

**SIGNIFICANT OPPORTUNITIES REGISTER - TRANSPORT**

Company Name	Public Report Year	Opportunity Description	Opportunity Category	Equipment type
Asciano Limited	2010	<b>Improved High Mast Lighting Efficiency at port terminal</b> At the identified terminal there are 29 High Mast light towers with a total of 282 individual lights. These lights were reviewed to determine what benefits could be gained by replacing with more energy efficient types, whilst maintaining a safe working environment.	Investment in the same but more efficient technologies	Lighting systems
Asciano Limited	2010	<b>Crane Lighting Controls to reduce light on time.</b> Due for requirement for 24/7 crane operations, all Container Cranes are fitted with extensive lighting. This is a particular requirement to provide safe operating areas on vessels. Most manufacturers provide this lighting so that it operates 24/7 (despite illumination conditions). Devices are being installed which will ensure that lights only operate in required illumination conditions.	Investment in new technologies or new configurations of technologies not used before	Lighting systems
Asciano Limited	2010	<b>Hydrocarbon management practices.</b> Cross industry research has indicated that improvements in fuel efficiency and power delivery could be achieved through improved fuel and lubricant handling – specifically filtration of fuel to reduce particulate contamination.	Improvement in process control	Road transport equipment
Asciano Limited	2009	<b>Turn off additional locomotives</b> when the train is operating in the tare (unloaded / empty) direction.	Improvement in process control	Rail transport equipment
Asciano Limited	2009	<b>Reconfigure the terminal's internal network (HV)</b> so as to capture regenerative energy from lowering containers on cranes.	Improvement in process control	Rail transport equipment
Australia Postal Corporation	2010	<b>Environmental Driver Program</b> Last year Australia Post piloted several driver training programs designed to assess the potential for driver behaviour to affect fuel use. A program was selected and is to be implemented in 2010–11. The program will focus on engine revving, idling, braking, economical driving, fuel economy and the use of air conditioning.	Changes in the staff operation of equipment	Road transport equipment
Australia Postal Corporation	2010	<b>Induction Lamps</b> The trial of induction lamps as a replacement for high bay metal halide lights, reported in last year's report, have proved to be very successful with savings of around 35 per cent achieved throughout the trial. These lights are now being implemented as part of our NEMP program in all of our major facilities across Australia. Additional savings in reduced heat load are also expected during the summer season.	Investment in the same but more efficient technologies	Lighting systems
Australia Postal Corporation	2010	<b>Truck Air Deflectors</b> During the heavy vehicle testing program at the Australian Automotive Research Centre in August 2009, the fuel consumption of a rigid truck was tested with the cabin air-deflector in several positions. 'Roll down' tests were conducted to allow calculation of the vehicle coefficient of aerodynamic drag for each deflector height, and lap tests at constant speed were conducted while monitoring the vehicle fuel consumption. During the testing program, it was also discovered that the prime-mover cabin air deflector was not in the correct position, and this was confirmed with the vehicle manufacturer. Analysis of the results indicates potential savings of 117,775 litres of diesel per year for rigid trucks and 92,249 litres of diesel per year for articulated trucks. We have since surveyed all trucks, and corrected the scoop height of all trucks in the Australia Post fleet.	Investment in research and development, testing and trialling	Road transport equipment
Australia Postal Corporation	2009	<b>Environmental driver program</b> Australia Post is preparing a pilot Environmental Driver Program (EDP) that aims to reduce fuel consumption through behavioural change. The pilot is designed to assess the potential for driver behaviour to be influenced; links between behaviour and fuel use; and the most effective way to influence driver behaviour through various training methods. A baseline account of driver performance will be established before the training commences against a defined assessment criteria; and this data will be used to evaluate the extent to which driver performance has changed. The criteria will include revving, idling, braking, economical driving, fuel economy and use of air conditioning. The proposal for the pilot was approved and broadly involves the following steps: develop and implement a pilot from August 2009 to January 2010 finalise the pilot in response to feedback from February to April 2010 undertake a national roll out of the final program from July 2010.	Changes in the staff operation of equipment	Road transport equipment
Australia Postal Corporation	2009	<b>High bay lamps</b> On average, lighting accounts for approximately 40 per cent of energy use at our facilities. We predominantly use metal halide lights across our major processing facilities, and in October 2008, we trialed both LED and induction lamps to find an energy efficient replacement. We found that both the <b>LED and induction lamps were more energy efficient</b> and had less heat output than metal halide lamps. However, the induction lamps were preferred as they are compatible with the building control system and can be turned on and off without impact; the feedback regarding the quality of light and light disbursement was positive; and they were more cost effective. The induction lamps demonstrated a 60 per cent reduction in electricity use and have six times the lifespan of the metal halide units thereby reducing maintenance costs. As a result, we are planning to progressively install the high bay induction lamps throughout our major processing facilities and have recommended that these lamps be included in new building projects.	Investment in research and development, testing and trialling	Lighting systems

Australia Postal Corporation	2009	<p><b>Environment Facility Data Tool</b> Behaviour change is a key component of our Corporate Responsibility strategy, and we are committed to empowering staff to make changes to reduce their environmental impacts. The first step in any behavioural change program is increasing people's awareness and knowledge of the relevant issues. As a result, we developed the Environment Facility Data Tool.</p> <p>The tool is an easy to use, online program that allows all managers and staff to view the energy, water, waste to landfill and greenhouse gas emissions from each facility on a monthly and annual basis. Staff can compare facilities and also see the information at state, national and divisional levels. It is accompanied by a checklist of simple opportunities that could be implemented at a site level to reduce energy, water and waste. Launched in May 2009, the tool is primarily aimed at facility managers so that they can understand the environmental impacts from their site, set targets, reduce their impacts, monitor their performance and educate staff. The tool is available through the intranet, preceded by a message from the Managing Director, and has been launched through bulletins, meetings and intranet promotions.</p> <p>The tool has also been demonstrated to other companies, including joint ventures and external environmental organisations, encouraging awareness raising.</p>	Changes in the staff operation of equipment	Own use
Australia Postal Corporation	2008	<p>LED lights at Dandenong Letters Centre</p> <p>Energy efficiency technology is advancing rapidly and new products are regularly being introduced into the market. This provides challenges in terms of: keeping up with new technology; validating claims made by producers in order to understand a product's effectiveness; understanding the life and expense of new innovations; and implementing uniform opportunities when the implementation process may take years as we have such a vast number of sites. In some instances we have trialled new products to determine their effectiveness within an Australia Post facility.</p> <p>One such trial being conducted is a <b>new high bay LED chip technology</b>. The LED lights are 80% more efficient than the current metal halide lights and offer superior lux levels both directly underneath the light and the surrounding area. Specifically, each LED unit uses .38 watt and lux levels range from 350 on the perimeter to 500 underneath the light during the day (compared to the metal halide lights with 1.83 watts and lux levels from 250 to 450 respectively). Another significant saving is a reduction in the heat load of up to 75%. The LED lights are between 65 and 75 degrees per unit, compared to 85-90 degrees for metal halide lights. The LED units have greater than twice the lifespan of the metal halide lights, which reduces waste and saves money spent on maintenance and replacement.</p>	Investment in research and development, testing and trialling	Lighting systems
Australia Postal Corporation	2008	<p><b>Passenger fleet replacement</b> The main initiative undertaken by Australia Post's transport sector was a review and selection of passenger vehicles. The evaluation considered: purpose; vehicle size; engine type (i.e. hybrid or combustion); fuel type (i.e. LPG or unleaded) and overall economy. The evaluation resulted in a "fit-for-purpose" vehicle allocation strategy, which allocates the most appropriate and efficient vehicle to each role. Thereafter, a tender was issued in February 2008 for passenger fleet vehicles to be supplied to Australia Post. The tender requested that vehicle suppliers propose vehicles with the lowest total cost of ownership and best performance in accordance with the Australia Green Vehicle Guide. It is envisaged that most of the existing passenger vehicles will be replaced with the more efficient models within three to four years. The combined annual energy savings from this initiative are estimated to be more than 1.5 million litres of fuel (44,250 G.J.) once fully implemented.</p>	Changes in management systems	Hybrid or electric vehicles
BGC (Australia) Pty Ltd	2009	<p><b>Operator training:</b> The employee induction process will include training of long haul truck drivers on operating techniques to reduce diesel consumption. This opportunity extends from the previously reported training of dump truck operators and will now be adopted across all driver training modules for all vehicle operators.</p>	Changes in the staff operation of equipment	Road transport equipment
BGC (Australia) Pty Ltd	2008	<p><b>Idle Time Management:</b> Broaden idle time analysis through time and motion study at specific sites and set targets to decrease idle time through technology considerations such as auxiliary power units and management techniques such as 'staggered starts' and monitoring of driver performance.</p>	Investment in research and development, testing and trialling	Road transport equipment
BGC (Australia) Pty Ltd	2008	<p>Light Weight Dump Bodies: <b>Fit all new dump trucks with light weight dump bodies</b> and retro fit all old trucks with light weight dump bodies when standard dump body requires replacement. The light weight bodies have several benefits including less tyre wear, increased payload, lower lifecycle cost of drive train and powerunits, reduced empty vehicle weight, reduced fuel consumption, faster cycle times.</p>	Investment in the same but more efficient technologies	Road transport equipment
BGC (Australia) Pty Ltd	2008	<p><b>Operator Training:</b> Implement a training module to educate, train and assess dump truck drivers on operating techniques to reduce fuel consumption.</p>	Changes in the staff operation of equipment	Road transport equipment
Brickworks Limited	2009	<p>Brickworks undertook a <b>review of the existing Car Policy to identify fuel saving opportunities</b> As a result of the review, the following parameters were introduced into the Car Policy: • Company vehicles must now have fuel consumption of less than 10 litres per 100 kms. • Restricted to a maximum number of 6 cylinders and • Engine capacity of less than 3 litres. In addition, preference for LPG or Diesel as a fuel source is encouraged through financial incentives to employees. Under the policy, 180 vehicles have been replaced over the period 1 July 2007 to 30 June 2009, which represents 49.5% of the total fleet. In 2006/07, the fleet comprised 94.2% Petrol vehicles, 5.8% Diesel vehicles and no LPG vehicles. As of June 2009, the fleet was made up of 27.5% Diesel vehicles, 27.1% LPG vehicles and 45.4% Petrol vehicles. As a result 54.6 % of the fleet is on a less environmentally damaging fuel, (compared to 5.8% in 2007) an 888% improvement. In terms of CO2e emissions 140 of the 180 replaced vehicles have lower emissions, with another 7 with equivalent emissions, resulting in 81.7% of the fleet emitting less CO2e than it did 2 years ago. Based on the kilometres</p>	Changes in management systems	Road transport equipment
Brickworks Limited	2009	<p>Brickworks Limited has reviewed the national truck fleet and identified this as an area for significant energy savings and reduction of emissions. The existing truck fleet consists of trucks with Euro 1 (as defined by European emission regulations for heavy-duty diesel engines) or at best Euro 2 engines. With recent advances in engine technology heavy vehicles are now available with improved emission control and improved fuel economy.</p> <p><b>Euro 4 and Euro 5 engines are now commercially available and have advanced diesel engine technology</b> in combination with selective catalytic reduction exhaust gas after treatment. Euro 4 and Euro 5 engines utilise exhaust gas recirculation which results in reduced nitrogen oxide emissions and reduced diesel particulate emissions. The inclusion of selective catalytic reduction further Brickworks EEO Public Report 2009 12 reduces nitrogen oxide in the exhaust gas. In commercial vehicles the engine is optimised for low fuel consumption. The vehicles are fully automatic which improves fuel economy by eliminating incorrect gear selection. After review of the potential energy savings the Board approved the <b>purchase of 18 new Rigid and Prime Movers</b>. Brisbane Transport has now contracted out the servicing of the air conditioning system on its fleet of over 1000 buses. <b>Servicing is now carried out on a more frequent basis ensuring that the air conditioning is working to its maximum efficiency.</b> This increased frequency has led to a drop in the number of systems failing which whilst not resulting in a direct decrease in energy consumption does have an increase in passenger comfort and potentially increased patronage which in turn takes more vehicles off Brisbane roads.</p>	Investment in the same but more efficient technologies	Road transport equipment
Brisbane City Council	2010	<p><b>Servicing is now carried out on a more frequent basis ensuring that the air conditioning is working to its maximum efficiency.</b> This increased frequency has led to a drop in the number of systems failing which whilst not resulting in a direct decrease in energy consumption does have an increase in passenger comfort and potentially increased patronage which in turn takes more vehicles off Brisbane roads.</p>	Changes in maintenance practices	Electric motors – HVAC and refrigeration equipment

