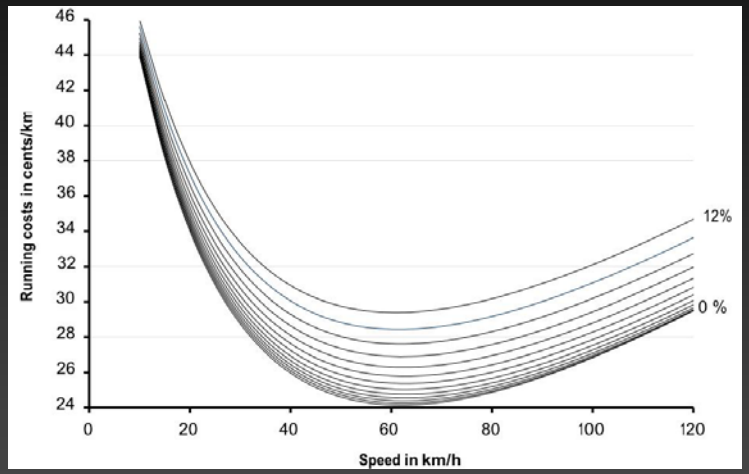
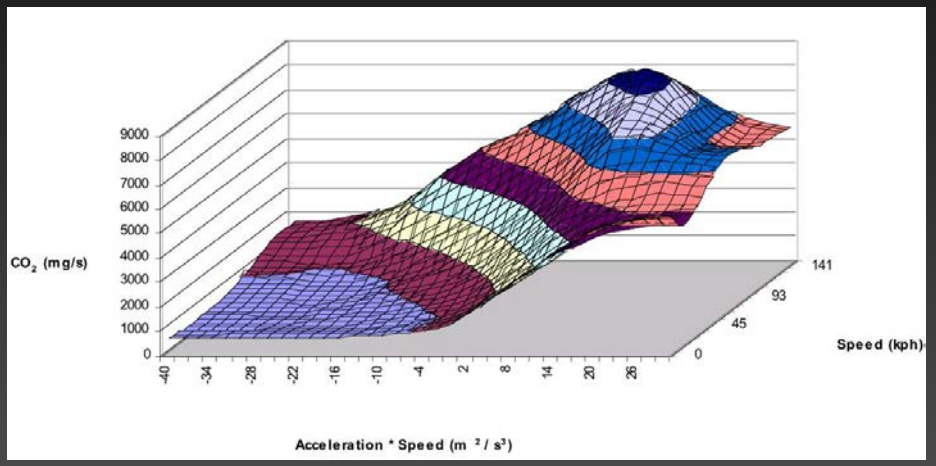
New Emissions Analysis Techniques

Discussion Overview





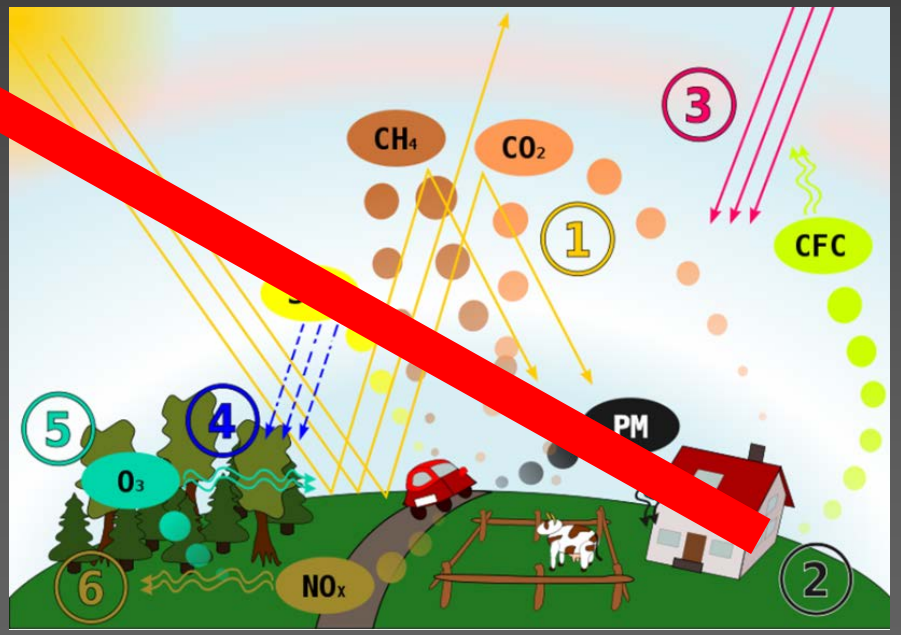
- Techniques used
- Approach differences
- Limitations

  - Disclaimer: Not an expert in dispersion modelling, climate change, and environmental assessment components

