SDSN GREECE

ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ
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The progress of the Greek Regions in relation to the Sustainable Development Goals (SDGs)

September 2022

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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

This Report for the Greek region provides an overview of the performance of the 13 Greek Regions on the Agenda 2030 and 17 Sustainable Development Goals (SDGs) adopted by global leaders in September 2015 at the UN Sustainable Development Summit.

The report was prepared by teams of independent experts at the SDSN Greece, Regional Policy Monitor and Data Consultants. The authoring team was led by **Professor Phoebe Koundouri** (AUEB, ATHENA RC), and included **Dr Conrad Landis** (AUEB), **Professor Chrysi Laspidou** (ATHENA RC), **Mr Angelos Plataniotis** (ATHENA RC), **Mr. Agiopoulos Kapsikas** (ATHENA RC), **Mrs Thalia Kanellopoulou** (Data Consultants), **Mr Vasileios Kasiolas** (Regional Policy Monitor, Data Consultants), **Mr Theofanis Zacharatos** (Regional Policy Monitor).

The results of this report are also displayed in maps "https://arcg.is/SHHL0", created by **Alice Guittard** (AUEB) in partnership with **SDGs Today** and **ESRI** using **ArcGIS Online**.

The views expressed in this report do not reflect the views of any organizations, agencies or programmes of the United Nations. Additionally, they may not reflect the opinions of the Lead author's host institutions.

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1. Executive Summary

In 2015, global leaders adopted a common vision for sustainable development with goals and targets to be achieved by 2030 (Agenda 2030, SDGs, Paris Climate Agreement). These goals and targets were adopted by national governments but with a clear recognition that regions and municipalities would play a crucial role in implementing these goals.

The current report presents a first step to target assessment for the thirteen first-level administrative entities - regions in Greece for the SDGs. The report builds on the approach and methodology used by the SDSN (Lafortune et al., 2019; Lafortune et al., 2021). The 2019 SDG Index approach and methodology are currently being audited by the European Commission Joint Research Centre.

This report presents Index scores and detailed dashboards for each goal for 13 Greek regions. Thessaly and the Ionian Islands are at the top of the Index for 2022, with the former being the sole Greek region that has already fulfilled more than half of the requirements towards 2030. Yet, even for these top performing regions major challenges remain in order to achieve all 17 SDGs.

The 2022 SDG Index and Dashboards for Greek regions generates five major findings:

- No region has met the goal for SDG 1, 2, 4, 7, 8, 9, 10, 11 and 16, while most of the regions face significant challenges.
- One region has already met the goal for SDG 3, 5, 6, 7 and 15, whereas the rest of the regions face medium to minor challenges.
- Two regions have already met the goal for SDG 14, whereas the rest of the regions face medium to major challenges, indicating significant heterogeneity in the subnational performance of the regions.
- The regions of Attica, Southern Aegean and Crete will have to try harder to overcome significant challenges towards achieving the SDGs until 2030, given that more than 60% of the Greek population resides in these areas (Eurostat, 2022).
- There is a significant lack of reliable data at regional level for most of the key performance indicators for SDG 12 and SDG 17, underlying the need for improving the availability of data at a subnational, NUTS2 level.

2. Introduction

Description of Agenda 2030 framework

The Agenda2030 and the Paris Climate Agreement are the roadmap to leave behind the "business as usual" model and implement a new way to produce, consume and act. The signatories' governments and countries analyze and adopt a policy framework with 17 goals, addressing all the major issues that we face globally, such as poverty, hunger, health and wellbeing, education, gender equality, environment and climate, strong institutions, peace and justice.

The Agenda2030 proposes a policy framework for a more sustainable future, with equilibrium in social wellbeing, environmental protection and economic prosperity. The Sustainable Development Goals (SDGs) are designed to apply universally to all countries, as they address challenges confronted by both the developing and the developed world. The set of goals is the result of a participatory consultation process involving various stakeholders, such as NGOs, the private sector, and authorities in a variety of levels in public administration. The 17 SDGs are followed by 169 targets and 231 indicators. The 2020 edition of the report shows that more efforts are to be made in order to achieve the goals by 2030, especially after the Covid-19 pandemic and the necessary recovery from it.

As we move forward to the middle of this decade, our society faces ongoing global crises such as the COVID-19 pandemic, energy instability, food insecurity, and wars all around the globe. For that reason, it is now clear, more than ever, the crucial role of local societies in the success of Agenda2030. The Sustainable Development Solutions Network (SDSN) estimated in 2016, that as much as 65% of the SDG agenda may not be fully achieved without the involvement of cities and local stakeholders.

Taking into consideration the broad and global character of the SDGs, their successful implementation depends on the active involvement of international, national and subnational stakeholders.

The aim of this study is to highlight the necessity for local governments at the Regional and Municipal levels to take action, in order to achieve Agenda2030. Moreover, this study provides crucial information about the current situation of SDGs implementation progress in Greece and aspires to become a useful tool for policy making in the hands of local governors.

Why is it necessary to monitor SDGs performance at a regional level?

In 2015, global leaders adopted a common vision for sustainable development with goals and targets to be achieved by 2030 (Agenda 2030, SDGs, Paris Climate Agreement). These goals and targets were adopted by national governments but with a clear recognition that regions and municipalities would play a crucial role in implementing these goals.

National governments cannot achieve the ambitious goals of the 2030 Agenda without the contribution of cities and regions, which can achieve the Sustainable Development Goals

(SDGs). While national governments hold the primary responsibility for implementation of the SDGs, it has been calculated that about 65 % of the targets require the participation of regional and local stakeholders.

The majority of people live and work in cities, and urbanization continues to grow all over the world, with 70% of the global population estimated to live in cities by 2050. The data from the OECD Metropolitan Database also shows that 63% of GDP is concentrated in the 327 OECD metropolitan areas with over 500,000 inhabitants.

In many countries, cities and regions have jurisdiction over policy areas underlying the SDGs such as water, housing, transport, infrastructure, land use and climate change. This connection is also established by OECD data: regional governments were responsible for almost 60% of total public investment in 2016 in the area of OECD, and for almost 40% worldwide. Except for SDG 11, which focuses on cities and communities, an estimated 65% of the 169 targets behind the 17 SDGs will fail to be reached without the active engagement of local and regional governments.

The efforts to "localize" the SDGs are constant, varying from conducting studies and organizing events to integrating local into national reviews and creating complete regional SDG strategies.

The SDG framework allows for flexibility in adapting the goals to the territorial context. For example, in each goal there is the possibility for selection of indicators monitoring specific challenges related to a given locality.

