

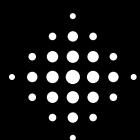


Australian Government

Department of Resources, Energy and Tourism

FIRST OPPORTUNITIES IN DEPTH: THE TRANSPORT INDUSTRY A LOOK AT RESULTS FROM 2006–2008

FOR THE ENERGY EFFICIENCY OPPORTUNITIES PROGRAM



National Framework
for Energy Efficiency

Energy Efficiency
Opportunities

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The report may be downloaded from www.energyefficiencyopportunities.gov.au.



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EXECUTIVE SUMMARY

This report provides a detailed picture of the energy use and energy savings potential of the large transport businesses that are participating in the Australian Government's Energy Efficiency Opportunities program.

Energy Efficiency Opportunities encourages Australia's large energy-using corporations to identify and implement projects that will save energy, lower their business costs and reduce greenhouse gas emissions.

The first tranche of 199 businesses that registered with the program in 2006 submitted reports on their first energy efficiency assessments in December 2008. An overview and analysis of the reports was published in *First Opportunities: A Look at Results from 2006-08* in March 2010.

The purpose of this new in-depth report, *The Transport Industry*, is to look more closely at the energy use and energy savings at more detailed sub-sector levels within the transport industry. It is part of a series of reports that similarly focus on particular industry sectors.

This document examines the energy use and savings reported by 119 business entities whose primary activity is transport.

The transport industry data is presented in aggregate, by industry sub-division, and energy savings by energy source and equipment type. It quantifies the potential benefits of implementing energy savings projects in terms of energy savings, financial benefits and the potential to reduce greenhouse gas emissions.

The information is analysed and presented using the sub-divisions for transport set down in the Australian and New Zealand Standard Industry Classification (ANZSIC) system.

The transport businesses reported they consumed 256.6 PJ of energy in 2007-08, equivalent to 14 percent of energy use for the Energy Efficiency Opportunities program.

The three largest energy-using transport industries were:

- air transport, which used 195.2 PJ of energy,
- rail transport, which consumed 27 PJ, and
- road transport, responsible for 16 PJ.

The transport entities reported energy savings opportunities that could save 10.3 PJ of energy per year. The three industries identifying the largest energy savings were:

- air transport, which found energy savings projects that could reduce energy use by 8.46 PJ,
- road transport, which identified 1.28 PJ in potential energy savings, and
- rail transport, with 0.42 PJ in savings.

The transport businesses reported they had assessed 81.3 percent of their total energy use, which was the highest of any industry. Given the assessment coverage recorded across the program was 57 percent, this was a stand-out result. It was heavily influenced by air transport, which had assessed 93.4 percent of its energy use.

While the transport entities consumed 14 percent of program energy use, they identified 15.2 percent of program energy savings.

The level of identified savings represented 4.9 percent of assessed energy use. This was slightly lower than the program average of 6.6 percent for all industries. The mining industry, for instance, identified energy savings representing 9.1 percent of assessed energy use.

The potential net financial benefits of implementing the energy savings were marginally higher in projects that had a financial payback of less than 2 years, compared to those with a 2-4 year payback. The details of the savings identified by the transport businesses could not be published as they were commercial-in-confidence.

The transport industry reported the highest rate of implementation of energy savings opportunities of any industry in the program. More than 95 percent of the identified energy savings in projects with a payback of less than 2 years had been, or were in the process of being, implemented. By comparison, the implementation of projects in this payback category across the program was 70 percent. Again, the transport industry result was heavily influenced by air transport.

In total, the energy savings identified by the 119 transport business entities equated to a potential reduction in energy-related greenhouse gas emissions of more than 717,000 tonnes of carbon dioxide-equivalent (CO₂-e) per year.

1. INTRODUCTION

The Energy Efficiency Opportunities program was set up with the aim to improve the energy efficiency of the country's largest energy users who together account for a major share of national energy use. Their performance is critical to Australia achieving its energy and climate change goals.

The program uses a whole-of-business approach and is designed to break down the many information, organisational and cultural barriers that inhibit the adoption of better energy efficiency practices and projects. It is underpinned by the Energy Efficiency Opportunities Act (2006), which came into effect on 1 July 2006.

Energy Efficiency Opportunities requires large energy-using businesses to conduct a detailed assessment of their energy use and to identify and evaluate opportunities to cost-effectively improve their energy efficiency.

Participation in the program is mandatory for corporations using more than 0.5 petajoules of energy per year. By August 2010, 270 plus corporations have registered for the program; 199 that registered in 2005-06 first reported their results at the end of 2008.

