Electric Vehicle Related Standards for the Pacific Region

Andrew Campbell

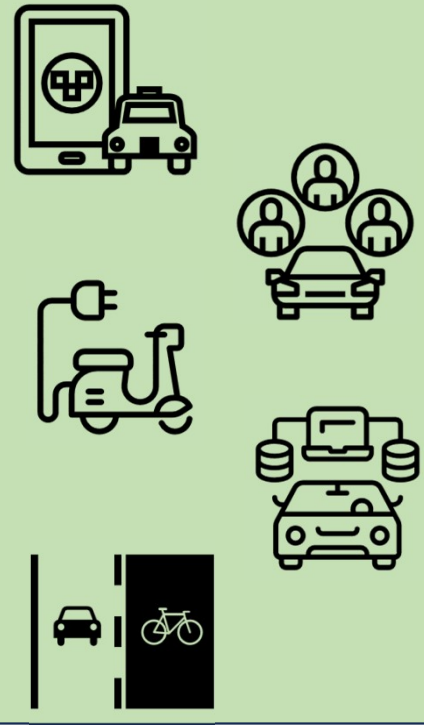
- Introduction – recap of Friday's presentation
- A reality check for small island countries.
- Recommendations.
- Main Points.

change → new technologies → new standards requirements

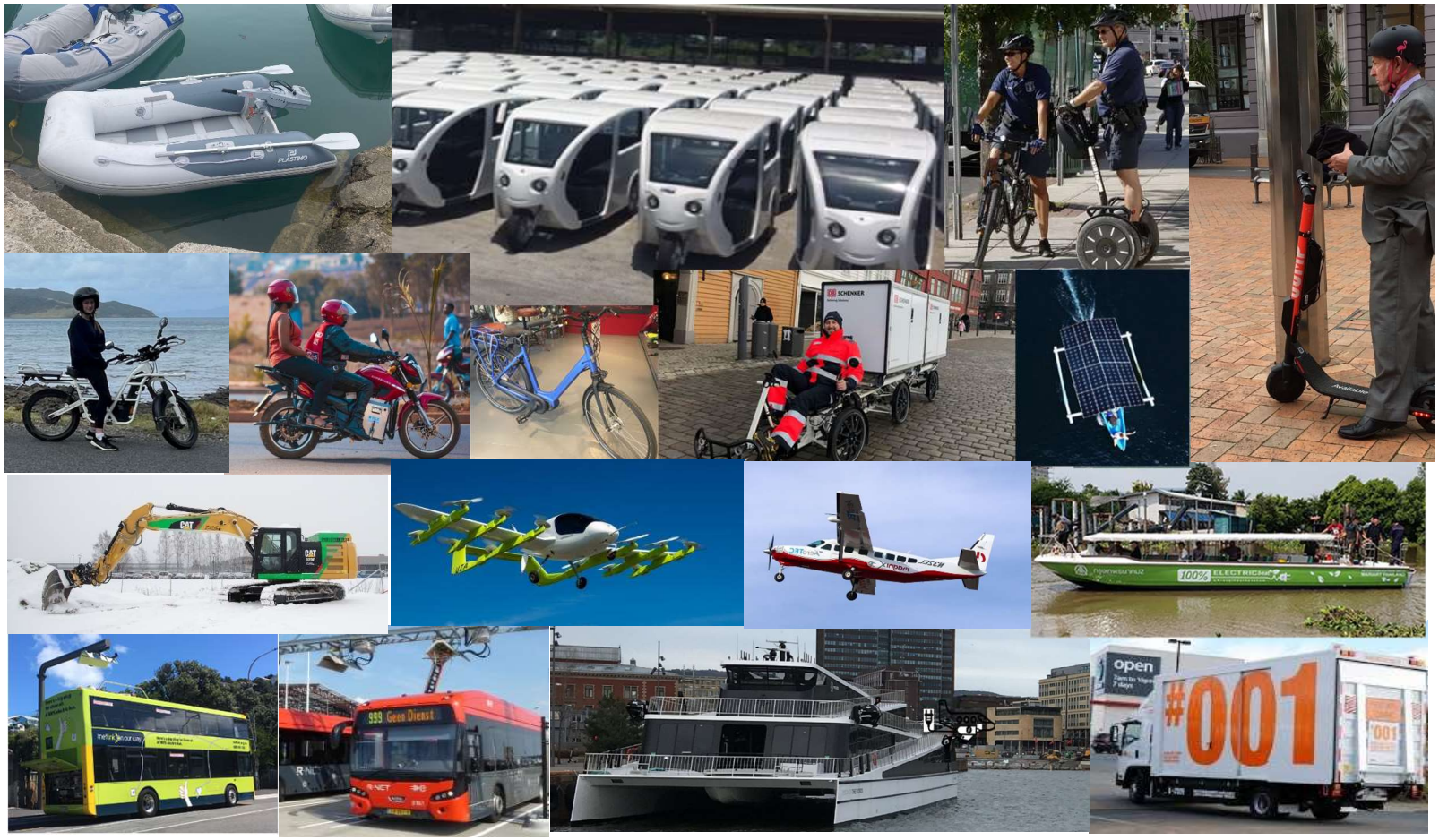
We need urgent and significant change

We have increasing access to many new affordable tools

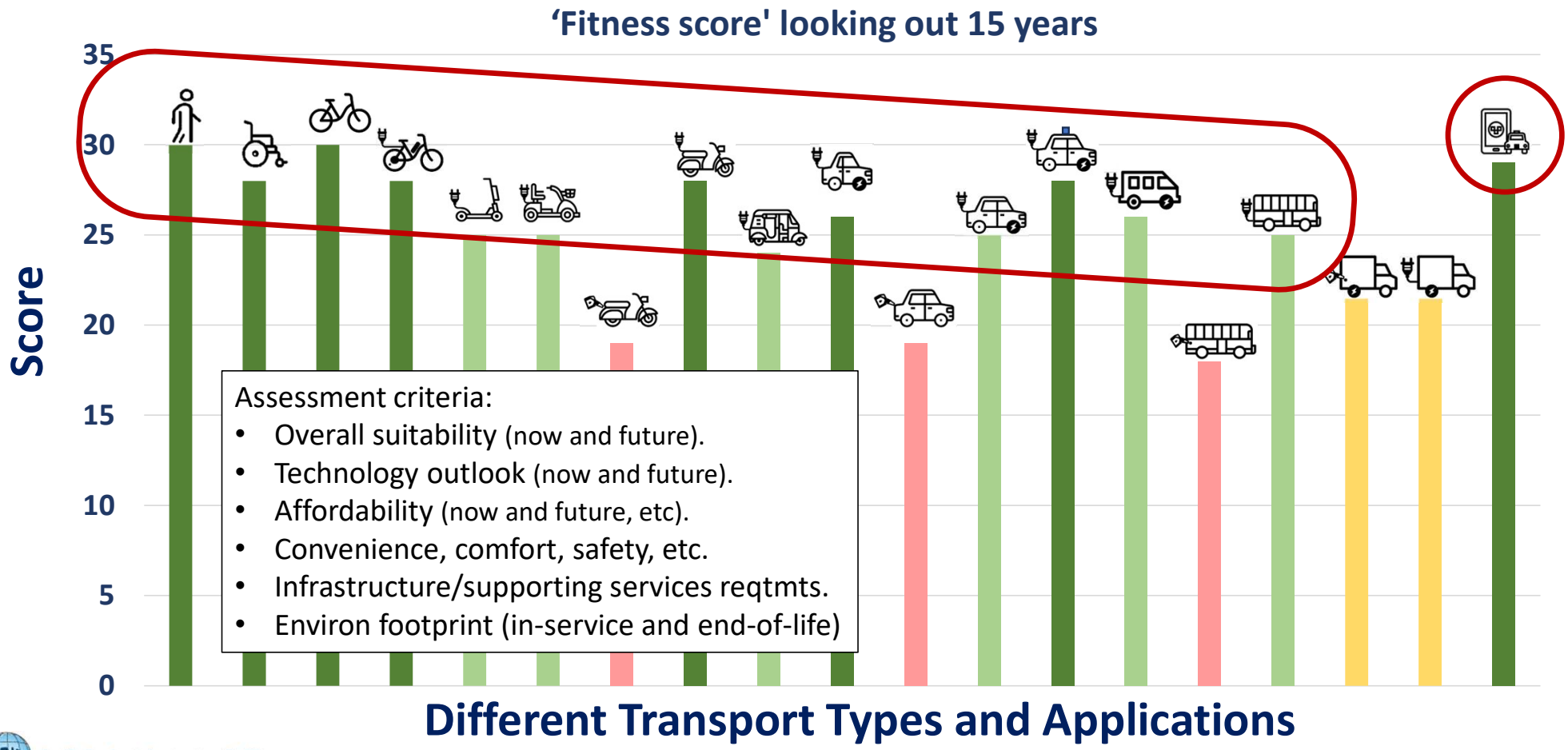
We have new minds providing new thinking and new solutions



