



BOOK OF PROCEEDINGS

INTERNATIONAL CONFERENCE SUSTAINABLE MOBILITY

5-6 MARCH

2026

The INTEC International Conference brings together academics, researchers, policymakers and industry experts to discuss innovative approaches and collaborative solutions for a sustainable future in engineering and mobility. The conference will be hosted by POLIS University in Tirana, Albania, and co-organized by partners from across the EU as part of the Erasmus+ CBHE Project 101081873-ERASMUS-EDU-2022-CBHE-STRAND-2.



INTEC International Engineering Competence Centres to push sustainable mobility development in Albania and Montenegro
Project Reference: 101081873-ERASMUS-EDU-2022-CBHE-STRAND-2

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Project Partners:



INTEC International Conference
February 2026
POLIS University, Tirana, Albania

INTEC>>>



ISBN 9789928347268

DOI: 10.37199/c41001000

Copyrights @POLIS Press

INTEC International Conference
February 2026
POLIS University, Tirana, Albania

INTEC>>>



Co-funded by the
Erasmus+ Programme
of the European Union

Partner Universities

Project Coordinator: FH JOANNEUM Gesellschaft mbH (FHJ), Austria
Frankfurt University of Applied Sciences (FRA-UAS), Germany
University of Split (US), Croatia
POLIS University (POLIS), Albania
Polytechnic University of Tirana (PUT), Albania
University of Vlore "Ismail Qemali" (UV), Albania
University of Montenegro (UOM), Montenegro
Adriatic University Bar (FSKL), Montenegro
University of Donja Gorica (UDG), Montenegro
AVL List GmbH (AVL), Austria
Gama Auto d.o.o. (GA), Montenegro
NVO Alfa Centar (AC), Montenegro

Conference Chair

DI Daniela Wenzl
Dr. Elona Karafili
Dr. Flora Krasniqi

Conference Keynote Speaker

DI Horst Pflügl, AVL List GmbH (AVL), Austria
MSc. Mine Bushi, General Directorate of Road Transport Services in Albania

Scientific Committee

Prof. Emeritus Dr. Nataša Gospić, Adriatic University Bar (FSKL), Montenegro
Prof. Dr. Bhavin Kapadia, FH JOANNEUM Gesellschaft mbH (FHJ), Austria
Assoc. Prof. Dr. Ivan Tolj, University of Split (US), Croatia
Prof. Dr. Kristofor Lapa, University of Vlore "Ismail Qemali" (UV), Albania
Prof. Dr. Damir Sedlar, University of Split (US), Croatia
Prof. Dr. Boško Ilija Matović, University of Montenegro (UOM), Montenegro
MA Adrian Millward-Sadler, FH JOANNEUM Gesellschaft mbH (FHJ), Austria
Dr. Anis Sulejmani, Polytechnic University of Tirana (PUT), Albania
Dr. Enkelejd Mëhilli, University of Vlore "Ismail Qemali" (UV), Albania
Dr. Blenard Xhaferraj, Polytechnic University of Tirana (PUT), Albania
Dr. Elona Karafili, POLIS University (POLIS), Albania
Dr. Flora Krasniqi, POLIS University (POLIS), Albania
Dr. Ivana Ognjanović, University of Donja Gorica (UDG), Montenegro

Organizing Committee

DI Daniela Wenzl
Dr. Keti Hoxha
Dr. Flora Krasniqi
Dr. Elona Karafili
MSc. Sadmira Malaj
MSc. Sindi Doce
MSc. Glejdi Fejza

TABLE OF CONTENTS

1. POLITICAL AND REGULATORY FRAMEWORK9

***RENEWABLE ENERGY PROCUREMENT (CPPA) AND TRANSPORT ELECTRIFICATION:
EUROPEAN PERSPECTIVES AND ALBANIAN CHALLENGE 10***

***REVIEW OF THE EVOLUTION OF INTERNATIONAL SHIP ENERGY EFFICIENCY
REGULATIONS AND THE ALBANIAN CONTEXT 20***

***THE EUROPEAN GREEN DEAL AND ITS NATIONAL IMPLEMENTATION: FROM STRATEGY
TO PRACTICE 30***

***THE CURRENT STATUS OF AUTONOMOUS VEHICLE TECHNOLOGY ADOPTION IN THE
BALKAN REGION 42***

***INTEGRATING EVENT DATA RECORDER (EDR) TECHNOLOGY INTO SUSTAINABLE ROAD
SAFETY FRAMEWORKS WITHIN THE EUROPEAN GREEN DEAL 56***

***INFRASTRUCTURE READINESS FOR SUSTAINABLE MOBILITY: EU FRAMEWORKS AND THE
CASE OF ALBANIA..... 70***

***FROM PREDICTION TO REGULATION: EVIDENCE PRODUCTION APPROACHES IN
AUTONOMOUS MOBILITY RESEARCH AND THEIR POLICY IMPLICATIONS..... 82***

REVIEWING THE EUROPEAN GREEN DEAL IN ENERGY, MOBILITY AND INDUSTRY 98

2. TECHNOLOGICAL INNOVATIONS 107

AUTOMOTIVE COOLING SYSTEMS SUSTAINABILITY: A FOCUS ON THE EXPANSION TANK
..... **108**

***EMPIRICAL COMPARATIVE STUDY OF STRUCTURAL CFRP SANDWICH STRUCTURE
INSERTS FOR OUT-OF-PLANE LOADS***..... **118**

***LIQUID COOLING SYSTEMS FOR ELECTRIC VEHICLE BATTERIES: IMPROVING SAFETY,
PERFORMANCE AND SUSTAINABILITY*** **132**

***DESIGN AND DEVELOPMENT OF A CONSTANT-VOLUME COMBUSTION CHAMBER FOR
OPTICAL INVESTIGATION OF HYDROGEN AND WATER INJECTION UNDER ENGINE-LIKE
CONDITIONS*** **138**

***ANALYSIS OF BATTERY CHARGING AND DISCHARGING BEHAVIOR FOR ELECTRIC VEHICLE
APPLICATIONS*** **148**

***IMPACT OF HEAT PUMP SYSTEMS ON WINTER ENERGY USE AND DRIVING RANGE IN
BATTERY ELECTRIC VEHICLES***..... **158**

THE ROLE OF INTERMODAL TRANSPORTATION FOR THE SUSTAINABLE MOBILITY..... **166**

***EMISSION REDUCTION OF MARINE PROPULSION SYSTEMS IN SECA ZONES THROUGH
THE INTEGRATION OF HYDROGEN TECHNOLOGIES*** **176**

