

The Renewable Energy Vehicle Project (REV)



THE UNIVERSITY OF
**WESTERN
AUSTRALIA**

Faculty of Engineering and
Mathematical Sciences



The Renewable Energy Vehicle project (REV)

is an initiative formed by The University of Western Australia to design and develop environmentally sustainable technologies for future transportation. In times of rising fuel prices, growing air pollution and global warming, finding ways for sustainable, environmentally friendly transportation is a fundamental goal.

In 2008 REV has developed a road-licensed plug-in electric commuter car based on a Hyundai Getz and in 2009/2010 an electric sports car based on a Lotus Elise. Two Formula SAE-electric race cars followed in 2010 and 2013. The REV electric cars cost as little as \$1.40/100km to run, while the petrol version of each car costs over \$10.00/100km.

REV participates in Perth's major events: Perth Motor Show, ResourCity, Greenhouse, Sustainable Living Expo, Elektrikhana, Perth Sun Fair, and UWA Expo, as well as a number of various related motoring and sustainability events. The REV vehicles are also being displayed around various Perth schools to develop an awareness program to educate primary and secondary school students about sustainability.

From 2010 to 2013 REV, CO2 Smart, EV Works and eleven partner organisations from WA government and industry conducted the Western Australian Electric Vehicle Trial with eleven converted Ford Focus, which constituted the first EV Trial in Australia. www.evtial.org

Within an Australian Research Council project from 2010 to 2015, funded by government and industry, REV has established Australia's first Level-2 charging

network with 23 fast-AC charging outlets in the Perth metropolitan region. The charging network is made available to members of the general public, while usage data is collected and analysed for research purposes.

All REV cars incorporate cutting-edge electromobility technology and IT components developed at UWA, including battery-management systems, regenerative braking, advanced driver information systems, data-logging black boxes and fleet tracking and evaluation systems. REV further developed autonomous (driverless) automotive systems for a BMW X5 and a Formula-SAE race car. Although electric cars are not a new invention, recent advances in motor, battery and controller technology make electric cars a viable alternative to petrol cars today and most major car manufacturers today produce electric cars. Emission-free power generation for charging EVs is an important part of the REV strategy. This is why REV generates its own clean power using grid-connected solar panels on the building's roof.

Team

The REV project is the co-operative effort of a team consisting of:

- Over twenty students from graduate, penultimate and final years from varying disciplines of Engineering, including Mechanical, Mechatronics, Electrical, Computer and Software.
- Industry-leading academic staff with industry experience supervise, moderate and assess student reports and work.

- UWA technical support staff who support students in project development and installations, offer assistance, and advice on practical components of the project.
- Volunteer support staff who are members of local organisations





Media and Internet

A key component of the project is raising public awareness of the need for sustainable transportation, therefore the project aims to maintain its significant media exposure over the coming years. Since 2008, REV has had over 10 TV reports, 25 radio interviews and over 100 print articles. REV entertains a significant web presence highlighting research results, vehicle specifications, upcoming event info, photos, videos and sponsor involvement with around one million page hits per year:
www.theREVproject.com

REV Sponsorship:

Sponsorship for the abovementioned projects is for one year at one of the following levels
 Sponsors have access to research and testing results, receive a certificate with recognition of their support, and receive invitations to annual REV events and project reports
 All sponsors are featured on the REV website

ADOPTING a Charging Station for the Electric Highway

REV promotes the initiative of building the "Electric Highway" between Perth and Margaret River by installing around ten fast-DC charging stations. This will provide a first stage of the latest generation charging infrastructure required for the wide-spread adoption of EVs and will allow EVs to break free from the city. We are looking for organisations to "adopt a station" by sponsoring purchase and installation costs of \$50,000 per station. Each station will be made available for EV owners of the general public, while UWA/REV will scientifically monitor and evaluate charging usage.
therevproject.com/trials/highway.php

Project Funding

REV is funded primarily through sponsorship from industry and government organisations in the form of cash or in-kind donations. Sponsors will be funding the ongoing maintenance and expansion of the West Australian charging station network, the construction of the Electric Jetski (to be completed in 2015) and ongoing research into autonomous electric cars. Our projects are aimed at electric drive and automation research, education and training for undergraduate and postgraduate students,

industry standardisation, infrastructure development, and community outreach. There are a number of ways your organisation can support the REV project: Through a one-off sponsorship amount by sponsoring a new charging station, which will also benefit the community as a whole, or through annual advertising on one of the existing charging stations. Help us to support the vital goal of a sustainable future!

