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Newsletter of the Sustainable Energy Industry Association of the Pacific Islands

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SEIAPI Training Plan For the Pacific Islands

Article By: Geoff Stapleton

The Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) has been promoting the need for solar training for system designers, installers, and maintainers since its establishment in 2010. The private solar industry companies and the electrical power utilities in the region require a well-trained technical workforce to meet the needs of their customers and to support national energy objectives.

In 2019, the German agency for international cooperation Gesellschaft für Internationale Zusammenarbeit (GIZ) purchased a once off license agreement for the resource material for the four GSES face-to-face training courses. The agreement is between Global Sustainable Energy Solutions (GSES) and Pacific Power Association (PPA) and it allows all Pacific based training centres free access to the resources including power point presentations, exercises, practical booklets, trainer's guide, etc.

Online technical training courses for the design and installation (theory only) of grid connected PV systems and off-grid PV systems (including PV/Fuel Generator Hybrids) are now available through the University of the South Pacific (USP) Pacific TAFE. SEIAPI is also in discussions with an anonymous donor and Australian DFAT with respect to funding the establishment of the *Pacific Sustainable Energy Training Centre (PSETC)*As a follow on to these activities SEIAPI last week released the SEIAPI Training Plan for the Pacific Islands (December 2022). The early sections of the document references numerous training reports, proposals and discussion papers produced in recent years and provides an overview of sustainable energy training activities undertaken in the last 10 years. The plan identifies the actions required to build capacity within the Pacific Island Countries and Territories with PSETC acting as a resource to support the provision of training in other countries. The initial focus is on technical training for the design and installation of grid connected PV systems, off grid systems and grid connected battery systems. However, SEIAPI will work with stakeholders and the proposed PSETC to develop new courses over the next few years.

The plan is available from the SEIAPI website under the Training page. (https://www.seiapi.com/wp-content/uploads/2022/12/SEIAPI-Training-Plan-Dec-2022-reduced.pdf)

Renewable Energy and Green Economy Trainings for Remote Rural Communities in Fiji, Vanuatu, Papua New Guinea and Solomon Island.

Article By: Mohammed Tazil (GGGI)

The Global Green Growth Institute (GGGI) conducted community level trainings in Fiji, Vanuatu, Papua New Guinea and Solomon Islands under its project titled "Capacity Building to Strengthen Sustainable Implementation of Renewable Energy Technologies for Rural Energy Access". This initiative was part of a 4-year regional project, funded by the Republic of Korea through the Korea International Corporation Agency (KOICA) in partnership with GGGI. The project aimed at training 3000 people in all 4 countries, including 40% women and 20% vulnerable groups. The target groups were local government officials, small businesses, local technicians, and traditional and community leaders. The project's main objective was to strengthen informed and inclusive decision-making by resource owners and local government officials for integration of green economy and renewable energy into local level planning and to strengthen implementation of renewable energy infrastructure for rural electrification. GGGI has worked closely with local partners and developed 10 training modules, complete with detailed Trainer Guides as well as simplified local language translated Learner Workbooks on the topics listed below. Each of the 4 countries has its own customized version of the modules to make it more relevant to the local context. 1. Green Economy General Principles 2. Green Business Basics 3. Energy Efficiency Basics 4. Inclusive Development 5. Renewable Energy General Principles 6. Renewable Energy Project Financial Management 7. Solar in the Community 8. Solar Operations and Maintenance basics 9. Pico-Hydro in the Community 10. Pico- Hydro Operations and Maintenance basics. A total of 32 experienced local trainers had undergone 2 weeks of Training of Trainers workshops in 4 countries, out of which 16 were mobilized to the selected remote rural communities to deliver the trainings. In Fiji, the communities trained were Bukuya in Vitilevu, Vunisea in Kadavu, Rukua in Beqa, Buca in Vanualevu and Tutu in Taveuni.

Figure 1: Participants from Vunisea in Kadavu (Fiji) working on the pico-hydro system demonstration.

In Vanuatu, the communities trained were Parissa and Small (Big) Nanuku in Santo, Tisman and Vinmavis in Malekula and Melsisi in Pentecost.

In PNG, the communities trained were Imuagoro, Kwikila station, Keapara, Alukuni, Karawa and Kalo in Rigo district. In Solomon Islands, the communities currently being trained are Lambi, Barana, GPPOL and Selwyn College in Guadalcanal as well as Tulagi and Bishop Koete in Central Province. For the development of some of the technical training modules, SEIAPI standards were adopted and acknowledged. All 4 countries training modules and project information are available for free online at: https://greeneducationportal.org/.

