

## ELECTRIC VEHICLES: RESEARCH INTO FUTURE PRICE AND SUPPLY

<b>Reason for this briefing</b>	We commissioned a report (attached) into the future price and supply of new electric vehicles. This briefing provides you with the key findings of the research and advises you of how we intend to use it.
<b>Action required</b>	Note the contents of this briefing.
<b>Deadline</b>	N/A
<b>Reason for Deadline</b>	N/A

### Contact for telephone discussion (if required)

Name	Position	Telephone		First Contact
		Direct Line	After Hours	
[REDACTED]	Senior Adviser	[REDACTED]		
Erin Wynne	Manager, People and Environment	[REDACTED]	[REDACTED]	✓

**MINISTER'S COMMENTS:** Withheld under section 9(2)(a) of the Official Information Act 1982

<b>Date:</b>	27 August 2015	<b>Briefing Number:</b>	OC03296
<b>Attention:</b>	Hon Simon Bridges (Minister of Transport)	<b>Security level:</b>	In-Confidence

### Minister of Transport's office actions

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> <i>Noted</i>        | <input type="checkbox"/> <i>Seen</i>                 | <input type="checkbox"/> <i>Approved</i>            |
| <input type="checkbox"/> <i>Needs change</i> | <input type="checkbox"/> <i>Referred to</i>          |   |
| <input type="checkbox"/> <i>Withdrawn</i>    | <input type="checkbox"/> <i>Not seen by Minister</i> | <input type="checkbox"/> <i>Overtaken by events</i> |

## Purpose of report

1. To inform you of the key findings of research we commissioned into the future price and supply of new electric vehicles and advise you about how we intend to use the research.
2. This briefing also provides a response to regulatory issues related to neighbourhood electric vehicles and heavy electric vehicles, which are noted in the report.

## About the research

3. We contracted the consulting firm Emission Impossible Limited to synthesise existing research on projections for electric vehicle supply, production, and price for the period 2015 to 2030, including quantifying the:
  - 3.1. expected level of electric vehicle production in New Zealand's key supply markets
  - 3.2. potential supply of new electric vehicles into New Zealand
  - 3.3. expected change in the price of new electric vehicles available to the New Zealand market.
4. The research is presented in the attached paper entitled *Research into the long-term trends for electric vehicle price and supply – understanding developments in the global market* (the report).
5. The report was peer reviewed by officials from the Ministry of Transport and the Energy Efficiency and Conservation Authority.
6. The research did not explore potential supply and prices for *used* electric vehicles. We investigated the prospects for the used market first-hand during a visit to Japan in June 2015. We have shared the findings from this trip with the wider Ministry, other government departments, and the Smart Grid Forum. We will also use the findings from Japan to inform our final advice to you on a package of measures to encourage the uptake of electric vehicles.

## Summary of key findings – production and supply projections

### Production

7. Not unexpectedly, the report concludes that the future market share of electric vehicles is highly uncertain. Table 1 below shows the range of mainstream estimates of electric vehicle production collated in a review of global and European projections (Ricardo AEA, 2013).

**Table 1: Mainstream estimates of new electric vehicle production (as a percentage of total production) for light duty vehicles**

Technology	Market share in 2020			Market share in 2030		
	Low	Medium	High	Low	Medium	High
Plug-in hybrid and battery electric combined	2%	4%	10%	20%	30%	50%

8. Based on the literature reviewed, and notwithstanding the uncertainty in projected electric vehicle demand and production, the report considers that growth in electric vehicle production capacity will be adequate to meet demand in New Zealand's key supply markets of Japan and Europe.
9. The report concludes that production of heavy commercial electric vehicles will be limited to a small niche market for the next decade because the current technology has technical constraints.

