Strategies for reducing fuel consumption

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Energy Efficiency and Conservation Authority
Te Tari Tiaki Pūngao

Overview of EECA

Crown entity

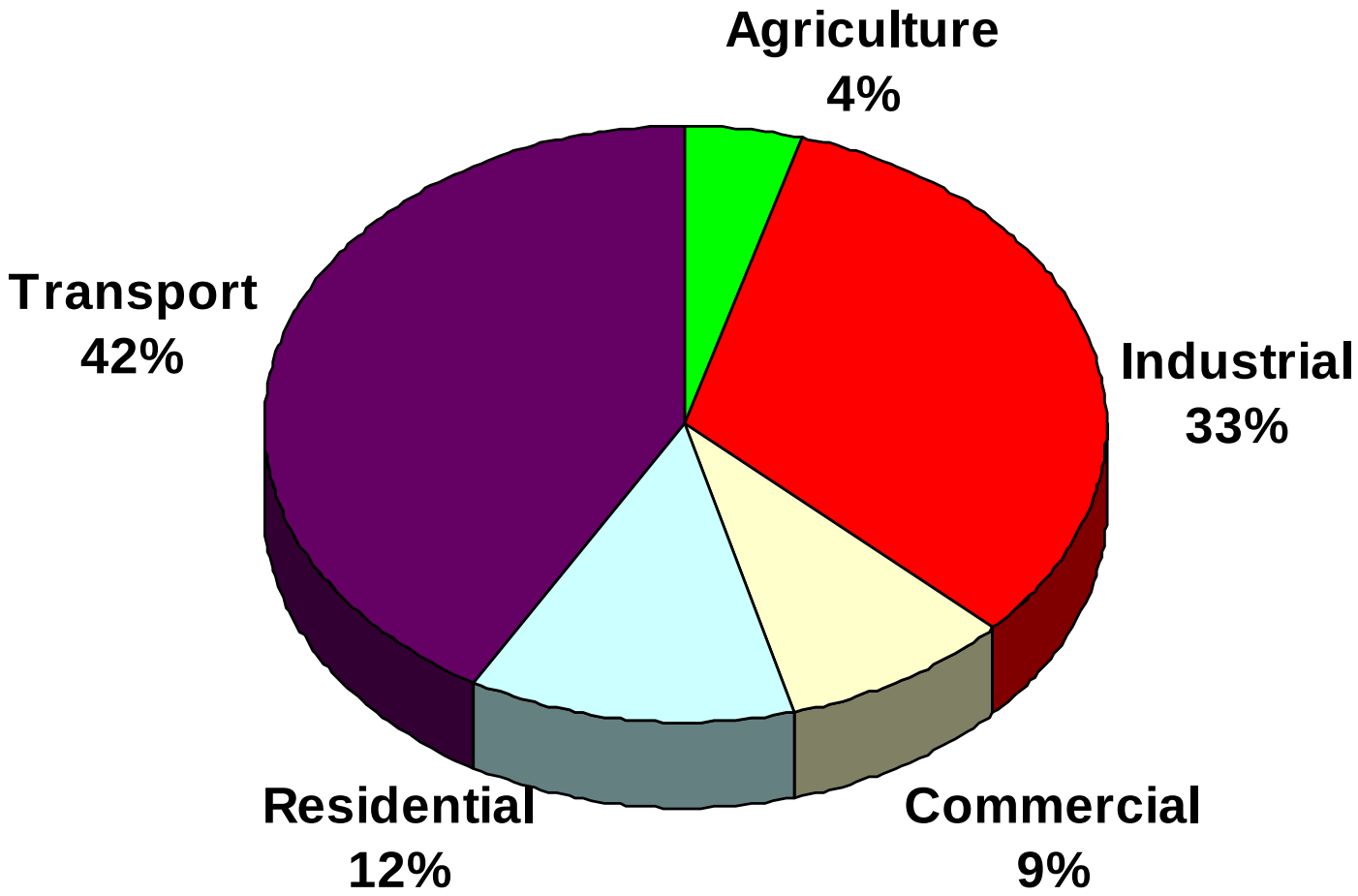
To encourage, promote and support:

- energy efficiency
- energy conservation
- use of renewable sources of energy

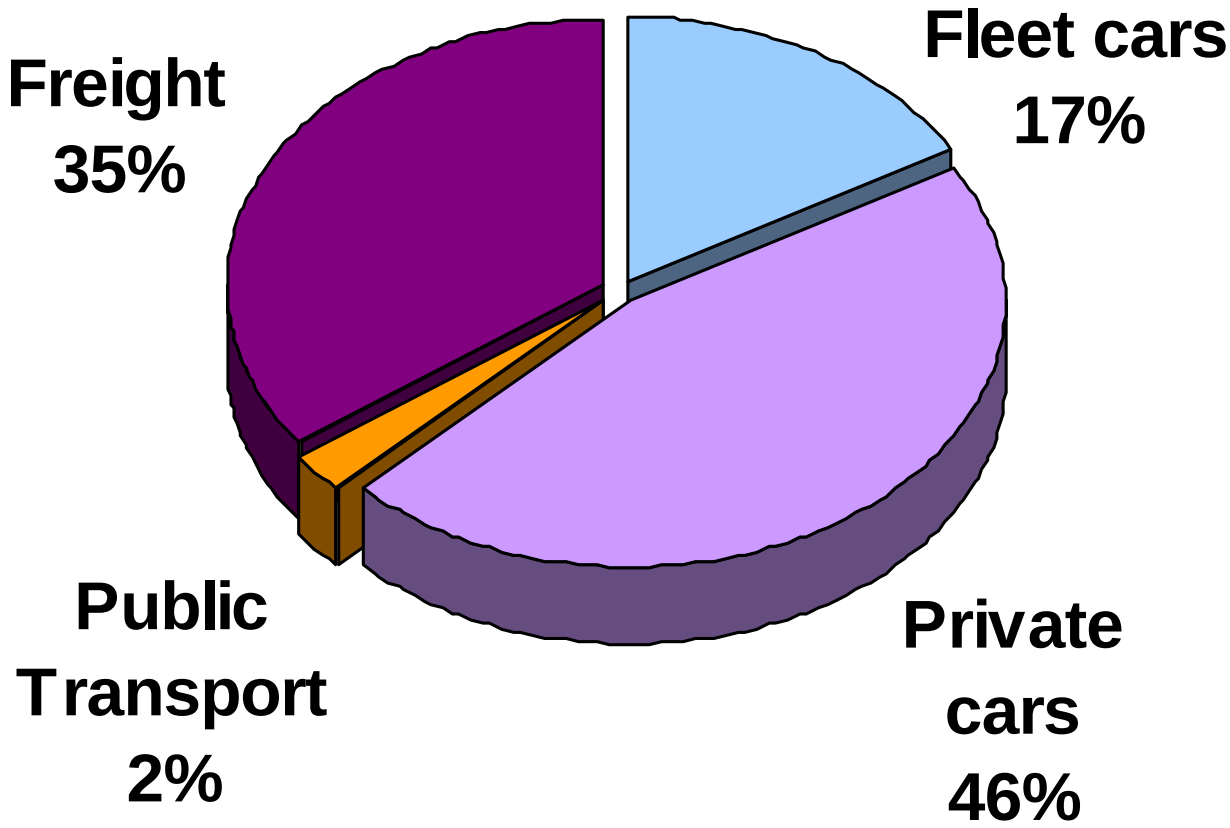
Implementation of the National Energy Efficiency Strategy (NEECS)

