**REPORT OF THE PACIFIC E-MOBILITY WORKSHOP**

**SUVA, FIJI: 28 – 30 NOVEMBER 2022**

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**Abbreviations and Acronyms**

BAU Business as Usual

CC Climate Change

CCREEE Caribbean Centre for Renewable Energy and Energy Efficiency

CO2 Carbon dioxide

CO2e Carbon dioxide equivalent

e- Electric (e.g., e-bus)

EV Electric vehicle

GGGI Global Green Growth Institute

GHG Greenhouse gas or greenhouse gases

IMO International Maritime Organisation

JICA Japan International Cooperation Agency

kW Kilowatt

LEDS Low Emissions Development Strategy

NDC Nationally Determined Contribution

NZ New Zealand

PCCC Pacific Climate Change Centre (SPREP)

PCREEE Pacific Centre for Renewable Energy and Energy Efficiency

PICT Pacific Island Countries and Territories

PV Photovoltaic

RMI Republic of the Marshal Islands

SDG Sustainable Development Goals

SIDS Small Island Developing States

SPC Pacific Community

TOU Time of use (metering)

UNIDO United Nation Industrial Development Organization

UNDP United Nations Development Programme

V2G Vehicle-to-grid

# **BACKGROUND**

The effort to reduce fossil fuel reliance in the Pacific Island Countries and Territories has focused mainly on the power generation sector while the bulk of the fuel consumed are in the transport sector.

Electric mobility (e-mobility) is one of the strategies available to the PICTs in order to reduce fossil fuel consumption in the transport sector.

The 4th Pacific Energy Ministers Meeting in 2019 directed SPC to develop a regional e-mobility program to address existing barriers to e-mobility and to promote SIDS-SIDS cooperation. PCREEE rolled out the e-mobility programme in 2021.

Various awareness, studies, demonstration and pilot projects on e-mobility have been conducted by various governments, agencies and development partners in the region.

In July 2022, the Pacific Energy Officials Meeting supported the convening of an in-person meeting to discuss the coordination of the e-mobility developments in the PICTs and the early adoption of electric vehicles (EV) policies, standards, and roadmaps at the national level to guide and facilitate the transformation in the energy and transport sectors.

# OBJECTIVES

The workshop was to bring together key stakeholders on e-mobility in the region to:

* discuss priority areas for e-mobility in the region and matters to be brought to the attention of the 5th Energy Ministers Meeting in 2023
* discuss SIDS-SIDS cooperation on e-mobility and establish a coordination mechanism for e-mobility in the PICs
* learn more about e-mobility developments in the PICs, SIDS and globally
* network and share experiences

# EXPECTED OUTCOMES

The expected outcomes of the workshop were:

* Improved appreciation of e-mobility and its advantages and disadvantages
* Strengthened partnerships and coordination of e-mobility effort in the PICTs
* Agreed priority areas for the promotion of e-mobility in the region

# WORKSHOP AGENDA

The Workshop Agenda is attached as **Annex 1**.

# PARTICIPANTS

More than 40 people registered for the workshop. On Day 1, 31 people signed the workshop registration. Of this 31, 5 or 16% were females and 84% were males.

Of the 31 participants on Day 1, 10 or 32% were government representatives, 16 or 52% were Develop Partners and 5 or 16% were from the private sector.

Of the 24 that registered on Day 2, 2 or 8% were females, 13 or 54% were development partners, 6 or 25% were government representatives and 5 or 21% were from the private sector.

Of the 16 that registered on Day 3, 3 or 19% were females, 6 or 38% were development partners, 6 or 38% were government representatives and 4 or 25% were from the private sector.

The Participants List is attached as **Annex 2**.

Presentations delivered at the workshop and referred to in this report can be accessed separately on this link - [Pacific Islands Workshop on Electric Mobility | PCREEE](https://pcreee.org/event/pacific-islands-workshop-electric-mobility)

# **SESSIONS AND OUTCOMES**

# OPENING

Mr Solomone Fifita, Manager of the PCREEE called the workshop to order and delivered the welcome remarks.

Mr Stein Hansen, the UNIDO Regional Director for Asia and the Pacific, delivered a statement on behalf of UNIDO and is attached as **Annex 3**.

Mr Akuila Tawake, the Deputy Director of the Geoscience Energy and Maritime Division of the Pacific Community delivered the Opening Remarks and is attached as **Annex 4**.

# **SESSION 1: SUSTAINABLE MOBILITY AND THE PACIFIC ISLANDS’ ENERGY AND CLIMATE COMMITMENTS**

Solomone delivered a presentation to set the scene for the workshop, making reference to the ministerial direction to develop a regional e-mobility programme and its eventual roll out. The presentation also elaborated on the workshop programme for the 3 days.

# THE PACIFIC CLIMATE CHANGE CENTRE

‘Ofa Kaisamy, Manager Pacific Climate Change Centre (PCCC), SPREP introduced the PCCC with its goal to enhance capacities for climate resilience in the Pacific through strengthened innovation and capacity-building.

The workshop learnt of the recent PCCC events such as the Innovative Exhibition on 4-6 Oct. 2022 which covered advance policy initiatives to advance electric public transportation transition (Decarbonizations of the Public Bus Sector in Fiji). She also highlighted the JICA-PCCC PROJECT: Supporting the Pacific to Access Climate Innovative Solutions.

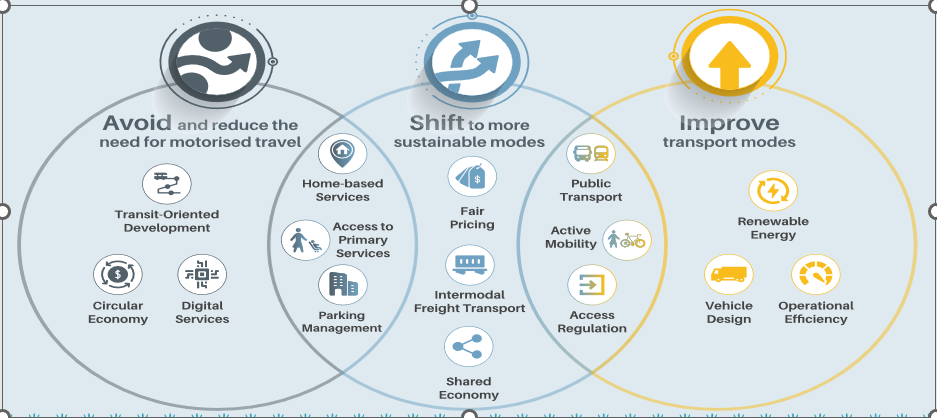
The workshop learnt of the PCCC’s future plans such as the:

* JICA Project for Innovative Solutions for Pacific Climate Change Resilience – Begin June/July 2023
* Finalize the Innovation Strategic Partnership Framework - 2023
* PCCC CC Innovation Lounge to be launched in 2023
* Engagement with national and regional stakeholders on innovative CC solutions for collaboration through the Innovation Strategic Partnership Framework

# THE NDC HUB

Amit Singh introduced the demand-driven nature of the NDC Hub and its sustainable mobility-related activities. The Hub received 36 country requests across 14 PICs during its Phase 1 & 2 and involving 6 MRV systems, 5 Investment Plans and various support in climate smart agriculture, water and sanitation and energy efficiency and more.

It was highlighted that of the 1st generation NDCs, only 21% had transport targets. This increased to 41% in the second generation NDCs. The Hub highlighted the priority PICs placed on reducing emissions in the land transport sector.

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The **“Avoid-Shift-Improve” framework was highlighted to the workshop as opportunities for further enhancing the NDCs to present more** meaningful, novel opportunities for countries to enhance their NDCs by better integrating transport solutions. Addressing transport in the NDCs brings about several broad co-benefits in the sustainable development agenda. It is also an opportunity to raise the ambition in NDCs through regional capacity building.

# PACIFIC REGIONAL MARITIME TRANSPORT OFFICIALS MEETING

The workshop learnt of the Pacific Regional Maritime Transport Officials meeting, which was virtually held on 15-18 November 2022. Among the matters discussed at the meeting was the Pacific Ports Vision 2030 – 2050 Recognition Framework. The workshop acknowledged that this is work in progress and noted the priority given to the interrelationships between:

* **Resilient**: The port is profitable and has the capacity to absorb, adapt to, and recover from disruptions.
* **Clean**: The port minimises its impact on surrounding natural environments & local communities.
* **Green**: The port has net zero carbon emissions.

The workshop learnt of on-going and planned maritime transport initiatives such as the:

* Possible extension of the IMO Improving availability of maritime transport costs data in the Pacific region project covering Cook Is, Fiji, RMI, Solomon Is, Tonga and Vanuatu.
* IMO’s Accelerating “Transfer of Environmentally Sound Technologies” (TEST Biofouling) through demonstration pilots to reduce biofouling and related emissions – 2023-2025 in Fiji and Tonga.
* Extension of the Pilot project on the retrofitting of a Fijian government ship with energy efficient technology.
* Building capacity of Pacific Islands Countries for climate mitigation in shipping and advocate measures for the reduction of GHG emissions from ships – 6 months in 2023 in the Cook Is, Fiji, Kiribati, RMI, Samoa, Solomon Is and Vanuatu.

# SUSTAINABLE MOBILITY AT THE NATIONAL LEVEL - PICS ENERGY ROADMAPS, NDCS, LEDS, SDG 7 ROADMAP, ETC

This session concluded with a presentation highlighting the priorities PICTs placed on sustainable mobility and the various e-mobility initiatives at the national level. Examples of various policy documents in Fiji, Samoa and Tonga were highlighted, such as the revised NDCs, their Low Emission Development Strategy and SDG 7 Roadmaps. The need for consistency among these policy documents was highlighted.

This presentation also highlighted some of the e-mobility support by the PCREEE in terms of national webinars and TA to a newly established e-mobility business in Fiji.

# **KEY MESSAGES AND TAKEAWAYS FROM SESSION 1**

* PICTs have identified sustainable mobility as a high priority in their economic, energy and GHG mitigation effort.
* There are other regional agencies, such as the NDC Hub, the Micronesia Sustainable Transport Centre and the PCCC who are supporting sustainable mobility effort in the region and they must be engaged on the implementation of the regional e-mobility programme.

# **SESSION 2: FRAMEWORK FOR REGIONAL TRANSPORT SERVICES**

Last minute cancellation from PRIF

# **SESSION 3: SHARING THE EXPÉRIENCES ON E-MOBILITY DEVELOPMENTS IN SIDS, ASIA & AFRICA, EUROPE, NZ AND BEYOND**

# CARIBBEAN

Barbados has over 1,000 private EV chargers; 45 public EV chargers, including 2 superchargers ©megapower; plughare.com finds 77 charging stations; in comparison: 22 Sol Gas Stations, 18 Rubis Gas Stations (40 in total); 1578 km of highway network; approx. 130,000 vehicles (including public service vehicles, government and private); approx. 49 EV buses

The Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) has some experiences from an office EV car. They then used the experiences to develop a position paper on EVs based on a 7 Zeros Concept:

1. Zero Emissions … should we accept pollution…?
2. Zero Energy … should we accept spill and fossil depletion…?
3. Zero Congestion … should continue to get stuck in traffic…?
4. Zero Accident … shouldn’t we reduce accidents and fatalities…?
5. Zero Empty … should we accept low daily vehicle utilisation…?
6. Zero Cost … should each of our citizens endure the cost to own a car…?
7. Zero worry…no stress

These seven concepts then frame the Regional Electric Vehicle Strategy (REVS) with its aim

*“To deliver intelligent, modern, affordable, clean, efficient, and safe mobility solutions for CARICOM citizens and businesses through the electrification of surface transportation within the Community,”* through 4 strategic initiatives for implementation, namely:

* Policy and Regulation
* Technology and Infrastructure
* Capacity Development & Awareness
* Finance, Market Development & Innovation

Caribbean EV programme looks at mainstreaming 3 disruptors:

* Electrification of the Transport System – EE power train, RE sources and storage
* Connectivity is terms of data mining, intelligence and the charging infrastructure
* Transport Demand Management - Reducing & Redistributing transport demand, Autonomous Driving and Urban planning.

# NZ

# UNIDO AND EUROPE

At UNIDO and in Europe, due to rapid battery innovation, the last decade has seen a revolution in EV economics, causing the price of EV batteries to plunge by 89%. This has resulted in total lifetime costs for EVs being less than for a comparable internal combustion engine (ICE) vehicle, due to EV savings on fuel and maintenance. In a couple years, most EVs are expected to cost less than comparable ICE cars.

Over the last decade, learning curves have produced remarkable effects for solar, wind, energy-efficient LED lighting, and batteries. These learning curve effects mean that the average cost of renewable electricity has fallen below the average cost of electricity from plants burning coal and natural gas across the globe.

