



Australian Electric Vehicle Association Inc.  
www.aeva.asn.au

## ELECTRIC VEHICLE NEWS

ISSN 0818-8491

Issue 236: July - September 2019

## The long-range edition

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2019 World Solar Challenge-key dates and categories

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Central Australia in an EV: it wasn't that hard, and it's getting easier!

Perth to Esperance and back: three EV test drive and review

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## Corporate members pages

Please note: this is an **OPT-IN** free listing offer to all current corporate members.

To be listed – email the details of your business (as listed below) to: [EVNews@bigpond.com](mailto:EVNews@bigpond.com)

Details needed: business name, state, logo if desired, brief business description – 10 words/2 lines maximum, contact details. See listings for examples:

### Hobart BMW (Tas)

Sales & Service of BMW PHEV & Electric vehicles

**Contact** (03) 6236 9099; [sales@hobartbmw.com.au](mailto:sales@hobartbmw.com.au)

**Web:** [www.hobartbmw.com.au](http://www.hobartbmw.com.au)

### University of Tasmania



Higher education provider and sustainability leader

**Contact:** [sustainability.utas@utas.edu.au](mailto:sustainability.utas@utas.edu.au)

**Web:** [www.utas.edu.au/sustainability](http://www.utas.edu.au/sustainability)

### Tesla Owners Club of Australia (nationwide)

Officially recognised club for Tesla owners and enthusiasts.

**Email:** [contact@teslaowners.org.au](mailto:contact@teslaowners.org.au)

**Web:** [www.teslaowners.org.au](http://www.teslaowners.org.au)

### SA Power Networks (South Australia)

SA's electricity distribution network operator

**Phone: (General enquiries)** 13 12 61

**Web:** [www.sapowernetworks.com.au](http://www.sapowernetworks.com.au)

### Evse.com.au (Sydney, nationwide)

Supply & Installation of EV Chargers, Adapters, Cables & accessories.

**Phone:** 1300 40 62 10

**Email:** [sales@evse.com.au](mailto:sales@evse.com.au)

**Web:** [www.evse.com.au](http://www.evse.com.au)

### OZ-DIY Electric Vehicles (Qld, nationwide)



Supply of EV components and batteries, EV repairs and conversions.

**Phone:** (07) 3808 7637

**Email:** [suziauto@live.com.au](mailto:suziauto@live.com.au)

**Web:** <http://ozdiyelectricvehicles.com>

### Tritium (Queensland/nationwide/world)

DC Fast Charging equipment designer & manufacturer

**Phone:** (07) 3147 8500

**Email:** [enquiries@tritium.com.au](mailto:enquiries@tritium.com.au)

**Web:** <https://www.tritium.com.au/>

**Priority One, powered by Ngroup** (Mornington Pen. Vic)  
Energy efficiency specialists in electrical, solar, batteries, hot water, heating & cooling.

**Email:** [operations@priorityone.services](mailto:operations@priorityone.services)

**Web:** [www.priorityone.services](http://www.priorityone.services)

### Rectifier Technologies (Victoria, nationwide)

Power converters for electric vehicle chargers.

**Phone:** (03) 9896 7500

**Email:** [sales@rtp.com.au](mailto:sales@rtp.com.au)

**Web:** [www.rtp.com.au](http://www.rtp.com.au)

### Electro.Aero (WA)

Electric aircraft flights and training

**Web:** <http://electro.aero>

### Gemtek Automation (WA, nationwide)



EVSE metering, installation, maintenance, service, spare parts, cables and adaptors.

**Phone:** (08) 9248 1881

**Email:** [admin@gemtek.com.au](mailto:admin@gemtek.com.au)

**Web:** [www.gemtek.com.au](http://www.gemtek.com.au)

### MiCycles - Adelaide Electric Bikes (SA)

"Adelaide's Electric Bike Specialist"



32A George St - Thebarton - South Australia

**Phone:** 0424 569 317

**Email:** [electricbikes@micycles.com.au](mailto:electricbikes@micycles.com.au)

**Web:** [www.micycles.com.au](http://www.micycles.com.au)

### Ogden Power (Alice Springs, NT)

Power generation design, install & service - solar, batteries, generators.

**Phone:** 0427 718 774

**Email:** [red@ogdenpower.com](mailto:red@ogdenpower.com)

**Web:** [www.ogdenpower.com.au](http://www.ogdenpower.com.au)

### Betts Boat Electrics (Qld, nationwide)

Marine electric propulsion outboard and inboard systems

**Phone:** 0419 674 135

**Email:** [bbelectricboat@gmail.com](mailto:bbelectricboat@gmail.com)

**Web:** [www.bbelectricboat.com](http://www.bbelectricboat.com)

**SkillBuild (NSW)**

Registered Training Organisation 70059



Phone: 1800 059 170; Mob: 0409 154 775

Web: [www.skillbuild.edu.au](http://www.skillbuild.edu.au)

**Zero Emission Vehicles Australia (WA, nationwide)**



Designer & manufacturer of EV products incl. motor controllers, battery management and safety systems.

Web: [www.zeva.com.au](http://www.zeva.com.au)

**Apollo Electrotech EC0171 (WA)**



Electrical engineers and contractors: Electrical, ICT, Energy Management & Automation, Fire.

Phone: (08) 9434 3333

Web: [www.electrotech.com.au](http://www.electrotech.com.au)



**ACE EV Group (Qld)**

Electric Vehicles and Infrastructure

Phone: 0412 028 709

Web: [www.ace-ev.com.au](http://www.ace-ev.com.au)

**RetroEV (Port Adelaide, SA)**



Phone: (08) 7226 9282

Mobile: 0437 485 216

Email: [energy@retroev.pro](mailto:energy@retroev.pro)

**M-TECH EV Technologies (Qld, Aust)**



EV charging pedestals, charging points: installations & accessories.

Phone: (07) 5580 3041

Email: [info@m-tech.com.au](mailto:info@m-tech.com.au)

Web: [www.m-tech.com.au](http://www.m-tech.com.au)

**EVolution (Victoria, nationwide)**

For EVerything EV, all you need is EVolution.

Phone: AUS 1300 70 11 99; NZ 0800 11 11 51

Email: [contactus@evolutionaustralia.com.au](mailto:contactus@evolutionaustralia.com.au)

Web: <https://www.evolutionaustralia.com.au>

**mpev.com.au (Victoria, nationwide)**



Mornington Peninsula Electric Vehicles

Custom classic ev conversions

Phone: 61 3 5988 6808

Email: [info@mpeve.com.au](mailto:info@mpeve.com.au)

## Notice to AEVA members

### New membership fees

*Started July 1<sup>st</sup>, 2019*

### The new rates are:

*Normal members: \$50*

*Concession\*: \$25*

*Corporate: \$125*

At the April 14th meeting of the AEVA national council, it was agreed that annual membership fees for concession, general and corporate should increase to \$25, \$50 and \$125 respectively. The decision to raise fees for the first time in almost two decades stems from the scale and nature of the EV expos we host each year, along with insurance premiums and web hosting services. The additional revenue generated - about \$7000 per year - would cover the cost of an event manager for the Sydney Expo and help fund a much needed upgrade of the AEVA website and membership database. The new fee structure started July 1st.

\* Students, Pensioners, Seniors, Health Card or similar.

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## **Who is AEVA?**

The Australian Electric Vehicle Association Inc. (AEVA) is a volunteer run, not-for-profit organisation dedicated to the cause of switching Australia's transport networks to electric drive as quickly as possible. Members come from a wide range of backgrounds, but all share a common interest in Electric Vehicles (EVs) and electric vehicle technology.

The AEVA is structured as a federation of state-based branches, overseen by a National Executive.

The purpose of the AEVA is to provide a forum for social and technical communication in the EV field, create greater awareness of EVs and encourage their use, to foster further research and development in EV technology, and to be an official source of information on EVs in Australia.

There are branches in all states and territories except the NT, which is covered by the SA branch. Branch contact details are listed at the end of this newsletter and the 'Around the Branches' section gives details of what's going on in your part of the country.

## **AEVA media contacts**

As a national body, we have members in each state and territory who are keen to field any questions for radio, television and print media.

TAS: Clive Attwater (AEVA acting President) - 0439 941 934

NSW: Greg Partridge - 0411 052 582

ACT: Peter Gorton - 0419 601 579

VIC: Bryce Gatton - 0428 537 053

SA: Paul Koch - 0431 866 586

NT (Alice Springs): Hunter Murray - (08) 89523411

NT (Darwin): Richard Smith – 0401 110 198

WA: Chris Jones - 0418 908 002

QLD: Leslie Smith - 0401 250 624

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### From the editor

*Bryce Gatton, national AEVA newsletter editor & Victorian AEVA branch secretary*

Welcome to edition 236 of EVNews. Following the 'EV silly season' sparked by the federal election, it is nice to return to the 'normalcy' of explaining the benefits and nuances of EV use to an ever expanding network of people.

In that light – this edition focusses on the ability of EVs to do the hard-yards in replacing fossil fuelled cars by answering the question '*can EVs travel the longer distances we in Australia are used to for weekends away and interstate trips?*'

First-up we have the 'Plasmaball run' From Perth to Esperance and back in WA by a group of WA AEVA members driving and comparing a Renault Zoe, a new Nissan Leaf 2.0 and a Hyundai Kona electric. (Page 17). It makes for interesting reading. (You'll have to read the report to find out which one failed to make it though!)

Another long-distance traveller (AEVA and TOCA member, Dick Friend) reports on his central Australia trip in a P85 Tesla Model S – and just how easy it was to do it.

Plus, don't forget that bi-annual, long-distance ultra-efficiency event: we have reminders of it on both the front cover and on page 25. Yes, that's the World Solar Challenge from Darwin to Adelaide running October 13 - 20 this year.

Also on the October front – don't forget to check out the four page information supplement about the national AEVA national EV Expo and AGM in Sydney, starting page 27.

For those of you still confused about charging speeds and ways to charge – we reprint an excellent article on the topic from Bridie Schmidt of the Australian EV website, TheDriven. (Many thanks to [www.thedrive.io](http://www.thedrive.io) for kindly allowing us to reprint it.)

As usual, we also have the regular sections on EV owners experiences (this time from AEVA NSW member, John August, on his recent need to buy a replacement BEV – and why it wasn't another BMWi3), overseas and local EV announcements and updates, plus a new 'regular' section starts in this edition: 'under the covers', where various items of EV tech are explained: this one on the pin configuration in the Type 2 and CCS2 plugs.

As always: if you want to contribute to this newsletter with experiences, articles (include photos please), product reviews, App suggestions or anything else – feel free to email me at [EVNews@bigpond.com](mailto:EVNews@bigpond.com) (note the new email address).

Yours in EV'ing!

Bryce (Also Victorian AEVA Branch Secretary)

### Deadlines for the next edition are:

**Articles, corporate member listings: September 1<sup>st</sup>, 2019.**

**Advertising space bookings: September 1<sup>st</sup>, 2019.**

**Branch reports and For Sale/Wanted: September 15<sup>th</sup>, 2019.**

**Advertising copy: September 15<sup>th</sup>, 2019**

**Publication date: Early October, 2019**



## From the President

*Clive Attwater: Acting AEVA President and Tasmania chair*



In late May, Greg Partridge asked me to become Acting President of AEVA until the end of his term due to personal circumstances he is facing at the moment. On behalf of AEVA I would like to thank Greg for his service to the organisation over the past year and a half as President and look forward to his ongoing contributions as an active member.

I am currently touring Czechia and Poland on my e-bike in a very warm European summer. E-mobility takes many forms and the provision for cycling I see here (and in Spain and Portugal last year) with amazing bike paths and routes shows the potential for diversification into easy, electrically assisted active

transport. E-scooters and pick-up-and-drop bikes also seem to be widespread.

The inevitable conversion to electric transport that AEVA members have seen for years is now happening. I believe AEVA's role needs to shift emphasis from making the case for the transition to happen (faster) to helping to make the transition well.

Already some regions with high EV penetration are having problems with local transformer capacity due to peak charging demands. Charge network interoperability is happening after a time of debilitating fragmentation. The disruption to the automotive retail sector is beginning to show. Electrification of others modes of transport have their own challenges.

Making the transition well means avoiding the foreseeable mistakes, especially where there are clear strategies to do so. AEVA will need to increase our engagement with State/Territory and national agencies and strengthen our coordination between branches across the country to a new level to contribute effectively. We also need to be clear about where our best contributions will be made: education/information/training, user feedback to service providers, guiding the framing of regulations, or other activities.

AEVA is represented on some state consultative bodies (Queensland, Tasmania), and may be invited to join the proposed national Low and Zero Emission Vehicles – Industry Reference Group. Gaining increased representation and maintaining credibility with both government and industry bodies will be essential to contributing effectively to the now inevitable electrification of transport.

In all of this we also need to continue to provide the sort of organisation that AEVA members expect, including the social activities, vehicle conversion group support and member information sharing that have sustained the organisation for over 45 years.

Clive Attwater, Acting AEVA National President.

## From the Secretary

*Dr Chris Jones; AEVA national secretary and WA Branch vice chair*



July marks the halfway point in the year, and with no major holidays on the horizon until Christmas, about the only good thing you can look forward to is a better-than-zero tax return. But the end of financial year is also when many members of our association get reminders about renewing their dues. We no longer have to wait until July to renew, but there are still quite a few of us who joined when the new fiscal year marked our renewal notices. So please don't forget to renew your membership, and remind others who've let theirs lapse to renew. Our association's strength is in its numbers, and more numbers means more impact. Also, as of July

1st membership fees have increased - Concession \$25, general \$50 and corporate \$125. This price rise is in response to the more ambitious expos we have been running - bigger events call for bigger venues with bigger price tags!