We look forward to you downloading and sharing the training modules amongst your networks.

Figure 2: Participants from Melsisi in Pentecost (Vanuatu) conducting wiring exercise on the solar home system demonstration kit.

RE-Infrastructure Should be Designed for Climate Resilience and Energy Security

Article By: Peter Johnston

New energy infrastructure is generally designed to function for 30 years or more and this is as valid for solar PV as for diesel systems. High quality panels can be expected to provide 25 years of energy output [1] at 80% or more of rated output but some there are recent claims of 80-88% after 40 years. Lithium battery output and lifetimes vary considerably depending on quality, usage patterns and battery chemistry [2] with EV batteries lasting longer than expected[3], exceeding guarantee periods. In general, a long lifetime is feasible for a well-designed PV system.

SEIAPI members need to be aware of the projected changes in climate and weather during the expected system lifetime – 2050 or beyond – for the countries and specific localities for which they design RE systems: design and build today for the expected environment of 2050. Among these changes is the expected severity of future hurricanes/cyclones. For Fiji, hurricane wind speeds have increased in the past decade and this is reflected in a new building code. Implications for SEIAPI can be covered in a future article if there is interest.

For the Pacific overall, the southern hemisphere is very stormy. The northern hemisphere has nothing comparable to the extreme storms, winds and waves of the south, which is about 24% stormier than the north Pacific. Recent research[4] shows that the southern hemisphere is getting even stormier over time, whereas the north is not, and this is consistent with what climate models simulate for a warming world. Increased storminess can result in more extreme winds, temperatures and rainfall. The implication for us is that design standards for (for example) the robustness of PV systems based on tropical conditions globally may overestimate the residence of systems for the south.

Global Solar Atlas

The World Bank and the International Finance Corporation, collectively The World Bank Group, have provided the Global Solar Atlas in addition to a series of global, regional and country GIS data layers and poster maps, to support the scale-up of solar power in their client countries. This work is funded by the Energy Sector Management Assistance Program (ESMAP), a multi-donor trust fund administered by The World Bank and supported by 13 official bilateral donors. It is part of a global ESMAP initiative on

[1] Solar Panel Lifespan Guide: How Long Do Solar Panels Last? (GreenCoast 19 Aug 2022) https://greencoast.org/solar-panel-lifespan/

[2] Lithium Battery Cycle Life (Climatebiz 15 Nov 2022) https://climatebiz.com/lithium-battery-cycle-life/

[3] How Long Does an Electric Car Battery Last? (EV Connect, 8 Nov 2022) https://www.evconnect.com/blog/how-long-does-an-electric-car-battery-last (Car & Driver 27 Oct 2022) https://www.caranddriver.com/research/a31875141/electric-car-battery-life/

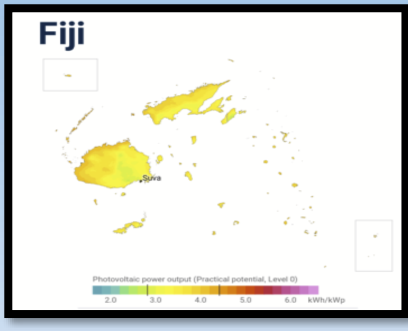
[4] Why the southern hemisphere is stormier than the northern (CarbonBrief 12 Dec 2022) https://www.carbonbrief.org/guest-post-why-the-southern-hemisphere-is-stormier-than-the-northern/

Renewable Energy Resource Mapping that includes biomass, small hydro, solar and wind.

The World Bank Group has selected Solargis as its global provider of solar data and related solar energy assessment services. This Global Solar Atlas has been prepared by Solargis under a contract to The World Bank, based on a solar resource database that they own and maintain.

The primary aim of the Global Solar Atlas is to provide quick and easy access to solar resource and photovoltaic power potential data globally, at a click of a mouse. GIS layers and poster maps showing global, regional, and country resource potential can be found in the Download section. Further description of the data provided, the methodology for estimating solar resource potential, and guidance on how to use it, can be found in the Knowledge Base section.

World Bank's Global Solar Atlas (2022) (available from: https://globalsolaratlas.info/global-pv-potential-study?c=-10.141932,82.265625,2)with practical solar potential (kWh/kWp) maps and annual variations (and other data) for over 200 countries, including at least 17 PICTs: American Samoa, Fiji, FSM, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Northern Marianas, Palau, PNG, Samoa, Solomon Islands, Tonga, Tuvalu & Vanuatu. Some of the Fiji data are shown below.



