



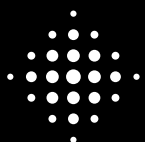
Australian Government  
Department of Resources, Energy and Tourism

# CONTINUING OPPORTUNITIES

# ENERGY EFFICIENCY OPPORTUNITIES PROGRAM – 2010 REPORT

## A LOOK AT RESULTS FOR THE ENERGY EFFICIENCY OPPORTUNITIES PROGRAM 2006-2010

Taken from public reports of  
assessments undertaken during the  
period July 2006-June 2010



**National Framework**  
for Energy Efficiency

**Energy Efficiency**  
Opportunities

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# 1 INTRODUCTION

The Australian Government's Energy Efficiency Opportunities (EEO) program is a legislated program that aims to improve the energy efficiency of the nation's largest energy-using businesses. The EEO program applies to large energy using corporations, covering all sectors including mining, resource processing, manufacturing, transport and commercial sectors, and is extending to electricity generators from 1 July 2011.

The EEO program is designed to deliver a range of beneficial outcomes, including:

- improving the identification and uptake of cost effective energy efficiency opportunities;
- enhancing productivity;
- reducing greenhouse gas emissions;
- improving financial outcomes for program participants; and
- facilitating greater scrutiny of energy use by large energy consumers.

The EEO legislation requires corporations that use more than 0.5 petajoules (PJ) of energy per year (equivalent to 10,000 households) to undertake rigorous and comprehensive assessments of their energy use to identify cost effective energy efficiency opportunities with up to a four year pay back period.

Corporations are required to report to their Board, to government, and publicly on the outcomes of their assessments and their business response. Implementation of identified opportunities and energy use savings is a business decision for firms.

The EEO program complements a carbon price by addressing information failures within corporations that prevent them from responding efficiently to price signals. Specifically, it provides corporations with detailed information, tools and assistance to assess energy use and, through that assessment, to reduce energy consumption and emissions – thereby mitigating the impact of a carbon price on energy costs.

The EEO program is targeted at large energy use corporations where the greatest potential for emissions and cost savings, derived through energy efficiency measures, is available. At present, there are 280 corporations that exceed 0.5 PJ of energy use and are formally registered under the EEO program. These corporations use around 30 per cent of Australia's total energy use. This compares with all households and their cars that use less than 20 per cent of Australia's total energy use.

From 1 July 2011, the Program will be extended to electricity generation corporations, and this will increase the coverage of the Program to approximately 57 per cent of Australia's total energy use.

The EEO program commenced in 2006 and the first public and government reports of December 2008 were released in February 2010. The 2009 results (December 2009 public reports), were also made available in 2010. Based on the latest series of public reports (December 2010), an overview of the 2010 results has now been prepared.

The 2010 results build on the success of previous results and continue to indicate that the Program is delivering substantial benefits in terms of energy and emissions savings as well as ongoing cost savings for participating corporations.

## 1.1 OVERVIEW OF PROGRESS IN 2009-10 REPORTING PERIOD

The *First Opportunities* report (2006-08), a major undertaking, detailed the 2008 assessment results as reported by the 199 corporations, with a 2005-06 trigger year, that participated in the first round of the program's government and public reporting requirements in December 2008.

The *Continuing Opportunities* report (2006-09) provided updated 2009 results for 199 corporations obligated to report at the end of 2009 as follows:

- 186 existing corporations (2005-06 trigger year) - second round reporting results (Dec 09); and
- 13 new corporations (2006-07 trigger year) - first round reporting results (Dec 09).

As at 1 June 2011, 280 corporations were registered in the EEO program. Of these, 207 were obliged to report at the end of 2010 as follows:

- 179 existing corporations (2005-06 trigger year) – third round reporting results;
- 10 existing corporations (2006-07 trigger year) - second round reporting results; and
- 18 new corporations (2007-08 trigger year) - first round reporting results.

This *Continuing Opportunities* report (2006-10) provides an overview of the 2010 results. The 207 corporations obligated to report by the end of 2010 indicated that they had assessed 85 per cent of their energy use. This compares with 82 per cent of assessed energy use in the 2008-09 reporting period and 57 per cent in the 2007-08 reporting period.

As a result of the energy efficiency assessments undertaken as part of the EEO program, the 207 reporting corporations had identified opportunities to save 141.9 PJ of energy per year (9.8 per cent of their assessed energy use) or 2.5 per cent of Australia's total energy use. This is a significant increase of 25 per cent on the energy savings of 113.7 PJ identified by December 2009 (Figure 1).

The 141.9 PJ of identified energy savings is equivalent to:

- emissions reductions of 11.2 million tonnes per annum, or 2 per cent of Australia's total greenhouse gas emissions; and
- financial benefit for EEO program corporations worth an estimated \$1.2 billion per annum.

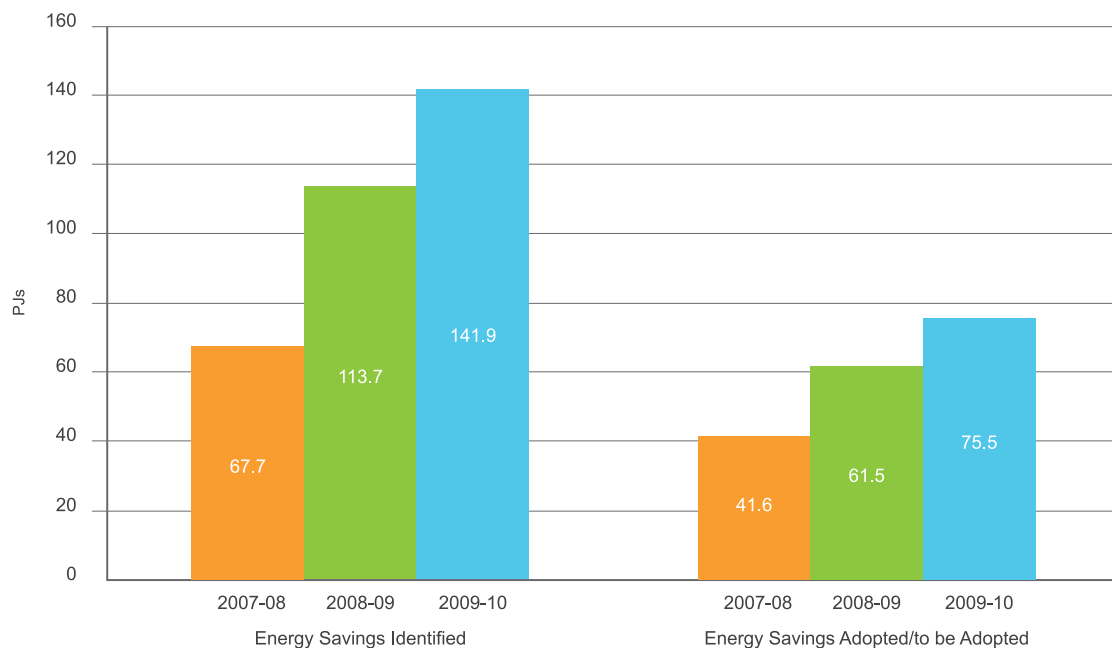
From these identified savings, corporations reported that they will implement opportunities that will deliver annual energy savings of 75.5 petajoules or 1.3 per cent of Australia's total energy use.