After the federal election EVs are still on the radar, but perhaps a sense of reason has started to return to the discussion. Despite only minor changes to the seating arrangements in Canberra, EV policy has shifted to the States, as they begin to set their own emissions reduction targets, renewable energy targets and promisingly, EV targets. The SA and ACT governments are leading the way with fleet targets, with the Victorian government making plans as well. The WA government is currently undertaking a whole-of-system review of the island electricity grid, and that includes significant attention being turned to EVs and bi-directional energy flows. Meanwhile the Queensland government is continuing to expand the fast charging network to west of the Great Dividing range.

The Secretary inbox has seen plenty of correspondence relating to these challenges, mainly from departmental staff wanting to know more about how the transition to EVs can be as smooth as possible. Similarly we've had plenty of dates with the press, including radio interviews, newspaper reports and the odd feature article in industry periodicals. We will continue to share our lived experience with EVs as often as we can, and help others learn the benefits of electrified transport.

I still get phone calls from Australians who are interested in converting cars to electric - despite the small (but growing) list of production cars on offer, people are still attracted to the idea of retro-fitting electric drives to old ICE cars. This is something the AEVA has been helping people with for 46 years, and will no doubt continue to do so. However the focus may shift towards ensuring the next generation of auto mechanics are well familiar with electric drive trains, not just for building their own, but to service the EVs of the future. The AEVA must continue to reach out to high schools and tech colleges, as well as the university and research sector so we can help prepare the next generation for the inevitable shift to electric. Get involved with your branch and start making plans today!

And finally: if you have any questions relating to the running of AEVA events, public liability insurance, introductions or just where to find some information on EVs and charging, please send me a message on [secretary@aeva.asn.au](mailto:secretary@aeva.asn.au)

Chris Jones, AEVA Secretary.



## Product Review

### Smart precharge controller

From ZEVA (Zero Emission Vehicles Australia)



Motor controllers for electric vehicles typically have a large internal capacitor bank on their input with very low ESR (Equivalent Series Resistance). As such, they require inrush protection when first powering up to prevent a large current spike which can damage components – most commonly, welding contactors shut or blowing fuses.

As a one-piece unit costing around \$70: I've found it makes installing a pre-charge system in EV conversions much simpler (and cheaper!) For further details, see:

<http://www.zeva.com.au/>

## EV Website links

New listings for this edition in red:

**Australian:**

**TheDriven** <https://thedriven.io/>

**Drive Zero** <https://www.drivezero.com.au/>

**EVTalk** <http://evtalk.com.au/>

**My Electric Car:** <https://myelectriccar.com.au/>

**International:**

**Plugin cars** [www.Plugincars.com](http://www.Plugincars.com)

**NZ Gov. EV info site** <https://www.electricvehicles.govt.nz/>

**Green Car Reports** <https://www.greencarreports.com/>

**Inside EVs** <https://insideevs.com>

**Cleantechnica** <https://cleantechnica.com/>

**Electrek** <https://electrek.co/>

**EVObsession** <http://evobsession.com/>

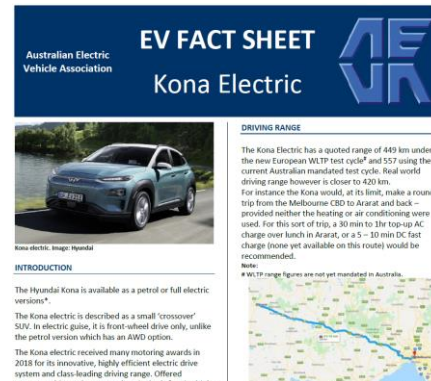
**Video sites:**

**Fully Charged** <http://www.fullychargedshow.co.uk/>

**Autogefuehl** <https://www.youtube.com/user/autogefuehl>

## Appy hour

### Reminder: AEVA EV Fact Sheets



The AEVA website hosts **EV Fact Sheets** on each of the full battery electric vehicles (BEVs) on the Australian market – plus a table listing all the BEVs and PHEVs (Plug-in Electric Vehicles) available (or coming soon) to Australia.

The BEV fact sheets are written to a standard two page format, thereby allowing a simple comparison of the main features of each BEV on the market. Standard items covered are brief model history, range, charging speeds and basic specifications like vehicle dimensions, weights and cargo volumes.

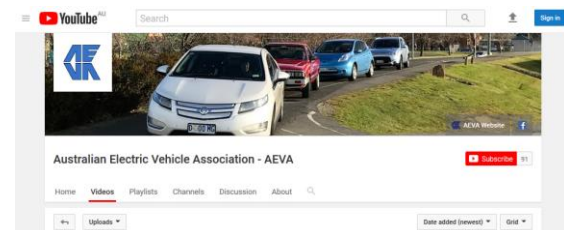
A must for anyone beginning their research on a new BEV to buy (or just out of curiosity to clarify the features of a particular BEV!).

The BEV sheets are updated on any major changes to a model, whilst the PHEV/BEV sheet is updated monthly.

You will find them at:

<http://www.aeva.asn.au/wiki/knowledge-base>

## Reminder: AEVA YouTube Channel



Yes folks, we now have our own dedicated YouTube channel! You will find it at:

<https://www.youtube.com/channel/UCnXUeRil052r6piTRh46Qdw/videos>

### Market Update: Q2 2019

By Bryce Gatton

Many reports are coming in from around the world now about the declining sales figures of ICE (Internal Combustion Engine) vehicles since the world peak in 2017. Conversely, reports of exponential growth in EV sales and ever growing EV order books (and even pre-order books with people putting significant sums down for EVs that have not even been released yet!) continue to confound EV naysayers.

Even several of the hold-outs against the EV rEvolution are now beginning to break ranks: Ford has made a US\$500 million investment in the new EV manufacturer Rivian, plus Toyota and Honda (who have long derided BEVs and promoted hydrogen fuel EVs instead) are now about to launch an ever expanding range of PHEVs and BEVs.

Meanwhile, some things don't change: Tesla has had yet another record quarter (delivering 95,200 vehicles in Q2) and the Tesla naysayers are saying demand will fall off a cliff in Q3 ... just like they have repeated after every positive quarterly report since Tesla started delivering vehicles to the market in 2008 ...

For those who are still expectantly waiting for affordable EVs: the time is getting closer. In Australia, the new Nissan Leaf is about to be released (or is it the 2.0 version as previously announced, not the 3.0 available in the rest of the world? We wait with bated breath to find out), with pre-orders now being taken. The Australian Tesla Model 3 'Configurator' has opened, with projected deliveries to begin in August. New EV entrants are also arriving: Mercedes will release its flagship electric car - the EQC - in Australia in October and ACE Auto hopes to release its first Australian assembled BEV van (the Cargo) late this year. Meanwhile, Hyundai is delivering the Kona electric and Ioniq range as fast as the trickle from the factory allows. Cumulative Kona sales to the end of May were 140, and outstanding orders were at 167, which at 40 a month delivered to all of Australia: this could take a while to fill even if there were no more orders. (And I know of several more orders coming from AEVA members since then). I also know of at least one since changed from 'order' to 'delivery': mine!!

In what is now becoming a famous quote used all around the world (including in a presentation to the SA AEVA branch recently – see their branch report in this edition) the CEO of Mercedes-Benz was recently quoted as saying *"Electric mobility is like an upside-down ketchup bottle. You know that at some point something will come out. You don't know when, but once it comes, it really does. Then it's bad if you're not prepared."*

Projections from several financial analysts are still moving the price parity point for EVs vs ICE closer, not further away. 2024 is the most likely (from Bloomberg New Energy Finance) – so for those holding out till they get cheaper still, it is only a couple more years to wait!

Meanwhile, the infrastructure here in Australia is still lagging behind – but there is some movement: ChargeFox have just announced the opening of a new charging station in Melbourne at Westfield Airport West. (Comprising four 350kW ultra-rapid and two 50kW fast chargers). Other stations are in the pipeline. Hopefully their promised 19 sites in Victoria by the end of 2019 do eventuate as Victoria till now has been a laggard in installed DC charging capacity. Meanwhile in other states, ChargeFox has just announced a partnership with Yurika to manage the 17 fast charging sites that make up the Queensland Electric Super Highway. (See fig 1 for the current status of the ChargeFox network).

Fig 1: ChargeFox network: as of July 2019 (Source: chargefox.com)

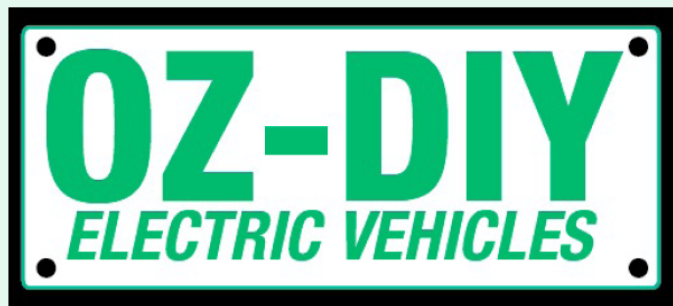


So onward and upward with EV adoption: I haven't even started on all the EV news in other fields. Buses, machinery, planes, bikes and more have evolved and advanced quickly in the last few months – more on these in later editions of EVNews!

## For Do-It-Yourself electric car conversions

- ✓ Budget priced AC & DC kits and components
- ✓ Workshop services to help complete current projects
- ✓ 'Drive in, Drive out' conversions, repairs and maintenance on all Electric Vehicles

Call or SMS  
0412 514 032  
*Graeme or Shane*



[www.OzDIYelectricvehicles.com](http://www.OzDIYelectricvehicles.com)  
3339 Pacific Highway, Springwood, Brisbane

## Current Australian BEV & PHEV availability (here, or coming very soon)

By Bryce Gatton

Current to June 16<sup>th</sup>, 2019

For latest version: see <http://www.aeva.asn.au/wiki/knowledge-base>

EV model	EV type	BEV range <sup>1</sup> quoted/real world <sup>2</sup> km	Battery size: kWh	Tow rating? Unbraked/braked	Cost <sup>3</sup>	Available now or ETA <sup>4</sup>
Audi e-tron	BEV	400/328	95	X	TBC >\$150k	Q3, 2019
Nissan Leaf 2.ZERO	BEV	285/240	40	X	\$57,000	Almost
Hyundai Kona electric	BEV	482/420	64	?	\$64,750	Y
Hyundai Ioniq electric	BEV	280/200	28	X	\$49,000	Y
Jaguar I-Pace	BEV	480/352	90	TBC (750kg)	\$132,000	Y
Tesla Model X Std Range	BEV	425/350	TBC	750/2250kg	\$142,000	Y
Tesla Model X Long Range	BEV	575/470	100	750/2250kg	\$162,000	Y
Tesla Model X Performance	BEV	550/450	100	750/2250kg	\$176,000	Y
Tesla Model S Std Range	BEV	490/390	TBC	X	\$133,000	Y
Tesla Model S Long Range	BEV	660/530	100	X	\$154,000	Y
Tesla Model S Performance	BEV	650/520	100	X	\$167,000	Y
Tesla Model 3 (base)	BEV	TBC/350	50	750/910kg	\$71,250	Y
Tesla Model 3 Long Range	BEV	TBC/500	75	750/910kg	\$94,500	Y
Renault Zoe	BEV	400/300	41	X	\$52,000	Y
Renault Kangoo ZE van	BEV	270/200	33	322kg max	\$53,000	Y
BMW i3	BEV	335/246	42	X	\$78,000	Y
BMW i3S	BEV	335/246	42	X	\$80,000	Y
BMW i8	PHEV	37/22	7.6	X	\$300,000	Y
BMW 330e	PHEV	37/23	7.6	X	\$80,000	Y
BMW X5 xDrive40e	PHEV	31/21	9	750/2700	\$140,000	Y
Hyundai Ioniq plug-in	PHEV	63/48	8.9	X	\$49,600	Y
Mini Countryman	PHEV	40/TBC	7.6	X	TBC \$63k?	Q2 2019
Mitsubishi Outlander	PHEV	54/35	12	750/1500	\$55,000	Y
Porsche Cayenne E-Hybrid	PHEV	36/18	10.8	750/3500	\$155,000	Y
Porsche Panamera E-Hybrid	PHEV	51/25	14.1	X	\$280,000	Y
Range Rover Si4 PHEV	PHEV	51/35	13.1	750/2500	\$165,000	Y
Volvo XC90-T8	PHEV	43/22	9.2	750/2400	\$136,000	Y

### Notes:

1. Quoted ranges are from the Green Vehicle Guide: <https://www.greenvehicleguide.gov.au> wherever possible. Those not yet available in Australia use the NEDC ratings.
2. Real world ranges are either US EPA ranges except for Renault, where manufacturer quoted real-world range used.
3. Approximate base model price based on currently available listings, inc on-road costs (ORCs).
4. ETA: Q=quarter. Q1=Jan-Mar; Q2=Apr-Jun; Q3=July-Sept; Q4=Oct-Dec

## How fast can you charge your electric vehicle? From trickle to ultra-rapid charging

From Bridie Schmidt, staff writer for The Driven, and Renew Economy websites.

First published on TheDriven ([www.thedrive.io](http://www.thedrive.io)) website, 21<sup>st</sup> June, 2019

Charging electric vehicles is not the same as refuelling a combustion vehicle, and the process has mired in myths that have dispersed throughout the media (no thanks to this year's pre-election campaign by the Coalition, which claimed that EVs take 8-10 hours to charge).



Kona EV charged by Delta charger at the Zero Emissions conference.

Delta Electronics senior e-mobility and energy storage sales manager Matti Dinkelmeyer decided to dispel some of the myths surrounding EV charging at the recent [Zero Emissions conference](#) in Sydney, and gave some useful insights into how EVs can be charged, and how quickly.

