Valuation of Used Electric Vehicles: Trustworthy Range and Remaining Useful Life Assessment

2026 Transportation Engineering, Economics, and Policy Workshop

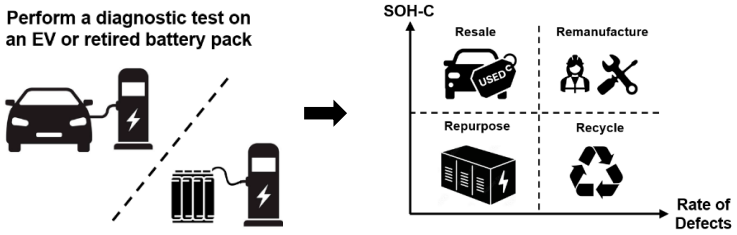
Presenter: Apoorva Roy
Advisor: Dr. Anna Stefanopoulou

ALFRED P. SLOAN FOUNDATION

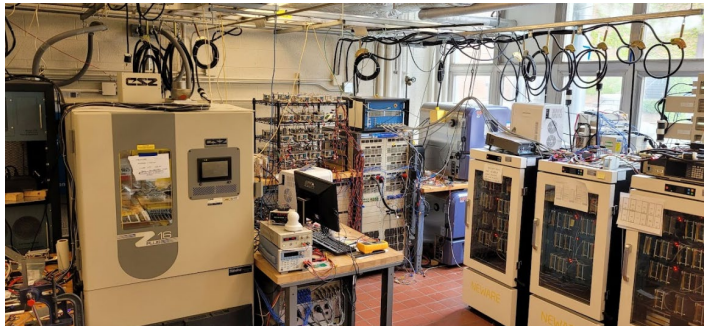
Background

About Me

Education: PhD candidate, Mechanical Engineering (2023-2026)
Thesis: Diagnostics and prognostics for second-life batteries
Experience: Battery modeling intern, Nissan Energy (Oct 2024-Apr 2025)
Fellowships: Sloan Interdisciplinary Transportation Fellowship (2025)
UM Institute of Energy Solutions Fellow (2026)



Battery Control Group
University of Michigan, Ann Arbor



Advisor

Dr. Anna Stefanopoulou
Huei Peng Distinguished University Professor of Mechanical Engineering
University of Michigan, Ann Arbor

Sloan Fellowship – External Advisory Board

Dr. Matthew Brusstar
Deputy Director, Testing and Advanced Technology Division
EPA NVFEL

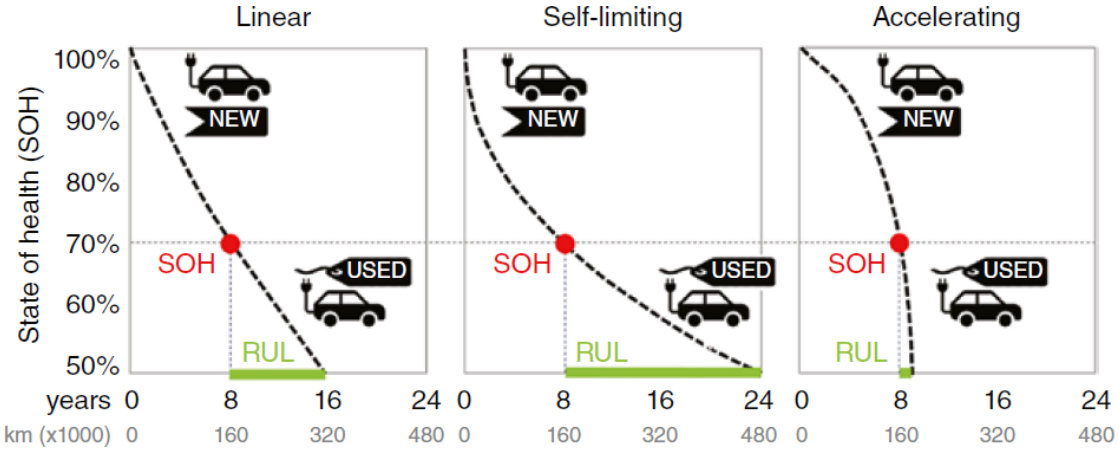
Dr. Terry Alger
Vice President of Innovation and Applied R&D
UL Solutions

