The Unnecessary Burden

Estimation of CO_2 emissions associated with the postponement of Romania’s and Bulgaria's accession to the Schengen area and generated by road vehicles while waiting for border control

KPMG in Romania

—

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Glossary

CO_2	Carbon dioxide
EU	European Union
HDV	Heavy Duty Vehicle
IGPF	General Inspectorate of the Romanian Border Police
LDV	Light Duty Vehicle
LPG	Liquefied Petroleum Gas
mn	million
UNTRR	Uniunea Nationala a Transportatorilor Rutieri din Romania (National Union of Road Hauliers of Romania)
SUV	Sport Utility Vehicle
tCO_2	Tonnes of CO_2
TRL	Transport Research Lab

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In the development of the Publication we have relied on data and information from publicly available sources, as well as on data and information received in response to requests for information submitted by KPMG to relevant public institutions in Romania, Bulgaria and Greece and private organizations (e.g. the General Inspectorate of the Romanian Border Police, the Border Police of Bulgaria, the Border Police of Greece, National Union of Road Hauliers of Romania, the National Association of Travel Agencies in Romania etc.) as well as on discussions with representatives of some of the of companies operating in the international transport sector. It has been assumed that all information obtained from public sources or provided by third parties is complete and accurate and it has not been independently audited or reviewed nor has its reliability, accuracy or completeness been verified by reference to sources, information or evidence by KPMG

Our Publication makes reference to ‘KPMG analysis’; this indicates only that we have (where specified) undertaken certain analytical activities on the underlying data, to arrive at the information presented; we do not accept responsibility for the underlying data.

General Context

The Schengen area

Started in 1985 as an intergovernmental initiative between five EU countries, the Schengen area represents one of the most important European projects. It has gradually expanded to become the largest free trade & travel area in the world, with no physical border controls[1].

Currently, all EU member states except Bulgaria, Cyprus, Ireland and Romania are part of the Schengen area, which also encompasses the following non-EU states: Iceland, Norway, Switzerland and Liechtenstein[2].

Being part of an area without border controls means that countries do not carry out checks at their borders (except in cases of specific threats) within the set of rules governing the Schengen area, called the Schengen Border Code. This has had a positive impact on the economies of all the member states. The increased speed at which trade can take place, by cutting down the time spent at internal borders, made the Schengen area goods and services more competitive compared with those arriving from non-Schengen regions.

Romania's and Bulgaria's accession to the Schengen area

Romania's accession to Schengen was a commitment undertaken through the EU Accession Treaty concluded before Romania joined the EU in 2007. The Treaty stipulates the provisions of the Schengen acquis which were compulsory for Romania, starting from the date of Romania's accession to the EU[3].

In 2007 when Romania became a member with full rights of the European Union, the country entered a new stage, which involved the preparation and implementation of the necessary measures to lift internal border controls with other EU member states.

Romania manages 448 km of land border with Hungary and 130.1 km of land border with Bulgaria. It also manages 2,070 km of EU external border – the second longest external border in the European Union – out of which 1,877 km is land. The land border between Bulgaria and Greece has a length of 494 km.

The European Parliament gave the green light for Romania and Bulgaria to join the Schengen area in June 2011, based on the fact that the two countries had fulfilled the technical conditions for becoming Schengen member states[4].

Although discussed and negotiated multiple times, eleven years later, on 8 December 2022, the accession of Romania and Bulgaria to the Schengen area was rejected once again, following the vote of the Justice and Home Affairs Council. The decision to reject Bulgaria and Romania's accession to the Schengen area causes negative impacts in various sectors of the national economies of both countries, and it has a impact from the environmental perspective as well.

