The role of transport models in climate change mitigation

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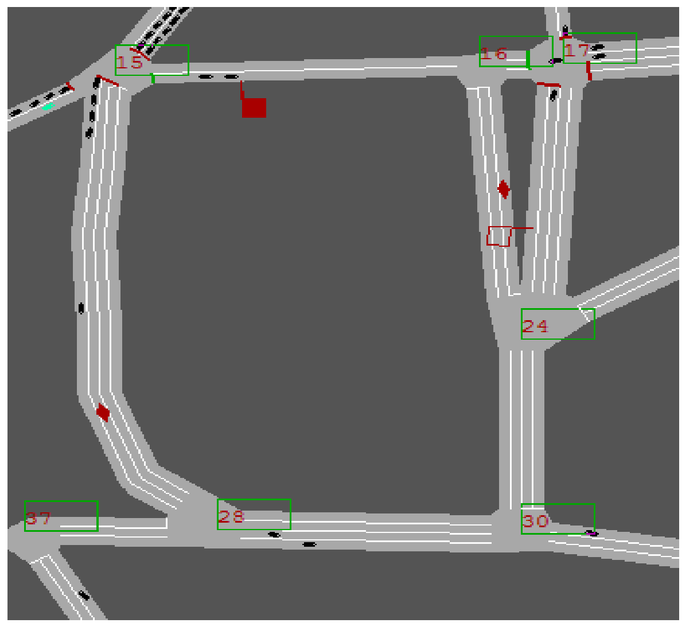
Introduction

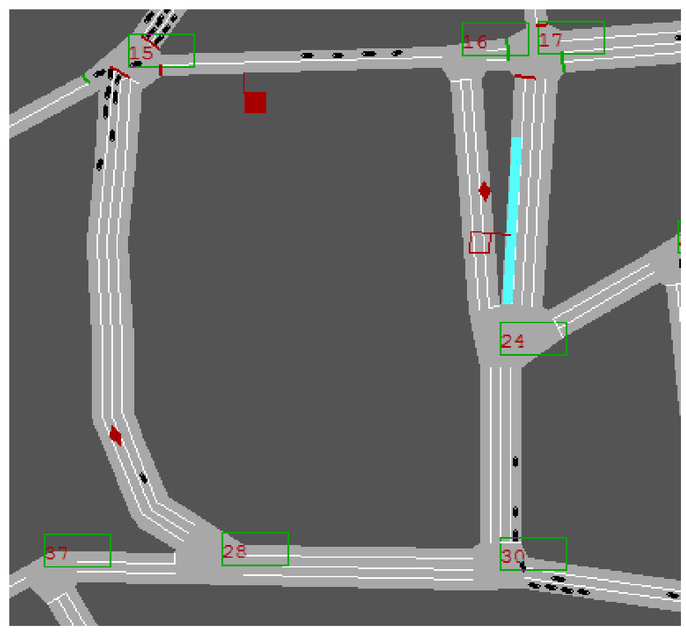
Transport contributes around a quarter of greenhouse gas emissions globally and the system needs radical changes in both technology and behaviour in order to mitigate climate change. Transport modelling can aid decision making and policy design for delivery of emission reductions. This work presents an overview of transport models used for calculating emissions from road transport, part of a wider project on urban transport emissions.

Microsimulation represents a series of modelling techniques built on the principles of the four stage trip model and use the principles of car following and lane changing rules[1,2]. Right are some images from the **DRACULA** model (Dynamic Route Assignment Combining User Learning and microsimulAtion)[3].

Outputs include speed, delays and information about the changes in emissions as a result of changes to the network.