In order to address climate change and environmental degradation, extreme poverty, unsustainable patterns of consumption and production, unemployment and socio-economic disparities, the involvement of head of regions, mayors and local leaders is considered imperative.

Reporting on SDGs at the regional level can produce outcomes resulting in achieving the overall implementation of SDGs, reinforcing national efforts, supporting regional development strategies, and providing a broader spectrum of within-country trends.

The present report aims at:

- ✓ Responding to this challenge and reinforcing governments in localizing the SDGs.
- ✓ Highlighting the implementation progress,
- ✓ Directing attention to the lack of data,
- ✓ Establishing a yearly monitoring system,
- ✓ Providing information to policymakers and citizens, to support the local governments in transformational changes are required,
- ✓ Measuring and analyzing the impact of the SDGs progress on local, national and international crises regarding environment, society and economy,
- ✓ Comparing the performance between the Greek regions and between Greek and EU regions with the similar characteristics

Quick overview of the performance of Greece at a National level

While presenting a quick overview of the report's results, we observe there is room for improvement for the Greek regions. The data analysis' presents a clear delay in achieving most of the Goals. In particular, the Greek regions face a significant number of challenges when it comes to the accomplishment of all Sustainable Development Goals. The vast majority of the regions face major challenges in terms of achieving the following goals:

- ☹ SDG 1 "No Poverty"
- ☹ SDG 9 "Industry, Innovation and Infrastructure"
- ☹ SDG 10 "Reduced Inequalities"
- ☹ SDG 11 "Sustainable Cities and Communities"

On the other hand, most of the regions have managed to improve a lot in terms of achieving the following goals

- ☺ SDG 2 "No Hunger"
- ☺ SDG 3 "Good Health and Well-Being"
- ☺ SDG 5 "Gender Equality"
- ☺ SDG 6 "Clean Water and Sanitation"
- ☺ SDG 8 "Decent Work and Economic Growth"
- ☺ SDG 13 "Climate Action"
- ☺ SDG 15 "Life on Land"

As far as it concerns the SDG 12 "Responsible Consumption and Production" and the SDG 17 "Partnerships for the Goals" there is a total lack of data and sources. This unavailability of relevant impedes the extraction of results. Hence, the report does not take into account the aforementioned Goals.

Taking into consideration the available data and after the statistical analysis it is safe to say that the Region of Thessaly is the leader in the necessary transformation in order to achieve the SDG's and the Agenda 2030, while the Region of Attica is the last one.

Continuing, the report presents in detail the information on every region regarding each target as well as their total scores.

Related work

2019 SDG Index and Dashboards Report for European Cities

This 2019 report presents the performance of 45 European countries with Index scores and detailed dashboards for each goal. The leaders of this year's Index are three Nordic European cities– Oslo, Stockholm and Helsinki. However, even these pioneer cities still face major challenges on the road to achieve all 17 SDGs. Moreover, the 2019 SDG Index and Dashboards for European Cities (prototype version) produces the following five major findings:

1. No capital cities and large metropolitan in Europe has achieved the SDG's.
2. There are persistent challenges related to SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action) and SDG 15 (Life on Land).
3. Decarbonizing transportation in cities and providing access to affordable housing remain major policy priorities.

4. Compared to the US Cities Index, better nutrition, diet and a more active life style in Europe drive higher performance on SDG 2 (No Hunger) and SDG 3 (Health and Well-Being).
5. Inequalities in economic and social outcomes and international spillover effects from consumption in cities require better data (Lafortune, G. et al., 2019).

The 2019 US Cities Sustainable Development Report

The 2019 US Cities Sustainable Development Report generates 7 main findings:

1. None of the most populous US'S cities are currently on track to achieve the SDGs.
2. Localization is key - comparing the US City and State Reports highlights the need to localize data and action towards SDG achievement.
3. There are pernicious inequalities that need to be addressed, and improvements on sustainable transit, rent affordability, and energy transition are sorely needed.
4. Improved data is required, most urgently on maternal mortality rates. Localizing the goals to specific communities may help fill some data gaps.
5. Compared to the "2019 SDG Index and Dashboards Report: European Cities", EU cities are generally outperforming US cities, in some cases with the US lagging seriously behind, like infant mortality rate, where the US average (6.5) is more than 2 times higher than the EU average (2.93), and gender wage gap, where the average gap in the US (27.3) is over 3 times larger than the average EU gap (8.79). On some Goals, most notably 12 and 13, both the US cities and EU cities have quite a bit of progress to make.
6. Best performing city overall is San Francisco-Oakland-Hayward, California and worst, on average, is Baton Rouge, Louisiana.
7. The Goals with the most overall progress made to date are Goal 6: Clean Water and Sanitation, and Goal 15: Life on Land, and the Goals with the least progress made are Goal 7: Affordable and Clean Energy and Goal 2: Zero Hunger (Lynch, A. et al., 2019).

The United States Sustainable Development Report 2021

The United States Sustainable Development Report 2021 concludes in the following:

1. States are not improving quickly enough to meet the SDGs by 2030 and at least 20 percent of indicators in every state are going in the wrong direction.
2. Inequalities are deeply entrenched across US states.
3. Preliminary results show that COVID-19 has increased challenges to SDG delivery and its impacts underline the need for universal health coverage and universal access to key social and physical infrastructure.
4. Environmental justice efforts show a path forward through Black and Indigenous and other excluded community-led efforts.
5. Data gaps, time lags, and lack of disaggregated data highlight the need for improvement in statistical capacity and new approaches to monitor SDG achievement (Lynch, A., & Sacks, J., 2021).