Absolute emission outputs

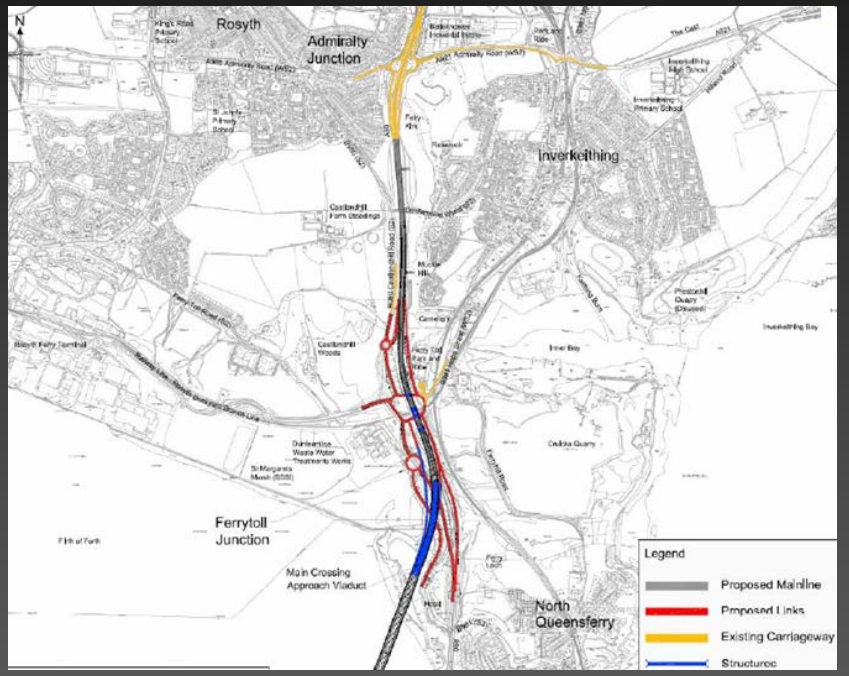
Dispersion modelling

Global, not local



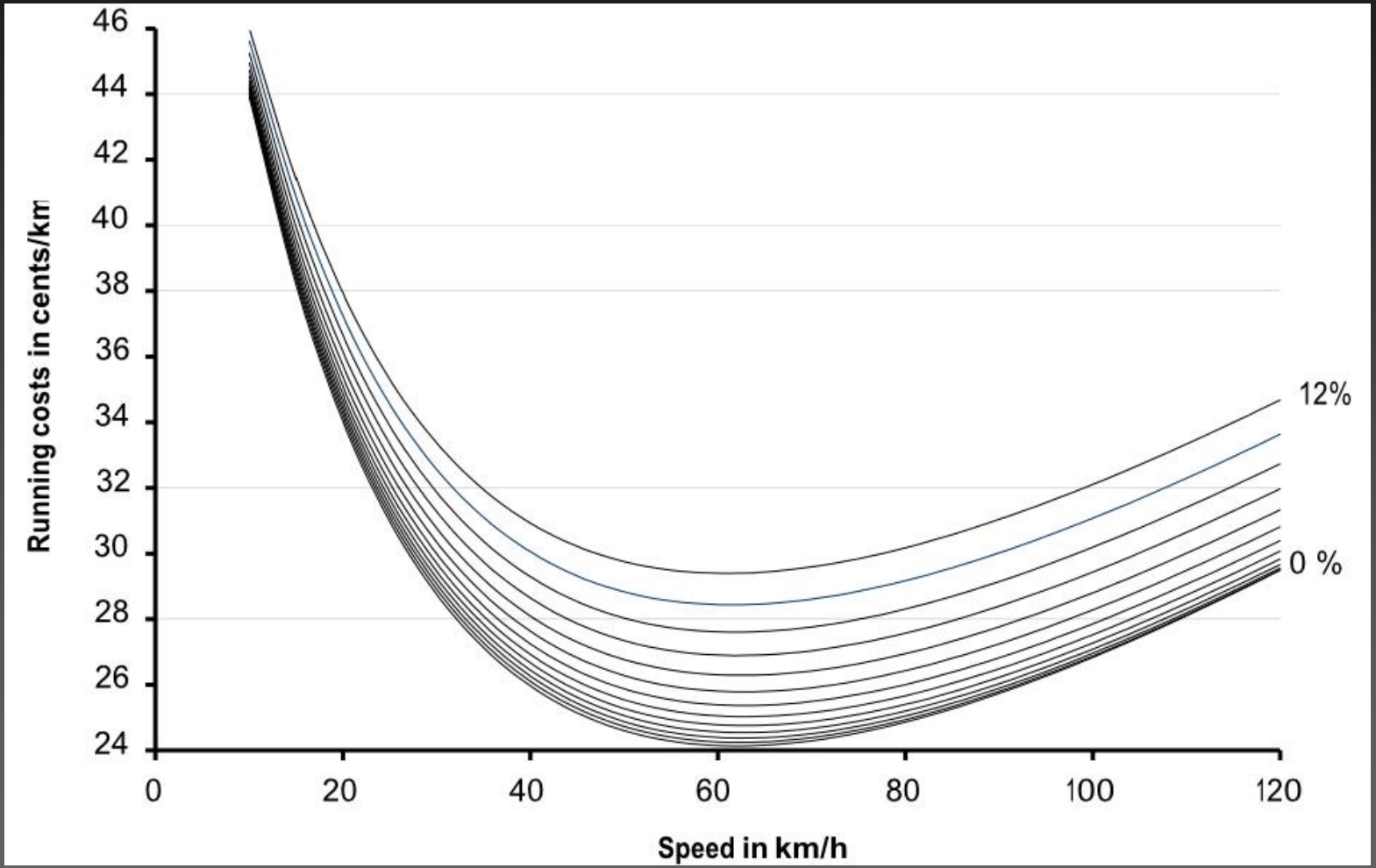
Transport Planning: Comparative

- Scheme A vs. Scheme B
  - (or vs. Do Min)



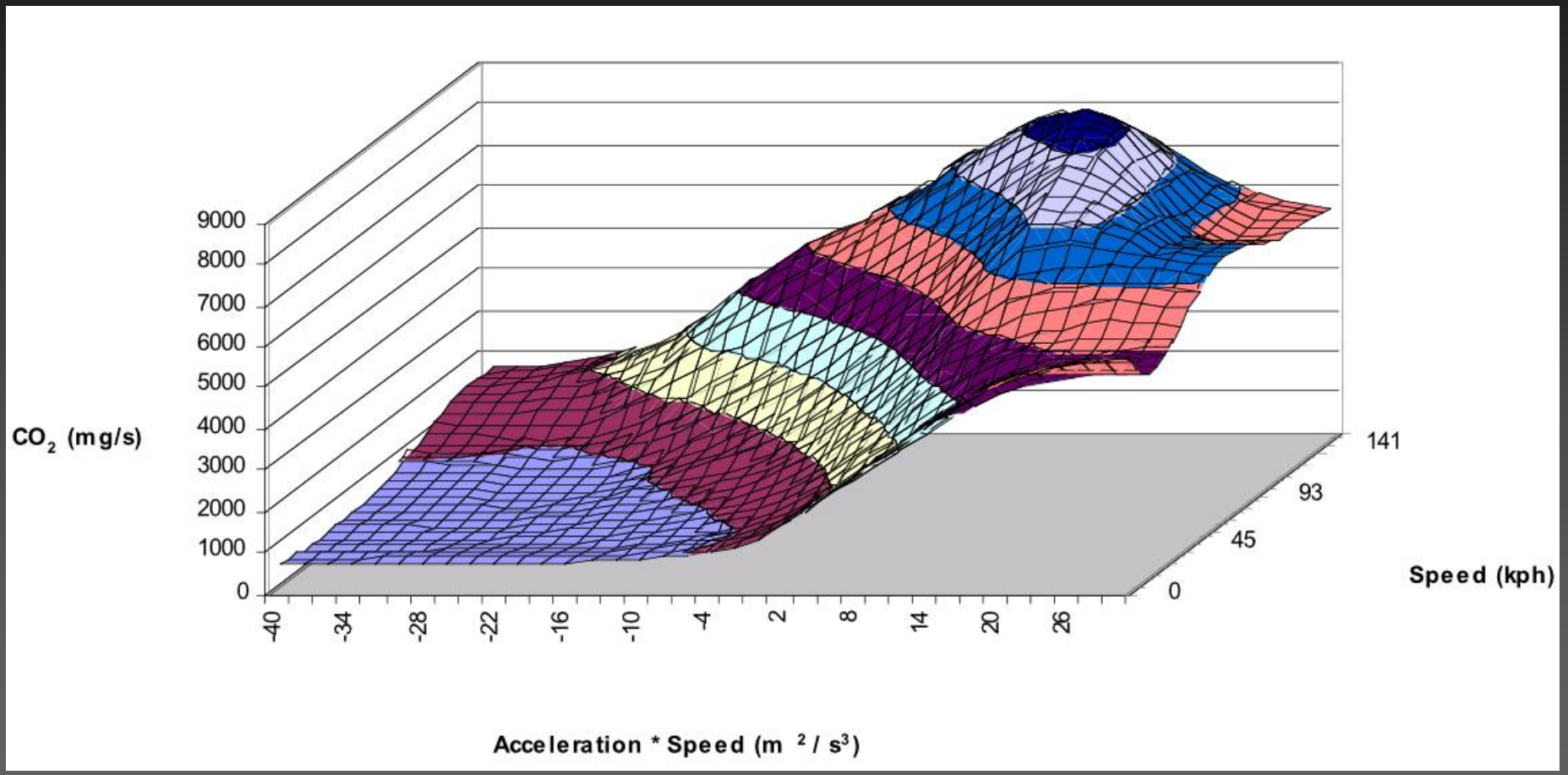
- Global media
  - Recent Australasian emphasis
    - Sydney: WestConnex
    - Nelson: New arterial

