

The role of e-mobility in Tuvalu's NDC and Energy Plan

Jamie Ovia

Climate Change Department



Background Information

- Tuvalu's First National Determined Contribution targets 2015 (as of now):
 - Reduce GHG emissions from the electricity generation (power) sector by 100% by 2025;
 - Reduce total GHG emissions from the entire energy sector to 60% below 2010 levels by 2025; and
 - Pursue a zero-carbon development pathway by 2050 (dependent on availability of finance and technology).
- Last GHG Inventory (2014) conducted, Energy Sector ~ 60% of all GHG
- Within the Energy Sector: Land Transport ~ 5%

Future Options for NDC

- NDCs updates (5+5) year basis
- Therefore, countries submit new NDC in 2025 with an end date of 2035; and in 2030 to submit NDCs with an end date of 2040; and so on.
- This will provide regular five-year updates to NDCs, with each lasting for ten years.
- **“NDC Implementation Roadmap and Investment Plan”** provides a good outlook for the e-bike initiative
- If this initiative is started the likely overall reduction over the span of 8 years would be ~ 1,089 tCO₂-e (based on 2002 data – 1013 motorbikes).
 - Need of database and main stakeholder to play the role of updating data on land transport.
- After e-bike initiative; future projects may be plausible for Tuvalu (e-vehicle, etc.)

E-bike initiative

Project name: E-bike initiative		
Sector: Land transport	Sub-sector: Micro mobility, MaaS	Project type: Information, investment
Project description		
<p>This project would encourage the uptake of electric bikes (e-bikes) for personal use through awareness-raising campaigns and supporting services. Mode shift from Internal Combustion Engines (ICE) motorbikes to e-bikes represents a significant opportunity for emission reductions in Tuvalu over the 2021-2030 period. In addition, increasing the uptake of e-bikes can reduce the number of cars and motorbikes on the road, thereby reducing emissions from the land transport sector, lead to savings in household expenditure, and result in health benefits.</p> <p>E-bikes are growing in popularity across the globe. E-bikes are the most popular form of micro mobility available today, with more than 3 million e-bikes sold globally in 2019 alone for private and shared use. Recent data shows that there are currently over 2,900 e-bike sharing schemes operating in cities worldwide.</p> <p>E-bikes have a lower per-unit cost relative to motorcycles and other vehicles. This represents an opportunity for much of the national population to acquire their own independent land transportation without significant additional subsidies or other concessional finance. Many e-bikes can also fulfil similar functions to small motorbikes. New models travel approximately 25-35km an hour (depending on the road and limiters set on e-bikes) with a pedal-assisted range of up to 100 km on a single charge.</p> <p>Stakeholders in Tuvalu indicated that it is possible to replace 100 percent of motorbikes with e-bikes in seven to eight years. This project concept note assumes it will take eight years to replace 100 percent of motorbikes with e-bikes. This would involve importing approximately 1,000 e-bikes into Tuvalu between 2022 and 2029.</p>		
Estimated emissions reduction potential		
<p>Based on the data for 2002, there are 1,013 motorcycles in Tuvalu.¹¹⁸ One motorcycle emits 0.196 CO₂-e per year, based on fuel consumption, distance travelled, and CO₂ emitted per litre of petrol. If 100 percent of the motorbikes can be replaced by e-bikes in the next eight years (replacing 126 motorbikes each year) this will reduce emissions by 25 tCO₂-e in the first year. Total emission reduction in Tuvalu would be 198 tCO₂-e annually after the fleet is fully replaced. The cumulative emissions reduction is 1,089 tCO₂-e between 2022 and 2030.</p>		
Cost estimates	Estimated time scale	
<p>Cost of awareness raising and support program</p> <p>The cost of awareness raising and supporting services would be approximately US\$152,000. This is based on a similar e-bike promotion project in Fiji,¹¹⁹ which is expected to cost US\$1,521,000 to target 10,000 bikes (Tuvalu is targeting approximately 10 percent of this number).</p> <p>Cost of motorcycle replacement</p> <p>E-bikes cost between US\$1,750 and US\$4,750, with average prices of US\$3,250.¹²⁰ Therefore, the total</p>	<p>This project assumes that it will take eight years to replace Tuvalu's full motorcycle fleet with e-bikes. This transition will occur at a constant rate of roughly 126 bikes per year.</p> <p>This transition is in line with the background vehicle replacement rate in Tuvalu. Most motor vehicles in Tuvalu are second hand Japanese models, and the motorcycle fleet turns over roughly every seven years. In addition, stakeholders in Tuvalu stated that it is possible to replace 100 percent of motorbikes in 7-8 years.</p>	