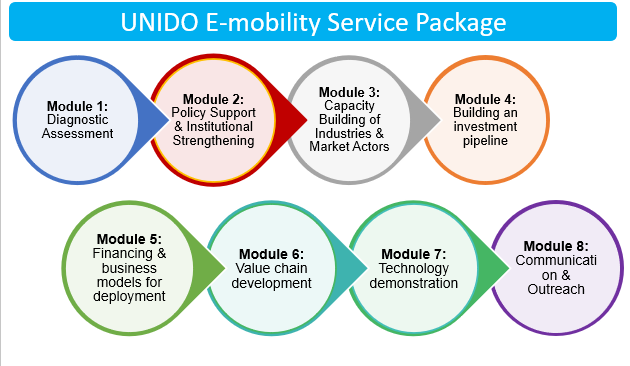
Global electric vehicle demand is set to rise exponentially by 2030 as governments develop their energy transition policies, and battery makers worldwide have responded by increasing their gigafactory plans in the past year.

Global plug-in electric vehicle sales are forecasted to reach 13.7 million units by 2025 and then 26.8 million units by 2030, up from 6.3 million units in 2021. This is set to be led by China, but also by Europe and the US, where governments are pushing decarbonization initiatives.

UNIDO is implementing or implemented 13 projects covering e-mobility in various settings, mainly focusing on EV-RE integration. These projects are in different settings in Asia, Pacific region, Africa and Europe.

It is critically important that EVs are powered with clean energy - meaning no GHG emissions to produce it, but the need for clean electricity imposes some challenges - RE are intermittent sources which require energy management solutions to incorporate them into the grid. In UNIDO’s projects, the focus is on demonstrating viable solutions of coupling RE with EV charging systems. And for this we also utilize second life batteries, which are not good enough for EVs (e.g., buses), but still perform well as an energy storage for electricity produced in RE.

UNIDO has extensive expertise in integration of RE and EV, based on China, Malaysia, and South Africa projects. Other areas cover EV industry ecosystem development – from the policy perspective and MSMEs. Batteries is also another area of expertise – with manufacturing and testing development in the countries. Technical standards development and implementation in the countries is another.



UNIDO offers comprehensive support to countries, as in the 8 Modules above, which is based on the diagnostic of country’s actual needs.

# GLOBAL

Drivers of e-mobility globally also apply to the PICs, including:

|  |  |  |
| --- | --- | --- |
| * Climate Change * Cost of fuel imports * Local air quality | * Resilience * Personal safety * Convenience | * Improve level of service * Improve quality of life * Congestion * Waste minimization |

Enablers of change include

* Rapidly increasing capability of technology

• IT and IoT

• Clever combinations = new ways, providing more affordable and accessible transport

* + accelerated uptake of e-mobility
  + micro- and small-format mobility
  + shared vehicles
  + connected, on demand services
  + i.e., mobility as a service (MAAS
* When will steering wheels become illegal???

New mobility options enabled by the development of modern batteries

**Global Trends In The Transport Sector**

* Priority on reducing reliance on cars ◊ support people to walk “pedestrians first”, cycle, use small-format vehicles and public transport.
* Adoption of low-emission vehicles (including EVs).
* Decarbonization of heavy transport has begun in many countries.
* Use of Shared vehicles
* New business models developing:
* Access to mobility via accessing services (UBER, Grab, other MAAS).
* New B2B models: e.g., Gojek (not wanting to invest in assets) and Gogoro (providing e2W transaction and battery as a service platform) … with potential for Gensit to manufacture and lease.
* Integration of multiple mobility platforms (through data/IoT/clever algorithms … e.g., balancing demand on local/grid electricity supply).

Many countries have focused on EV cars

* But micro/small EVs have important role:
* large GHG/travel changes with mode shift
* affordable e-mobility options now requires suitable infrastructure (beyond roads)

**Global Trends In Marine And Air**

Electrification of marine industry rapidly evolving …

* 2019: there were two suppliers of >40hpequiv outboards on plugboats.com portal. Yesterday there was 10.
* Many short-voyage large-vessels in commercial operation.
* Commercial (and military) drone use has been normalised.
* Electrification of aviation industries at an emerging level …
* 2022 has seen many maiden flights of final-design electric commercial passenger aircraft

**Global Trends In E-Mobility Charging**

Battery swapping expanding into many countries (providing fast “recharging” of small-format e-mobility vehicles. Provided as a service, removes battery cost from vehicle purchase, specialist entity can look after 1000’s batteries from introduction to end-of-life …).

* Importance of smart charging for grid management recognized.
* Commercial V2G emerging ◊ use of EV batteries to support the grid becoming a reality:
* UNIDO China-SAE GEF project.
* Gogoro and grid integration of battery swap stations in Taiwan.
* Most sales in lighter vehicle categories where at home/work charging prevalent ◊ encourage set up of charging at home, at work, parking spaces, government buildings
* Electricity distribution, and oil and gas companies are entering the market (e.g., Petronas and PLN in Indonesia, both charging stations and battery swapping).

**Global Trends In Electricity Supply**

Many countries have focused on EV cars

* But micro/small EVs have important role:
* large GHG/travel changes with mode shift
* affordable e-mobility option now
* … requires suitable infrastructure (beyond roads).

UNIDO is implementing a project “Promoting Green Electric Mobility (E-Mobility) Solutions for Urban Transport in Bhutan and the Wider Hindukush-Himalaya Region”

# **KEY MESSAGES AND TAKEAWAYS FROM SESSION 3**

* Emobility is part of modernisation, happening in parallel with advancement in smart technologies, smart grids, smart cities and etc
* Advancement in battery technology is driving the advancement in EVs
* UNIDO is among the leading international agencies providing technical assistance at various levels to e-mobility
* Prior hands-on experiences with EVs will help to shape e-mobility policies and plans
* The e-mobility infrastructure, e.g charging stations, needs to be there first in order to develop the e-mobility market.

# **SESSION 4: PERSPECTIVES AND EXPÉRIENCES ON E-MOBILITY**

# POWER UTILITIES

TE APONGA UIRA (TAU) – COOK IS

The ongoing changes TAU is undertaking, moving toward a transformation to renewable energy generation and supply, is a challenge. The nature of the customer base is changing and so is the need to keep up with the responsiveness to the changes. Renewable energy development, for instance, has opened services to include solar power systems and the small but potentially growing electric vehicle (EV) market.

At the moment, there are some 50 electric vehicles operating in Rarotonga, the majority being Nissan Leafs. Electric pickups/mini trucks, vans, motorcycles and tuk-tuks also operate on the island. The small size of the island and the limited road system on Rarotonga is very well suited to electric vehicles: roads are flat, distances driven are short and available road surface is limited

TAU has taken an innovative approach to this opportunity and explored EV charging technology in anticipation of EV growth in Rarotonga.

TAU has initially taken the first step with the installation of TAU’s first standard EV Level 1 charging station powered by a 10kW solar PV system with battery back in 2017 and located onsite, which has been used steadily by both private EV owners and the company vehicles over the past five years.

TAU recognizes the value of being at the head of a new wave of opportunity, in this case, the market in Rarotonga for EVs. Like the installation of its first public Level 2 charging station, TAU will continue to implement initiatives that will encourage growth and assist the consumer in their decisions.

The installation of a Level 2 Type 1 charger was installed in June 2019 onsite in close vicinity of the Level 1 charger.

The charger is a Wallbox Pulsar Plus Type 2 charger able to provide a maximum single-phase charge of 7.4kW.

All EVs on the island, including TAU’s 2 x 2018 Nissan Leaf’s can plug in.

Key Features of the Level 2 Type 1 Charger include:

* Connectivity – WIFI/Bluetooth
* User Identification – Wallbox app/ my Wallbox Portal
* User Interface - Wallbox app/ my Wallbox Portal
* Optional features – Power Boost

Charging Speed – initially, when TAU installed the charging station, the charging turnaround was not an issue because it was mainly used by two company vehicles. As technology improves and the cost of these technologies decreases, TAU is now looking at fast charging stations. Customer convenience with lowering charge times.

Customer Convenience – TAU has learnt that its charging station is not an ideal location for all its Customers, and access to the public charging station is limited, given that there is only one. Most EV owners have a standalone PV solar & battery system, residential PV system on a net metering arrangement or straight charge from the grid. Accessibility and charging speed have been the main learnings with this pilot.

Admittedly progressing EV from TAU’s point of view has had to take a back seat while it focus on delivering 6MWs of solar PV generation. However, TAU is looking at undertaking feasibility studies on how we progress with EVs in Rarotonga and the associated assets to make this work, including the charging station infrastructure.

ELECTRIC POWER CORPORATION - SAMOA

EPC is currently implementing an e-mobility Pilot Project called *Charging towards the Future*

The Objective is to Synthesize existing research on projections for electric vehicle supply, and price for the period 2020 – 2030 and to quantify the:

* Expected level of electric vehicle production in key supply markets.
* Potential supply of new electric vehicles into Samoa.
* Expected change in the price of new electric vehicles (including electric vehicle batteries) available to Samoa.

The information collation is limited to the neighborhood and conventional passenger vehicles (2020 to 2023). Light and heavy commercial vehicles will be in 2024.

Samoa is an extremely small market on the global scale. There are limited policies and incentives that are available to encourage the uptake of electric vehicles. Supply of electric vehicles to Samoa is extremely limited and up to 60MW of new renewable energy projects forecasted up to 2031.

The key findings from the research show that:

The Electric vehicle market is evolving quickly and globally but faces significant uncertainty. There is a need for policies to promote or encourage uptake of electric vehicles.

There are Consumer Concerns regarding the reliability, safety, battery degradation, price and resale values, and access to charging infrastructure.

Key Outputs from the project (Phase 1, 2020-2022) include:

* NECC/LTA EV Policy Drafted.
* Hyundai new EVs supply market opening.
* Township charging infrastructure Pilot.

There is consensus in international literature and amongst key stakeholders in Samoa that, over time, the cost of electric vehicles will become competitive with the cost of conventional vehicles, and that they will become widely available across more models.

Key findings and concerns in Samoa revolve around access to the infrastructure and public awareness.

Policies to promote or encourage uptake of electric vehicles will need to be flexible and adaptive to change.

TUVALU ELECTRICITY CORPORATION - TUVALU

E-mobility is in line with the National Strategy for Sustainable Development 2021-2030 and the Tuvalu National Energy Policy. Currently implementing a pilot e-mobility programme to:

* evaluate the technical and economic feasibility of deploying e-mobility at a larger scale while creating synergies with the renewable energy power plants in a harmonized energy system; and
* a Construction Supervisory Consultant (CSC) will carry out the Technical and Economic Evaluation of e-mobility in Tuvalu through the Electric e-motorcycle Pilot.

The pilot project is an activity of the Tuvalu Energy Sector Development Project (TESDP), Funded by – World Bank to a tune of USD$35K (including spare parts and training) involving 12 e-motorcycles with EastWest, China as the contractor. The motorcycles are currently being cleared through Customs.

The 12 motorcycles will be distributed with 7 for TEC, 2 for the Energy Department and 3 available for the Public. Users of the bikes will be required to fill some forms and enter their weights and distance travelled, etc.

The are some leftover funds under the GEF-funded FASNETT to showcase solar rooftop plus to install 10 waterproof power sockets and either a hybrid or EV car.

Tuvalu’s Energy Bill is under development and Part 8 is on E-Mobility, as below:

35. Promotion of e-mobility

1. The Minister shall provide regulations for the promotion, importation and sale of e-mobility transports, including the transition period from the use of vehicles operates by internal combustion engine to electric vehicles (EVs); and
2. The Department of Energy must develop policies to promote and increase public awareness of E-Mobility in Tuvalu

# REGULATOR – VANUATU UTILITIES REGULATORY AUTHORITY

Whilst energy services, communication and utility services have been established in the Pacific Islands for so many years, and operated largely either by government or semi-public institutions, or the private sector for some jurisdictions, the regulation of energy services only become introduced over the last 15 years, for much of the Pacific. Examples of energy regulators in the Pacific include, FCCC in Fiji, Electricity Commission in Tonga (2008), Office of the Regulator in Samoa and the Vanuatu Utilities Regulatory Authority.

The recent first annual meeting of the Office of the Pacific Energy Regulators Alliance learnt that more Pacific island countries, apart from the above-mentioned regulators, are either just established or are in the process of establishing their energy regulators, showing the increasing appreciation of the role of Regulators.

As regulators, our mandate evolves around, among others, four common objectives:

* Firstly, to ensure safety and quality of regulated services, particularly for the end users,
* Secondly is determine reasonable utility tariffs which can be afforded by various categories of utility consumers, whilst at the same time enabling operators to financially sustain their operations.
* Thirdly, Regulators also aim to ensure regulated services are reliable, and we collaborate with operators they are sufficiently technical and financial to provide reliable services.
* Finally, customers of utility services confront a variety of issues concerning the service they get, which range from safety, utility service cuts to high utility cost. They get the opportunity to present their grievances with the regulator when they are unsatisfied with the feedback they get from the operators. To best address the above objectives, the regulators set operating standards whereby operators are required to follow. Some of these are articulated on the legislative framework which governs that particular utility service. And this is very important for any service or product that the authorities decide to regulate. Accordingly, regulators now move to aligning their regulatory objectives with the broader policy objectives of the governments.

