NEWSLETTER

Society of Transport Engineers Nepal (SOTEN)

MESSAGE FROM PRESIDENT

Er. Hare Ram Shrestha, PhD
President

It gives me immense pleasure to extend my warm greetings on the publication of the 6th edition of the SOTEN Newsletter. This edition reflects our continued commitment to advancing knowledge, dialogue, and professional engagement in the transport sector of Nepal.

Over the past period, SOTEN has made notable progress through meaningful collaborations and research initiatives. I am particularly pleased to highlight our joint effort with the Asian Transport Outlook (ATO) and the United Nations Centre for Regional Development (UNCRD) in the publication of the Transport in Review Nepal document. This collaborative work stands as an important milestone in strengthening evidence-based transport policy and planning in Nepal.

In addition, SOTEN has successfully conducted a significant study on the Fare and Route Review of Public Transport in Kathmandu, assigned by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). This study has contributed towards improving efficiency, affordability, and sustainability in Kathmandu's public transport system.

SOTEN has continued various other activities related to transport sector in collaboration with other academic and professional organizations which are highlighted in this issue.

These achievements demonstrate SOTEN's growing role as a key knowledge partner in the transport sector. I would like to express my sincere appreciation to all our partners, contributors, and members for their continuous support and dedication.

I hope this newsletter serves as an informative and inspiring platform for all readers, encouraging further collaboration and innovation in the field of transport.
Thank you.

Warm Regards

Hare Ram Shrestha
President
Society of Transport Engineers Nepal

About SOTEN

The Society of Transportation Engineers Nepal (SOTEN), established in 2009, is dedicated to advancing the transportation sector through knowledge sharing, professional development, and capacity-building initiatives which currently has 424 members. It promotes research, innovation, and expertise within the field, contributing to sustainable and efficient transportation systems in Nepal. SOTEN is also a member of prestigious international organizations such as the Eastern Asia Society of Transport Studies (EASTS), United Nations Economic and Social Commission for Asia (UNESCAP), TRAN, the International Road Federation (IRF), and the Pacific reflecting its commitment to global collaboration and excellence in transportation engineering.

SOTEN Executive Members

Fifth Executive Committee (2024-26)

Er. Hare Ram Shrestha, Ph.D
President

Er. Anga Lal Rokaya
Vice-President

Er.Hemant Tiwari
General Secretary

Er.Shrawan Kumar Thapa
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Er.Bindu Adhikari
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Er. Binod Bhattarai
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Er. Nal Bahadur Thapa
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Er. Pradeep K. Shrestha, Ph.D
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Member

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Er. Top Bahadur Baniya
Member

Past President

Er Tulasi Sitaula
First Executive Committee
2009-14

Er. Lal Krishna KC
Second Executive Committee
2014-19

Er. Padam Badhadur Shahi, Ph.D
Third and Fourth Executive Committee
2019-21; 2021-23

Er. Rajendra Raj Sharma
Fifth Executive Committee
2024-25

Preparation and Launch of Transport in Review: Working Paper Series Nepal

This document is the result of dedicated collaboration across institutions and borders. SOTEN expresses sincere gratitude to the report's contributors: Sudhir Gota, Hemant Tiwari, Hare Ram Shrestha, Alvin Mejia, Choudhury Rudra Charan Mohanty, Ganesh Raj Joshi, Mel Eden, Adwait Limaye, Vibek Gupta, Saujanya Nepal, Nestor Benjamin Soco, and Aaron Salang, whose expertise and efforts made this knowledge product possible. We also thank ADB and AIIB for their generous support, and all partners and participants who contributed to a meaningful launch event.

On 23 March 2026, the Asian Transport Observatory (ATO), Society of Transport Engineers Nepal (SOTEN), and United Nations Centre for Regional Development (UNCRD) jointly launched a landmark report on Nepal's transport sector at an event held in Pulchowk, Kathmandu. Supported by the Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB), the publication offers a comprehensive, data-driven assessment of where Nepal stands and where it needs to go.

Key Findings at a Glance

Access has improved, with around 80% of households now within a 30-minute walk of a paved road, up from just over half in 2010/11. Yet rural communities, particularly in Karnali and Sudurpaschim, continue to face long travel times to essential services.

Road safety remains a serious concern. Nepal records 28 fatalities per 100,000 people, the second highest in Asia, with pedestrians and the 15–44 age group bearing the greatest burden. The economic cost of road crashes reached an estimated USD 3 billion in 2021.

