

Electric Vehicles and Charging Infrastructure on Pacific Islands Workshop Resources

Prepared by the National Renewable Energy Laboratory (NREL)
January 2025

Contents

- Data and Information 1
- Costs..... 2
- Emissions 2
- Policies and Strategies 2
- Gender Mainstreaming..... 3
- On-Demand and Public Transportation 4
- Electric Vehicle Planning and Deployment Models and Tools (including grid planning)..... 4
- Workforce Development..... 5
- Standards & Certification Organizations 6
- Managed and Bi-directional Charging..... 6
- Battery Buffered Charging Stations..... 6
- End-of-Life Management..... 6
- EVs and Resilience 7
- Fleets 7
- Partnerships and Programs..... 7
- Cybersecurity 7
- Communications Platform 8

Data and Information

- Alternative Fuels Data Center, including an interactive charging station locator and information on alternative fuel vehicles: <https://afdc.energy.gov/vehicles/electric-emissions>
- Electric vehicle efficiency: Singer et al. (2023). Electric Vehicle Efficiency Ratios for Light-Duty Vehicles Registered in the United States. NREL. <https://www.nrel.gov/docs/fy23osti/84631.pdf>

- FIJI: energy and transport data audit and data management assessment for electrification of the transport sector (2019): <https://www.unescap.org/kp/2020/fiji-energy-and-transport-data-audit-and-data-management-assessment-electrification>
- Collecting transport and travel data in the Pacific Islands – Fiji’s first national household travel survey (2015): https://australasiantransportresearchforum.org.au/wp-content/uploads/2022/03/ATRF2016_Full_papers_resubmission_217.pdf
- IEA EV data: <https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer>
- Jamaica Urban Transit Company Drive-Cycle Analysis: <https://www.nrel.gov/docs/fy19osti/73381.pdf>

Costs

- EV Total Cost of Ownership Tool (IEA): <https://www.iea.org/data-and-statistics/data-tools/electric-vehicles-total-cost-of-ownership-tool>
- Johnson et al. (2020). Financial Analysis of Battery Electric Transit Buses. NREL. https://afdc.energy.gov/files/u/publication/financial_analysis_be_transit_buses.pdf
- Burnham et al. (2021). Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains. Argonne. <https://publications.anl.gov/anlpubs/2021/05/167399.pdf>.

Emissions

- EV Life Cycle Assessment Calculator (IEA): <https://www.iea.org/data-and-statistics/data-tools/ev-life-cycle-assessment-calculator>
- GREET: “The Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model”: <https://greet.es.anl.gov/>
- AFLEET: “Alternative Fuel Life-Cycle Environmental and Economic Transportation” Tool: <https://greet.es.anl.gov/afleet>
- Long-Range Energy Alternative Planning (LEAP) modeling software: <https://ndcpartnership.org/knowledge-portal/climate-toolbox/long-range-energy-alternatives-planning-system-leap>

Policies and Strategies

- Building Blocks of Electric Vehicle Deployment: A Guide for Developing Countries: <https://www.osti.gov/servlets/purl/1785089/>
- Fiji Low Emissions Development Strategy (LEDS) 2018-2050: <https://gggi.org/report/fiji-low-emissions-development-strategy-2018-2050/>
- Fiji: Energy and Transport Data Audit and Data Management Assessment for Electrification of the Transport Sector – UNESCAP 2019 Report: <https://www.unescap.org/kp/2020/fiji-energy-and-transport-data-audit-and-data-management-assessment-electrification>
- Tonga Low Emission Development Strategy (LEDS) 2021-2050: https://unfccc.int/sites/default/files/resource/TON_LTS_Nov2021.pdf