Due to growing threats of our existence caused by impacts of climate change, our regional and national efforts are exhibited through solidified Pacific voices as well through national initiative including sustainable development strategies and Nationally Determined Contributions objectives. Achieving close to 100% renewable energy in electricity sector by 2030 is very ambitious but a common objective for many of our Pacific island nations, some of us getting close to or almost reaching there, whilst others barely reaching 20% of target level.

At national level, experiences has proven, that new policy setting with corresponding legislative formulation only becomes successful when there is strong political will and backing. Hence, fostering use of EVs in the Pacific can be supported through clear government policies with accompanying legal framework. Accordingly, institutional readjustments and capacity building and strengthening are essential in the implementation of EV policies and enforcement of related regulatory requirements. Given such, strong external support from development partner agencies will be quite essential during the early phases of the program.

Finally, future prospects of regulatory EVs will depend largely on regulatory setting within each Pacific Island country defined by the broader related legislative requirements. This may involve regulation of EV standards that are imported into the countries, including the technologies used in EV components, especially batteries. Regulation may be also applied to charging infrastructures and pricing and how these may be treated especially in electricity concession areas, where electricity operators have the sole right to produce and distribute electricity. Again, this may differ from one jurisdiction to another. Finally, the regulation of wastes from EVs especially batteries, and of course other relevant aspects that requires regulation.

# TRANSPORT

The integration of power and transport (EV) is something that seems a common concern amongst the participants.

In support of this, 3 key concepts at the Nexus of Transport and Power:

* Mini Grids / Grid Stability – Power Quality and/or rural electrification
* Peak shaving – Power Utility Investment Savings
* V2G aggregation – commercial perspective

These 3 concepts provide the response to most power utility concerns and also opportunities for the future.

V2G – high level for each stakeholder

**For the EVs owner:**

V2G can reduce the total ownership cost of EVs, and V2G also can be extended for local utilization as a home energy storage and emergency backup storage.

**For the grid operator:** V2G serves as a new resource for both up- and down-regulation and power storage. It provides and facilitates a solution to the fluctuation due to the high share of renewable energy, as well as the solution to the grid congestion and circumvents the need to upgrade the grid infrastructure.

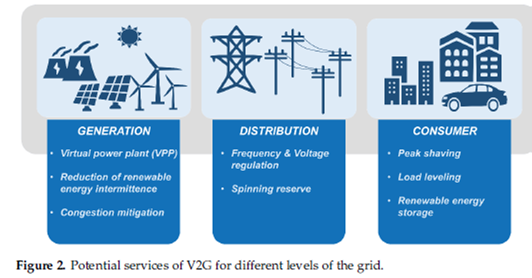
**For the government**: V2G creates a new circular economy in society, provides higher energy security (supply and quality), facilitates a greener environment, and reduces the noise due to vehicle engines. EVs and V2G will restructure the lifestyle and infrastructure in the city, leading to huge movement in economic activities.

**For the aggregator/EV operator**: V2G presents a new business opportunity in the electricity sector, including grid balancing services (in correlation with utilities, grid operators, and consumers) and renewable energy storage services (e.g., storage and minimization of curtailment and fluctuation).

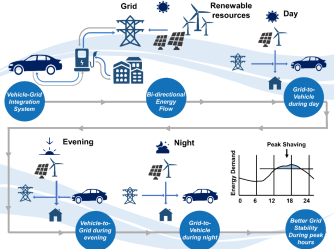
**For the office and real estate owners and business entities** (e.g., office, factory): V2G can facilitate local peak shaving, load leveling, and balance out the electricity demand.

Therefore, the total cost of electricity might be reduced.

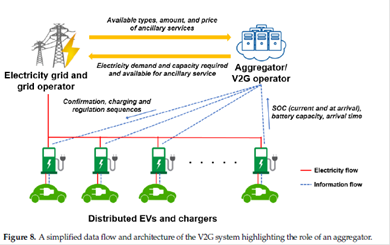
For item 1:



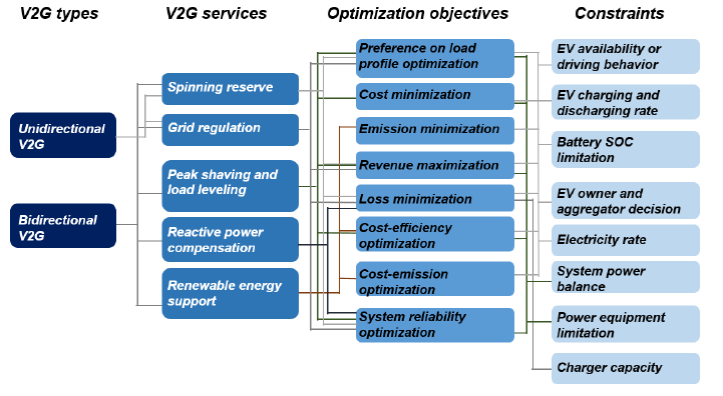
For item 2: standard renewable energy strategy



For item 3: EFL business opportunity



And in general



# ENERGY – DEPARTMENT OF ENERGY, TONGA

Tonga does not have many EVs on its roads, only 4 EVs (Nissan leaf) with a reported average of $200 in additional monthly electricity bills as compared to the usual $600 per month of fuel. There is also a reported 1 Plug-in hybrid (Mitsubishi Outlander)

Vehicle Tax is based on the size of the engine (cc) of ICE. Local car dealership are not convinced to import EVs yet due to lack of awareness and interests from the public and the very weak local maintenance capacity. Batteries also deteriorate quickly.

It is very difficult to import EVs - some shipping line restrict shipping vehicles with battery due to fire hazard – some EVs are shipped via NZ.

Tonga has a couple of EV-related policy documents – the Tonga Energy RoadMap, the Tonga Energy Efficient Master Plan, the NDC and the LEDS.

Tonga has current effort on Energy Planning, Technical Assistance on the Development of E-mobility Road Map (NREL) and a Public Transport feasibility study (GGGI), Cost benefit analysis of policy options for an increased EV uptake, Study on tariff and power sector infrastructure requirements on electric vehicles and Development of recommendations incentivizing Tonga’s EV transition*.*

An EV Demonstration Project is currently being discussed and a E-mobility Task Force has been established and a E-mobility proposal under GEF8 is currently being discussed.

Tonga has identified barriers to the introduction of EVs including:

Affordability, Fear of more EVs than charging stations will be an issue and grid readiness/stability for EV charging, Lack of studies for policy decision-makers to fully understand EV vs ICE (pros and cons), Incentives and policy options, standards etc. The change of the Transportation Culture in terms of ICE vs EVs, Public transport vs Private cars (convenience), charging time and changes to existing legislations are all part of the challenges.

EV awareness and behavioural change are all part of the barriers.

As a way forward, there is a need for Management/Coordination, a look at the required Investments/Financing/Market Innovation, Fuel efficiency standards, E-mobility infrastructure, Capacity building, Data Management, the Gender dimension, Awareness and to work closely with the power utility.

# INVESTOR – PRIVATE FINANCING ADVISORY NETWORK

PFAN has more than 160 climate, clean energy & finance experts around the world and hosted by UNIDO and REEEP since 2016, though initiated in 2006. It is an unique and proven public-private partnership business model ​funded by a Multi-Party Trust Fund.

PFAN bridges the gap between investor ready projects and investments.

PFAN has supported nearly 1,000 projects with more than 300 projects in the current pipeline and have leveraged about USD 2 billion worth of projects.

PFAN service offering includes Project Origination, Development Pipeline, Investment Facilitation and Tipping Point Technical Assistance (TPTA).

PFAN Investor Outreach includes Investor Database & Active Partnership Management, Build Investor Capacity, Investor Forums, Investor Roadshows, 1-1 Investor Introductions, Project Referrals and Origination & Engineering of Customized Portfolios.

Sectors and technologies supported by PFAN include renewable energy, energy storage & conservation, tourism, e-mobility and many more.

PFAN’s areas of focus in the Pacific include clean energy (e-mobility included) , climate change adaptation and working with and through partners (eg FDB / FREF).

PFAN’s e-mobility work in Fiji

PFAN’s role helped to facilitate the following:

* + Complementary Technical Assistance

Introduction to PCREEE’s Sustainable Energy Entrepreneurship Facility (PSEEF) facility that enabled the legal review around the electricity tariff.

Introduction to UNDP’s Blue Accelerator Grant Scheme (BAGS)

* + Our work with the developer helped open doors with entities such as locations including two key sites where charging infrastructure is located
  + Introduction of the developer to potential fleet partners (current model is being developed for public charging). There exists a large potential for a fleet conversion model.
  + Helped Leaf Capital in the process to secure debt with the Fiji Development Bank

Other financing opportunities are being explored as the program to scale up progresses.

Other comments:

* + As the first of its kind in Fiji had risks of ideas being “stolen” by vertically/horizontally integrated businesses and as a new entrant in the market
  + Rising fuel prices helped highlight the discussion as the concept was being shared with various stakeholders including Taxi operators, Fleet Owners and Car Dealerships.
  + Budget submissions

A budget submission put in by Leaf Capital was passed in which an incentive of FJD10k cash back on e-vehicles imported into Fiji.

Fiji already had a zero-duty scheme in place for electric vehicles, but the GoF also waived VAT on e-vehicle imports.

* + Had conversations with the utility that talked about capacity issues but cleared the air around the ability to sell power of charging.
  + A budget submission for LPG Generation for electricity was also adopted in the last budget which could be explored further around charging for an EV network in areas where grid capacity may be an issue. There is an established network of LPG Autogas dispensing stations around the country.
  + Other E-Mobility Initiatives:

There’s a retro-fit opportunity for marine transport sector (outboard motors)

Some suppliers are interested in setting up an ICE conversions facility in Fiji for trucks.

# DEVELOPMENT PARTNER – EUROPEAN UNION

The EU’s emobility projects in the Pacific include:

**Electric Scooters for police officers in the Marshall Islands**

* Implemented by RECO;
* 10 e-scooters provided to the police in 2021 for demonstration of the technology;
* A charging station;
* Policy support for the Local Government to develop regulations to support the adoption of e-scooters.

**Solar powered electric outboard boat**

* Implemented by the Pacific Maritime Technology Cooperation Center (MTCC). Global project implemented by the IMO and SPC and SPREP in the Pacific;
* Objective: Decarbonizing maritime transport;
* Regional technical support and implementation of SEEMP and ports energy audits and pilots in targeted countries: Fiji, Kiribati, RMI, Samoa, Solomon Islands, Tuvalu and Vanuatu
* One of the pilots in Fiji was the design and build of a solar powered electric outboard engine of a fishing boat that was given to the Fishing Women Club in NakalawacaTailevu. Launched earlier in 2022.

**TA for Decarbonizing the Government Fleet in Fiji**

* + Technical Specifications based on:
    - Data collection
    - Route and Vehicle Profiling
    - Battery Sizing and Design
  + Charging Strategy
  + Costs (CAPEX and OPEX)

There is also a data collection component being undertaken with the government fleet drivers through a GPS application to understand better the vehicle specifications; the routes taken, km driven, etc. The potential impact on the grid will also be modeled and simulated

Under the EU Green Deal and Fit for 55, the 27 EU Member States pledged to reduce emissions by at least 55% by 2030, compared to 1990 levels. The European Green Deal sets the blueprint for this transformational change; proposing to reduce GHG emissions in all sectors of the Economy:

* + Sustainable Transport
  + Cleaning the energy system
  + Renovating buildings
  + Nature-based Solutions
  + Circular Economy

Transport represents 27% of total EU’s emissions. Therefore the Fit for 55 package includes measures for all transport means: aviation; maritime and land transport. Package also includes CO2 emission performance standards for cars and vans (they represent 15% of EU’s total emissions).

But it is not only about e-mobility. It is very important to look at developing a Transport Decarbonization Strategy and Action Plan. For instance :

The European Commission developed a  [‘Sustainable and Smart Mobility Strategy’ together with an Action Plan](https://eur-lex.europa.eu/legal-content/EN/AUTO/?uri=CELEX:52020DC0789) that was presented in December 2020.

* Some targets from that Action Plan include:
* - By 2030 scheduled collective travel for journeys under 500 km should be carbon neutral
* - By 2030 zero-emission marine vessels will be market-ready
* - By 2035 zero-emission large aircraft will be market-ready
* To reach those targets different instruments are being deployed:
* Pricing Carbon and providing better incentives for users.
* from 2026 road transport will be covered by emissions trading, putting a price on pollution, stimulating cleaner fuel use, and re-investing in clean technologies. Carbon Pricing for the aviation sector and the maritime transport sector will also be deployed.
  + Other Instruments include:
    - Pricing Carbon and providing better incentives for users,
    - Fuel Efficiency Standards,
    - Green fuel, a big push for green Hydrogen,
    - Promotion of public transport,
    - Boosting the use of data and AI for smarter mobility,

# **KEY MESSAGES AND TAKEAWAYS FROM SESSION 4**

* Power Utilities in the PICs are interested on e-mobility and what it could contribute to achieve governments’ socio-political goals. The utilities are therefore engaging on pilot e-mobility projects to gain some firsthand experiences with the technology;
* The introduction of e-mobility would introduce an additional role for the Regulators in terms of the hardware to be used as well as the reselling of power through the charging stations.
* The Energy Departments are cautiously looking at e-mobility, trying to fully understand their advantages and disadvantages and to follow a structured approach to e-mobility through relevant policies, roadmaps and strategies.
* The finance advisory services stand ready to assist PICs to access funding for e-mobility as well as to support investors and entrepreneurs.
* Development partners are presently supporting some small scale emobility projects in the region. While emobility is being pursued on a large scale abroad, such as the European Union, the contexts and environments are totally different. There is therefore a need to keep following the progress abroad while at the same carrying out pilot projects and documenting experiences gained.

