



How Google's Environmental Insights Explorer (EIE) supports Aarhus's Green Transition

TECHNICAL CASE STUDY



SUMMARY

The case study uses [Google's Environmental Insights Explorer \(EIE\)](#), a tool utilising various data sources and modelling capabilities to assist cities in assessing emissions sources, conducting analyses, and formulating strategies for impactful actions. This case study shows the importance of having accurate boundaries defined before starting an emission analysis. As boundaries in EIE were adjusted to the needs of the city of Aarhus, the potential of EIE for data-driven action in the city's transportation sector has been shown.

AIMS / OBJECTIVES

1. *Adjusting EIE boundaries for the city of Aarhus to match the official boundaries of the city and use the data more accurately.*
2. *Assessing the Transportation Emissions data in the tool to help the city evaluate its usefulness for its transportation improvement efforts.*
3. *Comparing EIE data with the existing data in the inventories of the city to find synergies, fill data gaps and find potential applications for climate action.*

OUTCOMES

1. *New accurate boundaries for Aarhus in EIE to provide the city with accurate emissions and modal share data.*
2. *Analysis and comparison of data and city inventory to identify synergies and where the data can improve current calculations.*
3. *Evaluation of the tool's potential for data-driven climate action in the transportation sector.*

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INTRODUCTION

Aarhus Municipality is the second largest municipality in Denmark with 355,238 inhabitants and a size of 468 km². The city is primarily characterised by the vibrant cultural and business community that is home to the country's biggest container port. Aarhus is also becoming a major destination for meetings and conventions, particularly those with a scientific focus, and it's also a leading light in sustainability.

Aarhus and ICLEI Europe started working together on Google's EIE platform in 2022, analysing the data and emissions calculation methodology. The city showed interest in all current and upcoming features of EIE, including the Transportation Emissions data of the tool, which could have a promising application in Aarhus.

The city is at a stage where they have had access to EIE and have conducted an initial analysis of the tool. After successfully reconciling the boundary in EIE to align with the city's administrative area, the Aarhus team is getting to know the data and methodology of the tool in more depth.



Unsplash / Kristian Egelund

AARHUS CLIMATE STRATEGY AND TRANSPORT DECARBONISATION GOALS

Over ten years ago, Aarhus set the ambitious goal to be a CO₂-neutral urban society by 2030. Since then, the emissions in the city have successfully been halved. The updated Aarhus Green Transition, Climate Action Plan 2021-2024, focuses on five particular emission domains that require accelerated action on this transition during the current period up to 2024. These emission domains include Energy, Transportation, AFOLU, Industrial processes and Stationary Energy.

Transport is one of the main challenges in Aarhus's green transition, as much remains to be done with regards to reducing light transport, modal share shift and transition to renewables. Transport is by far the largest contributor to greenhouse gas emissions in Aarhus, almost 50% of the emissions, and the city has defined a specific target to reduce 79,000 tons of CO₂ emissions in the sector by 2024.

In addition, by 2030 Aarhus will:

- ✦ Increase the proportion of trips made by public transport, bicycle, and on foot
- ✦ 40% of car fleet will be electric
- ✦ 100% of public transport, private buses, and taxis without fossil fuels
- ✦ 30% reduction of the consumption of fossil fuels in trucks, ships, and aircrafts

In 2022 Aarhus was selected as one of the 100 cities at the Climate Neutral and Smart Cities Mission, which will contribute to the city becoming climate neutral by 2030. In this context, Aarhus would require more consistent and insightful data sources that could help to monitor their climate actions towards advancing climate neutrality.



GOOGLE'S EIE DATA

When the collaboration between ICLEI Europe and Aarhus started, the available data on the EIE platform for the city had the boundaries that can be seen in Figure 1. However, the city pointed out that these were not the correct boundaries for Aarhus municipality, which were in fact much larger. EIE was able to provide new data with much more accurate boundaries, which can be seen in Figure 2.

Currently, EIE is able to provide data for Aarhus from the years 2018 to 2022 and the boundary correction allowed the provision of a more complete emissions and trips data for the city. Table 1 below shows the differences in terms of population and emissions with the updated geographical boundaries, highlighting the importance of making this correction in order to have the most accurate data possible.

