NZTA research summary

September 2024

Strengthening our fuel use and vehicle emissions prediction modelling

In New Zealand, two models are used to estimate fuel use, which can be used to predict vehicle emissions. The models differ in their estimation approaches and are used in different ways. This research looked at opportunities to combine or better align them.

Integrating or aligning NZ Transport Agency Waka Kotahi economic and emission models

In 2023/24, researchers explored the possibility of aligning or integrating the New Zealand Vehicle Operating Cost (NZVOC) model and the Vehicle Emissions Prediction Model (VEPM). They reviewed the models, consulted key stakeholders and analysed options.

NZ TRANSPORT AGENCY WAKA KOTAHI

Te Kāwanatanga o Aotearoa
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Reviewing the models

The researchers identified or reviewed each model's:

- purpose
- scope
- data inputs and outputs
- update frequency
- common and unique elements.

They found several ways to align similar aspects between the models, including aligning the:

- current and forecasted New Zealand vehicle fleets
- estimates of average vehicle speeds
- effect of road design on vehicles' fuel use and emissions.

The NZVOC model, which is used in cost benefit appraisal:

- needs maintaining and updating (for example, the fleet profile only includes diesel and petrol vehicles)
- could be more user friendly
- isn't available to the public.

The VEPM, which is mainly used for planning:

- is available as an online tool and is regularly updated
- could be improved – for example:
  - to clearly show the effects of low speed on vehicle emissions
  - to include the effects of different road surface types.

The researchers also found that users should know the limits and best uses of each model so they can choose the appropriate model for their needs.

Feedback from stakeholders

After the review, the researchers led a workshop to get model owners' and users' feedback on:

- the models' current uses and value
- the models' limitations
- features they need or want.

The researchers gave participants options for integrating the models. They chose keeping both models and making improvements to each, including improving guidance and providing live help to users.

Options for improving the models

The researchers found nine opportunities to improve and better align the models:

- Opportunity 1: Using consistent vehicle classes and fleet proportions.
- Opportunity 2: Enabling the NZVOC model to recognise low and zero emission vehicles.
- Opportunity 3: Enabling the NZVOC model (or its outputs) to reflect changing vehicle fleets over time.
- Opportunity 4: Aligning the NZVOC model's emission outputs with the VEPM's emission outputs.
- Opportunity 5: Aligning speed drive cycles with average speed profiles.
- Opportunity 6: Enabling the VEPM to better reflect road condition and configuration effects.
- Opportunity 7: Developing use-case guidance and worked examples.
- Opportunity 8: Improving data collection and calculation transparency, and describing limitations.
- Opportunity 9: Making the NZVOC model easier to use.

The researchers assessed each opportunity against four criteria:

1. Clarity of scope
2. Technical feasibility
3. Benefit
4. Cost and complexity.

Opportunities 5 and 6 are complex and need further research, including testing the models.

Opportunity 9 may help, but the costs of improving the NZVOC model will probably outweigh the benefits.

They recommended grouping the opportunities into two separate jobs:

1. Development works (opportunities 1–4).
2. Guidance works (opportunities 7 and 8).

In their report, the researchers included a document outlining the work scope for both jobs.

RR 730: Integration of vehicle operating cost and emission models
NZ Transport Agency Waka Kotahi research report.
Available at **www.nzta.govt.nz/resources/research/reports/730**