Average Speed



- EEM A5.7 Table A5.1 Passenger Car VOC by speed and gradient

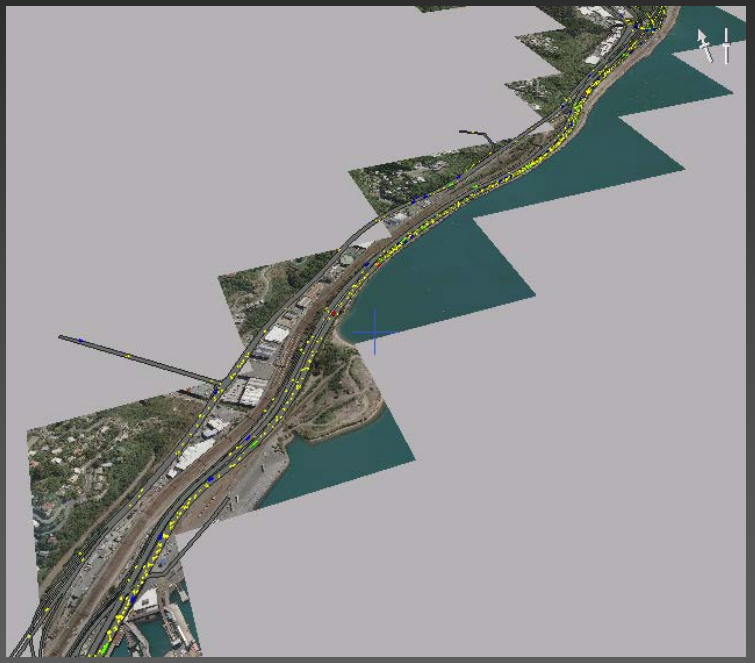
Instantaneous Emissions Model



- MODEM Based CO2 Emissions Surface Plot – EURO I Medium Petrol Car

Average Speed Method - limitations

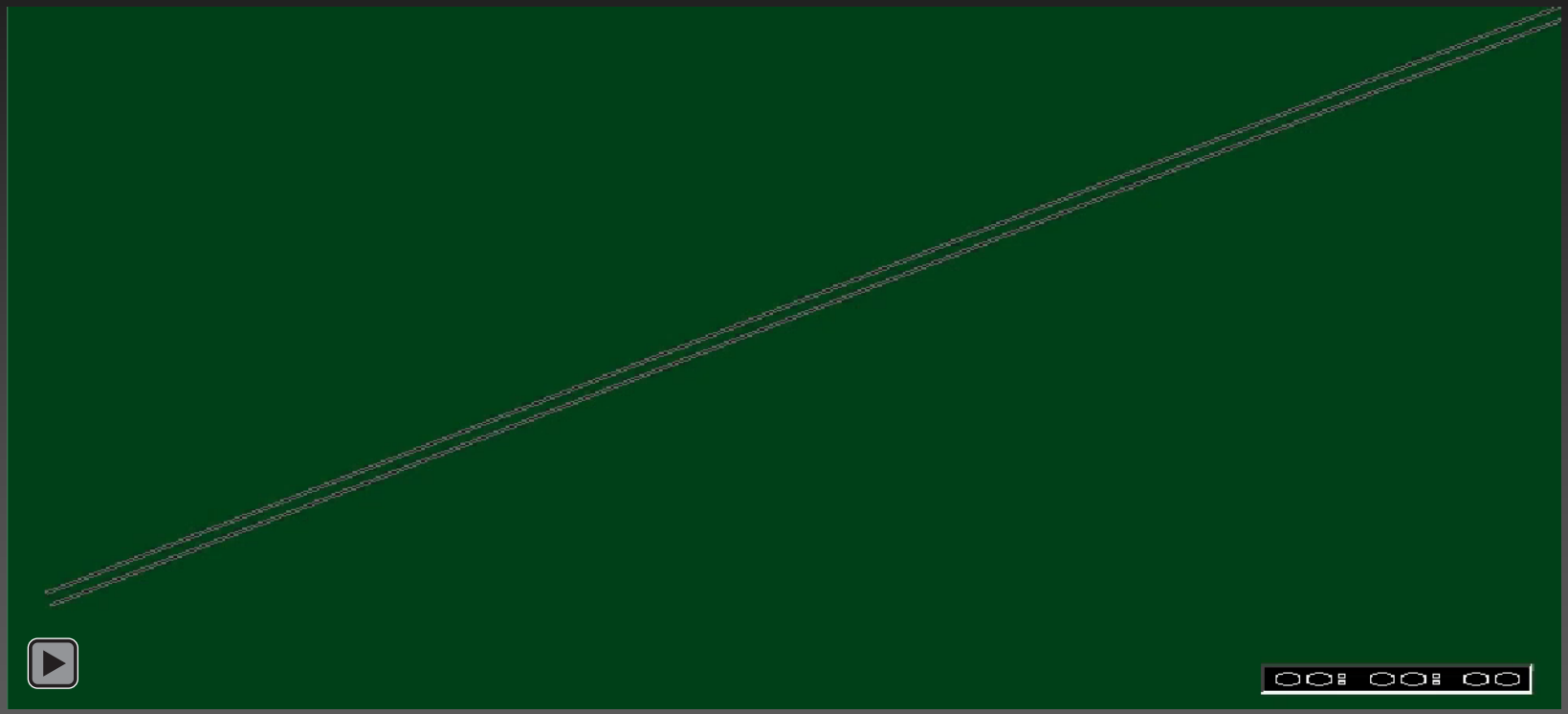
- Individual vehicle speed variations



- Collective speed and acceleration variations

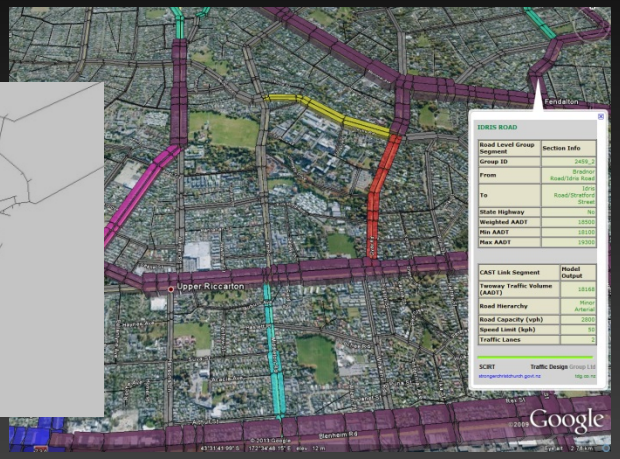
- Network condition variations

Illustration

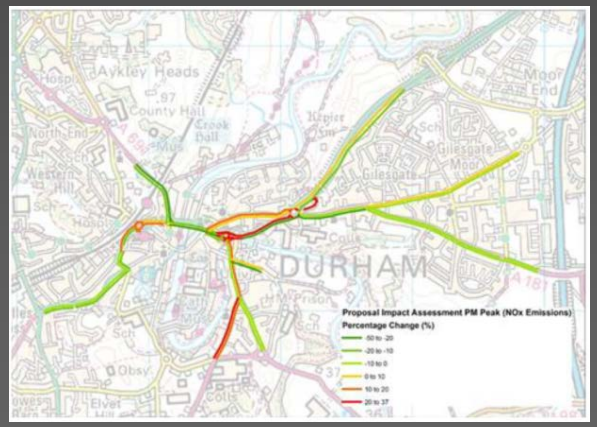


Transport Models

- Macroscopic
  - SIDRA, SATURN, Regional Models



- Microsimulation
  - Paramics, AIMSUN, VISSIM



Instantaneous Emissions Model (IEM)

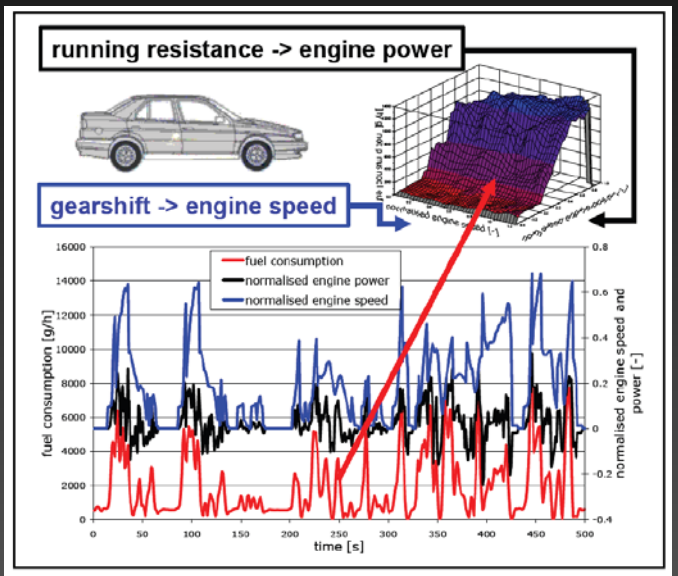


Figure 23: Derivation of engine emission maps for passenger cars in PHEM (Zallinger *et al.*, 2005a).

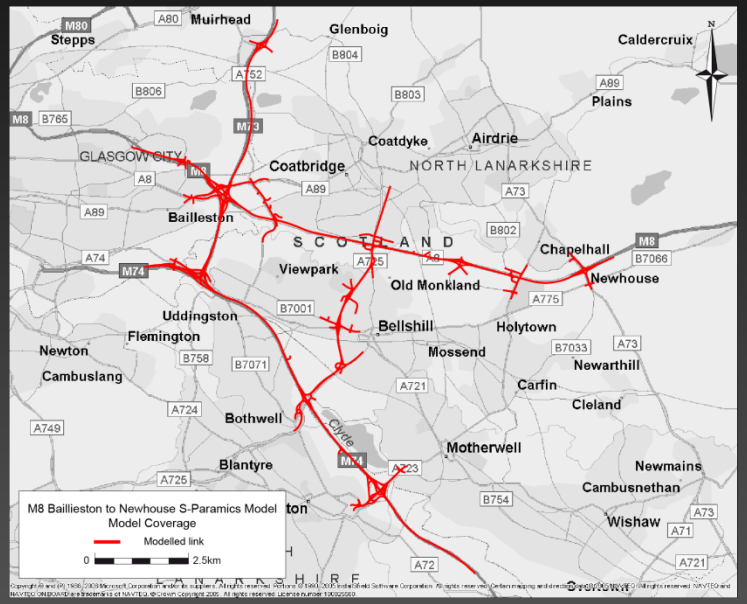