On the environmental front, transport has become Nepal's fastest-growing source of greenhouse gas emissions, with its share of national emissions rising from 4.8% in 2015 to around 12.5% today. However, Nepal's electric vehicle uptake is a rare global success story, with EVs now accounting for 53% of all vehicle imports by value, second only to Norway.

Kathmandu continues to lack any rapid transit infrastructure, and urban public transport remains underdeveloped relative to the city's density and growth.

Looking Ahead

The report serves as Nepal's baseline as the UN Decade of Sustainable Transport (2026–2035) begins. Contributors underscored that strong policy frameworks exist across all areas and that the urgent task now is implementation. Further research is currently underway to deepen the findings presented in this report, and additional content will be featured in upcoming editions of this newsletter as it becomes available.

The complete working paper, including data on rural access, urban sprawl, air pollution, logistics performance, and technology adoption, is available at:
asiantransportobservatory.org/transport-in-review/nepal-2026

SOTEN at NGS Youth Symposium 2026

Kathmandu — The Society of Transport Engineers Nepal (SOTEN) was represented at the NGS Youth Symposium 2026, a pre-event of GeoMandu 2027, where key discussions focused on "Strengthening Nepal's Transport Infrastructure: Role of Geotechnical Engineering in Planning, Design, and Practice."

SOTEN's General Secretary, Mr. Hemant Tiwari, participated as a panelist, contributing insights on the integration of geotechnical engineering in transport infrastructure development. The session was moderated by Er. Abhash Acharya and featured distinguished panelists including Er. Shuva Raj Neupane, Er. Uday Raj Neupane, Dr. Manita Timilsina, and Er. Arpan Bahadur Singh.

The symposium was organized by the Nepal Geotechnical Society, bringing together professionals and young engineers for knowledge exchange and collaboration in advancing Nepal's infrastructure sector.

Knowledge Sharing Series

SOTEN has continued its knowledge sharing series with the following episodes.

Episode 16 :Research on Transportation: Topic Selection to Article Publication

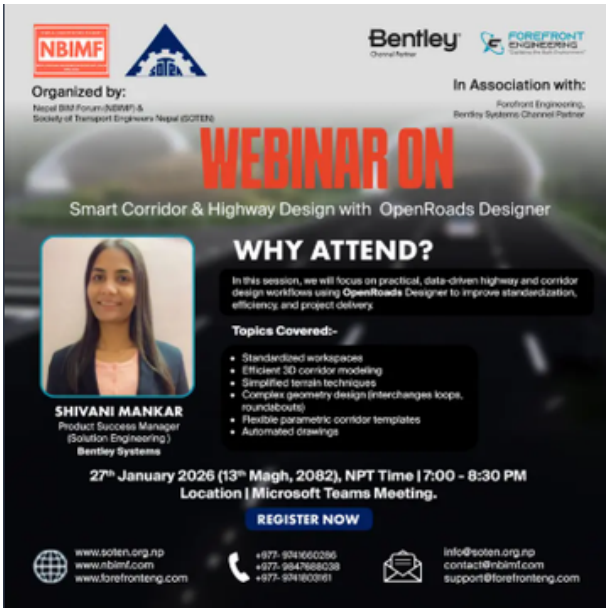
The Society of Transport Engineers Nepal (SOTEN) has successfully concluded its 16th Knowledge Sharing Session titled "Research on Transportation: Topic Selection to Article Publication." The session brought together participants eager to deepen their understanding of the research process, from identifying relevant topics to navigating the path toward publication.

The program featured Prof. Taku Fujiyama, PhD, from University College London, who provided comprehensive insights into the key stages of academic research. His guidance offered valuable direction to aspiring researchers and professionals in the field of transportation.

Episode 17 Smart corridor and highway design using Bentley OpenRoads Designer.

Kathmandu, Jan 27 — The Society of Transport Engineers Nepal (SOTEN), in collaboration with the Nepal BIM Forum (NBIMF), Forefront Engineering, and Bentley Systems, successfully conducted Episode 17 of its Knowledge Sharing Session, focusing on smart corridor and highway design using Bentley OpenRoads Designer.

The technical webinar brought together infrastructure professionals and practitioners to explore advanced tools and methodologies for modern road design. Participants were introduced to practical applications of Bentley OpenRoads Designer, highlighting its role in improving efficiency, accuracy, and innovation in transportation infrastructure projects.