PLATINUM Sponsors (AUD \$50'000+)

- Large logo on the REV cars, posters, newsletters, pamphlets, website
- Presentation and display of REV cars and team at company events
- Exclusive 30-day REV car access for company events, evaluation or promotion
- Annual guided tour and presentation by the REV team at UWA

GOLD Sponsors (AUD \$25'000+)

- Medium logo on the REV cars, posters, newsletters, pamphlets, website
- Presentation and display of REV cars and team at company events
- Exclusive 7-day REV car access for company events, evaluation or promotion
- Annual guided tour and presentation by the REV team at UWA

SILVER Sponsors (AUD \$10'000+)

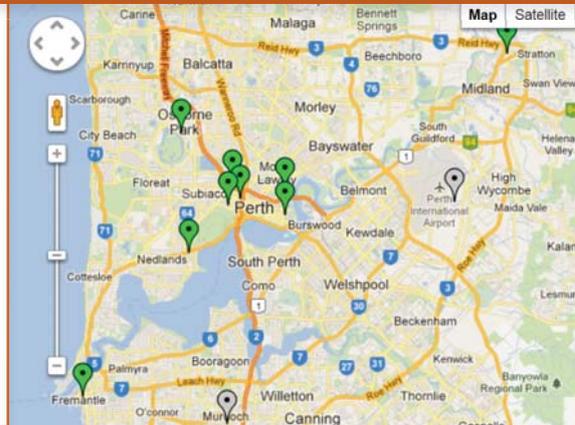
- Small logo on the REV cars, posters, newsletters, pamphlets, website
- Annual guided tour and presentation by the REV team at UWA

BRONZE Sponsors (AUD \$5'000+)

- Small logo on posters, newsletters, pamphlets, website

ADVERTISING on Charging stations

Advertising space is available at each REV charging station for \$1,000 per year and banner (700mm x 250mm). This funding allows us to maintain and continue to operate our charging station network. By advertising on a charging station, your organisation makes a contribution to extending and maintaining EV charging infrastructure in WA and thereby promoting zero-emission transport. See station locations at:
therevproject.com/charging/



REV Specifications

REV Spec Sheet	REV Eco (2008)	REV Racer (2009/2010)	EV Works Focus (2011)
Base car	2008 Hyundai Getz	2002 Lotus Elise S2	2011 Ford Focus Sedan
Seats/doors	5 seats / 5 doors	2 seats / 2 doors	5 seats / 4 doors
Original engine	1.4l, 4 cylinders, 70kW	1.8l, 4 cylinders, 116kW	2.0L 4-cyl. engine
Electric motor	Advanced DC FB-4001_DC	UQM Powerphase75_AC	Netgain Impulse 9
Controller	Curtis 1231C, 500A	UQM DD45-400L, 400A	EVnetics Soliton1, 1000A
Power, Torque	28kW, 136Nm	75kW, 240Nm	80kW, 53Nm
Regenerative braking	No	Yes	No
Instrumentation	EyeBot M6	Automotive PC	None
Batteries	Li-Ion-Phos., 45 x 90Ah	Li-Ion-Phos., 83 x 60Ah	Li-Ion-Phos., 45 x 160Ah
Battery weight	135kg	191kg	247.5kg
Voltage	144V	266V	144V
Total capacity	13kWh	16kWh	23kWh
Total weight (orig.)	1,160kg (1,160kg)	936kg (780kg)	1,330 kg (1,330 kg)
Top speed	125km/h	200km/h (estimate)	130km/h
Range	80km road-tested	100km road-tested	131km road tested
Charging Time	6h (full charge)	6h (full charge)	3h (fast), 10h (slow)



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