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## **6 Conclusions**

### ***6.1 Summary***

This study provided insight into the electrical energy consumption of the mining sector in South Africa, including feasible electrical energy saving strategies and the quantification thereof. Methods to improve the electrical consumption on existing systems on the mine were identified and investigated. Mine refrigeration systems were the main focus of this study.

After identifying specific components of the refrigeration process, simulation models were developed. Essential parameters, including mine operational restrictions and actual historical data, were used to predict electrical energy savings. The simulation results indicated, with acceptable accuracy, that the actual system response would correspond to the simulation model's predictions. Electrical energy savings would significantly reduce the operational costs of the mine. Eskom will also register considerable benefits through reduced load on the national supply grid and increases of the electricity reserve supply margin.

This study obtained savings of up to 30 % on mine refrigeration systems. This ultimately suggests that there lies great potential in implementing various combinations of the identified energy saving strategies on most, if not all, mining and other industrial refrigeration systems to reduce their overall energy consumption.

### ***6.2 Recommendations***

The sustainability of any of the identified strategies applied to industrial or mine cooling systems will largely depend on the continuous maintenance and monitoring of such systems. Furthermore, training with regards to how the strategies work and what the intentions of each are in relation to the electrical energy saving contribution of the entire system is essential for all plant operators and employees involved in operating and monitoring the system.

The energy saving methods identified and implemented for the purposes of this study greatly improves the energy consumption of the systems. However, one cannot without contention

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claim that it represents the ultimate or best achievable reduction in energy. There exists a perceived opportunity to further improve these methods to attain the maximum achievable reduction of energy of the system at any given point in time.