These energy savings are equivalent to:

- emission reductions of 6.0 million tonnes per annum or 1 per cent of Australia's total greenhouse gas emissions; and
- financial benefits worth an estimated \$700 million per annum.

The above savings represent an average net financial benefit of approximately \$117 per tonne of CO<sub>2</sub>-e reduced.

**Figure 1. Comparison of energy savings identified and adopted by corporations over the reporting years 2007-08, 2008-09 and 2009-10.**



More than half (i.e. 53 per cent) of the identified energy savings have been, are being or will be adopted<sup>1</sup> by corporations. Adopted energy savings rose to 75.5 PJ, a 23 per cent increase on the adopted energy savings of 61.5 PJ reported in December 2009 and an 81 per cent increase on the adopted energy savings of 41.6 PJ reported in December 2008 (see Figure 1).

This report presents analyses of the energy use and energy assessments of EEO corporations (Section 2), energy savings identified by industry sectors and corporations (Section 3) and the business responses of EEO corporations to energy savings identified in assessments (Section 4). In addition, Section 5 also presents a sample of the many and varied energy efficiency opportunities reported by corporations in 2009-10.

<sup>1</sup> Adopted energy savings = energy saving opportunities reported by corporations as implemented, implementation commenced, or to be implemented.

## 1.2 APPROACH USED IN THIS REPORT

Energy use and savings data are primarily provided by corporate entities using the Australian and New Zealand Standard Industrial Classification (ANZSIC) structure. Net financial benefits are not publicly reported and have been estimated based on 2008 government report data and reported in aggregate. Fuel types associated with corporations' energy saving opportunities are also not reported publicly so greenhouse gas emissions reductions have been estimated based on 2008 government report energy fuel type savings profiles.

Energy savings data pertains to all identified and reported opportunities, including data from corporations that have looked beyond the compliance requirements of the program and have identified and voluntarily reported a number of opportunities with greater than four year payback periods. The relative contribution of these opportunities to energy savings totals is indicated in Tables 2a and 2b of this report.

In order to demonstrate its significant contribution, the ANZSIC class 'Industrial Gas Manufacturing' has been extracted from the subdivision of 'Basic Chemical and Chemical Product Manufacturing' and grouped with the 'Oil & Gas Extraction' class to be categorised as 'Oil & Gas'. The remainder of the 'Basic Chemical and Chemical Product Manufacturing' subdivision has been categorised as 'Chemical Manufacturing'.

So as to be more easily understood, some of the ANZSIC sub-divisions are referred to by more common usage names. The Primary Metal and Metal Product Manufacturing subdivision has been categorised as 'Metals Manufacturing'; the Non-Metallic Mineral Product Manufacturing has been categorised as 'Ceramic, Glass and Cement Manufacturing'.

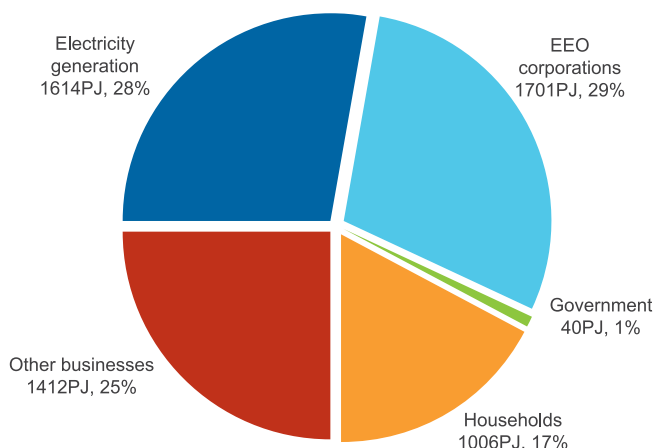
In this report, the term 'Adopted' refers to the business response categories of implemented, implementation commenced and to be implemented.

## 2 ENERGY USE OF REPORTING COMPANIES

The cohort of 207 publicly reporting corporations<sup>2</sup> reported a total energy use of 1,701 PJ in 2009-10. As shown in Figure 2, this represented almost a third (29 per cent) of total Australian primary energy use. The energy use of these 207 corporations represented a larger share of Australia's total energy use than that of the over 7.5 million households and their cars (17 per cent) or the net energy inputs of the 700,000 + 'Other Businesses' not covered by the program (25 per cent).

From 1 July 2011, the EEO program will be extended to electricity generation corporations (28 per cent), and this will increase the coverage of the Program to approximately 57 per cent of Australia's total energy use. The high proportion of total energy use covered by the EEO program demonstrates the potential for corporations in the Program to make a significant contribution to achieving Australia's energy and environmental policy objectives.

Figure 2: Energy use of EEO reporting corporations as a proportion of total energy use in Australia, 2009-10



### 2.1 ENERGY USE BY INDUSTRY SUBDIVISION

As in 2008-09, manufacturing, mining and transport were the industries reporting the highest energy use in 2009-10.

Almost a third of participants' energy use, or 515 PJ, was attributed to manufacturers of metal products such as aluminium, nickel, iron, steel, zinc, lead, silver, gold and copper. The second largest energy-using industry subdivision was Oil and Gas, consuming 240 PJ, or 14 per cent of participants' energy use. Activities in this sector include the conversion of gas into Liquid Petroleum Gas (LPG).