Corporations must use the program's assessment framework to assess their energy use and identify energy savings opportunities. The framework takes a whole-of-business approach to energy efficiency, addressing many of the factors that influence energy use across the business.

Corporations report to both the public and to government on the results of their energy efficiency assessments and the opportunities that exist for projects with a financial payback of up to four years.

The reports must detail the opportunities they have identified to save energy, quantify the energy savings the opportunities could deliver and state the corporation's business response to the opportunities.

As corporate structures vary, the legislation mandates that the controlling corporation of a corporate group registers with the program. That corporation is then responsible for the energy use and reporting for all its major business entities, including subsidiaries, joint ventures, partnerships, business units, sites and activities.

In their first reports to government, the 199 corporations reported data for 1099 separate entities. Of these, 119 business entities were involved in transport activity; this report presents the data submitted by these transport entities.

The corporations outlined their level of energy use, the proportion of assessed energy and the energy savings opportunities that they identified through their first assessments. They also reported on the potential energy savings, financial benefits and reductions in greenhouse gas emissions that could accrue from implementing the energy savings opportunities that had a financial payback of up to four years.

Energy Efficiency Opportunities operates in five-year assessment cycles. During the first five-year cycle, corporations must assess 80 percent of their total energy use and all sites that use more than 0.5 PJ of energy per year. In the second and subsequent cycles, corporations will assess 90 percent of their total energy use.

Corporations are taking the following five steps during the program's first cycle of 2006 to 2011.

Step 1. Determine whether the corporation has to participate in the program, ie whether it used more than 0.5 PJ of energy within the trigger year of 2005-06.

Step 2. Register within nine months of the trigger year, by March 2007.

Step 3. Prepare and submit an assessment and reporting schedule by December 2007.

Step 4. Conduct first energy efficiency assessments of each key division, activity or business unit by June 2008 or within two years of the trigger year.

Step 5. Report on assessment outcomes and business response by December 2008.

The legislation also has provision for verification to ensure that corporations have undertaken an assessment to the standard required and reported accurately on the results of the assessment. Verification will start in 2010.

The aim is to give an in-depth profile of the energy use and savings potential of Australia's important top energy users.

It should be read in conjunction with the main *First Opportunities* report, which describes the program in detail, lists the participating corporations, details the methodology used to analyse the data, and provides examples of energy savings opportunities. It can be found at the program website: www.energyefficiencyopportunities.gov.au

1.1. THE TRANSPORT INDUSTRY AND ENERGY EFFICIENCY OPPORTUNITIES

The transport activity reported under the Energy Efficiency Opportunities program is dominated by air transport, with rail transport a distant second in terms of its energy use. This could seem surprising given that most transport activity in Australia is in road transport.

However, many road transport businesses in Australia are small- and medium-sized companies. They are not required to participate in the program because they do not use more than 0.5 PJ of energy per year, leading to the dominance of air and rail transport in terms of program data.

The transport corporations participating in the Energy Efficiency Opportunities program mostly are commercial and freight airlines, road transport and logistics companies, railways, domestic shipping companies (tugboats) and port operations.

The primary sources of energy used in the industry are aviation turbine (jet) fuel and diesel. Opportunities to improve energy efficiency include: fuel switching to biodiesel or liquefied natural gas (LNG), changing driver behaviour to reduce fuel usage, and improving technology and scheduling.

The transport businesses reporting their energy use under the program account for 14 percent of total program energy use.

The transport entities report their data within the following ANZSIC sub-divisions:

- road transport,
- rail transport,
- water transport,
- air transport,
- other transport,
- postal and courier pick-up and delivery,
- transport support services, and
- warehousing and storage services.

For the purposes of this report the ANZSIC sub-divisions of the latter four categories have been merged into a single category called 'other transport services and storage'. This category was developed to protect commercially sensitive information. It does not affect the results for the industry as a whole, since these sub-divisions contributed a relatively low proportion of transport energy use and savings.

Although most corporations participating in the program undertake at least some transport activity, they will only report data within the transport industry sub-divisions if the *predominant* business activity of a specific corporate entity is transport based.

The three sub-divisions of main importance to the program are air transport, road transport, and rail transport as they are the largest energy-using and energy-saving transport industries.

In the data analysis for this report, an adjustment has been made to the way Australian energy use figures are presented so as to more accurately compare the aggregated energy use of the program's transport entities with the energy use of all Australia's transport industry.