“While other countries have already embraced [electric vehicle] technology, Australia is still very much at the forefront of the rollout of electric vehicles,” Dinkelmeyer says.

“We have seen quite a development in the market, and particularly in the most recent election...a lot of focus of these debates has been around recharging capabilities and questions about how fast ... fast charging takes.”

Dinkelmeyer says that transitioning to electric vehicle transportation will require a shift in behaviour for drivers from refilling the petrol tank every week or two, to “topping up” a charge instead – many of them on a daily basis.

“The paradigm shift now means that EV charging can happen anywhere and at any time, so any power socket becomes a refuelling station.”

“EV charging is easy – let’s face it, there’s only two types of fuels, there’s AC and DC,” he says.



Charger Type	Electric Car Range added
<b>Mode 2: AC power point.</b> 240V, 2-3kW (portable EVSE and power point)	Up to 15km/hour
<b>Mode 3: AC fixed home wall charger.</b> 240V, 3.6-7.2 KW (normal home situation: single phase)	Up to 40km/hour
<b>Mode 3: AC 'destination charger'</b> 415V, 11-22kW (Business, factory or other situation: 3 phase)	60-120km/hour
<b>DC Fast Charger</b> 50kW DC Fast Charger 100kW DC fast charger	Around 40km/10 min Around 80km/10 min
<b>DC Rapid Charger</b> 150kW DC Fast Charger	Around 180km/ 15 min
<b>DC Ultra-Rapid Charger</b> 350kW DC Fast Charger	Around 400km/ 15 min

### AC Charging explained

It's useful to think of charging in terms of kilometres per hour – that is, how many kilometres of range can be added to an electric car battery an hour, or in the case of DC fast chargers, each 10-15 minutes (see chart above).

AC chargers are characterised by slower charging rates, and include rates from the so-called 2-3kW “trickle” or “granny” charging off your wall socket at home up to 22kW “destination chargers” that are often found at shopping centres or car parks.

*“Each vehicle comes with a standard cordset, that’s usually 3.6kW of charging and can be plugged into any conventional wall socket anywhere, anywhere,”* Dinkelmeyer says, adding that the impact on the electricity grid (a topic that also received a fair deal of warranted attention at the conference) is limited as the rate is so small.

While a standard wall socket trickle charger offers about 15km per hour of charge, a 7kW “wall charger” can be purchased from a number of different providers to supply an increased charging rate at home or for other applications like residential and office blocks – for many people these chargers may be the main charging location used.

*“Dedicated residential or workplace chargers at 7kW again are limited impact on the grid,”* Dinkelmeyer says, comparing such single phase chargers to an air conditioner.

These 7kW chargers offer 40km of range per hour of charge, and with modern EVs featuring charging schedule abilities, they can be set to charge within off peak hours to ensure benefiting from lower electricity rates.



As Laetitia Odini at Schneider Electric tells The Driven, in mature electric vehicle markets most EVs are charged at home.

*“Overseas, the majority of the charging is done at home. People drive to work, then they return home,”* Odini tells The Driven.

*“Most of the penetration [of EV chargers] has really been in homes.”*

But the option remains to top up wherever you stop – at a friend’s for example, says Dinkelmeyer.

*“Day to day usage of your electric vehicle will become second nature to just plug it in anywhere making recharging a succession of top ups,”* Dinkelmeyer says.

*“You won’t want to wait until your battery is completely empty – you’ll just top up,”* he says.

While home chargers are designed for single phase electricity connections, three-phase systems allow for a faster AC connection of up to 22kW.

*“These are limited to workplace charging because the majority of properties in Australia are single-phase,”* Dinkelmeyer says.

He points out that the ability of an electric vehicle to use higher AC charging rates is limited by its on-board rectifier.

*“If your rectifier can only handle a maximum of 7kW then your 11-22kW charger is not really going to provide any benefits to the charge rate of the vehicle.”*



Delta charger and Mitsubishi PHEV at the Zero Emissions conference.

### **DC Charging explained**

Ranging from 50kW to 350kW charging rate, DC chargers offer drivers the option to get a faster boost of energy.

You would use a fast charger *“when you have a particular operational requirement to quickly charge your car or for those odd occasions where you forget to plug it in to get yourself out of a pickle on the way to work,”* says Dinkelmeyer.

*“Fast charging [is for] when you’re doing longer trips or when you have particular operational requirements.”*

While 50kW “fast chargers” can offer around 40 kilometres of extra range in 10 minutes, there are also much faster 150-175kW “rapid chargers” and 350kW “ultra-rapid chargers”, such as are being rolled out across the eastern seaboard of Australia.

Two 350kW chargers have already been rolled at Euroa and Barnawatha between Sydney and Melbourne, and a third was recently opened in Toombul, Brisbane.

These offer drivers the opportunity to stop for a shorter amount of time, general to travel from city to city or through regional areas.

*“It’s important to install alongside highways because Australia has long distances, but most of these new EVs have more than enough range to cater for a few days driving without worrying about a flat battery,”* says Odini.

Again, an electric vehicle’s ability to charge at these ultra-rapid rates depends on the vehicle’s on-board technology – check out our Models pages to explore the differences in charging rates of various electric vehicles available in Australia.

### **Charging in the future**

Other charging solutions such as wireless charging are under development, however Dinkelmeyer says that there are usability and efficiency issues that are yet to be solved.

*“There are a number of trial installations but energy efficiencies are still a concern,”* he says.

*“There is no uniform standard at this point in time. It requires additional hardware for the vehicle and in terms of usability, to have a maximum efficiency of that type of energy transfer you really need a very good alignment of the receiving end and the pad.”*

## Plasmaball Run

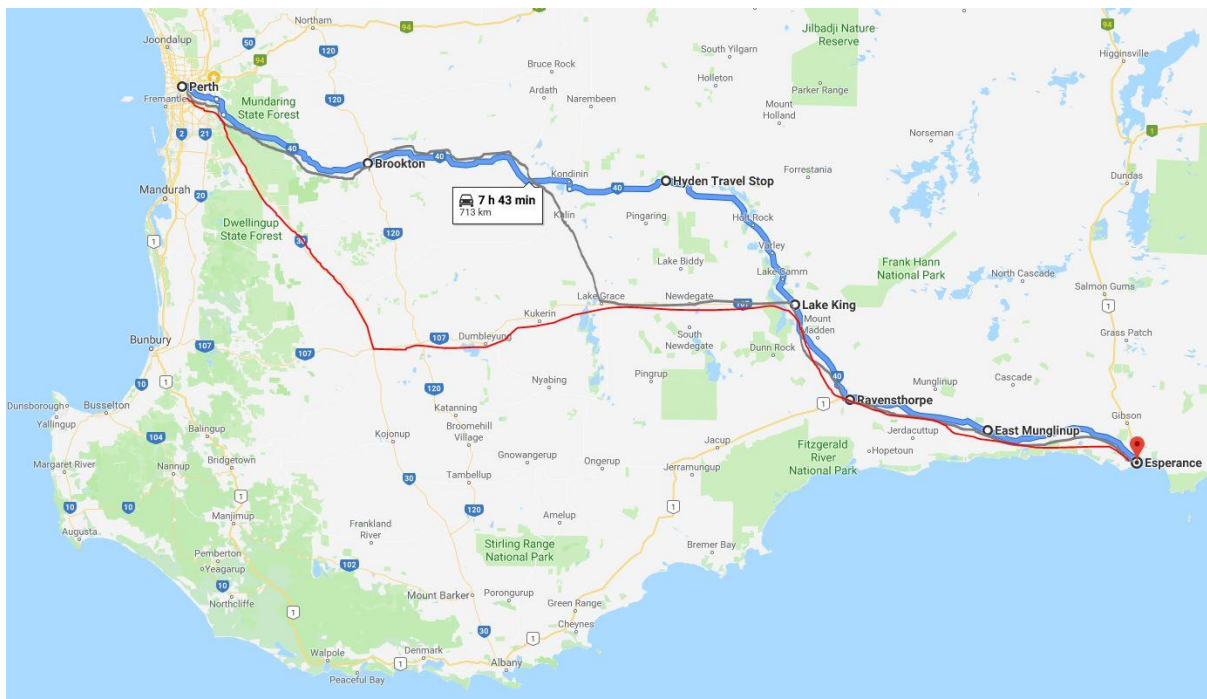
*Perth to Esperance in three different electric cars (none of which were a Tesla!)*

*By Chris Jones (with help from Matt Clifton and Jon Edwards)*



Who remembers the 1981 movie ‘Cannonball Run’ starring Burt Reynolds? The goal was to drive from one side of the USA to the other in record time and anything was fair game. Apart from thin plots and lots of action scenes, the movie title has inspired the inaugural Plasmaball Run. Several West Australian AEVA members decided we should set a challenging road trip in some more affordable EVs. Get to Esperance as quick as you can, using whatever means you can, so long as it was electric.

At about 700 km, it’s a long trip no matter which route you take. Power out here is good, just not particularly abundant. The AEVA has helped establish a network of three-phase sockets at pubs, roadhouses and shire buildings forming the basis of our “bush standard” EV charging infrastructure. We live in hope there will be some DC fast chargers on the road to Esperance in the next year.



Perth to Esperance in blue (Zoe) grey (Leaf 2.0) and red (Kona EV)

The trip would be entirely manageable in even the basest model Tesla. But for this trip we had a Hyundai Kona EV, the brand new Nissan Leaf and the Renault Zoe. Our goal was to demonstrate that it's entirely possible to travel rural Australia in a mid-range EV, despite there being effectively no charging network. It was also a great opportunity to highlight the amazing scenery over here, with Esperance being home to some of Australia's most iconic beaches.

Jon and his mum Fran were travelling in his Kona EV – a compact SUV with a comfortable 400 km highway range. Kat and I were loaned the unmistakably decaled demonstrator Renault Zoe thanks to Melville Renault, while Nissan Australia loaned Matt and Denni their Euro-spec Nissan Leaf 2.0 demo car. Both the Zoe and the leaf have approximately 40 kWh batteries, which on paper were quite capable of managing the two hour drives between charge points. The Leaf and Kona EV only have 7 kW on-board chargers, so a full recharge would take 6 to 9 hours! The solution was therefore to pack a portable DC fast charger powered from a 32 amp three-phase socket. This way about 16 kW could be pushed into the cars' CHAdeMO port, allowing for a 2.5 to 3 hour full charge at each stop.

The Zoe on the other hand has a 22 kW AC onboard charger which uses the same power electronics in the drive inverter. Some versions of the Zoe will allow up to 42 kW charging, however efficiency takes a hit at lower charge currents. 22 kW meant we could drive for two hours and charge for (theoretically) two hours. My calculations put this as a 14 hour trip using the available power points to their fullest.

Matt and Denni set off on Thursday evening, spending the night at the Bedford Arms Hotel in Brookton. The Leaf charged happily at 7 kW from the public charger at the roadhouse in the meantime. This proved a far more manageable alternative to rising at 3 am to get ahead of us in the Zoe! Kat and I set off at 6 am on Friday morning after fully charging the car the night before (something most motoring journalists always seem to forget to do). Jon and Fran set off from Cockburn slightly earlier at 5.30am but took a different route; via the wool capital of Wagin before heading due east from there.

The Zoe took a little bit of getting used to – The menu screens were not intuitive and for some reason perhaps unique to this particular car, there was no clock. One of the most valuable tools when driving an EV is a convenient chronometer and for some frustrating reason, the time could not be set! I suspect being a demo car it hadn't been loaded with the latest firmware so it was bound to have a few quirks. Expecting the energy consumption to be somewhere between 140 and 170 Wh/km, I was banking on a 1.5 hour recharge at Brookton. To our surprise though, the car was telling us we'd already used 60% of the battery in just 115 km of driving.

**The Zoe charged at 22 kW from this public charger while we enjoyed breakfast inside.**

The Leaf was a little better on energy consumption, but Matt and Denni's route took them up the Darling scarp which easily subtracts 20 km of range. By the time they got to Brookton they had consumed 60 % of their range also. The first part of this trip was sandplain suburbia, sipping a mere 150 Wh/km.





Matt had allowed for 185 Wh/km to clear the top of the ancient fault line which seemed consistent with their driving.

Jon and Fran cruised effortlessly through the hills in the Kona clearing the way with a newly installed ShooRoo - sound insurance for this hour of travel! The Kona averaged a mere 159 Wh/km at 100 km/h, arriving on schedule at 7.30am. Sharon from the Wagin Motel was perplexed when the pair opted for the 3 phase outlet over their Tesla Destination charger. She watched with awe as the multitude of cables was unraveled from the portable DC charger, the other end of which was plugged into the front of the car. Just a 50 minute break added 100 km of range before setting off again.

Back in the Zoe, we left Brookton with 90% of a charge, figuring we'd surely have enough energy to make the 200 km stretch to Hyden. Considering the Zoe claimed a 300 km range, it seemed a conservative number. As we approached half way, it became clear we didn't have enough to make the distance. A quick scan of the Plugshare app revealed several three phase sockets in Corrigin, including a 20 amp socket behind the pub. We'd borrowed a friend's JuiceBooster2; an extremely versatile Type-2 EVSE which comes with all manner of electrical protection and a multitude of different adaptors. The pub had just opened its doors so after plugging in we ordered some (non-alcoholic) drinks. The Irish barmaid told us about her parents and how they still drive around in a first generation Nissan Leaf!

The publican, Scott, introduced himself to us and it was clear he wasn't quite so enamoured with the concept. After some discussion he seemed skeptical of EV charging as a service and was concerned about what it would cost him. Scott also owns the motel and roadhouse in town, and while the sockets at both places were on Plugshare, he simply wasn't that keen on the idea.

