



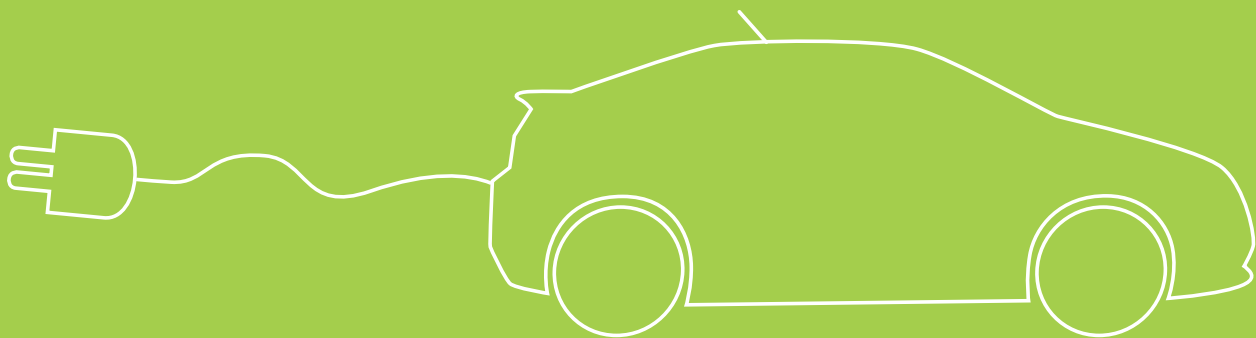
Driving Change:

Queensland's Electric Vehicle Policy

October 2011

Contents

Message from the Minister	1
Executive summary	2
The case for action.....	3
Links with climate change policy agenda	4
Driving delivery of Toward Q2 targets	4
The Queensland Government's EV Roadmap outcomes	5
Driving change: making Queensland EV ready	9



Message from the Minister



Queensland is gearing up for electric vehicles (EVs)—an exciting new technology which for the first time offers drivers a zero-carbon, fuel-free car travel option.

EVs will provide many environmental, economic and social benefits for Queensland. When recharged with renewably generated electricity, EVs are operationally ‘zero-carbon’ cars. EVs are cheaper to run and maintain compared to conventional petrol cars with up to 70 per cent less refuelling costs for the same number of kilometres.

EVs offer a unique capability for assisting Queenslanders to meet our Toward Q2 target of reducing household carbon footprints by one third by 2020, while also increasing demand for renewably generated electricity and reducing our reliance on imported oil. By making Queensland ‘EV-ready’, Queensland will be well positioned for increased EV availability.

Over time, the upfront costs of EVs will decrease as greater economies of scale are achieved in vehicle and battery production. This will give car owners and fleet managers more choice in low-carbon, energy-efficient vehicles.

Our EV Policy, *Driving Change*, signals Queensland’s readiness for EVs and our willingness to partner with industry players and local communities to transition to low-carbon alternative fuel and advanced technology vehicles. Queensland’s leadership on understanding the advantages, opportunities, impacts and challenges associated with EVs takes us one step closer toward a greener Queensland.

This policy outlines Queensland’s EV achievements to date and the benefits of making Queensland EV-ready.

I encourage you to think about how you can get involved in driving a change toward EVs and other low-emission transport options.

A handwritten signature in black ink that reads "Vicky Darling". The signature is fluid and cursive.

Vicky Darling, MP
Minister for Environment





Executive summary

Electric vehicles (EVs) are kick starting a global transition to cleaner, greener, resource-efficient vehicle technologies. Most major car companies around the world are accelerating investment and production of EVs and other advanced vehicle and alternative fuel technologies. Major economies including the United States, Canada, China, India and European Union nations are also providing incentives for industry and householders to support EV technology.

In Queensland, there is a window of opportunity to plan for increased EV availability and make Queensland EV-Ready. Building on Queensland's EV Roadmap released in 2010, *Driving Change* starts the journey towards an electric transport future with a range of actions to increase EV awareness, readiness and enable adoption including three flagship projects:

- **The Plugging-in Project:** Laying the foundations for a Queensland EV recharging network by installing at least 20 recharge points in government buildings, public places and community hubs, starting in South East Queensland.
- **EV-Ready Communities:** Delivering an 'on-the-ground' EV project with industry partners to demonstrate how EVs, recharging infrastructure and EV car-share can be built into urban developments and deliver benefits including affordable housing, renewable energy solutions, and lower-cost car travel.
- **EV Recharging Management Initiative:** Working with Energex and Ergon Energy to identify practical solutions for managing EV recharging impacts on Queensland's electricity networks.