SEIAPI Executive Officer's Visit to Solomon Islands and Tonga

Article By: Sandip Kumar

Further to his visit to Fiji and Vanuatu earlier this year meeting the local solar industry and the stakeholders, the SEIAPI Executive Officer, Mr. Geoff Stapleton also visited Solomon Islands in October and Tonga in November 2022.

Solomon Islands

From 11th October to 15th October, Mr. Geoff Stapleton, met with Ministry of Mines, Energy and Rural Electrification (MMERE), Solomon Islands National University (SINU), Electrical Contractors, private solar companies such as Superfly, Sunpower, FMC Pacific and others. Important issues affecting the local industry, training institutes and the relevant government industries were discussed. The highest priority now is how to increase the number of licensed electricians. It was realized that Solomon Power needs to conduct regular licensing examinations. (Note following the meeting Mr. Stapleton also thought that it is important that there are refresher courses for those individuals who have completed their electrical training say more than 12 months before they will be sitting the licensing exam). SEIAPI will then support Solomon's in the development of any solar technician's license. The requirements for this could be similar to the current requirements for a person to obtain their PPA/SEIAPI accreditation however the install license would only be available for licensed electricians similar to that in Australia. SEIAPI will provide support when and if required to Ministry of Energy with respect to feedback on Electricity Act and Energy Policy. Mr. Stapleton also met with the SINU trainers to determine the way forward to complete their training so they can obtain certificates.

Geoff Stapleton with SINU

Tonga

Geoff Stapleton's Meeting with Electrical Contractors in Tonga

Tonga

The executive officer Geoff Stapleton visited Tonga between 16th and 19th November 2022. While in Tonga, Geoff met with Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE), Tonga National Qualifications and Accreditation Board (TNQAB), Tonga Institute for Science and Technology (TIST), Tonga Power Limited, Electricity Commission, The Australian High Commission, and two local electrical contractors representing the Tonga Electrical Contractors Association. It was noted that the Training courses being delivered in Tonga must be in accordance with qualifications/courses accredited by the Tonga National Qualifications and Accreditation Board (TNQAB). SEIAPI will be working with PCREEE, TNQAB and Tonga Institute for Science and Technology (TIST) to have the Training Unit Standards that are accredited through EQAP to be accredited in Tonga. Initially it was thought that the units should be accredited as new units, but TIST believes that since they are accredited through EQAP it should be a faster process having them recognized within TNQAB. Once the units are accredited TIST will then offer the face-to-face courses using the GSES resource material provided through the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) funded licensed agreement with the Pacific Power Association. Geoff also met with electrical contractors who had attended the guideline workshops conducted in 2018 and 2019. These contractors have undertaken some grid connected solar installations and a few off-grid systems. They did have interest in being involved with solar farms, but these have generally been installed by overseas based companies not using local installers. SEIAPI will discuss this with the various donors, Tonga Power etc and see how local contractors could be used.

South Pacific's Largest Solar Power Plant Opens in Tonga.

Article By: Clay Energy

In the presence of Their Majesties King Tupou VI & Queen Nanasipau'u, The King & Queen of The Kingdom of Tonga, Tonga's new 6MW solar power plant was officially launched in December, 2022 at Fualu, Tongatapu by Prime Minister of the Kingdom of Tonga, Hon. Hu'akavameiliku. Implemented by New Zealand company Sunergise, alongside Tonga Power Limited, the Sunergise Tongatapu Solar Farm will assist the Government of Tonga's plans towards reducing the country's reliance on imported fossil fuels, reducing energy costs and achieving renewable energy targets. The Sunergise Tongatapu Solar Farm is the largest in the South Pacific. It was built as part of a power purchase agreement between Sunergise New Zealand Limited, a Todd Corporation solar company and Tonga Power Limited, with support from the Asian Development Bank. The Solar Farm is capable of producing 6.9MWp of renewable power, helping lower power costs to Tonga and producing enough renewable energy to offset 18% of Tongatapu's current diesel-powered generation. Comprising three interconnected 2.3MWp ground mounted solar arrays in western Tongatapu, the construction phase successfully met the extreme challenges presented by the 2022 Hunga Tonga–Hunga Ha'apai volcanic eruption and resulting tsunami, as well as the COVID-19 pandemic. Local Tongan civil, mechanical and electrical sub-contractors were engaged to work under the supervision of Sunergise engineering subsidiary Clay Energy and accounted for up to 70% of the construction labour for the project. As a result, Tongan companies also developed extensive experience in the construction of large solar power plants, increasing Tonga's in-country renewable energy skills capacity. Equipment selection and system design, for all three sites, was based on the need for longevity, climate resilience and ease of maintenance, given the maritime environment and tropical conditions at Tongatapu. Producing energy since August this year, and providing power for up to 10,336 households, the Solar Farm is helping The Government of Tonga pursue its National Energy Roadmap plans to see up to 70% of Tongatapu's electricity generation sourced from renewables by the end of 2025. Prime Minister, Hon. Hu'akavameiliku announced at the launch, "The successful completion of the Sunergise 6MW Independent Power Producer solar generation system today, demonstrates the major role renewable energy independent power producers play towards achieving our 70% target by end of year 2025. Although, the majority of our renewable generation sites are from donor partners who are with us here today, Tonga will also need to pursue the partnership and collaborations from independent power producers." Sunergise Chief Operating Officer, David Mulholland said, "Sunergise has a long history in the Pacific and is aligned with the Kingdom of Tonga's inspirational vision for a cleaner future with renewable energy." Mr. Mulholland added, "Getting to this point, through COVID-19 lockdowns and a devastating tsunami is testament to the dedication and skills of our people and partners in Tonga. "During the pandemic, we were fortunate to be granted one of the first exemptions for non-residents to assist with the scaling up and training of the local workforce. Then the devastating submarine volcano and tsunami hit.

