Traffic and Mobility Indicators from Innovative Data

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The work context

- Extended scope of transport statistics: from the transport of goods and passengers to the wider concept of mobility
- Need for new indicators, on accessibility and efficiency of public transport, comparative performance of modes, transport sustainability, etc. to evaluate the effects of policies that traditional surveys alone have difficulty to provide
- Increasing connectivity and digitization in transport made available new sources of data and opportunities for experimental indicators on mobility
- Recent amendment of the Regulation on European Statistics provides access to NSIs to privately held data and administrative data for statistics, that may help in producing indicators on mobility using innovative data

Traffic and Mobility Lab project

Aim: Develop indicators on traffic and mobility using innovative data & establish new ways of processing and sharing innovative data to produce statistics

- 2022: landscaping study to identified promising new data sources for meaningful transport indicators
- 2023: selection of 3 use cases for transport indicators, drafted agreements with relevant partners to get access to innovative data and developed methodology for new indicators
- 2024: calculation of indicators for selected countries using innovative data as proof of concept

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Traffic and Mobility Project – 3 Selected Use Cases

Use Case 1:
Adoption of Alternative Fuels

Measuring distribution and capacity of publicly available alternative fuels infrastructure (recharging stations) based on crowdsourced data in NUTS 2/3 regions.

Use Case 2:
Availability of Public Transport

Measuring availability of public transport using GTFS and crowdsourced data in NUTS 2/3 regions.

Use Case 3:
Air Quality Traffic Pollutants Levels

Measuring average concentration of selected air pollutants at peak traffic times and their variation based on the European Environment Agency air quality database and TomTom traffic data.

Use Case 1. Adoption of alternative fuels

Charging infrastructure for alternative fuels

Data sources:

- Open Charge Map *(open-source)*
- European Alternative Fuels Observatory *(commercial)*
- Open Street Map
- NUTS raw data

Indicators:

Indicator 1.1
- Charging infrastructure density

Indicator 1.2
- Charging infrastructure network capacity

Indicator 1.3
- Charging infrastructure distribution

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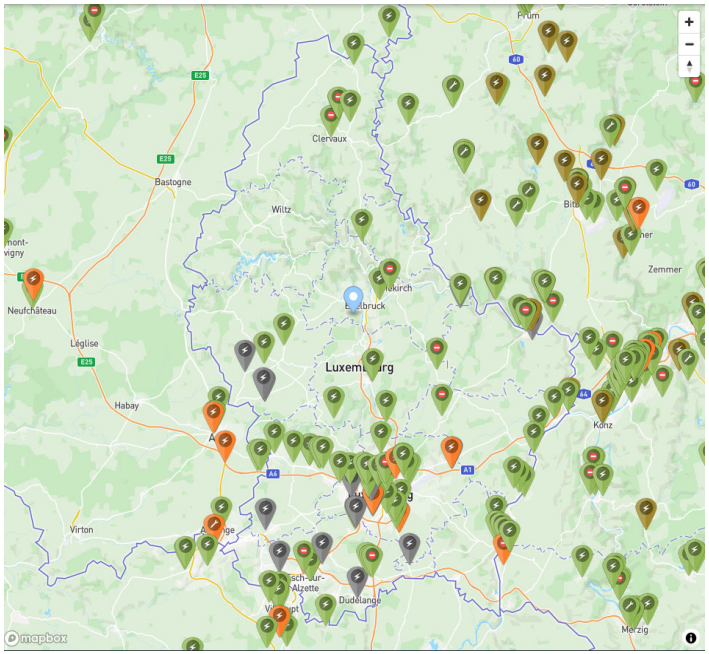
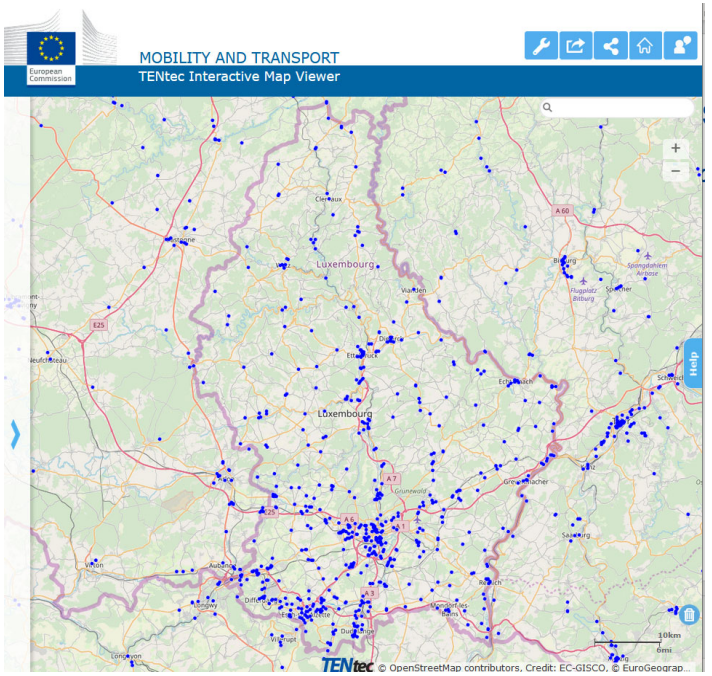
Charging infrastructure for alternative fuels

