



Fire Up the Dialogue

D3.2 BASELINE assessment REPORT

Project: Cross-sector dialogue for Wildfire Risk Management

Acronym: **Firelogue**



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D3.2 Baseline Assessment Report

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Glossary

Abbreviation	Meaning
BA	Burned Area
BC	Black Carbon
CH ₄	Methane
CO ₂	Carbon Dioxide
CO	Carbon Monoxide
EC	European Commission
EFFIS	European Forest Fire Information System
EIOPA	European Insurance and Occupational Pensions Authority
EU	European Union
GFAS	Global Fire Assimilation System
GWP	Gross Written Premium
IA(s)	Innovation Action(s)
IPCC	Intergovernmental Panel on Climate Change
MODIS	Moderate Resolution Imaging Spectroradiometer
MSI	MultiSpectral Instrument
NMHC	Non-Methane Hydro-Carbon
NO _x	Nitrogen Oxides
OC	Organic Carbon
PM _{2.5}	Particulate matter of size less than 2.5 µm
SDI	Stand Density Index
SO ₂	Sulphur Dioxide
SoW	Statement of Work
TC	Total Carbon in Aerosols
VOD	Vegetation Optical Depth
WFRM	Wildfire Risk Management





Executive Summary

This document (D3.2) presents a summary of the variables available at European Level to assess the status of the targets proposed by the European Commission (EC) to the Innovation Actions (IAs) as part of the H2020_LC-GD-1-1-2020 call, corresponding to a baseline for the year 2019 (and extended to the period 2010-2019 whenever possible).

Datasets at European level have been selected when available to identify values per country for the different targets. For each target, when data for 2010 to 2019 is available, the data for 2019, along with the median of the period, are provided. This is the case for targets related to fatalities, accidental fire ignitions, emissions, and control of wildfires in less than 24 hr, which were extracted from EFFIS databases. In the case of losses insured, an indirect variable is proposed, and only for 2019 since there are no consistent data for previous years. In the case of protected areas to be fire resilient, reduction of building losses and prescribed fires, there is no sufficient information to provide a baseline. In those sections, the limitations in data availability are discussed, and some potential indirect datasets are proposed to be used as proxy when available.

The document is structured as follows:

- **Section 1** provides an introduction to the deliverable.
- **Section 2** explains how the year(s) to be used as baseline were selected.
- **Section 3** and its sub-sections describe the sources of information and the methodology used to establish the baseline of each target, along with the results obtained and the limitations of those baselines.
- **Section 4** presents the conclusions from this analysis.





1 Introduction

Firelogue, as a Coordination and Support Action (CSA), aims to integrate the Innovation Actions' (IAs) findings across stakeholder groups and fire management phases. One of Firelogue's key objectives is to facilitate the impact assessment of Wildland Fire Risk Management (WFRM) measures and proposed solutions towards the impact expected by the call, while at the same time critically reflecting about those goals.

This document (D3.2) proposes a baseline to the targets defined by the EC, against which the impacts achieved by the IAs should be measured.

The H2020_LC-GD-1-1-2020 call proposes in its Statement of Work (SoW)¹ that:

The actions funded under this call topic should jointly contribute substantially to achieving by 2030 the following targets in Europe (with respect to 2019):

- **0 fatalities from wildfires**
- **50% reduction in accidental fire ignitions**
- **55% reduction in emissions from wildfires**
- **Control of any extreme and potentially harmful wildfire in less than 24 hours**
- **50% of Natura 2000 protected areas to be fire-resilient**
- **50% reduction in building losses**
- **90% of losses from wildfires insured**
- **25% increase in surface area of prescribed fire treatments at EU level**

Since the spatial target is "Europe", we have centred this baseline assessment on information that is available at European level, and, whenever possible, provided by European institutions. As such, the European Forest Fire Information System (EFFIS) is the main source of data (San-Miguel-Ayanz et al. 2013), as it is the group of researchers working specifically on the development and implementation of methods for the evaluation of forest fire danger and burned area (BA) mapping at European scale², as appointed by the European Council and Parliament (European Parliament 2003; 2006).

Other sources of data have also been used for this document, when EFFIS did not include the required data, or to complement the available information. Still, for some targets, there is no information currently available in a consistent way at European scale to provide the necessary data to perform the baseline assessment. In those cases, a description of the limitations is included in the corresponding section of this document.

¹ https://cordis.europa.eu/programme/id/H2020_LC-GD-1-1-2020, accessed on February 2023.

² <https://effis.jrc.ec.europa.eu/about-effis/brief-history>, accessed on February 2023.



2 Selection of the baseline assessment year

The Statement of work proposes the year 2019 as the baseline period against which the results of the actions taken by the IAs should be compared, to assess their contribution towards achieving the expected targets.

Still, after several discussions between the Firelogue consortium and the IAs, we consider that the year 2019 cannot be considered as an “average” year in terms of fire occurrence and BA in Europe, especially in some of the countries, where the 2019 fire season was either better or worse than previous years. From the discussion between the IAs and Firelogue, the period 2010-2019 was proposed, to extend the analysis at least 10 years back from the baseline year proposed by the EC. Although a longer period would in principle be better, the farther in time we search, the less data is available in the EFFIS reports. For the purpose of this document, this 10-year period was considered a good balance between the need to extend the baseline period and the availability of data per country.

In order to assess the yearly differences in fire occurrence during this ten-year period, the yearly burned area per country for the period 2010-2019 was extracted from the EFFIS statistical portal³, and its results are shown in Figure 1 (the table showing the data is available in the Annex as Table A6). Figure 2 shows the area burned relative to the total area of each country (the data are available as Table A7). EFFIS estimates the BA based on information from the Moderate Resolution Imaging Spectroradiometer (MODIS) onboard the TERRA and AQUA satellites, and in recent years Sentinel-2 MultiSpectral Instrument (MSI) data have also been included. Still, EFFIS indicates that fires smaller than 30 ha are not mapped (San-Miguel-Ayanz et al. 2020).

As shown in Figure 1 and Figure 2, the BA corresponding to Portugal in 2019 is much lower than the median burned area for the period 2010-2019. On the contrary, the BA of 2019 is the highest in the ten-year period for France, Kosovo, North Macedonia, Romania, Serbia, and the United Kingdom. For this reason, we propose to use median information for the period 2010-2019 instead of only 2019, whenever consistent data for this period are available from the sources used for this document. Nevertheless, the data corresponding to 2019 are still emphasized, to keep the original baseline year as an option if the EC prefers to use it.

³ <https://effis.jrc.ec.europa.eu/apps/effis.statistics/estimates>, accessed on January 2023.



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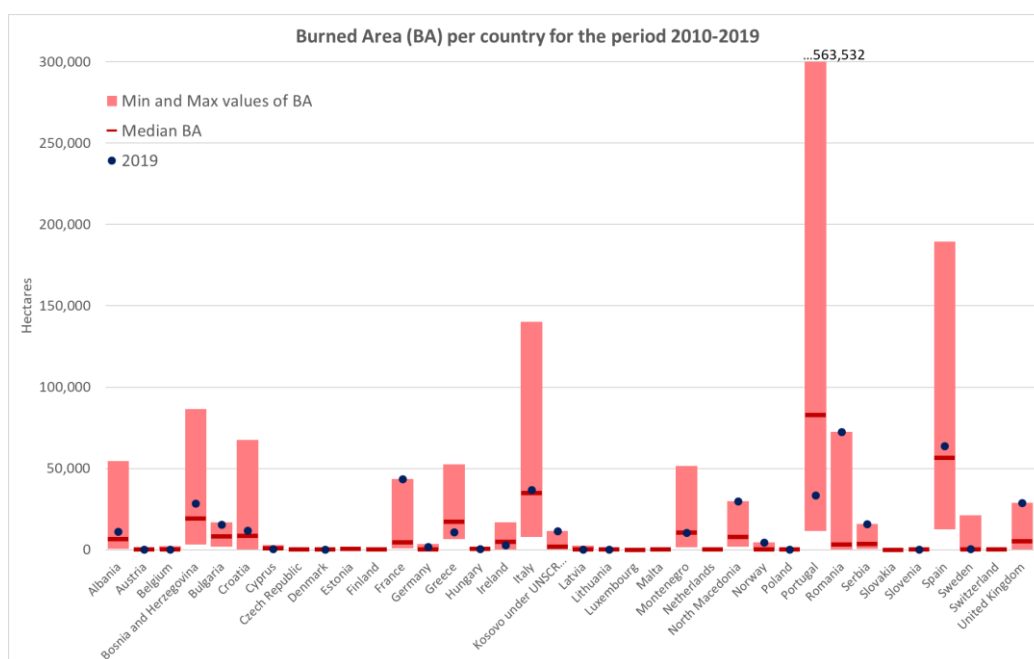


Figure 1: Burned area per country in Europe for the period 2010-2019, showing the minimum, maximum, and median BA during that period, plus the BA corresponding to 2019.⁴

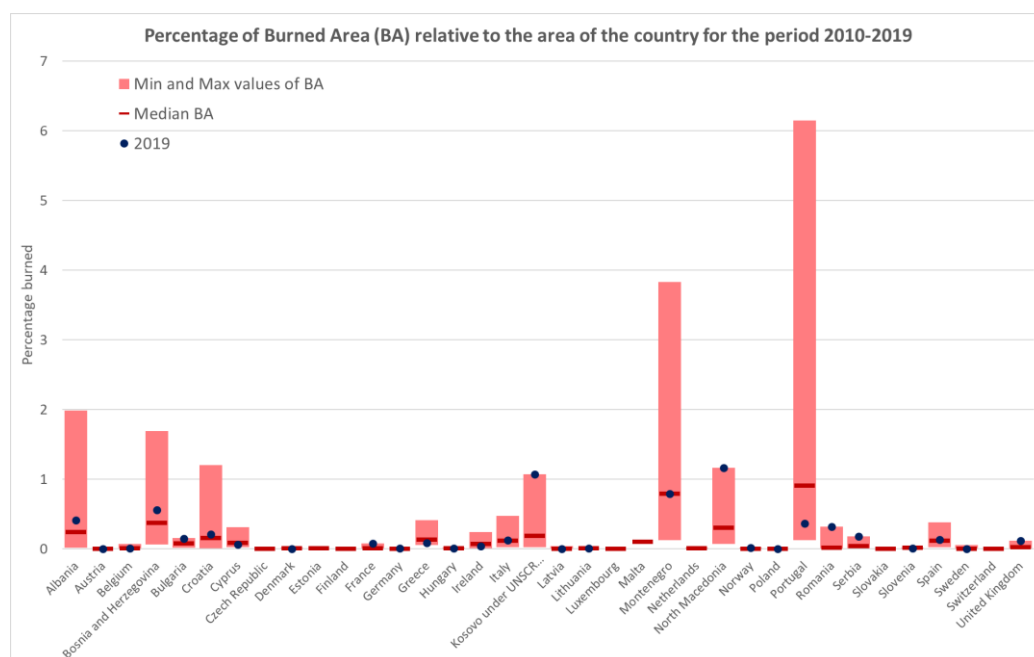


Figure 2: Burned area relative to the area of the country in Europe for the period 2010-2019, showing the minimum, maximum, and median area during that period, plus the area corresponding to 2019.

⁴ Since the BA of Portugal is the highest of all the countries in Europe, and its maximum is more than two times higher than the next country with maximum BA (Spain), the vertical scale of the figure has been shortened to a value lower than Portugal's maximum, in order to better show the values of countries with low BA. The exact value of BA of Portugal is shown above its bar. The same criterion has been used for the figures related to emissions from fires.



3 Baseline data for the different targets

The following sub-sections provide an analysis of each of the targets at European level based on data available at European scale for the period 2010-2019.

The Commission Regulation (EC) N° 1737/2006 (European Parliament 2006), in its Chapter III and Annex II, mandates the Member States to provide data to EFFIS on forest fires occurring in their territories. The information to be provided is: first alert, first intervention and extinction date and time; location of the outbreak; total fire damaged area; breakdown of the fire-damaged area into forest and other wooded land and non-forested areas; and presumed cause of the fire. Complementary, the document “The European Fire Database Technical specifications and data submission” (Camia et al. 2014) describes in detail the data items, the formats required for submission, and the process of data validation and storage. However, not all the Member States provide this information in a consistent way or it is provided using national standards instead of in a harmonized way across Europe (e.g. fire causes), and there are gaps in country information (see tables in the Annex).

For the targets indicated in Subsections 3.1, 3.2, 3.6 and 3.8, the data that is presented is extracted from the EFFIS annual reports corresponding to the period 2010 to 2019 (Schmuck et al. 2011; Schmuck et al. 2012; Schmuck et al. 2013; Schmuck et al. 2014; Schmuck et al. 2015; San-Miguel-Ayanz et al. 2016; San-Miguel-Ayanz et al. 2017; San-Miguel-Ayanz et al. 2018; San-Miguel-Ayanz et al. 2019; San-Miguel-Ayanz et al. 2020). Each country reports their yearly fire occurrence and characteristics in a semi-harmonised way, and not all countries include the information related to the EC targets. What is more, some countries provide information related to a target (e.g., fatalities) some years but not others. As such, the information is in some cases incomplete, but it is what is available. For this reason, the minimum, maximum and median values should be used with caution, as the input data to obtain these values is often incomplete. Still, we consider this a first step towards providing a baseline of the targets that the IAs could use as a starting point to perform an analysis of their contribution.

3.1. 0 fatalities from wildfires

There is no legal mandate by the EC for the countries to provide national information on fatalities from wildfires. Still, many countries report to EFFIS both the number of deaths and injuries due to fires on a voluntary basis. This includes those corresponding to fire fighters and of other people affected; only a few countries (e.g., Greece, Portugal) differentiate between fire fighters and civilians affected. For most of the countries, no information is provided as to the fatalities being as a direct consequence of the fire (i.e. while the fire was still active) or as an indirect consequence (e.g., fatalities some weeks or months after the fire due to smoke inhalation). Only a few countries (e.g. Portugal) indicate the cause of the death or the injury, and in the case they do, the causes are always related to activities directly associated to the wildfire (firefighting, escaping the fire, etc.). It is believed that even in those countries that have a more extensive and complete database on fatal accidents associated to wildfires, the numbers are underestimated. For example, there are several



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accidents related to agricultural burns that escape to control and cause victims, including very often the author of the burn. In Portugal alone it is estimated that there are between 5 to 10 such accidents per year, but quite often they are not reported at national scale⁵.

The information provided by the countries is not always consistent, because through the different reports some countries inform fatalities and injuries in some years, and not in others. The complete list of information provided by the different countries regarding fatalities and injuries is shown in Table A8. A summary, showing only the data on fatalities provided during 2019, plus the minimum, maximum and median values of the data provided for the period 2010-2019 is included in Table 1.

Table 1: Fatalities informed in the EFFIS yearly reports by each country in 2019, as well as the maximum, minimum, median and sum of fatalities reported in the period 2010-2019

Countries	2019	Fatalities 2010-2019			
		Max	Min	Median	Sum
Austria		0	0	0	0
Belgium		0	0	0	0
Bulgaria	0	0	0	0	0
Croatia		36	0	1	62
Cyprus	0	2	0	0	2
Czech Republic	0	2	0	1	9
Estonia		1	0	0	1
Finland	0	1	0	1	5
France	1	2	0	0	6
Greece	3	101	0	2	0
Hungary	0	0	0	0	117
Ireland	0	1	0	0	0
Italy	1	9	1	3	1
Latvia		0	0	0	19
Lithuania	0	0	0	0	0
Netherlands	0	0	0	0	0
Norway	0	1	0	0	0
Portugal		114	0	4	1
North Macedonia	0	5	0	0	0
Slovakia	0	1	0	1	137
Slovenia		0	0	0	5
Spain		7	1	5	0
Sweden		1	1	1	3
Switzerland	0	0	0	0	0

⁵ D. X. Viegas, personal communication.



3.2. 50% reduction in accidental fire ignitions

The Commission Regulation (EC) N° 1737/2006 (European Parliament 2006), in its Annex II, mandates the Member States to provide information on presumed fire causes classified into four categories:

- Unknown;
- Natural cause;
- Accidental cause or negligence, meaning connection to a human activity but without any intention of causing the fires (e.g. accidents caused by power lines, railways, works, bonfires, etc.);
- Deliberate cause or arson.

Complementary, the Harmonized classification scheme of fire causes in the EU adopted for the European Fire Database of EFFIS (Camia et al. 2013) proposed a more detailed classification, harmonizing the different existing country-level classifications and creating a hierarchical scheme, and recommending also to include information on the level of confidence of the fire cause. This hierarchical scheme is organized in 6 categories: unknown, natural, accident, negligence, deliberate, and rekindle. Within each category, different groups and classes define the lower two levels of the classification⁶. For example, the Negligence category is sub-divided into “Use of fire” and “Use of glowing objects” groups, and in turn each group is comprised by various classes (e.g., for the “Use of fire” group, some classes are “vegetation management”, “agricultural burning”, “recreation”, etc.).

Still, it is our understanding that the target proposed by the EC in the SoW, when referring to “accidental fire ignitions” is more aligned with the classification of fire causes proposed by the Regulation N°1737/2006, i.e., that the goal of the IAs should be to reduce any source of ignitions caused by human activities, but without the intention to cause a fire. As such, the information of fire causes included in this section merges accidental and negligence causes; those fires classified as rekindle are also included in the accidental/negligence category. As indicated in Section 3.1, the data informed by the countries in the different reports are not always consistent. In some cases, the sum of the percentages of each category is lower than 100%, when the countries do not indicate the cause of all the fires.

The complete list of information provided by the various countries regarding the different presumed causes of the fires is shown in Table A9. A summary, showing only the data corresponding to the accidental/negligence fire causes during 2019, plus the minimum, maximum and median values of the data provided for the period 2010-2019 is included in Table 1.

⁶ See Camia et al. (2006), Table 1.



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Table 2: Percentage of accidental/negligence (A/N) presumed fire causes informed by each country in 2019 in the EFFIS yearly reports, plus summarized data for the period 2010-2019

Countries	2019	Max	Min	Median
Austria	15	60	15	38
Bulgaria	78	82	66	74
Croatia	39	39	39	39
Cyprus	38	67	28	54
Czech Republic	53	53	42	48
Estonia		100	53	64
Finland	70	70	66	66
France	23	23	23	23
Germany	34	37	29	34

Countries	2019	Max	Min	Median
Italy	71.1	71	10	21
Netherlands	16	20	16	18
Poland	30.9	39	27	35
Portugal	40	66	16	34
North Macedonia		60	60	60
Romania	78	83	33	70
Slovakia	74	81	67	74
Slovenia	35	62	34	43
Sweden	30	30	30	30

The values shown in Table 2 should be used with care, because for some countries (e.g. Germany, Portugal, Slovenia, etc.) the proportion of unknown causes is high, and as such, it is not possible to know if the actual cause of the fire might have been an accident or negligence, and as such the real proportion of accidental/negligence causes must be higher than the value reflected in the table.

3.3. 55% reduction in emissions from wildfires

There is no legal mandate by the EC for the countries to provide national information on emissions from wildfires. EFFIS, in its Statistics Portal, offers seasonal trends⁷ for the fires of approximately 30 ha or larger, for all European countries, and for different contaminants. These emissions are extracted from the Global Fire Assimilation System (GFAS) version 1.2, provided by the Copernicus Atmosphere Monitoring Service⁸. These emissions are calculated based on Fire Radiative Power observations from the MODIS sensors, converting them to the dry matter consumed by the fire, and applying emission factors for different contaminants and biomes⁹. Of the 40 contaminants evaluated by GFAS, EFFIS provides information on the following:

- Black Carbon (BC)
- Methane (CH₄)
- Carbon Dioxide (CO₂)
- Carbon Monoxide (CO)
- Non-Methane Hydro-Carbon (NMHC)
- Nitrogen Oxides (NO_x)
- Organic Carbon (OC)
- Particulate matter of size less than 2.5 µm (PM_{2.5})

⁷ <https://effis.jrc.ec.europa.eu/apps/effis.statistics/seasonaltrend>, accessed on February 2023.

⁸ <https://atmosphere.copernicus.eu/>, accessed on February 2023.

