About the Heavy Vehicle Fuel Efficiency programme

The heavy vehicle fleet makes up 4% of New Zealand's total greenhouse gas emissions. The owners and operators of heavy vehicle fleets are not making fuel efficient decisions due to a lack of information, split incentives and affordability issues.

The Heavy Vehicle Fuel Efficiency Programme aimed to address these barriers by training and registering fuel management advisors (FMAs) to work one-on-one with larger operators and conduct workshops with multiple smaller operators. EECA fully funded or co-funded benchmarking, planning and implementation activities that FMAs implemented with fleet operators. The funded activities included:

- the time for a FMA to benchmark, monitor fuel use and develop an action plan to improve efficiency
- Safe and Efficient Driver Training (SAFED)
- tyre audits
- posters
- the establishment of fuel data management systems.

Conclusions

- There is a role for government to intervene in the heavy transport market to help realise the significant public benefits of reduced carbon emissions and improved air quality. There is also strong alignment with the proposed New Zealand Energy Efficiency and Conservation Strategy (NZEECS) priorities.
- The programme's engagement model was more successful with large fleets (largely due to the impact of driver training supported by management intervention and incentives), but performed poorly, and was not cost effective, with small fleets. Overall, the programme did not meet its targets or deliver its intended outputs.
- Decreasing fuel prices created a headwind for the programme and anecdotal evidence suggests this may have affected the motivation of new fleets to enter the programme. There is also anecdotal evidence that the highly competitive, low margin nature of the industry created incentives for operators to deny any fuel savings they may have achieved. EECA could have been more responsive to this and other changes, identifying these external factors up front in programme design and monitoring these as part of a monitoring and evaluation process.
- A significant limitation was inadequate monitoring systems. To demonstrate value-for-money and programme performance, the programme relied on data collection and analysis that wasn't able to be achieved. The effect of this was twofold:
    - The absence of motivating information for programme participants (fleet operators who can't observe savings are unlikely to pursue them).
    - An inability to monitor and track programme success by EECA.

Recommendations

- Review and investigate the freight system across the entire supply chain, with the Ministry of Transport and the NZ Transport Agency (NZTA), and under the proposed NZEECS.

- Initiate a cross-government analysis of the problem, the types and size of public benefits (i.e. carbon emissions, air quality, and safety), the timeframes of emerging technologies, and other environmental factors.
- Evaluate a range of intervention levers and potential programme design features (e.g. segmentation of target market).
- Based on this process, identify the most appropriate lead agency.
- If EECA is involved in any new iteration of the programme, it should ensure that it follows its Operating Model, including the development of a workable plan for the collection and monitoring of data (with relevant agencies). EECA should also ensure that data requirements are understood and agreed by EECA and programme participants before they engage in the programme.
- EECA could also consider any future heavy vehicle work alongside the Top 200/Next 1000 Programme.

Contents

1 The problem

1.1 Problem description

The owners and operators of heavy vehicle[1] fleets are not making fuel efficient decisions[2] although these decisions might be rational or efficient in other ways.[3] The heavy vehicle industry is not moving to a more fuel efficient position by itself because of:

- a lack of information, understanding and business acumen to increase fuel efficiency. A report in 2012 found that few operators measure what is happening in their fleets in a systematic way and many managers started in the industry as drivers and have received little formal training in financial management. They also lack awareness of the savings potential[4]
- a culture of inertia in the heavy vehicle industry leading to owners not prioritising energy efficiency
- busy schedules and slim profit margins mean that small fleet operators lack the time and resources to prioritise fuel efficiency and make changes. Managers are too busy dealing with day-to-day issues[4]
- split incentives created because the benefits of improved driver behaviour accrue to the business owner rather than the driver
- real and perceived affordability constraints and risk.

1.2 Why is it a problem?

The heavy vehicle fleet consumed 46 PJ of fuel in 2014.[5] This corresponds to 3,257 ktCO_2e which is 10% of New Zealand's energy related emissions and 4% of New Zealand's total greenhouse gas emissions. EECA's potentials analysis projects this will grow to 69 PJ by 2035.

Inefficient fuel use decisions by heavy vehicle fleets are part of a wider problem of emissions resulting from the goods delivery supply chain. The transport sector (freight or passenger) is 99% reliant on fossil fuels. Increasing population growth and consumer expectations for rapid delivery of goods is driving up fuel demand, increasing the environmental cost further. New Zealand's freight task (tonnage) is projected to increase by 58 per cent between 2014 and 2042.[6]

1.3 The programme

1.3.1 Origins

A report in 2005[7] recommended that EECA and NZTA consider introducing an operator-focused programme that included supporting fuel efficient driving practices, increasing skills and awareness on monitoring and managing fuel use, and encouraging improvements in freight logistics as a means of reducing freight travel demand. The Heavy Vehicle Fuel Efficiency Programme was launched in 2012 with the objective of improving the fuel efficiency of New Zealand's larger heavy vehicle fleets,

[1] Heavy vehicle means a motor vehicle (other than a motorcar that is not used, kept, or available for the carriage of passengers for hire or reward) having a gross laden weight exceeding 3,500kg.
[2] E.g. driver training (lowering speeds, smoother braking and cornering), vehicle choice, tyre inflation, engine tuning, aerodynamics, route optimisation.
[3] E.g. moving a load with a truck that is bigger than that what could do the job more efficiently (a bigger vehicle looks better), or exceeding the speed limit to meet customer delivery requirements.
[4] 'Fleet management commitment to fuel efficiency' (2012)
[5] Based on analysis done by EECA using MBIE's Energy in New Zealand data
[6] National Freight Demands Study
[7] Cited in 'Fleet management commitment to fuel efficiency' (2012).

including buses and road freight.[8] It was based on the United Kingdom's Department for Transport Freight Best Practice programme. The Heavy Vehicle Fuel Efficiency Programme focused specifically on the heavy vehicle fleet in New Zealand and did not attempt to solve the wider supply chain problems.