- Microsimulation model

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Timestamp	Link	Tag number	Base Type	Vehicle Type	Section Number	PosX (m)	PosY (m)	PosZ (m)	Bearing (deg from N)	Elevation (deg)	Gradient (%)	Acceleration (mpss)	Speed (kph)	Angular Velocity (deg/sec)	Brake	Right Indicator	Left Indicator	Busboard
57605.5	'20z:10	0	1	1	1	551.31	335.16	0	-172.746	0	0	0.619	31.244	0	0	1	0	
57605.5	'51:23z	2	13	16	1	117.59	374.83	0	100.016	0	0	0.9	12.96	0	0	0	0	50a
57605.5	'64:111	4	13	16	1	533.39	952.81	0	-178.73	0	0	0.9	12.96	0	0	0	0	54_to
57605.5	'66:65	1	13	16	1	651.03	686.23	5	-66.402	0	0	0.9	12.96	5.993	0	1	0	55_to
57605.5	'67:66	9	1	1	1	673.77	676.38	5	293	0	0	2	3.6	0	0	0	0	
57605.5	'70:69	3	13	16	1	608.06	875.28	0	-172.448	0	0	0.9	12.96	11.217	0	0	0	59_to
57605.5	'81:47	8	1	1	1	668.55	750.04	0	106.047	0	0	2.5	33.84	0	0	0	0	

