Driving energy forward: Lessons from the Exmouth Electric Vehicle Orchestration Trial

Unlocking the potential of electric vehicles in Western Australian regional microgrids

September 2025

Owned by the people of WA

HORIZON POWER

Acknowledgement of Country

We acknowledge and pay our respect to Aboriginal and Torres Strait Islander peoples as the First Peoples of Australia.

We are privileged to share their lands, throughout 2.3 million square kilometres of regional and remote Western Australia and Perth, where our corporate office is based, and we honour and pay respect to the past, present and emerging Traditional Owners and Custodians of these lands.

We acknowledge Aboriginal and Torres Strait Islander peoples' continued cultural and spiritual connection to the seas, rivers and the lands on which we operate. We acknowledge their ancestors who are part of one of the oldest continuous cultures on Earth and their unique place in our nation's historical, cultural and linguistic history.

Foreword

The Exmouth Electric Vehicle Orchestration Trial (EVOT) is a milestone in Western Australia's journey to a cleaner, smarter energy future.

Led by Horizon Power and delivered under the State Government's EV Action Plan, this trial set out to demonstrate that electric vehicles (EVs) can play a valuable role in our energy future – not just as transport, but as smart, flexible assets that support local microgrids and empower regional communities. By exploring how EVs can be integrated without costly upgrades to the power system, the trial helps pave the way for more sustainable energy use and greater customer choice.

Over 12 months, five vehicle-to-grid (V2G) capable EVs and smart charging infrastructure were deployed with local stakeholder partners in Exmouth. The trial validated that Horizon Power's Distributed Energy Resource Management System (DERMS) can automatically manage EV charging and discharging to protect the grid, support customer flexibility, and unlock new value for regional communities. With further development, the trial and its technology could be rolled out at scale. Importantly, the trial also revealed that real-world experience – letting people see and use EVs – was the single biggest driver of positive sentiment.

This whitepaper captures the journey, insights, and implications of the trial – not just for Exmouth, but for regional communities across Australia.

As regional WA moves toward integrating more renewables with the State and Federal Government's battery rebate schemes stimulating uptake of consumer energy assets, orchestrating resources like EVs will be critical. This trial demonstrates how innovation, community collaboration, and smart technology can converge to deliver real-world solutions for remote and regional energy challenges.

How EVs support renewable energy in regional microgrids

EVs don't generate renewable energy – but they can help us use it more effectively. In regional microgrids like Exmouth, where solar energy is abundant but sometimes wasted because supply exceeds demand, EVs offer a smart solution. When charged at the right times, EVs can soak up excess solar energy, reducing the need for solar generation to be turned down across the town and making better use of this valuable renewable energy.

Even more importantly, EVs can act as flexible energy assets – helping to shift energy demand, smooth peaks, and support grid stability. This means communities can adopt more renewables without needing expensive upgrades to the power system.

The Exmouth EV orchestration trial explored how we can enable more people to adopt EVs in regional areas while keeping the grid reliable and affordable, and create opportunities for customers to actively participate in the energy transition.

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1.0 Executive summary

Key outcomes and implications

The Exmouth Vehicle-to-Grid Orchestration Trial (EVOT) is a first for regional Western Australia, showing that EVs can do much more than just provide transport. By connecting EVs to Exmouth's local electricity grid, Horizon Power has proven that these vehicles can help support a reliable network with the integration of more renewable energy.

Horizon Power commenced the 12 month trial in April 2024, and worked with four community partner businesses to test five EVs and smart chargers that could both draw power from the grid and send it back when needed. Using advanced software, Horizon Power's trial team was able to automatically manage when the cars charged or discharged, making sure the grid stayed stable and reliable, even during Exmouth's hottest days and busiest tourist seasons.

The trial found that:

- EVs can be safely and effectively managed as part of the local grid, helping to reduce peak demand and make better use of solar energy.
- Community attitudes towards EVs improved dramatically once people had the chance to drive and charge them for themselves.
- Smart technology like Horizon Power's DERMS (Distributed Energy Resource Management System) is ready to support more EVs, more renewables, and more customer choice in regional WA.