Europe Sustainable Development Report 2021

The report gives prominence to the following key findings and recommendations regarding the SDG Performance and the Challenges in Europe

1. Ending the COVID-19 pandemic everywhere is a prerequisite for restoring and accelerating SDG progress in Europe and globally.
2. The pandemic is a setback for sustainable development in Europe, but the SDGs should remain the guidepost
3. Europe faces its greatest SDG challenges in the areas of sustainable diets and agriculture, climate and biodiversity (SDG2, 12-15), in strengthening the convergence of living standards across its countries and regions and needs to accelerate progress on many goals.
4. The recovery and pursuit of climate and biodiversity targets must be accompanied by ambitious social policies to "Leave No One Behind" and solidarity.
5. Further efforts are needed to strengthen the convergence of living standards across European countries.
6. Europe is the SDG leader globally, but generates negative international spillovers.
7. There is no sign of decoupling between economic growth and environmental spillovers embodied into EU consumption
8. The EU has legislative and policy tools in place, or in preparation, to address most SDG challenges, but it still lacks clarity on how it plans to achieve the SDGs
9. An integrated approach to the SDGs should focus on three broad areas: (i) internal priorities; (ii) diplomacy and development cooperation; and (iii) negative international spillovers.
10. The EU must lead multilateral Green Deal and SDG Diplomacy, including with China and Africa.
11. To ensure international legitimacy, the EU must address negative international spillovers.
12. The Multiannual Financial Framework, NextGenEU and the Recovery and Resilience Facility provide financial firepower to accelerate the transformation of the EU over the period 2021–2027
13. While few of the NRRPs available make explicit references to the SDGs, an in-depth review of specific measures included in two Plans (Italy and Spain) reveal that all SDGs are addressed, albeit to different degrees.
14. The Green Deal, Farm-to-Fork and Biodiversity strategies set high goals for improving the sustainability of EU food and land systems, yet their implementation across EU member states remains challenging.
15. While Farm-to-Fork is the first holistic strategy of the food system, clear quantitative targets are missing to track progress from the processing and consumption side
16. Food companies should disclose more information on aspects related to supply chain management and good corporate citizenship.
17. The EU relies extensively on models for policy assessment, but large gaps hinder a comprehensive overview of the potential impacts of Farm to Fork and Biodiversity strategies (Lafortune, G. et al., 2021).

Sustainable Development Report 2022

The Sustainable Development Report 2022 highlights 5 main conclusions:

1. Peace, diplomacy, and international cooperation are fundamental conditions for the world to progress on the SDGs towards 2030 and beyond.
2. For the second year in a row, the world is no longer making progress on the SDGs

3. A global plan to finance the SDGs is needed.
4. At mid-point on the way to 2030, policy efforts and commitments supporting the SDGs vary significantly across countries, including among G20 countries
5. Rich countries generate negative international spillovers notably through unsustainable consumption; Europe is taking actions (Sachs, J. et al., 2022).

3. Methodology

The purpose of this report is to inform policymakers, mainly at the regional level but also at the Central Government level, about the level of each region in terms of achieving the SDGs.

To measure performance at the regional level, we adopt the SDSN Global methodology. More specifically, our approach is as follows:

Step 1. Identification of SDGs indicators at a regional level

The first step of our methodology was to select suitable indicators that measure as reliably as possible the SDGs proposed by the UN Agenda 2030.

Our criteria were ***Relevance***, i.e., the indicators should be meaningful at a local level and be comparable 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 as recent as possible, and from official and reliable sources.

As for the process of indicators selection, to identify the indicators, we first referred to the Global Sustainable Development Report 2022[1] and the European Sustainable Development Report 2021,[2] and from those used for Greece at the national level, we isolated those indicators that make sense at the regional level. A second source we used to identify suitable indicators was the ESPON SDG localizing tool: Localizing and measuring Sustainable Development Goals (SDGs) in cities and regions.[3] For each proposed indicator in each of the SDGs we examined whether there was data available for its calculation. The European Handbook for SDG Voluntary Local Reviews was also useful in selecting indicators. Finally, the authors, based on the availability of data for their calculation, but keeping in line and close to the spirit with the indicators used in SDSN Sustainable Development Reports, invented some of the indicators.

Step 2. Data Collection

Indicators come from a mix of official and non-official data sources. To collect the data, we used mainly publicly available data from official sources such as **EUROSTAT**, the **Hellenic Statistical Authority (ELSTAT)** and the **European Environmental Agency (EEA)**. In some indicators we used data from a survey with questionnaires conducted at a Pan-Hellenic level by **Data Consultants**[4], while in others we used data from scientific publications. **Table 1** categorizes the indicators per data source. An extended analysis of the methodology we used for the targets is provided in Annex I.

[1] https://dashboards.sdgindex.org/
[2] https://eu-dashboards.sdgindex.org/chapters
[3] https://www.espon.eu/localise-SDG
[4] European & Regional Development Consultants. Website: https://www.dataconsultants.gr/

Table 1. Indicators per data source

Eurostat
• Severe material deprivation rate in cities (%) • People at risk of poverty or social exclusion (%) • Area under organic farming (utilized agricultural area (ha)) • Traffic fatalities (Number) * • Infant mortality rate (under 1) per 1,000 births • General practitioners per (100,000 pop) • Life expectancy (years) • 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 (%) • Students enrolled in tertiary education (% males) • Employment rates of young people not in education and training (females/males' ratio) • Water use per capita • Water abstraction per capita • GDP per capita • Long term unemployment Rate (%) • Income of households (in million euros) • R&D expenditure (%) • Patent applicants (per million pop) • Disposable income of private households • Persons at risk of poverty or social exclusion - EU 2020 strategy • Land covered by artificial surfaces • Ratio of forestry to total land use
ELSTAT
• Total cultivated agricultural and fallow land per Capita • Ratio of bathroom inside the house / total residential houses (%) • Ratio toilet or WC with hydraulic installation inside the house / total residential houses (%) • Petroleum consumption 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)
• 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

Data Consultants

- Share of Females to Regional Councils
- Perception of inhabitants on how easy it is to find a good job in the city they live in today (% of satisfaction)
- Perception of inhabitants on happiness living in this city today (% of satisfaction)
- Perception of inhabitants on how easy it is to find good housing in the city where they live at a reasonable price today (% of satisfaction)
- Perception of inhabitants regarding safety on walking alone at night in the city they live in today (% of satisfaction)

Laspidou C., Mellios N., et al. (2020)

- Total irrigated Crop Production (kg) per capita
- Non-Irrigated Crop Production (kg) per capita
- Meat production per capita
- Milk Production (kg) per capita
- Egg Production (number) per capita
- Ratio of Power Plant Capacity (MW) from sustainable sources

Step 3. Determination of targets for Goal Achievement

For each indicator we determine an "optimal" target value based on which we will judge the performance of each region on the specific indicator.

- In general, we used the Global Sustainable Development Report reference values where possible, while where this was not possible, we chose an alternative strategy:
- In indicators concerning gender equality, we used a target value of 50%
- In indicators related to poverty, crime, insecurity, etc., we used a target value of 0%
- In indicators regarding access to water, education, health services, etc., we used a target value of 100%
- We used science-based targets where these were available
- In the rest of the cases, we used the average of top-5 performers either at national, European or global level.

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 and last step of the methodology concerns the coloring (green, yellow, orange, red) according to the performance of each region in each of the individual KPIs and then the aggregation of the results in a final dashboard.