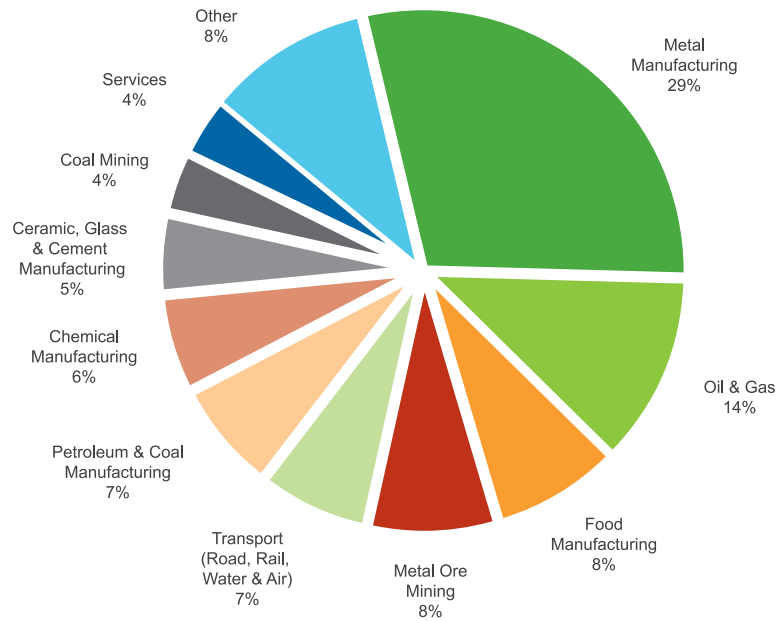
The other subdivisions that made up the largest energy users in 2009-10 were:

- Food Manufacturing (135 PJ);
- Metal Ore Mining (130 PJ);
- Transport – Road, Rail, Water & Air (115 PJ);
- Petroleum and Coal Product Manufacturing (115 PJ);
- Chemical Manufacturing (102 PJ);
- Ceramic, Glass and Cement Manufacturing (77 PJ);
- Services (71.3PJ); and
- Coal Mining (63 PJ).

Energy use by the remaining industry subdivisions has been aggregated under the 'Other' category in Figure 3, and includes corporations in the construction and other manufacturing sectors.

<sup>2</sup> The current list of 280 participating corporations (June 2011) is at [www.energyefficiencyopportunities.gov.au](http://www.energyefficiencyopportunities.gov.au).

Figure 3. Top energy users by industry subdivision 2009-10 (Total 1701 PJ)

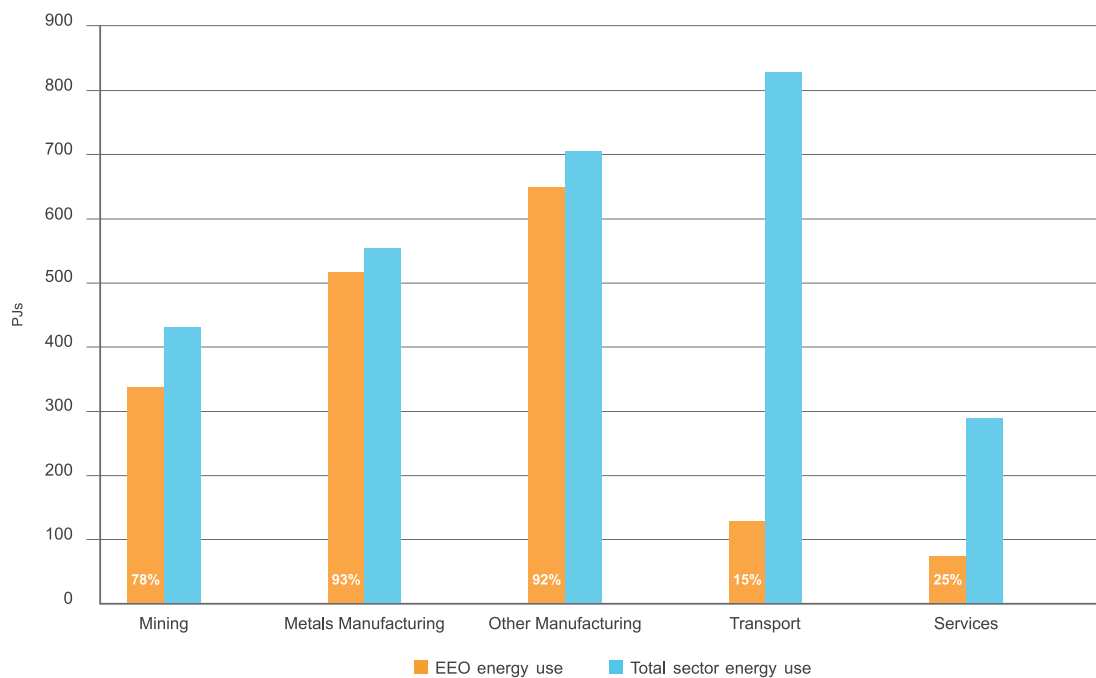


## 2.2 EEO ENERGY USE COMPARED TO TOTAL SECTOR ENERGY USE

When broken down by key industry sectors, EEO corporations comprise a large proportion of energy use in the mining and manufacturing sectors. EEO participants make up 93 per cent of the total energy use in the Metals Manufacturing sector, 92 per cent of other Manufacturing sector and 78 per cent of the Mining sector. This is to be expected, given that these sectors are dominated by large energy users – the intended target of the EEO program (i.e. the EEO program participation is required for corporations that exceed 0.5 PJ energy use per annum).

Conversely, EEO participants make up only 25 per cent of the total energy use in the Services sector and 15 per cent of the total energy use in the Transport sector. These two sectors comprise a large number of small to medium corporations / businesses and, as such, they are not picked up under the EEO program (i.e. these corporations do not exceed the 0.5 PJ annual energy use threshold for participation in the EEO program).

