



## Retrofitting Gasoline Motorcycles to Electric with the Deployment of Rapid Charging Infrastructure

Graphion Energy Solutions is committed to **enhancing connectivity** across the ASEAN region through our rapid electric motorcycle charging infrastructure. With collaboration with the Ministry of Energy and Mines, we aim to standardize and harmonize rapid DC charging stations throughout ASEAN nations with goal of reaching 30% EV by 2030.

### **Graphion's Mission:**

1. Present affordable retrofit options for ASEAN nations to achieve a higher percentage of electric vehicles, particularly focusing on two-wheel motorcycles.
2. Continue Expanding Rapid charger infrastructure through out the region.
3. Implement local training programs for retrofitting initiatives.
4. Implementation of Carbon Credit program for retrofitted electric motorcycles.

Our goal is to transition transportation systems from gasoline to electric, especially in countries like Laos, which has abundant renewable hydropower resources but continues to import gasoline for its primary mode of transport; ~2 million gasoline motorcycles. Overall, there are ~250 million gasoline motorcycles across the 10 ASEAN countries.

Currently, many Asean nations heavily depend on imported gasoline, which sells around \$1 per liter, with governments subsidizing approximately \$0.35-\$0.45 per liter, which can be multi-Billion USD per year. This dependency creates significant financial burdens and environmental challenges. By retrofitting old gasoline motorcycles to electric, we can reduce reliance on imports, lower transportation costs, and provide a sustainable, renewable solution.

### **-Other Environmental and health Impact of Gasoline Motorcycles:**

Gasoline motorcycles emit 4X more hydrocarbons(HC), 32X more nitrogen oxides (NO<sub>x</sub>), and much as 80X more carbon monoxide(CO) compared to gasoline cars.

## Energy cost comparison between Gasoline motorcycles and Electric Motorcycles

**Assumptions:**

Gasoline efficiency: 40km/liter

Gasoline cost: \$1.00/liter

Energy Consumption: 30 watt-hr/km

Electric cost: \$0.023 per kWh (Lao PDR, 500Kips per KWh)

For 10,000Km per Year	Gasoline 100cc	Electric 2,000watt
10 Year Gasoline Cost (2,500 Liters)	\$2,500	
10 Year Energy Cost (3,000Kw/hr)		\$70
10 Year Government Subsidy (\$0.35/L)	~\$1,000	0
Amount of CO2 Generated	6,000kg	0
HC, NO, CO are generated excessively	Yes	None
10 Year Total Energy Cost *Oil Change or Engine Maintenance cost is Excluded	\$3,500	\$70

## Retrofit cost

\*approx. factory cost

Retrofit Parts	Cost and Labor	Chargers	Cost
2-3Kw BLDC Motor	\$100	10 Minute Charger	\$1,000
Motor Controller	\$50	20 Minute Charger	\$300
Mechanical Parts	\$50	1Hr Home Charger	\$100
Wiring	\$30	3Hr Home Charger	\$50
Misc Parts	\$20		
Labor	2-4 hrs		
<b>Sub Total(without the Battery)</b>	<b>\$250+Labot+Profit</b>	<b>Other Options</b>	
Battery Option 1 (LIC)	+\$700	LED Head Light	
Battery Option 2 (NCM)	+\$500	Bluetooth Speakers	
Battery Option 3 (LFP)	+\$380	220AC Inverter	
Battery Option 4 (Na+)	+\$300		

## Comparison between Gasoline vs New Electric vs Retrofitted Electric Motorcycles

	Gasoline(100cc)	New Electric	Retrofitted Electric(2Kw)
Cost	\$600-\$1,500	\$2,000	~\$350
Battery Rental Cost	No	No/Yes(Swap)	\$6~8 per Month
Maintenance cost	High	Low	Low
Serviceable	Yes	No	Yes
Fuel Cost	High	Very Low	Very Low
Clean Energy	No	Yes	Yes
Noisy	Very High	No	No
Pollution	Very High	No	No
Gas/Charge Station	Yes	No	Yes
Charge Time	n/a	3-8 Hrs	10Min~1Hr
Home Charging	n/a	3-8 Hrs	1Hr
Renewable	No	No	Yes
Carbon Credit	No	No	Yes