In 2013 the Minister of Energy and Resources commissioned EECA to investigate new opportunities for energy efficiency and carbon savings outside EECA's mainstream programmes. The programme was expanded to smaller fleets as one of four small scale innovative programmes designed to meet this request.

The other three pilot programmes were the Fuel Efficient Tyres programme (2014 – 2016), the Lower Carbon Meat and Dairy programme (2014 – 2016), and Wood Energy South initiative (2014 – 2017). Each pilot programme was funded from a small amount of retained earnings rather than baseline.

1.3.2 Purpose

The purpose of the programme was to address information, capability and cost barriers in order to improve the fuel efficiency of New Zealand's heavy vehicle fleet and reduce greenhouse gas emissions.

1.3.3 Key components

Since it began in 2012, the programme has cost $3.5 million and reduced heavy vehicle fuel emissions in the order of 0.3%.

EECA trained and registered fuel management advisors (FMAs) to work one-on-one with larger operators and conduct workshops with multiple smaller operators.

EECA fully funded or co-funded benchmarking, planning and implementation activities that FMAs implemented with fleet operators. The funded activities included:

- the time for the FMA to conduct a fuel management review (benchmarking fuel use and practices), monitor fuel use and identify fuel efficiency potential
- the time for a FMA to develop an action plan as a result of the fuel review
- Safe and Efficient Driver Training (SAFED) to teach skills in fuel efficient driving (50% EECA-funded)
- tyre audits – expected to result in a tyre management plan which was in turn expected to result in tyres being maintained at the correct tyre pressure where previously they were under-inflated (50% EECA-funded)
- posters for workplaces to encourage drivers to carry out fuel efficient behaviour (100% EECA-funded)
- fuel data management to establish systems for fleet operators to track their own fuel use (50% EECA-funded).

Other initiatives explored with the operator but not funded by EECA included:

- routing and scheduling

[8] Original heavy vehicle business case

- aerodynamics
- vehicle selection
- maintenance

However, the results of these initiatives were not tracked and therefore are not included in the assessment of benefits achieved.

1.3.4 Targeting

The programme predominantly focuses on all road freight as there is larger potential for savings. It also included bus companies too.

1.4 Market characteristics

1.4.1 Transport energy use

Transport in New Zealand uses 200 PJ per annum, or 36% of New Zealand's consumer energy. However the costs of transport energy make up 47% of consumer energy costs. Therefore any improvements in the performance of the fleet can also make a difference in the profitability of business or disposable income for households.

1.4.2 Heavy vehicles

The national fleet of heavy vehicles is made up of both large fleets of vehicles and smaller owner-operated businesses. In September 2014 there were approximately 95,000 heavy vehicles in New Zealand, using 21% of national transport energy. Of these, 20,000 vehicles use more than 50,000 litres of diesel per annum. NZTA data from September 2014 indicates that 95% of the holders of goods service licences operate five or fewer vehicles.[9] Rough calculations show that more than 55% of the heavy vehicles in the industry operate as part of a small fleet, i.e. five or fewer vehicles.

The biggest 48 fleets collectively operate over 10,000 vehicles spread across the following sectors:

- Road construction and maintenance
- Dairy
- General freight
- Logging
- Ready mix
- Bus and coach
- Refrigerated freight
- Utilities
- Waste
- Bulk liquid, (e.g. milk and fuel).

Also of note are New Zealand's driving conditions. The windy, mostly two-lane driving conditions in New Zealand mean that heavy vehicles are going to be less fuel efficient in New Zealand at a baseline when comparing with overseas.

[9] X:\Research Monitoring & Technical Info (RT)\01 Monitoring\03 Ex Post\28 Heavy Vehicles\2015-16\Sources for report\Target market size.msg

1.4.3 Road freight

The bulk of the freight moved within New Zealand is moved by road.[10] A wide range of freight is moved by road, including moving stock between farms, home delivery of groceries and the movement of import and export goods. Goods moved by rail also generally include an on-road component, often called the "first and last mile".

The industry is demand driven; very little freight moved by the industry is generated by the industry. Demand for freight services comes from suppliers of goods wanting their goods delivered and customers wanting their goods or wanting goods picked up for delivery. Buyer-2-buyer (B2B) and buyer-2-customer (B2C) arrangements increase this demand. Some users of the industry use the transporting of goods as a mobile warehouse. This is especially so in situations where just-in-time manufacturing or production techniques are used. Many stores that sell directly to customers hold minimal stock on their retail premises. Instead the stock is held at a single location and is despatched to meet their customer's requirements, often overnight.

Operators

Freight operators can either employ drivers or use contract drivers, referred to as owner-operators. An owner-operator (often called an owner-driver) is an operator who owns the transport business and drives a truck in the business. They may operate more than one truck and are essentially small business owners. Owner-operators may work for other fleet operators.

Entry to the industry is relativity simple and cheap. A person wishing to move goods by road, and who intends to operate a vehicle that has an on-road weight greater than 6,000kg, need only obtain a Goods Service Licence. These licences are administered by the NZTA. There is no limit to the number of licences that are issued. No business or management skills have to be proven. Access to capital to fund a truck and/or its equipment is not required as this can be leased. There is no limit on the number of vehicles that can be operated under a licence.

The ease of entry and access to finance is one reason behind the large number of small fleet owner-operators within the industry. Information supplied by NZTA in September 2014 showed that approximately 52,000 fleets out of 55,000 operated five or fewer heavy vehicles.

Cost model information from National Road Carriers (a road transport association) suggests that, in general, the margins in truck operations are small, with net average profits of approximately 2–3% per year and a negligible return on assets. The exception is larger operators, who might achieve up to 7%, if they are involved in integrated logistics operations.

Vehicles

With a few exceptions, all new trucks that enter the New Zealand fleet are sourced from overseas. These generally enter the country as a cab and chassis and have freight bodies and other equipment fitted locally. Traditionally trailers were built in New Zealand but because of local demand there are some entering the fleet now that are built overseas; Australia and China are common sources.

