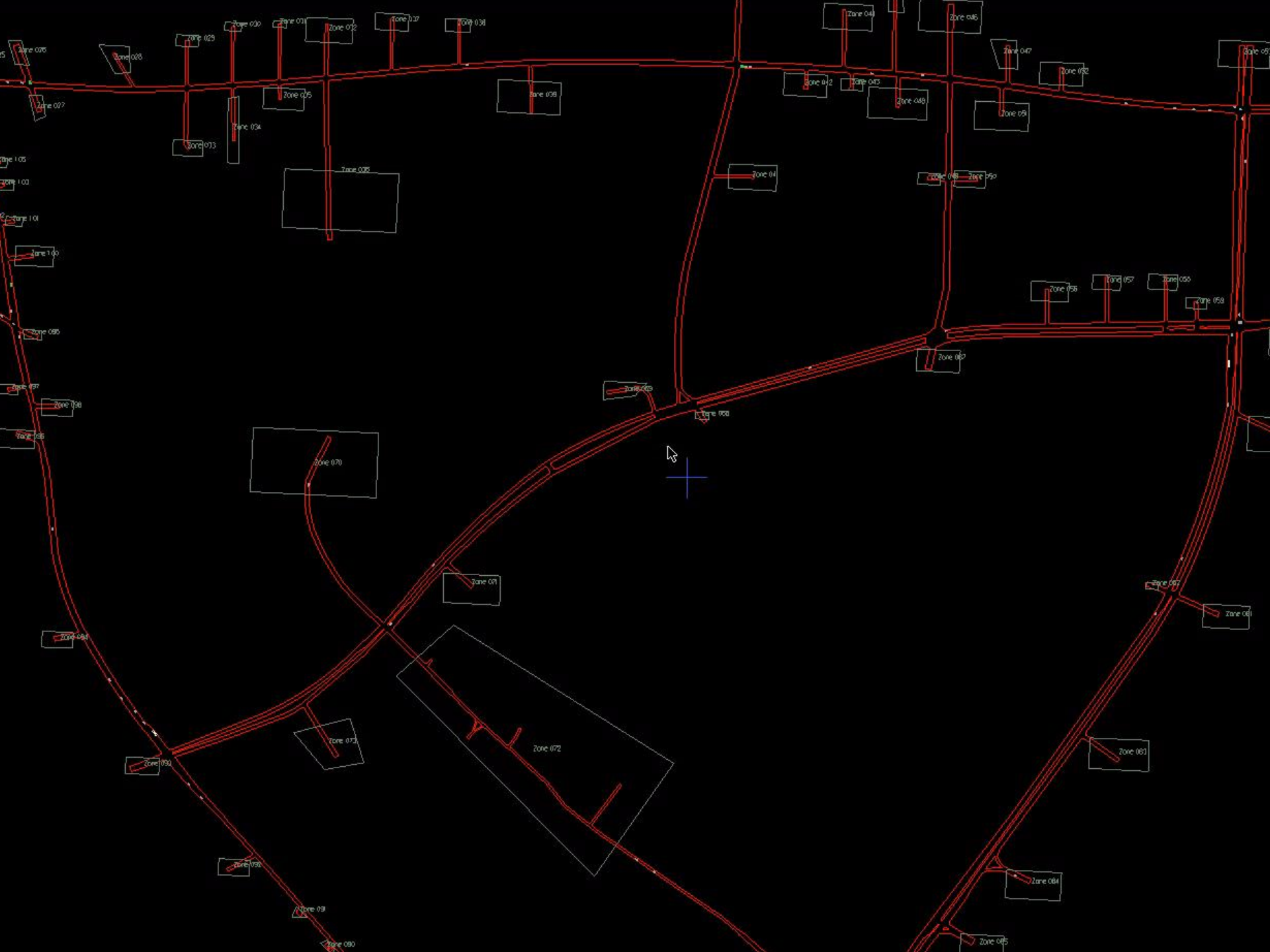


Modelling Microsimulation Outputs in ADMS-Roads

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ADMS-Roads User Group Meeting

8th November 2018



~~Less~~
Congestion = ~~Reduced~~
Journey Time = ~~Fewer~~
emissions

Fuel (ml/s)

Idle	Accelerating	Braking	Cruising
0.17	1.61	0.16	0.62

Energy of movement



Weight	890 kg	
Cd	0.37	
Frontal Area	1.95 m ²	
Rolling Resistance	0.015	
	Theory	Combustion
Energy to 30	24.9 Wh	100 Wh
Power at 70	4.5 kW	18.2 kW
Braking energy	20.7 Wh	



Weight	1410 kg	
Cd	0.32	
Frontal Area	2.73 m ²	
Rolling Resistance	0.020	
	Theory	Combustion
Energy to 30	40Wh	160 Wh
Power at 70	9.3 kW	37.1 kW
Braking energy	32.7 Wh	

