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WA WORKS

Supply Chain and Major Project News

Summer 2021-22

Climate change and ESG

The road to net zero

Energy
Diesel rise hitting industry

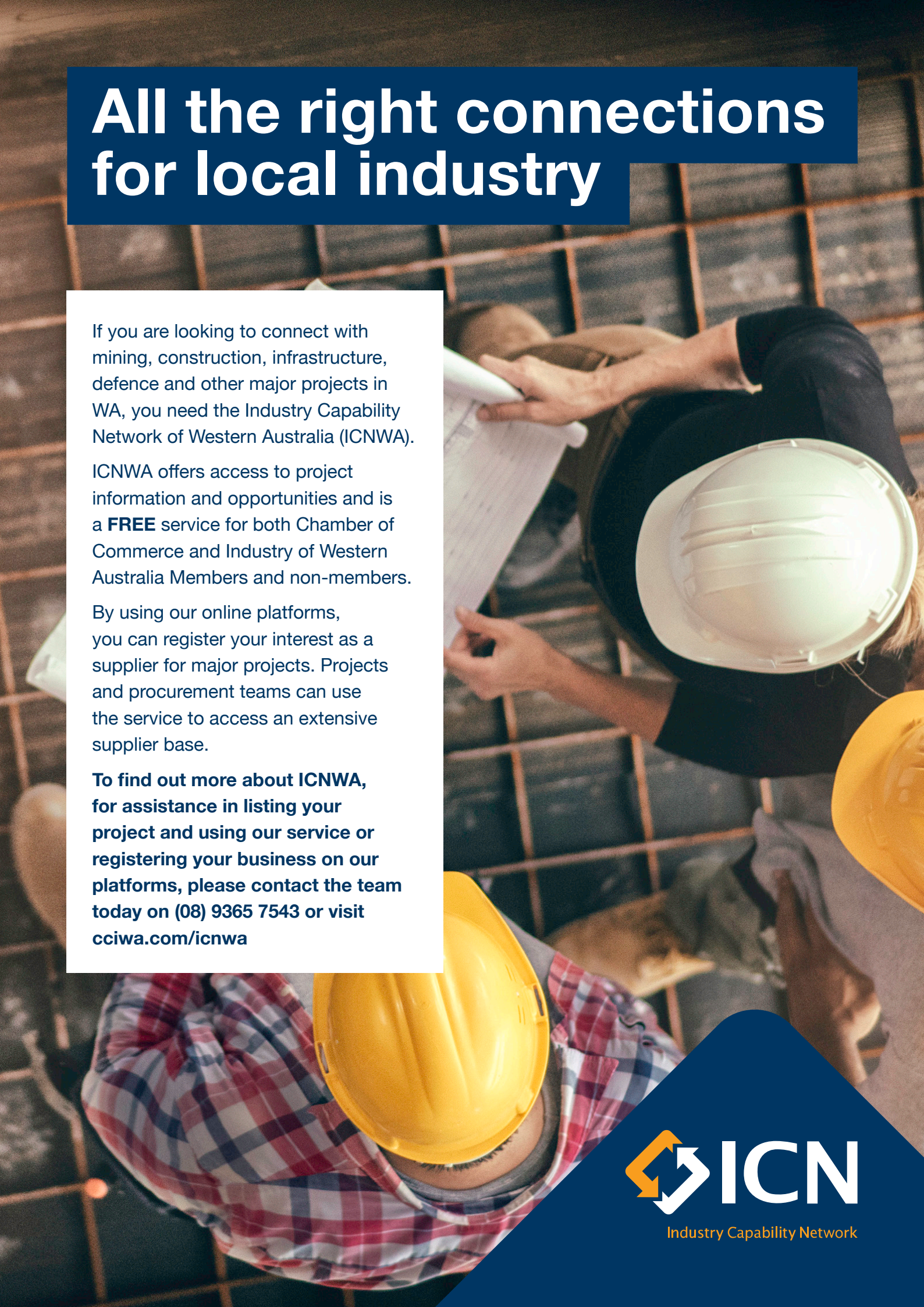
Infrastructure
WA's role in the space race

Resources
Local miners fuelling batteries

News, Profiles, Major Projects List, Opinion and more

Chamber of Commerce and Industry WA

All the right connections for local industry



If you are looking to connect with mining, construction, infrastructure, defence and other major projects in WA, you need the Industry Capability Network of Western Australia (ICNWA).

ICNWA offers access to project information and opportunities and is a **FREE** service for both Chamber of Commerce and Industry of Western Australia Members and non-members.

By using our online platforms, you can register your interest as a supplier for major projects. Projects and procurement teams can use the service to access an extensive supplier base.

To find out more about ICNWA, for assistance in listing your project and using our service or registering your business on our platforms, please contact the team today on (08) 9365 7543 or visit cciwa.com/icnwa

ICN

Industry Capability Network

In this issue

On the cover

Turning down emissions: Different strokes from different folks.

"Make a difference, make a dollar. There's nothing wrong with that"

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Welcome

Editor's Letter

Change is constant

Sixteen and a half billion dollars — that's how much Woodside will be ploughing into its Scarborough gas field development over the next few years.

In late November the company said it would build a 430-kilometre pipeline linking Scarborough to the mainland, as well as a second production train at the Pluto LNG processing plant.

First production is expected in 2026, and future issues of *WA Works* will take a closer look at just how much work will be involved in this massive project.

As Aaron Morey notes in his Economic Outlook, mining is becoming an even bigger component of WA's economy — it's now 47 per cent of total Gross State Product and could soon top 50 per cent.

This issue, however, is focused on both the climate change and the environmental, social and governance (ESG) issues that have drawn much attention in the lead-up to and wake of the COP26 meeting in Glasgow in November.

We look into the politics of climate change, and our Policy team considers whether a carbon pricing mechanism would be effective in decarbonising the WA economy.

A recent CCIWA survey indicated more than two-thirds of WA businesses were willing to pay an average of 12 per cent more on their energy bills to support achieving net-zero emissions, but there are no strong views on whether a carbon 'tax' or emissions trading scheme would be the best mechanism to price carbon emissions.

It wouldn't be an issue of *WA Works* without an update on the supply chain problems the world's facing.

It's a global issue but some factors in WA aren't exactly helping to improve the situation, as a growing number of voices are pointing out.

The inability of companies to get their orders into port or on the road is one thing, the growing cost of doing so is another; and if there's one cost that everyone resents but can't avoid (other than taxes, of course) it's the cost of fuel.

Mining companies, in particular, use hundreds of millions — possibly billions in one or two cases — of litres of fuel, primarily diesel, per year.

Even given they get a 43-cent rebate on fuel used off-road, have you seen the price of diesel lately? A 40 per cent rise in a fixed cost in just one year is a massive increase — no wonder Andrew Forrest is looking to hydrogen to power the Fortescue empire.

There's continuing progress in the development of alternative power supplies.

Firstly, Western Power is asking for expressions of interest in a disconnected microgrid to be built in the State's farming belt.

Meanwhile, Synergy is looking to use the old Kwinana Power Station site for its own $155 million, 100-megawatt battery that will store excess household solar power built up through the day and release it during the afternoon and evening peak period.

Finally, many thanks to erstwhile *WA Works* editor Stephen Bell, who has driven this magazine and its fortnightly newsletter forward for the past five years.

All of us at CCIWA hope "Belly" enjoys his retirement immensely — and, readers, don't be surprised if you see his name in these pages again.

Hugh Halloran

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Chamber of Commerce and Industry of Western Australia Limited
235 St Georges Terrace,
Perth, WA 6000
(08) 9365 7555
info@cciwa.com
www.cciwa.com

President
Nicolle Jenkins

Chief Executive Officer
Chris Rodwell

Editor
Hugh Halloran
(08) 9365 7524
hugh.halloran@cciwa.com

Advertising
1300 422 492
advertising@cciwa.com

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editor@cciwa.com
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CEO's Desk

Chris Rodwell

The market speaks on net zero

Many companies are seeking and achieving net zero accreditation while calling for more government support for low emissions technology

For some time CCIWA has been engaging closely with our members on the issue of climate change.

Our membership is by some measure WA's largest and most representative of the overall economy and key sectors.

That's why CCIWA has been best-placed to mobilise and bring together small, medium and large businesses, to identify the most pressing aspects of this challenge, and how businesses want to see them solved.

There is a breadth of views across the business community and ultimately we recognise our role in reconciling them to define a position that is in the best interests of our economy and the community.

Thousands of WA businesses have taken part in surveys and workshops with our team.

Our economy is emissions-intensive, oriented towards the production of minerals, energy, manufacturing and agricultural products.

Indeed, the mining sector now comprises a record 47 per cent of our economy, a clarion signal of our need to diversify our economy.

Yet even as Australia's leading industrial state, conversation among businesses on climate change has outpaced the politics.

Our engagement shows that the risks of climate change — to agricultural land, water resources and ecosystems, to coastal and regional communities and to investment, jobs, the economy — are deeply understood by WA business.

Businesses recognise that the expectations of stakeholders, employees, investors and customers have changed. The established and growing expectation is of more sustainable practices and more demonstrable progress towards sustainable environmental policies.

The availability and cost of investment, capital, loans and insurance for projects are all being shaped by these considerations. They are no longer expectations, they are more often non-negotiable.

CCIWA members like Austral Fisheries and Steel Blue are independently taking action, seeking and achieving net zero accreditation.

The market is speaking. This is a reality which sidelines more than a decade of debate.

Like so many of our members, CCIWA has supported a 'net zero by 2050' target for some time.

WA businesses, aligned with our global partners, are looking for a clear national approach to achieve it, to remain competitive and to shake off an overall perception of Australia.

And CCIWA has done what no-one in Australia has done: we've identified businesses' willingness to pay to achieve lower emissions.

Two-thirds of WA businesses are willing to bear higher energy costs.

On average, they say they can bear 12 per cent higher energy costs if it means reaching that ambition.

And significantly, there was no difference between metro businesses or regional businesses.

Some things stand out. Businesses do not want to see reliability compromised in favour of affordability or emissions reduction.

And more businesses expressed being 'unsure' about the best mechanism — whether an emissions trading scheme, emissions reduction fund, or a carbon tariff — than were 'for' or 'against' them.

The clearest view is that businesses want to see much more Government support for low-emissions technology.

At CCIWA's recent 'Conversations' series event, our guest, State Minister for Environment, Climate Action and Commerce the Hon. Amber-Jade Sanderson, released the McGowan Government's timeline, industry engagement plan and areas of economic activity that will be the focus of a Sectoral Emissions Reduction Strategy.

This is a vital step, as WA businesses want a plan, and they want to understand how it applies to them.

For our part CCIWA is optimistic.

We're optimistic because of WA's strong tradition of entrepreneurialism and innovation.

With our abundance of land, sun, wind and saltwater, we are well-resourced to develop greener energy, as the global transition to net zero takes shape.

Even two years ago, a national, bipartisan commitment to net zero would have been unthinkable.

And CCIWA will keep doing all we can to support our members and facilitate engagement with Government about how to get there.

"The established and growing expectation is of more sustainable practices and more demonstrable progress"

The Big Picture

BHP's new nickel sulphate plant in Kwinana aims to capture a significant slice of the growing market for battery precursor materials.

Economic Outlook

Mining now all but half the WA economy

The State economy is performing strongly without overheating, but challenges remain. Diversification and decarbonisation will play a role in the future; meanwhile the Government should be making it easier to do business in WA

Once a year the ABS releases detailed data on the State economies, providing important insights into the growth and structure of each State's economy.

November's release showed that WA's overall economy grew 2.6 per cent in 2020-21.

While that put WA in the middle of the pack, that growth rate came after WA recorded higher growth than other States in 2019-20.

All up WA has clearly been one of the best performing states over the past two years.

But November's release was significant for another reason: it showed that mining's share of the WA economy had grown even further, from a then-record 42 per cent in 2019-20, to a whopping 47 per cent in 2020-21.

To put that in context, the next highest share within WA is the construction sector, at five per cent.

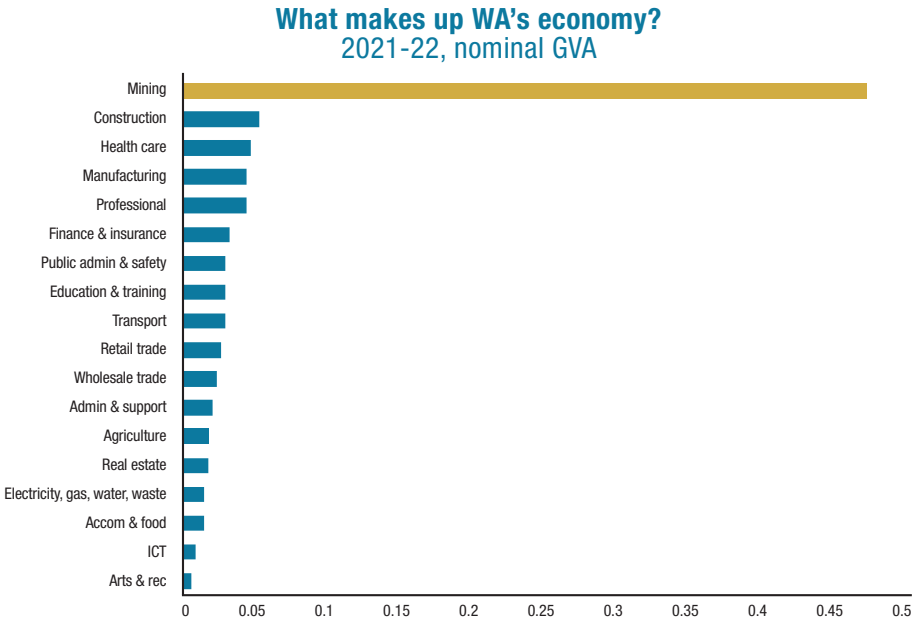
And looking outside WA, the highest share in any other state is the health and community services sector in Tasmania, which stands at 12 per cent.

It is fantastic that WA has such a strong mining sector.

At CCIWA we hope it goes from strength to strength, so that it can continue to support people directly employed in the sector, as well as those sectors linked to it, like construction, retail, real estate, manufacturing and professional services.

Indeed, mining will play a vital role in the world's current push to decarbonise the global economy.

Aaron Morey



At the same time, we must recognise that the good times won't last forever and must move quickly to diversify our economy.

That's why we are calling for a more competitive level of payroll tax for WA businesses.

When a WA business reaches around 20 employees, they face the highest payroll tax burden in the country.

"All up WA has clearly been one of the best performing states over the past two years"

For example, a WA business with a payroll of $2 million is estimated to pay nearly $40,000 (or 156 per cent more) than an equivalent business in South Australia — a State competing with WA for defence and other manufacturing industries.

We're also calling on the Government to invest more in its digital interface with business.

There are still too many licences in WA for which there is no information online, or that still need to be paid by cheque or money order.

If we can lower the costs of doing business by streamlining these sorts of regulatory processes online, we can give our local businesses a competitive advantage over those in other states.

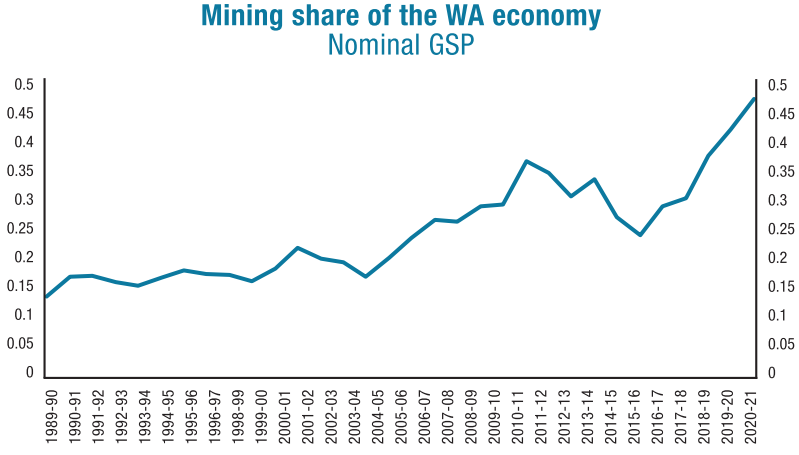
Finally, a plug for CCI-Economics…

Of all the public forecasts on the economy, CCIWA was by far and away the most accurate in its forecasts, predicting a 2.9 per cent growth rate (growth came in at 2.6 per cent).

And that's despite us going out early with our predictions.

It's a timely reminder that if you want to get the best insights on the WA economy — delivered in easy-to-understand language — there's no better source than CCI-Economics.

Aaron Morey is CCIWA's Chief Economist.



Scarborough gets the nod

Woodside and BHP have approved the massive Scarborough gas development, a decision expected to trigger more than 3,000 jobs as WA's dormant LNG construction industry kicks back into gear

By Stephen Bell

As flagged by Woodside earlier in the year, the final investment decision to develop the offshore Scarborough gas reservoir, build a second onshore LNG train at Pluto, and modify Pluto Train 1 will cost $US12 billion ($16.7b).

The FID was a sweet moment for Woodside CEO Meg O'Neill, who now gets to steer what could be the last major LNG development in WA, depending on how tightly present and future governments regulate carbon emissions.

Back in February 2018 when Woodside bought ExxonMobil's interest to assume 75 per cent control and operatorship of Scarborough, critics worried about how "dry" the reservoir gas is (i.e. lacks any oil sweeteners).

Nowadays, most of the chatter is about carbon, managing construction risks (given the tight labour market and staff turnover) and the ongoing COVID 19 restrictions.

But O'Neill insisted Woodside and its contractors have the execution risks in hand.

"This capital-efficient development leverages Woodside's existing infrastructure and our proven expertise in project execution," she said.

"The contracting model, development concept and execution strategy have been designed to reduce cost risk and protect shareholder value."

Construction is scheduled to begin next year and is expected to create 3,200 jobs. Once operational the project will support about 600 roles.

Key contractors

The key contractors working on Scarborough are McDermott for the Floating Production Unit; Subsea Integration Alliance for subsea hardware, risers and flowlines; Valaris for drilling; Europipe for the trunkline pipe; and Saipem for the trunkline installation.

Bechtel is the EPC Contractor for Pluto LNG 2.

Suppliers interested in participating in the project should visit the Pluto Train 2 and Scarborough pages on the ICN Gateway website. It is important to keep monitoring the Pluto Train 2 page as many more work packages for are expected to be published in coming weeks and months.

The gas field is about 375 kilometres off the coast of WA, with the gas to be transported to Pluto LNG through a new trunkline of about 430km.

The State Government welcomed the FID for the LNG export project alongside a new domestic gas facility to be built at the Pluto site.

It said the overall development will deliver large volumes of gas into the WA market, in support of the State's long-term energy needs and ongoing economic development.

The project will support the production of eight million tonnes per annum of LNG through Pluto Trains 1 and 2, and a domestic gas commitment of about 180 terajoules per day.

Around 1,400 petajoules of gas is expected to be supplied to the WA market over the life of the project.

Premier Mark McGowan described the venture's go-ahead as a boon for the State.

"In the coming days, we will execute agreements with the Scarborough and Pluto Train 2 joint ventures that will provide energy certainty for the State and support thousands of local jobs, as well as providing a transition fuel source for our major trading partners," he said.

"Most of the chatter is about carbon, managing construction risks and the ongoing COVID 19 restrictions"

Woodside adds to hydrogen plans in WA, Tas

Woodside has also expanded its interest in producing hydrogen, unveiling plans to build a $1 billion facility at Kwinana that would start construction in 2024, and has also secured land for its H2TAS project in Tasmania.

The H2Perth project will be built on 130 hectares of vacant industrial land to be leased from the State in the Kwinana Strategic Industrial Area and Rockingham Industry Zone.

The McGowan Government welcomed the announcement, tipping that H2Perth will generate 2,000 construction jobs in building the initial stage.

A Woodside spokesperson said Phase 1 would include 250 megawatts of electrolysis capacity, corresponding to about 10 units each of 25MW.

Phase 1, estimated to cost about $1b, will produce 300 tonnes per day of hydrogen, consisting of 100t of green hydrogen (via electrolysis) and 200t blue hydrogen (reformed natural gas).

Earlier this year, Woodside said it would be investigating the production and export of green ammonia produced from hydrogen produced from renewable hydroelectric power in Tasmania.

In a mid-November update, the company said it had secured land for its proposed H2TAS hydrogen plant, which has the potential to support up to 1.7 gigawatts (GW) of electrolysis for hydrogen and ammonia production.

The initial phase would have capacity of up to 300 megawatts (MW) and target production of 200,000 tonnes per annum (tpa) of ammonia.

Initially, green ammonia would be produced at a small-scale hydrogen electrolysis plant northeast Tasmania's Bell Bay region.

Woodside intends to make a final investment decision in 2023, with construction and commissioning expected to take about two years.

The first vessel unloading cargo for Fortescue's Iron Bridge project at Lumsden Point

More work coming at Lumsden Point

The Pilbara Ports Authority's (PPA) plan to build a logistics hub at Port Hedland is generating supply chain opportunities

By Stephen Bell

PPA expects the total cost of its new Lumsden Point facility at Port Hedland to eventually top $300 million, with contractors and suppliers able to participate in the staged works.

The first stage of the long-awaited general cargo port kicked into action last week when a vessel docked and unloaded an equipment module in support of Fortescue's US$3.5 billion ($4.6b) Iron Bridge magnetite project.

It was the culmination of a long journey for Lumsden Point, which has seen $143m of works — mostly on dredging and land development — since the State Government-owned PPA obtained environmental approvals in 2014.

However, PPA CEO Roger Johnston told *WA Works* substantial extra work is needed to transform the new port into a "multi-user facility and logistics hub", expected to alleviate the demand on existing cargo berths at the Port of Port Hedland.

"Further development of Lumsden Point includes additional dredging, a land-backed wharf and further development of the causeway and access corridor," he said, adding that the total cost of development will "exceed $300 million".

"Detailed design is still underway, which will inform the cost and timing of each stage of works," he said.

"There will be opportunities for contractors and suppliers to participate in future development works."

The next stage involves roadworks to unlock eight hectares of land within Lumsden Point — planned to commence early next year.

Johnston said these works will be the first stage of development and are "expected to be completed by the end of next year".

He said the future works would help support direct shipping services from Asia, the ongoing development of battery mineral mines, as well as providing opportunities for expanding agribusiness and proposed renewable energy projects in the Pilbara.

