



**Monitoring  
Atmosfery**

# **Narzędzia CAMS Policy – wsparcie administracyjne**

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Kamiński**



**PROGRAMME OF THE  
EUROPEAN UNION**










# CAMS i Program współpracy krajowej (National Collaboration Programme)

- CAMS (Copernicus Atmosphere Monitoring Service) jest jednym z sześciu serwisów tworzących unijny program obserwacji Ziemi – Copernicus.
- Program dostarcza produkty informacyjne oparte na obserwacjach satelitarnych Ziemi, obserwacjach naziemnych oraz modelowaniu
- Krajowe programy współpracy zostały wprowadzone w celu zwiększenie wykorzystania danych Copernicus w krajach członkowskich UE
- Serwis Obserwacji Atmosfery jako pierwszy pilotażowo wdraża krajowe programy współpracy NCP
- IOŚ-PIB wdraża program w Polsce
  - Wykorzystanie bezpośrednio danych
  - Prognoza wysokorozdzielcza
  - Emisja zanieczyszczeń
- Jednym z celów jest rozpowszechnienie informacji o serwisie CAMS w Polsce



# Serwisy dostępne w ramach CAMS Policy



- Strona internetowa: <https://policy.atmosphere.copernicus.eu/> 
- **Prognozy dzienne** wraz z szerokim wachlarzem analiz udziałów źródeł,  Daily Source Attribution ▾
- **Analizy roczne** wraz z udziałami źródeł i statystykami,  Yearly Air Pollution Analysis ▾
- **Raporty** – duże spektrum podsumowań, analiz, przedstawienie ciekawych epizodów,  Reports
- **Dokumentacja** – opis serwisów, zastosowanego modelowania, filmy instruktażowe,  Documentation
- Najczęściej zadawane pytania;  FAQ
- Informacje i odnośniki do byłych i przyszłych warsztatów CAMS Policy,  Workshops



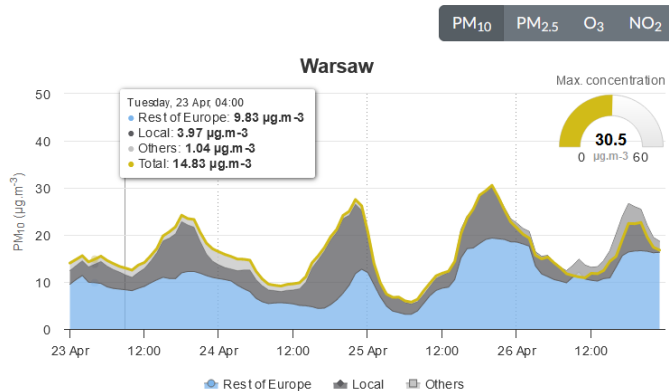
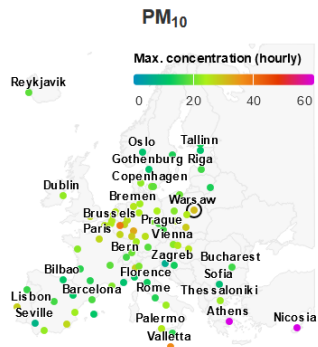
# Cams Policy – strona startowa



Data

**Policy Support** [Daily Source Attribution](#) [Yearly Air Pollution Analysis](#) [Reports](#) [Workshops](#) [Documentation](#) [FAQ](#)

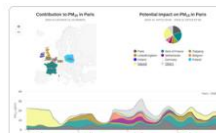
## Air pollution at target cities 4-day forecast (EMEP model)



For more information and additional results (past results, comparisons with [observations](#), [source tagging](#), and [custom scenarios](#)), check out the other [daily source attribution](#) products.

## Our services

CAMS policy support provides a number of products and results that aim at supporting decision and policy making in the management of air pollution episodes and reporting under European Directives. Policy services are based on the air quality regional services capacities to elaborate added value products describing the evolution of air quality in Europe and the influence of the main anthropogenic sources, helping in designing appropriate and efficient policy responses to episode situations.



### Country impact/contribution

Explore the potential impact of country emissions reduction on PM<sub>10/2.5</sub>, ozone and NO<sub>2</sub> based on EMEP [perturbation runs](#) and the country contributions for PM<sub>10/2.5</sub>, using LOTOS/EUROS [tagging method](#).

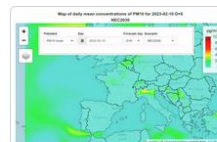
[daily impact](#) [yearly impact](#)  
[daily contrib](#) [yearly contrib](#)



### Sector apportionment

Inspect the potential impact of different measures affecting sector emissions at [targeted cities](#), make [custom scenarios](#) and inspect [chemical regimes](#) with the [Air Control Toolbox](#).