Context of the Publication

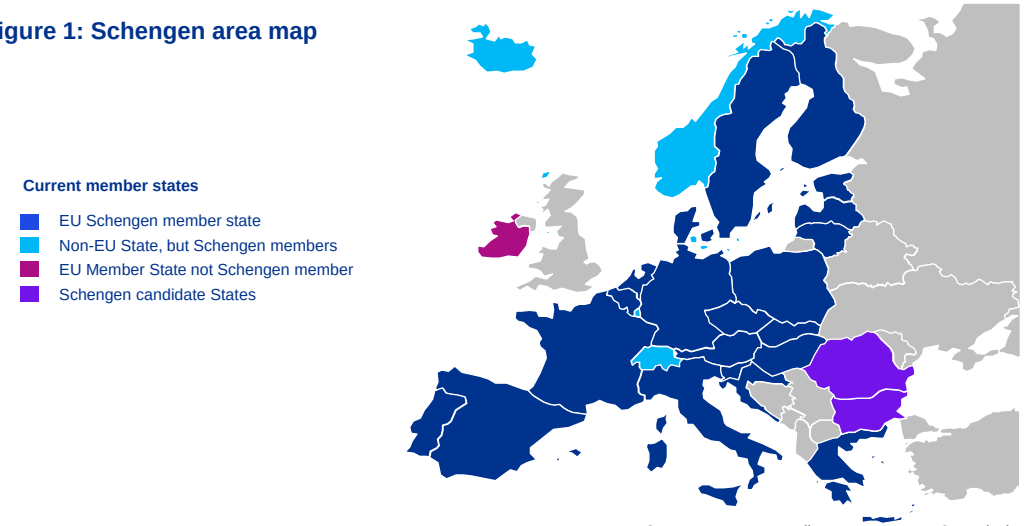
The accession of Romania and Bulgaria to the Schengen area would lead to the elimination of physical checks at the borders between the two countries, as well as at the borders of the two countries with other member states (i.e. at the borders between Romania and Hungary and between Bulgaria and Greece). This would translate into shorter travel times for both freight and passenger road transport along these countries' travel corridors.

Shorter travel times would have an immediate impact in reducing fuel consumption and therefore contribute to a reduction in emissions of CO_2 and other greenhouse gases associated with road transportation between these countries and the other EU member states.

As the European Union's targets on climate change are very ambitious, and all member states have to take measures to reduce their greenhouse gas emissions, all decisions and policies adopted within the European Union should be assessed from a climate change perspective as well, to quantify the associated impact.

The Publication aims to quantify the carbon emissions generated by the functioning of motor vehicles during periods of waiting for control checks at the borders with member states, following the rejection once again of Romania's and Bulgaria's accession to Schengen area in 2022.

Figure 1: Schengen area map



Source: European Parliament, European Commission

Methodology Overview

Scope of the Publication

The purpose of the analysis is to estimate the quantity of carbon emissions associated with the postponement of Romania's and Bulgaria's accession to the Schengen area, caused by the operation of engines while waiting at border crossing points. We further use the term "Border Carbon Emissions" in order to define the total carbon emissions of the road vehicles having their engines running during the time of waiting for the border control and during the border control, at the physical border check points with other EU member states.

Methodological aspects

In the analysis, we considered a one year period with respect to the estimation of CO_2 emissions. The estimation of the impact is the result of a comparison between the Border Carbon Emissions in the scenario in which Romania's and Bulgaria's accession to the Schengen area is not accepted (Actual Scenario) and the Border Carbon Emissions in the scenario in which Romania's and Bulgaria's accession to the Schengen area were to be accepted (Counterfactual Scenario).

Counterfactual Scenario

In the Counterfactual Scenario, the assumption used is that if Romania and Bulgaria were part of the Schengen area, then the waiting time related to border control at the border of the two countries with member states would be eliminated, and therefore we estimated the value of Border Carbon Emissions at nil. As such, the quantity of carbon emissions reduced by the admission of Romania and Bulgaria to Schengen would be equal to the Border Carbon Emissions estimated in the Actual Scenario.

The purpose of the Publication was not to reflect in the analysis the full impact on mobility habits and road transport volumes resulting from Romania and Bulgaria becoming Schengen members. However, we have assumed that this impact would be marginal and would not lead to significant increases in CO_2 emissions caused by additional road transport volumes in the Counterfactual Scenario, as compared to the Actual Scenario.

Actual Scenario

In order to use the most recent data to estimate the Border Carbon Emissions in the Actual Scenario, we sent requests for information to relevant institutions and organizations in relation to the transit of vehicles at the border for the full year 2022.

We have taken into account in the analysis the passing of road vehicles at the borders between Romania, Bulgaria and other member states, i.e.:

1. At the border between Romania and Hungary;
2. At the border between Romania and Bulgaria;
3. At the border between Bulgaria and Greece.

Estimation of Border Carbon Emissions in the Actual Scenario

We estimated the Border Carbon Emissions in the Actual Scenario as a function of the following three factors:

- The total number of motorized road vehicles crossing the border between Romania and the other member states during 2022 and between Bulgaria and Greece, in both directions of travel;
- The estimated time of waiting for the border control and during the border control, at the physical border check points between Romania and member states and between Bulgaria and Greece;
- The carbon emissions from idling engines while waiting for the border control and during the border control, at the physical border check points between Romania, Bulgaria and the other member states.

