



Used EV Battery Management Updates : Philippines

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EV Adoption Trends

Thailand – Increasing BEV Share



Philippines – Increasing eTrike, LEV and eJeeps

YEAR	E-MOTORCYCLE	E-TRIKE	CAR	SUV	UTILITY VEHICLE	TRUCK	BUS	TOTAL
2010	639	162	5	-	21	1	-	828
2011	309	82	2	-	33	-	-	426
2012	220	62	-	-	7	-	-	289
2013	421	85	3	-	9	2	-	520
2014	244	132	9	1	26	1	1	414
2015	380	162	7	-	28	1	2	580
2016	274	693	9	-	14	1	-	991
2017	498	1,404	66	12	89	1	-	2,070
2018	508	3,629	43	13	66	3	-	4,262
2019	767	372	116	12	302	1	-	1,570
2020	585	317	16	5	84	1	7	1,015
2021	675	120	35	-	136	-	-	969
2010-2021	5,520	7,220	311	43	815	12	10	13,934

Singapore – Higher end eCars , Commercial and eBuses

Fuel Type	Cars	Taxis	Motorbikes	Goods & Other vehicles	Buses	Fuel Type Total
Petrol	567,971	23	139,904	5,197	14	713,109
Diesel	18,050	7,839	-	134,299	19,096	179,284
Fuel-Electric Hybrid	37,807	8,282	-	8	50	46,147
Plug-In Hybrid	501	-	-	-	-	501
Full Electric	1,151	133	2	90	34	1,410
Others	231	-	-	3	-	234
Vehicle Type Total	625,711	16,277	139,906	139,597	19,194	940,685

EV Adoption Targets

Thailand (PC and Pick-up only)

ZEV USAGE TARGETS (BEV & FCEV).			
2022	2025	2030	2035
30,000 UNITS = 4% ACCUMULATIVE 52,000 UNITS	225,000 UNITS = 30% ACCUMULATIVE 402,000 UNITS	440,000 UNITS = 50% ACCUMULATIVE 2,050,000 UNITS	1,154,000 UNITS = 100% ACCUMULATIVE 6,400,000 UNITS

ZEV PRODUCTION TARGETS (BEV & FCEV).			
2022	2025	2030	2035
30,000 UNITS = 2% ACCUMULATIVE 50,000 UNITS	225,000 UNITS = 10% ACCUMULATIVE 400,000 UNITS	725,000 UNITS = 30% ACCUMULATIVE 2,935,000 UNITS	1,350,000 UNITS = 50% ACCUMULATIVE 8,265,000 UNITS

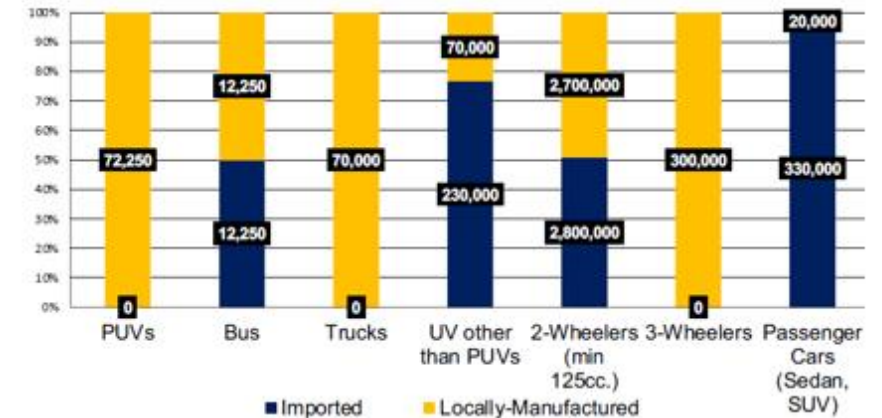
Singapore

Complete phase-out of ICE vehicles by 2040 -> 100% EV sales by 2031

Philippines

Projected EV Stock by 2030

Vehicle Segment	Projected EV Stock	Share (%)
Public Utility Jeepneys	72,250	1.09%
Bus	24,500	0.37%
Trucks	70,000	1.06%
Other Utility Vehicles	300,000	4.53%
2-Wheelers	5,500,000	83.12%
3-Wheelers	300,000	4.53%
Passenger Cars	350,000	5.29%
Total	6,616,750	