Electrification of mobility more than cars and their charging



Results of fitness assessment for PIC setting



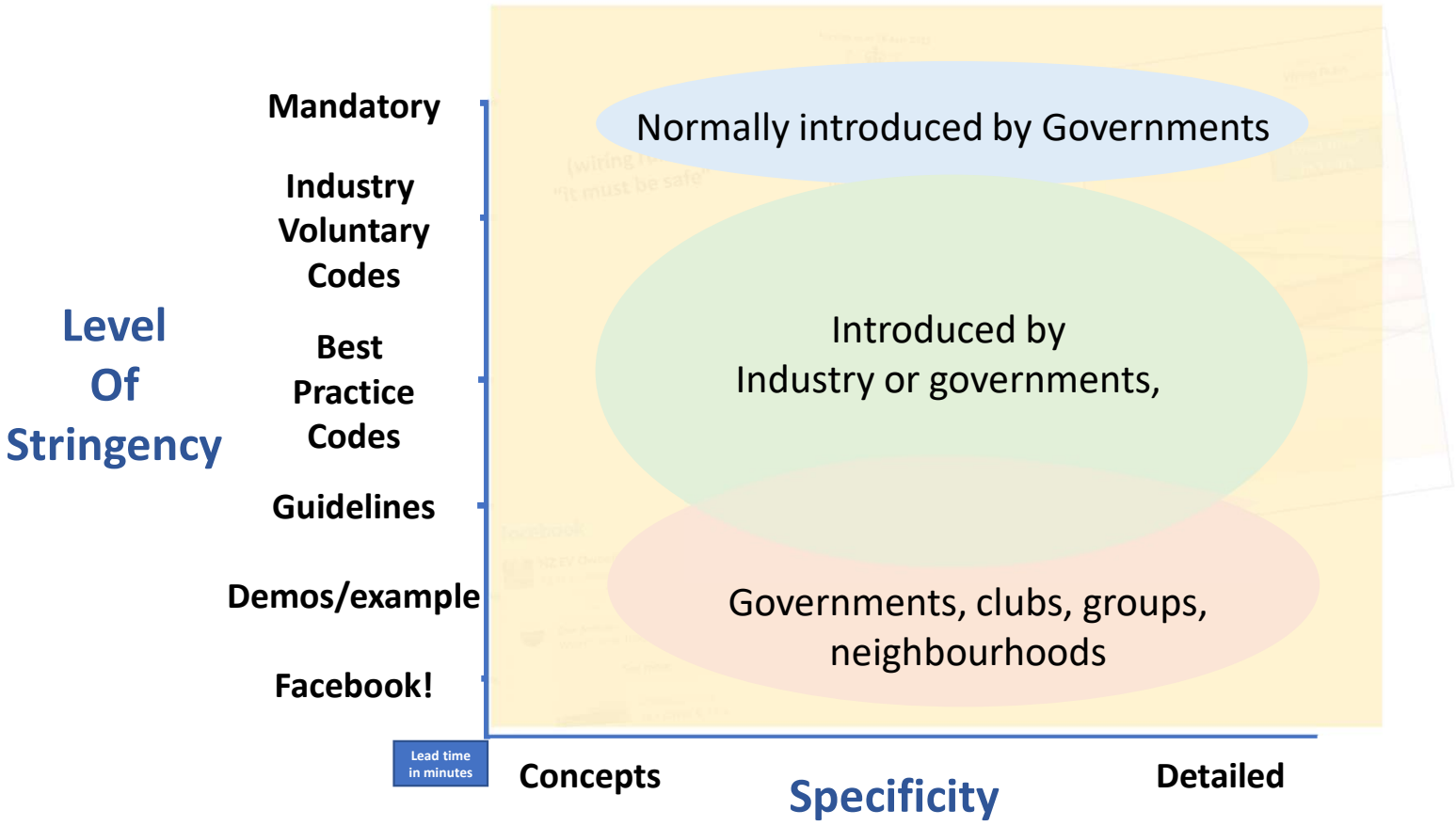
Standards have an important role, particularly for new technologies

To direct the sectors involved:

- **Safety … in use and in crashes**
- **Electrical safety**
- **Charging connectors**
- **…information**
- **Consumer/equipment information**
- **… and many others**

Primary function:
Equipment Must Work
It Must Be Safe
But there are many other factors

Standards come in different forms …

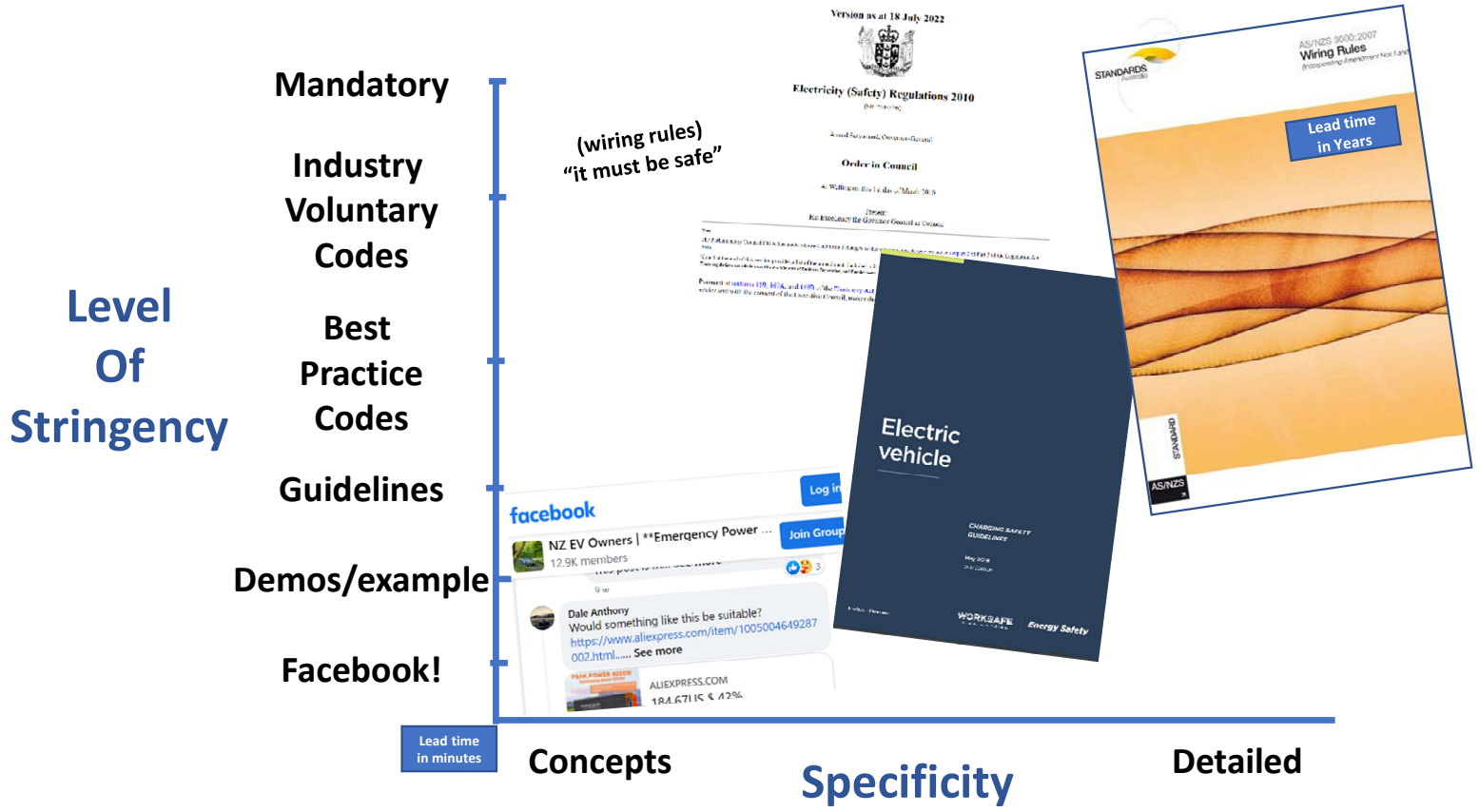


Difficult for many small island, "legislatively-light" nations.

Hence importance of encouraging best practice during early development stages … shorter lead times, etc.

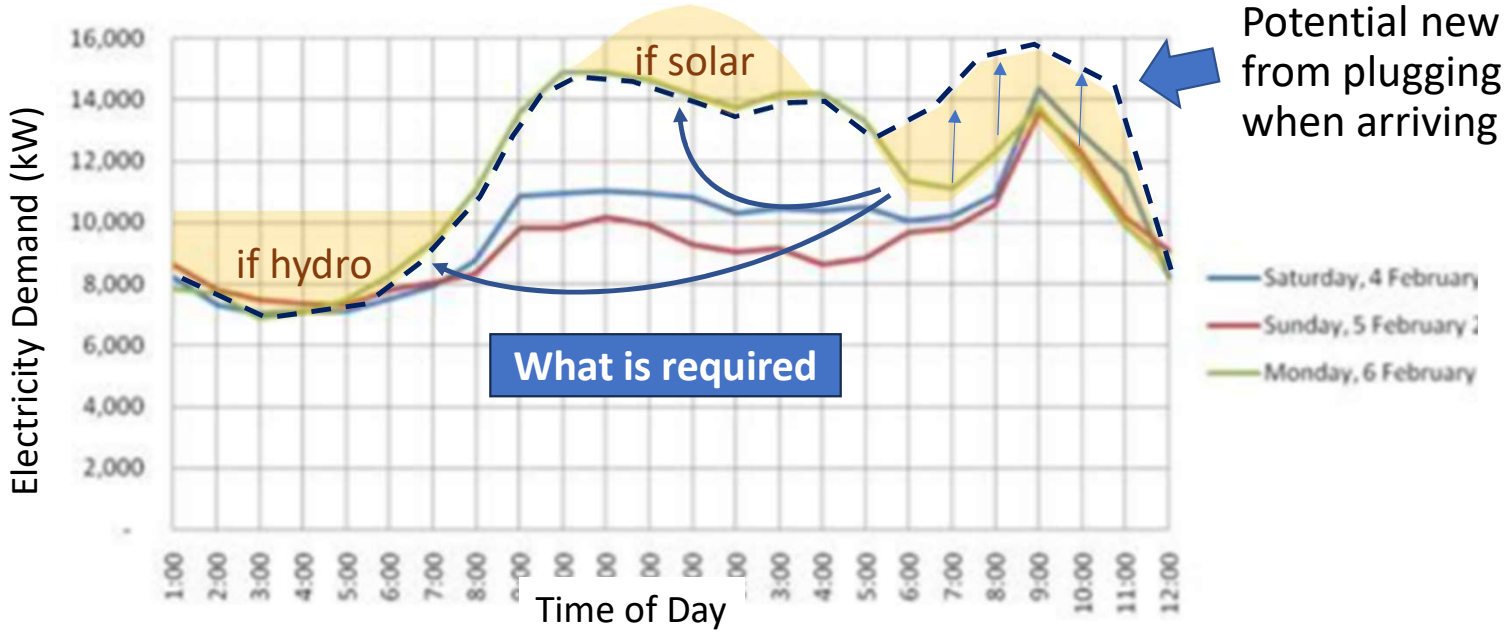
May need to lean on Consumer Guarantees Act to enforce.