Energy of movement

$$\text{Kinetic Energy (KE)} = \frac{1}{2} m \cdot v^2$$


Kinetic Energy

$$\text{Drag (DE)} = \frac{1}{2} \rho \cdot C_d A \cdot v^3$$

drag



rolling resistance

$$\text{Rolling resistance (rr)} = C_{rr} \cdot g \cdot m \cdot v$$



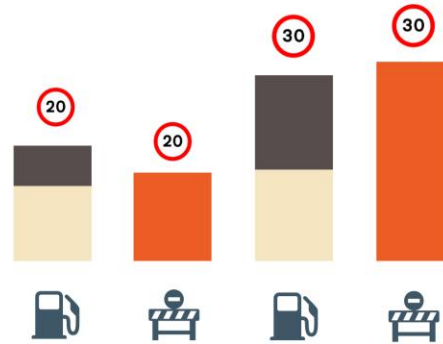
Picture: Sam Saunders

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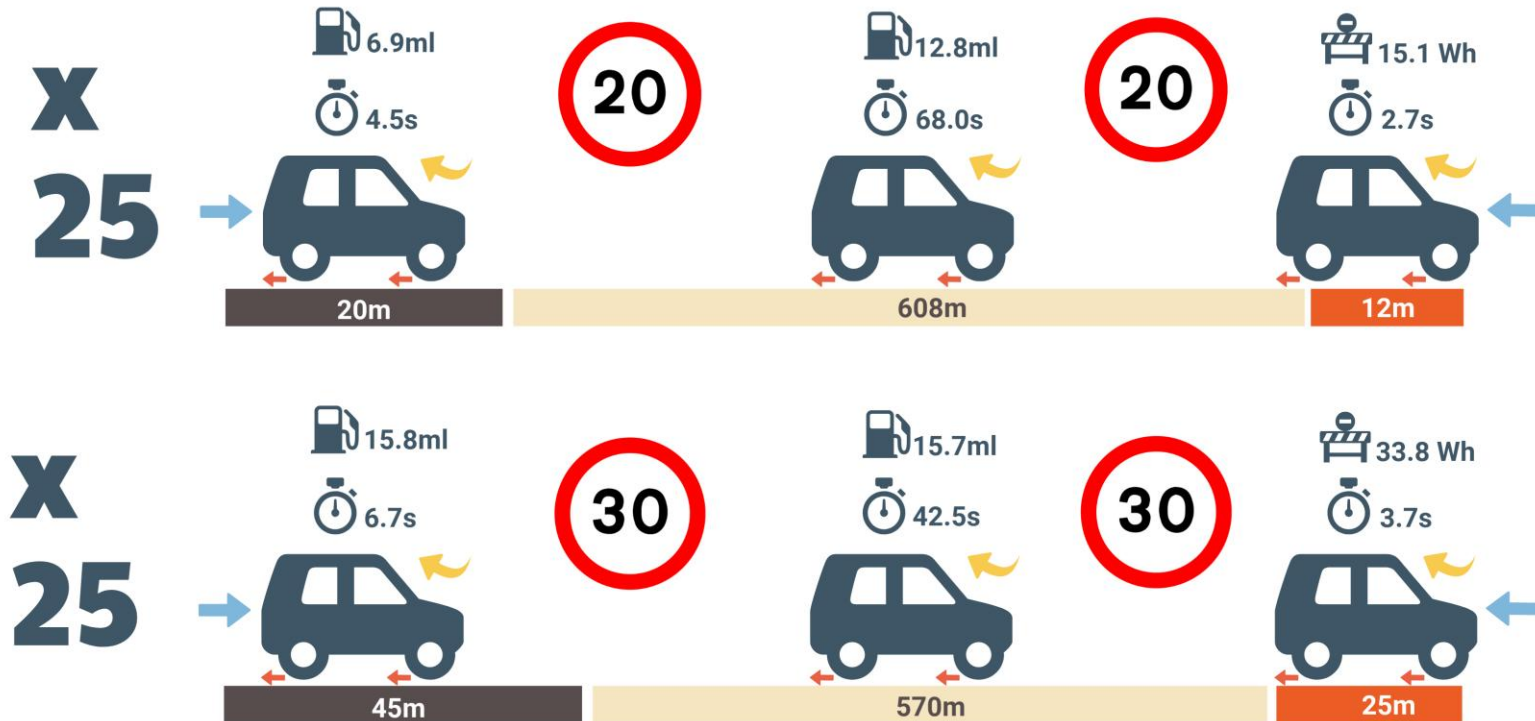
FUEL & SPEED

BREAKDOWN OF THE FUEL USE OF A JOURNEY AT 20 MPH vs 30 MPH

A typical 16km commute across a city with 25 starts and stops can be broken down into acceleration, **cruising** and **braking** energy and the subsequent fuel consumption of each. The extra time spent accelerating to 30 MPH doesn't seem like much, but it needs 8 times the energy per second of cruising, hence it hugely increases fuel use.