RUL Assessment Landscape

Policy Mandates – Applicable 2026 Model Year onwards

Category	CARB ACC II	GTR No. 22
Durability	80% of certified range retention at 10y/150k miles	80% of certified energy retention at 8y/100k miles
SOH Monitor	8y/100k miles at 70% or 75% state of health	None
Compliance	In-use verification to ensure $SOH_{dashboard}$ accuracy is within 5%	None

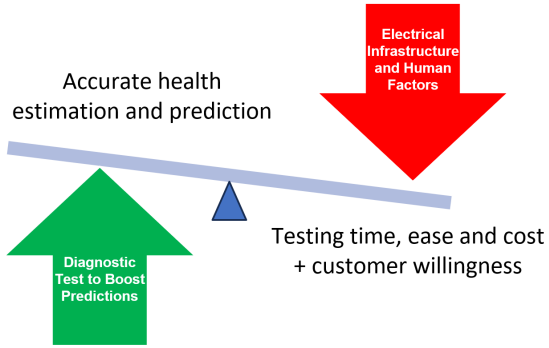
State of Health (SOH) ≠ Remaining Useful Life (RUL)



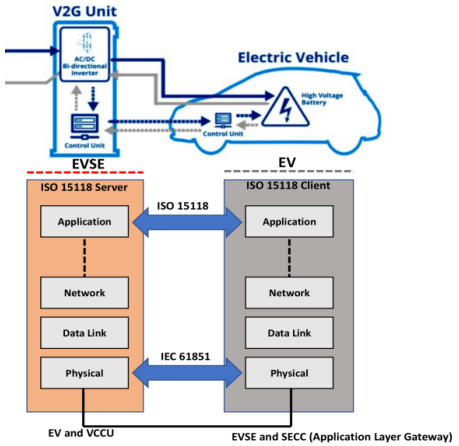
Source: Weng et al., "Battery passports for promoting electric vehicle resale and repurposing", Joule, 2023.

Engineering Solution

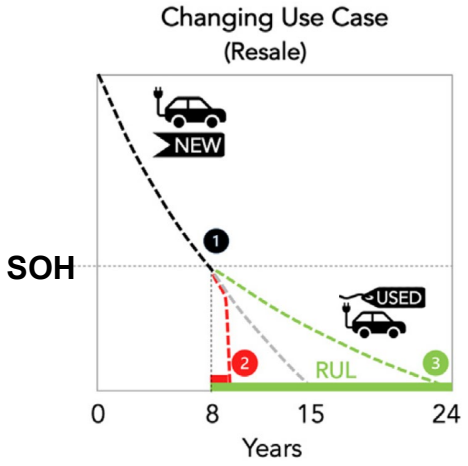
Rapid, scalable, transparent and accurate diagnostics



Optimizing tradeoffs



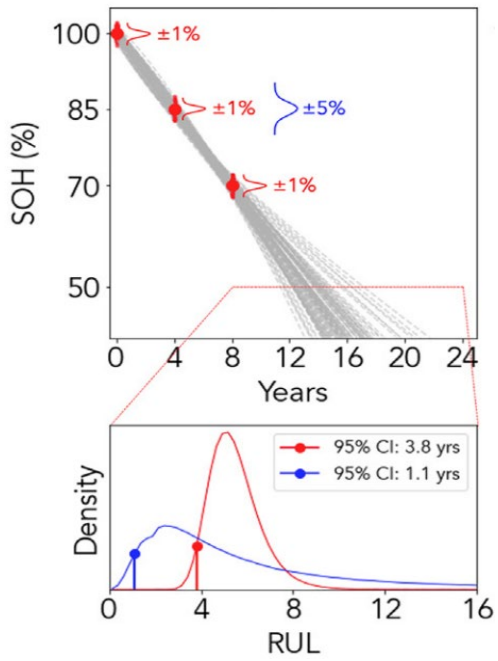
Inaccurate RUL assessment = Range anxiety



Source: Weng et al., "Battery passports for promoting electric vehicle resale and repurposing", Joule, 2023.