***A COMPREHENSIVE ANALYSIS OF VENTILATION SYSTEM FOR ENHANCED ENERGY
EFFICIENCY IN MARINE PROPULSION APPLICATIONS***..... **190**

***DESIGN AND TOPOLOGY OPTIMIZATION OF A LIGHTWEIGHT CHAIN SPROCKET FOR
ELECTRIC MOTORCYCLE APPLICATIONS***..... **200**

3. ECONOMIC AND BUSINESS PERSPECTIVE **211**

***FEASIBILITY OF ELECTRIC BUS DEPLOYMENT IN MONTENEGRO: A CASE STUDY OF
BUDVA***..... **212**

***MANAGING RENEWABLE ENERGY RESOURCES AS A FOUNDATION FOR SUSTAINABLE
MOBILITY TRANSITIONS*** **224**

4. SOCIAL AND ENVIRONMENTAL IMPACT..... **231**

***SMART MOBILITY TECHNOLOGIES AND THEIR IMPACT ON URBAN SUSTAINABILITY:
INSIGHTS FROM EUROPEAN AND WESTERN BALKAN CITIES***..... **232**

THE DISAPPEARING SQUARES: SOCIAL AND ENVIRONMENTAL IMPACTS OF URBAN MOBILITY PLANNING IN DURRËS.....	244
THE CITY THAT DEMANDS CONTINUOUS MOVEMENT: THE DISAPPEARANCE OF THE RIGHT NOT TO MOVE WITHIN THE FRAMEWORK OF SUSTAINABLE MOBILITY.....	256
COMPARISON OF LIFECYCLE EMISSIONS OF A SUV WITH FUEL CELL AND BATTERY ELECTRIC POWERTRAINS.....	264
BETWEEN RHETORIC AND REALITY: DISCURSIVE FRAMINGS, GREENWASHING AND OUTCOMES IN SUSTAINABLE MOBILITY.....	272
TOWARDS SUSTAINABLE TRANSPORT: A COMPARATIVE ANALYSIS OF ELECTRIC VEHICLE ADOPTION IN MONTENEGRO AND ALBANIA.....	284
LINKING MORPHOLOGY, PERCEIVED SAFETY, AND SUSTAINABLE MOBILITY IN POST-SOCIALIST URBAN CONTEXTS	296
REIMAGINING THE CITY THROUGH GREEN MOBILITY STRATEGIES: THE CASE OF TIRANA	304
5. CONTROVERSIES AND CHALLENGES	313
THE ADOPTION OF ELECTRIC VEHICLES IN ALBANIA: A COMPARATIVE STUDY WITH OTHER WESTERN BALKAN COUNTRIES	314
APPLICATION OF QUALITY TOOLS IN THE ANALYSIS OF FACTORS INFLUENCING THE DEVELOPMENT OF ELECTROMOBILITY IN MONTENEGRO.....	326
6. CASE STUDIES AND GOOD PRACTICES	335
CHILDREN PATHS AS AN URBAN REGENERATION STRATEGY: NAIM FRASHËRI'S CASE STUDY.....	336
7. FUTURE SCENARIOS.....	345
GENAI LITERACY AS A TRANSVERSAL SKILL FOR EMERGING PROFESSIONALS: IMPLICATIONS FOR SUSTAINABILITY-CRITICAL KNOWLEDGE WORK	346
CYBERSECURITY VULNERABILITIES IN ELECTRIC VEHICLE OPERATING SYSTEMS: A GLOBAL AWARENESS ANALYSIS.....	362

CYBERSECURITY CHALLENGES IN MODERN VEHICULAR COMMUNICATION NETWORKS
..... **372**

MAPPING DISTANCE AND TIME: LEVERAGING ISOCHRONE INTELLIGENCE IN EMERGING CITIES..... **382**

THE HISTORICAL DEVELOPMENT OF ARTIFICIAL INTELLIGENCE AND ITS INFLUENCE ON THE JOB MARKET IN AUTOMOTIVE ENGINEERING **394**

GREEN TRANSITION IN ALBANIA: CHALLENGES AND FUTURE ACTIONS..... **406**

OPTIMIZING PUBLIC TRANSPORT CORRIDORS USING AI-BASED SCENARIO MODELLING: A CASE STUDY ON TIRANA’S RING ROAD **414**

USE OF AI IN THE PROCESS OF GREEN TRANSFORMATION AND IMPACT ON PUBLIC HEALTH..... **426**

EFFECTS OF TECHNICAL TRAFFIC CALMING MEASURES..... **432**

CAN AI DEVELOP ITS OWN “TASTE” AUTOMOTIVE DESIGN?..... **440**

THREAT LANDSCAPE AND MULTI-LAYERED PROTECTION MECHANISMS FOR AUTONOMOUS AND ELECTRIC VEHICLE SYSTEMS **448**

DEVELOPMENT OF A RISK ASSESSMENT MODEL FOR THE TRANSPORT OF HAZARDOUS MATERIALS USING ALOHA AND GIS SOFTWARE TOOLS..... **460**

DEVELOPMENT OF AN AUTOMATIC TRAFFIC SIGN DETECTION SYSTEM USING YOLOV8 **470**

TOWARDS SUSTAINABLE TRANSPORT: A COMPARATIVE ANALYSIS OF ELECTRIC VEHICLE ADOPTION IN MONTENEGRO AND ALBANIA

DOI: [10.37199/c41001026](https://doi.org/10.37199/c41001026)

Radmila MILIĆ

University of Montenegro, Montenegro
radmilapotpara@gmail.com

Abstract

Environmental pollution represents a critical global challenge that demands urgent and coordinated action. One of the most effective pathways toward mitigating its impacts is the decarbonization of the transport sector, where the adoption of electric vehicles (EVs) plays a central role. Worldwide and across Europe, EV uptake has accelerated significantly in recent years, driven by technological advancements, supportive policies, and expanding charging infrastructure. However, the countries of Western Balkans are considerably behind these trends. This paper focuses specifically on Albania and Montenegro, two countries where the share of electric vehicles in the overall fleet remains very low. Increasing EV adoption in these countries first requires identifying the key obstacles that prevent citizens from choosing electric vehicles. Therefore, this paper examines perceptions of the main barriers to EV usage. Furthermore, it identifies the policy measures and incentives that residents consider most effective in encouraging the transition to cleaner mobility. Through this analysis, the research aims to support the development of evidence-based strategies that can accelerate transport decarbonization and contribute to regional environmental sustainability.