The lessons from Exmouth will help inform how regional power systems can evolve to support growing EV adoption, ensuring that communities across regional WA can benefit from cleaner, smarter and more reliable energy.

2.0 Background and context

Why this trial matters

Electric vehicles are becoming more common in Australia's cities, but their arrival in regional and remote communities brings unique challenges and opportunities. Without careful planning, lots of EVs charging at once could put pressure on smaller local power systems, especially in regional towns like Exmouth. But with the right technology, EVs can help make these systems stronger and more flexible.

Horizon Power, as WA's regional energy provider, is leading the way in finding smart solutions for the future. The Exmouth trial was part of the State Government's Electric Vehicle Action Plan[1], which aims to prepare WA's electricity system for the growing number of EVs and aligns with the Sectoral Emissions Reduction Strategy (SERS)[2] to decarbonise transport and electricity.

Why Exmouth was selected

Exmouth was chosen for this trial because it's a vibrant regional community with a strong interest in sustainability and innovation. The town's energy needs change dramatically between the quiet winter months and the busy tourist season, making it an ideal place to test how EVs can interact with the grid under varying conditions. The trial explored not only how EVs can support the grid, by helping manage demand and better utilise renewable energy, but also how smart technology can ensure the grid is ready to support EV uptake, giving customers more choice and flexibility. Exmouth's climate, with hot summers and mild winters, also provided valuable insights into how EVs and charging infrastructure perform in challenging environments.

Lessons from rooftop solar and the need for proactive EV integration

The rapid uptake of rooftop solar in regional WA brought many benefits but also created new challenges for managing local power systems. Horizon Power has learned from these experiences and is determined to make sure the transition to EVs is smooth, safe, and beneficial for everyone. By trialling advanced energy management technology and working closely with the community, Horizon Power is ensuring that regional WA stays at the forefront of Australia's clean energy future.

1 Electric Vehicle Action Plan: Preparing WA's electricity system for EVs
2 Sectoral emissions reduction strategy | Western Australian Government

3.0 Trial design and methodology

How the Exmouth trial worked

To test how EVs could be safely and effectively integrated into Exmouth's electricity grid, Horizon Power designed a practical, community-focused trial. The main objective was to prove that Horizon Power's DERMS technology could automatically manage EV charging and discharging while protecting the local power system. The trial also aimed to explore how this technology could support customer flexibility, gather feedback from regional partners, and identify opportunities and barriers to EV uptake in a real-world setting.

Partnering for real-world impact

Horizon Power worked with four local Exmouth organisations that share a commitment to innovation and sustainability. The Chamber of Commerce and Industry WA, Gascoyne Development Commission, Shire of Exmouth, and WA Country Health Services were selected not only for their active roles in the community, but also because they are leaders in adopting new technologies and supporting environmentally responsible practices. By working with these forward-thinking partners, Horizon Power ensured the trial reflected the values and aspirations of the Exmouth community, while gathering real-world insights from those most invested in a cleaner, smarter energy future.

The 12 month trial saw each partner receive one or more Nissan Leaf electric vehicles and smart chargers. This allowed them to experience EVs firsthand and provide feedback on how they fit into daily life and work. Each of the EVs was branded and named in consultation with the Traditional Owners of the Exmouth region, the Jinigudera people of the West Thalanyji nation. Each name reflects a special place or feature of the local landscape and seascape. The five EVs – Bundegi, Padjari Manu, Pilgramunna, Majun, and Wobiri, carry unique designs inspired by Exmouth's coastline, marine life and natural environment. This approach honours the region's cultural heritage and deep connection to Country, making each vehicle a moving celebration of Exmouth's identity and the enduring presence of the Jinigudera people.