⁹ <https://confluence.ecmwf.int/pages/viewpage.action?pageId=153390494>, accessed on February 2023.





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- Sulphur Dioxide (SO₂)
- Total Carbon in Aerosols (TC)

Each hourly observation for each contaminant from GFAS is added in EFFIS to obtain daily emissions and are then allocated to the different countries resampling a raster map of the countries' borders to the resolution of the GFAS dataset (0.1 degrees) to calculate the national statistics.

The tables corresponding to the country statistics for each of these 10 contaminants, and for the period 2010-2019, are included in the Annex, in Table A10 to Table A19. Below, the figures corresponding to CH₄ (Figure 3), CO (Figure 4) and CO₂ (Figure 5) are shown. The figures corresponding to the rest of the contaminants are included in the Annex. Even though the trends of the data shown in the figures are similar, and also similar to Figure 1, as the emissions are directly related to the BA, some differences are appreciable, because the total emissions for each contaminant will depend not only on the total burned area, but also on the type of vegetation burned and soil properties. For example, the maximum amount of methane emissions in Bulgaria was higher than those of Bosnia and Herzegovina and Croatia, while that is not the case when analysing carbon monoxide or carbon dioxide emissions.

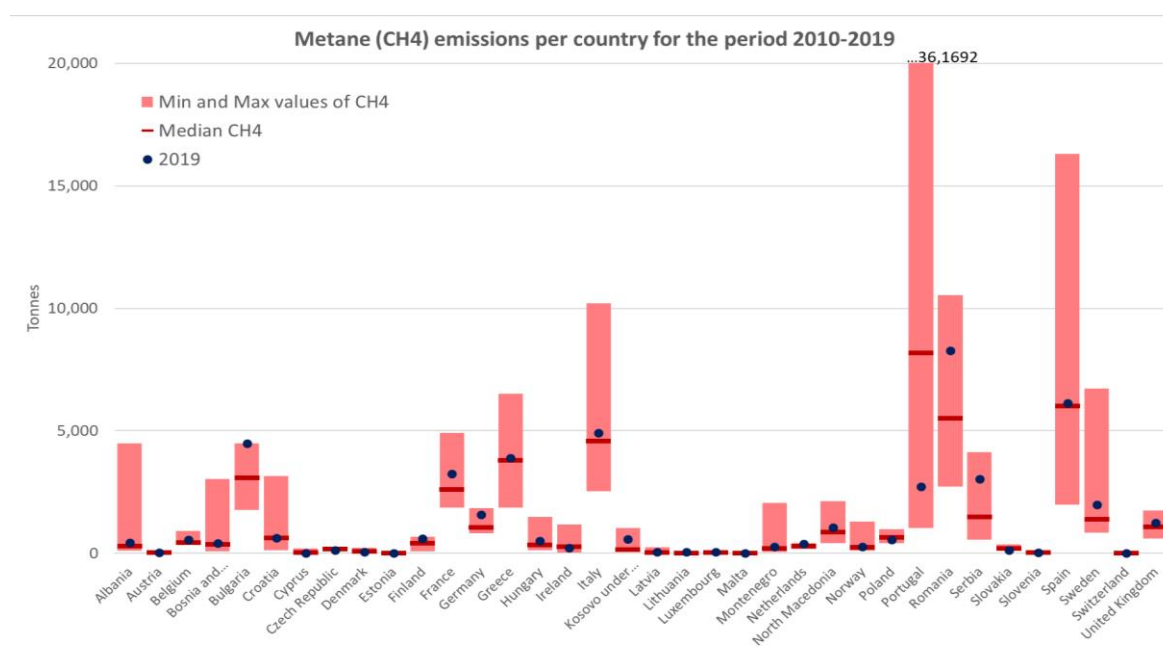


Figure 3: Methane emissions per country for the period 2010-2019





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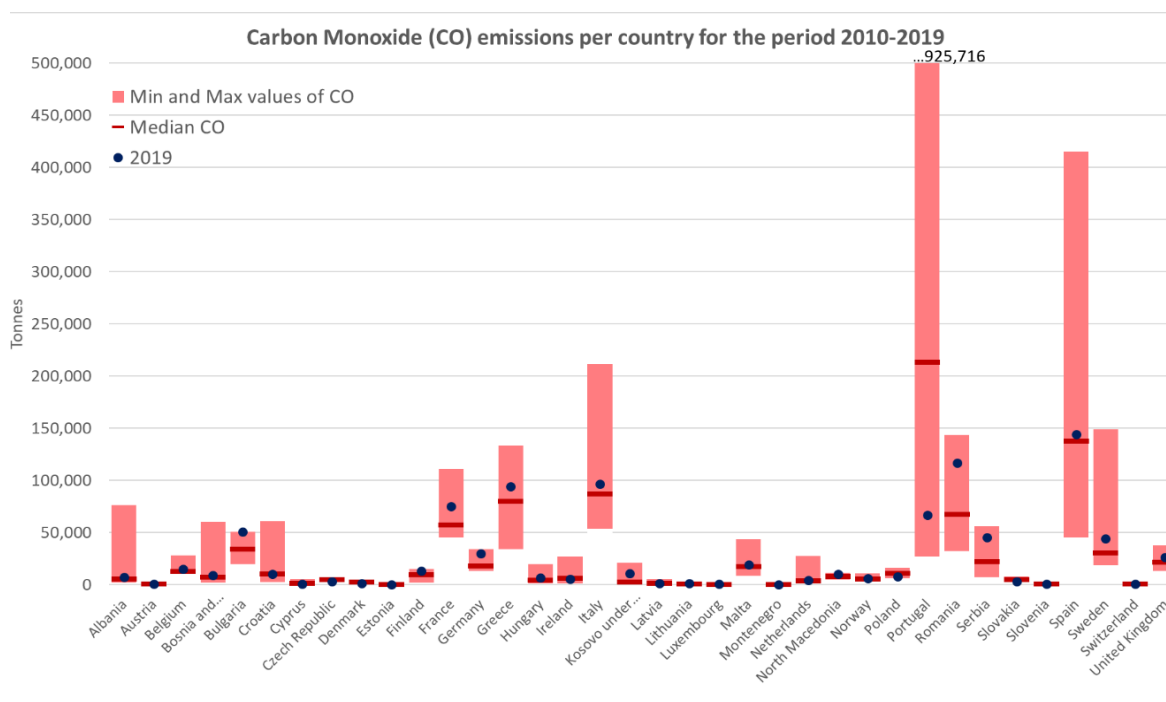


Figure 4: Carbon Monoxide emissions per country for the period 2010-2019

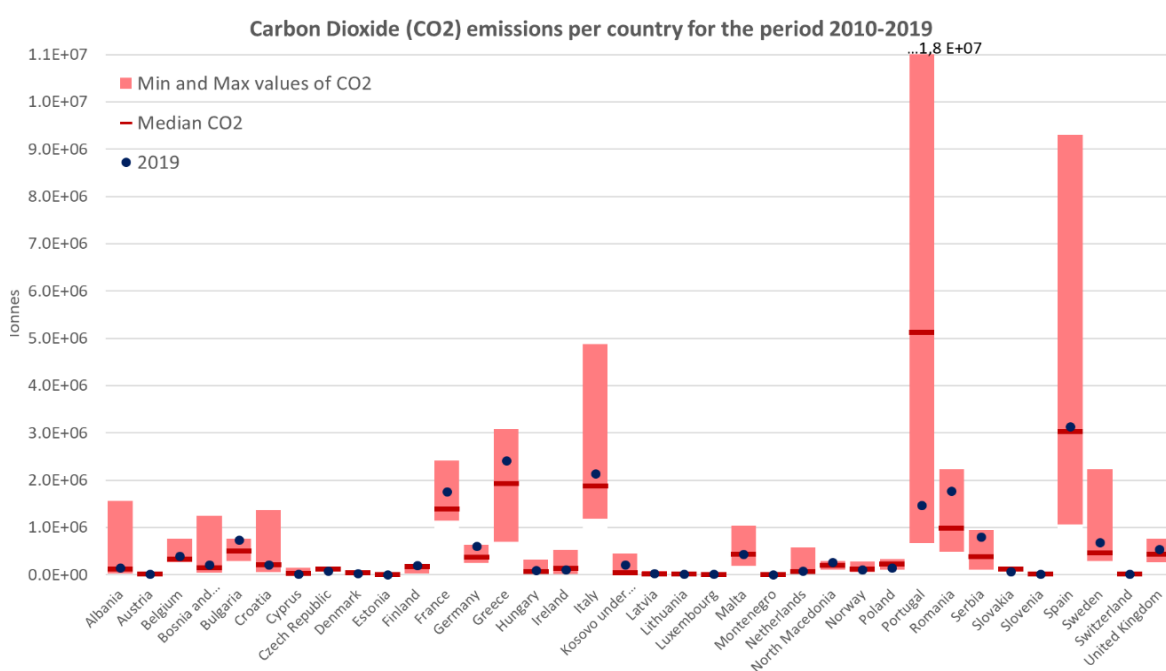


Figure 5: Carbon Dioxide emissions per country for the period 2010-2019





3.4. Control of any extreme and potentially harmful wildfire in less than 24 hours

The member states have to provide to EFFIS information for each fire event in their territory, as requested by Regulation (EC) N° 1737/2006 (European Parliament 2006). The information to be provided includes:

- Date and local time of first alert (when the official forest fire protection services were informed of the outbreak of the fire)
- Date and local time of extinction (when the fire was completely extinguished, i.e., when the last fire-fighting units left the scene of the forest fire)

Although this information should be provided by the countries to EFFIS, not all countries are currently doing it or have delivered it for the past years. What is more, the raw data cannot be provided by EFFIS to third parties (Camia et al. 2014).

Upon request, EFFIS has provided preliminary information, based on more than 2 million records, aggregated per county and year, corresponding to the number of fires with duration (difference between date and time of extinction and date and time of first alert) higher and lower than 24 hours. Complementary, and to have some information on the size of the fires (i.e., to assess if only the small fires were extinguished in less than a day), the database also indicates if the fires were smaller or bigger than 1 hectare. It is important to be aware that this information is still in draft state, as it is currently undergoing validation checks (records with start or end time missing, with negative duration, etc.). The data provided by EFFIS is shown in Table A20, while Table A21 presents those values expressed as percentages of the total yearly number of fires.

A summary corresponding to the year 2019 (for the countries that provided data for that year), showing the percentage of fires with duration <24 hours, and the maximum, minimum and median percentage for the period 2010-2019 is presented in Table 3.

Table 3: Percentage of fires with duration of less than 24 hours

	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2020-2019
Bulgaria	78.96	93.10	78.96	84.24
Croatia	86.61	94.26	70.06	81.69
Cyprus	100.00	100.00	97.78	100.00
Czech Republic	98.67	99.80	98.67	99.37
Estonia	100.00	100.00	90.00	94.72
France	92.07	96.97	89.95	94.19
Germany	98.26	100.00	97.02	99.05
Greece		76.77	75.61	76.19
Hungary	99.95	100.00	98.15	99.94
Italy		97.44	93.00	95.74
Latvia	95.94	100.00	95.62	98.84



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	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2020-2019
Lithuania		93.05	83.91	91.18
Poland	99.74	99.96	99.74	99.85
Portugal	99.75	99.93	98.01	99.62
Romania	88.92	97.11	82.20	90.63
Slovenia		98.90	76.06	92.31
Spain		97.26	94.14	96.11
Sweden	99.39	99.86	97.70	99.42
Switzerland		93.83	82.69	89.74

Although this data is preliminary, and as such the percentages are an estimation, it is still possible to conclude that **the vast majority of the fires are extinguished within the first 24 hours. However, there is no information provided in the database to assess if the fires had the potential to become extreme or harmful.**

Some countries report more than 90% of the fires having a size less than 1 hectare (e.g. Czech Republic, Latvia, Sweden), and these fires are expected to be extinguished in a short period of time. Still, even the countries where most of the fires informed are bigger than 1 hectare (probably because they do not include all small fires, or there are inconsistencies with the dates and/or time of reporting), such as Romania, Croatia or Bulgaria, have most of the fires extinguished in less than a day.

The verification of this Target can be misleading, as it is well known that it is the 2 to 5% of fires that become large fires. Even if the large majority of fires – as shown by the present analysis – are extinguished in less than 24 four hours, this is not the case for the extreme fires. It is also observed that some very large fires spread in less than 24 hours, so the limit of time imposed may not be adequate. In our opinion this target should be better studied, analysing the fires that escaped either a limit of size or of time for suppression, to better specify this target. As it is expressed now it may not provide a feasible and clear goal to the fire suppression system.

3.5. 50% of Natura 2000 protected areas to be fire-resilient

Natura 2000 is a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types that are protected in their own right. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive and the Habitats Directive. Although it includes strictly protected areas, most of the land remains in private ownership. The approach to conservation and sustainable use of Natura 2000 sites is much broader and largely focused on people working with nature rather than against it. However, Member States must ensure that the sites are managed in a sustainable way, both ecologically and economically. Natura 2000 areas cover over 18% of the European Union's





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land area¹⁰. Figure 6 shows the geographic distribution of these areas over land within Europe. These are the regions where the fire-resilience should be evaluated.

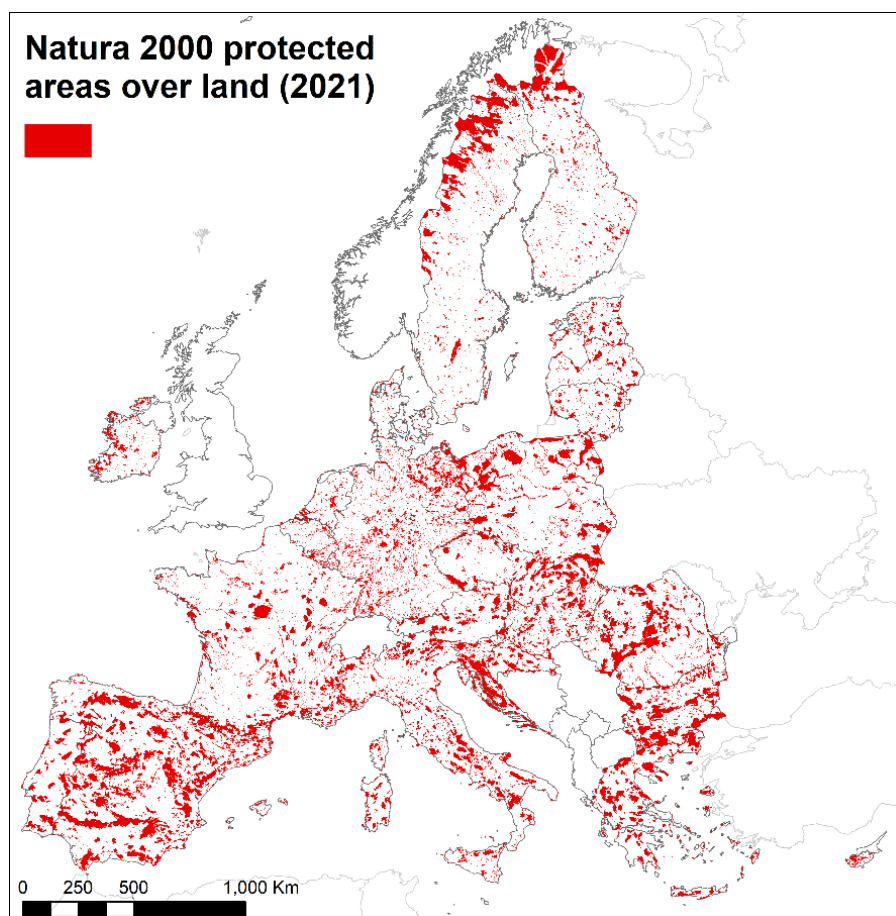


Figure 6: Location of Natura 2000 protected areas over land at the end of the year 2021¹¹.

Resilience has different definitions depending on the field of research that addresses this concept. In the Disaster Risk Assessment field, resilience is defined as: “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management” (United Nations Office for Disaster Risk Reduction 2017). From an ecological perspective, a classic definition of resilience is “the magnitude of disturbance that can be absorbed before the system changes in structure by changing the variables and processes that control behaviour” (Holling 1996). These definitions can include some degree of restoration, but the resilience of an ecosystem will be dependent on its own capacity to recover from a disturbance and how much time is necessary to

¹⁰ https://ec.europa.eu/environment/nature/natura2000/index_en.htm , accessed on February 2023.

¹¹ Obtained at <https://www.eea.europa.eu/data-and-maps/data/natura-14> , accessed on February 2023.





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return to the pre-disturbance state. When assessing resilience from fire disturbances, both aspects (social and ecological) need to be taken into account, as stated in Guidance for IPCC authors on the concept of risk (Reisinger et al. 2020). However, since the target proposed by the EC is specifically oriented towards Natura 2000 areas, the focus of this baseline will be on ecological variables and their sensitivity to fire, which can be used to assess ecological resilience.

No specific threshold exists to state if an ecosystem “is” resilient, or “is not” resilient. Instead, many research studies focus on measuring ecological resilience across space and time and compare its value for different areas or periods. Several authors have proposed different responses to assess differences in resilience and potential causes of variation. Peterson et al. (1998) proposed that the resilience of the ecosystems depend on the distribution of functional groups (species diversity) within and across scales. Smith et al. (Smith et al. 2022) used the vegetation optical depth (VOD), which is function of the vegetation water content and its structure, and usually used as a proxy for above ground biomass, as a measure of vegetation resilience. They also found a positive link between resilience and long-term water availability, and a negative link with inter-annual precipitation variability (Smith and Boers 2023). Other authors also linked resilience and tree mortality to drought conditions in different biomes (Gazol et al. 2018; Anderegg et al. 2020; Moreno-Fernández et al. 2022). In the case of forests affected by fires, North et al. (2022) proposed that minimal competition between trees supports vigorous tree growth, under the premise that resilience in fire-prone forests may require reducing tree densities and suggest as a proxy of this competition the Stand Density Index (SDI), which is based on the combination of number of trees and their size.

The studies mentioned above evaluate different aspects of ecosystem resilience, but each have limitations. For example, SDI might need to be combined with functional traits of different species, which have different adaptations to survive and grow after a fire disturbance, and that could result in higher or lower resilience values of different forests with the same SDI. Measuring resilience only through vegetation water content or biomass also omits the consideration of vegetation species, if those ecosystems are fire-dependent, fire-independent or fire-sensitive (Shlisky et al. 2007), and if those species are maintained or changed after a fire event.

What is more, restoring the original biomass and vegetation distribution after a fire disturbance might not be the best approach to increase resilience, as the predicted changes in climate and a long history of fuel accumulation due to land management practises have made some ecosystems unsustainable in the long term (McWethy et al. 2019). Aligned with this hypothesis, McWethy et al. (2019) differentiated between three forms of resilience:

- Basic resilience: focuses on the capacity of a system to maintain the same general structure, composition and feedback processes following disturbances and other shocks.
- Adaptive resilience: refers to the adaptation to new or dynamic conditions by changing fundamental characteristics of the system.
- Transformative resilience: creation of fundamentally new systems, through a profound shift in the human relationship with wildfire, and that will allow for an intentional transition to a new system that will be desirable under future conditions.





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It is not the objective of this document to indicate which type of resilience should be desirable for the Natura 2000 protected areas, but we consider important to mention these differences, to stress the complex nature of the concept.

EFFIS, in its Pan-European Wildfire Risk Assessment Report (Oom et al. 2022) does not address explicitly the concept of resilience. The authors focus, instead, on “ecological values” that could be vulnerable to fires. They calculate this indicator using the Natura 2000 and the World Database of Protected Areas information, potential burnable land, and an “ecological irreplaceability score” for each protected area (Le Saout et al. 2013), which provides information on biodiversity richness/uniqueness, conservation status and habitat fragmentation. Still, we consider that this indicator is not a good baseline to assess resilience, because it focusses on the ecological “value” of the ecosystems, and not in the capacity of them to recover from fire disturbances.