Standards come in different forms …



Standards important when integrating with other sectors ...

Transport and energy can no longer be considered separately. Standards important where they merge.



Potential new demand from plugging in an EV when arriving home

- **Time of Use (TOU) energy billing initially**, but may not be sufficient in future.
- Unmanaged charging will become unacceptable.
- → **Third-party controlled "smart chargers"** for certainty.
- Expect EVs to support the grid in the future.

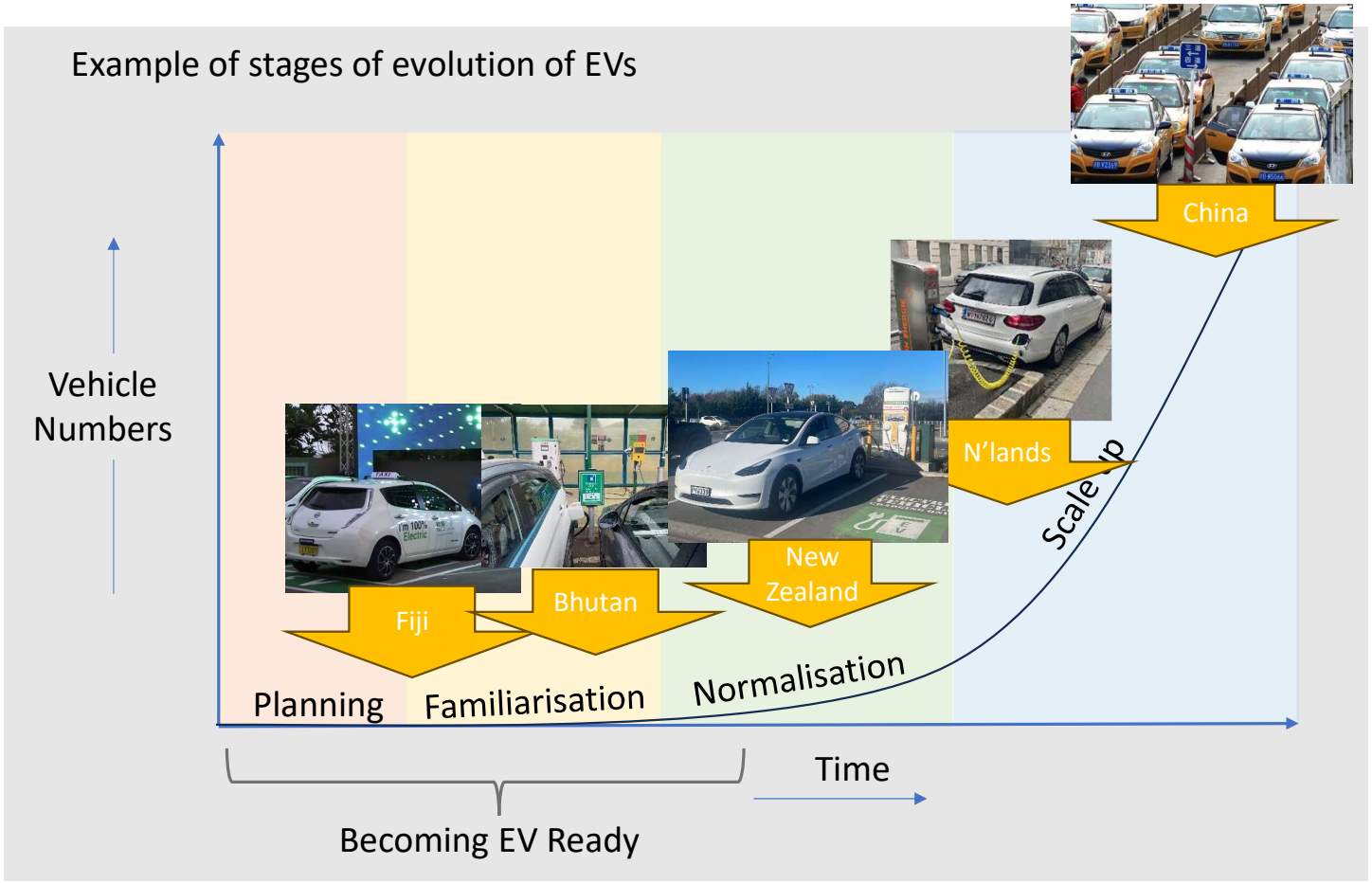
Importance of common communications systems → Open Charge Point Protocol (e.g. min OCPP 1.6) and other standards

Makeup of the extended EV eco-system:

- Electric Vehicles
- Charging infrastructure
- Electricity supply
- And different times in the life of these

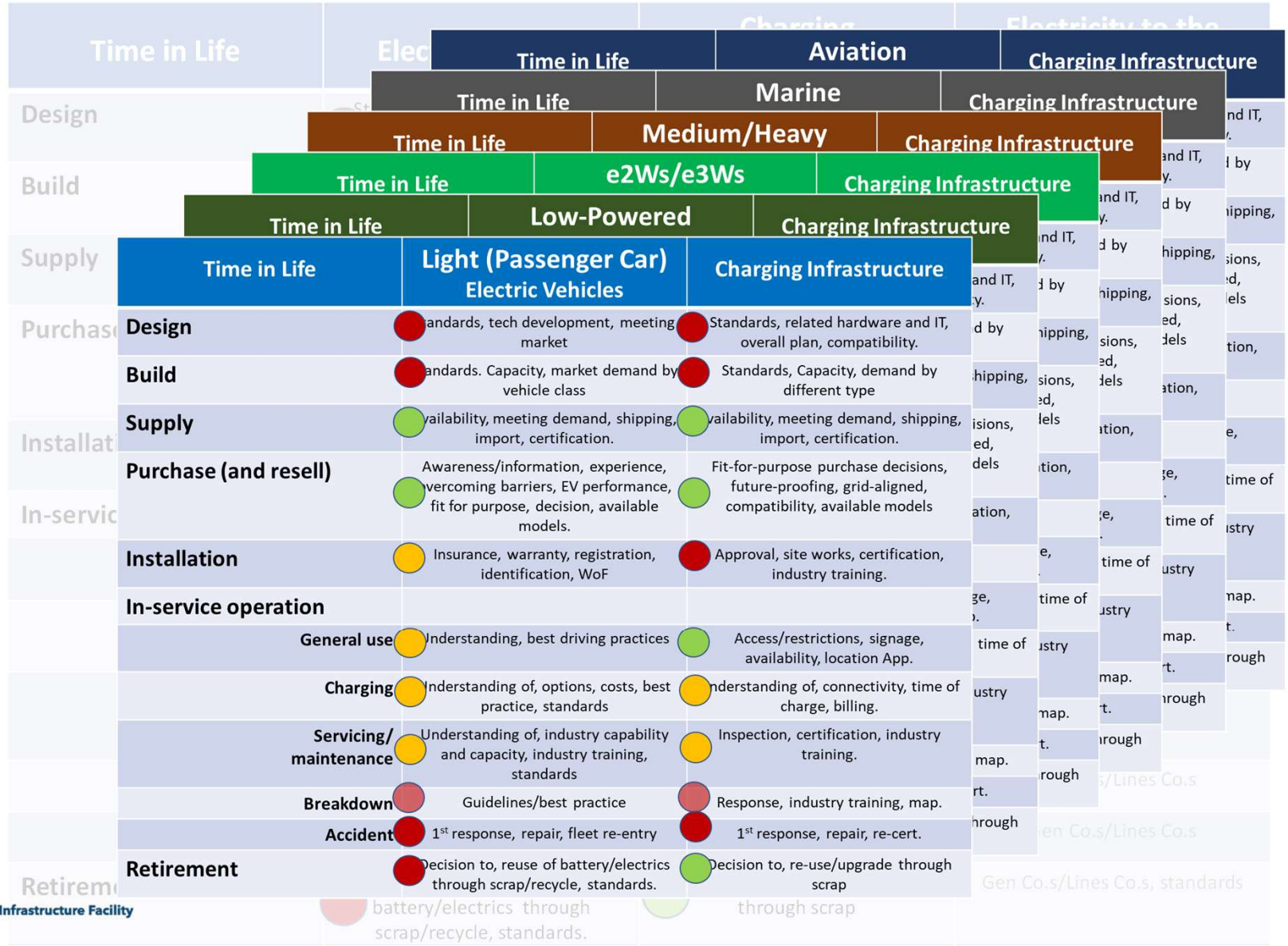
Time in Life	Electric Vehicles	Charging Infrastructure	Electricity to the Plug/Charger
Design	Standards, tech development, meeting market	Standards, related hardware and IT, overall plan, compatibility.	Electricity supply system, planning, standards
Build	Standards. Capacity, market demand by vehicle class	Standards, Capacity, demand by different type	Gen Co.s/Line Co.s, standards
Supply	Availability, meeting demand, shipping, import, certification	Availability, meeting demand, shipping, import, certification.	Gen Co.s/Lines Co.s, general information on
Purchase (and resell)	Awareness/information, experience, overcoming barriers, EV performance, fit for purpose, decision, available models.	Fit-for-purpose purchase decisions, future-proofing, grid-aligned, compatibility, available models	Gen/network upgrade, generation type switching … company and country plans
Installation	Insurance, warranty, registration, identification, WoF	Approval, site works, certification, industry training.	Gen Co.s/Lines Co.s
In-service operation			
General use	Understanding, best driving practices	Access/restrictions, signage, availability, location App.	Awareness, controls (pricing and other), specification
Charging	Understanding of, options, costs, best practice, standards	Understanding of, connectivity, time of charge, billing. Standards	Connectivity, time of charging, billing
Servicing/ maintenance	Understanding of, industry capability and capacity, industry training, standards	Inspection, certification, industry training. Standards	Gen Co.s/Lines Co.s
Breakdown	Guidelines/best practice	Response, industry training, map.	Gen Co.s/Lines Co.s
Accident	1st response, repair, fleet re-entry	1st response, repair, re-cert.	Gen Co.s/Lines Co.s
Retirement	Decision to, reuse of battery/electrics through scrap/recycle, standards.	Decision to, re-use/upgrade through scrap	Gen Co.s/Lines Co.s, standards