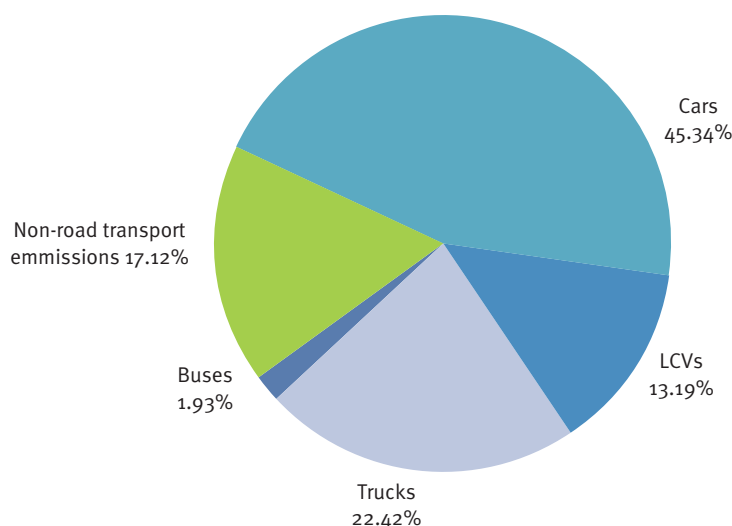


The case for action

The time to position Queensland for EVs is now. While EV numbers remain low, Queensland has the opportunity to make itself an attractive market for EV supply. This can be achieved by familiarising businesses and the communities with EV technology, normalising EV use, removing barriers and preparing electricity infrastructure for EV adoption.

There are five key reasons why Queensland is supporting EVs:

- **Reducing greenhouse gas emissions:** Transport is the fourth largest source of Queensland's greenhouse gas emissions. In 2009, cars were the largest source of those emissions (45 per cent). EVs recharged from renewably generated electricity offer the long-term potential to significantly reduce emissions from this sector. Even when recharged from the current Queensland grid, EVs are still about 25 per cent more greenhouse efficient than the average Queensland new car sold in 2010 and 45 per cent more greenhouse efficient than the average Queensland car currently in service.



- **Reduced oil dependence:** Queensland cars are almost completely reliant on liquid fossil fuels which are increasingly sourced from international reserves. EVs provide a means of switching to a domestic, secure and comparatively cheaper energy option.
- **Improved urban amenity:** EVs produce no on-road air pollution and very little noise. This means EVs can assist in improving our urban environments, making them healthier and more pleasant to live in.
- **Grid optimisation:** In the longer term, EVs offer opportunities for making more of our electricity supply and potentially even reducing the need for high-cost infrastructure that puts upward pressure on electricity prices. For example, EVs offer the opportunity to utilise power generated during off-peak periods. As coal-fired power stations cannot be simply turned off when there is little demand, EVs offer a way of storing currently under-utilised electricity generation capacity.

Looking forward, EVs could assist in managing peak demand with households using the EV's battery to power the whole house or selected appliances during peak demand periods and then recharging the EV from off-peak, often cheaper, power late at night. Finally, EVs also offer a way of storing domestically generated solar power and other renewably generated electricity, such as from wind, for later use.

- **New green industries:** EV uptake requires Queensland to invest in new skills and service industries creating new, clean-energy jobs. Additionally, Queensland is already developing EV technology and supply-chain industries in advanced battery technology and high-efficiency motor components. EV batteries also are likely to provide additional supply-chain benefits through their reuse and recycling.

Links with climate change policy agenda

ClimateQ: toward a greener Queensland outlines the government's comprehensive response to addressing climate change. In *ClimateQ*, the Queensland Government committed to making long-term investments in new and emerging technologies that can assist with reducing greenhouse gas emissions and preparing for climate change impacts.