Figure 4. EEO energy use compared to total industry subdivision energy use 2009-10



Source: Total Sector Energy Use: Australian Energy Statistics (2010) - Table A1 - Australian energy supply and disposal, 2008-09 - energy units EEO Energy Use: 2010 EEO Program Data

## 2.3 LEVEL OF ENERGY USE ASSESSED BY CORPORATIONS

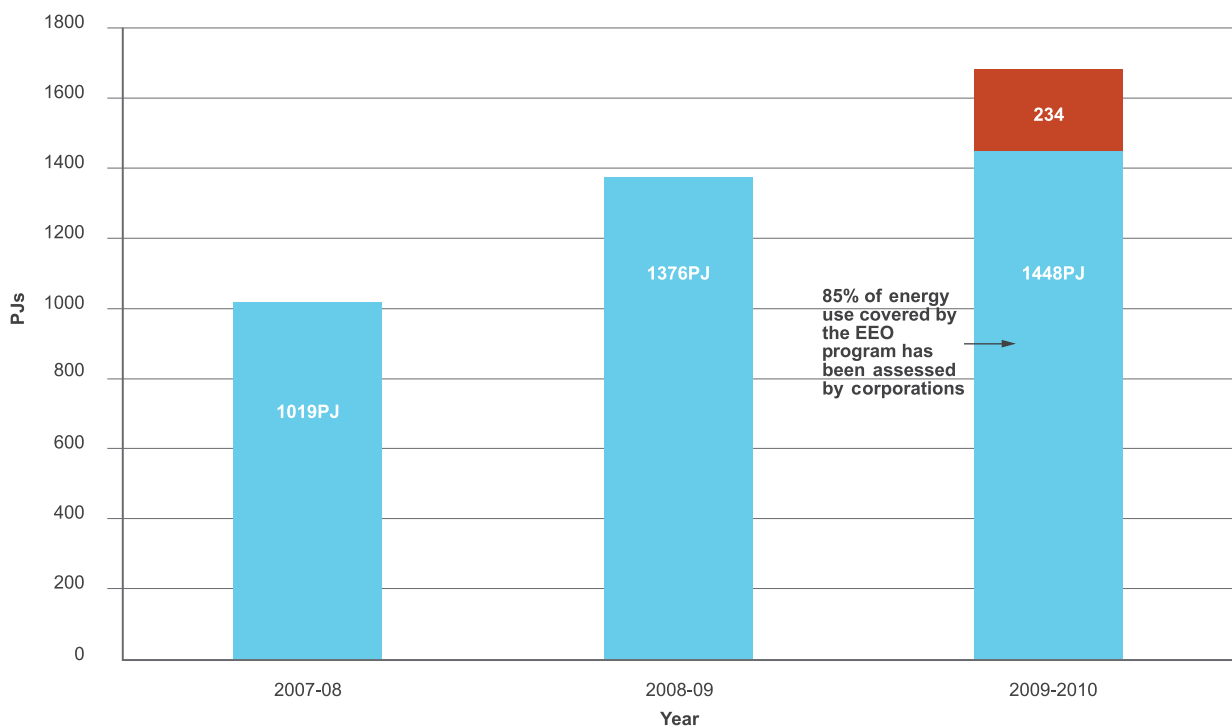
In the first five year cycle of the EEO program, corporations are required to assess at least 80 per cent of their total energy use and the energy use of all sites using more than 0.5 PJ of energy annually.

By December 2010, the 207 reporting corporations<sup>3</sup> had collectively assessed 85 per cent of their energy use, representing an increase from 82 per cent in December 2009 and 57 per cent in December 2008 (see Figure 5).

The 85 per cent of assessed energy use reported for 2010 includes:

- 37 corporations that had assessed 100 per cent of their energy use;
- 123 corporations that had assessed at least 80 per cent of their energy use; and
- 47 corporations that had assessed between 50 and 80 per cent of their energy use.

Figure 5. Energy use assessed as percentage of energy use



<sup>3</sup> Reporting corporations include companies who registered in 2005-06 and submitted their third public report, companies registered in 2006-07 who submitted their second public report and companies who registered in 2007-08 who submitted their first public report.

## 3 ENERGY SAVINGS IDENTIFIED

As at December 2010, the 207 reporting corporations had identified opportunities to save 141.9 PJ of energy per year, equivalent to 2.5 per cent of Australia's energy use or the energy use of 2.8 million Australian households. This is a 25 per cent increase on the 113.7 PJ of savings reported in December 2009.

### 3.1 SAVINGS AS A PROPORTION OF ENERGY ASSESSED

The proportion of energy savings, as a percentage of assessed energy use, highlights some significant outcomes. 37 companies (18 per cent) reporting energy savings of over 20 per cent of their assessed energy use, a combined 62.4 PJ of savings. In total, 128 of the 207 corporations (i.e. over 60 per cent) reported energy savings of more than 5 per cent of their assessed energy use, a combined 120.1 PJ of savings (see Table 1 below).

Six corporations reported no identified savings. Reasons reported for this included extenuating operational circumstances that prevented the completion of assessments, and the reduced scope to find cost-effective opportunities for companies that sourced their energy from process by-products that would otherwise incur disposal costs.

**Table 1: Identified savings ranges as a percentage of assessed energy use**

Energy Savings (% of assessed energy use)	Number of Corporations	Identified Savings (PJ)
0	6 (3%)	0
0<2	27 (13%)	0.9
2<5	46 (22%)	20.9
5<10	42 (20%)	16.3
10<20	49 (24%)	41.4
20+	37 (18%)	62.4
<b>Total</b>	<b>207 (100%)</b>	<b>141.9</b>

### 3.2 ENERGY-SAVING BY INDUSTRY SUBDIVISIONS

Potential energy savings in 2009-10, as provided by the 207 corporations that reported in 2010, were divided into the industry sub-divisions shown in Figure 6 (see also 1.2-Approach to this Report on pages 4 and 5).