- 20% improvement in energy efficiency
- 30PJ of renewable energy

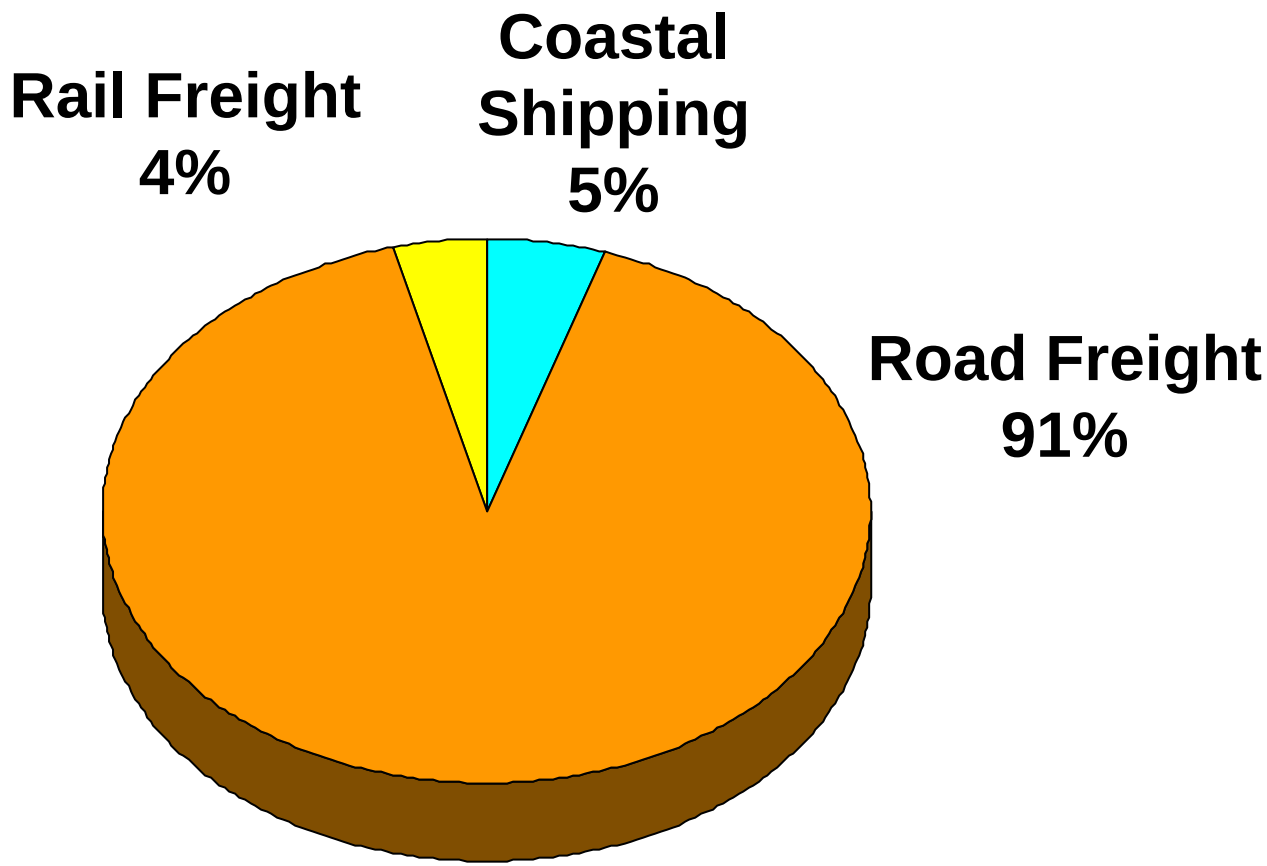
New Zealand's energy use



Transport energy use



Freight transport energy use



Why is government concerned about energy efficiency

Inefficient energy use is bad for the economy

Kyoto protocol target

Vehicle emissions of concern to public health and the environment

Project Outline

EECA commissioned the Heavy Vehicle Fuel Efficiency project to:

- Provide up-to-date information on the heavy vehicle fleet
- Review potential energy saving technologies and practices
- Review energy saving initiatives used overseas
- Develop a set of initiatives that Government could introduce