- Tonga Energy Efficiency Master Plan, 2020-2030: <https://www.ctc-n.org/system/files/dossier/3b/Final%20TEEMP%20for%20Cabinet%20Approval.pdf>
- Johnson et al. (2023). Policy Framework to Improve Mobility Efficiency and Electrify Transportation in Tonga. <https://www.nrel.gov/docs/fy24osti/87827.pdf>
- Narassimhan and Johnson (2018). The role of demand-side incentives and charging infrastructure on plug-in electric vehicle adoption: analysis of US states. Environ. Res. Lett. 13 074032. <https://iopscience.iop.org/article/10.1088/1748-9326/aad0f8>
- U.S. Department of Transportation National Blueprint for Transportation Decarbonization (2023): <https://www.transportation.gov/priorities/climate-and-sustainability/us-national-blueprint-transportation-decarbonization>
- Promotion of Environmentally Sustainable Transportation in the Pacific Islands: Fiji's Land Transport Sector from an Energy Perspective: https://prdrse4all.spc.int/system/files/pestran_-_fiji.pdf
- IEA Policies Database: <https://www.iea.org/policies/>
- AFDC Laws and Incentives: <https://afdc.energy.gov/laws>
- ICCT feebate simulation tool: <https://theicct.org/tools-feebate-simulation/>
- Guam Transportation Petroleum-Use Reduction Plan (2013): <https://www.nrel.gov/docs/fy13osti/57191.pdf>

Gender Mainstreaming

- USAID-NREL Partnership Action Plan for Gender Integration (2023): <https://www.nrel.gov/docs/fy24osti/90159.pdf>
- Just and Sustainable Mobility Transition in the Transport Sector: A Conceptual Framework and Gender-Mainstreaming Case Studies: <https://www.nrel.gov/docs/fy24osti/87449.pdf>
- Transport
 - [Get IT Gender Equality in Transport](#)
 - [Women Mobilize Women Toolkit](#)
 - [ITF Gender Analysis Toolkit](#)
 - [ADB Gender Toolkit for Transport](#)
- Fiji
 - <https://www.worldbank.org/en/news/feature/2016/05/24/fiji-growing-a-renewable-energy-industry-while-expanding-electricity-access>
 - <https://www.fijivillage.com/news/Fiji-Govt-aims-for-100-electricity-access-by-2026-and-embraces-Solar-Power-as-a-key-solution-48r5fx/>
 - <https://blogs.worldbank.org/en/eastasiapacific/advancing-gender-equality-pacific-win-win-women-and-economy>
 - http://www.fijihighcommission.org.uk/pdf/investors/sector_profiles/Investment_Fiji_Sector_Profile-Energy.pdf
- Pacific Islands
 - https://prdrse4all.spc.int/sites/default/files/nep-report_final_2023_2030.pdf

- https://pacificdata.org/data/dataset/b06bf712-fa30-4b9d-86f7-f4c9519433b3/resource/27e11a2c-b981-4ed9-8c7a-e609f3ffa32d/download/national-energy-policy-draft-6_final-clean-version.pdf
- https://si.se/app/uploads/2019/06/guide-to-gender-mainstreaming_digital-folder_eng.pdf
- https://pacificdata.org/data/dataset/b06bf712-fa30-4b9d-86f7-f4c9519433b3/resource/27e11a2c-b981-4ed9-8c7a-e609f3ffa32d/download/national-energy-policy-draft-6_final-clean-version.pdf
- <https://islands.irena.org/-/media/Sids/Files/Publications/Vanuatu---Renewables-Readiness-Assessment-Vanuatu.pdf>
- <https://documents1.worldbank.org/curated/en/099249304022420933/pdf/IDU1c742dd8b1f9871471319aaf136729dbbf9a8.pdf>

On-Demand and Public Transportation

- Publicly available worldwide map of on-demand transit systems developed by Lukas Foljanty, a German ODT expert: https://www.google.com/maps/d/u/0/viewer?mid=1kea0RcOhI8MxMUSTzgiKaAkUPWJ_vTc&ll=0%2C0&z=1. Lukas also writes quarterly reports on the status of on-demand transit and publishes them on LinkedIn.
- NREL Sustainable On-Demand Transit webpage (2024): <https://www.nrel.gov/transportation/sustainable-on-demand-transit.html>
- On-demand Transit Toolkit - Canadian Government (2022): <https://cutaactu.ca/wp-content/uploads/2023/08/CUTA-On-demand-transit-toolkit.pdf>
- Via Microtransit Guide (2022): https://ridewithvia.com/wp-content/uploads/2022/09/Via-Microtransit-Guide.pdf?li_fat_id=267ded80-34ae-4802-b95d-839c321289b2
- NREL case studies
 - Fort Erie, Ontario, Canada: <https://www.nrel.gov/docs/fy23osti/84578.pdf>
 - Innisfil, Ontario, Canada: <https://www.nrel.gov/docs/fy22osti/80754.pdf>
 - Arlington, Texas, U.S.: <https://journals.sagepub.com/doi/10.1177/03611981241234901>
 - St. Louis, Missouri, U.S.: <https://journals.sagepub.com/doi/10.1177/03611981241262306>