Brisbane City Council	2009	<p>Corporate Services (City Property) - Green IT solution It has been recognized that PC workstations and peripherals represent a significant proportion of ongoing operational costs and energy use within BCC properties.</p> <p>The Greentrac office solution that would be installed onto every BCC PC is a <b>consumption, cost analysis and environmental impact monitoring platform</b> designed to harness behavioral change for financial and environmental outcomes through energy efficiency.</p> <p>This system delivers key capabilities in 2 distinct areas: 1) providing the framework for control of energy consumption PC or peripheral device level 2) as the catalyst to user engagement and assumed responsibility for energy and environmental emissions savings.</p> <p>A budget application has been made to implement this project in the 2010/11 financial year.</p>	Investment in new technologies or new configurations of technologies not used before	IT, communications and other electronic equipment
Brisbane City Council	2009	<p>Brisbane Transport - <b>Power factor correction unit</b> - Brisbane Transport recently had a power factor assessment carried out at Toowong bus Depot workshops. The factor was found to be 0.62. Next year this bus depot will be billed for kVa's used rather than Kwh's and new meters will be installed to accurately invoice this sites electricity usage. The current method of billing in Kwh's does not accurately reflect the energy usage on this site. This unit will allow for the power factor to be corrected to around 0.9 which will lead to both energy and financial savings for Brisbane Transport.</p>	Investment in new technologies or new configurations of technologies not used before	Electrical equipment
Brisbane City Council	2008	<p>Light Replacement Rolling Program In accordance with existing City Property Branch initiative, <b>existing energy inefficient lights are being replaced with more energy efficient lights</b> at the end of their life. City Property Branch currently consumes 93,211 GJ of electricity per year. Approximately 25% of this is for lighting. City Property has committed to replace all existing lights with compact fluorescent lights (CFLs) as part of a rolling program over next 5 years were a energy/cost effective solution can be implemented. This opportunity represents a potential saving of total energy x lighting proportion x energy savings x time period. The financial savings of energy costs and also reducing operating and maintenance costs through less frequent light replacements mean that the capital costs associated with this project will be paid back within a reduced period of time. This policy will be reviewed as more efficient lights, for example, light emitting diodes, become available.</p>	Investment in the same but more efficient technologies	Lighting systems
Brisbane City Council	2008	<p><b>Adjusted Hours of Air Conditioning</b> Due to the range of facilities managed by City Property Branch the current standard air conditioning times of 7am through to 6pm may not be most energy efficient. City Property Branch is developing a policy, to be finalised in Mar 2009, to allow individual Facilities Managers to work closely with end users to determine the most efficient times and air conditioning temperatures (within accepted ranges) of the facilities under their management. A preliminary estimate is that by switching hours to 8am to 6pm, this project is estimated to save around 4,225 GJ/year. This project will determine the exact extent of savings and the payback period.</p>	Improvement in process control	Electric motors – HVAC and refrigeration equipment
Brisbane City Council	2008	<p><b>Adjusted Hours of Lighting</b> Due to the range of facilities managed by City Property Branch the current standard lighting times of 7am through to 6pm may not be most energy efficient. City Property Branch is developing a policy, to be finalised in Mar 2009, to allow individual Facilities Managers to determine the most efficient times and lighting levels (within accepted ranges) of the facilities under their management. A preliminary estimate is that by switching hours to 8am to 6pm, this project is estimated to save around 5,296 GJ/year. This project will determine the exact extent of savings and the payback period.</p>	Improvement in process control	Lighting systems
Cootes Transport Group	2010	<p><b>Repowering of units with poor fuel.</b> The conversion of engines has commenced and is ongoing, as engines wear out, CAT engines have proven to be economical and still available. New Caterpillar engines are now not available in Australia, but we have found it to be beneficial to fit 2nd hand rebuilt engines to achieve our goals. Evaluations are currently underway for an alternative engine – this EEO is currently ongoing</p>	Investment in new technologies or new configurations of technologies not used before	Mining, earth moving and other off-road materials handling equipment
Cootes Transport Group	2010	<p><b>LNG conversions</b> – three units were converted to LNG, some mixed results resulting in all 3 LNG units being removed. All units that have been removed proved to be unreliable and inefficient. A number of factors has resulted in this program being placed in the "under investigation". 1. The lack of re-fuelling facilities, minimal public re-fuellers are available. 2. The departure of CAT from the Australian markets has meant that "aftermarket" conversions are difficult, other engines are not suitable. 3. The cost to purchase a 100% LNG truck unit does not make the fuel attractive to the business, at this stage. 4. LNG will be further evaluated and remain as "under investigation"</p>	Investment in research and development, testing and trialling	Mining, earth moving and other off-road materials handling equipment
Cootes Transport Group	2010	<p><b>Reduction in engine RPM.</b> This opportunity is ongoing and has proved to be of great benefit. As vehicles are replaced units will be replaced with lower top gear engines RPM. 15 new units were placed on the road in FY 10, 15 old units were retired</p>	Investment in the same but more efficient technologies	Road transport equipment
Cootes Transport Group	2010	<p>A new Opportunity "<b>Green tyres</b>" was identified and was reviewed in FY10. Green tyres did provide fuel savings in some applications, however they did come with a higher capital cost. The "metro units" proved to provide no savings in fuel burn and that operating costs increased. On highway fuel burn provided fuel savings of 1.5% however overall operating costs increased - payback period was found to be cost negative. Initial OEM figures indicated we would see a fuel saving of around 2%, actual fuel savings was 1.5% - but only in certain applications. These fuel savings will only be identified in longer distance cartage.</p>	Investment in the same but more efficient technologies	Road transport equipment
Cootes Transport Group	2009	<p>A new Opportunity has been identified and is currently being reviewed – the <b>use of Green tyres.</b> Green tyres are providing fuel savings, however they do come with a higher capital cost, hence the payback period is yet to be confirmed. On initial investigation we believe a fuel saving of around 2% can be achieved, in certain applications. 2% of diesel burn 4,868,619 lts or 2,522 GJ. These savings will only be identified in longer distance cartage.</p>	Investment in the same but more efficient technologies	Road transport equipment
Cootes Transport Group	2008	<p>10 x Repowering units with poor fuel efficiency ADR 80 Detroit engines have been identified as high fuel users, <b>as the engines wear out they are being replaced with more fuel efficient CAT powerplants.</b> A saving of around 90,000 litres per annum of diesel has been identified. Engine replacements commenced in December 2006 with three engines already replaced and a further six scheduled for replacement in the next 18 months.</p> <p>Savings and Costing Summary Annual Energy Saving 3,474 GJ/annum Annual Cost Saving 135,532 \$/annum Estimated Capital Cost \$500,000 Simple Payback Period 3.7 years Status of EEO – Implemented in December 2006 and ongoing</p>	Investment in the same but more efficient technologies	Stationary reciprocating combustion engines - electricity generation

Cootes Transport Group	2008	<p><b>One diesel truck was converted to LNG</b> on a trial basis in Victoria, however terminal access was refused due to major hazards risk. The LNG kit was removed and two alternative trucks were converted in Western Australia, where there are better resources and available re-fuelling depots.</p> <p>Savings and Costing Summary  Annual Energy Saving 40,361 GJ/annum  Annual Cost Saving 170,000 \$/annum  Estimated Capital Cost \$1,000,000  Simple Payback Period 5.9 years  Trial on the original truck was identified as a failure. Refuelling facilities are still non-existent in the Eastern States, restricting growth in LNG conversions.</p>	Investment in new technologies or new configurations of technologies not used before	Alternative transport fuels
Cootes Transport Group	2008	<p>Reduction in engine revolutions - truck specifications  Vehicles specifications were thoroughly reviewed by IES in 2003. A matrix was completed comparing trip times/truck engine load and fuel usage. It was resolved that IES should trial <b>lowering engine RPM by operating a taller set of gears</b>. The net effect was a reduction in fuel burn of approx 6-8%. All new units introduced operate with optimum differential gears. The new ADR 80/03 engines run slower again, due to a higher and different HP map. New vehicles are running at lower RPM for past 3yrs - new units same to apply.</p> <p>Savings and Costing Summary  Annual Energy Saving 7,720 GJ/annum  Annual Cost Saving 280,000 \$/annum  Estimated Capital Cost \$0  Simple Payback Period 0 years</p>	Investment in research and development, testing and trialling	Road transport equipment
DP World Australia (POSN) Pty Ltd	2010	<p><b>Diesel Electric Straddles</b>  Straddle carriers are the major mode of operation at DP World Australia Limited, contributing to approximately 98% of diesel consumption on site. Due to the large energy consumption of straddle carriers the business was keen to identify and evaluate solutions for improvement. An identified solution to the problem was the purchase of diesel electric straddles to replace decommissioned hydraulic diesel straddle fleet. The diesel electric straddles improve energy efficiency through the use of smart power management features which keep the engine running on the lowest revs, consequently reducing fuel consumption and the noise generated during idling phases. In addition, the patented wheel hub drives and the hoist motor have a generative effect which feed energy back into the system when speed is reduced or the spreader is lowered. This energy is then reused to power other systems, therefore reducing the overall energy consumption and associated emissions of the straddle. Trials of Noell diesel electric straddles in similar port operations in the USA have indicated a diesel consumption rate of 15.9 litres per hour an improvement of 1.6 litres per hour on the sites existing fleet.</p> <p><b>LED Lighting on Walkway Lights of the Quay Crane</b>  Electricity consumption is a significant contributor to our energy use on site. One source of electricity consumption is the quay cranes, specifically the lighting on the cranes. Each quay crane has approximately 66 walkway lights which are currently fitted with 40 watt fluorescent lamps and fittings which have multiple failure points resulting in ongoing and time consuming maintenance. Energy efficient lighting is advancing with new products being regularly introduced to the market, one such technology is light-emitting diode (LED) lighting. LED lighting was identified as an energy efficiency opportunity for quay crane walkway lighting. It was identified that the existing 40 watt fluorescent lamp could be replaced by a 10 watt LED lamp which has an approximate life span of 30,000 hours compared to 6,000 hours for the fluorescent lamps and requires no maintenance. The replacement of current fluorescent lamps with LED lamps on three cranes is expected to result in an annual energy saving of 65 GJ. Additionally the increased lifespan of the LED lights will reduce waste and money spent on maintenance and replacement costs of the lamps. The LED replacement program is currently underway.</p>	Investment in new technologies or new configurations of technologies not used before	Forklifts, front end-loaders, and other machinery
DP World Australia (POSN) Pty Ltd	2010	<p><b>Prismalence Lighting on Quay Crane Trolley and Portal Beams</b>  In addition to the LED walkway lighting on quay cranes alternatives to the High Pressure Sodium (HPS) lighting was identified as an opportunity for improvement on the quay crane trolley and portal beams. Solutions for reducing the electricity consumption of the HPS lighting were explored with various specialists' suppliers with the preferred option being a prismalence light. It was identified that the existing 575 watt HPS lamp could be replaced by a 150 watt prismalence lamp which has an approximate life span of 20,000 hours compared to 9,000 hours for the HPS lamps, therefore reducing the required maintenance. The replacement of current HPS lamps with prismalence lamps on the quay crane trolley and portal beams on three cranes is expected to result in an annual energy saving of 134 GJ. Additionally the increased lifespan of the prismalence lights will reduce waste and money spent on maintenance and replacement costs of the lamps. The prismalence lighting is currently being implemented on three cranes where efficiency and maintenance savings will be monitored to verify the claims of the supplier.</p>	Investment in new technologies or new configurations of technologies not used before	Lighting systems
DP World Australia (POSN) Pty Ltd	2010	<p><b>Prismalence Lighting on Quay Crane Trolley and Portal Beams</b>  In addition to the LED walkway lighting on quay cranes alternatives to the High Pressure Sodium (HPS) lighting was identified as an opportunity for improvement on the quay crane trolley and portal beams. Solutions for reducing the electricity consumption of the HPS lighting were explored with various specialists' suppliers with the preferred option being a prismalence light. It was identified that the existing 575 watt HPS lamp could be replaced by a 150 watt prismalence lamp which has an approximate life span of 20,000 hours compared to 9,000 hours for the HPS lamps, therefore reducing the required maintenance. The replacement of current HPS lamps with prismalence lamps on the quay crane trolley and portal beams on three cranes is expected to result in an annual energy saving of 134 GJ. Additionally the increased lifespan of the prismalence lights will reduce waste and money spent on maintenance and replacement costs of the lamps. The prismalence lighting is currently being implemented on three cranes where efficiency and maintenance savings will be monitored to verify the claims of the supplier.</p>	Investment in new technologies or new configurations of technologies not used before	Lighting systems
Gladstone Ports Corporation Limited	2010	<p>Improved bulldozer fuel efficiency  GPC has <b>energy efficiency clauses included in its tender specifications for heavy machinery</b> and as such energy efficiency forms part of the tender evaluation process. The new D11T dozer from Caterpillar was claimed to have a 5% improvement in fuel economy compared with the previous D11R model. After taking delivery of the new D11T dozer, the fuel burn was monitored over a period of time and compared to the previous model (D11R). The analysis indicated that there was a 7.16% reduction in the fuel used by the D11T dozer to perform the equivalent amount of work. This equates to an annual reduction in fuel usage of 35,840 litres of diesel or 1,400,000 MJ of energy. This results in a reduction of 96.7 tonnes of CO<sub>2</sub>-e of gas emissions each year for every dozer that is replaced with a more efficient D11T dozer at our RG Tanna Coal Terminal. GPC's RG Tanna Coal Terminal currently has a fleet of 23 D11 dozers. This fleet is currently under a long term replacement program which aims to replace two dozers per year with more modern fuel efficient equipment. GPC now has four (4) D11T machines in operation, the 5th is due in November 2010 and the 6th is due in</p>	Changes in management systems	Forklifts, front end-loaders, and other machinery

