# Policies and Measures to mitigate Climate Change in the Transport Sector

Policy Brief, 2017

# Overview

The Study on the Transport Sector Summary of Analysis of Policies and Measures (STUTRA) was published in September 2017 and involved a study of energy consumption and greenhouse gas (GHG) emission from the Macedonian passenger car fleet. The main objective of the study was to propose "measures and policies which would enable increasing the efficiency and electrification of passenger cars in Macedonia" to cut carbon emissions and contribute to the mitigation of climate change (10). The study was conducted using 2019 as the first year of the implementation of its proposals and projected up to 2035. Two analytical models were used in the study, called MARKAL (MARKet ALlocation) – used to project energy requirements up to and including the year 2035 – and EnergyPLAN – used to analyze regional and national energy systems. The goals of the proposed policies were to:

1. Increase the share of low-carbon cars being part of the mix.
2. Enhance the phasing out of high-carbon cars from the traffic.
3. Increase the share of hybrid and electric cars.

The study also assessed "the contribution of transport electrification to increasing the share of renewable energy sources, by analyzing the electric cars and their impact on consumption".

**The proposals put forward by the study are as follows:**

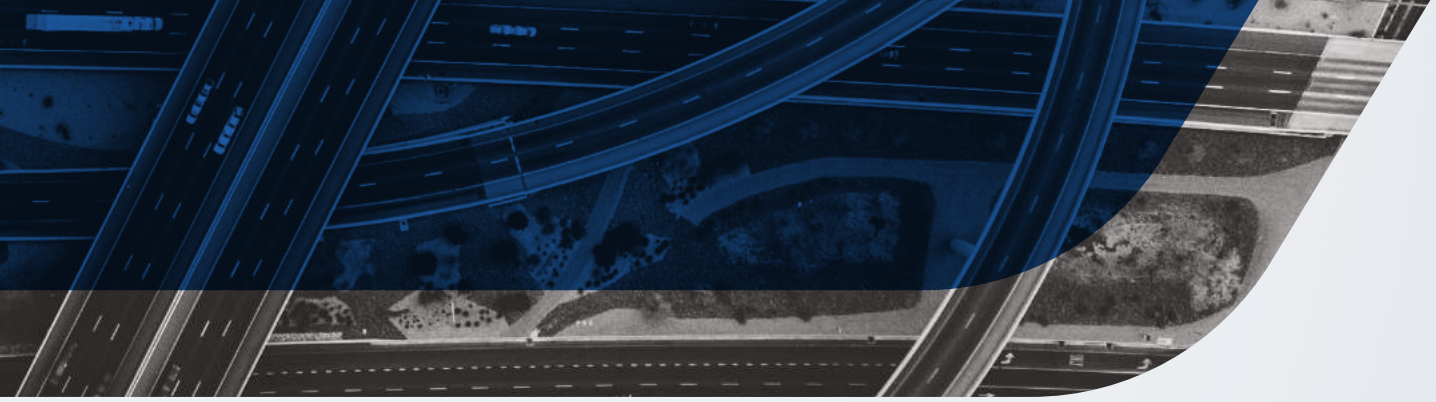
**1.** The current environmental tax levied on the import of used passenger vehicles should be extended to new vehicles. This tax should be calculated not on the volume of the cylinder and type of engine as it is now, but rather on a manufacturer-declared value of CO2 emissions.

**2.** The current environmental tax levied on vehicles at registration should be calculated according to declared CO2 emissions instead of according to vehicle engine power.

**3.** The environmental taxes on petrol and diesel fuel should be equalized and increased. Currently, the tax on diesel fuel is lower than the tax on petrol.

**4.** The exemption on excise duty should be extended from hybrid vehicles only to electric vehicles as well.

**5.** The current value-added tax (VAT) of 18% for hybrid and electric vehicles should be lowered to 5%. The change should be implemented alongside selective direct subsidization of hybrid and electric vehicles.



# Context

The study was conducted in a changing landscape for low-carbon cars. In 2016, the year before the publication of the study, the number of new electric cars registered globally reached a record 750,000, or 1% of the total market share. Though still a small proportion of the market, electric cars are becoming more popular with each passing year. Some countries have created sizable markets for electric cars through pro-electrification policies – for example, Norway, in which electric cars comprise 29% of the market share, achieved its high electric car market share by introducing various incentives, such as tax reductions and tax exemptions as well as toll and ferry ticket price exemptions.