Keywords: decarbonization, electric vehicle adoption, Montenegro, Albania

I. INTRODUCTION

Greenhouse gases, particularly carbon dioxide (CO₂), represent one of the primary drivers of global warming and ongoing climate change. According to the International Energy Agency (IEA), global energy-related CO₂ emissions reached 37.4 billion tons in 2023 (IEA, 2023). The energy sector, covering coal, gas, and oil, recorded the highest contribution with 14.65 billion tons (39.8%), followed by transport with 7.98 billion tons (21.7%), industry with 9.15 billion tons (24.9%), buildings with 2.97 billion tons (8.1%), and other sectors contributing 2.05 billion tons (5.6%) (IEA,

2023). Given the scale of transport-related emissions, political and research institutions increasingly highlight the urgency of transforming the mobility sector. The European Environment Agency (EEA) identifies transport decarbonization as a top priority, as the sector accounts for 25% of total EU greenhouse gas emissions (EEA, 2024).

In response, many studies emphasize the electrification of transportation, especially urban public transport, as a central strategy for reducing environmental impacts (Álvarez-Antelo et al., 2024; Kim et al., 2024). Electric mobility is frequently presented as more energy-efficient than conventional fuel-based systems, with fewer moving parts and reduced maintenance costs (Xing et al., 2023) with numerous authors identifying electric vehicles (EVs) as a leading solution for decarbonizing road transport (Maier et al., 2023). Although EVs offer substantial benefits, electrification alone cannot achieve net-zero goals without complementary improvements in the energy sector and reductions in emissions associated with vehicle manufacturing. Nevertheless, researchers and policymakers agree that electric mobility provides a clean, accessible and equitable path for reducing GHG emissions in transportation (Ndhlovu et al., 2025; Grdinić-Rakonjac & Lučić, 2025). Integrating renewable energy sources with charging infrastructure is essential for long-term sustainable mobility. The rapid global expansion of EV markets, reaching 6.6 million battery-electric (BEV) and plug-in hybrid electric vehicles (PHEV) sold in 2021 (Rozzi et al., 2024). In addition, in 2023, nearly one in every five new cars sold was electric (IEA, 2024), more than six times greater compared to 2018. This clearly shows increasing consumer interest

and technological progress. Norway stands out with exceptionally high adoption rates, driven by extensive research investments and strong government incentives (Ndhlovu et al., 2025). Projections from the IEA's Stated Policies Scenario suggest that, under current energy, climate, and industrial frameworks, every second vehicle sold globally by 2035 could be electric. These trends point to a rapid electrification of the transport sector, which is expected to play a central role in reducing GHG emissions and combating climate change.

Nevertheless, EV adoption remains shaped by various practical and psychological factors, including charging infrastructure availability, driving range, maintenance costs, performance expectations, and consumer awareness (Briand et al., 2025, Lučić & Grdinić-Rakonjac, 2025; Rozzi et al., 2024). Kumar & Alok (2020) identify several barriers: high total cost of ownership, insufficient charging networks, range anxiety, battery-related concerns, policy limitations, and performance uncertainty. In Finland, limited charging infrastructure and high upfront prices hinder adoption (Paiho, 2018). In this broader global and regional context, Montenegro and Albania remain in early stages of transition toward low-carbon mobility. Rising living standards, expanding tourism, and increased mobility needs have contributed to rapid growth in vehicle ownership. Yet, both countries still rely heavily on diesel-powered vehicles, while the penetration of hybrid and electric models remains

negligible. Understanding public perception is therefore essential for guiding policy design and ensuring effective national strategies for accelerating the shift toward sustainable transport.

II. METHODOLOGY

The study employs a comparative research design aimed at evaluating public perception of electric vehicles (EVs) in Montenegro and Albania. The methodology consists of two main components: an analysis of national vehicle fleet data for the period 2020 – 2024, and an online survey distributed to citizens of both countries. The first component relies on official national statistical sources, including Monstat for Montenegro and DPSHTRR for Albania, enabling a quantitative assessment of trends in vehicle ownership, motorization levels, and the distribution of fuel types across both markets. The second component, the survey, forms the basis for analyzing attitudes, awareness, and perceived barriers to EV adoption. A structured questionnaire was designed consisting of nine thematic questions and three demographic items regarding gender, age, and employment status. The survey was distributed electronically to ensure accessibility and anonymity. Questions covered key dimensions relevant to EV transition: frequency and purpose of vehicle use, household vehicle ownership, fuel type preferences, openness to EV adoption, perceived obstacles, and the influence of potential government incentives. This methodological approach enables a comprehensive evaluation of both the structural context (vehicle fleet characteristics) and the subjective context (citizen attitudes). By combining empirical data and perceptual insights, the study provides a grounded basis for identifying policy priorities that could accelerate the adoption of electric vehicles in Montenegro and Albania.

III. RESULTS

The results of the study provide insight into the current structure of the vehicle fleets in Montenegro and Albania, as well as into the public perception of electric vehicles (EVs) in both countries.

The analysis of national statistics from 2020 to 2024 (Table 1) shows a continuous increase in the number of registered vehicles in both markets. Vehicle registrations in Montenegro grew by 27% over the five-year period, while Albania recorded a 41% increase, indicating strong growth in motorization.

Table 1. Number of registered vehicles.

	2020	2021	2022	2023	2024

Montenegro	240611	254409	266747	285257	306686
Albania	676811	740669	796438	867765	959226

The motorization level in Albania and Montenegro is shown in Figure 1. Both countries demonstrate a steady growth in motorization level throughout the observed period. Albania shows a consistent year-to-year increase, generally rising by around 7% – 10% annually, reflecting a moderate but stable expansion of its vehicle fleet. Montenegro also records continuous growth, but at a slightly lower level, from 4% to 7% while maintaining a substantially higher overall level of motorization. When compared, Albania is gradually narrowing the gap, yet Montenegro remains markedly more motorized, indicating differing stages of market maturity and vehicle accessibility between the two countries. Despite this expansion, the share of low-emission vehicles remains negligible. Diesel vehicles represent the dominant fuel type in both countries, confirming the early stage of transition toward electromobility. Figure 2 for Montenegro and Albania, show that diesel is the mainly dominant fuel type in both countries, followed by petrol, while the share of hybrid and electric vehicles remains close to zero (DPSHTRR 2024, MONSTAT 2024).

