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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

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Project Partners:

FH JOANNEUM University of Applied Sciences · Frankfurt University of Applied Sciences · UPT · UCG · UDG · AVL · GAMA-AUTO · ALFA Centar

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Project Coordinator: FH JOANNEUM Gesellschaft mbH (FHJ), Austria
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University of Split (US), Croatia
POLIS University (POLIS), Albania
Polytechnic University of Tirana (PUT), Albania
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Dr. Elona Karafili
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01

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

DOI: 10.37199/c41001001

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Abstract

Transport electrification increases the strategic importance of electricity procurement because mobility operators become exposed to power price volatility and long-term cost uncertainty. Across Europe, long-term renewable procurement arrangements, including corporate power purchase agreements, have expanded as mechanisms to support renewable project financing while providing cost stability and sustainability assurance to buyers. This paper analyses the interface between renewable electricity procurement and transport electrification by linking procurement choices to mobility-specific requirements: predictable charging costs, bankability of charging infrastructure investments, and credibility of low-carbon claims. A comparative framing is applied, contrasting European market practice with the emerging Albanian context and identifying enabling conditions, barriers, and risk-allocation issues relevant to long-horizon contracting. The results suggest that, in transitional electricity markets, limited availability of standardized long-term contracting instruments and restricted risk-mitigation capacity can constrain renewable procurement for

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electrification projects. These constraints increase exposure to short-term price fluctuations, reduce confidence in long-term operating costs for fleet-based electrification, and weaken incentives for private investment in high-utilization charging hubs. The paper proposes enabling measures including standardized contracting approaches, aggregation of smaller offtakers, and institutional mechanisms to reduce counterparty risk and improve project bankability. Overall, the findings position renewable procurement as a foundational enabler of scalable transport electrification and underline the need for coordinated energy–transport policy design in the Western Balkans.

Keywords: renewable procurement, corporate PPA, transport electrification, price volatility, Western Balkans

I. INTRODUCTION

Electrification has become the dominant pathway for decarbonising road transport in Europe. Electric vehicles, electric buses, and battery-based logistics systems are expanding rapidly, driven by climate targets, air-quality regulation, and falling battery costs. However, the climate benefits of electrification depend on the carbon intensity and price stability of the electricity used to charge vehicles. As charging demand grows, transport becomes a large and price-sensitive electricity consumer, exposing fleet operators, public transport authorities, and logistics companies to energy market volatility.

In response to these challenges, European energy and transport actors increasingly rely on long-term renewable energy procurement mechanisms. Corporate power purchase agreements (cPPAs) allow large electricity consumers to contract directly with renewable energy producers, securing fixed-price green electricity over long periods. In doing so, cPPAs support renewable project financing while also providing price stability and sustainability credentials to buyers.

While cPPAs have become a central pillar of renewable energy finance in Western Europe, their role in supporting transport electrification is still uneven across regions. Albania, despite its high renewable electricity share, lacks a mature cPPA market and remains highly exposed to hydrological risk and price volatility. This paper examines how cPPAs can support transport electrification in Europe and why their deployment remains limited in the Albanian context.

II. RENEWABLE ENERGY PROCUREMENT AND TRANSPORT ELECTRIFICATION

Electrified transport systems differ from traditional energy consumers in three important ways. First, charging demand is highly variable, depending on driving patterns, time of day, and seasonal mobility. Second, transport electrification often involves large, geographically concentrated loads,

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such as depots, logistics hubs, and highway charging stations. Third, public and private fleet operators are highly sensitive to operating costs, making electricity price stability essential for investment decisions.

Renewable energy procurement through cPPAs addresses these challenges by providing long-term price certainty and additionality. By signing long-term contracts with wind or solar producers, charging network operators and mobility providers can lock in predictable energy costs while ensuring that their electricity supply is renewable. This reduces exposure to wholesale market fluctuations and supports corporate decarbonisation targets.

In the EU, cPPAs have expanded rapidly in sectors such as data centres, manufacturing, and increasingly transport. Electric bus operators, logistics companies, and charging infrastructure providers are using cPPAs to underpin business models that depend on stable electricity pricing. In this way, renewable procurement becomes a critical enabling factor for large-scale transport electrification.

