

Transport Sector Analysis

Sector Overview

In Romania, as well as in many other East European countries, transport sector GHG emissions are increasing fast and their growth is expected to continue into the future, accompanying the on-going economic convergence with the EU.

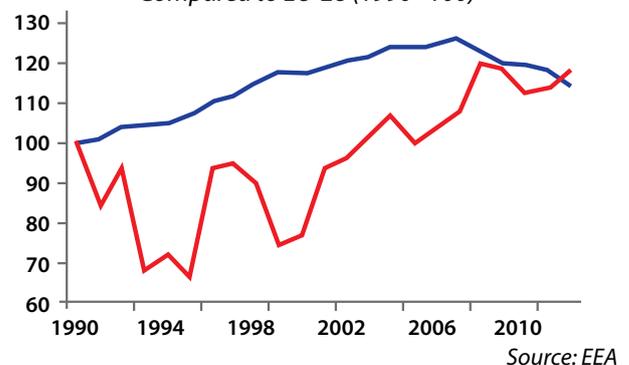
The main drivers of transport emission growth in Romania are increasing car ownership and usage and a high-emission old vehicle fleet. Road transport is the source of 91 percent of the transport emissions, while the corresponding EU average is 72 percent.

Romania's transport emissions are projected to rise by 34 percent in 2015-2050. However, the recommended Green package of measures is estimated to achieve a much lower emissions growth of 24 percent and the Super Green package lowers that to 17 percent.

Also, Romania, typically for the East European area, has a large share of old vehicles with high emission intensity. Processes in the freight segment are similar: motorization rates have increased, pushing out the less emission intensive rail.

In 2013, the transport sector accounted for 13.0 percent of Romania's total emissions¹, still significantly below the EU average of 25.3 percent. However, from 1990 to 2012, the transport sector's share in total emissions increased by 78 percent in Romania and only by 10 percent in the EU. Currently, transport emissions are falling in the EU and this trend is expected to continue, while Romania's emissions are set to grow with rising incomes and EU convergence.

Trends in Romania's Transport Emissions Compared to EU-28 (1990=100)



Rising incomes have made it possible for more households to own cars and to move to the suburbs, the latter leading to the falling land use densities in urban areas. Urban sprawl pushed up the costs of public transportation and in many cases made it financially non-viable. In turn, reduced availability of public transport exacerbated car usage: not only significantly more cars are on the roads, but the number and lengths of car trips are increasing.

¹This covers emissions from transport (road, rail, inland navigation and domestic aviation) and includes the GHG emissions regulated by the Kyoto Protocol and relevant for transport (carbon dioxide, methane, and nitrous oxide).

Decoupling² transport sector GHG emissions from economic growth is a key challenge. While the level of transport emissions in Romania is expected to increase even if an ambitious set of mitigation measures is implemented, reducing the pace of emission growth is feasible albeit challenging.

Transport is the second biggest GHG emitting sector in Romania, following the energy sector, and is therefore critical for mitigation. Romania has already put in place policies that will slow the growth of sector emissions, including fuel taxation, vehicle scrappage scheme, parking pricing and new vehicle registration tax, as well as urban traffic management and restrictions on urban access and speed.

However, more efforts are needed. Transport mitigation goals can be accomplished by channeling demand for transport to low emissions transportation modes and low emission vehicles, as well as by increasing the availability of public transport and building walking and biking zones, in conjunction with creating disincentives to driving in urban areas.



Minimizing transport externalities (such as local air quality, congestion, noise, reduced safety, inequity and health impact) translates into significant societal benefits (more so than in other sectors) and therefore is a critical part of mitigation. In addition, placing mitigation co-benefits at the center of green transport policy packages will motivate more informed discussions of green actions in transport.

Methodology

The objective of the analysis was to assess the impact of green policies and investments on transport emissions. For this purpose, the Romania Transport Strategic Emission Prediction Tool (TRANSEPT) –was developed.

It is a bottom-up detailed engineering model and includes four modules for calculating emissions:

- transport demand,
- vehicle stock;
- vehicle and driving efficiency,
- fuel consumption



Each module applies policy interventions under three scenarios – Baseline, Green and Super Green.

The Baseline scenario is based on The Romanian General Transport Master Plan and is consistent with the Baseline in the EC's "Trends to 2050" model. Apart from modeling, the assessment involved a non-quantitative evaluation of the barriers to implementation and the externalities of each green measure.