Crowd-sourced or commercial data?



Open Charge Map



EAFO/ Eco-Movement data visualized in TENtec Interactive Map Viewer

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Use Case 1: Charging infrastructure distribution

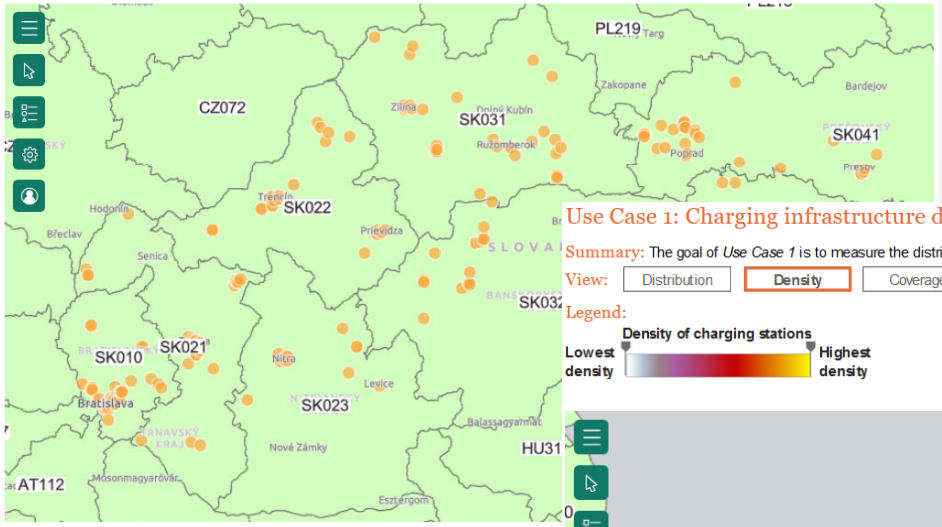
Summary: The goal of *Use Case 1* is to measure the distribution and capacity of recharging stations in NUTS 2/3 regions.

View: **Distribution** | Density | Coverage by time | Full coverage time

Legend:

Charging station

Distribution of individual charging stations



KPIs

Total charging stations	Total number of NUTS
222	8

Filters

Source: ○ EAFO ◉ OCM

Country: ☐ BE ☐ NL ■ SK

NUTS Level: Level 2 | Level 3

NUTS ID: ☐ SK010 ☐ SK021 ☐ SK022

Use Case 1: Charging infrastructure distribution

Summary: The goal of *Use Case 1* is to measure the distribution and capacity of recharging stations in NUTS 2/3 regions.

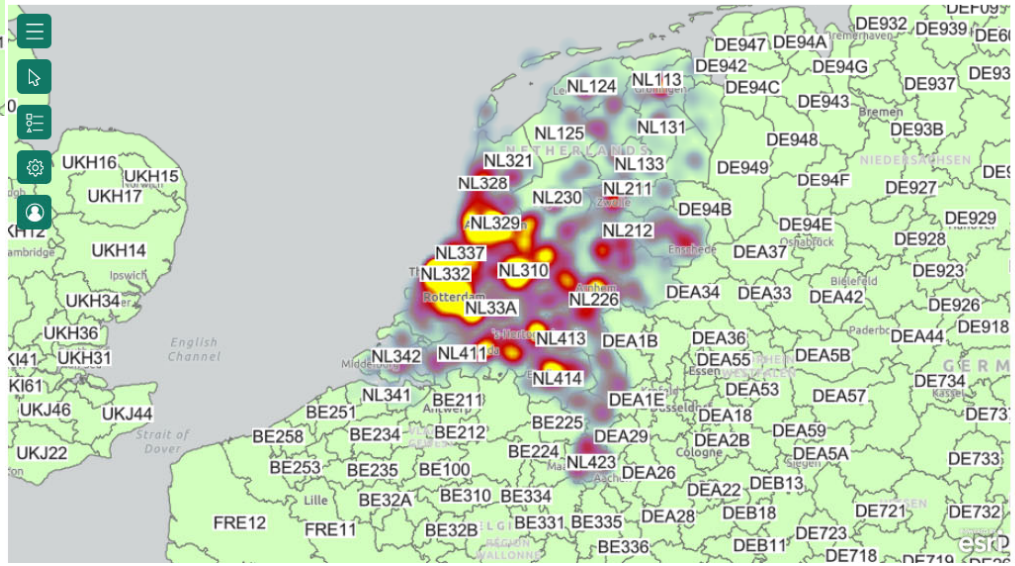
View: Distribution | **Density** | Coverage by time | Full coverage time