III. EUROPEAN CPPA MARKETS AND MOBILITY INTEGRATION

European cPPA markets are characterised by increasing liquidity, diverse contract structures, and growing participation by non-energy companies. Solar and wind developers use cPPAs to secure long-term revenues, while corporate buyers use them to hedge electricity costs and meet sustainability commitments. This has created a virtuous cycle in which renewable deployment and corporate demand reinforce each other.

In the transport sector, this dynamic is particularly strong. Operators of charging networks, electric truck fleets, and public transport systems increasingly act as large electricity consumers. By entering cPPAs, they can secure renewable electricity at fixed prices, allowing them to offer predictable charging tariffs or transport services. This reduces the financial risk associated with fluctuating wholesale electricity prices and improves the bankability of infrastructure investments.

Moreover, cPPAs facilitate the integration of renewable energy with digital energy management systems. Charging schedules can be aligned with periods of high renewable generation, and price signals can be used to optimise fleet charging. This supports grid stability while maximising the use of low-carbon electricity.

IV. THE ALBANIAN CONTEXT

Albania occupies a paradoxical position in the European energy landscape. Its electricity system is almost entirely renewable, dominated by hydropower, yet it remains highly exposed to hydrological

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variability and imports during dry years. At the same time, electricity markets are relatively underdeveloped, with limited forward markets and few long-term contracting mechanisms for private consumers.

Transport electrification in Albania is still in its early stages. Pilot projects for electric buses and charging stations have been launched, but large-scale deployment remains constrained by financial and institutional barriers. One of the most important of these barriers is the lack of stable and predictable electricity procurement mechanisms for transport operators.

Unlike in Western Europe, Albanian companies and municipalities have limited access to long-term renewable contracts. The absence of a liquid wholesale market, creditworthy offtakers, and standardised cPPA frameworks makes it difficult for renewable developers and transport operators to enter into direct agreements. As a result, charging networks and electric fleets remain exposed to short-term price volatility and hydrological risk.

V. RESULTS

The comparison between European and Albanian renewable procurement frameworks reveals three key differences. First, European markets offer a wide range of contract structures that allow transport operators to match electricity supply with charging demand. Albania lacks such flexibility, relying instead on spot market purchases and regulated tariffs.

Table 1. CfD hedge illustration: spot vs strike.

Period	*Spot price (€/MWh)*	*Strike price (€/MWh)*
1	52	65
2	58	65
3	65	65
4	72	65
5	80	65
6	90	65
7	85	65
8	78	65
9	70	65
10	62	65
11	55	65