Gladstone Ports Corporation Limited	2010	<p>Bulldozer reduced idle time</p> <p><b>A research and development project is currently in progress to develop a cabin air conditioning system.</b> The aim is to power it from an alternative energy source (batteries), rather than directly from the main engine. The target for the project is to reduce the dozer idle time from 30% to 15% of the engine run hours. The potential benefits from this project are:</p> <ul style="list-style-type: none"> <li>A reduction in the fuel consumed when not performing productive work (i.e. moving coal).</li> <li>Reduced greenhouse gas emissions.</li> <li>Reduced maintenance costs due to over servicing of components not used whilst the machine is stationary and idling. The dozer maintenance schedules are based on engine run hours therefore the maintenance cost per tonne of coal handled should reduce.</li> </ul> <p>Throughout the 2009/10 reporting period expressions of interest were sought to contract a supplier to develop the cabin air conditioning system. A supplier was chosen and in February 2010 the trials commenced on three dozers. The system is still in development and the focus is on achieving reliability with the air conditioning units. Over the next reporting period GPC will continue to work with the supplier to achieve the desired reliability levels.</p>	Investment in research and development, testing and trialling	Forklifts, front end-loaders, and other machinery
Gladstone Ports Corporation Limited	2010	<p>Reclaim tunnel lighting</p> <p>Stage 1 of the 5 year Process Control System Upgrade, was completed in August 2010. In the 2009-10 reporting period <b>lighting modifications were completed in the reclaim tunnel lighting systems</b> on conveyor twenty (CC20). The lighting and ventilation system is now controlled at the tunnel access Gladstone Ports Corporation Limited point by a start/stop button and the <b>vent fan also automatically starts and stops when the conveyor is utilised.</b> The system is now on a four hour timer for vent fan and four and half for lighting instead of continuous illumination. Lighting modifications in conveyor ten (CC10) were also completed as part of the stage 1 upgrade. CC20 was upgraded on the 28 March 2010, and was operational for 697 hours during the period 30 March 2010 to 30 June 2010. It was identified that in the three month period 1,535 hours of electricity was saved which is equivalent to 15,700 kWh of energy savings or 14,000 kg CO2-e. The cost saving for CC20 is approximately \$2,600 pa. Further analysis on both conveyors will be conducted over the coming reporting period to improve our understanding of the potential benefits and also prepare the justification to management.</p>	Investment in new technologies or new configurations of technologies not used before	Lighting systems; Electric motors – fans
Gladstone Ports Corporation Limited	2010	<p><b>Data collection, management and reporting</b></p> <p>At RGTCT, a large quantity of Powerlogic's ION meters (7650 and 6200 models) have been installed during various plant upgrades. The focus for this reporting period has been on ensuring all meters will communicate with the control system.</p> <p>The primary objectives were:</p> <ul style="list-style-type: none"> <li>To automatically collect all of the time-of-use metering data from the existing meters installed,</li> <li>Install new meters where required, and</li> <li>Configure them to make the data available for analysis on the corporate network.</li> </ul> <p>A secondary objective was to provide access to the full functionality of the ION meters from the corporate network.</p> <p>All ION 7650 meters have now been upgraded and configured. Training has been conducted on the use of the ION enterprise software, specifically its' operation, functionality and how to extract and export the data. Detailed analysis can now be undertaken on the specific metering points to improve GPC understanding of energy usage at the major energy user site RGTCT. GPC also engaged a Contractor to prepare a functional description system document that details how to manage and analyze energy data and then subsequently designed a system to implement. This work has been completed.</p>	Improvement in energy measurement & monitoring	Own use
Gladstone Ports Corporation Limited	2008	<p><b>Equipment Choice</b></p> <p>GPC required a new coal loader in 2006. The business decision making process included a technical evaluation of mechanical vs diesel electric drive systems and the decision making criteria included a high % weighting factor on fuel/lubricants and energy efficiency performance for the life of the machine.</p> <p>The evaluation team identified the <b>diesel electric loader would use approximately 15 to 20 litres per hour less diesel</b> when compared to a similar size mechanical drive loader with the same loading capabilities. The Diesel Electric 783 kW Wheel Loader was recommended and purchased. This Diesel Electric Loader has been in operation for over 2 years. The average hours of operation have been 2,700 per annum. The estimated savings resulting from the purchase decision are:</p> <ul style="list-style-type: none"> <li>An energy saving of 1,600,000 to 2,100,000 MJ per annum; and</li> <li>Reduction in greenhouse gas emissions of approximately 109,000 to 145,000 kg CO2-e per annum.</li> </ul> <p>Main contributing factors identified for fuel/lubricant savings when operating at an average 50 metre carry loading cycle (eg stockpile to bin) are as follows:</p> <ul style="list-style-type: none"> <li>Unique power regeneration using capacitors to store energy from the 4 x 300 kW Switched Reluctant (SR) motors when in the retard braking mode, 30%</li> <li>Constant RPM engine speed driving an AC regulated electric alternator.</li> <li>Engineered efficient drive systems, no torque converter, transmission, drop box differentials for improved cycle times and no wet brake systems.</li> <li>Reduced quantities of on-board lubricants/fluids thus reduced wastage and leaks.</li> </ul> <p>Additional benefits</p> <ul style="list-style-type: none"> <li>Annual maintenance cost reduction and extended 'working' life of the engine by up to about 20% compared to a mechanical loader due to the lower total</li> <li>Lower noise levels - The diesel electric loader's environmental noise level test results at high engine idle were 10% less than a mechanical loader as measured.</li> </ul> <p>The performance of the diesel electric loader has matched expectations and a second diesel electric 783 kW wheel loader was purchased and commissioned.</p>	Investment in the same but more efficient technologies	Forklifts, front end-loaders, and other machinery
Gladstone Ports Corporation Limited	2008	<p><b>Equipment Replacement</b></p> <p><b>Two (2) existing Caterpillar 011 N bull dozers with Cat 3508B engines are being replaced with Caterpillar 011 T bull dozers with Cat C32 ACERT engines,</b> one in November 2008 and the other in September 2009. Both types of bull dozers have the same work capabilities.</p> <p>The business decision criteria did give due consideration to the amount of energy to be consumed to do the work specified in the performance evaluation base scenario and demonstrated performance of the measuring and monitoring system(s) to facilitate the effective and efficient operation of the equipment.</p> <p>Caterpillar's tests show their D11T bull dozer uses at least 4.7% less diesel than their 011 N under the same conditions of operation. On average a bull dozer works 5,000 hour per annum. The estimated savings resulting from the replacement of the 2 bull dozers are:</p> <ul style="list-style-type: none"> <li>An energy saving of 965,000 MJ per annum per dozer; and</li> <li>Reduction in greenhouse gas emissions of approximately 67,000 kg CO2-e per annum per dozer.</li> </ul> <p>Additional benefits</p> <ul style="list-style-type: none"> <li>Less air pollution - The ACERT™ technology manages combustion using a combination of air management, multiple fuel injections and careful timing to</li> <li>Lower maintenance costs - The oil change over time is every 500 hours of service for the D11T bull dozer compared to the 011 R which is every 250 hours.</li> </ul>	Investment in the same but more efficient technologies	Forklifts, front end-loaders, and other machinery

Gladstone Ports Corporation Limited	2008	<p><b>Simple Control System Modification</b>  GPC's Administration building was opened in 1974. There have been many changes within the building since then including the upgrade of the centralised air-conditioning system in 2005.  The building consumed 501,774 kWh per annum in 2007-2008.  To assist understand the building's electricity requirements and usage patterns the primary metering system was modified to provide metering data recorded in half hour intervals on a monthly basis. The centralised air-conditioning system has its own distribution board. Temporary metering was installed and the electricity requirements of the centralised airconditioning system and computer server room dedicated air-conditioning units were measured and monitored in half hour intervals.  The centralised air-conditioning system and computer server room dedicated air-conditioning units consume about 56% of the building's total electricity usage.  Whilst reviewing the metering data it was noted that on public holiday's the building was consuming around half the normal business day's peak electrical demand (kW). Discussions with refrigeration personnel and review of the temporary metering data of the air-conditioning systems identified the c</p>	Improvement in energy measurement & monitoring	Electric motors – HVAC and refrigeration equipment
Gladstone Ports Corporation Limited	2008	<p><b>Education and Awareness</b>  Awareness is an important part of GPC's systematic approach to identify energy efficiency opportunities from both a procedural and technical aspect. After the presentation of the introductory video to the personnel in GPC's administration building informing them of the Energy Efficiency Opportunities Program, GPC's energy usage portfolio, the responsibilities of all personnel with respects the program and how they can contribute, some simple, but effective changes in general practices have occurred.  GPC's administration building was part of the assessments done thus far. The building consumed 501,774 kWh per annum in 2007-2008. The electricity usage has been measured and monitored over the past 5 months and will continue to do so into the future. Whilst reviewing electricity usages patterns, a significant change in electricity usage was noticed at the end of the business day. This has been a result primarily of initiatives taken by cleaning personnel to modify office cleaning practices and initiatives by personnel to turn office equipment and lights off when leaving the office. The electricity saving is estimated at 19,554 kWh per annum. This is a reduction in greenhouse gas emissions of 17,739 kg CO2-e per annum. The</p>	Changes in the staff operation of equipment	Electrical equipment
Jet Systems Pty Ltd	2009	<p><b>The use of Ground Power Units (GPU) rather than the use of Auxiliary Power Units (APU)s</b> being improved through a range of training, information and procedural improvements of staff. A GPU burns approximately 80 litres an hour less fuel than an APU while providing essential power to the planes electrical systems while the aircraft is not in the air. The implementation of this project is expected to reduce the greenhouse gas emissions from the aircraft while they are on the ground.</p>	Changes in the staff operation of equipment	Air transport equipment
Jet Systems Pty Ltd	2009	<p><b>Reducing the weight of the aircraft throughout the flight</b> reduces the total fuel burn. This will be implemented through ensuring that the plane lands with minimal excess fuel while remaining within legislative safety requirements.</p>	Improvement in process control	Air transport equipment
Jet Systems Pty Ltd	2009	<p><b>Stand alone occupancy detectors</b> were installed in December 2008 throughout the shared areas in the Adelaide offices including kitchens, toilets and meeting rooms as well as some offices. Motion sensor devices turn off the lights in that room after it has been unoccupied for eight minutes and turn back on when a person re enters the room. This is particularly useful in the 24 hour areas which are only manned by a small number of staff yet lights are often left on.</p>	Investment in new technologies or new configurations of technologies not used before	Lighting systems
JJ Richards & Sons Pty Ltd	2010	<p>JJR Fleet - <b>a trial has been conducted on side lift vehicles to install hydraulic launch assist</b> The results have shown to decrease fuel consumption by 10% by using the energy reserved from the hydraulic systems to power initial take off in the trucks.</p>	Investment in research and development, testing and trialling	Road transport equipment
JJ Richards & Sons Pty Ltd	2010	<p>JJR Fleet - <b>Installation of speed limiters on fleet vehicles</b>, on particular road systems has proven to be successful. Waiting for final purchase approval.</p>	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
JJ Richards & Sons Pty Ltd	2010	<p>JJR Fleet - <b>Investigating transmission programs that reduces fuel usage by altering gear ratios and reduces vehicles from holding on to particular gears.</b></p>	Investment in research and development, testing and trialling	Road transport equipment
John Swire & Sons Ltd - Alex Fraser Group	2009	<p>Eliminating diesel consumption from earthmoving equipment by installing an "apron feeder" at the Clayton concrete recycling plant. <b>Incorporation of a feeder system to replace an earth ramp</b> negates the need for a second front end loader, reduces the travel distance from stockpile to plant and allows loader to operate on level ground. Energy consumption for this process will drop from 3,740 GJ to 1,690 GJ a year.</p>	Investment in new technologies or new configurations of technologies not used before	Mining, earth moving and other off-road materials handling equipment
John Swire & Sons Ltd - Alex Fraser Group	2009	<p>Eliminating diesel consumption from earthmoving equipment by <b>connecting the finished product stacker at the Clayton concrete recycling plant to the "pug mill" secondary processing plant</b>. Linking the stacker from the crushing plant directly to the pugmill at our Clayton recycling plant has eliminated one front end loader for 503 hours per annum, resulting in annual savings of 607 GJ. Previously a front end loader was required to pick up finished product from a stockpile and load it into the pugmill.</p>	Investment in new technologies or new configurations of technologies not used before	Mining, earth moving and other off-road materials handling equipment
John Swire & Sons Ltd - Alex Fraser Group	2009	<p>Increasing efficiency of on-highway truck movements by <b>increasing payload per movement</b>. A "Performance Based Assessment" process will be done on 2 on-highway trucks to evaluate whether payload could be increased from 33.5 tonnes to between 38 and 41 tonnes per movement. This opportunity is anticipated to reduce energy use by 129 GJ per annum.</p>	Investment in research and development, testing and trialling	Road transport equipment
John Swire & Sons Ltd - Alex Fraser Group	2008	<p>Eliminating diesel consumption/CO2 emissions by <b>redesigning conveyor systems</b>. One activity that uses a lot of diesel fuel in our business is the handling of raw and finished material by heavy earthmoving equipment. Our concrete recycling plants move raw material through various stages of processing via fixed conveyor belts. A fixed conveyor deposits the finished material into a single conical stockpile, whose volume is limited by the fixed elevation of the conveyor. This fact necessitates the 'double handling' of finished material to a larger stockpile by an earthmoving machine. In the design for our new concrete recycling plant at Laverton we have incorporated a telescopic radial conveyor to handle finished material. This equipment not only allows for a larger, radial stockpile to be created, but the conveyor is also able to extend telescopically to deposit second and subsequent stockpiles, increasing the finished product volume significantly, and almost eliminating the need for double handling by earthmoving machines.</p>	Investment in new technologies or new configurations of technologies not used before	Forklifts, front end-loaders, and other machinery