The H2020 FirEURisk project (Grant Agreement number 101003890) is proposing, as part of its work, an Ecological Vulnerability Index that explicitly considers ecological resilience as a component of vulnerability (the other main component being the potential losses of ecological values), and that is being generated for the whole Europe (including, evidently, the Natura 2000 areas). This project evaluates resilience as a combination of the coping capacity of the ecosystem (the resistance capacity of an ecosystem to be negatively affected by the fire), and the recovery time necessary to return to the full sustainability of the ecosystem. These components, in turn, are based on fire severity, vegetation resistance, plant functional traits related to resprout, bank seed, etc., soil capacity, topographic capacity, historical silvicultural practices, and weather conditions (predisposition of the climate to facilitate regeneration based on solar radiation and precipitation). The input data for this index were obtained in different years, but the index is proposed to represent the conditions of c. 2019-2020.

As such, **we propose to use the Resilience component of the FirEURisk Ecological Vulnerability Index as the baseline for the measure of fire-resilience in the Natura 2000 protected areas**, once this index is published (which will occur during 2023). A possible way for the IAs to assess an increase in resilience after their activities could be to measure the change in any of the variables used to calculate the FirEURisk Resilience component (of course, that will only apply to the variables that can be affected by human intervention, such as silvicultural practices).

3.6. 50% reduction in building losses

There is no legal mandate by the EC for the countries to provide information on monetary value of the losses due to wildland fires. Still, a few countries provide information to EFFIS, which is included in its yearly Reports, although it does not always specify if the losses are only corresponding to buildings, or also include other assets (timber, public infrastructures, etc.), and it does not mention the number of buildings lost. In the case of Romania, it explicitly indicates that the values correspond to forest losses. The existing information on losses from fires is show in Table 4.





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Table 4: Value of losses due to fires indicated in the annual EFFIS reports by a few countries.

Country	Bulgaria	Czech Republic	Germany	Lithuania	Romania
2010	40,000 €	200,000 €	1,200,000 €		19,000 €
2011		300,000 €	900,000 €	20,000 €	91,000 €
2012	1,200,000 €	1,800,000 €	500,000 €	12,000 €	556,000 €
2013	370,000 €	200,000 €	500,000 €	21,000 €	133,000 €
2014	117,000 €	300,000 €	200,000 €	13,000,000 €	15,500 €
2015	380,000 €	700,000 €	837,000 €	44,235 €	392,900 €
2016	3,000,000 €	200,000 €	600,000 €	20,251 €	13,200 €
2017	2,000,000 €	300,000 €	291,000 €	10,031 €	133,000 €
2018	20,000 €	600,000 €	2,669,000 €	45,575 €	30,000 €
2019	1,060,000 €	700,000 €	2,221,000 €	74,084 €	35,800 €
Max	3,000,000 €	1,800,000 €	2,669,000 €	13,000,000 €	556,000 €
Min	20,000 €	200,000 €	200,000 €	10,031 €	13,200 €
Median	380,000 €	300,000 €	718,500 €	21,000 €	63,400 €

No other source of consistent information was found at European level, and for this reason **it is not possible to develop an appropriate baseline assessment for this target.**

3.7. 90% of losses from wildfires insured

There is no legal mandate by the EC for the countries to provide information on the insurance level of assets that were affected by wildland fires.

We understand that a parameter that could provide specific information regarding this target would be one related to “proportion of assets in wildfire-risk areas (e.g. wildland urban interface) insured for fire risk”, but nothing similar to this concept is available publicly. The European insurance companies are not required to release information on proportion of houses or other infrastructures in wildfire-risk areas insured for fire damages, and although they provide some information on Gross Written Premiums (GWP) covering fire damages¹², their numbers do not cover all the insurance companies in Europe, and are not official European values.

The official European institution that collects national data from insurers is the European Insurance and Occupational Pensions Authority (EIOPA). This organization provides statistical data on insurance undertakings and groups in the EU and the European Economic Area, aggregated by country. Although they have information since the early 2000s, this information is not consistent for the period 2010-2019. This is because in 2016 the Solvency II directive (European Parliament 2009) replaced the previous Solvency I one, and the data reported under Solvency II are not directly comparable to the Solvency I ones¹³. What is more, the statistical data under Solvency II is only

¹² DatabaseMarch2022-P&C-N.xlsx, downloaded from <https://www.insuranceeurope.eu/statistics> on February 2023.

¹³ Informed by the EIOPA help desk team by mail on 13/02/2023.





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available starting on 2019, and there is no data available for the period 2016 to 2018¹⁴. For this reason, **for this target only information for the year 2019 is provided.**

Within the insurance statistics made public by EIOPA, the information that is mostly related to the target being analysed is the Non-Life – Line of Business split per country based on GWP – Fire Prop¹⁵. The variable Fire Prop is defined as “fire and other damage to property, as indicated in Directive 73/239/EEC (Council of the European Union 1973), Annex A, 8 and 9”. As such, Fire Prop includes: all damages to or loss of property due to fire, explosion, storm, natural forces other than storm, nuclear energy, land subsidence, hail or frost, and any event such as theft. This means that the information provided by EIOPA is not specific to fire insurance, but that it includes coverage to other risks. This data is provided as GWP in million euros.

In order to provide a parameter that not only values the monetary value of the written premiums, we propose to use the “insurance density”, which is the GWP per inhabitant, as suggested by Insurance Europe¹⁶. The population data was extracted from Eurostat¹⁷, and corresponds to the “Population on 1 January 2020 by age and sex [DEMP_PJAN_custom_503198]”¹⁸. Figure 7 shows the insurance density per country for the year 2019. The values used to create this figure are indicated in Table A22.

The insurance density is not an ideal parameter for many reasons, e.g., not all inhabitants will be at risk from wildfires, especially in urban areas; it does not account for increases in insurance costs due to inflation; it does not provide information of number of houses or other infrastructures insured, etc. Still, using persistency, we would expect that if the insurance density increases, it would be providing fire risk insurance to more people and their related assets. As such, **we propose to use the insurance density as an indirect measure of the level of insurance of a country for damages related to fires.** Another type of insurance that is related to the losses that could occur due to wildland fires is the forest insurance (Brunette and Couture 2023), but this information is not available at EIOPA or other European institutions.

¹⁴ Informed by the EIOPA help desk team by mail on 10/02/2023

¹⁵ This information can be found in Table 18 of the file european-insurance-overview-repor-data-2020.xlsx, available as part of the EIO_Previous_Release.zip file that can be downloaded from https://www.eiopa.europa.eu/tools-and-data/statistics-and-risk-dashboards/insurance-statistics_en, accessed on January 2023.

¹⁶ <https://insuranceeurope.eu/publications/689/european-insurance-in-figures-2019-data/>, accessed on January 2023.

¹⁷ <https://ec.europa.eu/eurostat/web/main/data/database>, accessed on February 2023.

¹⁸ https://ec.europa.eu/eurostat/databrowser/view/demo_pjan/default/table?lang=en, accessed on February 2023. The data of 1 January 2020 was used as it was considered more representative to the population of 2019.





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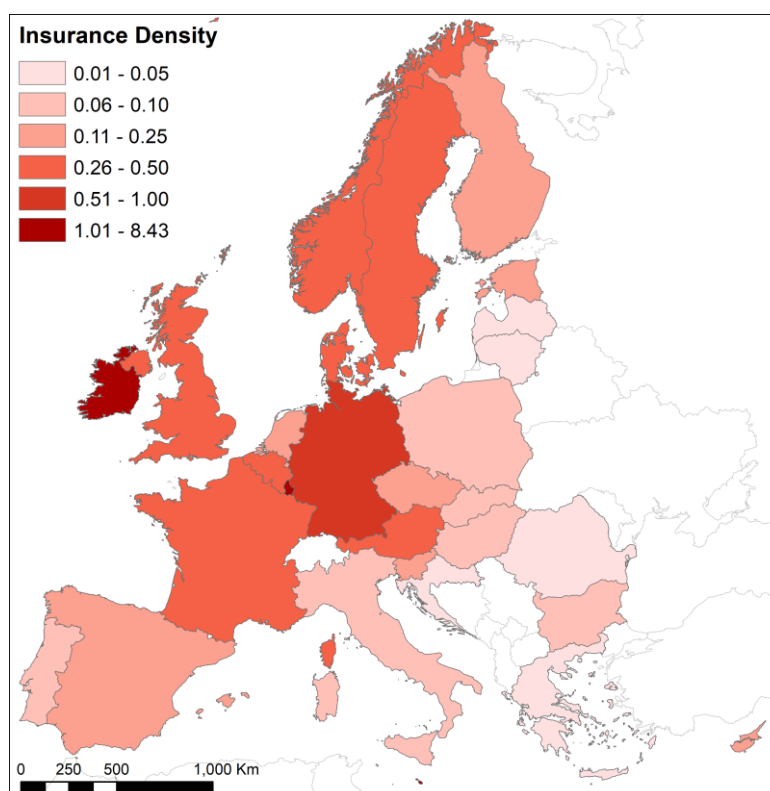


Figure 7: Insurance density (M€ per thousand inhabitants) for the countries that are included in the EIOPA statistics.

3.8. 25% increase in surface area of prescribed fire treatments at EU level

There is no legal mandate by the EC for the countries to provide national information on prescribed fire treatments. Still, a few countries supply information on these kind of treatments in their national reporting to EFFIS as part of their fire prevention activities. The information provided by the only three countries that explicitly inform about area treated with prescribed fires in the yearly EFFIS reports is shown in Table 5. Still, this information is most probably incomplete, as some of the countries that do prescribed burnings, such as Spain or Italy, have the fire prevention and firefighting responsibilities delegated to their regions or autonomous communities, and the regional administrations are not required to communicate fire prevention activities to the national authorities¹⁹ (from where it would be informed to EFFIS). No inference is done regarding maximum or median values of area treated, considering the incompleteness of the information.

Some other countries: Hungary, Ireland and Norway, state in the reports as part of their fire prevention activities that they perform prescribed fires, but do not state any specific area treated.

¹⁹ Personal communications from members of the General Direction in Natural Heritage and Forest Policy of Castilla y Leon (Spain), Wildland Fire Management National Service (Spain), Sardinia Forest Service (Italy).



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Table 5: Area (ha) of prescribed fire treatment informed by a few countries in the EFFIS annual reports

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
France		227	510							
Portugal	2,069	1,147	700	1,127	872	1,159	1,214	694	1,010	4,516
Spain			1,693	1,546		1,888	1,065	1,147	526	1,071

Some regions or countries have explicitly stated in their regulations the use of prescribed fires in fire risk management, e.g. France (Ministère de l'Agriculture 2004), the Autonomous Region of Sardinia, in Italy (Regione Autonoma della Sardegna 2022), or the Autonomous Community of Catalonia, in Spain (Generalitat de Catalunya 2006). The countries or regions that use prescribed burning maintain databases with the information of area burned, date of burn and location, but this information is not publicly accessible²⁰, nor it is homogenized across countries.

Other countries, such as Greece or Cyprus for example, do not perform prescribed burnings. Even though they do not have legislation explicitly forbidding prescribed fires, they have regulation forbidding lighting fires in agricultural areas or near forests or woodlands during the fire season. Greece, for example, only explicitly allows the use of fire as a backfire used to countermeasure an existing wildland fire (Ministry of climate crisis and civil protection – Ministry of environment and energy, 2022).

For the purpose of this document, **no reliable information on past prescribed fire treatments exist to create a baseline for the period 2010-2019 that could be used by the IAs.**

The FirEUrisk project, as part of its activities, has developed a map showing the areas of Europe that are most suitable for prescribed burning as a land management activity to reduce fire risk, using as suitability factors the days with weather conditions appropriate for prescribed burning and the difficulty to transport labour forces and equipment to perform the burnings. This map has been sent for publication in a scientific journal, and will also be available as part of FirEUrisk Deliverable D2.3 due in August 2023. Although this map does not provide information on past prescribed fires, it identifies countries and regions that would benefit most from prescribed fire treatments, and as such it could be used to guide the IAs towards focusing their effort to increase prescribe fires in those areas.

4 Conclusions

Creating a baseline assessment for the targets proposed by the EC is a very complex task, and it has many limitations. The only way to develop a homogeneous baseline for the whole Europe would be to use standardized data at European level, and from reliable (if possible governmental) sources.

For some targets, this information is available to a point, based on the data informed by the countries to EFFIS. That is the case for the targets related to fatalities, fire duration and fire causes. Still,

²⁰ Personal communication from S. Lahaye and D. Salis.



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although a legal mandate exists {European Parliament, 2006 #1203} to provide information on fire duration and cause, not all countries are complying with it, and this makes the information available limited. Regarding other targets, such as fatalities, losses from fires or prescribed burning, countries only provide information to EFFIS on a voluntary basis, and as such, the information is even more scarce. The target on the duration of extreme fires suppression must be revised based on better study of the statistics of very large fires in order to formulate this target more clearly and in a feasible way.

For other targets, such as emissions, Natura 2000 fire resilience and fire insurance, the countries do not provide any information to EFFIS. In the case of the fire emissions, EFFIS provides this information by country based on another existing product at European level (GFA) based on remote sensing and modelling, and as such, it can be considered to be consistent in time and space. But for the target of fire emissions to be achieved, the actual action to accomplish would be to reduce the burned area per country, since it is the main variable from which the emissions are calculated.

In the case of fire resilience, and as explained in Section 3.5, it is not possible to assess if a protected area is “resilient” or “not resilient” per se, because a clear threshold between these two states does not exist. We propose in this document a potential way to assess if an area becomes “more resilient” than in the baseline, using the methodology developed by FirEUrisk. And in the case of fire insurance, only a very indirect parameter is proposed, because insurance coverage in term of buildings instead of monetary value is not available publicly (it is only kept by the insurance companies and not shared), and that does not even take into account the subdivision that should be necessary to account for buildings only in fire-risk areas. A similar case happens with the building losses, where no consistent information is available, and as such, it is not possible to propose a consistent baseline.

Finally, the use of prescribed fires as a land management to reduce fire risk is directly dependent on the fire risk and fuel treatment policies of the different countries, and even regions within each country. In the regions/countries that perform prescribed burnings, the databases of past actions are not public, and this hampers the possibility to propose a baseline value to use as a comparison.

As a final conclusion, it is not possible to provide reliable baseline values for many of the targets proposed in the call. The information available has been included in this document, but it has limitations regarding completeness, and not always covers the whole European territory. Still, we hope that the data presented will serve as a starting point for the Is to evaluate the results of their actions.

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7 Annex

This Annex includes the tables with the data shown in Figure or map format within the report. In some sections, a graphical format was selected for the report content to make it easier for the reader to visualize and interpret the data while reading the document, but the data used to create these visualizations is included here in table format in case the readers want to evaluate it with more detail. In other sections, only a summarized version of the data is presented, while the complete information is shown in this annex.

Table A6: BA per country (in ha) for the period 2010-2019 extracted from EFFIS statistics

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	8,114	54,370	53,459	1,233	431	3,768	5,038	41,822	3,281	11,302	54,370	431	6,576
Austria										38	38	38	38
Belgium		2,180				80	54		166	287	2,180	54	166
Bosnia and Herzegovina	3,349	23,397	86,519	3,459	3,203	4,989	34,485	82,852	3,113	8,465	86,519	3,113	19,193
Bulgaria		1,969	16,928	2,966		3,346	11,483	5,214	1,973	15,503	16,928	1,973	8,349
Croatia	330	5,368	33,056	1,017	304	7,870	9,086	67,423	1,234	11,872	67,423	304	8,478
Cyprus	1,104	939	2,349	2,834	436	197	2,738	652	417	596	2,834	197	796
Czech Republic								145			145	145	145
Denmark								131	463	80	463	80	131
Estonia									385		385	385	385
Finland								210	303		303	210	257
France	4,653	4,831	3,298	891	4,667	2,046	10,767	20,626	2,581	3,602	43,602	891	4,660
Germany				133		105	314	57	3,622	2,006	3,622	57	224
Greece	6,472	5,713	52,487	19,762	14,815	1,613	31,707	20,041	2,037	10,736	52,487	6,472	17,289
Hungary			960	138		1,610		458	96	528	1,610	96	493
Ireland		16,724		8,211	141	6,807	1,177	7,219	2,840	2,820	16,724	141	4,824
Italy	34,280	36,997	82,856	15,776	13,176	7,773	35,246	40,214	4,002	6,887	140,214	7,773	34,763
Kosovo under UNSCR 1244		936	9,509	244		2,652	295	5,373	1,332	11,601	11,601	244	1,992
Latvia								35	2,493	49	2,493	35	49
Lithuania										236	236	236	236
Luxembourg											-	-	-





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Malta									32		32	32	32
Montenegro	2,088	16,180	36,795	1,623		13,534	8,195	51,531	4,331	10,603	51,531	1,623	10,603
Netherlands		148			396				183		396	148	183
North Macedonia	1,692	1,044	25,807	7,813		2,396	3,908	23,541	2,391	29,807	29,807	1,692	7,813
Norway		641		218	3,336	142		260	273	4,515	4,515	142	273
Poland					54	560			345	60	560	54	203
Portugal	127,636	4,442	101,053	153,408	11,550	7,286	165,853	63,532	7,144	33,451	563,532	11,550	82,748
Romania		333	3,023	3,101	2,403	7,320	4,368	30,481	3,287	72,666	72,666	333	3,287
Serbia		681	11,635	1,526		1,011	880	8,256	5,774	5,763	15,763	681	3,650
Slovakia											-	-	-
Slovenia			262				321	188		80	321	80	225
Spain	19,770	60,060	189,376	37,069	2,001	63,560	52,644	130,925	12,433	63,853	189,376	12,433	56,352
Sweden		143		50	3,633	147	99	732	21,320	485	21,320	50	316
Switzerland		74									74	74	74
United Kingdom		7,148		5,445	85	2,127	1,197	5,085	17,689	28,754	28,754	85	5,265

Table A7: Percentage of burned area relative to the area of the country in Europe for the period 2010-2019. BA corresponds to that of Table A6

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	0.296	1.984	1.951	0.045	0.016	0.138	0.184	1.526	0.120	0.412	1.984	0.016	0.240
Austria										0.000	0.000	0.000	0.000
Belgium		0.072				0.003	0.002		0.005	0.009	0.072	0.002	0.005
Bosnia and Herzegovina	0.065	0.457	1.690	0.068	0.063	0.293	0.674	1.618	0.061	0.556	1.690	0.061	0.375
Bulgaria		0.110	0.156	0.027		0.031	0.106	0.048	0.018	0.143	0.156	0.018	0.077
Croatia	0.006	0.275	0.591	0.018	0.005	0.141	0.162	1.205	0.022	0.212	1.205	0.005	0.152
Cyprus	0.119	0.102	0.254	0.307	0.047	0.021	0.296	0.071	0.045	0.065	0.307	0.021	0.086
Czech Republic								0.002			0.002	0.002	0.002
Denmark								0.003	0.012	0.002	0.012	0.002	0.003
Estonia									0.009		0.009	0.009	0.009
Finland								0.001	0.001		0.001	0.001	0.001
France	0.008	0.009	0.006	0.002	0.009	0.004	0.020	0.038	0.005	0.080	0.080	0.002	0.009
Germany				0.000		0.000	0.001	0.000	0.010	0.006	0.010	0.000	0.001





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Greece	0.050	0.277	0.407	0.153	0.115	0.090	0.246	0.155	0.093	0.083	0.407	0.050	0.134
Hungary			0.011	0.002		0.018		0.005	0.001	0.006	0.018	0.001	0.005
Ireland		0.243		0.119	0.002	0.099	0.017	0.105	0.041	0.041	0.243	0.002	0.070
Italy	0.116	0.125	0.280	0.053	0.045	0.026	0.119	0.474	0.047	0.125	0.474	0.026	0.118
Kosovo under UNSCR 1244		0.086	0.873	0.022		0.244	0.027	0.494	0.122	1.066	1.066	0.022	0.183
Latvia								0.001	0.040	0.001	0.040	0.001	0.001
Lithuania										0.004	0.004	0.004	0.004
Luxembourg											0.000	0.000	
Malta									0.100		0.100	0.100	0.100
Montenegro	0.155	1.203	2.736	0.121		1.006	0.609	3.831	0.322	0.788	3.831	0.121	0.788
Netherlands		0.004			0.012				0.005		0.012	0.004	0.005
North Macedonia	0.066	0.818	1.004	0.304		0.093	0.152	0.916	0.093	1.159	1.159	0.066	0.304
Norway		0.002		0.001	0.009	0.000		0.001	0.001	0.012	0.012	0.000	0.001
Poland					0.000	0.002			0.001	0.000	0.002	0.000	0.001
Portugal	1.393	0.703	1.103	1.675	0.126	0.516	1.811	6.152	0.405	0.365	6.152	0.126	0.903
Romania		0.001	0.013	0.013	0.010	0.032	0.019	0.132	0.014	0.316	0.316	0.001	0.014
Serbia		0.008	0.133	0.017		0.012	0.010	0.094	0.066	0.180	0.180	0.008	0.042
Slovakia											0.000	0.000	
Slovenia			0.013				0.016	0.009		0.004	0.016	0.004	0.011
Spain	0.040	0.120	0.379	0.074	0.044	0.127	0.105	0.262	0.025	0.128	0.379	0.025	0.113
Sweden		0.000		0.000	0.033	0.000	0.000	0.002	0.052	0.001	0.052	0.000	0.001
Switzerland		0.002									0.002	0.002	0.002
United Kingdom		0.071		0.023	0.000	0.009	0.005	0.021	0.073	0.119	0.119	0.000	0.022