<p>capital cost of replacing 100 percent of motorcycle fleet with e-bikes in Tuvalu would be US\$3,292,250. However, this expenditure would avoid US\$3,039,000 in expenditure on motorcycles over the same period (assuming the capital cost of a motorcycle is US\$3,000). The difference in the total cost of ownership is likely to be negligible because recharging an e-bike is much cheaper than refuelling a motorbike.</p> <p>Total investment need</p> <p>The total investment need of this project is therefore US\$3,444,000.</p>	
<p>Potential environmental or social impacts</p>	
<p>Negative</p> <ul style="list-style-type: none"> ▪ Experience globally shows that e-bikes often cause tensions over mixed-use space, and may increase risk to pedestrians of ridden on pavements <p>Positive</p> <ul style="list-style-type: none"> ▪ This project would encourage active transport, which provides significant health benefits through increased physical exercise ▪ This project would reduce local air and noise pollution from ICE vehicles ▪ This project can reduce risks associated with oil spills and contamination of both the coastal marine environment and freshwater. 	
<p>Affordability</p>	<p>Likely co-benefits</p>
<p>The cost of awareness raising and supporting services (US\$152,000) equates to 14 percent of the Government’s 2019 budget allocated to the Ministry of Communications and Transport.¹²¹ This project would be affordable for the ministry. Awareness raising and supporting services would also have benefits for other land transport projects, therefore cost could be attributed to more than one project.</p>	<p>E-bikes can:</p> <ul style="list-style-type: none"> ▪ Provide travel solutions for those who cannot/do not wish to drive or travel on public transport, contributing to SDG 11 (sustainable cities and communities) ▪ Promote physical exercise through active transport and reducing Non-Communicable Diseases, contributing to SDG 3 (good health and wellbeing) ▪ Reduce urban air pollution, contributing to SDG 3 (good health and wellbeing) and SDG 11 (sustainable cities and communities) ▪ Reduce congestion contributing to SDG 11 (sustainable cities and communities) ▪ Reduce reliance on imported fossil fuels, contributing to SDG 13 (climate action), SDG 7 (affordable and clean energy), and SDG 12 (responsible consumption and production) ▪ Reduce risks associated with oil spills and contamination of both the coastal marine environment and freshwater, contributing to SDG 14 (life below water), SDG 6 (clean water and sanitation) ▪ Reduce household costs of fuel, contributing to SDG 8 (decent work and economic growth) ▪ Encourage tourism but reducing cars on the road, contributing to SDG 8 (decent work and economic growth).
<p>Procurement method</p>	<p>Likelihood of attracting private or donor funding (high, medium, low)</p>
<p>Given e-bikes tend to cost less than motorcycles, people in Tuvalu are likely to be able to replace motorcycles with e-bikes when their motorcycles</p>	<p>Medium</p>

<p>come to the end of their useful lives. People can purchase e-bikes from commercial e-bike retailers. Finance may be required in some instances. Where finance is required, this should be provided by commercial finance organizations given the investments are commercially viable.</p> <p>Awareness-raising and supporting services could be funded either by the GoT or by international donors. In the Consultation Workshop, six out of nine stakeholders thought international donor funding to be the most appropriate way to fund this project, while only two out of nine thought government funding was appropriate.</p>	<ul style="list-style-type: none"> Donor funding is unlikely to be available to cover the capital costs of e-bikes because they are already cheaper than motorized alternatives. However, international donors may see value in supporting awareness-raising and supporting services projects, particularly if it is bundled with other transport projects in Tuvalu.
<p>Capacity requirement to implement (high, medium, or low)</p>	<p>Potential barriers</p>
<p>Low</p> <ul style="list-style-type: none"> The maintenance requirements for e-bikes are generally lower than for motorcycles Supporting services for e-bikes, such as bike stands and low-voltage public charging stations, are generally easy to install and maintain An awareness-raising campaign promoting the benefits of e-bicycles is likely to be simple to execute. 	<ul style="list-style-type: none"> The use of bicycles for commuting and general transport is currently limited in Tuvalu, particularly as the popularity of private vehicles (especially cars) has grown over the last few years. This barrier can be overcome through a combination of awareness-raising campaigns (including promoting health benefits, savings potential of bicycles and e-bikes), and support services Infrastructure barriers such as charging stations, would need to be provided. This barrier can be overcome because adequate charging stations will be included as part of this project In the Consultation Workshop, stakeholders stated that until Tuvalu is using renewable energy, it may be counterproductive to promote e-bikes. However, the energy required to charge an e-bike is low—approximately 0.4–0.8 kWh, costing US\$0.05–0.08 per charge. The additional energy required to charge a fleet of 1,000 e-bikes is 400–800 kWh per charge. In addition, Tuvalu is close to its 100 percent renewable energy target In the Consultation Workshop, stakeholders stated that the average weight and size of the population is large, which may limit the use of bikes. Standard bikes and e-bikes have an average load capacity limits of 130 kg. Some models also have higher load capacity; these models can also be considered for import if required Stakeholders in Tuvalu stated that land space is limited and improving existing roads will be challenging. Poor condition of roads may limit the uptake of this project. Future projects could consider upgrading main roads.¹²²