The costs of the green measures have been estimated using international case study evidence and adjusted to the Romanian context.

Marginal abatement cost curve (MACC) analysis was conducted to assess cost effectiveness and abatement potential of the measures and to illustrate their benefits relative to each other in a form useful for policy discussions.

²This term means a desirable change from the current situation when real GDP and transport emissions grow at the same rate (in parallel) to a situation when transport emissions growth, whether positive or negative, will be lower than real GDP growth.

The outcome of the analysis is a set of proposed green measures, their cost (investment and operational), and their abatement potential.

Green interventions were selected based on a multi-criteria analysis that took into account the following characteristics:

- (a) investment cost to the government;
- (b) cumulative emission savings;
- (c) cost effectiveness of abatement (unit abatement cost);
- (d) barriers to implementation;
- (e) externalities.

The externalities included local air quality, congestion, noise, safety, and social and health impact³. The costs of delivering the selected green measures were estimated using international case study evidence and then adjusted to the Romanian context.

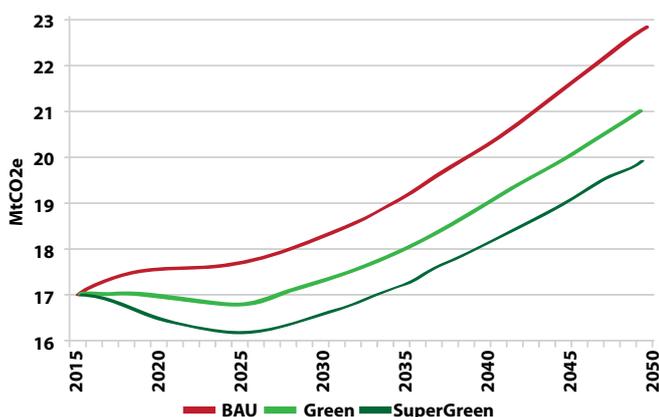
A more ambitious Super Green scenario included all assessed green measures, while a smaller scale Green scenario comprised a shorter list of measures that have higher performance according to the multi-criteria analysis -- most importantly, have lower cost, both total and per unit of CO₂ abated.

Findings

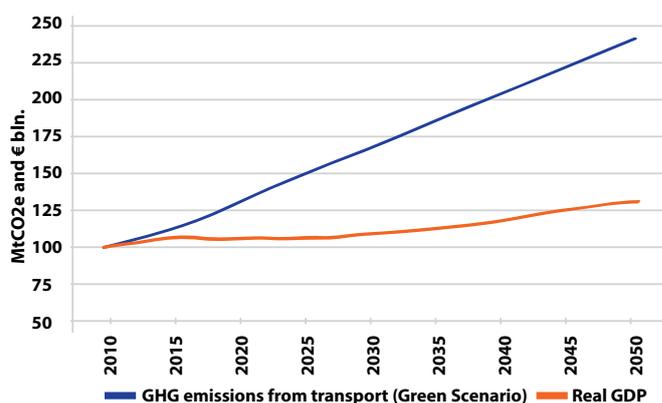
The findings show that Green interventions in Romania lead to a significant reduction of GHG emissions growth as compared with the Baseline and to a gradual decoupling of transport sector emissions growth from economic growth, thus achieving the goal of transport sector mitigation (Figure 1).

The growth of emissions will continue in all scenarios within the 35-year timeframe of this assessment, although with different rates across scenarios. Under the Baseline, emissions grow by 34 percent over the period 2015-2050, but only by 24 percent in the Green scenario and by 17 percent in the Super Green scenario. These results are in line with many studies stating that emissions reduction in transport is hard to achieve; more so in Romania and other countries of Eastern Europe where motorization rates are still rising. Instead, policies in these countries should aim at achieving reduced growth of transport emissions.

Figure 1. Green scenarios achieve significant abatement as compared with the Baseline, leading to decoupling of transport emissions from economic growth



a. Romania's transport emissions under alternative carbon abatement scenarios



b. Romania's transport GHG emissions and real GDP trends, 2010-2050 (2010 = 100)

³These were considered at a qualitative level, but not included in costs.

The main modeling outcomes include abatement potential, cost, and the cost effectiveness (cost per unit of abatement) of the selected green interventions for the period 2015-2050.