John Swire & Sons Ltd - Alex Fraser Group	2008	<b>Reducing diesel consumption/CO2 emissions with innovative gearbox software</b> on on-highway truck fleet. The company operates a fleet of 14 on-highway trucks that transport finished product, industrial bins and demolition waste around the Melbourne metro area. The fleet is a large user of diesel and each truck completes several thousand gear changes each day. Fuel use varies significantly depending on load and traffic conditions but also on gear selection. The fleet has been fitted with transmission shifting software that modifies the factory-set shift points in the upper engine RPM range to make a significant improvement in fuel economy. Over millions of gear changes this reduction in consumption of diesel is substantial.	<b>Investment in new technologies or new configurations of technologies not used before</b>	Road transport equipment
John Swire & Sons Ltd - Alex Fraser Group	2008	<b>Reducing diesel consumption/CO2 emissions by increasing the skills of earthmoving equipment operators</b> The company operates a fleet of approximately 40 earthmoving machines including hydraulic excavators and wheel loaders. For a given application an earthmoving machine has a range of fuel consumption that can be attributed to factors such as site layout and operator skill. For example a Caterpillar 980H wheel loader in a high workload application can use between 35.5 – 40.0 litres of diesel per hour. Operator technique such as how much throttle to use when raising the bucket on a wheel loader and the angle the bucket penetrates the stockpile are a matter of judgment, with poor operators using more fuel to achieve the same result as a good operator. We have employed a dedicated operator trainer to audit the skills of our operators, develop operator training programs and coach operators on the job. Operators use the company intranet to record diesel use and machine hours for each shift. This information is analysed against tones of material moved to compute a fuel use KPI for each site.	<b>Changes in the staff operation of equipment</b>	Mining, earth moving and other off-road materials handling equipment
John Swire & Sons Ltd - Kalari	2009	As part of the launch of Kalari's new driver simulator, we are developing a special <b>"Drive Green" training module to assist drivers in improving fuel efficiency</b> through a host of different driving techniques. Fuel efficiency is affected by a whole host of factors, and many of them are under the control of the driver. The transport industry recognises that driver behaviour can have a big impact on fuel efficiency – there can be up to 30% difference! Initial trials indicate that Drive Green Training integrated with our Driver Simulator can assist our drivers achieve an improvement of over 10%, with the average improvement being 5%	<b>Changes in the staff operation of equipment</b>	Road transport equipment
John Swire & Sons Ltd - Kalari	2009	Kalari continued to pursue its case for <b>Performance-Based Standards (PBS)</b> acceptance for its 25 m B-triple combination for its mineral sands contract. PBS allows greater flexibility for vehicle operators, designers and manufacturers in meeting regulatory requirements, while the standards directly protect safety, infrastructure and traffic flow, the acceptance of the design will allow Kalari to reduce the total number of prime movers operating on the contract by at least 2 which would equate to 2,180 x 180 kilometre round trips from the separation plant to the mine or the equivalent 392,000 km per year. Unfortunately, Kalari have abandoned this project as it has been unable to obtain approval from the Victorian Government Authorities.	<b>Changes in management systems</b>	Road transport equipment
John Swire & Sons Ltd - Kalari	2008	Kalari has purchased one of the first (p ACCAR) Kenworth Australia, designed, engineered and manufactured <b>LNG powered vehicles</b> . Kalari will take delivery of the 'LNG Prime Mover' in the first quarter of 2009 and the vehicle will be trialled throughout the remainder 2009. The prime mover will be powered by a 'Cummins Westport' engine that injects diesel just prior to natural gas to provide energy for auto-ignition. Natural gas is then injected at high pressure at the end of compression stroke (no pre-mixed air/fuel). This is able to be achieved by replacing the traditional injector with a common rail type injector. The engine maintains the same torque curve and power outputs. The engine produces approx 170 tonnes of CO2-e less emissions per year than similar engines powered by diesel. If the trial proves successful and there is a reliable supply of LNG, Kalari will consider ordering a number of LNG Prime Movers to operate on the east coast	<b>Investment in research and development, testing and trialling</b>	Road transport equipment
John Swire & Sons Ltd - Kalari	2008	Kalari in consultation with International Energy Services have been <b>trials LPGas1 Coldfuel system in 2 prime movers</b> one in Adelaide and the other in Melbourne since January 2008. LPGas1 Coldfuel system fumigates LPG with diesel and AET adds gas in a controlled manner into the engine air intake system just prior to the turbocharger. Diesel is still the main fuel with substitution rates typically of around 10%. LPG, having a higher flash point than diesel, increases the burn rate of the diesel which in turn provides a more complete combustion of the fuel i.e. by combining the two fuels 96-97%, of the diesel fuel is burnt, resulting in increased power and improved fuel consumption. Other benefits of using the LPG and Diesel blend include a reduction of NOx emissions by up to 12% and reduction of CO2 emissions by approximately 8%. Whilst there have been some setbacks with the trials i.e. there has been 2 engine failures which have required the engines to be re-built under warranty. Kalari will continue the trial until 2009 before considering converting any more of its fleet.	<b>Investment in research and development, testing and trialling</b>	Road transport equipment
John Swire & Sons Ltd - Kalari	2008	Kalari has long recognised that the first step to improve the fuel efficiency and fuel economy of its fleet is through driver training. Fuel economy can be improved by as much as 10 - 20% through driver training and is one of the reasons why Kalari enrolls all of its drivers in the Certificate III training course. To assist with further and ongoing training and to help monitor driver fuel efficiency performance, Kalari is <b>investing in a new state of the art Driving Simulator</b> . The simulator is fully portable to enable it to be relocated between depots Australia Wide and will eliminate the need for drivers to attend regular external training courses. The simulator addresses gear shifting techniques, speed management, space management, adverse conditions, emergency manoeuvres and equally as important, Fuel Efficient Driving Techniques. The training module also imparts to drivers the critical importance of route planning, control of engine torque and preventative maintenance related to engine wear. The scenarios contained in the training module challenge drivers to apply themselves to the concepts and demonstrate efficient gear shifting techniques and speed management to see the affect	<b>Changes in the staff operation of equipment</b>	Road transport equipment
John Swire & Sons Ltd - Swire Cold Storage	2009	Clayton facility. Project number 5. Warm up room. Status - Completed Warm up rooms are used in the cold storage industry by the store employees to warm themselves up every hour or so in a warmer environment than ambient. Store Workers conduct their operational duties in temperatures from +5 degrees Celsius down to - 25 degrees Celsius. The warm up room is also used to hang Personal Protective Equipment for drying and warming up. The warm room uses an electric operated, oil filled heater to warm up an internal room for the above set purpose. This heater operated on full heat, 24 hours per day, seven days a week. Capacity of the heater is 2000 watts. After EEO inspection/assessment process the Clayton EEO team agreed to <b>utilize the thermostat on the equipment and install a simple timer to switch off the equipment when facility is unattended</b> . Energy saving 64 GJ per annum. Cost to implement \$100.	<b>Investment in new technologies or new configurations of technologies not used before</b>	Electric motors – HVAC and refrigeration equipment
John Swire & Sons Ltd - Swire Cold Storage	2009	Lyndhurst Facility. Project number 34. Board Room air-conditioning. Status - Completed Board room is used typically only for 50% of the normal office hours. We found that the air-conditioning was running for 9 hours a day with common timer to General Office. The EEO team decided to <b>install an individual switch in the board room to switch on the Air-conditioning upon demand requirement</b> . The Air-conditioning unit is 11 kw in capacity. EEO team calculated that a saving of 5880 kWhrs would be saved with this implementation. Energy saving 22 GJ per annum. Cost to implement \$950.	<b>Investment in new technologies or new configurations of technologies not used before</b>	Electric motors – HVAC and refrigeration equipment
John Swire & Sons Ltd - Swire Cold Storage	2009	Homebush Facility. Project number 80. Room temperature calibration. Status - Implemented Refrigerated warehouses have numerous cold rooms running on temperature controlled devices. These devices can drift out of calibration and if this occurs, the room temperature call may cause excessive running of refrigeration equipment with additional energy consumption. With <b>regular calibration checks of temperature control devices</b> this situation can be avoided as in this case. Correct calibration is deemed as good maintenance practice. Energy saving estimated 571 GJ per annum. Cost to implement \$2,000.	<b>Changes in maintenance practices</b>	Electric motors – HVAC and refrigeration equipment

John Swire & Sons Ltd - Swire Cold Storage	2008	Lyndhurst has been the site where SCS's Engineering department has been conducting their <b>alternative lighting trials</b> , which are unique to the refrigerated warehousing industry, as trials must ensure technological soundness at -23°C temperatures. Thus far, we have experimented with various fluorescent combinations and emerging LED products, in combination with suitable sensor systems. Trialing must ensure that LUX requirements for OH&S are met, in addition to testing the viability of alternative systems in sub-zero temperatures. In traditional operations, 400 watt metal halide lights are used, and are generally on for the entire period of operation due to slow start up times. Proposed scenarios utilizing alternative lighting systems offer 35-40% savings on energy consumed by lighting in freezer areas.	Investment in research and development, testing and trialling	Lighting systems
John Swire & Sons Ltd - Swire Cold Storage	2008	Swire Cold Storage recognises that there are many savings to be made through programs to increase awareness of the role that floor operations has on energy use, particularly through air transfers and resulting condition loss. <b>Education programs coupled with toolbox talks and Standard Operating Procedures</b> will be implemented across the business, but will vary across each site. For example, Clayton – as an older site with limited rapid roller door technology – will focus on behavioural changes towards door use. The education program will be reinforced by audits and monitoring, and seeks to achieve improvements of 10-50% of energy loss via air condition transfers. It is extremely difficult to measure and quantify potential and realised savings in total energy consumption to a high level of accuracy, but it is envisaged that significant savings can be achieved.	Changes in the staff operation of equipment	Electric motors – HVAC and refrigeration equipment
John Swire & Sons Ltd - Swire Cold Storage	2008	Prior to the assessment period, the Site Manager at Clayton occupied a small building separate to the area of main operations. By relocating to the main area of operations with the rest of his staff, the <b>small building's lighting and airconditioning was shut down</b> . The additional benefit is that the manager also experienced improved operational efficiency by reducing travel time (which, when quantified, offers substantial "savings") While this opportunity offers relatively small energy savings, it demonstrates how the EEO program generated numerous energy saving initiatives that make good business sense and offer significant financial savings when initiatives were viewed from a "whole of business" perspective.	Changes in the staff operation of equipment	Lighting systems; Electric motors - HVAC and refrigeration equipment
K&S Corporation Limited	2010	Expansion of the installation program of <b>High Efficiency Alternators</b> (based on manufacturer's claims of improved fuel performance) - to provide fuel savings on a number of vehicles which had such alternators installed.	Investment in the same but more efficient technologies	Road transport equipment
K&S Corporation Limited	2010	Continued implementation of a tighter and expanded scheduled regime of <b>"Roller Shaker" testing</b> - for improved vehicle wheel drag, expanded across business units.	Changes in management systems	Road transport equipment
K&S Corporation Limited	2010	<b>Ribbed trailer equipment implementation program</b> - provided greater payload by the reduction of overall tare weight of trailer equipment.	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
K&S Corporation Limited	2008	K&S Fleet upgrade program incorporates the evaluation and selection of resources to meet specific customer service schedules. <b>Resources are matched to dedicated routes</b> enabling best utilization and greater customer service. These resources are upgraded on an ongoing basis to ensure maximum productivity and energy efficiency.	Changes in management systems	Road transport equipment
Lindsay Australia Limited	2009	The <b>consolidation of freight into B Double consignments to reduce the number of prime movers</b> required as a proportion of the total freight task. The proportion of the fleet that is now B Double rated has risen from 50% to 66% in this period. The level of B Double units within the fleet is reaching a peak as not all freight is suitable to B Double trailers. It is anticipated that this will effectively reduce the efficiency gains in the coming 2-4 year period.	Improvement in process control	Road transport equipment
Lindsay Australia Limited	2009	The use of <b>gas injection to improve burn of diesel which increases power and engine efficiency</b> reducing the overall quantity of diesel used by the fleet. The assessment of this opportunity is expected to take more than one year as it cannot successfully be assessed until the engine has run 1,300,00 kms. The company is limited in its ability to control many of the factors associated with engine efficiency as road conditions; individual driver behaviour; and load weight can vary dramatically.	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
Lindsay Australia Limited	2009	The use of <b>new oils and lubricants to increase engine efficiency and temperature management</b> . The company is undertaking a trial with assistance from Castrol Oil which is expected to continue for another year before results can be assessed.	Improvement in process control	Road transport equipment
Linfox Pty Ltd	2010	<b>Ecodriving</b> : Trial conducted by the company have demonstrated energy savings of up to 14%. As a consequence the company has developed curriculum to train drivers in the skills of eco driving. This material has been developed to provide instructor based training and also online training. Eight hundred and twenty six drivers had been trained to June 30,2010 and it is to train another 1000 drivers June 30 2011.	Changes in the staff operation of equipment	Road transport equipment
Linfox Pty Ltd	2010	<b>Tyre technology</b> in the form of reduced rolling resistance by using automated tyre pressure inflation systems is being adopted across the Linfox fleet to improve fuel efficiency.	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
Linfox Pty Ltd	2009	Ecodriving: trials conducted by the company have demonstrated energy savings of up to 14%. As a consequence the company has <b>developed curriculum to train drivers in the skills of eco driving</b> . This material has been developed to provide instructor based training and also online training. One hundred and sixty six drivers had been trained to June 30, 2008 and it is planned to train all drivers over the next 18 months.	Changes in the staff operation of equipment	Road transport equipment
Linfox Pty Ltd	2009	<b>Supply Chain Optimisation</b> : Supply chain optimization has been used as a tool in logistics for at least 2 decades, extensively, but Linfox has now acquired carbon mapping software which essentially maps energy use and can therefore optimize this element of the supply chain inputs. We have commenced trials with customers and in some cases reduced energy use in parts of contracts by up to 70%, mainly through modal switching of transport. This technique requires a high level of trust, transparency and co operation by the customer. During the year Linfox won industry recognition from the Logistics industry for our development of this capacity in conjunction with Software supplier Infor Pty Ltd.	Investment in research and development, testing and trialling	Road transport equipment