This image shows a network in DRACULA

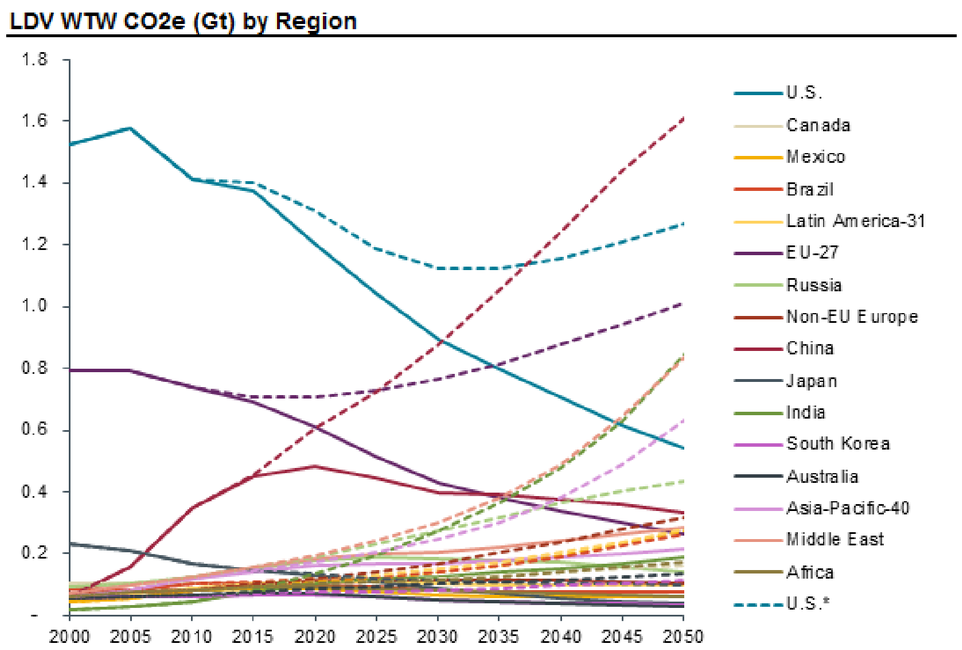


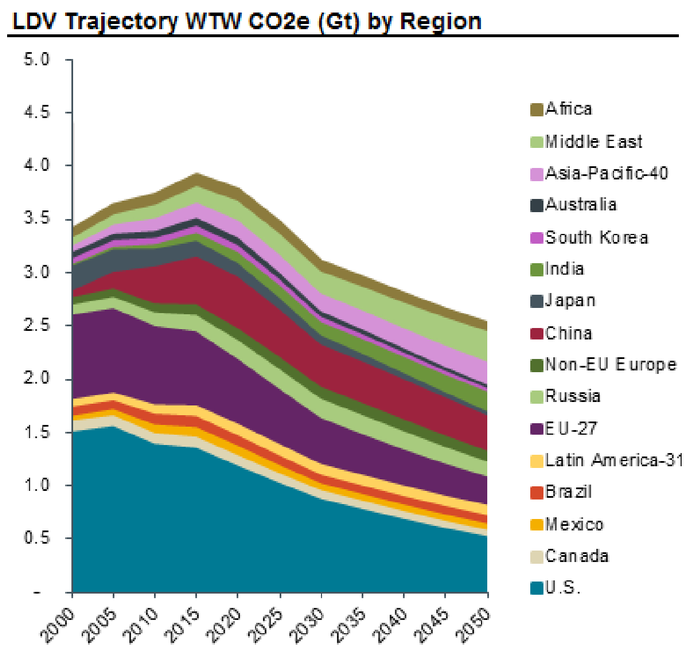
In this second image, a bus lane has been added to the network

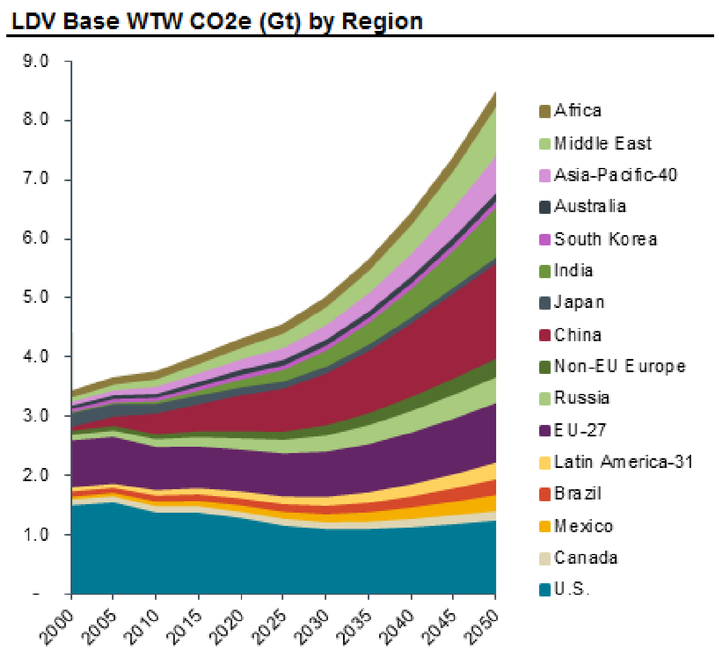
Techno economic models capture the dynamics of systems, such as transport, often at a regional or global scale. The images below are taken from the International Council for Clean Transportation's **Roadmap** model[4].

These models show the forecasts to 2050 for emissions from light duty vehicles globally, with the difference in the trajectory case and base case apparent, demonstrating the effort required for emission mitigation. The emissions are also broken down by region which increases the value of the output to decision makers.

Additional approaches for modelling transport include **Agent Based Modelling** and **System Dynamics.**







Outputs from the ICCT Roadmap model showing well-to-wheel emissions of CO_2 from light duty vehicles globally to 2050

Conclusions

There are challenges for users of transport models, particularly where there is a mismatch between model design and user requirements[5] and challenges also arise out of the closed nature of modelling tools[6]. Often it is necessary to combine multiple modelling approaches to address the issues of the real world transport system.

The variation in scales and scopes of modelling approaches provide a versatility of tools for different transport challenges, from the local to the global. The insight that transport models can provide about emissions from transport are highly valuable and should contribute to decision makers ability to mitigate these emissions in order to avoid dangerous climate change.

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