# **SESSION 5: INVESTING IN E-MOBILITY -**

# EV CHARGING AS A BUSINESS - ALEX REDDAWAY, LEAF CAPITAL / SWITCH NETWORK

EVs make sense in the Pacific and Leaf Capital is keen on i**ntroducing electric mobility to Fiji and the wider Pacific**.

**In the current climate,** Prices are falling - New EVs within 15% of petrol equivalent, used EVs are among the cheapest options. The range is increasing - 200km+ range is the new standard & Fast chargers are more affordable and low running costs benefit high mileage users. Savings from E-Minibus estimated at $0.25/km and Results in daily savings of $50-$112 depending on route.

It is a chicken or egg situation as despite the seemingly ideal circumstances, EV adoption has been negligible in the Pacific. Switch aims to identify areas in which e-mobility can make the biggest cost and emissions difference and deploy solutions that work from day one.

The company aims to create Green Mobility Hubs ccombining solar, EV charging and EVs, offsetting emissions while creating transformer capacity for charging, eliminating costly upgrades to the grid and being financially viable and delivering savings from day one.

The company hopes to make positive change, focussing on PSVs and hopes to reduce the running costs and improve revenue collection, eliminating fare inflation through a stable tariff, introducing new operating model where there are more runs with quicker journeys and savings of 15/40 tonnes of CO2e reduced per taxi/minivan.

**The company wants to positively contribute to the energy** through the:

* adoption of solar charges power dynamics,
* introducing TOU tariffs to influence the demand pattern
* assist power utilities to trial new approaches in advance; and
* to establish deeper partnerships with the power utilities in the region

# PROPOSAL FOR A ZERO EMISSION BUS NETWORK IN FIJI - ZEKITEK

There is a promising proposal for a closer cooperation between the Fijian Government and EBUSGEN regarding the electrification of the bus network in Fiji. The collaboration is looking at an integrated approach to achieve more competitive offer, optimised operational plan for the bus network, a low risk deployment with an adjusted asset plan where the infrastructure is optimised as well as the life cycle of the batteries through battery management and warranty measures, maintenance costs are reduced with shared business intelligence and a roadmap for autonomy.

The key integration factors in the cooperation include:

* Mass transit electrification and planning
* Roadmap for autonomy, battery optimisation, and weight reduction (composite)
* Future proof vision on electrification
* Scalable public transit vision
* Asset as energy storage transportation
* Trends in charging secured
* Energy storage in sustainable depots
* Business intelligence on all integration factors for continuous optimisation

The shared approach is supposed to provide comfort for the Fijian Government, the financiers, the operator, deployment, drivers, mechanics, battery management and passengers.

**The partnership will offer turnkey solutions to:**

Design – A vehicle to suit Fijian needs

Deploy – Seamless Implementation

* + Transformation and training of drivers
  + Support for impact on operational planning
  + Electricity network & charging
  + Renewable energy powered bus stop

Maintain – Fixed life cycle costs

* + Full fixed fee maintenance, including 10 years and/or   
    800.000 km with maximum 150 kW charging
  + Managed or training of staff

Finance – Turnkey finance solution

* + Residual value protection, due to integrated maintenance
  + Discounted interest rate for Tri-party solution

The next step in the collaboration would be to **investigate and test** with finance partner ING

Where the Fiji Government will:

* Instigate opportunity
* Define optimisation factors
* Integrate and test LTA teams
* Investigate financial benefit simulations
* Integrate asset into base planning
* Run pilot

While EBUSGEN will:

* Prepare business case
* Define KPIs
* Appoint subject matter experts
* Integrate asset plan in operations
* Adjust portfolio to demand
* Run pilot

It would be very interesting to watch the progress in this collaboration in Fiji.

# **KEY MESSAGES**

* Some companies are already motivated to start small scale investments on emobility in the PICs
* Experiences from these early investments would be most helpful in exploring varying technical and business models for emobility in the region

# **SESSION 6 - E-MOBILITY POLICY, ROADMAPS AND READINESS FRAMEWORK**

# TONGA EV ROADMAP & STRATEGIC PLAN – NREL

13% of Tonga’s total generation came from renewable sources in fiscal year 2019-2020. The goal now is 70% RE by 2025 and 100% by 2030, which will only increase the benefits of electrified transportation. Transport comprises 40% of national GHG emission.

Vehicle-kilometers traveled (VKT) is projected to increase from 2,289 VKT/person in 2016 to  
5,103 VKT/person in 2050 (including freight) in BAU scenario.  
The number of vehicles is estimated to grow at a rate of 1.3% between 2021 and 2035.

EVs can reduce GHG emissions and air pollutants. But there are other equally important measures in addition to EVs, according to Tonga’s LEDS 2021-2050 and these include:

* Improved data collection
* Vehicle standards and incentives
* Strengthening road maintenance
* Decentralized services
* Low emission vehicles
* EVs
* Sustainable maintenance of vehicles
* Non-motorised and cycling transport options
* Public adoption of 50% EVs

NREL is urgently providing a TA to Tonga to develop its EV roadmap and strategic plan. This This activity will reflect and build from the interventions and options identified  
in the TEEMP, TERM+, and NREL report. The overall aim of this framework is to  
assist Tonga in achieving the targets outlined in the TEEMP and TERM+, expected to be completed by June 2023.

The policy framework is structured into 3 key areas:

* EV adoption
* EV charging infrastructure
* Vehicle and transport system fuel efficiency

EV adoption includes:

* adoption of hybrids, plug-in hybrids, and battery electric vehicles
* Private vehicles, commercial fleets, government fleets, and public transport (reflecting GGGI work)
* Could include policies such as “feebate schemes”, tax incentives, purchase subsidies, etc.
* Vehicle shipping and procurement policies
* Battery end-of-life treatment

The EV charging infrastructure section deals with:

* Standards and guidelines
* Applicability of different standards in use throughout the world to  
  Tonga
* Incentivizing the building, operating, and maintenance of EV charging stations
* Types of charging stations, locations for stations, and business models
* Incentivize charging management systems to minimize grid impact
* Smart charging and time of-use pricing

Vehicle and transport system fuel efficiency

* Vehicle fuel economy requirements and vehicle import  
  or registration tariffs
* Decreasing the vehicle kilometers-traveled (VKT) required to get a given amount of transportation service
* Public transit (including on demand transit)
* Ridesharing
* E-bikes
* Relationship between transportation system efficiency  
  and EVs

# PNG EV POLICY

In 2022, PNG received a TA from CTCN to draft its national policy for deploying and scaling up E-mobility and supporting sustainable infrastructure. The policy recognizes the EV targets and initiatives from other regions of the world.

The primary objective of the PNG Electric Vehicle Policy, 2022 (in short “Policy”) is to:

* initiate and accelerate the adoption of EVs, especially in the category of public and employee transport, as well as in logistics (in urban areas).

The target of the policy is to:

* adopt EVs rapidly and to reach a **15% share of EVs in all new vehicle registrations by 2030**, thereby jumpstarting the EV market, providing new mobility choices as well as economic and social opportunities for Papua New Guineans, and reducing local pollutants as well GHG emissions from the transport sector.

The Policy will also seek to put in place measures to support job creation wherever possible, including in the creation and maintenance of infrastructure and the repair and maintenance of EVs.

The policy proposes that the policy be implemented through the following instruments:

* GoPNG leadership
* E-bus pilot project
* Gender-inclusive Skill Centers
* Battery Recycling Ecosystem
* Data collection and information sharing
* Charging network and database

Private charging points

Public charging infrastructure

Favourable electricity tariff for charging facilities

Renewable energy for EVs

User charging costs and payment infrastructure

* Financial and fiscal instruments

Initiatives applicable across vehicle segments

Initiatives for different modes of vehicles

Public transport fleet:

Freight (commercial) vehicles and employee transportation vehicles:

Four-wheelers (E-Cars):

* Administrative framework for policy implementation

# SOLOMON IS DRAFT ROADMAP FOR E-MOBILITY / EV READINESS FRAMEWORK

The Solomon Is also received a TA to develop a policy roadmap for EVs.

The overall objective of the TA is to conduct market analysis to introduce and promote low carbon transport complemented with policy, implementation roadmap, feasibility study and capacity building on electric vehicles.

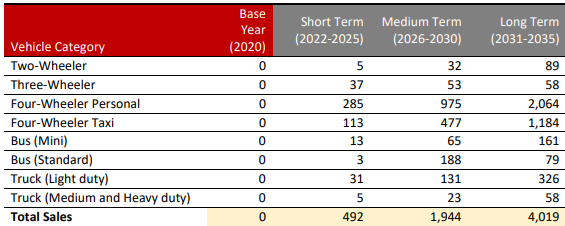
**CTCN’s support are in two areas:**

* Market analysis to recommend policy and implementation roadmap on low carbon transport through electric vehicle.
* Feasibility study on selected interventions and capacity building on low carbon transport.

The anticipated deliverables include:

* **A policy document** including the baseline assessment and barrier analysis to implement the policy, including the charging infrastructure required and battery management.
* **Draft and final report on implementation roadmap and stakeholder consultation** workshop
* **Draft and final report on the feasibility study** conducted.
* Draft **GCF concept note**
* **Report on capacity gaps** based on the assessment of the awareness of the stakeholders.
* **Virtual sessions** on capacity building and training with relevant materials
* Awareness raising **factsheets, brief manuals and brochures**

Proposed sales of EVs in the SI are as below:



EV sales as a % of total vehicle sales can be seen below:

Table

Description automatically generated

Proposed EV Public Charging Points:

Table

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The Policy Roadmap Measures include:

Establishing Targets

Financial Incentives for users

Non-financial incentives for users

Building and city development codes

Disincentives for ICEVs

Consumer Awareness

Costs about USD 26.3 million.

* 11.6 44% Bus subsidy
* 4.0 16% taxis subsidy
* .6 charger subsidy
* 8.4 Incentives to private cars
* 1.3 promotion & awareness

# **KEY MESSAGES**

* PICs are developing EV policies, roadmaps and framework to guide their effort on emobility
* Data collection, demonstration projects, financial incentives and disincentives and looking at the whole e-mobility ecosystem are highlighted in these policy documents
* Looking at the whole mobility options is also highlighted in these documents
* E-mobility is not a ready-made solution for all PICs, it needs to be thoroughly assessed on a case by case basis

# **SESSION 7 - DRAFT EMOBILITY STANDARDS AND GUIDELINES**

# GUIDELINE FOR EV CHARGING – UNIDO

The introduction of EVs would need Charging Standards covering areas such as safety (in terms of minimum requirements), interoperability of the EV and the charger and to ensure convenience (set specs for ordering vehicles)

On the other hand, we need Guidelines for setting the standards (ensure safety of installations and use), to ensure convenience is taken into account in the standards (… closest station …), and the speed of deployment and to provide flexibility for new technologies.

In March 2022, UNIDO drafted a template for PICs wishing to look at introducing a EV charging guideline. It also drafted a document with supporting information for PICs wishing to develop a national EV guideline for safe EV charging.

IEC Charging refers to 4 charging modes:

Mode 1 - AC Charging … e.g simple EV, domestic charging

* No pilot/checking system.
* May have little safety functions.
* Not recommended for HV charging.
* Not permitted in some countries.

Mode 2 – AC charging - At home - Slow Charging

In-Cord Control and Protection Device (IC-CPD):

* (Low voltage) pilot handshakes with EV and checks for faults before charging goes live.
* Regulates the charge rate.
* ‘Installation’ by plugging into socket outlet … requires electricity supply circuit to be safe.

‘Mode 3’ AC Charging … At-Home, Work, and in Public Spaces

Handshakes with EV and checks for electric faults before going live (as for Mode 2).

* Permanently wired to mains supply:
* Earth safety circuit more robust.
* Installed by a qualified electrician.