In its Australian Energy Statistics, ABARE allocates all road transport fuel use to the transport industry, which includes all petrol, diesel and LPG used by households in privately registered motor vehicles. However, to better present *industry* energy use, this report has reallocated 560 PJ of road transport fuel use back to households. This method resulted in the figure showing the program's transport entities accounted for 32 percent of Australian transport energy end use (Section 2). More information on method of analysis used in this report and *First Opportunities: A Look at Results from 2006-08* can be found in Appendix B of the main *First Opportunities* report.

2. ENERGY USE

The 119 entities undertaking transport activity within the program consumed 256.6 PJ of energy in 2007-08, representing about 32 percent of energy end use by the Australian transport industry.

Transport energy use is the most unevenly distributed of all industries participating in Energy Efficiency Opportunities, with around three-quarters (76 percent) of transport industry energy use consumed by the one sub-division of air transport.

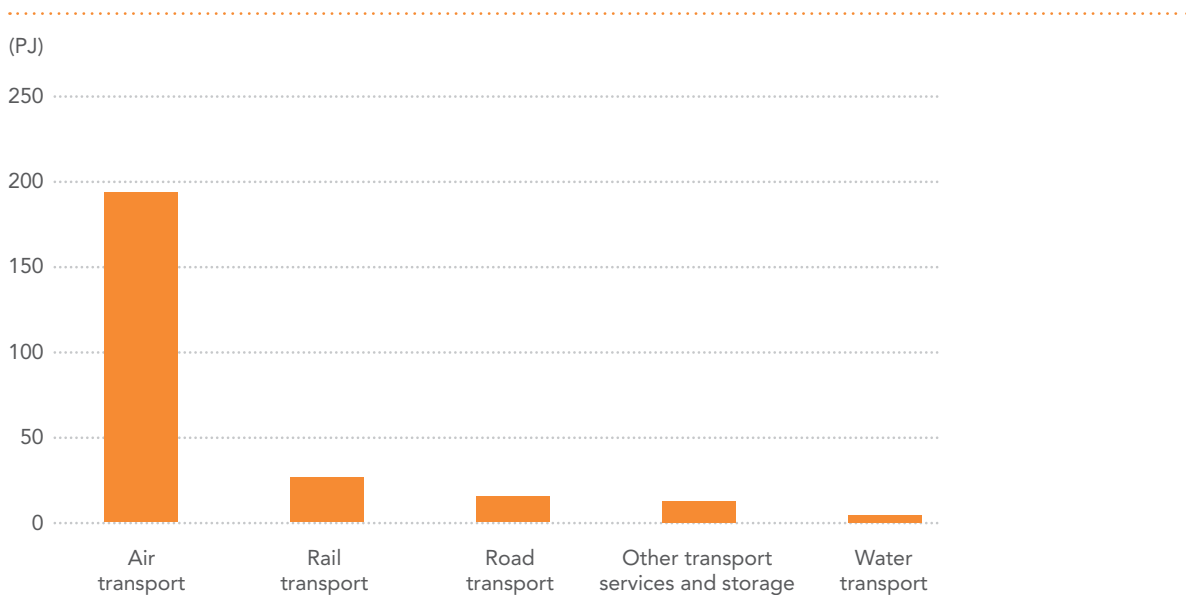
Rail transport entities were the second largest consumers of energy, accounting for 27 PJ or 10.5 percent of energy use in the transport industry. The road transport businesses used 16 PJ, or 6.2 percent, of transport energy use.

Table 1: Total energy use by EEO transport industry entities 2007-08

Transport industry sub-division	Total energy use (PJ)	Share of transport industry energy use (%)
Road transport	16.0	6.2
Rail transport	27.0	10.5
Water transport	5.1	2.0
Air transport	195.2	76.1
Other transport services and storage	13.4	5.2
Total transport	256.6	100.0

The dominance of air transport is seen graphically in Figure 1, with the air transport businesses using more than seven times the energy use of their rail transport counterparts.

Figure 1: Total energy use by EEO transport industry entities 2007-08



3. LEVEL OF ENERGY USE ASSESSED

The transport entities had assessed the highest amount of energy use of any industry, reporting they had assessed 81.3 percent of their energy use by June 2008, halfway through the first five year cycle. The average assessment coverage for the program was 57 percent.

Under program regulations, corporations are required to assess 80 percent of the energy use across the corporate group in the first assessment cycle and 100 percent of energy use at sites using more than 0.5 PJ per year. Corporations that registered in 2006 have until 2011 to meet this requirement.

