

Gold Fields Limited

2011 Investor Day

Presentation 3 of 9

Technology and Innovation

Tim Rowland

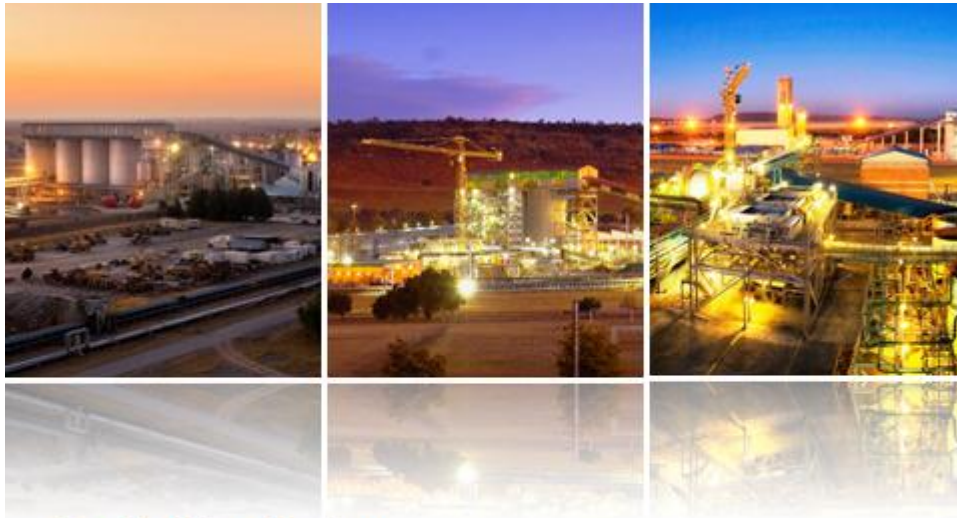
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Johannesburg

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GOLD FIELDS



South Africa Region



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The importance of technology

Imperative for improved safety, efficiency and delivering full potential from operations and projects

- Requirement for safe production
- Increasingly challenging ore bodies
- More onerous regulatory & social landscape
- Need for productivity gains
- Rising capital and operating costs
- Cash flow margins under pressure



- Engineering out risk
- Automation & mechanisation
- Research into mining innovation & robotics
- Power conservation
- Clean energy projects

Strategic Response

Technology a key enabler of our business
Investment in new technology vital to deliver future growth
"Fit for purpose" technology and innovation

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Although I've got a comparatively small slot I am cognisant of the fact I'm standing between you and the first coffee break, so I'll move through my slides quite rapidly.

However, I do think this is the first opportunity we've had to actually update an analyst day on technology and innovation issues in Gold Fields, so I think it's a short but a very important slot and I'm very pleased to be able to take you through, initially high level, our *modus operandi* on technology and innovation. But I want to spend the bulk of my time telling you about projects we've actually implemented on the operations and those that are rapidly advancing for implementation in the next few months.

I think it's very important that the technology and innovation focus in Gold Fields has always been there and it's always been driving technology transformation across the whole value chain, whether it be mining, processing, energy or environment performance.

Now, recent restructuring of technical support in Gold Fields has further enabled the drive on implementing what has to be smart, fit-for-purpose technology solutions in Gold Fields and they have to impact our operations and the vast growth portfolio that Tommy's just taken you through.

Right, this graphic highlights the important of technology and innovation at Gold Fields, but I think it highlights to all of you how important it is as a strategic differentiator in the peer group.

On the left-hand side we've listed the key pervasive issues that characterise the mining landscape at the present time, ranging from the requirement for safe production, which Nick highlighted, right through to cash flow margins being under pressure.



So, cognisant of those pervasive issues, it demands a strategic response from Gold Fields and that's exactly how we've approached it.

We firmly believe that technology and innovation is a key enabler to the gold mining business. Importantly, appropriate investment in technology is core to delivering on the full potential of the operating assets my colleagues will take you through later in the day, as well as the growth projects you've just heard about. In my mind smart fit-for-purpose solutions will provide a competitive advantage from Gold Fields.

