissions, security, poverty, innovation, agri-food sector.

b. Headline SDG Findings and Goal Achievement

Both texts present "five major findings", but the content of those findings changes between 2022 and 2023.

In **2022 SDG Greek Regions Report (2022)**:

- No region has met SDGs **1, 2, 4, 7, 8, 9, 10, 11 and 16**, and most regions face **significant challenges** for these.
- One region has met SDGs **3, 5, 6, 7 and 15**, while others face mainly medium to minor challenges.
- Two regions have met SDG **14**; others face medium to major challenges.
- Attica, Southern Aegean and Crete are highlighted as **lagging regions** that must try harder.
- There is a **total lack of data** at regional level for SDG **12 and 17**, which are therefore excluded.

In **2023 SDG Greek Regions Report (2023)**, the picture shifts:

- No region has met SDGs **1 to 13 and 16**, suggesting that even more goals are now clearly identified as unmet.
- Four regions have already met SDG **15**, instead of one; this indicates **improvement** in "Life on Land".
- Two regions have met SDG **14**, as in 2022 SDG Greek Regions Report, but the distribution of major and minor challenges is updated and described in more detail.
- Attica, Southern Aegean and Crete are **still flagged as problematic**, but the language now speaks of **"significant and major challenges"**, emphasising intensity.
- 2023 SDG Greek Regions Report introduces an additional nuance: it mentions that **one region meets SDG 17**, but then still recognizes **serious data gaps** and later repeats that SDG 17 is not fully analyzed due to lack of reliable data. This is a clear difference and a slight internal inconsistency compared with the stricter exclusion in 2022 SDG Greek Regions Report.

Overall, **2023 SDG Greek Regions Report shows some progress (more regions achieving SDG 15)**, but also a **sharper acknowledgment that most SDGs remain unmet** and that challenges are persistent and widespread.

c. National-Level Framing and External Benchmarks

Both texts provide a short national perspective, but **2023 SDG Greek Regions Report extends it much more**.

- **2022 SDG Greek Regions Report** focuses almost exclusively on **regional performance**. The national angle appears mainly through the statement that Thessaly leads and Attica is last, and through the reference that more than 60% of the population live in Attica, Southern Aegean and Crete, which are lagging.
- **2023 SDG Greek Regions Report** adds a **direct link to the SDSN SDR 2023** at national level. It states that Greece faces major challenges for **13 SDGs nationally** (2, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17), while doing somewhat better on SDG 6 and SDG 10. This situates the regional picture in a **wider national and international context**.

Thus, 2023 SDG Greek Regions Report connects the regional SDG index more strongly to **global reporting mechanisms and national performance**, whereas 2022 SDG Greek Regions Report stays more internal to the regional index.

c. Changes in Regional Ranking and Interpretation

A key difference lies in the **ranking of regions and how those rankings are interpreted**.

In **2023 SDG Greek Regions Report (2023)**:

- Thessaly still ranks first, now with 53.27 (a little bit higher score than in previous report), and is again presented as leading both **quantitatively and qualitatively**.
- The last region is now **Western Macedonia** (40.69), not Attica (as in previous Report).
- Attica moves up to **4th place** in the quantitative ranking (46.17), alongside improved scores for Central Macedonia and Eastern Macedonia & Thrace.
- However, 2023 SDG Greek Regions Report introduces an important new distinction between **quantitative ranking** (overall SDG scores) and **qualitative classification** (weighting of colour-coded zones: Red, Yellow/Orange, Green). In this qualitative ranking, Attica still performs poorly and lies among the last three regions.

This is a fundamental conceptual difference: **2022 SDG Greek Regions Report uses only one composite score**, while **2023 SDG Greek Regions Report adds a second layer of qualitative assessment**, showing that high overall scores can hide serious weaknesses in specific SDGs or indicators.

e. Treatment of Data Gaps and Methodology

Both texts underline data problems, especially for SDGs 12 and 17, but the way they handle methodology evolves significantly.

- In **2022 SDG Greek Regions Report**, methodological aspects are summarized briefly:
    - SDG 12 and 17 are excluded due to lack of data.
    - A simple description of the scoring is provided (normalized mean on a 1–100 scale).
- **2023 SDG Greek Regions Report** dedicates a substantial section to:

- **Data sources**: Eurostat, international organizations, private data providers, specialized sector reports.
- **Types of indicators**: economic, industrial, social, energy, health, educational indicators.
- **Quality criteria**: relevance to SDGs, coverage of regions, data quality and comparability.
- The role of **Earth observation** as a complementary tool, especially for SDGs 6, 11 and 15.
- The intention to establish **structured data collection systems** at regional level.

So, while 2022 SDG Greek Regions Report acknowledges a lack of data, **2023 SDG Greek Regions Report proposes a more detailed and operational methodology to address these gaps** and integrates data issues into the core narrative of the report.

f. Depth of Thematic Analysis

Another major difference is the **thematic depth**.

- **2022 SDG Greek Regions Report** focuses mainly on:
  - Lists of SDGs where regions have major, significant or minor challenges.
  - A simple national ranking.
  - A short list of priorities for future updates (trends, more SDGs, better data, communication to policymakers).
- **2023 SDG Greek Regions Report** goes much further, adding **multi-page thematic sections**:
  - **Energy (SDG 7):** RES capacity, energy communities, fossil fuel use, energy prices and vulnerability of electricity consumers.
  - **Climate change (SDG 13):** very hot vs very cold days, GHG emissions, ozone concentration, and implications for where to prioritize energy transition projects.
  - **Security and SDG 16:** perceived insecurity, injuries due to violence, penal violations.
  - **Poverty and inequalities (SDG 1 & 10):** low per capita income, disposable household income, risk of poverty and material deprivation in cities.
  - **Innovation and sustainable cities (SDG 9, 11, 12):** R&D investment, tertiary education, high-tech employment, internet use, housing affordability, transport indicators, lack of circular economy data.
  - **Agri-food and primary sector (SDG 2):** organic agriculture, cultivated land shares, livestock density, irrigation, cereals for food.

This means that **2023 SDG Greek Regions Report is not only reporting scores but also interpreting the structural causes and sectoral patterns behind them**, something that 2022 SDG Greek Regions Report does only in a very limited way.

g. Policy Implications and Forward-Looking Recommendations

Both texts contain forward-looking elements, but **the level of specificity differs**.

- **2022 SDG Greek Regions Report** proposes:

- Regular updates of the index and database.
- Integration of trends over time.
- Expansion to SDGs 12 and 17.
- Improved cooperation with partners and public authorities.
- Use of the index to guide **regional development policies, resource allocation and investment focus**.

- **2023 SDG Greek Regions Report** maintains these directions but adds:
  - A stronger emphasis on **zero-emission economy**, sustainable mobility, circular economy and agri-food transition.
  - A clear call to map **long-term strategies and trajectories**, linking regional actions to broader national and global SDG objectives.
  - A more explicit focus on **monitoring and evaluation**, good practices, and correction of weaknesses.
  - A specific conceptualization of SDG 17 at regional level (partnerships, funding, technology transfer, capacity building, data sharing).