"We've had Tesla owners come through here and plug in, and insist the power ought to be free because they're buying lunch. But the bloke who fills up with diesel and buys a sandwich isn't getting free fuel – why should you?" he asked. "My power bills are huge – I want to know what's this going to cost me?"

It's a fair question, and the prospect of EV drivers getting something for nothing doesn't sit well. I explained to him that my short stop with the Zoe would cost about \$3.50 in power, while a full charge on a Tesla might cost about \$40. I reminded him he is absolutely within his rights to charge for the power, and if accounting for it was important to him he could install a unit much like Brookton has. But at \$2000+ it would never pay for itself, and a 50 kW DC fast charger would make even less sense without some kind of government support. We left Corrigin with a feeling that while the transition to EVs is well underway, it won't all be smooth sailing.

The Zoe's brief top-up proved essential as we rolled into Hyden with about 7 km remaining on the guess-o-meter. We plugged the JB2 into an AEVA-supported 32 amp 3-phase socket and started to charge. We walked down to the local bakery where we enjoyed a sandwich and coffee. The plan was to charge here to 100% as it was clear we'd need all the range we could muster for the next 195 km leg to Ravensthorpe. We returned to the car some 25 minutes later to find it had stopped charging! I unplugged the setup and started again, this time it continued to charge seemingly unhindered. Confident it was just a mere glitch we set off on a walk to Wave Rock – a unique granite outcrop sporting a 15 metre overhanging wall. The walk took longer than expected, so you can imagine the disappointment once we discovered a 60 % state of charge. We restarted the charge which

continued for another 1.5 hours to full. Already two hours behind schedule we finally left Hyden for Ravensthorpe. With a full charge and constant, flat roads it was the perfect test to see how far we could go under what were effectively ideal EV driving conditions.



**Kat poses in front of Hyden's Wave Rock.** Caution rather than valour was Matt and Denni's approach to the Plasmaball Run. Kulin is 40 km south of Corrigin – wheatbelt heartland. There is no petrol station in Kulin; the cafe in town has the original lone pump for decorative nostalgia. The WA state government 'Royalties for Regions' scheme funded a 24 hour self-serve pair of fuel bowzers. A quick getaway was foiled by the stream of curious locals and travelers constantly enquired about the Leaf and the whole charging process! This simply meant a

shorter recharge at Lake Grace was required. Only one onlooker was skeptical, spouting the standard lines of EVs being worse for the environment / not suitable / never work usual misinformation. Matt would frequently remind them – *"Horses for courses. Use the right tool for the job. Diesel will move rural Australia for a while but not forever"*. He would remind folks that the shift to EVs was a transition to embrace, not some instant switch to be feared. He would cheekily go on to tease with *"It takes just 8 seconds to recharge at home; four seconds to plug in and four more to unplug the next morning..."* admitting it is a somewhat mischievous statement. By mid-morning they set off along the Tin-Horse Highway; a series of sculptures made from old car exhausts attached to 44 gallon drums and other old farm machinery, all resembling anthropomorphised animals in various positions and gestures. An interesting way to welcome you to Lake Grace!

#### **Making friends in Kulin, WA.**

Matt and Denni lost more time at Lake Grace as inquisitive truck drivers and curious grey nomads engaged in friendly chats about the transition to EVs. Needing a full battery for the unexplored range of 186km to Ravensthorpe, conversational delays were not an issue. Fully charged the Nissan and its occupants set off with the cruise control set at 80 km/h. A straight line of 115 km to Lake King, only interrupted three bends near the community of Newdegate, overshadowed by its magnificently painted grain silos.



Making good progress, Matt began to wonder - where are the others up to? No Plugshare check-ins at Ravensthorpe by anyone yet! Was Jon being sneaky not giving away clues? Where were Chris and Kat in the Zoe? Being too cynical to trust that the others would play fair, the cruise control was adjusted upwards to 90 km/h. To his surprise, the economy appeared to improve! A reading of 157



Wh/km suggested something odd. Without word on the whereabouts of the others they continued on to Ravensthorpe, hopeful to avoid a queue at the charger! Hoping to avoid three EVs descending onto one charger Matt lifted the cruise to 105 km/h, if nothing else to assess the consumption. Well, until the road works anyway.

An hour or so ahead of Matt, Jon and Fran parked the Kona at the Lake Grace Roadhouse. They unraveled the cables and charger as per usual, getting the system down pat. The Delta portable charger would easily push another 100 km range into the battery per hour of charging. They left Cockburn with 450 km on the guess-o-meter and after having travelled 328 km to Lake Grace with a one hour charge in Wagin, a very confidence-inspiring 332 km remained on the readout. There were only 186 km to Ravensthorpe under perfect conditions. The Kona EV was giving a pretty steady 159 Wh/km at 100 km/h; a testament to Hyundai's goal of high efficiency electric motoring.



**The Kona EV charges at Ravensthorpe (DC fast charger hidden inside).**

Jon and Fran arrived at Ravensthorpe ahead of the others, charged and moved on well before the others had even left their last stops. A slow internet connection might be to blame for the lack of updates to Plugshare - the perils of a not-quite-realtime system. Their last quick stop was in Munglinup for a courtesy recharge, mainly just to help

support the cause. Munglinup was one of the first localities to embrace an AEVA-backed three-phase socket, and Jon had been instrumental in setting it up with Richard the proprietor. Richard was not there but a donation was made for the few minutes charging performed. The roadhouse is a great little place with lots of gardens and a friendly atmosphere. The Kona-powered duo pushed on to Esperance, with a comfortable 30 km range to spare. Only 12.5 hours travel time highlighted the obvious benefits of a large battery.



**Floral mural painted on the silos at Ravensthorpe.**

Matt and Denni recharged in Ravensthorpe at 3 pm with 17 % left in the battery. Still no check-ins from the others though. Having seen the efficiency on this run, the LEAF was well placed to hit Esperance in one last charge. The final 187 km would be tackled with a full battery at 5 pm, but the pair encountered yet more road works and large (often deceased)

wildlife. Lambs, swooping owls and some very mobile wallabies kept them alert while another stretch of roadworks saw them roll into Esperance at 7:30 pm with 17 % remaining charge. So the New Nissan Leaf offers a no-stress range of about 200 km at 95 km/h. Notably, a distance of 733 km with an average consumption of 154Wh/km and a total travel time of 17.5 hours suggests that while the Leaf can be driven long distances through regions with effectively no charging infrastructure, it's probably not the right tool for the job.

200 Wh/km is pretty poor economy for a car the size of the Zoe. Well-inflated tyres, a slight tailwind and keeping the cruise control set to 98 km/h still saw us squeaking into Ravensthorpe Green Haven

Caravan Park on empty. It seemed 200 km was a hard range limit. Sure enough the Tesla destination charger was patiently waiting for us, which we finally plugged into at dusk. The staff at the caravan park were very friendly and helpful – “Yep, 50 cents a unit, just pay at the office when you’re done”. When it comes to charging as a service, these folks clearly ‘got it’. It seemed to be charging well when we left for the pub for dinner. The Ravensthorpe Hotel was hopping with a sea of fluorescent orange shirts and steel-capped boots. Workers from the Galaxy lithium mine, as well as those managing the currently idle FQM nickel mine made up the numbers. Ravensthorpe will welcome the electric car boom with open arms since the region is critical for supplying the world with essential battery resources, but is currently in need of a boost.

It hadn’t been 2 hours before we returned to the Zoe for a sadly familiar sight. 27 % state of charge! It would be at least two hours before we could set off again. What on Earth is causing this? Was it locking the car? Was it not locking the car? Was it a dodgy connector? Either way, we restarted the charge and settled in to a boring, cold night waiting in the car. Like a watched kettle never boiling, the last 5 % was agony. We left a \$20 note in the letterbox for the caravan park staff and set off for the last leg into town. Economy and road works be damned, I set the cruise control to 100 km/h and steered the car through the dark southern skies into Esperance. The shortest route to the motel was chosen, ensuring we rolled in on empty. The range remaining estimate gave up at 5 km, instead showing a nebulous (--). Just after midnight, 18 hours after setting off, we plugged into a 10 amp socket, enjoyed the most blissful hot shower and slept the sleep of the dead.

\*\*\*

Saturday brunch was delightful – local café Brown Sugar was adorned with indigenous art from the region, along with landscape paintings stunning coastlines. All six weary travelers enjoyed regaling stories from the road. We moved on to the Esperance foreshore where we met with local journalists who were keen to know more about our trip – Why? How long? Where did you charge? Perhaps the most amusing one was “But will they work in Esperance?” I smiled, turned around and looked at the three electric cars parked before us. I guess so! People would do double-takes as they made their way past the three cars; the bold livery on the Zoe being the only real giveaway the vehicles were not petrol powered. One professional couple had made arrangements to see us specifically as they were keen to replace their ‘town car’ with a new Nissan Leaf. Considering everyone on the south coast has at least one four wheel drive, replacing the other family car with electric seems obvious. We look forward to hearing the good news on their purchase come August!

We went into full tourist mode on Sunday. Leaving with a full overnight charge we had plenty of range to do the Great Ocean Drive; a loop taking you past Pink Lake, past the site of Australia’s first wind farm (and two more) as well as endless white sandy beaches bracketed by granite outcrops and perfect turquoise water. After lunch we travelled out to Lucky Bay – best known for its impossibly white beaches, blue water and of course the very photogenic kangaroos.



**The Kona EV visits Cape LeGrand National Park.**

All three vehicles and their occupants said goodbye to Esperance as we made our way back to Perth. Matt and Denni opted to leave that morning to spend the night in Lake Grace, making for a shorter day's drive back to Perth. Kat and I set off before sunrise in the Zoe but not before using the pre-conditioning feature on the remote. When plugged into a charger the

vehicle's climate control system can be fired up for 10 minutes. Considering it was barely 9 degrees C, this was a pleasant welcome to the morning. Esperance to Ravensthorpe at 98 km/h was comfortable and the energy consumption was consistent, albeit high. Driving without heat to conserve range is a noble endeavor, but boy it's not fun. The windscreen would fog up quickly as we dipped through broad valleys, but the demister worked almost instantly. The little bit of warm air was a nice respite, though it did cause the guess-o-meter to subtract about 10 km in an instant. Clearly it was to be used judiciously!

The familiar melody of "CHARGE YOUR CAR!" filled the cabin as we pulled up at Green Haven again. A young family who were loading their 4x4 and trailer near the charger were immediately intrigued by the process. They were clearly excited for the prospect of more affordable EVs, and electric adventure vehicles in particular. I plugged in and it began charging; but for how long? A short walk to the service station for a coffee would be enough time to assess the progress. Sure enough, the now familiar scene of a car at 25% and no means to charge it was upon us. Repeated efforts only caused the charge to end sooner, and on the last attempt it generated noises no machine outside of a TIG welder should make. It charged just fine on 10 amps, but unfortunately we didn't have a spare 20 hours. This car was going home on a flatbed and we were taking the bus.



**The Zoe informing us, yet again, it was unable to be charged.**

TransWA had a service rolling through town in about 40 minutes. Enough time to pack all of our stuff onto our shoulders and walk up the hill to the bus

stop. We paid for our tickets to the driver and took our seats. "Did your car break down? What happened?" he asked. I paused and wondered if it was worth telling the whole long story, or just being succinct. "Fuel pump" I quipped.

Jon had checked into the Ravensthorpe charger about an hour after we left. It must have been obvious we had difficulties; an EV in Ravensthorpe which is neither charging nor driving was clearly in trouble. Melville Renault were great – cars break down, it just happens sometimes and EVs are no exception. It should happen far less often, but a charger failure is probably akin to a fuel pump failure – a small problem with major implications. Renault Roadside assistance collected the car later in the week.

The trip really highlighted the need for a decent fast charge network in regional WA. To a lesser extent, it also highlighted the utility of a 60+ kWh battery for touring. 40 kWh makes for a capable capable city car, especially in a sprawling metropolis like Perth where clocking up 150 km in a day is possible. But a network of even just 50 kW DC fast chargers will add fast range to every EV in the state. With the prospect of 350kW chargers adding 300 km of range in 10 minutes, road tripping in EVs will be a doddle. Leaf version 2.1 with its 60 kWh battery will see it match the Kona for range and utility, making the occasional country trip feasible.

The Zoe's charger problem was a downer on what was an otherwise very easy drive. I've been around EVs long enough to have developed a sense of "range resilience". I never felt like we wouldn't make it to a charger in time. But the high energy consumption of the Zoe at highway speeds is concerning and possibly a sign of issues with the inverter unit. Even so, 200 km at 100 km/h is an entirely useful range and well within our needs. The 2020 iteration of the Zoe will have CCS2 DC fast charging standard, and comes with an extra 10 kWh of battery. This makes even the longest stretches of most routes possible, but not before we get a few more DC fast chargers out in the regions. Matt's only regret was that he only found the new Leaf's "Sport Mode" when he was back in Perth; no shortage of power at the wheels with this switched on! Jon's Kona was without a doubt the Plasmaball run champion for 2019; the extra battery capacity affords a clear advantage. However they were lucky they had the portable DC fast charging option, otherwise they might have struggled to find something to do in Lake Grace for 9 hours!

So there you have it – we proved you can drive three different non-Tesla EVs to far off places within a day. We never said it was easy, but it's undoubtedly possible in spite of the lack of infrastructure. I look forward to repeating this again soon. Where next?

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## 15th World Solar Challenge

*Darwin to Adelaide. One week. Three classes.*

For over 30 years, the Bridgestone World Solar Challenge has welcomed the greatest minds from around the world to Australia to push the limits of technological innovation and travel the outback in a vehicle powered only by the energy of the sun.

