



An Electric Vehicle Roadmap for Queensland

An issues paper for public discussion

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Foreword



As part of Queensland's leadership in embracing low carbon passenger transport options for the future, I am pleased to present the discussion and issues paper *An Electric Vehicle Roadmap for Queensland*.

Electric vehicles (EVs) are part of a new wave of clean vehicles emerging in global markets. International investment in the production of EVs is accelerating with major car companies planning to have their EV models on the market here by 2011, with more to come in following years.

In the long term, EVs offer a significant opportunity to reduce greenhouse gas emissions and when charged by renewable energy, they offer zero-emission transport.

While initial numbers may be small, the arrival of EVs in Australia is imminent and planning is essential to ensure Queensland infrastructure, industry and communities are both prepared and informed as we transition to a lower carbon economy.

Priority areas and actions canvassed in the Roadmap include environmental impacts; recharging and electricity grid impacts; standards, planning and regulation; consumer uptake and behaviour change; industry development; and renewable energy.

If we are serious about reducing transport-related emissions as Queensland's population continues to grow, we need to be ready for a market transformation. The Roadmap will encourage public discussion on the key actions that Queensland will need to take to prepare for EV technologies.

The Queensland Government is committed to reducing transport-related emissions, and to encouraging deployment of renewable energy. Under its *Toward Q2* targets, the Queensland Government is committed to reducing emissions associated with household fuel and energy use by one-third by 2020.

EVs are one part of a broad approach to improving emissions from transport over time. I'm pleased that Queensland will play a leadership role in facilitating the uptake of EVs when they come onto the Australian market.

I invite all Queenslanders who have an interest in sustainable transport solutions to consider the issues and opportunities identified in this EV Roadmap and provide their comments and ideas on this exciting new technology.

A handwritten signature in black ink, appearing to read 'Kate Jones'.

Kate Jones MP
Minister for Climate Change
and Sustainability





1. Introduction

Global interest in electric vehicles (EVs) has increased in recent years as an option for low carbon passenger transport and as a way of meeting the challenges of climate change and energy security. As part of a vision for a greener Queensland, the Queensland Government is committed to facilitating the arrival of EVs in Australia and engaging the public on new approaches to reducing the State's carbon footprint.

An Electric Vehicle Roadmap for Queensland outlines how Queensland will play a role in supporting the uptake of EVs. The Roadmap sets out a series of priority areas and actions to:

- position Queensland to optimise the greenhouse reduction potential of EVs
- investigate and where appropriate, plan for future infrastructure needs to support EVs and improve how the electricity network is used
- support Queensland industry, businesses, electricity distributors, and the community during the transition to EVs
- factor EVs into land use planning
- work with other governments and industry to harmonise standards, policies and regulations to support EVs.



2. Purpose of An Electric Vehicle Roadmap for Queensland

An Electric Vehicle Roadmap for Queensland introduces the topic of EVs and outlines the actions the Queensland Government will take to optimise and understand the advantages, opportunities, impacts and challenges of EVs in Queensland.

The main aim of the Roadmap is to develop an EV policy position for Queensland to take advantage of the potential of EVs in helping reduce greenhouse gas emissions. Current Queensland work on EVs focuses on policy development for passenger cars. However, the Queensland Government will be active in discussions regarding other EV technology applications.

The key drivers for a Queensland EV policy position include:

Reducing transport greenhouse gas emissions

In 2007, cars were responsible for almost half of all transport-related greenhouse gas emissions (GHGs) in Queensland, equivalent to more than 9 million tonnes of carbon dioxide equivalent (Mt CO₂e). As Queensland's population and car use continues to grow, emissions from transport are projected to reach almost 21 Mt CO₂e by 2020.

As EVs offer a significant opportunity to reduce GHGs, Queensland is acting now to position itself to support and facilitate greater use of these low and potentially zero emission vehicles.

Planning for EV infrastructure needs and better utilising the existing network

There is a need to plan for the demands of EVs on the existing electricity network. While EVs will utilise an existing fuel distribution network (i.e. the electricity grid) they will require a range of new infrastructure, in particular for recharging. There is potential for EVs to add value in the long term by making better use of this infrastructure.

Supporting the transition

Climate change policy aims to influence and guide the development of new industries and new products with a view toward more efficient use of energy.