[10] In 2012 91% of the freight moved in New Zealand by weight was moved on the road. By distance this was 70%. Ministry of Transport National freight Demand Study March 2014 http://www.transport.govt.nz/assets/Uploads/Research/Documents/National-Freight-Demand-Study-Mar-2014.pdf

As the majority of new trucks are sourced from overseas these comply with the fuel efficiency and environmental standards of the supplying country. Europe, Scandinavia and Asia are the main sources of new trucks entering New Zealand. Some are also sourced from the United States, often via Australia.

Industry Associations

The umbrella industry representative organisation is the Road Transport Forum New Zealand (RTF). The role of the forum is "to responsibly promote and advance the interests of the road transport industry and its member associations".[11]

The RTF has three constituent member organisations all of which play a similar role of representing their members on issues that affect them day-to-day. Their membership includes single and multi-vehicle operators. Each of these organisations has value-added activities that their members can subscribe to such as fuel and communication discounts.

The RTF claims that over 80% of road freight operators in New Zealand voluntarily belong to the RTF's member associations.

Constituent member organisations are:

- National Road Carriers, based in Auckland with membership spread from Northland to Waikato
- Road Transport Association NZ, based in Christchurch (but with five field representatives operating through New Zealand)
- New Zealand Trucking Association, based in Christchurch with predominantly South Island membership.

Service providers

Beside the three industry associations mentioned above there is, and has been for many years, a number of private organisations that advise the industry on best practice in reducing fuel use. These include but are not limited to:

- Eroad (http://www.eroad.co.nz/nz/landing/nzfuel/) - provides technology that allows operators to manage their fuel use by combining fuel records with vehicle distance and location information generated by telematics.
- CCS Logistics (http://www.ccslogistics.co.nz/) - helps target fuel economy improvements by using existing GPS or vehicle telematics data as a basis to deliver a continuous improvement programme for the fleet.
- MasterDrive Services (http://www.masterdrive.co.nz/) - offers driver training to reduce the environmental footprint of heavy vehicle operators.

[11] http://www.rtfnz.co.nz/about

2 Strategic fit

Table 1: *Strategic alignment of the programme*

Objective	Alignment
NZEECS 2011-2016	
"A more energy efficient transport system"	This programme focused on efficient energy use by heavy vehicles in the transport system.
Business Growth Agenda	
"Increase productivity and reduce carbon emissions through new energy efficiency projects"	The programme aimed to reduce carbon emissions associated with inefficient fuel use by heavy vehicles. It also involved helping businesses make better decisions that increased the productivity of the industry.
EECA's Transport Strategy 2015	
Describes the need for engaging directly with decision-makers in heavy vehicle fleets to encourage uptake of fuel efficiency practices	The heavy vehicle programme involved direct engagement with decision-makers.
Government Policy Statement on Land Transport Funding	
States that the Government is seeking an effective, efficient, safe, secure, accessible and resilient transport system that supports the growth of our country's economy, in order to deliver greater prosperity, security and opportunities for all New Zealanders	The heavy vehicle programme aimed to increase fuel efficiency and therefore productivity in the heavy vehicle industry, contributing to growth for New Zealanders.

3 Role for government

3.1 Market failures and barriers

There is a potential role for government where there are market failures and barriers which can lead to public benefits not being produced by private market agents. Generally, programmes aimed at increasing fuel efficiency have the public benefit of reducing greenhouse gas emissions. There is a role for government intervention where the government can help markets work better and be more efficient. The primary failures and barriers preventing the efficient use of fuel in the heavy vehicle industry are:

- a lack of information/understanding
- split incentives
- affordability

3.1.1 Market failures

Lack of information/understanding

Heavy vehicle fleet operators lack an understanding of the potential fuel savings available and strategies to attain them. For operators that understand their fuel use potential and go looking for fuel savings opportunities, there is a lack of accurate and independent information on available options. However, a much larger number of operators do not go looking for fuel savings because of time and capability constraints. Managers are too busy dealing with day-to-day issues to research and introduce new initiatives that require a proactive approach, and they have usually received little formal training in financial management. They also lack the ability to benchmark and monitor their fuel use in a useful way. Very few operators measure fuel used by individual vehicles because it is difficult, especially if drivers are not doing a set run. Fleets generally use GPS tracking systems to solve particular issues and review specific events rather than looking for fuel use trends.[4]

In order to address this, the government can provide information to fleet operators about how to measure and monitor fuel use, the fuel savings options available to them, and the methods to achieve them.

Split incentives

In the heavy vehicles industry, there are split incentives between the heavy vehicle drivers and the fleet operators. These split incentives are created because the monetary benefits of fuel efficiency generally accrue to the fleet operators but the drivers make the decisions about how efficiently each heavy vehicle is driven.[12] There is therefore no immediate incentive for drivers to use fuel efficiently. This creates a role for government to provide the right information to help fleet operators align the incentives of the drivers with their own and overcome this market failure.

In traditional economic theory, this is done through information provision and incentives. In practice, however, information alone is often not enough to change behaviour. The role for government in this case has to be broader than this, potentially including funding or co-funding of advisory services and tools to support fleet operators to invest in fuel efficiency.

3.1.2 Market barriers

Affordability

In the heavy vehicle industry there are historically slim profit margins and therefore potential affordability constraints. Whether these are real or perceived, they result in under-investment in fuel efficiency improvements. The heavy vehicle industry sees the risks associated with spending money on fuel efficiency to outweigh the benefits. This leads to market participants being unable to act efficiently and government has a role in helping overcome this by de-risking the investment. A further analysis of the impact of affordability constraints can be found in Appendix One.

3.2 Other barriers

New Zealand makes use of Road User Charges (RUC) to charge diesel fuel users and heavy vehicle users for using New Zealand roads. As RUC are paid in advance by kilometre driven and by vehicle

[12] This split incentive problem holds true to some extent for small operators who lease their heavy vehicle, but does not for those who own and drive their heavy vehicle.

weight (not litre of fuel used), they do not create an incentive to drive in a fuel efficient manner. Low diesel prices further dampen these incentives.