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Table A8: Fatalities (F) and injuries (I) from wildfires

Countries	2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		Fatalities 2010-2019			
	F	I	F	I	F	I	F	I	F	I	F	I	F	I	F	I	F	I	F	I	Max	Min	Median	Sum
Austria	0		0		0		0		0		0		0		0		0	10			0	0	0	0
Belgium															0						0	0	0	0
Bulgaria					0		0		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Croatia					36	126	22	83	0	3	2	12	0	13	1	101	1	9			36	0	1	62
Cyprus		1		1		4	0	0	0		0		2		0		0	6	0		2	0	0	2
Czech Republic	1	12	1	27	2	30	0	7	2	10	1	33	0	6	2	10	0	35	0	31	2	0	1	9
Estonia											1		0		0						1	0	0	1
Finland	1	12	1	17	0	6	1	12	1	3	0	3	0	4	1	4	0	2	0	1	1	0	1	5
France	0	30	0		2	50	0		0		1		2	2	0		0		1		2	0	0	6
Greece	0		2		4	13	2	21		17	1	14	2	6	2	28	101	120	3	9	101	0	2	0
Hungary	0	0	0	0	0		0	0	0				0		0	0	0	0	0	9	0	0	0	117
Ireland	1		0		0		0	0	0		0	0	0	0	0	0			0	0	1	0	0	0
Italy	3	55	4	50											9		2	19	1	13	9	1	3	1
Latvia							0										0				0	0	0	19
Lithuania	0		0		0		0		0		0		0		0		0		0	0	0	0	0	0
Netherlands																	0	0	0	0	0	0	0	0
Norway			0		0		0		0		0		0		0		1		0	0	1	0	0	0
Portugal	4		3		7		9		0	146	0		0		114						114	0	4	1
North Macedonia	0		0	7	5	12									0	4	0		0		5	0	0	0
Slovakia	0			4	1	5		1	1	1		1		1	0	1	1	2	0	2	1	0	1	137
Slovenia	0		0																		0	0	0	5
Spain	5														7	40	1	12			7	1	5	0
Sweden									1	1							1	10			1	1	1	3
Switzerland	0		0		0		0		0		0		0		0		0		0	0	0	0	0	0





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Table A9: Percentage of fires reported by the countries for the period 2010-2019 in the following categories:

A/N: accidental/negligence; N: natural; D: deliberate; U: unknown.

Countries	2010				2011				2012				2013				2014				2015			
	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U
Austria																								
Bulgaria	79	1	7	14	66	1	6	27	68	5	8	19	70	3	12	15	82	2	3	13	68	3	10	19
Croatia																								
Cyprus	59	8	28		55	7	32		53	15	27	5	67	4	19									
Czech Republic																								
Estonia	53				75	4			100				68				60				55			
Finland		12											66	10		15	66	10		15	66	10		15
France																								
Germany	29	4	21	46	31	4	17	48	34	6	19	41	36	4	18	42	35	4	20	41	32	5	19	44
Italy	67								21	0	41	38					11	1	64	24	10	1	60	29
Netherlands																								
Poland	39	1	43	16	35	1	44	20	36	1	43	20	35	1	42	22	37	1	40	22	38	1	49	19
Portugal	16	1	15	68	21	1	16	62	36	0	16	48	35	0	19	46	66	0	32	66	33	1	18	48
North Macedonia																								
Romania	33	1	2	50	52			48	71	1	0	28	62	3	3	32	67			33	69	2	1	28
Slovakia	76	2	5	17	81	0	3	17	79	2	8	11	76	2	14	8	73	1	17	8	69	5	10	17
Slovenia	47	9	16	28	62	3	7	28	43	4	11	42					43	11	11	34	39	3	4	54
Sweden																								

Table A9 continued.

Countries	2016				2017				2018				2019				A/N percentage 2010-2019		
	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	Max	Min	Median
Austria						10			60	19	8	13	15	30	15		60	15	38
Bulgaria	76	4	5	15	78	3	6	13	72	4	6	19	78	1	5	16	82	66	74
Croatia													39	6	2	53	39	39	39
Cyprus									28	15	57	21	38	23	39	14	67	28	54
Czech Republic					48	2	2	48	42	1	4	53	53	1	3	43	53	42	48
Estonia	64																100	53	64
Finland									70				70				70	66	66





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Countries	2016				2017				2018				2019				A/N percentage 2010-2019		
	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	A/N	N	D	U	Max	Min	Median
France													23	2	9	66	23	23	23
Germany	37	2	26	35	29	5	30	36	33	5	13	49	34	6	16	44	37	29	34
Italy													71.1	2		26.9	71	10	21
Netherlands									20		17	56	16		17	67	20	16	18
Poland	27	1	43	19	31.4	0.9	44.9	22.8	31.9	0.79	40.8	26.5	30.9	1.2	42.6	25.3	39	27	35
Portugal	33	1	17	49	34	1	16	49	40	1	12	47	40	1	18	41	66	16	34
North Macedonia					60	0	15	25									60	60	60
Romania	70	1	1	28	83			17	72	1		27	78		1	21	83	33	70
Slovakia	72	0	9	19	67	6	7	20	68	3	7	21	74	2	3	20	81	67	74
Slovenia	39	8	3	50	47	1	2	50	34	19	9	38	35	6	17	42	62	34	43
Sweden										11			30	5	22	43	30	30	30

Additional note:

- Hungary does not provide specific values for the different fire causes, but indicates in the different reports that the fire causes are 95-99% human induced, mostly induced by negligence and a small proportion due to arson.





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Table A10: Black Carbon (BC) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	13.89	132.13	466.06	12.14	8.65	30.01	20.86	160.37	39.83	43.67	466.06	8.65	34.92
Austria	3.86	3.49	2.91	4.05	7.47	7.09	0.94	3.63	3.13	3.36	7.47	0.94	3.56
Belgium	75.21	82.2	84.73	212.57	89.91	85.52	163.28	93.9	106.77	111.56	212.57	75.21	91.91
Bosnia and Herzegovina	13.44	63.71	376.29	23.42	15.64	41.9	46.7	194.6	11.57	63.23	376.29	11.57	44.30
Bulgaria	92.93	234.23	241.14	151.34	109.41	112.86	165.63	185.12	113.76	235.63	241.14	92.93	158.49
Croatia	21.17	232.5	248.07	15.14	16.07	141.18	60.79	397.98	32.63	62.32	397.98	15.14	61.56
Cyprus	30.79	8.19	23.97	41.35	5.06	6.17	16.41	6.54	6.27	3.67	41.35	3.67	7.37
Czech Republic	38.81	36.44	23.24	32.64	48.88	29.9	42.6	32.84	20.97	22.52	48.88	20.97	32.74
Denmark	6.18	10.44	28.17	20.17	10.32	12.63	17.5	27.92	13.68	9.46	28.17	6.18	13.16
Estonia	0.77	1.93	0.18	1.01	1.21	1.07	0.89	0.63	6.39	1.22	6.39	0.18	1.04
Finland	27.15	63.87	71.49	80.29	10.37	12.93	32.34	50.22	66.88	71.55	80.29	10.37	57.05
France	442.29	361.56	483.46	328.45	387.81	354.73	547.81	724.53	326.08	514.95	724.53	326.08	415.05
Germany	75.88	149.02	86.79	103.33	85.35	107.42	112.52	114.88	197.63	184.31	197.63	75.88	109.97
Greece	285.32	418.67	923.39	373.5	204.92	280.19	768.89	763.59	687.96	649.96	923.39	204.92	534.32
Hungary	21.72	55.39	99.89	14.76	23.18	23.23	7.22	18.24	12.24	31.29	99.89	7.22	22.45
Ireland	61.68	145.05	5.98	37.16	9.28	73.18	10.36	48.62	42.34	33.91	145.05	5.98	39.75
Italy	440.07	753.78	1076.37	479.2	584.67	414.2	528.91	1418.67	350.45	626.63	1,418.67	350.45	556.79
Kosovo under UNSCR 1244	6.78	78.7	132.98	9.28	7.43	12.74	4.97	22.11	12.51	63.34	132.98	4.97	12.63
Latvia	2.65	7.28	1.88	5.66	6.92	5.72	4.83	3.93	28.27	8.35	28.27	1.88	5.69
Lithuania	3.66	2.19	3.42	2.77	3.13	12.51	1.75	2.3	2.7	5.69	12.51	1.75	2.95
Luxembourg	0.92	0.53	0.71	0.64	0.71	2.38	1.5	2.95	2.34	3.22	3.22	0.53	1.21
Malta	0	0.22	0	0	0	0	0.13	0.71	1.11	0.15	1.11	0.00	0.07
Montenegro	6.9	67.56	170.6	5.96	9.66	38.67	15.73	128.66	11.54	24.98	170.60	5.96	20.36
Netherlands	39.28	61.79	32.92	57.12	43.11	55.19	33.53	83.14	59.98	74.82	83.14	32.92	56.16
North Macedonia	123.93	233.85	296.06	195.41	106.11	124.09	76.18	92.01	54.15	127.12	296.06	54.15	124.01
Norway	16.68	27.36	58.2	31.26	56.11	30.43	39.01	16.26	78.95	36.35	78.95	16.26	33.81
Poland	44.99	73.02	85.51	64.65	76.66	98.52	68.89	33.94	35.19	44.26	98.52	33.94	66.77
Portugal	1625.73	1441.54	1447.65	2000.89	191.62	938.76	2115.04	5236.64	601.39	442.93	5,236.64	191.62	1,444.60
Romania	230.31	723.23	714.66	272.84	301.78	276.47	342.17	493.32	155.2	584.51	723.23	155.20	321.98
Serbia	67.71	294.59	260.9	87.99	36.05	68.64	51.51	149.83	215.65	250.31	294.59	36.05	118.91





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Slovakia	40.45	40.76	49.18	27.6	26.9	21.51	42.95	37.34	32.64	20.78	49.18	20.78	34.99
Slovenia	1.31	2.49	4.69	4.78	1.42	2.11	5.1	17.85	1.67	4.51	17.85	1.31	3.50
Spain	544.83	1273.31	2674.22	874.8	470.39	1040.31	806.41	1846.38	309.33	954.81	2,674.22	309.33	914.81
Sweden	101.28	318.36	133.52	118.81	423.33	111.62	125.1	200.21	752.29	239.91	752.29	101.28	166.87
Switzerland	2.14	3.56	1.47	2.33	2.07	2.95	12.89	4.8	5.58	3.27	12.89	1.47	3.11
United Kingdom	137.67	234.44	157.25	130.94	78.58	104.76	124.49	82.32	134.69	164.57	234.44	78.58	132.82

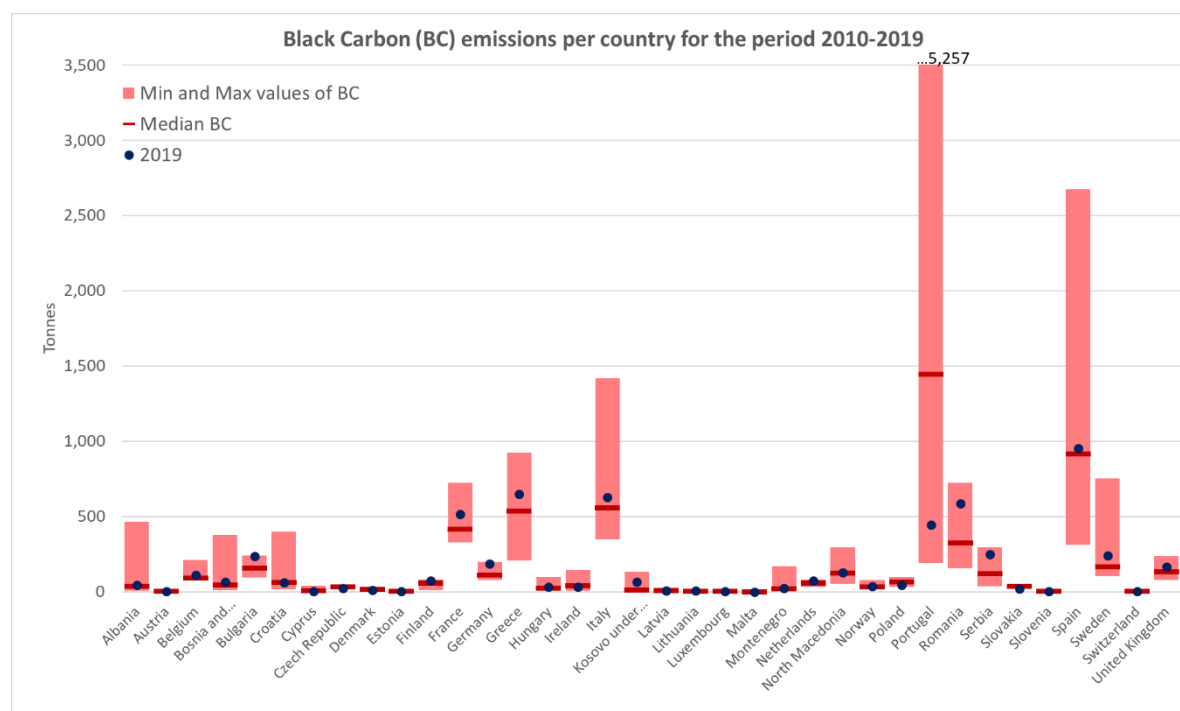


Figure A8: Black Carbon emissions per country for the period 2010-2019





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Table A11: Methane (CH₄) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	239.94	1428.52	4496.89	114.1	133.68	346.44	177.22	1716.86	230.49	441.93	4,496.89	114.10	293.19
Austria	43.79	30.78	19.34	37.9	43.5	42.6	13.07	29.79	23.76	28.53	43.79	13.07	30.29
Belgium	364.7	399.37	410.81	920.52	439.02	416.81	791.74	456.02	519.46	549.79	920.52	364.70	447.52
Bosnia and Herzegovina	130	629.21	3027.43	155.85	110.15	338.98	468.43	1655.94	82.42	414.77	3,027.43	82.42	376.88
Bulgaria	1761.18	3974.78	4426.82	2924.05	2135.12	2164.76	3231.29	3554.62	2226.39	4483.09	4,483.09	1,761.18	3,077.67
Croatia	279.21	2143.13	2533.45	138.41	161.6	862.8	606.64	3165.27	254.41	639.07	3,165.27	138.41	622.86
Cyprus	149.4	39.72	116.32	200.48	24.59	29.87	79.52	31.77	30.41	17.8	200.48	17.80	35.75
Czech Republic	192.09	192.75	126.86	169.14	247.86	157.38	221.93	190.72	119.51	126.17	247.86	119.51	179.93
Denmark	32	59.03	202.24	106.96	57.03	79.38	97.54	220.79	108.89	49.07	220.79	32.00	88.46
Estonia	5.03	13.96	1.52	7.06	7.72	9.15	7.28	4.75	54.56	13.33	54.56	1.52	7.50
Finland	221.67	529.24	542.86	673.82	84.67	86.86	269.23	318.18	552.88	604.8	673.82	84.67	423.71
France	2794.15	2406.92	2813.5	2009.95	2267.12	2134.51	3569.08	4913.71	1878.25	3240.54	4,913.71	1,878.25	2,600.54
Germany	817.29	1440.28	820.21	967.7	909.04	1062.51	1068.43	1150.6	1832.7	1590.98	1,832.70	817.29	1,065.47
Greece	1865.95	3731.72	6209.85	2910.55	2195.79	2431.29	6508.8	4510.27	3927.82	3881.08	6,508.80	1,865.95	3,806.40
Hungary	303.24	918.6	1483.3	265.88	381.44	369.3	120.84	304.72	215.74	506.28	1,483.30	120.84	337.01
Ireland	367.06	1183.42	41.84	186.42	70.57	516.98	65.21	304.58	305.73	233.7	1,183.42	41.84	269.14
Italy	3923.7	6030.32	8453.56	3590.42	4743.16	3082.46	4430.38	10206.44	2530.79	4923.4	10,206.44	2,530.79	4,586.77
Kosovo under UNSCR 1244	82.09	710.71	1033.21	122.2	112.07	143	68.51	272	139.06	591.33	1,033.21	68.51	141.03
Latvia	17.7	52.07	10.79	43.23	41.45	40.25	42.55	28.16	244.22	49.73	244.22	10.79	42.00
Lithuania	21.9	22.67	21.26	19.43	17.8	69.7	9.91	14.93	18.19	56.3	69.70	9.91	20.35
Luxembourg	18.62	10.83	14.21	12.59	14.27	47.42	30.03	58.79	47.14	63.38	63.38	10.83	24.33
Malta	0	1.08	0	0	0	0	0.62	3.43	5.31	0.73	5.31	0.00	0.31
Montenegro	65.35	1059.78	1638.05	67.35	70.72	408.66	158.61	2047.91	135.37	260.06	2,047.91	65.35	209.34
Netherlands	192.11	304.38	179.47	300.6	249.97	270.48	170.49	406.99	316.59	380.61	406.99	170.49	285.54
North Macedonia	702.04	1459.41	2118.17	1112.92	606.16	751.2	489.68	978.59	414.96	1046.93	2,118.17	414.96	864.90
Norway	116.47	226.39	476.46	208.54	440.71	221.28	242.62	1299.72	414.16	264.54	1,299.72	116.47	253.58
Poland	504.31	831.88	970.71	680.87	726.86	995.36	611.01	403.21	441.15	560.11	995.36	403.21	645.94
Portugal	8982.06	7528.22	8808.28	11375.89	1023.13	5031.76	13116.47	36168.96	3122.38	2719.72	36,168.96	1,023.13	8,168.25
Romania	4202.72	10548.54	9805.23	4268.12	4963.7	4235.83	6072.78	6571.08	2713.2	8277.25	10,548.54	2,713.20	5,518.24
Serbia	841.84	4139.7	3274.88	1279.14	545.79	883.08	718.97	1710.76	3193.36	3026.17	4,139.70	545.79	1,494.95
Slovakia	214.24	254.82	358.01	173.35	169.4	145.97	251.12	204.49	187.15	135.46	358.01	135.46	195.82
Slovenia	11.2	19.87	37.73	36.44	11.47	17.6	41.58	140.26	13.93	35.59	140.26	11.20	27.73





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Spain	3785.31	7643.63	16311.86	5774.93	3671.61	6305.48	5888.24	11568.85	1985.11	6129.88	16,311.86	1,985.11	6,009.06
Sweden	834.8	2666.99	1118.69	987.71	3593.72	939.59	1033.17	1678.42	6737.28	1987.89	6,737.28	834.80	1,398.56
Switzerland	14.69	17.62	7.12	12.91	10.12	14.53	63.33	24.32	29.99	16.93	63.33	7.12	15.81
United Kingdom	1108.41	1752.57	1341.18	1150.99	777.13	901.09	831.18	611.35	1058.93	1256.4	1,752.57	611.35	1,083.67

