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MINE CLOSURES: IN PURSUIT OF HAPPY ENDINGS

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HOW DOES THE LATEST COMMONWEALTH GOVERNMENT-FUNDED COOPERATIVE RESEARCH CENTRE AIM TO DRIVE SUSTAINABLE POST-MINING TRANSITIONS? **TARA HAMID** REPORTS.

Within the next decade, several large mines in Australia will reach the end of their lifecycle.

Ensuring that mine closures are done responsibly and with the least impact on regional mine-dependent economies is the focus of the newly-funded Cooperative Research Centre for Transformations in Mining Economies (CRC-TiME).

Sustainable and responsible mine closure practices have been highlighted as a priority by the Commonwealth Government in the National Resource Statement 2019.

It is also viewed as an area

where Australia could create new opportunities by exporting its technologies and expertise globally.

To support that objective, the CRC-TiME is looking to spend over \$130 million, contributed in cash and kind by its partners on collaborative research and development projects over the next 10 years. The funding includes \$30 million announced by the federal government in March.

The CRC-TiME is jointly led by the University of Western Australia and the University of Queensland, and brings together over 70 industry partners, including major mining and METS (mining equipment, technology and services) companies, regional development organisations, local, state

and Commonwealth Governments, and research partners.

The Australian Government's Cooperative Research Centres (CRCs) are intended to improve collective action to increase the competitiveness of Australian industries.

While the new CRC-TiME is still at the beginning of its collaborative journey, University of Western Australia professor and CRC-TiME chief executive officer Guy Boggs believes the initiative is a step forward for the mining sector.

"We have a world-leading mining industry here in Australia. We also have well-structured government regulations when it comes to mine closure and rehabilitation. But what we have not

done well enough in the past is to look at opportunity areas where we can position the regional communities to successfully transition post mining," he tells *Australian Mining*. "As a community, we have this understanding that mines start, operate and then just put back what was there before. But, as a broader community, we have never dealt with the issue that mines actually do change the landscape.

"So that rather than just thinking about putting back what was there before, since we are already asking mining companies to spend millions of dollars on rehabilitation work, let's make sure that this money is actually spent for the best interest of the community."



ERIZON HELPED WITH EARLY REHABILITATION OF HILLGROVE RESOURCES' KANMANTOO COPPER MINE IN SOUTH AUSTRALIA. IMAGE: ERIZON.



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Professor Anna Littleboy, from the Sustainable Minerals Institute of the University of Queensland, has been appointed as research director for CRC-TiME. Together, the two academicians will be hosting the western and the eastern presence of CRC-TiME. She concurs with Boggs on the importance of shifting the focus to communities.

“One of the things that we asked ourselves as we went through the planning for CRC-TiME was ‘what are we trying to achieve with this CRC?’ And eventually the conversation evolved from asking ‘what does it mean to close a mine?’ to ‘what does it mean to transition the mining community?’ Littleboy says.

CRC’s foundational programs

Seeking to answer this question will be the focus of the first of the three foundational programs that the CRC plans to undertake over the next 12-18 months, Littleboy explains.

“Over the next months, we will be conducting a range of consultations around Australia for each program of research that we anticipate the CRC to undertake. We call the first program, Regional Economic Development, and this is where we anticipate the regional and community groups to come together with the mining industry and the state governments to discuss the best post-mining opportunities for their relevant regions,” she says.

“For example, in the Bowen Basin where we have a predominantly coal mining economy, we expect a whole range of conversations to be held about regional development. Researchers at the University of Queensland, the University of Western Australia and CSIRO can all come together as part of virtual research teams to collaborate.”

And what solutions will the research teams focus on? According to Boggs, these could include a range of options for the mining regions.

“Part of this might be around re-establishing the land’s biodiversity values, part of it might be looking at the commercial opportunities and part of it might be looking at the way the mines are constructed in the first place to ensure that the legacy that they leave is one that the communities can use,” Boggs explains.