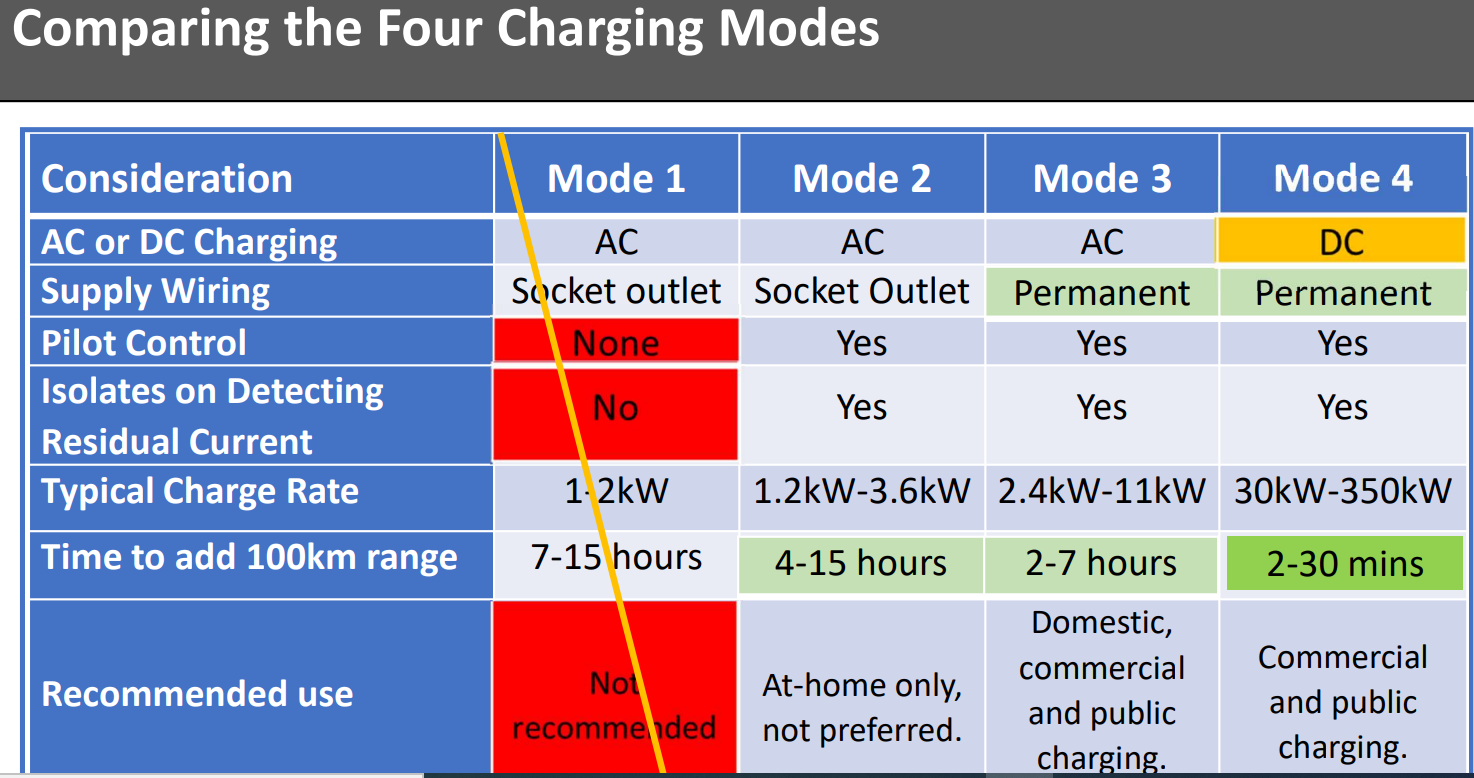
‘Mode 4’ AC Charging … ‘At-Home, Work, and in Public Spaces

e.g., Simple EV, Domestic Charging

* No pilot/checking system.
* May have little safety functions.
* Not recommended for HV charging.
* Not permitted in some countries.

Recommendations, making charging safer and convenient …

1. Equipment built to recognized international standards (e.g., IEC).
2. Installation/works to meet national standards and regulations.
3. Use RCD/GFFI protection on electric supply circuits used for charging.
4. Strongly discourage Mode 1 charging.
5. Encourage female Type 2 (Mennekes) for pubic AC charging.
6. Encourage CHAdeMO and CCS Type 2 for DC public charging.



Template and supporting information on PCREEE’s website.

Guideline now requires country-specific calibration, Country acceptance of (voluntary) guidelines, awareness raising (develop/provide infographics, webinars, other) and as required update of guidelines.

# PRIF TA ON STANDARDS FOR EVS FOR PICS

# WB AND PPA – DESIGN OF A REGIONAL E-MOBILITY POLICY FRAMEWORK AND TECHNICAL GUIDELINES IN THE PICS - INCHUL HWANG, WORLD BANK / RICHARD BRAMLEY, ECA, UK

The Word Bank is engaged on a TA which is a Study of a Roadmap for E-mobility in the PICs.

The TA is funded by the WB’s Korea Green Growth Trust Fund (KGGTF). The focus of the roadmap is on assessing **the feasibility of large-scale EV deployment** in the PICs, with particular consideration given to high levels of VRE in the electricity systems. The roadmap aims to provide concrete **policy recommendations and technical guidelines** to support the PICs in promoting a transition to sustainable, decarbonised transport.

The tasks of the consultants included studying and assessing the current status of e-mobility, grid impact assessment, cost-benefit analysis, barriers to e-mobility uptake, policy recommendations and technical guidelines/standards for EV charging and maintenance.

# **1.STATUS OF EVs IN THE PICs**

On the **Status –** the study found that E-mobility uptake remains low, but there is considerable potential. The following were identified:

* **Vehicle ownership** in the PICs is **low and the distances travelled** tend to be **short**, which has led to low e-mobility uptake at the moment
* However, short distances mean that virtually all trips can be conducted with less than a single charge. And fuel is expensive
* Potential uptake varies a lot by EV type, based on how mature the technologies are and their suitability for users in each PIC. For instance:
* Electric cars - High, particularly for taxis and high-use customers
* Electric motorbikes - High, in countries where motorbikes are already used
* Electric vans and trucks - High for delivery vans and transport, low for trucks
* Electric buses - Low unless heavily subsidised
* Electric boats - Low
* Micro e-mobility - Moderate to high, with only small barriers to entry
* Overall, **electric cars, motorbikes, and vans** have the most potential in the short to medium-term future

In terms of the future p**rospect of EVs in the PICs - the expected uptake is uncertain but will likely not exceed 10% by 2030.**

**Electric cars**

* Estimates suggest that globally at least 10% of cars will be EVs by the end of the decade
  + Exact **uptake rates are difficult to estimate** given uncertainties about future technology costs and policies
  + Uptake is generally expected to **be slower in low and middle-income countries** due to a reliance on second-hand vehicles and lower incomes
* ECA/TTA estimates that the share of **electric cars** in the PICs will be **6-19% of all cars in 2030,** based on 20%-60% EV share in new vehicle sales. Actual uptake is likely to be at the lower end of this range

**Electric motorbikes**

* **Uptake could be high** in countries already using two-wheelers, as low-cost models enter the market

**Electric vans**

* Uptake of electric vans **likely limited** to small goods transport and public transport

The study divided 11 PICs into f**our groups and sample countries and noted:**

* There is significant diversity across the 11 PICs
* To ensure the analysis and recommendations reflect this diversity, while also being informed by detailed analysis, the PICs are grouped into **four categories** and **select** **one country** from each to **analyse**
* Sample countries analysed in grid impact and economic viability assessments: **Fiji, Solomon Islands, Marshall Islands, Tuvalu**

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Countries** | **Key (relative) characteristics** | **Likely main types of e-mobility** |
| **Large markets** | * Fiji * Samoa | * Large (in size and population) * Wealthy * High vehicle ownership * Cheap electricity | * Electric cars (private, taxis) * Electric vans (taxis, commercial) |
| **Intermediate markets** | * Vanuatu * Solomon Islands * Tonga | * Large (in size and population) * Less wealthy * Low vehicle ownership | * Electric cars (taxis) * Electric vans (commercial) |
| **Small islands** | * Kiribati * FSM * Marshall Islands * Palau | * Small (short distances) * Low vehicle ownership | * Electric cars (taxis) * Electric motorcycles |
| **Very small islands** | * Nauru * Tuvalu | * Very small (short distances) * Very small markets | * Electric motorcycles and electric scooters |

# **2.IMPACT OF E-MOBILITY ON ELECTRICITY SYSTEMS**

In terms of the likely impacts of **e-mobility on the electricity systems, electricity demand will vary by country, based on car ownership & electricity demand:**

* **Fiji** impacts are relatively **high** (5% increase in demand for 10% EV uptake) due to higher car ownership and average distances travelled daily (~30km/car/day)
* Percentage impacts in **Solomon Islands** are also **high** (6% demand, 10% EV uptake) due to low existing electricity demand per customer, which counteracts its low car ownership
* Impacts on the **Marshall Islands** and **Tuvalu** are **very low** because car ownership is low (for example Tuvalu has only 65 registered cars)
* As a general rule for the large and intermediate markets, **every 1% uptake in e-mobility** will lead to an approximate **0.5% increase in electricity demand**

The study noted that **Solar + BESS and daytime charging will be the most efficient way to meet EV demand**

* A combination solar + BESS is currently more expensive than solar + diesel generation (although not by much at current fuel prices)
* Massive investment needed for solar + BESS and network upgrades will be a challenge, but it is expected to change by 2030 as the **cost of solar and BESS capacity continues to fall**
* It will be much **cheaper to supply EV demand during sunshine hours** than non-sunshine hours, by a factor of more than two in some cases
* This is true even after accounting for the fact that network costs are mostly incurred during weekday business hours
  + Because most PICs currently typically face peak demand during the middle of the day, driven by commercial air-conditioning

**Much more solar is needed to improve EV business**

* Most Pacific electricity systems have high solar potential but have underbuilt solar and therefore rely on diesel-fired generation
* **Diesel generation** (which is expensive and has high emissions) is currently the marginal generator in most countries, so is used to **supply any new EV charging demand** 
  + This limits the viability of EVs, as it leads to **high charging costs** and limited environmental benefits
* **Fiji** and **Samoa** are well **placed to displace diesel through a combination of solar and hydro**, but only if they invest more heavily in solar than planned
* Other PICs will **need to add a lot of solar and BESS** to regularly push diesel off the margin. Network upgrades might be pursued at the same time.

**The more daytime charging, the cheaper the cost of supplying EVs**

* Without incentives encouraging otherwise, residential consumers will likely prefer to charge at home, typically through trickle charging from a standard electrical outlet
* This would lead to a predominance of overnight charging, which would ease demands on generation and network capacity in the short-term
* But would be sub-optimal once the utilities invest more heavily in solar generation
* If EV demand is met with solar+BESS demand (instead of hydro), then overnight EV charging will be around 50% more expensive than daytime charging
  + Daytime charging can be encouraged through time-of-use (TOU) tariffs and by installing public charging facilities

# **3.ECONOMIC VIABILITY OF E-MOBILITY**

* Once governments know what is beneficial to society, they can implement policies that aligning societal benefits with individual financial incentives (eg. through tax breaks to reflect environmental benefits)
* The **viability of EVs** is calculated by **comparing EV and ICE costs:**
  + Upfront costs for vehicles and charging infrastructure
  + Fuelling/charging costs
  + Maintenance costs
  + Environmental costs from vehicles and electricity generation
* Net benefits are calculated under three distinct scenarios. **Low, medium, and high-use** cases for each EV Type (eg. taxis = high-use e-cars) are evaluated
  + To reflect that some vehicles are used more than others, which will impact how much lower operating costs offset higher upfront costs

**EVs will become viable if countries increase solar generation and encourage daytime charging**

* Despite forecast significant reductions in their upfront costs, e-cars, e-motorbikes, and e-vans are all **unlikely to be viable by 2030** if countries do not make significant investments in solar generation
* If the PICs successfully **increase solar penetration**, then **EVs will be viable**, except for when the usage is low
  + This also depends on countries implementing incentives to encourage daytime charging (to benefit from cheap and clean solar energy)
* The **higher benefits** in the **medium and high use cases (ie. commuters and taxis)**, suggests policies should focus on encouraging EV uptake among these groups
* In **Tuvalu** and other **very small islands**, EVs are **unlikely to become viable** in the short to medium term
  + The short distances travelled do not allow the high upfront costs of EVs to be recouped through lower operating costs

# **4.BARRIERS AND POLICY RECOMMENDATIONS**

# Barriers to e-mobility uptake in the PICs

* While there is variation between countries, the barriers shown in bold are generally the most impactful
* Not all of these can be easily mitigated, in particular those relating to **commercial viability**. But as demand grows, private sector will bring more cheaper second-hand EVs to market
* The **reliance on diesel-fired electricity generation** will **take time to mitigate**, but is critical. Decarbonisation of transport and electricity must happen in tandem
* Policy-makers should give all barriers some attention, because many are inter-dependent
* Unfortunately, smaller PICs will generally have a lower ability to act and mitigate barriers

# Barriers and Policy Recommendations – Transport/electricity infrastructure

|  |  |
| --- | --- |
| **Barriers** | |
| **A** | **Lack of electricity charging infrastructure** |
| **B** | **Dependency on diesel-fired electricity production and resulting high tariffs** |
| C | Lack of technical support and adequate maintenance services for EVs |
| D | Limited environmental benefits given reliance on diesel generation for electricity |
| E | Electricity grid has limited capacity for electricity charging infrastructure |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Policy recommendation** | **Potential impact** | **Fiscal affordability** | **Ease of implementation** | **Overall priority** |
| 1 | **Develop public electric charging infrastructure** | High | Medium | Medium | High |
| 2 | Support the development of in-house EV charging facilities | Medium | Medium | Medium | Medium |
| 3 | **Roll-out electricity smart meters** | High | Low | Medium | High |
| 4 | Require charging facilities in new buildings | Low-Medium | High | High | Medium |
| 5 | **Expand RE and BESS capacity** | High | Low | Low | High |
| 6 | **Introduce electricity time-of-use tariffs** | High | Medium | Medium | High |
| 7 | Foster development of private PV facilities to charge EVs | Medium | High | Medium | Medium |
| 8 | Conduct impact assessments of EV uptake on distribution grids | Medium | Medium | Medium | Medium |
| 9 | Offer special EV access | Low-medium | Medium | High | Low |