While we were greatly concerned for the people of Tonga, when communications were finally reestablished the teams from Sunergise, Clay Energy, Tonga Power just got on and got the job done." Sunergise is the leading developer and operator of solar generation in the Pacific Islands and has delivered over 20MW of solar power implementations in New Zealand, Fiji, Tonga and the South Pacific.

6MW Solar Power Plant in Tonga

Technical Article

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

(This article has been extracted from the EV Charger Infrastructure and Procurement Guide, available at: https://www.gses.com.au/ev-charger-guide/)

The collective software and hardware systems that form an electric vehicle charging station are referred to as electric vehicle supply equipment (EVSE). A charging station serves to charge a battery pack in an electric vehicle or in a plug-in electric vehicle (PEV) via the on-board charger (OBC) by using the grid for energy delivery. The hardware includes the physical charger and the associated electrical infrastructure, while the software includes the mobile charger app, local constraint management, booking, billing and payment portals.

A schematic of a typical charging station and how it connects to the grid is depicted in Figure 1 and is explained in the following section

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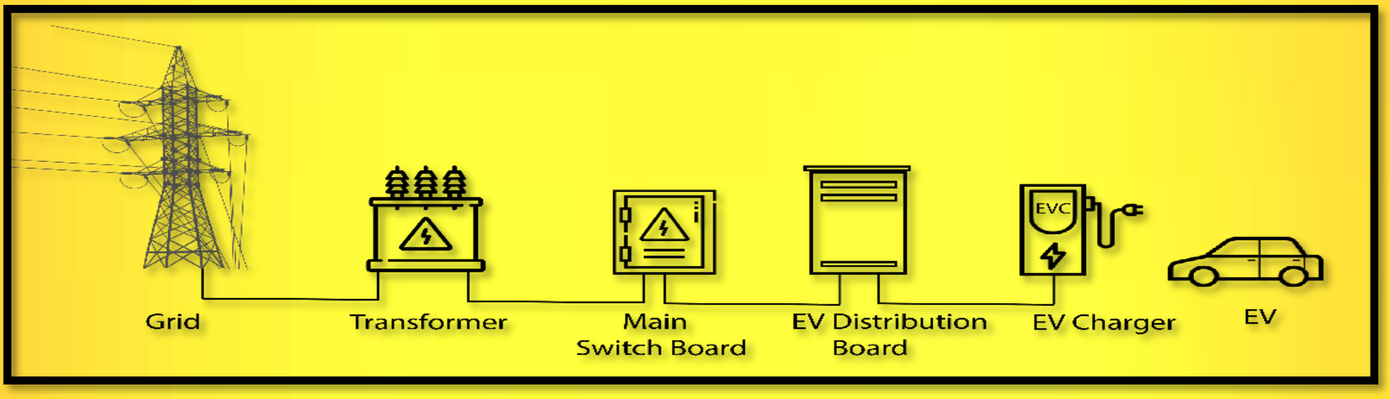

FIGURE 1 - LAYOUT OF AN EV CHARGING STATION AND HOW IT CONNECTS TO THE GRID

TYPES OF CHARGING STATIONS

There are two broad categories of EV charging stations, alternating current (AC) and direct current (DC). The type of charger to be used depends on the application and vehicle type.