In other words, 2022 SDG Greek Regions Report is mainly about improving the index itself, whereas 2023 SDG Greek Regions Report uses the index as a starting point for a more comprehensive regional development and transformation agenda.

h. Summary of Key Differences

To Sum up:

- **Structure**: 2022 SDG Greek Regions Report is concise and index-driven; 2023 SDG Greek Regions Report is longer, thematically structured, and more analytical.
- **SDG achievements**: In 2022 SDG Greek Regions Report fewer regions have achieved SDG 15; in 2023 SDG Greek Regions Report four regions do. Both agree that SDG 14 is met by two regions, but 2023 SDG Greek Regions Report details the challenge distribution more.
- **Rankings**: 2022 SDG Greek Regions Report places Attica last; 2023 SDG Greek Regions Report shows Attica climbing in quantitative ranking but still weak qualitatively, while Western Macedonia falls to the bottom.
- **Methodology and data**: 2022 SDG Greek Regions Report briefly notes data gaps; 2023 SDG Greek Regions Report elaborates on sources, methods, Earth observation and structured data collection.
- **Policy depth**: 2022 SDG Greek Regions Report suggests general “ways forward”; 2023 SDG Greek Regions Report offers a more detailed policy agenda across sectors (energy, climate, security, poverty, innovation, agriculture).

Taken together, 2022 SDG Greek Regions Report and 2023 SDG Greek Regions Report can be seen as two stages of the same project: 2022 SDG Greek Regions Report establishes the initial measurement and ranking

framework, while 2023 SDG Greek Regions Report refines the metrics, deepens the analysis, and moves closer to a full policy-support tool for regional SDG implementation in Greece**.**

Author Statement on the Use of AI Tools. The authors confirm that this manuscript was conceptualized, drafted, and revised by the authors. Generative AI tools were used only for minor text editing and grammar refinement, while all intel- lectual content, analysis, interpretations, and conclusions are the authors' own. The authors assume full responsibility for the accuracy and originality of the work.

References

Koundouri, P., Laspidou, C., Landis, C., Plataniotis, A. Kaptsikas, A., Kanellopoulou, T., Kasiolas, V., Zacharatos, T., (2022). The progress of the Greek Regions in relation to the Sustainable Development Goals (SDGs), Sustainable Development Solutions Network -SDSN Greece.

Lafortune, G., Cortés Puch, M., Mosnier, A., Fuller, G., Diaz, M., Riccaboni, A., Kloke-Lesch, A., Zachariadis, T., Carli, E. Oger, A., (2021): Europe Sustainable Development Report 2021: Transforming the European Union to achieve the Sustainable Development Goals. SDSN, SDSN Europe and IEEP. France: Paris.

Lafortune, G., Zoeteman, K., Fuller, G., Mulder, R., Dagevos, J. and Schmidt-Traub, G. (2019): The 2019 SDG Index and Dashboards Report for European Cities (prototype version). Sustainable Development Solutions Network (SDSN) and the Brabant Center for Sustainable Development (Telos).

Lafortune, Grayson Fuller, Adolf Kloke-Lesch, Phoebe Koundouri and Angelo Riccaboni (2024). European Elections, Europe's Future and the SDGs: Europe Sustainable Development Report 2023/24. Paris: SDSN and SDSN Europe and Dublin: Dublin University Press

Laspidou, C., Mellios, N., Spyropoulou, A., Kofinas, D. and Papadopoulou, M., 2020, Systems thinking on the resource nexus: Modeling and visualization tools to identify critical interlinkages for resilient and sustainable societies and institutions, Science of The Total Environment, 717, https://doi.org/10.1016/j.scitotenv.2020.137264.

Lynch, A., LoPresti, A., Fox, C. (2019): The 2019 US Cities Sustainable Development Report. New York: Sustainable Development Solutions Network (SDSN).

Lynch, A., Sachs, J. (2021): The United States Sustainable Development Report 2021. New York: SDSN.

Papadimitriou, E., Fragoso Neves, A. and Becker, W., JRC Statistical Audit of the Sustainable Development Goals Index and Dashboards, EUR 29776 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-08995-7 , doi:10.2760/723763

Sachs, J., Lafortune, G., Kroll, C., Fuller, G., Woelm, F. (2022). From Crisis to Sustainable Development: the SDGs as Roadmap to 2030 and beyond. Sustainable Development Report 2022. Cambridge: Cambridge University Press.

Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. (2018): SDG Index and Dashboards Report 2018. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

Sachs, J.D., Lafortune, G., Fuller, G. (2024). The SDGs and the UN Summit of the Future. Sustainable Development Report 2024. Paris: SDSN, Dublin: Dublin University Press

Annex I - Indicators description

Below is the list of indicators used for the calculation of regional SDG performance and for the construction of the dashboards. Data is available upon request to the authoring team.

SDG	SDG Index	Indicator code	Indicator	Reference Year	Source
1	1_1	sdg1_depriv	Severe material deprivation rate in cities (%)	2020,00	Eurostat
1	1_2	sdg1_povrisk	People at risk of poverty or social exclusion (%)	2020,00	Eurostat
1	1_3	sdg1_lwintensity	People (0-59 years) living in households with very low work intensity (%)	2023,00	Eurostat
1	1_4	sdg1_fert	Fertility rates	2022,00	Eurostat
2	2_1	sdg2_crop	Total cultivated agricultural and fallow land per Capita	2022,00	ELSTAT
2	2_2	sdg2_uaa	Area under organic farming (utilised agricultural area (%))	2020,00	Eurostat
2	2_3	sdg2_uaa2	Utilised agriculture area (by hectare) **given as percentage per Total Land Area (TLA)	2020,00	Eurostat
2	2_4	sdg2_cerealpr	Cereals for grain. total area of production (in stremmas. 1 stremma = 0.1 ha) **given as percentage per Total Land Area (TLA)	2022,00	ELSTAT
2	2_5	sdg2_animpop	Animal populations (thousand heads of live bovine animals) **given as percentage per Total Land Area (TLA)	2023,00	Eurostat
2	2_6	sdg2_irrig	Irrigated areas (total irrigated crops in stremma) **given per (ha) of utilised Agrriculture areas	2022,00	ELSTAT

3	3_1	sdg3_traffic	Traffic fatalities (Number) *	2022,00	Eurostat
3	3_2	sdg3_infmort	Infant mortality rate (under 1) per 1.000 births	2022,00	Eurostat
3	3_3	sdg3_doctors	General practitioners per (100.000 pop)	2022,00	Eurostat
3	3_4	sdg3_lifee	Life expectancy (years)	2022,00	Eurostat
3	3_5	sdg3_beds	Available beds in hospitals (per 100.000 inhabitants)	2022,00	Eurostat
3	3_6	sdg3_unmet	Self-reported unmet needs for medical examination by main reason declared and NUTS 2 regions (Too expensive or too far to travel or waiting list %)	2023,00	Eurostat
3	3_7	sdg3_canc	Death due to cancer rate	2021,00	Eurostat
3	3_8	sdg3_heartdis	Death due to ischaemic heart diseases rate	2021,00	Eurostat
3	3_9	sdg3_fert	Fertility rates	2022,00	Eurostat
4	4_1	sdg4_earlyleav	Early leavers from education (%. 18-24)	2023,00	Eurostat
4	4_2	sdg4_secondary	Adults with upper secondary education (% 25-64)	2023,00	Eurostat
4	4_3	sdg4_neet	NEET rate (% 15-24) (Not in Education. Employment. or Training)	2023,00	Eurostat