### *Supply*

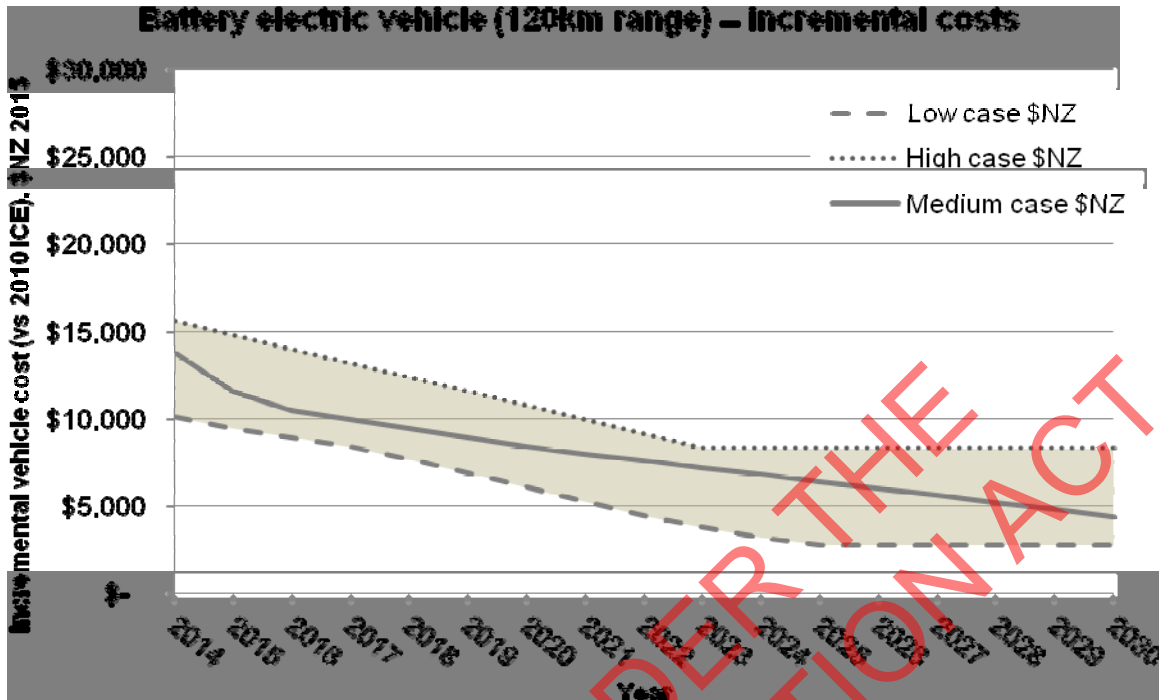
10. The responses to a stakeholder survey suggest that supply of electric vehicles in New Zealand is limited at present, compared with international markets, because there is limited demand. The general consensus is that demand in New Zealand will lag behind other countries because:
  - 10.1. the price of electric vehicles relative to internal combustion vehicles is still too high without government support/subsidies/penalties to encourage adoption
  - 10.2. other countries have better charging infrastructure.
11. Although supply of electric vehicles is currently limited in New Zealand, motor vehicle importers consistently report that they could respond quickly to increased demand if sales of electric vehicles did pick up.