AC chargers are commonly referred to as the level 1 chargers (AC slow chargers) and level 2 chargers (AC fast chargers). AC power from the grid is transported to the electric vehicle and converted to DC power via the vehicle's on-board charger.

AC chargers are characterized by their low output power, which increases the overall charging time. However, the OBC can regulate the voltage and current as needed for the EV, indicating a much simpler mechanism, such that the charging station does not need communicate to the EV

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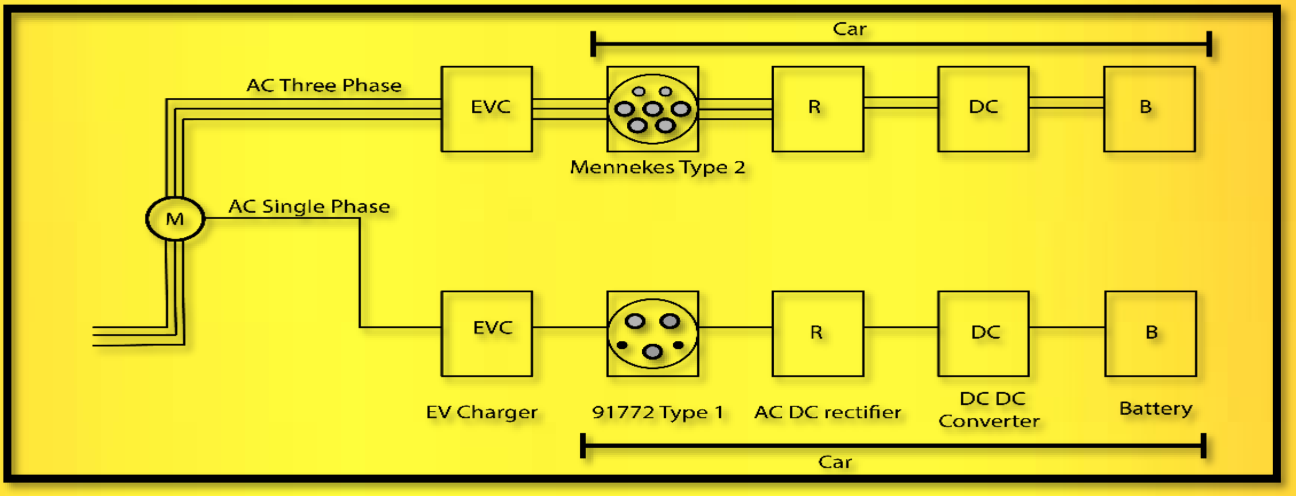


FIGURE 2 - SCHEMATIC OF AN AC CHARGING STATION

Conversely, DC charge points commonly known as level 3 chargers or DC fast chargers, provide superior charging speeds. The challenge is that the technology is significantly more complex and requires communication with the EV for efficient and safe charging. In the DC configuration, the EV supply equipment obtains AC power from the grid and directly converts it to DC voltage by by-passing the on-board charger to charge the vehicle's battery, as shown in the following figure.