"PPA and Fortescue have worked closely together to fast-track the delivery of this important piece of infrastructure which in the short term meets the needs of Iron Bridge but in the longer term will be important for all port users," he said.

> "The total cost of development will exceed $300 million"

Fortescue's investment

Fortescue Director Projects Derek Brown said Iron Bridge is a "strategic investment" for the miner and the new purpose-built module offload facility will "help underpin the project schedule through the successful delivery of large modules".

The iron ore miner funded the new infrastructure in the hope it will resolve a "logistics bottleneck" for the delivery of large modules at Port Hedland, as it looks to keep Iron Bridge on track after it suffered major cost blowouts earlier this year.

It its latest quarterly update, Fortescue said the huge project remained on target for first production in December 2022.

During the September quarter, the project achieved milestones, including:

- Delivery and installation of the first modules to site
- Installation of the first high pressure grinding roll (HPGR) in the tertiary crushing facility
- Completion of earthworks for the tailings storage facility
- Construction of the module offload facility at Lumsden Point
- Commissioning and operation of the airport.

Fortescue expects total capital expenditure, excluding its FFI subsidiary, of US$2.8b to US$3.2b ($3.7b to $4.2b) in the financial year ending June 30, 2022.

Gas from Woodside's $16bn Scarborough gas field development will be processed at the company's existing onshore Pluto LNG plant. Source: Woodside Energy Ltd

The new ESG climate

Two issues ago, *WA Works* said the 'E' in ESG (environmental, social and governance) concerns would arguably be the biggest single catalyst for change in the resources industry. Some six months or so later, this prediction looks to be holding true — a 'green revolution' is underway, writes **Hugh Halloran**

In the lead-up to, during and after the interminable proceedings of the COP26 climate change conference in Glasgow, Scotland, this November, the term 'net zero' became a mantra for journalists, analysts, activists, politicians and company directors alike.

Net zero had bumbled along in the obscurity of the environmental press for some years, never scaling even mild heights of interest among the mainstream population — but once the trend caught on, no commentator could risk not dropping it into their remarks.

And if net zero means anything, it means there are big changes ahead for the resources industry, which now makes up nearly 50 per cent of the Western Australian economy.

One of those big changes is BHP selling off its petroleum division to Woodside. The Big Australian has made its call on the future of oil and gas and has decided to bet on iron ore and other minerals rather than the energy game.

Woodside clearly sees a different future — one where oil and gas projects continue to be vital in the medium to long term — and has decided to go ahead with the development of its Scarborough gas field.

In terms of scale, the Scarborough go-ahead is the largest oil and gas investment decision to occur in Australia in recent years and will lead to the creation of more than 3000 jobs.

As CCIWA CEO Chris Rodwell said, Scarborough is exactly the type of project WA has excelled in attracting, but it was also important to recognise that we need to attract investment in emerging sectors to support our economic diversification.

"It sends a message to the world that we're ready for business on the eve of our reopening to the world," Rodwell said.

"It also serves as a reminder of the transformative impacts of business investment. That's why we must ensure our regulatory environment is geared to generate greater investment — ultimately, it enhances the prosperity of all Australians."

Tackling the green revolution

Given the noise about how capital markets will seek to invest (or not) in traditional and new industries, it's timely that we look at how our three big publicly listed iron ore miners are tackling the green revolution in different ways.

Fortescue Metals Group is taking the boldest approach, as even someone who hasn't heard the name 'Twiggy' since the 1960s would be aware, but BHP and Rio Tinto are beating their own paths towards a greener future.

Is hydrogen the only answer though?

Beatrice Thomas takes a look at "The politics of climate change" and how the flurry of announcements and promises will actually affect business in the months and years ahead.

As many suspect, it's one thing to promise action but another to manifest it successfully.

"Going the green mile" casts an eye over what some local Perth businesses are doing in respect of their own ESG requirements; as we discover, it's not just big companies that have a role to play, or indeed, an opportunity to grow, in this evolving area.

In "Navigating the drive to do good", Elva Darnell writes about how big businesses and governments have promised to use their procurement powers for environmental and social good, and some WA suppliers are betting they'll stick to them.

Crystal Print, for example, has spent $700,000 over the past decade installing solar panels, improving energy efficiency and offsetting emissions.

The company is also pushing for more Indigenous engagement, in both its staffing and through its partnership with the recently launched Yonga Solutions, a majority-owned Indigenous business.

And finally, "A rare opportunity" explores how Iluka Resources could put the Mid West mining town of Eneabba on the global green energy map early in 2022 if it approves the development of Australia's first rare earths refinery.

The green revolution

Hydrogen is ubiquitous in the current energy debate, with Fortescue Chairman Andrew Forrest its biggest cheerleader in Australia. But how long will it take WA's biggest miners to incorporate the miracle molecule into their DNA? **Hugh Halloran** investigates

To paraphrase Gordon Gecko, "Green is good. Green is right."

When companies the size and nature of Fortescue Metals, BHP and Rio Tinto get on the green wagon, it's a sure thing there are substantial bottom-line considerations behind their moves.

In the lead-up to and fallout from the Conference of Parties 26 (COP26) meeting in early November, Fortescue Metal's Fortescue Future Industries (FFI) subsidiary was releasing a statement almost every day selling the benefits of its plans for a future green hydrogen economy.

Between October 27 and November 5, FFI put out seven media releases, while shortly before COP26 started, Fortescue chief Andrew Forrest appeared on Channel 7's *Flashpoint* and told viewers the biggest investment banks and analysts in the world believed the green hydrogen part of the next industrial revolution would be $12 trillion.

That's trillion dollars with a T.

"When the world turned to fossil fuels it underwent an industrial revolution," Forrest said.

"When the world turns to renewable energy and renewable fuels that industrial revolution will be so much bigger.

"We're going to move on from the era of polluting the world because we've got a much better way of producing all the energy we need, all the products we need, but with zero pollution.

"We could have green energy industries all over our beautiful country — not just in one state or another state, everywhere. It is the obvious and clear future to a higher standard of living at a lower cost."

Chief scientist backs hydrogen

Like Forrest, Australia's chief scientist from 2016 to 2020, Alan Finkel, is a big believer in the future of hydrogen.

In his lead industry address at the Australian Petroleum Production and Exploration Association (APPEA) 2021 conference and exhibition in Perth in June, Finkel said that initially hydrogen would be used for making ammonia and for oil refining, but eventually it would be used in huge quantities for steelmaking.

It would also be used in the heavy-duty, long-haul transport sectors.

Later, in October, Finkel told *The Australian*

newspaper that hydrogen presented "an extraordinary export opportunity" that was almost beyond imagining but that could rival our LNG exports.

"Imagine a world where Australia, 20 or 30 years in the future, is producing as much hydrogen in energy-equivalent terms as our 2020 LNG exports," he said.

Not so fast, says BHP

BHP is taking a more circumspect approach, however, playing down the potential of hydrogen to change the world.

In a recent discussion at the Financial Times Mining Summit, BHP CEO Mike Henry said the company continued to believe that hydrogen would have its day, but current economics were not attractive for hydrogen-based steelmaking.

Developing green Direct Reduced Ironmaking (DRI) would take a massive quantum of capital, and existing blast furnaces still had another 20 or 30 years of useful life.

"We think the economics of taking all that sunk capital, throwing it away and developing hydrogen-based steelmaking rapidly are going to prove to be too challenging," Henry said.

Asked how much he thought it would cost the industry to get into green DRI, Henry said it would be many hundreds of billions of dollars.

"Even for a company like BHP, if at some point in the future BHP changed its mind and wanted to become a green DRI producer and we wanted to convert all of BHP's iron ore with hydrogen, the amount of capital involved would be well in excess of BHP's current market cap, so it would have quite a dilutive effect in terms of return on capital employed for BHP shareholders. We just do not believe that is the right way to go."

Henry did, however, refer to BHP's announcement in 2020 of a 30 per cent reduction in emissions by 2030 and its more recent 'Say on Climate', in which the company committed to a target of net-zero Scope 3 emissions for both shipping and supply into BHP.

> **"We're going to move on from the era of polluting the world"**

BHP was collaborating with others in the supply chain, notably the Baowu group and HBIS group in China, and with JFE Steel in Japan, to help them solve what for them were Scope 1 and Scope 2 emissions, and what for BHP were Scope 3.

"We are investing in the technologies that are going to enable decarbonisation, ultimately," Henry said.

"We also have, through our ventures arm, some investments in even more bleeding-edge or cutting-edge technologies to enable steelmaking decarbonisation."

"I want to ensure that anything we are specifically putting a target out there on is something that we have a high degree of confidence in our ability to achieve and that we have a real understanding of both the technologies and the costs required for doing so."

Meanwhile, in November BHP announced it was divesting its 80 per cent interest in BHP Mitsui Coal (BMC), which operates a metallurgical coal joint venture in Queensland in a deal with Stanmore Resources worth up to $1.8 billion.

"As the world decarbonises, BHP is sharpening its focus on producing higher quality metallurgical coal sought after by global steelmakers to help increase efficiency and lower emissions," BHP's President Minerals Australia Edgar Basto said in announcing the deal.

Rio seeks a third way

Australia's other major miner, Rio Tinto, is taking a third approach: on the one hand it's investigating how to decarbonise the production of steel and aluminium by using hydrogen, and on the other it's investigating other means to reduce its carbon emissions.

One such investigatory project uses plant matter known as lignocellulosic biomass, instead of coal, to be blended with iron ore and heated by a combination of gas released by the biomass and high efficiency microwaves that can be powered by renewable energy.

Lignocellulosic biomass includes sustainably produced agriculture by-products such as wheat straw, corn stover, barley straw and sugar cane bagasse along with and purpose-grown crops.

Importantly, the process does not use foods such as sugar or corn, and nor would Rio use biomass sources that included old-growth forests.

The use of raw biomass in Rio Tinto's process could also avoid the inefficiencies and associated costs of other biomass-based technologies that first convert the biomass into charcoal or biogas.

Rio Tinto Iron Ore Chief Executive Simon Trott said the company was encouraged by early testing results of this new process, which could provide a cost-efficient way to produce low-carbon steel from Pilbara iron ore.

"More than 70 per cent of Rio Tinto's Scope 3 emissions are generated as customers process our iron ore into steel, which is critical for urbanisation and infrastructure development as the world's economies decarbonise," Trott said.

"So, while it's still early days and there is a lot more research and other work to do, we are keen to explore further development of this technology."

Green shoots

Finally, it's worth noting the focus newer and smaller mining companies such as Bellevue Gold are placing on being green.

Bellevue, which proposes to develop one of WA's highest-grade, lowest-cost gold mines over the next 18 months, is proudly proclaiming its commitment to sustainable mining practices and says it's forecast to be the lowest greenhouse gas emitter per ounce on the Australian Stock Exchange.

The company plans to be one of the country's best-in-class 'green and gold' miners with a forecast greenhouse gas intensity of 0.202 tonnes CO2 equivalent per ounce thanks in part to its planned integration of renewable energy to complement its off-grid, baseload gas-fired power station.

It's forecast to have the least total Scope 1 emissions of any major off-grid gold mine in Australia; to have one of the cleanest power supplies for any gold mine in Australia; and to be well insulated for any future carbon tax legislation.

Let's hope that all the efforts outlined here mean that insulation won't be needed.

Australia sits on a COP26 panel. Source: UNFCCC

The politics of climate change

A flurry of pledges, centred around COP26 in Glasgow, has many believing a climate change paradigm shift is taking place. But what does it mean for businesses? **Beatrice Thomas** reports

"The path of progress is not always a straight line. Sometimes there are detours. Sometimes there are ditches."

It's with these concluding remarks at the 26th UN Climate Change Conference of Parties in Glasgow on November 13, that a clearly frustrated UN Secretary-General Antonio Guterres neatly summed up the complexity of climate change dialogue today.

It had been "an extremely challenging conference", he acknowledged, and after a fortnight of negotiations, the Glasgow Climate Pact signed by 197 participating countries was a "compromise" deal on climate.

"(The approved texts) reflect the interests, the conditions, the contradictions and the state of political will in the world today," Guterres said.

Going into the summit, the UN wanted an end to fossil fuel subsidies; to phase out coal; put a price on carbon; and to deliver on a $100 billion annual climate finance commitment to help developing nations reduce emissions and adapt to climate change.

What it achieved top line was agreement to "phase down" coal use, following last-minute interventions from India and China; commitments from 141 countries to end deforestation; a methane pledge from 105 countries; and agreement from 450 global financial services firms to mobilise $130 trillion — 40 per cent of the world's financial assets — to align with net zero goals and a 1.5-degree Celsius warming limit set out in the Paris Agreement.

COP26 also finalised the Paris Rulebook — agreeing on the "enhanced transparency framework" (common reporting of emissions and support), a new mechanism and standards for international carbon markets, and common timeframes for emissions reductions targets.

And in a surprise side deal, the United States and China — the two largest emitters of CO2 — pledged to boost climate cooperation over the next decade.

But, as COP26 President Alok Sharma pointed out, to keep the 2030 goal of a 45 per cent reduction in emissions on 2010 levels in sight, accelerated action is needed this decade.

1.5C target 'unlikely'

Analysts say staying within the 1.5C target compared to pre-industrial levels is unlikely.

"By the end of the COP26 Summit and by the most optimistic scenario, we could get to 1.8C with full implementation of submitted targets, binding long-term targets and 2030 NDCs (nationally determined contributions), pledges and targets, but experts suggest that the most likely outcome is 2.4C," Citi Research wrote in its post-conference note.

For its part, Australia went into COP26 having made a long-awaited commitment of net zero by 2050, with Prime Minister Scott Morrison's plan based on accelerating technologies such as hydrogen and solar while "preserving our existing industries, establishing Australia as a leader in low emissions technologies, and positioning our regions to prosper".

"The plan is based on our existing policies and will be guided by five principles that will ensure Australia's shift to a net zero economy will not put industries, regions or jobs at risk," he said.

The non-binding plan, which came after protracted negotiations with the Nationals, made no change to Australia's existing 2030 emissions reduction target of 26 to 28 per cent on 2005 levels (the Government says it's on track for a 35 per cent cut).

Meanwhile, Federal Labor has since revealed its own pre-election policy of a 43 per cent cut by 2030, driven by an overhaul of the existing safeguard mechanism that sets a "baseline" pollution limit on businesses that emit more than 100,000 tonnes of CO2 annually.

The Australian Chamber of Commerce and Industry says updated 2030 targets "push the frame towards more ambitious action on climate change". "If Australian businesses are to remain internationally competitive, we must have the clear policy settings that signal this commitment," ACCI CEO Andrew McKellar says.

The Climate Council has called for a 75 per cent reduction this decade, labelling Australia the "worst climate performer out of all developed countries".

"Net zero is a joke without strong emissions cuts this decade," says Climate Council CEO Amanda McKenzie.

Cost of inaction

In its own modelling, the Federal Government highlights the likely costs of inaction.

"In a world taking more ambitious climate action it is almost certain that Australia would face some form of global response if it did not take on a credible 2050 emissions target," the Long-Term Emissions Reduction Plan modelling reads.

"This could take a variety of forms: increased capital costs for Australian governments, firms and households reflecting increased perceived financial risks; trade action against Australian exports intended to offset any competitive advantage derived from perceived weaker abatement policies; or lower demand for specific Australian products reflecting potential consumer concerns about a perceived lack of action on climate."

Tim Siegenbeek van Heukelom, Global Head of ESG at Socialsuite, an ESG management platform, says there is already a clear shift towards stakeholder-focused capitalism irrespective of how fast or otherwise governments are moving.

"Stakeholders outside of government — investors, shareholders, fund managers — they're all starting to almost mandate ESG [economic, social and governance concerns] at large, climate action, all those things," he says.

"They are saying: if you don't have genuine ESG credentials, and you can't show us that, then we're not that interested anymore in investing in you."

Siegenbeek van Heukelom says the lack of mandates in the federal plan puts the onus on businesses to lead the way.

"The fact that the Australian Government is not making companies do it shouldn't mean that companies shouldn't be doing something," he says.

"Now, at a small to medium-sized company level, there's really that sense of urgency that 'I need to do something here as well'."

> **"Net zero is a joke without strong emissions cuts this decade"**

WA's 2030 target

That sense of urgency is also being felt at a State Government level, with Climate Action Minister Amber-Jade Sanderson telling *WA Works* the State is "committed to transitioning the WA economy to net zero emissions by 2050 and is undertaking the work to develop credible interim targets".

At CCIWA's In Conversation on Climate Change event on December 2, she revealed a 2030 target will apply to all government agencies and trading enterprises, including heavy-emitter Synergy, and the Government is considering broader industry targets as part of Sectoral Emissions Reduction Strategies (SERS) to be developed over the next 18 months.

"We need significant action this decade to leverage green capital, support transition of energy-intensive industries, protect our economy, and importantly, to limit global warming," she told the business breakfast.

Amber-Jade Sanderson

Sanderson confirmed that the Government would be putting in place mechanisms to manage and enforce sectoral targets, and is looking at legislation as "an important piece of the puzzle".

Sanderson said the Federal Government's "eventual agreement" of net zero by 2050 "was a conversation that people are having a couple of years ago".

"Actually the discussion is: what's happening in 2030, 2040; what are we doing now in this decade? And that's what's missing out of that piece," she said.

According to global law firm DLA Piper, scrutiny of corporate net zero targets is set to escalate as "all eyes are now on implementation, transparency and accountability".

"There will now be an increased focus on greenwashing, particularly in light of the raft of pledges aligned to the Paris Agreement, with litigators predicting a wave of greenwashing claims coming down the line," it said in a COP26 outcomes overview.

On a global scale, countries will have to account for their progress next year at COP27 in Egypt, with the UN's Guterres to also convene a "global stock-taking summit" with world leaders in 2023.

"We need pledges to be implemented," Guterres said. "We need commitments to turn concrete. We need actions to be verified. We need to bridge the deep and real credibility gap."

UN Secretary-General Antonio Guterres. Source: UNFCCC

Brian Finnigan

Navigating the drive to 'do good'

Big businesses and governments have promised to use their procurement powers for environmental and social good. Further down the food chain, some WA suppliers are betting they'll stick to them. But meeting the demands of a more ecologically and socially aware customer is not always simple

By Elva Darnell

Arnold Whiteside's mission is simple: "Make a difference, make a dollar. There's nothing wrong with that."

Whiteside is Managing Director of Crystal Printing Solutions, one of the largest printing operations in WA.

Its 4000-square-metre Cannington hub produces more than 40 million printed items a year for 35,000 customers.

It's also one of the greenest printing operations in WA.

Whiteside has spearheaded significant investments in solar energy and efficiencies to help bring down the company's emissions.

About $700,000 has been spent over the past decade installing solar panels, improving energy efficiency and offsetting emissions.

He says Crystal is also pushing for more Indigenous engagement, in both its staffing and through its partnership with the recently launched Yonga Solutions, a majority-owned Indigenous business.

Whiteside plans on doing more than just contributing towards a greener, more equitable future.

He's hoping to give Crystal a competitive edge, meeting the demands of an ever-more discerning contractor with its own environment, social and governance, so-called ESG, mandates to meet.

And, says Whiteside, Crystal's own ESG efforts are already contributing to business wins from customers keen to lower emissions and improve Indigenous engagement.

"You've got government and corporate providing the carrot and not the stick — the carrot is 'there's money in this'," he says.

The business side of doing good is becoming increasingly important.

Ratings agencies have even started to include ESG risk in their methodologies, a move that made headlines early in 2021 when the S&P revised the industry risk of oil and gas companies due to climate dangers.

Meanwhile, consultancy firms are waging a battle of ideas over how ESG strategy and auditing should be conducted (and why they should be the ones doing it), with PwC, Deloitte, McKinsey and KPMG all offering their services.

Procurement as an ESG tool

With two-thirds of the average company's ESG footprint falling with suppliers, according to McKinsey, procurement decisions are important for all companies looking to improve their sustainability credentials.

Procurement is a tool already being utilised by some of Australia's biggest names in business.

Fortescue Metals Group says its 'Sustainable Procurement Standard' is taken into consideration when awarding and assessing contracts.

Wesfarmers has a mandatory audit program for its supply chain to help ensure ethical sourcing of its products.

And Laing O'Rourke has taken a lead role in putting sustainability at the forefront of its procurement strategy to help tackle Scope 3 emissions.

In fact, Laing O'Rourke recently pre-screened businesses hoping to tender for work on the Great Eastern Highway Bypass project with a questionnaire focused on Aboriginal participation and environmental issues.

But who sets the rules around ESG requirements, and what does this mean for smaller businesses trying to compete on narrow margins?

Brian Finnigan is the Senior Social Procurement Adviser at Industry Capability Network (ICN) in Victoria, where that state's government has created a framework to use its purchasing power to tackle social issues.

The framework has been in place for more than three years, and Finnigan says it is more than a ticking-the-box exercise.

"Measuring impact is always a bit of a struggle," he says.

"There are different kinds of measuring criteria, in terms of the framework in Victoria... but a key area... is employment opportunities for specified priority job seeker groups."

The ICN in Victoria has developed a tool that allows bidders, suppliers and subcontractors to input the work hours of particular cohorts and receive feedback on whether their commitments were met.

"A dialogue can be had if they're not meeting those targets, what kind of support can we put in place to actually change that environment?" Finnegan says.

"But it's not a … kind of wish list and 'If we can get it, that'd be great'.

"It's a case of 'no, you have to do it', and there will be potential financial consequences for non-compliance."

Many governments around Australia, including WA, have social procurement frameworks (SPFs) in place, although in greater infancy.

The State Government here launched its new social procurement framework in mid-2021.

The framework targets gender equality, and increased purchasing from disability enterprises, Aboriginal businesses and regional small and medium enterprises within the supply chain.

Targeted frameworks

Finnegan says that ICN has set up a national social procurement strategy to be able to talk with businesses and governments based on the experience of what's happened in Victoria.

He says that in Victoria they don't blanket-set all 10 objectives of their framework to any tender; rather, they target only those that are most appropriate to the particular project and work.

"There's a big public housing redevelopment program going on (in Victoria), and one of the key things that resonates with the government department that's issuing that tender is employment opportunities for people in public tenancy," he says.

