Updating and extending Vehicle Fleet Emission Model

December 2018 | By Haobo Wang, Tim Denne¹, Adolf Stroombergen², Iain McGlinchy, Ralph Samuelson, Sina Mashinchi, and Stuart Badger



¹ Resource Economics ² Infometrics



What is VFEM?

- MoT's Vehicle Fleet Emission Model can project vehicle fleet composition, energy (fuel and electricity) use, and greenhouse gas emissions
- VFEM has been used extensively for low carbon policy developments and related CBAs, as well as international reporting

Base Case



Ministry of Transport

How does VFEM work?







Why does VFEM need to be updated and extended?

- Currently it can only project up to 2040
 - Need to support low carbon policy for net zero emissions by 2050
- An EV uptake model was developed in 2015, mainly for light passenger vehicles
 - EV technology/market has developed fast
 - Light commercial vehicles
 - Heavy vehicles
- A study for real-world fuel efficiency was carried out in 2014
 - A large body of more recent data is available



A Model for Projecting the Uptake of Electric Vehicles

for Ministry of Transport

August 2015



What are we doing for VFEM?

Four work streams are underway to extend VFEM to 2055

- > Updating and extending EV uptake model
 - Detailed economic/market analysis
 - LPVs, LCVs, and HCVs
- > Updating real-world fuel efficiency study
 - A large amount of data has been obtained from three sources
- > Updating and extending the vehicle numbers and VKT model
- Revising VFEM model structure, and testing and optimising VFEM



What are the timelines?



Work stream	Team	Timeline	Status
Updating & extending EV uptake model	Resource Economics & Infometrics	By 30 October 2018	Draft model and report completed
Updating real-world fuel efficiency study	Haobo Wang & Iain McGlinchy	By 20 December 2018	Analysis of Eroad data completed
Updating & extending vehicle numbers and VKT model	Ralph Samuelson & Sina Mashinchi	By 30 November 2018	Completed
Revising VFEM model structure and optimising the model	Haobo Wang & Stuart Badger	By 29 March 2018	Revision of model structure completed



A Model for Projecting the Demand for Electric Vehicles

Tim Denne, Resource Economics Adolf Stroombergen, Infometrics Presentation to Transport Knowledge Conference Wellington, November 2018



Model Structure



The model has different worksheets for:

- Inputs (yellow tabs)
- Results (green tabs)
- Scenarios (grey tabs)
- Data (red tabs)
- Workings (blue tabs).





Selected Outputs: EV% of New Registrations











Summary

The model projects a long way into the future. There is considerable uncertainty. For example:

- Oil prices
- Electricity prices
- Carbon price
- Rate of change in EV battery storage capacity
- Rate of price decline of EV batteries
- Battery depreciation (physical and economic)
- Future policy settings (eg excise taxes)

We don't have a crystal ball so:

- Many inputs may be changed by the user
- But there is a risk of silly results
- Users should be careful!





Updating real-world fuel efficiency study





Real-world fuel use data from EROAD



Diesel HCVs - Median FE (L/100km) and median GVM (kg) in the two surveys

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Real-world fuel use data from EROAD – Cont'd

Diedel HCVs - Median fuel economy (L/100km) and median GVM (km) change with YoM



- Variation in FE is likely caused by GVM changes
- Further confirm that FE seems not to change with YOM for heavy diesel trucks

Contact:

h.wang@transport.govt.nz