CREVI Component	Sub-Components	EV Market			Charging Infrastructure				Industry Development			
		Cost and Financing	Technical Support	Technology Inertia	Public Charging Infrastructure	Battery Swapping and Leasing	Power Supply Related	Used Battery Management	EV Parts/Module Production	Battery Cell Production	Vehicle Assembly	Impact to the ICE Industry
EV Demand Generation	Introduce mechanisms that enable price competitiveness of EVs											
	Introduce financing support programs that enable lower investments for EVs											
	Introduce funding support programs that enable price competitiveness of EVs											
	Establish mechanisms to facilitate EV adoption in the government sector											
	Mandate adoption of Electric Vehicles in Corporate, Logistics and Tourism											
	Mandate Adoption of electric Vehicles in Public Transport											
	Establish the necessary regulations and standards to ensure safety and quality of											
	Provide quality technical support and maintenance services											
EV Charging Infrastructure	Introduce non-fiscal incentives to complement the financing and mandated adoption program											
	Facilitate permitting, installation and safe operations of charging points and swapping											
	Clarify charging standards and protocols											
	Manage the business risk and investment											
	Introduce regulations to enhance convenient access to EV charging services											
	Facilitate the development of charging infrastructure plans at the local level											
	Facilitate use of green energy in EV charging											
Industry Development	Minimize grid impact of EV charging and provision of sufficient grid capacity											
	Facilitate demand generation for electric											
	Provided innovative incentives to provide fighting chance to local industry players											
	Implement a strategic adoption of EV and EVCS standards into regulations and facilitate compliance of locally developed and manufactured vehicles and products											
Capability Building Program	Ensure technology competitiveness of the local EV industry											
	Capacitate government institutions concerned to implement the CREVI											
	Develop capacity to deliver efficient and safe technical support services											
	Capacitate emergency response industry to safely deal with EV cases											
	Develop capacity to support the Charging Infrastructure development and operations											
	Develop capacity to ensure efficient operation of electric vehicle fleets											
	Upgrade human resource capacity on vehicle development and manufacturing											
Research and Development	Introduce just transition interventions											
	Source alternative sources of funds for the roll-out of capacity building programs											
	Enhance mechanisms to access R and D support to the EV industry											
	Ensure compliance of locally developed and manufactured EVs to applicable technical regulations and promote international competitiveness											
	Support the local technology capacity to expand local EV related product lines											
Research and Development	Promote the development and adoption of common EV platforms											
	EV and energy storage system (ESS) battery industry development											
	Smart grid and EVCS network development											

Market Development

- **Demonstrate**
- **Mandate**
- **Reduce Cost**
- **Finance**
- **Incentivize**
- **Improve**

Industry Development

- **Create demand**
- **Financial competitive advantage**
- **Standards and Technical Regulations**
- **Quality and Cost**

Research and Development

- **Industry focused mechanisms**
- **Technical compliance and certification**
- **Expand local product portfolio**
- **Common EV Platform**
- **Charging and Grid**

Charging Infrastructure Development

- **Establish and Streamline Policy**
- **Standards and Technical Regulations**
- **Plan and implement**
- **Green energy**
- **Reduce peak**

Capability Building

- **CREVI implementation**
- **Design, Manufacturing, Operations, Servicing and Charging**
- **Just transition**

Annual Adoption Share (Draft)