The *ClimateQ* commitment provided the context for Queensland's signing of The Climate Group's EV20 initiative—an international agreement between global cities, states and countries to collaborate on developing and deploying electric vehicles. In light of EV20 and *ClimateQ*, the government released *An Electric Vehicle Roadmap for Queensland—An Issues Paper for Public Discussion* in June 2010 outlining Queensland's interest in electric vehicle technology, its benefits, and the next steps for policy development. It also invited feedback from the public.

Driving delivery of Toward Q2 targets

In 2008, the Government released *Toward Q2: Tomorrow's Queensland* which set a target to cut Queensland households' carbon footprint by one third on 2007 levels by 2020 through reducing waste, car use, and electricity consumption.

Achieving this target means reducing the average Queensland household's carbon footprint of 13.77 tonnes of carbon dioxide equivalent (tCO₂e) in 2006–07 to 9.18 tCO₂e by 2020.

Current policies and improvements in appliance energy efficiency are expected to reduce average Queensland household emissions but additional measures will still be needed to achieve the Q2 target.

One of the ways to achieve the target is to improve the fuel efficiency of Queensland cars. Supporting Queensland households and businesses to use EVs will assist in achieving this, especially when they are recharged using renewably generated electricity.

If action is taken early and preparations are made for a world with electric vehicles, Queensland will be ahead of the game. Unlike any other vehicle technology currently available, electric vehicles emit less than half the emissions of an average in-service Queensland car today when recharged from the existing electricity mix. As well, when recharged from renewably generated electricity such as GreenPower™, EVs are the only zero-emission car technology currently available.



The Queensland Government's EV Roadmap outcomes

The EV Roadmap

An Electric Vehicle Roadmap for Queensland: An issues paper for public discussion (the EV Roadmap) outlined the issues and opportunities EVs present for Queensland. The EV Roadmap invited public submissions and committed to undertake further investigation around five key questions:

- What are the environmental and resource management impacts of EVs?
- How will EV recharging impact on Queensland's electricity distribution infrastructure and electricity prices?
- How will consumers react to EVs and how can consumers be supported to better understand EV technology?
- Are changes to standards, regulations, and planning arrangements needed to make Queensland EV ready? If yes, what needs to be done?
- How can the government support local EV industry development?

Submissions from the community, businesses, local governments, and researchers indicated strong support for the Queensland Government taking action on EVs and acknowledged the environmental benefits, as well as potential impacts on urban electricity networks. There was also strong support for the Queensland Government to facilitate cross-sectoral partnerships to maximise efforts to make Queensland EV ready.

Additionally, a whole-of-government working group was formed to investigate the five areas of inquiry and put forth suggestions for supporting EVs in Queensland, as summarised below.





Environment and resource management

EVs recharged using 100 per cent renewable energy produce zero greenhouse gas and no air-polluting emissions during operation. Being powered by electricity has the added benefit that it avoids using oil, which is becoming increasingly expensive due to declining easily accessible reserves and vulnerability to natural disasters, industrial accidents and political instability.

An analysis comparing EV greenhouse efficiency to other vehicles indicated that the average EV, when recharged from the existing Queensland electricity mix, is about 25 per cent more efficient than the average new car bought in Queensland in 2010. When recharged from the grid the average EV is about 45 per cent more efficient than the average in-service Queensland car.

In the future there are also likely to be opportunities for battery reuse in second-life applications such as energy storage for off-grid solar power systems, telecommunications installations and household use. This will further reduce the whole-of-life emissions of EVs and their batteries.

Further analysis will be needed to investigate the environmental and resource management implications of battery recycling and demand for rare earth minerals.



Image courtesy of Energex



Consumer Uptake and Behaviour Change

Current trials and evaluations indicate that an EV has a range of approximately 100 km on a single charge under Australian driving conditions. With most South East Queensland drivers travelling less than 50 km on average per day, EVs provide a real alternative to conventional vehicles.

Early EV adopters are likely to be fleet managers interested in evaluating new vehicle technology while also demonstrating clean and green leadership. Early private EV buyers are likely to be households located in inner urban areas.

EV numbers are expected to remain low for the next few years with only about 2 000 likely to be on Queensland roads by 2015. As global production increases, current projections suggest that there could be up to 32 000 EVs on the road—equivalent to approximately one per cent of all Queensland cars—in 2020.