Emphasis on encouraging voluntary adoption of energy saving initiatives

Heavy Vehicle Fuel Efficiency Project

Peter Baas

Managing Director

Transport Engineering Research New Zealand Ltd

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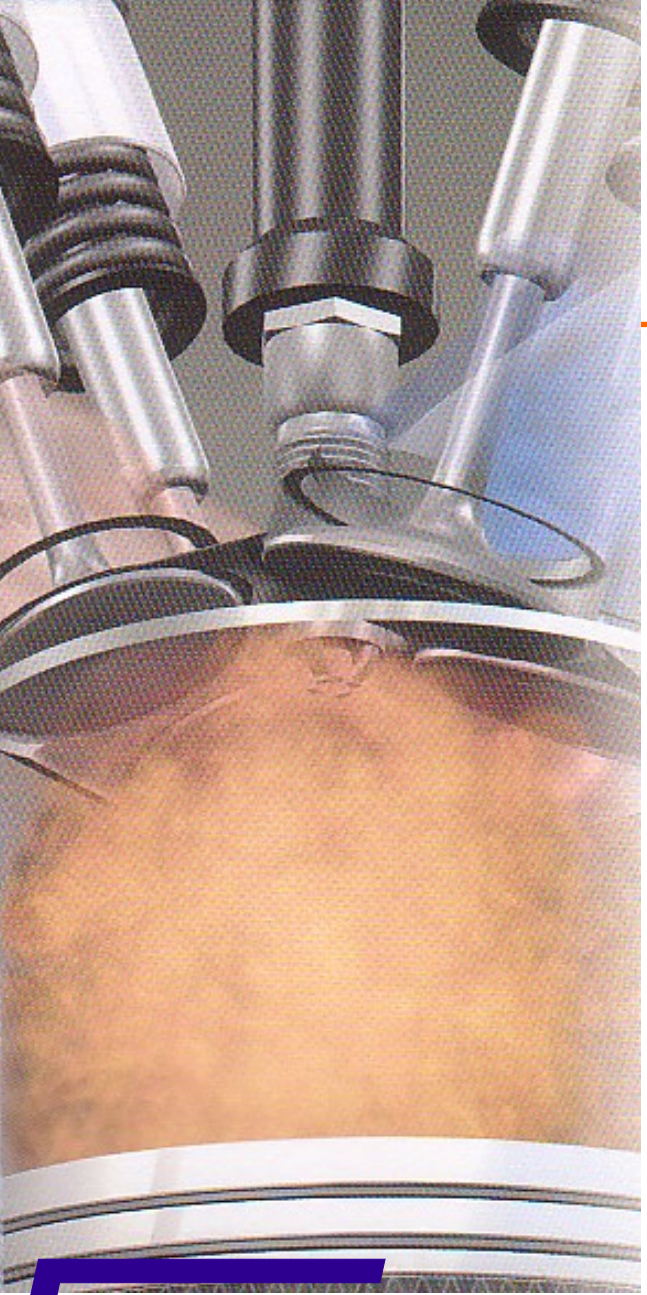