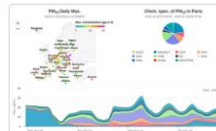
[daily forecasts](#)



### Policy scenarios

Investigate how the air quality will improve in 2030 through implementation of the [Clean Air Programme Directive \(EU\)](#) on the reduction of national emissions of certain atmospheric pollutants.

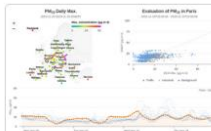
[daily forecasts](#)



### Chemical speciation

Explore which [chemical species](#) constitute the PM<sub>10</sub> forecasted with two different models (EMEP, LOTOS/EUROS) in the different European targeted cities.

[daily forecasts](#) [yearly analysis](#)



### Model evaluation

Online comparisons between model forecasts and [EEA](#) observations for EMEP (PM<sub>10/2.5</sub>, ozone) and LOTOS/EUROS (PM<sub>10/2.5</sub>).

[daily forecasts](#) [yearly analysis](#)



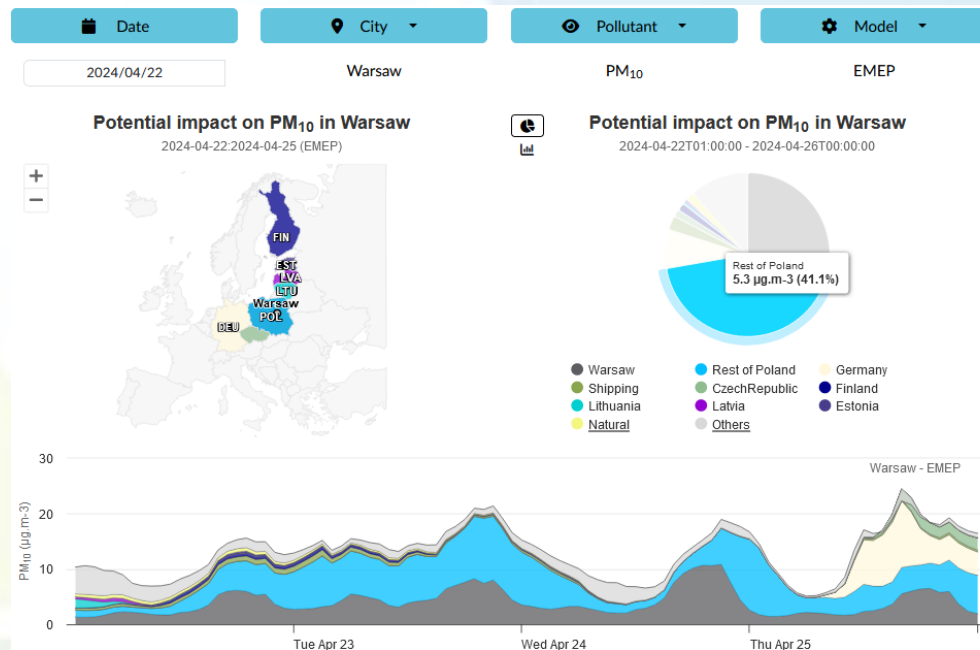
### Air Quality Reports

Find reports on [major air pollution episodes](#) in Europe (fine particles, ozone, forest fires, ...), as well as [annual assessment reports](#).

[reports](#)

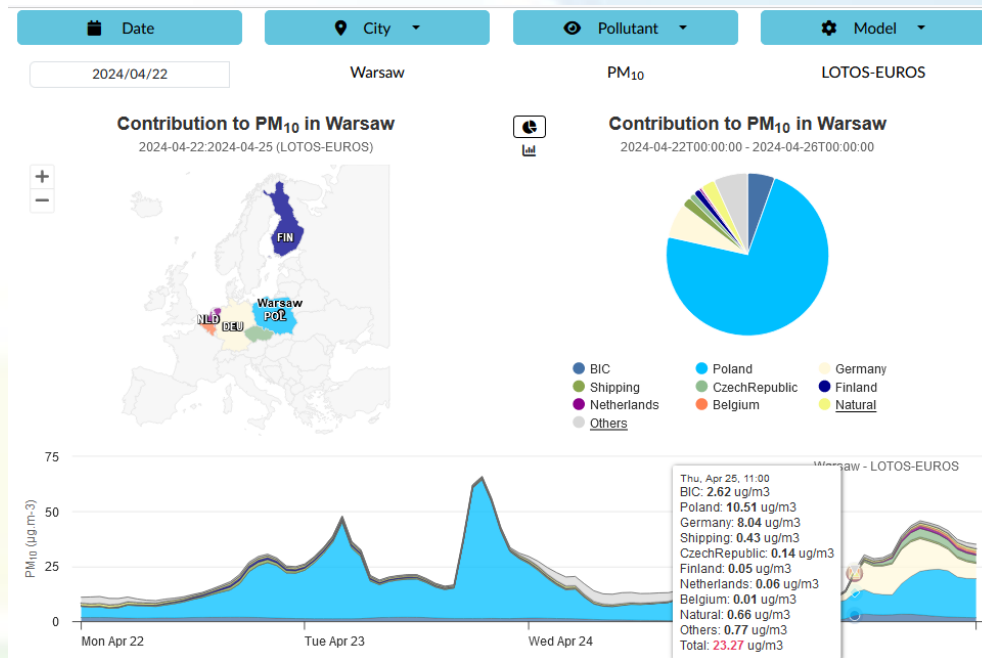
# Prognozy dzienne – udział źródeł miasto/kraj