4	4_4	sdg4_earlyedu	Four year-olds in early childhood education (%)	2022,00	Eurostat
4	4_5	sdg4_adultedu	Adult participation in learning (%)	2023,00	Eurostat
4	4_6	sdg4_tertatt	Tertiary educational attainment. age group 25-64 (%)	2023,00	Eurostat
5	5_1	sdg5_tert	Students enrolled in tertiary education (% males)	2020,00	Eurostat
5	5_2	sdg5_empl	Employment rates of young people not in education and training (females/males ratio)	2021,00	Eurostat
5	5_3	sdg5_women	Share of Females to Regional Councils	2021,00	Self
5	5_4	sdg5_emplgap	Gender employment gap (measured in %)	2023,00	Eurostat
6	6_1	sdg6_bath	Ratio of bathroom inside the house / total residential houses (%)	2021,00	ELSTAT
6	6_2	sdg6_wc	Ratio toilet or WC with hydraulic installation inside the house / total residential houses (%)	2021,00	ELSTAT
6	6_3	sdg6_watusepc	Water use per capita	2019,00	Eurostat/ELSTAT
6	6_4	sdg6_watabspc	Water abstraction per capita	2019,00	Eurostat/ELSTAT
6	6_5	sdg6_irrig	Irrigated areas (total irrigated crops in stremma) **given per (ha) of utilised Agrriculture areas	2022,00	ELSTAT
7	7_1	sdg7_petrol	Petroleum consumption per capita	2022,00	ELSTAT

7	7_2	sdg7_ppcap	Ratio of Power Plant Capacity (MW) from sustainable sources	2023,00	Entso-e transparency platform
7	7_3	sdg7_cooling	Cooling degree days	2023,00	Eurostat
7	7_4	sdg7_heating	Heating degree days	2023,00	Eurostat
7	7_5	sdg7_encom	Energy Communities	2023,00	
7	7_6	sdg7_encommw	Energy Communities MW	2023,00	
8	8_1	sdg8_gdppc	GDP per capita	2022,00	Eurostat
8	8_2	sdg8_ltunemp	Long term unemployment Rate (%)	2023,00	Eurostat
8	8_3	sdg8_satemp	Perception of inhabitats on how easy is it to find a good job in the city they live today (% of satisfaction)	2022,00	RGC
8	8_4	sdg8_housinc	Income of households (in mln euros)	2021,00	Eurostat
8	8_5	sdg8_rllabprod	Real labour productivity (per person. index. 2015=100)	2022,00	Eurostat
8	8_6	sdg8_nomlabprod	Nominal labour productivity (per person. measured in euro annually)	2022,00	Eurostat
8	8_7	sdg8_eapop	Economically active population (thousand persons. 15-74 years)**per total population 15-74 yrs	2023,00	Eurostat
8	8_8	sdg8_workacc	Work Accidents	2022,00	ELSTAT

8	8_9	sdg8_neet	NEET rate (% 15-24) (Not in Education. Employment. or Training)	2023,00	Eurostat
8	8_10	sdg8_lwintensity	People (0-59 years) living in households with very low work intensity (%)	2022,00	Eurostat
9	9_1	sdg9_rd	R&D expenditure (%)	2021,00	Eurostat
9	9_2	sdg9_satcit	Perception of inhabitats on happinnes to live in this city today (% of satisfaction)	2022,00	RGC
9	9_3	sdg9_hrscitec	Human resources with tertiary education or in science and technology (% of population in the labour force)	2023,00	Eurostat
9	9_4	sdg9_rdpers	R&D personnel and researchers (% of population in labour force)	2021,00	
9	9_5	sdg9_htechemp	Employment in high-tech sectors by NUTS 2 regions (% of total employment)	2023,00	
9	9_6	sdg9_intus	Internet usage (% of population per region)	2022,00	
9	9_7	sdg9_ltusers	Experience of internet users (% of long-term users)	2019,00	
9	9_8	sdg9_marpass	Maritime transport of passengers (1000 passengers)	2022,00	Eurostat
9	9_9	sdg9_airpass	Air transport of passengers (1000 passengers)	2022,00	Eurostat
9	9_10	sdg9_marfreight	Maritime transport of freight (1000 tonnes)	2022,00	Eurostat
9	9_11	sdg9_airfreight	Air transport of freight (1000 tonnes)	2022,00	Eurostat

10	10_1	sdg10_dispinc	Disposable income of private households	2021,00	Eurostat
10	10_2	sdg10_riskpov	Persons at risk of poverty or social exclusion - EU 2020 strategy	2020,00	Eurostat
10	10_3	sdg10_incqsr	Income quintile share ratio S80/S20 (index)	2023,00	Eurostat
10	10_4	sdg10_gdppc	GDP per capita	2022,00	Eurostat
10	10_5	sdg10_migr	Population change - Demographic balance and crude rates at regional level (Net migration plus statistical adjustment)	2022,00	Eurostat
11	11_1	sdg11_sataccom	Perception of inhabitants on how easy is to find good housing in the city where they live at a reasonable price today (% of satisfaction)	2022,00	RGC
11	11_2	sdg11_satcit	Perception of inhabitants on happiness to live in this city today (% of satisfaction)	2022,00	RGC
11	11_3	sdg11_railnet	Rail network by NUTS 2 regions (total railway lines klm)** per Total Land Area (Km2)	2022,00	Eurostat
11	11_4	sdg11_nights	Nights spent at tourist accommodation establishments (total number)	2023,00	Eurostat
11	11_5	sdg11_bedpl	Number of bed-places (number)**per capita	2023,00	Eurostat
11	11_6	sdg11_marpass	Maritime transport of passengers (1000 passengers)	2022,00	Eurostat
11	11_7	sdg11_airpass	Air transport of passengers (1000 passengers)	2022,00	Eurostat