# Local Context

Within Macedonia, the MARKAL model predicts that on its current trajectory, total energy consumption will increase by 91% between 2012 and 2035, from 1,830 ktoe to 3,497 ktoe. Passenger cars accounted for 40.8% of GHG emissions in the transport sector in 2012. due to very old car fleet i.e. 65% of the vehicles have been manufactured before 2002 (as a result of the rapid increase of the passenger cars number mainly with old cars). The passenger car fleet alone accounted for 444ktoe of energy consumption in 2012, a total that will grow to 946 ktoe of energy consumption in 2035.

STUTRA predicts that Macedonia's CO2 emissions will increase by 58% between 2012 to 2035, from 10,864 Gg CO2-eq to 17,203 Gg CO2-eq. The transport category is projected to increase in its share of contributions to GHG emissions in that time period, from 12.1% in 2012 to 15.8% in 2035.

STUTRA found that a combination of the policies evaluated could promote electrification of the passenger car fleet and encourage a shift toward clean energy in what is currently projected to be an energy sector driven by coal power production in 2035, both developments that would cut GHG emissions.

# Recommended Policies and Predicted Outcomes

## 01 Environmental Tax at Import – Extension and New Calculation Method

This recommendation calls for the restructuring of the passenger car environmental tax at import. Currently, the environmental tax at import is calculated according to cylinder volume and engine type. The tax ranges from 1500 to 3500 MKD (approximately 29 to 68 USD). STUTRA's proposal is to divide vehicles into 15 categories according to their CO2 emissions. Manufacturers would declare the CO2 emission of their vehicles, which would then be used to calculate the tax. The 15 categories correspond to ranges of CO2 emission ranges. Cars that emit 0 g CO2/km would pay 0 MKD in environmental tax at import, while cars that emit 301 g CO2/km or more (or has an undeclared CO2 emission rate) would pay over 28500 MKD, according to the proposal included in STUTRA. The study foresaw a three year adjustment period for this tax, allowing for a progressive implementation. Furthermore, STUTRA called for this tax at import to be extended to new cars as well instead of solely having an environmental tax on used cars as is the case currently.

The MARKAL model showed that the tax alone would not result in a change to the Macedonian vehicle stock leading up to 2035. However, significant funds would be obtained from this tax – 8.1 million euros would be gained in the first year of implementation alone, which the study suggests should be put toward the direct subsidization of low CO2 emission vehicles. As families replace cars over time that are, on average, more efficient than their previous cars, funds collected from this tax will reduce; by 2035, the tax is projected to bring in approximately 0.3 million euros.

## 02 Environmental Tax at Vehicle Registration – New Calculation Method

This recommendation is purely a change in the methodology used to calculate the existing environmental tax paid at vehicle registration. Currently, the environmental tax rates at vehicle registration are calculated according to engine power – vehicles are categorized into one of eight engine power ranges. Akin to the environmental tax at import, the new tax collection methodology would calculate tax rates depending on declared CO2 levels rather than engine power, according to vehicle consumption and the type of fuel the vehicle uses. The tax would depend on the same 15 CO2 categories as the proposed environmental tax at import, ranging from 0 g CO2/km to 301+ g CO2/km. The study foresaw a three year adjustment period for the tax. Though this proposal and the import tax proposal seem almost the same in practice, the tax at registration would have a lower rate in each of its categories (except for the 0 g CO2/km category, which is exempt from tax in both proposals). The highest rate, for 301+ g CO2/km, is over 3563 MKD under this proposal.

The study concluded from the MARKAL model that the tax alone would not change the vehicle stock in Macedonia in the period up to 2035. However, the funds from this tax could be used to subsidize hybrid and electric cars, like the proposed environmental tax at import plan. In the first year of implementation, the tax would bring in a projected 4 million euros. By 2035, due to expected vehicle replacement rates and the assumption that new cars are more efficient than the models offered currently, the funds collected from this tax would decrease to 2 million euros.

## 03 Environmental Tax on Fuels – Tax Rate Equalization and Increas

This recommendation calls for the equalization of the diesel fuel and petrol tax rates and a proportional tax rate increase on the fuels. Currently, the fee on petrol is 0.08 MKD/liter while the fee on diesel is 0.03 MKD/liter. Under the STUTRA proposal, the tax for both petrol and diesel would be raised to 0.3 MKD/liter in the first year of implementation. The proportional changes would occur annually, eventually bringing the tax rate on petrol and diesel fuel to 2 MKD/liter in 2035.