Linfox Pty Ltd	2008	<p>The majority of Electricity use in Linfox is in either Office or Ambient Temperature Warehouse environments. From a total of 215 sites throughout Australia, Linfox does not have control over electricity metering, regulation or payments in 99 of these. In such cases Linfox operates as a Logistics tenant often as part of a premises controlled by a manufacturer or distributor. Of the remaining 116 sites, 71 are Logistics sites and 45 Armaguard sites. It was decided to start with a programme which highlighted a common electricity use in all sites where Linfox had effective control – lighting. A total of 116 sites have now conducted Electricity Audits using the Greenhouse Challenge Plus Energy Audit Tool for Indoor and Outdoor Lighting (the major component of Linfox Electricity use in ambient temperature Warehouses)</p> <p>The results of the Audits, conducted by 2 Site representatives and a staff member of the Environment and Climate Change office identified many opportunities for Energy Saving through:</p> <ol style="list-style-type: none"> <li>1. <b>Changed Practices within the site</b></li> <li>2. <b>Installation of new lighting mechanisms</b></li> <li>3. <b>Changing control systems</b></li> <li>4. <b>Greater awareness of electricity use</b></li> </ol> <p>The programme has involved changes to specifications for new buildings incorporating energy efficient design (the first building completed since this prog</p>	<p><b>Changes in the staff operation of equipment; Investment in the same but more efficient technologies</b></p>	<p><b>Lighting systems</b></p>
Linfox Pty Ltd	2008	<p><b>Supply Chain Optimisation</b></p> <p>Supply Chain Optimisation refers to the configuration of distribution patterns across and between the links in a supply chain and the opportunity to deliver goods from point of production to point of consumption within predetermined parameters.</p> <p>Prior to consideration of Energy Use (and Carbon Emissions) this was predominantly on the criteria of price and timeliness. In late 2007 Linfox had the opportunity to be one of the first organisations in Australia to trial Carbon Footprint software which tracked carbon emissions (as an outcome of Energy use). We have found this a powerful tool to take into account energy use and have trialled it with a national customers with some surprising results. Our analysis has shown that with our trial customer a 10% reduction in energy use could be achieved with no increase in cost through three main actions:</p> <ol style="list-style-type: none"> <li>1. Changing the source of freight</li> <li>2. Changing the mode of transport</li> <li>3. Change the transport route</li> </ol> <p>Not all of the above actions are within the control of Linfox, implementation of these changes also requires customer capacity and willingness to change. However this powerful analytical tool provides significant opportunities for reductions in energy use, although it is very time consuming in the data</p>	<p><b>Changes in management systems</b></p>	<p><b>Road transport equipment</b></p>
Linfox Pty Ltd	2008	<p><b>Aerodynamic Vehicle Design</b></p> <p>Aerodynamic Vehicle Design has not received a great deal of focus from the road transport industry in Australia and has suffered, in our view, from a lack of rigorous investigation. With this in mind Linfox has funded a study by Monash University and a supplier of road transport trailing equipment, Maxi trans, to investigate and report on opportunities to implement effective Aerodynamic features to existing road transport equipment. Maxitrans is Australia's largest manufacturer and supplier of trailing transport equipment and solutions. Synonymous with road transport in Australia through the two market leading brands Freightner and Maxi-CUBE, MaxiTRANS has expanded through the acquisition of several other leading trailer brands to become the leading supplier of road transport equipment for the general freight, temperature controlled freight and bulk transport market sectors. MaxiTRANS is also a leader in the supply of repair and service support to the Australasian transport industry as well as being a significant supplier of parts. Monash University is a dynamic and internationally recognised university with a long established tradition in providing excellence in education. It is a Project background: Linfox, MaxiTRANS and Monash University recognise that considerable potential exists to develop, adapt and implement improvements</p> <ol style="list-style-type: none"> <li>1. To investigate and evaluate options for retrofitting of Heavy Vehicles and trailing equipment with devices to achieve improved aerodynamic performance</li> <li>2. To develop techniques and test procedures to evaluate aerodynamic performance of Heavy Vehicles.</li> <li>3. To develop best practice procedures for the design of new Heavy Vehicles and trailing equipment in Australia</li> <li>4. To develop a methodology to quantify energy savings as a result of aerodynamic improvements in Heavy Vehicle configurations</li> <li>5. Identify, following the above, any amendments to existing legislation that may be necessary to implement any vehicle changes that may be outside existing legislation.</li> </ol> <p>It is expected that this report will be received in the 2008-09 reporting period and the Energy Saving target for this initiative is set relatively low at 0.75% due to Tyre Technology</p>	<p><b>Investment in research and development, testing and trialling</b></p>	<p><b>Road transport equipment</b></p>
Linfox Pty Ltd	2008	<p><b>Improved Tyre Technology through new materials and better monitoring of tyre pressures</b> has the opportunity to reduce rolling resistance of vehicles and thereby increase fuel economy.</p> <p>New materials are the province of tyre manufacturers and we have been considering different tyre types, predominantly those with a higher silicon content that deliver higher fuel economy.</p> <p>We have also commenced a trial of onboard monitoring tyre pressures via micro chip technology that utilises a sensor in each tyre that alerts the operator to a tyre pressure that is outside an acceptable range. The significance of this in heavy vehicles, particularly, is significant. Often "inside" tyres of dual tyre sets cannot be easily checked by the operator and can run at relatively low pressures, undetected for some time and cause increased energy use as a consequence in addition to considerations of vehicle safety and stability.</p> <p>We estimate the ongoing savings in energy use for vehicles from this combined initiative, when implemented to be 0.5%</p>	<p><b>Investment in research and development, testing and trialling</b></p>	<p><b>Road transport equipment</b></p>
Linfox Pty Ltd	2008	<p><b>Improved Vehicle Utilisation</b></p> <p>Improved Vehicle Utilisation refers to the elimination of vehicles travelling empty without freight on board.</p> <p>This is a widely recognised inefficiency in the road transport industry and is a major potential to reduce unnecessary use of energy. An analysis of a sample of vehicle fleets has revealed situations ranging from full utilisation up to 50% under-utilised.</p> <p>We have started to analyse this opportunity and have developed an imaginative solution in one contract that transports raw materials, including liquids to a manufacturer and solid raw materials from the manufacturer to distribution centres. The vehicle below has below tray storage for liquids as well as carrying capacity on the tray.</p> <p>A conventional solution would require a tanker, not suitable for other purposes, delivering raw material in and travelling back to base empty. This solution avoids the need to have two specialised vehicles on the road under-utilised for 50% of the time by providing an integrated solution requiring only one vehicle with 100% utilisation.</p> <p>It is estimated that across the vehicle fleet an average of 30% of vehicle kilometres travelled is spent with vehicles returning from a delivery unladen. Although</p>	<p><b>Improvement in process control</b></p>	<p><b>Road transport equipment</b></p>

Linfox Pty Ltd	2008	<p><b>Eco Driving</b> refers to a system of driving where maximum fuel economy is achieved by the vehicle operator. This achievement is attained by observing a range of behaviours in driving that have been codified by Linfox and translated into a curriculum document suitable for instructional purposes. Over the next 24 months it is planned to train all Linfox Vehicle Operators in Eco Driving. The reduction in energy use from this activity is estimated to be 4.8%.</p> <p>In addition to the above programme we have partnered with a firm of Environmental Specialists, Andromeda Pty Ltd to produce the Eco Drive programme in an online version for use by Linfox staff and external users. The curriculum has been made available to this company, Andromeda, at no cost in order that they can commercialise the product and make it widely available to small and medium sized enterprises who may not, if reliant on their own resources, secure access to this training.</p> <p>In the absence of significant technological advances Eco Driving represents the single largest opportunity for improvement in energy use in the road transport sector.</p> <p>The biggest barrier to adoption of the principles of Eco Driving is acceptance by vehicle operators of changed driving habits. To overcome this barrier with these include delivery modes, learning materials, coaching, monitoring and recognition programmes.</p>	Changes in the staff operation of equipment	Road transport equipment
Mitchell Corp Australia Pty Ltd	2010	<p>Retreads</p> <p>Mitchell Corp Australia has a fleet in excess of 250 prime movers and associated trailing equipment, the majority of the fleet being road train combinations (each of which has 72 tyres). Mitchell in conjunction with our tyre service provider undertook <b>research into the benefits of using retreads on all drive and trailer tyres</b> in the fleet (investigating both financial and environmental benefits). Industry figures indicated approximately 80 litres of crude oil are required to produce new tyres vs only 16 litres for a retread tyre, this represents a significant reduction in embodied energy per tyre. Retread tyres traverse the same/or similar distance as new tyres whilst costing less than new tyres, resulting in financial savings for the business. Since the implementation of the project in FY09-10 Mitchell used in excess of 14,000 retread tyres. The project has resulted in significant financial benefits, has reduced embodied energy associated with retreads by approximately 20,000 GJ per annum (effectively reducing GHG emissions by 1377 tonnes in FY09-10) and has reduced quantity of waste tyres to landfill by 660 tonnes. These positive outcomes from our FY09-10 trials have resulted in the</p>	Investment in research and development, testing and trialling	Road transport equipment
Mitchell Corp Australia Pty Ltd	2010	<p>LNG Venting to Atmosphere (refueling from ISO)</p> <p>A large portion of the Mitchell fleet is run on dual fuel (LNG/Diesel), this significantly reduces greenhouse gas emissions from transport fuel which is the primary energy source consumed by the business. To enable our fleet to run on dual fuel Mitchell have installed the necessary infrastructure to undertake refuelling of the LNG fleet. A significant environmental aspect associated with this refuelling task is the current requirement to vent LNG direct to atmosphere in some specific circumstances. Mitchell instigated this project aimed at <b>reducing (and where possible eliminating) the requirement to vent LNG</b> and hence reduce consumption/waste of this energy source. Venting of LNG direct to atmosphere is necessary when refuelling a vehicle at the LNG ISO Storage Tank (located in Cue), this process requires the vehicle tank to be vented to atmosphere prior to refuelling from the ISO tank. Mitchell deemed the elimination of venting as essential and has worked with our LNG supplier to address this situation, through the installation of a new permanent LNG refuelling facility at Cuddingurra site. Venting of vehicle tanks is only required when refuelling from an ISO tank, the</p>	Changes in management systems	Road transport equipment
Mitchell Corp Australia Pty Ltd	2010	<p>Speed Limiting</p> <p>The fleet of vehicles that service a major customer and operate within the boundaries of the Port Hedland township were identified as appropriate to <b>trial speed limiting for improved fuel efficiencies</b>. Due to the controlled operating circumstances of this fleet (short round trip, same load weights, same task, etc) Mitchell is conducting investigations for potential improvement in fuel burn (energy efficiencies) when speed limiting these vehicles to a maximum 90km per hour. The combinations operating on this contract are triple road trains that undertake the transport of product from the customer site to Port facility. Mitchell are currently implementing trials to collate the data necessary to validate if speed limiting (to 90km/hour) will result in improved fuel burn rates for the road trains operating on this contract. The anticipated reduction in fuel consumption per km (energy efficiencies) will correlate in financial saving for the business. The majority of Mitchell contracts and tasks are performed over significant distances, these operating conditions prohibit investigation of wide spread speed limiting as this will impact significantly on driver fatigue management, legislative driving hour requirements.</p>	Investment in research and development, testing and trialling	Road transport equipment
MJ Luff Pty Ltd	2010	<p>A <b>Driver Training Programme</b> has been designed for line-haul drivers and implementation is due to commence shortly. Similar programmes have been shown to reduce energy consumption by up to 15% but a conservative figure of less than 10% has been used in this assessment. Approx 100 drivers are to undergo online training over a two year period commencing shortly.</p>	Changes in the staff operation of equipment	Road transport equipment
MJ Luff Pty Ltd	2010	<p>The majority of trucks over 12 tonne ZGVM already have aerodynamic kits fitted at the time of purchase. The potential to <b>add further aerodynamic equipment to the remainder of the heavy vehicle fleet</b> will be investigated. An average efficiency improvement of 3% is anticipated which may be a cost-effective efficiency option for high mileage vehicles.</p>	Investment in the same but more efficient technologies	Road transport equipment
MJ Luff Pty Ltd	2010	<p>The company is investigating the potential to use tyres on line-haul vehicles that are certified by the US EPA SmartWay programme as having <b>lower rolling resistance</b> than other tyres on the market. Although an average efficiency improvement of only 3% is anticipated it may prove cost-effective for some vehicles.</p>	Investment in the same but more efficient technologies	Road transport equipment
MJ Luff Pty Ltd	2010	<p>The use of <b>nitrogen-rich air in line-haul vehicles</b> has been shown to reduce blowouts and tread wear by keeping the air in tyres cooler. Energy efficiency is also improved when tyres maintain their shape and it is claimed that an improvement of up to 5% is possible, although this need to be verified by further investigation.</p>	Investment in the same but more efficient technologies	Road transport equipment
Public Transport Authority of Western Australia	2009	<p><b>Nitrogen filled tyres</b></p> <p>It has been claimed that nitrogen filled tyres have advantages over standard compressed air filled tyres including increased tyre life and improved fuel efficiency. Further investigation will be required to determine the benefits, barriers and savings.</p>	Investment in research and development, testing and trialling	Road transport equipment
Public Transport Authority of Western Australia	2009	<p><b>Diesel hybrid buses</b></p> <p>Diesel hybrid buses combine a conventional diesel engine with an electrical storage and drive system. It has been claimed that the hybrid technology enables the diesel engine to be run at optimal fuel efficiency to increase the fuel efficiency of the vehicle. Other associated technology such as regenerative braking are also usually incorporated to further increase fuel efficiency. Further investigation will be required to determine the benefits, barriers and savings.</p>	Investment in new technologies or new configurations of technologies not used before	Hybrid or electric vehicles
Public Transport Authority of Western Australia	2009	<p><b>Diesel Selective Catalytic Reduction (SCR) Euro 5 buses</b></p> <p>Diesel SCR Euro 5 buses have been reported to have potential energy savings of up to 5%. However it is claimed that the SCR Euro 5 buses may be more costly than conventional buses and also require AdBlue additive (reagent) to be used. Further investigation will be required to determine the benefits, barriers and savings.</p>	Investment in new technologies or new configurations of technologies not used before	Road transport equipment