Episode-18 Intelligent Traffic Management for building Smart & Safe Urban areas and Highways.

Episode 18 of its Knowledge Sharing Session, centered on "Intelligent Traffic Management for Building Smart and Safe Urban Areas and Highways." The session featured expert presentations from Mr. Dhaval Desai (Trafitek, Mumbai), Mr. Yogesh Wani (FLIR, Mumbai), and Mr. Habib Noor (FLIR, Singapore), who shared advanced insights on emerging technologies and strategies aimed at enhancing mobility, safety, and efficiency in transportation systems.

The webinar attracted a diverse group of professionals and stakeholders, fostering meaningful discussions on the future of intelligent transport solutions in both urban and highway contexts.

Episode-19 Professional Engineer's Registration in Nepal

The Nepal Engineering Council (NEC), in collaboration with the Society of Transport Engineers Nepal (SOTEN), organized an interactive session on "Professional Engineer's Registration in Nepal" on March 31, 2026.
The session aimed to guide engineering professionals through the procedures, requirements, and significance of obtaining Professional Engineer (PE) registration in Nepal. Participants gained clarity on the application process, eligibility criteria, and key considerations for successful registration.

MEMORANDUM OF UNDERSTANDING

SOTEN Signs MoU with Thapathali Campus

On 29 March 2026, the Society of Transport Engineers Nepal (SOTEN) signed a Memorandum of Understanding (MoU) with Thapathali Campus, marking an important step toward strengthening the link between academic learning and professional practice in the field of transport engineering.
Through this partnership, both institutions aim to promote knowledge exchange, research opportunities, and skill development, bridging the gap between engineering education and the evolving needs of Nepal's transport sector.

Conference

SOTEN at LEC Conference 2026

On 31 January 2026, SOTEN proudly collaborated with Lalitpur Engineering College, Safe & Sustainable Travel Nepal, and Green Decision Labs & Research for the 2nd International Conference on Engineering Technology & Infrastructure Development.
The event brought together brilliant minds to discuss sustainable engineering, transport innovation, and infrastructure development, serving as a remarkable platform for knowledge sharing and networking. SOTEN extends its gratitude to all participants, partners, and organizers for making this conference a success.

Guest Lecture

As part of an ongoing collaboration between Universal Engineering & Science College (UESC) and the Society of Transportation Engineers Nepal (SOTEN), the institution's General Secretary, Hemant Tiwari, recently held an interactive discussion with MSc Transportation students at UESC. The session focused on identifying potential research areas within the transport sector, aiming to bridge the gap between academic knowledge and real-world challenges. Topics included urban mobility, road safety, public transport optimization, and sustainable infrastructure. This collaboration reflects a shared commitment to fostering problem-driven research and equipping future transport professionals with the insights needed to address Nepal's evolving transportation needs.

Participation in Trainings

SOTEN has been nominating members for specialized trainings organized by SCAEF Nepal and other organizations. Recently our members participated in GIS and Remote Sensing (Pokhara, 27–30 March 2026) and Microsoft Office with Advanced Excel (Kathmandu, 22–24 March 2026) training program Organized by SCAEF Nepal.

Also our two other members were nominated for training on Road Design and Estimation Organized by Sirius Innovatech Engineering.

Group Photo of our members participating in trainings

What's Next?

EASTS Board Meeting 2026,

We are thrilled to announce that Nepal has been selected as the host country for the EASTS Board Meeting 2026, a landmark achievement for SOTEN and a celebration of Nepal's growing presence in the region. Where breathtaking mountains meet vibrant culture, our leaders will gather to shape the future of the organisation.

International Conference on Digital Technology and Infrastructure (ICDIEAS, 2026)

The Society of Transport Engineers Nepal (SOTEN) is thrilled to announce its official collaboration with United Technical College for the upcoming International Conference on Digital Technology and Infrastructure (ICDIEAS, 2026) Call for Abstracts with extended submission deadline: 1st May 2026. Notification of acceptance: 25th May 2026. Early bird registration: 15th May 2026. Registration closes: 1st June 2026. Conference date: 15th June 2026. Conference features include keynote speeches by industry leading experts, parallel technical sessions on trending topics, and exclusive networking opportunities for professional collaboration. The conference is available via e conference and physical presence.