Table A12: Carbon Monoxide (CO) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	2833.06	22241.71	76356.95	1976.4	1699.09	5280.94	3337.77	27848.22	5511.26	7219.49	76,356.95	1,699.09	5,396.10
Austria	674.88	548.94	429.27	740.18	1056.87	1019.12	178.51	580.41	473.22	538.68	1,056.87	178.51	564.68
Belgium	10005.7	10931.47	11266.8	28304.06	11981.97	11381.75	21713.25	12497.29	14211.85	14880.8	28,304.06	10,005.70	12,239.63
Bosnia and Herzegovina	2172.19	10631.09	60075.3	3472.88	2304.74	6437.88	7805.01	32269.59	1731.18	9204.02	60,075.30	1,731.18	7,121.45
Bulgaria	19829.26	47450.03	50660.59	32566.23	23672.3	24214.4	35866.36	39761.68	24658.9	50429.46	50,660.59	19,829.26	34,216.30
Croatia	3825.73	36858.45	40701.12	2460.73	2609.81	19801.21	9929.63	60675.65	4910.22	10262.05	60,675.65	2,460.73	10,095.84
Cyprus	4090	1080	3190	5500	670	830	2170	870	840	500	5,500.00	500.00	975.00
Czech Republic	5181.88	4975.93	3210.33	4438.96	6579.43	4085.54	5773.51	4581.65	2929.78	3127.91	6,579.43	2,929.78	4,510.31
Denmark	853.04	1437.25	4727.25	2770.89	1476.76	1950.72	2516.29	4986.74	2454.14	1305.77	4,986.74	853.04	2,202.43
Estonia	121.66	318.71	33.59	162.42	187.88	201.54	162.68	108.61	1122.96	225.2	1,122.96	33.59	175.28
Finland	4953.87	11772.4	12436.22	14924.58	1893.99	2081.1	5978.56	7793.53	12307.02	13363.32	14,924.58	1,893.99	9,782.97
France	59462.89	53553.37	67926.66	46887	55300.07	50751.84	81953.5	110764.7	45538.25	75164.46	110,764.70	45,538.25	57,381.48
Germany	13066.16	25774.08	14215.37	17368.55	14249.1	17775.84	18540.73	19403.84	33696.77	29669.2	33,696.77	13,066.16	18,158.29
Greece	40699.98	65526.75	133683.03	56021.85	34102.23	51729.24	124441.11	106306.71	95055.48	94306.15	133,683.03	34,102.23	79,916.45
Hungary	4107.07	11255.91	19642.84	3085.6	4670.31	4773.97	1485.08	3693.64	2545.78	6301.41	19,642.84	1,485.08	4,388.69
Ireland	9203.59	26876.86	959.66	5017.8	1616.31	12128.44	1596.7	7489.61	6911.15	5542.46	26,876.86	959.66	6,226.81
Italy	69343.76	116198.96	164145.33	71985.31	91673.96	62620.99	82752.99	211579.91	53635.29	96201.65	211,579.91	53,635.29	87,213.48
Kosovo under UNSCR 1244	1197.13	12645.85	20797.35	1711.9	1436.51	2176.05	962.23	4082.43	2312.04	10559.65	20,797.35	962.23	2,244.05
Latvia	425.49	1214.69	271.31	979.36	1038.67	947.65	865.52	656.3	5301.08	1248.97	5,301.08	271.31	963.51
Lithuania	511.34	370.5	481	436.87	431.25	1728.12	241.63	329.9	388.25	927.28	1,728.12	241.63	434.06
Luxembourg	203.7	118.63	155.43	137.93	156.03	519.14	328.67	643.83	516.39	694.14	694.14	118.63	266.19
Malta	17056.57	32940.62	43238.2	26924.57	14640.17	17355.57	10821.06	15266.13	8062.44	19351.58	43,238.20	8,062.44	17,206.07
Montenegro	0	29.74	0	0	0	0	17.06	94.16	145.65	19.99	145.65	0.00	8.53
Netherlands	1105.98	13167.11	27286.45	1012.56	1470.02	6459.16	2564.19	25204.15	1996.46	4117.69	27,286.45	1,012.56	3,340.94





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
North Macedonia	5251.37	8287.33	4674.56	7949.56	6342.62	7384.68	4574.5	11116.05	8360.91	10213.71	11,116.05	4,574.50	7,667.12
Norway	2750.32	5039.42	10641.54	5007.96	9983.03	5148.45	5982.81	2745.94	10967.65	6151.53	10,967.65	2,745.94	5,565.63
Poland	7628.91	12435.51	14570.22	10692.02	12212.76	16091.36	10747.71	5901.22	6302.83	7848.43	16,091.36	5,901.22	10,719.87
Portugal	231940.81	200713.4	225849.27	281965.1	26751.88	130952.67	318038.56	925716.04	84391.84	66495.64	925,716.04	26,751.88	213,281.34
Romania	48393.03	143494.41	139486.52	55833.5	62591.45	55076.57	71873.75	96332.15	32038.59	116485.64	143,494.41	32,038.59	67,232.60
Serbia	12419.83	55892.12	47359.03	17389.47	7168.72	12680.23	9998.98	26515.91	42161.79	45108.81	55,892.12	7,168.72	21,952.69
Slovakia	5493.71	5903.98	7465.78	3917.93	3833.11	3100.1	5963.5	5180.95	4540.13	2989.37	7,465.78	2,989.37	4,860.54
Slovenia	246.97	447.76	848.7	834.44	257.77	390.55	929.24	3176.55	308.46	805.3	3,176.55	246.97	626.53
Spain	84065.39	185042.76	415025.31	131828.81	74554.63	150705.84	129347.89	277789.4	45258.61	143846.78	415,025.31	45,258.61	137,837.80
Sweden	18601.14	59737.42	24794.41	21948.12	79305.43	20793.31	23005.12	35729.87	148694.97	44213.6	148,694.97	18,601.14	30,262.14
Switzerland	348.28	477.61	195.21	333.69	277.85	395.27	1728.49	653.3	785.83	451.92	1,728.49	195.21	423.60
United Kingdom	21606.03	37719.94	26283.83	21251.41	12841.53	17256.05	18158.86	12933.53	21319.53	26322.05	37,719.94	12,841.53	21,285.47

Table A13: Carbon Dioxide (CO₂) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	44198	442777	1560095	40664	27569	97964	69502	520013	140442	146474	1560095	27569	119203
Austria	12579	11832	9905	12090	25888	24392	2990	12235	10774	11258	25888	2990	11961
Belgium	267814	292418	301567	756580	320247	304226	581177	334443	380112	396656	756580	267814	327345
Bosnia and Herzegovina	45557	211011	1242205	79861	54137	143125	154685	626676	39575	218156	1242205	39575	148905
Bulgaria	291683	746391	759589	472973	341321	352953	516616	578675	354725	737046	759589	291683	494794
Croatia	69972	794319	840037	50648	54629	496613	205594	1365519	112433	210742	1365519	50648	208168
Cyprus	109660	29140	85370	147170	18040	21920	58360	23320	22330	13070	147170	13070	26230
Czech Republic	137871	128115	81520	115351	173084	105152	150935	115293	73549	78857	173084	73549	115322
Denmark	21620	36842	86789	70803	35303	41235	59625	81714	39878	33010	86789	21620	40557
Estonia	2460	6137	500	3252	3857	3002	2559	1854	19412	3764	19412	500	3127
Finland	78032	182126	213954	227046	29937	41117	91917	163378	190887	201351	227046	29937	172752
France	1450054	1233730	1443385	1140551	1339661	1226496	1847696	2413576	1141975	1763884	2413576	1140551	1391523
Germany	249231	472976	289596	334957	287469	358449	373194	376932	630582	611812	630582	249231	365822
Greece	1000820	1435919	3084203	1294086	692877	975311	2785181	2690216	2426710	2412265	3084203	692877	1924092
Hungary	69874	174157	313217	46770	73254	70876	22282	57664	38419	98832	313217	22282	70375
Ireland	205712	526845	19215	131468	27779	227425	34009	159005	133998	106318	526845	19215	132733





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Italy	1500581	2565090	3684298	1647526	1965087	1415147	1792187	4873300	1178357	2132931	4873300	1178357	1878637
Kosovo under UNSCR 1244	22496	264552	444592	29955	23974	42475	15415	70097	38485	207014	444592	15415	40480
Latvia	8475	22441	6455	17056	23043	17826	14387	11940	79437	27813	79437	6455	17441
Lithuania	12939	7203	12024	9090	11066	44019	6057	8164	9312	19342	44019	6057	10189
Luxembourg	2892	1684	2206	1958	2215	7370	4666	9140	7330	9854	9854	1684	3779
Malta	438194	822490	1033204	690585	375262	437406	267843	311920	188066	439742	1033204	188066	437800
Montenegro	0	796	0	0	0	0	457	2520	3899	535	3899	0	228
Netherlands	23773	218228	582820	20131	32855	130010	53495	415527	38601	84609	582820	20131	69052
North Macedonia	139730	219005	113077	198376	144888	196074	117523	295300	208173	262567	295300	113077	197225
Norway	52121	78176	167197	99524	165046	93151	127649	243809	274583	111146	274583	52121	119397
Poland	151538	245307	287019	218486	262134	334420	236637	113207	115614	146742	334420	113207	227561
Portugal	5571470	5039057	5202349	6987789	664879	3262000	6849872	17970049	2131149	1476468	17970049	664879	5120703
Romania	723914	2225795	2194594	830054	920675	862076	1061970	1508644	489299	1769582	2225795	489299	991322
Serbia	216338	943101	845169	271555	112304	219856	160185	484932	679349	807725	943101	112304	378244
Slovakia	143607	140270	167045	96544	94158	75043	151616	130677	114645	72582	167045	72582	122661
Slovenia	3679	7297	13693	14327	4144	5971	14652	52534	4666	13268	52534	3679	10283
Spain	1807680	4347588	9309025	2937935	1592382	3565500	2714876	6161790	1060674	3129102	9309025	1060674	3033519
Sweden	289644	892756	378206	338166	1189076	315288	357289	544821	2230554	683675	2230554	289644	461514
Switzerland	6687	12495	5225	7944	7437	10440	45844	16819	19267	11510	45844	5225	10975
United Kingdom	461567	758252	502981	433486	265243	340989	429999	271750	446502	536564	758252	265243	439994





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Table A14: Non-Methane Hydro-Carbon (NMHC) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	286.09	1806.61	5762.48	146.73	160.6	430.25	230.41	2142.34	333.32	563.5	5,762.48	146.73	381.79
Austria	54.48	40.25	26.53	46.05	62.02	59.98	15.84	38.94	31.98	37.12	62.02	15.84	39.60
Belgium	554.97	607.12	624.95	1750.69	666.58	633.04	1197.45	693.38	789.49	832.23	1,750.69	554.97	679.98
Bosnia and Herzegovina	167.58	799.69	3946.54	213.75	150.98	450.2	593.92	2113.62	111.89	575.16	3,946.54	111.89	512.68
Bulgaria	2080.79	4745.88	5244.92	3448.46	2515.52	2554.19	3803.12	4193.2	2622.11	5291.8	5,291.80	2,080.79	3,625.79
Croatia	343.91	2791.17	3241.17	178.34	207.6	1230.34	777.87	4225.86	341.92	816.46	4,225.86	178.34	797.17
Cyprus	290.2	284.14	185.09	251.29	371.18	232.23	330.02	274.58	172.46	182.84	371.18	172.46	262.94
Czech Republic	227.2	60.45	176.92	304.97	37.42	45.44	118.42	48.32	46.25	27.09	304.97	27.09	54.39
Denmark	47.19	85.86	256.95	157.27	81.33	106.72	138.56	269.74	132.71	72.18	269.74	47.19	119.72
Estonia	6.64	18	1.81	9.23	10.27	10.87	8.79	5.9	67.47	16.25	67.47	1.81	9.75
Finland	267.55	635.34	674.11	805	102.31	113.53	322.59	426.26	664.29	720.49	805.00	102.31	530.80
France	3635.87	3302.65	4032.13	2838.22	3219.84	3015.48	4862.48	6614.04	2704.37	4505.98	6,614.04	2,704.37	3,469.26
Germany	1024.49	1798.85	1051.88	1225.48	1154	1355.14	1360.3	1453.69	2304.96	2060.52	2,304.96	1,024.49	1,357.72
Greece	2617.82	4893.89	8619.3	3921.71	2790.62	3380.91	8733.82	6486.09	5697.27	5638.6	8,733.82	2,617.82	5,266.25
Hungary	368.02	1094.14	1777.66	315.48	455.38	437.16	143.21	363.51	255.76	604.56	1,777.66	143.21	402.59
Ireland	506.23	1534.42	54.71	279.49	87.61	661.78	87.95	410.31	394.68	301.85	1,534.42	54.71	348.27
Italy	5129.74	8004.92	11293.37	4847.23	6238.67	4149.92	5783.6	13869.68	3391.08	6555.26	13,869.68	3,391.08	6,011.14
Kosovo under UNSCR 1244	101.99	920.49	1363.58	149.33	135.31	179.71	82.26	331.79	168.96	751.98	1,363.58	82.26	174.34
Latvia	23.22	66.29	15.28	53.86	56.99	51.55	52.06	35.65	290.46	68.54	290.46	15.28	52.96
Lithuania	31.47	28.63	30.19	25.71	25.88	101.45	14.29	21.05	25.22	72.39	101.45	14.29	27.26
Luxembourg	21.86	12.74	16.69	14.81	16.76	55.72	35.29	69.09	55.43	74.5	74.50	12.74	28.58
Malta	1021.78	2071.47	2910.55	1617.66	880.46	1074.68	687.3	1245.93	561.7	1396.21	2,910.55	561.70	1,160.31
Montenegro	0	1.65	0	0	0	0	0.95	5.22	8.07	1.11	8.07	0.00	0.48
Netherlands	85	1277.22	2121.72	84.96	95.13	518.77	203.58	2465.5	169.43	331.95	2,465.50	84.96	267.77
North Macedonia	291.16	459.3	257.68	439.03	348.56	409.37	252.68	616.24	461.7	565.07	616.24	252.68	424.20
Norway	149.71	271.98	574.63	273.18	540.21	279.71	327.56	149.18	605.84	334.15	605.84	149.18	303.64
Poland	636.17	1047.02	1221.6	867.37	943.6	1276.47	801.81	503.57	544.64	693.99	1,276.47	503.57	834.59
Portugal	12834.98	11105.7	12484.97	15640.25	1487.88	7318.7	16280.13	52180.54	4703.39	3727.18	52,180.54	1,487.88	11,795.34
Romania	4977.79	12584.1	11734.77	5052.9	5865.37	5058.63	7143.56	8012.71	3224.19	9840.39	12,584.10	3,224.19	6,504.47
Serbia	1029.41	5015.74	4022.23	1527.75	651.88	1077.71	863.09	2119.03	3834.12	3724.14	5,015.74	651.88	1,823.39
Slovakia	317.6	356.07	481.8	244.77	238.9	202.71	362.35	297.56	270.3	189.36	481.80	189.36	283.93
Slovenia	13.3	24.22	45.89	45.18	13.93	21.08	50.2	171.92	16.62	43.57	171.92	13.30	33.90





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Spain	5061.27	10704.1	23530.56	7852	4912.67	8837.72	7799.63	15808.17	2751.66	8354.59	23,530.56	2,751.66	8,103.30
Sweden	1004.15	3169.84	1337.45	1184.36	4275.13	1121.35	1241.71	1927.34	8015.88	2386.15	8,015.88	1,004.15	1,632.40
Switzerland	18.96	26.46	10.84	18.38	15.38	21.91	95.79	36.16	43.36	24.99	95.79	10.84	23.45
United Kingdom	1457.6	2280.97	1705.04	1484.4	996.61	1154.71	1145.45	806.47	1388.03	1638.6	2,280.97	806.47	1,422.82

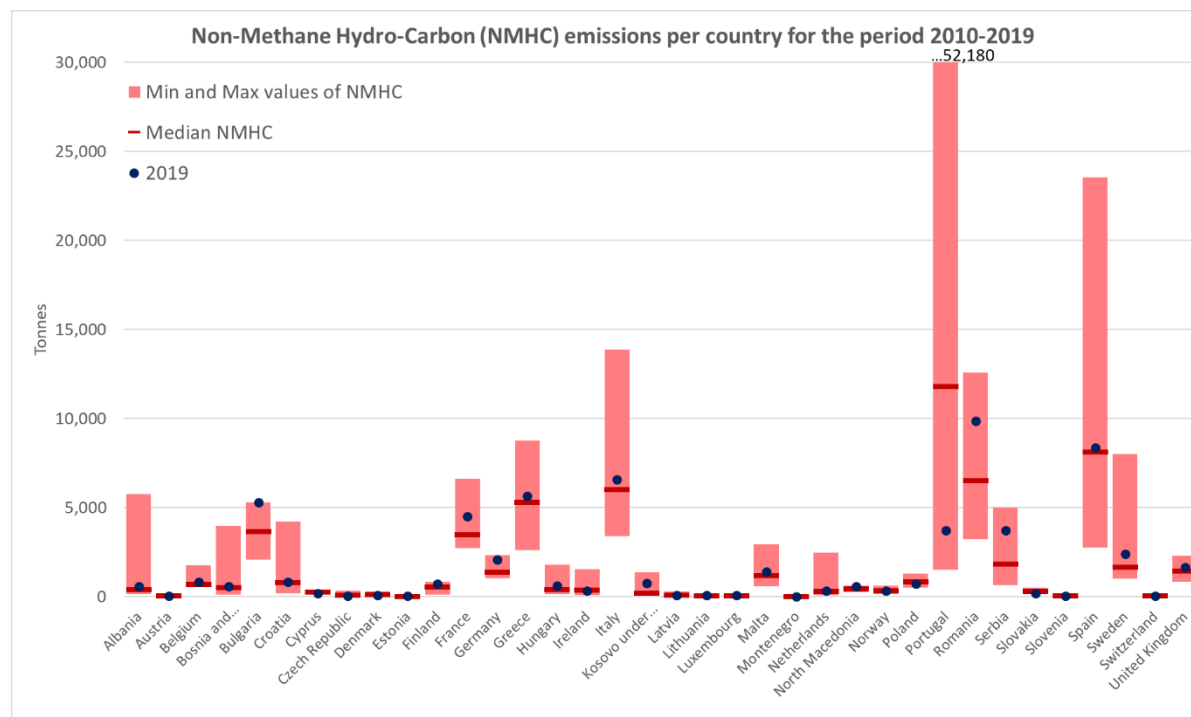


Figure A9: Non-Methane Hydro-Carbon emissions per country for the period 2010-2019