"If you're just bidding just to win a bid, with aspirational pie in the sky ESG or SPF targets in your bid, without any real intention or authentic commitment to delivering upon them: It's great for winning a bid but not so great when you have to reapply to bid for something else and are clocked for noncommittal."

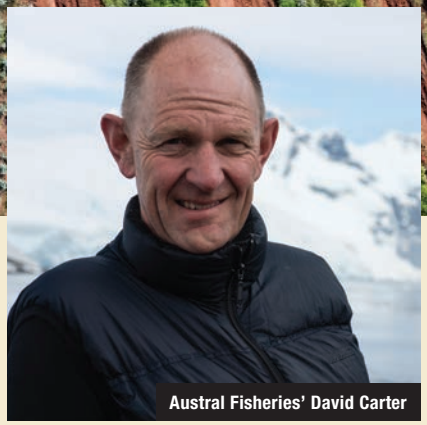
His tip to medium-sized businesses daunted by the pivot to more robust ESG requirements: "For me, it certainly makes sense to understand your business from a social perspective, but it makes financial sense as well."

And, he says, you may already be doing a great deal in the employment of disadvantaged groups, or environmentally.

"So it's understanding what you're bidding for and what the ask is and finding an authentic response." ◉

Going the green mile

Achieving net zero emissions can be a complex and resource-intensive exercise for a business of any size. **Beatrice Thomas** sat down with the leaders of four WA companies to discuss their carbon reduction journeys.



Austral Fisheries' David Carter

Austral Fisheries

Annual revenue: $120m | Employees: 40 | Est: 1977

It was a trip to Antarctica, a part of the world most impacted by climate change, in 2015 that set Austral Fisheries CEO David Carter on the path to creating a carbon-neutral business.

Already a leader in sustainability — Austral's major fishing operations and seafood brands had been independently certified by the Marine Stewardship Council — Carter recognised more could be done.

The Perth-based company was burning 9 million litres of diesel a year as its fleet of 15 vessels navigated three fisheries stretching from the sub-Antarctic to the northern tropics.

"It occurred to me that we had an obligation and an opportunity in taking the business carbon-neutral and really folding our commitment to the environment into the brands that we offer to our customers," Carter tells *WA Works*.

The next steps were by no means plain sailing — the company needed to calculate its Scope 1, 2 and 3 emissions; determine how to offset them; and get the Austral Board to approve the cost.

But 402 days after Carter's "once-in-a-lifetime" trip to Antarctica, Austral became the first seafood business in the world to be certified as carbon neutral under the Australian Government Carbon Neutral Program.

To abate the 40,000 tonnes of CO2 that it emits each year, Austral plants about 220,000 mixed native trees annually in the Yarra Yarra Biodiversity Corridor in Perenjori, about 400 kilometres northeast of Perth. It has planted more than 1 million trees to date in partnership with Carbon Neutral Pty Ltd.

Carter says accounting for Scope 1, 2 and 3 emissions includes all emissions created by the business during its operations — from logistics and travel (including staff travel) to the emissions created by its suppliers and partners as Austral's products travel from ocean to plate.

To further its objectives, Austral invested $50 million co-developing a diesel-electric hybrid fishing vessel with Norwegian shipbuilder Baatbygg that uses around half the diesel load of a similar-sized boat.

It has also partnered with blockchain-powered platform OpenSC to trace and track the entire supply chain journey of its products, and invested heavily in new fishing gear to reduce its by-catch.

"The next step for us has to be to find ways to use either less or no diesel," Carter says.

"The business of offsetting can only be transitionary, and the focus must be on the opportunities that zero carbon shipping solutions deliver."

A fishing industry veteran of more than 40 years, he says Austral's carbon-neutral status, which is accredited under the Federal Government's Climate Active program, has "opened doors" and "delivered shareholder benefit", but he remains frustrated that it stands alone among wild-capture fishing companies.

"We're not being well served by political, federal leadership … and we're now seeing everyday examples of a frustrated industry stepping up and getting on with it," he says.

"Without a narrative around climate, and without being framed as part of the solution, then you're part of the problem and you will be denied access to capital and talent. And without that you're dead in the water."

Blackstone Minerals

Annual revenue: $771,400 | Employees: 289 | Est: 2017

Blackstone Minerals is a junior miner with big ambitions.

Unlike mining companies transitioning to net zero carbon emissions, the publicly listed outfit is aiming for a zero-carbon project from the outset.

Its goal? To make its flagship Ta Khoa Nickel-Copper-PGE Project in northern Vietnam the world's first green nickel processing facility as it seeks to tap into Asia's growing lithium-ion battery industry.

Located 160 kilometres west of Hanoi in the Son La Province, Ta Khoa comprises an existing open-pit mine, which Blackstone plans to restart with the addition of a new downstream nickel refinery to produce nickel, cobalt and manganese (NCM) precursor products.

Currently in a definitive feasibility study and pilot plant phase, the project, which would ramp up to ~25ktpa over an 8.5-year project life, would be powered by South East Asia's largest hydroelectric power plant.

"It's really an investor-led strategy," says Blackstone Managing Director Scott Williamson when asked about the project's first-mover status.

"Traceability will be a big part of ... the lithium-ion battery. The ultimate customer of the electric vehicle will want to know where their nickel, cobalt and manganese has come from, and what … ESG (Environmental, Social, and Governance) levels are in that particular product."

To substantiate its green compliance, Blackstone has signed a partnership with Circular Ltd, a UK-based provider of supply chain traceability.

It's also working with the Electric Mine Consortium — an industry group of major players focused on electrifying underground and open pit mining equipment — and is investigating the economic and environmental benefits of producing green hydrogen for use in its fleet and for on-selling.

Blackstone Social Performance Lead Anna Cranney says building a pilot plant has allowed the company to "think more clearly about how we do it in a way that's environmentally responsible".

It has also enabled greater consideration of the "social" aspect of ESG.

"We're very mindful of the communities that we're working amongst, and the environmental impacts that we might have in some of our decisions. Also, how we mine responsibly and ensure that there's fair labour, there's opportunities for training and development — all of that is part and parcel of what we define as green nickel."

Williamson admits that accounting for Scope 3 emissions is a challenge, with many suppliers not yet tracing their carbon.

However, the project's location in Vietnam, where it has received government support, coupled with favourable labour market conditions has created strong margins to enable investment in green technologies.

Cranney says it will be a 3-4-year pathway to comply with global certification standards outlined by the Task Force on Climate-Related Financial Disclosures (TCFD).

But as an emerging mining company it "gives us the freedom to take some risks in terms of business strategy and ESG".

"Discussion around climate change has been typified by inconsistency or uncertainty, so we've found that being really on the front foot and straightforward about that has been an advantage," she says.

"The other thing is there's huge amounts of capital now available to businesses like ours that are listed in a sector that is contributing to a transition in terms of green energy. And there's lots of opportunity in that."

A final investment decision on Ta Khoa is expected in 2022.

Blackstone Managing Director Scott Williamson and Social Performance Lead Anna Cranney

Province Resources

Market capitalisation: $200m | Employees: 10 | Est: 2020

When Province Resources shifted from minerals exploration to also focus on green hydrogen, Managing Director David Frances says it was with full knowledge that the industry itself is still green.

Frances estimates it will be 10 years before the sector really starts to "hit its straps".

But with its HyEnergy project in Carnarvon unlikely until to start production until 2027, the ASX-listed company is powering ahead with planning and approvals and expects the technology will catch up.

"As we move through the project, technology is changing," Frances says.

"The electrolyzer side is changing, so we're not pinning our hopes on any one technology as yet; we'll sort of look at those as the project develops."

The $22 billion, 8-gigawatt project in Carnarvon in WA's Gascoyne region is projected to produce 500,000 tonnes of green hydrogen annually for domestic and international markets.

About 70 per cent of its energy is expected to come from about 1500 wind turbines, with the remaining 30 per cent generated from a ~6000-hectare solar farm.

"Unlike mining projects, it's a rather large project capex-wise, but also longevity," Frances explains. "Mining and oil and gas tend to have finite resources or reserves … whereas as long as the wind is blowing and the sun shining and the ocean has got water in it, you can make green hydrogen."

He says the carbon-intensive nature of grey hydrogen, which makes up about 95 per cent of existing global output, and the difficulty of capturing and storing carbon from the blue hydrogen process at mass means "green hydrogen really is the only one that works".

"It really is the holy grail of fuel sources," he says.

While the technology of creating hydrogen has been around for 100 years, transporting it safely — and at scale — is the challenge.

Province is working with partner Global Energy Ventures to investigate compressed hydrogen, which is emerging as the cheapest and most efficient way to transport the fuel over the distances required to reach end markets such as South Korea and Japan, and would be piped offshore to a ship-loading buoy — negating the need for a port.

It's also looking at the options of liquid hydrogen and converting hydrogen to ammonia for bulk transport.

"As technology catches up, which it will, it's liquid hydrogen; so within the next 10 years, liquid hydrogen is probably going to be feasible," Frances says.

Province Resources Managing Director David Frances

"While the technology of creating hydrogen has been around for 100 years, transporting it safely is the challenge"

Frances describes the global spotlight on hydrogen, fuelled by high-profile project announcements from major resources companies, as following a similar path to the evolution of technology disrupters such as electric vehicles, which was driven by Europe.

Once again, he says, the EU is leading the charge with green hydrogen a major part of the region's 2050 emissions reduction targets.

However, Australia has a major opportunity to harness its renewables generation capacity to be a world leader in green hydrogen. Initiatives such as the WA Government's proposed changes to the land tenure regime to support green energy projects is a welcome start, Frances says.

"With all of these things, they tend to tread water for a long time and then when the pendulum swings, things tend to go exponential," he says.

Steel Blue

Annual revenue: $95m | Employees: 80 | Est: 1995

Fittingly for the CEO of a footwear manufacturer, it was a boots-on-the-ground approach that led Garry Johnson to begin the journey of taking Steel Blue carbon-neutral.

"It was really those years visiting our European operations as we set up there six years ago," Johnson recalls.

"I'd spend the weekends walking around and I'd be looking at retail stores and reading the local papers to see what was going on and I could really see there was a strong movement going on around business learning to lead the way in terms of climate (initiatives)."

Around 2019 the company's leadership group started to think through how it could approach a global issue from a local level.

Steel Blue's Garry Johnson

"Our first step was really a very easy pragmatic one, which was to install a 100-kilowatt solar power system here, which made a difference straightaway," Johnson says.

What eventually evolved was a sustainability roadmap that identifies five strategic priorities across its supply chain with commitments to human rights, climate, environment, diversity and inclusion, and communities.

As well as solar panels, which generate between 71 and 100 per cent of the business' operating needs depending on the time of day, Steel Blue also switched to motion-sensor LED lighting; implemented a hybrid car policy to update its fleet by 2025; went paperless; and is exploring innovations to extend product durability of its safety work boots.

"As an organisation, we think it is important to recognise the impact we have on the communities and environments where we operate," Johnson says.

In November, Steel Blue achieved Scope 3 Climate Active certification — the highest level possible under the Australian Government-backed program — for its Australian operations, meaning it has achieved net zero emissions across its entire value chain.

It reduced those emissions as much as possible and offset the rest through investments in the Australian Native Reforestation Yarra Yarra Biodiversity Corridor northeast of Perth and the Rimba Raya Biodiversity Reserve Project in Indonesia, where Steel Blue has a second manufacturing facility.

"The first big step for me was really trying to understand what are we actually going to measure — I'd never heard of Scope 1, Scope 2, Scope 3," Johnson says.

"And the literature is quite daunting. If you want to reduce your emissions, you have to actually understand the impact of the various things you do in your business and how they create emissions."

However, Johnson says the benefits of taking action have flowed through in both staff satisfaction with the company's sustainability efforts and appeal to customers, many of whom are big miners with their own net zero targets.

It's next goal: to achieve net zero status across its global operations in New Zealand, Europe and the US.

"Everybody would prefer to support a brand that's doing the right thing, sustainability-wise, in addition to being a great product," Johnson says.

"It's a bit like a restaurant that's got a great deal. You've still got to have great food, but if you have that sustainability piece as well, I think that makes a difference."

A rare opportunity

The Mid West region north of Perth could become critical to the world's clean energy transition if local miner Iluka Resources approves its Eneabba rare earths refinery project

Iluka Resources' Tom O'Leary

By Stephen Bell

Iluka could put the tiny Mid West mining town of Eneabba on the global green energy map early in 2022 if the Perth-based company's board approves the development of Australia's first rare earths refinery.

A positive final investment decision (FID) on the downstream plant would signal WA's transition into a globally significant rare earths processing hub, producing several critical minerals needed for the green energy transition.

The FID would be a special moment for Iluka, which has been producing the less glamourous mineral sands products ilmenite, rutile and zircon for many years — both in Australia and offshore.

And, if Iluka does make a positive call on building the refinery, it will be down in part to a lucky break three decades ago.

Back in the early 1990s, Iluka was generating a lot of monazite — a waste product of the company's mineral sands mines. But rather than mixing the mineral back into the waste tailings as part of mine rehabilitation, a bright spark at Iluka suggested that the monazite might one day be valuable and should be saved.

So a decision was made to store the monazite in a mining void at Iluka's Eneabba mineral sands operations, about three hours north of Perth.

Three decades later, Iluka still hasn't identified the person who made the call to save the monazite for future generations.

But whoever he or she is, they have done Iluka and WA industry a big favour. Once a nearly worthless by-product, the monazite today is hot property — mostly because of its high concentrations of rare earth elements.

In August, Iluka reported a spot price of US$7100 ($7700) per tonne of monazite concentrate, the form of the mineral that Iluka aims to produce from its $35 million Eneabba Phase 2 project, now in construction.

At that spot price, Iluka estimates the net present value of Eneabba Phase Two as $770m — not bad for a product once considered mining waste.

But the Perth company is scheming to add even more value to the monazite via Eneabba Phase 3 — the refinery. Also known as a finishing plant, it would see WA become a global player in supplying the rare earth oxides essential for making the permanent magnets inside electric motors that power EVs and wind turbines.

Rare earths are also necessary in the manufacture of catalytic converters for vehicle emission control of hybrid and petrol-fuelled cars, in modern rechargeable batteries, and as an alloying agent to create high-strength metals in aircraft engines.

Iluka CEO Tom O'Leary recently told an American-Australian Association critical minerals panel that the $20m feasibility study into the refinery was progressing alongside discussions with the Federal Government.

"Just to emphasise the impact on the supply chain, Eneabba Phase 3 is not about producing a concentrate or a carbonate that can only go to China for further refining into rare earth oxides," he said.

"This is a fully integrated refinery to produce the key magnet metal rare earth oxides."

Third parties welcome

O'Leary said Iluka is working closely with the Federal Government on "risk sharing" arrangements for Phase 3, which will be capable of processing third-party rare earth concentrates proposed by several Australian junior companies.

"This would see Eneabba and Australia become a key global hub for the secure production of refined rare earths," he said.

Another company, Lynas Rare Earths, is also building a downstream plant at Kalgoorlie. However, this so-called cracking and leaching plant will produce an intermediate product requiring refining in Malaysia to produce the rare earth oxides.

Phase 1 of Iluka's Eneabba rare earths venture began last year and produces a mixed

Iluka Resources Eneabba Pit

concentrate grading about 20 per cent monazite.

Phase 2 will be capable of producing 22,000 tonnes per annum of 90 per cent monazite concentrate, suitable as a direct feed for rare earth refineries, from mid-2022.

The monazite stockpile is sufficient to underpin an eight-year life for Phase 2. However, this estimate excludes ongoing replenishment from Iluka's Jacinth-Ambrosia (South Australia) and Cataby (Mid West) mines, which would contribute a further two years of life.

Depending on the results of the Phase 3 study, and ongoing talks with Federal credit agencies, Iluka may choose to retain part or all of the Phase 2 products for feeding the refinery.

The finished production would include oxides of neodymium, praseodymium, terbium and dysprosium — the magnet rare earths used in emissions-free electric motors.

Victorian mine needed?

The relatively short life of Iluka's Eneabba operation has some stockbroking analysts concerned.

Credit Suisse, for instance, believes that building a rare earth metals refinery only makes sense if the company adds products from its undeveloped Wimmera mineral sands project in Victoria.

The bank's long-standing commodities analyst Matthew Hope says Iluka's mooted refinery will need to incorporate Wimmera to make a worthwhile return on investment.

"We believe Iluka's refinery plan could provide a lucrative multi-generation business, provided Wimmera mineralisation in Victoria can be exploited at about 30 million tonnes per annum," Hope said in a research note.

The known resources at Wimmera are "vast", according to Hope, and Iluka has three deposits in the field, located in the Victorian Murray Basin.

However, development of Wimmera is hindered by a tiny grain size, uranium and thorium contamination of the zircon, and the rutile grains being too fine for chlorinators.

"Wimmera is the key for value, but zircon contamination needs a solution," he said.

Iluka, meanwhile, said it is focused on finding a processing solution to remove impurities from the zircon at Wimmera, which currently make the deposit unsuitable for the key ceramics market.

The company planned to commission a zircon refining pilot plant at Wimmera before the end of 2021.

"The processing of Wimmera's rare earth minerals through a potential Eneabba refinery would simplify the Wimmera development," Iluka said.

Mastering the process

Hope, meanwhile, said Iluka will need to master the "long and difficult process" of separating the rare earth oxides from the raw refinery feed, should Eneabba proceed with the project.

"The know-how cannot be acquired," he said, adding that Sydney-based Lynas has the only rare earth refinery outside China.

"Lynas uses over 1000 SX (solvent extraction) steps at its Malaysian plant and it took six years to reach 90 per cent of nameplate capacity," Hope said.

"An Iluka refinery would have even greater complexity as it wants to separate more elements, including Terbium and Dysprosium."

Credit Suisse assumes a five-year ramp-up, with recovery rising from 50 per cent to 90 per cent.

WA Works understands that Iluka is looking to address the technical risks of Phase 3 by consulting with companies such as Caresta, which has deep experience in building and troubleshooting rare earth processing facilities.

Solving the separation of rare earths might allow Iluka to later expand the refinery towards 18,000 tonnes per annum total rare earth oxides, fed by a large Wimmera mine of more than 32 million tonnes per annum, Hope estimates.

Policy Corner

Does Australia need a strong carbon pricing mechanism to achieve net zero?

Climate change is one of the most significant global policy challenges of our time, changing the way we live and do business, writes **Anthea Wesley**

At the global, national, state and local scales, the shift in and around environmental, social and governance (ESG) issues — and climate change in particular — in recent months has been remarkable, making this the most significant social, political and economic issue of our time.

The scale of this phenomenon is clearly shown through key market indicators, such as green bonds and private equity funding of climate-positive investments.

Figure 1 shows a marked rise in the value of green bonds since 2016, reflecting clear investor interest in projects that deliver positive environmental and/or climate benefits.

Similarly, Figure 2 shows exponential growth in climate-related private equity investment from 2020. These investment trends demonstrate expectations around the world are changing.

While there are no emissions mandates imposed by governments on individual businesses, the current reality is such that investors, customers and financial capital markets will likely 'mandate' businesses to reduce their carbon footprint.

Increasingly so, climate risks, including the perception of climate inaction, are likely to shape investment decisions, impacting the assets, regions, countries and companies, capital is given to.

If Australia is seen to be behind on climate change action, this is a risk for Australian businesses, consumers and households.

The current reality is such that investors, customers and financial capital markets will likely 'mandate' businesses to reduce their carbon footprint.

Some of CCIWA's members have reported that Australia is seen by some global investors and

Anthea Wesley

customers to be a 'laggard' on climate change.

While businesses are seeking to signal their climate credentials with international investors and customers, they are struggling to fully shake the country's broader reputation.

Many WA businesses say that a price on carbon is the most effective measure to encourage a shift in production and consumption decisions required to transition to net zero.

The OECD also suggests a well-designed carbon pricing mechanism is one of the most effective weapons to decarbonise economies.

In fact, over two-thirds of WA businesses we surveyed are willing to pay more on their energy bills to support achieving net-zero emissions.

Willingness to pay varies across industry sectors, but on average, WA business is willing to pay 12 per cent more. There are, however, no strong views on whether a carbon 'tax' or emissions trading scheme would be the best mechanism to price carbon emissions.

As global action on climate change intensifies, many countries are exploring carbon pricing and associated carbon markets in response.

Often there is an explicit market-based instrument, such as a carbon tax or emission trading scheme, in combination with carbon markets and a crediting mechanism to stimulate low-emissions investments.

According to The World Bank, there are 61 countries with carbon pricing initiatives in place or scheduled for implementation, 31 with emissions trading schemes (ETS) and 30 with carbon taxes.

Given the current interplay between the Emissions Reduction Fund, the Safeguard Mechanism and the Secondary Carbon Credit Market, Australia effectively has a voluntary emissions trading scheme for large emitters.

But these measures combined are narrowly defined. Just recently, the Federal Government moved to strengthen the framework with the introduction of the Safeguard Crediting Mechanism following recommendations from the King Review and committed additional funding to the Emissions Reduction Fund as a mechanism to incentivise low emissions projects.

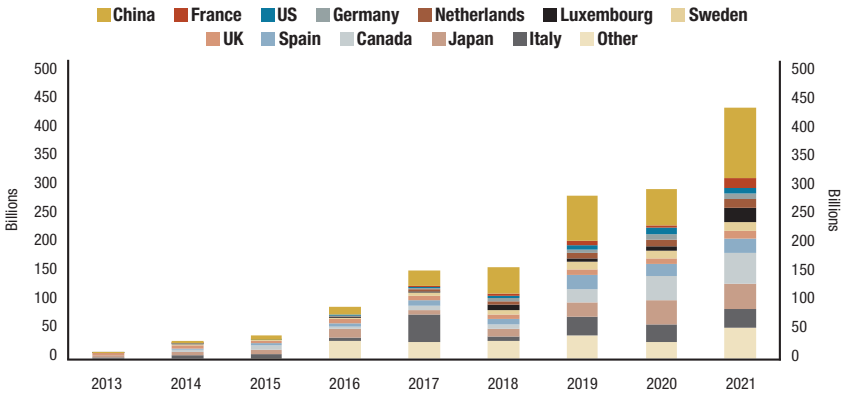
While these are positive steps, many suggest more can be done. Ultimately, Australia needs to send a genuine signal to the world that it is doing its bit to address climate change.

CCIWA has conducted extensive consultation with its members on these important issues, and as an extension of this work, will release a comprehensive climate change position statement in February 2022.