	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Household																		
Cars	0.01%	0.02%	0.03%	0.25%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%	13.00%	14.00%	15.00%
UV	0.01%	0.02%	0.03%	0.25%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%	13.00%	14.00%	15.00%
SUV	0.01%	0.02%	0.03%	0.25%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%	13.00%	14.00%	15.00%
MC	0.01%	0.02%	0.03%	0.25%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%	13.00%	14.00%	15.00%
TC	0.01%	0.02%	0.03%	0.25%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%	13.00%	14.00%	15.00%
Corporate, Logistics and Tourism																		
Cars	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
UV	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
SUV	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MC	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TC	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Bus				1.00%	1.00%	1.00%	1.00%	1.00%	25.00%	25.00%	25.00%	25.00%	25.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Trucks				0.50%	0.50%	0.50%	0.50%	0.50%	12.50%	12.50%	12.50%	12.50%	12.50%	25.00%	25.00%	25.00%	25.00%	25.00%
Public Transport																		
Cars	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
UV	0.03%	0.05%	0.08%	1.00%	2.50%	5.00%	10.00%	20.00%	30.00%	40.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Jeepneys	1.00%	2.00%	5.00%	10.00%	15.00%	20.00%	25.00%	40.00%	50.00%	50.00%	50.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MC	0.03%	0.05%	0.08%	0.75%	1.50%	3.00%	5.00%	10.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TC	1.00%	2.50%	5.00%	5.00%	10.00%	10.00%	20.00%	20.00%	20.00%	30.00%	40.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Bus	0.10%	0.10%	0.10%	5.00%	5.00%	5.00%	5.00%	5.00%	50.00%	50.00%	50.00%	50.00%	50.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MiniBus																		
Government																		
Cars	5.00%	10.00%	25.00%	40.00%	55.00%	70.00%	85.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
UV	5.00%	10.00%	25.00%	40.00%	55.00%	70.00%	85.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
SUV	5.00%	10.00%	25.00%	40.00%	55.00%	70.00%	85.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MC	5.00%	10.00%	25.00%	40.00%	55.00%	70.00%	85.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TC	5.00%	10.00%	25.00%	40.00%	55.00%	70.00%	85.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Bus	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	25.00%	25.00%	25.00%	25.00%	25.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Trucks	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	2.00%	2.00%	2.00%	2.00%	5.00%	5.00%	5.00%	5.00%	5.00%