# Barriers and Policy Recommendations – Commercial viability

|  |  |
| --- | --- |
|  | **Barriers** |
| **F** | **Price gap between the upfront cost of EVs and ICE, with demand in the PICs very sensitive to price** |
| **G** | **Small trip distances limits operating cost savings** |
| **H** | **Reliance on second-hand vehicles and the limited second-hand EV market** |
| I | Limited financing options for investment in infrastructure and EV fleets |
| J | Limited fiscal capability to subsidise EV uptake |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Policy Recommendations** |  |  |  |  |
| 10 | Provide purchase incentives, such as subsidies or tax breaks | High | Low | Medium | High |
| 11 | Offer targeted financial incentives for private companies to establish EV fleets | Medium-High | Medium | Medium | Medium |

* These are focused on **reducing the upfront cost differential** between electric and ICE vehicles and fairly reflecting the environmental benefits of EVs
* Policy makers should hold off introducing large purchase incentives until their national electricity system can charge EVs from renewable sources
* Many of these are interrelated and are focused on enabling **daytime EV charging using cheap solar generation**
* Some are contingent on others and should not necessarily be implemented immediately. For example introducing **time-of-use tariffs requires roll-out of smart meters** and **should not be implemented until RE capacity has been expanded**

# Barriers and Policy Recommendations – Governance and policy

|  |  |
| --- | --- |
| **Barriers** | |
| **K** | **No clear e-mobility strategy or roadmap** |
| L | Limited coordinated efforts between the Pacific Island Countries |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Policy recommendation** | **Potential impact** | **Fiscal affordability** | **Ease of implementation** | **Overall priority** |
| 12 | **Create a regional e-mobility council** | Medium | High | High | High |
| 13 | **Develop a regional e-mobility strategy** | Medium | Medium | High | High |
| 14 | **Develop national e-mobility strategies** | Medium | High | High | High |
| 15 | Monitor progress made on e-mobility | Low | High | High | Medium |
| 16 | Coordinate planning across public administrations | Low | High | Medium | Medium |

* **This roadmap** provides a starting point for **regional and national e-mobility strategies**
* Such strategies should be developed by local stakeholders to ensure that they have ownership over the policy

# Recommendations – Regulations and standards

|  |  |
| --- | --- |
| **Barriers** | |
| **M** | **Absence of regulations and standards relating to EVs** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Policy recommendation** | **Potential impact** | **Fiscal affordability** | **Ease of implementation** | **Overall priority** |
| **17** | **Establish regulatory instruments for EVs** | **Medium** | **High** | **Low-medium** | **Medium** |
| **18** | **Develop technical guidelines for EV charging** | **Low-medium** | **High** | **High** | **Medium** |
| **19** | **Establish minimum standards for EVs and charging equipment** | **Low-medium** | **High** | **High** | **High** |
| **20** | **Develop public procurement procedures for EV products** | **Low-medium** | **High** | **High** | **Medium** |

* Technical annexes to the report, which can be used as a starting point for national guidelines and standards, include:
  + Technical guidelines for EV charging stations
  + Minimum standards for EV charging equipment
  + Guidelines for EV maintenance procedures

# Barriers and Policy Recommendations – Communication and awareness

|  |  |
| --- | --- |
| **Barriers** | |
| Limited experience and training with EVs |
| Limited understanding of quality standards of EVs and associated products |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Policy recommendation** | **Potential impact** | **Fiscal affordability** | **Ease of implementation** | **Overall priority** |
| 21 | **Develop an e-mobility communication strategy** | Medium | High | Medium | High |
| 22 | Engage with stakeholders | Medium | High | Medium | Low |
| 23 | Launch EV pilot projects | Medium | Medium | Medium | Medium |
| 24 | Switch public vehicle fleets to e-mobility | Medium | Low | Short term | Low |
| 25 | Provide training and information on e-mobility | Medium | High | Medium | Medium |
| 26 | Mainstream gender aspects in EV policy | Low | High | Medium | Medium |

* An e-mobility communication strategy will be a key step in the implementation of regional and national e-mobility strategies

# **KEY MESSAGES**

* Opportunities for e-mobility vary from country to country and from vehicle to vehicle
* Impacts Of emobility on the electricity demand will vary by country, based on car ownership & electricity demand
* There is a need for fully study and understand the economic viability of e-mobility and to design policies accordingly
* There are various barriers relating to emobility in the areas of transport and electricity infrastructure, communication and awareness, regulations and standards, governance and policies as well as economic viability and these must be addressed
* Among the recommendations for addressing the governance and policy barriers is the need to establish a regional e-mobility council / support group

**SESSION 8 - A CONSULTATIVE AND COORDINATION MECHANISM FOR E MOBILITY IN THE PICTS** – Andrew Campbell

The question was asked as to where to from the Workshop.

The workshop was reminded that the Common Success Themes of transport roadmaps among many countries, include:

* Having a vision of the future that is wanted
* A specific dedicated group with specific tasks and responsibilities
* An agreed roadmap by and for all parties
* Practical Targets
* Well-thought out incentives
* Quality, dependable information, … quality marketting / public management
* Supporting policy

In terms of developing emobility roadmaps, the PCREEE Regional EV programme have activities under Standards and Guidelines, Awareness and Promotion, Demonstration and Upscale under each type of vehicle and charging facility, which countries can consider for their roadmaps.

Under Central Policy and Administration, the proposed activities include:

* Developing high level targets and mandates
* Form a regional EV Coordination Hub for coordinating programmes and collecting and sharing information
* Develop national EV roadmaps
* Set tax levels
* Develop minimum specs for import
* Deploy a M & E system
* Introduce / amend regulatory frameworks
* Maintain a watching brief on global EV-related developments

Referring to the World Bank study:

**High Level Interventions include:**

Roll out electricity smart meters

Expand RE and Bess Capacity

Introduce TOU tariffs

Provide purchase incentives, such as subsidies or tax breaks

Create a regional emobility council

Develop regional / national emobility strategies

Minimum standards for EVs and charging equipment

Communication Strategy

**Medium Level Interventions include:**

Medium Level Interventions

Conduct impact assessments on the grids

Targeted incentives to establish EV fleets

Coordinate planning

Public procurement procedures

Monitor progress

Guidelines for EV charging

Regulatory instruments

Launch EV pilot projects

**Low Level Interventions include:**

Offer special EV access

Engage with stakeholders

Switch public vehicle fleets to emobility

GGGI SUSTAINABLE MOBILITY WORK GLOBALLY AND IN THE PACIFIC REGION **– Dr Julia Hollnagel,**

**GGGI’s transport sector priorities:**

**Mainstreaming sustainable transport strategies** into national, sub-national, regional, local, and sectoral policies and development plans;

**Developing sustainable transport projects/programs** by applying e-mobility  
solutions to transport infra & system investments; and

Strengthening and supporting relevant **stakeholder capacity**through a diverse set of global programs

GGGI’s Transport Approach -

* Linking e-mobility solutions to smart public transport infra & system
* Applying an e-mobility component to relevant projects
* Facilitating the adoption of the e-mobility in the private sector

GGGI’s Sustainable Mobility Work in the Pacific

* Offices in 5 Countries: Kiribati, Tonga, Papua New Guinea, Vanuatu and Fiji
* (+ CFAN advisors covering additionally Tuvalu, Samoa and the Solomon Islands)
* Providing technical assistance for  
  i. strengthening the regulatory framework and filling of gaps in technical,  
  financial, and legal studies to enable e-mobility adoption,  
  ii. the preparation of bankable concept notes, and  
  iii. capacity building and knowledge sharing.  
  Supporting identification and mobilization of resources Integrated Sustainable Transport Project for Korean Green ODA (at concept level stage)
* E-Mobility Global Program expansion to Pacific region under GEF8 jointly with UNEP

# **KEY MESSAGES**

It is important for the PICs to learn from other countries who have advanced with their emobility effort**.**

**Part of the success stems from having a comprehensive Emobility roadmap with practical targets**

It is critical that the electrification of transport is aligned with the decarbonisation of the electricity system, and that the electricity system is able to cope with the increased electricity demand.

It is important to set up a emobility group to support and monitor the region’s emobility developments.

# **SESSION 9 - KEY MESSAGES FOR THE PACIFIC ENERGY MINISTERS’ MEETING**

# **KEY MESSAGES**

**KEY MESSAGES FOR THE PACIFIC ENERGY & TRANSPORT MINISTERS**

**BACKGROUND**

* Addressing the imbalance in regional energy sector support & EE in the transport sector has been talked about but not much follow up on the ground
* Pacific Energy and Transport Ministers had the foresight and courage
* At the 4th PETMM, Ministers tasked SPC, UNIDO and SIDS Dock to design and roll out a regional e-mobility policy and programme
* PICs is suitable for e-mobility
* High renewable energy targets and ambitions
* Short average distances travelled per day
* High fuel dependency and costs
* Vehicle ownership is low
* Aging vehicle fleets

**Electrification of the transport sector must go hand-in-hand with the pursuit of RE and EE targets**

**Transport and the Power Utility must play a key role**

* At the national level, PICs were following up on the PA, and submitted their NDCs and NDC Plus and placed priority on EE in the transport sector with e-mobility as one of the options
* Some PICs were updating their energy sector plans and roadmaps and included e-mobility
* PCREEE started rolling out the regional e-mobility programme in 2021.

Deliveries by the SPC regional e-mobility programme [supported by UNIDO and ADA]

* Webinars on EVs – Regional, Kiribati, Nauru, SI, Tonga, Tuvalu and Vanuatu
* Awareness Event focussing on sustainable transport in Samoa
* Developed CTCN funding proposals for SI and Vanuatu – e-mobility feasibility study, EV roadmap, etc
* Legal TA to Leaf Capital [Fiji]
* Exposure visit [Tuvalu] and participation at the NZ EV Summit – [Fiji and Tonga]
* Development of awareness materials on EVs
* Convening of the first regional workshop

**KNOWN E-MOBILITY EVENTS IN THE PICs**

| **Country** | **Pilot Project** | **Supporting Agencies** |
| --- | --- | --- |
| American Samoa |  |  |
| Cook Is | EV charger demo by power utility (2017) | Te Aponga Uira |
| Fiji | Techno Feasibility Study for shuttle buses | * Commonwealth |
| TA for decarbonizing Government Fleet | EU |
| design and built of a solar powered electric outboard engine of a fishing boat | EU, MTCC SPC |
| Readiness proposal to scale ebus pilot (GCF) | TBC |
| Project for the enhancement of planning for transport decarbonization and electric mobility | KOICA |
| Electric Vehicle Charging Network Development (NDC Investment Plan) – final stage of publication | LEAF Capital / SWITCH |
| Launch the first Fiji and Pacific Islands States Electric Charging Network | UNDP Blue Accelerator Grants Scheme (BAGS) |
| 0 emission bus network proposal | ZekiTek |
| e-mobility roadmap study | World Bank |
| French Polynesia |  |  |
| FSM |  |  |
| Guam |  |  |
| Nauru | EV activities under GEF project |  |
| New Caledonia |  |  |
| Niue | EV activities under GEF project |  |
| Palau |  |  |
| PNG | Development of an EV policy | CTCN |
| RMI | 10 e-scooters & a charging station provided to the police in 2021 for demonstration of the technology | EU |
| EV roadmap study | World Bank |
| Samoa | 10 EV Cars by the power utility - EPC |  |
| Solomon Is | Policy Roadmap for e-mobility | CTCN |
| e-mobility roadmap study | World Bank |
| Tonga | EV roadmap and strategic plan | NREL [USA] |
|  | E-vehicle and charging station demo | PCREEE |
| Tuvalu | 12 e-bikes by power utility - TEC | World Bank |
| EV roadmap study | World Bank |
| Vanuatu | Feasibility study for low emission land transport sector | CTCN |
| Wallis & Futuna |  |  |