11	11_8	sdg11_allveh	Stock of all vehicles (except trailers and motorcycles) (number)**. passenger vehicles per 1000 inhabitants**	2022,00	Eurostat
11	11_9	sdg11_motcyc	Stock of motorcycles (number)**powered two wheelers per 1000 inhabitants**	2022,00	Eurostat
11	11_10	sdg11_traffic	Victims in road accidents (number killed)	2022,00	Eurostat
11	11_11	sdg11_depriv	Severe material deprivation rate in cities (%)	2020,00	Eurostat
12	12_1	sdg12_wastemgmt	Number of recovery and disposal facilities (waste management operations | recovery. recycling and backfilling)	2020,00	Eurostat
12	12_2	sdg12_petrol	Consumption of petroleum products per capita	2022,00	ELSTAT
12	12_3	sdg12_marfreight	Maritime transport of freight (1000 tonnes)	2022,00	Eurostat
12	12_4	sdg12_airfreight	Air transport of freight (1000 tonnes)	2022,00	Eurostat
12	12_5	sdg12_uaa	Utilised agriculture area (by hectare)	2020,00	Eurostat
12	12_6	sdg12_nights	Nights spent at tourist accommodation establishments (total number)	2023,00	Eurostat
12	12_7	sdg12_bedpl	Number of bed-places (number)**per capita	2023,00	Eurostat
13	13_1	sdg13_pm2_5	PM2.5 (ug/m3)	2022,00	EEA

13	13_2	sdg13_pm10	PM10 (ug/m3)	2022,00	EEA
13	13_3	sdg13_o3	O3 (ug/m3)	2022,00	EEA
13	13_4	sdg13_ghgem	Total greenhouse gas emissions per year	2022,00	EDGAR (European Commission)
13	13_5	sdg13_cooling	Cooling degree days	2023,00	Eurostat
13	13_6	sdg13_heating	Heating degree days	2023,00	Eurostat
14	14_1	sdg14_marine_n2k	Surface (ha) of marine sites designated under NATURA 2000 (1 hectares = .01 km2) per capita	2021,00	EEA
14	14_2	sdg14_bwq	Bathing sites with excellent water quality per 10.000 citizens	2023,00	EEA. SSW
15	15_1	sdg15_artsurf	Land covered by artificial surfaces	2018,00	Eurostat
15	15_2	sdg15_forest	Ratio of forestry to total land use	2018,00	Eurostat
15	15_3	sdg15_terrestial_n2k	Surface (ha) of terrestrial sites designated under NATURA 2000 (1 hectares = .01 km2) per capita	2020,00	EEA
15	15_4	sdg15_soilero	Severe estimated soil erosion by water. (Agricultural areas. forest and semi natural areas (excluding beaches. dunes. sand plains. bare rock and glaciers and perpetual snow)%)	2016,00	Eurostat
16	16_1	sdg16_totoff	Total Penal Code Offenses per 100.000 inhabitants	2023,00	ELSTAT

16	16_2	sdg16_lifecrim	Crimes against life per 100.000 inhabitants	2023,00	ELSTAT
16	16_3	sdg16_inj	Injuries per 100.000 inhabitants	2023,00	ELSTAT
16	16_4	sdg16_sexual	Crimes against sexual freedom per 100.000 inhabitants	2023,00	ELSTAT
16	16_5	sdg16_propcrim	Property crimes per 100.000 inhabitants	2023,00	ELSTAT
16	16_6	sdg16_viol	Violations of Special Criminal Laws per 100.000 inhabitants	2023,00	ELSTAT
16	16_7	sdg16_satsaf	Perception of inhabitants regarding safety on walking alone at night in the city they live today (% of satisfaction)	2022,00	RGC
17	17_1	sdg17_intus	Internet usage (% of population per region)	2022,00	
17	17_2	sdg17_ltusers	Experience of internet users (% of long-term users)	2019,00	
SDG	SDG Index	Indicator code	Indicator	Reference Year	Source

Annex II – Methodology Index & Dashboards

The Report measures the progress of Greek Regions towards the United Nations Sustainable Development Goals. Using publicly available, recent data from reputable sources, the index presents an overview of progress towards the SDGs. It builds upon the "SDG Index and Dashboards Report for European Cities" (Lafortune et al., 2019) and the "Europe Sustainable Development Report 2021: Transforming the European Union to achieve the Sustainable Development Goals" (Lafortune et al., 2021) reports, developed by SDSN in 2019 and 2021 respectively. The scores represent progress towards these goals which are meant to be achieved by 2030. The methodology below builds on the methodology established by SDSN for the SDG Index and Dashboards Report (Sachs et al, 2018).

The methodology for the index and the Dashboards can be divided into four primary steps. The first is to censor extreme values in the distribution of the indicators, by setting lower and upper bounds accordingly. The second is to rescale the data so that performance is comparable across indicators. The third is to define

the limits for the color-scale (Red, Orange, Yellow, Green). Finally, the fourth is to aggregate indicator scores into goal scores and an overall SDG Index Score.

A2.1 Indicators

Table A1.1 describes the key performance indicators by SDG, its source and start and end dates of the raw time series. Data are collected at an annual basis, at NUTS2 level from 2012 to 2023. No imputed data is used in our analysis. The latest available year is used as a reference year for Dashboards (2023 for most of the indicators). Table A2.1 reports the NUTS2 level classification as well as the share of missing data over all key performance indicators upon the reference year. Additional information, including raw data, is available online.

Table A2.1 *Missing Values per NUTS2 level classification*

Region	Missing Values
Thessaly (EL61)	1,89%
Ionian Islands (EL62)	8,49%
Eastern Macedonia and Thrace (EL51)	2,83%
Western Macedonia (EL53)	9,43%
Epirus (EL54)	2,83%
Peloponnese (EL65)	3.77%
Northern Aegean (EL41)	8,49%
Central Greece (EL64)	3,77%
Western Greece (EL63)	0,94%
Central Macedonia (EL52)	0,00%
Crete (EL43)	0,94%
Southern Aegean (EL42)	4,72%
Attica (EL30)	1,89%

A2.2 Setting the Bounds

Raw indicators are adjusted to control for direction (More is Better or Less is Better). So, in this section the "upper bound" is used to refer to the target value, even if the raw indicator data is descending and the most progress is represented by a smaller number.

The lower bound (LB) for the data was derived from the 2.5th percentile, used to censor extreme values on the lower end of the cross-sectional distribution.

The upper bound (UB), e.g., the optimum or target, for normalization was determined using a four-step decision tree:

1. Use official SDG targets. These concern principles of zero poverty, universal secondary completion, universal access to water and sanitation, full gender equality, for example. Official SDG Targets are defined based on the ESDR 2021 (Lafortune et al., 2021).
2. Apply "Leave no one behind" principle to measures associated with extreme poverty (e.g., wasting), public service coverage, access to basic infrastructures.
3. Use science-based targets where they exist, e.g., 100% Sustainable management of fisheries.
4. For all other indicators, we use the average of the top performers. In cases where the top performers were used to generate the upper bound, we took the top 5 regions of all those included in the dataset, minus clear outliers. These targets are ambitious and focus attention on where regions are lagging behind. As such, the top 5 regions in the sample represent optimal performance possible for Greek municipalities. In some cases, the top EU, OECD or Global Performers were used.
Table A2.2 reports all the indicators we used, its direction (More is Better or Less is Better), the Target (Upper Bounds) as well as the principle used for the definition of the Optimum (Target or Upper Bound). Once the Upper and Lower Bounds are established, data were censored to [LB, UB] for all indicators.