If you have any views on these issues, please reach out to policy@cciwa.com.

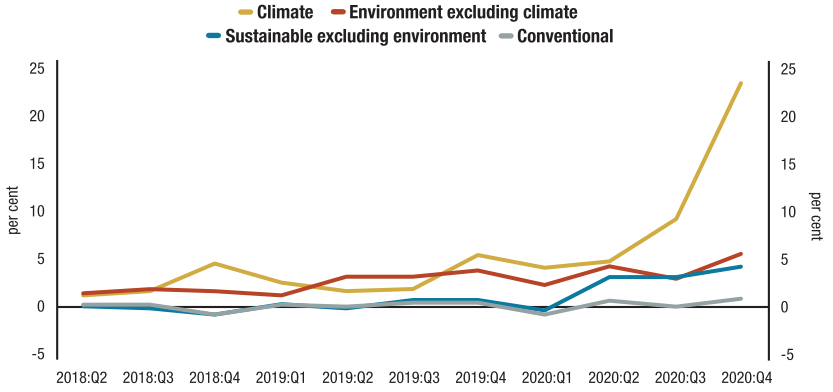
Anthea Wesley is CCIWA's Senior Policy Adviser.

Figure 1: Green bond issue amounts



"Investors, customers and financial capital markets will likely 'mandate' businesses to reduce their carbon footprint"

Figure 2: Net flows into funds, growth rate, by fund label



Driving a new chapter in Causeway story

The historic Causeway Bridge is about to forge a new chapter that will be applauded by all travellers looking to navigate the critical river crossing that links Perth's east and west, writes **Stephen Bell**

Main Roads WA's latest infrastructure project is one that will face daily scrutiny from CBD regulars, whether city residents, office commuters, wandering tourists or boaties on the Swan River.

The $50 million Causeway Pedestrian and Cyclist Bridge project will be under the eyes of Perth in the next two years as construction progresses beside the existing traffic bridges that are used by more than 45,000 cars and trucks each workday.

Walkers and cyclists are also heavy users of the crossing, as they navigate a narrow, 2-metre wide path next to the western traffic bridge. With more than 1400 cyclists and 1900 pedestrians using the route each day, the crossing can become "uncomfortable and unsafe", Main Road says.

In contrast, the new bridge will be 6 metres wide, with dedicated pedestrian and cycling lanes connecting the Victoria Park foreshore with Heirisson Island and the CBD.

As *WA Works* went to press, Main Roads was close to deciding on the winner of a contract to build and design the new structure, having shortlisted two consortia in April 2021:

- The Matagarup Heirisson Alliance of Decmil, SRG Global and Arup; and
- A Civmec-led alliance with Seymour Whyte and WSP.

Artist's impression of new Causeway Pedestrian and Cyclist Bridge

Both were invited to submit a detailed tender. The winner will start work in early 2022 — about 180 years after the first Causeway bridge was completed as a key piece of infrastructure for the embryonic Perth colony.

According to the Museum of Perth, the first bridge was opened by Chairman of the Road Trust J.W. Hardey on May 24, 1843. It was originally a toll road charging the princely sum of six pence to horse and carriage riders, and one pence for pedestrians to cross.

"The original Causeway remained the only Swan River crossing in Perth for 19 years until it was largely destroyed"

The museum says the original Causeway remained the only Swan River crossing in Perth for 19 years until it was largely destroyed during flooding in the winter of 1862.

Its replacement, opened in 1867, used convict labour to reconstruct the bridge several feet higher than the original.

There were several major upgrades of this crossing over 80 years until it was replaced in 1947 by the current dual Causeway Bridges, which have been upgraded and modified to the structures we use today.

Now industry has a chance to put its stamp on a new bridge for the new century.

The new crossing will include two bridge sections, with the shorter 140-metre section connecting the City of Perth to Heirisson Island and a longer 250-metre section completing the pedestrian and cycle pathway from the island into Victoria Park.

The Matagarup Heirisson Alliance listed on the ICN Gateway site to reach out to industry ahead of Main Roads' final decision.

The Alliance invited expressions of interest from WA companies interested in supplying or participating in the project. It also aimed to "maximise opportunities for local industry and to increase Aboriginal business participation".

The scope of works for the new bridge includes construction of footbridges, retaining walls and other structures including:

- The new McCallum Park Footbridge over the Swan River south of Heirisson Island;
- The new Point Fraser Footbridge over the river north of Heirisson Island; and
- Associated retaining walls and other structures.

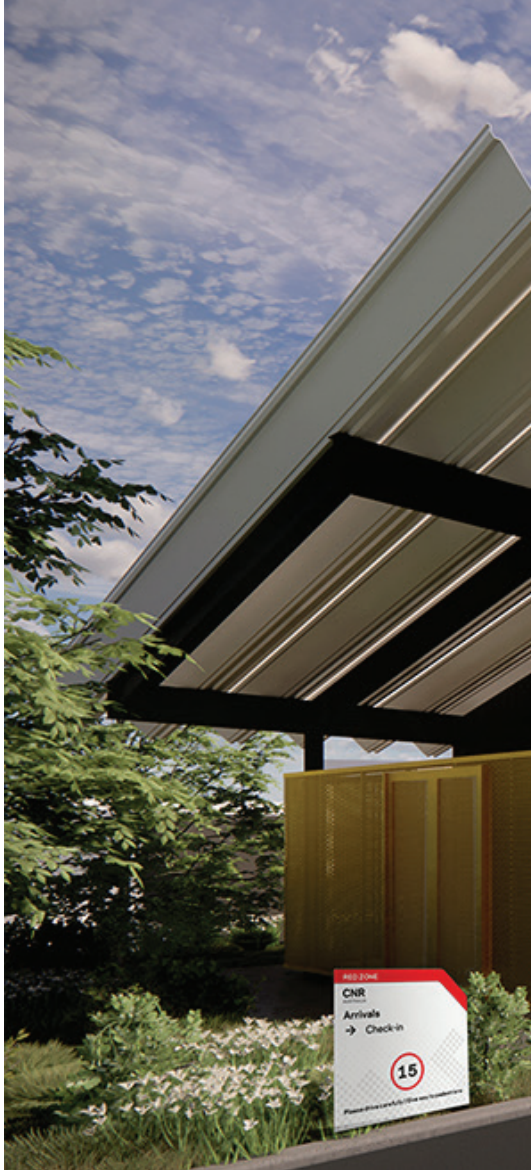
The scope includes a range of other path works, fencing, works on accommodation affected by the project, drainage, lighting, signage and pavement marking.

The project is part of the Perth City Deal. It is jointly funded by the Federal ($25m) and Western Australian ($25m) governments and the City of Perth.

Construction is expected to be completed in 2024.

An early peek at oil and gas prospects

We provide the pick of the new subcontracting opportunities appearing on ICN Gateway, headed by Santos' long-awaited Dorado oil and gas project off the Pilbara coast, which is now in the engineering design phase ahead of a likely final investment decision (FID) in the first half of 2022



By Stephen Bell

Dorado, about 150 kilometres north of Port Hedland, is one of WA's biggest new oil and gas developments with an estimated cost of US$2 billion ($2.8b) — ensuring it is high on the wish list of most local oil and gas suppliers.

The offshore venture entered the Front End Engineering Design (FEED) phase in late June, which was quickly followed by Santos' contract awards to Altera Infrastructure of the project's floating production storage and offtake (FPSO) vessel, and Malaysia's Sapura for the design and installation of the wellhead platform (WHP).

Santos, and the two key contractors, detailed their plans for Dorado at a recent CCIWA-managed industry briefing at the Hyatt Hotel, which attracted hundreds of suppliers sniffing out work prospects.

Santos Dorado Project Director Gareth Bamford told a packed room the FPSO constitutes about half the total value of the project. He showed details of the huge FPSO vessel, which will be a Suez Max tanker conversion capable of processing 100,000 barrels of oil per day.

The vessel, which also features a disconnectable turret mooring in 90 metres of water, will be delivered under an Engineering, Procurement and Construction (EPC) model with Australian Industry Participation (AIP).

Bamford also said Altera had begun Front End Engineering Design (FEED) for the huge vessel.

Altera Infrastructure's Dorado Project Manager Vincent Lawless showed 11 FPSO packages identified as early opportunities for AIP.

"In our preliminary assessment during FEED we will engage with ICNWA to assess potential for the following SCM (Supply Chain Management) delivered packages," Lawless said.

The packages are:

- Process Shell
- Separators
- Scrubbers
- Miscellaneous Pressure Vessels
- Vapour Recovery Unit
- Produced Water Treatment
- Hydrocyclones
- Glycol Contractor and Regenerator/TEG
- Offloading hose reel
- Hydraulic Submersible Pumps (Hull)
- Lifeboats

Lawless said the work will be delivered by Sembcorp Marine, a key subcontractor to Altera for the FPSO project.

In terms of work prospects on the FPSO generally, Altera and its major contractors would liaise with ICNWA to ensure package descriptions were loaded on ICN Gateway, so they can be viewed by local suppliers, he added.

All packages would be "cascaded down the line, contractors, subcontractors, etc., all the way down to the level of $1 million," Lawless said.

He urged suppliers interested in any packages to prequalify on Santos' Approved Vendor List (AVL).

"This is a live document — we have a number of approved vendors already in there, but the list will expand as we go through the AIP process," Lawless said.

ICNWA Manager Ray Loh said the FPSO packages highlighted by Altera at the briefing would be listed on ICN Gateway's Santos Dorado page, which is regularly updated to include new scopes of work as they arise.

'Minimalist' Well Head Platform

Santos Development Engineering Manager Kevin Black, meanwhile, said the Dorado well head platform (WHP) would require a gravity base structure (GBS) driven by geotechnical conditions at the site.

The "not normally manned" structure will be a 4-legged jacket with a steel mat GBS and three pre-installed risers, while the umbilical

Centre for National Resilience concept

will include an electrical power cable, fibre optic bundle, chemical injection and WHP hydraulic fluid.

The facility will also include 10 production wells, but the WHP is capable of housing 16 if more are required later in the field life.

"The well head platform itself is … I'm going to call it minimalist," Black said.

"We're trying, as far as possible, to put as little stuff on the WHP as we can in order to minimise the amount of time people will need to be on the well head platform, for safety and operational reasons," he said.

The three core phases of the WHP delivery are:

1. Engineering and Design from now until June 2022
2. Procurement and Construction July 2022 — February 2024
3. Transportation and Installation March — April 2024

Questioning local content

Bamford, meanwhile, reinforced Santos' local content aspirations for Dorado, telling the audience that the oil and gas giant had already spent $140m on the project in Australia.

However, Dynapumps National Business Development Manager Mark Wilkins noted that the bulk of Altera's FEED team is in the Oslo, Norway, offices of Dorado topside subcontractor Aker Solutions.

"What is the reality of actually getting contracts placed in WA?," he asked Bamford.

"Because, when I look and I see 'WA content', but then I'm seeing some of the work being carried out in Oslo … will the work come to WA contractors or is it going to be placed elsewhere?"

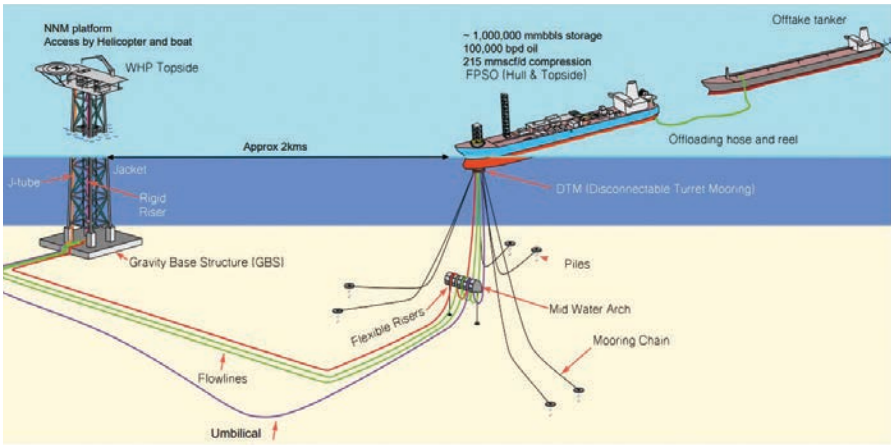
Bamford responded that the AIP process is to ensure that "everybody has a fair opportunity to participate in the project".

"We have to submit, as part of the AIP process, a report to the (Federal) Government every six months to demonstrate our commitment to it," he said.

The project has an Australian Industry Participation Plan (AIPP) and work packages continue to be advertised via ICN Gateway.

Santos has an 80 per cent interest in the Dorado field and is operator. The remaining interest is held by Carnarvon Petroleum. >

Dorado Overall Project Scope - components



Business coach Reena Strehle and ICN's Ray Loh

> Multiplex goes to market

Multiplex is seeking interest from subcontractors to help it build the Federal Government's new $200m quarantine facility near Bullsbrook.

The construction giant, named head contractor in August, has advertised work packages for the Centre for National Resilience Perth project on the ICN Gateway website.

The Centre is required to respond to WA's critical need for a purpose-built alternative accommodation facility for returning oversees travellers to mitigate the spread and release of COVID-19 into the community, the new listing says.

The project includes modular buildings to provide accommodation to single people, couples and family groups.

It is the latest to be managed by Multiplex, which also has Managing Contractor Contracts (MCC) with the Federal Department of Finance to deliver new Centres at Melbourne and Brisbane.

"To increase opportunities available to subcontractors and suppliers, Multiplex has identified a number of packages which it can engage through a two-stage tender process," it says.

"This first stage, the Invitation to Register Interest (ITR), will enable the project to short-list organisations to be invited to a Request for Tender (RFT)."

The two-stage tender process increases opportunities for companies to tender for the works.

To participate in the tenders, all businesses should visit the ICN Gateway page, which explains how to register a general expression of interest.

Multiplex says the subcontract trades are being procured across two priorities and respondents can apply for one or more trades within a priority in their response.

Priority 2 contains 21 separate packages, including:

- Civil Works
- Soft and Hard Landscaping
- Mechanical Services
- Electrical Services
- Structural Steel
- Metalworks
- Carpentry
- Waste Water Treatment plant
- Power Generation plant
- Potable Water Storage

Priority 3 includes:

- Fixed Joinery inclusive of mirrors and lockers
- Painting and Epoxy works
- Loose Furniture, Fixtures and Equipment
- Racking and Logistics

In August, Finance Minister Simon Birmingham confirmed the centre will be built on Commonwealth-owned land within the Bullsbrook Training Area near Pearce airbase, on Perth's northern outskirts.

He said the Federal Government was continuing to work towards the first 500 beds being operational in the first quarter of 2022.

"Whilst a number of sites around Perth were considered, the Bullsbrook site provides the best option for the centre to be delivered quickly and cost effectively, so that more international travel can be safely facilitated sooner," Birmingham said.

Multiplex Regional Managing Director Chris Palandri said the builder will be drawing on its skills and knowledge from delivering the Melbourne quarantine centre, to deliver the Perth project.

The Federal Government's decision to build at Bullsbrook followed widespread media speculation the 1000-bed complex was headed for the southern suburb of Jandakot.

BCI approves $1.2b Mardie development

After four years of predevelopment, BCI Minerals is poised for major construction of its Mardie salt and potash project in Q1 2022, following a final investment decision for the Pilbara venture in October.

At the time of writing, the start of construction remained subject to funding and final approvals.

The overall cost of Mardie — the first new solar salt operation in WA in almost 25 years — has risen to $1.2b.

The new estimate, which includes contingency, funding, interest and ramp-up costs is a significant increase on the previously forecast $913m cost for the West Pilbara venture.

BCI says it has secured $740m of project debt funding to underpin the capex requirement, including an extra $40m from the Federal Government's Northern Australia Infrastructure Facility, which is now contributing $490m.

Federal Government agency Export Finance Australia is contributing a further $110m.

BCI has also obtained credit approvals from two commercial banks to provide a $140m construction loan, plus $170m of facilities for cost overrun and guarantee requirements.

The company says all Mardie's costs will be funded by the project debt packages and about $460m in equity.

The latter will be a combination of cash reserves, ongoing royalty earnings from BCI's Iron Valley mine, potential corporate debt and new share sales, BCI says.

BCI Managing Director Alwyn Vorster said he is confident that "with the ongoing support of our board, shareholders and other stakeholders, BCI is on the cusp of creating a unique, sustainable project in Western Australia".

The finished project will boast a capacity of 5.35 million tonnes per annum of salt and 140,000tpa of sulphate of potash.

The Kerry Stokes-backed BCI has announced contracts with WBHO for the southern trial evaporation pond and Ertech Geomarine for the seawater pump structure, while Enginium has the project management deal.

BCI proposes to transport the high-purity salt, fertiliser-grade sulphate of potash (SOP) and other commercial by-products to a jetty in shallow waters and transfer by barge to bulk carriers at Pilbara Port Authority anchor points about 25km offshore.

The latest work packages for Mardie can be viewed on the ICN Gateway website.

Lena Constantine

Are efficiencies driving the near extinction of entry level jobs?

We're seeing a rapid decline in entry level jobs for young people.

We're seeing a rapid decline in entry level jobs for young people.

According to a new report from PricewaterhouseCoopers, entry level jobs have decreased by over 50 per cent in the past 15 years, across the country.

Have we instead been turning our attention to already skilled and experienced workers?

From our perspective at CCIWA, we can corroborate that we have seen a downward trend in traineeships, apprenticeships, graduate placements, and internships offered in WA over the past decade.

The opportunities for young people to gain job roles that don't require experience have diminished, and the demand for experienced and skilled workers has increased.

Some of the stepping stones people need to gain experience in the workforce have been removed.

This report also observes that due to this decline, the time taken for young people to move into full-time employment after graduating university has blown out to an average of 4.7 years.

A combination of factors

There could be a wide range of drivers behind this.

1. **Poaching existing skills are cheaper than growing new ones.** Employers are often driven to find efficiencies — and attracting a skilled experienced worker instead of taking on a green, unskilled young person is usually a much quicker, less resource-intensive option.
2. **Tight economic conditions and falling government support.** Since the end of the resources boom in 2014, businesses have been focused on day-to-day survival, leaving very little fuel in the tank for long-term workforce planning. Over this time, governments have also removed various incentives to help businesses employ apprentices and trainees, increasing the cost for employers.
3. **Tight labour markets are a double-edged sword.** WA's very tight labour market now means that while opportunities for lower skilled, less aspirational jobs are in abundance, many businesses who have higher skill requirements are struggling to find the time or skilled staff to offer the training required in these roles.

This has created the perfect storm, with businesses struggling to make long-term investments during challenging economic conditions, leaving them on the backfoot for the next uptick.

With WA now experiencing the lowest levels of unemployment in a decade, we need skilled workers, but the pipeline is dry.

Migration will be vital to filling these short-term gaps, giving businesses the breathing space they need to recalibrate their long-term workforce strategies.

> **"Opportunities for young people to gain job roles that don't require experience have diminished"**

Government support is also vital.

The unexpected turnaround in the number of apprenticeships and traineeships being offered by employers can be directly linked to the Commonwealth's Boosting Apprenticeship Commencements (BAC) wage subsidy.

Essentially, employers (can still) attain a 50 per cent rebate on wages paid to their apprentices and trainees, up to $7000 per quarter, for a year.

This has helped apprenticeships and traineeships increase by approximately 90 per cent in a 12-month period.

Work Integrated Learning

One area where there's still a gaping hole is in graduate positions for university-qualified people in need of a stepping stone into the workforce.

At CCIWA, we're working with the university sector to get undergraduates the opportunities they need to build their work exposure and experience levels through our Work Integrated Learning Program.

We're here to help undergraduates get placements in our members' workplaces; the students gain some course credits and experience, and employers can get a chance to try before they buy, so to speak.

This goes some way to helping with that issue of inexperience preventing the employment of graduates when they finish studying.

(If any employers are looking to take on an intern for a 150-hour placement in Science, Engineering, Business or Law streams, please contact Apprenticeship Support Australia on 1300 363 831.)

But can more be done?

Given the immense pressure businesses are under, do universities need to have a clear front door to help businesses find what they need?

Maybe a more practical approach is needed, in that employers need support in how to induct, develop and retain graduates.

Whatever the solution, there has never been a more pressing time to get creative to get back in place entry level pathways for young people to get into our workforce.

Lena Constantine is Associate Director, Industry Skills at CCIWA and manages ASA WA.

Faster, better, stronger

The race is on to improve the efficiency of lithium-ion battery packs for electric vehicles to help meet global decarbonisation targets. **David Allan-Petale** looks at four WA companies accelerating the power of EV batteries

A key ingredient for global net zero plans is the electrification of transport networks — electric cars, trucks, trains and, maybe one day, aeroplanes and ships.

With the Federal Government recently committing Australia to net zero by 2050, the race to create more efficient EV batteries has come sharply into focus, along with WA's emerging role in this global effort.

The main ingredients for EV battery packs are nickel, cobalt, and lithium, with major producers across WA going after these key resources.

But a growing cohort of Perth-based companies are developing specialised materials and products for the global EV battery market, leveraging WA's favourable business environment to place the State at the fulcrum of global net zero ambitions.

Talga Resources' global integration

Based in Perth with graphite and cobalt mines in Sweden and a processing facility in Germany, Talga Resources is a vertically integrated EV battery-focused company.

Talga develops battery anode and graphene additives that enhance the efficiency and power output of EV batteries.

The company has sought European resource projects so it can tap into the Continent's demand for EV vehicles, but the company prizes its WA location — the best of both business worlds.

Talga's Mark Thompson

"WA has been a global player in mineral-based projects, processing technologies, and metallurgical technologies since the gold rush of the 1800s, bringing best practice to the world," Talga's founder and Managing Director Mark Thompson told *WA Works*.

"As such, by being based in WA, Talga is able to tap into a deep reserve of knowledge and expertise about how best to use minerals to solve the world's problems."

This combination of WA-based management and Europe-focused production allows Talga to develop products for the global EV battery market, with major car brands including Volkswagen, Toyota, Volvo, Ford, Tesla, General Motors, Nissan and Renault pledging to go electric within the next 10 to 15 years.

"In order to meet the demands of battery manufacturers and automotive companies, Talga is working towards 2024 production of Talnode-C, its flagship battery anode product," Thompson said.