- Wybór daty – codzienna prognoza na 96 godzin,
- Wybór miast (PL – Katowice, Łódź, Poznań, Trójmiasto, Warszawa, Wrocław)
- Wybór zanieczyszczenia – PM10, PM2.5, NO2, O3.
- Na podstawie symulacji perturbacyjnych modelu EMEP,
- Udział źródeł w podziale na miasto, kraje, emisje z żeglugi, naturalne, inne.



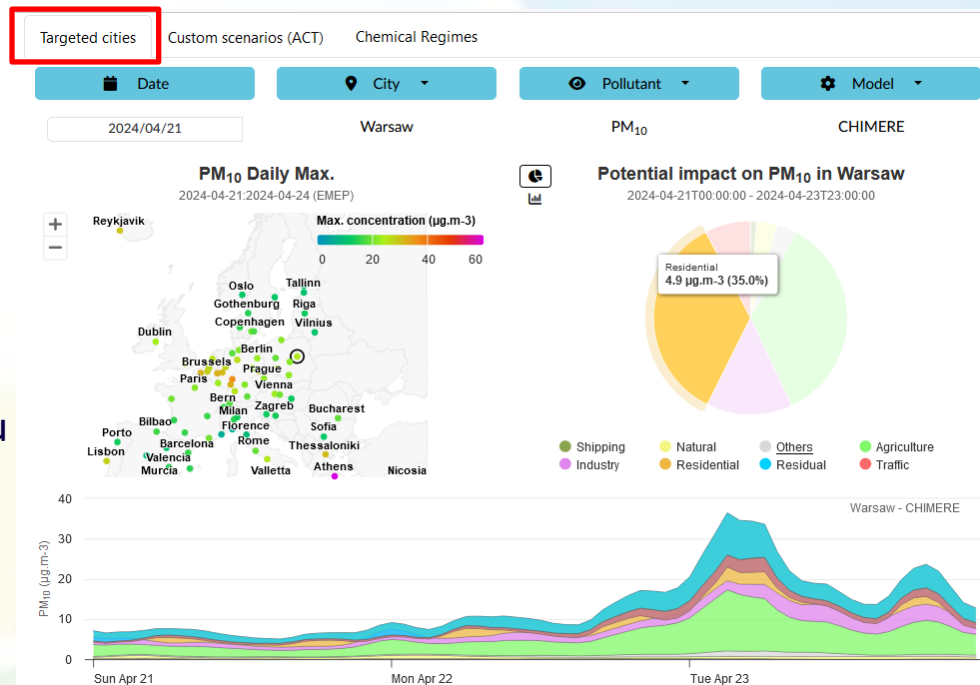
# Prognozy dzienne – udział krajowy

- Wybór daty – codzienna prognoza na 96 godzin,
- Wybór miast (PL – Katowice, Łódź, Poznań, Trójmiasto, Warszawa, Wrocław)
- Wybór zanieczyszczenia – PM10, PM2.5.
- Na podstawie symulacji „etykietowanych” (tagging) modelu LOTOS-EUROS,
- Udział źródeł w podziale na kraje, BIC, emisje z żeglugi, naturalne, inne.