Data and information

To collect the primary data for the analysis, we sent requests for information with respect to the inputs needed, to relevant public institutions in Romania, Bulgaria and Greece as well as private organizations (e.g. the General Inspectorate of the Romanian Border Police, the Border Police of Bulgaria, the Border Police of Greece, the National Union of Road Hauliers from Romania, the National Association of Travel Agencies in Romania, the Romanian Automotive Register, the National Road Infrastructure Administration Company of Romania etc.).

The Publication is based on the data and information obtained following these enquiries and received by 17 March 2023, as well as on the information retrieved from reputable publicly available sources to which we have applied the methodologies and assumptions further described in this Publication.

Generally, the carbon emissions calculation process involves working with a large and very diverse set of parameters and variables. But the extent of the variations is difficult to estimate in the absence of reliable data. As in some cases, the quality or the granularity of the data sets were not the highest possible, the analysis and projections were made conservatively.

Estimation of Border Carbon Emissions (1/4)

This section provides further details about the approach taken for the estimation of the Border Carbon Emissions in the Actual Scenario, and the assumptions used.

Number of motorized road vehicles

The total number of motorized road vehicles crossing the border considered in the estimation of the Border Carbon Emissions comprises both travel streams (entry and exit) at the Romanian and Bulgarian borders. Following a request for information submitted to the General Inspectorate of the Romanian Border Police, we received the monthly number of motorized road vehicles crossing the borders between Romania and the member states during 2022, split by the following categories: Passenger Cars, Minibuses, Large Passenger Buses and Trucks.

Figure 2: Number of motorized road vehicles crossing the border between Romania and Hungary in 2022

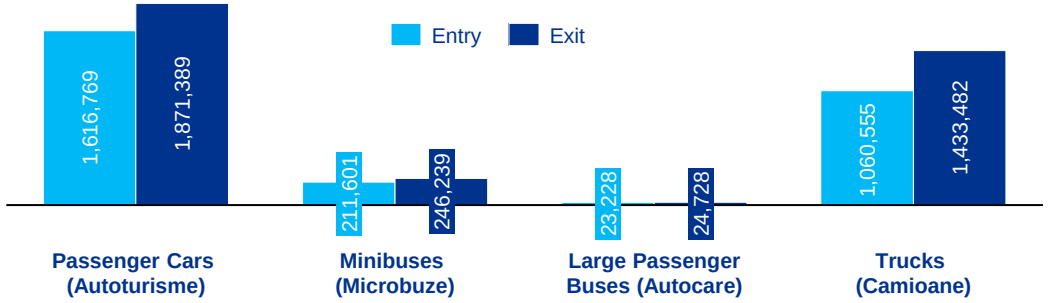
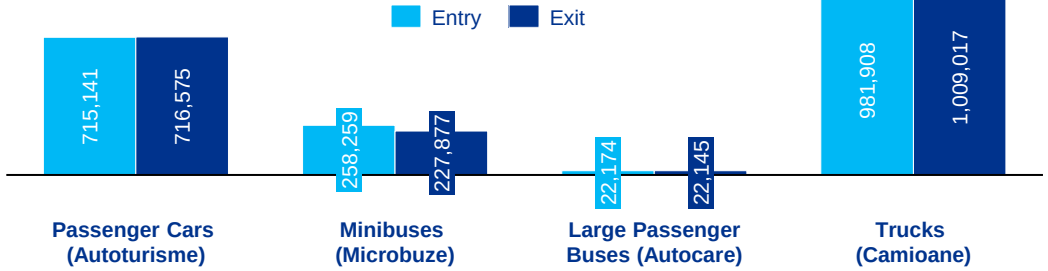


Figure 3: Number of motorized road vehicles crossing the border between Romania and Bulgaria in 2022