Expect a country's standards system to evolve over time, as the market develops



Many small island nations:

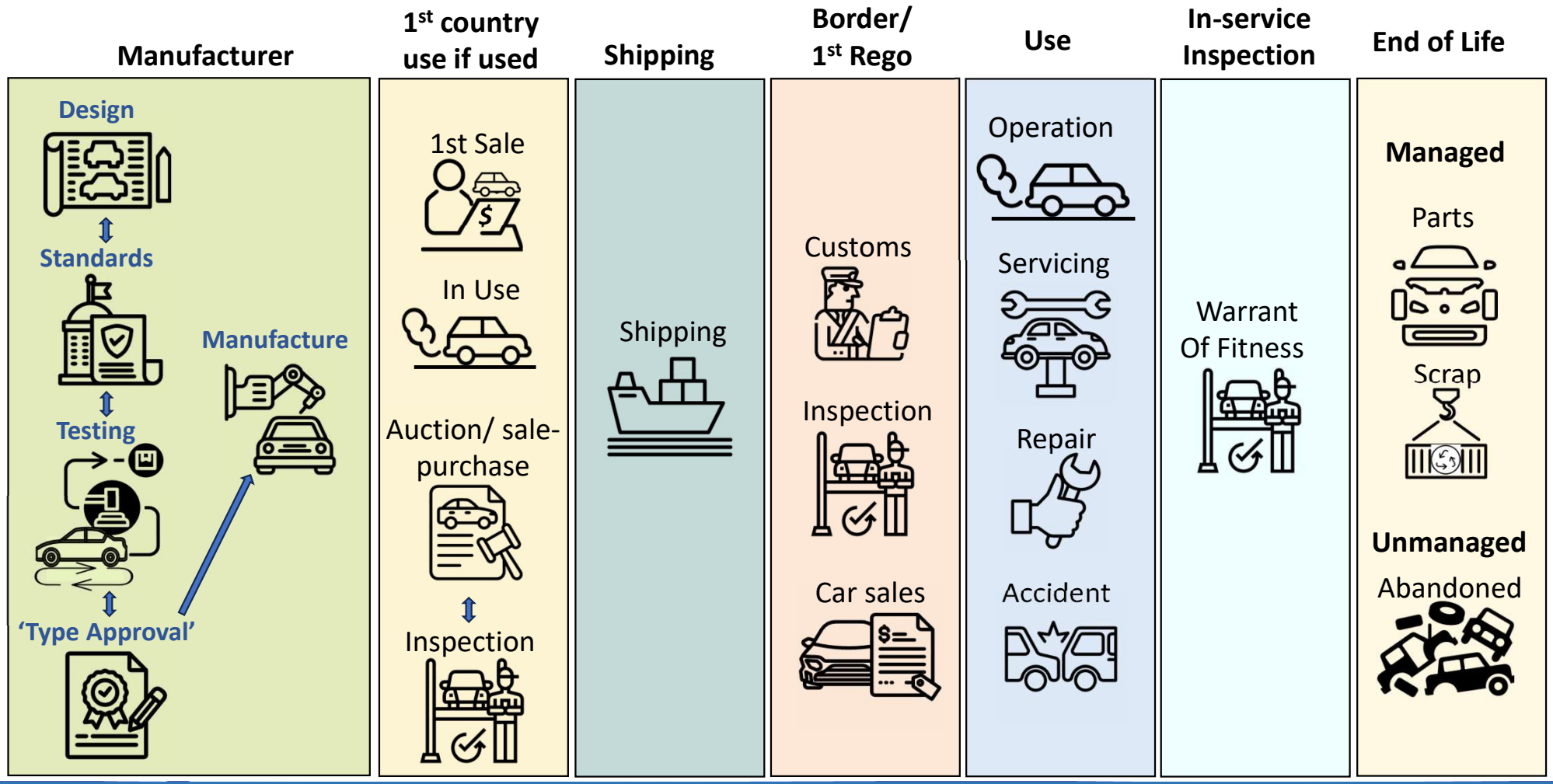
- Are technology receivers
- Are in an early "becoming EV ready" phase.
- Are resource and policy constrained.
- → best to adopt standards from other countries.
- → need to focus on the most essential/urgent standards:
  - ie reality of what can be introduced this/next year.
- → what is the **long term** standards system vision?
- → providing the target deployment plan.



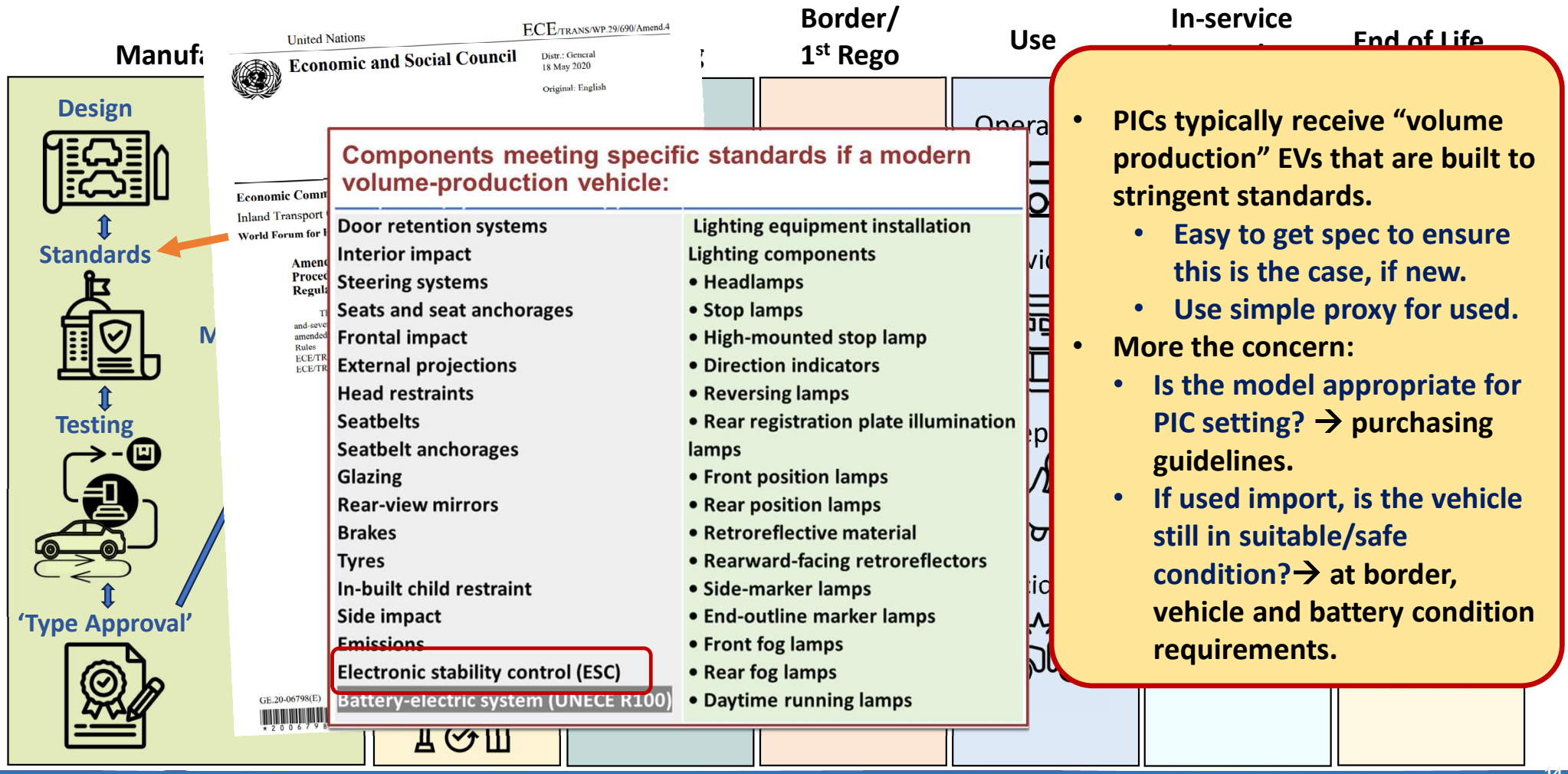
Pacific Region Infrastructure Facility

Light-duty electric vehicles

Important to get build standards right – happening as BAU



Important to get build standards right – happening as BAU



- PICs typically receive "volume production" EVs that are built to stringent standards.
  - Easy to get spec to ensure this is the case, if new.
  - Use simple proxy for used.
- More the concern:
  - Is the model appropriate for PIC setting? → purchasing guidelines.
  - If used import, is the vehicle still in suitable/safe condition?→ at border, vehicle and battery condition requirements.