Chamber of Commerce and Industry WA

GASCOYNE DEVELOPMENT COMMISSION

Shire of Exmouth

Government of Western Australia
WA Country Health Service

Bundegi

is the beach near
the north of Exmouth

Padjari Manu

is the Traditional Owner
name of Vlamingh Head

Pilgramunna

encompasses concepts of the sea
and connection to coastal resource

Majun

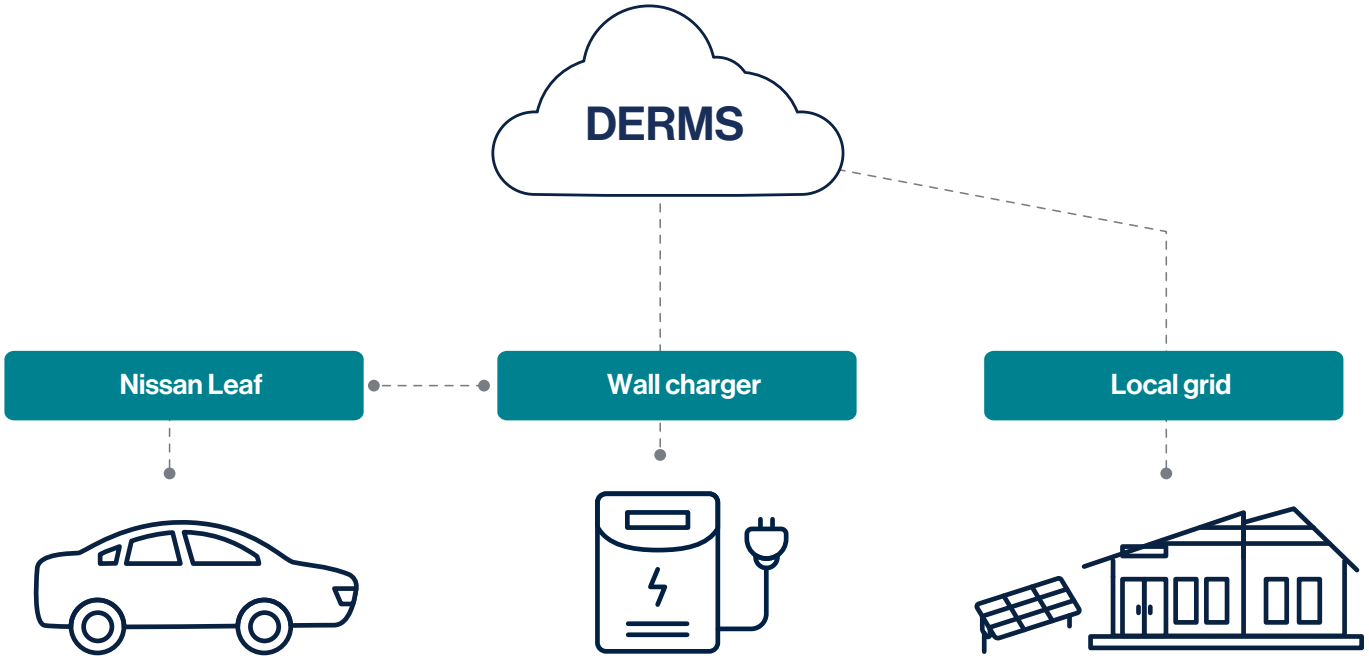
is the Traditional Owner
name for sea turtle

Wobiri

is a popular surfing beach in Exmouth

Horizon Power's V2G capable EVs

Trial technology



Vehicles: The trial used five Nissan Leaf e+ electric vehicles. These were chosen because they could both charge from the grid and, using special technology, send electricity back when needed (a feature called “vehicle-to-grid” or V2G).

Chargers: Each EV was paired with a Wallbox Quasar charger, which is capable of two-way charging. This means the car could be charged, or discharged and could help power the grid if needed.

DERMS: The real innovation was Horizon Power’s DERMS. This advanced software could automatically decide when each car should charge or discharge, based on what was happening in the town’s electricity network. For example, it could:

- Pause charging during times of high energy demand on the network
- Encourage charging when there was lots of solar energy available on the network
- Allow cars to send power back to the network to help during peak times

Safety and standards

All equipment was installed by qualified local electricians, following strict Australian safety standards. Because some of the technology was new to Australia, Horizon Power worked closely with regulators and industry experts to make sure everything was safe and reliable.

Step-by-step testing

The trial was rolled out in three main phases:

1. **Getting connected**

   Making sure the chargers could talk to DERMS and respond to basic commands.