This involves, initially, the determination of the limits of the indicators, taking into account the "direction" of each one, i.e., if a greater value implies a better performance or vice versa. The Upper Bound (UB) for each indicator is the "optimum" value (described in stage 3 above), whereas the Lower Bound (LB) is defined, consistently to the SDSN methodology, as the 2.5th percentile of the cross-sectional distribution to control for the impact of outliers.

Next, the scores are transformed, so to normalize the range [LB, UB] to a [0,100] scale, using the formula

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

Then the border values are determined, based on which the coloring of the performance of each region to a specific indicator will change. The Yellow-Orange Limit (YOL) is the average (LB; UB) / 50, in the [0.100] scale. For the Green and Red Limits, we used the YOL ± 1 cross sectional standard deviation.
Finally, the indicators and limits were aggregated per SDG (average scores and limits) and a total score was calculated by aggregating the performance in the KPIs under each SDG.

A more detailed analysis of the methodology we used for the regional SDG scores and dashboards from a technical perspective is provided in Annex II.

4. Results and discussion

1.1. Aggregate performance heatmap

The Greek regions (**Figure 1**) Face a significant number of challenges when it comes to achieving all Sustainable Development Goals (**Table 2**). As seen on the progress heat map (**Table 3**), the vast majority of the regions face major challenges in terms of achieving the following goals:

- **SDG 1 "No Poverty":** No region has met the goal, whereas another eight face major challenges.
- **SDG 4 "Quality Education":** No region has met the goal, whereas another twelve face major challenges.
- **SDG 8 "Decent Work and Economic Growth":** No region has met the goal, whereas another eight face major challenges.
- **SDG 9 "Industry, Innovation and Infrastructure":** No region has met the goal, whereas another eleven face major challenges.
- **SDG 10 "Reduced Inequalities":** No region has met the goal, whereas another twelve face major challenges.
- **SDG 11 "Sustainable Cities and Communities":** No region has met the goal, whereas another eleven face major challenges.

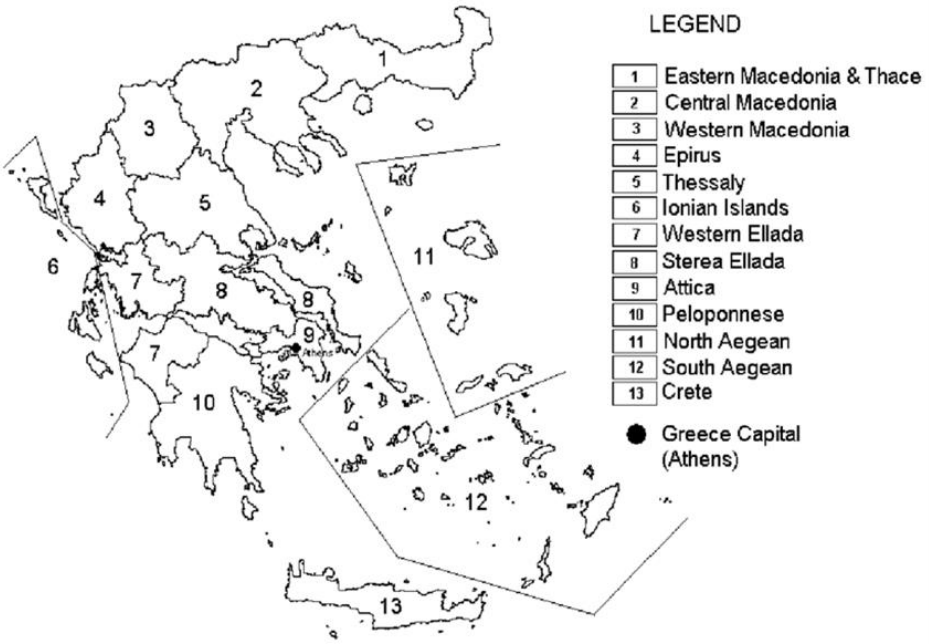

Figure 1 The regions of Greece (NUTS 2). Source: ResearchGate.com

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

- **SDG 3 "Good Health and Well-Being":** One region has already met the goal, whereas another two only face minor challenges.
- **SDG 5 "Gender Equality":** One region has already met the goal, whereas another seven only face minor challenges.
- **SDG 6 "Clean Water and Sanitation":** One region has already met the goal, whereas another three only face minor challenges.

- **SDG 13 "Climate Action":** One region has already met the goal, whereas another three only face minor challenges.
- **SDG14 "Life Below Water":** Two regions have already met the goal, whereas another one only faces minor challenges.
- **SDG 15 "Life on Land":** One region has already met the goal, whereas another nine only face minor challenges.

To finish with, there was no available data on any of the indices concerning SDG 12 and SDG 17; hence, the report does not take into account the aforementioned Goals. 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)	51,65
2	Ionian Islands (EL62)	49,60
3	Eastern Macedonia and Thrace (EL51)	47,37
4	Western Macedonia (EL53)	46,72
5	Epirus (EL54)	46,24
6	Peloponnese (EL65)	43,96
7	Northern Aegean (EL41)	43,02
8	Central Greece (EL64)	42,55
9	Western Greece (EL63)	41,00
10	Central Macedonia (EL52)	40,29
11	Crete (EL43)	40,04
12	Southern Aegean (EL42)	39,08
13	Attica (EL30)	36,82

The region of Thessaly is the only Greek region that has already fulfilled the requirements towards Sustainability until 2030, by more than 50% **(Table 2).** The regions of the Ionian Islands, Eastern Macedonia and Thrace, as well as Western Macedonia seem to be facing some challenges. On the other hand, the regions of Attica, Southern Aegean and Crete will have to try harder to overcome significant challenges towards achieving the SDGs until 2030, given that more than 60% of the Greek population resides in these areas (Eurostat, 2022).

Table 3 The SDGs heat map for the Greek regions

	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													
SDG2													
SDG3													
SDG4													
SDG5													
SDG6													
SDG7													
SDG8													
SDG9													
SDG10													
SDG11													
SDG13			N/A					N/A			N/A	N/A	
SDG14													
SDG15													
SDG16													

Target achieved
Significant challenges
Minor challenges
Major challenges

4.2. Performance by Region

4.2.1. Region of Thessaly (EL61)

Thessaly is one of the most populous Greek regions. According to the 2011 census, the region has a population of 732,762 and a total area of 14,036.64 km2. Larissa is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.868 in 2019).