Table A2.2 *Indicators – Upper Bounds*

	KPIs	Optimum	More is Better (=1)	Rule for Optimum	Rule Source
1	1_1	0,00	0,00	SDG Target	ESDR 2021
1	1_2	0,00	0,00	SDG Target	ESDR 2021
1	1_3	0,00	0,00	desired target	Author
1	1_4	2,10	1,00	Best of top performers (European regions)	Eurostat Regional Yearbook 2024
2	2_1	10,00	1,00	Average of top performers (inter-National)	Our world in data
2	2_2	17,00	1,00	Average of top performers	Eurostat Regional Yearbook 2024

				(Mediterranean Europe regions)	
2	2_3	0,25	1,00	Average of top performers (inter-National)	Our world in data
2	2_4	0,07	1,00	Average of top performers (National)	own data
2	2_5	0,82	1,00	Average of top performers (inter-National)	Eurostat files
2	2_6	0,59	1,00	Average of top performers (National)	own data
3	3_1	0,00	0,00	SDG Target	ESDR 2021
3	3_2	0,00	0,00	SDG Target	ESDR 2021
3	3_3	697,88	1,00	Average of top performers (National)	Own data
3	3_4	83,00	1,00	Average of top performers (Global)	ESDR 2024
3	3_5	620,00	1,00	Average of top performers (inter-National)	EU Commission Healthcare Statistics and OECD
3	3_6	2,00	0,00	Average of top performers (inter-National)	EU Commission Healthcare Statistics and OECD
3	3_7	0,00	0,00	human-oriented target	Eurostat Regional Yearbook 2024
3	3_8	0,00	0,00	human-oriented target	own data
3	3_9	2,30	1,00	Average of top performers (inter-National)	UN and Eurostat Regional Yearbook
4	4_1	4,00	0,00	Average of top performers (EU)	ESDR 2021
4	4_2	100,00	1,00	SDG Target	SDR 2021
4	4_3	8,00	0,00	Average of top performers (OECD)	ESDR 2021
4	4_4	100,00	1,00	Leave no one behind	ESDR 2021
4	4_5	28,00	1,00	Leave no one behind	ESDR 2021
4	4_6	45,00	1,00	Average of top	Eurostat files

				performers (inter-National)	
5	5_1	0,50	1,00	Leave no one behind	ESDR 2021
5	5_2	1,00	1,00	Leave no one behind	ESDR 2021
5	5_3	50,00	1,00	SDG Target	ESDR 2022
5	5_4	10,00	0,00	Average of top performers (inter-National)	Eurostat files
6	6_1	1,00	1,00	Leave no one behind	ESDR 2021
6	6_2	1,00	1,00	Leave no one behind	ESDR 2021
6	6_3	0,00	1,00	Average of top performers (National)	Own data
6	6_4	0,00	1,00	Average of top performers (National)	Own data
6	6_5	0,59	1,00	Average of top performers (National)	own data
7	7_1	0,51	0,00	Average of top performers (National)	Own data
7	7_2	1,00	1,00	Science-based/technical optimum	ESDR 2021
7	7_3	1.096,00	0,00	Average of top performers (National)	own data
7	7_4	1.590,00	0,00	Average of top performers (National)	own data
7	7_5	490,00	1,00	Average of top performers (National)	own data
7	7_6	385,00	1,00	Average of top performers (National)	own data
8	8_1	33.000,00	1,00	average of top performers	European Map of GDPs
8	8_2	3,00	0,00	Average of top performers	ESDR 2021
8	8_3	1,00	1,00	Leave no one behind	ESDR 2021
8	8_4	6.254,56	1,00	Average of top performers (National) outliers excluded	Own data
8	8_5	110,00	1,00	Average of top performers (inter-	Eurostat files

				National)	
8	8_6	55.000,00	1,00	Average of top performers (inter-National)	Eurostat files
8	8_7	0,75	1,00	Average of top performers (inter-National)	Eurostat files
8	8_8	0,00	0,00	Human oriented target	own data
8	8_9	5,00	0,00	Average of top performers (inter-National)	Eurostat files
8	8_10	30,00	0,00	Average of top performers (inter-National)	Eurostat files
9	9_1	3,30	1,00	Average of top performers (EU)	ESDR 2021
9	9_2	1,00	1,00	Leave no one behind	ESDR 2021
9	9_3	65,00	1,00	Average of top performers (inter-National)	Eurostat files
9	9_4	2,25	1,00	Average of top performers (inter-National)	Eurostat files
9	9_5	10,00	1,00	Average of top performers (inter-National)	Eurostat files
9	9_6	100,00	1,00	tech-oriented target	own data
9	9_7	60,00	1,00	Average of top performers (inter-National)	Eurostat files
9	9_8	3.150,00	1,00	Average of top performers (National)	own data
9	9_9	25.000,00	1,00	Average of top performers (National)	own data
9	9_10	80.000,00	1,00	Average of top performers (National)	own data
9	9_11	100,00	1,00	Average of top performers (National)	own data
10	10_1	30.000,00	1,00	Mean	ESDR 2021

10	10_2	0,00	0,00	SDG Target	ESDR 2021
10	10_3	3,40	0,00	average of top performers	Eurostat files
10	10_4	33.000,00	1,00	average of top performers	European Map of GDPs
10	10_5	4.000,00	1,00	Average of top performers (inter-National)	UN statistics
11	11_1	1,00	1,00	Leave no one behind	ESDR 2021
11	11_2	1,00	1,00	Human oriented target	own data
11	11_3	0,0055	1,00	Average of top performers (National)	own data
11	11_4	2.500.000,00	1,00	Average of top performers (National)	own data
11	11_5	0,10	1,00	Average of top performers (National)	own data
11	11_6	3.100,00	1,00	Average of top performers (National)	own data
11	11_7	6.000,00	1,00	Average of top performers (National)	own data
11	11_8	265,00	0,00	International Sustainability Targets-Top of international performers	Eurostat files
11	11_9	15,00	0,00	International Sustainability Targets-Top of international performers	Eurostat files
11	11_10	0,00	0,00	Human oriented target	own data
11	11_1	7,00	0,00	International Sustainability Targets-Top of international performers	Eurostat files
12	12_1	NA	1,00		
12	12_2	0,53	0,00	Average of top performers (National)	own data
12	12_3	7.000,00	1,00	Average of top performers (National)	own data