Meanwhile, elsewhere…

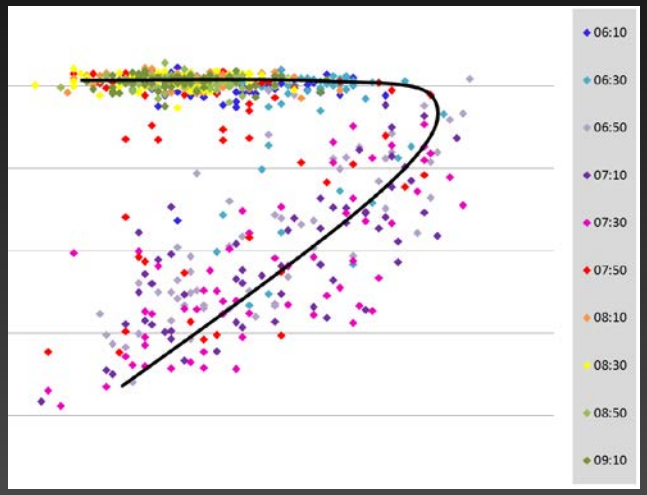
- UK, DMRB

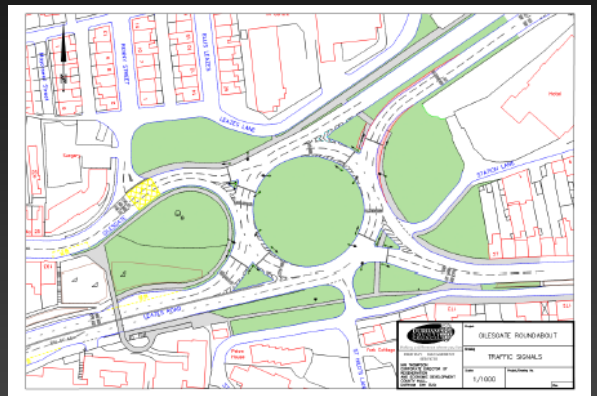
projects which result in variations in driving patterns but do not greatly affect average speed, a more detailed emission model may be required



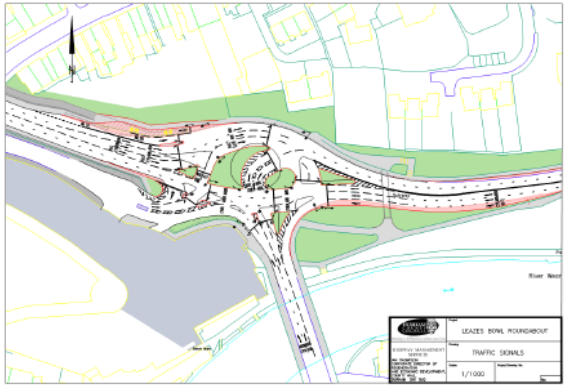
- Scotland, A.I.R.E.
  - Analysis of Instantaneous Road Emissions

“Nature of the Scheme”

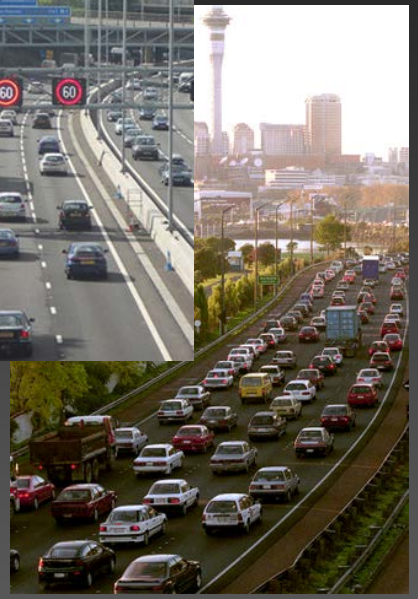




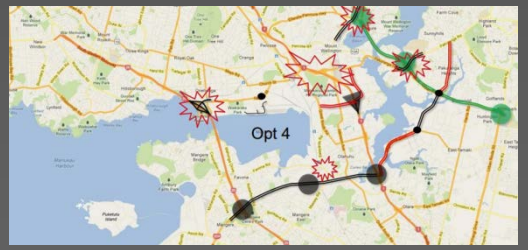
A181 Gilesgate Roundabout – Proposed Traffic Signal Layout



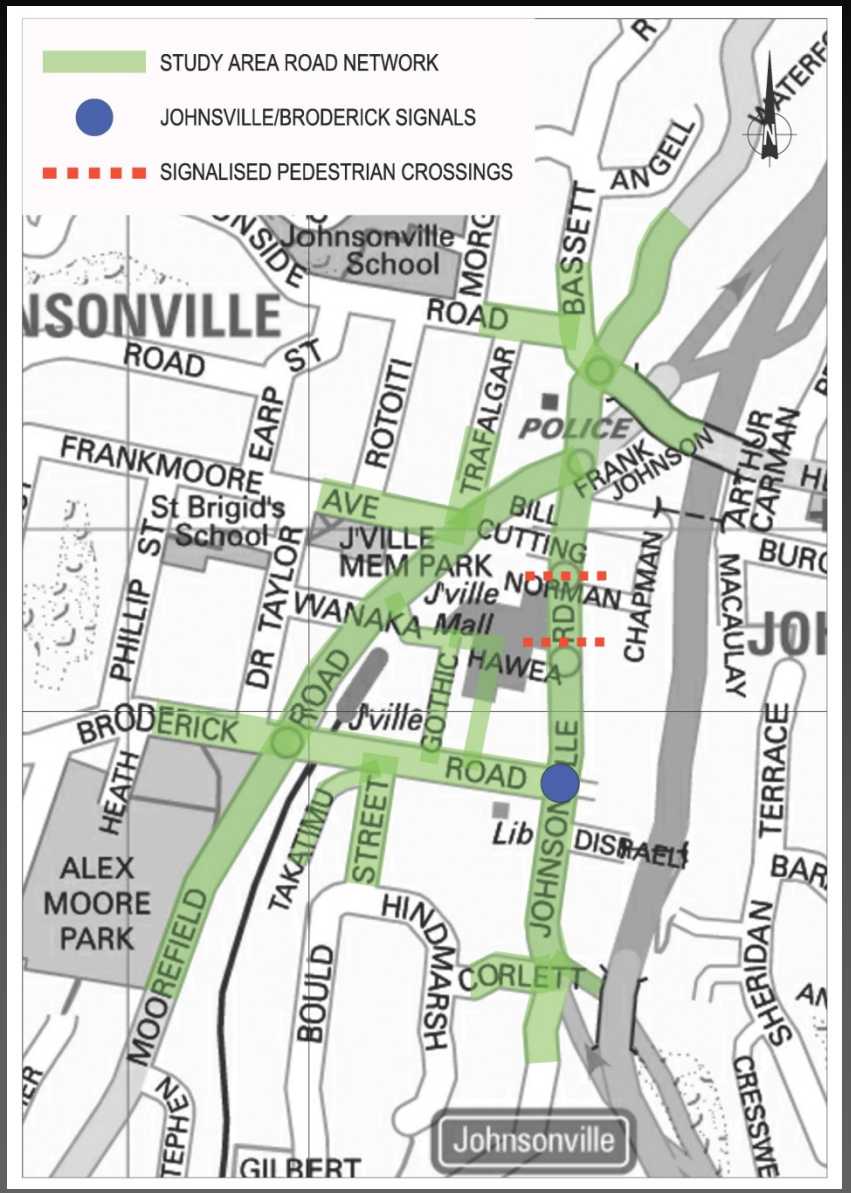
A690 Leazes Bowl Roundabout – Proposed Traffic Signal Layout