The region of Thessaly faces major challenges in achieving SDGs 4, 8, 9, 10 and 11, as seen in **Table 4**. It is indicative that less than 1% of the region's GDP is reinvested in R&D and that there are only 2.11 patent applicants per million inhabitants. Furthermore, slightly less than one out of three inhabitants face risk of poverty or social exclusion (Eurostat, 2019).

The region has yet to meet any SDG, whereas there are only minor challenges in order to achieve five SDGs (namely 3, 6, 7, 15 and 16) (**Table 4**). In fact, only 3.1% of the land is covered by artificial surfaces; the crime rate is very low (448.03 offenses per 100 thousand inhabitants) and the life expectancy has risen to 82.3 years (Eurostat, 2019).

Table 4 The SDGs status for the region of Thessaly

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	
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

4.2.2. Region of Ionian Islands (EL62)

The Ionian Islands is a region spanning across the Ionian Sea. According to the 2011 census, the region has a population of 207,855 and a total area of 2,306.94 km2. Corfu is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.879 in 2019).

The region of Ionian Islands faces major challenges in achieving SDGs 3, 4, 11 and 16, as well as significant challenges when it comes to another five SDGs, as seen in **Table 5**. It is indicative that 79% of the region's population find it difficult to find good housing (RPM, 2022). Furthermore, more than 18% of the inhabitants' face risk of poverty or social exclusion (Eurostat, 2019).

The region has already met SDG 14, whereas there are only minor challenges in order to achieve four SDGs (namely 1, 5, 6 and 7) (**Table 5**). In fact, there are more than 6.59 bathing sites in the region with excellent water quality per 10 thousand inhabitants (EEA, 2019). It is worth mentioning that the region faces significant challenges in achieving five SDGs (namely 2, 8, 9, 10 and 15).

Table 5 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	
SDG13: Climate Action	N/A
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved · Significant challenges · Minor challenges · Major challenges

4.2.3. Region of Eastern Macedonia and Thrace (EL51)

Eastern Macedonia and Thrace covers the northeastern part of the Greek mainland. According to the 2011 census, the region has a population of 608,182 and a total area of 14,157.76 km^2. Komotini is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.849 in 2019).

The region of Eastern Macedonia and Thrace faces major challenges in achieving seven SDGs (namely 1, 3, 4, 8, 9, 10 and 11), as seen in **Table 6**. It is indicative that more than 35% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 18% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has already met SDG 13 (**Table 6**). In fact, only 2.7% of the land is covered by artificial surfaces; 0.67 ha of terrestrial sites per capita are NATURA 2000 regions and the O3 levels stand at 819.11 ug/m3 (Eurostat, 2019 & EEA, 2022).

Table 6 The SDGs status for the region of Eastern 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	
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

4.2.4. Region of Western Macedonia (EL53)

Western Macedonia covers the north part of the Greek mainland. According to the 2011 census, the region has a population of 283,689 and a total area of 9,451 km^2. Kozani is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.88 in 2019).

The region of Western Macedonia faces major challenges in achieving six SDGs (namely 1, 4, 8, 9, 10 and 14), as seen in **Table 7**. It is indicative that more than 32% of the inhabitants are at risk of poverty or social exclusion, whereas slightly more than 17% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has already met SDG 6, whereas there are only minor challenges in order to achieve another four SDGs (namely 5, 13, 15 and 16) (**Table 7**). In fact, more than 96% of inhabitants have in-house bathrooms. Moreover, only 2.7% of the land is covered by artificial surfaces and the ratio of forestry to total land use stands at 0.45 (Eurostat, 2018).

Table 7 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	
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

4.2.5. Region of Epirus (EL54)

Epirus covers the northwestern part of the Greek mainland. According to the 2011 census, the region has a population of 336,856 and a total area of 9,203.22 km^2. Ioannina is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.879 in 2019).

The region of Epirus faces major challenges in achieving six SDGs (namely 4, 8, 9, 10, 11 and 14), as seen in **Table 8**. It is indicative that almost 29% of the inhabitants are at risk of poverty or social exclusion, whereas slightly more than 15% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has already met SDGs 3 and 15, whereas there are only minor challenges in order to achieve SDG 7 (**Table 8**). In fact, the number of traffic fatalities and the infant mortality rate have significantly fallen in the past decade. Moreover, only 1.5% of the land is covered by artificial surfaces and the ratio of forestry to total land use stands at 0.35 (Eurostat, 2018).

Table 8 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	
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

4.2.6. Region of Peloponnese (EL65)

Peloponnese covers the southeastern part of the Peloponnesian peninsula. According to the 2011 census, the region has a population of 577,903 and a total area of 15,489.96 km^2. Tripolis is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.849 in 2019).

The region of Peloponnese faces major challenges in achieving five SDGs (namely 1, 4, 9, 10 and 11), as seen in **Table 9**. It is indicative that more than 34% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 21% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has yet to meet any SDG; there are only minor challenges in order to achieve two SDGs before 2030 (namely 2 and 16) (**Table 9**). In fact, only 4.7% of the land is covered by artificial surfaces and the crime rate is low (1,094.13 offenses per 100 thousand inhabitants) (Eurostat, 2019). It is worth mentioning that the region faces significant challenges in achieving seven SDGs (namely 3, 5, 6, 7, 8, 14 and 16).

Table 9 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	
SDG13: Climate Action	N/A
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 Northern Aegean (EL41)

The region of the Northern Aegean spans across the northern part of the Aegean Sea. According to the 2011 census, the region has a population of 199,231 and a total area of 3,835.91 km^2. Mytilene is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.852 in 2019).

The region of the Northern Aegean faces major challenges in achieving six SDGs (namely 1, 2, 4, 8, 10 and 16), as seen in **Table 10**. It is indicative that more than 32% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 18% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has yet to meet any SDG; there are only minor challenges in order to achieve four SDGs before 2030 (namely 5, 7, 14 and 15) (**Table 10**). In fact, more than 96% of inhabitants have in-house bathrooms. Moreover, only 2.7% of the land is covered by artificial surfaces and the crime rate is low (652.27 offenses per 100 thousand inhabitants) (Eurostat, 2019).

Table 10 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	
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	
SDG13: Climate Action	N/A
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved · Significant challenges · Minor challenges · Major challenges

4.2.8. Region of Central Greece (EL64)

Central Greece spans across the east part of central Greece, including the island of Euboea. According to the 2011 census, the region has a population of 547,390 and a total area of 15,549.31 km^2. Lamia is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.848 in 2019).