KEC CONFERENCE 2026

The 8th Conference on Engineering and Technology, dedicated to enhance research ability, will be held on 24th Baisakh, 2083 (7th May, 2026). The event features a Symposium on Traffic and Transportation Engineering. It is organized by Kantipur Engineering College in collaboration with the Society of Transport Engineers Nepal (SOTEN) and Safe & Sustainable Travel Nepal (SSTN).

LEC Journal 2026 Volume 3

The Society of Transport Engineers Nepal (SOTEN) is pleased to announce its collaborative partnership with Lalitpur Engineering College (LEC) and Safe & Sustainable Travel Nepal (SSTN) for the International Journal on Engineering Technology and Infrastructure Development (InJET InDev) 2026 Volume 3. SOTEN encourages researchers to submit papers on Civil Engineering, Computer Science and IT Engineering, Artificial Intelligence, Rehabilitation and Retrofitting, Data Science and Machine Learning, Electrical Engineering, Environment Engineering, Mechanical Engineering, and Electronics Engineering. Paper submission deadline is May 2026, with publication in September 2026.

Transport Affairs

Petroleum Prices Hits Travel and Lives

Citing to the increased diesel prices, public transport using the non-renewable resources fare and freight vehicles fare have been increased by 16.71% for public transport, 21.68% and 15.75% for freights in hill and plain respectively. This has been caused due to the ongoing tension at the middle east and seems to worsen with the latest increase in the fuel prices, especially the diesel price. The approval to the fare hike has been provided by the Ministry of Physical Infrastructure and Transport. This would certainly impact the travel of the citizen which could affect the economy of the country. The consumers goods prices are also set to hike after this hike. [Ratopati, April 08, 2026]. The current price of the diesel is at Rs 234.50 per litre and the increment has been made for the fifth time in 31 days. [The Kathmandu Post, April16, 2026]. A study by Graham and Glaister (The Demand for Automobile Fuel, A Survey of Elasticities, 2002] suggested that the faster growth of fuel prices than the income growth may lead to the effect in the travel and consecutively the ownership of the cars. The trend is quite visible in Nepal in recent years. The EV vehicles has prominently increased sales compared to the combustion engine vehicles.

The Kathmandu Post on April 13, 2026 wrote an article on this price hike. The article presents an estimated increase in inflation by 2% with the 21% increase in cargo fares. To alleviate this problem, Government has started to make a legal framework to allow the conversion of old vehicles into Electric Vehicles as per the cabinet's decision. However, the risks born by this conversion has to be first sort out which has a major risk of fire associated. Other part being the eccentric weight distribution brought in by the heavy batteries and use of non-standard motors, batteries and many more. These technical hurdles and associated institutional capacity gap has to be first addressed for the feasible and effective implementation of the policy, as per Bishal Silwal's article posted in the Kathmandu Post of April, 2026.

Nagdhunga Tunnel gets its long awaited operator

China based Yuxin-ART JV wins the bid to manage and operate the Nagdhunga Tunnel. The company would pay Rs 1.1 billion over five years to the government for running the tunnel. There were a total of 7 bidders shortlisted. There would also be a three month of trial period beginning from mid June. A year delay has been observed. The tunnel would be operated, managed and maintained based on the Tunnel Operation and management Procedure which was approved in October 2025. For DoR and MoPIT this would be a milestone project for the operation and management of other road tunnels being constructed in Nepal. The journey through will take around 30 minutes for the travel facing a toll fees of Rs 50 for small vehicles to Rs 500 for large trucks. [March 31, My Republica]. The tunnel achieved it's breakthrough after a four and a half years of construction in April 14, 2024.

Underpass and Flyover at Koteshwor

A loan agreement has been signed between Government of Nepal and Government of Japan for building grade separated intersection at Koteshwor to ease the congestion. A loan of 34.59 billion Japanese yen (31.76 billion Rupees) has been approved by the Japan. The loan is provided for the payment period of 30 years with the yearly rate of 0.2 %. [Rising Nepal Daily]

The project includes a 664 meter long flyover which will be built from Tinkune to Tribhuvan International airport followed by a 700 m long tunnel inside the airport area continued through another 238 meters of flyover connecting to Jadibuti. The completion is expected around 2090 B.S.. Currently, JICA, Japanese Cooperation Agency JICA has been selected as a consultant for the preliminary study and has produced an IEE report in 2023 and the Final Report of the preparatory Survey in 2024

Proposed Plan for the Grade Separation sections of the project roads

Source: Final Report on Preparatory Survey of Koteshwor Intersection Improvement Project

A 3 D view of the project showing tunnel and the flyover.