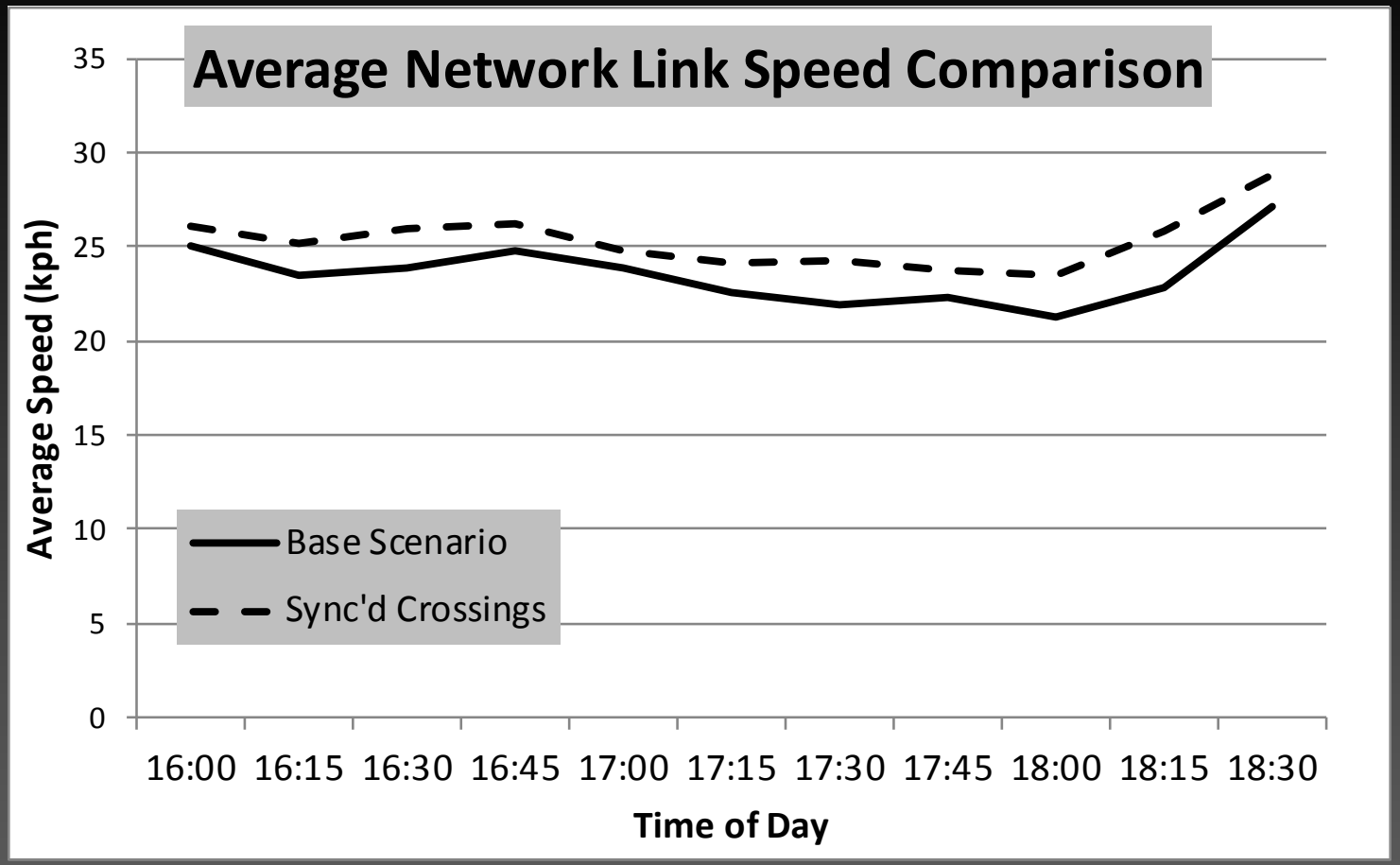


SUBTLE!