About 16 of the transport businesses had assessed 100 percent of their energy use; another 17 had assessed part of their energy-using operations. A further 86 transport entities had not assessed any of their energy use.

The relatively high proportion of entities not having assessed their energy use could be explained by the nature of the transport businesses. Those that have vehicle fleets may take longer than average to complete assessments because they opt to undertake a representative assessment.

A representative assessment involves analysing a representative sample of vehicles in depth, then rolling out identified energy savings opportunities across the components of their fleet that are sufficiently similar (such as a vehicle category or model). The representative approach must be approved by the Department of Resources, Energy and Tourism in the corporation's Assessment and Reporting Schedule.

Table 2 shows energy use, energy assessed and the percentage of energy assessed by each transport sub-division.

Table 2: Assessed energy use as a proportion of total participants' energy use by the transport industry

Transport industry sub-division	Energy use (PJ)	Assessed energy use (PJ)	Share of total assessed energy use (%)	Assessment coverage (%)
Road transport	16.0	6.4	3.1	40.0
Rail transport	27.0	14.1	6.7	52.1
Water transport	5.1	0.9	0.4	17.4
Air transport	195.2	182.4	87.4	93.4
Other transport services and storage	13.4	4.9	2.3	36.4
Total transport	256.6	208.6	100.0	81.3

The greatest amount of assessed energy, of 182.4 PJ, was reported by air transport businesses; they accounted for 87.4 percent of all the assessed energy reported within the transport industry.

The air transport entities achieved an assessment coverage of 93.4 percent, the highest percentage coverage among the large energy users within the program.

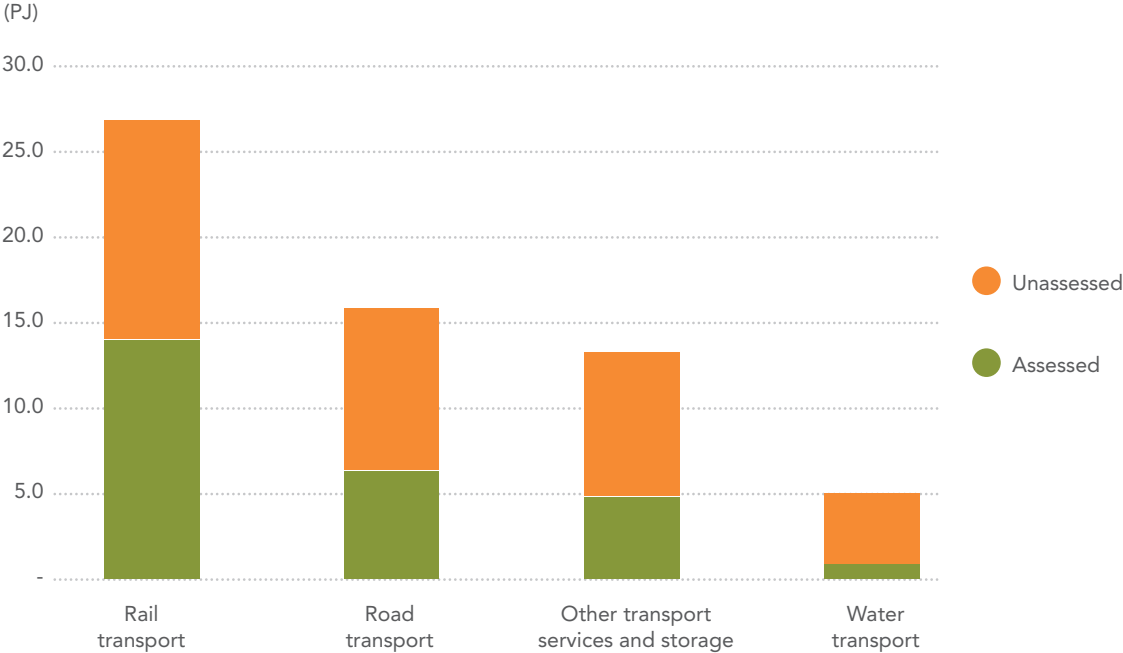
The rail transport businesses reported the second highest level of assessed energy, of 14.1 PJ, representing an assessment coverage of 52.1 percent. This accounted for 6.7 percent of the assessed energy use for the transport industry as a whole.

The third highest level of assessed energy was reported by the road transport businesses. They assessed 6.4 PJ or 40 percent of their energy use, which accounted for 3.1 percent of the transport corporations' combined assessed energy use.

The assessment coverage of the transport industries is shown in Figure 2 without air transport to show the relative size of the other transport sub-divisions. (The energy assessment coverage of air transport is 93 percent and would dominate the graphic illustration of the other industries.)