The region of Central Greece faces major challenges in achieving seven SDGs (namely 3, 4, 7, 8, 9, 10 and 11), as seen in **Table 11**. It is indicative that only 72% of adults have received at least upper-secondary education and that nearly one in four inhabitants between 18 and 24 years of age are neither in education nor in employment or training (Eurostat, 2020).

The region has not met any SDG, whereas there are only minor challenges in order to achieve four more SDGs (namely 2, 5, 13 and 15) (**Table 11**). In fact, only 3.2% of the land is covered by artificial surfaces; 0.67 ha of terrestrial sites per capita are NATURA 2000 regions and the O3 levels stand at 1,844.97 ug/m3 (Eurostat, 2019 & EEA, 2022).

Table 11 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	
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

1.1.9. Region of Western Greece (EL63)

Western Greece spans across the western part of the Peloponnesian peninsula, including as well the western part of central Greece. According to the 2011 census, the region has a population of 679,796 and a total area of 11,350.18 km^2. Patras is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.861 in 2019).

The region of Western Greece faces major challenges in achieving seven SDGs (namely 1, 4, 8, 9, 10, 11 and 14), as seen in **Table 12**. It is indicative that more than 42% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 26% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has yet to meet any SDG; there are only minor challenges though in order to achieve four SDGs before 2030 (namely 2, 5, 7 and 15) (**Table 12**). In fact, 4% of the land is covered by artificial surfaces; the ratio of forestry to total land use is equal to 0.31 and the crime rate is very low (870.11 offenses per 100 thousand inhabitants) (Eurostat, 2019).

Table 12 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	
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

4.2.10. Region of Central Macedonia (EL52)

The region of Central Macedonia spans from the northern Greek border to the northern shores of the Aegean Sea. According to the 2011 census, the region has a population of 1,882,108 and a total area of 18,810.52 km^2. Thessaloniki is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.876 in 2019).

The region of Central Macedonia faces major challenges in achieving eight SDGs (namely 1, 2, 8, 9, 10, 11, 14 and 16), as seen in **Table 13**. It is indicative that more than 31% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 17.5% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has yet to meet any SDG; there are only minor challenges though in order to achieve three SDGs before 2030 (namely 5, 6 and 15) (**Table 13**). In fact, nearly 80% of adults have received at least upper-secondary education and only 11% of inhabitants between 18 and 24 years of age are neither in education nor in employment or training (Eurostat, 2020).

Table 13 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	
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 Crete (EL43)

The region of Crete lies in the southernmost part of Europe. According to the 2011 census, the region has a population of 636,504 and a total area of 8,450 km^2. Heraklion is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.879 in 2019).

The region of Crete faces major challenges in achieving nine SDGs (namely 1, 4, 5, 6, 9, 10, 11, 13 and 16), as seen in **Table 14**. It is indicative that more than 26% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 16% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has yet to meet any SDG; there are only minor challenges though in order to achieve two SDGs before 2030 (namely 2 and 8) (**Table 14**). In fact, 4% of the land is covered by artificial surfaces; life expectancy stands at 82.1 years; the crime rate is low (940.03 offenses per 100 thousand inhabitants) and more than 3 out of four adults have received at least upper-secondary education (Eurostat, 2018, 2019 & 2020).

Table 14 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	
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

4.2.12. Region of Southern Aegean (EL42)

The region of Southern Aegean includes the Cyclades and the Dodecanese Island complexes. According to the 2011 census, the region has a population of 309,015 and a total area of 5,286 km^2. Ermoupolis is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.850 in 2019).

The region of Southern Aegean faces major challenges in achieving nine SDGs (namely 1, 2, 3, 4, 6, 9, 10, 11 and 16), as seen in **Table 15**. It is indicative that more than 30% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 20% of those living in cities face severe material deprivation (Eurostat, 2020).

The region has already met SDG 14; there are also just minor challenges in order to achieve two more SDGs before 2030 (namely 8 and 15) (**Table 15**). In fact, there are more than 8.1 bathing sites in the region with excellent water quality per 10 thousand inhabitants (EEA, 2019). In addition, 1.43 ha of terrestrial sites per capita are NATURA 2000 regions (EEA, 2021).

Table 15 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	
SDG13: Climate Action	N/A
SDG14: Life Below Water	
SDG15: Life on Land	
SDG16: Peace, Justice and Strong Institutions	

Target achieved · Significant challenges · Minor challenges · Major challenges

4.2.13. Region of Attica (EL30)

The region of Attica includes the metropolitan area of Athens, the island of Kythera and the Argosaronic island complex. According to the 2011 census, the region has a population of 3,828,434 and a total area of 3,808.10 km^2. Athens is the capital city, whereas the region ranks very high in terms of the Human Development Index (0.913 in 2019).

The region of Attica faces major challenges in achieving ten SDGs (namely 2, 3, 4, 6, 9, 10, 11, 14, 15 and 16), as seen in **Table 16**. It is indicative that more than 23% of the inhabitants are at risk of poverty or social exclusion, whereas nearly 18% of the region's land is covered by artificial surfaces (Eurostat, 2018 & 2020).

The region has already met SDG 5; there are also just minor challenges in order to achieve one more SDG before 2030 (namely 13) (**Table 16**). In fact, the representation in the regional council is equal between males and females (RPM, 2022). In addition, the long-term unemployment rate is just 10% (Eurostat, 2020). It is worth mentioning that 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 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	
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

5. Conclusions and ways forward

This 2022 SDG Index and Dashboards for Greek Regions, "The progress of the Greek Regions in relation to the Sustainable Development Goals (SDGs)" is a first attempt to track Greek region's performance on the SDGs. It aims to help identify policy priorities but also to identify major data gaps in the context of the SDGs at the subnational level.

The main results indicate that significant challenges in the progress towards the implementation of the SDGs exist all the Greek regions for most of the 15 goals, with an average score of 43.72%, and only 37% if scores are weighted with population criteria.

SDSN Greece is willing to frequently update the report and database and add new features and indicators over time. The main priorities for moving forward are:

- Integrate progress over time (trends): Currently the report provides a snapshot using the most recent 2022 data. Yet, regions' trajectories matter also to evaluate progress and commitments to the goals. Data availability over time at the subnational level is limited and hence this report aims to establish a structured data collection process by the Regions.
- Increase the number of SDGs covered: Currently the report misses reliable data for targets 12 and 17, while the availability of KPIs for all Regions is limited for target 13.
- Continue to work closely with strategic partners to improve data availability and quality, to fill data gaps and promote evidence-based policymaking at subnational-regional level.
- Communicate the results to both the regional and governmental authorities and stakeholders, to provide validation on KPIs and Targets used and to use it as a guide for the:
    - Design of appropriate Regional Development policies
    - Optimal resources allocation
    - Focus of the portfolio of investment to challenges of each region
- Track local regional efforts and policies to achieve the SDGs. Expand the report to map the existence of long-term targets and related pathways and evaluate policy actions at regional level that may pave the way for long term economic, social and environmental transformations.

