FACT SHEET
31 December 2018

Beatrix, a deep-level gold mine in the Free State province of South Africa, encounters methane from underground sources intersected during mining operations and liberated into the general mine atmosphere.

GENERATING CLEAN ENERGY:
BEATRIX METHANE CAPTURE AND DESTRUCTION PROJECT

Methane encountered in underground mining needs to be removed or diluted on account of its highly explosive nature. The removal and venting of the underground methane to surface contributes to mine safety and reduces global warming.

Sibanye-Stillwater's Beatrix operations set about exploring opportunities to reduce the impacts (remove methane from the workplace as much as possible, in the interest of employee safety) in 2003 and, in 2006, entered into an agreement with carbon and climate change advisory firm, Promethium Carbon, for project administration and approvals. The system was designed and built to extract and flare (on surface) 400 litres per second of methane gas (in identified sealed-off working areas) from the Beatrix South section. The flare destroys the methane gas and thus reduces the global warming effect. In addition to the destruction of methane extracted from the underground working environment, the Beatrix methane project also flared methane from five surface exploration boreholes in the area.

The Beatrix project was initially registered under the Verified Carbon Standard (formerly Voluntary Carbon Standard), a standard for certifying carbon emission reductions, from 1 March 2011 to 30 June 2011. This registration was an interim measure until the registration under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) could be implemented. During the initial registration period, the project was able to earn 9,643 verified carbon units (VCUs). A VCU represents one tonne of carbon dioxide equivalent (CO_2e) emissions reduced. The VCUs were held in a Markit Registry account and transferred to the VCU buyer's account on 7 November 2013. Sibanye-Stillwater received payment for the 9,643 VCUs on 13 November 2013. The Markit Registry allows account holders to manage all their global carbon, water and biodiversity credits in a central financial markets-based registry system. It manages environmental portfolios, and supports existing and emerging environmental programmes and markets.

Inspections are conducted regularly at the Beatrix methane extraction site.

Project registration under the CDM came into effect from 1 July 2011. In 2013, the project was extended to include generators that would use the extracted methane as a fuel source to produce electricity.

Electricity generation from extracted mine methane not only destroys the methane, it also serves to reduce our carbon emissions from purchased electricity as the methane-generated electricity is consumed by the mine and proportionally displaces electricity purchased from Eskom, which primarily uses coal-fired power stations.

As a CDM project, Beatrix has accrued carbon credits for electricity generation from mine methane and flaring, generating 1MW of electricity with capacity to generate 3.5MW (constrained by the flow and quality of methane).

The first crediting period of the CDM project extended from 1 July 2011 to 30 June 2018. During the 2018 applicable crediting period (1 January to 30 June 2018), approximately 35,000 carbon credits were accrued (2017: 40,000).

The carbon credits accrued during the first period have been split into three separate batches. In 2018, we made significant progress by appointing Epic as the designated operating entity for the verification of the third batch of carbon credits while Carbon Check continued with verification of the second batch.

Epic and Carbon Check are designated operating entities accredited by the UNFCCC CDM to validate project proposals or verify implemented projects in terms of achievement of planned greenhouse gas emission reductions.

Methane is extracted from the Beatrix underground mine in the Free State.

Batch (period)	Carbon credits	Status
First batch (1 July to 31 March 2012)	35,290	Verification complete
Second batch (1 April 2012 to 30 April 2013)	50,000	Verification underway
Third batch (1 May 2013 to 30 June 2018)	200,000	Verification underway

The volume of methane gas destroyed since 1 July 2011 to 31 December 2018 is approximately 13 million cubic metres. During this period, a total of 314 000t CO_2e emissions was averted.

Flaring of methane at the boreholes was discontinued in 2018 following significant fluctuations and the decrease in methane volumes.