Government Agendas towards Transport Development

The new formed government has made the commitment to upgrade East-West Highway to international standards within the next three years. The commitment paper also includes the development of integrated multimodal transport system that would connect roads, water ways and airports which is required for the efficient transportation of people and goods. It also includes the development of international trade through cross-border waterways with India and maritime ports as per transit and trade agreements with China which will increase the access to international waterways for Nepal. The safety would be enhanced in the transport sector with the use of modern technology and required trainings to the personnel in transport. [Ratopati, April 14, 2026]

Important Updates

A total of 45.16% of progress has been observed till the date and the deadline currently is set to Chaitra 2083. 2 major tunnels out of 7 have been completed whereas other tunnels are under construction whereas 13 bridges out of 89 bridges have been constructed. The Bridge construction progress and tunnel construction could be summed up in the table as shown:

Tunnel Progress

Tunnel Name	**Length (m)**	**Progress / Status**
Mahadevtar (Makawanpur)	**3,455**	2,348m excavated (approx. 70%). Breakthrough expected by Ashar.
Dhedre	**1,691**	Finishing work underway inside (Twin Tunnels).
Lendanda	**1,623**	Finishing work underway inside (Twin Tunnels).
Chandram Bhir	**2,237**	315m excavated so far.
Sisoutar	**390**	5m excavated; portal work ongoing.
Devichaur	**1,000**	Portal construction work started.
Mauribhir	**583**	Portal construction work started.

Road and Bridge progress

Location / Section	Description	Status
Khokana - Dukuchhap	0 to 6.5 km	**Stalled.** Issues with land acquisition (315 ropanis total) and cultural heritage.
Dhedre (Bakaiya-12)	~31 km from KTM	Two parallel 82m high bridges (300m length) over Jitpur River are in final stages.
Lendanda (Gadhi-1)	Adjacent to Dhedre	Two parallel 82m high bridges (339m length) over Chalise River; beams being placed.
Bara/Makawanpur End	Near Nijgadh	11 km section ready; 5 km of blacktopping completed on subbase/service lanes.

[ekantipur, 31 January 2026]

[source: ekantipur]

After the halt of regular flights in West Asia region due to ongoing tension, Ministry of Foreign Affiars along with the Nepal Airlines arranged 4 flights, to Dubai and Damam to and fro on 3rd, 4th and 5thof April to ensure the air connectivity. On 1 April, a Kuwait airways flight landed in Bhairahawa from Kuwait. For railway development, in March, India completes the Detailed Project Report following the completion of final location survey of the railway between Raxaul and Kathmandu set to be a 136 km. This has been stated in the Rajya Sabha by the Railway Minister of India. [Indian Express, 23 March, 2026] . Across the country, in the month of January, road crashes claimed 238 lives with the major reason behind the crashes being speeding, drink driving, inexperienced drivers and unnecessary overtakes. The major share of crashes was taken by motorbikes followed by cars and jeeps. [The Kathmandu Post, 29 January 2026]. In the March, Nepal faces yet another air crash where Air Dynasty Helicopter crash landed in Khotang. While no death was observed, one passenger among five borne injuries.

SOTEN Membership Types & Fees

Life Member: A one-time membership for lifetime affiliation and benefits.
Eligibility: MSc Transportattion or 5 years of Relevant experience in Transportation Sector after B.E
Fee: NPR 5,500

General (Professional) Member: Annual membership for practicing engineers and researchers with full rights.
Eligibility: MSc Transportattion or 5 years of Relevant experience in Transportation Sector after B.E
Fee: NPR 1,000 per year

Associate Member: Annual membership for professionals in related fields (planning, policy, etc.), Students (Msc Ongoing or Fresh Graduates)
Fee: NPR 1,000 per year

Blog

कर्णाली प्रदेश: बढ्दो सडक सुरक्षा जोखिम !