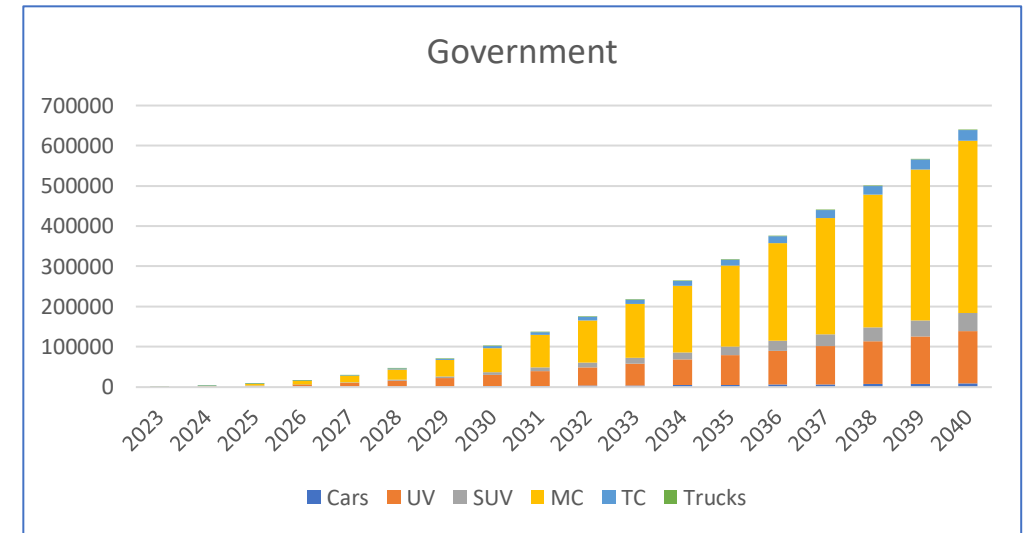
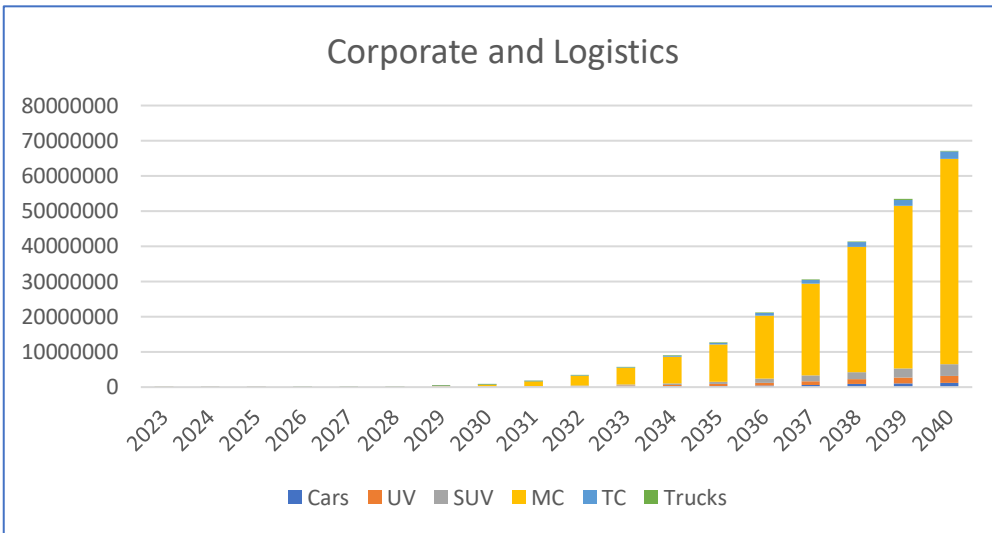
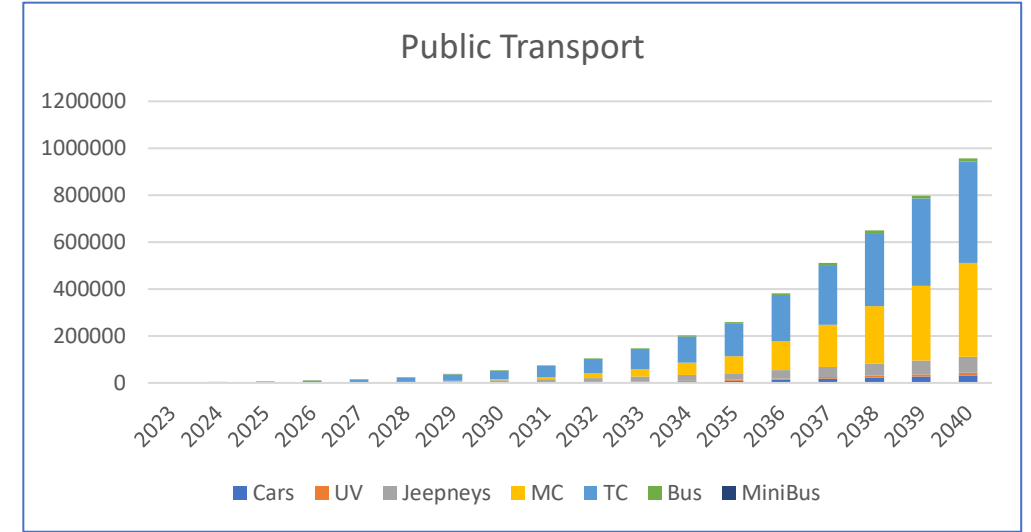
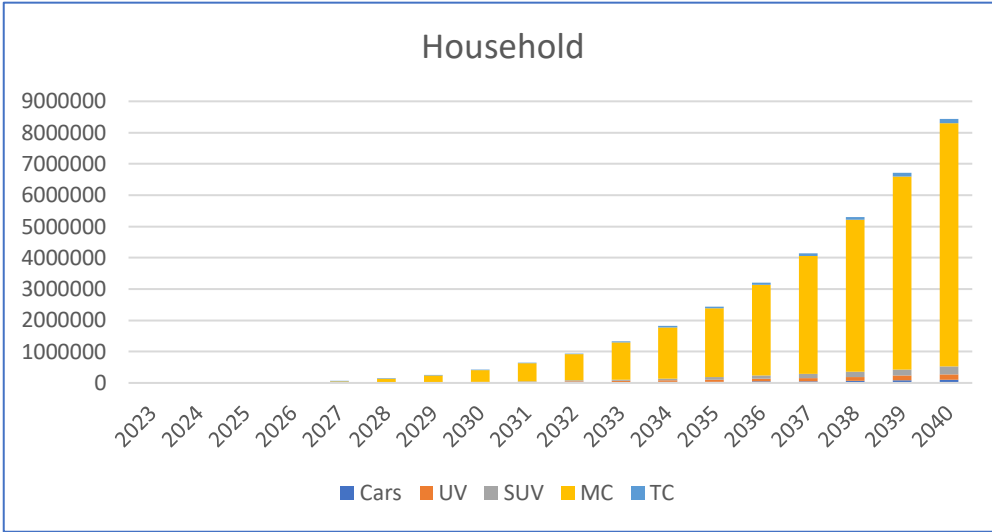
Projected Vehicle Stock Share (Draft)