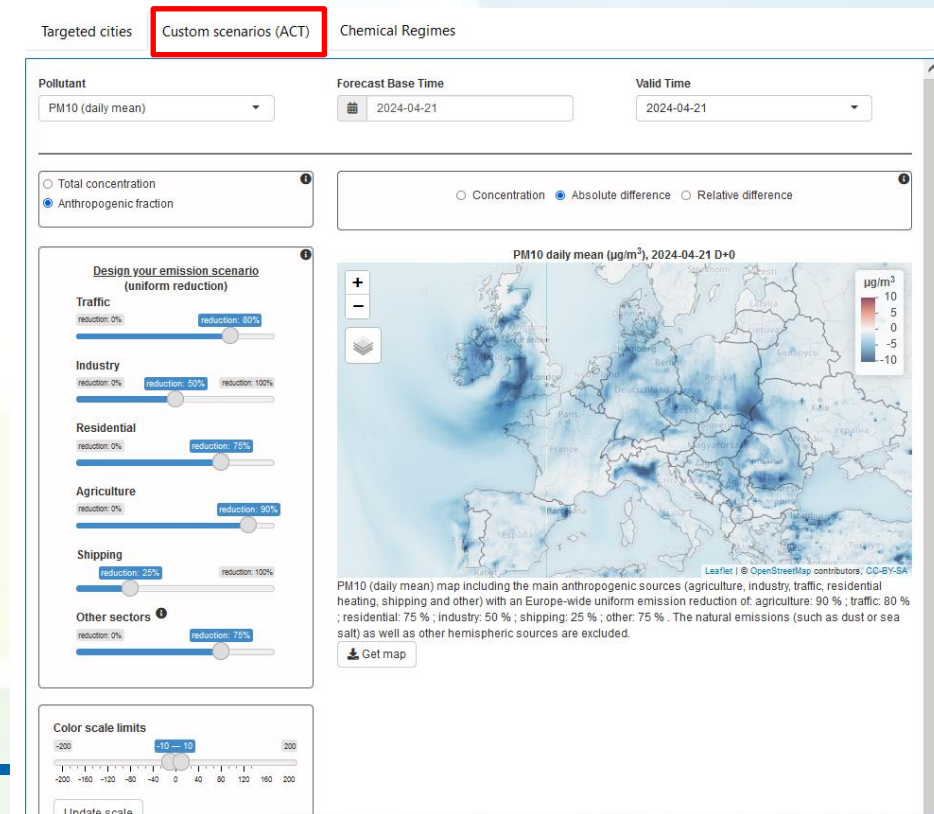
# Prognozy dzienne – udział sektorów dla miast

- Wybór daty – codzienna prognoza na 96 godzin,
- Wybór miast (PL – Katowice, Łódź, Poznań, Trójmiasto, Warszawa, Wrocław)
- Wybór zanieczyszczenia – PM10, PM2.5, O3, NO2.
- Na podstawie symulacji modelu CHIMERE,
- Udział źródeł w podziale na sektory: kom.-byt., transport, żegluga, rolnictwo, przemysł, transgraniczny, naturalny, inne.



# Prognozy dzienne – własny scenariusz redukcyjny

- Wybór daty,
- Cała domena obliczeniowa,
- Wybór zanieczyszczenia – PM10, PM2.5, O3, NO2.
- Wybór emisji – totalne, wyłącznie antropogeniczne,
- Własny wybór redukcji (5% interwał) dla sektorów: kom.-byt., transport, żegluga, rolnictwo, przemysł, inne.
- Do wyboru- stężenia; absolutna i relatywna różnica względem źródłowej prognozy.





# Prognozy dzienne – redukcja względem NEC

- Wybór daty i dnia prognozy,
- Cała domena obliczeniowa,
- Wybór zanieczyszczenia – PM10, PM2.5, O3, NO2.
- Do wyboru trzy „scenariusze”:
  - Referencyjny – na podstawie emisji z 2015 roku,
  - NEC2030 – zakładający redukcji emisji zgodne z dyrektywą,
  - Różnica między scenariuszami.

How would different policy scenarios of emission reductions affect current air quality? 

