GOLD FIELDS

Energy Efficiency *Opportunities*

ENERGY EFFICIENCY OPPORTUNITIES PUBLIC REPORT F2008

Controlling Corporation

Gold Fields Australia Pty Ltd

Period to which this report relates

(See sub-section 22(2) of the Act and Regulation 7.1 of the *Energy Efficiency Opportunities Regulations (the Regulations) 2006*)

Start 1st July 2007 **End** 31st December 2008

Part 1 - Summary of assessments conducted thus far

Table 1.1 - Description of the way in which the corporation has carried out its assessments and over what period was each assessment taken. A statement saying that the intent and key requirements of the Energy Efficiency Opportunities legislation have been met must be made.

During the period covered by this report, energy efficiency opportunity assessments were carried out at the two Gold Fields Australia operations, St Ives Gold Mine at Kambalda and Agnew Gold Mine near Leinster. This was performed in line with Gold Fields Australia's Assessment and Reporting Schedule (A&RS). External consultants were engaged to assist with management of the process although the majority of the work was carried out by Gold Fields personnel, both from operational and corporate functions.

Gold Fields has adapted Continuous Improvement business systems to comply with the Australian Governments Legislation for their Energy Efficiency Opportunities (EEO) assessments. The Implementation Plan is included in Gold Fields Australia's Assessment and Reporting Schedule and covers an eight stage process that addresses the key elements of the EEO program. The assessments were carried out in the abovementioned period in line with this implementation plan.

Table 1.2 - Group member/business unit/key activity/site that have been assessed	**Energy use per annum in the year the assessment is completed ***	**Energy data accuracy (if not within ±5%) ****	**Reasons for not achieving data accuracy to within ±5% ****
Agnew Gold Mine	**0.38 PJ**	Not applicable	Not applicable
St Ives Gold Mine	**1.80 PJ**	Not applicable	Not applicable
Total	**2.18 PJ**		
Total as a % of total energy use of the group covered by this report	100%		

* Energy Bandwidth may only be used if approved in the Assessment and Reporting Schedule
** Data accuracy not within ± 5% can only be included if approved in the Assessment and Reporting Schedule

Part 2 - Outcomes of and business response to opportunities that have been identified and evaluated for each group member, business unit, key activity or site assessed

Group member/business unit/key activity/site >0.5 PJ name: **Gold Fields - Agnew Gold Mine**

Table 1.3(a) Status of Opportunities		**Number of Opportunities**	**Estimated energy savings per annum by payback period (GJ)**		**Total estimated energy savings per annum (GJ)**	***Accuracy range (%)**
			0 – < 2 years	**2 – ≤ 4 years**		
Outcomes of assessment	Identified (accuracy ≤ ±30%)	34	25,603	13,220	38,823	±10%
	Identified (accuracy > ±30%)	22	19,060	8,678	27,738	±30%
	**Total Identified	56	44,663	21,898	66,561	-
***Business Response	Under Investigation	22	19,060	8,678	27,738	±30%
	To be Implemented	9	16,260	1,198	17,458	±10%
	Implementation Commenced	2	277	733	1,010	±10%
	Implemented	9	9,066	11,289	20,355	±10%
	Not to be Implemented	14	-	-	-	-

Group member/business unit/key activity/site >0.5 PJ name: **Gold Fields - St Ives Gold Mine**

Table 1.3(b) Status of Opportunities		**Number of Opportunities**	**Estimated energy savings per annum by payback period (GJ)**		**Total estimated energy savings per annum (GJ)**	***Accuracy range (%)**
			0 – < 2 years	**2 – ≤ 4 years**		
Outcomes of assessment	Identified (accuracy ≤ ±30%)	13	70,623	28,436	99,059	±30%
	Identified (accuracy > ±30%)	25	439	1,694	2,133	±40%
	**Total Identified	38	71,062	30,130	101,192	±30%
***Business Response	Under Investigation	25	439	1,694	2,133	±40%
	To be Implemented	10	1,128	20,967	22,095	±30%
	Implementation Commenced	-	-	-	-	-
	Implemented	3	69,495	7,469	76,964	±10%
	Not to be Implemented	-	-	-	-	-

*The accuracy range for projected or actual costs, benefits and energy savings.
**You must ensure that this row is the sum of the two rows above it.
*** The data contained in each row of the business response area must total to the data contained in the 'Total Identified' row.

Details of at least three significant opportunities found through EEO assessments

Details must include a brief description of the opportunity and may optionally include details of the costs of implementation, energy/dollar savings and any other benefits (such as greenhouse reductions).