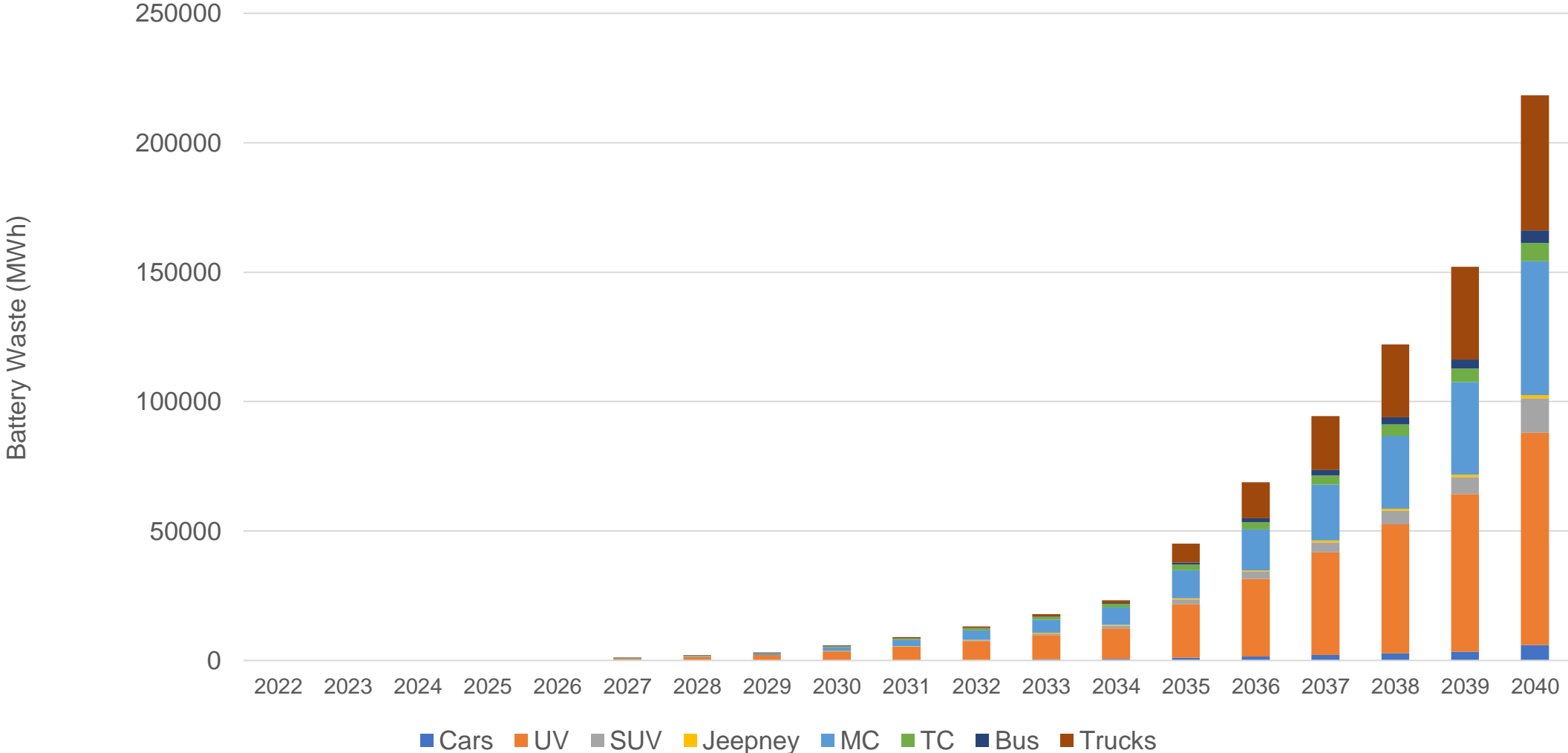
EV Fleet size

Household	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Cars	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%	0.7%	1.0%	1.5%	1.9%	2.4%	3.0%	3.6%	4.3%	5.0%	5.8%	6.6%	7.4%	
UV	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%	0.7%	1.1%	1.5%	2.0%	2.5%	3.1%	3.8%	4.5%	5.2%	6.0%	6.8%	7.7%	
SUV	0.0%	0.0%	0.0%	0.0%	0.3%	0.6%	1.1%	1.6%	2.2%	2.8%	3.5%	4.3%	5.1%	6.0%	6.9%	7.8%	8.8%	9.8%	
MC	0.0%	0.0%	0.0%	0.0%	0.4%	0.8%	1.4%	2.0%	2.7%	3.5%	4.4%	5.3%	6.3%	7.3%	8.4%	9.4%	10.6%	11.7%	
TC	0.0%	0.0%	0.0%	0.0%	0.3%	0.7%	1.1%	1.7%	2.4%	3.1%	4.0%	4.9%	5.9%	7.0%	8.1%	9.3%	10.5%	11.8%	
Corporate, Logistics and Tourism																			
Cars	0.0%	0.0%	0.0%	0.1%	0.2%	0.4%	0.8%	1.5%	3.0%	5.1%	8.0%	11.4%	14.7%	21.7%	28.4%	34.7%	40.8%	46.5%	
UV	0.0%	0.0%	0.0%	0.1%	0.2%	0.4%	0.8%	1.5%	3.0%	5.2%	8.1%	11.7%	15.1%	22.3%	29.1%	35.7%	42.0%	48.0%	
SUV	0.0%	0.0%	0.0%	0.1%	0.3%	0.6%	1.2%	2.3%	4.6%	7.9%	12.0%	17.1%	21.6%	31.9%	41.2%	49.5%	57.1%	63.8%	
MC	0.0%	0.0%	0.0%	0.1%	0.4%	0.8%	1.5%	2.9%	5.8%	10.0%	15.2%	21.4%	26.9%	39.8%	51.1%	61.1%	69.9%	77.6%	
TC	0.0%	0.0%	0.0%	0.1%	0.3%	0.7%	1.3%	2.5%	4.9%	8.5%	13.1%	18.8%	24.1%	35.5%	46.3%	56.4%	65.9%	74.8%	
Bus	0.0%	0.0%	0.0%	0.1%	0.2%	0.3%	0.4%	0.5%	3.5%	6.3%	9.0%	11.5%	13.8%	19.1%	24.0%	28.6%	33.0%	37.1%	
Trucks	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.2%	1.4%	2.5%	3.5%	4.5%	5.4%	7.5%	9.4%	11.3%	13.0%	14.7%	