Main Points

A 10% saving in fuel could typically increase profitability by 15% to 35%

Very few operators monitor fuel consumption

If you can't measure it, you can't manage it

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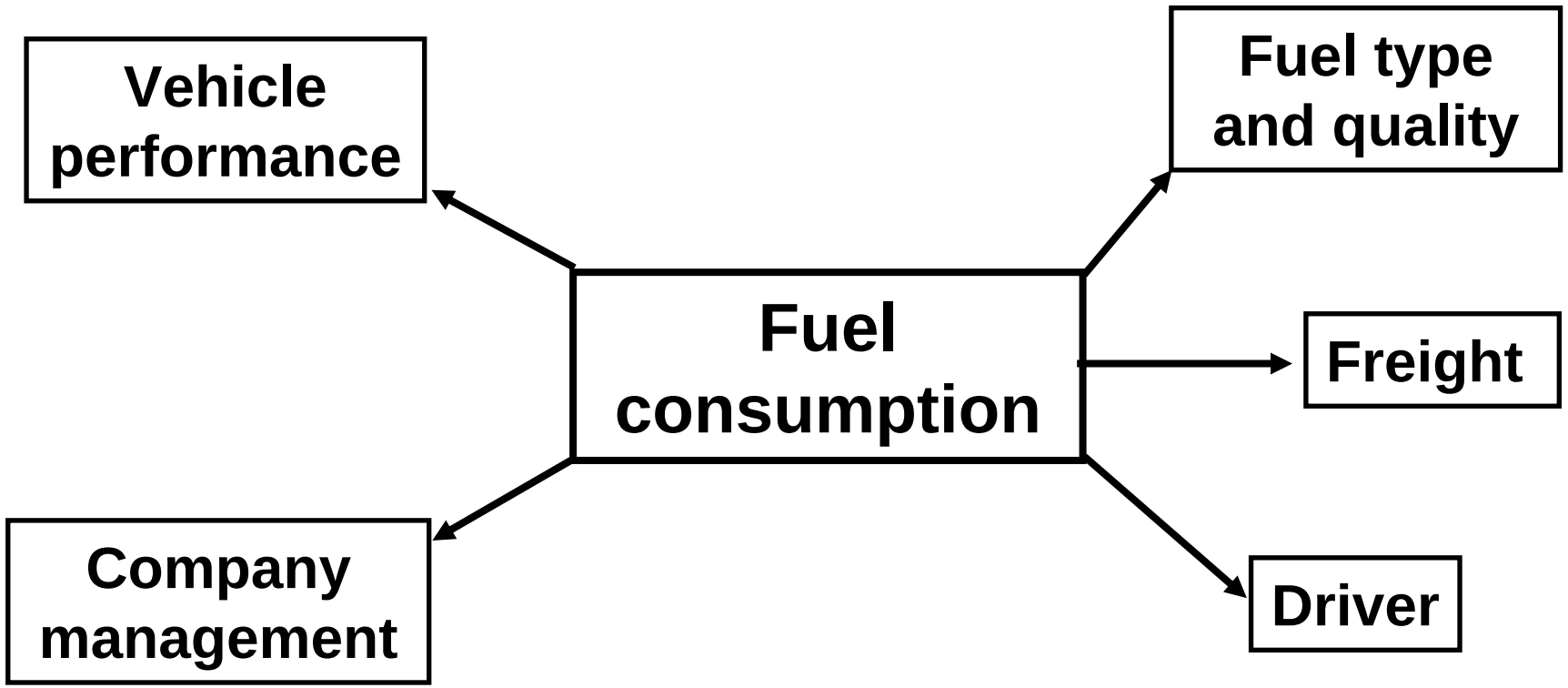
Factors affecting fuel consumption



Driver

Difference in fuel consumption between good and poor drivers:

- Up to 35% difference **(US Technology & Maintenance Council)**
- Up to 12 litres per 100km **(Canadian study)**

Differences due to:

- Speed
- Gear ratios (engine rpm)
- Gear change points
- Engine idling

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Speed

A reduction of 8 km/h in average speed can result in a 10% - 15% fuel saving

Reduction in speed also improves safety

Cruise control provides savings of up to 6% if used properly. Lower peak speeds but little difference in trip time