The transport businesses that constitute the 'other transport services and storage' sub-division were relatively small energy-using industries, and had assessed 36.4 percent of their combined energy use.

Figure 2: Assessed and unassessed energy use by transport industry participants



The businesses operating in water transport had assessed a significantly lower 17 percent of their energy use.

4. ENERGY SAVINGS IDENTIFIED BY CORPORATIONS

The corporations were required to report on the energy efficiency opportunities that they identified during their energy efficiency assessments and the energy savings that could arise if they implemented these projects.

The transport businesses identified 10.29 PJ of energy savings as a result of their assessments, which represented 15.2 percent of energy savings identified for the program.

Table 3 shows the 10.29 PJ of energy savings projects represented 4.93 percent of the level of energy assessed by the transport businesses.

The air transport businesses identified by far the greatest level of energy savings, of 8.46 PJ, or 82.25 percent of transport industry savings. The savings were identified from an energy assessment coverage of 93 percent and represented 4.64 percent of the energy use assessed by the air transport industry.

Table 3: Identified energy savings by transport industry as a share of total energy use, energy savings and assessed energy

Transport industry sub-division	Energy savings identified (PJ)	Share of total energy savings (%)	Energy savings as a share of total energy use (%)	Energy savings as a share of assessed energy (%)
Air transport	8.46	82.25	4.34	4.64
Road transport	1.28	12.48	8.04	20.13
Rail transport	0.42	4.04	1.54	2.95
Other transport services and storage	0.13	1.23	0.95	2.60
Water transport	-	-	-	-
Total transport	10.29	100.00	4.01	4.93

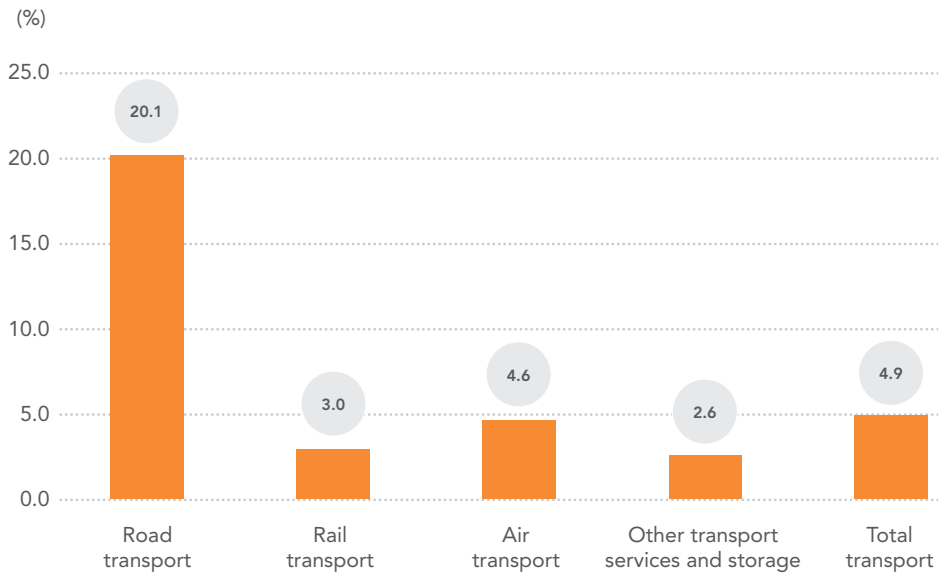
Note: Opportunities for water transport entities were not explicitly quantified and included in the results from first assessments, so no energy savings have been reported for this sub-division.

The road transport businesses identified 1.28 PJ of energy savings projects after assessing 40 percent of energy use. The savings were equivalent to 20.13 percent of assessed energy.

Businesses operating in rail transport had assessed 52 percent of their energy use, resulting in them identifying 0.42 PJ in energy savings. The savings were equivalent to 2.95 percent of assessed energy. Similarly, other transport services and storage businesses identified savings of 0.13 PJ, or 2.60 percent of assessed energy.

Identified energy savings, as a percentage of assessed energy, are shown in Figure 3.