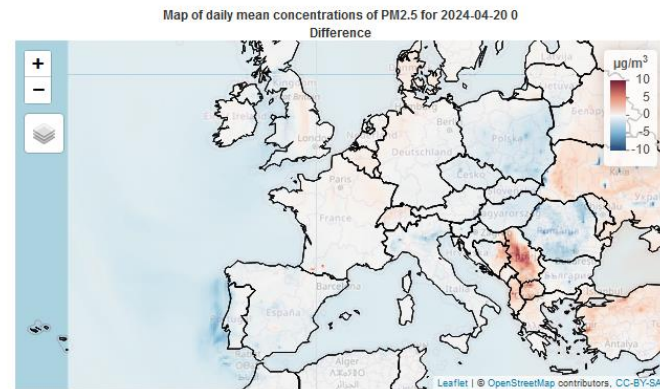
Pollutant

Day

Forecast day

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Scenario

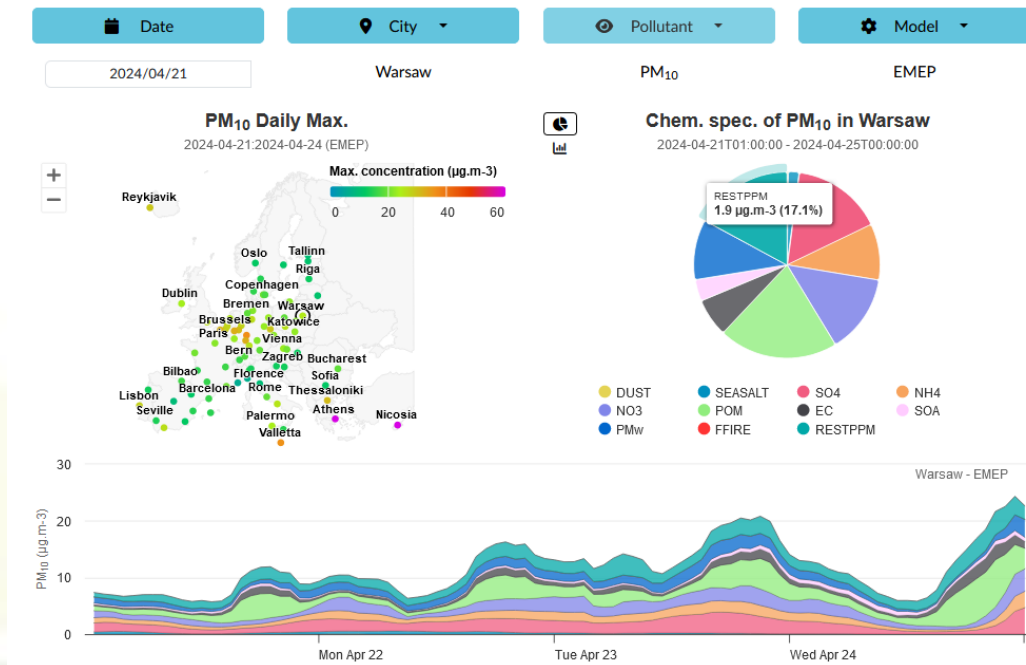


Reference is the baseline scenario with the complete set of emissions of 2015 for 7 pollutants: nitrogen oxides (NOx), carbon monoxide (CO), ammonia (NH3), volatile organic compounds (VOCs), sulphur dioxide (SO2), PM (PMcoarse and PM2.5). NEC2030 matches the national emission reduction commitments by the year 2030 agreed under European Directives.



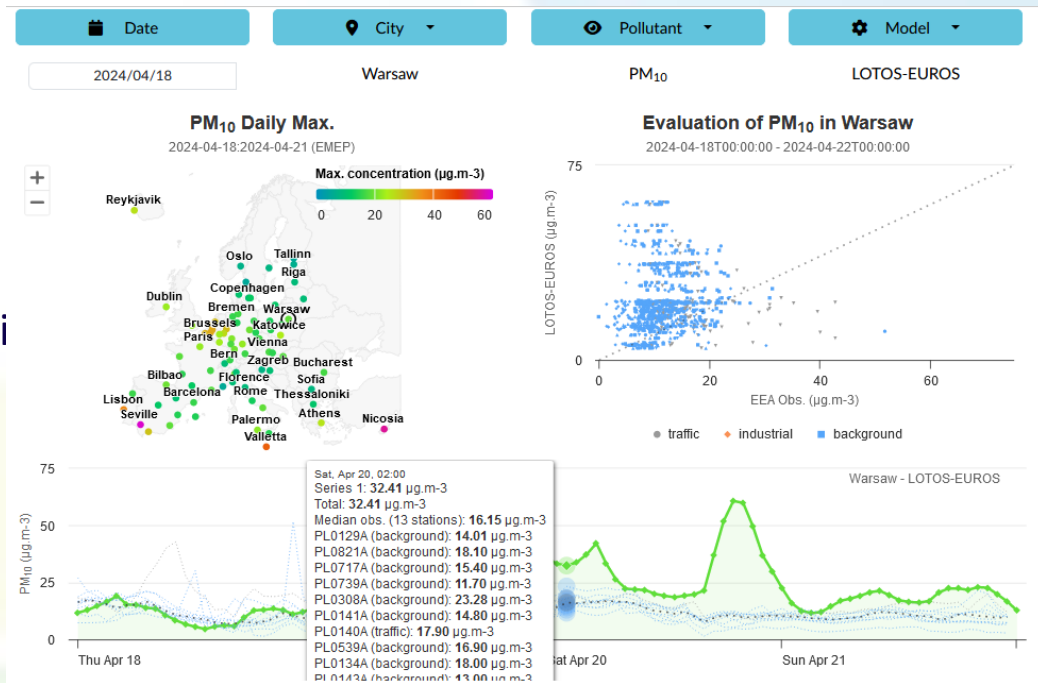
# Prognozy dzienne – specjacja chemiczna pyłu PM10

- Wybór daty – codzienna prognoza na 96 godzin,
- Wybór miast (PL – Katowice, Łódź, Poznań, Trójmiasto, Warszawa, Wrocław),
- Wyłącznie dla pyłu PM10,
- Na podstawie symulacji modelu EMEP,
- Udział źródeł w podziale na skład chemiczny pyłu.