Legend:

Density of charging stations

Lowest density — Highest density

Density of charging stations



KPIs

Total charging stations	Total number of NUTS
7,825	40

Filters

Source: ○ EAFO ◉ OCM

Country: ☐ BE ■ NL ☐ SK

NUTS Level: Level 2 | Level 3

NUTS ID: ☐ NL111 ☐ NL112 ☐ NL113 ☐ NL124 ☐ NL125

Category:

- ☐ 0. Unknown
- ☐ 1. Slow AC recharging point, single-phase
- ☐ 2. Medium-speed AC recharging point, triple-phase
- ☐ 3. Fast AC recharging point, triple-phase
- ☐ 4. Slow DC recharging point
- ☐ 5. Fast DC recharging point
- ☐ 6. Ultra-fast DC recharging point (Level 1)
- ☐ 7. Ultra-fast DC recharging point (Level 2)

→ Go to Statistics

Use Case 1: Charging infrastructure distribution

Home

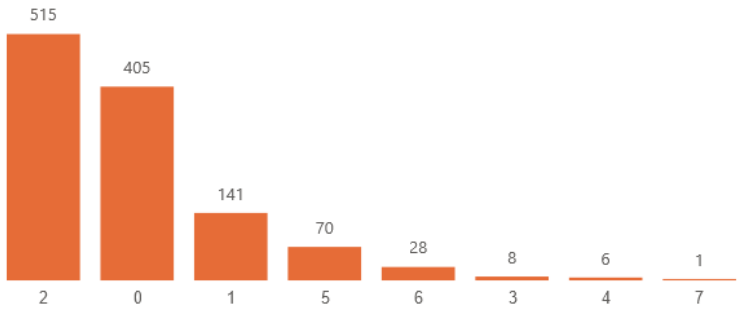
Summary: The goal of *Use Case 1* is to measure the distribution and capacity of recharging stations in NUTS 2/3 regions.

View: 1.1 - Charging stations by Region | **1.2 - Charging stations by Category** | 1.3 - Distribution of charging stations

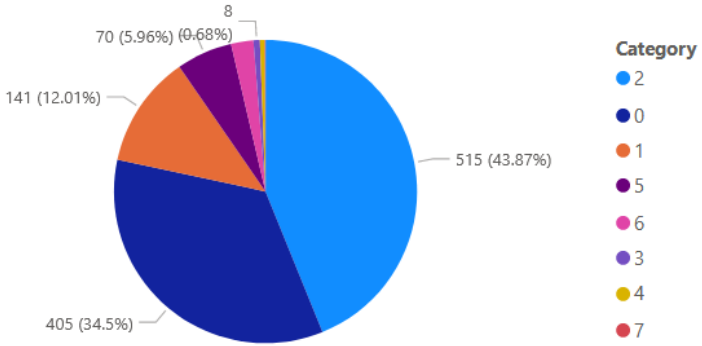
Indicator 1.2 overview

NUTS ID	Category	# Charging stations
BE234	2	97
BE211	2	79
BE100	2	73
BE234	0	63
BE211	0	44
BE241	0	39
BE100	0	37
BE251	2	31
BE242	2	27
BE211	1	22
BE241	2	22
BE242	0	21
BE224	2	19
BE328	0	19
BE212	2	17
BE224	0	17
BE212	0	16
BE251	0	15
BE310	2	15
BE332	0	14
BE213	0	13
BE213	2	13
BE254	0	12
BE223	2	11
BE211	5	10
BE213	1	10
Total		**1,174**

of Recharging stations by Category



of Recharging stations by Category



KPIs

Total charging stations	Total number of NUTS
1,174	39

Filters

Source
- ○ EAFO
- ◉ OCM

Country
- ■ BE
- ☐ NL
- ☐ SK

NUTS Level
- ○ NUTS 2
- ◉ NUTS 3

NUTS ID
- ☐ BE100
- ☐ BE211
- ☐ BE212
- ☐ BE213
- ☐ BE223

Category of Charger
- ☐ 0. Unknown
- ☐ 1. Slow AC recharging point, single-phase
- ☐ 2. Medium-speed AC recharging point, triple-phase
- ☐ 3. Fast AC recharging point, triple-phase
- ☐ 4. Slow DC recharging point
- ☐ 5. Fast DC recharging point
- ☐ 6. Ultra-fast DC recharging point (Level 1)
- ☐ 7. Ultra-fast DC recharging point (Level 2)

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Use Case 1: Charging infrastructure distribution

Home

Summary: The goal of *Use Case 1* is to measure the distribution and capacity of recharging stations in NUTS 2/3 regions.