Figure 3: Identified energy savings as a percentage of assessed energy use

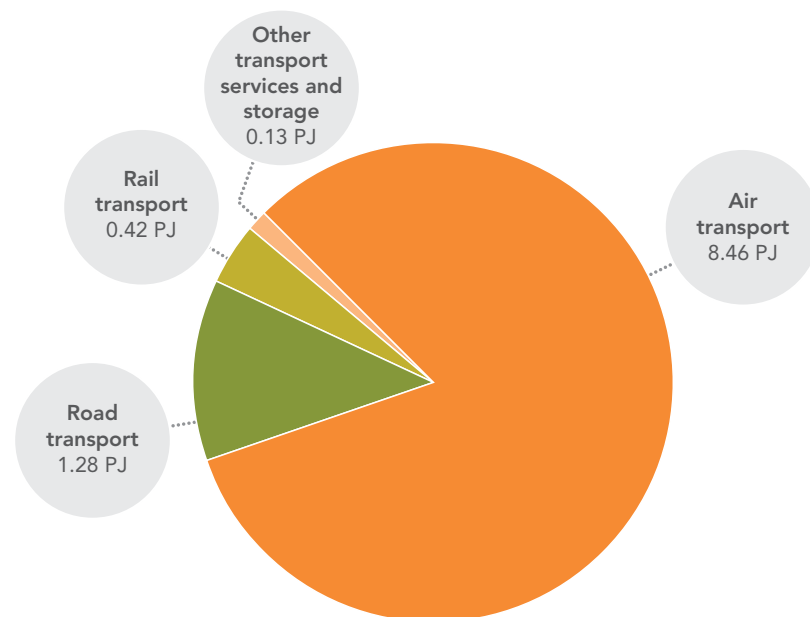


Note: The water transport entities did not explicitly quantify any energy savings.

The relative size of energy savings identified by the transport industries is shown in Figure 4.

More than three-quarters of the energy savings were identified by air transport entities, with 8.46 PJ of energy savings. The second largest share of savings was identified in road transport, with 1.28 PJ, followed by rail transport, with rail businesses identifying 0.42 PJ of savings projects. The remaining transport industries identified 0.13 PJ of energy savings.

Figure 4: Identified energy savings per year by transport industry

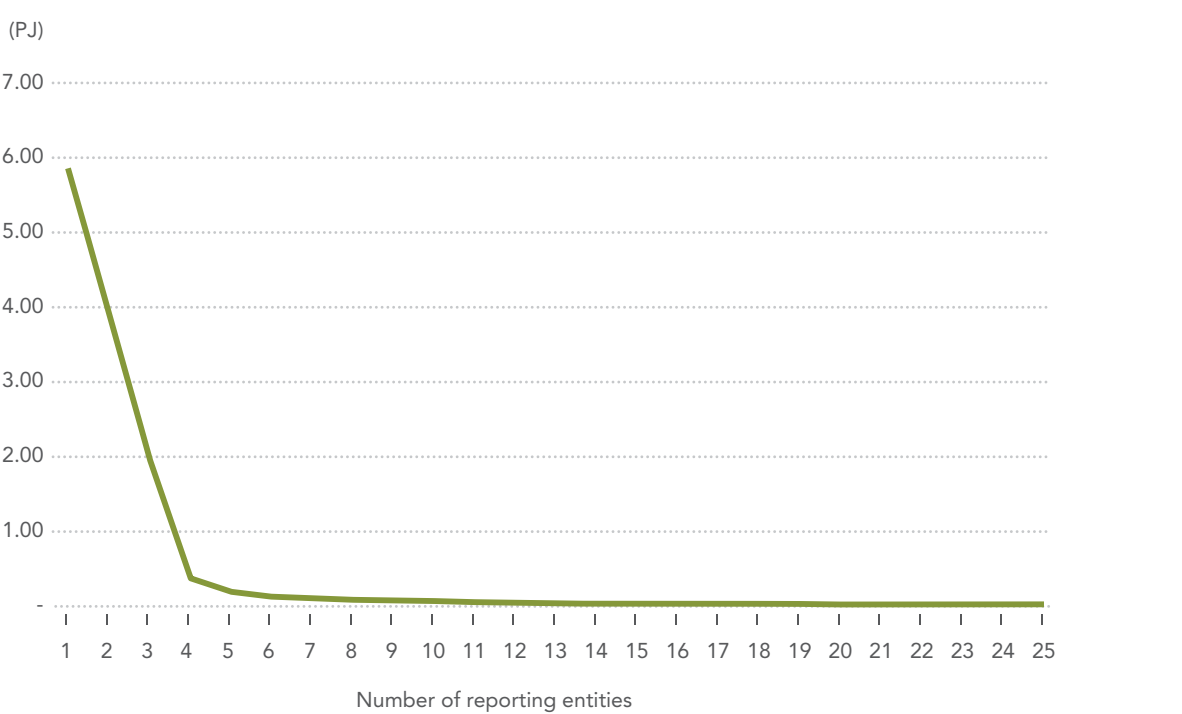


The analysis of the transport entities' reports shows that the identified energy savings opportunities were unevenly distributed throughout the transport industry, as shown in Figure 5.