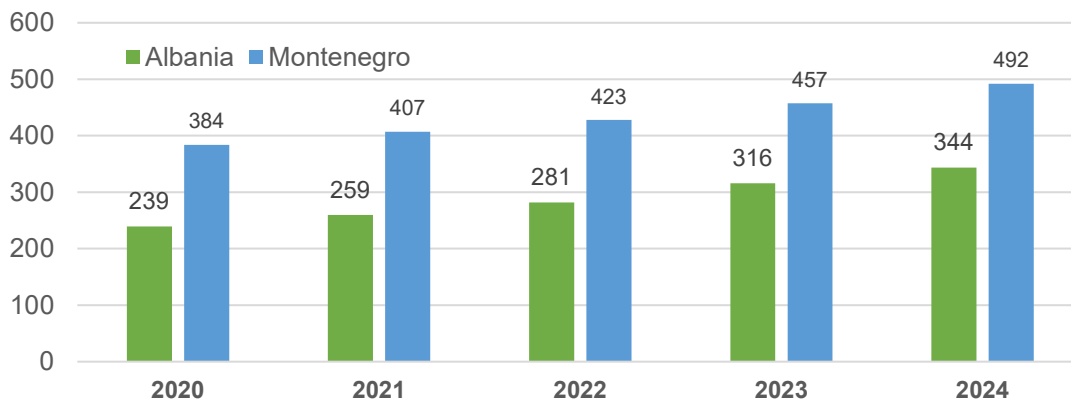


Figure 1. Level of motorization in Albania and Montenegro.

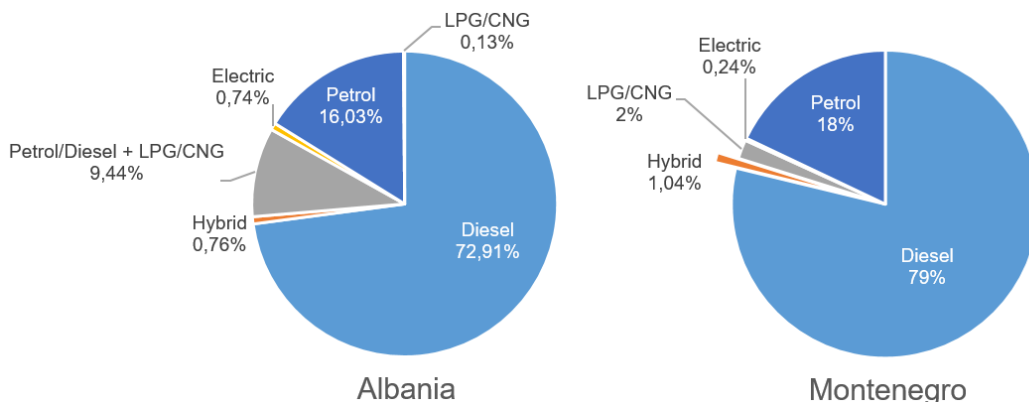


Figure 2. Structure of newly registered vehicles by fuel type for 2024 in Albania and Montenegro.

Montenegro demonstrates a more dynamic early development of electromobility, with hybrid vehicles increasing from 0.01% in 2022 to 1.04% in 2024 and electric vehicles from 0.19% to 0.74%, resulting in a higher overall share of low-emission vehicles compared to Albania. Albania shows a steadier but slower rise, with hybrids growing from 0.34% to 0.76% over the same period, remaining below Montenegro’s 2024 levels despite starting from a higher baseline. Overall, Montenegro now holds the larger share of hybrid and electric vehicles, reflecting a faster acceleration toward electromobility, while Albania’s progress remains consistent but more moderate.

A total of 105 respondents from Montenegro and 105 respondents from Albania participated in the survey, ensuring balanced samples across the two countries. The demographic structure of the participants is presented in Table 2. The data indicate notable differences in sample composition: Albanian respondents include a higher proportion of male participants (72 male respondents) compared to Montenegro (47 male respondents). Age distribution differs substantially, with Albania’s sample predominantly composed of younger individuals aged 18 – 24 (91 respondents), whereas Montenegro shows a more balanced representation across the 18 – 24, 25 – 34, and 35 – 44 age groups. Occupational status reflects these age patterns: Albania’s sample is heavily student-dominated with 77 students in the sample, while Montenegro shows a higher presence of employed respondents in both fixed-term and permanent positions. These structural differences are important when interpreting attitudes toward electromobility, as age and employment status may influence respondents’ mobility needs, purchasing capacity, and overall readiness to adopt new vehicle technologies.

Table 2. Demographic structure of the sample.

		Albania	Montenegro
Gender	Male	45%	69%
	Female	55%	31%
Age	18-24	50%	87%
	25-34	31%	5%
	35-44	11%	3%
	45-55	5%	5%
	55+	4%	0%
Occupation	Employed on a fixed-term contract	7%	18%
	Employed on a permanent contract	15%	27%
	Student	73%	45%
	Unemployed	5%	8%
	Retired	0%	2%

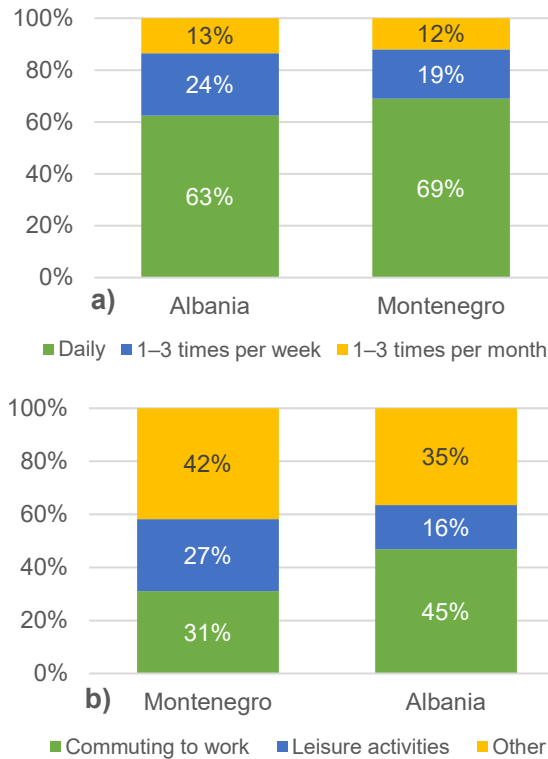


Figure 3. Car usage frequency (a) and primary travel purposes (b) in Albania and Montenegro.