Important to get build standards right – happening as BAU

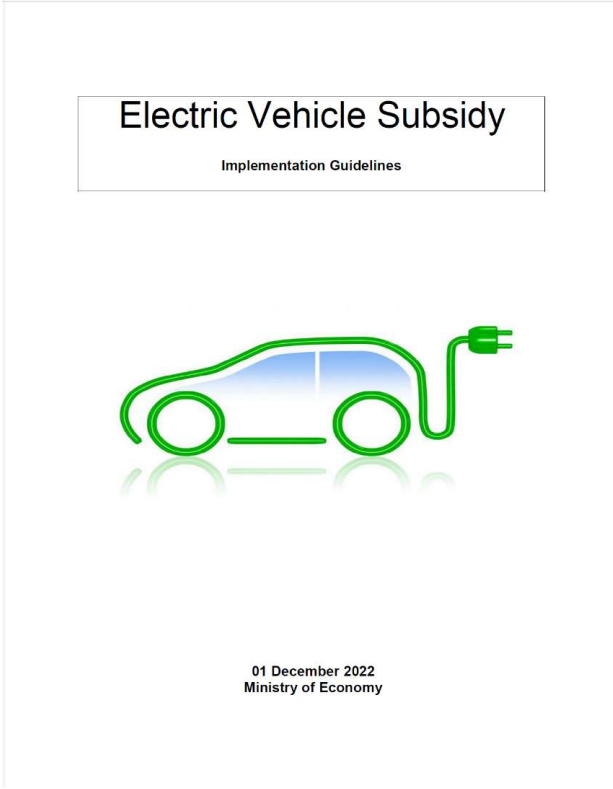
Purchasing and Owning an EV in Fiji

Guide

- **PICs typically receive "volume production" EVs that are built to stringent standards.**
  - **Easy to get spec to ensure this is the case, if new.**
  - **Use simple proxy for used.**
- **More the concern:**
  - **Is the model appropriate for PIC setting? → purchasing guidelines.**
  - **If used import, is the vehicle still in suitable/safe condition?→ at border, vehicle and battery condition requirements.**

Border Inspection

- **All fuelled vehicles must be built to Euro 4** or near equivalent (evidence: JEVIC report, Statement of Compliance, or other as provided by Laws of Fiji TSQ 18,885).
- **Age restriction**, currently:
  - Hybrid: no more than 5 YO at time of import.
  - Diesel, petrol: no more than 8 YO at time of import
  - Commercial, bus, no age restriction (**but Euro IV**).
- RHD (LHD requires prior approval).
- No written off vehicles.
- **Electric vehicles:**
  - No specification requirements other than:
  - Battery State of Charge (SOC) at least 80% to receive F$10,000 subsidy.
  - No Vat, no Import Levy.

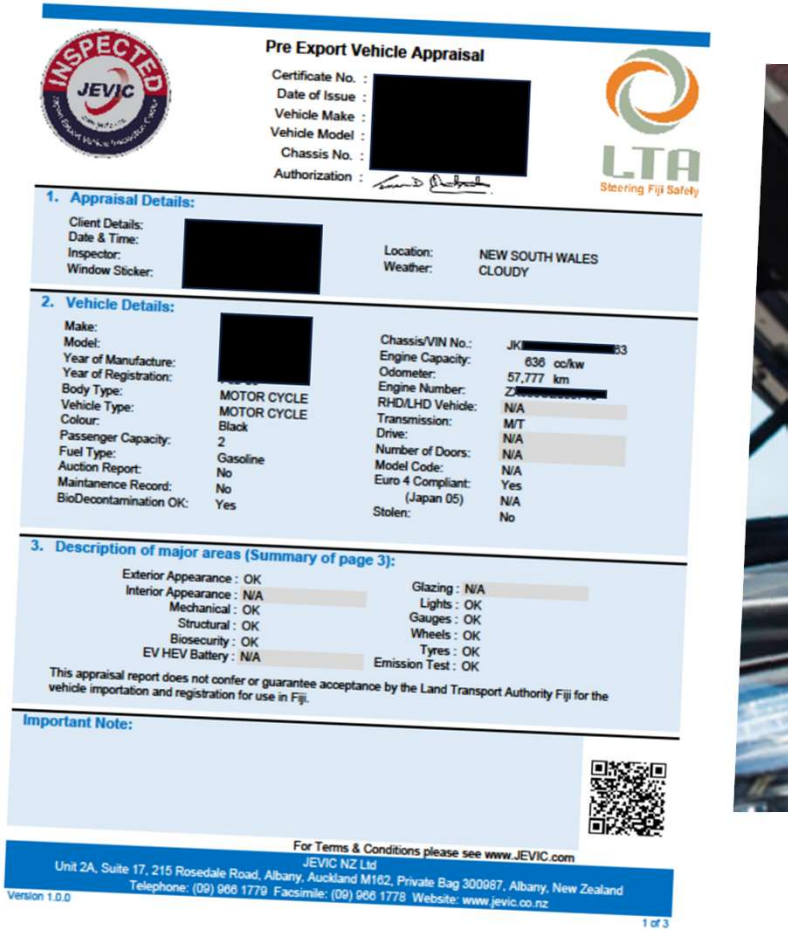


https://www.frcs.org.fj/wp-content/uploads/2021/03/Tax-Talk-Importation-of-Used-Motor-Vehicle-and-Machinery.pdf
https://frcs.org.fj/faqs/customs-faqs/

Pre-shipping inspection … a success story

- LTA worked with Japan Export Vehicle Inspection Center (**JEVIC**, an independent body) to develop a pre-shipping **inspection** specification for Fiji.
- **F$260** if done in Japan, F$316 if NZ, F$318 if Aus. Has become accepted by industry.
- **Check of many items** including body (photos) suspension, general engine, warning lights, EV/PHEV battery condition (SOH), simple emissions.
- Although **post purchase**, inspection report allows purchaser to **go back to supplier** if there is an issue, enabling the purchase to be made good before shipping.
- Has **lifted the quality** of supply … now a rarity to find a poor inspection report.
- Issue: can not be applied if cars originating from other than Japan, NZ and Australia.

Has been recommended across the region



INSPECTED JEVIC

Pre Export Vehicle Appraisal

Certificate No. :
Date of Issue :
Vehicle Make :
Vehicle Model :
Chassis No. :
Authorization :

LTA
Steering Fiji Safely

1. Appraisal Details:

Client Details:
Date & Time:
Inspector:
Window Sticker:

Location: NEW SOUTH WALES
Weather: CLOUDY

2. Vehicle Details:

Make:		Chassis/VIN No.:	JK[redacted]83
Model:		Engine Capacity:	636 cc/kw
Year of Manufacture:		Odometer:	57,777 km
Year of Registration:		Engine Number:	Z[redacted]
Body Type:	MOTOR CYCLE	RHD/LHD Vehicle:	N/A
Vehicle Type:	MOTOR CYCLE	Transmission:	M/T
Colour:	Black	Drive:	N/A
Passenger Capacity:	2	Number of Doors:	N/A
Fuel Type:	Gasoline	Model Code:	N/A
Auction Report:	No	Euro 4 Compliant:	Yes
Maintanence Record:	No	(Japan 05)	N/A
BioDecontamination OK:	Yes	Stolen:	No

3. Description of major areas (Summary of page 3):

Exterior Appearance :	OK	Glazing :	N/A
Interior Appearance :	N/A	Lights :	OK
Mechanical :	OK	Gauges :	OK
Structural :	OK	Wheels :	OK
Biosecurity :	OK	Tyres :	OK
EV HEV Battery :	N/A	Emission Test :	OK

This appraisal report does not confer or guarantee acceptance by the Land Transport Authority Fiji for the vehicle importation and registration for use in Fiji.

Important Note:

For Terms & Conditions please see www.JEVIC.com

JEVIC NZ Ltd
Unit 2A, Suite 17, 215 Rosedale Road, Albany, Auckland M162, Private Bag 300987, Albany, New Zealand
Telephone: (09) 966 1779 Facsimile: (09) 966 1778 Website: www.jevic.co.nz

Version 1.0.0

1 of 3

In addition, have choices for the charging connector …

- Fiji and RHD PICs typically **receive vehicles built to EU and Japan** vehicle regulations.
- Typically fitted with **Type 1 or Type 2** AC charging connectors, and/or **CCS Type 2 or CHAdeMO** DC fast charging connectors.
- Many Chinese-origin EVs are available with Type 2 and CCS Type 2 connectors.
- → no need to additionally complicate (small) market by providing for other than Type 1/2 and CCS2/CHAdeMO.
- Type 1/2 and CCS2/CHAdeMO and associated charging supply equipment **defined by** various International Electrotechnical Commission **(IEC) standards**. Examples:
  - **IEC 62752:** In-cord control and protection devices (Mode 2 charging)
  - **IEC 62196-2:** AC charging connectors (Type 1 and Type 2)
  - **IEC 62196-3:** DC charging connectors (CCS2, CHAdeMO)
  - **IEC 61851-23/24:** DC charging system performance and communication.
- Some UL (US) and other standards systems provide equivalent or like-requirements for some equipment.
- There are many other standards defining charging equipment … and like ESC for cars, **expect compliance** by defining the connector type … but should still **demand compliance to specific standards.**

As an example … let's go shopping …

Alibaba.com | Products | What are you looking for? | Search | Deliver to: US | English-USD | Sign in | Sign up

All categories | Featured selections | Trade Assurance | Buyer Central | Help Center | Get the app | Become a supplier

Filters

Categories

- car charger
- wall-mounted charging...
- floor-mounted charging...
- portable charging stations
- charging cables
- ev connectors
- car battery charger

View more

Supplier features

- Trade Assurance
- Verified Supplier

Product types

- Sample Order

Min. Order

less than | OK

Supplier Country/Re...

search

- China

Home > Vehicle Accessories, Electronics & Tools > Auto Electronics > Car Charger > China ev charger

Ev charger (160975 products available)

Wallbox 22kw Level 2 Fast Charging Station **EV** Wall **Charger** 32A Wall...

Verified

$255.60-$300.00

Min. Order: 2 pieces

32A BESEN Home EVSE Wallbox 22kw **EV Charger**

Verified

$195.00-220.00

Min. Order: 2 pieces

Ovrod 32A Wifi 3 Phase 22 Kw Car Charging Shenzhen Evse Home Fast...

Verified

$172.00-202.00

Min. Order: 2 units

Nacs **Ev** Charging Socket **Ev Charger** Electric Car Vehicle 40A 11kw NACS...