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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 Ind.	Indicator description	Reference Year	Data Source	Comments
1	1_1	Severe material deprivation rate in cities (%)	2020	Eurostat	Data readily available. No manipulation required.
1	1_2	People at risk of poverty or social exclusion (%)	2020	Eurostat	Data readily available. No manipulation required.
2	2_1	Total cultivated agricultural and fallow land per Capita	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
2	2_2	Area under organic farming (utilised agricultural area (ha))	2007	Eurostat	EUROSTAT data adjusted with population per region (census 2011 data)
2	2_3	Total irrigated Crop Production (kg) per capita	2010	Laspidou C., Mellios N., et al. (2020) / ELSTAT	Data from scientific publication, adjusted with population per region (census 2011 data)
2	2_4	Non-Irrigated Crop Production (kg) per capita	2010	Laspidou C., Mellios N., et al. (2020) / ELSTAT	Data from scientific publication, adjusted with population per region (census 2011 data)
2	2_5	Meat production per capita	2010	Laspidou C., Mellios N., et al. (2020) / ELSTAT	Data from scientific publication, adjusted with population per region (census 2011 data)
2	2_6	Milk Production (kg) per capita	2010	Laspidou C., Mellios N., et al. (2020) / ELSTAT	Data from scientific publication, adjusted with population per region (census 2011 data)
2	2_7	Eggs Production (number) per capita	2010	Laspidou C., Mellios N., et al. (2020) / ELSTAT	Data from scientific publication, adjusted with population per region (census 2011 data)
3	3_1	Traffic fatalities (Number)	2019	Eurostat	Data readily available. No manipulation required.
3	3_2	Infant mortality rate (under 1) per 1,000 births	2019	Eurostat	Data readily available. No manipulation required.
3	3_3	General practitioners per (100,000 pop)	2019	Eurostat	Data readily available. No manipulation required.
3	3_4	Life expectancy (years)	2019	Eurostat	Data readily available. No manipulation required.
4	4_1	Early leavers from education (%, 18-24)	2020	Eurostat	Data readily available. No manipulation required.

SDG	SDG Ind.	Indicator description	Reference Year	Data Source	Comments
4	4_2	Adults with upper secondary education (% 25-64)	2020	Eurostat	Data readily available. No manipulation required.
4	4_3	NEET rate (% 15-24) (Not in Education, Employment, or Training)	2020	Eurostat	Data readily available. No manipulation required.
4	4_4	Four-year-olds in early childhood education (%)	2019	Eurostat	Data readily available. No manipulation required.
4	4_5	Adult participation in learning (%)	2020	Eurostat	Data readily available. No manipulation required.
5	5_1	Students enrolled in tertiary education (% males)	2020	Eurostat	Calculated ratio by combining EUROSTAT data
5	5_2	Employment rates of young people not in education and training (females/males' ratio)	2021	Eurostat	Calculated ratio by combining EUROSTAT data
5	5_3	Share of Females to Regional Councils	2021	Self calculated	Ratio calculated by Data Consultants through desk research
6	6_1	Ratio of bathroom inside the house / total residential houses (%)	2011	ELSTAT	Calculated ratio through combination of ELSTAT data
6	6_2	Ratio toilet or WC with hydraulic installation inside the house / total residential houses (%)	2011	ELSTAT	Calculated ratio through combination of ELSTAT data
6	6_3	Water use per capita	2019	Eurostat/ ELSTAT	EUROSTAT data adjusted with population per region (census 2011 data)
6	6_4	Water abstraction per capita	2019	Eurostat/ ELSTAT	EUROSTAT data adjusted with population per region (census 2011 data)
7	7_1	Petroleum consumption per capita	2020	ELSTAT	Data readily available. No manipulation required.
7	7_2	Ratio of Power Plant Capacity (MW) from sustainable sources	2010	Laspidou C., Mellios N., et al. (2020)	Data from scientific publication, adjusted with population per region (census 2011 data)
8	8_1	GDP per capita	2019	Eurostat	Data readily available. No manipulation required.
8	8_2	Long term unemployment Rate (%)	2020	Eurostat	Data readily available. No manipulation required.
8	8_3	Perception of inhabitats on how easy it is to find a good job in the city they live in today (% of satisfaction)	2022	RGC	Data came from a panhellenic survey with questionnaires, organized by Data Consultants
8	8_4	Income of households (in mln euros)	2019	Eurostat	Data readily available. No manipulation required.
9	9_1	R&D expenditure (%)	2019	Eurostat	Data readily available. No manipulation required.
9	9_2	Patent applicants (per million pop)	2012	Eurostat	Data readily available. No manipulation required.
9	9_3	Perception of inhabitats on happinnes to live in this city today (% of satisfaction)	2022	RGC	Data came from a panhellenic survey with questionnaires, organized by Data Consultants
10	10_1	Disposable income of private households	2019	Eurostat	Data readily available. No manipulation required.
10	10_2	Persons at risk of poverty or social exclusion - EU 2020 strategy	2020	Eurostat	Data readily available. No manipulation required.