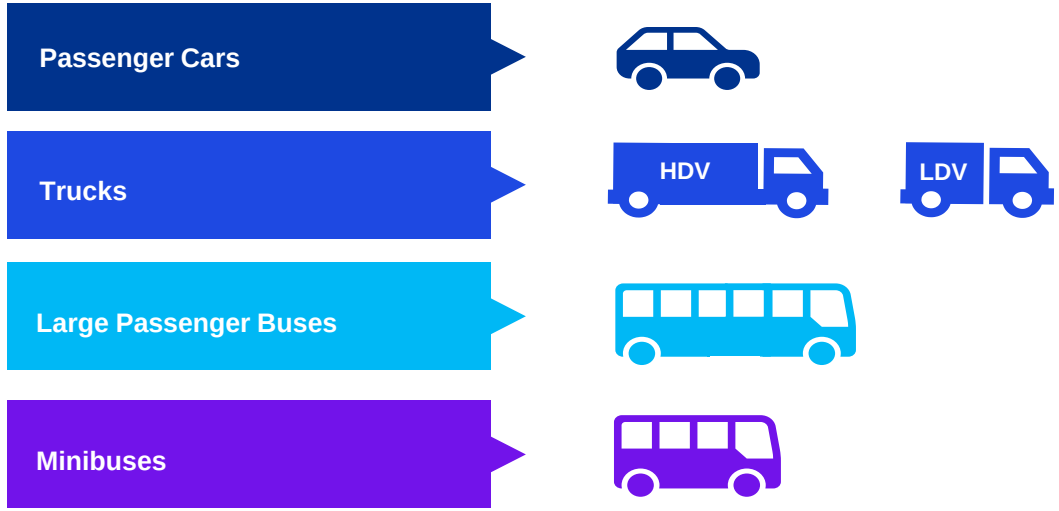
Note: The Motorcycle category was excluded from the analysis as their proportion of the total number of border crossings (<0.2%) is marginal.
Source: General Inspectorate of the Romanian Border Police, KPMG analysis

Given the lack of data at the time of writing this Publication, for the number of vehicles crossing the border between Bulgaria and Greece, we considered in the analysis the number of vehicles crossing the Romanian – Bulgarian border during 2022, as a conservative proxy.

In order to capture into the analysis the fact that fuel consumption and carbon emissions are significantly influenced by the vehicle type (Heavy Duty Vehicles, Light Duty Vehicles, Passenger Cars – SUVs/ Family Cars/ Small Cars etc.), we extended the analysis by breaking it down into the following categories of vehicles:

- Heavy-duty vehicles (HDVs);
- Light-duty vehicles (LDVs);
- Large Passenger Buses (*Autocare*);
- Minibuses;
- Passenger cars (including small cars, family cars/estate cars and SUVs).

Figure 4: Type of motorized road vehicles



Estimation of Border Carbon Emissions (2/4)

Vehicle waiting time

We assumed that the waiting time at the physical border with member states is impacted by:

- the time of waiting in line for the border control; and
- the time spent during the actual control routine.

In addition to the variation of the waiting time due to different border control measures (i.e. control of documents or other verifications), the time spent at the border varies based on seasonality, with periods of holiday (i.e. winter and summer holidays, school holidays etc.) creating long queues at the borders and increasing the time per passage for a vehicle.

To embed this seasonality into the analysis, our aim was to gather information on waiting time at least on a month by month basis, or to refer to yearly averages, as a proxy.

Based on enquiry with the General Inspectorate of the Romanian Border Police, the estimates of waiting time at the borders are performed in real time and published on the webpage of the institution. Historical databases with average waiting times per category of vehicles, per month, are not available.

As such, for the estimates regarding the average waiting times were made based primarily on:

- information provided by UNTRR;
- enquires and interviews with international transport operators and logistics companies; and
- KPMG analysis.

Generally, at the border, vehicle waiting time varies between categories of vehicles (e.g. passenger cars vs. passenger buses vs. commercial trucks).

Therefore, for the categories of vehicles identified in the previous step, we estimated, in a conservative way, different idling time as follows:

Trucks

For Trucks (both LDVs and HDVs) we have taken into account the information made public by UNTRR[5]. According to UNTRR, the average waiting time at the border of Romania with Hungary and Bulgaria varies between 30 minutes and 72 hours, with an average of 6 hours per passing.

No reliable information is available on what proportion of the waiting time is spent with engine running. For this reason, we have taken a conservative interval of reference between 30 minutes (the minimum waiting time indicated by UNTRR) and 6 hours (the average waiting time indicated by UNTRR). Further on, we have taken into account the middle of this waiting time interval, i.e. approximately 195 minutes with engine running, in average, per crossing.

Passenger Buses

For Passenger Buses, we have considered the responses received from relevant operators of international transport of passengers. The average waiting time interval, based on seasonality, varies between 30 and 90 minutes.