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12	50	65

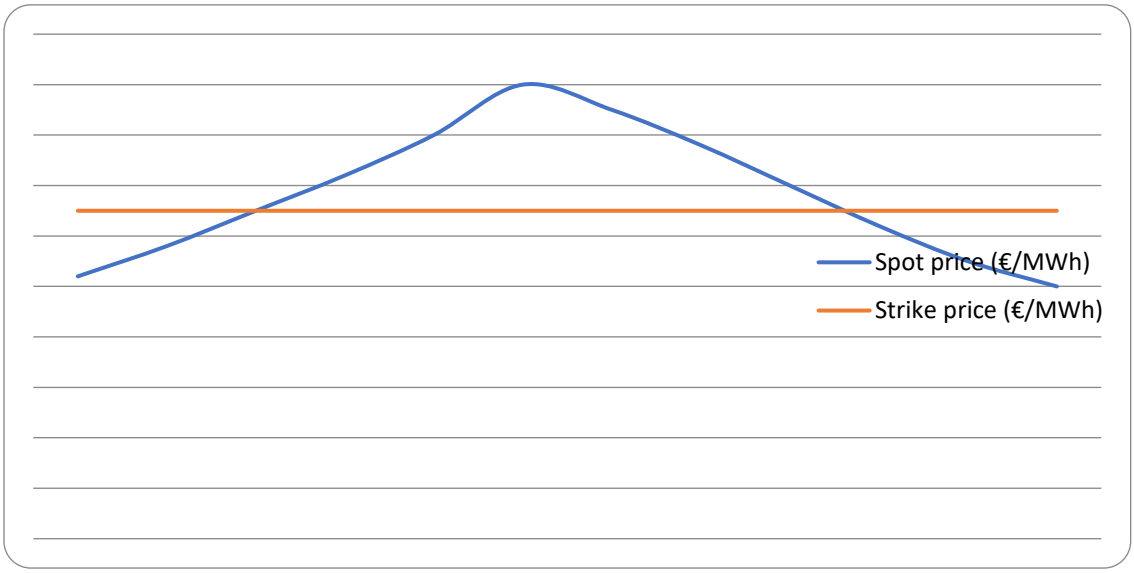

Figure 1. CfD hedge illustration: spot vs strike.

Second, European cPPA markets benefit from strong financial institutions, guarantees, and regulatory clarity, which reduce counterparty risk. In Albania, perceived credit risk and regulatory uncertainty discourage long-term contracting between renewable producers and transport operators.

Third, in Europe, renewable procurement is increasingly integrated with infrastructure planning. Charging hubs, logistics depots, and public transport systems are designed around long-term energy contracts. In Albania, energy procurement and transport planning remain largely disconnected, leading to suboptimal investment decisions.

Table 2. (Green shade) Renewable share (%): EU vs Albania Grid; (Blue shade) CO2 intensity proxy (gCO2/kWh); (No shade) Transport electricity demand (index).

Year	***EU renewable share (%)***	***AL renewable share (%)***	***EU CO2 intensity (gCO2/kWh)***	***AL CO2 intensity (gCO2/kWh)***	***EU transport demand (index)***	***AL transport demand (index)***
2020	40	95	250	40	10	1
2022	45	95	220	50	15	2
2025	60	94	160	60	30	6

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2028	70	93	120	55	45	12
2030	80	95	90	45	60	20
2035	88	94	60	50	95	35

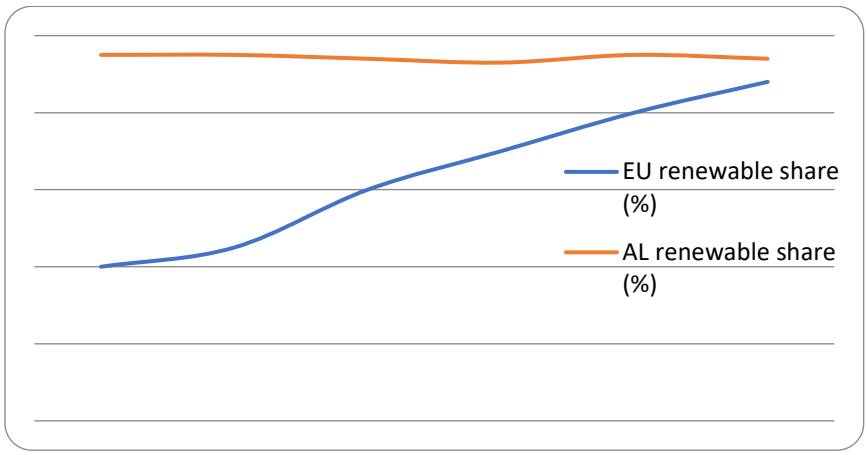

Figure 2. Renewable share (%): EU vs Albania.

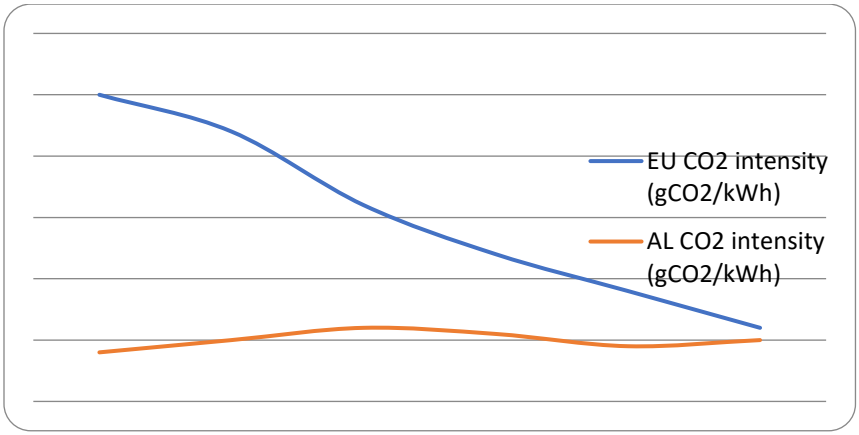

Figure 3. Grid CO2 intensity proxy (gCO2/kWh).