Public Transport Authority of Western Australia	2009	<b>Emulsified Diesel Fuel (Diesel-water blends)</b> Emulsified diesel fuel is diesel fuel blended with a small percentage of water and an additive. It has been claimed that emulsified diesel fuels generally do not require engine modifications, and can help reduce exhaust emissions of particulates, nitrogen oxides (NOx), and greenhouse gas emissions. Further investigation will be required to determine the benefits, barriers and savings. Several emulsified fuels are commercially available: Aquadiesel (Shell), Aspira (BP), PuriNOx (Lubrizol), Profomix (Chevron), Aquazole (TotalFinaElf), Aspira (BP) and GECAM (Cam Technologie). Shell Aquadiesel is a blend of diesel (85%), water (12%), and emulsifier (2%) that is designed to reduce exhaust emissions of particulates, nitrogen oxides (NOx), and greenhouse gas emissions. It has the same retail price as standard diesel. Laboratory testing showed increased fuel efficiency (8% improvement), decreased NOx. Decrease in particulates have also been reported (see reference below). Very slight increase in greenhouse emissions reported -2%.	Investment in research and development, testing and trialling	Road transport equipment
QANTAS Airways Limited	2010	<b>Fleet Renewal</b> Fleet renewal is the foundation for Qantas' fuel conservation program. The Qantas Group is investing US\$22 billion in highly fuel-efficient next generation aircraft (at list prices), such as the Airbus A380 and Boeing 787. The Qantas Group has six A380s in service, with a further 14 to come, and 50 B787s on order. During the year, the Group brought 23 new aircraft into service: • Qantas and QantasLink - three A380s, one A330-200, three B737-800s, seven Bombardier Q400s • Jetstar, including Jetstar Asia - one A330-200, six A320-200s, two A321-200s • The Group retired nine aircraft - three B747-400s, three B767-300ERs and three B737-300s. More than 150 new aircraft are planned for delivery over the next eight years. This represents more than one new aircraft per month, and will enable the retirement of up to 65 older aircraft with some types (B767-300 and B737-400) to be progressively phased out.	Investment in the same but more efficient technologies	Air transport equipment
QANTAS Airways Limited	2010	Flight Planning Optimisation Qantas has invested in <b>enhancing its flight planning systems, developing a capability known as "Free Flight"</b> . This system enables the aircraft to optimise the flight path to take advantage of the most favourable wind and weather conditions while minimising fuel consumption. Qantas is pioneering <b>Required Navigational Performance (RNP), which uses leading edge technology to land aircraft efficiently</b> . This is one of a range of advanced navigational aircraft technology enabling procedures such as Automatic Dependent Surveillance - Broadcast (ADS-B); Dynamic Aircraft Route Planning (DARF), tailored arrivals, Constant Descent Arrivals (CDAs) and Electronic Flight Bag (EFB).	Investment in new technologies or new configurations of technologies not used before	Air transport equipment
QANTAS Airways Limited	2010	Composite Containers. Reducing aircraft weight is a key element of reducing aircraft fuel burn and emissions. Qantas has continued its program of aircraft weight reduction across all aspects of its operation and has recently completed <b>replacement of its most common type of aluminium freight containers with advanced composite devices</b> . These containers are approximately 50% lighter than previous aluminium containers saving over 150 kg on some aircraft whilst also proving to be more durable and damage resistant.	Investment in the same but more efficient technologies	Air transport equipment
Qantas Airways Limited	2009	Qantas plans to invest \$1.7 billion (FY10) and \$2.7 billion (FY11) on new aircraft acquisitions and non aircraft capital, <b>introducing into its fleet some of the world's most efficient aircraft</b> , including the Boeing 737-800 and the Boeing 787 Dreamliner which will offer a 20 per cent reduction in fuel per seat kilometer compared to similar sized aircraft. The cornerstone of QantasLink's fleet renewal remains the 72-seat turbo-prop Bombardier Q400. QantasLink now operates 14 Q400 aircraft. On regional routes, the Q400 burns 35 per cent less fuel than similar-sized jet aircraft.	Investment in the same but more efficient technologies	Air transport equipment
Qantas Airways Limited	2009	Qantas' program of <b>weight reduction</b> focuses on two main streams - "Above Wing" which targets reducing the weight and volume of cabin product on board the aircraft and "Below Wing" which involves the technical removal of weight from equipment and furnishings on board. This program has achieved an average of 119kg reduction per aircraft.	Improvement in process control	Air transport equipment
Qantas Airways Limited	2009	Qantas' Auxiliary Power Unit (APU) reduction program focuses on <b>utilising ground based infrastructure (Power and Pre-Conditioned Air) where available to minimise APU usage</b> across its network. This operational change has achieved savings of over 1.25 megalitres of jet fuel or 45,960 GJ of energy in 2008/9.	Improvement in process control	Air transport equipment
QR Limited	2009	<b>Regenerative Braking</b> \$2.6 million/annum saving Braking traditionally wastes energy due to the loss of heat. However, with regenerative braking, this energy is returned back into the supply network to be used by other locomotives. The current generation of AC traction electric locomotives that are being delivered to QR are "regenerative braking ready". QR and the electricity supply company are currently investigating the system ramifications and it is expected that a trial will commence in the near future.	Investment in new technologies or new configurations of technologies not used before	Rail transport equipment
QR Limited	2009	Replace system fleet - Newlands system A saving of 3.67 ML of fuel and \$4.6 million/annum <b>Replace the existing fleet of locomotives working in the Newlands system with state of the art AC traction diesel locomotives</b> Due to the increased haulage capacity of the AC traction locomotives, two locomotives would be able to haul the same load as four general purpose type locomotives that comprise a large proportion of the current fleet.	Investment in the same but more efficient technologies	Rail transport equipment
QR Limited	2009	<b>Modernise system fleet</b> - Newlands system A saving of 1.75 ML of fuel and \$2.2 million/annum The current fleet is a mixture of locomotive classes, predominantly those locomotives that are available. If locomotives were modernised and optimised during overhaul, specifically for this (and similar) traffic, a significant improvement in locomotive efficiency would result. 20 locomotives could be replaced by 15. 3 as these locomotives could haul the same load as four general purpose type locomotives.	Investment in the same but more efficient technologies	Rail transport equipment
QR Limited	2008	<b>Smart-start (an automatic idling locomotive shutdown program)</b> 0 month pay back on investment of Smart Start with \$ 40,000/annum saving and a CO2-e reduction of 81.2 tonnes per locomotive. The basic principle of the automatic engine start stop system is to shut down the locomotive engine when it has been idling for a predetermined amount of time. As a result of shutting down the engine, savings in fuel and carbon emissions are gained and locomotive work time is reduced.	Investment in new technologies or new configurations of technologies not used before	Rail transport equipment
QR Limited	2008	<b>Speed reduction</b> on the North Coast line \$2.5 million - \$3.4 million saving and a CO2-e reduction of 7,185 tonnes per year. Train performance simulations were conducted for container trains between Brisbane and Cairns. The results of the simulation showed there was a potential 11% saving in fuel, however there would be a 6% increase in travel time.	Investment in research and development, testing and trialling	Rail transport equipment

QR Limited	2008	<b>Limiting throttle usage</b> on the Mt Isa return leg \$1,260,000 saving and a CO2-e reduction of 2,631 tonnes per year. Train performance simulations were conducted for empty mineral concentrate train operations between Stuart and Mt Isa. The results of the simulation showed that an 8% reduction in fuel usage could be achieved by limiting high throttle usage, however there would be a 5% increase in travel time.	<b>Investment in research and development, testing and trialling</b>	<b>Rail transport equipment</b>
Rail Corporation NSW	2010	RailCorp has undertaken a detailed assessment of its train stabling practices. Trains are taken out of service and stabled when they are not required. The assessment found that auxiliary systems such as carriage lighting and air conditioning systems often remain active while trains are stabled for train cleaning, service preparation, security and reliability reasons. The study highlighted that considerable energy savings could be achieved by <b>improving train shut down practices</b> where organisational objectives such as safety, security and reliability are not compromised. RailCorp is investigating procedural options for reducing energy consumption during stabling in the broader context of RailCorp's efforts to improve and maintain the safety, cleanliness and reliability of its passenger fleet.	<b>Changes in the staff operation of equipment</b>	<b>Rail transport equipment</b>
Rail Corporation NSW	2010	<b>Station LED Lighting</b> As previously reported, RailCorp has investigated station lighting energy consumption and identified upgrade options based on best available lighting technologies. LED (Light Emitting Diode) technologies have been found to offer the potential for significant energy efficiency and performance benefits. RailCorp is currently trialing LED technologies at its Hurlstone Park and Hornsby stations and at other facilities such as some substation yards. These LEDs installations have so far been performing well against key performance criteria and are being further examined. The final outcomes of LED trials will be considered for potential specification in RailCorp's station design standards.	<b>Investment in the same but more efficient technologies</b>	<b>Lighting systems</b>
Rail Corporation NSW	2010	<b>Energy Efficient Running</b> Desktop studies and stakeholder consultations have revealed that <b>train driver practices such as maximising coasting, optimising acceleration rates and avoiding stop/start driving</b> may offer traction energy efficiency benefits. A assessment is currently underway using train performance modeling software to better understand and quantify these potential energy savings. The technical performance characteristics of RailCorp's various rollingstock types, baseline driving styles and actual network parameters such as gradients, distances between stations and current timetables are being factored into this modeling to better understand these opportunities in the context of RailCorp's complex operational network. Those opportunities that are verified to offer cost effective energy savings while not adversely impacting on safety, reliability and on-time running may be further explored.	<b>Changes in the staff operation of equipment</b>	<b>Rail transport equipment</b>
Rail Corporation NSW	2009	Much of RailCorp's modern train motor carriages are fitted with regenerative (rheostatic) braking, which feeds electricity back into the overhead wiring system or to on-board systems under braking conditions. RailCorp currently reuses a significant amount of regenerated electricity in its traction system, supplying approximately 7% of RailCorp's total traction electricity usage. However a large amount of regenerated energy is unable to be reused when the local traction supply is not receptive to power flows; as a result this energy is typically dissipated as heat in banks of resistors. RailCorp undertook an <b>assessment of options for storing regenerated braking energy using trackside energy storage technologies</b> . The assessment found that super capacitors, flywheels and to a lesser extent lithium-ion battery trackside regenerative storage technologies could have potential for further investigation. The assessment found these technologies are still developing and to date there has only been limited trial application on rail networks internationally. Due to the very early stages of commercial development the payback period was found to be significantly greater than four years. RailCorp	<b>Investment in research and development, testing and trialling</b>	<b>Rail transport equipment</b>
Rail Corporation NSW	2009	RailCorp assessed utilising <b>LED marker lights to replace the existing incandescent marker lights</b> used on the majority of its trains. Marker lights are used at each end of train consists to enhance the visibility of trains. The assessment found the payback to be in excess of four years, however further investigation into this initiative is being undertaken as it may enable energy efficiency initiatives to be realised in the area of train stabling. The area of train stabling operations is currently being assessed and will be reported in a future EEO report.	<b>Investment in the same but more efficient technologies</b>	<b>Lighting systems</b>
Rail Corporation NSW	2009	Further work has been undertaken in the area of station lighting systems following the initial assessment reported in RailCorp's first EEO report. RailCorp has engaged specialist lighting services to provide advice and recommendations for improving lighting energy performance at stations. RailCorp has also worked with Transport Infrastructure Development Corporation (TIDC) to <b>develop Sustainable Design Guidelines for Stations, Commuter Car Parks and Maintenance Facilities</b> . TIDC is a government agency responsible for the delivery of major rail infrastructure works, which when delivered are operated by RailCorp. The Sustainable Design Guidelines provide a process for enhancing sustainable performance in the design of new (and for major upgrades of) rail stations, commuter car parks and train maintenance facilities and include guidance on measures to improve energy efficiency. Furthermore RailCorp is undertaking trials of energy efficient LED lighting at two of its urban stations. They are currently in place and being monitored and evaluated against key performance requirements.	<b>Changes in management systems</b>	<b>Lighting systems</b>
Rail Corporation NSW	2008	<b>Refurbishment of existing lighting with more energy efficient options</b> during the station upgrade Representative assessments were conducted at six RailCorp stations. These assessments highlighted station lighting as an opportunity area where energy efficiency improvements could be achieved. Due to the large number of stations and the varying age of station infrastructure, the type of lighting currently in use at stations varies. The assessments identified refurbishment solutions which involved replacing existing fittings, lamps and associated control gear with more energy efficient alternatives. It was identified that the replacement of existing lighting without regard to the asset age is neither cost effective nor environmentally sound. Instead, a targeted approach through existing station upgrade programs has been identified as the most efficient approach for introducing more efficient lighting systems to stations. Further investigation is to be undertaken to identify efficient lighting options, which meet safety and business requirements, for application in specific functional areas of stations. Viable options from this review will be considered for incorporation into RailCorp's station upgrade and design standards.	<b>Investment in the same but more efficient technologies</b>	<b>Lighting systems</b>
Rail Corporation NSW	2008	<b>Use of voltage reduction units on station lighting circuits</b> Representative assessments at stations highlighted that the use of voltage reduction units (VRUs) on selected station lighting circuits would decrease the energy used during operation. VRUs work on the principle that fluorescent lights only need full power when initially switched on; after a warm-up period the voltage can be reduced. This can save up to 25% of the power consumed by fluorescent lights and potentially extend lamp life. Further investigation is required to determine which lighting areas are suitable for VRU application and to fully assess reliability and safety issues.	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>Lighting systems</b>