Adaptive cruise control expected to be on 14% of trucks in US in 2004

Air-conditioning

Air-conditioning increases fuel consumption by 3% to 4%

Open windows also increase fuel use

Best to use in-cab ventilation system if possible

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Vehicle

Total Energy Used per Hour

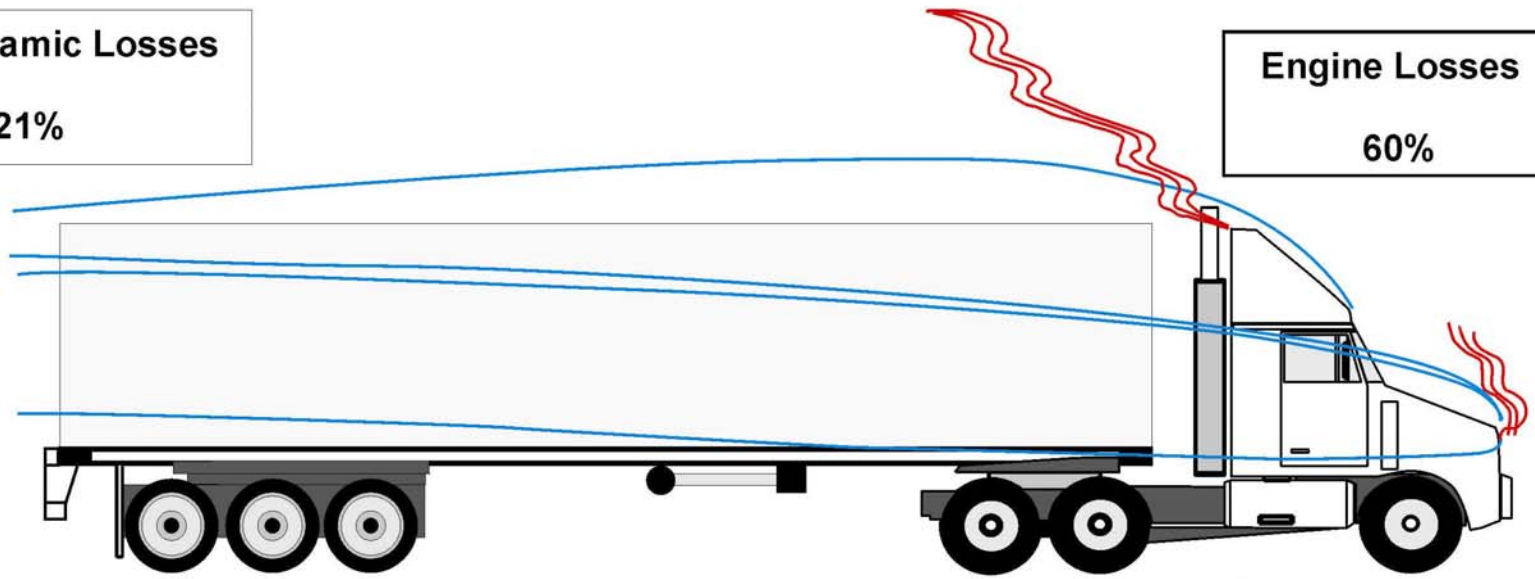
105 km/h, fully loaded, level road for one hour
Base = 400 kWh Mass 36.3 tonne

Aerodynamic Losses

21%

Engine Losses

60%



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Rolling Resistance

13%

Drivetrain

2%

Auxiliary Loads

4%

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Aerodynamic losses

Item	Potential Savings
Cab roof deflectors (Williams, Simmons et al. 1981)	6 – 16%
An air dam front bumper	2 - 3%
Minimising inter-vehicle gaps (OEE Canada 1998)	2 - 5%
Smooth-side trailer	2 - 4%
Side skirts on trailers (OEE Canada 1998)	3%
Bonneted versus cab over primemovers[1]	2 cents/km

1. The HV weights and dimensions rule has meant that cab over primemovers are used in a majority of combinations

Engines and Transmissions

Matching engine size to the required task will give the best fuel economy

Semi and fully automatic transmissions now offer as good or better fuel efficiency than standard manual transmissions

Electrification of air compressor, air conditioning and hydraulic pumps can reduce fuel consumption by 18% (US CCTP 2003)

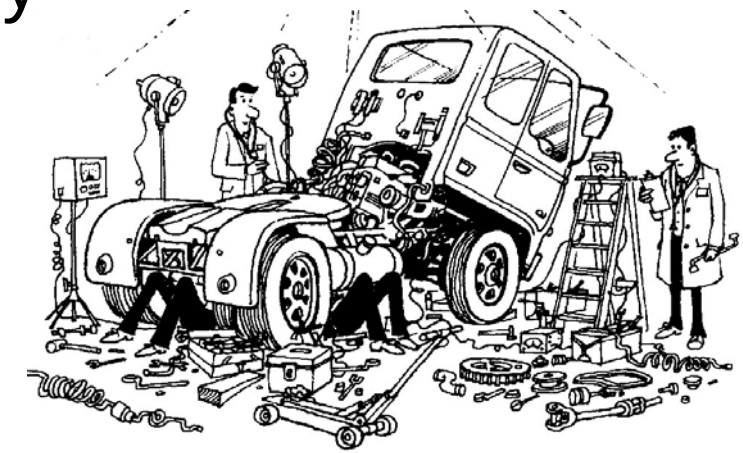
Maintenance

Poorly tuned engine can use 50% more fuel than a well tuned one

Clogged air filter can cause a 10% increase in fuel consumption

Fuel efficient driving significantly reduces maintenance

Maintenance intervals based on fuel consumption rather than distance travelled



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Tyres

80% of tyre problems due to under-inflation

Correct tyre inflation reduces tyre wear by 15%

Flats and blowouts significantly reduced

20psi under-inflation causes 10% increase in rolling resistance and a 2% deterioration in fuel consumption