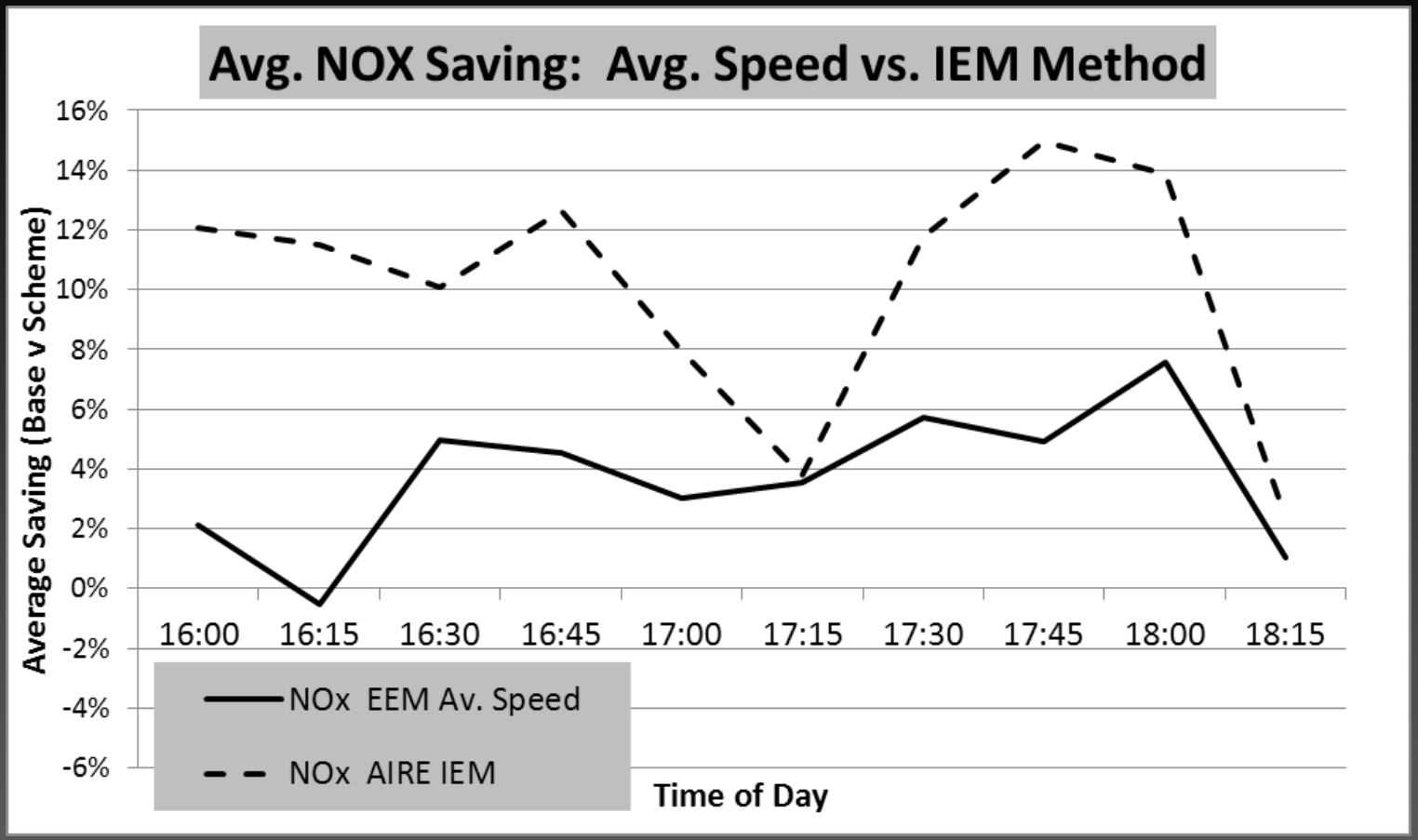


Example

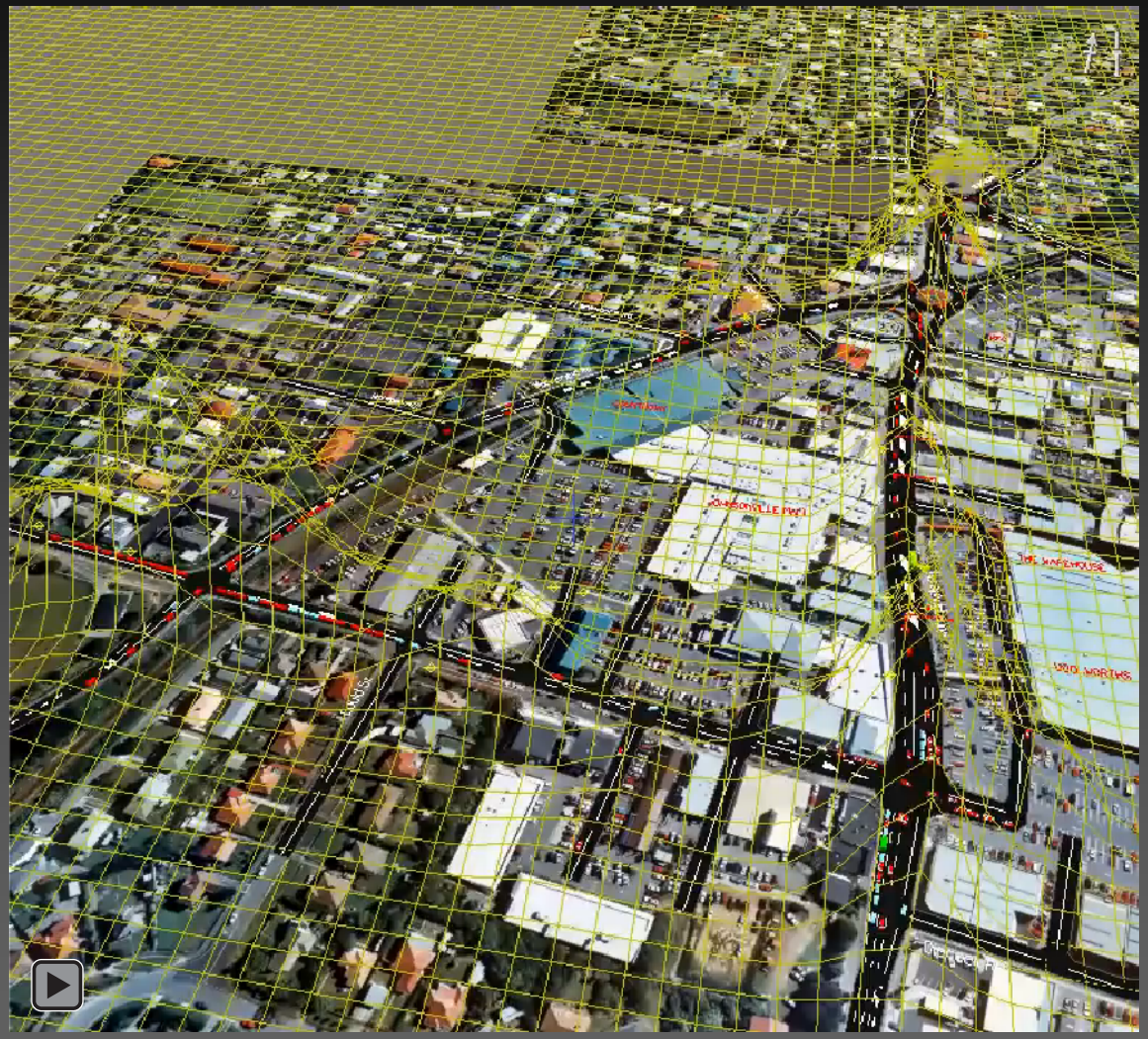

STUDY AREA ROAD NETWORK
JOHNSVILLE/BRODERICK SIGNALS
SIGNALISED PEDESTRIAN CROSSINGS
Johnsonville School
ROAD
BASSETT
ANGELL
POLICE
FRANKMOORE
EARP ST
ROTOITI
TRAFALGAR
FRANK JOHNSON
ARTHUR CARMAN
St Brigid's School
AVE
J'VILLE MEM PARK
BILL CUTTING
NORMAN CHAPMAN
PHILLIP ST
DR TAYLOR
WANAKA
J'ville Mall
HAWEA
MACAULAY
BRODERICK
ROAD
GOTHIC
J'ville
HEATH
ALEX MOORE PARK
TAKATIMU
STREET
Lib
DISRAELI
TERRACE
MOOREFIELD
BOULD
HINDMARSH
CORLETT
SHERIDAN
Johnsonville
GILBERT


Average Network Link Speed Comparison
Average Speed (kph)
35
30
25
20
15
10
5
0
Base Scenario
Sync'd Crossings
16:00
16:15
16:30
16:45
17:00
17:15
17:30
17:45
18:00
18:15
18:30
Time of Day