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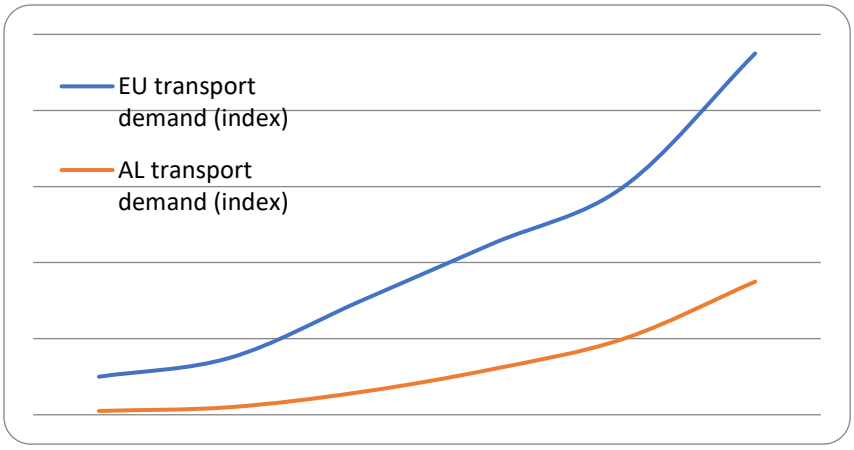

Figure 4. Transport electricity demand (index).

VI. DISCUSSION

The findings highlight the importance of renewable energy procurement as a structural component of transport electrification. Without long-term contracts, charging networks and fleet operators face unpredictable costs, undermining investment incentives. In Europe, cPPAs provide the financial backbone of the electrified mobility transition. In Albania, their absence creates a barrier despite the availability of renewable electricity.

Table 3. (Green shade) E-trucks (k): EU vs Albania: (Blue shade) Fast chargers needed (k): EU vs Albania; (No shade); Transport electricity demand (TWh): EU vs Albania.

Year	EU e-trucks (k)	EU fast chargers (k)	AL e-trucks (k)	AL fast chargers (k)	EU transport elec demand (TWh)	AL transport elec demand (TWh)
2022	5	1	0.05	0.01	0.47	0.01
2025	30	4	0.2	0.05	2.67	0.05
2028	120	18	0.8	0.15	9.9	0.15
2030	270	36	2	0.4	21.22	0.31
2035	800	90	10	2	61.2	1.08
2040	1500	150	25	6	113.1	2.37

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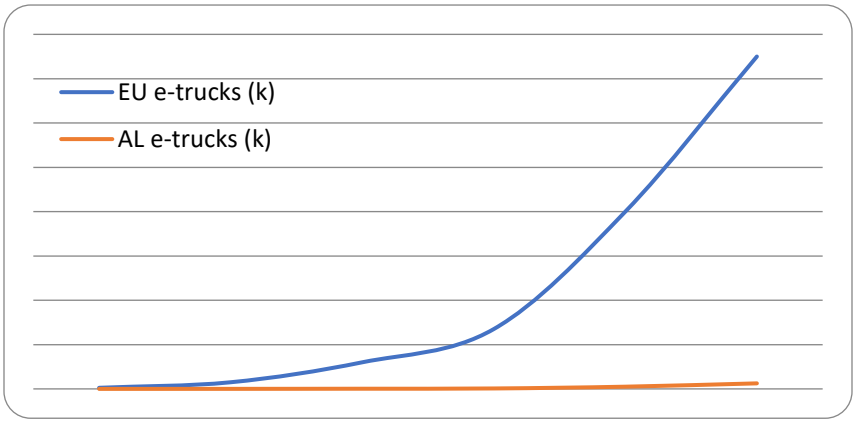

Figure 5. E-trucks (k): EU vs Albania.