View: 1.1 - Charging stations by Region | 1.2 - Charging stations by Category | **1.3 - Distribution of charging stations**

Indicator 1.3 - %Coverage at current time radius

NUTS ID	Time radius (minutes)	NUTS covered%
BE100	10	100.00
BE211	10	83.92
BE212	10	92.28
BE213	10	65.43
BE223	10	56.12
BE224	10	75.19

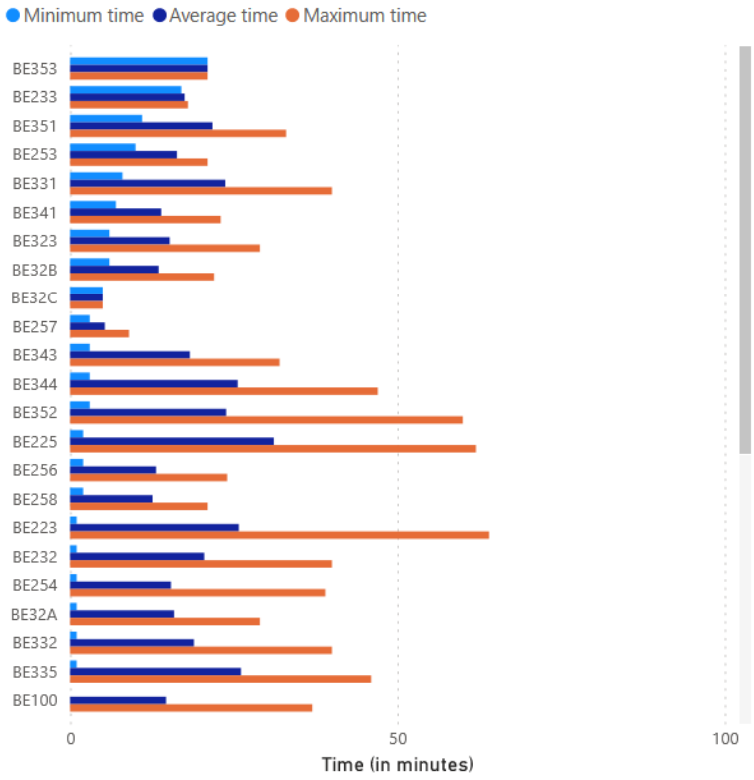
Indicator 1.3 - Time needed to cover all points

NUTS ID	Time needed (minutes)
BE100	10
BE211	30
BE212	20
BE213	30
BE223	60
BE224	20
BE225	50

Indicator 1.3 - Travel time between stations in minutes

NUTS ID	Minimum	Average	Maximum
BE310	0	25.45	81
BE213	0	26.85	72
BE223	1	25.77	64
BE241	0	22.21	63
BE225	2	31.13	62
BE212	0	22.26	60
BE352	3	23.84	60
BE224	0	19.77	51
BE234	0	15.18	49

Min, Average, and Max travel time between stations in a given NUTS



Filters

Source
- ○ EAFO
- ◉ OCM

Country
- ■ BE

NUTS Level
- ○ NUTS 2
- ◉ NUTS 3

NUTS ID
- ☐ BE100
- ☐ BE211
- ☐ BE212
- ☐ BE213
- ☐ BE223

Time radius (minutes)
- ◉ 10
- ○ 20
- ○ 30
- ○ 40
- ○ 50
- ○ 60

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Use Case 2. Availability and efficiency of public transport

Data sources:

- General Transit Feed Specification - GTFS data (public transport timetables)
- Population grid, TomTom traffic profiles (commercial data),
- Geospatial data available in GIS (roads, transport networks, stops, networks, etc.)