The Queensland Government is embracing the emergence of new local enterprise and aims to encourage additional economic development in the clean technology and renewable energy business sectors.

Building energy security

Petroleum supply, costs, access, and availability are ongoing risks for energy security and the Queensland Government recognises the need to consider viable alternative energy options. Additionally, some energy analysts point to a theory of 'peak oil', arguing that official estimates of future oil supply may be overly optimistic, and that supply will be constrained by lack of resources soon enough to be a concern.

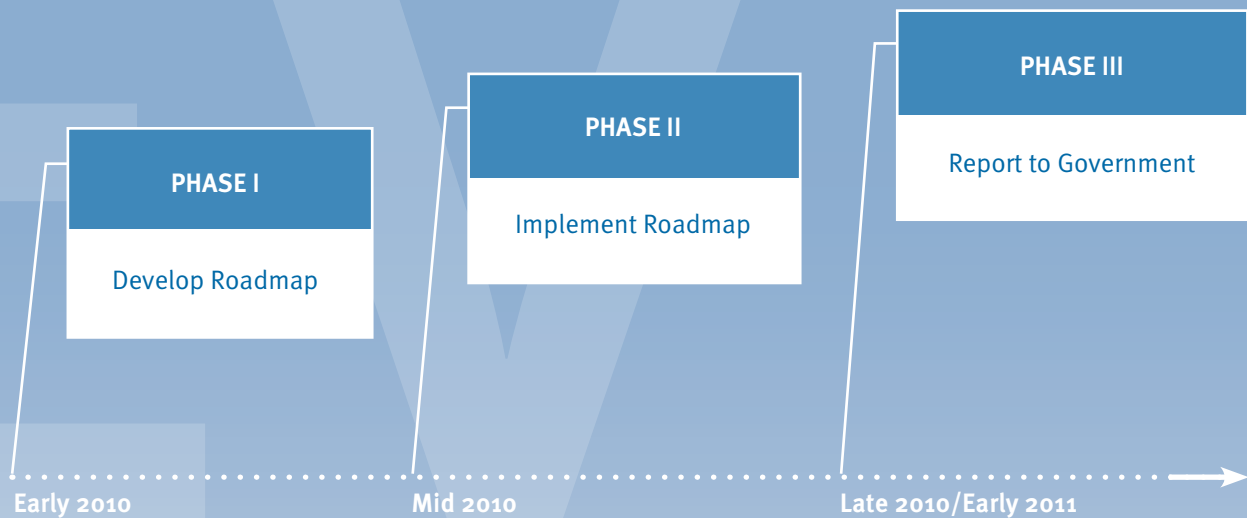
The Queensland Government recognises the need to consider viable alternatives to petroleum-based transport and supports EVs as their use of electric energy offers Queenslanders a transport option that is not reliant upon access to conventional oil.

Harmonising EV standards and regulations across government

Working collaboratively with other jurisdictions, the Queensland Government will play a leadership role to ensure that policy development for electric vehicle standards is coordinated across Australia.

Queensland is already actively engaged in collaborative planning for electric vehicles and is committed to supporting coordination across all relevant stakeholders and jurisdictions.

3. Timeline for development of Roadmap (Figure A)



4. Why is the Queensland Government preparing for EVs?

Internationally the investment and production of EVs is rapidly accelerating with many major car companies planning to have EVs available on the market from the end of 2010. However, initial production volumes will be small with only 750,000 EVs expected to be available in the global market in the next three years. It is unlikely that a substantial percentage of these EVs will be sold in Australia.

While Australian EV numbers may be relatively low in the short term, the immediate benefits of a supportive EV policy include:

- demonstrating Queensland's commitment to sustainable, cleaner and greener vehicle technology
- the potential for EVs and emerging electricity grid technology to enhance infrastructure efficiency over time
- the opportunities for energy security presented by moving away from petroleum-based transport.

The Queensland Government is committed to reducing transport-related emissions. Under its *Toward Q2* targets, the Queensland Government is also committed to reducing emissions associated with household fuel and energy use by one-third by 2020. The Government's revised climate change strategy, *ClimateQ: toward a greener Queensland* launched in August 2009 along with other sustainable transport measures seek to reduce transport emissions by promoting the uptake of low emission vehicles and reducing car travel.

If the Queensland Government does not prepare for EVs, as their numbers increase, uncontrolled EV charging could adversely affect the existing electricity grid, electricity pricing and household energy use.