Analysis of mobility habits reveals that daily car use is highly prevalent in both countries, with a higher share of Montenegrin respondents using a car every day, while Albanian respondents more frequently report using a car 1 – 3 times per week. Monthly use is minimal in both samples. Figure 3 indicates that commuting is the dominant reason for car use in Albania (45%), compared to 31% in Montenegro, highlighting stronger work-related reliance on private vehicles among Albanian respondents. Conversely, leisure-related trips are more common in Montenegro (27% vs. 16%), and Montenegrin respondents more often report “other” purposes such as shopping or family obligations (42% vs. 35%). These patterns suggest that car mobility in Albania is more work-driven, whereas in Montenegro it is more diversified across daily activities.

Figure 4. presents the distribution of vehicle age among the surveyed respondents in Albania and Montenegro. In the Albanian sample, a larger proportion of respondents use newer vehicles, with 8% of vehicles being up to 3 years old, 12% between 4 – 6 years, and 24% between 7 – 10 years. In contrast, Montenegro has far fewer newer vehicles, but a much larger proportion of older vehicles: 56% are 11 – 20 years old, and 16% are over 20 years. Fuel type usage also differs between the two countries. Diesel is the predominant fuel in both samples, used by 75% of respondents in Albania and 83% in Montenegro. Gasoline usage is higher in Albania (22%) than in Montenegro (12%), reflecting a more diversified fuel consumption. Other fuel types, including hybrid, gas, or combined gasoline/gas vehicles, are minimally represented in both countries (1 –3%). These findings show that Montenegro relies heavily on diesel, while Albania demonstrates a more balanced distribution between diesel and gasoline, although diesel remains dominant. These survey results are consistent with the actual situation observed in both countries, reflecting the total number of vehicles and their distribution relative to vehicle fleets.

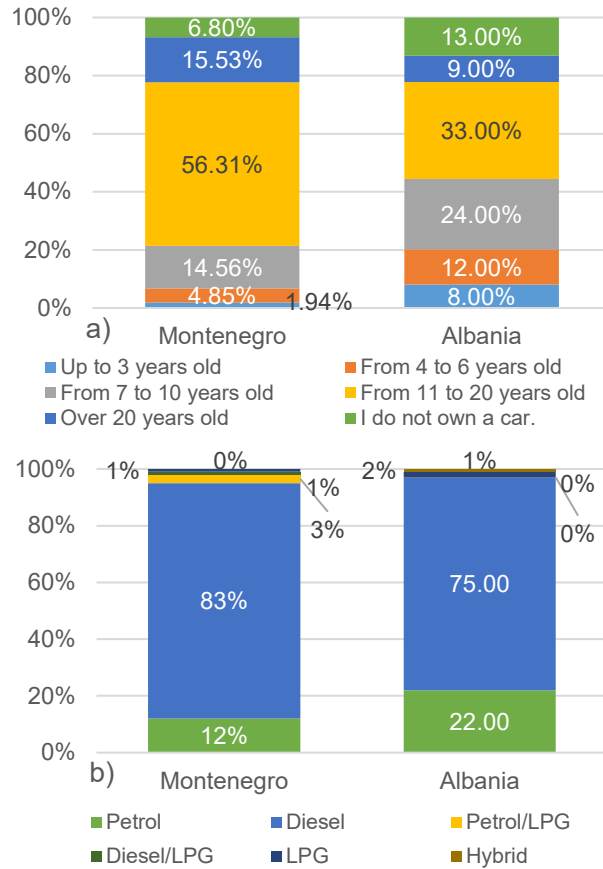


Figure 4. Vehicle age (a) and fuel type (b) among respondents in Albania and Montenegro.

The survey responses from Albania and Montenegro regarding government incentives influencing the decision to purchase an electric vehicle presented in Figure 5 reveal notable differences and similarities between the two countries. Offering a higher buyback price for conventional vehicles is considered minimally attractive in both samples, with only 5% of Albanian respondents and 3% of Montenegrin respondents finding it appealing. A substantial share of respondents holds a negative attitude toward electric vehicles, particularly in Montenegro, where 35% expressed reluctance, compared to 25% in Albania. This significant proportion likely reflects barriers such as limited charging infrastructure, low public awareness, perceptions of unreliability, and entrenched habits of using conventional fuels, especially diesel, as indicated by earlier findings.

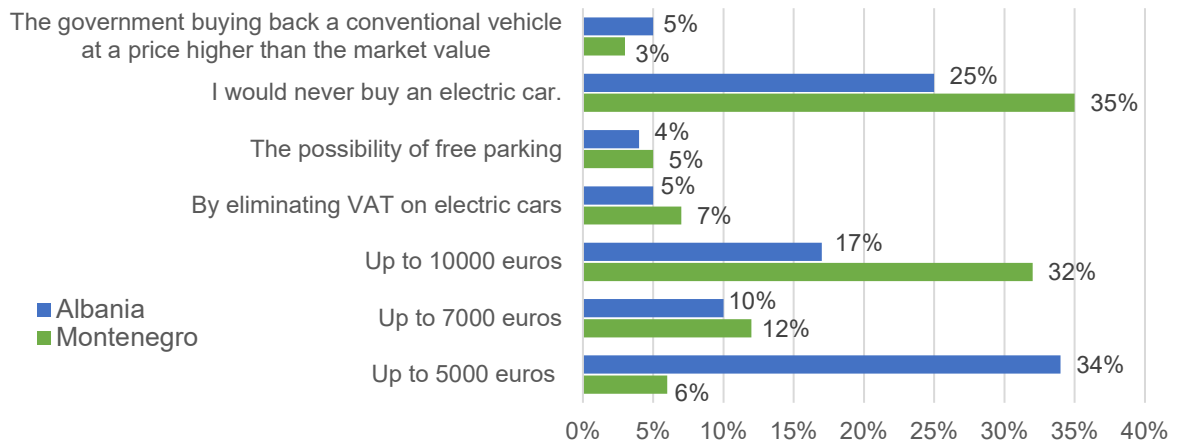


Figure 5. Preferred government incentives for electric vehicle adoption in Albania and Montenegro.