Indicator 2.1

- # of stops / (population and/or area km^2)
- Average # of lines serving public transport stops per NUTS 2/3 region
- Times of day when public transport is available

Indicator 2.2

- Travelable distance via public transport in a given time frame (in terms of % of region area and/or % of population reached)

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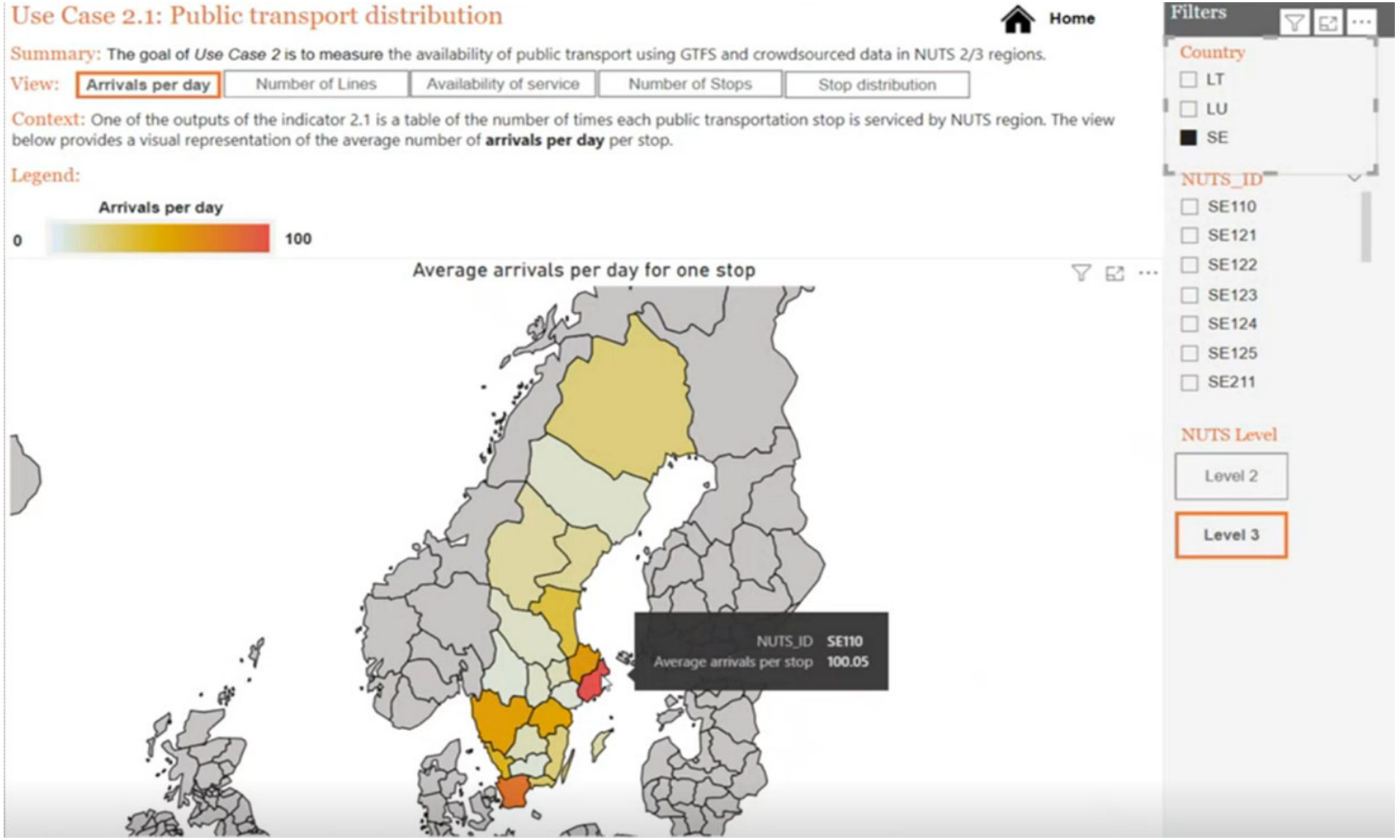

Use Case 2.1: Public transport distribution
Home
Summary: The goal of *Use Case 2* is to measure the availability of public transport using GTFS and crowdsourced data in NUTS 2/3 regions.
View:
Arrivals per day
Number of Lines
Availability of service
Number of Stops
Stop distribution
Context: One of the outputs of the indicator 2.1 is a table of the number of times each public transportation stop is serviced by NUTS region. The view below provides a visual representation of the average number of **arrivals per day** per stop.
Legend:
Arrivals per day
0
100
Average arrivals per day for one stop
NUTS_ID SE110
Average arrivals per stop 100.05
Filters
Country
LT
LU
SE
NUTS_ID
SE110
SE121
SE122
SE123
SE124
SE125
SE211
NUTS Level
Level 2
Level 3

Use Case 2.2: Reachability of public transport

Home

Summary: The goal of *Use Case 2* is to measure the availability of public transport using GTFS and crowdsourced data in NUTS 2/3 regions for 2021.