Rail Corporation NSW	2008	<b>Replacement of current lighting on V-Set trains with more energy efficient alternatives</b> RailCorp conducted an assessment of lighting onboard V-Set intercity trains. The assessment identified energy savings that could be made by changing the existing lamps and fittings with T8 tri-phosphor lamps, electronic ballasts and new fittings. Due to the non standard nature of electrical systems on trains and overarching public safety considerations, further investigation is required. RailCorp plans to undertake further investigation against relevant performance requirements and trialing, if viable, to ensure it meets safety and reliability criteria.	Investment in the same but more efficient technologies	Lighting systems
Regional Express Holdings Ltd	2010	<b>Radar Standard Instrument Departure (SID)</b> for Rex aircraft departing Sydney which has calculated savings of 47,000 litres of fuel per annum. These Radar SIDs shorten the distance flow on departure between the runway and the first tracking point in comparison to the current process. These Radar SIDs are currently used however, the frequency of use will significantly increase.	Improvement in process control	Air transport equipment
Regional Express Holdings Ltd	2010	<b>Increasing cruise altitude:</b> Due to the success of Sydney-Lismore and Sydney-Ballina sector, we are now looking into extending this across the network. With effect December 2010, flight planning changes to 16k and 17k feet will begin to be implemented to multiple sectors in the Regional Express Network. Total anticipated savings from these sectors is 199k litres.	Changes in the staff operation of equipment	Air transport equipment
Regional Express Holdings Ltd	2010	<b>Aircraft weight reduction:</b> The energy committee identified further opportunities within this category. A) Replacing of the Hydralock seat reclining mechanism with a fixed support is one such initiative which will save about 3Kg of weight per aircraft. Replacement will come at a cost of \$13,674 per aircraft but we may be able to reduce this cost by either manufacturing the fixed arm ourselves or by selling the removed Hydralocks. Average weight saving across the fleet (47 aircraft) would be 3kg. The payback period will fall outside the 4yr period as the investment would be AUD 642k and the savings is only 184GJ (AUD 4k per yr) After careful consideration of costs and savings potential, the energy committee has decided not to implement this opportunity. B) Replacing leather seat covers to E leather seat covers is another initiative within the aircraft weight reduction category which will save about 68kg (average 1.3kg across fleet of 51 aircraft). We have rchased 4 aircraft sets of E Leather seat covers. Each E leather seat cover is about 35% lighter than genuine leather. A genuine leather cover weighs 1.4Kg. A 35% saving equals 500g per seat which equates to 17Kg per aircraft (our Saab aircraft have leather seat covers is \$131,569. Whilst the payback period will fall outside the 4 yr period, this initiative is deemed implemented as we have already purch	Improvement in process control	Air transport equipment
Regional Express Holdings Ltd	2010	<b>Use of bio-fuel in CT7 engine:</b> The energy committee is looking to discuss with GE and the oil majors of feasibility to introduce biofuel into the Saab engine. Certification of this could take 1 -2 yrs. Unfortunately, the oil majors have reverted mentioning that they don't have any biojet to offer in Australia and it is unlikely there will be any available in commercial volumes for the foreseeable future. At the present time the only "bio-fuels" that are approved for use in turbine engines are those that meet the requirements set out in ASTM D7566. D7566 currently only covers Fischer-Tropsch hydroprocessed SPK(FT-SPK), typically produced from gas, coal or biomass. Only the "biomass" feedstock would be considered biojet. A second bio-jet will be included in 7566 in the very near future - these are often referred to as HRJs or hydro-treated renewable jet fuels. HRJ is simply hydro-treated natural plant or animal oils such as camelina, jatropha, algae or tallow refined to meet the requirements of D7566 and blended to meet ASTM D 1655. Def Stan 91-91 is following this work closely and will adopt the same approvals in due time. If we are successful in introducing bio-fuel into the Saab	Investment in new technologies or new configurations of technologies not used before	Air transport equipment
Regional Express Holdings Ltd	2009	<b>Reduction of aircraft weight</b> 1) Ladders - removing ladders from aircraft. Removed 14 steel ladders (7.5kg each) and 26 aluminium ladders (5.5kg each). Achieving total weight savings of 248kg across the fleet. 2) Removing Aircraft flight manuals (AFM, 1.8kg) and Aircraft Operations manuals (AOM, 3.5kg) from aircraft achieving total weight savings of 222.6kg across the fleet. Total impact of above 2 initiatives will result in 11.2 kg per aircraft savings	Improvement in process control	Air transport equipment
Regional Express Holdings Ltd	2009	<b>Raising height restrictions for aircraft arriving and departing from Sydney</b> Currently departing aircraft from Sydney is held down at low level for significant amount of track miles causing extra fuel burn. Similarly arriving aircraft are forced to descent prematurely to lower levels by air traffic control forcing them to lower off and burn unnecessary fuel as a result. If these height restrictions could be raised, there would be significant savings in fuel burn. Currently proposals have been put forward to Air Services Australia by all the main industry participants operating into Sydney to raise these heights by at least 2,000 feet. Savings of 166,666 litres across fleet.	Changes in management systems	Air transport equipment
Regional Express Holdings Ltd	2009	<b>Increasing cruise altitude</b> Current standard cruise altitudes are being reviewed by flight operations performance engineering with the view to introducing variable standard altitudes to allow for higher levels at lighter loads. The object of the review is to increase the average cruising height level across the entire network which will reduce average fuel burns and hence carbon emissions. Case study conducted on Syd – Lismore and Syd - Ballina routes projected over a year is anticipated to produce savings of approx 16,600 litres	Changes in management systems	Air transport equipment
Regional Express Holdings Ltd	2009	<b>Installing solar panels</b> at our Subsidiary's (Australian airline pilot academy) newly constructed campus The installation of 24 solar panels in various buildings of the pilot academy which is expected to cost AUD 75,000 will reduce the requirement to purchase electricity from the grid which in turn will reduce scope 2 emissions associated with the purchase of electricity. The electricity consumption of the campus comprising the main administration and academic block, accommodation block, is expected to consume 900,000 Kwh per annum. The solar panels are expected to reduce energy consumption by 7,884Kwh per year with anticipated savings of approx 28 GJ (AUD 1,050 in electricity cost)	Investment in new technologies or new configurations of technologies not used before	Solar Photovoltaic
Regional Express Holdings Ltd	2008	<b>Reduction of aircraft weight</b> The following initiatives are at various stages of completion: 1) Catering – 1 drawer per bar instead of 2. Reduction of 8Kg per aircraft. Made possible by removing spirits from the bar. Initiative completed. 2) First aid kit – currently sourcing plastic container to replace metal container. Reduction of 1Kg per aircraft 3) Sheepskin seat covers – convert to leather. 5 aircraft have been converted. 1 aircraft left to convert. Conversion cost approx AUD40K per aircraft. Reduction of 5kg per aircraft. Also removes the need to dryclean sheep skin which is energy intensive 4) Water in toilets – blocking of taps and provide antiseptic swipes. All new leased aircraft are also being blocked off. 7 litres or 7kg reduction per aircraft due water weight. Cost for this initiative is minimal -placard and ongoing cost of antiseptic wipes. 5) Chocks – removed from aircraft. Ground staff bringing to aircraft upon arrival. Reduction of 12kg per aircraft. 6) Ladders – removing ladders from aircraft. Initiative will be completed in 2 weeks time. Removing 14 steel ladders (7.5kg each) and 26 aluminium ladders (5.5kg each). The above initiatives can reduce aircraft weight by approx 22kg per aircraft. Fuel savings are estimated at about 0.02 litres/kg/hr. Based on annual flight h	Improvement in process control	Air transport equipment

Regional Express Holdings Ltd	2008	<b>Installing winglets to reduce drag</b> Currently exploring this opportunity with Aeronautical Engineers Australia. Fuel consumption savings are estimated at 5%. Estimated installation cost of AUD 8 million over 40 aircraft with yearly savings of AUD 1.99 million. 4yr Payback period expected.	<b>Investment in research and development, testing and trialling</b>	<b>Air transport equipment</b>
Regional Express Holdings Ltd	2008	<b>Reducing flight frequencies</b> in winter due to higher fuel uplift in winter vs summer months Due to the specific gravity of fuel in winter, it is observed that fuel consumption per hr in winter months is higher than the average for the rest of the year. The consumption differential between winter and non winter months is approx 16 litres/hr. We examined the possibility of reducing flight frequencies by 10% in winter months (approx 1,455 hrs) which would result in 23,000 litres of fuel savings. At the same time, the revenue loss stemming from the reduced frequencies is expected to be AUD 2.9 million assuming 65% load factor and conservative average fare. This results in negative net financial benefit of approx AUD 703,000 per yr over a 4 yr period. The energy committee and Rex management decided not to implement this opportunity.	<b>Changes in management systems</b>	<b>Air transport equipment</b>
Regional Express Holdings Ltd	2008	<b>Request for reduction in track miles</b> from Air Services Australia The current Air Services process for arrival and departure manoeuvre the aircraft up to 20 nautical miles further than the direct flight path. If the aircraft flight path was able to be streamlined to the more direct route REX would be able to reduce the sector length by approximately 5 minutes resulting in a fuel saving of 1.8 million litres per year. We have formally requested Air Services Australia to consider providing Rex with reduced track miles wherever possible.	<b>Improvement in process control</b>	<b>Air transport equipment</b>
Scotts Transport Industries Pty Ltd	2009	Fuel savings have been recognized due to the adoption of the National Heavy Vehicle Accreditation Scheme which incorporates the <b>review of driver practices</b> through Log Book validation and GPS tracking.	<b>Changes in the staff operation of equipment</b>	<b>Road transport equipment</b>
Scotts Transport Industries Pty Ltd	2008	Scotts Transport Pty Ltd is investigating opportunities to increase payload and improve customer service. <b>Resources are managed to minimize inefficiencies in partial loading and empty running</b>	<b>Changes in management systems</b>	<b>Road transport equipment</b>
Scotts Transport Industries Pty Ltd	2008	Negotiations with prospective and existing clients has resulted in significant <b>movement from single trailer to B-Double combinations reducing road time</b>	<b>Improvement in process control</b>	<b>Road transport equipment</b>
Scotts Transport Industries Pty Ltd	2008	Analysis of fleet to allow replacement programs that best <b>match engine efficiency to load requirement.</b>	<b>Investment in research and development, testing and trialling</b>	<b>Road transport equipment</b>
Skywest Airlines Pty Ltd	2010	<b>PC energy consumption monitoring</b> Skywest's office PC fleet contributes to its total energy use. PCs which are on, but not actively or effectively being used represent a waste of energy & cost to the environment. An opportunity has arisen to trial the company's power management software to measure & manage its carbon gas emissions from its PCs. The software monitors & provides an analysis of the company's PC energy usage & costs. It also allows the company to identify energy efficiencies to maximize its emissions reductions. It delivers to each PC user relevant & timely information about their computer use & feedback on how to change their usage in order to reduce their energy consumption (eg display shutdown, screen saver launch). It is estimated that power efficiency will increase by up to 50-85% with the use of this software & result in savings of approximately 2,547 GJ of CO2 emissions per year. The project payback depends on the level of support the company requires by the supplier, however it is estimated a 3 year supplier support package will result in a	<b>Improvement in energy measurement &amp; monitoring</b>	<b>IT, communications and other electronic equipment</b>
Skywest Airlines Pty Ltd	2010	<b>Office PC desktop replacement</b> Old, obsolete and inefficient PCs have been replaced with newer cost-efficient desktops in 2010. They offer optional high efficiency power supplies & energy conscious design options including up to 90% efficient power supply units & power management settings. Annual savings are estimated at 249 GJ tonnes of CO2 emissions per year.	<b>Investment in the same but more efficient technologies</b>	<b>IT, communications and other electronic equipment</b>
Skywest Airlines Pty Ltd	2010	<b>Office equipment replacement</b> Skywest continue to replace old, obsolete and inefficient PCs with newer cost-efficient systems including new laptops in 2011. They offer optional high-efficiency power supplies & energy conscious design options including up to 90% efficient power supply units & power-management settings. Annual savings are estimated at 116 GJ of CO2 emissions per year.	<b>Investment in the same but more efficient technologies</b>	<b>IT, communications and other electronic equipment</b>
Skywest Airlines Pty Ltd	2009	<b>Fokker 100 Fuel Policy - slower cost index</b> Following a trial in June 2009; Flight Operations and scheduling have determined that flying at a slower cost index with result in lower fuel burn. Coupled with climbing at 250/0.65 which is proven to save approximately 100kg per sector; this is now operational in F100 flight operations.	<b>Changes in management systems; Improvement in process control</b>	<b>Air transport equipment</b>
Skywest Airlines Pty Ltd	2009	<b>Fokker 100 APU Operating Policy</b> Skywest has been investigating the use of the Auxiliary Power Units in F100 aircraft. In line with the industry practices, flight operations now comply with turning off the APU after start and back on again once inbound to the bay.	<b>Changes in management systems; Improvement in process control</b>	<b>Air transport equipment</b>
Skywest Airlines Pty Ltd	2009	<b>SOE Desktop Refresh</b> Old, obsolete and <b>inefficient PCs have been replaced with newer systems</b> as part of the SOE desktop refresh programme.	<b>Investment in the same but more efficient technologies</b>	<b>IT, communications and other electronic equipment</b>
Skywest Airlines Pty Ltd	2009	<b>Server Virtualisation</b> Server side hardware has been migrated to a virtualised environment; reducing the total amount of hardware required. Information Technology staff have been looking into the usage throughout the office and devised a matrix of costs.	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>IT, communications and other electronic equipment</b>
Skywest Airlines Pty Ltd	2008	<b>Implementation of Reduced Vertical Separation Monitoring (RVSM)</b> The goal of this project was to optimise flight and operating conditions of the Fokker 100 jet fleet (8) aircraft. By seeking and gaining approval from the Civil Aviation Safety Authority (CASA) to operate aircraft to Reduced Vertical Separation Monitoring (RVSM) means Skywest can now operate it's aircraft to cruise at higher altitudes. Higher altitude cruise will lead to a corresponding reduction in overall fuel burn. Skywest estimate that between 2 to 5% less fuel burn would be achievable by operating at FL330 - FL350 versus FL250 - FL310. Before the implementation of RVSM the standard fuel burn per flight hour for the F100 Jet aircraft was approximately 2,500 litres. All eight (8) Fokker 100 Jet aircraft operated by Skywest Airlines are approved to RVSM standard. The costs of implementation were \$16,000 and Skywest estimate that cost savings per annum as a result of reduced fuel burn will be between \$325,000 and \$757,000	<b>Improvement in process control</b>	<b>Air transport equipment</b>