“There are a lot of opportunities for energy production and agricultural development post mining. There’s a whole suite of different uses that mines could be suitable for that would help the communities that have come to be dependent on the mine to transition and be economically resilient after the mine closes.”

While the first program puts communities at the centre of decision-making for their regions, the second program that would form the



GUY BOGGS, CEO OF THE TRANSFORMATIONS IN MINING ECONOMIES CRC.



CRC TiME'S RESEARCH DIRECTOR, PROFESSOR ANNA LITTLEBOY.

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foundation of CRC-TiME, Professor Littleboy says, will focus on what the mining companies can do at the planning stage.

“There are a lot of things mining companies can do whilst operating that can help to facilitate what will happen in the future. But we need to understand how to factor that into risk modelling, mine planning and mine scheduling,” she says.

“That’s where we anticipate research that will be more closely aligned with the mining companies. We’ll be talking to mining companies about how do they do mine planning at the moment? How do they factor social performance and community engagement into their operations? How can we embed that a little more strongly in operations?”

And finally the third program of focus for the CRC-TiME will revolve around technological solutions to minimise risk from mining operations.

“Here in Australia, we have really strong research capabilities. Because of our historically strong mining industry, the research community has been able to grow around that – particularly in areas related to bio-diversity and ecosystem restoration in mining rehabilitation,” says Professor Boggs.

Economic impact of CRC-TiME

In its economic modelling, the CRC-TiME estimates that through

consultative works with relevant research bodies and mining companies and the resulting economic opportunities, the CRC could help generate as much as \$2.4 billion for the mining industry and broader community during its 10 years of work.

The figure, Littleboy says, comes from detailed modelling, primarily driven through interviews with end users, the community and the state governments involved in the program.

Part of this economic impact, according to the academician, could be driven from increased certainty around mine relinquishments, resulting in more investor confidence.

“One of the issues facing Australia’s mining industry is that there are very few cases of successfully closed and relinquished sites. And if the mining industry cannot demonstrate that they can close mines, then obviously that has an impact on their ability to get investment to open new mines,” Littleboy says.

An independent study by the Australian Academy of Technology and Engineering (ATSE) in 2017 suggested that up to 50,000 mines in Australia have been abandoned.

In a study in the same year, the Australian Institute estimated the number to be more than 60,000, adding that one case was identified between 2007 to 2017 where a mine had been

fully rehabilitated and relinquished.

Professor Boggs says part of CRC-TiME’s efforts to increase certainty of mine relinquishment will be working with the Western Australian, Queensland and South Australian governments to find solutions for remediating the legacy sites.

“We have a number of government departments that are very interested in the work that the CRC could do around abandoned sites. We will be looking at how to better remediate some of these legacy sites,” Boggs says

“Legacy sites also provide opportunities to test and trial new technologies and innovations – which would be difficult to trial in operational mine sites.

“So we will be exploring whether we can use legacy sites as testing grounds to help develop new technologies that help with closing operational mines.”

Global market opportunities

Another area where CRC-TiME sees opportunities for positive economic impact on the mining sector is in global supply growth opportunities.

“There’s a burgeoning global market for closure solutions as the industry matures around the world everywhere. All mining jurisdictions are facing this issue of rehabilitating the mines and handing them back to the people,” says Littleboy.

“So we calculate that if Australia can position itself as a global leader in providing these solutions for mine closure, there is potentially a billion dollars out there in terms of a global market to access and the intellectual property and commercial services to meet that market.”

The value of rehabilitated land post mining is the third area of economic impact that the CRC-TiME economic modelling considered.

“Obviously if we can deliver back some productive land for agriculture or horticulture, then that land has an economic value post mining,” says Littleboy.

“We haven’t actually managed to quantify the environmental value of the land that we return to people, nor have we managed to quantify the value that for example Indigenous people will get out of retaining access to country, but those are obviously very important impacts that we can deliver through this CRC as well.”