"Talnode-C production, using our proprietary coating technology, will be fed by the highest-grade natural graphite ore in the world from Talga's 100 per cent-owned Vittangi graphite project in northern Sweden," he said.

Altech's clay revolution

Perth-based Altech Chemicals sources kaolin — a soft, white clay — from its quarry in Meckering, then ships the raw material to its processing plant in Malaysia where it's refined into 99.99 per cent (4N) high-purity alumina (Al_2O_3), or HPA.

This material is increasingly in demand for lithium-ion battery separators, as well as anodes (electron donors) and cathodes (electron receivers).

Altech's 4N technology was developed in Perth, and the company is now creating even more advanced solutions for the global EV battery market.

"Altech is using its HPA to develop nano-coating technology on graphite and silicon,

which has the potential to significantly increase the energy capacity of the Li-ion battery," Altech Managing Director Iggy Tan said.

While Altech's technology and raw materials are from WA, Tan said he would like more government support for the EV battery sector so local production can be ramped up.

"Much like the EU is doing to develop the battery and EV industries — Altech has a very bright future with its proposed battery materials plant in Saxony, Germany, supplying the rapidly growing EV and battery industry in Europe," he said.

Celsius and Vmoto: united by battery ambition

A common thread for EV battery companies in WA is that while the State is a great place to host a business and develop advanced technologies, manufacturing is tougher.

This is a familiar conundrum to Blair Sergeant, Executive Director, Corporate, of Perth-based Celsius Resources, and a Non-Executive Director at Vmoto, a global electric scooter maker that began in Perth.

Celsius has copper and cobalt plays in Namibia and the Philippines critical to EV batteries, while Vmoto makes electric scooters for the Asian and European markets.

Sergeant said WA's strong business environment allowed its global operations to grow strongly, but there was wide desire for more local solutions.

"You've got this incredible situation of combining technological innovation — which Australia's actually pretty good at, although that is not recognised widely but we are — and combining that with the development of underlying raw materials which makes it all happen," he said.

"Being in WA gives us great stability."

Meanwhile, for electric vehicles like Vmoto scooters, Sergeant believes Australian consumers will make the switch if local leaders create the conditions.

"Encourage businesses and you'll see a big take up of electric vehicles in this State and that will be great for all of us, from consumers to the mining companies that are concentrating on the elements that create EVs," he said.

"Change is coming then, and so we think there's a good market to attack if you position yourself well." ●

Refining a low-carbon vision

A private Brisbane company has pitched a plan to build a $460 million low-carbon nickel refinery in Kalgoorlie that would produce downstream battery material products

By Stephen Bell

Pure Battery Technologies (PBT) says it hopes to approve the refinery project by late 2022, a decision tipped to generate more than 1100 jobs during construction and operations.

The proposed nickel, manganese and cobalt (NMC) refinery would initially produce 50,000 tonnes per annum of precursor cathode active material (pCAM) per year — enough to produce up to one million lithium-ion EV batteries, PBT says.

The company's CEO Bjorn Zikarsky said the investment will seek to commercialise a patented selective acid leaching (SAL) process developed by the University of Queensland.

"The pCAM hub in Kalgoorlie will source the base feedstock from emerging producers in the region," Zikarsky told *WA Works*.

"Additionally, PBT and Poseidon Nickel have signed an MOU to study the suitability of Poseidon's nickel concentrate production from Black Swan and/or Lake Johnston as feed for the refinery," he said.

The 1100-job figure is the total jobs at the end of construction and will gradually incline from mid-2022, he added.

"It is acknowledged that the WA labour market is tight. We are bringing a new technology and industry to the market which we believe will attract employees to the region," he said.

"Our preference is always to help communities grow with our business, so we are currently engaging with local authorities to plan the best approach for dealing with this problem and the associated accommodation issues.

"If the Australian and Western Australian governments are serious about supporting new industry, then they will also support the communities that they are developed in," Zikarsky said.

Funding will be derived via a combination from PBT's shareholders, project partners, project finance, equity and, if necessary, industry, he said.

The company forecasts a final investment decision will be made at the end of the feasibility study, which is anticipated to be Q3 2022.

"The Kalgoorlie pCAM hub is ground-breaking in terms of the green technology it will use and its role in the future of domestic and overseas EV markets," Zikarsky said.

"Compared to typical pCAM production processes, our advanced processing technology uses clever chemistry to reduce CO2 emissions by between 70 and 85 per cent, making the batteries 6-12kgCO2/kWh less carbon-intensive," he said.

Poseidon CEO Peter Harold said he looked forward to working with PBT to determine if the company's potential concentrate production could be feed for PBT's refinery.

"Should we decide to proceed with development of our projects, this could be a great way for us to improve the payability of the nickel in our concentrates and improve the margins of our projects," he said.

Should the Kalgoorlie proposal proceed, it would be WA's third nickel refinery.

BHP's longstanding Kwinana facility now houses a new processing plant that refines nickel powders into the battery mineral nickel sulphate.

The global miner produced the first nickel sulphate crystals in October 2021, marking an important moment in WA's quest to capture a bigger slice of the battery materials market.

The plant is an Australian-first and will produce 100,000 tonnes of nickel sulphate per year when fully operational, making it the largest of its kind in the world. It consists of leaching tanks, purification technology, a crystalliser and dryer and automated packaging system.

Nickel from BHP's mines is processed at the Kalgoorlie nickel smelter, before it is transported to the Kwinana nickel refinery and refined into nickel metal, including a powdered form that is then processed through the new plant to make nickel sulphate.

However, PBT says its facility would aim to go further downstream than BHP's plant.

The Glencore-owned Minara Resources also operates a high pressure acid leaching (HPAL) refinery at its Murrin Murrin laterite mine in the Eastern Goldfields that produces high-grade nickel and cobalt briquettes for export out of Kwinana.

"We are bringing a new technology and industry to the market which we believe will attract employees to the region"

With demand for battery materials expected to accelerate this decade as developed economies seek to achieve their net zero carbon emissions, PBT's new low-carbon refinery would be a welcome addition to the Kalgoorlie economy.

ESG – the new normal

Environmental, Social, Governance (ESG) strategy and reporting is not new to the business world but the increase in demand for ESG alignment, compliance and reporting is. RSM Australia's **Natalie Saunders** explains

Environmental, social and governance (ESG) are the foundations for effective sustainability strategy and reporting.

Each pillar is integrated in how we do business through the resources we use, the people we hire and the laws and frameworks we adhere to.

Good ESG strategy and reporting makes for good business and investors, shareholders and stakeholders are now demanding it.

ESG has been positioned front and centre for business and political leaders around the world.

In November, COP26 in Glasgow highlighted the intertwined nature of each ESG pillar.

This has been expressed in demands for human rights to be included in climate change discussions, as well as ensuring the correct governance and systems are in place to hold governments and organisations accountable.

The pressure, especially on the financial sector, saw the International Financial Reporting Standards (IFRS) announce the establishment of the International Sustainability Standards Board (ISSB) during COP26.

The ISSB will act as a governing body to regulate ESG standards internationally. This comes as welcome news for those trying to navigate the various ESG reporting standards, and sends a clear signal to the market that ESG is here to stay.

Since the Paris 2015 talks, there has been a drastic uptake in how many businesses operate, shifting to a stakeholder capitalist approach, where companies are serving their stakeholders not just their shareholders.

This approach uses an ESG framework to consider the ESG landscape that the company functions in, and how they can serve it and minimise harm while making profits.

Companies that are adopting this approach

Natalie Saunders

Prime Minister Scott Morrison at COP26. Source: UNFCCC

are reaping countless benefits, with an increase in investors focused on the triple bottom line to understand risk; as a means for employee engagement and retention; and a mechanism to attract new business opportunities.

It is now also being recognised as a metric for resilience, with firms who practise business responsibly weathering the negative financial implications of the COVID-19 pandemic more than others. This resilience is representative of how companies no longer just need to consider the short-term profits but also the longer-term ESG impacts to and from their business.

Despite the benefits experienced with firms that engage with and embed ESG into their practices, many companies are yet to adopt an ESG framework. Increasing demand for companies who score well on ESG is no longer a future expectation but is now being demanded.

Companies are swapping suppliers when existing suppliers are failing to adopt various ESG standards such as renewable energy commitments; safe working conditions; and ethical practices. Price is no longer the sole motivator.

Similarly, governments are shifting to ESG commitments with net zero being prominent across the federal and state governments including the recent Federal Australian Government net zero by 2050 commitment at COP26 and the Western Australian Climate Policy.

To meet these commitments, companies will need to ensure their goods and services that are procured by government agencies are meeting these commitments.

This ultimately poses a considerable financial risk for many companies that aren't choosing to adopt and integrate an ESG framework.

Companies are also now addressing the symbiotic relationship between business and the world, addressing not only how they have impact across ESG metrics but also how ESG risks can impact their business and how these should be managed.

As the world faces widespread disruption to global supply chains on the back of the pandemic, we can also expect similar disruptions with climate change.

With extreme weather events expected to increase in severity and frequency, disruptions will intensify, interrupting production and increasing costs but also creating new social issues including secure access to food, nutrition and medical support potentially impacting the welfare of employees.

In the aftermath of single events, companies often demonstrate resilience and recover quickly; but when the disruptions are ongoing, businesses can struggle to recover and their resilience for future stressors can diminish.

In understanding ESG risks, companies are also managing to mitigate, minimise and adapt when they arise, creating a resilient organisation.

Although it is clear ESG is a necessity for companies, many business leaders are unsure where to begin or how to embed ESG reporting in a way that adds value, ensures responsible business activities and meets stakeholder expectations.

As the world continues to rapidly change, the way companies act and report against ESG will continue to become more sophisticated.

Positioning ESG central to business strategy and operations is going to ensure organisations remain resilient and competitive in their respective markets.

Natalie Saunders is RSM Australia's Senior Manager in Climate Change and Sustainability Services.

Diesel driving costs higher

The rising price of diesel fuel is hitting regional freight costs while also spurring efforts by the mining sector to boost their adoption of renewables

By Hugh Halloran

It's impossible to miss the fact that fuel is costing a lot more than it did a year ago.

As usual, most media reports have focused on the effect rising petrol prices have on household finances — but the story of how a commensurate rise in the price of diesel fuel affects business and industry is just as important.

Indeed, it's arguably more important because increasing diesel prices mean increasing freight costs, and that means end-consumers face a double-whammy of paying more for their own fuel and more for end products.

For companies — notably those in mining — that can't simply charge more for what they produce, it could mean a drop in profits and shareholder disquiet.

Diesel prices have gone up by 40 per cent since November last year: the Western Australian state average for diesel was below $1.20 per litre at the start of 2021; it's now topped $1.60 per litre and will only get worse if the oil price keeps rising.

There are multiple reasons oil is going up.

Firstly, when the COVID-19 pandemic first hit, the Organization of Petroleum Exporting Countries (OPEC) and other oil-producing countries — together, 'OPEC+' — decided to cut production to stabilise the oil price.

Lockdowns and travel restrictions meant consumers were driving much less and both domestic and international air travel dropped to virtually nothing.

More recently, soaring Chinese demand for natural gas combined with a shortfall in global gas production is forcing industries overseas to move to using oil to generate power instead.

Further, average daily crude production in the United States is down 6.7 per cent on a year ago, and commercial crude stockpiles are 15 per cent lower, according to the US Energy Information Administration(EIA).

US shale producers have been drilling less, and there were supply disruptions following hurricanes in the Gulf of Mexico in the northern summer.

The EIA expected global oil inventories would continue falling for the rest of 2021, but that production would rise through 2022.

Freight impact

The CEO of the Western Roads Federation, Cam Dumesny, represents WA's road transport industry.

He says most freight companies have fuel surcharge clauses in their contracts to allow for the rise and fall in fuel prices, and so ultimately businesses will have to charge their consumers higher prices to compensate for the higher costs associated with these surcharges.

Regional WA, in particular, will be affected because the regions are not only heavily dependent on road transport, but they draw only a fraction of metropolitan freight volumes.

Higher volumes soften the blow of higher prices by spreading cost increases more broadly across more vehicles — a luxury unavailable to those companies operating in areas of sparse populations and demand where fuel makes up about a third of the total cost of transport.

"It's a concern because when you push freight prices up you always get a decline in freight movements. Like everything that's price-sensitive, some things start to drop off," Dumesny said.

"We rise and fall on the activity of the economy but we're a lead indicator, always have been. Ultimately businesses are going to get it back from consumers, and you'll see it in food prices inevitably."

Mining bears the brunt

The picture is not so rosy for other heavy users of diesel, however — and that includes the backbone of the WA economy, the mining industry.

Australia's mining sector uses about 10 per cent of the country's energy; a 2017 report by the Australian Renewable Energy Agency (ARENA) said the industry consumed about 5 billion litres of diesel each year — a figure which has probably increased in the four-plus years since.

Take, for example, Fortescue Metals Group, which noted in its September 2021 quarterly production report (released in late October 2021) that its costs were up 20 per cent on last year's September quarter, in part because of increased diesel prices.

Forrest's hydrogen drive.

Fortescue also plans to convert about 300 mining trucks to either hydrogen or battery power by 2030, and the company has commissioned Hyzon Motors to custom-build 10 full-sized, hydrogen-powered coaches.

Vanadium alternative

IGO is another miner looking to shift to alternative power sources.

It will be conducting a 12-month trial of a 300 kilowatt-hour (kWh) vanadium redox flow battery (VRFB) standalone power system (SPS) at its Nova Nickel Operation.

The system has been designed to provide a 100 per cent renewable energy supply for much of the year, with a diesel genset used only during periods of extended cloud cover.

"For companies — notably those in mining — that can't simply charge more for what they produce, it could mean a drop in profits and shareholder disquiet"

Even discounting the federal diesel rebate (currently 43.3 cents per litre), a 40 per cent price rise on an annual consumption rate of 700 million litres — noting this has been a gradual, not instant, increase — is a significant sum of money.

And with Fortescue on track to otherwise use a billion litres of fuel by 2030, it's no wonder Andrew Forrest wants to remove the use of diesel across the company's operations.

He told an August meeting of analysts and investors the company believed it would lower its operating costs by going green, while at the same meeting Fortescue Future Industries CFO Michael Masterman said there would be "very significant operating cost savings from both diesel elimination and also gas elimination".

This process has already started at the (now gas-fired) Solomon Power Station, the Chichester Hub, which alone uses 100 million litres of diesel per year, and of course through

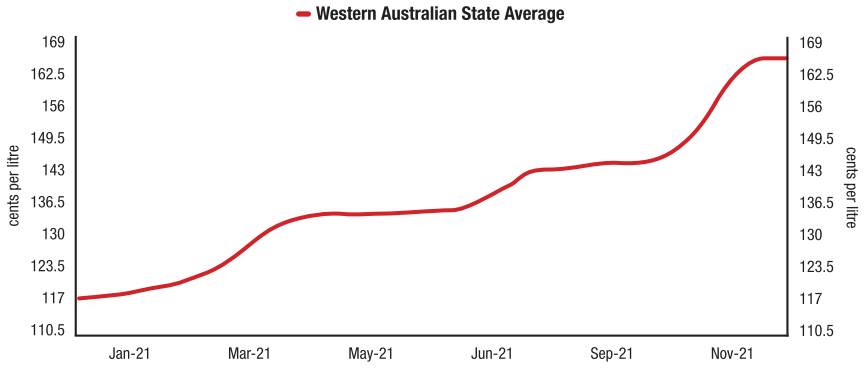
The SPS will be provided to IGO by Australian Vanadium and its subsidiary VSUN Energy for free during the trial period, after which IGO will have the option of purchasing or renting the system.

IGO's Chief Operating Officer, Matt Dusci, said the company's strategic focus was on products that are critical to enabling clean energy solutions.

"As part of our strategy to deliver those products, we aspire to be carbon neutral across our business and to do this, in part, by leveraging renewable energy solutions and innovation to reduce emissions at our remote exploration and mining operations," he said.

In the meantime, it remains to be seen whether our other miners — and industry more broadly — will find rising diesel prices increasingly intolerable or just the price of doing business.

Average Weekly Prices for Western Australian Diesel
Weeks to Sunday, 21 Nov 2021



Seven projects for summer

WA Works has identified seven new major projects with a combined value just shy of $5 billion for the summer edition

By Stephen Bell

The latest additions to *WA Works*' exclusive major projects list represent a mixed bag of opportunities for the supply chain ahead of the summer holiday season.

"Mixed" in most senses of the word, given the seven projects all stem from different commodities and industrial sectors.

However, three of the new entries are based at Kwinana, showing that Perth's longstanding southern industrial zone is in no danger of going out of fashion.

Easily the largest entry for this edition is Mineral Resources' Ashburton iron ore venture in the Pilbara which has an estimated capex requirement of $2.5b.

After many months of speculation, MRL's Managing Director Chris Ellison publicised the estimate during his annual general meeting address to shareholders, highlighting a range of $80 to $85 per tonne iron ore capacity for the 30 million tonnes per annum venture.

Ashburton is a key cog in MRL's long-held ambition to capture a much bigger slice of the lucrative iron ore export market, currently dominated by the three majors Rio Tinto, BHP and Fortescue.

MRL is also competing with Gina Rinehart's Atlas Iron to push more iron ore out of Port Hedland.

If approved in the near-term, Ashburton is forecast to ship its first ore at the end of 2023 by virtue of a "full pit-to-port infrastructure solution", according to MRL.

Hydrogen at Kwinana

The next biggest entry is Woodside's proposal to build its $1b H2Perth hydrogen facility at Kwinana.

This venture fits into the "long-dated" variety with the local energy giant aiming to start construction in 2024.

Nevertheless, the McGowan Government welcomed the announcement, tipping that H2Perth will generate 2000 construction jobs.

Phase 1 is slated to include 250 megawatts of electrolysis capacity and produce 300 tonnes per day of hydrogen, consisting of 100t of green hydrogen (via electrolysis) and 200t blue hydrogen (reformed natural gas).

If the venture makes it to the starting blocks, it will easily be WA's biggest hydrogen project by the proverbial country mile.

The next two listings are substantial but far from sure bets.

A $500 million suburban shopping centre upgrade is one of these "maybes" after the owners of Westfield Booragoon flagged their development plans with a State Government authority.

Booragoon co-owners Scentre Group and AMP Capital lodged a development application in early November with the State Development Assessment Unit, however no details on timing or scope were released.

The Booragoon upgrade has been long-mooted, with AMP flagging a $400m facelift back in 2012.

That plan never eventuated, a victim of Perth's commercial and retail construction slump in the latter years of the last decade, which also prompted deferral of the $500m redevelopment of Westfield Galleria in Morley and Scentre Group's long-planned expansion of Westfield Stirling in Innaloo.

Nowadays the market looks rosier, with UniSuper's just-completed redevelopment of Karrinyup, including an onsite licensed bar and leisure activities, packing in the summer season shoppers.

WA's next lithium mine?

Liontown's $473m Kathleen Valley lithium project is as far removed from those luxury Karrinyup shops as you could imagine, boasting an address in the Northern Goldfields near the nickel mining town of Leinster.

The mooted mine would process 2.5 million tonnes per annum of ore to produce about 500,000tpa of spodumene concentrate with a 4Mtpa expansion planned in Year 6.

Liontown expects to make a final investment decision in Q2 2022, leading to the start of early works in Q4 2022 and commissioning Q1 2024.

Back in the metro area, major cement maker Adbri turned the first sods at its $199m Kwinana upgrade that is expected to generate 130 construction jobs.

The investment will consolidate Adbri's two old production sites, where some of the key equipment is 50 years old, into a single state-of-the-art facility.

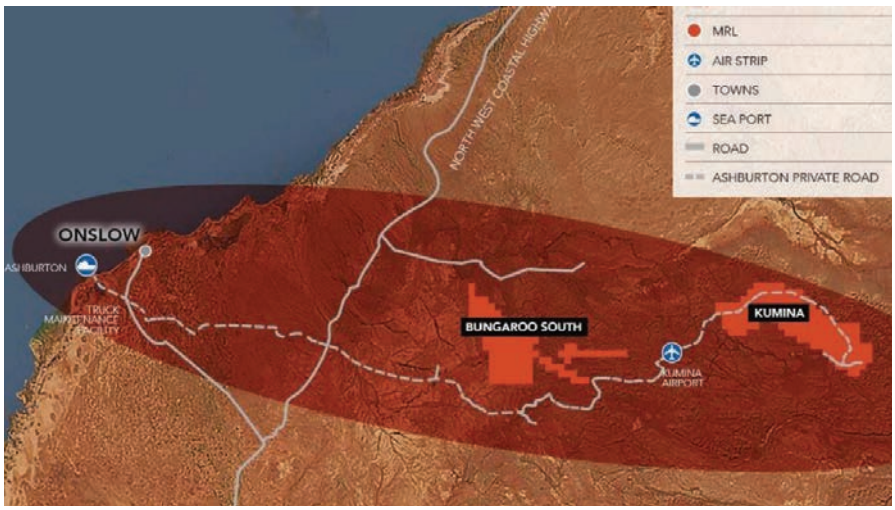
And Italian energy storage provider NHOA won the role of delivering Synergy's first grid-scale battery, to be sited at the old Kwinana Power Station site.

NHOA will deliver the 100MW device and has awarded a $50m engineering, procurement, construction and commissioning (EPCC) contract for the big battery to local power services outfit GenusPlus Group.

Construction was due to begin prior to Christmas, with the unit expected to be operational by the end of 2022.

The new additions are rounded out by the Pilbara Port Authority's ongoing Lumsden Point, which has seen $143m of works — mostly on dredging and land development — since the PPA obtained environmental approvals in 2014.

However, PPA CEO Roger Johnston told *WA Works* substantial extra work is needed to transform the new port into a "multi-user facility and logistics hub", with the total cost of development expected to exceed $300m.



$155m Kwinana battery to smooth excess solar

During its original 45 years of life, the old Kwinana Power Station was fed by a variety of generation fuels — oil, coal, gas and diesel. Now the site is being given a new life and a new fuel in an effort to keep the South West Interconnected System safe during peak periods, writes **Hugh Halloran**

Italian energy storage provider NHOA has won the role of delivering Perth's first grid-scale battery at the old Kwinana Power Station site.

Project operator Synergy has awarded a $155 million contract to NHOA to deliver the 100-megawatt device, expected to have the capacity to power the equivalent of 160,000 homes for two hours.