Electric Vehicle Planning and Deployment Models and Tools (including grid planning)

- NREL transport tools: <https://www.nrel.gov/transportation/data-tools.html>
 - OpenPATH: <https://www.nrel.gov/transportation/openpath.html>
 - Mobility Energy Productivity (MEP) Tool: <https://www.nrel.gov/transportation/mobility-energy-productivity-tool.html>
 - EVI-LOCATE: <https://evi-locate.nrel.gov>
 - NREL EVOLVE: <https://github.com/NREL/EVOLVE>
 - EVI-FAST: <https://nrel.gov/transportation/evi-fast.html>

- EVI-Pro: <https://www.nrel.gov/transportation/evi-pro.html>
 - Bogotá, Colombia EVI-Pro analysis: <https://www.nrel.gov/docs/fy24osti/85935.pdf>.
- RouteE Compass: <https://pypi.org/project/nrel.routee.compass/> (get routes or vehicle miles traveled for any origin-destination pair):
- Greening the Grid EV and Sustainable Transport Toolkit: <https://greeningthegrid.org/electric-vehicle-and-sustainable-transport-toolkit>
- NREL EVOLVE: <https://github.com/NREL/EVOLVE>
- IEA EV Charging and Grid Integration tool: <https://www.iea.org/data-and-statistics/data-tools/electric-vehicle-charging-and-grid-integration-tool>
- [Fiji: An Analysis of the Power Sector Infrastructure Requirements on Electric Vehicles for Viti Levu – UNESCAP 2019 Report](#)

Workforce Development

- U.S. Federal Fleet program trainings: <https://www.energy.gov/femp/fleet-electrification-step-2-review-zev-and-evse-training-materials>
- U.S. EV Champion Training Series: <https://www.energy.gov/femp/electric-vehicle-training>
- [ESB Training Connections: Best Driving Practices \(VA Clean Cities\)](#)
- [ESB Training \(A-Z Bus Sales\)](#)
- [Axle Mobility](#) free online EV training for safety, electrical awareness
- Automotive Service Excellence (ASE) xEV, [Level 1 & 2 xEV Standards and Certifications](#)
- SAE, [Course Catalog](#)
- ESBI [ESB Technician Training Database](#)
- State workforce dept or even DOT/DOE
 - Michigan Ex: [EV Jobs Academy](#) and [employer vetted curriculum](#)
- Clean Cities and Communities <https://cleancities.energy.gov>
- Electric School Bus Initiative's [All About Charging Infrastructure Video Guides](#)
- EVITP, <https://evitp.org/>- for licensed electricians
- Clean Cities and Communities coalitions and state departments of transportation/state energy offices: https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/
- Emergency Response Guides: [NFPA](#) or [Energy Security Agency](#)
- Submerged vehicles, [NFPA Fact Sheet](#)
- Alternative Fuels Data Center, [EV Safety Training Resources for First and Second Responders](#)
- National Fire Protection Association [EV Safety Online Training](#)
- [National Training and Productivity Centre | Fiji National University](#)
- Clean Tech Institute curriculum: www.cleantechinstitute.org/Training/CEVT.html

Standards & Certification Organizations

- Campbell (2024). EV Standards for the Pacific Region. PRIF. https://www.theprif.org/sites/theprif.org/files/documents/PRIF-EV%20Standards%20Final_website.pdf
- NFPA 70E – Standard for Electrical Safety in the Workplace
- International Electrotechnical Commission (IEC): <https://www.iec.ch/homepage>
- Society of Automotive Engineers (SAE): <https://www.sae.org/>
- Underwriters Laboratories (UL): <https://www.ul.com/>

Managed and Bi-directional Charging

- Smart Electric Power Alliance (2024). The State of Managed Charging in 2024. <https://sepapower.org/resource/state-of-managed-charging-in-2024/>
- Hale (2023). NREL Managed Charging Factsheet. <https://www.nrel.gov/docs/fy23osti/86875.pdf>
- Smart Electric Power Alliance. The State of Bi-Directional Charging in 2023. https://s3.us-east-1.amazonaws.com/fonteva-customer-media/00Do0000000Yi66EAC/ruHbLFZi_SEPA_State_of_Bidirectional_Charging_Report.pdf
- Anwar et al., 2022. “Assessing the value of electric vehicle managed charging: a review of methodologies and results.” *Energy & Environmental Science*. <https://pubs.rsc.org/en/content/articlelanding/2022/ee/d1ee02206g>