**IDENTIFIED BARRIERS TO E-MOBILITY**

| **BARRIERS** | **STATUS AND PROGRESS** |
| --- | --- |
| **Transport and electricity infrastructure** |  |
| Lack of electricity charging infrastructure | PICs are piloting charging stations. Run as a business in Fiji |
| Dependency on diesel-fired electricity production and resulting high tariffs | Ambitious RE targets have been adopted and pursued to address this. |
| Lack of technical support and adequate maintenance services for EVs | Private sector will respond to a clear govt policy on EVs and movements in the market |
| Lack of technical support and adequate maintenance services for EVs | Private sector will respond to a clear govt policy on EVs and movements in the market |
| Limited environmental benefits given reliance on diesel generation for electricity | Ambitious RE targets have been adopted and pursued to address this. |
| Electricity grid has limited capacity for electricity charging infrastructure | Depend on a case by case basis |
| **Commercial viability** |  |
| Price gap between the upfront cost of EVs and ICE, with demand in the PICs very sensitive to price | Financial and fiscal incentives are being considered. Rolled out in Fiji already. |
| Small trip distances limits operating cost savings | Can be an advantage for EVs too. |
| Reliance on second-hand vehicles and the limited second-hand EV market | Secondhand car dealers are not motivated to import EVs |
| Limited financing options for investment in infrastructure and EV fleets | The finance is there. Accessing the funds is another issue. |
| Limited fiscal capability to subsidise EV uptake | No sufficient hands-on experiences yet to guide the subsidy discussions |
| **Governance and policy** |  |
| No clear e-mobility strategy or roadmap | PICs are working on their strategies and roadmaps, etc |
| Limited coordinated efforts between the Pacific Island Countries | First regional workshop on e-mobility on 28 – 30 Nov 2022 |
|  |  |
| **Regulation and standards** |  |
| Absence of regulations and standards relating to EVs | UNIDO and PRIF are working on one. |
| **Communication and awareness** |  |
| Limited experience and training with EVs |  |
| Limited understanding of quality standards of EVs and associated products |  |

**RECOMMENDATIONS**

|  |  |  |
| --- | --- | --- |
| **Transport/electricity infrastructure** | **Status** | **Lead / Volunteer** |
| Develop public electric charging infrastructure | Pilot projects are being considered | PCREEE and the industry |
| Roll-out electricity smart meters |  |  |
| Expand RE and BESS capacity |  |  |

* Many of these are interrelated and are focused on enabling daytime EV charging using cheap solar generation
* Some are contingent on others and should not necessarily be implemented immediately. For example introducing time-of-use tariffs requires roll-out of smart meters and should not be implemented until RE capacity has been expanded

|  |  |  |
| --- | --- | --- |
| **Commercial viability** | **Status** | **Lead / Volunteer** |
| Provide purchase incentives, such as subsidies or tax breaks |  |  |

* These are focused on reducing the upfront cost differential between electric and ICE vehicles and fairly reflecting the environmental benefits of EVs
* Policy makers should hold off introducing large purchase incentives until their national electricity system can charge EVs from renewable sources

|  |  |  |
| --- | --- | --- |
| **Governance and policy** | **Status** | **Lead / Volunteer** |
| Create a regional e-mobility council | PCREEE has proposed a EV Working Group – see **Annex 5** | PCREEE as the secretariat |
| Develop a regional e-mobility strategy | Isn’t the regional EV programme sufficient? |  |
| Develop national e-mobility strategies | Strategies, roadmaps and action plans are being developed | National energy and local authorities |

* This WB roadmap provides a starting point for regional and national e-mobility strategies
* Such strategies should be developed by local stakeholders to ensure that they have ownership over the policy

|  |  |  |
| --- | --- | --- |
| **Regulations and standards** | **Status** | **Lead / Volunteer** |
| Establish minimum standards for EVs and charging equipment | UNIDO support & PRIF TA | UNIDO & PRIF |

* Technical annexes to the report, which can be used as a starting point for national guidelines and standards, include:
  + Technical guidelines for EV charging stations
  + Minimum standards for EV charging equipment
  + Guidelines for EV maintenance procedures

|  |  |  |
| --- | --- | --- |
| **Communication and awareness** | **Current Status** | **Lead / Volunteer** |
| Develop an e-mobility communication strategy | None in existence |  |

* **An e-mobility communication strategy will be a key step in the implementation of regional and national e-mobility strategies**

**Recommendations to Ministers [to note, to acknowledge, call, to approve, etc]**

**Note** the progress with the roll out of the regional e-mobility programme [A summary of the e-mobility workshop outcome will be annexed to the meeting paper]

1. **Acknowledge** national effort on e-mobility
2. **Acknowledge** DPs’ and the private sector’s effort on e-mobility
3. **Acknowledge** the need for the pursuit of e-mobility to be conducted in tandem with the pursuit of renewable energy targets
4. **Acknowledge** the need for the Power Utility and Transport to be actively involved in the e-mobility development
5. **Call** on DPs and donors to support EV feasibility studies, pilot projects
6. **Approve** the establishment of the regional EV Working Group

# **SESSION 10 – SITE VISITS**

The workshop concluded with site visits to a Leaf Capital charging station at the Kundha Singh Supermarket, Princess Road, Suva and the Proposed Valalevu bus terminal.

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| --- | --- |
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# **WORKSHOP EXPENSES**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  | **Country Participant** | **DSA (Daily Subsistence Allowance** | **E-Ticket** | TOTAL |  |
|  | Cook Island | $ 2,693.45 | $ 3,377.22 | $ 39,411.72 |  |
|  | Samoa | $ 2,631.22 | $ 2,149.14 |  |
|  | Tonga | $ 15,876.73 | $ 7,226.70 |  |
|  | Vanuatu | $ 3,550.88 | $ 1,906.38 |  |
|  | **Other Related Expenses** |  |  |  |  |
|  | Bus Hire for the Field Trip | $ 275.00 | | |  |
|  | Catering | $ 7,565.00 | | |  |
|  | IT Overtime Assistance | $ 30.00 | | |  |
|  | Other Training Materials | $ 322.05 | | |  |
|  |  |  |  |  |  |
|  | **TOTAL WORKSHOP EXPENSES (FJD$)** | | | **$ 47,603.77** |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

# **ANNEX 1**

**PACIFIC ISLANDS WORKSHOP ON ELECTRIC MOBILITY**

**28 – 30 November 2022**

**Pasifika Conference Room, Lotus Building, Nabua, Suva**

**Draft Agenda Items**

**DAY 1**

**THEME : THE POTENTIAL ROLE OF E-MOBILITY ON THE PACIFIC ISLANDS’ ENERGY SECURITY AND 1.5OC AMBITIONS**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **TOPIC** | **PRESENTER** | **STATUS** |
| **OPENING** | | | |
| 0830 - 0900 | Registration | | |
| 0900 - 0910 | Welcome – Solomone Fifita, PCREEE | | |
| Statement by UNIDO - Mr Stein Hansen – UNIDO Regional Director for Asia and the Pacific | | |
| Opening Remarks by Ms. Rhonda Robinson, Director, Geoscience Energy and Maritime Division, SPC | | |
| Group Photo | | |
| **Session 1** | **Sustainable Mobility and the Pacific Islands’ energy and climate committments** | | |
| 0910 – 0920 | * Sustainable Mobility at the Global Level – SDGs, COPs, etc * PCCC key function on supporting Innovation | ‘Ofa Kaisamy,  Manager Pacific Climate Change Centre, SPREP | confirmed |
| 0920 – 0930 | * Sustainable Mobility at the regional level – the role of the NDC Hub | Amit Singh, NDC Hub, SPC | **c**onfirmed |
| 0930-0940 | * Sustainable Mobility at the regional level:   Related outcomes from the Pacific Regional Maritime Transport Officials meeting: 15-18 Nov | Yolisaguyau Tom’tavala, Policy and Legal Adviser, Oceans and Maritime Programme (OMP),  Geoscience, Energy and Maritime (GEM) Division, SPC | confirmed |
| 0940-0950 | * Sustainable Mobility at the sub-regional level – Micronesian Center for Sustainable Transport. | Dr. Peter Nuttal / Andrew Irwin | confirmed |
| 0950 - 1000 | * Sustainable mobility at the national level - PICs Energy Roadmaps, NDCs, LEDS, SDG 7 Roadmap, etc | Sosefo Tofu, PCREEE | confirmed |
| 1000-1030 | **MORNING TEA** | | |
| **Session 2** | **Framework for regional transport services** | | |
| 1030 - 1230 | * The draft structure of the new regional transport framework | Jane Romero Technical Assistance Officer, PRIF | To be confirmed with Jane Romero |
| 1230 - 1330 | **LUNCH** | | |
| Session3 | **Sharing the expériences on e-mobility developments in SIDS, Asia & Africa, Europe, NZ and beyond** | | |
| 1330 - 1350 | * Caribbean | Dr. Gary Jackson, Executive Director, CCREEE | Confirmed. Will send a recorded presentation. |
| 1350 - 1410 | * Asia & Africa | Andrew Campbell | confirmed |
| 1410 - 1430 | * Europe | Sema Gentjan, Project Administrator, UNIDO | confirmed |
| 1430 - 1450 | * NZ | Richard Briggs, EECA | Confirmed. To be delivered virtually. |
| 1450 - 1500 | * Q & A |  |  |
| 1500 - 1530 | **AFTERNOON TEA** | | |
| **Session 4** | **Perspectives and expériences on e-mobility** | | |
| 1530 - 1545 | * Power Utility Perspectives | Te Aponga, Cook Is - Danny Vakapora  EPC Samoa – Reuben Talaepa  Tuvalu Electricity Corporation - Mafalu Lotolua | confirmed  confirmed  confirmed |
| 1545 - 1600 | * Regulator Perspective | Paul Kaun – CEO, URA, Vanuatu | confirmed |
| 1600 - 1615 | * Transport Perspective | Fiji LTA | to be confirmed |
| 1615 - 1630 | * Energy Office Perspective | Kakau Foliaki, DoE, Tonga | confirmed |
| 1630 – 1645 | * Investor Perspective | David Eyre, PFAN | Confirmed |
| 1645 - 1700 | * Development Partner perspective | Ms.Roxane Castelein, EU | Confirmed |
|  | **END OF DAY 1** | | |

**DAY 2**

**THEME : THEME :** **BUILDING BACK STRONGER AND BETTER WITH SUSTAINABLE MOBILITY**

|  |  |  |  |
| --- | --- | --- | --- |
| **Session 5** | **Investing in e-mobility** | | |
| 0900-0930 | * EV charging as a business | Alex Reddaway, Leaf Capital / SWITCH Network | confirmed |
| 0930 - 1000 | * Proposal for a zero emission bus network in Fiji | Bill Marr, Director and Business Adviser, ZekiTek | Confirmed on 241122 to be done virtually |
| 1000-1030 | **MORNING TEA** | | |
| **Session 6** | **E-mobility policy, roadmaps and readiness framework** | | |
| 1030 - 1100 | * Tonga EV Roadmap & Strategic Plan | Bonnie Powell &  Dustin Weigl - NREL | Confirmed  to be done virtually |
| 1100 - 1130 | * PNG EV Policy | Kalina Naris, National Energy Authority, PNG | Sosefo as the alternative |
| 1130 - 1200 | * Solomon Is draft roadmap for e-mobility / EV readiness framework | John Korinihona / WB | Solomone as the alternative |
| 1230 - 1330 | **LUNCH** | | |
| **Session 7** | **Draft emobility standards and guidelines** | | |
| 1330 – 1500 | * The UNIDO draft | Andrew Campbell | confirmed |
| 1500 – 1530 | **AFTERNOON TEA** | | |
| 1530 – 1630 | * PRIF TA on standards for EVs for PICs | Luke Smith & Andrew Campbell | confirmed |
| 1630 - 1700 | * WB and PPA – design of a regional e-mobility policy framework and technical guidelines in the PICs | Inchul Hwang, World Bank / Richard Bramley, ECA, UK | confirmed to be delivered virtually. |
|  | **END OF DAY 2** | | |

**DAY 3**

**THEME: MOVING FORWARD COOPERATIVELY AND COHESIVELY**

|  |  |  |  |
| --- | --- | --- | --- |
| **Session 8** | A consultative and coordination mechanism for e-mobility in the PICTs | | |
| 0900 - 0930 | * Coordinating of e-mobility effort in the region and regular networking | * Andrew Campbell | Confirmed |
| 0930 - 1000 | * Possible resource mobilization effort and GGGI’s transport effort | * Julia Hollnagel, Senior Officer- Pacific Transport & Sustainable Mobility, GGGI | confirmed |
| **Session 9** | **Key messages for the Pacific Energy Ministers’ Meeting** | | |
| 1000 - 1030 | * Key Messages | Solomone Fifita, PCREEE | confirmed |
| 1030 - 1100 | **MORNING TEA** | | |
| **Session 10** | **SITE VISITS** | | |
| **1100 - 1230** | * Charging Stations:  1. Kundan Sign   Supermarket, Princess Rd, Suva   1. Mana Coffee, Holland St, Suva | Alex Reddaway, Leaf Capital / SWITCH Network | confirmed |
| * Bus routes - Fiji shuttle bus project sites – Valelevu | Bill Marr, ZekiTek | confirmed |
|  | **LUNCH** | | |
|  | **END OF DAY 3** | | |

# **ANNEX 2**

Pacific Islands Workshop on Electric Mobility (28-30 Nov 2022) & Virtual Meeting of the PCREEE Steering Committee (1-2Dec2022) Pasifika Conference Room

