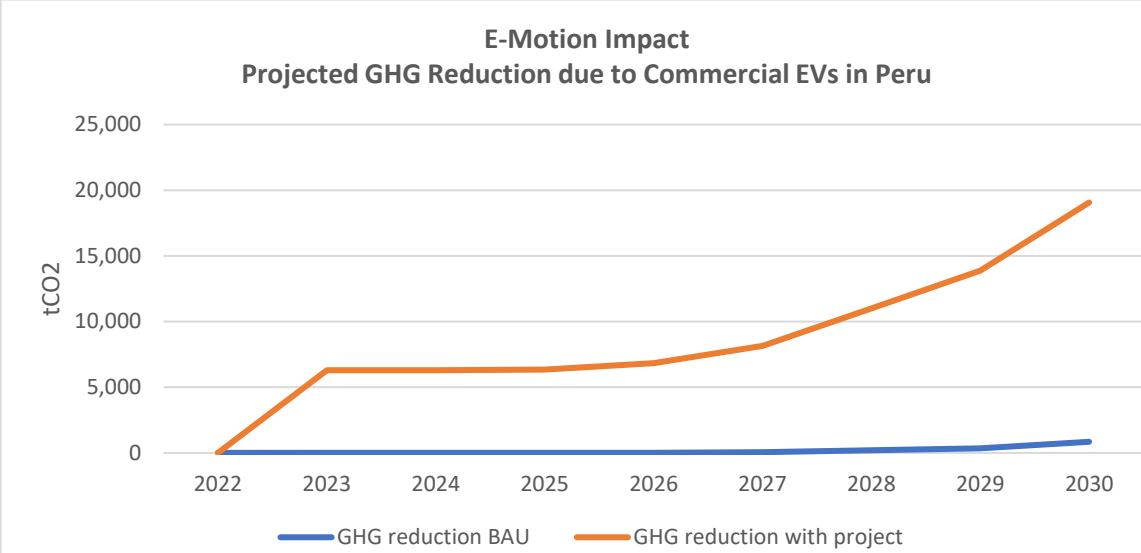
grütter consulting

E-Motion Summary Peru



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Overview

1. Peru has an area of 1,285,215 km^2 and 32.5 million inhabitants. Lima, Arequipa and Callao are the only cities with more than 1 million inhabitants. In 2019, the GDP per capita was 7,000 USD. PM_{10} measurements in Lima show that the maximum value of 50 $\mu g/m^3$ is surpassed at most stations in most months. The same holds true for $PM_{2.5}$.

Climate and Energy Policies

2. Peru's Greenhouse Gas (GHG) emissions for 2017 are estimated at 157 $MtCO_{2e}$. The Nationally Determined Contribution (NDC) includes 62 measures to reduce emissions by 20% with respect to the business-as-usual scenario, and a further 10% depending on international collaboration. This shall limit GHG emissions to a maximum of 209 million tons in 2030, and in case of international support, the limit is fixed at 179 million tons (NDC, 2020). The NDC proposes the entry of 6,707 electric buses and 171,359 electric light-duty vehicles by 2030.

3. In 2019 the share of renewables in total electricity generated was 60%. Based on MINEM Peru has a very large not yet exploited renewable energy potential basically for wind (>22,000 MW exploitable), geothermal (3,000 MW potential) and solar PV. The carbon grid factor of Peru is 0.223 $kgCO_2/kWh$.

Transport Sector

4. 2019 around 6.7 million vehicles were operating in Peru. Road transport GHG emissions of Peru in 2018 are estimated at 28 million tCO_{2e}[1]. Commercial vehicles including taxis, buses and LCVs are responsible for around 60% of emissions. GHG emission from the transport sector are expected to grow under a BAU scenario by around 32% reaching 38 million tCO_2 by 2030.