While relatively minor, incentives such as free parking are slightly more attractive in Montenegro (5%) than in Albania (4%). Other measures, including VAT exemptions or the trade-in of old vehicles, show a limited impact in both countries. The appeal of financial subsidies varies considerably: in Montenegro, a subsidy of up to 10.000€ is the most attractive, garnering support from 33% of respondents, whereas in Albania only 18% favour this level. Smaller subsidies of 7.000€ receive similar interest in both countries (12% in Montenegro and 10% in Albania). In contrast, a subsidy of 5.000€ is the most popular option in Albania, supported by 34% of respondents, while in Montenegro this level receives much lower backing at 6%. These results indicate that while high-value subsidies strongly motivate Montenegrin respondents, Albanian respondents tend to favour more moderate incentives, highlighting country-specific differences in financial expectations and perceived feasibility of adopting electric vehicles.

The survey results showed in Figure 6 reveal the primary barriers preventing respondents in Albania and Montenegro from purchasing electric vehicles, highlighting both shared concerns and country-specific differences. Frequently cited obstacle in both countries is limited driving range, identified by 27% of Albanian respondents and 23% of Montenegrin respondents. This indicates that range anxiety remains a critical factor influencing consumer decisions, reflecting concerns about the reliability of electric vehicles for everyday mobility. In line with concerns about limited driving range, a prominent barrier is insufficient charging infrastructure. In Albania, 28% of respondents expressed concern that they would be unable to adequately charge their vehicle during use, slightly higher than the 23% reported in Montenegro. A notable share of respondents also indicated that purchasing a new vehicle is unnecessary, with 22% in Albania and 19% in Montenegro expressing no immediate need for replacement. This suggests that a portion of the vehicle-owning population may not actively consider technological transition, potentially slowing the adoption of electric

vehicles. Financial constraints represent a more significant challenge in Montenegro, where 19% of respondents cited high investment costs as a barrier, compared to 13% in Albania. Interestingly, fear of technological innovation was the least cited barrier in both countries, reported by 10% of Albanian respondents and 15% in Montenegro. While relatively minor, this factor points to the need for improved public awareness, technical education, and exposure to electric vehicle operation to build consumer confidence. Overall, these findings suggest that policy measures aimed at increasing EV uptake must prioritize infrastructure development, range assurance, and financial support, while also addressing informational gaps to mitigate apprehension toward new technologies.

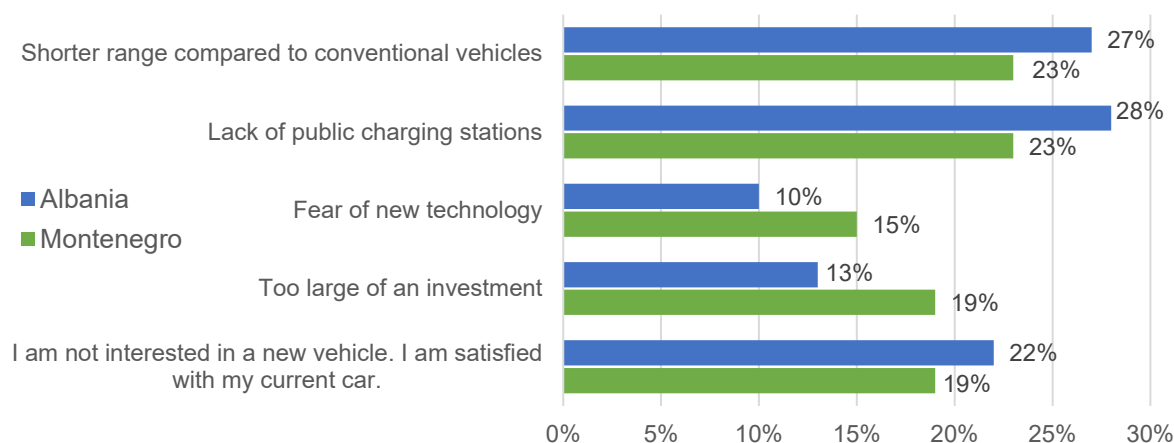


Fig.6: Preferred government incentives for electric vehicle adoption in Albania and Montenegro

These findings underscore the importance of expanding both public and private charging networks to support the transition to electromobility, while also highlighting the crucial role of targeted subsidies and financial incentives in promoting EV adoption. Effective policy measures should therefore focus on developing reliable charging infrastructure, ensuring adequate vehicle range, and providing financial support, alongside addressing informational gaps to reduce concerns toward new technologies.

IV. CONCLUSION

The study highlights the current state of vehicle fleets and public attitudes toward electric vehicles (EVs) in Montenegro and Albania. Overall, it was confirmed that Montenegro and Albania remain at an early stage of the electromobility transition. Policy measures should therefore be context-specific, emphasizing targeted financial incentives, substantial infrastructure investment, and

educational campaigns to address informational gaps and alleviate concerns. Tailoring strategies to national priorities and consumer perceptions is essential to accelerate EV adoption, reduce reliance on conventional fuels, and support the sustainable development of transport systems in both countries. A key limitation of this study concerns the composition and representativeness of the sample. The sample may not adequately reflect the broader target population, which limits the generalizability of the findings. So, future research should aim to use larger, more diverse, and more representative samples. This would enhance the reliability of findings and allow for more robust subgroup analyses.

ACKNOWLEDGEMENTS

The authors express their sincere appreciation to our colleagues from Albania for their valuable assistance in facilitating the distribution and collection of the survey sample in Albania.

REFERENCES

- Álvarez-Antelo D, Lauer A, Capellán-Pérez I. (2024). Exploring the potential of a novel passenger transport model to study the decarbonization of the transport sector. *Energy*. 305, p. 132313.
- Briand Y, Pye S, D'Agosto M, Goes GV, Neves Schmitz-Gonçalves D, Garg A, Trollip H. (2023). Passenger transport decarbonization in emerging economies: policy lessons from modelling long-term deep decarbonization pathways. *Clim Policy*. P. 1-21.
- DPSHTRR (2024). <https://www.dpshttr.al/te-reja/lajme/raporti-mjeteve-green-periudhen-janar-nen-tor-2024>. Accessed 3 Nov 2025.
- European Environment Agency. (EEA). 2024. Transport and Mobility. <https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility>. Accessed 2 Dec 2025.
- Grđinić-Rakonjac, M, Lučić, M. (2025). Electric Vehicle Selection with Easy Applicable MCDM Methods. *Transportation Research Procedia*, 90, p. 782-789.
- IEA, International Energy Agency. (2024). Global EV Outlook 2024, Moving towards increased affordability. <https://iea.blob.core.windows.net/assets/a9e3544b-0b12-4e15-b407-65f5c8ce1b5f/GlobalEVO Outlook2024.pdf>. Accessed 2 Dec 2025.
- International Energy Agency. (IEA). 2025. France. CO2 Emissions in 2023. <https://iea.blob.core.windows.net/assets/33e2badc-b839-4c18-84cef6387b3c008f/CO2Emissionsin2023.pdf>. Accessed 2 Dec 2025.