In order to adequately prepare Queensland for the emergence of EVs on local roads, Queensland must plan ahead.



Image courtesy of Mitsubishi Australia.

5. What are EVs?

EVs are powered by electricity stored in an on-board battery instead of conventional fuels. There are two main types: battery-only EVs (e.g. Mitsubishi iMiEV) and plug-in hybrid EVs (PHEVs) which use a small internal combustion engine to recharge the on-board batteries and extend the distance they can travel (e.g. Chevrolet Volt). Other EV technologies include electric bikes, buses and forklifts.

EVs require recharging by either (or both):

- plugging into an electricity supply (which could be from a renewable energy source), at home, work or other publicly accessible recharge points; and/or
- ‘swapping’ an empty battery for a fully-charged battery at a battery exchange station.

EVs utilise existing electricity infrastructure for recharging and do not rely on new types of fuel production and refuelling infrastructure, unlike other alternative vehicle technologies (e.g. hydrogen).

6. Why are EVs considered ‘cleaner’ and ‘greener’?

Reducing road transport greenhouse gas emissions will require the integration of various policy responses and EVs are one example of a transport option that can be used to reduce emissions. Supporting their use will form a key part of Queensland’s policy response.

EVs are a ‘cleaner’ and ‘greener’ option for motorists because they:

- result in zero-emission motoring when recharged from renewable energy such as GreenPower as no emissions are produced when an EV is driven
- produce at least 15 percent less emissions compared with the average new car sold in Australia—when recharged from the current Queensland grid
- produce no on-road air pollution emissions which result from burning fossil fuels.

Also, in the longer term EVs have the potential to improve electricity generation and distribution by better utilising the existing electricity network. EVs can also increase capacity for renewable energy generation by utilising advanced infrastructure technology such as a smart grid.

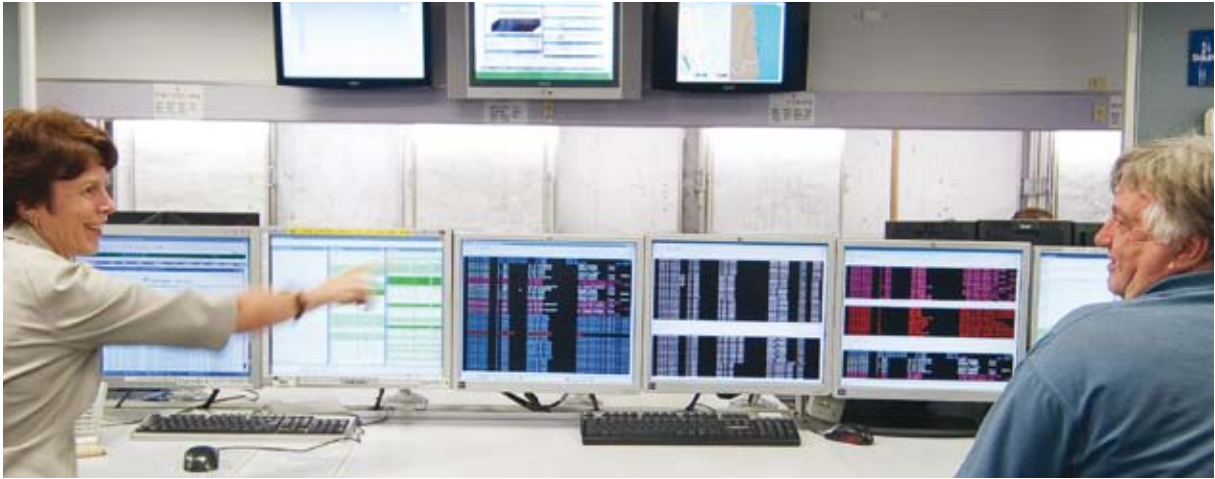


Image courtesy of Energen.

What is smart grid technology and how does it work?

Smart grids are an emerging technology that energy providers are developing to enhance the functionality and increase the efficiency of the existing electricity grid. Specifically, smart grids aim to embed telecommunications into existing electricity networks in industrial, commercial and household settings. This would enable real-time monitoring of electricity use at the household or business level which would help energy providers manage demand upon the electricity network, particularly to avoid excessive demand that may result in brown or black outs.