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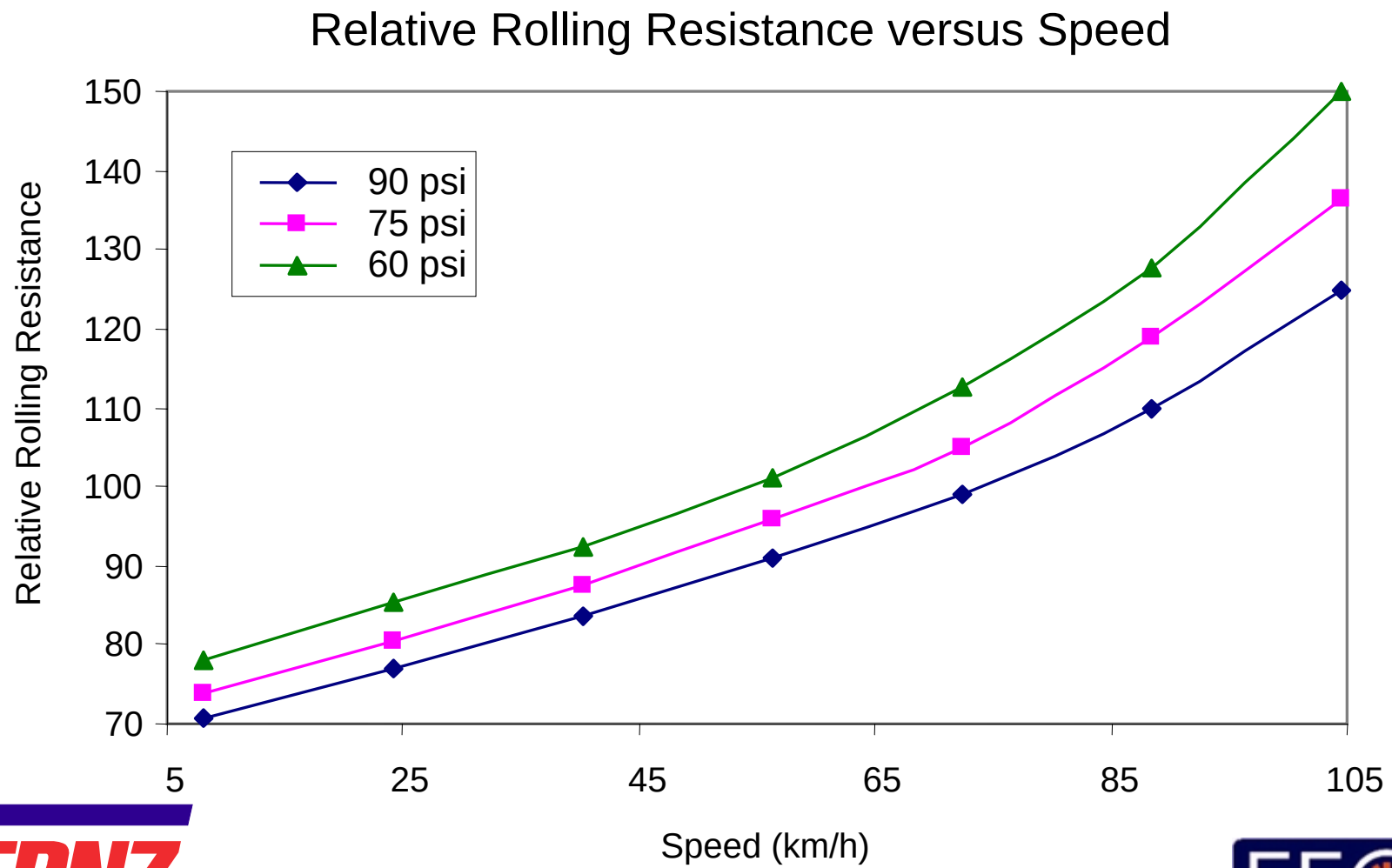
Effect of tyre pressure and speed