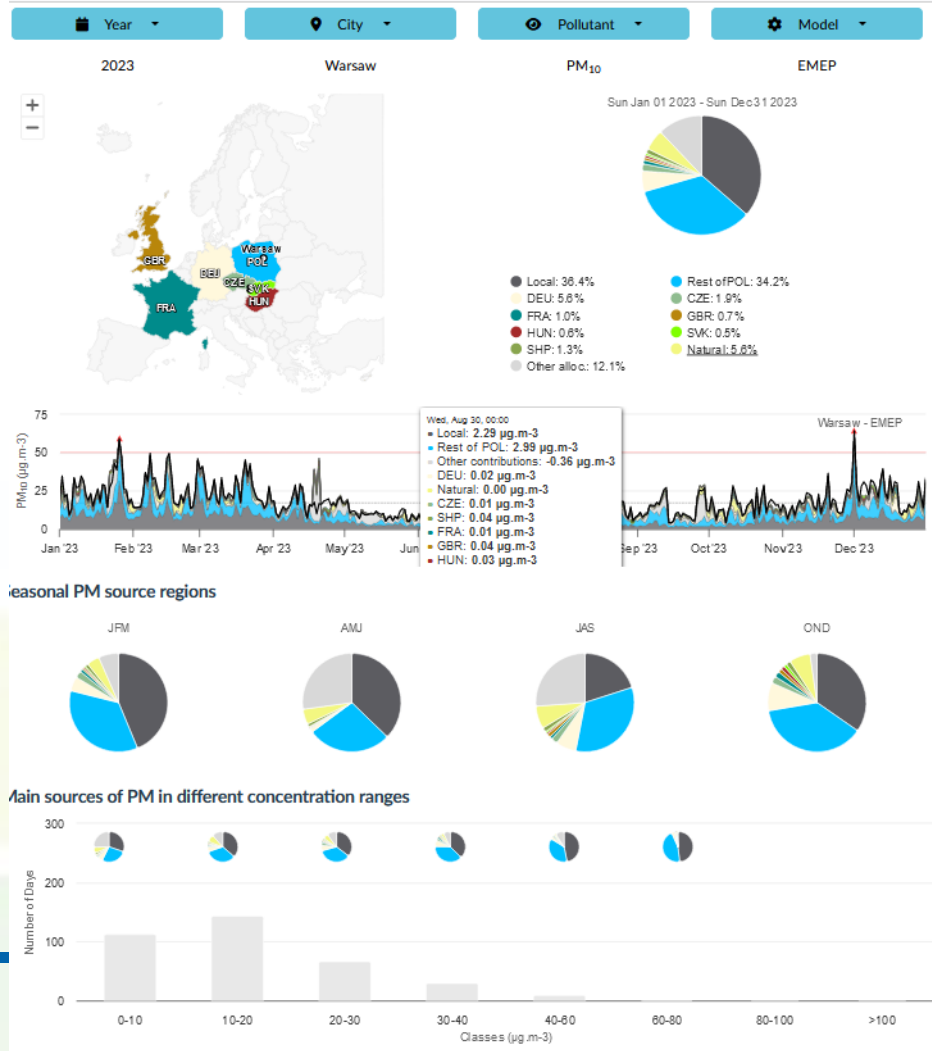
# Prognozy dzienne – ewaluacja modeli

- Wybór daty – codzienna prognoza na 96 godzin,
- Wybór miast (PL – Katowice, Łódź, Poznań, Trójmiasto, Warszawa, Wrocław),
- Zanieczyszczenie w zależności od modelu,
- Wykres zmian czasowych modelu i obserwacji,
- Wykres rozrzutu (scatter) obrazujący średnie stężenia modelowe vs obserwacje.



# Analizy roczne

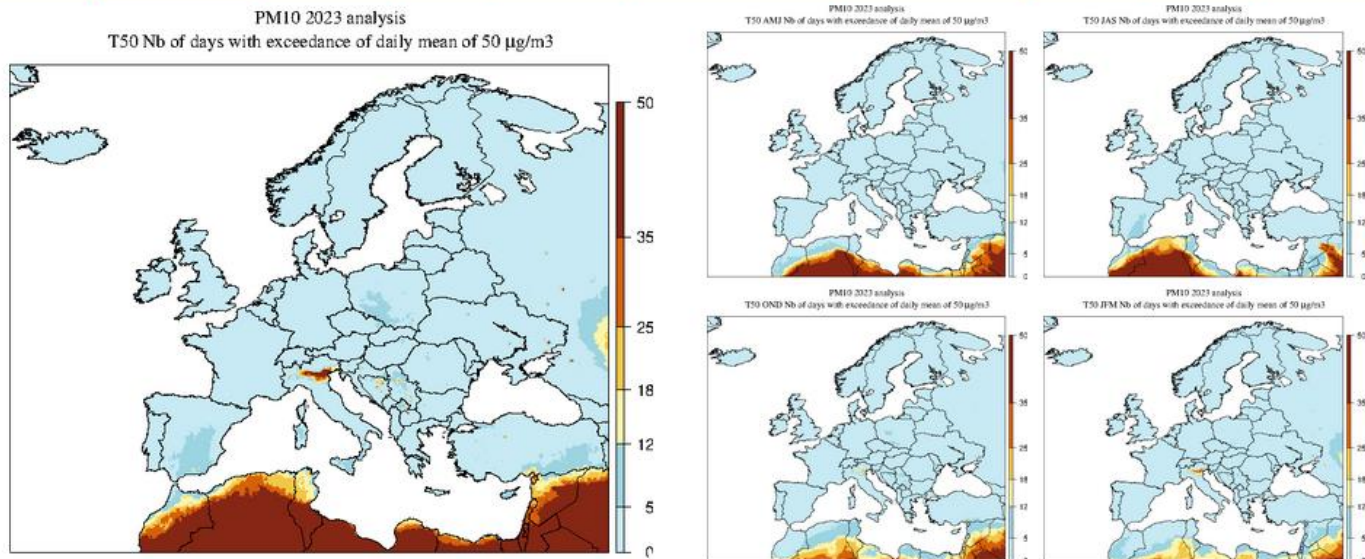
- Podobny wybór analiz jak w przypadku prognoz dziennych,
- Brak analiz scenariusza NEC,
- Zmienność dobowa na „osi czasu” obejmująca cały rok,
- Dodatkowe informacje w podziale na kwartały i przedziały stężeń,
- Diagnostyki względem wartości normowanych.