Traversing 3,000km from Darwin to Adelaide, teams comprise of tertiary and secondary students from over 30 countries.

These students and their support team have achieved greatness by engineering and building a vehicle with their own hands and powering it across some of the world's most challenging landscape.

In 2017, the Bridgestone World Solar Challenge celebrated its 30th Anniversary. Running from October 13 to 20, the 2019 competition marks the 15th journey from the Top End to Adelaide.

### THE JOURNEY

It's all about energy management! Based on the original notion that a 1000W car would complete the journey in 50 hours, solar cars are allowed a nominal 5kW hours of stored energy, which is 10% of that theoretical figure. All other energy must come from the sun or be recovered from the kinetic energy of the vehicle.

These are arguably the most efficient electric vehicles.

Having made the journey to Darwin by successfully navigating quarantine, customs, scrutineering, safety inspections and undertaken event briefings, participants are ready to start their epic journey.

Once the teams have left Darwin they must travel as far as they can until 5:00pm in the afternoon where they make camp in the desert where-ever they happen to be. All teams must be fully self-sufficient and for all concerned it is a great adventure - many say the adventure of a lifetime.

During the journey there are 7 mandatory check points where observers are changed and team managers may update themselves with the latest information on the weather, and their position in the field. At check points, teams can perform the most basic of maintenance only - checking and maintenance of tyre pressure and cleaning of debris from the vehicle.



### THE CLASSES

Participating teams enter their vehicle into one of the following three classes:

The Challenger Class is for single-seat solar cars designed to be fast.

The Cruiser Class is for efficient, practical solar cars with two or more seats.

The Adventure Class is a non-competitive class for solar cars built for previous events.

Further information: <https://www.worldsolarchallenge.org>

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# Sydney Electric Vehicle Expo

26<sup>th</sup> – 27<sup>th</sup> October 2019



# The Sydney Electric Vehicle Expo 2019

As public interest in Electric Vehicles is at an all-time high, now is the time to showcase the range of electric vehicles and associated technology available in the Australian market.

The Sydney Electric Vehicle Expo aims to provide consumers with access to the latest vendors and information enabling them to make informed decisions when considering the purchase of an Electric Vehicle.

<b>Dates</b>	Saturday 26 <sup>th</sup> and Sunday 27 <sup>th</sup> October 2019
<b>Time</b>	Main Event 10:00am - 4:30pm Try-drive 10:30am – 4:00pm
<b>Location</b>	Sydney Olympic Park, Sydney Showground

AEVA events are held all over Australia and attract thousands of visitors looking to experience first-hand, the thrill of driving electric ... the EV-grin.

## Attractions

- Test drives and rides on public roads in the Olympic Park Precinct
- Consumer talks and Q&A with celebrity/noteworthy speakers
- Related industry vendor displays
- “Show ‘n’ Shine” display and competition – a showcase of converted, customised and modified Electric Vehicles (EVs)
- A family friendly event with food and drink available
- Public free entry

## Our Aims

- Increase awareness of electric vehicles
- Overview of the range of vehicles available in the Australian market
- Demonstration of electric vehicle capabilities, dispel myths and inspire uptake
- Opportunity to touch, feel, drive/ride a range of vehicles
- Electric vehicle businesses to engage directly with their target markets
- Knowledge share of global trends in the electric vehicle sector

This public display is expected to draw thousands of future EV owners per day interested in the release of new electric vehicles such as; Nissan LEAF, Hyundai Ioniq, Hyundai Kona, Kia Niro, Renault Zoe. Plus there will be industry leaders giving consumer orientated talks on topics targeted at informing and educating the potential EV purchaser.

This is not your ordinary car show!

# Sponsoring the 2019 Electric Vehicle Expo

AEVA is delighted to present you with the opportunity to be a part of the inaugural event. As a “not for profit organization” we are looking for various levels of support from companies in the field to consider a display. There are several ways that you can sponsor the Electric Vehicle Expo 2019.

You will benefit from several promotional events in the lead up to the conference in October. Please view each package to ensure the one you chose is right for you and your organisation.

This convention will address many of the questions that need to be considered with the arrival of EVs over the next few years. This is a good opportunity for all participants to get a deeper understanding of the current state of the industry and how it will progress in the future years in Australia, to help plan for the changes EVs will bring.

Our aim is to provide a first-tier presentation of Electric Vehicles and technology featuring the very best in Electric Vehicles.

It's because of your generosity that we can provide insight to the community. Electric vehicles is a growing industry, currently in its infancy in Australia with an increasing number and variety of vehicles available, together with the corresponding interest from the public, it is our intention to continue to host this crucial event on an annual basis. Thank you for considering being one of our trusted partners.



# Sponsorship and Exhibitor Packages

*The Sydney Electric Vehicle Expo is a unique sponsorship and marketing opportunity. Sponsors will benefit from promotions leading up to the event, having your brand in front of the Australian EV community and those interested in sustainability more broadly.*

## Sponsorship opportunities include:

- *Exclusive Brand Partner*
- *Platinum Sponsor*
- *Gold Sponsor*

## General Exhibitor opportunities include:

- *Vehicle Exhibitors*
- *Trade Display*
- *Configurable Display Areas*

## For More Information

If you wish to enquire about sponsorship or exhibiting at the 2019 Sydney Electric Vehicle Expo, please contact Simone or Michael to discuss options and for the full information and pricing package:

- Simone – 0421 050 966 – [info@theEvExpo.com](mailto:info@theEvExpo.com) or
- Michael – 0419 986 801 – [treasurer@aeva.asn.au](mailto:treasurer@aeva.asn.au)



## Under the covers: the CCS socket explained.

*Bryce Gatton looks at why the CCS2 socket in most new EVs is so much smaller than the CHAdeMO/Type 2 pairing in the current Leaf.*



Fig. 1: CHAdeMO (left) and Type 2 (right) sockets in current model Nissan Leaf



Fig 2: CCS2 combo socket

Unlike the CHAdeMO DC charging system (which uses a different communications protocol to the AC charging system) both the Type 2 AC connector and the CCS DC charging systems share a common communications system for 'talking' to the car and the charger<sup>1</sup>. As shown in figures 3 and 4, these are:

- (a) the 'PP' pin, which tells the EVSE that an EV is plugged in and
- (b) the 'CP' pin, which tells the car exactly what current the EVSE can supply.

Commonly, for AC EVSEs the charge rate for one phase is 3.6 or 7.2kW, or three phase at 11 or 22kW – but many other options are possible depending on the EVSE settings<sup>2</sup>.

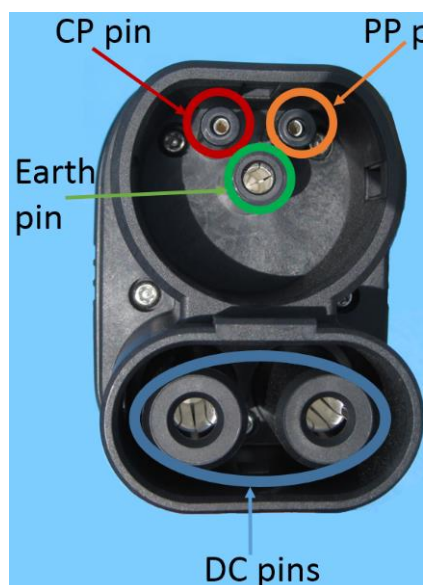


Fig. 3: CCS2 plug DC pin layout

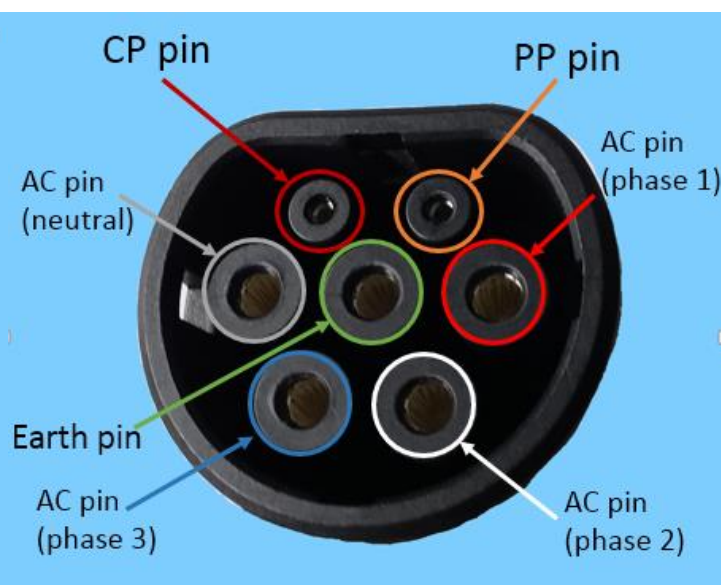


Fig. 4: Type 2 AC plug to car socket pin layout

Because CCS DC charging uses the same communications system as the AC charging system (as shown in figures 3 and 4), for DC charging using the CCS system the manufacturer only needs to add and connect two more pins for DC below the Type 2 inlet socket and talk to the car and EVSE via the same pins as before. The result is what is called the CCS (Combined Charging System) plug and socket, as shown in figures 2 and 3. (BTW: A longer story applies as to why Tesla sockets, until the Model 3, were different: but we don't have space here for that!).

This is also why the CCS system allows for a much smaller plug than the older separate CHAdeMO and AC sockets. Because CHAdeMO uses a totally different communications system to the Type 2 AC connector (in fact CHAdeMO uses many more pins to do the same thing) CHAdeMO needs to have a separate socket – hence the large space allowance in EVs using CHAdeMO DC charging to allow for these. (See fig. 1 and fig. 5).



Fig 5: CHAdeMO plug (left) and plug inserted (right) – 2011 Nissan Leaf





**Notes:**

1. EV chargers are more properly referred to as EVSEs – short for Electric Vehicle Supply Equipment.
2. Mass-produced electric cars are smart: they will only draw as much charging current as what the EVSE tells them they can. (At least up to their manufacturer's set maximum: in the case of many manufacturers, for AC this is 7.2kW single phase)

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## **Model Update News: New Renault Zoe revealed in Europe.**

*Bigger battery, more range, more power, DC charging & more features: catching up with the pack?  
By Bryce Gatton. First published on TheDriven.io, June 2019*



**Pic: Groupe Renault**

Renault has just announced the specifications of the third generation all-electric Zoe to be released for sale ... sometime soon. (A date was not specified in the press announcement, but its European release is rumoured to be for late 2019 or early 2020).

In the new model, Renault are addressing many of the issues that were starting to let the Zoe down after being well and truly overtaken by later entrants to the EV market.

The specifications of the new Zoe include a 52kWh battery (up from 41) that will offer a driving range of around 380km under the new European WLTP test cycle. (This should result in a real-world range of approximately 350km).

There will also be the option of adding DC charging – although only at a maximum of 50kW. (For comparison, the Hyundai Ioniq, Kona and Kia e-Niro can all charge at up to 70kW DC, the Tesla model 3 standard range is a maximum of 150kW, the Model 3 long-range can do up to 250kW and the soon-to-be released Porch Taycan can do up to 350kW!)

Motor power is also to be increased with the introduction of an optional GT-Line version sporting a 100kW motor in addition to the existing 80kW motor currently on offer overseas. (Note: in Australia we still only get the 68kW motor and in the new version may only get the R110, not the R135 100kW motor either).

The noticeably light regenerative braking in the current Zoe has also been addressed with the addition of a 'B' mode to give a stronger regenerative braking effect. According to Renault, this should potentially enable 'one-pedal' driving in most circumstances.



**Pic: Groupe Renault**

Inside, the Zoe will have a larger touchscreen (9.3 inch), a new dash layout, a light restyle of the interior layout and seating and the replacement of the mechanical parking brake handle with an electronic pushbutton.

Exterior changes are more limited, but noticeable. Headlamps, fog lamps and tail-lights will all be LED, and there are a number of stylistic changes to the taillight, headlamp and front bumper areas. Three new metallic colours have been added to the range and there is also a revamped range of wheel designs, including three different wheel diameter options. (15, 16 and 17-inches). Another improvement on the existing Zoe is the addition of four-wheel disc braking to all versions. (The current Zoe uses drum rear brakes).

To keep up with today's ever-increasing focus on driving safety – the new Zoe will include a suite of additional safety systems. These include Active Emergency Braking System (AEBS), Lane Departure Warning (LDW), Lane Keeping Assist (LKA), Traffic Sign Recognition (TSR), Blind Spot Monitoring (BSM) and Auto High/Low beam headlamps (AHL), hands-free Easy Park Assist (EPA), front and rear parking sensors, Auto-Hill hold and an automatic parking brake function.

Interestingly, the maps on the new Zoe navigation system can be updated via the 'map-auto update' function, rather than the current annoying process used by most manufacturers where the maps can only be updated by authorised service technicians (usually during a service).

As for when it reaches Australia's shores: Renault Australia have stated that the R110 motor version may become available here sometime in 2020. No word on the R135 though.

## **Overseas model announcement: Vauxhall opens UK order books for Corsa-e.**

*By Bryce Gatton. First published on TheDriven.io, June 2019*

In an exciting year for EVs (well, overseas at least), Vauxhall has recently opened its UK order books for the Corsa-e. Recently announced in general terms by Vauxhall (and reported by TheDriven here: <https://thedriven.io/2019/05/24/vauxhall-releases-official-specs-photos-corsa-e/>) more details have now come forth.

The announcements today included that it will come with a 50kWh battery and an estimated 328km (WLTP) driving range. Charging will include 11kW AC capable charging and DC charging to 80% in 30 minutes. As such it appears to hit the 'sweet spot' for providing an EV that can fully replace an ICE vehicle by supplying a good range and fast charging speeds at a reasonable price point.