The key focus areas that define our approach currently are listed on the right-hand side.

This is our strategic response and it's really focused on engineering out the risk from the business, automation and mechanisation, research into mining innovation and robotic solutions for deep level mining, power conservation projects and clean energy projects.

Gold Fields technology and innovation strategy

Technology and Innovation framework integrated across the Group



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The *modus operandi* for the approach to technology and innovation is not complicated. It's simple, but that's the way I like it to be if it's going to be effective and sustainable and, importantly, it's now centrally managed. It's a centrally managed process through a central steering committee. This central steering committee ensures that the various regions in the group and their inherent operations, the capital growth projects and the exploration portfolio, are all effectively networked and aligned to the core technology strategy, the road map and the delivery principles on the process. It also ensures that all the high-impact areas are the ones that always enjoy the prioritised investment, development and the rapid implementation.

So simply, in the top blue box we've got the push-out technology. That's really focused on an internal continual assessment of practices, challenges and opportunities within Gold Fields that we identify for piloting and targeted rapid deployment across the group. So that's very much the internalised focus, but it's got to be balanced by an acute awareness of what's happening externally to Gold Fields at all times.

So that continual scanning and benchmarking of the technology environment outside of the group to identify opportunities for testing and piloting is equally important. What we're putting together is a defined technology suite and that's a technology suite of heavy mining equipment, systems, etcetera, that will actually define how we ensure leading practices are always put in place, not only on the current operations but as we build the new era mines going forward.

The third one: We're very cognisant of the fact that we don't want to become a research and development organisation. There are a lot of people out there that are very good at doing that and they need to carry a lot of that risk. However, where we don't have an off-the-shelf solution from either the internal or external scanning we will embark on investing dollars in research and development, especially when we know it's



going to bring a step change to the way we do our business and the way we can manage our productivity. So the research and build component is about focusing engagement with partners. These can be research and technology companies around the world, OEMs, the original equipment manufacturers which we're closely aligned with and talking to at the moment. They have to be aligned to our vision and strategy but that's how we pull together the whole research and build component of the T&I approach.

The next few slides are going to show you technologies and innovative processes we've already brought to bear in Gold Fields, or those that are rapidly advancing.

Python Plant

Flexible solution to surface processing

Optimise Our Operations

- Unlocking gold reserves in surface resources at KDC
 - Brings forward low cost gold ounces
- New technology
 - Skid mounted, mobile, versatile, compact and multiple integrated units
 - modular set-up
 - Operational flexibility
 - Designed to realise energy efficiency
 - Robust and low operating costs (R55/t vs R75/t)
 - Environmental compliance
 - Smaller footprint
 - Water recovery module
 - Potential power saving (3MW vs 15MW in a conventional plant)



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Peter Turner is going to talk a little bit more about the Python plant in his section and how it's influencing the ability for us to bring quality surface resources ounces forward. I just want to highlight the technology side here.

The Python plant epitomises some key values in Gold Fields. Safety, innovation and delivery are front and centre at the Python plant. When you pre-concentrate ore in a modular plant with low energy processing, like the Python, you can count on substantial reductions in cost structures and environmental impact, and that's exactly what we're going to get from the Python plant.

The Python is a modular, skid-mounted, fully-integrated processing plant. It's got a small footprint. It's got the full array of primary jaw-crushing and screening. It's got a vertical shaft impact crusher. It's got Nelsons in the system, flash-flotation and at the back end it's got an ILR or intensive leach reactor.

Importantly, the ILR ensures added security as the product produces a concentrated liquid that then goes for final recovery through electro-winning at one of our current CIL plants.

So it vastly improves the security aspect.

All items of the Python plant can be moved from site to site at relatively short notice and at low cost.

So overall, what this technology is bringing to the operations on the West Wits, (KDC - the former Kloof-Driefontein now consolidated as KDC) is operational flexibility on surface and significant energy efficiency.



There are no gold-in-process issues and there's a very short 24-hour gold-in-process pipeline involved here.

So it's provided a paradigm shift in our ability to deal with the surface resource potential at the current gold prices.