And NHOA has awarded a $50m engineering, procurement, construction and commissioning (EPCC) contract for the big battery to local power services outfit GenusPlus Group.

Construction was due to begin in November, with the unit expected to be operational by the end of 2022.

First mooted in October 2020, the battery is designed to flatten the so-called duck curve of Perth's household solar-driven energy market.

It will be designed to store excess rooftop solar energy during the day, when demand is low, and discharge electricity rapidly during the afternoon and evening peak.

One in three WA households have rooftop solar panels and this is expected to rise to 50 per cent by 2030.

Ensuring stability

Synergy General Manager Generation Dion Paunich said excess rooftop solar generation not used by homes was exported back into the South West Interconnected System (SWIS), causing system risks in a grid not designed for such a high uptake in unconstrained renewables.

He said Synergy had developed the big battery in Kwinana as a landmark energy storage solution to support more renewables coming on to the grid while maintaining system stability.

"The Australian Energy Market Operator's (AEMO) September 2021 Renewable Energy Integration — SWIS Update Report, indicated excess rooftop solar peaks during middays in autumn and spring when the weather is mild and sunny, and in particular on weekends when energy demand is low," Paunich said.

"In the summer months the big battery will be used to reduce any instability caused by the peaks and troughs of demand and generation."

"The battery will be able to both discharge before a low-demand event is predicted to mitigate risk or reserve energy and dispatch gradually according to system needs."

Increasing renewable generation

Paunich explained the big battery would enable higher levels of renewable electricity generation to work efficiently within the SWIS by storing and pushing power back out to WA homes when it's needed.

"The timing and occurrence of this will be based on system requirements assessed by AEMO."

The big battery will cover the equivalent size of three tennis courts at the old Kwinana Power Station site.

"The surrounding site is bigger than 20 tennis courts, side-by-side, offering space to expand the battery's power and energy capacity as our state grows and our energy demands change," Paunich said.

"We are exploring various different ways to stabilise the grid in collaboration with the State Government and other stakeholders... [and] are undertaking several exciting projects and pilots to develop innovative energy solutions.

"These include our innovative work on the Australian-first PowerBank community battery storage trials, WA's first virtual power plant (VPP) in schools and the industry-leading Project Symphony community VPP project.

"New market rules to commence in October 2023 for the Wholesale Electricity Market will further enable battery storage and we will continue to look at expanding investment into viable solutions."

The future of batteries

For all the talk about renewable batteries powering the homes and vehicles of the future, one simple fact remains: Australia has a nascent, at best, battery manufacturing industry despite being a substantial producer of the main commodities used in lithium-ion batteries, lithium, nickel, manganese and cobalt

By Hugh Halloran

Perth's Future Battery Industries Cooperative Research Centre (FBICRC) is seeking to lift Australia's manufacturing capabilities by developing technical capabilities in the production of advanced battery materials on an industrial scale in WA.

The centre recently signed contracts with a consortium of leading local, national, and international companies, the WA Government, contractors and academic institutions to design and commission its flagship Cathode Precursor Production Pilot Plant in Kwinana.

The pilot plant will produce precursor suitable for material qualification in electric vehicle (EV) value chains and build on the downstream opportunities created by the battery-grade chemical refineries being commissioned or constructed in WA.

All up, the FBICRC and its partners will invest $18 million ($9.2 million cash and $9.2 million in-kind, including the repurposing of BHP's existing nickel sulphate pilot plant) and use locally sourced materials to produce the cathode chemistries used in EVs.

Curtin University is leading the first step to cathode precursor production at CSIRO's Waterford facilities in Perth with the further step to convert to cathode active materials being led by the Queensland University of Technology in Brisbane, while the University of Technology Sydney will provide expertise on advanced materials development.

BHP's recently opened nickel sulphate plant in Kwinana was developed from piloting studies carried out by the company at its former premises at CSIRO in Waterford.

The FBICRC's cathode Precursor Production Pilot Plant project will take some of the existing equipment owned and operated by BHP and reuse,

modify and integrate it with precursor cathode active material (PCAM) plant units to be installed at the site for the production of PCAM material.

FBICRC CEO Stedman Ellis said the pilot plant would be designed to produce between 2kg and 8kg per day from the four fully integrated, automated, PCAM production units.

"The four PCAM production trains are configured to operate separately which allow the simultaneous testing of different conditions to produce different PCAM products," Ellis said.

"The development of the capability to produce PCAM materials that meet industry standards on the pilot plant scale will allow further development and piloting at a larger scale and represents a further step towards commercialisation."

He said the objective of the Cathode Precursor Production Pilot Plant project was to establish a technical and processing capability in Australia that can produce cost-effective, high-quality, high-nickel NCM precursors on a production scale, while minimising processing wastes.

"In addition, the demonstration plant will serve as an exemplar to develop confidence in our ability to produce and develop cathode precursor materials, serve as a tool for training staff and support plant optimisation and product development," Ellis said.

"The goal is to promote the generation of an industry that can supply battery manufacturers and provide an opportunity to create a battery manufacturing industry here in Australia.

"Future estimates expect precursor production to increase to around 17–fold by 2025 to $385 billion"

"Currently, Australia exports the main commodities used in the lithium battery production in the form of mineral concentrates and very little of the value incorporated into manufacturing of lithium-ion battery materials is retained in Australia.

"Future estimates expect precursor production to increase to around 17–fold by 2025 to $385 billion [so] battery precursor production is a crucial step to add value to the Australian battery industry and currently there are no commercial facilities for this in Australia."

Lithium-ion batteries are widely considered as the most advanced power sources for the generation of electric vehicles and smart grids to reduce the reliance on non-renewable energy sources.

A battery consists of two electrodes (anode and cathode) made of different materials, connected by a cation-conducting fluid or gel electrolyte; the cathode makes up around 40 per cent of the cost of a battery's production.

Western Australia has the raw materials to make cathode material used in the lithium-ion battery in globally leading or competitive amounts, Ellis said, and the value of processing and refining these metals could add significant value to the Australian economy.

Power utility to trial new microgrid

Industry will participate in Western Power's latest energy project — a disconnected modular grid powered by a high proportion of renewable sources

By Hugh Halloran

Western Power aims to provide greater power reliability for regional WA communities by developing a disconnected microgrid (DMG) — a first for the State Government-owned utility.

The utility is asking for Registrations of Interest (ROI) from companies able to provide a DMG that would supply a small rural town (about 50 customers) in one of the Mid West, Wheatbelt or Great Southern regions.

The successful proponent/s would be expected to deliver an innovative, integrated and renewables-driven (at least 90 per cent) solution by June 2023.

At the time of writing, potential vendors had until Friday January 7, 2022, to propose one of three options:

- A capex solution (Western Power owned, operated and maintained asset)
- An opex Solution (vendor owned, operated and maintained asset)
- A combination of both capex and opex solution, that satisfies the design, supply and installation of a disconnected microgrid for a small rural town.

In their submissions, suppliers are asked to demonstrate their track record and capability in delivering services for DMGs as well as elect their preferred type of solution.

DMGs are isolated, self-supported networks operating independently from the rest of the grid.

They operate similarly to Stand-alone Power Systems (SPS) but supply a greater number of customers (more than five) within a small network in a town.

A Western Power spokesperson said the company was committed to providing industry development opportunities for local manufacturers and providers.

It was thought a modular network of remote power systems, including DMGs, may be a more cost-effective way to ensure power reliability and quality for smaller regional communities.

"As part of the rapidly changing energy sector, Western Power is transforming the network to a more modular grid using emerging technology and innovative solutions to integrate greater renewables and deliver improved power reliability for communities in regional WA," the spokesperson said.

Battery knowledge needed

"Businesses considering registering their interest should have a full understanding of battery technology and control systems to ensure their offering provides capacity and capability required to operate a fully independent small network.

"This will require flexibility of control between the energy sources that will need to be closely co-ordinated. Local companies will likely require good support from the manufacturer of the equipment they are considering in the design of the energy source for the DMG."

The proposed DMG was expected to be able to manage peak loads from seasonal activities (i.e. harvest) and to also have sufficient back-up battery capacity for these periods.

Outside harvest times, it would only need to generate the power required by customers.

In the past few years, Western Power has procured contracts with third parties for its existing Perenjori and Kalbarri microgrid projects in the Mid West, as well as for its SPS program.

Unlike the Perenjori and Kalbarri microgrids, however, this ROI intends to explore the capacity for WA businesses to develop a fully disconnected microgrid pilot.

The Perenjori Microgrid and associated 1MWh network battery, which is part of the larger Perenjori electricity grid, has improved the townsite's power reliability since it began operating in mid-2018, preventing about 40 hours of outages.

Prerenjori is located at the end of a long

stretch of powerlines that are exposed to a range of environmental factors that in the past cut power to the town.

The microgrid, the first of its kind in WA, sustained significant damage in April this year from Tropical Cyclone Seroja, and repairs were delayed due to difficulties in getting specialist resources and equipment from overseas due to COVID-19, the spokesperson said.

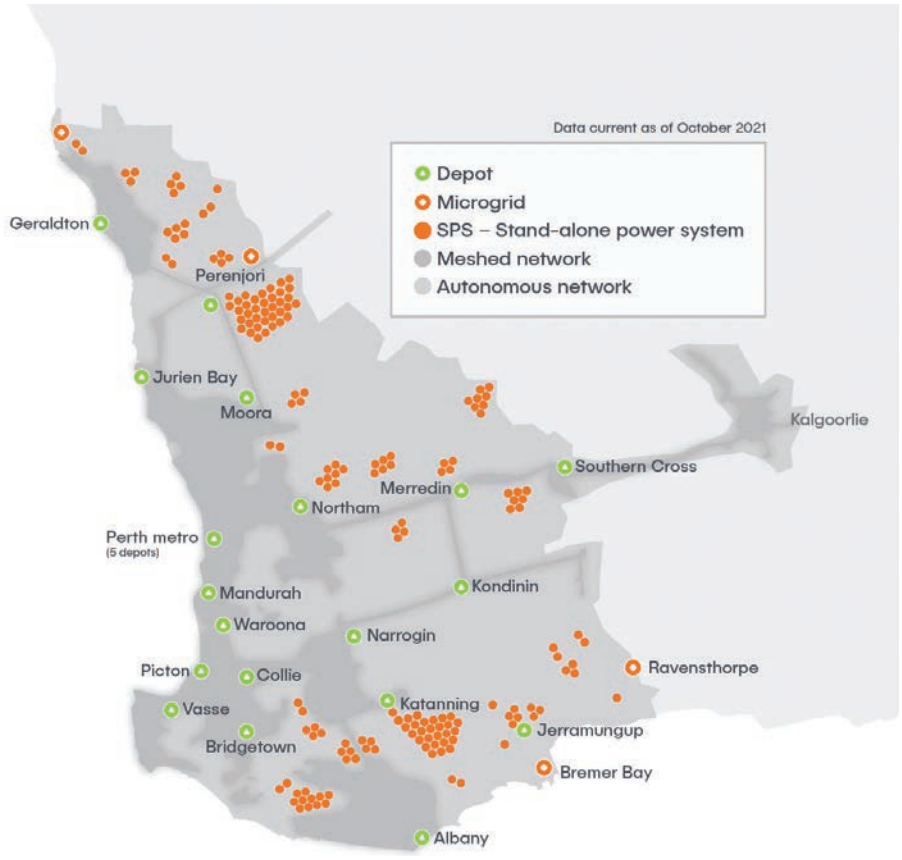
Thankfully these issues have been resolved and the microgrid is back up and running, providing improved power quality and reliability for the town of Perenjori.

The Kalbarri microgrid is intended to significantly improve power quality and reliability for the township, which is connected to a 140km-long, exposed rural feeder line from Geraldton.

Interference on the line has in the past caused extended outages, which has a knock-on effect on local businesses and tourists.

An operational trial is underway and final commissioning for the Kalbarri microgrid is on track for late December this year.

"These tests will integrate the microgrid battery and controller to the network which is essential in making sure it operates effectively and efficiently in delivering electricity to Kalbarri," the spokesperson said.

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The Big Picture

Amazon is one international company that has taken to chartering its own ships and using 53-foot rail containers to transport goods in the face of the supply chain crisis. (Source: Port Houston)

Wharf 'war' worsens freight delays

Industrial disputation and the lingering shockwaves from a global shortage of container ships continues to disrupt Australia's industrial supply chains. And there is no end in sight, writes **Hugh Halloran**

If you've heard more than enough about the problems being caused by supply chain issues, brace yourself — the story isn't going away any time soon.

Ongoing industrial relations issues at three Australian ports — Fremantle, Melbourne and Sydney — have been helping to blow out delivery times for months.

In a timely update, the Australian Competition and Consumer Commission (ACCC) released its biannual report on the stevedoring industry in November, saying in part that restrictive work practices and industrial actions had escalated over the past decade, contributing to the relatively poor performance of Australian ports and causing ongoing disruptions to the entire supply chain.

Managing director of freight forwarder EES Shipping Brian Hack put it more bluntly: "The MUA [Maritime Union of Australia] is basically at war with Patrick Terminals", and delays because of go-slow actions are having a flow-on effect across other industries.

Of Australia's five major ports, only Brisbane's is ranked higher than the lowest quartile of the world's 351 ports, according to the World Bank's Container Port Performance Index 2020 released earlier this year.

In other words, the ports of Fremantle, Adelaide, Melbourne and Port Botany rank among the worst-performing in the world.

The ACCC said it had been told by other market participants that are not parties to the disputes between stevedoring companies and their workers that industrial action was one of the major causes of supply chain disruptions, and these disruptions had caused considerable delays, higher costs, and loss of business.

Among other suggestions, the Commission recommended the Federal Government address industrial relations and restrictive work practices issues across the supply chain.

Amazon has begun chartering its own ships and using 53-foot rail containers to ensure it can keep its supply chain moving. (Source: Port Houston)

Small business frustration

The very same sentiment was clearly expressed at a CCIWA Small Business Summit in late October.

One importer expressed his immense frustration with the ongoing issues at Fremantle Port, saying the wharfies there were holding business to ransom.

He was awaiting an already delayed delivery of aerosol cans and the delivering ship was moored at North West Cape for a week before it ended up going to Adelaide instead of Fremantle, and the cans were trucked to Perth from there.

In the meantime he'd had to let six employees go.

It would need both the Federal Government and the Fair Work Commission (FWC) to fix the problem, but the FWC had thus far shown little interest in seeking a resolution.

"They're not true strikes, they take a day off, come back to work for a day, then take another day off. It's difficult enough to get containers, but then we have our own wharves holding us up," he said.

Hack said he was aware that some heavy bulk vessels transporting steel had simply given up on waiting for access to Fremantle Port, pulled anchor and left for Melbourne and Adelaide, and more recently some containerised vessels were doing the same thing.

"We're monitoring the marine traffic websites, just the vessels that are outside of port here, and all these vessels are just sitting out there in Gage Roads doing nothing for days and days and days — 8.5 days on average," Hack said.

Fremantle already had other operational constraints such as ships not being allowed to leave in darkness: "It costs money, it causes delays, and it means the next vessel can't come in till the next day."

Further industrial relations issues with landside transport companies have thankfully been resolved, at least for now, but continuing increases in consumer demand for online deliveries are making things worse.

Container ships wanted

The big issue, however, is the dire shortage in the availability of container ships and the resultant extreme hike in the prices demanded for access to containers.

Images of dozens of container ships moored off the United States' west coast ports of Los Angeles and Long Beach, unable to be unloaded, indicate a grim situation that's dragging down trade among the rest of the world.

According to Western Trucking Federation CEO Cam Dumesny, this is becoming more and more of a global conversation.

"Australia's still in its infancy in raising the issue; they've actually started to use the term globally now — it's no longer supply chain disruption, it's global shortages," Dumesny said.

"You've got companies that are struggling to get stuff in, and then if they're not getting stuff in then we've got nothing to transport in terms of carts to a manufacturer, then when the manufacturer's not producing anything, we've got nothing to transport out!"

There was no point attacking the shipping lines themselves for these problems, as Australia wasn't on major global shipping routes and Fremantle Port was little more than a "Thomas the Tank Engine spur line", Dumesny said.

"When you look at it, Melbourne Port's about 42 per cent of [Australian] container trade; Freo's down at about 12 per cent, so we're 12 per cent of a secondary shipping route — it's not much.

"We're not a major port in the scheme of things, and so if we go and create disruption against the global shipping companies, we may pay a penalty — that's the balancing act."

Back to the United States, it may be there are truck driver shortages in the US — certainly, the pandemic caused demand for fuel to drop sharply so companies started letting drivers go, whereas other drivers retired early — and some estimates suggest at least 50,000 drivers have left the industry.

Equally, however, there are many drivers who simply can't get a load on their chassis; and it seems this is often because there's nowhere to put the empty containers they're returning to the port because of the overflow of new containers waiting to be picked up.

Doing it themselves

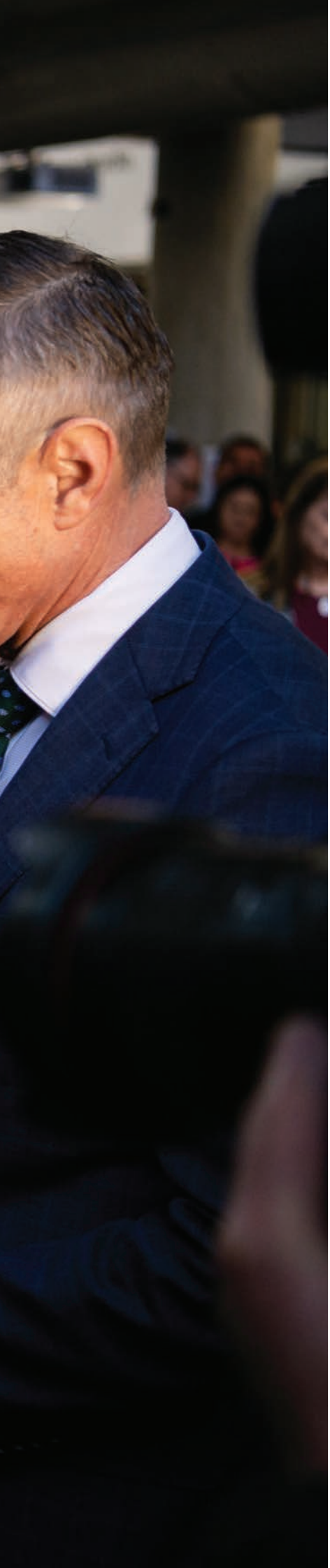
It's got to the point where major companies like Amazon, Walmart, Target, IKEA and Home Depot are chartering their own ships and going to secondary ports to ensure supplies can continue to be delivered.

Walmart, for example, has taken to using dry bulk cargo ships for transport, while both it and Amazon have also started using 53-foot rail containers rather than the traditional 20-foot or 40-foot shipping containers.

It should also be noted that California has required that all heavy-duty trucks that visit its ports and intermodal rail yards must have engines built in 2007 or later; in other words, trucks older than 15 years are effectively banned from transporting goods within California.

By January 1, 2023, all diesel-fuelled drayage trucks must have 2010 or later engines to operate in the Golden State.

California may be well-intentioned in requiring cleaner-burning vehicles, but the effects are reaching well beyond its state borders and coastline.



A space trail blazer

The recent launch of a home-grown satellite into orbit has rocketed WA into the new space race and paved the way for more ambitious missions, including a moon shot, writes **Lisa Calautti**

When Phil Bland watched Western Australia's first home-grown spacecraft, Binar-1 CubeSat, blast into the Florida sky in August the landmark event struck a surprisingly emotional chord with the Curtin University professor.

"It's fantastic and to be honest, I didn't realise how emotional I would feel when I first saw it on the launch pad and the rockets fire, and then it sets off," Bland tells *WA Works*.

"And when I saw it deploy from the space station and saw our little spacecraft begin up in the clouds and over the blue ocean of the Earth … it was an incredible moment," says Bland, the director of Curtin's Space Science and Technology Centre.

"As a scientist, there is that cold rational part of you, but to just to see that (the launch) — I was very, very moved. It was beautiful."

Now almost four months on (the launch date was August 29) the Binar-1 is continuing its orbit 400 kilometres above the Earth's surface, which is approximately the distance between Perth and Albany.

It circles the planet once every 90 minutes.

Binar-1's two cameras take photos of WA from space, with its star camera able to precisely determine the direction the satellite is facing, which is a vital part of capability for any future missions.

Small but mighty

The Binar-1 — named after the Noongar word for fireball — is a CubeStat satellite tinier than a shoebox and consists of a 10-centimetre, cube-shaped module. However, the Binar-1 is made of just one module and hence, is technically a 1UCubeSat.

This small structure is part of a mighty mission, which is putting WA on the map in Australia's space sector.

Bland says the Binar-1 launch was the first time a WA university had put a small spacecraft in orbit.

"There's actually only been 14 Australian spacecraft in history from universities, to industry, to defence, so we are adding to that and over the next 18 months we will be flying another six. So we well be adding to that quite sustainably," he explains.

The Binar-1 journey began when Bland and a small team of engineers and Curtin University PhD students embarked on an operation to create a small spacecraft after they found they were unimpressed by models that could be purchased online.

Initially the spacecraft operation began as an honours program for student engineers. However, since 2017 the team has grown substantially.

"We made a decision to really build it (the Binar-1) ourselves from the ground up, and what >

> that ended up looking like is, we got all the systems on a single circuit board … so we can build small spacecraft much more easily. What it means for WA is, it's actually quite a big deal," he says.

"You can say it took 4.5 years to build one, but its going to be a hell of a lot shorter to build more now that we know what are doing!"

The Binar-1 has shown that the technology Bland and his team created via a single circuit board has worked, which is a huge feat.

"We know that through this operation, we might not get everything that we wanted out of it — all the pretty pictures we wanted — but we know that with this mission the new technology is solid, so that's really great news," he says.

"Building smaller spacecrafts for startups, businesses and universities is now a reality"

To the moon

The success of Binar-1 has paved the way for future missions and firm plans are in place for a home-grown space mission not too far down the line.

"We have a really nice concept for a moon mission — NASA really like the concept. They like it so much they've said, 'Well if you can build it maybe we will give you a free ride,' which is very nice. So I think that's where we want to end up," Bland says.

"We want to build a version of the spacecraft that is tough enough to live on the moon for three months and do the analysis in partner with NASA."