12	12_4	60,00	1,00	Average of top performers (National)	own data
12	12_5	0,25	1,00		
12	12_6	2.500.000,00	1,00	Average of top performers (inter-National)	Our world in data
12	12_7	0,10	1,00	Average of top performers (inter-National)	Our world in data
13	13_1	0,00	0,00	SDG Target	ESDR 2021
13	13_2	0,00	0,00	SDG Target	ESDR 2021
13	13_3	0,00	0,00	SDG Target	ESDR 2021
13	13_4	0,00	0,00	SDG Target	EU Commission Targets
13	13_5	1.096,00	0,00	Average of top performers (National)	own data
13	13_6	1.590,00	0,00	Average of top performers (National)	own data
14	14_1	1,24	1,00	Science-based/Technical optimum	ESDR 2021
14	14_2	6,93	1,00	Average of top performers (National)	ESDR 2021
15	15_1	2,17	0,00	Average of top performers (National)	Own data
15	15_2	0,39	1,00	Average of top performers (National)	Own data
15	15_3	0,93	1,00	Average of top performers (National)	Own data
15	15_4	1,00	0,00		
16	16_1	0,00	0,00	Science-based/Technical optimum	ESDR 2021
16	16_2	0,00	0,00	Science-based/Technical optimum	ESDR 2021
16	16_3	0,00	0,00	Science-based/Technical optimum	ESDR 2021
16	16_4	0,00	0,00	Science-based/Technical optimum	ESDR 2021
16	16_5	0,00	0,00	Science-based/Technical optimum	ESDR 2021
16	16_6	0,00	0,00	Science-based/Technical optimum	ESDR 2021
16	16_7	1,00	1,00	Leave no one behind	ESDR 2021

A2.3 Rescale Indicators - Normalization

Once the upper and lower bounds for normalization have been established, the indicators were transformed on a linear scale to [0,100] using a classic min-max transformation:

$$x' = 100 \frac{(x-LB)}{(UB-LB)}$$

Where 100 represents optimal performance. In this way, the normalized data can be interpreted as distance to the optimum. A score of 50 denotes the half-way point between the worst performance to the best.

A2.4 Dashboard Ratings

The methodology for building the dashboards consists of establishing quantitative thresholds to classify regions' performance on indicators into a traffic light table. The indicator-level dashboard ratings are then aggregated into an overall dashboard rating by goal. To assess a region's progress on an indicator, we use four bands (red, orange, yellow and green). These bands are based on the green thresholds, which denote SDG achievement, and the red thresholds, which denote major challenges to SDG achievement. Orange indicates significant challenges, while yellow minor challenges. For each indicator, the Yellow/Orange Limit (YOL) is defined as the average between the lower and the upper bounds (e.g., 50 in the normalized scale [0,100]). The green and red thresholds were determined as YOL ± one standard deviation of the cross-sectional distribution. Table A2.3 presents the dashboard ratings for all the indicators used in the analysis.

Table A2.3 *Dashboard Ratings – Indicators*

SDG Ind	Macedoni	Attica (EL3	Northern A	Western G	Western M	Epirus (EL5	Thessaly (E	Ionian Islar	Central Mac	Crete (EL4	Southern A	Peloponnese	Central Gree
1_1	1,00	2,00	1,00	1,00	1,00	1,00	3,00	3,00	1,00	1,00	1,00	1,00	2,00
1_2	1,00	2,00	1,00	1,00	1,00	1,00	1,00	3,00	1,00	1,00	1,00	1,00	1,00
1_3	1,00	2,00	2,00	1,00	1,00	3,00	2,00	3,00	1,00	3,00	4,00	2,00	2,00
1_4	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	2,00	2,00	1,00	1,00
2_1	3,00	1,00	2,00	2,00	3,00	1,00	3,00	1,00	2,00	2,00	1,00	2,00	2,00
2_2	1,00	1,00	1,00	1,00	2,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
2_3	3,00	1,00	4,00	3,00	3,00	1,00	4,00	4,00	4,00	4,00	2,00	2,00	3,00
2_4	4,00	1,00	2,00	2,00	2,00	1,00	4,00	1,00	4,00	4,00	1,00	1,00	3,00
2_5	3,00	3,00	1,00	3,00	2,00	4,00	4,00	2,00	4,00	1,00	2,00	1,00	2,00
2_6	4,00	2,00	1,00	3,00	2,00	3,00	4,00	1,00	4,00	2,00	1,00	3,00	3,00

3_1	3,00	1,00	4,00	3,00	4,00	4,00	3,00	4,00	2,00	3,00	3,00	3,00	3,00
3_2	1,00	3,00	2,00	3,00	3,00	3,00	3,00	1,00	2,00	3,00	3,00	2,00	2,00
3_3	3,00	4,00	2,00	2,00	1,00	4,00	3,00	3,00	4,00	3,00	2,00	2,00	1,00
3_4	1,00	2,00	3,00	1,00	4,00	4,00	2,00	1,00	1,00	3,00	3,00	2,00	2,00
3_5	3,00	3,00	2,00	1,00	3,00	3,00	4,00	2,00	3,00	2,00	1,00	1,00	1,00
3_6	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
3_7	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
3_8	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	2,00	1,00	1,00	1,00
3_9	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	2,00	1,00	1,00
4_1	2,00	4,00	NA	3,00	NA	NA	NA	NA	4,00	3,00	3,00	3,00	1,00
4_2	1,00	4,00	1,00	1,00	2,00	2,00	2,00	1,00	2,00	1,00	1,00	1,00	1,00
4_3	2,00	3,00	2,00	4,00	1,00	1,00	2,00	2,00	3,00	4,00	3,00	2,00	2,00
4_4	2,00	2,00	1,00	2,00	3,00	2,00	2,00	4,00	3,00	4,00	4,00	4,00	1,00
4_5	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
4_6	1,00	4,00	2,00	2,00	2,00	3,00	3,00	1,00	3,00	2,00	1,00	2,00	1,00
5_1	4,00	4,00	4,00	4,00	4,00	3,00	4,00	3,00	4,00	4,00	1,00	4,00	4,00
5_2	4,00	4,00	NA	4,00	NA	NA	4,00	NA	2,00	1,00	2,00	2,00	3,00
5_3	1,00	1,00	1,00	2,00	2,00	1,00	1,00	1,00	2,00	1,00	2,00	1,00	2,00
5_4	1,00	4,00	3,00	1,00	2,00	3,00	2,00	2,00	1,00	3,00	1,00	2,00	1,00
6_1	2,00	4,00	1,00	2,00	2,00	2,00	2,00	2,00	3,00	1,00	1,00	1,00	1,00
6_2	1,00	4,00	2,00	2,00	3,00	2,00	2,00	3,00	3,00	1,00	2,00	2,00	2,00
6_3	4,00	1,00	1,00	2,00	4,00	2,00	3,00	NA	2,00	2,00	1,00	3,00	3,00
6_4	4,00	1,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	1,00	4,00	4,00
6_5	4,00	2,00	1,00	3,00	2,00	3,00	4,00	1,00	4,00	2,00	1,00	3,00	3,00
7_1	3,00	4,00	4,00	3,00	2,00	1,00	3,00	2,00	3,00	3,00	1,00	2,00	1,00
7_2	3,00	2,00	4,00	4,00	1,00	4,00	4,00	2,00	3,00	4,00	4,00	1,00	1,00
7_3	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
7_4	4,00	4,00	4,00	4,00	1,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
7_5	1,00	2,00	1,00	2,00	3,00	1,00	2,00	1,00	3,00	1,00	1,00	1,00	1,00
7_6	2,00	1,00	1,00	1,00	1,00	1,00	3,00	1,00	4,00	1,00	1,00	1,00	2,00