- Kim YG, Lim HW, Lee J. (2024). Decarbonizing road transport in Korea: role of electric vehicle transition policies. *Transp Res Part D Transp Environ.* 128, p. 104084.
- Kumar RR, Alok K. (2020). Adoption of electric vehicle: a literature review and prospects for sustainability. *J Clean Prod.* 253, p. 119911.
- Lučić, M., Grdinić-Rakonjac, M. (2025). Defining a new set of criteria for electric vehicle selection. *Transportation Research Procedia*, 83, p. 569-576.
- Maier R, Posch A, Probst C, Plakolb S, Steininger KW. (2023). Cutting social costs by decarbonizing passenger transport. *Transp Res Part D Transp Environ.* 122, p. 103878.
- MONSTAT (2024). https://monstat.org/uploads/files/publikacije/MONSTAT_MNE_2024.pdf. Accessed 3 Nov 2025.
- Ndhlovu, E., Mhlanga, D., & Duri, B. (2025). Decarbonising urban transport: An overview of electric vehicles, public transport, and sustainable infrastructure in achieving net-zero emissions. *Discover Global Society*, 3(1), p. 53.
- Paiho S, Saastamoinen H, Hakkarainen E, Similä L, Pasonen R, Ikäheimo J, Horsmanheimo S. Increasing flexibility of Finnish energy systems – A review of potential technologies and means. *Sustain Cities Soc.* 43, p. 509-523.
- Rozzi E, Giglio E, Moscoloni C, Novo R, Mattiazzo G, Lanzini A. (2024). Comparative study of electric and hydrogen mobility infrastructures for sustainable public transport: a PyPSA optimization for a remote island context. *Int J Hydrogen Energy.* 80, p. 516-527.
- Xing J, Liu X, Zhang Y. (2023). Development of the electric vehicle industry in China. *China Economics Journal.* 16, p. 139-184.

International conference on sustainable mobility

Agenda

Project title: International Engineering Competence Centres to push Sustainable
 Mobility Development in Albania and Montenegro
Acronym: INTEC

Work package	
WP11	International conference
TASK	
11.4	Community Building Events

Dates	05.03.-06.03.2026
City	Tirana
Meeting venue	POLIS University Entrance Hall
Address	Rr. Bylis 12, Kodi Postar 1051, Kutia Postare 2995, Tirana, Albania

05.03.2026	
Entrance Hall, POLIS University	
8:30 - 9:00	Registration
9:00 - 9:30	Opening Performance
Welcome session - Auditorium A5 (Ground floor)	
9:30 - 10:00	Opening Remarks Dr. Elona Karafili (Vice Rector, POLIS University) Dr. Flora Krasniqi (Head of Office of Projects and Internationalization, POLIS University) DI Daniela Wenzl (INTEC Project Coordinator)
Auditorium A5 (Ground floor)	
10:00 - 11:00	Keynote speakers DI Horst Pflügl AVL Collaborative Research for sustainable Mobility DPSHTRR Representative - (General Directorate of Road Transport Services in Albania)
11:15 - 11:30	Coffee break (Moving into parallel sessions)

11:30	SESSION 1: POLITICAL AND REGULATORY FRAMEWORK AULA B1	SESSION 2: TECHNOLOGICAL INNOVATION AULA B4
11:30 - 11:45	Opening Session: Prof. Emeritus dr Nataša Gospić (FSKL)	Opening Session: Associate Prof. Ivan Tolj (US)
11:45 - 12:00	Integrating Event Data Recorder (EDR) Technology into Sustainable Road Safety Frameworks within the European Green Deal Eriselda Alimeti, Parid Milo, Mentor Çejku, Anis Sulejmani, Odhisea Koça	Empirical Comparative Study of Structural CFRP Sandwich Structure Inserts for Out-of-Plane loads Imre Kovács
12:00 - 12:15	Infrastructure Readiness for Sustainable Mobility: EU Frameworks and the Case of Albania Ervin Kalemaj, Parid Milo, Mentor Çejku, Anis Sulejmani, Odhisea Koça	The Role of Intermodal Transportation for the Sustainable Mobility Márton Kovács
12:15 - 12:30	Review of the Evolution of International Ship Energy Efficiency Regulations and the Albanian context Dr. Blenard Xhaferaj, Doklejda Hodaj	Impact of Heat Pump Systems on Winter Energy Use and Driving Range in Battery Electric Vehicles Luis Henrique Pereira Martins
12:30 - 12:45	Renewable Energy Procurement (CPPA) and Transport Electrification: European Perspectives and Albanian Challenge Antonio Ndoci, Anis Sulejmani, Odhisea Koça, Mentor Çejku, Parid Milo	Liquid Cooling Systems for Electric Vehicle Batteries: Improving Safety, Performance and Sustainability João Miguel de Almeida Ribeiro Silva
12:45 - 13:00	The Current Status of Autonomous Vehicle	Analysis of Battery Charging and Discharging Behavior for Electric Vehicle Applications Leona Markic, Luka Filipović

	Technology Adoption in the Balkan Region Darjana Lopičić, Oliver Popović, Miloš Ilić, Bojan Kocić	
13:00 - 14:00	Lunch	
14:00 - 14:15	Reviewing the European Green Deal in Energy, Mobility and Industry Veselinka Calasan, Ivana Ognjanović	Automotive Cooling Systems Sustainability: A Focus on the Expansion Tank Ana Inês Barbeiro Casimiro
14:15 - 14:30	The European Green Deal and its National Implementation: From Strategy to Practice Blerina Bektashi, Andi Bektashi	Design and Development of a Constant-Volume Combustion Chamber for Optical Investigation of Hydrogen and Water Injection Under Engine-like Conditions Julius Hollerith, Prof. Dr. Bhavin Kapadia
14:30 - 14:45	From Prediction to Regulation: Evidence Production Approaches in Autonomous Mobility Research and Their Policy Implications Sadmira Malaj	Emission Reduction of Marine Propulsion Systems in SECA Zones Through the Integration of Hydrogen Technologies Motaleb Miri, Ivan Radaš, Marija Mandić, Ivan Tolj
14:45 - 15:00	Questions and Discussion	A Comprehensive Analysis of Ventilation System for Enhanced Energy Efficiency in Marine Propulsion Applications Sara Blašković, Gojmir Radica, Jakov Šimunović