- The second user's operating conditions could be significantly different from the first
- Consumers prefer used vehicles over new - except for EVs! Used EVs are affordable but durability concerns hurt adoption rates, especially in rural areas.

Supplemental



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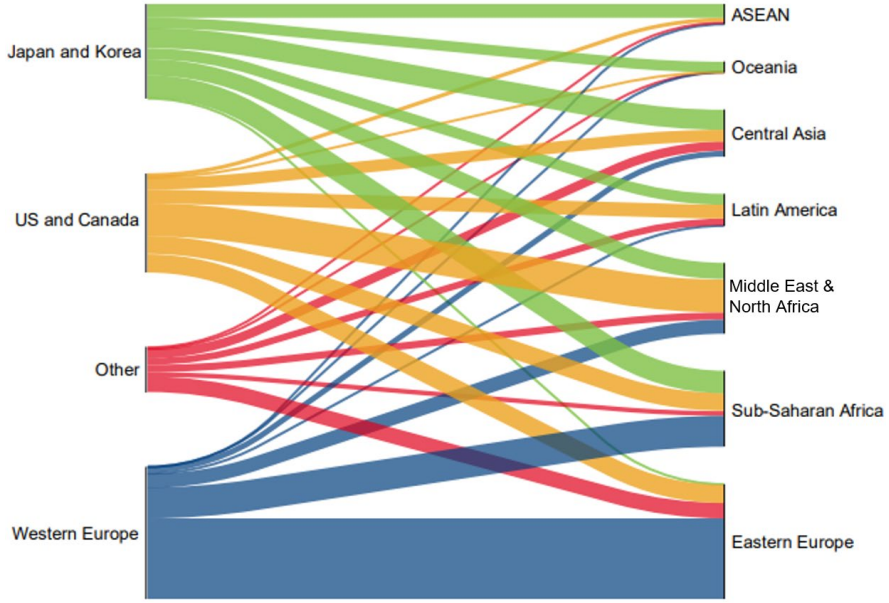
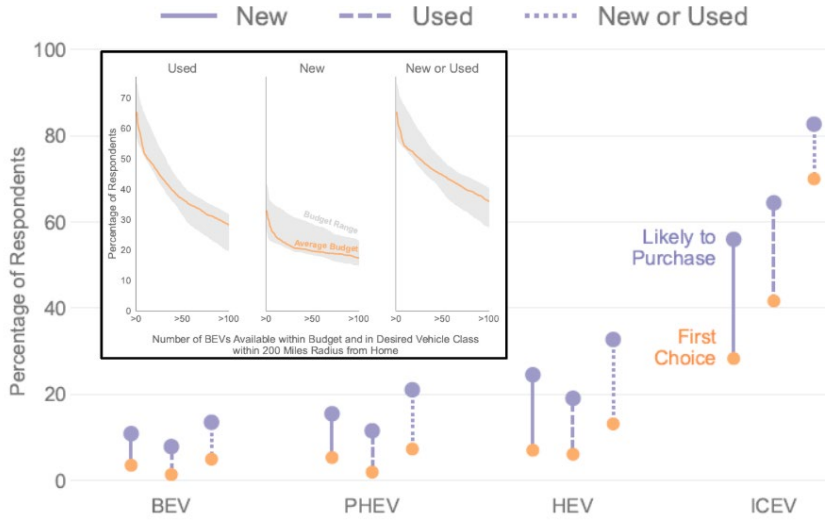


Source: Trade data from international statistics or national statistics offices compiled by ITF. Full details of the data sources used are shown in the methodology section.

Source: NEW BUT USED: THE ELECTRIC VEHICLE TRANSITION AND THE GLOBAL SECOND-HAND CAR TRADE © OECD/ITF 2023



Source: Tomkins et al., "Quantifying real and perceived barriers to EV adoption in rural Michigan", Scientific Reports, 2025.