Decipher is one of the partners on the CRC-TiME program. Having grown out of the Industrials Division of Wesfarmers, Decipher will bring expertise around software solutions in mine closure and rehabilitation, tailings reporting and monitoring, and data processing to CRC-TiME.

Decipher chief executive Anthony Walker says he is optimistic about the



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ERIZON HELPED WITH THE SUCCESSFUL REHABILITATION OF RIO TINTO'S HAIL CREEK MINE IN THE BOWEN BASIN. IMAGE: ERIZON.

cultural change in the mining sector.

"Decisions about mine closure in Australia have tended to have little consideration of how the land might be used post-mining. However, this is beginning to change, particularly with increased stakeholder pressure, environmental concerns and regulatory changes," Walker says.

The company is looking to leverage its satellite and LiDAR-based tools and data processing technology to facilitate research on mine rehabilitation.

"The CRC-TiME could not have come at a better time, and I'm really excited that we have the technology to help revolutionise the task of mine rehabilitation and closure and ultimately improve those rates of relinquishment of land," Walker says.

"It's exciting and encouraging to see a cultural shift in the industry in recent years with an increased appetite for collaboration by industry, research bodies and government in this space."

Anglo American and Komatsu have this year demonstrated a modern example of this collaboration between a major miner and METS company.

The two companies announced a collaborative mine rehabilitation partnership that will see more than 9000 trees planted at Anglo American's

Dawson coal mine in the Bowen Basin, Queensland as part of a five-year rehabilitation project.

The project includes a pilot of biodegradable Cocoon planting technology, which reduces the need for irrigation, to help drought-proof the newly-planted trees.

The Cocoon pods require 100 times less water than traditional methods and can support a young plant through its critical first year with an accessible reservoir of water and moisture.

Positive changes on the way

Another industry partner on the CRC-TiME program is Erizon, which brings extensive expertise around soil stabilisation, revegetation and site rehabilitation work.

The company has delivered rehabilitation solutions to major mining companies, including revegetation and soil stabilisation work on Rio Tinto's Hail Creek mine in the Bowen Basin and early rehabilitation at Hillgrove Resources' Kanmantoo copper mine in the Adelaide Hills, South Australia.

Erizon environmental consultant Glenn Sullivan says when it comes to revegetation and soil management, early planning is key to a successful

and low-cost mine rehabilitation program.

"One challenge that the mines are facing at the moment is around availability of high-quality top soil for revegetation. When the soil is stockpiled for many years, it loses its biological value and without a long-term plan, it can get completely eroded or depleted," Sullivan says.

As part of its range of solutions and products for mine rehabilitation, Erizon has developed EnviroSoil as a top soil alternative that can be applied hydraulically to the depleted stockpile to bring back organic matter and nutrients to the soil.

"Even if the mine is halfway through its life and the operators realise that they are going to run out of top soil, for example due to soil erosion or depletion, there are still ways to create suitable top soil with early planning," Sullivan says.

In Sullivan's observation, the re-vegetation approach in Australia needs to be upgraded in line with the latest innovations.

"When it comes to re-vegetation, certain parts in Australia are renowned for using the same old methods that were used decades ago and not really embracing innovation and new ways of

doing things," he says.

But the trend is changing as regulations around mine rehabilitation tighten, Sullivan continues.

"We are certainly having more discussions around forward planning for mine rehabilitation with our customers now that we had, say, three years ago," he says.

The team of experts behind CRC-TiME sees the positive response from the mining community as a positive sign that the sector is getting ready for more collaboration.

"One of the most exciting things about the CRC-TiME is that a large number of mining companies have supported this initiative – which shows that they see value in cooperating around mine closure," Boggys says.

"Mine rehabilitations have historically been seen as areas of commercial conflict between the mining companies. So there has been a lack of sharing in the past. Now the industry as a whole is realising that it needs to work collaboratively to achieve better outcomes in mine closure.

"This cannot be achieved with the mines working in silos and CRC-TiME is hoping to facilitate a greater transparency." ■