From the findings of the MARKAL model, the study concluded that the environmental tax on fuels would not change the Macedonian vehicle stock in the period up to 2035. That said, the funds could be put toward the subsidization of hybrid and electric vehicles. During the first year of implementation, the tax would bring in a projected 2.1 million euros. Unlike the first two environmental tax proposals, the recommended fuel tax is projected to bring in more funding in 2035 than in the first year of implementation – the MARKAL model projected 9.8 million euros would be brought in by this tax in 2035.

## 04 Exemption on Excise Duty Extension and 5. VAT Reduction for Hybrid and Electric Vehicles

The final two recommendations of STUTRA were to exempt excise duties on electric vehicles, a practice that is already in place with hybrid vehicles, and to reduce the VAT on hybrid and electric vehicles from the current 18% to 5%. These indirect subsidy measures were proposed to promote sales of low CO2 emission vehicles.

The projected effects of the final two proposals of STUTRA were analyzed together. The study found that these proposals would have the following effects:

· A "drop in purchasing of used diesel cars starting from [the first year of projected implementation, 2019], replaced by the purchase of hybrid vehicles using petrol" (40),
· An increase in the number of hybrid vehicles purchased,
· And a "lowering of CO2 emissions by 10% in 2035 in relation to the section of passenger cars…" (40).

However, these policies alone would not help electric cars penetrate the market, according to the projections of the study. These indirect subsidies would need to be accompanied by direct subsidies, but only on certain types of vehicles – namely vehicles that are hybrid vehicles for the sake of efficiency rather than expensive vehicles that are hybridized for the sake of luxury. STUTRA ran an analysis on the direct subsidization of all hybrid and electric vehicles without the proposed excise tax exemption and VAT reduction. The study found that through a direct subsidization-only policy, subsidizing 10,000 euros for every newly purchased battery electric vehicle and 7,000 euros for every newly purchased plug-in hybrid electric vehicle, electric cars would become competitive in the market in 2026 (seven years after initial proposal implementation). The total share of road kilometers driven by electric vehicles in 2035 using this intervention is projected to be 19%. On the other hand, with a combination of indirect subsidy policy and selective direct subsidy that is variable over the period leading up to 2035 (gradually dropping from 7,000 euros for electric vehicles in 2019 to 3,500 euros in 2035 and to 1,500 euros for hybrids), "the penetration of electric vehicles [would begin] in 2019" and the share of electric vehicles in road kilometers would "amount to approximately 25%" (42).

**Individually, the interventions proposed by STUTRA would not achieve sweeping changes to the vehicle market makeup. However, together, the proposals could have a significant impact. If all the aforementioned interventions are implemented, the "share of hybrid vehicles in the total mpkm in 2035 would amount to 25.9%" and the "share of electric vehicles in the total mpkm in 2035 would amount to 40.8%" (43).**