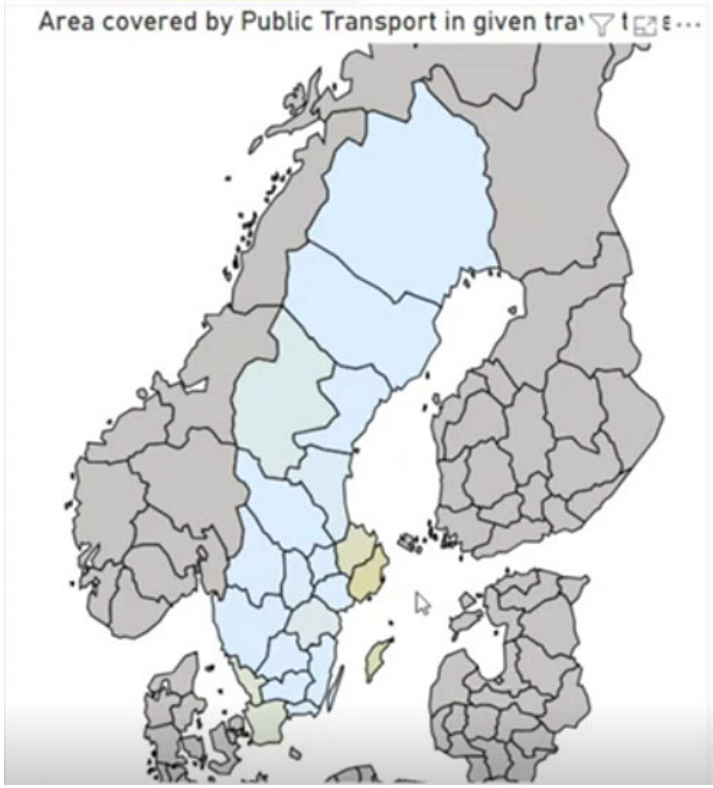
View: Area Coverage | Population Coverage

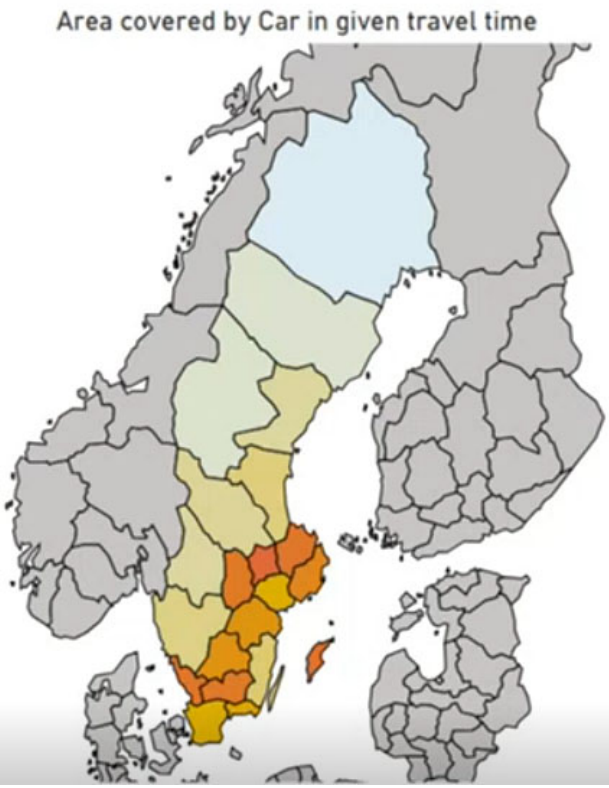
Context: The output of the indicator 2.2 is a table with the breakdown of area coverage (in km² and percentage), and population reached (in percentage) per travel time per transportation type (public transport and car). The view below is a visual representation of the percentage **area covered** by public transport (left) and by car (right) per travel time per NUTS region ID.

Legend:

Coverage

0% 100%





Filters

Country
- LT
- LU
- SE

NUTS ID
- SE110
- SE121
- SE122
- SE123
- SE124
- SE125
- SE211

NUTS Level
- Level 2
- Level 3

Travel time (minutes)
60

Use Case 2.2: Reachability of public transport

Home

Summary: The goal of *Use Case 2* is to measure the availability of public transport using GTFS and crowdsourced data in NUTS 2/3 regions for 2021.

View: Area Coverage | **Population Coverage**

Context: The output of the indicator 2.2 is a table with the breakdown of area coverage (in km² and percentage), and population reached (in percentage) per travel time per transportation type (public transport and car). The view below is a visual representation of the percentage of the **population reached** by public transport (left) and by car (right) per travel time per NUTS region.