Recharging and Electricity Grid Impacts

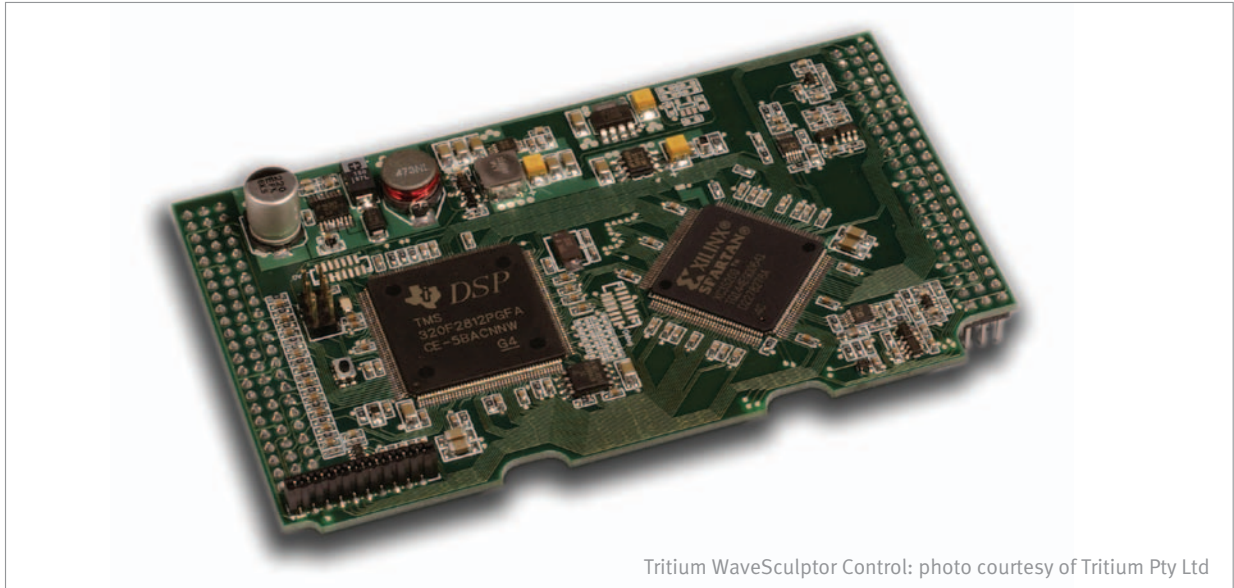
While EV numbers remain low, Queensland has an opportunity to prepare the electricity network for EV recharging impacts and use the learnings gained from the rapid uptake of domestic air-conditioners.

Research by the Department of Employment, Economic Development and Innovation, Ergon Energy and Energex indicates that EVs are unlikely to adversely affect grid integrity during the early phases of market adoption through to at least 2015. Post-2015, this research indicates planning for EV adoption and strategies for managing recharging demands on grid integrity and electricity generation will be needed.

Standards, Planning and Regulation

In Australia, national work is underway to identify and agree on EV-specific standards, especially for components and batteries. The Queensland Government is participating in this work, which commenced in 2009 and is scheduled to finish towards the end of 2014.

Most EV-related standards will be introduced at a national level. Investigations are underway to identify other changes to Queensland legislation needed to accommodate EVs, their use, recharging and end-of-life management.



Tritium WaveSculptor Control: photo courtesy of Tritium Pty Ltd

Industry Development and Growth

Queensland has a small but growing supply-chain capability in EV components, advanced energy storage, renewable energy systems and recharging infrastructure. Opportunities for industry growth include:

- leveraging innovation programs to support collaborative EV and renewable energy projects
- niche EV applications in marine and industrial sectors
- retrofitting or aftermarket conversions of conventional cars to fully electric drivetrains.

Queensland has strong research and engineering capabilities in electrical power engineering and renewable energy systems integration. Utility and other specialised companies are available to support the development of smart grids.

The Queensland Government has invested a total of \$1.3 million in EV-related projects including:

- RedFlow Technologies Ltd to develop advanced energy storage systems (Queensland Sustainable Energy Innovation Fund grant)
- Tritium Pty Ltd to develop a universal power controller (Queensland Sustainable Energy Innovation Fund grant)
- The Very Small Particle Company to develop advanced battery storage systems (Business Industry Transformation Incentive grant)
- Frankland Island Cruises to develop a marine electric drive system (Business Industry Transformation Incentive grant).