Barriers and Enabling Factors

5. Enabling Factors and Barriers to Commercial EVs in Peru

Enabling factors	• Lithium extraction potential: Peru has one of the 10 largest lithium-in-stone reserves in the world. • Manufacturers' interest in the market: Several pilot projects of companies such as Enel x, QEV Tech, Engie and BYD have been realized. • Peru is structuring an electric mobility strategy
Barriers	• Atomised transport sector which hinders capital investment. • Abundant and very low priced natural gas for vehicle usage. • High initial capital cost of EV

Market Analysis

6. The investment in **Battery Electric Buses (BEBs)** with the current financial conditions and business models is not profitable, a considerable risk, and requires a significant increase in owners capital. The main problem for BEBs in Peru is the very low CNG prices combined with relatively high electricity prices resulting in CNG buses having a lower energy cost than BEBs. Concessional loan conditions and even a 20% upfront grant are not sufficient to turn the FIRR positive. With current energy pricing policies BEBs in areas with CNG provision do not make commercial sense in Peru. This statement remains valid even with future decreasing costs of BEBs.

[1] Tank-to-wheel approach; well-to-wheel approach including Black Carbon: 38 $MtCO_{2e}$

7. Similar to e-buses the investment in **e-taxis** as well as of **e-LCVs** with current financial conditions and energy prices is not profitable, even with significant external support and even with decreasing EV prices.

8. In various areas CNG is neither currently nor in the medium term (next decade) available due to lack of a pipeline. This includes as large cities Arequipa and Cuzco. In these cities the relevant reference bus is a diesel unit and not a CNG unit. Arequipa as well as Cuzco also have interest in promoting BEBs due to significant air pollution caused by diesel units. This situation is aggravated with the high altitude of these cities resulting in reduced engine power and increasing fuel consumption and emissions.

9. BEBs are more viable in Peru in areas with diesel buses i.e. where natural gas is not used. Together with concessional finance it is profitable to implement an initial lot of BEBs. Due to risk reduction measures medium-term commercial uptake of BEBs is feasible in this area. Thus the Program can have a decisive impact on accelerating climate friendly technologies in these areas. Compared with the BAU scenario this results by 2030 in 290,000 tCO_2 avoided as well as reduced air pollutants.

Investment Projects

10. Proposed Investment Project

Project	Delivery model	Expected year	CAPEX
76 12m BEBs in Arequipa	Private operator with concession from the city	2023	29 MUSD

Financial Assistance (FA)

11. FA includes concessional loans for electric buses including vehicles, charging infrastructure, grid connection and required bus depot upgrades. GCF participation in concessional loans is 30% at an estimated interest rate of 0.75%. Investment grant support worth 20% of the total e-bus investment is also provided with GCF funds. In absence of such support investments will not take place.

Technical Assistance (TA)

12. TA includes for e-buses (i) Support in the structuring of concession contracts with alternative business models; (ii) Elaboration of a roadmap for electrification of public transport services; (iii) Battery policies including battery re-usage, recycling and disposal; (iv) training and capacity building (v) outreach events and knowledge materials. The forementioned TA is executed by GIZ. TA is also given for project preparation (full feasibility, due diligence) of individual investment projects. Latter is executed by AFD.

GCF Intervention at a Glance

13. Financial Parameters

Parameter	Value
Total CAPEX excluding TA	29 MUSD
GCF Loan	9 MUSD
GCF Grant FA	6 MUSD
GCF Grant TA	2 MUSD
Total GCF	**17 MUSD**
Co-finance ratio	**46%**

14. Impact Parameters

Parameter	Direct Impact	Indirect Impact	Total Impact
GHG in tons lifetime asset	99,000	187,000	285,000
$PM_{2.5}$ in tons lifetime asset	3	6	9
NO_x in tons lifetime asset	375	710	1,090
Energy saving in TJ lifetime asset	1,000	2,670	3,700
GCF cost per tCO_{2e} avoided	**170**		**59**
Total cost per tCO_{2e} avoided	**316**		**109**

Direct impact: due to investment projects
Indirect impact: Due to acceleration of EV deployment caused directly by the FA and the TA