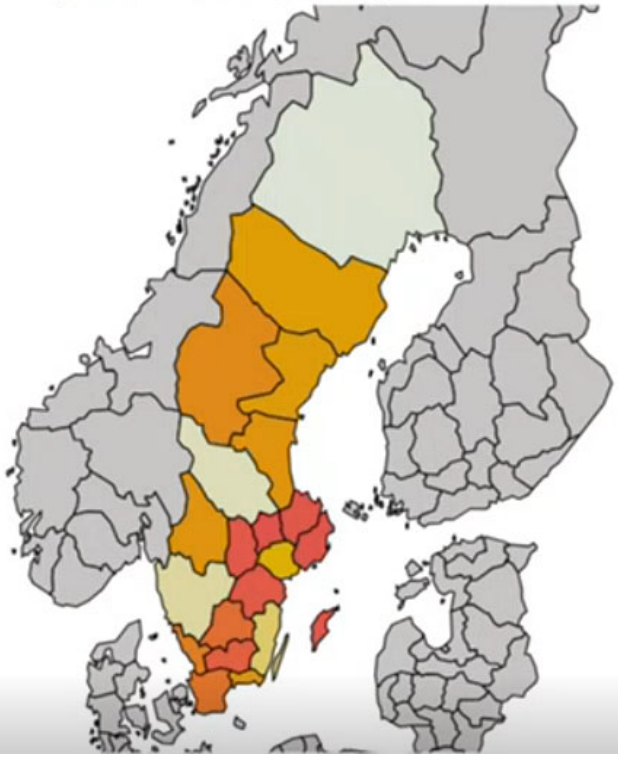
Legend:

Coverage

0% 100%

Population reached by Public Transport in given travel time

Population reached by Car in given travel time



Filters

Country

- [ ] LT
- [ ] LU
- [x] SE

NUTS ID

- [ ] SE110
- [ ] SE121
- [ ] SE122
- [ ] SE123
- [ ] SE124
- [ ] SE125
- [ ] SE211

NUTS Level

Level 2

Level 3

Travel time (minutes)

60

3. Use Case 3: Traffic and Air Quality

Data sources:

- EEA's hourly Air Quality data (NO_2, SO_2, C_6H_6)
- TomTom data for traffic
- NUTS regions data

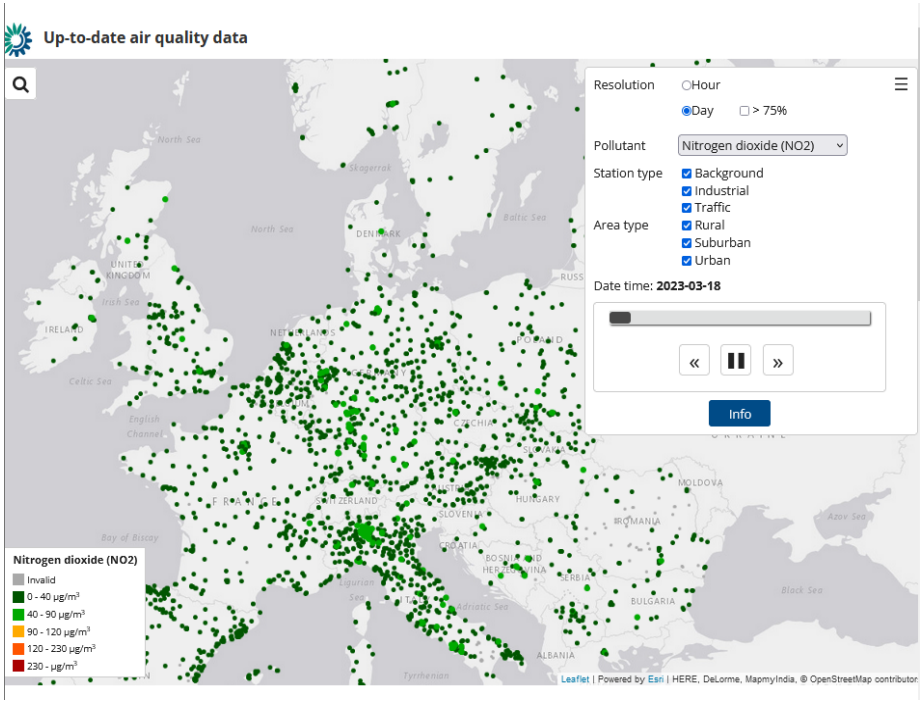
Indicator 3.1

- Average level of air pollutant at peak traffic times (over day/week/working days/ month per City or NUTS 2/3 region)
- Average difference of level of air pollutants between peak traffic times and baseline