EVs do not require development of a smart grid to be able to be used on Queensland roads, but some smart grid capabilities will be essential to effectively monitor and manage the impacts of EVs on the network. Smart grid technologies will be among the options for managing EV impacts on the grid.

In the longer term, EVs used in combination with smart grid technology have the potential to further cut greenhouse gas emissions as EVs provide a way of using and storing renewable energy, which is often produced when demands for electricity are low (e.g. off-peak intermittent wind power generation).

Additional benefits from widespread use of EVs over time include improved air quality (in urban areas especially), energy security through reduced dependency on fossil fuels and the potential for industry development through the development of a local EV supply chain.

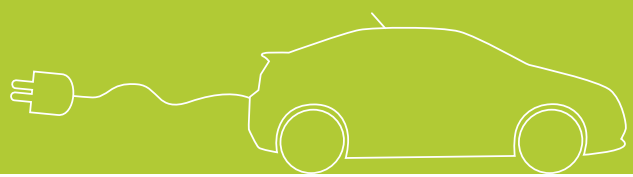
7. Policy work areas for EVs in Queensland

The Queensland Government has identified the following five policy work areas for 2010 to plan for and support EV deployment. Details of the key issues that will be considered for each policy area are highlighted in Figure B.



Environmental and resource impacts

- Assessing the potential of EVs to reduce GHGs compared with other low carbon vehicle technologies.
- Understanding the whole-of-life impacts of EVs on other environmental indicators including greenhouse gases, air quality, noise and community activity.
- Determining what frameworks will be needed to guide EV battery recycling, disposal, and second-life uses.



Impacts on the electricity distribution network

- Forecasting the short and long term impacts of EVs on the existing electricity grid in Queensland.
- Modelling potential changes in infrastructure costs as a result of EV uptake.
- Incorporating the role of EVs in strategic infrastructure improvement projects such as intelligent grid and advanced metering systems.
- Developing a full understanding of the synergies between EVs and renewable energy and how to leverage them locally.

Regulatory planning and harmonisation of standards

- Reviewing existing regulatory policy for vehicles and electricity supply to ensure the inclusion of EVs and to enable EVs to transition seamlessly on Queensland roads.
- Encouraging the development of EV charging infrastructure for public areas and households that is supportive of the needs of EV drivers and energy providers.
- Coordinating regulatory policies and standards with other jurisdictions.