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Industry consultation

Very few (< 1%) monitor fuel consumption on a per driver or per vehicle basis

Difficult to monitor with fuel cards

- multiple vehicles refuelled at once
- driver takes card with him
- refrigeration units etc filled when refuelling the truck
- unaccounted fuel (UK estimates of 10%)

Consultation

Fuel efficiency seldom plays a part in purchase decisions

Difficult to influence truck purchase decisions

More important to set-up a vehicle to be low RUC than low fuel consumption, RUC typically cost 1.5 times fuel cost

Consultation

Barrier to specifying Euro 3 engines is the poor quality of NZ diesel fuel

Without mass and dimension changes will only get 8% to 10% fuel savings

Speed limiters should be set to 90 km/h

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Consultation

Current driver training does not focus on fuel-efficient driving practices

Fuel challenge in NZ Trucking worked well

NRC free-cargo, a web-based load sharing and cost model programme for small operators

Main vehicle operating costs

Finance costs
Vehicle depreciation

Fixed once vehicle selected

RUC
Repairs & maintenance
Fuel
Labour
Insurance & crash repairs

Variable costs

10% saving in fuel can increase profits by up to 15% to 35%

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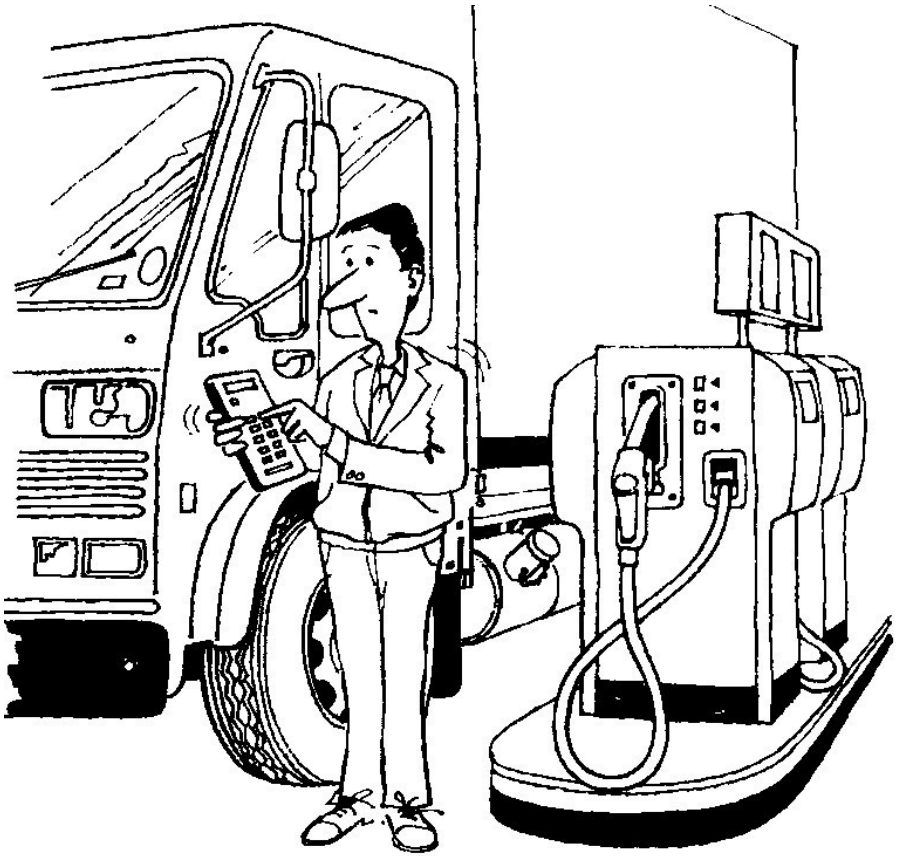
Effect on profit

The above estimates are from overseas studies

How can you know you can't achieve similar results if you don't monitor fuel consumption?



Fuel saving is a good starting point towards

“best practice”

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WIN-WIN-WIN

Reduced fuel bills

Reduced maintenance costs

Reduced tyre wear

Reduced insurance premiums

Improved safety

And is good for the economy and the environment

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Improving energy choices

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