For the estimation performed we have taken into account the middle of this waiting time interval, i.e. approximately 60 minutes with engine running, on average, per crossing.

Passenger Cars

We have considered Passenger Cars as having the lowest waiting time as compared to the other types of vehicle. Therefore, we have estimated the higher end of the interval of reference for this type of vehicle, to be equal to the lower end of the interval for large passengers buses and trucks (i.e. 30 minutes) but no less than an average of 10 minutes.

For the estimation we have taken into account the middle of this waiting time interval, i.e. approximately 20 minutes with engine running, on average, per crossing.

Estimation of Border Carbon Emissions (3/4)

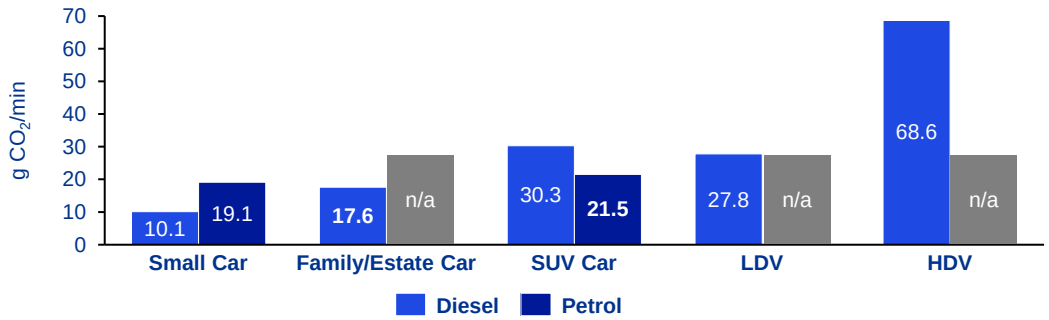
CO_2 emissions per unit of waiting time

Exhaust emissions from road transport arise from the combustion of fuels such as petrol, diesel, liquefied petroleum gas (LPG) etc., in internal combustion engines. Petrol and diesel vehicles contribute differently to the transportation sector CO_2 emissions.

The quantification of CO_2 emissions resulting from various sources requires internationally recognized credible methodologies and procedures. However, in highly complex projects, there are various levels of uncertainty.

In order to ensure the transparency and the reliability of the results presented in the Publication, we referred to relevant information concerning the CO_2 emissions released into the atmosphere whilst idling (i.e. with engine running in stationary mode), as a proxy for the estimation of carbon emissions of vehicles with engine running while waiting for control checks at the border. Specific data for Romania and Bulgaria was not available so we have used for the calculations, the figures published in the "Idling Action Research – Review of Emissions Data" study prepared by Transport Research Lab* for the City of London in 2020[6] (see graph below). We consider this approach as rather conservative, as the average vehicle fleet age in Romania and Bulgaria is higher than in the UK[7], with an implied negative impact on the level of carbon emissions of engines. Also, emissions while idling can be lower than emissions of vehicles which move in a queue while waiting at the border.

Figure 5: The average of CO_2 emitted, by fuel and vehicle type, whilst idling for one minute



Source: KPMG analysis, Transport Research Lab, PUBLISHED PROJECT REPORT PPR987 – Idling Action Research - Review of Emissions Data

*Note: *Established in 1933 as the UK government's Road Research Laboratory, the renamed TRL (Transport Research Lab) was privatized in 1996.*

In Figure 5, where "n/a" is displayed, the data was unavailable. Given the lack of information, we have made the following assumptions in the analysis:

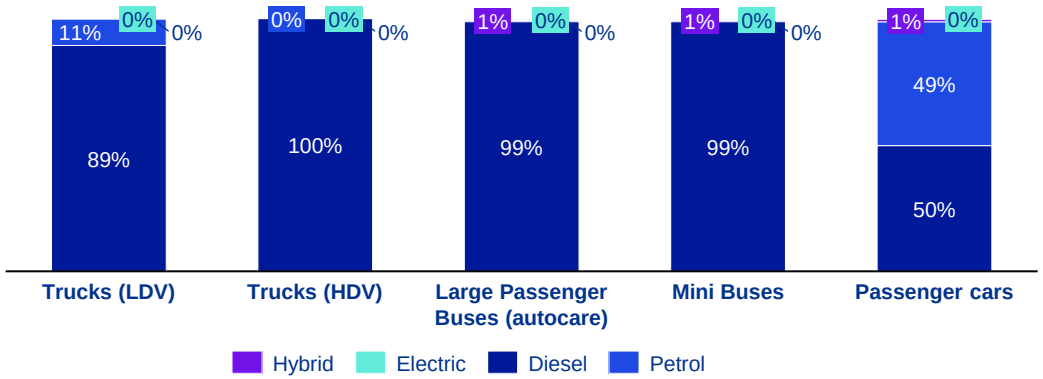
- The CO_2 emissions for Passenger Cars used in the analysis take into account the average between Small Cars, Family/Estate Cars and SUV Cars for both diesel and petrol engine types;
- The CO_2 emissions for Large Passenger Buses have been assimilated to High Duty Vehicles;
- The CO_2 emissions for Minibuses have been assimilated to Light Duty Vehicles for diesel, while for petrol we assumed that the values of CO_2 emissions are in the proximity of an SUV, and therefore we have used the SUV value as a proxy in the calculation.