Understanding and engaging potential EV consumers

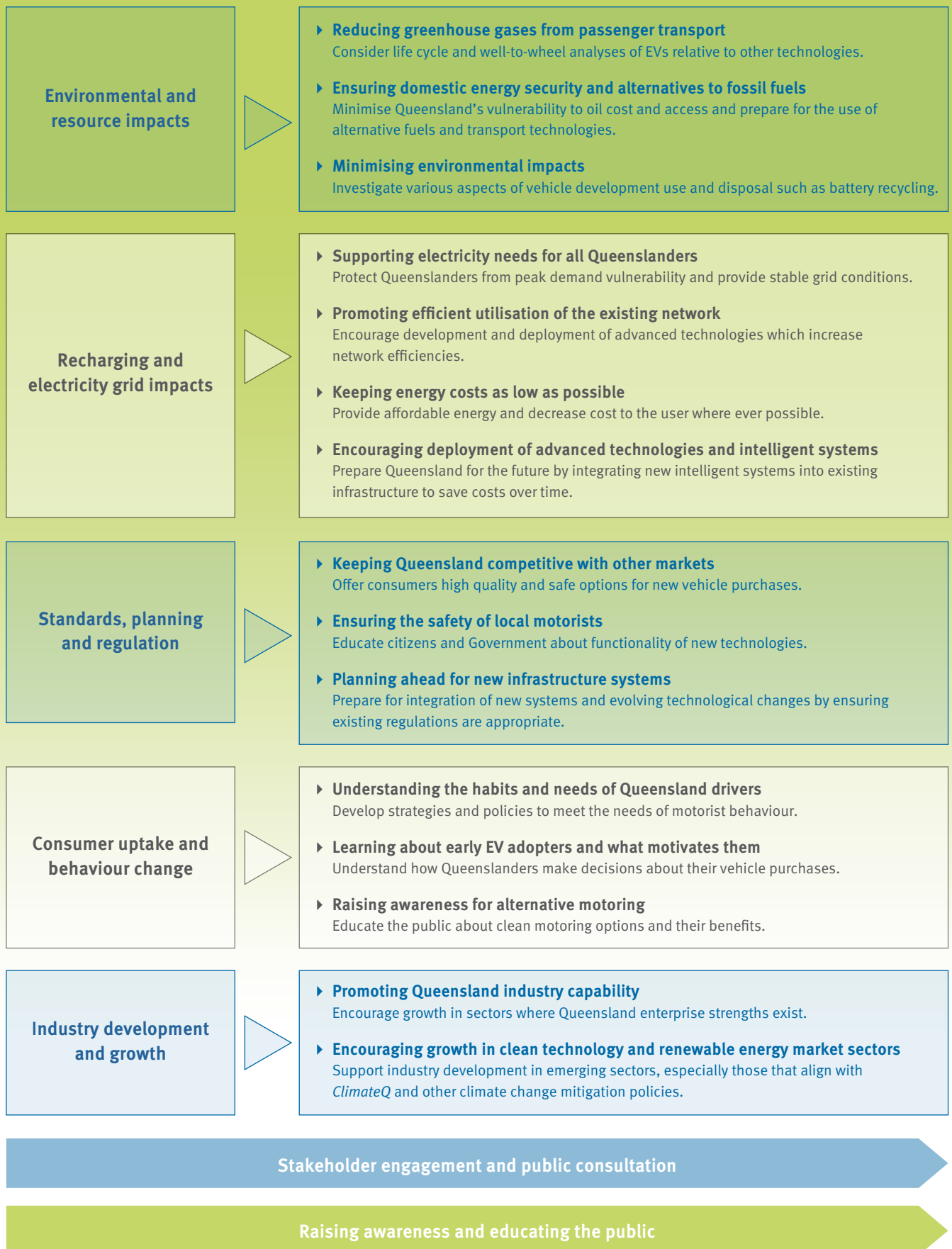
- Understanding the profile of Queensland early EV adopters.
- Considering government policy options for accelerating the adoption of EVs, including incentives.
- Raising awareness of EVs and other low carbon vehicle technologies and promoting potential environmental and economic benefits for consumers and industry.

Promoting local industry development

- Surveying local EV-related enterprises and their capabilities to promote economic development and the creation of ‘green’ jobs in Queensland.
- Coordinating ‘green’ industry development across government to maximise opportunities for growth.
- Engaging local and interstate industry stakeholders to develop a body of knowledge related to EV adoption.
- Reviewing short and long term renewable energy generation plans and including EV deployment scenarios in future forecasts.



Figure B





Images courtesy of ECOTality (left) and ChargePoint Australia (right)—ChargePoint executives pictured charging a BMW mini e.

8. Early actions and new initiatives to meet the challenge

The Queensland Government has been actively engaged in EV policy initiatives over the past 12 months. The main projects with direct links to this Roadmap include:

EV20 Accord

In December 2009, the Queensland Government signed on to the EV20 initiative—an international accord between global cities, states and countries to collaborate in accelerating the development and deployment of EVs. This initiative is hosted by The Climate Group, an international, non-partisan, not-for-profit organisation working to advance climate change advocacy and the development of clean technology. The Queensland Government is an active member of the Climate Group and has partnered with it on various projects including the *Climate Leaders Summit* and the *2009 Queensland Climate Summit*.

Ergon EV pilot program

Ergon Energy launched an EV smart charging pilot program in June 2009. This program develops smart charging and vehicle-to-grid technologies in its first phase and in its second phase evaluates these technologies as part of a field trial using one or more Mazda2's converted to EVs by Energetique (an Australian retrofit company). A key outcome of this project will include real world data on EV connectivity with the electricity grid. This project is currently underway in conjunction with the Townsville Solar City initiative and is expected to conclude in late 2010.

Queensland Sustainable Energy Innovation Fund (QSEIF)

QSEIF has awarded grant funding to a number of local clean vehicle enterprises, including Tritium for development of its efficient motor controller for EV application and Deep Green Research, for its conversion of a Honda Civic to an EV. Both companies are based in Queensland and have had their products showcased in the Global Green Solar Car Challenge, an internationally renowned annual solar car race hosted in Australia. Additionally, QSEIF funded the local battery storage system company Redflow.