Compressed Air-less Shaft

Changing the paradigm – re-engineering to reduce power consumption

Optimise
Our Operations

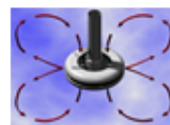
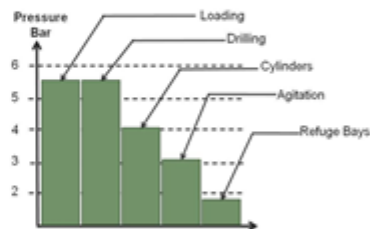
- Removing underground reliance on compressed air

Compressed air

- Current deep underground compressed air systems sub optimal
 - Consume ~20% of electricity
 - Typically less than 20% efficient

Major users profiled

- Solutions available for loading, drilling, box front cylinders and agitation
- Ventilation of refuge bays still requires a viable solution



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Moving onto the compressed airless shaft.

This is another example of changing current paradigms that are in the existing DNA of the mining industry.

The compressed airless shaft is one of the most important projects running in the South Africa Region at the moment.

Obviously existing pneumatic systems have been in use for many years in the South African industry and compressed air usage is common across all the operations, whether it be Beatrix, KDC and, to a more limited extent, at South Deep.

Typically the systems in place at the moment are based on vast reticulation networks underground and they account for about 20% of total electricity usage which are typically less than 20% efficient because of the vast systems underground.

The compressed air is typically used for powering drilling, rock-loading, mud and backfill agitation and obviously, and probably most importantly, to ventilate the refuge bays underground.

Although solutions exist for almost all aspects of compressed air usage, they've never been brought together and effectively installed in a holistic solution underground on a deep level mine.

Our compressed airless shaft project is doing exactly that. Bringing all the disparate solutions to compressed air usage together into one co-ordinated solution that's going to work for us.



At the bottom of the slide, on the left, you've got one of those electro-hydraulic rock loaders that we developed with the OEM.

The middle photo is a hydraulic drill that we're using with power packs and trialling underground at the moment.

On the right is a typical turbulator - that means we don't have to use compressed air for agitating the backfill dams and the mud dams.

It's the ventilation of the refuge bays that remains one of the key challenges to be solved, mainly because compressed air is used for ventilating these bays and cooling the virgin rock temperatures underground at depth.

So trials are continuing across the value chain on compressed air on a number of our shafts. We're pushing this project hard. We do expect to get incremental reductions in compressed air usage over the coming months and the next year or two. Obviously our final objective is to get a fully compressed airless shaft at KDC, and that's when we feel the project will have totally delivered on its full mandate.

You can see in the graphic on the right-hand side the comparative compressed air usage per activity. If we can take it away from loading and drilling we're going to reduce the compressed air usage by over 30% in one fell swoop.

Drop-in impellers and composite fans

Drawing down power consumption and operating cost

Optimise Our Operations

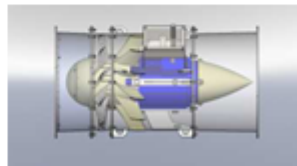
- Drop-in impellar - cutting edge ventilation technology
- Composite fans

Drop-in impellers use less power and improve efficiency

- Potential saving
 - Average ~8MW at KDC (already done at South Deep)
 - R40 million annual saving in 2012 terms

Composite fans (33.5kW fan provides the same airflow as a 45kW fan)

- Potential saving
 - 7MW (~600 fans being installed over the next 12 months)
 - R35 million annual saving in 2012 terms



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Moving on to drawing down power consumption.

As we know, the Eskom increases are going to be close to 28% in the South African environment, and electricity makes up 20% of working cost.

Importantly here, I'm talking about dropping in impellers and what it does to the megawatt usage and the Rand costs.

The use of this technology at South Deep has improved efficiencies from 22% to over 40%. That has meant we haven't had to switch on the second fan at South Deep as early as we thought. When we do switch the second fan on in October next year, we're going to see a reduction of over a megawatt in power, and for every megawatt reduction you can equate that to about a R5 million drop in costs. So that's important in that context.