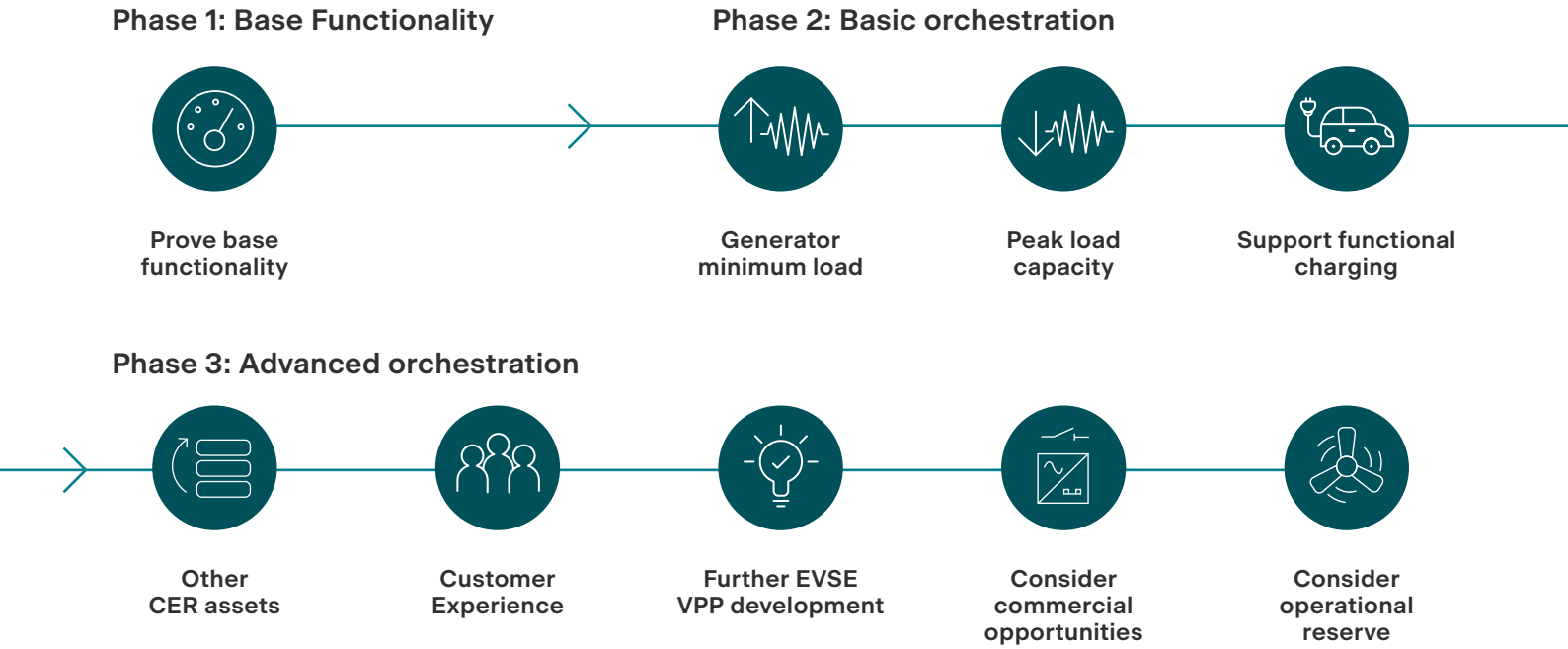
2. **Smart orchestration**

   Testing how well the system could automatically manage charging and discharging to support the grid.

3. **Advanced scenarios**

   Trying out more complex situations, like giving customers the ability to override the remote orchestration request if they needed their car urgently, or testing how the system handled unexpected events.

This careful, step-by-step approach meant Horizon Power could learn as much as possible, while keeping the community's needs and safety front and centre.



4.0 Community engagement, experience and insights

Bringing the community on the journey

Horizon Power designed the Exmouth trial as a genuine partnership with the four local Exmouth organisations. The trial partners used their EVs for everyday tasks, reflecting the real needs and typical driving patterns and usage of an Exmouth community member.