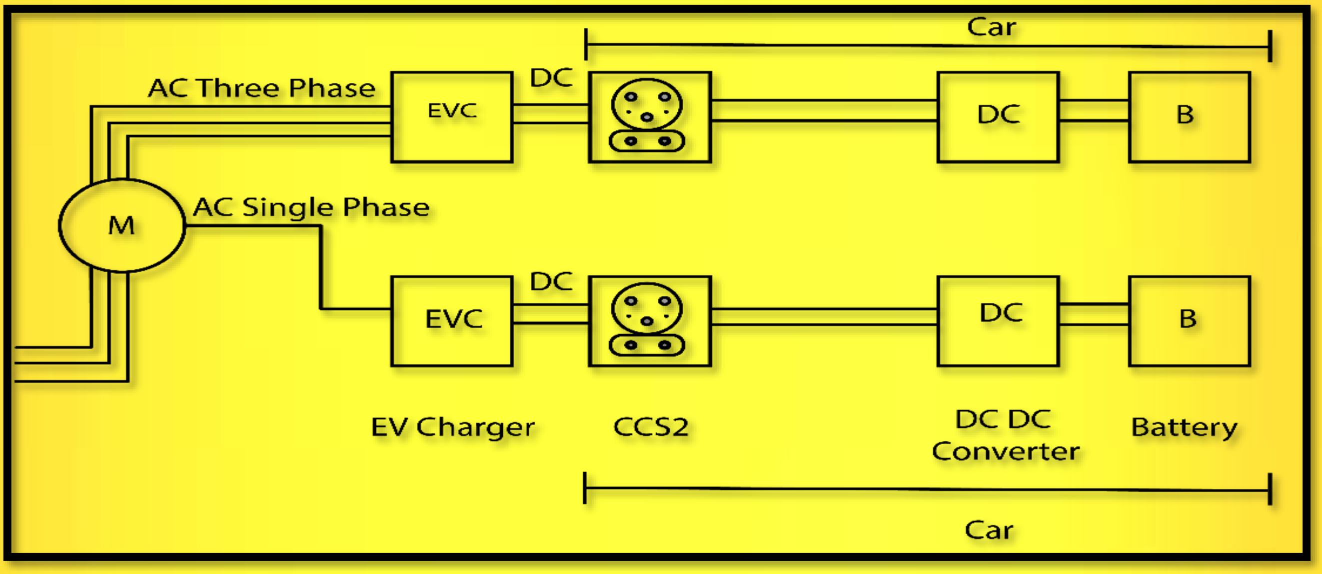


FIGURE 3 - SCHEMATIC OF A DC CHARGING STATION

DC chargers are arranged in stacks to provide high currents of up to 400A and voltage outputs of up to 600V. This translates to vehicle charging durations of 30 minutes, compared to 8 - 16 hours when using AC chargers. A more detailed comparison of the charging plug types, and their applications is presented in the following section, in Table 1.

Further to the charging stations levels, each charger type will have a specific connector suited for a vehicle type and application. For instance, a passenger vehicle is likely to use a charging port that differs to one required for heavy trucks, and a charger in a shopping centre will be unlike one in a residential setting. The main distinguishing feature of these rests on how quickly the charger can charge a vehicle.

The higher the EV charging level, the faster the charger can "top up" the vehicle. However, there is a trade-off associated with faster electric vehicle supply equipment: capital costs increase relative to charging speeds. The cost ramifications span beyond the charger itself and may necessitate expensive grid related upgrades, which are often not economically feasible.

Table 1 synthesises the main characteristics of each charger type.

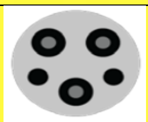
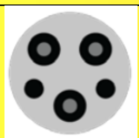
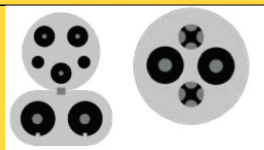
	Level 1 – AC slow charging	**Level 2 – AC fast charging**	**Level 3 – DC fast charging**
Connector image	 **Type 1**	 **Mennekes – type 2**	 **CCS CHAdeMo**
Pins	Live Neutral Earth	Live Neutral Earth	AC three phase and DC +/- or DC only +/-
Charging power	1.4kW – 2.4kW	7.4kW – 22kW	25kW – 450kW
Required outlet	Standard 240V AC household socket	Level 2 wall box connected to a standard 240V AC household socket	480V DC (requires significant infrastructure)
Range added per hour	10km	40km – 120km	150km – 300km
Conventional application	Standard when purchasing an EV, typically used in conjunction with smaller batteries, such as those found in hybrid cars.	Suitable for charging your vehicle for at least one or two hours, or overnight. At home installations requires a dedicated circuit to increase the power of the charge point.	Level 3 chargers are often located in car parks, petrol stations, roadside, and motorways. The technology boasts charging rates up to 50 times faster than level 2 chargers and can recharge EVs in minutes.
Typical locations	House, apartment building	House, apartment building, shopping centres	Petrol stations, shopping centres, destination charging

TABLE 1- A DESCRIPTION OF THE THREE EV CHARGER TYPES AND THEIR RESPECTIVE TECHNICAL SPECIFICATIONS

The Australian standard approves both the European and Japanese plug types, but the Federal Chamber of Automotive Industries (FCAI) endorses the Mennekes (type 2) plug for AC charging, and both CCS and ChaDeMo for DC charging. The majority of Australian EVs are supplied with type 2 or with either ChaDeMo or CCS sockets. For DC fast charging, it should be noted that CCS sockets are vastly more common than ChaDeMo.

For full guide, please go to: https://www.gses.com.au/ev-charger-guide/

MERRY CHRISTMAS AND A HAPPY 2023 FROM SEIAPI

Email your comments/suggestions on secretariat@seiapi.com or eo@seiapi.com or admin@seiapi.com