### **Summary of key findings – electric vehicle cost projections**

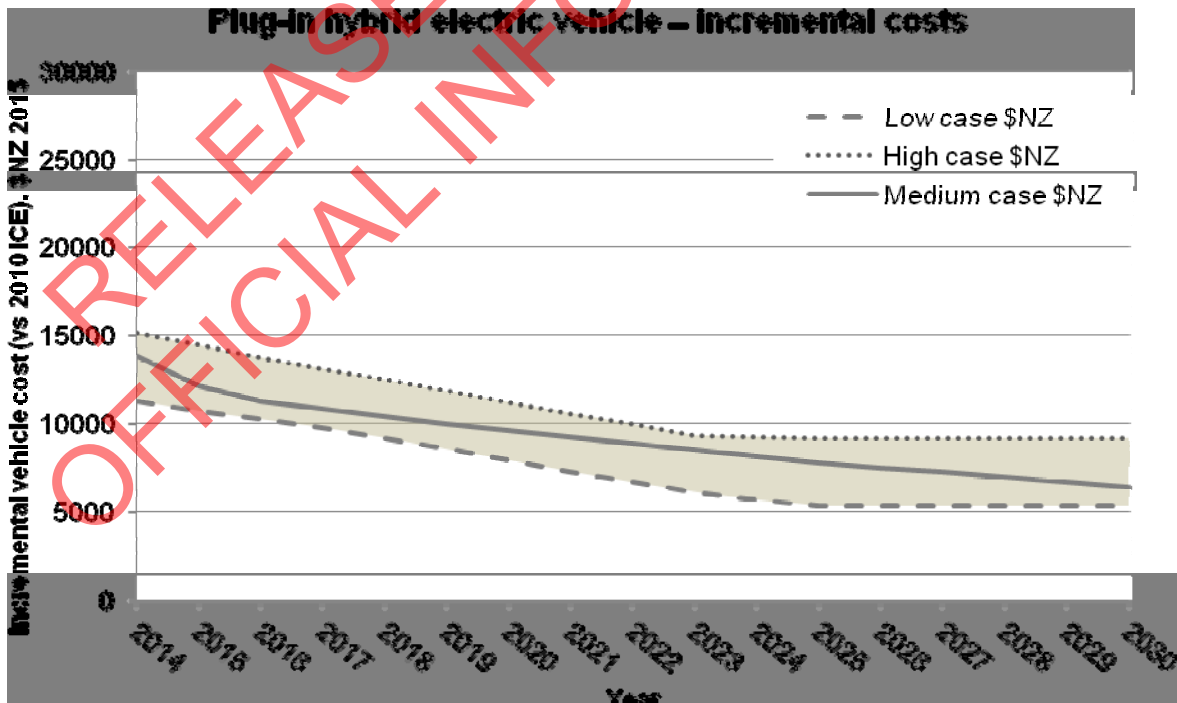
12. The report provides estimates for the incremental cost of manufacturing a battery electric vehicle compared with an internal combustion engine vehicle constructed in accordance with 2010 fuel efficiency requirements.<sup>1</sup>
13. The results suggest that the current cost of manufacturing a battery electric vehicle with a 120 kilometre range (e.g. the Nissan Leaf or the Ford Focus) is between NZ\$9,500 and NZ\$15,000 more than the cost of manufacturing an equivalent internal combustion engine vehicle. This differential is expected to drop to between NZ\$3,000 and NZ\$8,000 by 2025.

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<sup>1</sup> The incremental cost of an electric vehicle may actually be less in future because the cost of manufacturing internal combustion engines is expected to increase due to stricter fuel efficiency standards in vehicle manufacturing markets. However, this may not necessarily translate into price increases for internal combustion vehicles.



14. The current cost of manufacturing a plug-in hybrid electric vehicle with a 50 kilometre all-electric range is between NZ\$9,000 and NZ\$15,000 more than the cost of manufacturing an equivalent internal combustion engine vehicle. This differential is expected to drop to between NZ\$5,500 and NZ\$9,000 by 2025.



15. It is not possible to project price with any confidence because reductions in manufacturing costs may not necessarily translate directly into vehicle price.<sup>2</sup> However, there is a general expectation that electric vehicle prices will reduce over time and will eventually be competitive with conventional vehicles.

### **Regulatory issues raised in the report**

16. The report raises the following regulatory issues in relation to neighbourhood electric vehicles<sup>3</sup> and heavy electric vehicles:
- 16.1. Neighbourhood electric vehicles do not meet New Zealand frontal impact regulations.
  - 16.2. Some models of neighbourhood electric vehicles are designed for a maximum speed of 45 kilometres per hour.
  - 16.3. Batteries for electric bus and trucks are heavy and electric buses would be likely to breach limits under the Vehicle Dimensions and Mass (VDAM) Rule.
  - 16.4. The extra battery weight means electric heavy commercial vehicle adopters could pay more under the existing Road User Charges (RUC) regime than they would for comparable diesel vehicles. Any increase in weight reduces the payload, unless the vehicle's maximum weight rating also increases. In some cases, this might move the vehicle into another RUC cost category.

#### *Neighbourhood electric vehicles*

17. In March 2015, we provided you with a briefing and report on measures to encourage the uptake of electric vehicles (OC02885). It contained advice on the recognition of alternative low emission vehicle designs, of which neighbourhood electric vehicles are just one.
18. You noted that we would explore the recognition of alternative low emission vehicle designs outside of an electric vehicle package, because the issue is relevant to a much wider range of emerging vehicles (e.g. segways, electric bikes, cars and some autonomous vehicles).