EECA, ACC, NZTA, WorkSafe New Zealand, Police and industry training organisations all intervene in the transport market. This creates artificial divides of what the Government perceives as benefits and/or costs. No agency is focused on the multiple benefits of better driving (productivity, road safety, and carbon emission reductions; see Table 2).

Anecdotal evidence suggests that fleet operators are reluctant to share best practices or admit to cost savings because they have such low margins and the industry is so intensely competitive. Any claimed savings might put pressure on operators to pass cost savings on to their customers.[13]

3.3 Potential benefits

Table 2: *Types of expected benefits*

Public benefits	Private benefits
• Avoided greenhouse gas emissions (primary EECA focus) • Improved air quality • Increased productivity and competitiveness • Reduced likelihood of vehicle crashes through safer driving practices	• Reduced fuel costs • Driver safety improvement • Reduced maintenance expenses through gentler vehicle use

Avoided greenhouse gas emissions – primary public benefit
Heavy vehicle fuel use releases greenhouse gases, contributing to climate change. This is the primary focus for EECA's engagement in this market.

Improved air quality – public benefit
Heavy vehicle fuel use is associated with poor air quality. Poor air quality can cause respiratory conditions that require hospitalisation; this costs the public health system. This particularly affects the elderly and children.

Increased productivity and competitiveness – public benefit
Fuel efficiency in a heavy vehicle fleet can lead to improvements in business, and increases in market productivity and competitiveness.

Reduced likelihood of vehicle crashes through safer driving practices – public benefit
Driving that increases fuel efficiency is also safer, slower and more controlled. This increases road safety and reduces the likelihood of crashes. This improves public safety on the roads.[14]

[13] Anecdotal evidence presented to Government by an industry expert.

[14] *The Relationship Between Fuel Economy And Safety Outcomes*, Narelle Haworth & Mark Symmons, Monash University Accident Research Centre Report 188 December 2001

Reduced fuel costs – private benefit
International research suggests that appropriate and targeted driver training such as SAFEDNZ can on average deliver a 9% fuel saving immediately after training and a 5% saving in the long-term.[15]

Driver safety improvement– private benefit
When drivers use fuel efficient practices, driver and other road user safety improves.[16]

Reduced maintenance expenses through gentler vehicle use – private benefit
The potential to reduce these costs is conservatively estimated as being 2% of annual repair and maintenance costs.[17] The savings come about because of improvement in driving technique (e.g. reduced harsh acceleration, braking and cornering, and fewer gear changes).

3.4 Potential costs
As Section 1.4 shows, there are existing providers of fuel management advice. There is no evidence that these operators are being crowded out by the programme. None of the providers offer fuel management advice as their primary business function; instead, it is an add-on.

4 Intervention

4.1 Intervention logic
The EECA intervention logic map can be seen in Appendix Two. It was developed during an internal evaluation early in 2016.

There are two distinct ways – or channels – fleet operators engage with the programme:

- Large fleets[18] receive one-on-one assistance from a FMA who provides a review of their fuel use to identify opportunities for efficiency gains (the 'Fuel Advisor Channel').
- Smaller fleets send fleet representatives to a workshop run by a FMA (the 'Workshop Channel').

The structure of these delivery channels is described in Appendix Three. While these are the two main ways of engaging with fleet operators, there are two fleets that have had their engagement with the programme customised to their business. They have 'in-house' FMAs who EECA supports financially, either by funding wages on an ongoing basis (in one instance) or one-off FMA training (in the other).

4.2 Options
Options for increasing fuel efficiency were outlined in the programme business case and plan in 2012, the majority of which were included in the programme:

- Driver training

[15] Formal review of UK SAFED training cited in X:\Research Monitoring & Technical Info (RT)\01 Monitoring\03 Ex Post\28 Heavy Vehicles\2015-16 data review\Fleet Fuel Efficiency - A Win Win Opportunity.pdf p3
[16] *Driving To Reduce Fuel Consumption And Improve Road Safety* Haworth, N. and Symmons, M. Monash University Accident Research Centre.
[17] Conservative estimate based on the results from the final pilot of SAFED NZ in March and April 2010. http://safednz.govt.nz/safed-benefits/truck-calculator/
[18] Those fleets using at least 1 million litres of fuel per annum.

- Reducing idle time
- Lower speeds
- Vehicle choice
- Correct tyre pressures
- Engine tuning and remapping
- Covering empty trailers
- Maintenance
- Aerodynamics
- Route optimisation – reducing unnecessary travel.

4.3 Investment objectives

Table 3 outlines the greenhouse gas emissions savings objectives for the programme across time. Originally, they were expressed as litres of fuel savings but they have been converted here to greenhouse gas targets.

Table 3: *Carbon targets for the programme (tCO_2e per annum)*

June Financial Year				
2012/13	2013/14	2014/15	2015/16	2016/17
1,400	7,000	17,100	21,500	7,000

4.4 Potential impact

Research suggests that a SAFED course can average a 9% fuel saving immediately after training and a 5% saving in the long-term.[19] If it is assumed that 80% of the fuel use is by operators that have not already employed these measures and there is a 5% saving available,[20] then there is potential for a 1.8 PJ saving today from SAFED alone. The equivalent greenhouse gas emissions savings is 140,442 tCO_2e or 4.3% of total heavy vehicle emissions.

4.5 Market readiness

The technologies and practices to improve heavy vehicle fuel efficiency are well-proven and commercially available. The use of telematics to track speeding, routing, and idling is reasonably widespread.

The incentives to participate are there as there are reasonable private benefits available, in the form of cost reductions.