If funding continues, Bland predicts the dream could be a reality in three to four years.

The future for WA

Now the groundwork has been laid, Bland says building smaller spacecrafts for startups, businesses and universities is now a reality.

"I want to help WA space innovation and industry," he explains.

"We can use these spacecraft for a whole bunch of things that can benefit the State. They can do earth observation, they can do communications, they can do position location and timing. They can do a tonne of things — they can look for bushfires."

Space benefits virtually every area and every sector of the economy, Bland believes.

And he says the Binar-1's success and future expeditions will have far-reaching rewards for its home state.

"Space is really quite unusual in that spacecraft can tell you when to harvest crops, or when part of a forest is drying out. Space benefits virtually every area and every other sector of the economy," he says.

"It is quite hard to think of something that isn't impacted by space-based assets. It's almost everywhere and a lot of people don't realise."

Professor Bland says establishing a WA space industry is vital for future jobs.

"I think we are in a really critical time in WA in terms of opening that up. We can help local businesses and we can train those students … but we need a space industry here, so that jobs go here."

Launching Bunbury into the space age

WA will become an important location for tracking space junk and other hazards orbiting the earth after US company LeoLabs announced plans to build two new radars near Bunbury.

The South West venture will host the ninth and tenth space radars in the company's global radar network, which will boost its surveillance of satellites and debris in low earth orbit.

The issue of space junk endangering other space infrastructure, including satellites and the International Space Station, was highlighted in November when Russia launched a direct ascent anti-satellite missile to destroy an old Soviet spy satellite.

LeoLabs CEO Dan Ceperley said the radar site was a step forward in the company's investment in Australia, which includes offices in Sydney and Newcastle.

"It started earlier this year with hiring a world-class team led by retired Air Commodore Terry van Haren," he said.

"This radar site and this team will make Australia a space surveillance superpower and will be the foundation of transparency, sustainability, and deterrence in space for decades to come."

The Bunbury site works were expected to start before the end of the year and the radars are likely to be operational by October 2022.

Deputy Premier and WA Science Minister Roger Cook said the investment was recognition of the State's significant geographic advantages for space communications and tracking objects in space.

"WA is uniquely placed to support the new era in space, and LeoLabs' new radar will be another example of how our State is leading Australia in growing the nation's space sector," he said.

Meanwhile, Space Industry Association of Australia CEO James Brown said the radar marked an important step in growing Australia's space surveillance capability.

"Australia clearly has an opportunity to become a space surveillance superpower and a leader in global space governance, and LeoLabs can certainly play a role in supporting and informing that mission," he said.

"The innovative space radar capability is an opportunity to provide the Australian space industry with a unique opportunity to develop new products and services, generating hundreds of millions of dollars in potential future export revenues."

Dr Catherine Bowen

Your Will — Giving with warm hands

Getting your Will right, and making sure you keep updating it as circumstances change, will save a lot of angst after your death. It's especially important if you own or have a share in a family business — don't let what you've spent years building up get lost to legal fees, writes **Dr Catherine Bowen**

As a member of a family business, you may have both dependants and assets. Your Will becomes therefore both a personal and a business/legal document.

How long is it since you checked your Will?

In any five-year period, most people will experience one or more of the following — each should be a reminder to check your Will: a birth or death; a marriage or divorce; a change of health or wealth; someone *enters* or *leaves* the family business.

So, does your Will accurately reflect your family / business circumstances?

Could someone legally challenge it today?

The *Family Provisions Act 1972* (WA) (Inheritance Act) contains enough grey areas for potential plaintiffs to be advised that they have 'entitlement'.

If someone feels that they have not been *"adequately provided for in the estate of a deceased relative"* they have the right to appeal/challenge the Will.

While most families deny the likelihood of this occurring, the reality is that people, circumstances and priorities change over the years and needs, perceived or otherwise, becomes the impetus.

Once challenged, your Will becomes a public entity, and a creature of wilful determination that can potentially drag your family through the Courts for years.

The costs include staggering legal fees and inestimable damage to the family and the business.

Sadly, your assets diminish as people not associated with your family collect the spoils.

You can choose to avoid this.

Start early: Set things up whilst *still of clear mind and good health.*

Do not become a victim of the insecurities of old age where undue pressure from family/business members may influence your decisions.

If you believe there is a need to alter your Will or executors, keep everyone informed and destroy the previous Will.

Executor/s: Approximately one-quarter of West Australians use the Public Trustee to execute their Will.

Choose anyone you trust as Executor/s, but do ensure they have agreed, and keep the family clear on your wishes.

For family businesses, two are better than one!

How to start: First, list your assets.

Open discussions with family / business members are important in relation to the decisions you will make.

People need to know where they and the business stand.

Be certain to include those not in the family business in your discussions. Keep everyone informed.

Be prepared for some in the family/business to be angry or upset; but understand that by discussing and tackling the challenges now, your Will remains a proactive, inclusive document that becomes a part of your legacy.

If people know in advance, *why* and *how* a Will has been structured, they are less likely to challenge your decisions and the Courts are more ready to uphold your wishes.

Once you've 'written' your Will, take it to your legal advisor to have it checked, tidied and witnessed. It will save you heaps this way.

A quick check of the Office of the Public Trustee may further guide you:

- Marriage automatically cancels all previous wills.
- Divorce *does not* automatically cancel a Will in Western Australia.
- Your de facto partner *may not* automatically be entitled to your estate.
- Children of previous relationships *do have* legal entitlement.
- A recent inclusion (2013) to the Inheritance Act legislation now acknowledges and includes stepchildren. You may need to seek advice regarding their entitlement.

www.justice.wa.au/publictrustee

By combining open communication and careful planning, a well-constructed Will can ensure that your family business is secure, that the family can live in harmony, and that you can rest in peace!

Dr Catherine Bowen is a Family and Small Business strategist / Mediator; Management Academic Curtin University; Broadacre farmer.
Cathie.bowen@curtin.edu.au

If you expand it, they will come

A *WA Works* tour of Wanneroo's new Neerabup Industrial Area (NIA) reveals plans to transform the northern suburbs industrial park into a tech hub and economic pillar, writes **David Allan-Petale**

It's busy on Wanneroo Road, the key inland artery through Perth's northern suburbs where the working day is underway.

Driving under a newly built flyover bridge, the City of Wannero's Manager Advocacy & Economic Development Steve Marmion is on his way to inspect the NIA, a key strategic development for Wanneroo's rapidly expanding workforce.

"By 2031, it is estimated that the (Wanneroo's) resident labour force will grow to 143,000," Marmion says.

"Providing opportunities, such as the NIA, to generate local employment is critical to enabling people to work closer to home."

Located 35 kilometres north of Perth's CBD, the estate has 600 hectares available for development — but it's not just about creating local jobs.

Marmion drives into the NIA and stops at the edge of some major earthworks that are transforming Neerabup from a small industrial park on the edge of the northern suburbs to a pillar of WA's economic future.

Tech defines Neerabup's future

In October, the State Government announced a 51-hectare development at the NIA for the Australian Automation and Robotics Precinct (AARP) for testing new technologies like remotely controlled machines.

City of Wannero's Steve Marmion

"We are very excited that the area has attracted a groundbreaking project to develop an Australian Automation and Robotics Precinct, backed by a State Government investment of $20 million," says City of Wanneroo Mayor Tracey Roberts.

"Our focus is to support the development of this precinct to help attract more businesses to the area and ensure jobs of the future are available for our local workforce."

With AARP established, Neerabup could become a hub for technology companies supporting sectors from the mining industry to motorsport — especially as a raft of major infrastructure developments there accelerate.

Levelling the playing field

The NIA was first sited in the 1970s and is home to a core group of businesses, from the immense hydroponic warehouses of Trandos Farms to concrete plants and panel beaters.

Driving through the area's signposted streets ready for more buildings to arrive, Marmion points out the excavators digging out tonnes of sand and limestone — an immense task.

"This work is required to bring the land levels down to agreed structure plan levels to enable the land to be developed for industrial purposes; it is crucial that the developed industrial land is flat to meet market expectations," he says.

Alongside the AARP, the main development zone in the immediate term is Lot 9100, which the City wants to subdivide into industrial lots.

These plans have been endorsed by the council and were recently approved by the WA Planning Commission, with the first lots expected to enter market in 2023.

Roads are the key to Neerabup

At the City's main office in Wanneroo, Marmion displays a series of aerial shots of Wangara, the City's main industrial area.

From a half-full zone in 2021, Wangara morphs into an area with barely any room to grow by 2020, mostly because of new interchanges for

Wanneroo, Ocean Reef and Gnangara Road, and Mirrabooka Avenue.

The upgraded roads eliminated scores of chokepoints and connected Wangara more easily to the State's major freight links.

Connecting roads are also the key to Neerabup's future, and these have been targeted with funding that will see them improve as the NIA expands.

"The State Government has committed to providing $20m for the upgrade of Flynn Drive (and) the Federal Government has also provided $2m towards the project," Marmion says.

"The Whiteman Yanchep Highway (Gnangara Road and Neaves Road) is another important road that will link the NIA directly to the Tonkin Highway."

All the NIA's crucial roads are either allocated funding or at the top of the agenda for development — moves that will see the area become a connected hub for future business.

The NIA's net zero

In addition to opening up the NIA for creating future technologies, the City is investigating a Waste Precinct and scoping a potential solar microgrid to provide renewable power.

These could make the NIA more self-sufficient and boost Wanneroo's green credentials.

"On completion, it is expected to be one of the biggest industrial estates in Perth, ultimately generating up to 30,000 new job opportunities — a significant contribution towards employment self-sufficiency in the region," says City of Wanneroo Chief Executive Officer Daniel Simms.

Driving back along Wanneroo Road, truck after truck filled with sand and limestone from the NIA passes by, with each load being taken to local building projects like the Ocean Reef Marina.

It may look like wide open space right now, but the NIA is already helping build the future; and as its development accelerates, this land at Perth's edge is becoming a vital centre.

"We are very excited that the area has attracted a groundbreaking project"

Digging in

We unearth the best tender awards, project progress and significant announcements over the last quarter

October

Work prospect in the post

A new construction opportunity for the WA supply chain is on the way, with Australia Post appointing local outfit PS Structures to build its new $82 million parcel facility at Welshpool.

Australia Post says the purpose-built facility, at a forecast 23,000 square metres of floor space, will be larger than the playing field at Optus Stadium.

BHP delivers first battery product at Kwinana

BHP has produced the first crystals from its nickel sulphate plant in Kwinana, south of Perth, marking an important moment in WA's quest to capture a bigger slice of the market for battery materials.

The nickel sulphate plant is an Australian-first and will produce 100,000 tonnes of nickel sulphate per year when fully operational, making it the largest plant of its kind in the world.

ADCO wins Metronet Control Centre job

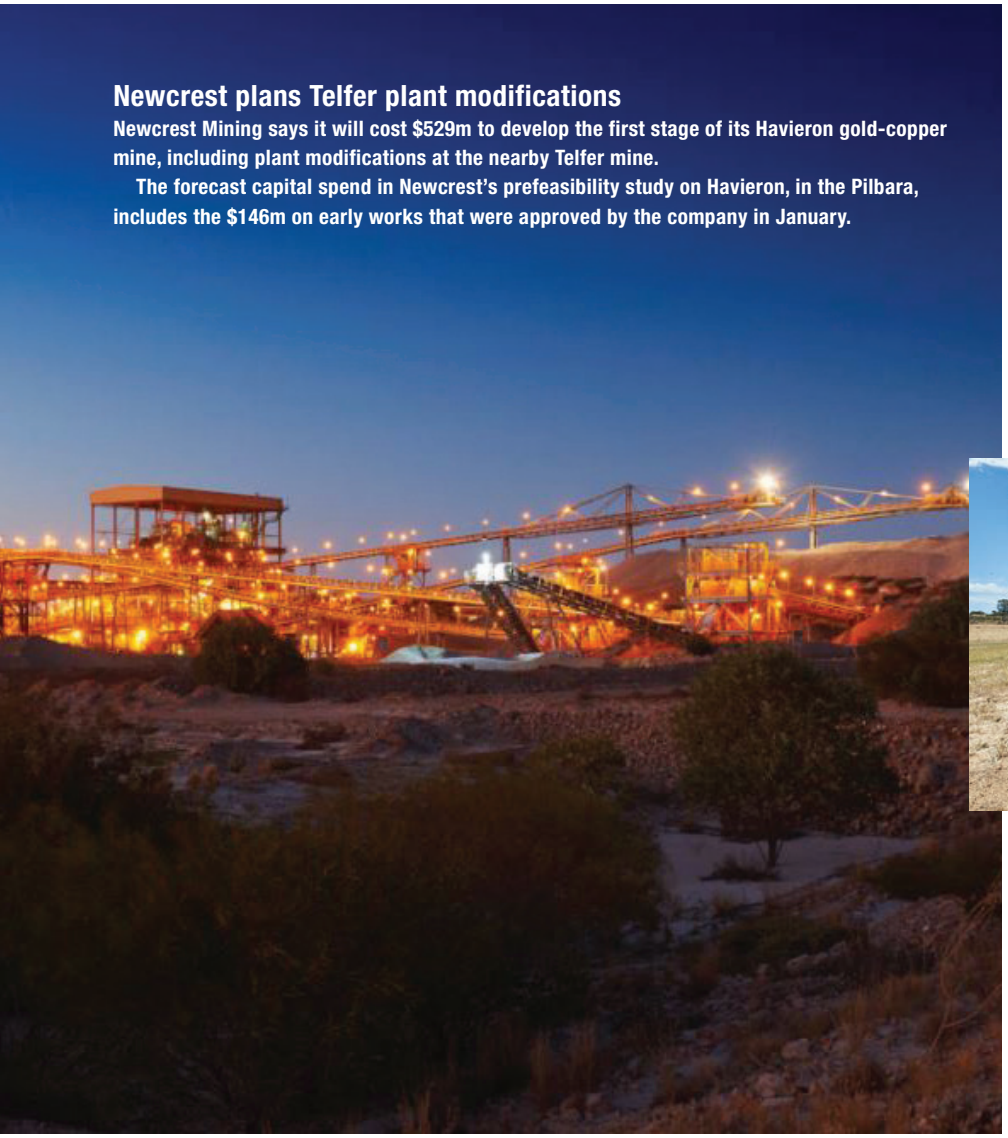
A new city construction project is on the way, after ADCO Constructions was confirmed as builder of the PTA's Public Transport Operations Control Centre (PTOCC) in East Perth.

The PTOCC, expected to cost about $50m, is an essential precursor to the proposed roll out of an upgraded $267.6m High Capacity Signalling (HCS) project.

Newcrest plans Telfer plant modifications

Newcrest Mining says it will cost $529m to develop the first stage of its Havieron gold-copper mine, including plant modifications at the nearby Telfer mine.

The forecast capital spend in Newcrest's prefeasibility study on Havieron, in the Pilbara, includes the $146m on early works that were approved by the company in January.



Waitsia kicks off with Aboriginal deal

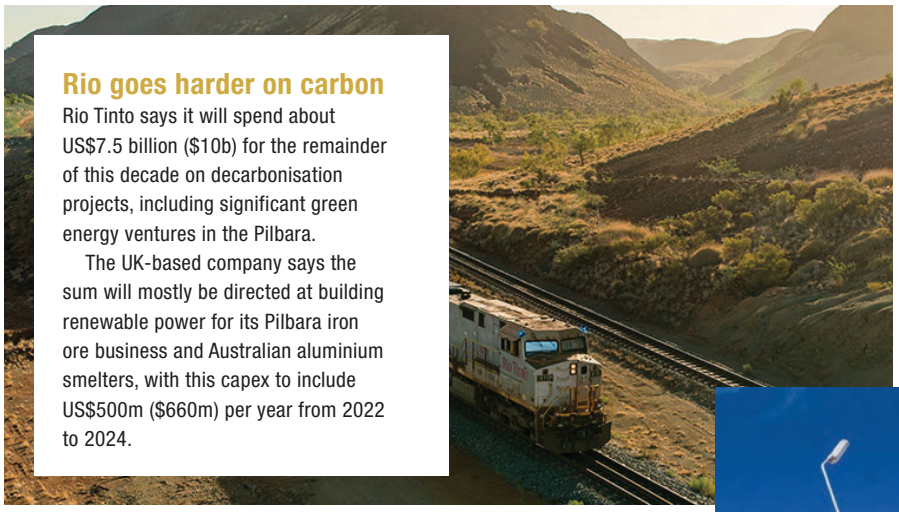
Mid West Aboriginal business Garla Barna Civil & Mining (GBCM) has won a key early contract as Mitsui's $800m Waitsia gas project starts construction.

Mitsui said GBCM won the bulk earthworks job for Waitsia Stage 2 — WA's newest export project that is expected to ship much of its gas as LNG via the Woodside-operated North West Shelf infrastructure at Karratha.

Aerison's multiple awards

Engineer Aerison says it has won new contracts totalling about $140m in the resources, gas and electrical infrastructure sectors.

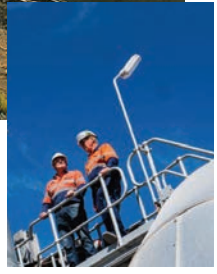
The Perth-based company, which listed on the ASX in July, says the engineering, fabrication and construction contract awards will begin immediately and are scheduled for completion in 2022.



Rio goes harder on carbon

Rio Tinto says it will spend about US$7.5 billion ($10b) for the remainder of this decade on decarbonisation projects, including significant green energy ventures in the Pilbara.

The UK-based company says the sum will mostly be directed at building renewable power for its Pilbara iron ore business and Australian aluminium smelters, with this capex to include US$500m ($660m) per year from 2022 to 2024.



Multiplex goes to market

Multiplex is seeking interest from subcontractors to help it build the Federal Government's new $200m quarantine facility near Bullsbrook.

The construction giant, named head contractor in August, advertised work packages for the Centre for National Resilience Perth project on the ICN Gateway website.

130 jobs at Kwinana cement project

Major cement maker Adbri has turned the first sods at its $199m Kwinana upgrade project that is expected to generate 130 construction jobs.

The investment will consolidate Adbri's two old production sites, where some of the key equipment is 50 years old, into a single state-of-the-art facility.

Wodgina restart for MARBL partners

Mineral Resources says the restart of its partly-owned Wodgina lithium mine in the Pilbara will create up to 200 new full-time jobs.

MRL said the MARBL joint venture, owned 60 per cent by US-based Albemarle and 40 per cent MRL, would look to initially restart one processing line at Wodgina and have it operating by the third quarter of 2022.

November

Mining work still flowing

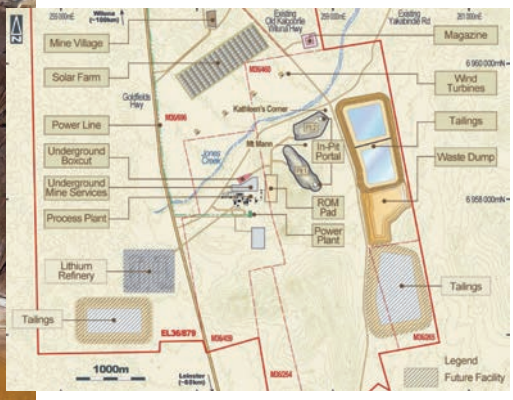
WA's mining sector is still humming along nicely, with nearly $250m of work awarded to Mondadelphous, SRG Global, Altype Engineering and Southern Cross Electrical Engineering.

Monadelphous was the biggest winner after securing new contracts and extensions in the resources industry totalling about $110m.

"Strong interest" in next lithium mine

WA's next big lithium venture is taking shape with Liontown Resources seeking to make a final investment decision by the middle of next year for its $473 million Kathleen Valley mine.

The project, located in the Northern Goldfields near Leinster, would include a high level of renewable energy to power a traditional crushing and milling circuit producing lithium and tantalum concentrates.



UGL wins Chevron maintenance deal

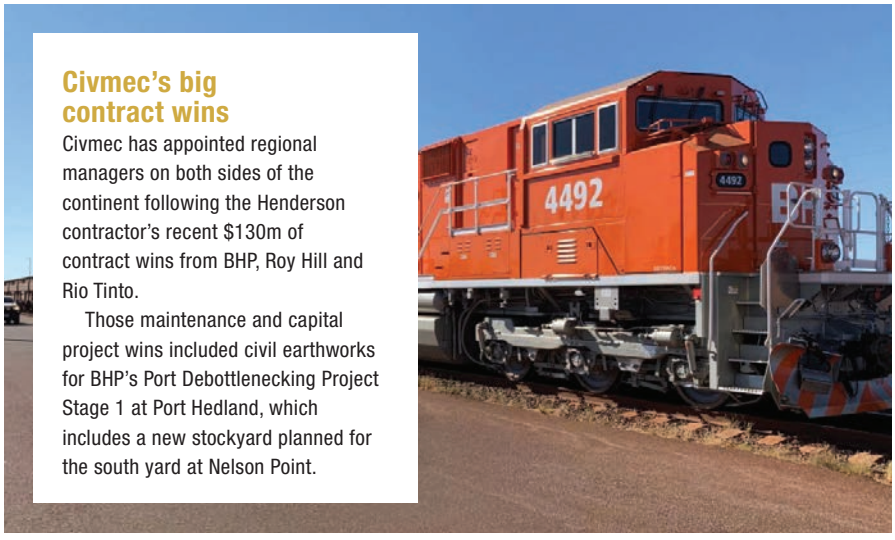
CIMIC Group's UGL has been awarded a long-term maintenance contract worth up to $400m with Chevron for works in the Pilbara expected to generate hundreds of jobs.