The trial was designed to reflect the real needs and rhythms of the Exmouth community, including seasonal fluctuations in energy demand. Outside of short, dedicated test windows, trial partners were given the freedom to use and charge the vehicles as they saw fit – allowing Horizon Power to observe natural behaviours and better understand how EVs interact with the grid in everyday life. This approach provided valuable insights into how EVs can support the microgrid and how smart technology can help the grid support EV uptake, especially in dynamic regional environments.

How hands-on experience shifted attitudes and built trust

At the beginning, many participants were new to electric vehicles and unsure what to expect. As the trial progressed, confidence grew through hands-on experience and ongoing support. By the end of the trial, all partners reported using the EVs daily and expressed a strong sense of pride in being part of a pioneering initiative.

Feedback from partners highlighted several benefits:

Hands-on experience built confidence

"Seeing is believing"—using the EVs every day helped demystify the technology

Community pride

The trial put Exmouth "on the map" as a leader in clean energy innovation.

The EVs are ideal for in-town fleets and as a second household car. Charging with solar just makes sense for Exmouth."

Gascoyne Development Commission

Cost savings and sustainability

Partners appreciated the lower running costs and the ability to charge with solar, aligning with Exmouth's environmental values.

No inconvenience from managed charging

Participants found the smart charging system easy to live with, provided it was reliable and transparent.

Behavioural and operational insights

The Exmouth trial provided valuable lessons not just about technology, but about how people interact with new energy solutions in real life. Understanding these behavioural and operational insights is key to designing future products and ensuring a smooth transition to smarter, cleaner energy systems.

Partners were comfortable with Horizon Power managing EV charging, as long as it didn't impact their ability to use the vehicle when needed.

Trust and transparency were essential; participants wanted clear communication and reliable access to their vehicles.

Visible use of EVs by local organisations helped normalise the technology and encourage broader community uptake.

Vehicle availability, clear communication, and easy integration into daily routines were critical for acceptance.

12,000km+

travelled by one partner throughout the trial period

Enjoyed the convenience

Fuel cost savings

Great driving experiences

5.0 Technical insights

How smart orchestration worked

The trial proved that Horizon Power's DERMS could automatically manage EV charging or send power back to the grid. The system used real-time data from the local network, weather forecasts, and the vehicles themselves to make these decisions.

Key technical achievements included:

Managing peak demand: DERMS could pause or slow down EV charging during busy times, helping to avoid overloading the grid.

Supporting renewable energy: The system encouraged charging when there was plenty of solar energy available, making the most of Exmouth's sunshine.

Vehicle-to-Grid (V2G) capability: For the first time in regional WA, EVs were able to send power back to the grid during peak demand, acting as "batteries on wheels."

Fail-safe settings: The system defaulted to safe charging if communication was lost.

Real-world results

Charging and discharging: The trial showed that EVs could be charged up when demand was low or solar was plentiful, and could discharge to support the grid when demand was high.

Localised control: DERMS could manage individual chargers or groups of chargers, responding to specific needs in different parts of the network.

Customer flexibility: Drivers could override the system if they needed their vehicle urgently, ensuring the technology worked for people as well as the grid.

Lessons learned

System complexity: As more EVs and other energy resources are added, it's important to keep business rules and system settings clear and well-documented to avoid confusion or unintended consequences.

Interoperability: The trial highlighted the need for equipment and software to work together seamlessly, especially as technology evolves.

Forecasting and data: Accurate forecasting of when vehicles are plugged in and how much energy they need is key to unlocking the full benefits of V2G.