# Analizy roczne – Air Quality Indicators

European maps of annual/seasonal averages, exceedances and exposure

PM <sub>10</sub>	<b>PM<sub>10, exc</sub></b>	PM <sub>2.5</sub>	O <sub>3</sub>	O <sub>3, exc</sub>	SOMO35 (O <sub>3</sub> )	AOT40 (O <sub>3</sub> )	NO <sub>2</sub>	SO <sub>2</sub>	CO <sub>max</sub>
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2013    2014    2015    2016    2017    2018    2019    2020    2021    2022    2023

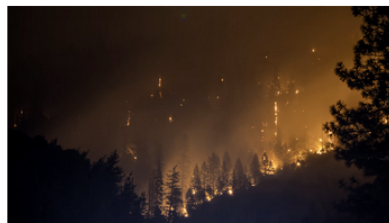
Maps for the years up to 2021 are from the CAMS [Validated Reanalysis](#) and the year 2022 is from the CAMS [Interim Reanalysis](#). The corresponding reports include more details on the methodology to compute these indicators, their evaluation, and the corresponding interpretation.



# Raporty

- Raporty z epizodów zanieczyszczenia powietrza o dużym zasięgu (pyły, ozon, pożary, pył mineralny),
- Trzy rodzaje raportów w ujęciu rocznym:
  - Roczny raport udziału źródeł w największych miastach Europy,
  - Interim raport (IAR) – stworzony na podstawie modelowania połączonego z danymi obserwacyjnymi,
  - Roczna ocena jakości powietrza w Europie (AAR) – dla roku Y-2.

## Episode Reports



In the case of major air pollution episode (fine particles, ozone, forest fires, mineral dust, ...), CAMS publish comprehensive [episodes analysis](#) reports combining multiple source of information, including meteorology data, observations (ground measurements, satellite pictures), and model forecasts.

## Annual Reports



CAMS deliver every year air quality reports describing the status of air pollution in Europe over the years. They provide a description of the evolution of regulatory air pollutant concentrations (nitrogen dioxide, ozone, particulate matter) and an analysis of most severe episodes that occurred over the target year.

Three reports are published every year:

- [The annual source contribution report](#) provide an overview of the air quality in some European cities using the source contributions forecasts from EMEP and LOTOS-EUROS.
- [The interim assessment report](#) (IAR) describes the situation (air pollution levels and episodes) of the previous year. It is based on CAMS air quality model results combined with observations from regulatory air quality monitoring networks run everywhere in Europe. However, observations that are reported to the European Environment Agency are not fully validated by the data providers (in the sense of quality assurance criteria implemented along with the air quality Directive) and this is the reason why those reports are "interim reports".
- [The validated annual assessment reports](#) (AAR) describes the situation that occurred two years ago and is based on CAMS air quality model results combined with validated observations provides by the European monitoring networks. The report is published later, once quality assurance checking on observation data is achieved. It provides the best estimate of air pollutants concentration patterns and levels in Europe over the target year. Regulatory indicators and metrics, as described in the European air quality Directives, are proposed and are completed by other indicators relevant to describe health and ecosystems exposure to air pollution.



# Dokumentacja

- Linki do dokumentów opisujących działanie poszczególnych serwisów,
- Filmy instruktażowe – tzw. „tutoriale”,
- Odnośniki do studiów przypadku („case study”) wybranych epizodów itp.,
- Lata dla których przygotowano analizy epizodów,

## Overview of available guidance

The CAMS policy tools are intended to be as intuitive as possible. Most of the charts are **interactive** (zoom, click on/off). Those tools are designed to answer specific questions formulated at the top of each page.

All of the pages presenting model forecasts include a **short readme section** that you can access by clicking on the **i** button. Note that similar buttons in some of the charts will also provide additional information.