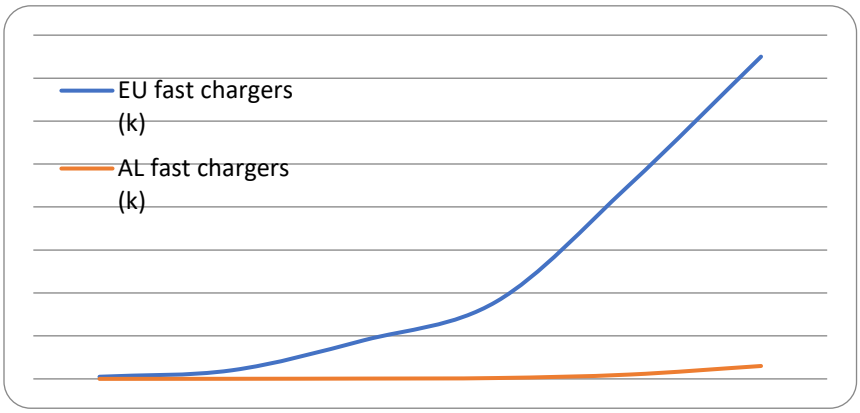

Figure 6. Fast chargers needed (k): EU vs Albania.

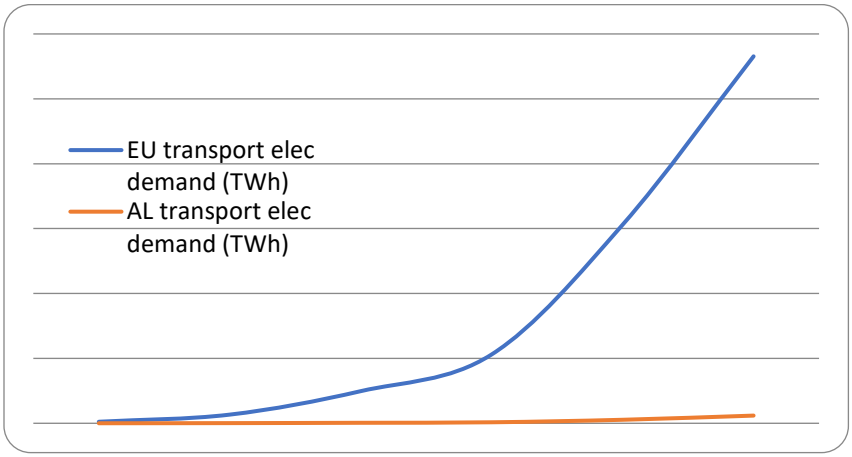

Figure 7. Transport electricity demand (TWh): EU vs Albania.

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Developing a functional cPPA market in Albania would require regulatory reform, market liberalisation, and institutional capacity building. By enabling long-term renewable contracts, Albania could leverage its renewable resources to support transport electrification while reducing dependence on imports and price volatility.

VII. CONCLUSION

Renewable energy procurement through corporate power purchase agreements is becoming a cornerstone of Europe's transport electrification strategy. By providing price stability, sustainability assurance, and project financing, cPPAs link the energy transition with the mobility transition. Albania's experience demonstrates that renewable electricity alone is not enough; institutional and market frameworks are equally critical. Aligning renewable procurement mechanisms with transport electrification strategies is therefore essential for achieving sustainable mobility across Europe and its neighbouring regions.

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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	Coummunity 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)**

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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

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	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 Ognjanovic	**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** Motalleb 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

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

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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	Coummunity 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

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	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

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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 **Opening Session:** Prof. Kristofor Lapa (UV)	**Use of AI in the Process of Green Transformation and Impact on Public Health** - Esmeralda Hamiti, Federika Alliaj, Kristi Metushi
12:15-12:30	**The Adoption of Electric Vehicles in Albania: A Comparative Study with Other Western Balkan Countries** - Doklejda 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**	

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