Table 1: Comparison of the two datasets for Aarhus in EIE

| | Initial Aarhus boundaries | New Aarhus boundaries |
|---|---------------------------|-----------------------|
| Size (km ²) | 53 | 468 |
| Population (inh.) | 138,071 | 344,567 |
| Total transportation emissions in 2019 (tCO ₂ e) | 253,000 | 541,000 |

Figure 1 (left): Initially available boundaries for Aarhus on the EIE platform

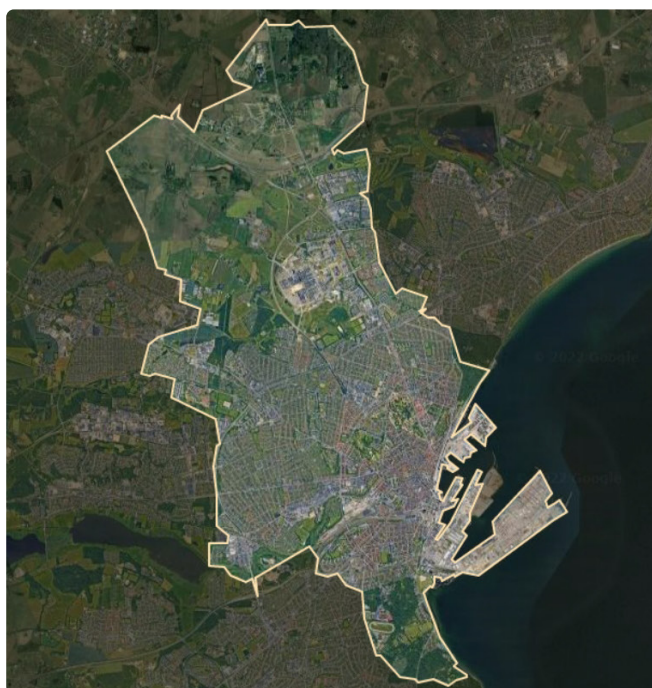
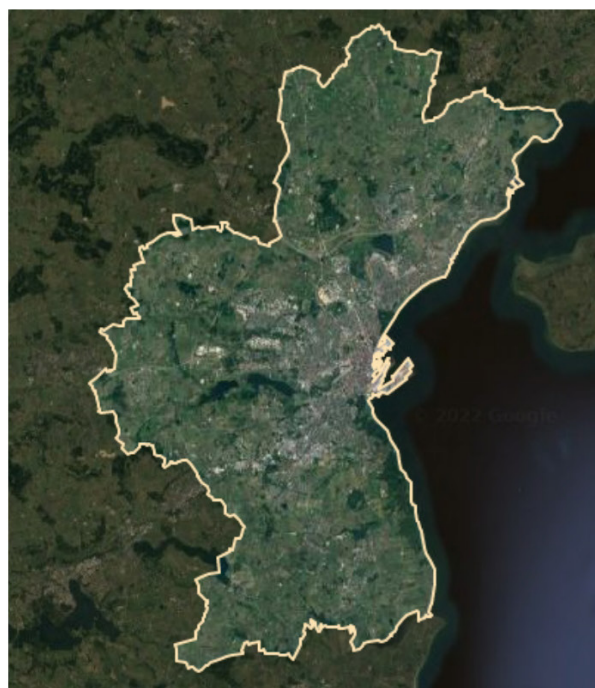


Figure 2 (right): Corrected boundaries for Aarhus on the EIE platform



TRANSPORTATION EMISSIONS DATA ANALYSIS

Having clarified and updated the city's boundary to the preferred area, the team studied the existing data in EIE for transport emissions in the city, in order to compare it with the existing emissions inventory in Aarhus.

Aarhus reports its emissions to the CDP- ICLEI Track platform. From a methodological perspective, Aarhus's emissions are calculated under a top-down approach (fuel sales method) covering only emissions from vehicles registered within Aarhus' boundaries, and categorised in scope 2 emissions. This means that emissions from vehicles registered in other cities and belonging to citizens that commute to Aarhus (scope 3 emissions) are not included in Aarhus' GHG emissions inventory.

Table 2: Transport emissions data analysis between EIE and Aarhus's city inventory

| | |
|---|---------------|
| Google EIE on-road transport emissions (tCO ₂ e) | 541,157 |
| Aarhus on-road transport emissions (tCO ₂ e) | 459,000 |
| Difference in tCO ₂ e | 82,157 |
| Difference (%) | 17.90 |

As EIE uses a bottom-up approach, aligned with the GPC Method, the following premises were defined to carry out the analysis between both sources of data:

- ★ 2019 as the year for which the data is compared (city data available in the CDP-ICLEI track)
- ★ Only fuel-based on-road transport emissions were compared, as rail is an emission-free mode in EIE
- ★ The comparison of Aarhus emissions data for on-road transport (automobile and bus), has been made against EIE emissions data from following the GPC Protocol compliant methodology, as the current on-road transport emissions from Aarhus do not include vehicles outside city boundaries
- ★ All emissions (CO₂, CH₄ and N₂O) were included in the analysis without disaggregation, as the city and EIE report aggregated GHG emissions, measured in tCO₂e

Having the comparable emissions data from the two sources (EIE and city inventory) the difference between the two can be obtained.