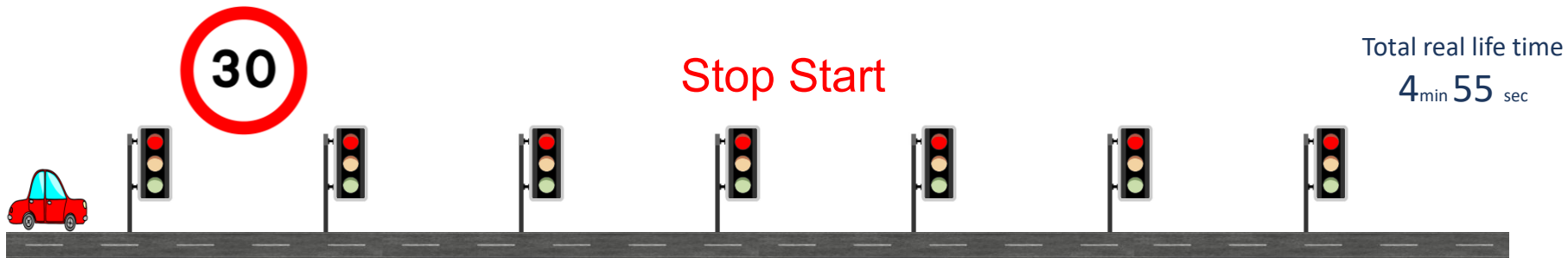
- Fuel Consumption (ml)
- Braking wear energy (Wh)
- Time for stage (s)
- Vehicle weighing 1419 kg
- Drag
- Kinetic Energy
- Rolling Resistance





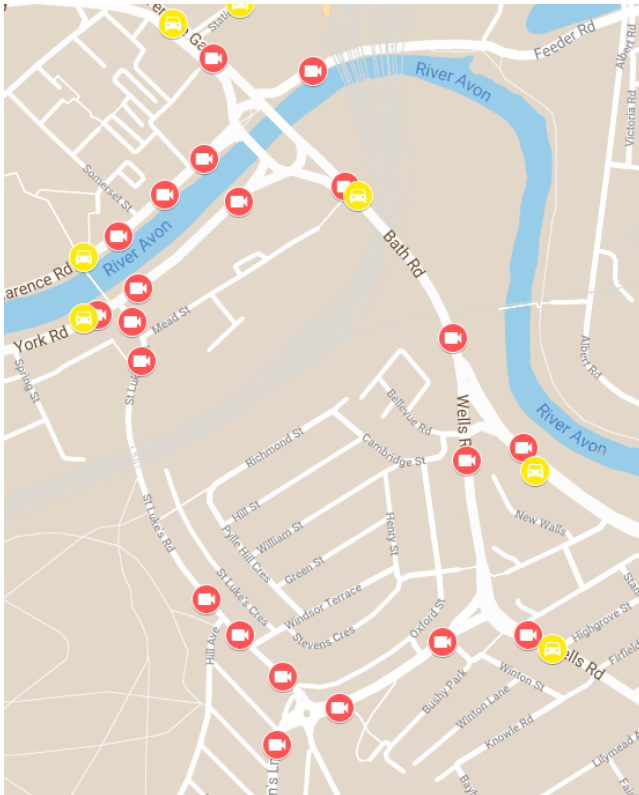
Green Waves

- Synchronisation of Green signals to match traffic flow
- Can reduce stops and starts significantly
- High potential to optimise night time and off peak flows which account for 80% of emissions
- Can increase LEV ranges