Should the carbon tax come into effect on 1 June 2019, as indicated by National Treasury in the second draft of the Carbon Tax Bill, the purchaser of carbon credits from our Beatrix methane capture and destruction project, Mercuria Energy Trading, will be approached to possibly use the carbon credits to offset a portion of the carbon tax. The Carbon Tax Bill makes provision to offset 10% of the carbon tax liability through the exchange of valid carbon credits.

METHANE (colourless and odourless) is a potent greenhouse gas, which contributes to global warming and climate change at a rate 25 times higher than carbon dioxide. It cannot be detected without special electronic equipment.

Unlocked during mining operations and transported by air from sources deep underground, it is extremely dangerous as it is highly explosive and can displace oxygen so that people exposed to it are prone to suffocation.

A methane management system has been developed at Beatrix to control this risk. The mine standard requires a minimum of two flammable gas detection instruments at each stope panel and there must be at least one instrument at each development end when work is underway.

At the Beatrix mining units 1 and 2, there is a telemetry system with strategically placed flammable gas and velocity sensors, critical fans and carbon monoxide sensors. Environmental conditions are monitored in the central control room at mining unit 1, located at 3 shaft, on a 24-hour basis. Clear call-out procedures are followed in the event of an emergency.

Where elevated concentrations of flammable gas are constantly present in the general atmosphere, a location is declared hazardous, based on the results of risk assessments. Hazardous locations require special operating conditions, such as explosion-protected apparatus, telemetry monitoring, strict adherence to mine standards and awareness training for all employees. Hazardous location meetings are held monthly, involving all related disciplines.

To ensure proper supervision at all working places, the mine has developed a workplace management system: documents with special instructions, hazard identification, risk assessments, Department of Mineral Resources recommendations, a flammable gas register and hand-over notes are stored in the mine overseers' offices. The system is also used during the induction of new employees or when people are moved from one mining section to another.

In addition to flammable gas induction training, the mine has regular safety awareness sessions, such as safety flashes and special awareness drives, including the annual methane month in May and the monthly Methane Emergency Preparedness Safety Health (MESH) days when specific methane safety-related topics are discussed.

BEATRIX METHANE CAPTURE AND DESTRUCTION PROJECT: TIMELINE

28 July 2006

R54 million Beatrix methane capture and destruction project officially starts in agreement with Promethium Carbon (carbon and climate change advisor) for administration and approvals

Sibanye-Stillwater is the first gold mining company in the world to trade in certified emission reductions.

2011

Beatrix eligible to register under Clean Development Mechanism of the Kyoto Protocol to United Nations Framework Convention on Climate Change (UNFCCC) to earn certified emission reductions or carbon credits

21 May 2011

Flare commissioned with capacity to extract initial 400 litres per second of methane gas from identified sealed-off working areas at Beatrix South section

July 2011-end December 2014

Total of 164,038 tonnes carbon dioxide equivalent (CO_2e) destroyed

2013

- Processing of second batch of Beatrix certified emission reductions began for period from 1 April 2012 to 30 April 2013
- Issuance process begins to earn 36,010 certified emission reductions (from 1 July 2011 to 31 March 2012)

5 September 2013

9,643 voluntary carbon units (VCUs) issued and held in Markit Registry account (R323,084)

7 November 2013

VCUs transferred to buyer's account

17 October 2014

- Verification of first batch of carbon credits under CDM completed and 35,290 certified emission reduction (CER) credits issued

31 December 2014

- 195 litres per second of methane gas extracted from underground and flared
- Volume of methane destroyed since commissioning the project (including main flare and borehole flames): 10.9 million cubic metres

20 February 2015

Verification proccess of second batch of carbon credits for period from 1 April 2012 to 30 April 2013 began

2018

- First crediting period of CDM project that started on 1 July 2011 ends on 30 June 2018
- Epic appointed as designated operating entity for verification of third batch of carbon credits (for period from 1 May 2013 to 30 June 2018) while Carbon Check continues with verification of second batch of carbon credits
- Secondary sealing completed and results in fugitive mine methane emission reduction of 198,522t CO_2e

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