Also, we've got a programme which will equate to about an eight megawatt reduction at the KDC mine, which will have less than a two-year payback. That's equivalent to a cost reduction annually of over R40 million. This is cutting edge technology and we're one of the first companies to bring these into the business. It's got quite a significant impact on drawing down cost. Also, the removal of the inline auxiliary fans, which are highlighted at the bottom of the slide, has a potential impact of seven megawatts or a R35 million annual dropdown in power costs.

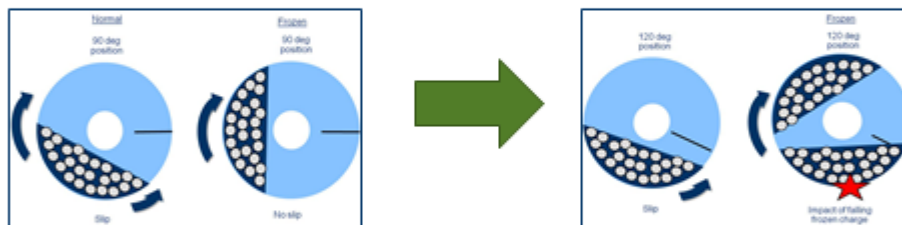
So some very significant savings in electricity and power costs from those engineering interventions.

Mill safe start system

Large mill protection and safety

Optimise Our Operations

- Prevents premature mechanical & electrical failure of large geared grinding mills
- Offers protection against locked charge incidents with uninterrupted production
- To be incorporated at all new projects



- Detects & measures torque transients during start-up
- Enables corrective action to be taken ensuring longer life of associated equipment
- Implemented at Tarkwa, order placed for Damang mills and potential roll out to most of the Group's large geared mills

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The next one I want to talk to you about is the mill safe start technology.

At our large mills at Tarkwa were the first company globally to take the mill safe stance system on board.

This system is designed to assist with the safe starting of big grinding mills, using a lop-charge protection system. Very simply, it measures torque transience during start-up and it records those in real time. Under normal operating conditions the charge inside the mill, which is mainly ore, steel balls and water, should slip in the opposite direction of the mill rotation as depicted in the figure on the left. And this is how the tumbling motion, required to effect the grinding in the mill, is facilitated. However, when the mill is stationary the charge can solidify under certain conditions and that's also very difficult to measure in real time. If this lop-charge in the mill slips during start-up it's known as a "lop-charge slip". This could cause damage to the mill shell and the mill drive mechanisms.

We've now installed these two-systems at the sag mill and the bore mill at Tarkwa.

What's exciting about this is that within 12 weeks of installing the system at Tarkwa, we managed to avoid a lop-charge situation that would have cost us a total cost to business of over \$9 million. So for the \$240,000 investment in this technology at Tarkwa, it's already pre-empted what could potentially have been a \$9 million los by avoiding that lop-charge.

As I said, Gold Fields is the first company to put this in place on large mills.

Platsol

Innovative solution for low grade poly-metallic ores

Grow Gold Fields

- High pressure oxidation leaching in autoclave unit
 - Bringing Arctic Platinum ore body to account
-
- Improved overall recovery through bulk flotation and higher mass pull
 - Typical recovery improvement of ~20 percentage points to 70%
 - Improved overall revenue from basket of metals
 - Yields individual products on site
 - PGM precipitate
 - Copper cathode
 - Nickel hydroxide
 - Environmentally friendly process Hydromet vs Smelter
 - Potential application to other poly-metallic and refractory style ores



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Platsol has already been spoken about eloquently by Tommy so I don't think I should go into too much detail here other than the fact that it is new and it is innovative.

It is patented and, importantly, previously we were looking at the production of a float concentrate at APP that would have been sold to smelters. This needed elevated clearing of the concentrate and it led to elevated metal loss in the residues to the tailings. Importantly, what we've got as a result of Platsol is improved overall recovery through flotation and higher mass pulls. We enjoy much higher dissolutions and, as Tommy mentioned, we can actually produce individual products on site now, such as the PGM concentrate, the copper cathode and the nickel cobalt hydroxide products.