Verified

$85.00-95.00

Min. Order: 50 pieces

As an example … let's go shopping …

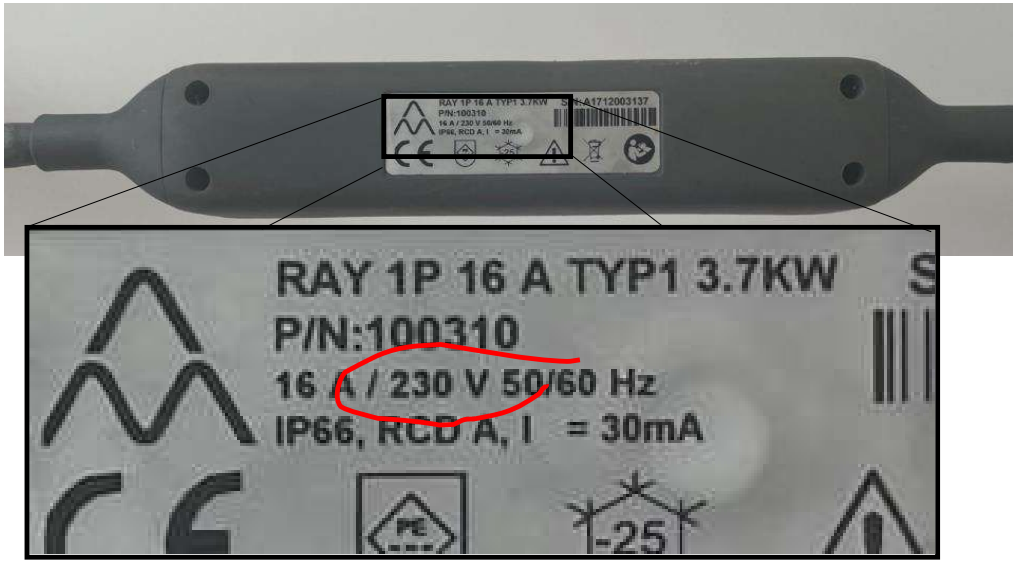
Alibaba.com | Products | What are you looking for? | Search | Deliver to: US | English-USD | Sign in | Sign up

All categories | Featured selections | Trade Assurance | Buyer Central | Help Center | Get the app | Become a supplier

Filters | Home > Vehicle Accessories, Electronics & Tools > Auto Electronics > Car Charger > China ev charger

Certifications

Also require matching of charger and electricity supply …

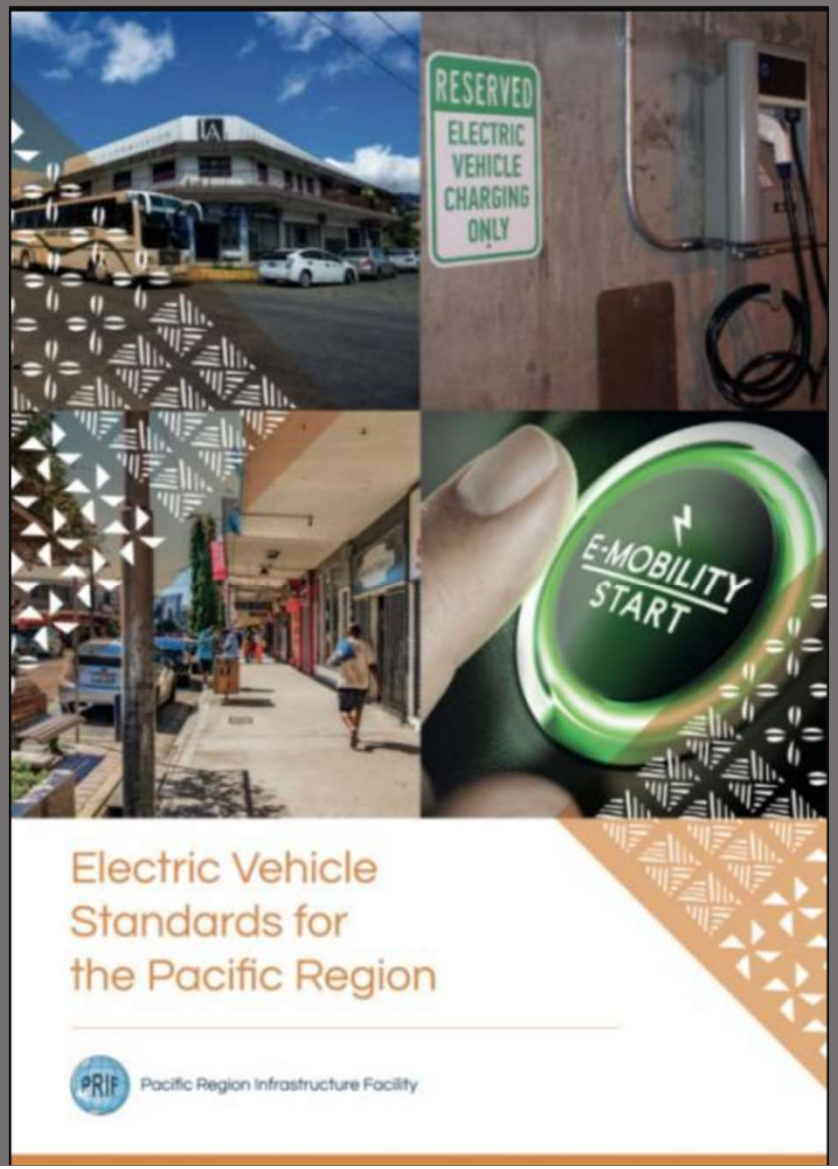


Is the charger compatible with the electricity supply circuit?

… as required by the Wiring Rules (AS/NZS 3000)

Detail provided in the Pacific Region Infrastructure Facility's (PRIF's)

Electric Vehicle Standards for the Pacific Region



PRIF's "Electric Vehicle Standards for the Pacific Region" work

Vehicle Types Considered

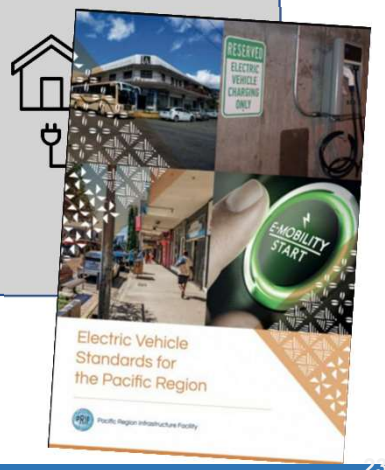
- Micro-format
- Small-format
- Medium-format
- Large-format
- Small-vessel
- Medium-vessel
- Large-vessel
- Drones
- Aviation

Services

- Chargers
- Connectivity
- Elect supply
- Time in life

Not detailed

- Cybersecurity
- V2X



Recommendations, to make light-duty EV charging safer and convenient …

1. Equipment built to specific, recognised **international standards** (lists provided).

2. Installation/works to meet **national standards** and regulations.

3. Use of **ground fault protection** on electric supply circuits used for charging.

4. **Encourage Type 2 (Mennekes) for pubic AC charging.**

5. **Encourage CCS Type 2 and CHAdeMO for DC public charging.**

6. Urgent need for transfer of best practice knowledge → provide **early information dissemination through use of guidelines**.

Type 2
(AC charging)

CCS Type 2
(DC charging)

CHAdeMO
(DC Charging)

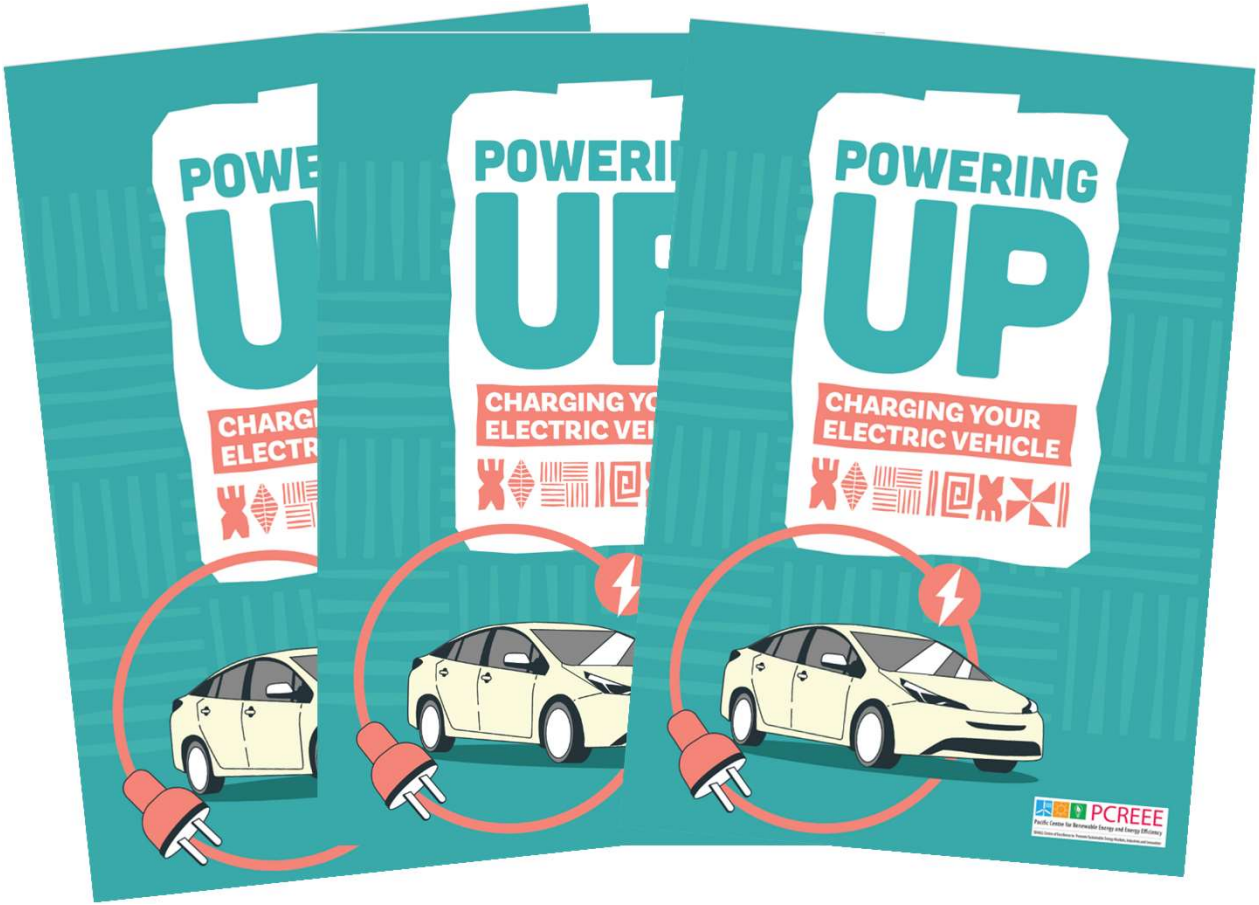
Field observations also show urgent need for achieving “best practice” standards in use

Gaining best practice:

- “Must-be-safe” policy only goes so far.
- Important to inform users on what is best practice, and encourage it.