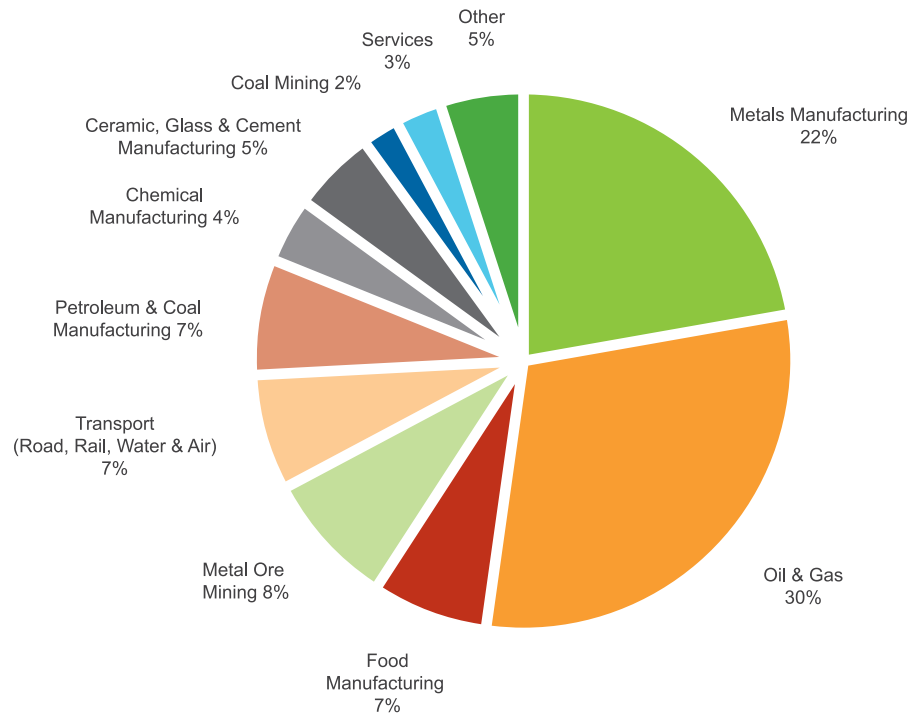
Corporations in the Oil and Gas and Metals Manufacturing subdivisions identified the largest energy savings, with 44.5 PJ (20 per cent of energy assessed) of savings for Oil and Gas and 30.7 PJ (7 per cent of energy assessed) of savings for Metals Manufacturing.

While both industries are large energy users, the energy savings identified by the 'Oil & Gas' sector were proportionately larger at 30 per cent of total energy savings compared to 22 per cent for Metals Manufacturing and much smaller proportions for the other eight sectors. The identified energy savings in other sector / sub-divisions in 2009-10 were:

- Metal Ore Mining (10.9 PJ);
- Food Product Manufacturing (10.1 PJ);
- Petroleum and Coal Product Manufacturing (9.9 PJ);
- Transport (Road, Rail, Water, Air) (9.4 PJ);
- Ceramic Glass and Cement Manufacturing (6.5 PJ);
- Chemical Manufacturing (5.6 PJ);
- Services (4.6); and
- Coal Mining (2.5 PJ).

As observed in 2008-09, the industries with the highest energy use were typically the industries that identified the highest energy savings.

Figure 6: Energy savings by industry subdivisions

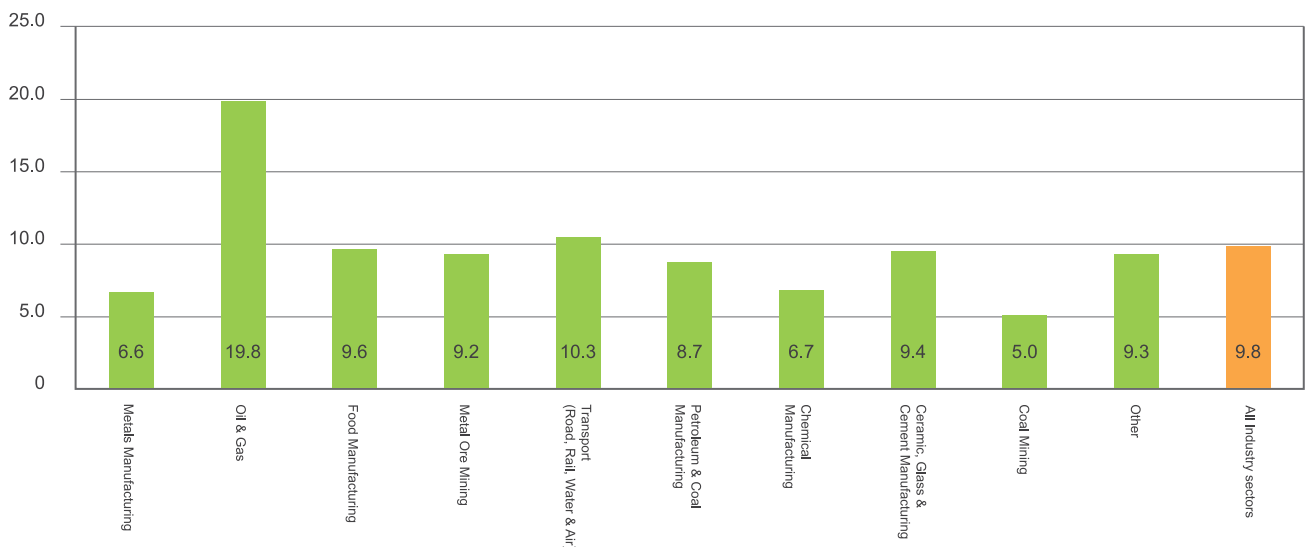


### 3.3 INDUSTRY SHARE OF IDENTIFIED ENERGY SAVINGS

Businesses in the EEO program have together identified energy savings equivalent to 9.8 per cent of the energy assessed to date (Figure 7), compared to 8.3 per cent in 2009 and 6.6 per cent in 2008.

The level of energy savings identified by the 'Oil & Gas' subdivision, at 19.8 per cent of energy assessed, is the highest savings proportion of any industry sector in 2009-10. The notable growth in energy savings identified by this industry over the last two reporting years is largely due to the completion of Woodside Petroleum's assessment of its large energy-using Karratha Gas Plant in Western Australia and Santos' assessment of its Port Bonython fractionation plant.