Cumulative abatement potential of the recommended measures in the Super Green scenario in 2015-2050 is 68 MtCO₂e and in the Green scenario is 36.7 MtCO₂e.

The measures delivering the highest abatement are:

- (a)** speed restrictions;
- (b)** fuel tax increase;
- (c)** programs encouraging efficient driving patterns, with advertising campaigns targeted at private car users and training programs in freight and public transport,
- (d)** a progressive new vehicle registration tax (Environmental Stamp) promoting low emission vehicles.

Together, these four measures deliver 49.7 MtCO₂e of abatement in 2015-2050, or 73 percent of the total abatement achieved in the Super Green scenario⁴.

Three other recommended measures are aimed at reducing urban emissions through offering alternatives:

- driving in the cities
- include walking and biking zones for active travel
- parking infrastructure.

These measures are supported by behavioral incentives to limit urban driving:

- low emission zones restricted to higher emission vehicles
- user fees in congested areas,
- parking pricing.



Additional measures encourage investment in low emission public vehicles. The scrapping of ageing and high-polluting vehicles is supported through subsidies to the price of more efficient vehicles.

Financing needs for the recommended measures in transport rise sharply between the Green and the Super Green scenarios, but still remain modest, as incremental investments within a large sector.

Under the Green scenario, additional investments total about €135 million over 2015-50⁵ but almost €1.7 billion in the more ambitious Super Green scenario. Most of the costs are incurred in the first fifteen years, during 2015-2030. In the first five years, 2015-2020, the implementation of the recommended transport measures will require just above €60 million in the Green scenario but approximately €608 under the Super Green scenario.

⁴Abatement in the Green scenario is lower than from these four measures because due to the cost criterion used in the selection, not all of them are included in the Green scenario.

⁵Discounted at four percent rate.

As the last step of the analysis, a marginal abatement cost curve (MACC) provided a framework to present the outcomes of the transport sector analysis in a form useful for policy discussions.

Cost and abatement potential of the proposed interventions estimated in this assessment are used as an input into a tool developed at the World Bank to calculate MACC parameters⁶. The most cost efficient measures are the fuel price tax increase, scrappage scheme, vehicle registration tax, parking pricing, and urban congestion pricing; the measures delivering maximum abatement are speed restrictions, vehicle registration, and fuel price taxation.

Conclusions and Recommendations

As Romania's motorization rate converges with that of the EU, transport emissions are expected to grow even if green measures in the sector are implemented.

Unlike in other sectors, where the objective is to reduce emissions, the goal of green growth development in transport in Romania is to decouple growth of emissions from economic growth. The main areas of concern coincide with the top drivers of emissions – the old vehicle fleet, increasing private ownership of vehicles, and growing usage of vehicles – should be addressed using policy or behavioral incentives such as taxes, regulations, fees and pricing aimed at encouraging replacement of old vehicles and discouraging driving.

The proposed mitigation action plan recommends a set of actions on the basis of the estimates made in this assessment.

Particular policy instruments recommended include adjustment of fuel pricing; the New Vehicle Registration Tax (Environment Stamp), which would be levied according to a vehicle's Euro standard, CO₂ emissions, and engine displacement, with a discount rate applied depending on the age of vehicle; parking pricing, in conjunction with tightened parking regulation and enforcement, as a solution to city congestion; and air travel taxation, to control growing demand for air travel at the margins. In urban areas, a combination of parking charges with an effective and efficient public transport system and good walking and cycling facilities creates behavioral changes that lead to reduced driving. A modal shift from road to much less emission-intensive rail transportation, or to public transport (national rail system, local bus, tram, or trolleybus systems) could help contain road transportation demand and emissions, while also resulting in a co-benefit of decreased road congestion and reduced road accidents.

Institutional arrangement and coordination are also critical.

Actions should start with collaborations between transport stakeholders, such as Government ministries, the rail sector, the City of Bucharest, municipalities, bus operators, and parking management organizations. More complicated but also necessary actions in this area should aim at creating clear governance structures and contractual arrangements, as well as increasing administrative and technical capacity to support strategy development and project implementation.

⁶See Chapter 9 in: *Romania: A Climate Change and Low Carbon Green Growth Country Assessment*, World Bank, 2015, forthcoming in 2015. This chapter discusses the MACC approach used in this assessment across sectors.



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