An example of orchestration during high-load periods

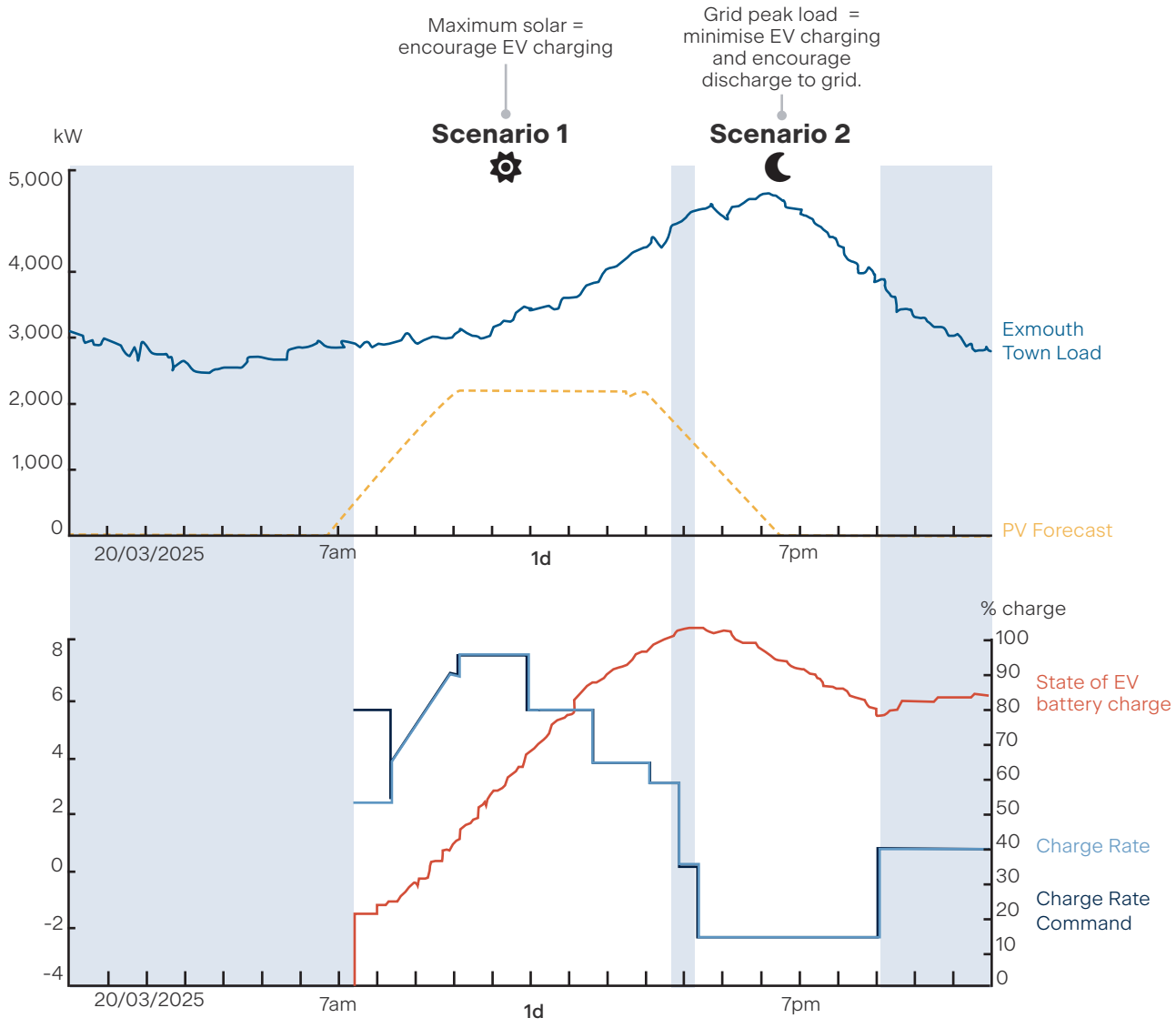


Figure 1: DERMS orchestrated discharge events during high-load periods.

In Exmouth, the demand for power in summer can reach peak capacity for the power station and put the balance of the system at risk. The ability to orchestrate EV supply equipment (EVSE), and carefully manage charging capabilities can encourage energy to be discharged from EVs back into the system during these times.

In winter, low demand for power during the day can put the system at risk of imbalance the other way, so charging EVs from the grid during this time can help to support the entire system.

What this means for regional WA

The technical success of the Exmouth EVOT shows that regional microgrids can safely and effectively integrate EVs and V2G technology. With the right systems in place, communities can enjoy more reliable power, lower costs, and greater use of renewable energy—while giving customers the flexibility and control they need.

Supporting customer flexibility and potential future products

The trial demonstrated that smart technology has the potential to give EV owners more choice and control over their energy use in the future. While trial participants didn't actively manage their charging, Horizon Power successfully tested the ability to automate charging in response to external signals, such as app-based preferences or grid conditions. This validated the potential for future products that could help customers charge when energy is cheapest or cleanest, without compromising convenience.