4.6 Risks

There are specific barriers to change in the heavy vehicle industry that could decrease uptake of the programme. These are:

- an industry culture resistant to change
- the cost of training

[19] Formal review of UK SAFED training cited in X:\Research Monitoring & Technical Info (RT)\01 Monitoring\03 Ex Post\28 Heavy Vehicles\2015-16 data review\Fleet Fuel Efficiency - A Win Win Opportunity.pdf p3

[20] 5% for sustained driver behaviour change and 1% for low rolling resistance tyres (not all tyres are replaced at once).

- a lack of resources to participate in the programme (e.g. time, co-funding a FMA)
- poor time management
- operators not looking to medium and long term time frames
- pressure from customers increasing Buyer-2- Buyer and Buyer-2-Customer demands.

Table 4 outlines the key risk identified by EECA in the programme business case and plan.

Table 4: *Identified risks to programme success*

Risk	Consequences	Probability	Mitigation
Low industry uptake	Low	High	The proposed approach has been canvassed with the Energy Management Association of New Zealand and industry participants who were shortlisted through the RFP. This includes: National Road Carriers, Z Energy, ERoad, CCS Logistics, FleetSafe and Traffic Design Group. All parties fully support the approach and agree that it has the ability to grow the market.

4.7 Interdependencies

The programme has no interdependencies with other EECA programmes or programmes run by other government agencies.

4.8 Resource allocation

The 2012 programme business case says that the resource requirement through to June 2013 was 1.3 FTEs. The current direct resource is 3.0 FTEs, excluding support from other teams (e.g. the Marketing, Finance, and Strategy & Programme Portfolio teams).

EECA expenditure (including staff costs) is shown below:

Financial Year ending June	2013	2014	2015	2016	Total
EECA Expenditure	$724,231	$686,920	$1,127,076	$965,808	$3,504,036

5 Performance

5.1 Effectiveness

An internal evaluation was conducted by EECA in early 2016. It found that performance of this programme was poor overall and can be described across four dimensions. The evidence shows that:

- programme participation is low
- participating fleet operators are positive about the programme
- individual fleet performance was hard to measure (e.g. fleet operators are not monitoring fuel efficiency, but do monitor total fuel use)
- fewer than expected FMAs have been accredited.

5.1.1 *Programme participation is low*

Programme participation was low (Table 5). An estimated 5% of the total fleets in the market have participated.[21] Participation was greater in larger fleets.

Fuel management reviews were completed for 77 operator fleets as at June 2016. Thirty of these had dropped out of the programme after the initial fuel review so EECA cannot observe what changes were made in their fuel consumption. EECA believes that the large falls in the price of fuel in late 2014 and early 2015 coincided with a drop in the number of new participants in the programme. As fleets were already making savings on fuel costs it is likely that fuel efficiency was further de-prioritised.

Table 5: *Number of fleets participating in programme compared to total fleets*

	Number of vehicles in operator fleet			
	up to 5	6 to 10	11 to 25	26 or more
Number of fleets (September 2014 NZTA fleet data)	52,461	1,252	843	522
Number of fleets in programme	8	12	47	77
% participation in programme	**0.02%**	**0.96%**	**5.58%**	**14.75%**

Participation from small fleets was very poor. Smaller fleet operators showed initial interest for the workshops but many failed to attend workshops when organised. EECA's records show that 49 operators have engaged with the workshop programme since it started. In June 2016, 24 operators were still involved. As described in section 1.4.2, smaller fleets make up over 50% of the total number of heavy vehicles in the market. Therefore, not reaching them as a group has a large impact on the success of the programme.

Low uptake from the industry was categorised to have low consequences for the programme in the business case. The impact of this may have been underestimated.

There is anecdotal evidence that the programme was more successful than what the results could report (and several case studies reporting significant savings were published). This is potentially because fleet operators did not want to disclose to customers or competitors that they were achieving cost reductions and larger margins, which may have led to being pushed down on price.[13]

5.1.2 *Fleet operator response was positive*

A customer satisfaction survey[22] of fleet operators who received a fuel management review was carried out. It showed that fleet operators found the fuel management review easy to understand and useful for identifying opportunities and the costs and benefits of realising them. Most respondents stated they had implemented some of the recommendations and about half believed

[21] Assuming the target fleets are those with more than 5 vehicles (i.e. larger fleets).

[22] HVPA Transport Customer Satisfaction Report 2016 conducted by Ipsos 2016 (n=38)

they could have achieved them without their advisor, but that the advisor provided help and guidance.

5.1.3 *Individual fleet performance was hard to measure*

The potential for long-term fuel impacts can be seen in metrics of changes in heavy vehicle driver behaviour. In-vehicle data collection systems, such as Telematics, show patterns in over-speeding, harsh breaking/accelerating and harsh cornering. Some operators have reported to EECA that there have been improvements in the aforementioned behaviours which provides indicative evidence toward fuel and therefore carbon savings. EECA has not formally collated and analysed this information. However, the lack of usable fuel consumption data meant that EECA was unable to estimate associated carbon reductions. There are four components to this issue:

- There is seldom a clear baseline level of fuel consumption against which to claim savings.
- The fuel use of a large firm is difficult to estimate when the cost at a fleet level, rather than volume at a driver level, is the key measure for management. In many cases operators had poor accounting systems and lacked the resources to fix them, further muddying their understanding of fuel use.
- There are a lot of factors that impact fuel use other than driver behaviour and tyre pressure; this creates an attribution problem.
- In the case of many fleets, they do not track their fuel use at all, making fuel benchmarking impossible, and making it difficult to build capability to manage fuel efficiency.

Fleet operators are not monitoring fuel use

Some of the successes of the programme have been achieved in fleets that have undertaken fuel reviews resulting in driver training and tyre audits. However, equipping operators to benchmark their fuel use relies on the assumption that the operators are collecting and monitoring relevant information for this benchmarking. In fact, fleet operators were not monitoring fuel use and so intended outcome of building capability in the industry to manage their fuel efficiency has not been achieved. Increased uptake in the programme is unlikely to fix this issue.