Premier's Council on Climate Change (PCCC) Working Paper

Transforming transport: Planning for next generation technologies

The PCCC is an advisory council established to ensure Queensland's efforts in addressing climate change are informed by the best available local and national knowledge and experience. In June 2009, the PCCC commissioned a working paper to examine options for reducing Queensland road transport emissions. At its meeting on 7 April 2010, the Premier accepted the working paper, which recommended a range of measures for Queensland Government consideration including developing a strategy to support the uptake of EVs. The Queensland Government is currently developing its response to this working paper's recommendations. It is expected that its response and the working paper will be published in late 2010.



Nationally coordinated government action

The Queensland Government has been an active member of national processes examining opportunities to improve the fuel efficiency of the Australian vehicle fleet, including the Council of Australian Governments (COAG) vehicle fuel efficiency working group. In 2009, the work of this group identified a need to design the fuel consumption label which is required by Australian Design Rule 81/02 to be attached to all new vehicles sold in Australia. EVs were uniquely considered given they produce no emissions when driven.

The Queensland Government was a contributor to an initial scoping plan for EV component and infrastructure charging standards undertaken by the Council for the Australian Federation (CAF). This report was published in March 2010. Additionally, Queensland is providing early input to a CAF initiative on energy infrastructure planning, which is expected to be released publicly when complete.

Industry consultation and partnerships

The Queensland Government has engaged in discussions with key EV industry stakeholders including: Better Place Australia, ECOTALITY, and ChargePoint Australia (charging infrastructure providers), and Mitsubishi and Nissan (EV manufacturers). ECOTALITY, which recently announced its Asia-Pacific operations will be located in Brisbane, has received \$US100 million from the United States of America's Department of Energy for the largest scale EV pilot program in the world.

9. Potential role of pilot programs on EVs for Queensland

Where EV-related issues cannot be thoroughly investigated via research, the Queensland Government will consider undertaking a locally operated EV pilot program. A Queensland EV pilot program would be multi-faceted to include active studies of vehicles, charging, driver behaviour and grid connectivity, as well as other topics such as consumer engagement and the feasibility of fleet applications.

Various pilot programs are underway internationally and a small number are occurring in Australia. Roadmap activities will be informed by the outcomes of these trials where possible, relevant and available within the Roadmap's timeframe.

10. Public consultation and discussion opportunities

The arrival of EVs in Australia is imminent and planning is essential to ensure that Queensland infrastructure, industry and communities are prepared and well informed as we transition to a lower carbon economy.

The Queensland Government is committed to facilitating the deployment of this new technology in the near term and aims to leverage Queensland's strengths to position residents, industry and other key stakeholders for a low carbon transport future.

An industry consultation group, involving vehicle, component and infrastructure manufacturers and providers, will be engaged to provide guidance on the Roadmap implementation process. Queensland will remain in close contact with national and interstate EV developments and will leverage its international linkages, such as its membership with the EV20 Initiative, to coordinate its approach to accommodate for EVs.