15:00 - 15:15		<p>Design and Topology Optimization of a Lightweight Chain Sprocket for Electric Motorcycle Applications</p> <p>Teo Čolović, Ivo Marinić-Kragić</p>
15:15 - 15:30	<p>SESSION 3: ECONOMIC AND BUSINESS PRESPECTIVES + CASE STUDIES AND GOOD PRACTICES</p> <p>Aula B1</p> <p>Opening Session: Dr. Anis Sulejmani (PUT)</p>	<p>Questions and Discussion</p>
15:30 - 15:45	<p>Managing Renewable Energy Resources as a Foundation for Sustainable Mobility Transitions</p> <p>Deivi Sinanaliaj, Martin Bektashi</p>	
15:45 - 16:00	<p>Feasibility of Electric Bus deployment in Montenegro: A Case Study of Budva (Erasmus+ INTEC / IECC Context)</p> <p>Anastasija Mrkajic, Vinko Nikic.</p>	
16:00 -16:15	<p>Children Paths as an Urban Regeneration Strategy: Naim Frasheri Study Case</p> <p>Dejvi Dauti</p>	
16:15 - 16:45	<p>Questions and Discussion</p>	

International conference on sustainable mobility

Agenda

Project title: International Engineering Competence Centres to push Sustainable Mobility Development in Albania and Montenegro
Acronym: INTEC

Work package	
WP11	International conference
TASK	
11.4	Community Building Events

Dates	05.03.-06.03.2026
City	Tirana
Meeting venue	POLIS University Entrance Hall
Address	Rr. Bylis 12, Kodi Postar 1051, Kutia Postare 2995, Tirana, Albania

06.03.2026		
First Floor Hall, POLIS University		
8:30 – 9:00	Registration	
9:00– 9:15	SESSION 4: SOCIAL AND ENVIRONMENTAL IMPACT AULA B1	SESSION 5: FUTURE SCENARIOS AULA B4
9:00 – 9:15	Opening Session: Prof. Dr. Bhavin Kapadia (FHF)	Opening Session: MA Adrian Millward-Sadler (FHJ)
9:15 – 9:30	Comparison of Lifecycle Emissions of a SUV with Fuel Cell and Battery Electric Powertrains - Bhavin Kapadia, Alper Sayin, Sandra Eisenträger	GENAI Literacy as a Transversal Skill for Emerging Professionals: Implications for Sustainability- Critical Knowledge Work - Adrian Millward-Sadler
9:30 – 9:45	Smart Mobility Technologies and their Impact on Urban Sustainability: Insights from	Effects of Technical Traffic Calming Measures – Filip Perović

	European and Western Balkan Cities – Alma Gjonaj, Vjola Ziu	
9:45 – 10:00	The Disappearing Squares: Social and Environmental Impacts of Urban Mobility Planning in Durres – Arjola Sava	Cybersecurity Vulnerabilities in Electric Vehicle Operating Systems: A Global Awareness Analysis - Aleksa Radević
10:00 – 10:15	The City that Demands Continuous Movement: The Disappearance of the Right not to Move within the Framework of Sustainable Mobility – Avrili Meshi	Development of a risk assessment model for the transport of hazardous materials using ALOHA and GIS software tools – Marko Radetić
10:15 – 10:30	Between Rhetoric and Reality: Discursive Framings, Greenwashing and Outcomes in Sustainable Mobility – Kejsi Veselagu	Mapping Distance and Time Leveraging Isochrone Intelligence in Emerging Cities - Andia Vllamasi, Erjon Cobani
10:30 – 10:45	Reimagining the City Through Green Mobility Strategies: The Case of Tirana - Vjola Ziu, Alma Gjonaj	Can AI develop its Own “Taste” Automotive Design? - Gregor Andoni, Kristjana Meço
Coffee Break		
11:00 – 11:15	Linking Morphology, Perceived Safety, and Sustainable Mobility in Post-Socialist Urban Contexts- Sindi Doce	Optimizing Public Transport Corridors Using AI-Based Scenario Modelling: A case Study on Tirana’s Ring Road - Erjon Çobani, Julian Beqiri, Merita Guri
11:15 – 11:30	Towards Sustainable Transport: A Comparative Analysis of Electric Vehicle Adoption in Montenegro and Albania - Radmila Milić	Threat Landscape and Multi-Layered Protection Mechanisms for Autonomous and Electric Vehicle Systems - Marko Asanovic, Oliver Popović, Zoran Avramović, Nataša Gospić

11:30 - 11:45	Questions and Discussion	Cybersecurity Challenges in Modern Vehicular Communication Networks - Aleksandar Grgurević, Nataša Gospić, Oliver Popović
11:45 - 12:00		Green Transition in Albania: Challenges and Future Actions - Erik Kushta, Andi Hyka, Enea Nasto
12:00 - 12:15	SESSION 6: CONTROVERSIES AND CHALLENGES Aula B1	Use of AI in the Process of Green Transformation and Impact on Public Health - Esmeralda Hamiti, Federika Alliaj, Kristi Metushi
	Opening Session: Prof. Kristofor Lapa (UV)	
12:15-12:30	The Adoption of Electric Vehicles in Albania: A Comparative Study with Other Western Balkan Countries - Doklelda Hodaj, Andrea Lapa	Development of an Automatic Traffic Sign Detection System Using YOLOv8 - Valentina Vojinović, Luka Filipović
12:30-12:45	Application of Quality Tools in the Analysis of Factors Influencing the Development of Electromobility in Montenegro - Jelena Šaković Jovanović, Draško Jovanović, Mirjana Grdinić Rakonjac, Marko Lučić, Miloš Perović, Aleksandar Vujović, Gordana Radulović	The Historical Development of Artificial Intelligence and Its Influence on the job market in Automotive Engineering - David Josef Pilgram
12:45 - 13:45	Questions and Discussion	Questions and Discussion
13:45	Lunch	