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Table A15: Nitrogen Oxides (NO_x) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	73.81	658.88	2329.76	60.71	45.94	154.79	105.02	833.95	185.16	217.53	2,329.76	45.94	169.98
Austria	19.88	17.03	14.14	23.26	35.54	34.14	4.99	18.44	15.17	16.94	35.54	4.99	17.74
Belgium	345.71	377.47	389.25	757.17	413.6	392.88	745.81	431.67	490.69	512.84	757.17	345.71	422.64
Bosnia and Herzegovina	66.04	323.46	1915.43	114.38	74.91	203.68	236.28	1021.25	56.2	303.35	1,915.43	56.20	219.98
Bulgaria	502.23	1243.46	1295.75	819.26	593.85	610.8	899.61	1002.92	618.26	1276.22	1,295.75	502.23	859.44
Croatia	107.54	1132.02	1220.74	76.13	78.46	659.21	299.66	1925.49	156.27	307.73	1,925.49	76.13	303.70
Cyprus	141.52	37.62	110.18	189.95	23.31	28.31	73.74	30.11	28.82	16.88	189.95	16.88	33.87
Czech Republic	178.43	169.78	108.98	151.93	225.87	139.51	197.38	153.93	98.88	105.78	225.87	98.88	152.93
Denmark	29.25	48.49	155.66	94.53	50.21	65.3	85.43	162.3	79.85	44.72	162.30	29.25	72.58
Estonia	4.04	10.46	1.08	5.34	6.26	6.5	4.87	3.56	35.84	6.8	35.84	1.08	5.80
Finland	160.64	381.1	406.73	482.41	61.45	69.07	192.92	260.48	398.5	431.57	482.41	61.45	320.79
France	1978.79	1763.28	2283.57	1563.48	1860.22	1698.54	2703.73	3647.08	1532.83	2499.04	3,647.08	1,532.83	1,919.51
Germany	389.72	746.75	436.4	537.24	423.39	539.52	565.76	589.38	1048.16	930.71	1,048.16	389.72	552.64
Greece	1338.8	2026.68	4378.93	1782.17	1010.48	1328.89	3943.92	3560.16	3137.28	3179.26	4,378.93	1,010.48	2,581.98
Hungary	114.54	298.62	540.95	79.57	123.94	129.64	39.44	97.52	66.2	168.49	540.95	39.44	119.24
Ireland	310.01	757.22	31.59	172.57	52.86	400.03	53.39	250.7	226.51	183.39	757.22	31.59	204.95
Italy	2147.36	3688.96	5225.81	2312.72	2908.22	2016.99	2589.85	6854.84	1616.35	3065.72	6,854.84	1,616.35	2,749.04
Kosovo under UNSCR 1244	34.57	391.72	666.5	48.47	39.06	63.92	27.18	118.59	69.43	326.39	666.50	27.18	66.68
Latvia	14.15	39.98	9.18	31.98	34.95	31.3	26.61	21.59	170.48	42.08	170.48	9.18	31.64
Lithuania	17.09	11.15	15.98	14.35	14.53	58.48	8.14	10.89	12.69	28.07	58.48	8.14	14.44
Luxembourg	5.08	2.96	3.87	3.42	3.86	12.9	8.17	16.04	12.84	17.27	17.27	2.96	6.63
Malta	575.15	1092.45	1398.43	907.07	492.98	578.69	356.35	453.18	257.21	608.39	1,398.43	257.21	576.92
Montenegro	0	1.03	0	0	0	0	0.59	3.25	5.04	0.69	5.04	0.00	0.30
Netherlands	33.77	352.72	829.46	29.62	47.56	192.47	77.11	671.99	57.95	122.9	829.46	29.62	100.01
North Macedonia	181.27	285.74	159.2	271.89	214.32	254.86	156.83	383.59	285.86	350.76	383.59	156.83	263.38
Norway	90.87	163.14	345.01	166.34	291.61	169.21	197.68	90.27	375.27	202.2	375.27	90.27	183.45
Poland	223.71	362.9	425.88	318.19	372.26	483.78	331.9	170.64	180.17	222.92	483.78	170.64	325.05
Portugal	7882.82	6880.88	7203.36	9623.11	912.91	4465.36	9938.88	30571.11	2780.06	2228.12	30,571.11	912.91	7,042.12
Romania	1241.85	3992.68	3954.94	1524.85	1680.2	1503.24	1861.81	2742.22	833.89	3284.05	3,992.68	833.89	1,771.01
Serbia	358.63	1555.81	1358.77	483.8	196.56	362.3	281.14	781.1	1160.05	1309.15	1,555.81	196.56	632.45
Slovakia	187.29	196.43	241.86	129.81	127.11	101.31	200.1	175.85	152.97	98.59	241.86	98.59	164.41
Slovenia	7.97	14.58	27.57	27.29	8.37	12.62	30.13	103.44	9.97	26.22	103.44	7.97	20.40





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Spain	2757.25	6205.74	12878.45	4356.97	2317.9	5043.19	3869.72	9274.66	1499.25	4780.82	12,878.45	1,499.25	4,568.90
Sweden	602.54	1927.9	801.63	710.32	2560.05	671.88	745.01	1155.1	4366.6	1431.22	4,366.60	602.54	978.37
Switzerland	11.53	16.44	6.74	11.34	9.6	13.62	59.61	22.48	26.81	15.48	59.61	6.74	14.55
United Kingdom	686.89	1224.66	832.43	664.46	388.73	544.02	594.73	419.15	682.67	849.92	1,224.66	388.73	673.57

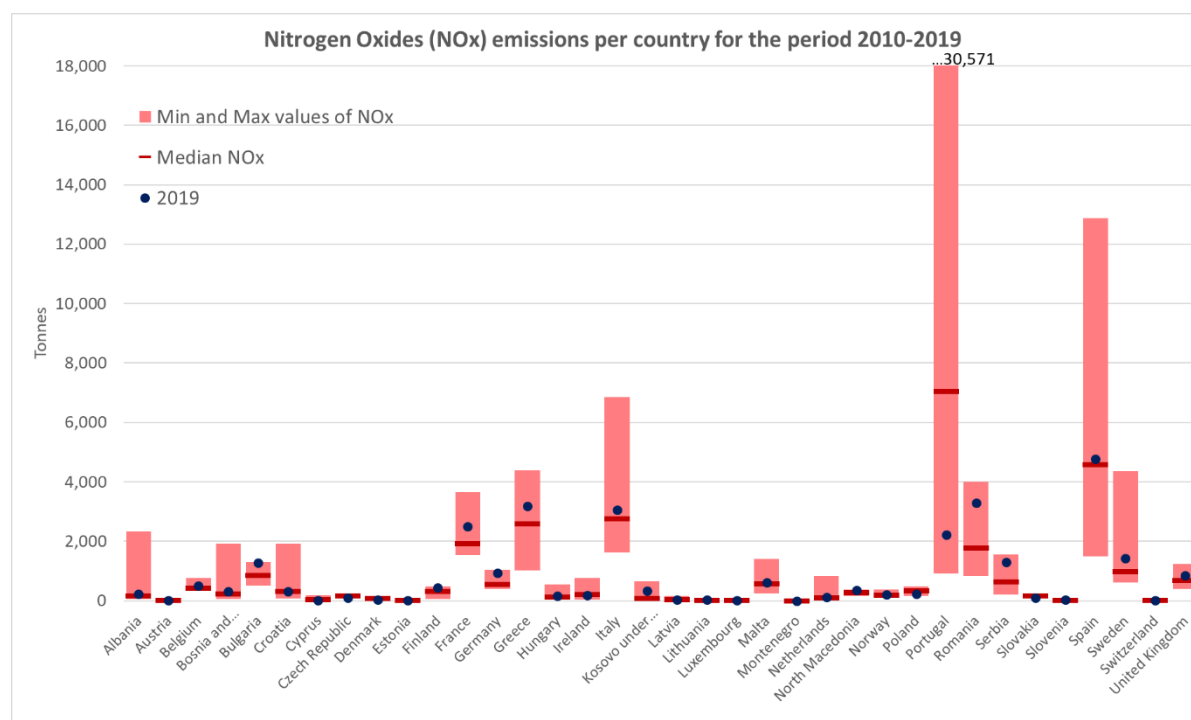


Figure A10: Nitrogen Oxides emissions per country for the period 2010-2019

Table A16: Organic Carbon (OC) emissions per country for the period 2010-2019





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	131.19	1120.67	4093.53	107.13	84.67	285	192.8	1596.22	285.16	374.71	4,093.53	84.67	285.08
Austria	36.63	28.68	24.65	56.08	59.14	58.5	9.48	33.98	25.34	31.07	59.14	9.48	32.53
Belgium	522.8	571.05	588.67	1478.23	625.73	594.41	1127.89	652.96	742.49	776.57	1,478.23	522.80	639.35
Bosnia and Herzegovina	110.26	589.31	3656.89	200.68	122.64	341.85	427.05	2082.32	96.37	506.84	3,656.89	96.37	384.45
Bulgaria	903.77	2217.46	2326.64	1475.79	1072.5	1101.7	1629.01	1812.38	1118.04	2311.59	2,326.64	903.77	1,552.40
Croatia	183	1853.48	2020.66	136.83	127.62	1020.17	501.56	3189.91	252.85	513.01	3,189.91	127.62	507.29
Cyprus	214.03	56.91	166.66	287.28	35.24	42.82	111.57	45.54	43.57	25.54	287.28	25.54	51.23
Czech Republic	270.78	267.4	174.27	237.49	347.05	220.65	303.68	243.21	158.46	169.32	347.05	158.46	240.35
Denmark	48.08	74.65	361.8	151.23	89.37	133.63	153.77	410.13	202.79	73.83	410.13	48.08	142.43
Estonia	8.66	23.05	2.91	11.34	13.21	17.45	13.09	8.72	84.02	15.04	84.02	2.91	13.15
Finland	416.48	999.3	993.39	1278	158.9	150.83	507.73	537.87	1043.29	1149.93	1,278.00	150.83	765.63
France	3225.98	3083.41	3696.14	2575	3156.28	2855.81	4958.46	6938.13	2448.13	4343.17	6,938.13	2,448.13	3,191.13
Germany	718.57	1520.5	781.39	1055.82	710.18	955.08	1031.49	1103.17	2042.14	1720.27	2,042.14	710.18	1,043.66
Greece	2079.98	3284.54	7017.78	2836.44	1662.65	2645.24	5621.08	5506.91	4948.07	4907.32	7,017.78	1,662.65	4,095.93
Hungary	211.98	559.89	1058.14	143.49	228.42	267.62	76.71	178.73	122.49	316.2	1,058.14	76.71	220.20
Ireland	597.38	1904.41	66.95	269.08	129.19	912.97	108.23	510.8	493.72	411.03	1,904.41	66.95	452.38
Italy	3568.61	6319.76	8770.07	3843.43	5211.21	3447.84	4473.36	11517.23	3179.68	5264.79	11,517.23	3,179.68	4,842.29
Kosovo under UNSCR 1244	60.14	688.29	1227.66	89.38	70.09	109.6	55.58	236.61	152.77	626.89	1,227.66	55.58	131.19
Latvia	30.63	92.36	16.24	77.04	68.03	71.29	64.48	50.56	453.61	81.5	453.61	16.24	69.66
Lithuania	26.29	20.35	24.64	28.87	22.25	91.94	13.05	16.85	20.31	46.67	91.94	13.05	23.45
Luxembourg	9.17	5.33	6.99	6.21	7.03	23.39	14.81	29.02	23.23	31.24	31.24	5.33	11.99
Malta	880.72	1687.15	2188.01	1389.48	755.44	891.22	551.73	742.19	405.38	966.35	2,188.01	405.38	885.97
Montenegro	0	1.55	0	0	0	0	0.89	4.92	7.62	1.04	7.62	0.00	0.45
Netherlands	54.8	616.69	1341.62	48.92	83.8	326.26	126.19	1169.8	97.88	202.21	1,341.62	48.92	164.20
North Macedonia	276.74	441.12	279.05	456.96	403.2	390.4	252.81	587.28	481.99	564.88	587.28	252.81	422.16
Norway	205.83	427.21	895.87	361.37	816.8	397.96	399	211.68	627.85	476	895.87	205.83	413.11
Poland	371.87	602.82	711.64	524	601.86	796.6	534.36	289.57	318.39	376.01	796.60	289.57	529.18
Portugal	13913.89	11257.93	13524.5	16287.65	1536.77	7473.46	19290.87	65415.97	4474.97	4286.45	65,415.97	1,536.77	12,391.22
Romania	2253.44	8230.31	8318.92	2663.18	3423.66	2951.62	3541.24	5592.91	1522.03	7089.81	8,318.92	1,522.03	3,482.45
Serbia	695.08	2901.21	2515.27	990.03	389.27	690.67	570.56	1483.81	2236.59	2475.22	2,901.21	389.27	1,236.92
Slovakia	286.08	334.66	426.22	205.47	202.42	159.08	308.24	284.71	241.34	157.72	426.22	157.72	263.03
Slovenia	21.37	36.94	70.41	66.77	21.44	33.37	78.09	259.85	26.49	65.99	259.85	21.37	51.47
Spain	5298.99	10993.89	23670.77	7474.28	4210.27	8787.76	7099.98	17430.52	2587.79	9033.07	23,670.77	2,587.79	8,131.02
Sweden	1573.52	5000.77	2120.24	1867.03	6841.11	1783.52	1948.76	3055.78	12823.62	3754.01	12,823.62	1,573.52	2,588.01





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Switzerland	25.8	25.8	10.19	20.3	14.5	21.05	91.53	36.07	46.18	25.32	91.53	10.19	25.56
United Kingdom	1242.97	2516.64	1730.26	1238.32	658.05	1077.32	986.48	810.3	1292.22	1697.27	2,516.64	658.05	1,240.65

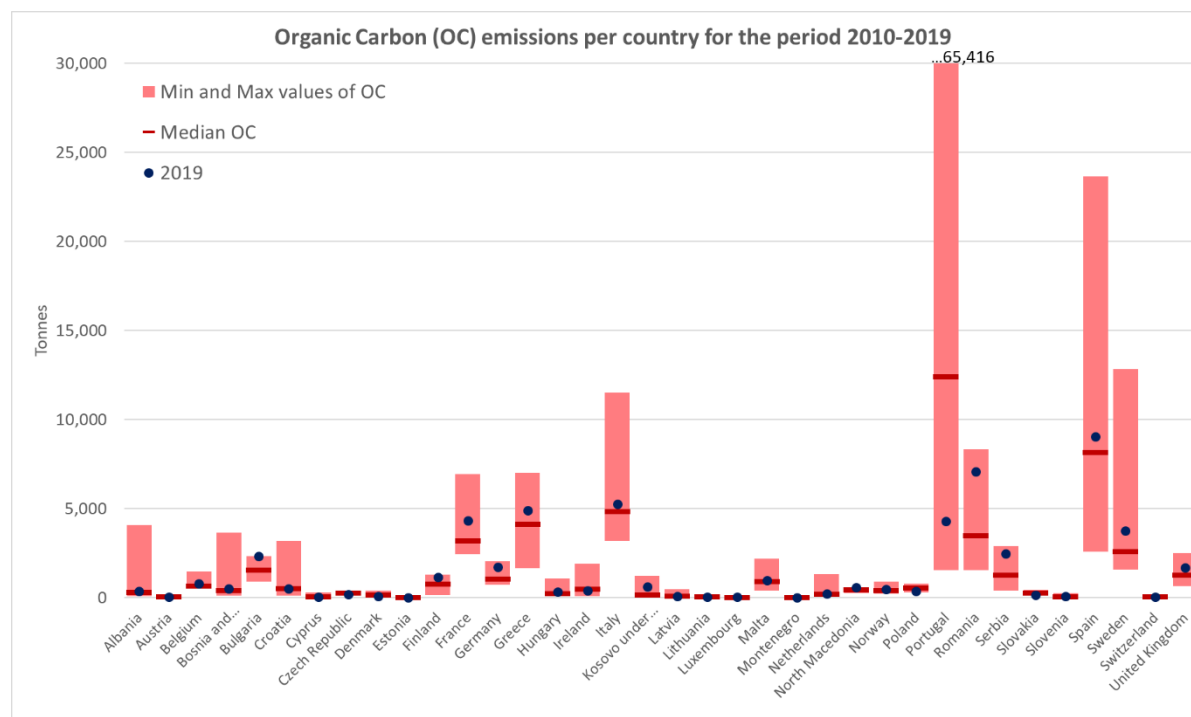


Figure A11: Organic Carbon emissions per country for the period 2010-2019





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Table A17: Particulate Matter 2.5 (PM2.5) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	251.81	1934.82	6790.12	176.38	154.51	482.91	306.2	2616.51	448.74	633.41	6,790.12	154.51	465.83
Austria	61.83	47.47	38.1	82.46	90.83	89.43	16.58	53.44	40.72	49.29	90.83	16.58	51.37
Belgium	803.45	877.96	904.74	2018.13	962.57	914.23	1733.49	1003.64	1141.46	1196.19	2,018.13	803.45	983.11
Bosnia and Herzegovina	186.81	968.13	5670.57	309.7	195.84	556.05	706.33	3187.86	151.76	793.24	5,670.57	151.76	631.19
Bulgaria	1772.02	4226.21	4524.14	2910.8	2118.57	2166.25	3212.17	3560.92	2208.49	4522.76	4,524.14	1,772.02	3,061.49
Croatia	332.45	3131.36	3481.38	222.27	220.79	1618.38	855.36	5195.9	413.97	881.78	5,195.90	220.79	868.57
Cyprus	328.97	87.49	256.17	441.51	54.15	65.81	171.44	69.98	66.99	39.25	441.51	39.25	78.74
Czech Republic	417.14	411.52	268.28	364.94	534.58	338.76	469.52	379.67	245.34	261.65	534.58	245.34	372.31
Denmark	72.72	116.97	518.02	231.59	133.33	194.87	229	580.68	286.96	111.62	580.68	72.72	211.94
Estonia	12.53	33.52	4.09	16.62	19.16	24.52	18.39	12.38	122.91	23.38	122.91	4.09	18.78
Finland	587.84	1408.36	1412.73	1798.87	224.4	217.91	715.25	783.28	1470.64	1617.48	1,798.87	217.91	1,095.82
France	5038.09	4764.5	5726.22	4000.75	4819.74	4394.43	7516.39	10463.85	3802.96	6661.09	10,463.85	3,802.96	4,928.92
Germany	1197.17	2568.5	1280.38	1667.12	1228.77	1588	1680.63	1798.54	3346.58	2734.47	3,346.58	1,197.17	1,673.88
Greece	3336.81	5530.12	11194.53	4671.41	2905.74	4261.76	9070.03	8683.82	7758.61	7690.47	11,194.53	2,905.74	6,610.30
Hungary	375.4	1032.84	1855.73	276.39	424.24	465.57	139.38	334.35	231.43	578.85	1,855.73	139.38	399.82
Ireland	879.84	2784.19	98.11	411.85	183.7	1311.18	158.28	745.57	720.83	403.95	2,784.19	98.11	566.34
Italy	5948.53	10177.19	14179.43	6178.35	8277.57	5479	7244.48	18297.61	4912.67	8440.63	18,297.61	4,912.67	7,761.03
Kosovo under UNSCR 1244	105.62	1125.38	1915.38	156.29	128.63	190.23	93.79	392.94	238.88	997.64	1,915.38	93.79	214.56
Latvia	44.31	132.45	24.38	110.07	99.99	102.36	94.02	72.32	640.13	119.88	640.13	24.38	101.18
Lithuania	41.61	33.77	39.25	42.98	35	142.78	20.23	26.99	32.45	79.58	142.78	20.23	37.13
Luxembourg	18.26	10.62	13.92	12.35	13.98	46.51	29.45	57.65	46.26	62.2	62.20	10.62	23.86
Malta	1383.22	2688.85	3563.34	2184.27	1187.94	1413.66	882.59	1297.04	667.84	1611.44	3,563.34	667.84	1,398.44
Montenegro	0	2.39	0	0	0	0	1.37	7.56	11.7	1.61	11.70	0.00	0.69
Netherlands	93.39	1160.6	2300.18	86.44	131.32	560.84	217.77	2215.74	172.88	350.88	2,300.18	86.44	284.33
North Macedonia	424.59	675.26	417.27	688.54	595.98	598.52	383.82	900.42	725.83	857.87	900.42	383.82	636.89
Norway	295.71	602.15	1147.54	522.38	1030.69	568.94	583.11	302.76	946.77	680.26	1,147.54	295.71	592.63
Poland	654.12	1065.74	1253.33	911.76	1029.1	1371.82	901	512.26	560.66	678.58	1,371.82	512.26	906.38
Portugal	20807.58	17049.85	20556.72	24542.17	2319.41	11306.11	28318.39	99712.46	6864.78	6345.12	99,712.46	2,319.41	18,803.29
Romania	4348.35	14027.12	13850.97	5479.4	6046.52	5210.19	6609.56	9302.63	2890.79	11755.41	14,027.12	2,890.79	6,328.04
Serbia	1172.18	5131.56	4338.4	1691.86	682.02	1183.01	969.07	2474.94	3947.2	4192.11	5,131.56	682.02	2,083.40
Slovakia	444.56	515.93	667.28	325.17	319.58	256.11	485.72	436.57	376.09	250.04	667.28	250.04	406.33
Slovenia	30.03	52.27	99.59	94.87	30.31	46.95	110.2	368.26	37.27	93.49	368.26	30.03	72.88





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Spain	7996.7	16631.51	35931.02	12244.47	6641.99	13384.34	10908.01	26375.29	3990.94	13534.95	35,931.02	3,990.94	12,814.41
Sweden	2218.82	7143.12	2985.09	2630.57	9619.52	2509.9	2747.45	4302.16	17734.3	5290.62	17,734.30	2,218.82	3,643.63
Switzerland	37.14	39.36	15.67	30.21	22.31	32.2	140.27	54.8	69.26	38.32	140.27	15.67	37.73
United Kingdom	1964.53	3761.14	2632.65	1969.21	1114.42	1669.05	1552.45	1234.07	2001.22	2569.13	3,761.14	1,114.42	1,966.87