Figure 7: Identified energy savings as a percentage of assessed energy use



### 3.4 IDENTIFIED ENERGY SAVINGS BY PAYBACK PERIOD

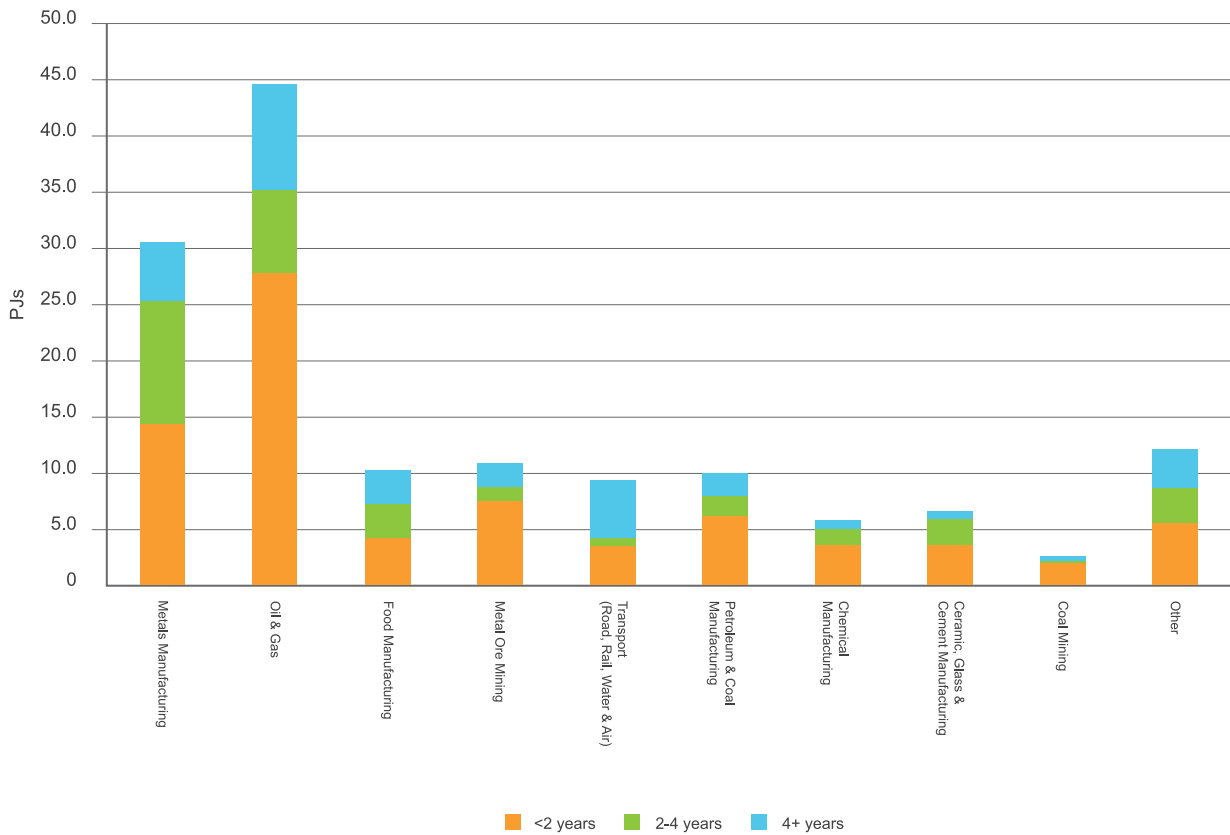
As in 2007-08 and 2008-09, the majority of energy saving opportunities identified and reported by corporations had payback periods of two years or less (Figure 8).

The Metal Ore Mining and Petroleum and Coal Manufacturing subdivisions in particular reported that 69 per cent and 62 per cent of the savings identified by each industry were in projects with less than two year paybacks.

The Transport division however, reported high levels of energy savings in projects with payback periods greater than four years. These voluntarily reported savings accounted for approximately 57 per cent of all energy savings reported by the industry, and may reflect the longer payback periods of opportunities such as upgrading entire fleets or replacing large pieces of transport equipment.

The Coal Mining subdivision reported very little energy savings (5 per cent) with a payback periods of two to four years.

Figure 8: Identified energy savings by payback period



## 4 BUSINESS RESPONSE

Under the EEO program, corporations are required to present energy assessment results to decision makers for consideration and then to report to their board and publicly on the business responses to opportunities. Corporations report their business responses under five categories: implemented, implementation commenced, to be implemented, under investigation, or not to be implemented.

### 4.1 BUSINESS RESPONSE TO ENERGY SAVINGS

As of December 2010, EEO corporations reported adopting projects that would deliver 75.5 PJ of energy savings (Tables 2a and 2b). This is an increase of 14 PJ since December 2009, and indicates that corporations adopted more than half, or 53 per cent, of the energy savings identified in assessments.

Nearly three quarters, or 73 per cent, of energy efficiency projects adopted by corporations had a less than two year payback (see Figure 9). However approximately 12 per cent, or 9.1 PJ, of energy savings adopted were in projects with more than four year paybacks, a noteworthy increase from around 9 per cent in 2008-09. Data for opportunities with paybacks over four years is not complete as it is voluntary information only provided by some corporations. However this voluntary data suggests that some corporations are considering the benefits of longer term energy efficiency investments in accordance with equipment lifecycles, plant maintenance and refurbishment schedules.

30 per cent, of the corporations' identified energy savings were under investigation, with the potential to deliver a further 43 PJ in energy savings each year. Projects with less than two year paybacks made up 19.4 PJ, or just under half of the energy savings currently under investigation.

As shown in Figure 9, opportunities classified by participants as not to be implemented primarily had longer paybacks of two to four years (48 per cent) or more than four years (38 per cent).

Overall, projects classified as not to be implemented represented 16.5 per cent of the energy efficiency opportunities identified in assessments, compared to fewer than 3 per cent in 2007-08. This is possibly a reflection of corporations progressing investigation of identified opportunities to their end point, deciding to implement those that are most viable and leaving those that are not (179 corporations were four years through a five year assessment cycle as at 30 June 2010).