Of the 119 energy using entities within transport, 25 had identified energy savings projects.

- three transport businesses identified 0.4 PJ or more of energy savings,
- six transport entities identified 0.1 PJ or more, and
- 19 reported they had identified less than 0.1 PJ of energy savings.

Figure 5: Distribution of identified energy savings by transport industry



The net financial benefits that could be derived from implementing the identified energy savings opportunities were reported to government by the transport businesses. However, these have not been published in this report to avoid the disclosure of individual corporations' commercial-in-confidence information.

5. BUSINESS RESPONSE TO ENERGY SAVINGS BY PAYBACK PERIOD

Corporations are required under program rules to report whether they would proceed with implementing the energy savings opportunities that they identified during their energy efficiency assessments.

Their business response is reported under the following five categories: under investigation, to be implemented, implementation commenced, implemented and not to be implemented. The categories allow the program to differentiate the *potential* energy and emissions savings of projects that might be implemented from the *actual* savings of projects already completed.

In assessing their business response, the corporations used two separate payback categories – projects with a payback of less than two years and a payback of 2-4 years. A payback period refers to the time taken for an investment to yield a positive return.

The amount of energy savings the transport businesses identified was divided about equally between the two payback categories. This was unlike the rate reported for the program as a whole, where double the amount of energy savings were identified in the less than two year category compared with the 2-4 year category (41.8 PJ and 20.7 PJ respectively).

Table 10 shows that just over half of the reported energy savings in the transport industry, or 5.45 PJ of energy, were in the less than two year category, and slightly less than half, 4.83 PJ, identified in projects with a 2-4 year payback.

Almost all, or 96 percent, of the energy savings in projects with paybacks of less than two years were being adopted, meaning the businesses already had, or were planning to, implement the projects. This again was similar to the 91 percent of projects that were being adopted in the 2-4 year payback periods.

The adoption rate for projects in the transport industry was far higher than that reported across the program, with 70 percent of energy savings being adopted in the less than two year category for all industries, and 48 percent in the 2-4 year payback period.

Around 45 percent of the energy savings identified by the road transport businesses were in the less than two year category and 89 percent of these savings were being adopted.

In contrast, fewer than 5 percent of identified savings in rail transport were in projects with less than two year paybacks and only 31 percent of these had been, or were planning to be, implemented. None of the energy savings projects in the 2-4 year payback periods for rail transport businesses were being adopted.

Table 4: Identified energy and financial savings by payback period

Payback period	Transport industry sub-division	Energy savings (PJ)	Financial savings (\$/GJ)	Proportion of identified savings to be adopted*
0 < 2 years	Road transport	0.58	np	89
	Rail transport	< 0.01	np	31
	Water transport	-	np	-
	Air transport	4.80	np	97
	Other transport services and storage	0.07	np	72
	Total transport	5.45	np	96

Payback period	Transport industry sub-division	Energy savings (PJ)	Financial savings (\$/GJ)	Proportion of identified savings to be adopted*
2-4 years	Road transport	0.70	np	100
	Rail transport	0.41	np	-
	Water transport	-	np	-
	Air transport	3.67	np	100
	Other transport services and storage	0.05	np	27
	Total transport	4.83	np	91

np = data not published to maintain confidentiality of commercially sensitive information.

* 'Adopted' refers to the business response categories of to be implemented, implementation commenced, and implemented.

Energy savings among the air transport businesses was split reasonably evenly between the two payback periods. About 57 percent were identified in the less than two year payback period. The remaining savings were in projects with 2-4 year payback periods.

The road transport and air transport businesses recorded the highest rate of adoption of projects, reporting they had, or were planning to, implement *all* of the energy savings projects with paybacks of 2-4 years.

The proportion of energy savings being adopted by businesses in the other transport services and storage sub-division was 72 percent for projects with a less than two year payback and 27 percent for those with a 2-4 year payback.

The net financial returns of the energy savings cannot be presented on a dollars per gigajoule base due to commercial-in-confidence reasons. However, the financial savings were marginally higher in the less than two year category compared to the 2-4 year category.