- 1.0 - 2.0kph, 4 - 10%

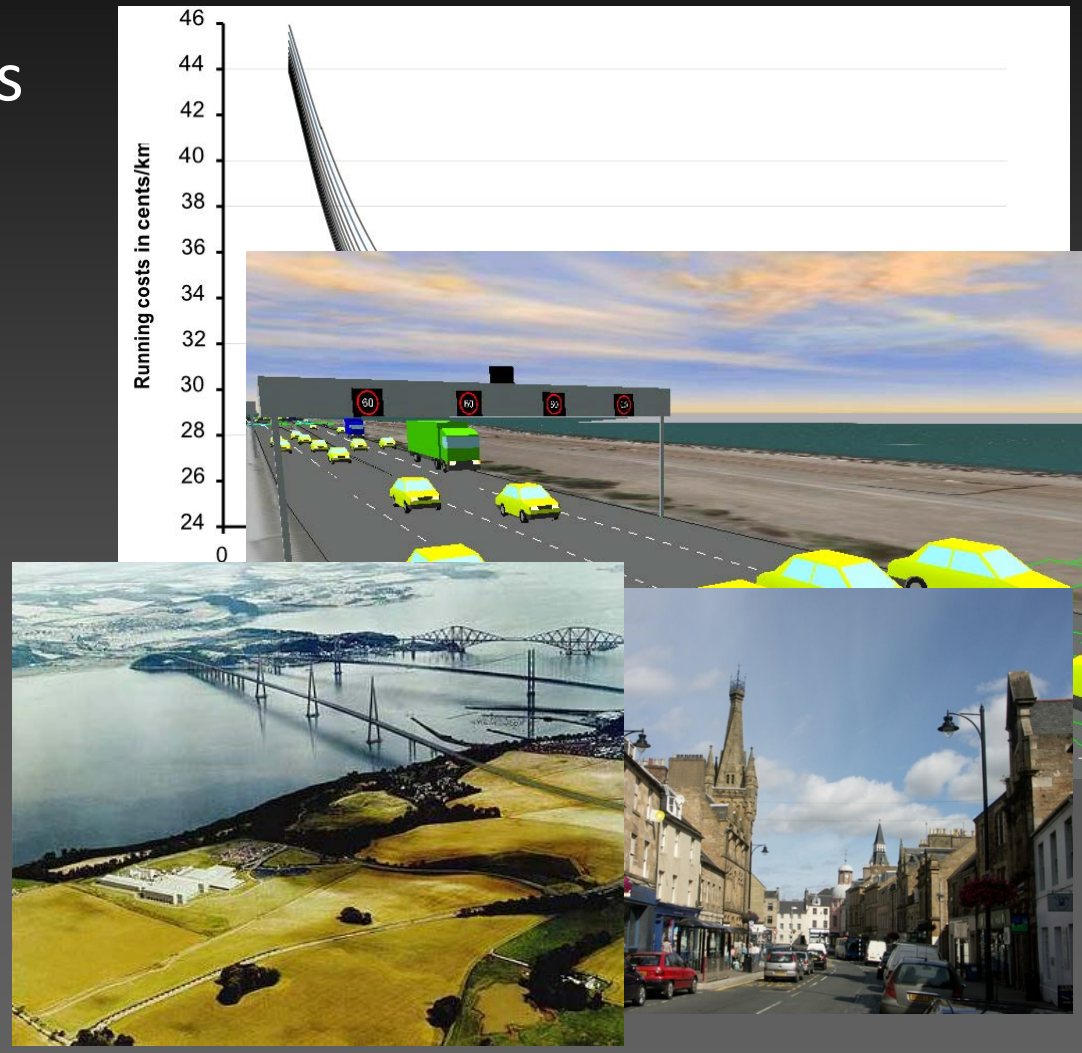


- EEM: 2 - 6%
- AIRE: 8 – 14%



Considerations

- Marginal BCR calculations
- Where on the curve
- Sustainability initiatives
  - Modern schemes
- Specific, local, projects
- High profile

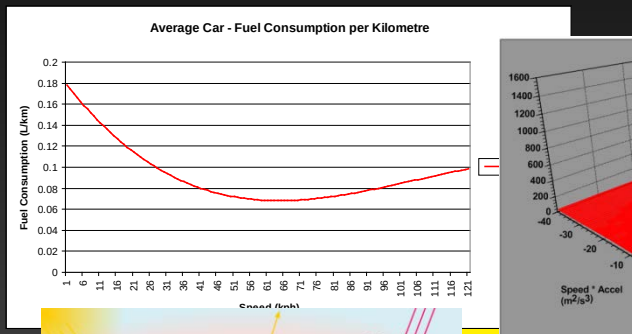


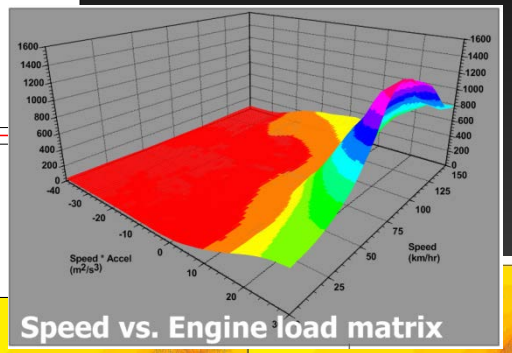
Summary

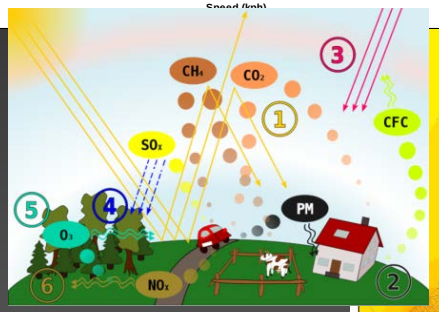
- Average Speed
- IEM

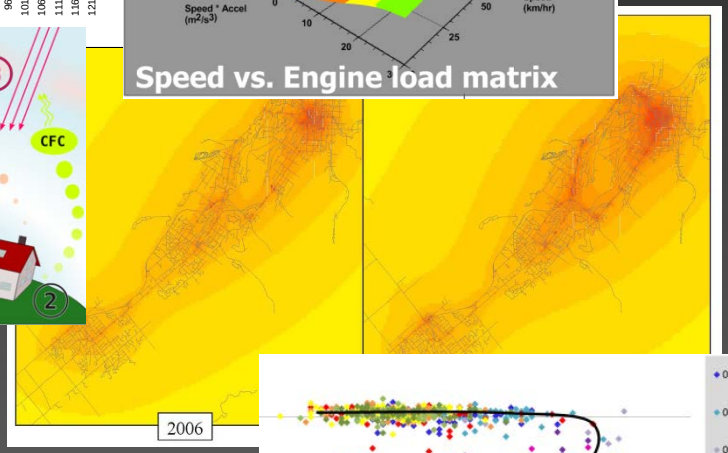
- Global awareness
- Local issues

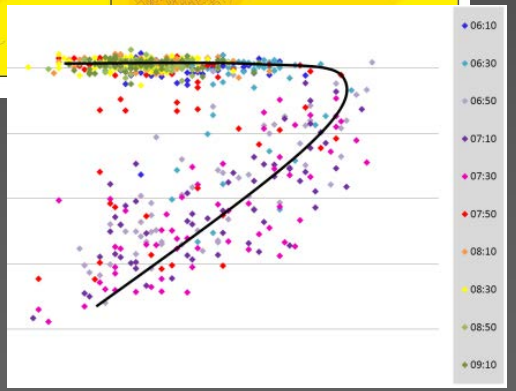
- Nature of the scheme
  - Stop-start
  - Bottleneck
  - Marginal
  - High profile
  - Local











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