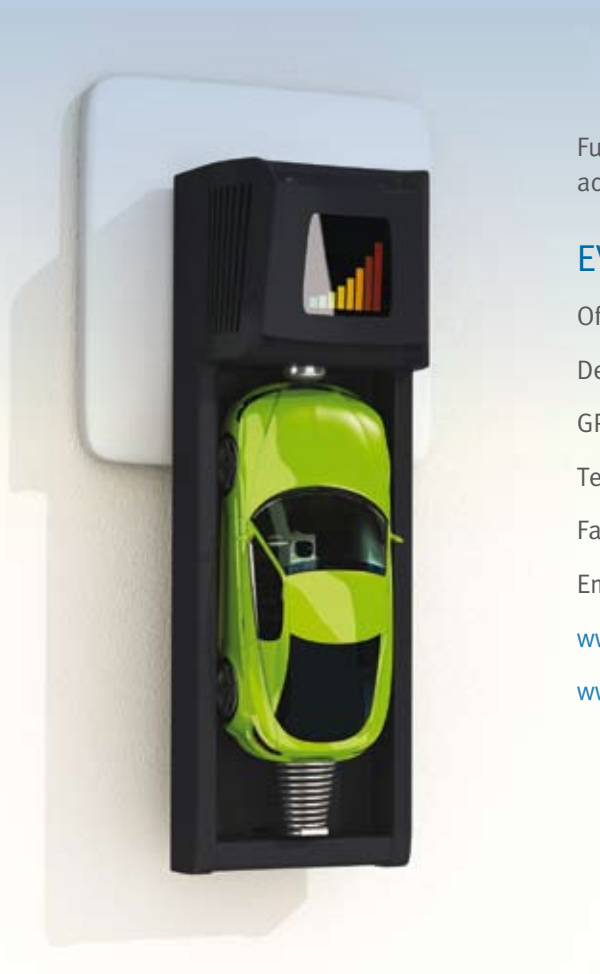
11. Get involved

The Queensland Government through its Office of Climate Change within the Department of Environment and Resource Management will coordinate implementation of *An Electric Vehicle Roadmap for Queensland* in partnership with other key government agencies such as the Office of Clean Energy—Department of Employment, Economic Development and Industry and the Office of Sustainable Transport—Department of Transport and Main Roads.

Opportunities for public involvement are central to EV policy implementation as public comments will assist in framing the final shape of the Roadmap. Feedback will be analysed and reported against the five key work areas in a policy statement which will be compiled in late 2010. The public comment period will end on **19 July 2010**.

If you would like to be included in consultation meetings with industry leaders and stakeholder groups register your interest by emailing evroadmap@climatechange.qld.gov.au. You may be asked to complete a questionnaire as part of this process.

The department welcomes your input in creating policies and management tools that are future-oriented and meet the needs of Queenslanders in transitioning to a lower carbon future. If you are interested in reading more about EVs or any other issues in the Roadmap please visit our website www.climatechange.qld.gov.au



Further information on the Roadmap and associated activities are available by contacting:

EV Roadmap Working Group

Office of Climate Change

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Tel: 1300 130 372

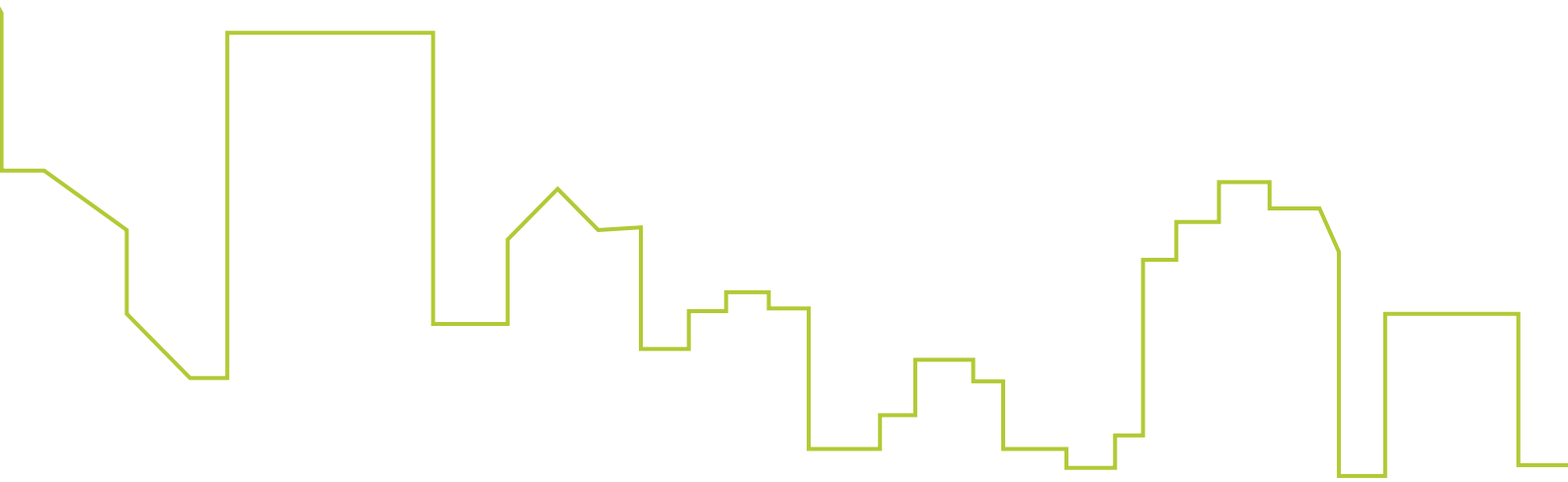
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