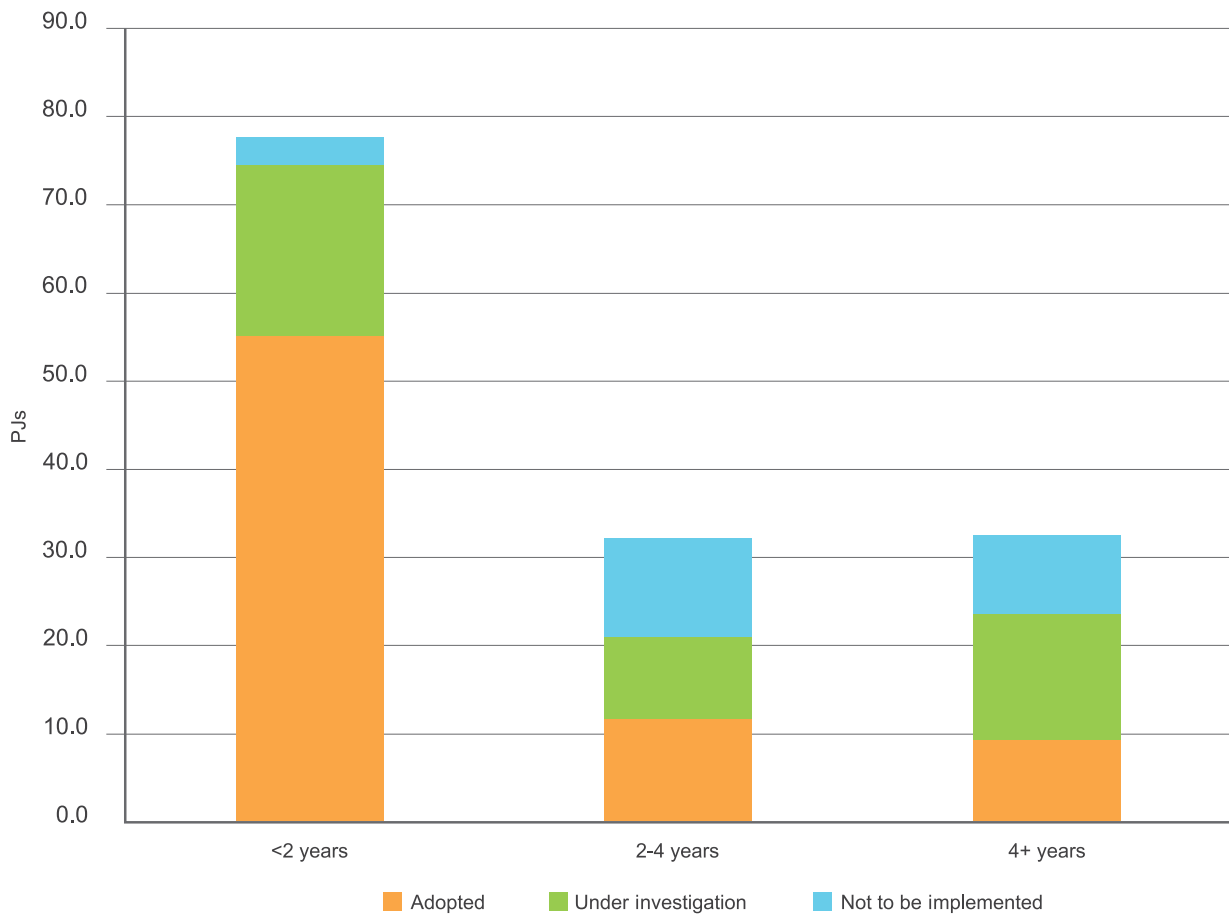
**Table 2a: Identified savings by business response and payback period**

Business Response	<2 years (PJ)	2-4 years (PJ)	4+ years (PJ)	All paybacks (PJ)	Percentage of total
Under investigation	19.4	9.3	14.3	43.0	30.3
Adopted	54.9	11.5	9.1	75.5	53.2
Not to be implemented	3.2	11.2	9.0	23.4	16.5
<b>Total Identified Savings</b>	<b>77.5</b>	<b>32.0</b>	<b>32.4</b>	<b>141.9</b>	<b>100</b>

**Table 2b: Adopted savings by stage of implementation and payback period**

Business Response	<2 years (PJ)	2-4 years (PJ)	4+ years (PJ)	All paybacks (PJ)	Percentage of Identified Savings
Implemented	28.1	6.2	1.5	35.8	25.2
Implementation commenced	13.4	3.5	6.4	23.3	16.4
To be implemented	13.4	1.8	1.2	16.4	11.6
<b>Total Identified Savings</b>	<b>54.9</b>	<b>11.5</b>	<b>9.1</b>	<b>75.5</b>	<b>53.2</b>