Safe Charging – A Template for PICs Introducing Electric Vehicle Charging Guidelines
Draft: 16 March 2022
PCREEE
Supporting Information for PICs Developing Guidelines for Safe Electric Vehicle Charging
Draft: 16 March 2022
PCREEE
Pacific Community

Simple guidelines aimed at users new to EVs



Simple guidelines example …

UNDERSTANDING EV CHARGING

Charging Basics
Just Plug & Relax.

Charging an EV is easy—just plug in and let your EV and charger look after the detail. You might also have a smart charger that allows you to program when the charge happens, and at what rate, to best match with the supply of electricity.

Know Your EV's Needs

The charging connectors of your EV and charging point must match … know your EV's requirements and where compatible charging points are, if needing to charge out and about.

SAFETY AND EFFICIENCY

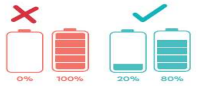
Safety First
Use equipment that's specified for the job. Portable charging cables must be rated for use with the local power supply. They should be used uncoiled with correct sockets and protected electricity supply circuits in accordance with accepted requirements. A licensed electrician must install permanently-wired charging points and is responsible for meeting these regulations. Do not use extension cords. Know how to quickly turn off the power supply.

Check Before You Charge
Inspect cables & connectors. Look over your cables and plugs before each use. If anything appears damaged, don't risk it—get it fixed.

Charge Cool, Charge Smart
It's best to charge in the shade and in the cool breeze if charging during the day. If not charging from solar, charging during the cool of the night might be better.

It's Safe to Charge in the Rain
Charging in light rain is okay for standards' compliant EVs and chargers but hold off washing your EV for another time. Don't leave your cables or chargers unnecessarily exposed to the weather. The control unit on a portable charging cable should also be kept dry.

Follow the 20/80 Rule
For everyday driving, keep your battery between 20% and 80% charged. This reduces stress on the battery and extends its life.



CHARGING ROUTINE

Get into a Charging Routine
Like charging your phone, routines can make life easier. An advantage of an EV is not between 20% and 80% charged. This reduces stress on the battery and extends its life.

CHARGING ROUTINE

Get into a Charging Routine
Like charging your phone, routines can make life easier. An advantage of an EV is not needing that trip to a fuel station. Also make the rest of the your ownership experience a convenient one, while considering the best time and place to charge your EV.

SCAN HERE
for more information

Provided by
Region Infrastructure Facility

Filling in the standards' knowledge gaps – lessons learned from the service industry

Knowledge gap – Federal States of Micronesia

- Some recent EV imports are **no longer working due to lack of local service industry capability …**
  → need for capacity development
  → whereas active participation of mechanics in advanced certified EV training courses in Rarotonga/NZ

Success story from Fiji …

- Prius Hybrid vehicles have a lithium-ion battery.
- Some Prius Hybrids now have very high distances travelled with batteries in poor state of health.
- At least two companies offer a quality battery replacement service using used imported batteries.
  - Extends life of Prius Hybrids.
  - 8-month payback and $$$ savings thereafter.
- **Trained automotive technicians: FNU's Cert III, Hybrid and Electric Vehicle System Course***
- However, disposal of replaced batteries currently unresolved.

Automotive Electrical & Electronics - 2022

- *Are you looking for a career?*
- *Have you considered a career in Automotive?*
- *Step Into New Technology & Learn About Hybrid Electric Vehicles & Computer Control Cars*

CRN	Course Name	Mode	Start Date	Finish Date	Fees
10342	Automotive Electrical & Electronics Principles	Day	5/07/22	11/07/22	$ 198.00
10343	Starting System	Day	14/07/22	20/07/22	$ 198.00
10344	Ignition System	Day	25/07/22	29/07/22	$ 198.00
10345	Charging System	Day	3/08/22	9/08/22	$ 198.00

But in reality … some owners will not be bothered …

→ what will it take to achieve best practice?

Lessons learned on standard's requirements for small-format electric vehicles including micromobility

Lithium-ion batteries caused more than 1,000 fires during the past year in Australia

By Emily Baker 7.30

Wed 13 Mar

Lithium-ion batteries caused more than 1,000 fires during the past year in Australi

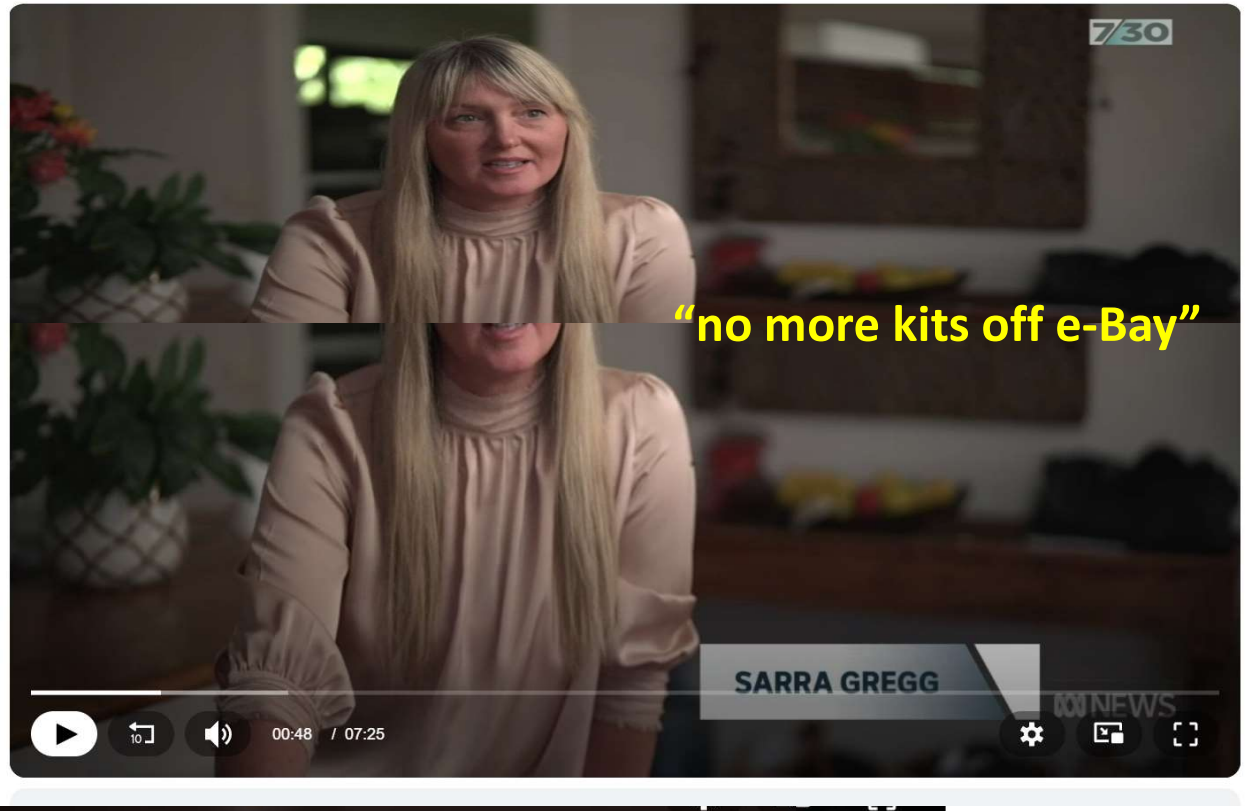
By Emily Baker 7.30

Wed 13 Mar

Lithium-ion batteries caused more than 1,000 fires during the past year in Australia

By Emily Baker 7.30

Wed 13 Mar



Issues for e-bikes in Pacific setting …

- Many e-bikes charged inside homes.
- Many on-line suppliers do not build to recognised safety standards …
  - Build standards recently developed, and in place, in US and EU but yet to become recognised elsewhere.
  - NSW, Australia, about to adopt new battery-related regulations (in Feb 2025).
- It is relatively easy to purchase and import micromobility vehicle "bargains" from overseas … without appropriate due diligence/knowledge.
- A range of voltages:
  - 24V to 72V (charging using matching power supply/chargers).
  - No global standardisation of low voltage, DC charging connectors → risk of mismatch → the battery and the charger must both have safety features.

Illustrated by the global 2015 Hoverboard Crisis

- Faulty lithium battery and charging systems resulting in **no or poor-quality safety protection** due to poor manufacturing standards, inadequate testing, use of low-quality parts, and mismatch of charger and batteries.
- → Risk of battery overheating, fire and explosion.
- Airlines quickly banned carriage of li-ion hoverboards.
- Australia and New Zealand regulators quick to respond:
  - AS/NZS 60335.2.201-2016 standard introduced in 2016 – sets safety requirements for battery-powered self-balancing personal transport

Case Study: e-Bikes Vanuatu

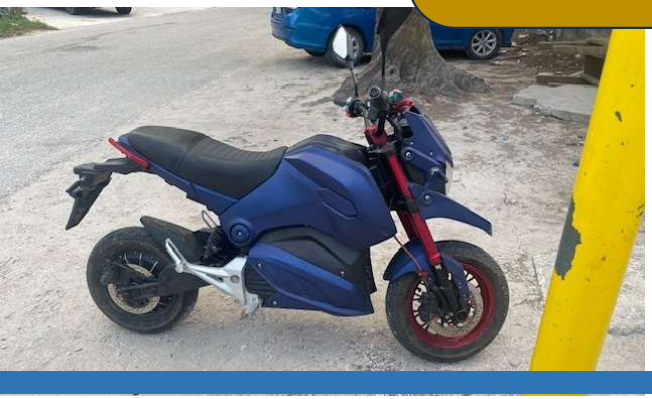
- Imported a ‘container lot’ of e-bikes, **matching chargers** in April 2023.
- **Quality checked** before purchase (through NZ agent), although not built to recognized international standard.
- Follows supplier/manufacturer **guidance on charging** plus carried out own research on charging.
- → keeps the battery cool during charging:
  - Rests battery before charging
  - Air-conditioned charging room separate from house.
- Turns chargers off soon after batteries have charged.
- Same procedure followed by Tik-e Tours, Rarotonga.
- Also … e-Bikes Vanuatu and Tik-e Tours trained in servicing and carry spare parts.