Battery Buffered Charging Stations

- Battery Energy Storage for Electric Vehicle Charging Stations Help Sheet (2024).. Joint Office of Energy and Transportation. <https://driveelectric.gov/files/battery-buffered-help-sheet.pdf>

End-of-Life Management

- EPA Battery Webpages: [Used Lithium-ion Batteries webpage](#), [Frequent Questions on Lithium-ion Batteries webpage](#), [Universal Waste webpage](#)
- EPA Best Practices and Labeling Projects: [Best Practices and Labeling webpage](#)
- Choosing a Responsible Recycler: [How to Choose a Responsible Recycler Guide](#)
- Technical and Economic Feasibility of Applying Used EV Batteries in Stationary Applications: <https://www.osti.gov/servlets/purl/809607>
- NREL Battery Second Use webpage: <https://www.nrel.gov/transportation/battery-second-use.html>
- NREL LIBRA Model: <https://www.nrel.gov/transportation/libra.html>
- NREL repurposing cost calculator: <https://www.nrel.gov/transportation/b2u-calculator.html>

- A Second Life for Electric Vehicle Batteries: Answering Questions on Battery Degradation and Value: <https://www.nrel.gov/docs/fy15osti/63524.pdf>
- NREL Battery Lifespan webpage: <https://www.nrel.gov/transportation/battery-lifespan.html>
- NREL Battery Recycling Supply Chain Analysis webpage: <https://www.nrel.gov/transportation/battery-recycling-supply-chain-analysis.html>
- NREL Battery Second Use for Plug-In Electric Vehicles: <https://www.nrel.gov/transportation/battery-second-use.html>
- Lithium-Ion Battery Technologies for Electric Vehicles: Progress and Challenges: <https://ieeexplore.ieee.org/document/10143713>
- Electric Vehicle Lithium-Ion Battery Life Cycle Management: <https://www.nrel.gov/docs/fy23osti/84520.pdf>

EVs and Resilience

- Florida Alternative Transportation Fuel Resilience Plan (2022). www.nrel.gov/docs/fy23osti/83795.pdf

Fleets

- U.S. Federal Fleet Zero-Emission Vehicle Ready Center: <https://www.energy.gov/femp/federal-fleet-zev-ready-center>

Partnerships and Programs

- Global Climate Action Partnership (GCAP): <https://globalclimateactionpartnership.org/>
- Clean Energy Solutions Center: <https://www.cleanenergyministerial.org/initiatives-campaigns/clean-energy-solutions-center/>
- UN Climate Technology Centre & Network: <https://www.ctc-n.org/>
- Local Island2030 Islands Network: <https://www.islands2030.org/>

Cybersecurity

- NREL Cybersecurity for Electric Vehicle Fast Charging Infrastructure (2021): <https://www.nrel.gov/docs/fy21osti/75236.pdf>
- NREL Electric Vehicle Cybersecurity Threats and Mitigation Approaches (2019): <https://www.nrel.gov/docs/fy19osti/74247.pdf>
- NREL Cybersecurity for Electric Vehicle Grid Integration: <https://www.nrel.gov/transportation/electric-vehicle-grid-cybersecurity.html>
- Distributed Energy Resource Cybersecurity Framework: <https://dercf.nrel.gov/>
- Cybersecurity for Energy Systems: Foundational Concepts for Bangladesh Electric Utilities (presentation): <https://www.nrel.gov/docs/fy24osti/88792.pdf>
- NIST XFC Cybersecurity profile: <https://www.nccoe.nist.gov/projects/cybersecurity-framework-profile-electric-vehicle-extreme-fast-charging-infrastructure>
- U.S. FEMP Federal Fleet Cybersecurity: <https://www.energy.gov/femp/federal-fleet-cybersecurity>

- NMFTA Cybersecurity Requirements for Telematics Systems: <https://nmfta.org/wp-content/media/2022/11/NMFTA-Cybersecurity-Requirements-for-Telematics-Systems-v1.5.pdf>

Communications Platform

- Local 2030 Islands Network Virtual Islands Platform, link to join: <https://bit.ly/4fRjQrh>