8_1	1,00	4,00	1,00	1,00	1,00	1,00	2,00	1,00	1,00	2,00	1,00	1,00	2,00
8_2	2,00	3,00	3,00	3,00	1,00	2,00	3,00	3,00	2,00	4,00	4,00	3,00	NA
8_3	1,00	1,00	2,00	1,00	1,00	1,00	1,00	2,00	1,00	2,00	4,00	1,00	1,00
8_4	3,00	4,00	1,00	3,00	2,00	2,00	4,00	1,00	4,00	4,00	3,00	3,00	3,00
8_5	4,00	3,00	3,00	3,00	1,00	3,00	4,00	2,00	3,00	3,00	2,00	3,00	4,00
8_6	1,00	4,00	1,00	1,00	3,00	1,00	1,00	1,00	1,00	1,00	2,00	2,00	3,00
8_7	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
8_8	4,00	1,00	4,00	3,00	4,00	4,00	4,00	4,00	2,00	3,00	4,00	4,00	3,00
8_9	2,00	3,00	1,00	3,00	1,00	1,00	1,00	2,00	3,00	3,00	3,00	1,00	2,00
8_10	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
9_1	1,00	2,00	1,00	2,00	1,00	2,00	1,00	1,00	2,00	3,00	1,00	1,00	1,00
9_2	3,00	2,00	4,00	2,00	1,00	3,00	3,00	4,00	3,00	3,00	4,00	3,00	2,00
9_3	1,00	4,00	1,00	1,00	1,00	2,00	2,00	1,00	2,00	1,00	1,00	1,00	1,00
9_4	2,00	4,00	2,00	2,00	1,00	3,00	2,00	1,00	3,00	3,00	1,00	1,00	1,00
9_5	1,00	3,00	NA	1,00	1,00	1,00	1,00	NA	1,00	1,00	NA	1,00	1,00
9_6	3,00	4,00	4,00	3,00	4,00	3,00	2,00	4,00	2,00	4,00	1,00	3,00	3,00
9_7	3,00	4,00	1,00	2,00	3,00	2,00	3,00	1,00	3,00	3,00	4,00	3,00	3,00
9_8	3,00	4,00	2,00	4,00	NA	3,00	2,00	4,00	1,00	3,00	4,00	1,00	2,00
9_9	1,00	4,00	1,00	1,00	1,00	1,00	1,00	2,00	2,00	2,00	3,00	1,00	1,00
9_10	1,00	4,00	NA	1,00	NA	1,00	1,00	1,00	1,00	1,00	1,00	2,00	1,00
9_11	1,00	4,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
10_1	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
10_2	1,00	2,00	1,00	1,00	1,00	1,00	1,00	3,00	1,00	1,00	1,00	1,00	1,00

10_3	1,00	1,00	1,00	3,00	3,00	3,00	3,00	2,00	1,00	4,00	2,00	1,00	3,00
10_4	1,00	4,00	1,00	2,00	1,00	1,00	2,00	1,00	4,00	2,00	1,00	2,00	2,00
10_5	4,00	3,00	2,00	2,00	1,00	3,00	2,00	1,00	4,00	2,00	1,00	2,00	2,00
11_1	1,00	1,00	2,00	1,00	2,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
11_2	3,00	2,00	4,00	2,00	1,00	3,00	3,00	4,00	3,00	3,00	4,00	3,00	2,00
11_3	3,00	4,00	1,00	2,00	1,00	1,00	2,00	1,00	3,00	1,00	1,00	3,00	2,00
11_4	4,00	4,00	4,00	4,00	1,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
11_5	3,00	1,00	4,00	2,00	1,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00	3,00
11_6	3,00	4,00	2,00	4,00	NA	3,00	2,00	4,00	1,00	3,00	4,00	1,00	2,00
11_7	2,00	4,00	2,00	2,00	1,00	1,00	2,00	4,00	4,00	4,00	4,00	2,00	1,00
11_8	3,00	1,00	4,00	4,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	4,00	4,00
11_9	3,00	2,00	1,00	2,00	4,00	3,00	3,00	1,00	3,00	1,00	1,00	3,00	3,00
11_10	3,00	1,00	4,00	3,00	4,00	4,00	3,00	4,00	2,00	3,00	3,00	3,00	3,00
11_11	2,00	3,00	2,00	1,00	2,00	2,00	4,00	4,00	2,00	2,00	1,00	1,00	3,00
12_1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12_2	3,00	4,00	4,00	3,00	2,00	1,00	3,00	2,00	3,00	3,00	2,00	2,00	1,00
12_3	2,00	4,00	NA	4,00	NA	3,00	4,00	1,00	4,00	3,00	2,00	4,00	4,00
12_4	NA	4,00	1,00	NA	NA	NA	NA	NA	2,00	1,00	1,00	NA	NA
12_5	3,00	1,00	4,00	3,00	3,00	1,00	4,00	4,00	4,00	4,00	2,00	2,00	3,00
12_6	4,00	4,00	4,00	4,00	1,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
12_7	3,00	1,00	4,00	2,00	1,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00	3,00
13_1	NA	4,00	NA	4,00	4,00	4,00	4,00	NA	4,00	1,00	NA	NA	NA
13_2	NA	2,00	NA	1,00	3,00	1,00	1,00	NA	2,00	1,00	NA	NA	3,00
13_3	4,00	2,00	NA	2,00	NA	1,00	3,00	NA	3,00	NA	NA	NA	3,00
13_4	3,00	1,00	4,00	3,00	2,00	4,00	3,00	4,00	2,00	3,00	4,00	2,00	2,00
13_5	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
13_6	4,00	4,00	4,00	4,00	1,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
14_1	2,00	1,00	3,00	1,00	NA	1,00	2,00	4,00	1,00	2,00	4,00	3,00	2,00
14_2	1,00	1,00	4,00	2,00	1,00	2,00	2,00	4,00	1,00	2,00	4,00	2,00	2,00
15_1	4,00	1,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00
15_2	4,00	2,00	2,00	3,00	4,00	4,00	3,00	2,00	3,00	1,00	1,00	2,00	4,00
15_3	3,00	1,00	4,00	2,00	3,00	4,00	4,00	1,00	2,00	3,00	4,00	3,00	3,00
15_4	4,00	4,00	4,00	2,00	4,00	2,00	4,00	1,00	4,00	2,00	4,00	3,00	3,00

16_1	3,00	1,00	3,00	2,00	4,00	3,00	3,00	2,00	1,00	3,00	1,00	3,00	2,00
16_2	4,00	2,00	4,00	3,00	4,00	3,00	3,00	1,00	3,00	1,00	1,00	3,00	3,00
16_3	3,00	1,00	1,00	1,00	3,00	3,00	3,00	1,00	2,00	2,00	1,00	2,00	2,00
16_4	4,00	3,00	3,00	4,00	4,00	4,00	4,00	3,00	3,00	3,00	1,00	4,00	4,00
16_5	4,00	1,00	4,00	3,00	4,00	4,00	4,00	3,00	1,00	3,00	3,00	3,00	3,00
16_6	3,00	3,00	3,00	2,00	4,00	2,00	3,00	1,00	2,00	1,00	2,00	1,00	2,00
16_7	2,00	1,00	1,00	2,00	2,00	2,00	3,00	2,00	1,00	1,00	3,00	1,00	1,00
17_1	3,00	4,00	4,00	3,00	4,00	3,00	2,00	4,00	2,00	4,00	1,00	3,00	3,00
17_2	3,00	4,00	1,00	2,00	3,00	2,00	3,00	1,00	3,00	3,00	4,00	3,00	3,00

A2.5 Aggregate Scores and Thresholds

Once normalized indicator scores have been calculated (section A2.3), we aggregate the indicator scores into goal scores (SDG scores) using a simple average. We similarly aggregate the goal scores into the index score using a simple average. We did not impute scores for regions on specific indicators.

