

Northern Star



The Jundee Processing Plant, Yandal Operations

Snap Shot

CSA Global was commissioned by Northern Star Resources Limited (Northern Star) in November 2020 to identify emissions-intensive areas at their operations in Australia and North America. The purpose of this project was to find opportunities where reductions in absolute greenhouse gas (GHG) emissions and GHG emissions intensity could be made and to suggest available abatement activities to reduce GHG emissions.

NORTHERN STAR

Northern Star is Australia's second largest gold miner by market capitalisation, in the ASX50, and operates mining assets in the tier-1 locations of Western Australia and Alaska (based on the Fraser Institute Mining Survey 2020 Investment Attractiveness Index). It operates several open pit and underground gold mines across three production centres: Kalgoorlie, Yandal and Pogo. On 3 May 2021 Northern Star updated its Ore Reserves to 21Moz and 56.5Moz Mineral Resources (ASX announcement dated 3 May 2021). In FY2022 Northern Star announced production guidance of 1.55 to 1.65 Million ounces per annum of gold with the goal of growing to production of 2 Million ounces per annum by FY2027.

THE CHALLENGE

The resources and mining sector is typically an energy intensive industry due to the sheer volume of material moved during operations. Gold mining is no exception and large quantities of material need to be mined, crushed, and processed to extract the gold. Gold mining can differ from other commodities such as iron ore as some operations process ore onsite, extracting and producing a gold product that is transported to a refinery to produce refined gold or bullion. This can result in Scope 1 emissions that are not applicable to other commodities or sites, where the processing is passed onto a buyer and the associated emissions become Scope 3. This is not applicable to all gold mines, only those operations with processing plants located at the mine. All other mines must transport ore to a processing plant to produce the final product. Northern Star has a combination of mine sites with processing plants and sites that require transport of the ore for production.

GHG emissions-intensive areas in gold mining can vary significantly depending on a number of factors, including the main energy supply for the mining operations, the type of mine (whether it is open-pit, underground or a combination of both), its geographic location, the depth of the mine and more.



Project Snapshot

Northern Star wanted a better understanding of its GHG emissions across mining operations in Australia and North America.

Northern Star engaged CSA Global to undertake a detailed desktop study of the Company's GHG emissions profile to highlight GHG emissions intensive areas and activities, and to identify the best opportunities to help reduce GHG emissions.



Solar powered monitoring bores, Yandal Operations

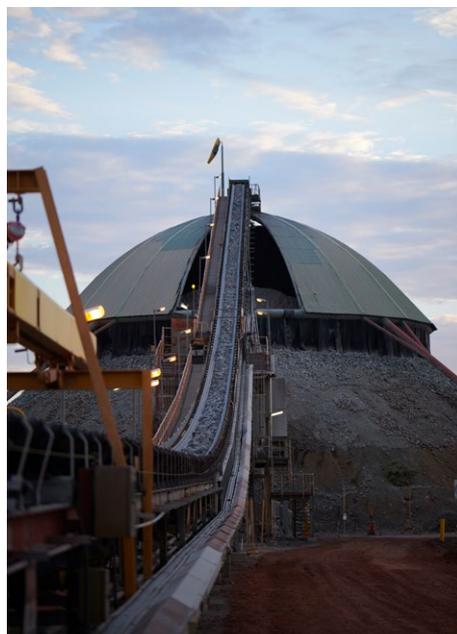
The aspiration of Northern Star to align with the Paris Agreement and being able to consider decarbonisation strategies requires a clear understanding of their GHG emissions. Understanding precisely where the GHG emissions-intensive areas exist within their gold mining operations, enables Northern Star to focus on activities in the regions where they felt they would see most benefit.

THE SOLUTION

Using supplied granular monthly GHG emissions data matched with energy usage data and mining and processing physicals from each mine, CSA Global undertook an analysis of Northern Star's GHG emissions. CSA Global also considered the projected mine lives and any future expansion activities at the time. For example, planned processing throughput upgrades or expansions to current mining operations.

CSA Global used GHG emissions intensity metrics for the whole of mine evaluation and developed some metrics to focus on assessing the mining stage of operations. A comparison of the individual mines was completed to investigate any commonalities between locations.

The relationship between the gold grade processed and the GHG emissions intensity per gold ounce produced was assessed to determine how sensitive an operation is to changes in gold grade. During steady-state mining and processing, a mine's GHG emissions intensity can be predicted by the grade of the ore processed.



Ore stockpile at Kanowna Belle, Kalgoorlie Operations.



Ore processing, Carsovue Dam, Kalgoorlie Operations.

Results Snapshot

The investigation highlighted:

The areas that provided the greatest opportunity for Northern Star to reduce GHG emissions.

The areas and activities that have high GHG emissions or a high GHG emissions intensity.



Open pit mining at Thunderbox, Yandal Operations

THE RESULTS

Compared with other Australian gold mines, Northern Star has some of the lowest GHG emissions intensities, particularly their Yandal operations.

This project identified the primary source of energy at Northern Star's operations to account for the largest proportion of GHG emissions, approximately 70%. This includes energy production from grid-supplied electricity and electricity generated on-site. Northern Star has been able to identify which assets have the greatest opportunity to reduce GHG emissions through the introduction of low emissions energy.

Assets with longer mine life have the greatest opportunity to make long-term reductions in GHG emissions, through the inclusion of low emission energy solutions such as renewables.

A few notable GHG emissions-intensive areas were identified during the project including, required heating of underground workings in cold climates to ensure essential services do not freeze during the winter months and GHG emissions associated with transporting ore over longer distances to processing facilities.

The study also identified GHG emissions intensity is forecast to reduce at some of the operations based on planned expansion and estimated future gold production.

These results allowed CSA Global to suggest a range of high-level abatement activities that could reduce emissions at Northern Star's operations. A detailed assessment of each of the abatement options will be required prior to considering implementation.

Abatement measures suggested included:

- Fuel management strategies.
- Electric vehicles and mining fleet.
- Addition of renewables.
- Ventilation on demand.
- Preconditioning of underground ventilation and other energy efficiencies.

Northern Star intend to use this study to inform its future GHG emissions reduction plans.



Light vehicle maintenance workshop, Kalgoorlie Operations



Dry stack tailings facility, Pogo