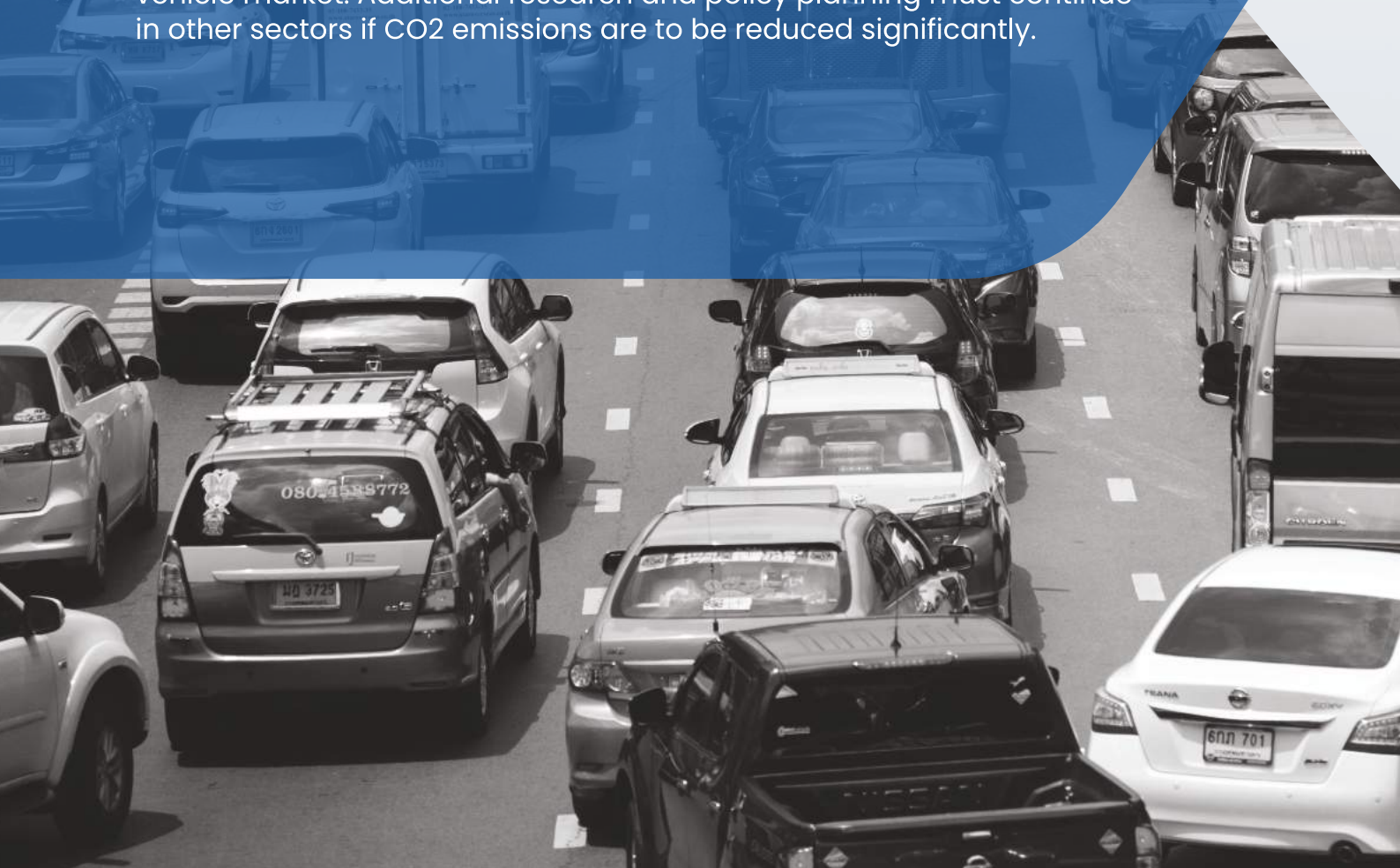
# Changes to the Power System

According to the study:

> "Electric vehicles can contribute to direct reductions of CO2 emissions in the transport sector, but also to increased penetration of renewable energy sources. Vehicles are parked 80-95 percent of the time, and if continually plugged in the grid, they can be used for smart charging, for e.g. when there is excess cheap power at the electricity market or to balance the system. Therefore, smart charging can satisfy the demand and enable greater penetration of renewable energy sources in the energy system accompanied by insignificant additional costs, because batteries and chargers are paid by the transport system" (47).

# Limitations

Though the study provides a comprehensive overview of its proposed policies, the proposals are ultimately only intended to change the passenger vehicle market. Additional research and policy planning must continue in other sectors if CO2 emissions are to be reduced significantly.



# 3 years later...

Brief retrospective

- National Transport Strategy 2018-2030 adopted
- Amendment to the Law on Motor Vehicle Tax adopted (2019)
- Tax duty for vehicles takes into consideration CO2 emissions
- Plug-in hybrid vehicles exempted from excise duty (50%)
- Energy Law (2018)
  The Legal framework for the renewable energy sources (RES) in transport is yet to be harmonized with the Directive 2009/28/EC, including the adoption of sustainability criteria for biofuels and bio liquids. However, this directive is valid until 2021 and the new Legal framework will be harmonized with the Directive EU 2018/2001, which includes adoption of stricter criteria for biofuels and bio liquids.
- Equaling Excise Duty of Diesel Fuel and Petrol. The Excise Duty for Diesel is increased by 3 MKD.
- Law on Motor Vehicle Tax adopted (2019)
- Electric vehicles exempted from excise duty
- National Energy and Climate Plan (under development) incorporates all measures from STUTRA
- Tax duty not calculated as per the proposed scheme in STUTRA i.e. lower values per CO2 were set.

**Compiled by:** Preston Stewart, as an FDR Foundation Summer Researcher. (2020)

**Original case study:** Case Study - Transport Sector: Assessment of the mitigation potential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