Putting customers in control

The trial proved that smart technology can support a range of flexible options for EV owners. For example, Horizon Power's system allowed drivers to:

- **Override automated charging schedules** if they needed their car urgently, ensuring customer convenience always comes first.
- **Choose when and how their EV charges or discharges**, making it easy to take advantage of cleaner solar energy by charging during sunny periods or reducing burden on the network by charging during off-peak times late at night.

This flexibility means that EVs can fit seamlessly into daily life, whether you're using your car for work, family, or community activities.

Potential for future products

The DERMS technology tested in Exmouth demonstrates that, as the technology and market evolve, new customer products such as time-of-use tariffs, virtual power plant participation for EVs, and smart home integration could be possible. These products are not currently available and any future product offerings would be subject to further development, regulatory approval and customer consultation.

6.0 Technical learnings and strategic recommendations

The Exmouth Electric Vehicle-to-Grid Orchestration Trial is a milestone in Western Australia's journey to a cleaner, smarter energy future.

Key technical learnings

1. Designing with the whole system in mind

As more electric vehicles and other energy resources are added to regional microgrids, the systems that manage them can become increasingly complex. The trial highlighted the importance of taking a whole-of-system approach when designing functionality or future products to ensure that decisions made in one part of the system don't create unintended consequences elsewhere. Clear business rules and well-documented processes are essential to support safe, reliable and scalable integration.

2. Virtual Power Plants (VPPs) are powerful tools

Grouping EVs and other customer energy resources (CER) and assets into "virtual power plants" allows for smarter, more flexible management of the grid. The trial demonstrated the value of VPPs, but also highlighted the need for ongoing development and standardisation to keep things manageable as the technology scales up.

3. Interoperability and edge intelligence matter

For the system to work smoothly, all assets and devices—cars, chargers, and management software—need to communicate seamlessly. The trial highlighted the importance of using National Standards and ensuring that "edge" devices (like gateway devices) are smart enough to handle local decisions and fail-safes.

4. Fail-safes and reliability are essential

The trial confirmed that having robust fail-safe settings is critical. If communication is lost or something unexpected happens, the system must default to safe, customer-friendly settings so vehicles remain available for use, and the power system remains stable.

5. Ramp rates and device performance need attention

How quickly a charger or EV can change its charging or discharging rate (the "ramp rate") can impact grid stability. The trial found that not all devices behave the same way, so testing and certification are important to ensure reliable performance.

6. Forecasting and data are key

Accurate forecasting of when vehicles are plugged in and how much energy they need is crucial for optimising the benefits of V2G. The trial showed that as more data becomes available, forecasting will improve, unlocking even greater value for customers and the grid.

7.0 Implications for regional microgrids

The EVOT has shown that electric vehicles and smart charging technology can play a valuable role in supporting regional microgrids. These small, self-contained electricity networks are common in remote and regional Western Australia, and they face unique challenges compared to larger city grids.

By integrating EVs with advanced management systems like DERMS, regional microgrids can become more flexible and resilient. The trial demonstrated that EVs can help balance supply and demand, especially during periods of high or low energy use. For example, EVs can be charged when there is excess solar generation, and can even send power back to the grid when demand peaks.

The ability to co-ordinate EV charging with renewable generation means more clean energy can be used locally, reducing reliance on fossil fuels and supporting community sustainability goals.

Addressing operational challenges

The trial highlighted some important operational considerations for microgrids:

- even a small number of EVs can have a noticeable impact on grid stability, so smart management is essential
- localised energy management is important—DERMS can manage individual chargers or groups of chargers based on specific network needs
- robust fail-safe settings are needed to ensure vehicles remain available for customers, and the power system remains stable even if communication is lost

Lessons for other regional communities

The Exmouth trial provides a practical blueprint for other regional and remote communities preparing for EV integration. Key lessons include the importance of community engagement, clear communication, and ongoing support for customers and installers. It also shows that with the right technology and processes, regional microgrids can safely and effectively adopt new energy solutions.