Few FMAs remain active

There was a smaller than expected number of FMAs to perform the fuel reviews. There were 40 trained and 12 are still active. Some agents were in the market providing fuel management services before the programme began, but many have been developed throughout the programme.

5.2 Achieved benefits

Estimated fuel savings were well below target in 2014 and 2015, but reached the target in 2016 (Table 6).

Table 6: *Estimated fuel savings against original programme target*

Programme target	Estimated savings 2014	Estimated savings 2015	Estimated savings 2016
2.5 million litres of fuel savings per annum	100,000 litres	800,000 litres	2,200,000 litres

5.3 Value-for-money

A cost-benefit analysis (CBA) has been carried out that assumes that fuel savings of 5% have been generated for fleets involved in the programme. The monetary savings from this are private benefits and the carbon savings are public. The level of confidence in the outputs of this analysis is relatively low given the lack of actual measurements of fuel consumption and the estimation of private expenditure. Other public benefits (e.g. local air pollution reduction effects on health costs, road safety) were not monetised or included. Further details on the CBA are available in Appendix Four.

Table 7: *Value-for-money metrics over the life of the programme*

Metric	Value	Comment
Net present value	-$1.96m	This demonstrates a net economic loss from the programme.
Benefit-cost ratio	0.57	The programme returned $0.57 in total monetised benefits to society for every dollar spent by both EECA and private entities
ROI- Government	0.03	Every dollar spent by EECA has generated $0.03 of public benefit
Benefit (public) to benefit (private) ratio	0.04	Every dollar of private benefits generated $0.04 of public benefit

5.4 Programme future

After its internal evaluation, EECA committed to redesigning the programme. While it has not performed to expectations, the heavy vehicle area is still considered an area worth working in. That redesign is being put on hold until completion of this review.

6 Lead organisation

This review raises questions about whether EECA is the appropriate organisation to lead interventions in the heavy vehicles market. Although EECA has a statutory mandate to promote energy efficiency, there are other government agencies intervening in this market to achieve different outcomes (e.g. road safety). EECA could contribute to a more comprehensive intervention in the heavy vehicles industry, and it is recommended that it work with the Ministry of Transport and NZTA to investigate opportunities in the freight system.

EECA has experience delivering energy efficiency programmes in the business sector using intermediary service providers (see the Top 200/Next 1000 Programme review). However, the heavy vehicles programme is the first time it has engaged directly with the heavy vehicle industry. Throughout the programme EECA has collected market insights and established numerous relationships with the industry. These should be leveraged in any future intervention in the market, regardless of who leads.

7 Conclusions

There is a role for government to intervene in the heavy transport market to help realise the significant public benefits of reduced carbon emissions and improved air quality. There is also strong alignment with the proposed NZEECS priorities.

The programme's engagement model was more successful with large fleets (largely due to the impact of driver training supported by management intervention and incentives), but performed poorly, and was not cost effective, with small fleets. Overall, the programme did not meet its targets or deliver its intended outputs.

Decreasing fuel prices created a headwind for the programme and anecdotal evidence suggests this may have affected the motivation of new fleets to enter the programme. There is also anecdotal evidence that the highly competitive, low margin nature of the industry created incentives for operators to deny any fuel savings they may have achieved. EECA could have been more responsive to this and other changes, identifying these external factors up front in programme design and monitoring these as part of a monitoring and evaluation process.

A significant limitation was inadequate monitoring systems. To demonstrate value-for-money and programme performance, the Heavy Vehicle programme relied on data collection and analysis that wasn't able to be achieved. The effect of this was twofold:

- The absence of motivating information for programme participants (fleet operators who can't observe savings are unlikely to pursue them).
- An inability to monitor and track programme success by EECA.

8 Recommendations

It is recommended that EECA:

- review and investigate the freight system across the entire supply chain, with the Ministry of Transport and the NZ Transport Agency, and under the replacement NZEECS
- initiate a cross-government analysis of the problem, the types and size of public benefits (i.e. carbon emissions, air quality, and safety), the timeframes of emerging technologies, and other environmental factors
- evaluate a range of intervention levers and potential programme design features (e.g. segmentation of target market).

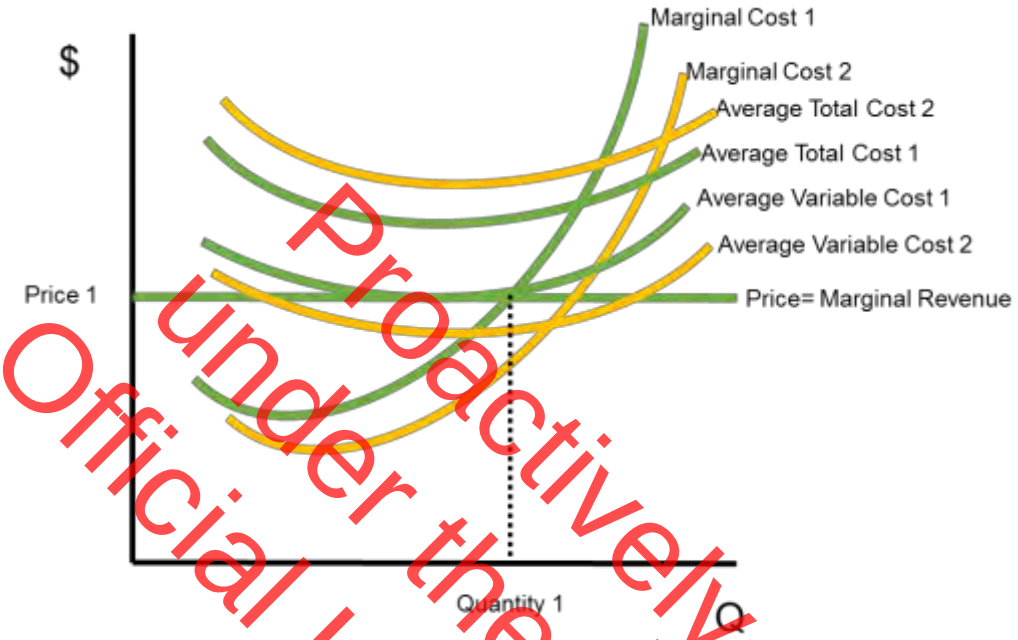
Based on this process, the most appropriate lead government agency can be identified.