Estimation of Border Carbon Emissions (4/4)

Fuel considerations

In order to calculate the number of vehicles crossing the border based on fuel type, we have referred to the information available on the data.gov.ro website concerning the structure of national vehicle fleet in Romania as at 31 December 2021 (the latest year available). We have used this statistics as a proxy for the analysis, by equivalating the structure to estimate the breakdown of fuel type for the vehicles which cross the border. While heavy duty vehicles and large passenger buses are powered primarily by diesel fueled engines, the category of passenger cars is not polarized in a similar manner, with almost half of the fleet being powered by petrol ("*benzina*") engines.

Figure 6: Share of engine type in the national fleet in Romania as at 31 December 2021



Source: Data.Gov.Ro, Parc auto Romania, KPMG analysis

Diesel based engines dominate the heavy duty vehicles and large passenger buses category mainly because of their greater fuel efficiency and torque as compared with petrol engines[8]. Given the fact that diesel and petrol engines dominate the transport fleet, we did not include in the calculation the carbon emissions of vehicles with engines fueled by other sources (GPL, hybrid etc.), their impact being marginal in the analysis.

CO_2 emission estimation

The Border Carbon Emissions in the Actual Scenario was calculated by incorporating into the following equation the variables previously detailed in the Publication:

$$\textit{Border Carbon Emissions in the Actual Scenario} = \sum \begin{cases} no.\,of\ vehicles\ per\ category_{ij} \\ \times \\ vehicle\ wating\ time_i \\ \times \\ CO_2 emissions\ per\ unit\ of\ waiting\ time_{ij} \end{cases}$$

Where,

- i refers to the vehicle category (HDVs, LDVs, Passenger Cars etc);
- j refers to the fuel category (diesel, petrol);

The value of Border Carbon Emissions based on the assumptions used in the Actual Scenario is estimated to be higher than 46 thousands of tCO_2 per year.

As previously mentioned in the Publication, we consider the value of the Border Carbon Emissions estimated in the Actual Scenario as being reflective and directly associated with the postponement of Romania's and Bulgaria's accession to the Schengen area, due to the fact that the Counterfactual Scenario in our analysis assumes nil impact on Border Carbon Emissions, due to waiting time being considered nil.

Results and Conclusions of the Publication

The decision to keep Romania and Bulgaria outside the Schengen area, is placing an additional and unnecessary burden, on the efforts of the EU to become carbon neutral.

Over 46 thousand tCO_2/year

Emitted due to the postponement of Romania's and Bulgaria's accession to the Schengen area

Over 311 thousand mature trees*

Are needed to sequester the associated border waiting carbon emissions

Over 56 million kWh

Coal based electricity equivalent **

Each month that passes until Romania and Bulgaria become full members of the Schengen area means additional CO_2 emissions of over 3,800 tCO_2 into the atmosphere, increasing the carbon footprint of the EU, and generating air pollution for the communities living close to the border check points.

The climate impact is far greater, if we consider that both Romania and Bulgaria were given the green light by the European Parliament to join the Schengen area in 2011. If the estimation of the impact over one year derived through this Publication were to be extrapolated over a period of 11 years, considering all other things being equal, the result would lead to an estimate of over 500 thousand tCO_2 emissions, equivalent to over 600 GWh of electricity produced from coal sources.

*Notes: * estimate based on United Nations, Department of Economic and Social Affairs – Forests[9]*

*** coal being the most carbon intensive fossil fuel in terms of emissions, equivalence performed following KPMG Analysis and based on data from Romanian Energy Regulatory Authority (ANRE) 2021 December Report[10]*

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