Future opportunities

As more EVs are introduced and technology continues to evolve, regional microgrids will have new opportunities to improve reliability, reduce costs, and make better use of local renewable resources. Ongoing trials, collaboration, and investment in smart systems will be essential to realise these benefits across Western Australia

8.0 Conclusion

The trial delivered clear evidence that electric vehicles and smart energy management can strengthen regional microgrids. This first-of-its-kind project for regional Western Australia showed that EVs, when intelligently orchestrated, can improve grid reliability, support more customer energy resources and renewable energy integration, and give communities greater control over their energy future. These outcomes directly support the State Government's commitment to net zero emissions by 2050[3].

By combining innovative technology with strong community engagement, Horizon Power has set a new benchmark for what's possible in remote and regional Western Australia. The lessons learned here will help guide future projects, ensuring that new energy solutions are practical, customer-focused, and ready to meet the needs of local communities. With the right support and ongoing collaboration, regional WA is well positioned to support Australia's clean energy transition and deliver on the priorities outlined in the SERS[4 5].

Vision for the future of V2G for regional WA

Looking ahead, V2G technology has the potential to play a key role in regional WA's pathway to net zero. As outlined in the State EV Strategy and SERS, accelerating the uptake of electric vehicles and integrating them with renewable energy will be critical for decarbonising the transport and electricity sectors. V2G can help regional microgrids make the most of local solar and wind resources, improve energy resilience, and reduce reliance on fossil fuels.

The Exmouth EVOT demonstrates that, with the right technology and community partnerships, regional WA can be active participants of this clean energy transition. Continued investment in smart infrastructure, customer education, and supportive policy will ensure that V2G and other innovative solutions deliver real benefits for regional communities—supporting jobs, sustainability, and a cleaner future for all Western Australians.

Strategy alignment: How the Exmouth V2G trial supports WA's clean energy goals

- Directly supports WA's net zero by 2050 target and interim 80% reduction in government operational emissions by 2030.
- Demonstrates practical decarbonisation pathways for regional electricity and transport, as prioritised in the Sectoral Emissions Reduction Strategy (SERS).
- Pilots electric vehicle and V2G integration in a regional microgrid, aligning with the State EV Strategy's focus on accelerating EV uptake and expanding charging infrastructure beyond metropolitan areas.
- Reflects government priorities for innovation, customer choice, and community engagement in the energy transition.
- Provides a blueprint for delivering reliable, affordable, and sustainable energy solutions to regional and remote communities.
- Exemplifies the collaborative, forward-looking approach called for in WA's climate and energy strategies.

3 Reducing emissions | Western Australian Government
4 Sectoral emissions reduction strategy | Western Australian Government
5 Pathway to net zero set with sectoral emissions reduction strategy | Western Australian Government

Appendices

Glossary of terms

Customer Energy Resources (CER)	energy assets owned or managed by customers, such as electric vehicles, rooftop solar panels, home batteries, and smart appliances. CERs can generate, store, or manage electricity and can be coordinated to support the grid, reduce energy costs, and increase the use of renewable energy.
EV (elecric vehicle)	a car powered by electricity, typically using a battery and electric motor.
V2G (vehicle-to-grid)	technology that allows EVs to send electricity back to the grid.
DERMS (distributed energy resource management system)	software that manages and coordinates energy resources like EVs, solar panels, and batteries.
Microgrid	a small, local electricity network that can operate independently.
Virtual Power Plant (VPP)	a group of distributed energy resources (like EVs, solar panels, batteries, and smart appliances) managed together to support the grid.
Fail-safe	a safety feature that ensures devices operate safely if communication or control is lost.
Ramp rate	the speed at which a device can increase or decrease its power output.
Edge intelligence	smart decision-making capabilities built into devices at the “edge” of the network (like gateway devices).
Time-of-use tariff	an electricity pricing scheme where costs vary depending on the time of day.
Solar integration	using solar energy to charge EVs or power homes and businesses.
Orchestration	automated management of when and how energy resources operate to support the grid.

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1. Electric Vehicle Action Plan: Preparing WA’s electricity system for EVs
2. Sectoral emissions reduction strategy | Western Australian Government
3. Reducing emissions | Western Australian Government
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