If EECA is involved in any new iteration of the programme, it should ensure that it follows its Operating Model, including the development of a workable plan for the collection and monitoring of data (with relevant agencies). EECA should also ensure that data requirements are understood and agreed by EECA and programme participants before they engage in the programme.

EECA could also consider any future heavy vehicle work alongside the Top 200/Next 1000 Programme.

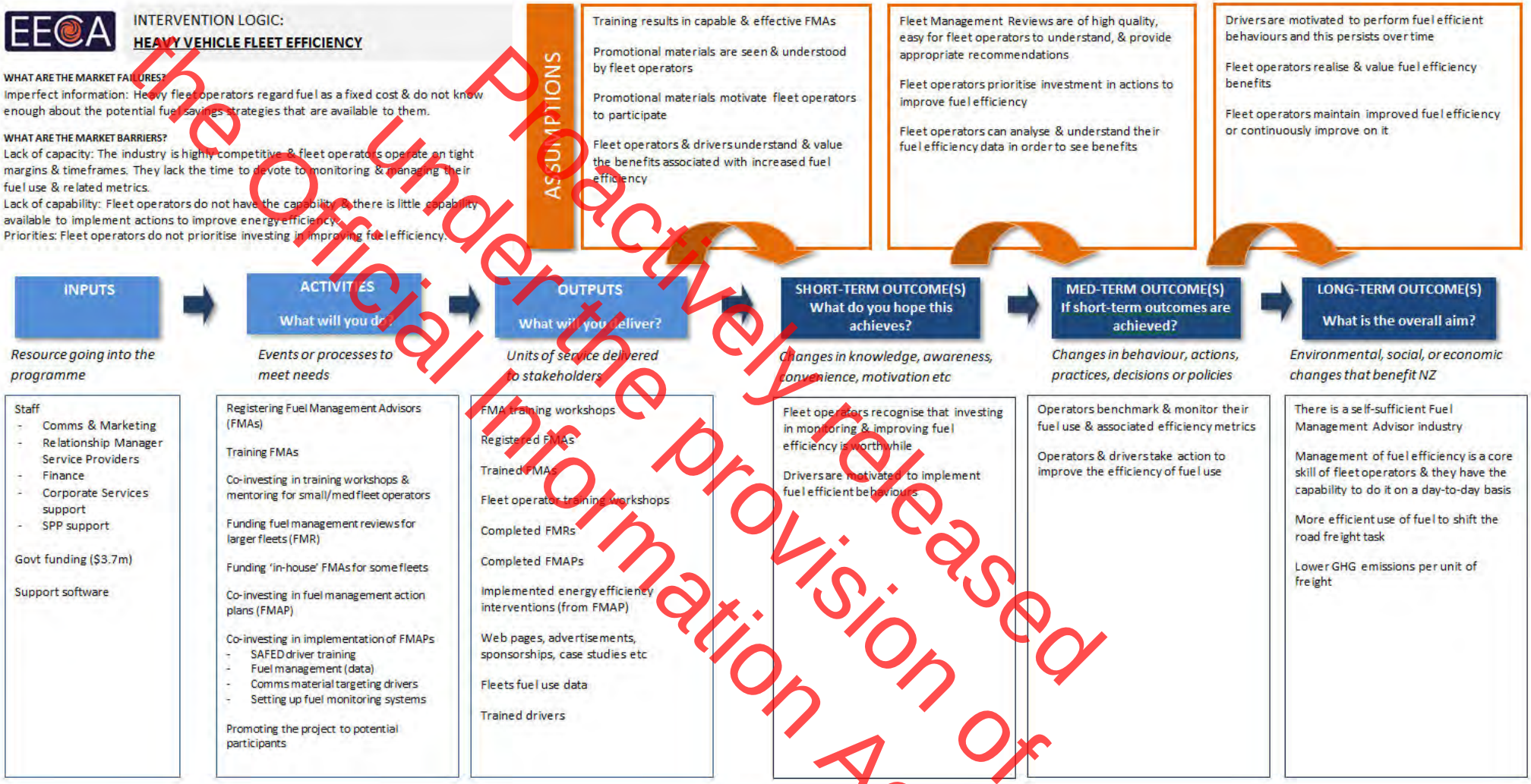
9 Appendices

9.1 Appendix One – A typical perfectly competitive heavy vehicle business



ATC may not be known to the firm but the AVC is. In the short term the price equals the AVC and this point dictates supply. If the heavy vehicle firm undertakes an activity to increase fuel efficiency they can reduce AVC but the ATC may increase through the fixed costs associated with implementing a fuel efficiency programme. Optimism biases, market churn and firm ignorance or optimism could lead to price staying below ATC. If marginal cost fell, then the price could fall also. This would lead to a lower market price, and the heavy vehicle companies do not keep the benefits of fuel efficiency as profits (or to pay for investments in training), but pass them on to consumers in price reductions.

9.2 Appendix Two – Intervention logic



9.3 Appendix Three – Delivery channels

9.4 Appendix Four – Cost-benefit analysis summary

This review cost benefit analysis assesses the quantifiable outcomes of EECA's expenditure from programme inception through to the end of the 2015/16 financial year. General assumptions applied in the analytical framework used in this review:

- EECA costs include all direct internal costs and payments and grants to service providers and client companies. General EECA overheads have not been included.
- All third party capital and operating costs, whether actual or estimated, are included. Estimated/budget costs and benefits are used in the absence of actual measured benefits. Source, granularity and attributed confidence of this data are noted.
- Only expenditure to year end 2015/16 is included, anticipated subsequent payments are omitted.
- Future benefits (e.g. energy savings) accruing from EECA expenditure to year end 2015/16 are included. Benefits from future expenditure omitted.
- Comment is made on the likely additionality of the EECA programmes.
- Cash flows are expressed in NZ$2016 discounted at the default Treasury rate of 7%.