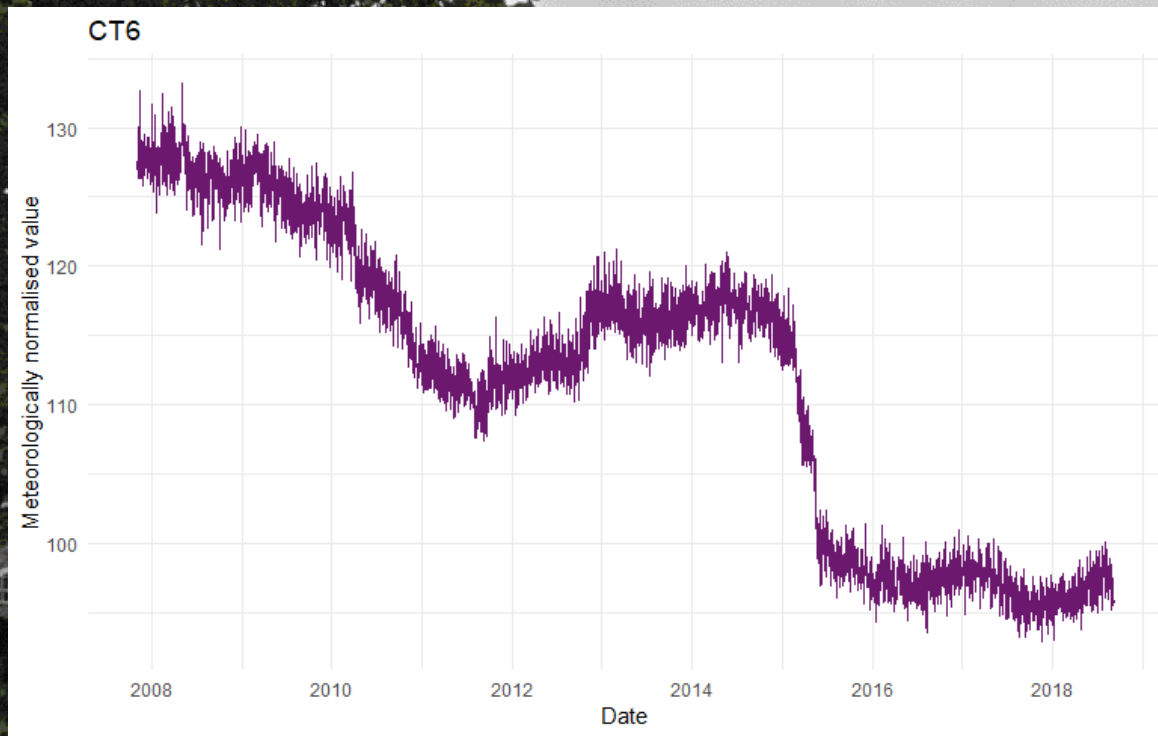




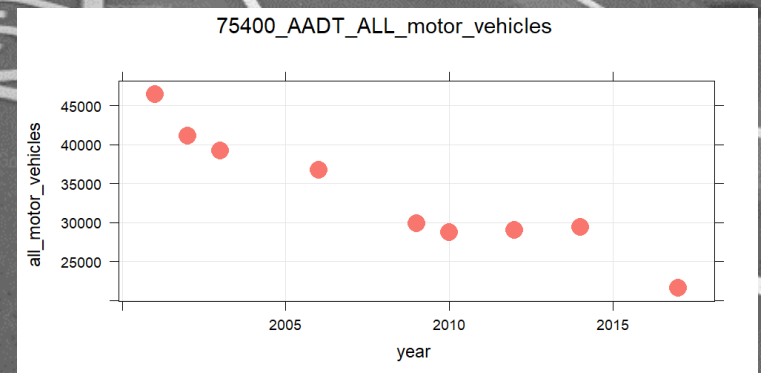
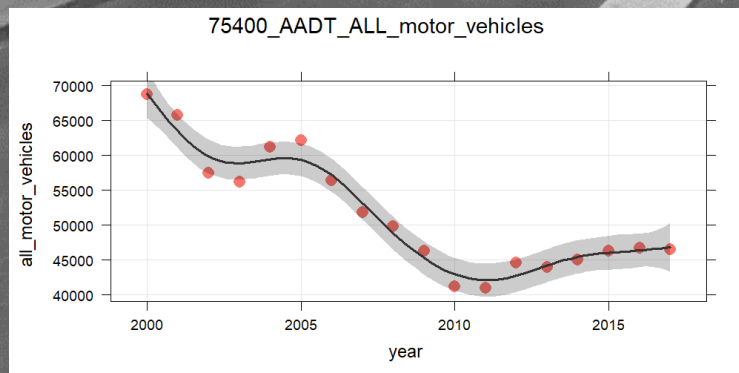
Traffic Data



- AADTs usually used with diurnal profiles
- Bluetooth/GPS from mobile phones and other devices
- ANPR data mainly used for Speed/Congestion Charge/CAZ enforcement
- 24/7 data with OD and route info
- Benefits:
 - Eliminate need for adhoc surveys, resources spent on modelling.
 - Provide additional information, such as route and OD data
 - Faster creation of models
 - Accuracy



DfT 75400



Conclusions

- Vehicle dynamics play an important role in emissions
- Considering this in more detail opens up additional mitigation solutions
- The benefits to the industry and society of improved traffic data collaboration are:
 - Lower costs
 - Improved understanding of road usage, especially at off peak periods
 - Use of instantaneous emissions models possible.
 - Lower emissions
 - Improved city operation and quality of life
- Once established, connections between Microsimulation and ADMS could reduce model creation time.
- Vehicle dynamics play an even greater role in the movements of electric and hybrid cars



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