36

E-motorbikes (e2Ws/e3Ws)








A similar situation for electric motorbikes …

- Poor understanding → risk poor purchase decisions.
- Potentially unsafe charging.
- Risk of incidences creating barriers to uptake of appropriate technology

Electric Buses … PRIF Report Recommendations

Similar to light-duty EVs:

- Electric drivetrain compliant with **relevant technical principles of UNECE R100.**
- **Minimum 80% residual battery capacity** at time of import, if used.
- Use of **Type 2, CCS Type 2** charging connector(s).
- Appropriate level of **due diligence** carried out by well-informed parties. Make use of already developed specifications and lessons learned for procurement.
  - **Consider single supplier for both vehicle and charging infrastructure.**
  - **Recommend parties with real world experience to be involved.**

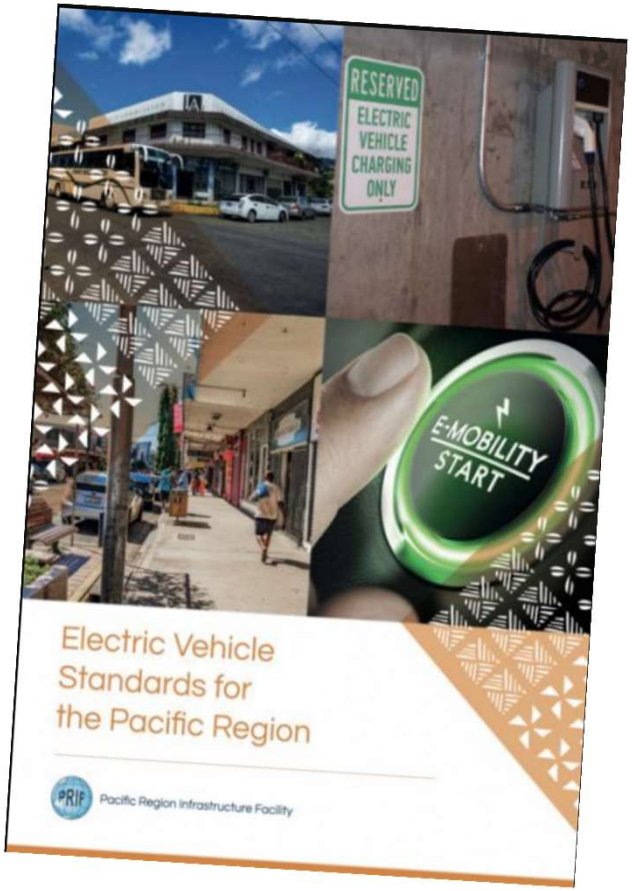
Lessons learned: good specification goes beyond consideration of (safety) build standards

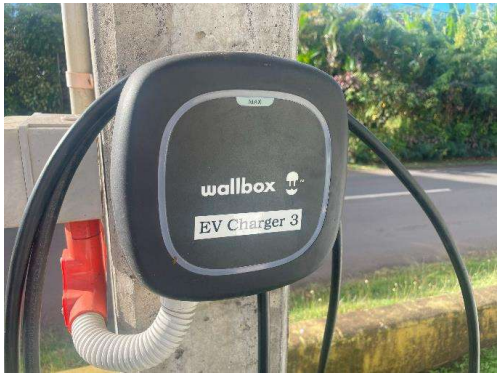
- Good application engineering important to provide fit-for-purpose solutions for local setting.
- Importance of lessons learned.


CITY BUS


INDONESIA


GA722


RESERVED
ELECTRIC VEHICLE CHARGING ONLY
E-MOBILITY START
Electric Vehicle Standards for the Pacific Region
Pacific Region Infrastructure Facility


wallbox
EV Charger 3


Type 2 CS Connector
Type 1 EV Connector


evnex


Type 2 EV Connector

Supporting Information for PICs Developing Guidelines for Safe Electric Vehicle Charging
EV
Draft: 16 March 2022
PCREEE

End of Life Vehicle Management






The good and the bad … what might be the case for Li-ion batteries???

Taking the example of end-of-life vehicles (ELVs):

- There does not appear to be the same accumulation of ELVs in Fiji as in other PICs. However:
  - Does this mean there is a working system, or that the problem is buried, literally???
  - Vehicle scrap merchants have gone “underground”??

Dayal Steels:

- Reports has been recovering ELVs for around 10 years (Dayal Sales Manager).
- Fiji Times reports processing and melting around 50 ELVs per day in steel making (more than rate of vehicle imports).
- Have own recovery trucks.
- … TAJ Auto Wreckers, Nausori, have not managed to get Dayal Steels interested in recovering their wrecks.

The Fiji Times

HOME NEWS SPORT LIFESTYLE KAILA PEOPLE LOCAL TRAVEL DINING & ENTERTAINMENT

Steelmaker eyes scrap metal

Business, Local News, News | Published: December 22, 2023 | Last Updated: March 24, 2024 | By DIONISIA TABUF

Listen to this article:

Minister for Trade Manoa Kamikamica (right) met with Dayal Steels founder and managing director Jay Dayal (middle) and his son Pratik Dayal (left). Picture: SUPPLIED / MINISTRY OF TRADE

The main difference between ICE and EV … the Lithium-ion battery

- **Toxic heavy metals:** Lithium, cobalt, nickel, and manganese can leach into soil and groundwater, causing widespread contamination.
- **Soil and groundwater contamination:** These toxic substances can degrade soil quality and pollute water sources, affecting plant, animal, and human health … **bioaccumulation and biomagnification** ….
- **Health risks:** Exposure to these metals can lead to neurological issues, developmental problems, organ damage, and an increased risk of cancer.
- **Harmful gases, air pollution and respiratory hazards:** Damaged batteries can release toxic gases. Inhalation of these gases can cause respiratory problems and other health issues in humans and animals.
- **Increased fire and explosion risks:** Li-ion batteries are prone to igniting and exploding when damaged or improperly disposed of in landfills, spreading toxic substances.
- **Loss of valuable materials:** Improper disposal results in the loss of recoverable materials like lithium and cobalt, which are finite and costly to extract.

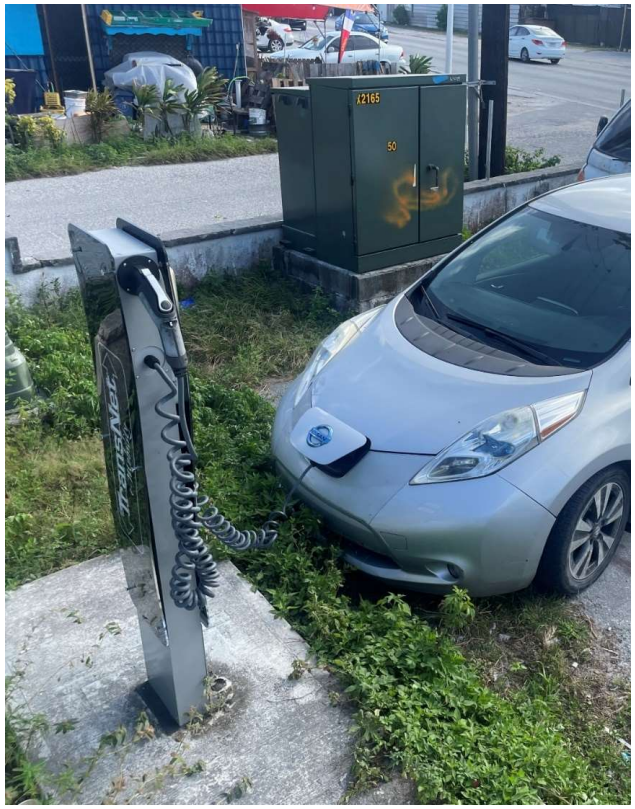
Requires urgent management → minimum of collection point

PRIF's EV Standards' findings for post-vehicle batteries in the Pacific context

- Batteries or battery cells in working condition are **valuable** locally … energy storage supporting renewable electricity generation.
- But need to be **recovered and repurposed correctly** → require knowledge development on post-vehicle batteries:
  - **Awareness** of the risks and the need for good management.
  - **Demand good practice** handling, recovery, repurposing and storage of surrendered batteries. Certification of services providers where practicable.
- Establish a battery collection point.
- Currently **no recycling/deposal options** for li-ion batteries in the Pacific, and cannot transport damaged batteries, therefore:
- Establish **best practice storage of damaged batteries**.
- Maintain watch on global end-of-life battery management and adopt fitting practices as they become practicable in the local setting.

Main Points

- PIC settings can be quite different to other countries:
  - Can be **legislatively light, and resource constrained.**
  - Still **early in EV understanding and adoption.**
  - Still in "becoming EV-ready" stage.
- Urgent need to **gain knowledge on, and follow best practices** that are appropriate for the local settings.
  - Require local solution for awareness raising … infographics, short guideline material, radio, social media (e.g., Tik-Tok).
- Greater need to integrate charging with the supply of electricity → adoption of smart charging.
- **Reference to relevant internationally recognised standards** important, as is directing the country towards the use of specific connectors, charging and communications protocols across these.
- Further detail: see PRIF's report *Electric Vehicle Standards for the Pacific Region* (with further supporting material due out in 2025).




Questions?