Driving change: making Queensland EV ready

Driving Change is the Queensland Government's first step for making Queensland EV ready. Our policy outlines a three-part strategy of EV Awareness, EV Readiness and EV Enablers; and involves a range of practical and action-focused initiatives.

EV Awareness

To build community awareness and confidence in EV technology, the Queensland Government will:

- demonstrate clean and green government leadership
- build community EV awareness and familiarity
- facilitate knowledge sharing amongst Queensland's EV users, technology developers and fleet managers.

Clean and green government leadership

In late 2010 and early 2011, three Mitsubishi i-MiEVs were integrated into the government fleet. QFleet, the government's fleet manager, is currently evaluating EV suitability as a government fleet car. The evaluation's findings to date indicate EVs are well suited to government fleet usage patterns, provide an enjoyable driving experience, and are cheaper to operate and maintain compared to comparable conventional cars.

Building on the success of the current EV evaluation, the Queensland Government will continue to invest in other EV models such as the Nissan Leaf and the Holden Volt as they become available.

EVs in the Community

The Department of Environment and Resource Management has a dedicated EV which is used around Queensland to raise awareness of EVs and their benefits, as well as working to familiarise and normalise the technology. This work has been very well received to date with the EV being shown at industry conferences, technology displays, school fetes and industry training events.

The Queensland Government will continue to showcase its EV and provide more opportunities for the community to get involved, including making the Department of Environment and Resource Management's EV available for community events and test drives. It will also make its EV available for short-term trials of up to three months with community organisations and eligible fleets to experience and assess EV suitability for their driving needs.

EV Knowledge Network

The Department of Environment and Resource Management will bring together a group of Queensland's early EV adopters, EV technology developers and fleet managers to share knowledge, experiences and technology advancements. These meetings will be chaired by the Minister for Environment and be designed to provide support and facilitate feedback from real-world EV use to improve Queensland's EV policy settings.

Energex—Understanding the impacts of electric vehicles on our network

Energex is getting ready for electric vehicles.

As electric vehicle numbers increase, Energex is working with government and industry bodies to identify and address potential challenges and prepare the electricity infrastructure for wider use in the community. This work will include market analysis and modelling of network user data to better understand the likely impact electric vehicles will have in South East Queensland. Knowledge gained through this analysis and modelling will be used to develop practical strategies for managing EV recharging impacts on our urban electricity networks, and ultimately, prices. For example, changing tariff structures to incentivise off-peak electric vehicle recharging will be considered, especially given the potential for optimising the productivity of existing network assets.

Managing electric vehicle recharging impacts is needed because preliminary research indicates recharging an electric vehicle may generate between two to five kilowatts of electricity demand. In large numbers, this level of draw could result in further peak electricity demand growth and require additional investment in network infrastructure.

Future work will examine the potential for using electric vehicles as ‘mobile batteries’ for storing electricity for use during peak times of demand or for storing excess solar power generated in the urban network.

EV Readiness

To make Queensland ‘EV Ready’ three flagship measures will be delivered:

- the Plugging-in Project
- EV-Ready Communities
- the Queensland Energy Management Plan’s EV Recharging Management Initiative.

Plugging-In Project

The Queensland Government will provide funding towards installing EV recharging facilities in a range of locations including government buildings, major destinations, and commercial and community hubs, such as universities, and centres of commercial activity.

The purpose of the Plugging-in Project is to build a basic recharging network across major hubs initially in South East Queensland, mainly within an 80 km range of the Brisbane CBD.

Preliminary mapping analysis indicates initial areas should include government buildings and commercial and community hubs across Brisbane and in areas such as Ipswich, Springfield, the Gold Coast, Pine Rivers and the Sunshine Coast. Further installations in areas within 160 km of the Brisbane CBD and regional centres will also be considered.

EV-Ready Communities

The Queensland Government will partner with the urban development sector to develop and deliver an EV integration showcase project. The aim of the project will be to demonstrate how shared EV recharging infrastructure, and potentially EV car-sharing services, can be effectively integrated into a multi-residential development design and delivery.