Public Transport																			
Cars	0.0%	0.0%	0.0%	0.1%	0.2%	0.4%	0.8%	1.6%	3.2%	5.6%	8.8%	12.7%	16.6%	24.5%	32.2%	39.9%	47.4%	54.8%	
UV	0.0%	0.0%	0.0%	0.1%	0.2%	0.4%	0.9%	2.0%	3.5%	5.5%	7.4%	9.9%	12.3%	17.2%	22.1%	26.9%	31.6%	36.3%	
Jeepneys	0.0%	0.1%	0.4%	0.8%	1.5%	2.4%	3.5%	5.4%	7.6%	9.9%	12.2%	14.4%	16.7%	21.2%	25.8%	30.3%	34.8%	39.4%	
MC	0.0%	0.0%	0.0%	0.1%	0.4%	0.8%	1.5%	2.9%	5.8%	10.0%	15.2%	21.4%	26.9%	39.8%	51.1%	61.1%	69.9%	77.6%	
TC	0.0%	0.2%	0.4%	0.6%	1.1%	1.6%	2.5%	3.4%	4.3%	5.7%	7.5%	9.8%	12.1%	16.7%	21.2%	25.7%	30.1%	34.5%	
Bus	0.0%	0.0%	0.0%	0.4%	0.8%	1.2%	1.6%	2.0%	6.0%	9.9%	13.8%	17.7%	21.4%	29.2%	36.8%	44.4%	51.8%	59.1%	
MiniBus																			
Government																			
Cars	0.4%	1.1%	3.0%	5.9%	9.9%	14.8%	20.7%	27.4%	33.8%	39.8%	45.6%	51.2%	56.4%	61.4%	66.2%	70.8%	75.1%	79.2%	
UV	0.4%	1.2%	3.1%	6.1%	10.1%	15.1%	21.1%	28.0%	34.6%	41.0%	47.0%	52.8%	58.3%	63.6%	68.7%	73.6%	78.2%	82.7%	
SUV	0.6%	1.8%	4.7%	9.2%	15.2%	22.4%	30.7%	40.1%	48.6%	56.2%	63.1%	69.2%	74.8%	79.8%	84.4%	88.4%	92.1%	95.4%	
MC	0.8%	2.3%	6.1%	11.8%	19.2%	28.2%	38.5%	50.0%	60.1%	69.0%	76.8%	83.7%	89.7%	95.0%	99.7%	100.0%	100.0%	100.0%	
TC	0.5%	1.3%	3.6%	7.0%	11.6%	17.3%	24.1%	31.8%	39.0%	45.8%	52.2%	58.2%	63.9%	69.2%	74.2%	78.9%	83.3%	87.4%	
Bus	0.1%	0.2%	0.3%	0.4%	0.4%	0.6%	0.7%	0.8%	3.7%	6.5%	9.2%	11.6%	14.0%	19.2%	24.2%	28.8%	33.2%	37.3%	
Trucks	0.0%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.4%	0.6%	0.7%	0.8%	0.9%	1.0%	