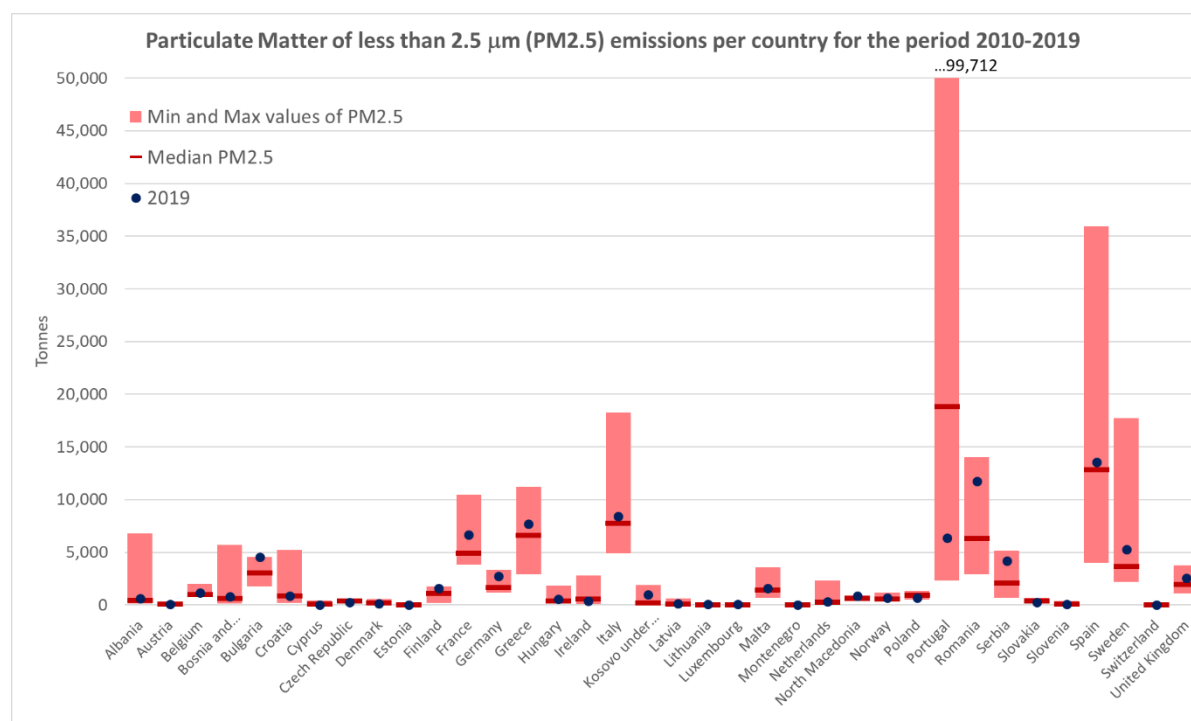


Figure A12: Particulate Matter 2.5 emissions per country for the period 2010-2019





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Table A18: Sulphur Dioxide (SO₂) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	12.06	114.92	430.03	11.33	8.13	29.13	20.74	166.21	32.02	38.97	430.03	8.13	30.58
Austria	3.72	3.06	2.75	6.05	6.64	6.56	0.94	3.69	2.75	3.34	6.64	0.94	3.52
Belgium	59.83	65.45	67.41	150.21	71.53	68.11	128.74	74.55	85.02	88.85	150.21	59.83	73.04
Bosnia and Herzegovina	11.51	61.9	396.53	22.19	13.44	36.82	44.7	225.01	10.53	56.07	396.53	10.53	40.76
Bulgaria	81.4	206.01	211.47	132.13	95.74	98.9	145.66	162.74	99.8	208.35	211.47	81.40	138.90
Croatia	17.98	195.12	208.91	14.55	13.21	113.82	52.14	344	27.3	53.04	344.00	13.21	52.59
Cyprus	24.51	6.51	19.08	32.88	4.03	4.92	12.78	5.2	4.98	2.92	32.88	2.92	5.86
Czech Republic	30.93	30.32	19.7	26.99	39.57	25.03	34.45	27.24	17.86	19.1	39.57	17.86	27.12
Denmark	5.47	8.4	39.93	17.15	10.06	14.87	17.32	45	22.26	8.38	45.00	5.47	16.01
Estonia	0.97	2.55	0.32	1.25	1.47	1.91	1.43	0.95	9.13	1.58	9.13	0.32	1.45
Finland	45.63	109.47	109.28	139.88	17.41	16.72	55.58	59.87	114.22	125.83	139.88	16.72	84.58
France	359.63	340.97	414.71	287.25	353.96	319.23	549.79	766.52	275.03	483.34	766.52	275.03	356.80
Germany	74.44	147.35	82.49	112.45	72.86	100.09	108.83	115.89	218.18	184.49	218.18	72.86	110.64
Greece	230.12	347.37	773.81	306.27	170.17	291.22	643.53	616.92	556.57	552.34	773.81	170.17	449.86
Hungary	20.91	53.03	103.91	13.17	21.53	26.23	7.31	16.76	11.42	30.17	103.91	7.31	21.22
Ireland	66.87	209.96	7.38	30.69	14.2	100.89	12.08	56.92	54.39	45.52	209.96	7.38	49.96
Italy	378.18	682.09	948.17	418.09	562.75	375.87	477.81	1258.85	348.67	569.86	1,258.85	348.67	520.28
Kosovo under UNSCR 1244	6.05	73.06	133.44	8.89	6.73	11.16	5.59	24.25	16.04	66.67	133.44	5.59	13.60
Latvia	3.42	10.18	1.83	8.45	7.61	7.88	7	5.55	49.56	9.13	49.56	1.83	7.75
Lithuania	2.94	2.12	2.74	3.19	2.49	10.38	1.46	1.88	2.22	4.84	10.38	1.46	2.62
Luxembourg	0.8	0.47	0.62	0.56	0.62	2.05	1.31	2.59	2.09	2.77	2.77	0.47	1.06
Malta	99.14	187.77	238.98	156.35	84.91	99.64	61.15	76.08	43.83	103.51	238.98	43.83	99.39
Montenegro	0	0.18	0	0	0	0	0.1	0.56	0.87	0.12	0.87	0.00	0.05
Netherlands	5.73	58.26	140.01	4.96	9.19	33.58	13.05	109.98	9.88	20.88	140.01	4.96	16.97
North Macedonia	31.72	50.46	31.47	51.81	45.22	44.69	28.75	66.96	54.61	64.29	66.96	28.75	47.84
Norway	22.78	46.76	98.18	40.1	79.83	43.91	44.51	23.33	71.2	52.5	98.18	22.78	45.64
Poland	37.8	60.96	72.04	53.83	62.95	82.48	56.59	29.13	31.86	37.19	82.48	29.13	55.21
Portugal	1568.8	1279.12	1552.61	1843.29	173.91	845.62	2153.29	7539.91	511.04	478.5	7,539.91	173.91	1,415.87
Romania	205.94	819.24	840.4	312.2	331.39	288.05	330.66	565.31	141.17	715.29	840.40	141.17	331.03
Serbia	70.64	285.78	253.41	98.48	38.16	69.49	57.18	152.7	219.12	251.94	285.78	38.16	125.59
Slovakia	32.49	37.32	46.58	22.84	22.52	17.5	34.29	32.19	27.19	17.5	46.58	17.50	29.69
Slovenia	2.35	4.05	7.72	7.33	2.34	3.64	8.56	28.54	2.9	7.29	28.54	2.34	5.67





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Spain	584.35	1229.54	2670.34	828.94	458.79	981.89	780.61	1942.07	287.25	1003.82	2,670.34	287.25	905.42
Sweden	172.34	546.95	232.04	204.42	748.28	195.17	213.45	334.47	1390.6	411.08	1,390.60	172.34	283.26
Switzerland	2.88	2.95	1.16	2.3	1.67	2.41	10.46	4.1	5.21	2.88	10.46	1.16	2.88
United Kingdom	134.42	275.88	187.18	132.57	68.54	116.12	108.91	88.73	140.46	185.44	275.88	68.54	133.50

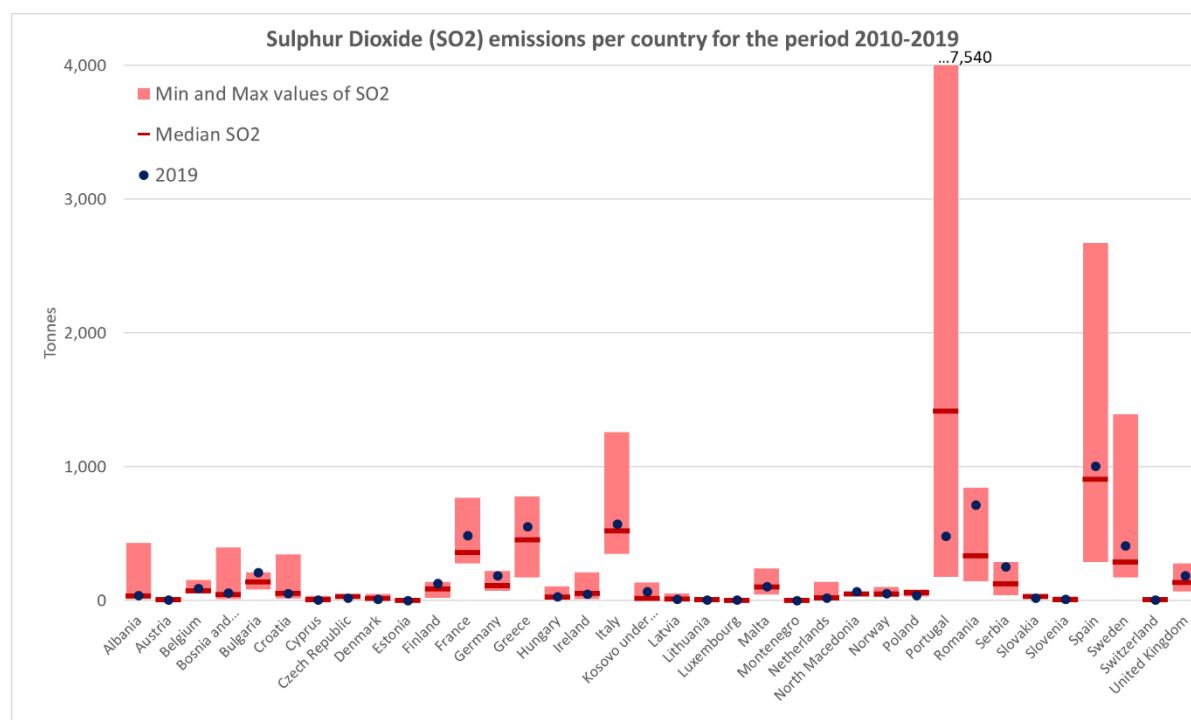


Figure A13: Sulphur Dioxide (SO₂) emissions per country for the period 2010-2019





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Table A19: Total Carbon in Aerosols (TC) emissions per country for the period 2010-2019

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Albania	121.55	1139.39	4176.95	109.47	79.48	279.84	196.44	1563.63	322.23	382.66	4,176.95	79.48	301.04
Austria	36.04	30.04	26.16	52.02	64.68	63.12	8.99	34.77	27.05	31.69	64.68	8.99	33.23
Belgium	603.47	659.03	679.52	1705.43	721.87	685.75	1296.66	750.72	856.61	894.91	1,705.43	603.47	736.30
Bosnia and Herzegovina	114.42	592.36	3695.8	212.66	132.83	361.65	429.56	2047.84	102.4	548.07	3,695.80	102.40	395.61
Bulgaria	818.5	2060.46	2122.81	1330.18	963.94	994.42	1461.53	1634.83	1004.02	2088.6	2,122.81	818.50	1,395.86
Croatia	180.49	1950.17	2090.02	139.42	133.11	1145.13	518.34	3398.05	272.28	529.01	3,398.05	133.11	523.68
Cyprus	247.05	65.71	192.34	331.6	40.67	49.4	128.76	52.52	50.29	29.46	331.60	29.46	59.12
Czech Republic	311.64	301.31	194.77	269.02	396.46	248.23	346.2	271.83	176.33	188.74	396.46	176.33	270.43
Denmark	53.31	84.52	345.83	169.32	95.51	134.41	163.57	379.83	187.44	81.72	379.83	53.31	148.99
Estonia	8.56	22.4	2.63	11.2	13.13	15.82	11.87	8.15	79.08	14.07	79.08	2.63	12.50
Finland	382.15	913.18	931.69	1163.54	145.92	147.79	463.33	539.14	953.85	1044.85	1,163.54	145.92	726.16
France	3540.88	3271.65	4088.71	2817.1	3424.09	3102.46	5171.5	7120.59	2725.43	4640.81	7,120.59	2,725.43	3,482.49
Germany	711.9	1593.85	794.12	1041.12	727.05	969.23	1037.79	1097.22	1992.89	1745.97	1,992.89	711.90	1,039.46
Greece	2317.08	3483.13	7699.38	3075.24	1711.87	2928.69	6216.36	6200.78	5589.16	5548.51	7,699.38	1,711.87	4,515.82
Hungary	202.13	516.13	984.04	131.46	211.72	242.94	69.88	165.39	112.04	292.84	984.04	69.88	206.93
Ireland	616.33	1864.38	66.03	305.78	121.13	878.54	109.22	514.78	481.46	398.49	1,864.38	66.03	439.98
Italy	3749.24	6643.72	9308.86	4114.3	5381.56	3653.67	4642.24	12311.42	3297.48	5539.97	12,311.42	3,297.48	5,011.90
Kosovo under UNSCR 1244	59.71	707.69	1260.62	86.08	66.53	110.52	51.65	225.01	142.99	623.1	1,260.62	51.65	126.76
Latvia	30.1	88.48	17.34	72.51	69.91	68.66	59.91	48.18	411.71	83.94	411.71	17.34	69.29
Lithuania	29.65	20.3	27.63	28.99	25.24	103.35	14.53	18.82	22.23	48.41	103.35	14.53	26.44
Luxembourg	8.2	4.77	6.24	5.54	6.27	20.87	13.24	25.93	20.8	27.98	27.98	4.77	10.72
Malta	999.37	1892.1	2409.5	1575.8	856.4	1003.33	615.83	766.29	441.96	1042.09	2,409.50	441.96	1,001.35
Montenegro	0	1.79	0	0	0	0	1.03	5.68	8.79	1.21	8.79	0.00	0.52
Netherlands	57.72	585.01	1410.63	49.95	87.99	333.19	131.34	1107.69	98.62	209.02	1,410.63	49.95	170.18
North Macedonia	317.96	504.09	300.3	501.4	420.55	447.73	282.9	671.14	528.06	632.45	671.14	282.90	474.57
Norway	198.69	390.59	821.53	354.81	676.36	378.7	403.73	201.7	690.43	452.72	821.53	198.69	397.16
Poland	379.19	613.22	722.87	540.59	633.96	826.7	567.92	290.65	312.99	374.24	826.70	290.65	554.26
Portugal	14920.82	12509.7	14659.45	17804.51	1683.56	8204.77	20071.25	65828.06	5115.99	4415.7	65,828.06	1,683.56	13,584.58
Romania	2053.89	7572.83	7681.96	2419	3098.94	2727.92	3207.98	5382.49	1397.8	6475.76	7,681.96	1,397.80	3,153.46
Serbia	665.44	2757	2437.17	913	359.68	661.22	521.37	1445.3	2088.52	2395.99	2,757.00	359.68	1,179.15
Slovakia	326.7	360.54	447.47	228.02	223.97	175.75	344.87	316.44	270.12	173.67	447.47	173.67	293.28
Slovenia	19.37	34.17	65.01	62.55	19.75	30.42	71.65	241.2	24.08	61.23	241.20	19.37	47.70





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Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Maximum 2010-2019	Minimum 2010-2019	Median 2010-2019
Spain	5410.61	11702.58	25890.05	7839.67	4413.11	9407.86	7356.37	18005.13	2768.13	9337.12	25,890.05	2,768.13	8,588.40
Sweden	1439.95	4535.91	1931.46	1704.55	6209.3	1622.63	1782.33	2783.63	11640.56	3430.06	11,640.56	1,439.95	2,357.55
Switzerland	25.02	29.24	11.76	21.64	16.75	24.06	104.87	40.4	50.1	28.14	104.87	11.76	26.58
United Kingdom	1279.96	2496.1	1690.9	1251.01	678.2	1068.82	1065.93	821.17	1312.66	1696.67	2,496.10	678.20	1,265.49

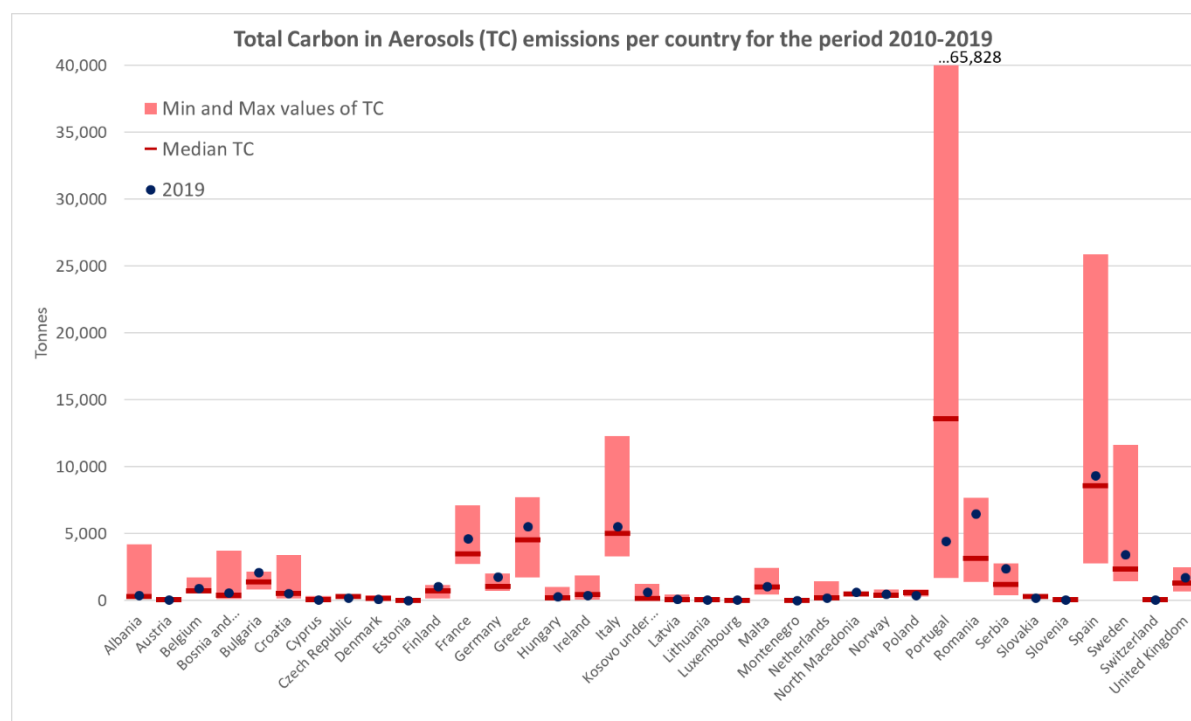


Figure A14: Total Carbon in Aerosols emissions per country for the period 2010-2019





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Table A20: Preliminary number of fires per year and country, aggregated per duration and size