Indicator 3.2

- # of Km with both high traffic and high air pollutant concentration

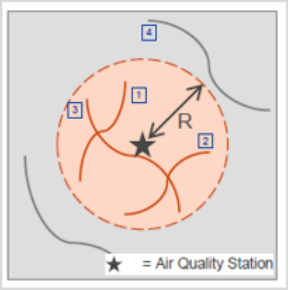
Data sources and methodology



[EEA's Up-to-date air quality data]

Calculation

Calculate monthly baseline for average air pollutant concentrations per station



Identify roads around air quality station (R=100m)

Identify traffic on those roads

Calculate average air pollutant concentration during traffic and compute the difference to baseline

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Use Case 3.1: Average air quality during traffic

Home

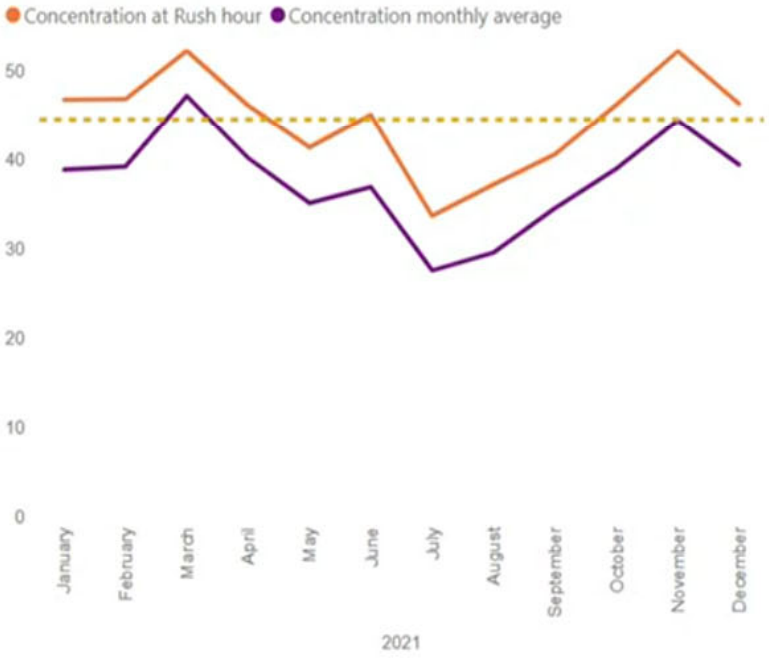
Summary: The goal of *Use Case 3* is to measure the average concentration of selected air pollutants at peak traffic times and their variation based on the European Environment Agency air quality database and TomTom traffic data.

Context: The output of the indicator 3.1 is a table with the concentration at rush hour, the monthly concentration baseline, and the difference between these two figures per air pollutant, per day, and per air quality station ID for a given year and country. The view below provides an additional visual representation of the evolution by day of the difference between the concentration at rush hour and the monthly **average concentration per air pollutant** per air quality station ID.

Date

01/01/2021 31/12/2021

Concentration by Day



Monthly comparison of Air Pollutant Concentration

Month	Average Concentration at Rush hour	Concentration monthly average
January	46.74	38.82
February	46.79	39.17
March	52.21	47.17
April	46.08	40.14
May	41.33	35.09
June	45.02	36.89
July	33.66	27.55
August	37.17	29.57
September	40.55	34.52
October	46.16	38.93
November	52.17	44.38
December	46.29	39.37
Total	**44.48**	**37.61**

Filters

Air Pollutant

- C6H6
- NO2
- SO2

Sampling Station ID

SPO-BETB001_00008_100

Location of Sampling Station

Data sources and challenges

- Commercial data set have better and richer content than free data sets, but can they generate financial costs
- Public data not always easy to get and use (administrative agreements, format, etc.)
- GTFS (timetables) data: not harmonised, no centralised repository, theoretical travel times/schedules, cannot differentiate between peak and off-peak hours, no systematic distinction between buses, trams, trains, etc.
- Benchmarking of results and transparency of methods is key
- Emissions data not complete and the number of traffic air stations rather limited (e.g. 11 for BE)
- Sensitivity of the results to the distance from measuring stations

Next steps

- Considering to publish the selected indicators and methodology as experimental statistics
- Give the opportunity to users to give feedback on methodology
- Discuss with national statisticians scaling up the project to cover more countries, different territorial delimitations (e.g. FUA)
- Enforcing internal capacity to host, maintain and further develop indicators (TMLAB)
- Develop an action plan for implementing the amended Regulation on European statistics facilitating access to privately held data and administrative data for statistics
- Provide insight on issues related to quality and harmonisation of statistics from innovative data (need for updated quality criteria, statistical production model, etc.)

Thank you

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