Projected Vehicle Stock (Draft)



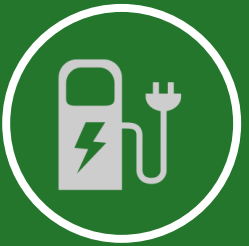
Battery Waste Volume Projections



Related CREVI Lines of Actions

	Lines of Action	Expected Output
Capacity Building	Perform a competitive selection process for at least two industry research and demonstration contracts on the development of lithium battery materials recovery and recycling technology.	<ul style="list-style-type: none"> · Lithium battery recycling technology ready for adoption by the government and/or private investors.
	Perform a competitive selection process for at least two industry research contracts on the design of renewable auxiliary power storage system and corresponding technical requirements/parameters for the repacked used battery cells.	<ul style="list-style-type: none"> · Technical requirements/guidelines to promote interoperability of used battery packs for auxiliary battery storage in smart grid systems.
Policy Development	Introduce extended responsibility policies for EV battery suppliers and leasing service providers geared towards reusing spent batteries for auxiliary power storage for RE microgrids. Compliance shall become one of the eligibility requirements for green investment loans.	<ul style="list-style-type: none"> · Better managed EV battery waste. · Renewable energy growth supported.
	Introduce strategic technical standards and parameters for electric Jeepney and Tricycle batteries as an eligibility requirement for the green investment programs.	<ul style="list-style-type: none"> · Accelerate the adoption of fast charging batteries in electric jeepneys and tricycles which in turn enhances the attractiveness and convenient and cheaper operation of the vehicles.
Incentives	Incentivize or introduce necessary policies to encourage use of repacked used EV batteries in microgrid installations in the country.	<ul style="list-style-type: none"> · Better managed EV battery waste. · Renewable energy growth supported.

- ***CREVI is currently being finalized***
- ***EV Adoption is expected to accelerate starting 2025 when the support programs are put in place***
- ***Management of battery would eventually have to be dealt with***
- ***CREVI strategy anchored on reusage in RE industry and recycling***
- ***CREVI strategy consist of capacity building, policy and standards and incentives to facilitate reusage and recycling***
- ***Technology cooperation will be needed***



[Thank You]