That price: £29,990 (Au\$54,500). However in the UK the price reduces to Au\$48,000 after applying their (conservative) government's £3,500 'Plug-in Car Grant'.

That makes it 'under \$50K' – which is the price tag that I anecdotally hear from many people as being their personal tipping point for making the switch to EV.



**Pic: Vauxhall Motors Limited**

Like a lot of new EV offerings: a pre-order option was announced soon after the model announcement, with Vauxhall offering a £500 reservation fee to secure an order on a Corsa-e. To sweeten the deal still further: the first 500 UK customers to place a reservation will receive a free home charging kit when they take delivery of their vehicle.

As ever with new EV model announcements there is a waiting period to endure – though not too long a one in this case. Series production is slated to start in January next year.

Like most EV manufacturers the battery will come with a significant warranty – in this case at least 70 per cent of its capacity is maintained for 100,000 miles (160,000km) or eight years.



With a 0 – 100km/hr of 8.1 seconds it is no slouch (and is probably all that sensible drivers actually need) but for an EV that is definitely not class leading. Other specifications released so far include 7-inch touch screen, satellite navigation, LED headlights, alloy wheels, rear parking sensors and DAB radio.

**Pic: Vauxhall Motors Limited**



**Pic: Vauxhall Motors Limited**

However, for the technically minded interested in the rest of the Corsa-e's details (including the power train and battery system), they will have to wait until September this year when the full specifications and range pricing will be released at the Frankfurt Motor Show.

As to whether it ever reaches our shores, this is an interesting question. Vauxhall was until recently part of the GM group – so being right-hand drive, it would have been a candidate to become a Holden here. Now Vauxhall is part of the Peugeot-Citroen group, perhaps we may see it as sold here as one of their brands? We can only hope.



## Factory Towbar available for European Tesla Model 3

*But not yet for Australia – but Model 3 IS rated in Australia for towing*

*By Bryce Gaton*

Tesla has finally delivered on its promise that the Model 3 would eventually be rated for towing: the European configurator for the Tesla Model 3 has recently added a towbar option. (Or as Tesla call it: a 'tow hitch').

For English purchasers it adds another £970 (AU\$1800). Described as a “*High strength steel tow bar with a removable adapter. Capable of towing up to 910 kgs*”, it answers the question that many people here ask me about EVs – as in “are there any full battery EVs that tow?” Until now my answer is that the average BEV here in Australia is not rated for towing, with the exception of the Kangoo ZE and the Tesla Model X (and hopefully soon the Jaguar I Pace, which is now rated in the UK for towing, but not so here yet).

It also answers the question put by our esteemed Prime Minister as to whether ‘*EVs will ruin the Australian weekend*’ by preventing the average Australian going on longer trips out of town along with the camping, biking or other gear that usually accompanies them.

And that answer has now been shown to be an even more emphatic ‘NO!’ The Model 3 has a WLTP driving range of 556km for the long-range version (WLTP is the new European test cycle that gives a lot closer to real-world distances), the best fast-charging network in Australia, more luggage capacity than any ICE (internal combustion engine) vehicle of comparable size (the Model 3 has both front and rear storage areas) plus it now has a close to one tonne tow capacity.



The other question is whether a tow option will be available here in Australia, now the Australian Model 3 configurator has opened. The answer is a nuanced 'yes', and comes in three parts:

1. Yes: Tesla has homologated the Model 3 in Australia through the Australian Government SEVS website (<https://rvcs.infrastructure.gov.au/>) with a tow rating of 910kg, and is listed as an option ('O') for both of the Model 3 versions currently sold here.

Standard Equipment or Options Affecting ADR Compliance			Variant Information		
	1	2		1	2
Air Conditioning	S	S	Variant Name	E3R8	E3D8
Antilock Brakes	S	S	Axle Code	R11	R11
Power Windows	S	S	Tare Mass	1726	1856
Power Mirrors	S	S	Gross Vehicle Mass		
Driver's Airbag	S	S	Maximum Towing Mass (Braked Trailer)	910	910
Passenger's Airbag	S	S	Minimum Towing Mass (Non-Braked Trailer)	750	750
Central Locking	S	S			
towing	O	O			
front fog lamp	O	O			

2. No: Tesla are not yet offering it as a dealer fitted option within the Australian configurator, unlike the European one. On enquiry, they have also refused to comment on when, or even if, the Tesla Model 3 towbar will be opened as an option on the Australian configurator.
3. Yes: a tow bar can be fitted, but not a Tesla one any time soon. Given the Model 3 has been both homologated by Tesla for fitting a tow bar and given a 910kg tow rating – there appears to be nothing stopping anyone fitting a suitable, properly complied one after taking possession of a Model 3.

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(Deadline for ad copy – September 15<sup>th</sup>)

## Going outback in an EV - a real charge!

*From Dick Friend, AEVA and Tesla Owners Club of Australia (TOCA) member*

***"Electric car through Central Australia? You can't do it!"***

***And the one we've all heard before: "You'll need an awful long extension cord".***

When the Tesla Owners Club of Australia (TOCA) announced their AGM would be in Alice Springs, I thought it'd be an interesting challenge. So the plan involved:

- one 2015 Tesla Model 85S (ie single motor, rear-wheel drive, 50,000km on clock) aka "Tess"
- the TOCA & Australian Electric Vehicles Association (AEVA) sponsored network of 3-phase charge points being extended from round Australia to also being "up the middle".

### PRE-PLANNING

Straight from a week at Mount Hotham, where Tess (with chains on rear wheels) drove out from under a metre of snow like a snow plough, before heading to the sun-drenched Centre. Charge stops were a cinch Melbourne to Adelaide, but thereafter it required use of the on-screen mapping, battery level, range indicators, and charge rate. Tess provides warnings if range is excessive and/or what speed to slow to ensure your destination can be reached. Emergency bedding was packed (but as it turned out, unnecessarily) not least because Tess has no spare tyre. An inflation kit was packed, and puncture goo was bought along the way.

### MELBOURNE - ADELAIDE

**Tuesday 14 August:** collected co-pilot Anthony (Ant) from Tullamarine & with Dutchman & EV advocate Tomas sliding his 6' 7" frame into the rear seat, we did a few touristy things in Ballarat, supercharging there and through Keith en route to Adelaide. There we picked up a TOCA loan set of 3-phase connectors for charging at remote locations before partying on Rundle Street. We stayed at the Majestic Roof Garden Hotel (with \$35 valet parking/Tesla charging).

### ADELAIDE - ALICE

**Wednesday 15 August:** After breakfast with sustainability officers from the City Council, we lazily toured the Adelaide Hills and to Jacobs Creek Visitor Centre in the Barossa, persuading the Manager to keep up with competitors and install a Tesla Destination Charger. Then to the Kegel Club in Tanunda (Australia's oldest sporting facility!) and a late lunch at Seppeltsfield Winery. Afternoon tea at the Clare Supercharger allowed a diversion to the Hornsdale Wind Farm and BFB (the world's biggest battery)! Then it was a fast trip to Port Augusta, where Tess drank at the Standpipe Motel Destination charger.



Look for the wind turbines in background

### Thursday 16 August:

Now off the Supercharger network, we left at 6am for the 176km up the Stuart Highway to Pimba, where we were the first to patronise the new AEVA 3-phase charger, which topped up our range at a rate of 50km/hr (compare Superchargers at  $\leq 700$ km/hr). On the worldwide App PlugShare, we

recorded the details and a photograph of Tess charging, so EVer will know that the site exists and it works! Glendambo (112 km away) was next, for a leisurely 2-hr lunch. Plugging in gave an extra 100km range, enabling a 255km afternoon cruise to Coober Pedy. Straight open roads invited maximum speed (briefly) then we throttled back and, using the on-screen range indicators we arrived at the Desert Cave Underground Motel with just a few kms of range left. Their destination charger gave a full battery recharge overnight.



Travelling companions “alert” after a night in Coober Pedy

### Friday 17 August:

We found the unlabelled charger at Marla (234 km), recently installed for the Breast Screening Van, and left Tess to enjoy a drink while we enjoyed a 2.5-hr lunch break amongst a few trees.

After a 180-km afternoon trip to the Kulgera Roadhouse we enjoyed their specially brewed beer before pushing the limits without a top-up, slowing to just 80km/h to maximise range. With nothing left in the tank, we reached the ERLDUNDA Roadhouse, right on the junction of the Lasseter Highway to Uluru.

### Saturday 18 August:

With a full tank and a 130kmh speed limit, the 200kms to ALICE SPRINGS was quickly accomplished, completing the Melbourne to Alice trip in just over 4 days (including rubber-necking along the way). We joined the EV parade of Teslas (along with a new-generation Prius and a hybrid Beemer) as part of HENLEY-ON-TODD-REGATTA. The AEVA/TOCA stand with a Model X on show attracted attention. Over dinner, crews from Brisbane, Sydney, Adelaide, Melbourne & Darwin shared stories of their journeys from different directions, before overnight charging at the Crowne Plaza.

### Sunday 19 August:

Ant was farewelled at the airport before the afternoon’s TOCA AGM, which was a video hook-up with all states. Wife Julie joined the journey and advice was sought on attempting the circle route to Uluru, travelling north along the Larapinta anticlockwise from Alice through Tjoritja (the West MacDonnell Ranges) around to Uluru (Ayers Rock) via Watarrka (Kings Canyon) – a corrugated dirt road, in any season it is advised to seek police advice about the road condition.

### Monday 20 August:

We headed early to Glen Helen Gorge, and found the unlabelled charge point which, as it had not yet been used, was inaccessibly squeezed between a shipping container and an immobile caravan. At the river feeding the beautiful Gorge’s permanent waterhole, we encountered the first finishers of the Larapinta Run, a four-day marathon running 40km/day!

The young management team were unwilling to accept cash for the charge power but, being on generators and knowing that refusing recompense is unsustainable, we insisted on paying \$20 for our brief top-up of electrons, then added the charge location and details to the PlugShare App for future users. After a little Tesla ride, the manager provided gratis our \$6 permit to traverse Aboriginal lands (and at least two language groups).



**First finishers of the Larapinta Run**



**Speed warnings to suit most language groups**

It had been dry in recent months and the road had been recently graded, so we breezed along happily traversing the 180kms of corrugations that is the Mereenie Loop road, arriving at Watarrka National Parks (Kings Canyon) dusty but none the worse for wear. People were staggered we'd taken such a low-slung rear-wheel drive luxury vehicle over the Loop (typical comment: "I've never dared take my 4-wheel drive there").



**The seasonal Mereenie Loop link road (shown in yellow)**

The two new charge points recently "installed" (and on which we were relying) had not yet been wired up, and the electrician was a week away! With just a few kilometres range left, we headed up to the maintenance manager to connect to his welder's 3-phase outlet. It was an unusual socket, but I had an adapter in my kit - but the leads wouldn't reach 10 metres past immovable machinery, leaving us 1 metre short. But we moved to the adjoining workshop for the

Canyon Helicopter Flights with 3-phase in easy reach! Without time to complete the 4-hr Kings Canyon Rim Walk, we strolled under the sheer southern wall.

**Sun setting on the George Gill Range**

### **Tuesday 21 August:**

After such excitement the 275km south on the Luritja Road to the Lasseter Highway and then westward to Uluru, was uneventful. After finding Tomas accommodation we bade our farewells, as he was flying from Uluru home to the Netherlands the next morning. The Ayers Rock Resort Technical Manager should, we were told, be able to assist with charging. Mark Blain showed his four intended locations for





charging infrastructure: the campground, the Outback Pioneer Lodge, the Desert Gardens Hotel, and the upscale resort Sails-in-the-Desert. But Tess needed a charge now, and Mark ushered us to the workshops' 3-phase outlet. After a spin the next day, Mark totally understood EVs, loving the auto-pilot for long stress-free runs to Alice and beyond. His intended EV will be powered from the solar installation which provides 40% of the resort's power now and, maybe, 100% sometime soon!

That evening we experienced the Field of Light, where 50,000 solar lights spread over 50,000 sq metres swayed in the evening breeze, changing colours as you meander through. It was installed by four guys and 15 volunteers in five weeks, using 380kms of optic fibre to interconnect the lights with 36 portable panels - if these guys had been employed to roll out the NBN Australia would have saved billions!

### **ULURU to MELBOURNE**

#### **Wednesday 22 - Monday 27 August:**

After a further day visiting the Uluru Cultural Centre, waterholes, sacred caves, ancient rock art and spectacular landscapes around the Rock and the Olgas, we drove to Erldunda (247 km) and returned a spare wheel to Ross Middleton, an 81 yo Tesla S owner visiting from Sydney, who had popped down the 200 km from Alice to meet us, returning to Alice before sunset and the risk of roos on the road.

Heading south, motorists who had run out of fuel asked us if we had a jerrycan and, never having seen an electric car, they doubted our claim to have no petrol whatsoever! Our return journey was partly a reverse of the northward one but, after supercharging in Adelaide, we headed up the Hills to Hahndorf, and wound south on bucolic roads to Langhorne Creek, crossing the Murray River at Tailem Bend, along the Coorong past Meningie to overnight at the fishing port of Robe. Our final day was via the Blue Lake at Mount Gambier, a degustation lunch & charge at Dunkeld's Royal Mail Hotel and a top-up charge at Ballarat.