The difference in on-road Transportation Emissions is 17.9%, being higher on EIE than in the city inventory. One of the reasons that could cause this difference, could be due to the fact that the city on-road Transportation emissions only account for vehicles registered in Aarhus (scope 2 emissions).



OUTCOMES AND IMPACT OF THE STUDY

This study shows the importance of having correctly defined boundaries and population in a city in order to accurately calculate the emissions. The correction of boundaries in EIE allowed the city to have a comparable data source and proved that the tool is accurate. The data was similar to Aarhus' inventory for total on-road emissions, and a reasonable explanation was found for the discrepancies.

This study sets the path to further use EIE as a source of information for the city inventories, either for the Transportation Emissions or for refining the modal share

and trips made by mode of transport. As the tool provides yearly datasets, it could be a great source of information for Aarhus as they also elaborate an inventory every year.

Going forward, Aarhus will use EIE for data-driven policymaking in the transportation sector to achieve their green transition goals. EIE can support in identifying targeted decarbonisation actions linked to the city's targets of increasing the proportion of trips made by public transport, bicycle, and on foot, and help support 100% of public transport, private buses, and taxis to operate without fossil fuels.



Interview with **Aarhus Signe Søndergaard Carstensen** (Data Officer) and **Søren Winther Lundby** (Funding & Project Manager), Climate Sec. Aarhus Municipality

VALUE TO CITIES

What value did you personally find in EIE?

The EIE platform is a great, and most needed tool. Good, precise data, that leaves us with a profound and holistic overview, is a fantastic foundation for well-informed political decisions and planning.

What do you think the value of EIE is to your city?

Regarding traffic data EIE gives us a valid picture of the emissions within the city border, including passing through traffic; and other modes of transport including pedestrians and bike riders. What would be great to add is even more specific data sets on zip code level. Also, it would be very useful to us to have exact and precise data sets on cargo trucks to and from the harbour (and to various logistical hubs at the outskirts of the city).

OPERATIONAL IMPACT

How do you think EIE will support your city or local government's operations?

We will use the data in our management support deliverables - to further fact-based political decisions. It is of utmost importance to ensure that politicians make decisions on a valid foundation.

GLOBAL IMPACT

What do you see will be the impact for all cities?

We anticipate a huge impact, because cities will have a valid data set for the city. Valid and solid data is a prerequisite for any good decision making. It goes without saying that the positive impact from using the platform will increase in accordance with the development and improvement of the platform.



OUTLOOK

Other cities with similar characteristics to Aarhus can learn the importance of exploring different sources of data that can complement the city's data sources. EIE can provide detailed data on local mobility on an annual basis. Reflecting on how EIE can be utilised by other cities, Signe Søndergaard Carstensen (Data Officer) and Søren Winther Lundby (Funding & Project Manager) from the Aarhus Municipality note that this tool can have a strong impact. *“Valid and solid data is a prerequisite for any good decision making. It goes without saying that the positive impact from using the platform will increase in accordance with the development and improvement of the platform.”*

Cities like Aarhus, that are part of the EU Mission on Climate Neutral and Smart Cities, could benefit from EIE especially to obtain detailed information on outbound and inbound trips occurring in the city in order to assess their transport-related scope 3 emissions. With this information cities could identify new transport decarbonisation options between cities in the same region.

References

Aarhus Climate Action Plan:
https://endelafloesningen.aarhus.dk/media/69806/klimahandlingsplan-2021-2024_gb_web.pdf

CDP-ICLEI Track. (2022). *CDP ICLEI Unified Reporting System*. Retrieved October, 2022, from www.cdp.net/en/cities

Google's EIE platform:
<https://insights.sustainability.google>

Talks with Aarhus city representatives

Talks with the EIE team

ICLEI Europe

ICLEI – Local Governments for Sustainability is a global network working with more than 2500 local and regional governments committed to sustainable urban development. Active in 125+ countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development.



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