हेमन्त तिवारी

नेपालभर पछिल्ला दश वर्षमा करिब १,८०,४७४ सडक दुर्घटना भएका छन्। ती दुर्घटनामा २४,६४८ जनाको मृत्यु, ५४,१८० जना गम्भीर घाइते र १,७८७९८ जना सामान्य घाइते भएका छन्। यो तथ्याङ्कले देशभर नै सडक दुर्घटना तीव्र गतिमा बढिरहेको देखाउँछ, जसको प्रतिबिम्ब कर्णाली प्रदेशमा पनि स्पष्ट रूपमा देखिन्छ।कर्णाली प्रदेशमा पछिल्ला पाँच वर्षमा (२०७७/७८–२०८१/८२) ३,२७४ दुर्घटना भएका छन्, जसमा ६५५ जनाको मृत्यु, २,०५० जना गम्भीर घाइते र ४,८१८ जना सामान्य घाइते भएका छन्। यी तथ्यांकहरूले कम जनसंख्या र न्यून सवारी साधन भए पनि सडक सुरक्षा चुनौती गम्भीर रहेको स्पष्ट पार्छ। जिल्ला अनुसार हेर्दा सुर्खेत र सल्यानमा सबैभन्दा बढी दुर्घटना र मृत्यु भएको छ भने दैलेख, कालिकोट, जाजरकोट, जुम्ला लगायतका जिल्लामा मध्यम स्तर र हुम्ला, डोल्पामा न्यून देखिन्छ।

कर्णालीमा हुने दुर्घटनामा दुई पाङ्ग्रे सवारी साधनको संलग्नता उल्लेखनीय रूपमा उच्च छ। कर्णाली प्रदेशभित्र दुर्घटनाको गम्भीरता हेर्दा करिब ९% घटनामा मृत्यु, २८% मा गम्भीर चोट र ६३% मा सामान्य चोट लाग्ने गरेको छ। कुल मृतकमध्ये ४७८ पुरुष र ११७ महिला रहेका छन्। साथै, ४९ बालक र ११ बालिकाले ज्यान गुमाएका छन्, जसले बालबालिकासमेत जोखिममा रहेको देखाउँछ। त्यस्तै, ३७ वटा जनावरको मृत्यु हुनु सडकको मिश्रित प्रयोग (मानव र पशु आवागमन) को संकेत हो।

समयअनुसार विश्लेषण गर्दा दिउँसो १२ बजेदेखि ६ बजेसम्म सबैभन्दा बढी (१,५३३) दुर्घटना भएका छन्। बिहान (६–१२ बजे) ७४५, साँझ (६ – राति १२ बजे) ९०६, राति (राति १२– बिहान ६ बजे) ८८ रहेको छ। यसले बढी यातायात चाप हुने समयमा दुर्घटना बढ्ने प्रवृत्ति देखाउँछ। सवारी साधनको आधारमा मोटरसाइकल प्रयोगकर्ताहरू बढी जोखिममा (२,०६४ दुर्घटनामा संलग्न) रहेको देखाउँछ । त्यसपछि कार/जिप (६३३), ट्र्याक्टर (४४८) लगायतका सवारी साधनहरू छन्।

दुर्घटनाका कारणहरूको विश्लेषण गर्दा करिब ८० प्रतिशत दुर्घटना चालककै कारणले हुने गरेको देखिन्छ। तीमध्ये तीव्र गति (८३%) सबैभन्दा ठूलो कारण हो। साथै मदिरा सेवन, ट्राफिक नियम उल्लङ्घन, लापरवाहीपूर्ण सवारी चलाउने जस्ता कारणहरू पनि रहेका छन्। यात्रुका कारण हुने दुर्घटनामा बाटो काट्ने क्रममा लापरवाही (४४%) छ भने सवारी साधनको अवस्थाका कारण हुने दुर्घटनामा ब्रेक फेल (५४%) देखिन्छन्।

यी तथ्यांकहरूले स्पष्ट रूपमा देखाउँछन् कि अधिकांश दुर्घटना चालकको व्यवहारसँग सम्बन्धित छन्—जस्तै तीव्र गति, लापरवाही, र ट्राफिक नियमको पालना नगर्नु। साथै, कठिन भौगोलिक अवस्था, साँघुरा सडक र सुरक्षाका पूर्वाधारको अभावले जोखिमलाई अझ बढाएको छ।

कर्णालीमा सडक सञ्जाल विस्तार हुँदै जाँदा जोखिम पनि बढ्ने निश्चित छ। त्यसैले अहिले नै सचेत र योजनाबद्ध रूपमा कदम चाल्नु आवश्यक छ। सडक सुरक्षा केवल यातायातको विषय मात्र होइन, यो जनस्वास्थ्य, सुशासन र दिगो विकाससँग प्रत्यक्ष रूपमा जोडिएको विषय हो। गति र ट्राफिक नियम कडाइका साथ कार्यान्वयन, जनचेतना अभिवृद्धि, सवारी चालक प्रशिक्षण, मोटरसाइकल सुरक्षामा जोड, सडक पूर्वाधार सुधार तथा आपतकालीन सेवाको सुदृढीकरण अत्यन्त आवश्यक छ। कर्णालीको सडक सुरक्षा चुनौती केवल तथ्यांक होइन—यो मानव जीवन, परिवार र समग्र समाजसँग जोडिएको विषय हो। अब ढिलो नगरी कार्यान्वयनमा जाने समय आएको छ।