Home was reached without incident in 14 days (13 nights) including considerable sightseeing and frivolity, cultural enrichment, and lobbying and proselytising for EV infrastructure. The EV guru who organised the Alice meet-up, and the first to complete a full EV trip around Australia - Richard McNeall - thought I was being optimistic in allowing just over 4 days to reach Alice, but all went to schedule, despite a few curve balls along the way. But Tess was magnificent, with another 5,000 kms on the clock without so much as pumping up the tyres and, by then 56,000 kms on her first set of tyres. The only thing replaced in her 3+ years life were the wiper blade rubbers (apparently they're usually the first thing to wear out on a Tesla)!

What began as a "Why not have a meeting in Alice" quickly became an enjoyable much more. What's not to like about the air-conditioned comfort of a fully-adjustable armchair ride hands-free, throttle-free in Autopilot mode, in the safest production car in the world!? Free fuel on the Supercharger Network and, when being accommodated at motels, rarely (if ever) being charged while your vehicle is being re-fuelled - inexpensive, comfortable and relaxed motoring - and, for EVs getting easier all the time!



## **Owner's experiences: John August and his EV journey ... so far**

*AEVA member John August recounts why he chose to buy a BMW i3 three years ago, and when having to choose a replacement EV three years later, why it wasn't another i3!*

A bit over 3 years ago, I needed a new car, an electric car that could travel long distances, the best option being an i3. I drove it from Sydney to Broken Hill, Perth, Brisbane - and still further, to Airlie Beach, Tasmania in convoy for the annual AEVA congress plus multiple times to Canberra, Wollongong, the Blue Mountains, etc. etc. Still, while you could use petrol in the so called "range extender", you could only get about 200km, so I often made use of a jerry can. Even then, the fact many outback petrol stations don't stay open late took me by surprise: at one point, I ended up calling a taxi out of Broken Hill to deliver some petrol to me. (Yes, I'm silly dork at times).

As for tyres: much as I had the impression the i3 tyres were high tech and really tough, I punctured them twice when checking out the Henbury crater (about 15km off the Sturt Highway in the Northern Territory). One of these I was unable to repair, with the manual providing the 'helpful' advice that I needed to take it to a professional ... while I stood marooned in the outback. At least it cost me nothing to ship the car, but not to a city that had the tyres in stock. It was then I discovered that those fitted to the i3 ones are expensive! Apparently you're talking 3 cents per km for motive force, and 6 cents per km for tyres. The tyres were (are?) supposed to be *the lowest rolling resistance tyres in the world*. Yes, they maximise range, but I'd prefer a lesser range and cheaper tyres. The sales person also claimed they were readily available: but as it turns out, that's only in a few capital cities. It gets worse when you need to ship them into a place like Darwin.



But, to give the i3 its credit, it was a lovely car to drive, excellent handling, comfy seats, and a good cruise control. The controls (including making telephone calls) were very ergonomic, although you couldn't change the speed of playback or fast forward through tracks. You can also lay the seats flat and sleep in the back - a very decadent and satisfying thing to do in a BMW. But the i3 had numerous frustrating idiosyncrasies that ultimately made me pick another car as a replacement.

And what were these annoyances? Well, the Range Extender could only maintain the state of charge, not increase it. If you know there's a petrol station in 30km, it would be nice to up the petrol in the tank so you can fill the tank, particularly when the tank is only 9 litres. Further, you cannot use the range extender until you've reached 75% of charge. When traveling in the outback, it would be nice to use the fuel till the tank is empty, and then use electricity to get to the next servo. But, no, toss away 25% of the charge that you might have used to get that flexibility. Further, the car won't engage the Range Extender automatically. So, if your attention wanders, you can notice that you're suddenly down to 50% charge without realising it. Or, watch that gauge: and don't watch the scenery, don't enjoy the drive, just watch the gauge. 90 - 89 - 88 watch it ... 78 - 77 - 75 RIGHT! TURN IT ON! Now, is that the enjoyable, relaxing drive that BMW claim for their cars? Yes, it has good handling and acceleration. Mmmm. Definitely. I did make a point of writing about this to BMW,

and I tried to be nice about it, pointing out both the good things and bad things about the i3. I received a form letter claiming my letter was a complaint and not really engaging with it at all. It was my first inkling that maybe BMW really were a monolith, for all the good vibes they try to put out. My i3 developed several faults, including the airbag, motor and charger. Fortunately it was repaired under warranty, and they threw in a free repair for the mirror I had damaged. Still, I had to wait for the parts from Germany, and they resisted my attempted to extricate the car from them to drive to an EV meet at Inverell. Please don't get me wrong - various individuals within BMW were



helpful and considerate at times, but there was a bigger picture that was beyond their control. So while I was moderately happy with my i3, the decision to replace it was forced upon me when another car turned right in front of me and slammed into my driver's side front wheel and sheared it off. As a result, the i3 was written off.

So now I looked at getting a new car: the major alternative was a Hyundai Ioniq PHEV, with about 60km range on the battery and 1000km on the fuel tank. The i3 did have better acceleration and handling - from the moment you touch the pedal, you have power, and you can - well - teleport across the road, really nice when you are making right hand turns. With the Ioniq, it takes somewhere around 1/4 second to figure out you want power, and then it starts up the engine and you get that power. But, it does have reasonably good handling and is comfortable apart from that. The user interface for music and various odds and ends is not as ergonomic. Still, it seems the Ioniq has better regenerative braking - based on both my experience stopping at lights and the fact that I can get all the way from my mates place at Leura in the Blue Mountains to my place in North Ryde (about 100km) on a single charge. The Ioniq also has better fuel economy. (To give it's due: the Ioniq does have a proper engine and gearbox with a direct drive to the wheels, as compared to a motorcycle engine that the BMW engineers had lying around!). With a bit of a push, I can get an electric range of 60 or 70kms. For general driving around town, I find that is sufficient - but it's a nuisance charging a lot more often than I did in the i3. There was one hidden 'gotcha'. I do not want a sunroof - particularly for outback driving in the heat. But, there was one creature comfort I really liked in the i3 - the front parking assist, with an all-round display of what is happening around you. But, it only comes with the more expensive model - along with that damned sun roof. However, I recall being told the only difference between the two models were rotating mirrors and the sun roof. And not wanting the sun roof, I went with the basic model. But I was never told I'd be losing the front parking assist. I then put my hand up to have something installed, at the cost of more than \$1,000 - but even that only beeps at you, not a patch on the real thing.

Nevertheless, overall I am happy with the Ioniq. In the end, I find the things a car cannot do are easier to accept compared to things that a car will not let you do - so it is much easier coping with the things the Ioniq cannot do, as compared to the things the i3 would not let you do.



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(Deadline for ad copy – September 15<sup>th</sup>)

### Branch news:

#### West Australia:

The WA branch has been busy with several public events, invited interviews and even the odd EV road trip. One thing we learned from Electrikhana this year is that people are still very interested in conversions – So in late April we held a conversion workshop at Chris Jones' place in Kalamunda.

Almost 30 people came for the barbecue lunch and show-and-tell, with plenty of road-going conversions to look at and compare. It was so popular we will have to host another one sometime soon!



Several community-inspired EV charge points are popping up around the state, including Trillion Trees (formerly Men of the Trees) and the Canning River Eco Education Centre set to get one shortly. This will make for a great addition to the annual Electrikhana and the Perth National Science Week events held here. In other charging infrastructure news, a new "Solar Hut" has been opened to the public in Cockburn, consisting of a 5 kW PV array and battery bank. Also, the highly efficient diesel generator powered 50 kW DCFC 'Chargepod' has been moved from Jurien Bay, north of Perth to Arthur River about 200 km south of Perth on the Albany Highway. Rest assured, the Jurien Bay site will soon have a 50 kW SETEC charger hard-wired on site thanks to the efforts of our dedicated member Jon Edwards.

A popular spot for transcontinental travellers is the Mundrabilla Roadhouse and sheep station. Located 560 km west of Ceduna and 782 km East of Norseman, it's pretty remote. But it does sport an AEVA 3-phase socket! The roadhouse had a 100 kW solar array and lead batteries installed a few years ago in an effort to reduce their diesel consumption, but due to a series of complications the batteries were damaged and they have been relying heavily on generators. Several AEVA and Sustainable Energy Now (SEN) members have been working with the roadhouse manager to determine what the causes were and how to get the system back online. Once operational it will again show other remote roadhouses around the country how to save on fuel and keep it clean, particularly for EV road trippers.

We had a visit from Behyad Jafari in May where he and Peter Newman gave a brief presentation to a room full of clean energy boffins, EV enthusiasts and policymakers. Hosted by Western Power the event was a great opportunity to see familiar faces and reaffirm our collective goal to keep the momentum. Perth is also set to become the centre of a national Cooperative Research Centre (CRC) focussed on batteries – the \$135 million Future Battery Industries (FBI-CRC) will be based at Curtin University and will focus on enhancing Australia's position in the battery resources and manufacturing industry.

The Mandurah city council hosted a "Future Transport Day" where the AEVA had a presence. The display consisted of most commercially available EVs, as well as the Toyota Mirai fuel cell vehicle. When asked where the HFCV could refuel in WA the answer was a muffled 'nowhere yet'. Electricity is fortunately ubiquitous!

Finally a few of us dedicated road-trippers took a leisurely drive to Esperance, testing out the capabilities of a few commercially available EVs. (You can read about that trip in this issue of EV news).



### Victoria:

Following the 'EV silly season' sparked by the federal election, the branch could finally settle down to the usual business of supporting the ever increasing interest and uptake of EVs in Victoria.

April saw a relaxed social meeting at the Wheelers Hill Hotel, whilst May saw us regaled by two sets of EV adventurers: first the Solar Tuk Tuk team about their imminent world Tuk Tuk tour – starting late May. (It is currently in Thailand. To follow them – see <https://solartuk.org/>), and then the designers of an off-road EV bike starting in their design and build journey.

June was a busy month with the setting up of a Ballarat and region AEVA sub-branch, our June meeting where we heard about the solar charged miniature train project by the Box Hill Miniature Steam Railway Society, and the setting up of our EV Week committee to plan and run our September 14 – 21 events.

For EV Week, the Victorian committee has come up with five events:

- Electrikhana on Saturday 14<sup>th</sup> September
- EV presence and ambassadors at the ReNew Sustainable House day, September 15<sup>th</sup>
- EV Long Weekend Drive and public information tour, September 14<sup>th</sup> to 21<sup>st</sup>
- AEVA stands at:
  - the National Roads and Traffic Expo conference, September 17<sup>th</sup> and 18<sup>th</sup> and
  - ECOSS Sun Festival, September 21<sup>st</sup> (also where the EV Long Weekend tour will end)

Also on the agenda has been the production of an EV Buyers Guide. It has been written (at around 120 pages) and is currently being styled. The plan is for it to be ready for electronic distribution to members in September and for printed copies to be available for sale at the National AEVA Expo in October.



Draft route of Victorian EV Long Weekend Tour.

### Tasmania:

The Tasmanian government recently funded a grants programme for charging infrastructure in the state. At \$450,000 total, this means that Tasmania is now the leading state when it comes to public money allocated to EV infrastructure (per capita).

The first grant was \$2500 to install a destination charger. Congratulations to the 11 organisations who received the money. These chargers must be publicly available, so we all win!

The second grant is for DC fast chargers. The grant has closed and received almost 30 applicants, but the winners haven't been announced yet. This one is a bit more serious, up to \$50,000 per application. The programme is a big deal, as another 9 or 10 DC fast chargers could potentially cover the entire state. Knowing that you are always within reach of a charger reduces the height of one of the hurdles in the way of deciding to buy an EV.

Speaking of DC fast chargers, Bennetts Petroleum has opened the second 50kW fast charger for the state. Situated at Kempton, this will make trips along the highway a bit more comfortable.

Members have been out and about at a number of events including the Launceston Motor Show, Ecofest (Ulverstone), Agfest (Carrick) and an open day at Macquarie Point in Hobart. Motors Hyundai and BMW, both in Hobart, have been very helpful with providing vehicles for these events. People familiar with the state will see from this list that we get to events all over the place, although we haven't yet been to one on the west coast. Hopefully those grants will kick start one or more DC fast chargers in Queenstown or Zeehan. Certainly plenty of power stations down that way!



The charger at Bennetts Petroleum in Kempton.  
50kW CCS2 & CHAdeMO.



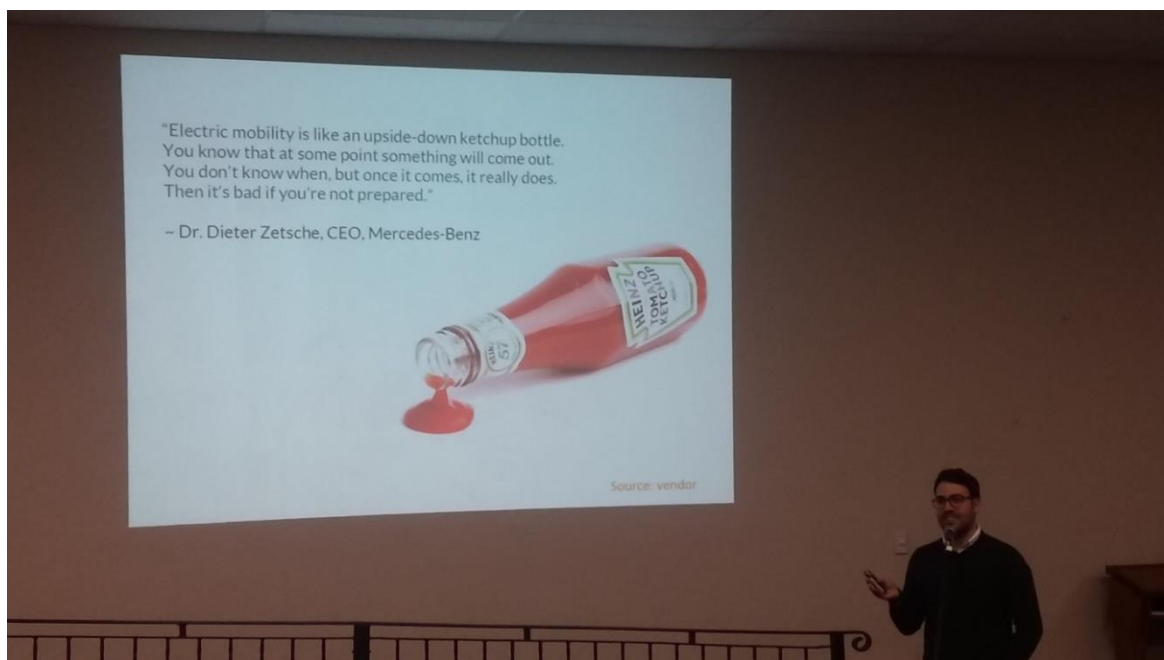
The AEVA & Renew stand at Agfest.