Table 1.4 **Opportunities 1-5: Agnew Gold Mine**	
1. Use of Variable Speed Drives (VSD's) to control underground primary ventilation fans	The underground mining operation began a study to upgrade and increase the size of the primary ventilation fans. In total, the fans were to increase in capacity from 450kW to 800kW. A review highlighted that the fan sizing was in excess of requirements for current conditions and that the full capacity would not be required for a number of years at which the mine depth had increased. Therefore it was proposed and decided to install the new fans using VSD's control in order to obtain the optimum velocity. **Energy Saving: 8,830 GJ per annum** **Greenhouse Gas Saving: 1,648 tCO2e per annum** **Cost Saving: $295,000 per annum**
2. Replace compressor with more efficient model	The leaching process at Agnew uses compressed air to agitate the Leach and Ads tanks. The existing compressors operated at full load continuously. A project was implemented to replace one of the compressors with a variable speed compressor. The new compressor operates to produce the optimised volume to maintain line flow and pressure depending on the process requirements. **Energy Saving: 50 MWh/Month** **Greenhouse Gas Saving: 403 tCO2e per annum** **Cost Saving: $72,000 per annum**
3. Implement use of coaster bus for site personnel daily mobilisation from camp.	The Agnew mine site is located 25km from the accommodation village. Historically, site personnel would utilise a number of 4WD vehicles to travel to and from site, with limited numbers per vehicle reducing efficiency. A site policy was introduced to reduce the number of vehicles leaving the site. Two buses were purchased (one each for the mill area and for the underground mining operation) and site personnel are now required to utilise these for daily mobilisation between site and the village. **Energy Saving: 1,026 GJ per annum** **Greenhouse Gas Saving: 72 tCO2e per annum** **Cost Saving: $44,484 per annum**

4. Power Monitoring Project	The practice for monitoring power consumption previously was by monthly physical readings of the breaker meters. There was no allowance for monitoring instantaneous current or power consumption. A project was implemented to install digital power meters at each of the High Voltage breakers. In turn, these metered values were then displayed on the sites central computer system via Citect. On each meter there is power monitoring and trending for phase voltage, phase current and power consumption including power factor. In addition to this there is daily, weekly and monthly power consumption reports generated and trended to enable staff to accurately monitor and manage power consumption. **Energy Saving: 709 GJ per annum** **Greenhouse Gas Saving: 132 tCO2e per annum** **Cost Saving: $23,600 per annum**
5. Site relocation of building to centralise departments	The Agnew lease covers a large area of land. The distance from the main administration building to the mineral resources and geology department was approximately 10km. A project was initiated to relocate these two departments (building included) adjacent to the main administration and security gate area. The plan was to reduce the amount of daily traffic carrying out the 20km round trip and thus saving on labour, fuel & maintenance. **Energy Saving: 657 GJ per annum** **Greenhouse Gas Saving: 46 tCO2e per annum** **Cost Saving: $35,000 per annum**
Opportunities 6-8: St Ives Gold Mine	
6. Greater Leviathan primary ventilation fan optimisation	The Greater Leviathan mining operation, comprising the Sirius, Conqueror and Brittania ore bodies, adopt a primary ventilation system that meets statutory mine ventilation requirements. Over the course of mine life, these ore bodies have become depleted and now operate on a care and maintenance basis. While maintenance work is still required, it has been studied that the primary ventilation system can be operated more effectively to minimise both airflows and electricity use, whilst still complying with mining regulations. **Energy Saving: 20,271 GJ per annum** **Greenhouse Gas Saving: 3,784 tCO2e per annum** **Cost Saving: $695,793 per annum**

7. Belleisle Underground mine power optimisation	The Belleisle Underground mine is centred beneath the Mars Open Pit. Mining commenced with electricity supplies being drawn from diesel powered generating units, to operate dewatering, ventilation and mining operations. Studies and assessments were completed to provide the underground mining operation with a permanent grid connected power supply, removing the requirement for diesel fuelled electrical generation. The project involved the installation of an 11kV power corridor and associated infrastructure being run to the mine site, and subsequently reticulated through out the workings. **Energy Saving: 49,224 GJ per annum** **Greenhouse Gas Saving: 4,981 tCO2e per annum** **Cost Saving: $1,703,124 (diesel only) per annum**
8. Cave Rocks Mine power optimisation	The Cave Rocks mining operation is located well away from the Lefroy Process Plant, and relies on electricity supplied by diesel generating units. The mine, with a wide operating footprint, had six base generating units to supply the site with electricity. The site comprises surface infrastructure including office and workshop facilities, water pumps and ancillaries, while mining activities utilized ventilation fans, pumps, electric/hydraulic drill rigs and ancillaries. Studies and assessments were completed to consolidate the electrical supply infrastructure into one main source, consequently raising the efficiency of the overall electrical supply. The project involved the installation of a central power station and associated infrastructure to reticulate power through the surface and underground mine workings. **Energy Saving: 7,469 GJ per annum** **Greenhouse Gas Saving: 445 tCO2e per annum** **Cost Saving: $83,950 per annum**

Part 4 - Declaration

(See paragraph 8 of Schedule 4 of the Regulations and paragraph 22(4)(c) of the Act)

The information included in this report has been reviewed and noted by the board of directors and is to the best of my knowledge, correct and in accordance with the *Energy Efficiency Opportunities Act 2006* and *Energy Efficiency Opportunities Regulations 2006*.	 Alex Munt – Senior Finance Manager & Director, Gold Fields Australia Pty Ltd