#### *Vehicle Dimensions and Mass Rule*

19. The VDAM Rule does not differentiate between vehicles on the basis of motive power source. The limits established in the VDAM Rule, including weight, are based on an analysis of matters including safety, contribution to productivity, and infrastructure impacts. Impact on roading is a key issue, but the focus is on maximising the use of New Zealand's investment in roading infrastructure.
20. A review of the VDAM Rule is underway which is considering limits related to weight. It is guided by Government's Better Regulation policy and will seek to minimise compliance costs for operators and, as far as is practicable, be future-proofed for emerging technologies.
21. The report suggests that production of heavy commercial electric vehicles will be limited to a small niche market for the next decade. This niche could include electric or hybrid buses, which are currently being considered for purchase in at least one region. Hybrid buses are

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<sup>2</sup> Factors influencing price might include the availability of unused battery production capacity, a manufacturer's desire to be perceived as a technology leader and the willingness of the manufacturer to set a price that will gain market share.

<sup>3</sup> A neighbourhood electric vehicle is a three- or four-wheeled vehicle with low power. This term is commonly used in the US but neighbourhood electric vehicles are typically known as quadricycles in Europe. The Renault Twizy is an example of an electric quadricycle.

likely to be only slightly heavier than equivalent diesels, but this could still result in these buses exceeding current weight limits when fully laden. This issue is being considered in the review of the VDAM Rule.

### *Road User Charges*

22. Heavy electric vehicles would not be penalised in terms of RUC charges. RUC rates are set according to the type of vehicle, how much it weighs, and how that weight is distributed. The heavier a vehicle is, the more damage it does to the road surface, all other things being equal.
23. The revenue obtained from RUC is used mainly for road construction and maintenance, along with other activities benefiting road users. RUC charges are reviewed as required, depending primarily on government's revenue requirements. In recent years, there have been annual reviews, but in the past there have been long periods when rates remained the same.
24. The RUC Act 2012 allows for no distinction between heavy vehicles on the basis of their motive power. The only factors taken into account in setting charges for these vehicles are the costs they generate in terms of providing roads and bridges that are adequate for their weight, and repairing damage caused by their use.
25. Gross vehicle mass and relative payload are only some of the factors that determine the cost effectiveness of one type of heavy vehicle over another. The specific freight task, energy efficiency and related vehicle requirements are more relevant to the cost effectiveness of using a particular class of heavy electric vehicle. These more critical factors operate independently of RUC, which is a relatively minor factor in the overall cost of operating a heavy vehicle.

### **Next steps**

#### *Sharing the report with stakeholders*

26. The Ministry has already been approached by the Smart Grid Forum and a consultant acting on behalf of Contact Energy for a copy of the report. The parties agreed to wait for the report on the understanding that we would provide it to stakeholders shortly.
27. We consider that making the report available would be a positive contribution to the discussions and work on electric vehicles by government and private sector organisations. In the first instance, we plan to share the report with the attendees of a meeting of chief executives that Martin Matthews is convening to discuss the electric vehicle package. The meeting will likely occur in the next fortnight. We will then make it available to other interested stakeholders.

#### *Making the report publicly available*

28. We will make the report available on our public website following Cabinet decisions on the electric vehicle package.
29. We consider there is a low risk of this report being used to criticise government policy on electric vehicles. The report emphasises the uncertainty of projections of future electric vehicle market share. It represents one view of projections based on the most robust information available at the time. We will need to continue to monitor development of the electric vehicle market. In addition, we have existing key messages that we can use to respond to questions about electric vehicle uptake and policy.

*Further research*

30. The results of the research are being fed into a further piece of work that we have commissioned. Consultants are developing a model for electric vehicle uptake that can be used to test various scenarios, including the impact of measures to encourage the uptake of electric vehicles. We expect this work to be completed by the end of August 2015.

**Recommendations**

31. The recommendations are that you:
- (a) **note** the key findings of the research we commissioned into the future price and supply of new electric vehicles
  - (b) **note** that we will shortly make the report available to stakeholders engaged in the development of the electric vehicle package, and put it on our public website following Cabinet decisions on the package.

  
**Senior Adviser**

Erin Wynne  
**Manager, People and Environment**

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the Official Information Act 1982

**MINISTER'S SIGNATURE:**

**DATE:**

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