### South Australia:

The Branch continues to build in numbers as the interest in electric vehicles grows.

A very important part of each meeting is high quality presentations aimed at building knowledge and awareness around the very broad subject of electric mobility. It's an opportunity to listen to the most up-to-date information on a subject and ask pertinent questions, and in most cases the presenters also stay for supper where people can ask them specific questions. The presentations are also videoed and then up-loaded on to our webpage where we receive many positive comments, in particular about how they are valued.

At our most recent meeting, we had a very detailed and informative presentation by Mr Travis Kauschke from SA Power Networks. Travis works in the Future Strategies unit, where they are planning for the uptake of electric vehicles in the State.



Travis Kauschke from SA Power Networks speaking at our June 2019 meeting

In many cases people talk about the grid not being able to support the mass uptake of electric vehicles. From Travis's presentation, it was quite clear that the grid is well positioned to support the uptake.

The take-home message was if charging occurred outside peak periods there would not be a need for a massive increase in generation and through better infrastructure utilisation, costs to charge an EV are predicted to reduce.

It was good to hear this information first hand as it breaks down another barrier that people may have against purchasing an electric vehicle.

We feel being well informed is critical whenever considering major purchases, such as an electric vehicle. Although in most cases when you do purchase an electric vehicle, you never look back!

Paul Koch  
Chairperson, SA Branch



### New South Wales:

Events: AEVA NSW supported a number of EV Events in Q2:

- Vivid Ideas on 11 June;
- the Eastern suburbs charging network launch (mentioned below);
- EV Expo at the National Transport Museum at Inverel on 4 May;
- The Smart Energy Expo April: The climate change Media Centre helped us do a present on East Side FM just before the federal Election;
- Taree Eco festival in Early June;

There has been a lot of activity preparing for the AGM in Sydney later this year. The contract with the venue has been signed and the date is set for 26 and 27 October at Olympic Park. Sydney Branch had branch meetings on 10 April, and 12 June, as well as various informal meetups, mostly once a week. Wiebe Wakker and his car, Blue Bandit, finished their marathon trip from Amsterdam to Sydney on 7 April 19, in the Royal Botanic Gardens, Bennelong Lawn. (See Pics 3 and 4).

Charging infrastructure: NRMA now have 15 Fastchargers commissioned in NSW, and 9 in the process of being installed. City of Newcastle is getting its second Veefil DC Fastcharger (CCS-2 and Chademo) together with 2 x Dual Type-2 EV Links soon. They are run by Chargefox for the Newcastle City Council. (See Pic 1).

Three Eastern Sydney Councils have teamed up to provide Type-2 Charging stations at iconic locations on 5 June. They are at Bondi Beach, Double Bay, Coogee Beach, and in Randwick. Additional chargers will soon be installed at Bondi Junction and Maroubra. Celebrity Leaf enthusiast, and host of Australia's Bachelor/Bachelorette TV Series - Osher Gunsberg, was enlisted to do the MC-ing. (See Pic)



Pic 1: New Newcastle chargers



Pic 2: Osher Gunsberg opening new charger



Pic 3: Weibe at the finish line



Pic 4: Weibe's travel map



### Australian Capital Territory:

The AEVA ACT Working Group on EV Policy and Advocacy has continued to be a model of industry.

The Group has completed an application for a grant of \$15,000 under the ACT Community Zero-Emissions Grants Program. If awarded, the grant would be used to support four EV advocacy events during 2019/20. Thanks to AEVA ACT member Denby Angus for co-ordinating and editing this bid.

The bid was strengthened by several letters of support, including one from the Conservation Council ACT Region. Objectives of the Conservation Council have substantial areas of overlap with those of AEVA. It is hoped that there will be opportunities for the two organisations to co-operate in the future.

The Group has been discussing a paper by AEVA ACT member Pete Gorton concerning guidelines for the use of e-scooters in Canberra. The aim is to gain legislative approval for e-scooters to operate on Canberra's bike paths and footpaths. Members Pete Gorton and Dave Southgate met with representatives of Pedal Power (local bicycle advocacy group) to sound them out on this issue. On 25 June, ACT Minister Rattenbury released a discussion paper seeking the views of the ACT community on what restrictions should be placed on e-scooter use in the future. Thus, our work on this issue has been timely. The consultation is open until 23 July.



**ACT AEVA member Rene's eBoxter**

### Queensland:

In May the AEVA Queensland attended the Logan Eco Action Festival. This year we were put out the front so everyone walking from the carpark could visit before entering the festival. We had lots of interest in the cars and e-bikes. It was very encouraging to meet people actively looking for ways to help the environment in every aspect of their lives.

For June, the AEVA Queensland attended the Green Heart Fair. This was similar to the Logan Eco Action Festival, but had an area for people to tryout electric skateboards and bicycles.

Also in June the AEVA Queensland attended the Noosa EV Expo. There were many exhibitors, including EV Surfboards, EV Flight boards, e-bike, skateboards, marine outboards, AC and DC charging stations, and private cars on display. It was an awesome day.

([https://youtu.be/W2TIro\\_KIMA](https://youtu.be/W2TIro_KIMA))

Gary Crighton represented the AEVA Queensland at the Queensland EV Council to add input for the priorities of the Council.

For April, we had guest speaker Karl Richards, who has created a very interesting moped EV. ([www.ducavelo.com](http://www.ducavelo.com) )

In May we had guest speaker Simon Bartlett explain the REVOLUTION - Ignite Ideas Project using a 22kw EV AC type 2 connector as part of a trial for smart charging.

Also, thanks to the great work from Jon Day, our meetings are now filmed and put on YouTube. He also published the talks from the 2018 EV Expo.

Leslie Smith  
Secretary Queensland AEVA.

Pic: Qld AEVA members is 'normal' mode. :-)



## For sale/Wanted:

### For Sale:

Vic. number plate EV identification stickers.



THE required EV identification label in Victoria.  
(but NOT supplied by VicRoads)  
Made to VicRoads specification (Regulation 48B)

\$10 pair. Postage included  
Contact Bryce: [bryceg@zoho.com](mailto:bryceg@zoho.com)  
Or see him at AEVA events  
All profits to AEVA

**AEVA charging signs:**  
Contact your local  
State/ Territory branch  
secretary for  
details/supplies.



### Member ads:

#### For Sale:

##### Member ad:

##### 2013 Mitsubishi iMiEV

Registration FREFUL. Dark maroon, as new cond.  
Reg. to Dec 2018. Done 15,000km. Range 115km.  
Takata airbags replaced.  
**Price:** \$15,000.  
**Location:** Wangaratta, Vic.  
**Contact:** Frank 0428 568 008,  
[francisreeves@bigpond.com](mailto:francisreeves@bigpond.com) or Meg 0408 108 963.



### Wanted:

#### Holden Volt

Preferably in WA, but willing to get one shipped interstate if the price & condition is right.  
If you're thinking of trading one in for a nice shiny new EV, save us both the hassle of negotiating with a dealer!

Contact: Mitch Bisby (WA AEVA Events Coordinator) via  
AEVA forum For Sale section:  
<https://forums.aeva.asn.au/viewtopic.php?f=34&t=6087>

**Wanted:** good second-hand electric DC motor  
(warp9, montenergy ME1002, etc) and controller  
(zeva, Curtis, etc ).

**Contact:** via PM on AEVA forum.  
<http://forums.aeva.asn.au/viewtopic.php?f=34&t=5715>

### Parts:

#### Blade electron (not going)

LONG RANGE version (2 seater)

#### The good:

Very low km since new  
300V system running a Tritium controller  
Was running well till controller died  
Approx 100 90Ah cells in good condition

#### The bad:

Dead Tritium controller  
Will sell complete or as parts  
Call Bryce: 0428 537 053

### Non-member ads:

#### WANTED:

Plugin kit for Series 2 Prius. If you can help,  
please contact Bob Rich.

**Email:** [bob@bobswriting.com](mailto:bob@bobswriting.com)

**Phone:** (03) 5962 3875

.... who will be eternally grateful.

### Non-member ads: (Continued)

BMW i3 2016 wreck (stat Write off) - Heavy front accident - Fully intact, 22 kWh battery still installed and in good condition.

The car has only done 18k kilometres.

I want to get rid of the whole car complete, not just the battery. I was going to use this car for an Electric conversion but I ran out of time. The only thing I don't have is the keys. The front left wheel has broken off with the strut which I have.

Located in Victoria.



\$10,000 for the complete car.

Further details: AEVA forum For Sale section.

<https://forums.aeva.asn.au/viewtopic.php?f=34&t=6091>

### Corporate member ads:

#### Hobart BMW:

Mention this ad to receive a complementary 5 year/ 80,000 km BSI service package\*.

(\*offer expires September 30. 2019. Talk to consultant for T&C's on BSI Package)

#### Betts Boat Electrics:

E-propulsion Spirit 1

1 Kw outboard motor, including battery

**Price:** \$2690

**Location:** Queensland

**Contact:** 0419 674135



## Branch contact info:

### ACT:

**Meeting day:**

First Monday of each month from 7pm  
(except January)

**Venue:**

Hellenic Club Canberra City, 13 Moore St  
Some members meet in the Bistro at about 6:15  
pm for a meal beforehand

**Postal address:**

N/A

**Contact:**

Greg Walpole  
E: gregorywalpole@gmail.com  
Ph: N/A

### New South Wales:

**Meeting day:**

First Wednesday, every 2<sup>nd</sup> month (starting in  
February each year).

**Venue:**

Baulkham Hills Sports Club  
11 Renown Rd, Baulkham Hills

**Postal address:**

PO Box 5285, Clayton Vic 3168

**NSW Contact:**

Mark Roberts  
E: mark.roberts.aeva@gmail.com  
Ph: 0412 588 803

### Queensland:

**Meeting day:**

Third Wednesday of each month - 7:30pm

**Venue:**

The Albion Peace Centre  
102 McDonald Rd, Albion

**Postal address:**

PO BOX 6031, ST LUCIA, QLD, 4067

**Contact:**

Leslie Smith  
E: les@nano.com.au  
Ph: 0401 250 624

### South Australia:

**Meeting day:**

Third Wednesday of each month - 7:30pm

**Venue:**

Vogue Theatre, 25 Belair Rd, Kingswood SA 5062  
(Northern Function Room).

**Postal address:**

AEVA (SA), PO box 434, Park Holme 5043, SA

**Contact:**

Eric Rodda  
W: [www.sa.aeva.asn.au](http://www.sa.aeva.asn.au)  
E: See SA AEVA website for contact link

### Tasmania:

**Meeting day:**

Every eight weeks, on the Wednesday.  
Visit [www.aeva.asn.au/tasmania](http://www.aeva.asn.au/tasmania) for date.

**Venue:**

Varies - See AEVA website

**Postal address:**

226 Four Springs Road, Selbourne TAS 7292

**Contact:**

Penny Cocker  
E: [chair@tas.aeva.asn.au](mailto:chair@tas.aeva.asn.au)  
Ph: 0466 269 636

### Victoria:

**Meeting day:**

Second Wednesday of the month

**Venue:**

varies – see AEVA website

**Postal address:**

PO Box 5285, Clayton Vic 3168

**Contact:**

Daryl Budgeon  
E: [budgeond@gmail.com](mailto:budgeond@gmail.com)  
Ph: 0432 401 132

### West Australia:

**Meeting day:**

Second Tuesday of the month

**Venue:**


Varies - See AEVA website

**Postal address:**

26 Minerva Way, Carine, 6020

**Contact:**

Antony Day  
E: [secretary@wa.aeva.asn.au](mailto:secretary@wa.aeva.asn.au)  
Ph: 0416 345 575

	<b>Australian Electric Vehicle Association Incorporated</b> ABN: 27 629 533 129 PO Box 434 Park Holme SA 5043 <a href="http://www.aeva.asn.au">www.aeva.asn.au</a>
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*Please tick a box*

TYPE (Please tick): ☐ ORDINARY \$50.00 per year  
☐ CONCESSION \$25.00 per year

FIRST NAME:		LAST NAME:	
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### CORPORATE MEMBERSHIP TAX INVOICE

☐ SUBSCRIPTION: \$125.00 per year

COMPANY NAME:	
CONTACT PERSON:	
POSITION:	

### CONTACT DETAILS ...for either type of membership / renewal

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ADDRESS 2:			
CITY/TOWN:			
STATE:		POSTCODE:	
PHONE:			
MOBILE:			
FAX:			
EMAIL:			
WEBSITE:			

AEVA BRANCH (meetings you attend):	
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By Joining you agree that you support the aims of the association and will abide by the rules of its constitution.

SIGNATURE:.....DATE:...../...../.....

No GST is included as we are GST EXEMPT.  
Please Make Cheques and Money Orders Payable to **AEVA Inc.**

#### Privacy Statement:

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