Typical nominal recoveries, as Tommy said earlier, have actually improved by over 20%.

This produced a paradigm shift to the economics of the APP project.

Remember the potential application of this to other polymetallic or refractory ores across the globe is going to provide a very interesting options to Gold Fields as well.

Methane extraction at Beatrix Gold Mine

Carbon and Energy Management

Securing Our Future

- First hard rock project in the world registered under the Kyoto Protocol
- Underground and surface borehole methane extraction

- Methane captured at source underground and conveyed via a network of pipes to surface, where it is flared
- Managing carbon emissions and footprint
 - Planned to reduce 1.7Mt CO₂ for the first 7 years
- Phased approach
 - Methane flaring
 - Power generation (~4MW)
- Carbon credits derived from the project to be traded
- Stage II Methane Project (West)



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Now moving on to a project that is very much front and centre to securing our future, it's the methane extraction project at Beatrix.

Nick did mention this earlier in his section and it's part of the carbon and energy management plans and strategy that we've got in place in Gold Fields.

The Beatrix methane project will remove up to 49% of the high-impact greenhouse gas, which we know as methane, at Beatrix.

It's actually going to reduce Beatrix's carbon footprint by a significant 25%.

The captured methane will be used to generate between a four and five megawatts of electricity per year once the co-generation power plant has been built. This will save about 12,000 tonnes of methane, equivalent to 252,000 tonnes of environmental carbon dioxide.

This has enabled Gold Fields to become the world's first gold mining company to enter into a true contract to sell CERs or certified emission reduction certificates, which are the financial securities used to trade carbon emissions.

This contract for the sale of CERs from Beatrix was recognised by the London-based Risk magazine, as the 2010 Deal of the Year in its Annual Energy Awards.

So we're very proud of that project down at Beatrix.

Water treatment in South Africa Region

Liquid Gold Project - key to unlocking sustainable solutions

Securing Our Future

- Acid Mine Drainage – world-wide Concern
 - License to Operate – water security is a key contributing factor
 - Proactive – sustainable potable water solution for mine and dirty fissure water
-
- Motivation
 - Plan proactively for responsible mine closure
 - Improved security of water supply
 - Community Involvement in related Local Economic Development
 - Technology selected and piloted
 - Ion-Exchange, Crystallator, selected anion and cation resins customised to our requirements
 - Partnerships required to ensure project sustainability beyond mining



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My last example of technology and innovation in practice in Gold Fields is the liquid gold project.

We want to be proactive in unlocking sustainable solutions across the group and this example in South Africa is about treating water and securing water supplies for the future.

We're fortunate that the KDC operation in South Africa is in a water catchment area that hasn't been materially affected by AMD, as the basin is still being dewatered through current mining activities.

But we remain focused proactively on delivering the liquid gold project.

Very simply, liquid gold is about preventing future AMD.

It's about being smart by creating a sustainable business solution that will continue beyond the operating life of the current assets and also, importantly, make sure it enables the eventual closure of the operations in a responsible, liability-free manner.

I won't go into the technology here but it's not using reverse osmosis - it's using an ion-exchange approach.

It's been piloted extensively across our operations on the West Wits and we're very happy with the pilot results and the generation of potable water from mine and dirty fisher water is now a very realistic prospect for us.

At this stage we've identified all our key stakeholders and we've initiated the process of developing the



necessary commercial partnerships that are important for this big project to work for us in South Africa.

In conclusion, there's no doubt in my mind that technology and innovation can contribute to turn available ore bodies and resources like the ones Tommy was talking about, to account, and to do this in a safer fashion, more efficiently, more cost-effectively with a better environment footprint.

Improvements in T&I will definitely influence the way we approach our new projects in Gold Fields and how they're assessed. It's going to make the business safer and more value-accretive.

In closing, I think that technology advancement and implementation in Gold Fields will assist in attracting and retaining the right calibre of staff and professionals from across the globe, and help to move Gold Fields into the future.

Thanks very much.

END OF TRANSCRIPT