Figure 9. Identified savings by payback period and business response

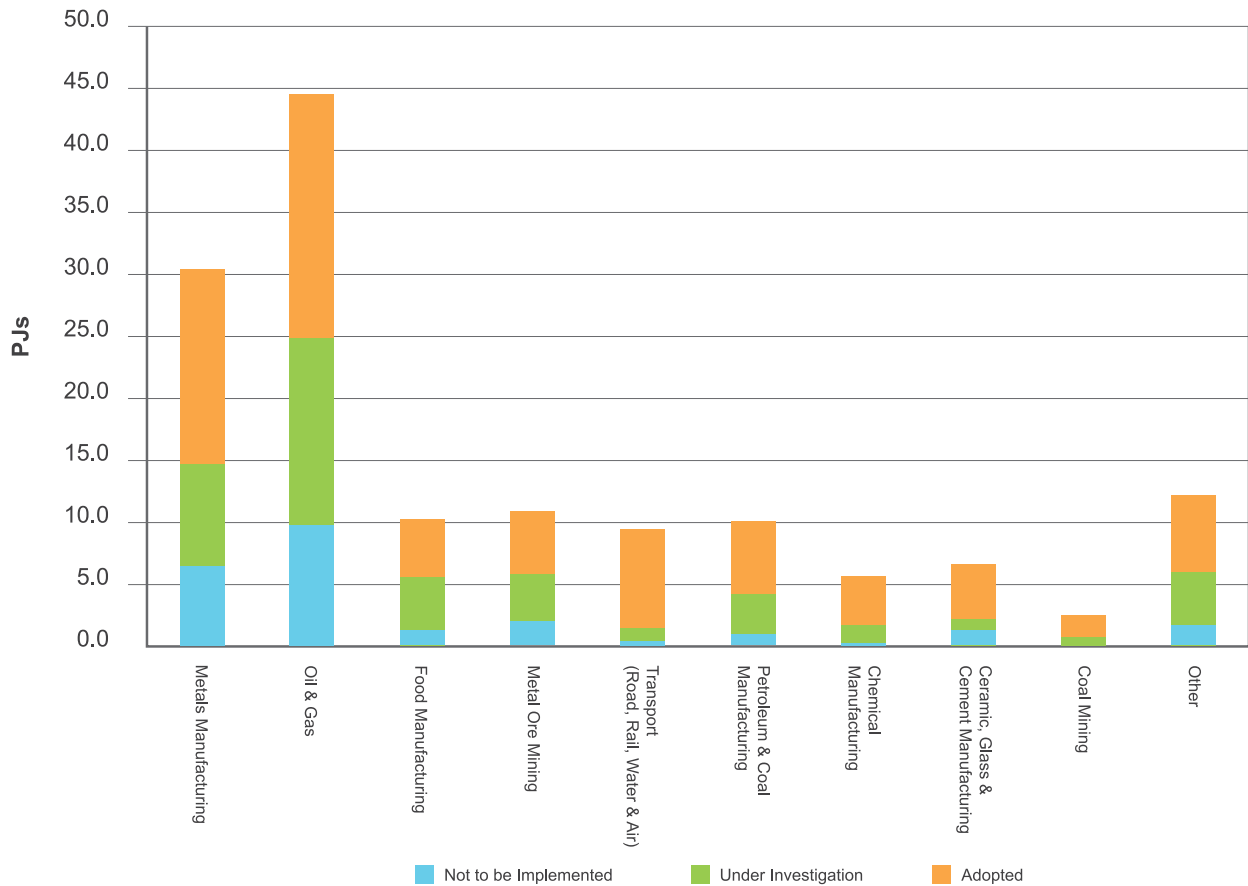


## 4.2 BUSINESS RESPONSE BY INDUSTRY SECTOR

In 2009-10, corporations in the 'Oil & Gas' subdivision (19.7 PJ) and Metals Manufacturing subdivision (15.8 PJ) adopted the greatest amount of energy savings. Together these two industries were responsible for 47 per cent, of the energy savings adopted by all EEO participants as at December 2010.

The highest rates of opportunity adoption were in the Transport (85 per cent), Coal Mining (73 per cent) and Ceramic, Glass and Cement Manufacturing (68 per cent) sectors as illustrated in Figure 10 (yellow bar in graph indicates proportion of opportunities adopted). Rates of adoption of energy efficiency opportunities across the remaining industries varied between 44 per cent in 'Oil & Gas' to 59 per cent in Petroleum and Coal Manufacturing.

Figure 10: Business response to identified energy savings by industry sector



Approximately 42 per cent of the energy savings identified by the Food Manufacturing and 35 per cent of Metal Ore Mining and the Other subdivisions were under investigation.

The Metals Manufacturing and Oil & Gas subdivisions could potentially deliver a further 23.3PJ in energy savings.

The highest proportion of identified savings categorised as 'not to be implemented' was in the 'Oil & Gas' subdivision. Businesses in this industry had determined that they would not proceed with 9.7 PJ, or 21.8 per cent, of their identified energy savings. Just as Woodside Petroleum's Karratha Gas Plant contributed to a significant portion of savings to be adopted it also contributed significantly to those savings categorised as 'not to be implemented'.

## 5 APPROACHES TO SAVING ENERGY

Corporations are required to describe three examples of significant energy saving opportunities in their public reports. Whilst far from a complete representation, the selection of opportunities, discussed in section 5.1 below illustrates the diverse range of approaches being adopted by the 207 reporting corporations to improve their energy efficiency.

### 5.1 TYPES OF OPPORTUNITIES

- Three Australian automotive manufacturers have reported the implementation of 0.46 PJ of energy savings, which is equivalent to approximately 13.7 per cent of their total energy use. The savings identified by the automotive industry include the optimisation and improved maintenance of compressed air systems by GM Holden, Ford's reduction in unnecessary paint shop energy use during non-production periods through new modes of operation and the capture and subsequent use of compressor waste heat, which reduces plant and equipment heating requirements. Toyota also found opportunities involving reductions in vehicle conveyor energy use and optimisation of press shop compressed air and load profiles.
- The dairy products manufacturer Murray Goulburn Co-operative has implemented 78,903 gigajoules of energy savings, equal to 2 per cent of the corporation's total energy use. Opportunities reported by Murray Goulburn include upgrading boiler control systems to dual digital combustion control, installing variable frequency transformers to refrigeration compressors, recovering waste condenser heat to reduce steam load and replacing multiple air compressors with a single high-speed turbine.
- Iluka Resources has implemented an internal Energy-Greenhouse Gas Data Management System which facilitates closer and timely monitoring of energy performance across its mineral processing sites, assisting opportunity identification. As part of its Energy Efficient Opportunities assessment, the company also undertook detailed process modelling at its synthetic rutile operations. In total, Iluka has identified opportunities which could save 0.69 petajoules of energy per year. This included maximising heat recovery rates from the kiln cooler of the synthetic rutile plant through pumping, heat exchanger and piping changes.
- Plastics manufacturer Qenos had a purge gas stream from the recycle gas compressors which has to be de gassed prior to recovery for the process. When the purge gas did not have enough differential pressure to be recovered (estimated to be 50 per cent of the time) it was sent to the flare and burnt. An alternative return location to the process was identified with a higher pressure differential that enables the purge gas to be continuously recovered, saving 22,000 GJ of energy and \$228,000 per annum.
- Woodside examined the glycol reboiler, the primary consumer of electrical energy on the company's Angel Gas Platform. Due to the conservative design of the glycol unit on the Angel facility there was the potential to optimise the process. It was calculated that the glycol reboiling temperature could be reduced, thus saving electrical energy. It is estimated that the reduction in operating temperature will save approximately 10,900 gigajoules per annum.
- Packaging company Amcor replaced a steel belt in an industrial oven with a synthetic belt, which reduced heat loss and production losses. Natural gas use has decreased by an estimated 3,840 gigajoules per year and reduced GHG emissions by 197 tonnes per year; the project financial payback period is 3 years and 9 months.
- Ecodriving trials conducted by the transport company Linfox, have demonstrated fuel savings of up to 14 per cent. As a consequence, Linfox has developed curriculum to train drivers in the skills of eco-driving. By 30 June 2010, Linfox had trained 826 drivers and planned to train another 100 drivers over the following year.
- In the past, all secondary mine ventilation fans at Newmont's Jundee Operations underground were run at all times. An opportunity was identified to turn fans off in areas of the underground mine when they are not required, to reduce the energy demand of the secondary fans. A change to operating practice has been implemented for fans to be turned on as required by calling mine control, creating significant energy savings of 28,800 gigajoules per year. In addition, Newmont considers connecting all secondary fans to a centralised control system should yield significant energy and greenhouse gas emissions savings and has the potential to defer the need to invest in installation of a refrigeration plant by a year.