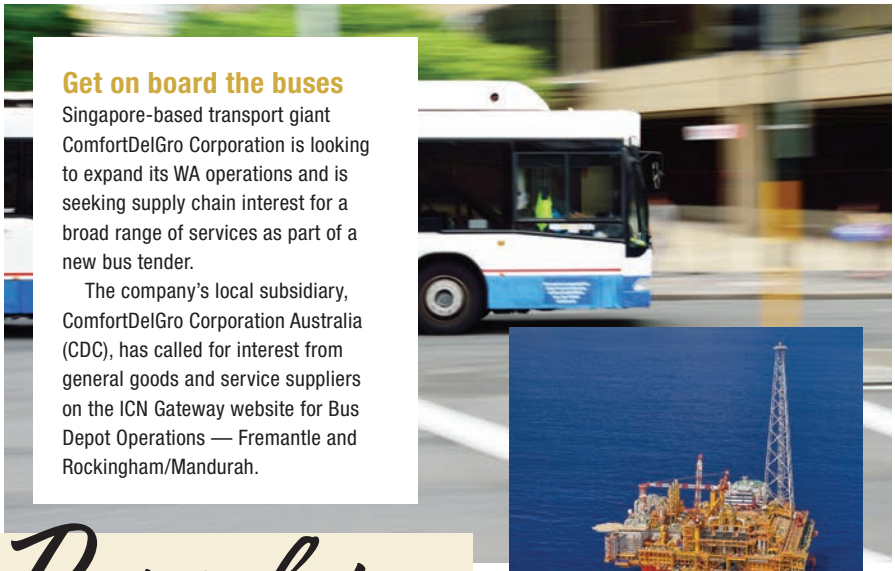
The engineer will deliver front-line and campaign maintenance, brownfield execution scopes and turnarounds at Chevron-operated facilities over an extendable term of up to 10 years, generating annual revenue of about $40m.

Civmec's big contract wins

Civmec has appointed regional managers on both sides of the continent following the Henderson contractor's recent $130m of contract wins from BHP, Roy Hill and Rio Tinto.

Those maintenance and capital project wins included civil earthworks for BHP's Port Debottlenecking Project Stage 1 at Port Hedland, which includes a new stockyard planned for the south yard at Nelson Point.





Get on board the buses

Singapore-based transport giant ComfortDelGro Corporation is looking to expand its WA operations and is seeking supply chain interest for a broad range of services as part of a new bus tender.

The company's local subsidiary, ComfortDelGro Corporation Australia (CDC), has called for interest from general goods and service suppliers on the ICN Gateway website for Bus Depot Operations — Fremantle and Rockingham/Mandurah.

December

BHP lists first packages at Jimblebar

Global miner BHP has advertised the first work packages for its latest brownfield iron ore project — the beneficiation of "fines" iron ore at the Jimblebar mining complex in the Pilbara.

WA Works broke the news of BHP's plans for Jimblebar in July when the company listed the project on the ICN Gateway website. Now the iron ore giant has updated that listing by seeking expressions of interest from industry for 13 scopes of work.

Ichthys booster win for McDermott

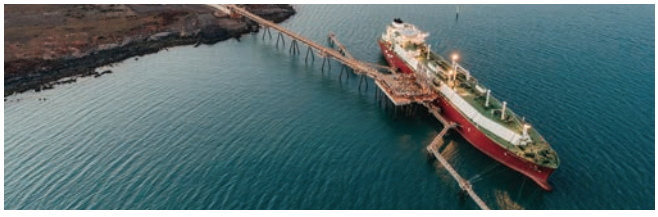
US-based contractor McDermott has won a deal to supply a compression module for Inpex's Ichthys LNG project off the Kimberley coast.

McDermott said it won an engineering, procurement and construction (EPC) contract after recently completing FEED services for a booster compression module for Ichthys.

New $2.5b iron ore venture flagged

After many months of speculation, Mineral Resources has estimated the cost of building its long-promised Ashburton iron ore project at $2.5b.

MRL's Managing Director Chris Ellison publicised the estimate during his annual address to shareholders, highlighting a range of $80 to $85 per tonne iron ore capacity for the 30 million tonnes per annum venture.



Scarborough gets the nod

Woodside and BHP have approved the Scarborough gas development, a decision expected to trigger more than 3000 jobs as WA's dormant LNG construction industry kicks back into gear.

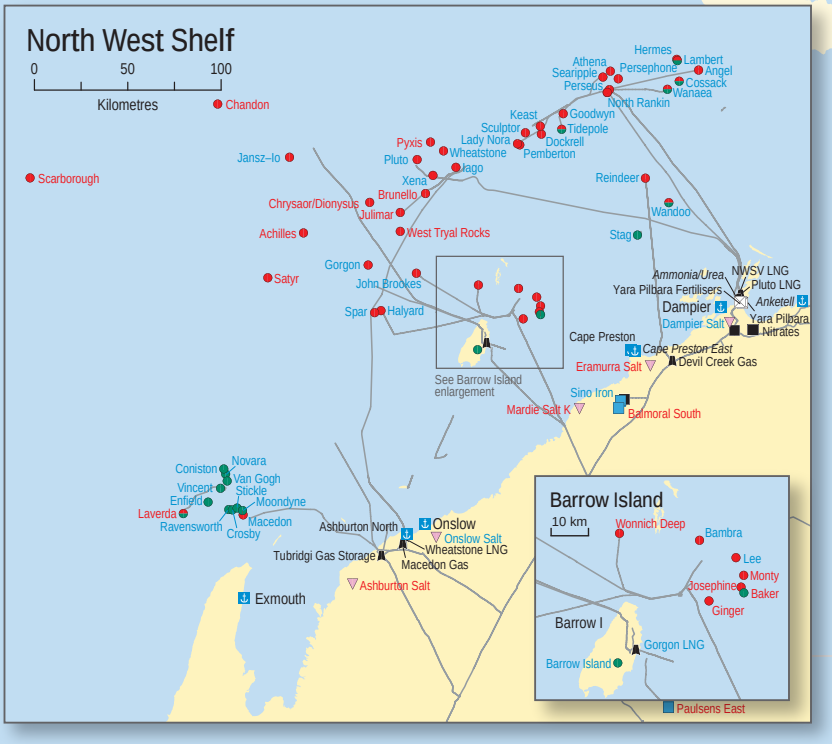
As flagged by Woodside earlier in the year, the final investment decision to develop the offshore Scarborough gas reservoir, build a second onshore LNG train at Pluto, and modify Pluto Train 1 will cost $US12b ($16.7b).

Compiled from *WA Works* digital fortnightly newsletter. Your subscription entitles you to nominate 10 email address to receive the newsletter. Contact waworks@cciwa.com.au to add or update emails.

The Big Picture

Western Australia will soon be home to a LeoLabs 1D phased array space radar like this one. (Source: LeoLabs)

Major Resource Projects 2021



Project labels:

Principal resource projects operating with sales >$5 million in 2019–20 are in blue text

Resource projects currently under construction are in green text

Planned mining and petroleum projects with at least a pre-feasibility study (or equivalent) completed are in red text

Principal resource projects recently placed on care and maintenance, or shut are in purple text

Commodities

Ag..... Silver
Al..... Alumina
Au..... Gold
Cu..... Copper
Dmd..... Diamond
Fe..... Iron
Gr..... Graphite
Grt..... Garnet
K..... Potassium
Kln..... Kaolin
Li..... Lithium
LNG..... Liquefied natural gas
Mag..... Magnetite
Mn..... Manganese
Ni..... Nickel
Pb..... Lead
Pd..... Palladium
Pt..... Platinum
REE..... Rare earth elements
Ta..... Tantalum
Ti..... Titanium
V..... Vanadium
W..... Tungsten
Zn..... Zinc
Zr..... Zirconium

Mineral symbols

- Precious mineral (Dmd)
- Precious metal (Au (or as shown))
- Steel alloy metal (Ni (or as shown))
- Speciality metal (Ti–Zr (or as shown))
- Base metal
- Iron
- Bauxite
- Coal and lignite
- Uranium
- Industrial mineral
- Mineral Processing plant

Petroleum symbols

- Gas
- Oil
- Oil and gas
- Petroleum Processing plant
- Oil / gas pipeline, operating
- Oil / gas pipeline, proposed

Infrastructure

- Power plant
- Port

Infrastructure status

Operating or under development

Proposed

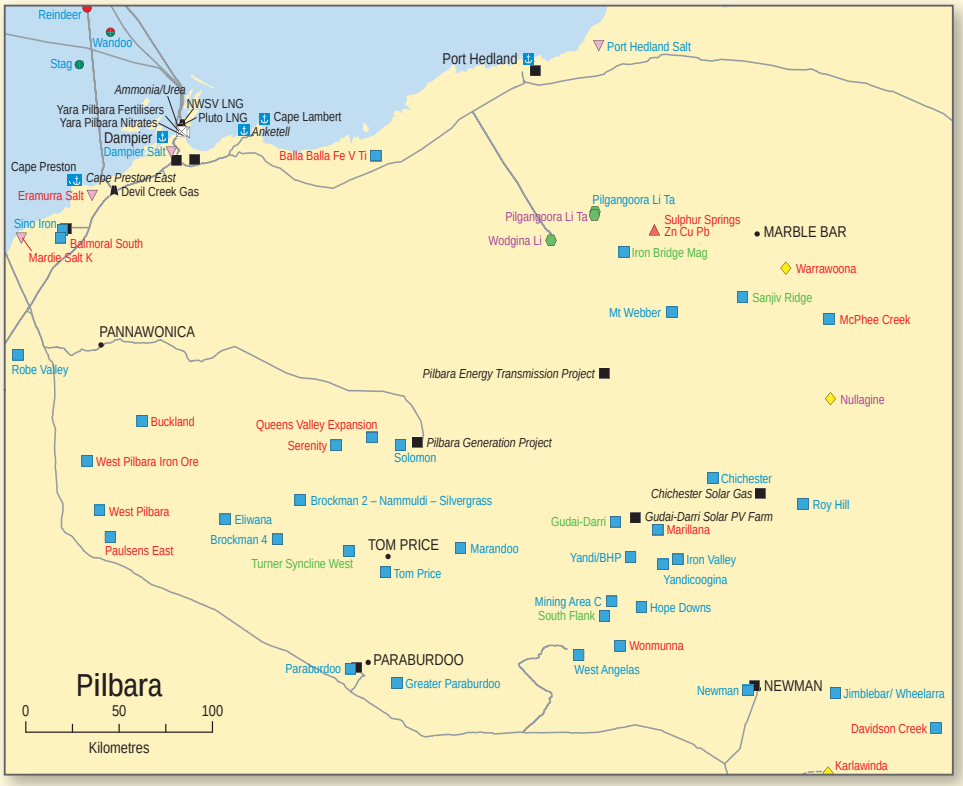
Prelude
Ichthys
Torosa
Brecknock
Calliance
Blacktip
Sorby Hills Pb Zn Cu
Wyndham
KUNUNURRA
Koolan Island
Matsu
Argyle Dmd
Derby
Thunderbird
Savannah North
Savannah
McIntosh Gr
India Bore
Panton Pt Pd
Broome
Ungani
HALLS CREEK
Halls Creek
Kapok West Pb Zn Ag
Browns Range REE
Dorado
Admiral Bay Zn Pb
Asian Renewable Energy Hub wind and solar
See North West Shelf enlargement
See Pilbara enlargement
Woodie Woodie Mn
Nifty Cu
Telfer Au Cu
Havieron
O'Callaghans W Cu Zn Pb
Kintyre
Lake Mackay K
Lake Disappointment K
Yangibana REE
Cape Cuvier
Lake MacLeod Salt
CARNARVON
Butcherbird Mn
Abra Pb Cu Zn
Beyondie K
Glenburgh
Fortnum
Plutonic
Hermes
DeGrussa Cu Au
Jack Hills
Shark Bay Salt
Coburn
Paroo Station Pb
Jundee
Matilda–Wiluna
Lake Way K
Gabanintha V Ti
Wiluna West
Iron Ridge
Australian Vanadium V Ti
Yeelirrie
Cue
Meekatharra
Barrambie V Ti Fe
Yandal
Lake Wells K / Australian Potash
West Musgrave
Wingellina
Dalgaranga
Mt Magnet
Balline Grt
Port Gregory Grt
Windimurra V Fe
Kirkalocka
Penny
Geraldton
Gruyere
Tropicana
Cyclone
Mulga Rock
Edna May
Nova
EUCLA
PERTH
Fremantle
Tampia
Cosmic Boy Concentrator
See Goldfields enlargement
Wickepin Kln
Bunbury
Mt Cattlin Li Ta
Great Southern Au Cu
Ravensthorpe
Munglinup Gr
Esperance
See South West / Mid West Coastal enlargement
Southdown Mag
Mindijup
Albany
0
100
200
300
400
Kilometres

Enquiries for latest information for Commonwealth-controlled waters is available from the National Offshore Petroleum Titles Administrator (NOPTA) at <info@nopta.gov.au>

Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Major Resource Projects
2021



Commodities

- Ag..... Silver
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- Cs..... Cesium
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- Fe..... Iron
- HPA..... High purity alumina
- K..... Potassium
- Kln..... Kaolin
- Li..... Lithium
- LNG..... Liquefied natural gas
- LPG..... Liquefied petroleum gas
- Mag..... Magnetite
- Ni..... Nickel
- Pb..... Lead
- REE..... Rare earth elements
- Sisd..... Silica sand
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Petroleum symbols

- Gas
- Oil
- Oil and gas
- Petroleum Processing plant
- Oil / gas pipeline, operating
- Oil / gas pipeline, proposed

Infrastructure

- Power plant
- Port

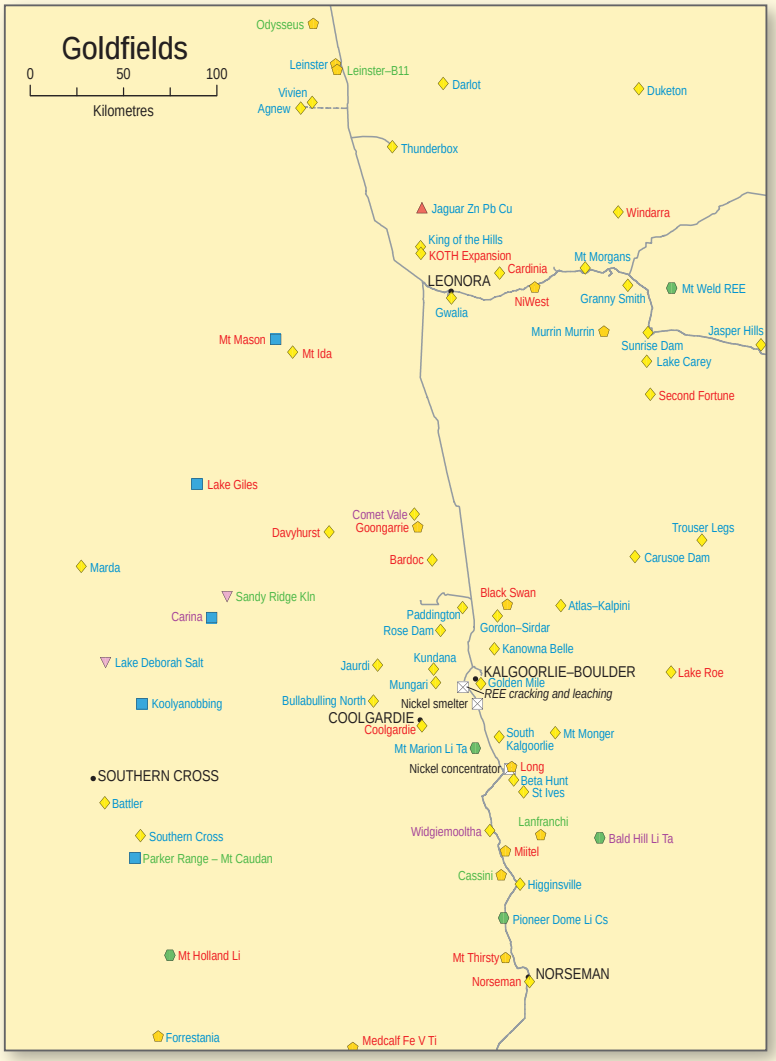
Infrastructure status

- Operating or under development
- *Proposed*

Enquiries for latest information for Commonwealth controlled waters is available from the National Offshore Petroleum Titles Administrator (NOPTA) at <info@nopta.gov.au>

Project labels:

Principal resource projects operating with sales >$5 million in 2019–20 are in blue text
Resource projects currently under construction are in green text
Planned mining and petroleum projects with at least a pre-feasibility study (or equivalent) completed are in red text
Principal resource projects recently placed on care and maintenance, or shut are in purple text



HMS Astute during its visit to Fleet Base West in November


Nuclear powered USS Sante Fe joins four of Australia's Collins Class subs during a training exercise


HMAS Stirling Armament Wharf Extension

$1.5b nuclear sub bonus

When our allies' nuclear submarines pop by HMAS Stirling on Garden Island for a friendly neighbourhood visit in future years, they'll be welcomed to WA by some upgraded infrastructure

By Stephen Bell

The Federal Government says it will invest about $1.5 billion at the HMAS Stirling Naval base to help support nuclear submarines as part of its new AUKUS alliance with the UK and US.

The investment in several upgrades, flagged by Defence Minister Peter Dutton, is slated to begin mid-decade at the Stirling base on Garden Island south of Perth.

It follows the Morrison Government's decisions in September to retain Full Cycle Docking (FCD) of the Collins submarines in South Australia, while scrapping France's $50 billion deal to provide new conventional submarines in favour of building eight nuclear boats using US technology.

At a media conference at HMAS Stirling, timed to coincide with the docking of British nuclear submarine HMS Astute, Dutton confirmed the naval base would need upgrades under the AUKUS arrangements.

"As you can see by HMS Astute behind, she's a bigger boat than the Collins-class," he said.

"It's about 97 metres in length; as the High Commissioner pointed out, in excess of 100 crew. So we need to make sure that we have an investment in the infrastructure when we have these visits.

"And for Western Australia it means the capability is going to be there for the boats to be sustained, to be repaired, in some cases to be upgraded. So that's the work that we undertake now."

During the media conference, Dutton also confirmed the cost of the upgrades would be "north of" a $1b figure mentioned by a journalist

The media conference was attended by Defence Industry Minister Melissa Price, British High Commissioner to Australia Vicki Treadell and Chief of Navy Vice Admiral Michael Noonan.

Asked to clarify the cost of the expected upgrades, a Defence spokesperson told *WA Works* that Defence is developing plans for infrastructure to support enhanced Maritime Undersea Combat and Surveillance capabilities, which will also capture requirements for future nuclear-powered submarines and visiting US and UK submarines.

"This investment is likely to be significant and in multiple locations around Australia," she said.

"Initial infrastructure works proposed at HMAS Stirling to support the submariner workforce growth and other Maritime Undersea Combat & Surveillance capability projects is expected to be in the order of $1.5b and are planned to commence mid-decade."

The works will likely include a new multi-use facility, a Submarine Force Headquarters and training facility, additional explosive ordnance storage and facilities to support information warfare.

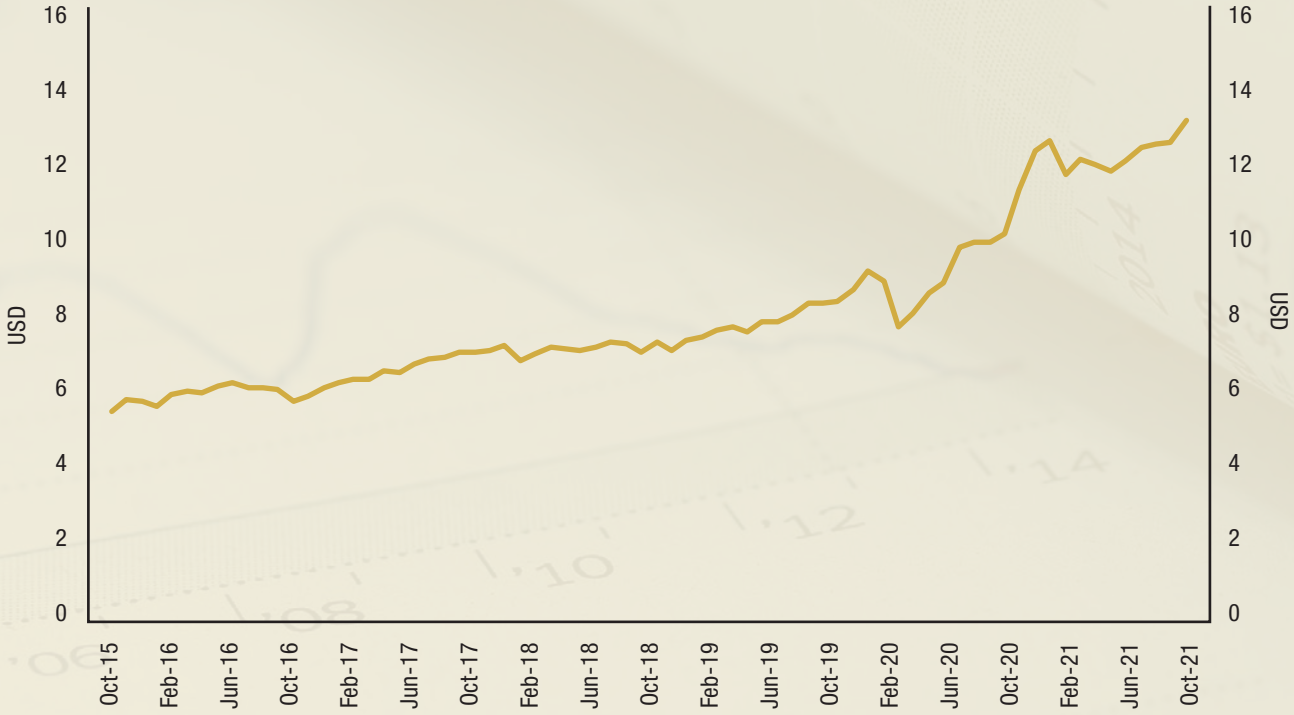
An enhanced torpedo maintenance facility and quality of life facilities such as living-in accommodation, gymnasiums and messing will also be provided.

"Investment to support Maritime Undersea Combat and Surveillance capabilities will also be required at locations other than Stirling," she added.

The forecast work program highlights the strategic importance of WA's marine shipbuilding and sustainment facilities at Henderson in supporting the future AUKUS fleets as The Morrison Government looks to crank up undersea surveillance to combat regional threats in the Indian Ocean.

The graph that tells the story

Econfin Global Renewables Infrastructure Fund



Green investment

Over the past 18 months, investor interest in low-carbon assets and green energy has intensified.

The Econfin Global Renewables Infrastructure Fund (ECOIX) is an institutional-grade impact fund investing in listed companies that own low-carbon power generation assets such as solar and wind.

The fund's net asset value (NAV) has catapulted 31 per cent year-to-date to US$13.7 per unit. This is up 54 per cent compared to pre-pandemic levels — a sign that capital allocation towards decarbonisation and emissions reduction is quickly gaining momentum.

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