**More information** regarding the models and methodologies used can be found in the [Frequently Asked Questions](#).

**Detailed documentations** for the [Air Control Toolbox](#) and the [Source Allocation Products](#) provide a description of the methodology and give several examples of step-by-step use cases. Scientific articles providing a thorough presentation of the methods and validation are also available ([ACT](#), [SA products](#)).

**Tutorial videos** are also available and provide step-by-step guidance on how to use ACT and the Source Allocation tools\*.



\*we are continuously working on improving the service. The version presented in those videos might slightly differ from the current version of the service.

Several **case studies** are documented in the various [episode reports](#) and [Interim Assessment Reports](#) (IAR), as listed in the table below. Many of them illustrate how the CAMS policy products (time series, maps, source apportionment and chemical regime charts) can be used to better understand how different emissions sources contribute to air pollution in European cities. Depending on the type of air pollution episode, the user would make use of different tools; the following list of case studies published in the IAR and episode reports illustrates the diversity of such applications.

	Ozone	PM
<b>Sensitivity maps</b>	Aug 2018, Apr 2019, Jun 2019, Jul 2019, Aug 2020, Jun 2021, Aug 2021, Jun 2022, Jul 2022	Oct 2018, Jan 2019, Feb 2019, Apr 2019, Oct 2019, Jan 2020, Mar 2020, Sep 2020, Nov 2020, Dec 2021, Jan 2022, Mar 2022, Dec 2022
<b>Sector apportionment</b>	Jul 2022	Jan 2022, Mar 2022, Dec 2022
<b>Country scenarios</b>	Apr 2019, Jun 2019, Jul 2019, Aug 2020	Jan 2019
<b>Chemical regimes</b>	Jul 2022* (episode report)	
<b>City/Country Source Allocation</b>	Jun 2019, Jul 2019, Jun 2021, Jul 2022, Jun 2023	Dec 2016, Jan 2017, Dec/Jan 2017/2018, Feb 2018, Jan 2020, Apr 2020, Oct 2020, Feb 2021, Mar 2022, Mar 2022, Jul 2022, Feb 2023

Episodes covered in the episode reports and in the Interim Assessment Reports



# Warsztaty

- Organizowane każdego roku dla wszystkich zainteresowanych, szczególnie przedstawiciele administracji,
- Udział bezpłatny – jednak potrzebne są środki na delegacje,
- Strona zawiera linki do poprzednich warsztatów,
- Na stronach warsztatów znajduje się wiele użytecznych prezentacji:
  - dodatkowe informacje na temat narzędzi,
  - Prezentacje na temat implementacji nowej dyrektywy powietrznej,
  - Dalsze perspektywy i priorytety CAMS,
  - Współpraca z innymi instytucjami (EEA, JRC),



To facilitate interaction with the policy users and make our services closer to users' needs and expectations, policy users workshops are organized every year. This is a forum where more recent products and services updates are presented, where policy users' feedback is discussed and considered to define together the service evolutions.

## Previous CAMS policy user workshops

- The [8th CAMS policy user workshop](#) will be held on the 28<sup>th</sup> of February in Paris, as the Ministère de la Transition écologique et de la Cohésion des territoires.
- The [7th CAMS policy user workshop](#) (hybrid) was held on the 4<sup>th</sup> of October 2023, in Athens at the National Hellenic Research Foundation (NHRF). It was organized together with the FAIRMODE 2023 Technical meeting. The agenda of the meeting and all presentations are available online at the [event webpage](#).
- The [6th CAMS policy user workshop](#) (hybrid) was held on the 08<sup>th</sup> of November 2022, at the Centre Borschette in Brussels. The agenda of the meeting, presentations and minutes are available online at the [event webpage](#).
- The [5th CAMS policy user workshop](#) (virtual) was held 29 June 2021, in cooperation with FAIRMODE (JRC). The [agenda](#) can be found at the [workshop event page](#). The minutes can be found [here](#)
- The [4th CAMS policy user workshop](#) (virtual) was held 8-9 December 2020 virtually, in cooperation with the European Commissions (DG\_ENV and DG\_DEFIS). The [agenda](#), [presentations](#) and [minutes](#) can be found at the workshop event page.
- The [3rd CAMS policy user workshop](#) was held 13-14 February 2019 at the Centre for Innovation and Technology Transfer Management of Warsaw University of Technology, back-to-back with the FAIRMODE 2019 plenary meeting in Warsaw. The [agenda](#), [presentations](#) and [minutes](#) can be found at the workshop event page.
- The [2nd CAMS policy user workshop](#) has been held 22 January 2018 in Copenhagen, hosted by the European Environment Agency (EEA). Presentations and [minutes](#) can be found at the [workshop event page](#).
- The [1st CAMS policy user workshop](#) was held 28 November 2016 in Brussels, hosted by the European Commission (DG\_ENV). The [agenda](#), [presentations](#) and [minutes](#) can be found at the workshop event page.







**IOŚ-PIB**

Institute of Environmental Protection  
National Research Institute

Dziękujemy za uwagę!