This project will also develop guidelines for integrating EVs and EV carshare services into greenfield developments. Additionally, there is scope for leveraging greenfield development participants to pool funds to seed commercial carshare businesses following finalisation of the guidelines.

EV Recharging Management Initiative

While EV recharging is unlikely to cause significant impacts on existing electricity infrastructure in the short term, carefully planned management of EVs will minimise any potential risks that may arise and, in many cases, optimise how Queensland's electricity network is used.

The EV Recharging Management Initiative forms part of the government's Queensland Energy Management Plan. The Department of Employment, Economic Development and Innovation will investigate options for managing EV recharging impacts on Queensland's electricity generation capacity and distribution network. Some examples of potential EV recharging management options include a dedicated EV tariff for recharging and use of load management devices.

Ergon Energy and Energex are currently developing options to modernise their energy load control platforms and accommodate EV recharging into the relevant regulatory framework so that potential negative impacts can be minimised while numbers are low. In the longer term (after 2015) it is expected that intelligent energy management systems using advanced communication and IT applications will be gradually integrated into the electricity network to build a 'smart grid'. A smart grid uses IT software to allow end users and suppliers to communicate and better manage how and where electricity is used.

Ergon Energy's EV Project

Ergon Energy will use Townsville and Magnetic Island as 'test beds' to assess how electric vehicles and recharging behaviour could impact on Queensland's regional power network.

The three-year project will use a fleet of seven electric vehicles—five Mitsubishi i-MiEVs and two aftermarket electric converted vehicles.

The trial will test ways for managing vehicle recharging while avoiding or minimising negative impacts on energy demand, energy distribution infrastructure, such as transformers or local substations, and energy pricing.

The early part of the project will focus on awareness and recharging behaviour, as well as technologies for enabling off-peak electric vehicle recharging. Later in the project, Ergon will investigate opportunities for using electric vehicles as 'batteries on wheels' to supplement household electricity use, thereby tempering growing energy demand during peak periods.

"This is the first research project of its kind in Queensland and will enable us to prepare for the potential widespread introduction of electric vehicles in the future," said Ian McLeod, Ergon Energy Chief Executive.

"The introduction of EVs brings with it an opportunity to reduce our dependence on fossil fuels and part of the trial will look at ways to harness renewable energy to power electric vehicles. When electric vehicles are powered by renewable energy they produce no greenhouse gases.

"The project will identify the benefits and challenges, and ultimately improve our understanding of them so that we can support customers who drive them," he said.

EV Enablers

The Queensland Government will implement four enabling initiatives to support EV uptake and industry development:

- Smart Urban Energy Forum
- Funding EV innovation
- National EV standards development
- Green car skills.

Smart Urban Energy Forum

The Smart Urban Energy Forum will bring together EV enterprises, financial institutions, the electricity industry, the renewable energy industry, IT developers, training institutions, vehicle service providers, urban developers and research institutions on a regular basis. The forum will be a means to share information on technology development and, funding and partnership opportunities, particularly those likely to result from the Australian Government's Clean Energy Future Plan.

Funding EV innovation

Queensland has an emerging and highly innovative EV technology sector which the government will continue to support through leveraging state and federal innovation funding programs and potentially funds from the Commonwealth Government's Clean Energy Future package.

Additionally, the government will continue to support EV-related projects where appropriate through innovation funding schemes such as the Business Industry Transformation Incentive scheme and the Queensland Sustainable Energy Innovation Fund.

National EV Standards Development

In 2010, Standards Australia formed a national working group to identify the areas where EV standards are needed to provide market certainty and consumer confidence. Queensland Government representatives participated in the national working group, which signed off on a three-year work plan in late 2010.

The standards development process is now underway and Queensland Government representatives will be participate to deliver market certainty and consumer confidence as well as ensuring standards are relevant and practical in the Queensland context.

Green car skills

As part of its three-year *ClimateQ: toward a greener Queensland* initiative, *Skills Development for a Low Carbon Economy*, the Queensland Government is working through Automotive Skills Queensland to identify future training needs and carbon management strategies relevant to the automotive trades sector. This will include considering future skill needs for servicing, repairing and maintaining EVs.