Specific inputs used in the review of the Heavy Vehicle Fuel Efficiency Programme:

- EECA costs contributing to the initial workshop and establishing the driver training and monitoring programmes. These are treated as public costs and are taken from EECA's internal records.
- Third party costs paid by service providers and client companies for the on-going driver training and monitoring programme and contribution to the initial workshop and programme establishment noted above. These are designated private costs and have been estimated as a proportion of EECA's corresponding contribution.
- The principal quantifiable benefit is the reduction in diesel fuel consumption by the client companies. This is a private benefit. The volume of fuel saving has been estimated as 5% of the total quantity of fuel consumed by the companies reporting in any year adjusted by the proportion of drivers who have attended the SAFED programme[23]. Fuel consumption data is provided on a monthly basis by the service providers. No saving has been attributed to companies completing a tyre audit.
- Reduced carbon dioxide emissions can be directly associated with the fuel savings. This is a public benefit.
- Fuel savings are assumed to be realised only in the year of a company's reporting. A sensitivity analysis is included below in which savings persist at a level of 50% after the final year (2015/16) of the programme.
- Economic prices of diesel fuel for each year to date have been derived from MBIE's oil price monitor and maintained at the average 2016 level thereafter. Carbon dioxide prices are set

[23] 5% is estimated to be a conservative sustainable reduction in fuel consumption exhibited by drivers attending the SAFED course. Refer "Fleet Fuel Efficiency: A Win-Win Opportunity", Peter Baas, TERNZ. Whilst monthly monitoring of the client companies' fuel consumption was undertaken, confounding factors such as changes in vehicle fleet compositions and operations made consistent analysis difficult. However, the reporting results were not inconsistent with the 5% estimate.

at the average value of an NZU in each year of the programme and valued at $25 per tonne thereafter

Costs and benefits are summarised in the table below.[24]

Estimated Savings	Savings	*2013*	*2014*	*2015*	*2016*
Participants Litres		0	2,193,355	21,037,335	54,942,866
Saved Litres		0	103,124	781,629	2,174,360
EECA Expenditure		*2013*	*2014*	*2015*	*2016*
Programme development		317,703	17,728	37,807	0
EECA costs		158,924	317,849	476,773	476,773
Communication and Marketing		128,000	99,000	137,000	86,910
SME Workshop costs		0	64,956	171,839	18,102
Fuel management advisor training		0	3,011	13,423	16,696
In-house fuel management advisor		0	0	0	62,333
Fuel managment reviews		72,825	70,061	52,209	56,559
Implementation funding		46,779	114,315	238,025	248,435
		724,231	686,920	1,127,076	965,808
Third Party Costs	Contribution				
In-house fuel management advisor	50%	0	0	0	62,333
Fuel managment reviews	5%	3,833	3,687	2,748	2,977
Implementation funding	50%	46,779	114,315	238,025	248,435
		50,612	118,002	240,773	313,745

Key conclusions to draw under these assumptions:

- The present value of the programme to date is in the order of -$2 million (see table below).

Cash Flow: $2016		*PV 2016 $M*	*2013*	*2014*	*2015*	*2016*	*2017*
EECA Costs	*Public*	*-3.840*	-734,738	-670,306	-1,128,152	-965,308	0
Third Party Costs	*Private*	*-0.766*	-51,346	-115,148	-241,003	-313,745	0
Energy Saved	*Private*	*2.535*	0	116,527	733,914	1,616,202	0
CO2 Reduction	*Public*	*0.113*	0	1,369	21,281	88,714	0
Net Present Value		*-1.959*	-786,084	-667,559	-613,960	425,362	0
Ratios							
All Benefits/All Costs		*0.57*					
Public Benefits/Public Costs		*0.03*					
Public Benefits/Private Benefits		*0.04*					
Private Costs/Public Costs.		*0.20*					

- Benefits fall principally to the private sector through fuel cost savings whereas public benefits from carbon dioxide reduction are relatively insignificant. Conversely, EECA

[24] The total participating litres is the sum of all reported litres for fleets that we know have undertaken SAFED training. The numbers are semi-cumulative as they include ongoing litres from fleets enrolled in previous years that are still reporting.

provides the large majority of programme expenditure. Public net present value is -$3.7 million and private net present value is $1.8 million.

- The public/private distribution of benefits and costs is reflected in the performance ratios: public benefits to public costs are 0.03.
- After being strongly negative in earlier years, the incremental net cash flow in financial year 2016 has improved significantly despite the fall in oil prices. This is due to the increasing volume of fuel consumed by companies participating in the programme and a fall-off in programme development and workshop costs.
- The programme's economic performance would improve if it could be demonstrated that fleet fuel savings persist beyond the reporting period. With a carry-over of 50% from 2015/16 into the next year, the net present value of the programme to date would improve to -$1.1 million and public benefits to public costs to 0.05.

The level of confidence in the outputs of this analysis is relatively low given the following assumptions used:

- No actual measurements of reduction in fuel consumption have been included in the analysis due to the difficulties experienced determining these consistently using the data provided by the service providers. Whilst the 5% average saving is considered conservative, the upside is relatively limited, probably unlikely to exceed 7%. At this level net present value would improve to -$0.9 million and the public benefit to public cost ratio to 0.04.
- Third party costs have been estimated relative to EECA's corresponding costs.

Nevertheless, these reservations should be held in the context of:

- The programme recently has experienced a sharp uptake in levels of participation indicating positive overall cash flows may result from continuation in the programme. However, the heavy bias of private over public benefits means the public benefits to public costs ratio will struggle to approach unity.
- It is probable the additionality of this programme is relatively high given the small financial margins most road freight operators work under.