	Dura- tion	Burned Area	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Poland	Portugal	Romania	Slovenia	Spain	Sweden	Switzer- land
2010	<24 hours	<1 ha	42	31	72	676	21	2885	399	313	38	1247	105	257	4220	18344		26	7715	2978	45
		>1 ha	79	84	61	44	3	767	34	100	68	1458		14	402	3646		5	3607	120	5
		Total	121	115	133	720	24	3652	433	413	106	2705	105	271	4622	21990		31	11322	3098	50
	>24 hours	<1 ha		1		3		16	1	32	1	19		32	2	123			57	6	1
		>1 ha	29	6		4	2	98	5	93	1	52		10		324		1	262	11	3
		Total	29	7		7	2	114	6	125	2	71		42	2	447		1	319	17	4
	Total		150	122	133	727	26	3766	439	538	108	2776	105	313	4624	22437		32	11641	3115	54
	<24 hours	<1 ha	124	52	40	1243	16	3069	442	344	892	3261	129	321	7373	20200		60	10703	3351	70
		>1 ha	227	156	45	82	2	869	23	149	1128	3348	2	18	668	4760		30	5057	145	6
		Total	351	208	85	1325	18	3938	465	493	2020	6609	131	339	8041	24960		90	15760	3496	76
2011	<24 hours	<1 ha	7	4		7		36	1	44	1	60	3	19	4	131		1	82	4	
		>1 ha	57	43		2	2	150	2	115		245	3	11	1	282			501	12	5
		Total	64	47		9	2	186	3	159	1	305	6	30	5	413		1	583	16	5
	Total		415	255	85	1334	20	4124	468	652	2021	6914	137	369	8046	25373		91	16343	3512	81
	<24 hours	<1 ha	187	109	44	1442	4	2692	373		1280	3737	77	129	7596	16788	232	104	10243	2100	39
		>1 ha	331	314	33	104	1	735	32		1375	4123	4	19	1559	4350	541	32	4920	94	6
		Total	518	423	77	1546	5	3427	405		2655	7860	81	148	9155	21138	773	136	15163	2194	45
	>24 hours	<1 ha	20	8		2		43	1			100		10	8	3	28		150	1	2
		>1 ha	86	94	1	7		135	1		2	462		2	6	35	106	9	567	2	3
		Total	106	102	1	9		178	2		2	562		12	14	38	134	9	717	3	5
	Total		624	525	78	1555	5	3605	407		2657	8422	81	160	9169	21176	907	145	15880	2197	50
2012	<24 hours	<1 ha	123	43	62	646	9	1548	303		408	1052	117	357	4545	15473	42	54	7610	4576	33
		>1 ha	127	50	70	22	3	372	30		350	907	2	31	297	3720	55		2746	296	2
		Total	250	93	132	668	12	1920	333		758	1959	119	388	4842	19193	97	54	10356	4872	35
	>24 hours	<1 ha	10			2		18	1			28		14	4	3	3	11	87	7	3
		>1 ha	38	17	3			65	2		1	56		15	3	98	18	6	336	11	2
		Total	48	17	3	2		83	3		1	84		29	7	101	21	17	423	18	5
	Total		298	110	135	670	12	2003	336		759	2043	119	417	4849	19294	118	71	10779	4890	40
	<24 hours	<1 ha	45	16	48	834	64	1194	201		495	825	151	504	4703	6004	36	26	6494	4017	33
		>1 ha	63	19	20	33	19	378	10		542	896	2	125	477	1064	42	5	2855	285	2
		Total	108	35	68	867	83	1572	211		1037	1721	153	629	5180	7068	78	31	9349	4302	35
	<1 ha		2	1		1	1	36				16	1	31	3	1	1	2	76	8	3





D3.2 Baseline Assessment Report

	Dura- tion	Burned Area	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Poland	Portugal	Romania	Slovenia	Spain	Sweden	Switzer- land
2015	>24 hours	>1 ha	6	4		1	4	96				36	1	29	5	4	4	1	299	32	1
		Total	8	5		2	5	132				52	2	60	8	5	5	3	375	40	4
	Total		116	40	68	869	88	1704	211		1037	1773	155	689	5188	7073	83	34	9724	4342	39
	<24 hours	<1 ha	142	40	51	1645	45	2050	451		545	1677	239	567	10934	12583	67	72	7516	2541	82
		>1 ha	135	92	35	77	16	631	38		522	2190	8	74	1215	3296	162	12	3513	132	6
		Total	277	132	86	1722	61	2681	489		1067	3867	247	641	12149	15879	229	84	11029	2673	88
	>24 hours	<1 ha	12	5		4		39	1			69		41	4	2	3	5	119	4	3
		>1 ha	44	30		10	4	152	4		2	222		21	25	24	16	2	568	5	3
		Total	56	35		14	4	191	5		2	291		62	29	26	19	7	687	9	6
	Total		333	167	86	1736	65	2872	494		1069	4158	247	703	12178	15905	248	91	11716	2682	94
2016	<24 hours	<1 ha	214	35	71	866	63	2067	327		231		95	469	4934	10470	75	68		4092	51
		>1 ha	207	75	47	26	15	489	33		221		2	63	304	2741	93	15		215	1
		Total	421	110	118	892	78	2556	360		452		97	532	5238	13211	168	83		4307	52
	>24 hours	<1 ha	19	1		3		43	2				1	74	3	1	1	3		13	2
		>1 ha	45	46	1	1	4	149	2					28	7	75	4	3		21	8
		Total	64	47	1	4	4	192	4				1	102	10	76	5	6		34	10
	Total		485	157	119	896	82	2748	364		452		98	634	5248	13287	173	89		4341	62
2017	<24 hours	<1 ha	164	66	67	919	49	2171	160		749		68	337	3307	13711	115	74		3647	39
		>1 ha	198	155	25	60	12	683	9		699		5	41	256	3600	306	20		195	4
		Total	362	221	92	979	61	2854	169		1448		73	378	3563	17311	421	94		3842	43
	>24 hours	<1 ha	9	7		2		75					1	35	2	6	2	7		10	2
		>1 ha	42	87				244	1		1			10		118	20	6		14	7
		Total	51	94		2		319	1		1		1	45	2	124	22	13		24	9
	Total		413	315	92	981	61	3173	170		1449		74	423	3565	17435	443	107		3866	52
2018	<24 hours	<1 ha	92	18	90	1920	184	1210	932		334		189	779	8217	8819	67	25		5689	43
		>1 ha	57	27	41	72	31	319	79		196		14	52	575	1368	68	4		339	1
		Total	149	45	131	1992	215	1529	1011		530		203	831	8792	10187	135	29		6028	44
	>24 hours	<1 ha	7	2		11	2	30	9				1	93	18	1	1	2		33	3
		>1 ha	20	8		12	12	50	22				2	48	5	8	22	1		109	3
		Total	27	10		23	14	80	31				3	141	23	9	23	3		142	6
	Total		176	55	131	2015	229	1609	1042		530		206	972	8815	10196	158	32		6170	50
2019	<24 hours	<1 ha	207	34	76	1833	127	1927	685		1286		223		8782	6818	121			3437	
		>1 ha	232	63	23	97	16	707	51		793		37		758	1298	256			139	
		Total	439	97	99	1930	143	2634	736		2079		260		9540	8116	377			3576	





D3.2 Baseline Assessment Report

	Dura- tion	Burned Area	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Poland	Portugal	Romania	Slovenia	Spain	Sweden	Switzer- land
		<1 ha	21	2		14		64	1				10		12	1	3			5	
	>24 hours	>1 ha	96	13		12		163	12		1		1		13	19	44			17	
		Total	117	15		26		227	13		1		11		25	20	47			22	
	Total		556	112	99	1956	143	2861	749		2080		271		9565	8136	424			3598	

Table A21: Preliminary number of fires per year and country, aggregated per duration and size (in percentage)

	Dura- tion	Burned Area	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Poland	Portugal	Romania	Slovenia	Spain	Sweden	Switzer- land
2010	<24 hours	<1 ha	28.00	25.41	54.14	92.98	80.77	76.61	90.89	58.18	35.19	44.92	100.00	82.11	91.26	81.76		81.25	66.27	95.60	83.33
		>1 ha	52.67	68.85	45.86	6.05	11.54	20.37	7.74	18.59	62.96	52.52	0.00	4.47	8.69	16.25		15.63	30.99	3.85	9.26
		Total	80.67	94.26	100.00	99.04	92.31	96.97	98.63	76.77	98.15	97.44	100.00	86.58	99.96	98.01		96.88	97.26	99.45	92.59
	>24 hours	<1 ha	0.00	0.82	0.00	0.41	0.00	0.42	0.23	5.95	0.93	0.68	0.00	10.22	0.04	0.55		0.00	0.49	0.19	1.85
		>1 ha	19.33	4.92	0.00	0.55	7.69	2.60	1.14	17.29	0.93	1.87	0.00	3.19	0.00	1.44		3.13	2.25	0.35	5.56
		Total	19.33	5.74	0.00	0.96	7.69	3.03	1.37	23.23	1.85	2.56	0.00	13.42	0.04	1.99		3.13	2.74	0.55	7.41
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00
2011	<24 hours	<1 ha	29.88	20.39	47.06	93.18	80.00	74.42	94.44	52.76	44.14	47.17	94.16	86.99	91.64	79.61		65.93	65.49	95.42	86.42
		>1 ha	54.70	61.18	52.94	6.15	10.00	21.07	4.91	22.85	55.81	48.42	1.46	4.88	8.30	18.76		32.97	30.94	4.13	7.41
		Total	84.58	81.57	100.00	99.33	90.00	95.49	99.36	75.61	99.95	95.59	95.62	91.87	99.94	98.37		98.90	96.43	99.54	93.83
	>24 hours	<1 ha	1.69	1.57	0.00	0.52	0.00	0.87	0.21	6.75	0.05	0.87	2.19	5.15	0.05	0.52		1.10	0.50	0.11	0.00
		>1 ha	13.73	16.86	0.00	0.15	10.00	3.64	0.43	17.64	0.00	3.54	2.19	2.98	0.01	1.11		0.00	3.07	0.34	6.17
		Total	15.42	18.43	0.00	0.67	10.00	4.51	0.64	24.39	0.05	4.41	4.38	8.13	0.06	1.63		1.10	3.57	0.46	6.17
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00
2012	<24 hours	<1 ha	29.97	20.76	56.41	92.73	80.00	74.67	91.65		48.17	44.37	95.06	80.63	82.84	79.28	25.58	71.72	64.50	95.58	78.00
		>1 ha	53.04	59.81	42.31	6.69	20.00	20.39	7.86		51.75	48.96	4.94	11.88	17.00	20.54	59.65	22.07	30.98	4.28	12.00
		Total	83.01	80.57	98.72	99.42	100.00	95.06	99.51		99.92	93.33	100.00	92.50	99.85	99.82	85.23	93.79	95.48	99.86	90.00
	>24 hours	<1 ha	3.21	1.52	0.00	0.13	0.00	1.19	0.25		0.00	1.19	0.00	6.25	0.09	0.01	3.09	0.00	0.94	0.05	4.00
		>1 ha	13.78	17.90	1.28	0.45	0.00	3.74	0.25		0.08	5.49	0.00	1.25	0.07	0.17	11.69	6.21	3.57	0.09	6.00
		Total	16.99	19.43	1.28	0.58	0.00	4.94	0.49		0.08	6.67	0.00	7.50	0.15	0.18	14.77	6.21	4.52	0.14	10.00
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2013	<24 hours	<1 ha	41.28	39.09	45.93	96.42	75.00	77.28	90.18		53.75	51.49	98.32	85.61	93.73	80.20	35.59	76.06	70.60	93.58	82.50
		>1 ha	42.62	45.45	51.85	3.28	25.00	18.57	8.93		46.11	44.40	1.68	7.43	6.12	19.28	46.61	0.00	25.48	6.05	5.00
		Total	83.89	84.55	97.78	99.70	100.00	95.86	99.11		99.87	95.89	100.00	93.05	99.86	99.48	82.20	76.06	96.08	99.63	87.50





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	Dura- tion	Burned Area	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Poland	Portugal	Romania	Slovenia	Spain	Sweden	Switzer- land
2014	>24 hours	<1 ha	3.36	0.00	0.00	0.30	0.00	0.90	0.30		0.00	1.37	0.00	3.36	0.08	0.02	2.54	15.49	0.81	0.14	7.50
		>1 ha	12.75	15.45	2.22	0.00	0.00	3.25	0.60		0.13	2.74	0.00	3.60	0.06	0.51	15.25	8.45	3.12	0.22	5.00
		Total	16.11	15.45	2.22	0.30	0.00	4.14	0.89		0.13	4.11	0.00	6.95	0.14	0.52	17.80	23.94	3.92	0.37	12.50
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	<24 hours	<1 ha	38.79	40.00	70.59	95.97	72.73	70.07	95.26		47.73	46.53	97.42	73.15	90.65	84.89	43.37	76.47	66.78	92.51	84.62
		>1 ha	54.31	47.50	29.41	3.80	21.59	22.18	4.74		52.27	50.54	1.29	18.14	9.19	15.04	50.60	14.71	29.36	6.56	5.13
		Total	93.10	87.50	100.00	99.77	94.32	92.25	100.00		100.00	97.07	98.71	91.29	99.85	99.93	93.98	91.18	96.14	99.08	89.74
	>24 hours	<1 ha	1.72	2.50	0.00	0.12	1.14	2.11	0.00		0.00	0.90	0.65	4.50	0.06	0.01	1.20	5.88	0.78	0.18	7.69
		>1 ha	5.17	10.00	0.00	0.12	4.55	5.63	0.00		0.00	2.03	0.65	4.21	0.10	0.06	4.82	2.94	3.07	0.74	2.56
		Total	6.90	12.50	0.00	0.23	5.68	7.75	0.00		0.00	2.93	1.29	8.71	0.15	0.07	6.02	8.82	3.86	0.92	10.26
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2015	<24 hours	<1 ha	42.64	23.95	59.30	94.76	69.23	71.38	91.30		50.98	40.33	96.76	80.65	89.78	79.11	27.02	79.12	64.15	94.74	87.23
		>1 ha	40.54	55.09	40.70	4.44	24.62	21.97	7.69		48.83	52.67	3.24	10.53	9.98	20.72	65.32	13.19	29.98	4.92	6.38
		Total	83.18	79.04	100.00	99.19	93.85	93.35	98.99		99.81	93.00	100.00	91.18	99.76	99.84	92.34	92.31	94.14	99.66	93.62
	>24 hours	<1 ha	3.60	2.99	0.00	0.23	0.00	1.36	0.20		0.00	1.66	0.00	5.83	0.03	0.01	1.21	5.49	1.02	0.15	3.19
		>1 ha	13.21	17.96	0.00	0.58	6.15	5.29	0.81		0.19	5.34	0.00	2.99	0.21	0.15	6.45	2.20	4.85	0.19	3.19
		Total	16.82	20.96	0.00	0.81	6.15	6.65	1.01		0.19	7.00	0.00	8.82	0.24	0.16	7.66	7.69	5.86	0.34	6.38
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	<24 hours	<1 ha	44.12	22.29	59.66	96.65	76.83	75.22	89.84		51.11		96.94	73.97	94.02	78.80	43.35	76.40		94.26	82.26
		>1 ha	42.68	47.77	39.50	2.90	18.29	17.79	9.07		48.89		2.04	9.94	5.79	20.63	53.76	16.85		4.95	1.61
		Total	86.80	70.06	99.16	99.55	95.12	93.01	98.90		100.00		98.98	83.91	99.81	99.43	97.11	93.26		99.22	83.87
	>24 hours	<1 ha	3.92	0.64	0.00	0.33	0.00	1.56	0.55		0.00		1.02	11.67	0.06	0.01	0.58	3.37		0.30	3.23
		>1 ha	9.28	29.30	0.84	0.11	4.88	5.42	0.55		0.00		0.00	4.42	0.13	0.56	2.31	3.37		0.48	12.90
		Total	13.20	29.94	0.84	0.45	4.88	6.99	1.10		0.00		1.02	16.09	0.19	0.57	2.89	6.74		0.78	16.13
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00		100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00
2017	<24 hours	<1 ha	39.71	20.95	72.83	93.68	80.33	68.42	94.12		51.69		91.89	79.67	92.76	78.64	25.96	69.16		94.34	75.00
		>1 ha	47.94	49.21	27.17	6.12	19.67	21.53	5.29		48.24		6.76	9.69	7.18	20.65	69.07	18.69		5.04	7.69
		Total	87.65	70.16	100.00	99.80	100.00	89.95	99.41		99.93		98.65	89.36	99.94	99.29	95.03	87.85		99.38	82.69
	>24 hours	<1 ha	2.18	2.22	0.00	0.20	0.00	2.36	0.00		0.00		1.35	8.27	0.06	0.03	0.45	6.54		0.26	3.85
		>1 ha	10.17	27.62	0.00	0.00	0.00	7.69	0.59		0.07		0.00	2.36	0.00	0.68	4.51	5.61		0.36	13.46
		Total	12.35	29.84	0.00	0.20	0.00	10.05	0.59		0.07		1.35	10.64	0.06	0.71	4.97	12.15		0.62	17.31
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00		100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00
2018	<24 hours	<1 ha	52.27	32.73	68.70	95.29	80.35	75.20	89.44		63.02		91.75	80.14	93.22	86.49	42.41	78.13		92.20	86.00
		>1 ha	32.39	49.09	31.30	3.57	13.54	19.83	7.58		36.98		6.80	5.35	6.52	13.42	43.04	12.50		5.49	2.00





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	Dura- tion	Burned Area	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Poland	Portugal	Romania	Slovenia	Spain	Sweden	Switzer- land
2019		Total	84.66	81.82	100.00	98.86	93.89	95.03	97.02		100.00		98.54	85.49	99.74	99.91	85.44	90.63		97.70	88.00
	>24 hours	<1 ha	3.98	3.64	0.00	0.55	0.87	1.86	0.86		0.00		0.49	9.57	0.20	0.01	0.63	6.25		0.53	6.00
		>1 ha	11.36	14.55	0.00	0.60	5.24	3.11	2.11		0.00		0.97	4.94	0.06	0.08	13.92	3.13		1.77	6.00
		Total	15.34	18.18	0.00	1.14	6.11	4.97	2.98		0.00		1.46	14.51	0.26	0.09	14.56	9.38		2.30	12.00
		Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00		100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00
	<24 hours	<1 ha	37.23	30.36	76.77	93.71	88.81	67.35	91.46		61.83		82.29		91.81	83.80	28.54			95.53	
		>1 ha	41.73	56.25	23.23	4.96	11.19	24.71	6.81		38.13		13.65		7.92	15.95	60.38			3.86	
		Total	78.96	86.61	100.00	98.67	100.00	92.07	98.26		99.95		95.94		99.74	99.75	88.92			99.39	
	>24 hours	<1 ha	3.78	1.79	0.00	0.72	0.00	2.24	0.13		0.00		3.69		0.13	0.01	0.71			0.14	
		>1 ha	17.27	11.61	0.00	0.61	0.00	5.70	1.60		0.05		0.37		0.14	0.23	10.38			0.47	
		Total	21.04	13.39	0.00	1.33	0.00	7.93	1.74		0.05		4.06		0.26	0.25	11.08			0.61	
		Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00		100.00		100.00	100.00	100.00			100.00	





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Table A22: Insurance density per country for the year 2019.

Country	Population 2019*	Fire Prop (M€)	Insurance Density (M€ per thousand inhabitants)
Austria	8901064	3357.43	0.37719423
Belgium	11522440	4405.01	0.38229837
Bulgaria	6951482	354.22	0.05095604
Croatia	4058165	193.79	0.04775311
Cyprus	888005	110.19	0.12408714
Czech Republic	10693939	1223.67	0.1144265
Denmark	5822763	2683.91	0.4609341
Estonia	1328976	143.28	0.10781233
Finland	5525292	864.09	0.15638811
France	67320216	21943.44	0.32595617
Germany	83166711	42345.5	0.50916406
Greece	10718565	402.01	0.03750595
Hungary	9769526	562.65	0.05759235
Ireland	4964440	8936.66	1.80013456
Italy	59641488	5944.2	0.09966552
Latvia	1907675	67.52	0.03539387
Lithuania	2794090	99.99	0.03578625
Luxembourg	626108	5277.61	8.42923266
Malta	514564	648.86	1.26098989
Netherlands	17407585	3582.59	0.20580626
Norway	5367580	1950.16	0.36332202
Poland	37958138	1937.79	0.05105071
Portugal	10295909	823.47	0.07998031
Romania	19328838	273.42	0.0141457
Slovakia	5457873	296.28	0.05428488
Slovenia	2095861	439.36	0.20963222
Spain	47332614	10439.09	0.22054751
Sweden	10327589	4541.42	0.43973671
United Kingdom	67025542	27905.53	0.41634173

* Corresponding to 1 January 2020.





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