Centre for Economic Issues

MINISTRY OF ECONOMY OF THE SLOVAK REPUBLIC

Growth potential of electric vehicles and their impact on transport fuels and electricity demand in the Slovak Republic

Executive Summary, December 2019

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Disclaimer

The purpose of this analysis is to highlight important topics in relation to the growth of electric vehicles use, transport fuel consumption, electricity demand and greenhouse gas emissions from road transport in Slovakia and to initiate public discussion on these topics.

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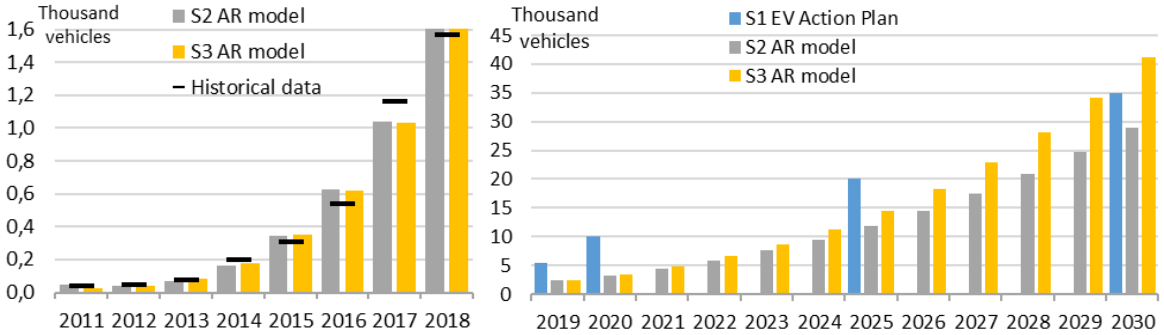
Executive Summary

- **The number of electric vehicles on the roads will continue to rise globally, as well as in Slovakia, over the next ten years.** The transition from internal combustion engine (ICE) vehicles to the electric vehicles (EV) will impact consumption of fossil fuels and electricity in transport sector and aid to improve air quality, especially in congested municipal areas. Development in charging infrastructure, smart grids and energy storage should progress in line with the growth of electromobility.
- **Actual historical trend suggests that the number of EVs in Slovakia may reach 28 thousand to 41 thousand vehicles by 2030.** This is less than 1.2% - 1.8% of the current number of all passenger cars (M1) in Slovakia.

Graph: Scenarios of potential EV growth in Slovakia (based on historical data until 2018)



Source: Action Plan for Electromobility Development by the Ministry of Economy of the Slovak Republic, ZAP SR and own calculations

- **The electricity demanded by these electric vehicles to travel 12,000 km to 15,000 km in a year could reach 220-710 TJ or 90-200 GWh in 2030**, which is less than 1% of total electricity consumption in Slovakia in 2018 (111 PJ or 31 TWh). Should the growth of EVs in Slovakia become more progressive, then for example 116,000 EVs (5% of current passenger cars fleet) would consume up to 2 PJ or 0.56 TWh of electricity.

Table: Fuel demand by forecast scenario

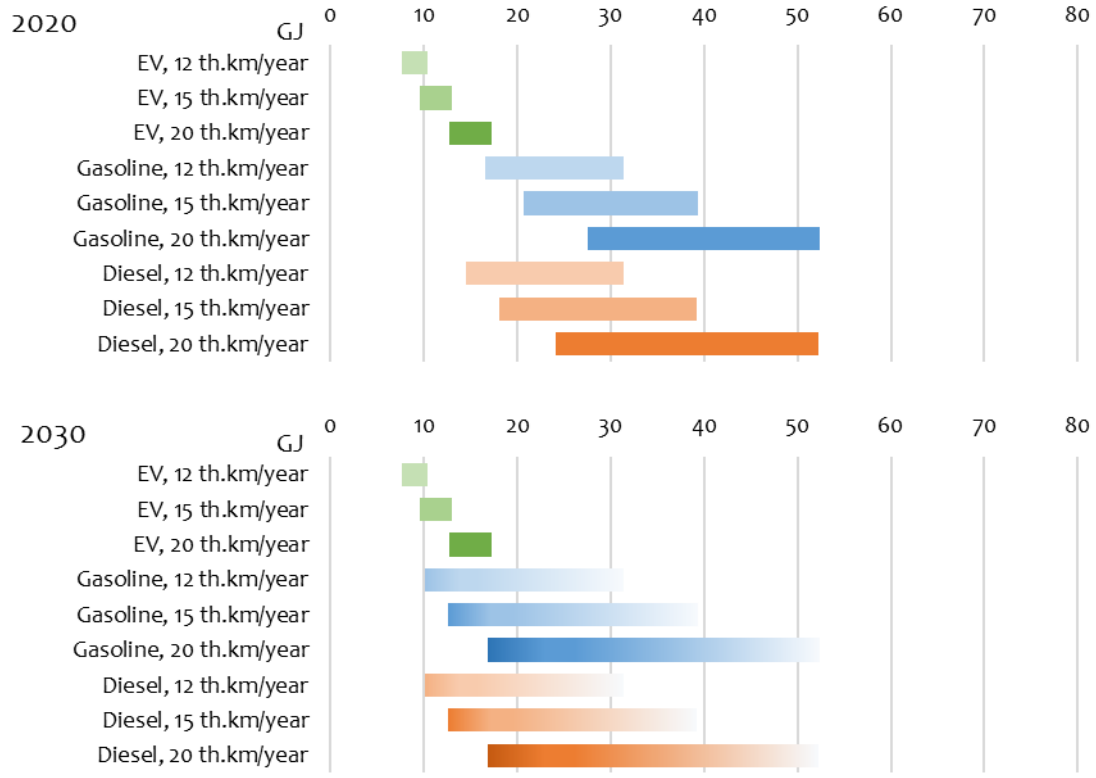
Year	Scenario	Electric vehicles pc	Electricity (min) TJ	Electricity (max) TJ	Electricity (min) GWh	Electricity (max) GWh
2020	**S1**	10 000	76	172	21	48
	S2	3 305	25	57	7	16
	S3	3 473	26	60	7	17
2030	**S1**	35 000	266	604	74	168
	S2	28 847	219	498	61	138
	S3	41 230	315	711	87	198
2,5% of passenger cars (M1)		58 170	442	1 003	123	279
5% of passenger cars (M1)		116 606	883	2 007	245	557
All passenger cars (M1)		2 326 787	17 662	40 135	4 906	11 149