EV power points

- EV technologies are the only currently available option that offers potentially zero-emission car travel.
- EVs also offer other benefits such as less air pollution, domestic energy storage opportunities, and cheaper motoring.
- Between now and 2015, EV numbers are expected to remain relatively low until production plants are re-tooled and economies of scale are reached.
- EV recharging is unlikely to add additional stress to electricity infrastructure while EV numbers are low.
- Queensland has a window of opportunity to make itself EV ready and secure its place in the EV revolution.

For further information contact:

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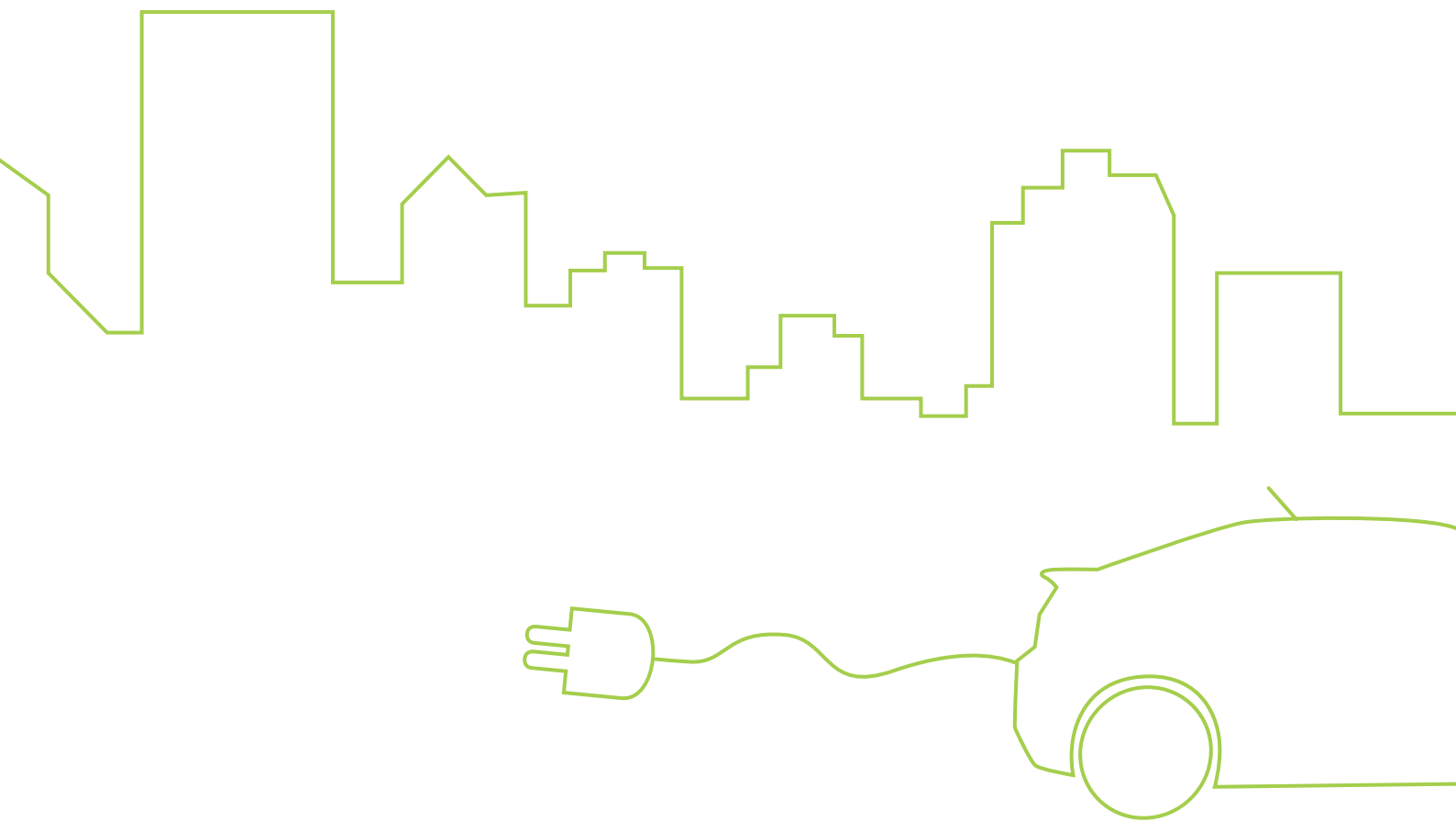
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