6. GREENHOUSE GAS EMISSIONS

The greenhouse gas emissions produced by the transport entities were calculated based on their use of different types of fuels, mainly aviation (turbine) jet fuel and diesel. The reported figures for both energy use and energy savings were converted into emissions using National Greenhouse Accounts (NGA) factors produced by the Department of Climate Change and Energy Efficiency.

As the emissions only relate to the corporations' use of energy, they are referred to as energy-related emissions to distinguish them from total emissions data published in the National Greenhouse Gas Inventory. (Energy-related emissions include only the greenhouse gas emissions arising from the direct combustion of energy and the use of purchased electricity.)

Most of the emissions reductions in the transport industry arose from energy savings in liquid fuels. These fuel types were mainly aviation turbine fuel (jet fuel), referred to as AVTUR, and diesel. Table 5 and Figure 6 show emissions reductions, both direct and indirect, for the transport sub-divisions.

About 98 percent of the reductions in greenhouse gas emissions were from the direct combustion of liquid fuels.

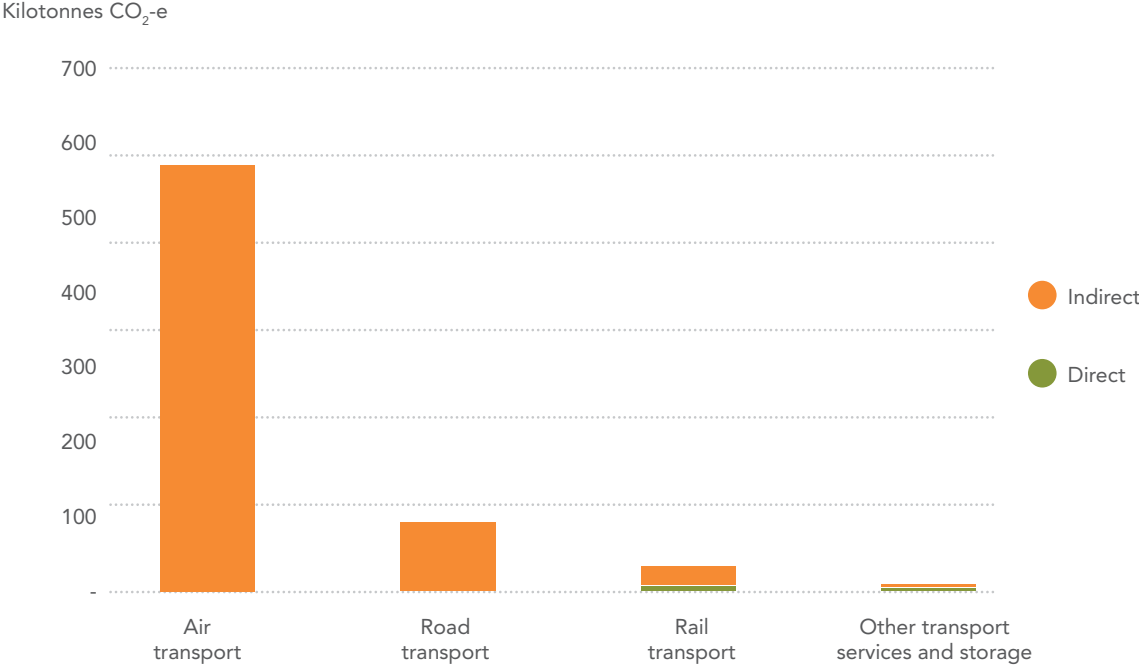
Table 5: Reductions in greenhouse gas emissions by transport industry

Transport industry sub-division	Reductions in emissions (tonnes CO ₂ -e)		
	Direct emissions	Indirect emissions	Total emissions
Road transport	88,503	636	89,139
Rail transport	26,827	7,694	34,521
Water transport	-	-	-
Air transport	583,443	19	583,462
Other transport services and storage	4,765	5,761	10,526
Total transport	703,539	14,110	717,648

The air transport businesses identified the largest emissions reductions, with their reported energy savings equating to a potential reduction in emissions of 583,462 tonnes of carbon dioxide-equivalent (CO₂-e). Almost all (99 percent) of these were attributable to savings in AVTUR.

The energy savings projects of the road transport businesses equated to the second largest share of emissions reductions, of 89,139 tonnes CO₂-e, with the majority of these attributable to identified savings in diesel fuel.

Figure 6: Reductions in greenhouse gas emissions by transport industry



Over half the reduction in indirect emissions (7,694 tonnes CO₂-e) came from the rail transport industry due to electricity savings identified in passenger rail transport.

The direct emissions reductions in rail transport were mainly associated with the identified savings of diesel fuel.