EV Battery Health Optimization in Nepal

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Nepal's transport sector has undergone a rapid transformation. Electric vehicles (EVs) now account for 73–76% of new four-wheeled passenger vehicle sales, making Nepal the second-largest EV market globally after Norway. In fiscal year 2024/25, EV imports reached 44,534 units, valued at NPR 43.99 billion. This expansion is reflected in four-wheeled imports, which rose from 11,701 units in 2023/24 to 13,578 units in 2024/25, a 15% increase. Growth has been driven by tax incentives, hydropower-based electricity, and rising fuel costs. At the same time, structural factors reinforce the transition. EVs operate as near-zero-emission vehicles in Nepal's hydropower-based system, while the transport sector contributes about one-quarter of Kathmandu's fine particulate pollution and petroleum imports continue to strain foreign exchange reserves. Economic factors further support adoption. Electric vehicles cost around NPR 50 per kilometre, compared to NPR 73 for petrol vehicles. However, long-term benefits depend on battery performance. Batteries account for up to 45% of vehicle cost and largely determine lifespan. They degrade over time, and at around 80% capacity they are considered to have reached end-of-life. Battery replacement is also the third-largest ownership cost. Therefore, effective battery health management is critical to ensuring that Nepal's transition to electric mobility delivers sustained economic and environmental benefits.

A Policy Architecture Coming Into Place

Nepal's electrification ambitions are now supported by a strong and layered policy framework. The Third Nationally Determined Contribution (NDC 3.0), submitted in May 2025, targets 90% of private and 70% of public passenger vehicle sales to be electric by 2030, increasing to 95% and 90% by 2035. These targets are more ambitious than earlier commitments and, for the first time, include mass transit. Plans include 50 km of electric bus or light rail in the Kathmandu Valley by 2030, expanding to 100 km by 2035, along with 200 km of electric railway nationally by 2030 and 300 km by 2035. Fiscal policy further reinforces this transition. The Finance Act 2025/26 maintains EV tax incentives, introduces a 1% customs duty on charging equipment, and provides a five-year tax exemption for charging-related industries. At the provincial level, Bagmati Province has mandated that all new taxi registrations be electric from 2024. At the national level, the current Rastriya Swatantra Party(RSP) government has prioritised energy through an "Energy Development Decade." Its targets include 30,000 MW of installed capacity, increased electricity consumption, expansion of charging infrastructure, and deployment of electric buses in major cities. Together, these policies create a coherent and reinforcing framework, making Nepal's transition to electric mobility more credible and sustained than ever before.

What Degrades a Battery, and How Quickly?

Understanding what causes batteries to degrade is the first step toward managing it effectively. Battery degradation occurs through two main processes: calendar ageing (time-based) and cycling ageing (use-based). Among the influencing factors, temperature is the most critical. Lithium-ion batteries operate best between 15°C and 30°C. Deviations from this range significantly accelerate degradation. High temperatures increase electrolyte breakdown and accelerate capacity loss.

Evidence shows that raising temperature from 25°C to 40°C leads to disproportionately higher degradation. In warm climates, calendar ageing alone accounts for 62–83% of total capacity loss. Notably, managing temperature during parking—not just operation—can extend battery life by up to 87%. Cold conditions pose different risks. They reduce conductivity and increase the likelihood of lithium plating, which causes permanent damage. Alongside temperature, state of charge (SOC) is a key controllable factor. Capacity loss increases sharply above 80% and below 20%, making this range optimal for battery operation. Although battery management systems limit usable capacity, user behaviour remains critical. Charging patterns and driving conditions further influence degradation. Frequent fast charging increases capacity loss compared to slower charging, while aggressive driving and steep gradients raise thermal and cycling stress. In high-altitude regions, reduced atmospheric pressure increases internal resistance and lowers the efficiency of regenerative braking. Although regenerative braking can extend urban driving range by 8–25%, this benefit is partly reduced in mountainous terrain.

