## Unlocking the Potential of EV Insurance in Indonesia: Actuarial Solutions and Data-Driven Insights

## Introduction

The electric vehicle (EV) market is rapidly growing, presenting both opportunities and challenges for the insurance industry. This document provides a conceptual and analytical examination of the impact of EV adoption on an insurance company's operations. It includes key risk factors, solutions to enhance profitability, and recommended actions supported by quantitative calculations.

## Story about market in Indonesia

Start with a real-world scenario: a family considering their first EV purchase in Jakarta but unsure about insurance coverage.

* **Key Points**:
  + Rapid EV adoption due to government incentives and climate goals (e.g., 13M electric two-wheelers (E2Ws) and 2M electric four-wheelers (E4Ws) targeted by 2030).
  + Challenges for insurers: higher repair costs, battery-specific risks, and data gaps.
  + Call to action: How actuarial science can provide the solutions.

## EV Market Dynamics in Indonesia

#### ****Insight from Market Research****:

* **Adoption Status**:
  + E2Ws dominate due to lower costs (projected 40% price drop with subsidies).
  + E4Ws face affordability challenges (e.g., only 0.1% of consumers can afford mid-class EVs).
* **Infrastructure and Ecosystem**:
  + Growth of SPKLU (charging stations): Tripled in 2022 but unevenly distributed (88% in Java and Bali).
  + Battery standardization and availability as key enablers.

## Unique Risks in EV Insurance

Electric vehicles introduce distinct risks compared to internal combustion engine (ICE) vehicles. These risks include higher repair costs, battery replacement costs, uncertain claim patterns, and cybersecurity vulnerabilities. For instance, EV battery replacements can cost between $5,000 and $20,000, and EV repair costs are approximately 30% higher than ICE vehicles.

### Key Risks and Impacts

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| --- | --- | --- |
| Risk Type | Description | Impact on Operations |
| Battery Replacement | High cost of replacing EV batteries. | Increases claim severity. |
| Repair Costs | Specialized components require expensive repairs. | Drives up premiums. |
| Cybersecurity | Risks from connected and autonomous features. | Potential liability claims. |
| Data Gaps | Limited historical data for EV claim trends. | Uncertainty in pricing models. |

## 2. Premium Modeling for EV Insurance

Premium modeling for EV insurance requires a blend of traditional actuarial techniques and advanced analytics. The following methodology ensures accuracy and profitability:

- \*\*Claim Frequency and Severity Analysis\*\*: Use statistical models like Poisson regression for frequency and gamma distribution for severity.  
- \*\*Incorporating Telematics Data\*\*: Utilize real-time driving behavior data to refine risk assessments.  
- \*\*Dynamic Pricing\*\*: Adjust premiums based on telematics scores, vehicle type, and regional factors.

## 3. Reinsurance Strategies for EV Risks

Reinsurance is essential for managing EV risks. Recommended strategies include:  
- \*\*Excess of Loss Reinsurance\*\*: Covers high-severity claims, such as battery replacements.  
- \*\*Quota Share Reinsurance\*\*: Shares a proportion of premiums and risks with reinsurers.  
- \*\*Parametric Reinsurance\*\*: Quick payouts based on predefined triggers, such as large-scale recalls.

## 4. Recommended Actions

To enhance operational resilience and profitability, insurance companies should:  
1. Collaborate with reinsurers to develop tailored solutions for EV-specific risks.  
2. Invest in data infrastructure to collect and analyze EV-related data, including telematics and repair costs.  
3. Design customer-centric products, such as usage-based insurance and discounts for eco-friendly behaviors.

## Conclusion

The transition to electric vehicles is reshaping the insurance landscape. By adopting innovative risk management strategies, leveraging data analytics, and collaborating with reinsurers, insurers can not only mitigate emerging risks but also capitalize on the opportunities presented by the EV market.