Source: own calculations

Note: The min and max values are calculated using the intervals in the table in Explanatory note (pg. 4).

- **One electric vehicle consumes a comparable amount of electricity as a medium-sized household (starting from 2.1 MWh or 7.6 GJ per 12,000 km at 16 kWh/100 km) annually.** In order for the consumption of gasoline and diesel, as well as transport-related emissions of CO_2, to decrease, a new EV must be used as a replacement of, not as an addition to, an ICE vehicle (whose consumption starts from 14.5 GJ of diesel or 16.5 GJ of petrol per 12,000 km for most efficient small cars).

Chart: Comparison of fuel and electricity consumption per vehicle, range by min and max fuel consumption, min includes EU fuel standards for 2020 and 2030

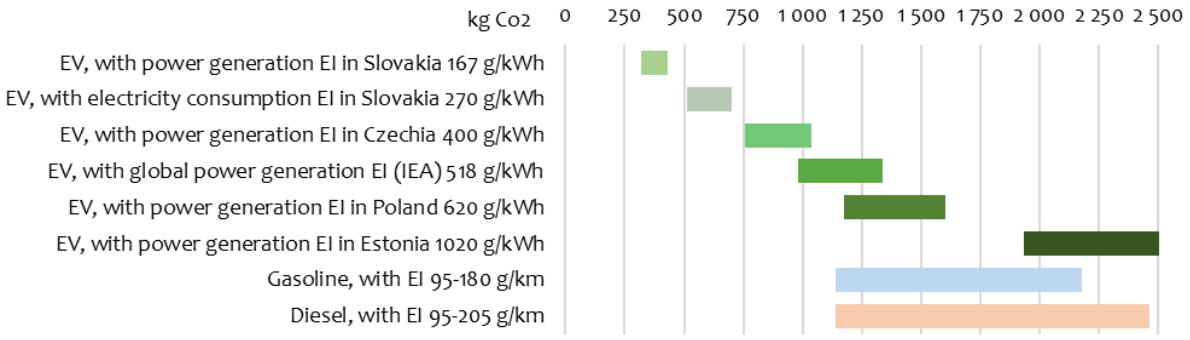


Source: own calculations

Note: The min and max values are calculated using the intervals in the table in Explanatory note (pg. 4), with the min value for gasoline and diesel in 2030 as 2.5 l / 100 km, adjusted share per vehicle based on EU fuel standards for 2030.

- **Owing to Slovak low-carbon electricity generation mix EVs can contribute to reducing greenhouse gas emissions and improving air quality,** especially in locations with heavy traffic and congested municipal areas. When comparing greenhouse gas emissions of EVs and ICE vehicles, CO_2 equivalent emissions related to the electricity generation for annual EV use is added. As such, the CO_2 eq. emissions attributed to the use of EV are equivalent to 14% -28% of the CO_2 eq. emissions of an ICE passenger car. However, emissions of other pollutants from vehicle operation, such as microparticles from brake, tire, road surface remain a problem.

Graph: Emissions of EVs and ICE vehicles driving annually 12,000 km, with respect to emission intensity of electricity production in selected countries



Source: own calculations
Note: The min and max values are calculated using the intervals in the table in Explanatory note (pg. 4).

- **The transition to electric mobility will increase society's dependence on electricity.** Therefore, a crucial task for policy makers, energy companies and other key players will be to ensure the availability of resources for low-carbon electricity generation, the overall energy security, as well as the stability and efficient management of the electricity transmission system, especially in case of simultaneous charging of more EVs in densely populated areas.

- Replacing gasoline or diesel cars with electric vehicles is not the only nor the ideal solution to reduce fuel consumption of fossil fuels, total energy consumption, greenhouse gas emissions and the impact of climate change. Such transition must be accompanied by the implementation of other clean transport and mobility solutions, such as the use of other alternative fuels; public passenger transport; the implementation of the circular economy principles, shared economy activities, municipal "smart city" initiatives; or even a complex change in the concept of mobility.

Explanatory note

Table: Base for interval calculations

Range	EV (MJ/100 km)	Gasoline (l/100 km)	Diesel (l/100 km)	Distance
Min	57	4,1	3,6	12 000 km
Max	78	7,8	7,8	20 000 km

Zdroj: vlastný výpočet

Full report including annexes and data is available in Slovak language at website of Center for Economic Issues:
https://www.economy.gov.sk/ministerstvo/centrum-pre-hospodarske-otazky/publikacie/analyzy