SDG	SDG Ind.	Indicator description	Reference Year	Data Source	Comments
11	11_1	The perception of inhabitats on how easy it is to find good housing in the city where they live at a reasonable price today (% of satisfaction)	2022	RGC	Data came from a panhellenic survey with questionnaires, organized by Data Consultants
12	12_1	NOT AVAILABLE DATA AT NUTS2 LEVEL			
13	13_1	PM2.5 (ug/m3)	2020 - 2022	EEA	Ratio calculated by combining data from the European Environmental Agency (EEA)
13	13_2	PM10 (ug/m3)	2020 - 2022	EEA	Ratio calculated by combining data from the European Environmental Agency (EEA)
13	13_3	O3 (ug/m3)	2003 - 2022	EEA	Ratio calculated by combining data from the European Environmental Agency (EEA)
14	14_1	Surface (ha) of marine sites designated under NATURA 2000 (1 hectares = .01 km2) per capita	2021	EEA	Ratio calculated by combining data from the European Environmental Agency (EEA) and adjusted with population per region (census 2011 data)
14	14_2	Bathing sites with excellent water quality per 10,000 citizens	2019	EEA, SSW	Ratio calculated by the authors, through desk research and adjusted with population per region (census 2011 data)
15	15_1	Land covered by artificial surfaces	2018	Eurostat	Data readily available. No manipulation required.
15	15_2	Ratio of forestry to total land use	2018	Eurostat	Data readily available. No manipulation required.
15	15_3	Surface (ha) of terrestrial sites designated under NATURA 2000 (1 hectares = .01 km2) per capita	2020	EEA	Ratio calculated by combining data from the European Environmental Agency (EEA) and adjusted with population per region (census 2011 data)
16	16_1	Total Penal Code Offenses per 100,000 inhabitants	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
16	16_2	Crimes against life per 100,000 inhabitants	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
16	16_3	Injuries per 100,000 inhabitants	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
16	16_4	Crimes against sexual freedom per 100,000 inhabitants	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
16	16_5	Property crimes per 100,000 inhabitants	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
16	16_6	Violations of Special Criminal Laws per 100,000 inhabitants	2019	ELSTAT	ELSTAT data adjusted with population per region (census 2011 data)
16	16_7	Perception of inhabitats regarding safety on walking alone at night in the city they live in today (% of satisfaction)	2022	RGC	The data came from a panhellenic survey with questionnaires, organized by Data Consultants.
17	17_1	NOT AVAILABLE DATA AT NUTS2 LEVEL			

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 2022. No imputed data is used in our analysis. The latest available year is used as a reference year for Dashboards (2022 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)	3,77%
Ionian Islands (EL62)	15,09%
Eastern Macedonia and Thrace (EL51)	5,66%
Western Macedonia (EL53)	11,32%
Epirus (EL54)	5,66%
Peloponnese (EL65)	9.43%
Northern Aegean (EL41)	13,21%
Central Greece (EL64)	3,77%
Western Greece (EL63)	1,89%
Central Macedonia (EL52)	1,89%

Region	Missing Values
Crete (EL43)	3,77%
Southern Aegean (EL42)	9,43%
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*

SDG	SDG Index	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
2	2_1	6.54	1.00	Average of top performers (National)	Own calculations

SDG	SDG Index	Optimum	More is Better (=1)	Rule for Optimum	Rule Source
2	2_2	0.88	1.00	Average of top performers (National)	Own calculations
2	2_3	2815.66	1.00	Average of top performers (National)	Own calculations
2	2_4	1197.86	1.00	Average of top performers (National)	Own calculations
2	2_5	124.71	1.00	Average of top performers (National)	Own calculations
2	2_6	433.49	1.00	Average of top performers (National)	Own calculations
2	2_7	300.08	1.00	Average of top performers (National)	Own calculations
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 calculations
3	3_4	83.00	1.00	Average of top performers (Global)	ESDR 2021
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
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
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 calculations
6	6_4	0.00	1.00	Average of top performers (National)	Own calculations
7	7_1	0.51	0.00	Average of top performers (National)	Own calculations
7	7_2	1.00	1.00	Science-based/technical optimum	ESDR 2021
8	8_1	3000.00	1.00	Mean	ESDR 2021
8	8_2	3.00	0.00	Average of top performers	ESDR 2021

SDG	SDG Index	Optimum	More is Better (=1)	Rule for Optimum	Rule Source
8	8_3	1.00	1.00	Leave no one behind	ESDR 2021
8	8_4	6254.56	1.00	Average of top performers (National) ex. outliers	Own calculations
9	9_1	3.30	1.00	Average of top performers (EU)	ESDR 2021
9	9_2	240.00	1.00	Average of top performers (EU) ex.outliers	ESDR 2021
9	9_3	1.00	1.00	Leave no one behind	ESDR 2021
10	10_1	30000.00	1.00	Mean	ESDR 2021
10	10_2	0.00	0.00	SDG Target	ESDR 2021
11	11_1	1.00	1.00	Leave no one behind	ESDR 2021
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
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 calculations
15	15_2	0.39	1.00	Average of top performers (National)	Own calculations
15	15_3	0.93	1.00	Average of top performers (National)	Own calculations
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 Index	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_1													
1_2													
2_1													
2_2													
2_3													
2_4													
2_5													
2_6													
2_7													
3_1													
3_2													
3_3													
3_4													
4_1													
4_2													
4_3													
4_4													

SDG Index	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)
4_5													
5_1													
5_2													
5_3													
6_1													
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16_7													

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
2.00	89.46	3.79	43.52	63.67	73.38	66.07	64.25	56.76	32.37	52.31	27.13	73.42	67.32
3.00	31.36	34.15	56.85	43.35	57.19	88.30	64.22	42.33	41.30	62.99	41.31	44.19	27.59
4.00	24.84	53.47	11.09	40.17	38.33	46.12	38.95	35.77	52.90	48.80	20.39	37.60	20.92
5.00	66.67	96.50	64.44	73.63	67.36	43.94	46.87	48.25	69.13	41.10	24.18	43.92	66.47
6.00	61.18	47.42	45.73	56.05	89.22	61.03	71.84	82.53	70.75	34.63	27.44	59.27	60.94
7.00	49.97	48.52	53.60	55.80	21.77	61.16	75.62	62.58	33.96	44.61	40.55	45.43	8.86
8.00	54.61	64.00	19.18	50.75	33.52	34.47	59.32	53.03	58.70	75.48	80.93	64.92	50.01
9.00	28.08	31.06	50.05	28.24	2.51	33.07	31.40	38.77	28.42	36.26	41.28	25.08	14.65
10.00	7.40	29.73	9.97	0.00	11.56	17.29	17.73	39.06	13.96	19.37	23.69	10.14	15.00
11.00	13.97	0.00	46.47	25.44	49.49	2.72	12.91	4.92	21.85	4.06	13.44	31.18	24.73
12.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13.00	91.00	66.24	NA	53.85	74.76	44.45	65.82	NA	44.83	11.04	NA	NA	75.12
14.00	17.30	1.91	76.36	7.34	0.00	9.91	23.57	97.49	4.26	33.51	100.00	45.95	29.08
15.00	88.23	14.36	75.54	68.57	86.95	90.02	84.98	37.74	68.32	51.52	54.46	64.56	82.69
16.00	66.54	22.33	26.38	48.12	70.73	61.61	74.15	44.35	38.35	50.82	30.39	54.68	57.03
17.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDG Index	47.37	36.82	43.02	41.00	46.72	46.24	51.65	49.60	40.29	40.04	39.08	43.96	42.55

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													
SDG2													
SDG3													
SDG4													
SDG5													
SDG6													
SDG7													
SDG8													
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SDG17													