Participants List

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pacific Islands Workshop on Electric Mobility (28-30 Nov 2022) & Virtual Meeting of the PCREEE Steering Committee (1-2Dec2022) Pasifika Conference Room Participants List** | | | | | |
| **No.** |  | **Country Nominee** | **Company/ Organisation** | **Job Title** | **Email Address** |
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| 9 | PNG | Mr.Derek Warakai | East Sepik Provincial Government | Director Disaster & Climate Change | [derekwarakai@gmail.com](mailto:derekwarakai@gmail.com) |
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| 13 | RMI | Mr.Kamalesh Doshi | Ministry of Environment - RMI | World Bank Sustainable Energy Development Program Project Manager | [kamaleshdoshi6@gmail.com](mailto:kamaleshdoshi6@gmail.com) |
| 14 | Samoa | Mr.Reuben Patrick Daniel Jnr Talaepa | Electric Power Cooperation | GIS- Engineer | [talaepap@epc.ws](mailto:talaepap@epc.ws) |
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|  |  |  |  |  |  |
| **Organisations** | | |  |  |  |
|  |  |  |  |  |  |
| 20 | Commonwealth | Catherine Cooke |  |  |  |
| 21 | EECA | Richard Briggs | Energy Efficiency and Conservation Authority of NZ |  |  |
| 22 | EU | Ms.Roxane Castelein | European Union | Mitigation Adviser | [Roxane.CASTELEIN@eeas.europa.eu](mailto:Roxane.CASTELEIN@eeas.europa.eu) |
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| 25 | GGGI | Mr.William Rolaston | GGGI (Global Green Growth Institute) | Consultant |  |
| 26 | Iron Nova | Mr.Vimal Ram | Iron Nova Inc |  | [info@ironnova.ca](mailto:info@ironnova.ca) |
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|  |  |  |  |  |  |
| **Pacific Community (SPC)** | | | | | |
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| 40 | PCREEE | Solomone Fifita | SPC-PCREEE | PCREEE Manager | [solomonef@spc.int](mailto:solomonef@spc.int) |
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|  |  |  |  |  |  |

# **ANNEX 3**

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Opening Remarks by

Mr. Stein Hansen, Director and UNIDO Representative

Regional Hub in Thailand

Pacific Islands Workshop on Electric Mobility

*“The Potential Role of E-mobility on the Pacific Islands’ Energy Security and*

*1.5oc Ambitions”*

Pasifika Conference Room, Lotus Building, Nabua, Suva,

28 – 30 November 2022

Excellences, distinguished delegates and experts, ladies and gentlemen,

On behalf of the United Nations Industrial Development Organization – UNIDO – I am honored to join you at this essential event on e-mobility. I wish to thank our partners and friends at PCREEE and SPC for having organized such a timely meeting!

Ladies and gentlemen, This event takes place right after the conclusion of the COP27 in Egypt, where ambitious commitments towards greening our economies and recovery pathways from COVID-19 were presented. A notable achievement, among others, was be the creation of a Loss and Damage Fund. This fund will be relevant to the Pacific Island Countries and Territories, considering the exposure to climate threats. Around the world, and especially in your region, we see the impacts of climate change, more extreme weather events - severe storms, droughts, flooding and heat waves are happening with greater frequency and intensity. Our global economic reliance on fossil fuels, the COVID-19 pandemic and the recent conflict in Europe have currently brought energy security to the top of the global agenda. The impacts of these crises have not been shared equally. Indeed, as we all know, it is the most vulnerable people that are being impacted the most by climate change and the energy crisis. As small and remote economies, the Pacific SIDS are bearing the brunt of such challenges. The region’s limited natural resources. The economies that lack diversification and the disproportionate suffering from large distance to major markets. The dependence on imported fossil fuels contributes to serious fiscal deficits, leading to higher energy costs for families and key island industries. This fossil fuel pathway implies fewer jobs, fewer opportunities for the youth and less resources to adapt to climate change. A rapid transformation towards sustainable energy is therefore imperative for the SIDS.

Sustainable energy represents an important tool to improve the competitiveness and productivity of key island industries, ranging from the generation and distribution of power and energy services, to construction, fisheries, agroprocessing, ecotourism, net zero transport, waste management, as well as water/desalination. In this perspective, considering the GHG emissions reduction potential in the Pacific, e-mobility solutions have a key role to play in addressing energy security and meeting climate targets.

Ladies and gentlemen, When asked about the newly invented cars in 1905, the German Kaiser, Wilhelm II, responded that he rather ‘*believed in horses… automobiles are a passing phenomenon*’. We all know how that story ended. Automobiles turned out to be not just faster than horses. Their large-scale adoption has reshaped both our livelihoods and our modern way of living. Similarly today, the electrification of transport is set to dramatically transform not only mobility per se, but also the way energy is supplied and consumed. The last decade has seen an unprecedented revolution in EV economics worldwide. According to the latest edition of the IEA’s Global Electric Vehicle Outlook, more electric cars sold on average in one week in 2021 than in the whole of 2012, reaching a record number of 6.6 million – almost half of these in China, following with 2.3 million in Europe and 630,000 in the United States. By 2021 there were more than 450 commercially EV models available: that is five times more than in 2015. Such a growth has been boosted more than half of a trillion $USD in planned EV supply chain investments. EV battery prices have plunged by 89% during the last decade. Policy support has played an instrumental role in stimulating these investments. The EU and California have pledged to have 100% zero emissions vehicles sales by 2035. This is fundamental step towards full e-mobility transition.

Ladies and gentlemen,

Now, coming back to the Pacific. Mindful of the great potential and opportunities that electric vehicles (EVs) can bring to the region, the Fourth Pacific Regional. Energy and Transport Ministers’ Meeting requested PCREEE and UNIDO in 2019 to assist the Pacific Island Countries and Territories with the development of a regional e-mobility policy document and a regional e-mobility program.

Since then, UNIDO and PCREEE have developed a comprehensive technical assessment to identify feasible and viable options for integrated e-mobility solutions in the PICTs. Based on these findings, a regional policy document has been developed with concrete EV targets by 2030 and 2050. The document includes thirty-eight specific policy actions required to address the existing barriers for EV products and services. Furthermore, UNIDO and PCREEE have developed a draft project document for a regional e-mobility program. That is based on an integrated approach that promotes the expansion of renewable energy power generation, e-mobility and electrical storage simultaneously. The programme can bring multiple benefits and mark a paradigm shift in the power and transport sectors of Pacific islands. A harmonized regional approach can help to address existing barriers more effectively and at a lower cost. It can promote common standards between countries and create the needed economies of scale to influence international vehicle supply chains and investments in charging infrastructure and innovative e-mobility business models.

The program will include south-south and triangular cooperation with other SIDS regions and pioneering e-mobility countries (e.g. China, Norway, US, individual EU countries) within the Global Network of Regional Sustainable Energy Centers. Currently, CCREEE in the Caribbean and ECREEE in West Africa are working on similar e-mobility initiatives.

Colleagues, ladies and gentlemen, Despite the multiple challenges, I remain optimistic for this region. While looking at today’s programme and the invaluable partners sitting here around this table, I am happy to note that the work we started on e-mobility has created a powerful snowball effect. Quite a few of you are doing significant work on many levels: policy, technical guidelines and standards, charging infrastructure, private sector engagement and financing mechanisms, innovative business models, grid integration, etc. Significant progress has been made, but a lot still remains ahead of us. We need to substantially push on the accelerator, increasing both our ambition and speed.

We remain at your disposal to support you with technical assistance and innovation on e-mobility. Progress by innovation, is our motto at UNIDO. UNIDO is ready to continue helping the countries with the development of their national e-mobility roadmaps, including the demonstration of e-mobility solutions, integrated with renewable sources of energy. In conclusion, I encourage you all to join hands and work together. Only through a joint cooperation and a holistic approach to e-mobility, we can bring the much-needed transformation in the Pacific!

Thank you, and I am looking forward to a fruitful deliberation of this meeting!

# **ANNEX 4**

**PACIFIC ISLANDS WORKSHOP ON ELECTRIC MOBILITY**

**28 – 30 November 2022**

**Pasifika Conference Room, Lotus Building, Nabua, Suva**

Opening Address

By Mr Akuila Tawake, Deputy Director, Georesources and Energy Programme, GEM Division, SPC 

* Distinguished government representatives – including those who are joining us online
* Mr Stein Hensen, UNIDO Regional Director for Asia and the Pacific
* Mr. Manfred Bürstmayr, Advisor Sustainable Energy, Austrian Development Agency
* Mr. Sema Gentjan, representative of the 10 regional energy centres that are members of the Global Network of Sustainable Energy Centres
* Representatives of Development Partners
* Representatives of fellow sister CROP agencies
* Representative of the private sector and the energy industry
* Ladies and Gentlemen

Good morning, Bula and welcome to the Pasifika Conference room and to the Lotus Building – the home of the Geoscience Energy and Maritime Division of the Pacific Community.

I see some familiar faces from earlier Energy events and am pleased to see new ones too. It shows that this subject of electric mobility does not restrict itself to the government energy offices only. It extends to cover transport, power utilities, the energy regulators and the transport industry too.

There are very interesting events happening in our world these days:

At the global level, hundreds of Pacific Islands Leaders and very senior government officials were recently in Egypt at the COP 27 and were joining thousands from around the world to discuss how to save humanity and our planet from the rise in the average global temperature due to increasing concentration of greenhouse gas emissions in the atmosphere.

At the regional level, the Pacific Power Association held its 29th Annual Conference and Trade Exhibition last week at Brisbane, Australia on the theme - “Supporting Utilities towards Environmental Stewardship, Operational Performance and Financial Stability”.

In July this year, the Pacific Energy Officials met to discuss priorities and challenges in the energy sector.

Just last week, the Pacific Maritime Transport Officials met to look at the opportunities and challenges in the maritime transport sector.

At the national level, this week is the Energy Awareness week in Samoa on the theme – Sustainable Energy Transitions Enhanced. Tomorrow is dedicated to an Energy Investment Forum – a matchmaking event for investors and project developers in Samoa.

All these global, regional and national events have one common thread – saving our planet and reducing GHG emissions by increasing the use of feasible renewable energy and energy efficient technologies.

The consumption by the transport sector of the bulk of the fossil fuel imported to this region is very well known. It is also very well known that the transport sector holds the key to the region’s contribution to the global effort to significantly and urgently reduce GHG emissions. We all know that the PICTs have adopted very ambitious renewable energy targets and, if achieving these targets can also provide renewable electricity for our transport sector, then we have a very promising future ahead of us.

The decision therefore by the Energy Officials Meeting in July to convene this first ever regional workshop on electric mobility in the region is timely. It is happening right at the end of COP 27 and this is what real actions on the ground is all about.

There are a lot of work on e-mobility going on in the region and each country and development partner have gained some knowledge and experiences about e-mobility. But we have not had the opportunity to sit down together as a region and as a group of practitioners with common interests to freely share our hands-on experiences – the positives and the negatives too.

I am therefore pleased to note the multitude of stakeholders who are participating in this workshop – the national energy offices, the power utilities, the energy regulators, the transport ministries, the development partners as well as the representatives from the transport industry.

With this mix of participants and their wealth of knowledge and experiences, I do look forward for some very fruitful outcomes in terms of:

* learning more about e-mobility developments in the PICs, SIDS and globally
* identifying areas for SIDS-SIDS cooperation on e-mobility
* establishing a coordination mechanism for e-mobility developments and networking in the PICs
* agreeing on messages that should be shared and directions that should be asked of the Energy and Transport ministers when they meet in Vanuatu in 2023

I sincerely hope you will have time for a little bit of shopping in Suva and as you return home this week let me wish you and your colleagues, loved ones and families a Festive Season filled with joy and happiness.

I wish you all the best in your deliberations and it is now my pleasure to declare this workshop open.

# **Annex 5**

**The Regional EV Working Group (EVWG)**

The Regional EV Working Group (EVWG) is a gathering of interested individuals under the regional e-mobility programme implemented by the PCREEE.

**Function**s

It is proposed that the EVWGberesponsible for:

* + Assessing the performance of the PCREEE regional emobility programme
  + Providing guidance and advisory assistance, as necessary and requested by implementation partners
  + Coordinating the collection and dissemination of data and information on the developments and experiences with emobility in the region
  + Reviewing of draft regional policies, standards and guidelines before widespread circulation in the region

**Membership**

Membership in the EVWG will be on a voluntary basis. The suggested members are:

* 1. Development Partners – UNIDO
  2. Multilateral partners – World Bank
  3. Regional Agencies – SPC (PCREEE & MTCC)
  4. Power Utilities – Tuvalu Power Corp
  5. Transport Authorities – Fiji LTA
  6. Industry – LEAF Capital / Switch
  7. Energy Office – Solomon Is
  8. Regulators – Utilities Regulatory Authority (Vanuatu)

**Secretariat**

The PCREEE will provide the role of Secretariat to the EVWG

**Meetings of the EVWG**

The venue and times for the meetings of the EVWG will be decided by its members. Each member will pay for its costs of its participation unless there is a sponsor.

Meetings will be as casual as it can to allow for free exchanges and to be held back-to-back or at the margins of relevant gatherings where most of the members will be present.

Speakers / experts will be invited to attend the meetings of the group to provide information on a particular aspect of e-mobility and make themselves available for a hearty Q&A session at the end of their presentation.