The framework of the SDGs does not assign greater importance to any goals or targets over others. Consequently, for aggregating the goal scores we assigned equal weighting to all goals and similarly to all indicators underneath a goal. Implicitly this means that the weighting of indicators in the overall index score is disproportional to the number of indicators within a goal. Finally, a total SDG Performance score is calculated for each region by aggregating the individual SDG Scores.

Table A2.4 presents the calculations for the individual SDG scores, as well as the SDG Performance Score for all Greek regions.

Table A2.4 *SDG Scores*

SDG	Eastern Macedonia and Thrace (EL51)	Attica (EL30)	Northern Aegean (EL41)	Western Greece (EL63)	Western Macedonia (EL53)	Epirus (EL54)	Thessaly (EL61)	Ionian Islands (EL62)	Central Macedonia (EL52)	Crete (EL43)	Southern Aegean (EL42)	Peloponnese (EL65)	Central Greece (EL64)
1.00	19.93	38.73	23.03	0.00	24.03	33.40	43.07	50.88	25.19	34.01	21.94	15.11	37.88
1	20,26	32,47	25,65	13,24	8,58	31,08	32,83	49,49	20,61	41,23	39,73	24,42	29,88
2	62,69	18,77	30,50	55,31	43,86	39,45	67,42	27,57	62,84	42,54	17,53	22,09	43,49
3	24,62	33,39	36,45	32,08	39,01	55,69	48,53	31,56	32,25	50,11	36,57	26,28	22,69
4	25,88	65,00	22,61	43,66	37,08	30,04	31,33	34,11	56,88	55,00	40,27	42,01	11,73
5	57,63	67,28	62,13	60,10	61,74	48,98	67,06	48,24	44,49	45,16	25,26	49,25	51,14
6	65,58	39,18	34,25	55,14	66,52	56,51	73,22	48,41	66,75	37,61	13,93	58,38	58,83
7	44,30	38,16	34,72	51,30	22,19	37,09	58,62	30,81	59,51	29,73	21,39	27,15	28,42
8	36,59	50,24	28,54	40,06	18,82	21,85	37,42	29,09	33,29	47,83	44,15	39,82	46,97
9	28,27	72,76	32,76	32,58	22,95	33,90	24,85	30,78	28,17	38,94	34,60	22,78	19,87
10	24,51	48,84	15,16	24,37	18,97	35,39	36,14	23,52	42,82	35,79	16,45	17,67	33,43
11	55,34	48,40	54,21	46,91	34,09	55,83	53,22	63,53	56,83	57,09	60,66	57,12	55,16
12	63,61	70,95	80,41	74,90	43,14	60,07	81,23	59,46	76,73	61,21	53,78	60,67	66,43
13	59,97	47,19	64,53	54,28	39,49	48,16	58,62	64,35	56,40	36,98	60,07	43,79	56,67

14	17,24	2,06	78,97	9,43	0,00	10,28	24,80	100,00	4,43	35,01	100,00	52,02	26,19
15	89,97	32,44	77,34	61,69	86,86	74,62	85,04	28,31	76,17	46,66	63,63	67,87	80,41
16	67,07	24,91	53,38	44,74	73,18	62,72	71,34	30,86	37,46	37,81	25,89	49,78	47,81
17	65,42	92,89	50,76	57,10	75,32	59,94	53,88	41,94	44,99	70,08	49,20	68,86	64,02
SDG Index	47,58	46,17	46,02	44,52	40,69	44,80	53,27	43,65	47,10	45,22	41,36	42,94	43,71

Once the dashboard rating for an indicator is established (section A2.4), the indicator ratings are aggregated across goals to generate an overall SDG dashboard color. Averaging across all indicators within a goal might hide specific policy challenges if a region performs well on most of the metrics included but has major issues on one or two measures. Therefore, the SDG dashboard for the Greek regions aggregate indicator ratings by taking the two worst performing indicators under a goal. We used the average of the two worst rescaled metrics in order to derive the overall goal rating. This strict methodology is meant to focus attention on those areas lagging behind and underline that good performance on some indicators cannot compensate bad performance on others. We added the additional rule that all indicators had to be green under a goal in order for the goal's overall rating to be green. In the same vein, an overall red rating was applied to an SDG only when the two worst indicators were both red. Table A2.5 presents the aggregated ratings for all the SDG goals.

Table A2.5 SDG *Dashboard Ratings*

	Eastern Macedonia and Thrace (EL51)	Attica (EL30)	Northern Aegean (EL41)	Western Greece (EL63)	Western Macedonia (EL53)	Epirus (EL54)	Thessaly (EL61)	Ionian Islands (EL62)	Central Macedonia (EL52)	Crete (EL43)	Southern Aegean (EL42)	Peloponnese (EL65)	Central Greece (EL64)
SDG1	1	1	1	1	1	1	1	2	1	2	2	1	1
SDG2	3	1	2	3	2	2	3	2	3	2	1	2	2
SDG3	1	2	2	2	2	3	2	2	2	3	2	1	1
SDG4	2	3	1	2	2	2	2	2	3	3	2	2	1
SDG5	3	3	3	3	3	2	3	2	2	2	2	2	3
SDG6	3	2	2	3	3	3	3	2	3	2	1	3	3
SDG7	2	2	2	3	1	2	3	2	3	2	1	2	2
SDG8	2	3	2	2	1	1	2	2	2	2	2	2	2
SDG9	2	3	2	2	1	2	1	2	2	2	2	1	1
SDG10	1	2	1	1	1	2	2	1	2	2	1	1	2
SDG11	3	2	3	2	2	3	3	3	3	3	3	3	3
SDG12	3	3	3	3	2	3	3	3	3	3	3	3	3
SDG13	3	2	3	3	2	2	3	3	3	2	3	2	3
SDG14	2	1	3	1	1	1	2	4	1	2	4	3	2
SDG15	4	2	3	3	4	3	4	2	3	2	3	3	4
SDG16	3	1	3	2	3	3	3	2	2	2	2	2	2
SDG17	3	4	3	3	3	3	3	2	2	3	2	3	3
M.O.	**2,41**	**2,18**	**2,29**	**2,29**	**2,00**	**2,24**	**2,53**	**2,24**	**2,35**	**2,29**	**2,12**	**2,12**	**2,24**