Nepal's Geography Makes This Harder Than It Looks

While battery degradation mechanisms are universal, their impact in Nepal is shaped by significant geographic and climatic diversity. A techno-economic assessment estimates EV battery lifespan in Nepal at around eight years, well below the global average of 10–15 years. This gap reflects differences in grid quality, terrain, and charging behaviour. Importantly, these national average masks strong regional variation. In the Terai, temperatures often exceed 30°C, and vehicles are frequently parked under direct sunlight at high states of charge. These conditions accelerate calendar ageing, which is already the dominant source of capacity loss in warm climates. In contrast, conditions in the Kathmandu Valley are more favourable. Moderate temperatures are closer to the optimal range, and short travel distances (20–30 km) support slow overnight charging. This naturally helps maintain a stable state of charge and reduces stress on batteries. However, the situation changes in mountainous regions. Cold temperatures reduce charging efficiency and increase the risk of lithium plating. At the same time, steep gradients require sustained high power, leading to deeper discharge cycles and faster degradation. Higher altitude further reduces the efficiency of regenerative braking, limiting energy recovery. Overall, these regional differences highlight that a single battery management approach is not sufficient. Instead, strategies must be tailored to the specific thermal, topographical, and operational conditions across Nepal

Turning the Evidence Into Action

Translating this understanding into practice requires coordinated action across infrastructure, behaviour, and regulation. First, on infrastructure, expanding reliable slow-charging facilities at homes, workplaces, and transit depots is more suitable for Nepal's short urban trip patterns than a heavy reliance on fast charging. Fast-charging networks can reinforce range anxiety and encourage full-capacity charging, which accelerates degradation. Charging infrastructure has grown rapidly, reaching 1,511 stations by July 2025, up from fewer than 50 in 2020. However, coverage remains concentrated in urban areas, and rural gaps require systematic expansion. Second, on behaviour, user practices play a critical role. Many drivers routinely charge to 100%, often unaware of its long-term impact on battery health. Evidence from electric bus fleets shows that maintaining controlled state-of-charge levels can significantly extend battery life. Similar practices can be encouraged in Nepal through targeted user awareness and training. Finally, on regulation, battery end-of-life management is becoming increasingly urgent. Nepal is projected to generate 600–1,000 tonnes of battery waste by 2029/30. However, retired batteries still retain 70–80% of their capacity and can be reused for stationary storage, backup power, and rural electrification. Such reuse can reduce emissions by 25–56% and improve economic returns, with recycling facilities showing a potential payback period of around three years.

However, realizing this potential will require the development of standardized testing methods, safety protocols, and regulatory frameworks for battery reuse and recycling, which are currently lacking in Nepal.

The Foundation Is There; the Work Is Not Yet Done

Nepal's EV transition rests on a strong foundation. Short urban trip patterns, expanding hydropower capacity, and a layered policy framework—including NDC 3.0 targets, fiscal incentives, provincial mandates, and national energy goals—collectively support long-term electrification. The technical knowledge required for effective battery management is also well established. However, converting this foundation into lasting outcomes requires coordinated progress. Infrastructure investment, user behaviour, and regulatory systems must evolve together. Moreover, these efforts must reflect regional differences across the Terai, the Kathmandu Valley, and mountainous areas, which directly influence battery lifespan. At the same time, a broader structural concern remains. EV adoption in Nepal is concentrated in private vehicles, raising the risk of "green congestion," where emissions decline but traffic conditions remain unchanged. Therefore, public electric transport is essential. Mass transit commitments and electric bus deployment are not supplementary measures but central to achieving sustainable mobility. Ultimately, the success of Nepal's transition will depend on balancing private EV growth with strong investment in public transport, ensuring that the shift leads to genuine sustainability rather than cleaner congestion.

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Call for Contribution

This Newsletter is the initiative of 5th Executive Committee of SOTEN where we bring the summary of SOTEN activities together with major national affairs on transport sector. Being the first issue, the newsletter may have some rooms for improvement, and we will keep enhancing the quality of newsletter in future. We planned to publish newsletter quarterly. In this regard, we would like to request all SOTEN members to share any of your individual or organizational achievement or blogs/articles. There is also a dedicated space on SOTEN website for our member's blogs/articles. Promoting research and publication is one of the major goals of SOTEN and we are moving on that track through these kinds of initiatives.
Feel free to provide us feedback.

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