Skywest Airlines Pty Ltd	2008	Revised Company Fuel Policy. The Skywest Fuel policy has been amended with regard to fixed reserve. Previously Skywest Fuel policy was to carry sufficient fuel for a minimum of 60 minutes flying over and above sector to be flown. The policy has been reduced from 60 to 30 minutes without compromising the safe operation of Skywest flights. Given the fact that fuel burn is increased by the carriage of excess fuel. The <b>reduction of excess fuel carried</b> will result in reduced fuel burn per hour and therefore reduced fuel usage overall. Skywest estimate that approximate 315,000 litres of fuel <b>will be saved per annum by operating the Fokker 100 Jet Fleet (8 aircraft) with a lower base fixed fuel reserve.</b>	<b>Changes in management systems; Improvement in process control</b>	Air transport equipment
Skywest Airlines Pty Ltd	2008	Skywest has been working with Governments and local councils to reduce where feasible, the frequency of flights to regional communities being serviced by smaller turbo prop aircraft and replacing the capacity with less frequency and larger regional jet aircraft. Skywest plans to introduce an all Jet Schedule to it's Kalgoorlie service from February 2009, with further ports to benefit from a Jet Service at a later date. The exact cost savings and reduced carbon emissions from <b>operating larger aircraft with reduced frequency on certain routes</b> have yet to be quantified.	Improvement in process control	Air transport equipment
Spotless Group Ltd	2010	Laundry Division <b>1. Route optimisation of the National laundry vehicle fleet</b> Victoria Over the last two years, route optimisation of the laundry vehicle fleet centered on those vehicles from our Punchbowl (NSW), Kelvin Grove (QLD), Murdoch (WA) and Dudley Park (SA) laundries. For the year ending June 2010, we observed an annual reduction in fuel use of 16% (or 52 kilolitres) from those laundry vehicle fleets.	Improvement in process control	Road transport equipment
Spotless Group Ltd	2010	Lighting - <b>Configuring lighting circuits in the learning space to operate via occupancy sensors</b> – 1,394 GJ saving	Investment in new technologies or new configurations of technologies not used before	Lighting systems
Spotless Group Ltd	2010	Lighting - <b>Install daylight sensors</b> on walkways to switch off lights during daylight hours - 523 GJ saving	Investment in new technologies or new configurations of technologies not used before	Lighting systems
Spotless Group Ltd	2010	Lighting - <b>Rewire ballasts for corridor lights to allow de-lamping</b> to single T5 lamp - 262 GJ saving	Improvement in process control	Lighting systems
Spotless Group Ltd	2010	HVAC - <b>Install chiller optimisation units</b> to achieve significant energy savings with short paybacks – 1,189 GJ saving	Investment in the same but more efficient technologies	Electric motors – HVAC and refrigeration equipment
Spotless Group Ltd	2010	Metering - <b>Install online web metering to allow good energy monitoring and management</b> 174 GJ saving	Improvement in energy measurement & monitoring	Own use
Spotless Group Ltd	2010	Miscellaneous - <b>Install automatic shut off system on chilled water fountains</b> after hours - 30 GJ saving	Investment in the same but more efficient technologies	Electric motors – HVAC and refrigeration equipment
Svitzer Australasia Services Pty Ltd	2010	The <b>behavioral change</b> required to achieve a significant reduction in fuel usage requires buy-in from the participants. Identifying the Andromeda Group has lead to a proposal to develop the Eco-Float software as an e-learning tool. This tool is designed to create engagement with tug crews on <b>environmental issues and legacy. A similar tool has been successful in road transport, called Eco-Drive.</b>	Changes in the staff operation of equipment	Water transport equipment
Svitzer Australasia Services Pty Ltd	2010	Achievement of goals requires measurement of progress and feedback to participants. Tug crews will receive <b>feedback on progress towards fuel reduction targets</b> by reports generated from bespoke software being developed for this purpose. The software is currently being modified to suit other <b>business segments and will eventually deliver regular reports on fuel consumption to all users.</b>	Improvement in energy measurement & monitoring	Water transport equipment
Svitzer Australasia Services Pty Ltd	2010	A market assessment of <b>potential fuel additives</b> has identified Ener-burn. Backed by rigorous laboratory testing, this product has supported claims of fuel savings. A measured field trial is in the final stages of verification.	Investment in research and development, testing and trialling	Water transport equipment
Svitzer Australasia Services Pty Ltd	2008	Fuel flow meters fitted to tugs, giving a <b>real-time readout of fuel usage to operators.</b>	Improvement in energy measurement & monitoring	Water transport equipment
TNT Australia Pty Ltd	2009	The development of new <b>energy efficient freight depots</b> at Townsville, Darwin and Perth	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
TNT Australia Pty Ltd	2009	<b>Consolidation of Archerfield, Riteway Brisbane, Darwin Priority, Hallam and Sameday Sydney activities within other TNT Australia depots</b>	Changes in management systems	Road transport equipment
TNT Australia Pty Ltd	2009	Relocation and/or <b>refurbishment of Singleton and Geelong depots</b>	Changes in management systems	Road transport equipment
TNT Australia Pty Ltd	2009	<b>Rationalisation of multi-function device (MFD) fleet</b> within Head Office and nationally	Improvement in process control	IT, communications and other electronic equipment
TNT Australia Pty Ltd	2009	Investigation of <b>energy efficient lighting technologies</b> within Head Office	Investment in the same but more efficient technologies	Lighting systems
TNT Australia Pty Ltd	2008	The continued <b>introduction of diesel/electric hybrid trucks</b> to complement the ten Hino hybrid trucks introduced in 2008	Investment in the same but more efficient technologies	Hybrid or electric vehicles
TNT Australia Pty Ltd	2008	The ongoing <b>retirement of remaining petrol powered small trucks and vans</b>	Investment in the same but more efficient technologies	Road transport equipment
TNT Australia Pty Ltd	2008	<b>Consolidation of the national forklift fleet</b>	Improvement in process control	Forklifts, front end-loaders, and other machinery
TNT Australia Pty Ltd	2008	<b>Consolidation of three Adelaide depots into one facility</b>	Changes in management systems	Road transport equipment

TNT Australia Pty Ltd	2008	Commissioning of a new 'green' depot at Canberra	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
TNT Australia Pty Ltd	2008	Introduction of various lighting efficiency solutions to select depots nationally	Investment in the same but more efficient technologies	Lighting systems
TNT Australia Pty Ltd	2008	Installation of electrical supply balancing equipment at depots identified as providing payback periods of less than four years	Investment in new technologies or new configurations of technologies not used before	Electrical equipment
Toll Holdings Ltd	2010	<p>The power required to maintain a given road speed depends on the sum of the following forces:  Aerodynamic Drag    Grade Resistance    Tyre Rolling Resistance    Engine Accessories (eg cooling fan)    Drive train losses</p> <p>Aerodynamic drag is the result of forces (pressure imbalances) acting on a vehicle as it passes through the air. The magnitude of the forces acting on a vehicle depends on speed, frontal area and external shape. Aerodynamic drag is the most significant contributor to vehicle power requirements above a speed of 80 km/hr. Aerodynamic treatments can significantly reduce the horsepower required to move the truck. Aerodynamic treatments are more effective at higher speeds. The power required to overcome things like tyre rolling resistance, at lower speeds, are not affected by the aerodynamic aids. Not only cabs are affected by wind resistance, but also trailers play their part in creating Aerodynamic drag. Side skirts are also able to reduce aerodynamic drag.</p> <p>The three trials conducted on the Minchinbury – Wentworth Ville – Wyong run all increased fuel efficiency by the following %  Trial 1 – Modified Prime Mover/Modified Trailer = 7.82%  Trial 2 – Modified Prime Mover only = 3.07%  Trial 3 – Modified Trailer only = 3.33%</p>	Investment in research and development, testing and trialling	Road transport equipment
Toll Holdings Ltd	2010	Hybrid electric vehicles were introduced into the Foster's Heathwood site in October 2009. Hybrid electric vehicles, combining an internal combustion engine and one or more electric motors, are particularly suited to dense metropolitan applications. This initiative has reduced greenhouse gas emissions significantly. Such initiatives, once proven, will then be rolled out across Toll as appropriate.	Investment in new technologies or new configurations of technologies not used before	Road transport equipment
Toll Holdings Ltd	2009	<p><b>Speed limiting</b>  There are many factors that affect fuel efficiency. These factors can be classified in the following groups  1. Vehicle Power Requirements  2. Engine Operation and Management  3. Vehicle Operating Techniques  4. Weather and Seasonal Conditions</p> <p>One of the factors in the Vehicle Operating Techniques is the speed of the vehicle. As a general rule, a 2 km/hr increase in road speed equals nearly a 2% increase in fuel consumption. This means that increasing road speed from 90 to 100 km/hr will result in an increase of 0.2 km/Litre. This theory was tested at Woolworths Barnawatha. This site was chosen due to the long distances that these vehicles travel at 100km/hr. Woolworths Barnawatha is a site located in Northern Victoria. The site services the ACT and Riverina Areas.</p> <p>The speed limiting trial was conducted on vehicles (Kenworths 401) that service the ACT. Although not all variables were taken into account, one of the main variables (weight) was recorded. Driver behaviour was not taken into account; however the same driver was used to reduce the influence of this variable. The vehicles were limited from 100 to 95km/h initially and then to 90km/h.</p> <p>The fuel efficiency was calculated by the following formula:  Fuel Efficiency = kms travelled/litres of fuel used per trip. (Litres of fuel calculated from the amount of litres refuelled to maximum. The vehicle was refuelled to maximum.)</p> <p>Results showed an 8.5% efficiency gain, which meant an annual saving of 502.7 kilolitres (19,380 GJ of energy). However, it was recommended that driver behaviour was also recorded. With the successful savings made, the site has decided to move to 95km/h speed limiting on selected vehicles. This differs from the outcome of the unsponsored trial.</p>	Changes in the staff operation of equipment	Road transport equipment
Toll Holdings Ltd	2009	<p><b>Installation of Sunset Sensors</b>  The objective of this trial was to determine if the installation of sensors controlling High Bay Lighting reduced power consumption and greenhouse gas emissions. Sunset sensors were installed on 21 July 2009 at selected Contract Logistics sites in Newcastle and Victoria.</p> <p>The trial was successful in the reduction of power usage. The average monthly electricity usage before the sensors were installed was 59,492 kWh. This usage reduced to 43,747 kWh post trial, showing an efficiency gain of 188,935 kWh and 680GJ of energy per year. There were also significant reductions in annual running costs with savings after the trial equalling \$17,468. The payback period was 1.7 months.</p>	Investment in research and development, testing and trialling	Lighting systems
Toll Holdings Ltd	2009	<p><b>Implementation of an idle-free policy</b>  The Western Australian Department of Environment and Conservation (DEC) worked closely with Toll IPEC as part of the CleanRun Behaviour Change Initiative program (CR-BCI), which aims to improve Perth's light vehicle sector by simultaneously reducing fuel consumption through voluntary behaviour change. The implementation of an idle-free policy was the selected behaviour-change.</p> <p>Trialling took place over 3 months with 42 volunteer drivers. These drivers typically drove three to five tonne trucks in a range of PUD runs, ranging from 60 to 80 stops a day. Simple reminders such as posters, stickers and labels were placed around the depot to remind them to switch off. Measurement technology was also installed in selected vehicles, which allowed drivers to monitor their idling times. Knowing they were being measured had a big impact on their behaviour and being able to see a measurable result was great feedback to the drivers and encouraged them to become more enthusiastic about continuous Operational Efficiency.</p>	Changes in management systems; Investment in research and development, testing and trialling; Changes in the staff operation of equipment	Road transport equipment
Toll Holdings Ltd	2009	<p><b>Driver behaviour</b> has been identified as having the greatest single energy and cost saving operational efficiency potential. Advances in new vehicle technology have continued to increase horsepower by some 20% and torque by 30% which can easily result in drivers using excessive fuel by prematurely accelerating in varying traffic conditions. Toll recognises the impact driver training has on behaviour and linked with controlling vehicle speeds where conditions safely allow, improved awareness and reduced engine idling times have all become focal points of a vehicle/driver performance measure. These basic operational efficiencies have resulted in savings of up to 15%.</p>	Changes in the staff operation of equipment	Road transport equipment



Toll Holdings Ltd	2009	<p><b>Alternative fuels</b></p> <p>The range of alternative fuels has grown significantly over the past 5 years specifically in the area of gaseous fuels; algae based bio-diesel and synthetic fuels. Toll has trialed a number of alternative fuels to date with varying success and is investigating the benefits of current gaseous alternate fuels. LNG and CNG can deliver operational savings of up to 20% in specific vehicle applications and require development of a fuel supply infrastructure, improved maintenance facilities to support original equipment manufacturer warranties and specific vehicles. They do hold significant promise as part of our energy mix going forward.</p>	Investment in research and development, testing and trialling	Alternative transport fuels
Toll Holdings Ltd	2008	<p><b>Technology</b></p> <p>Improvements in vehicle technology have highlighted potential energy savings of both vehicle manufacturers and after market Research and Development companies.</p> <p>Toll is currently <b>trialing a fuel device</b> with supplier claimed savings of up to 10%, the results of the test will be measured against potential implementation to impact the greatest fuel saving vehicles.</p>	Investment in research and development, testing and trialling	Road transport equipment
V/Line Passenger Pty Ltd	2009	<p>A review was undertaken of lighting at the West Melbourne depot. The review found that energy could be saved in two ways. The first improvement was through the <b>refurbishment of light fittings</b>. This involved among other things the replacement of fluorescent tubes with more efficient types and the installation of high performance reflectors. The second improvement identified was through the installation of voltage reduction units for fluorescent lights. These units would reduce the voltage of the lights when full power is not required (i.e. after a warm-up period). The annual savings generated through these improvements, inclusive of energy savings and maintenance savings, was calculated to be approximately \$60,000 p.a. The investment required to implement these improvements is approximately \$208,000. This represents a payback period of 3.4 years. These improvements would also generate a greenhouse gas emission reduction of approximately 650 tonnes p.a. There are currently no funds available to implement these improvements.</p>	Investment in the same but more efficient technologies	Lighting systems
V/Line Passenger Pty Ltd	2009	<p>A review was undertaken of the pool of V/Line road vehicles. The light motor vehicle fleet consists of several different types of sedans and station wagons as well as Toyota Hilux 2WD and 4WD utility vehicles. Research was undertaken to determine the greenhouse gas emissions of vehicles in our current fleet and those of alternative vehicles which would also meet the requirement of the business. The research determined that the Toyota Hilux 2WD and 4WD had the lowest emissions when compared with other vehicles in their respective classes. The research also determined that the Toyota Aurion had greenhouse gas emissions that were on average 10 per cent lower than other sedans in the fleet and 12 per cent lower than station wagons in the fleet. A reduction in greenhouse gas emissions would therefore be achieved if the company standardised on the Toyota Aurion when replacing existing sedans or acquiring new sedans. There will be a corresponding reduction in energy use estimated to be five per cent of total road vehicle energy use. A <b>revised Motor Vehicle Policy</b> incorporating these changes has been approved by the board. The change in vehicles will occur as</p>	Changes in management systems	Road transport equipment

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