

The road to mining sustainability

Accelerating electrification in mine to port haulage



Decarbonisation and sustainability are a focus for many mining CEOs, with ambitious targets for CO2 emissions reductions. There are many innovative electrification projects on mine sites, yet significant opportunities remain to reduce carbon emissions through the decarbonisation of haulage, from mine to port.

Resource Unicorns Capital and Shoal Group have joined forces to focus on how to electrify this part of the supply chain, and use a digital environment to design, optimise and de-risk solutions.

Electrification and decarbonisation of haulage

Electric Vehicle (EV) sales in Australia have gone from zero in 2011 to 8.5% of the car market in 2023. The growth has been exponential, as consumers realise fuel savings. But what about bigger vehicles?

Vehicle charging has been seen as a barrier, however, new infrastructure and solutions are developing to solve this problem. Truck drivers could stop for a lunch break and charge at 350KW for about 1 hour before continuing on their journey. Battery swapping is faster, with a six minute swap.

Whole of system approach

Electrification on the mine site is already in progress, with:

- ✓ Exploration – drilling, vehicles
- ✓ Mining – drilling, excavating, haulage
- ✓ Processing – crushing, treating, separating.

About 30% of carbon emissions are related to haulage. We need a whole of system approach with a new model of operation that will:

- Design and optimise an EV vehicle and infrastructure solution
- De-risk mine to port haulage for all stakeholders, including financiers, mining companies and OEMs
- Provide remote monitoring of critical assets, optimising the value chain
- Ensure data security and sovereignty
- Link with financing and infrastructure investment.

"Supporting mining decarbonisation 2030 targets and Net-Zero 2050"

Using modelling and simulation approaches to optimise solutions

Modelling and simulation approaches enable a new system, like mine to port haulage, to be considered and understood. The approach combines:



Systems Engineering

Enables the whole capability to be understood, such as legacy systems, new technologies, systems integration, the environment, infrastructure and vehicles. It then enables risks to be identified and managed, as well as opportunities.



Digital Engineering

Enables the modelling of the whole capability – from mine to port – to understand the behaviour of the design, interfaces, gaps, risks and impacts of any changes.

Compared with physical trials and pilot plans, the outcome is that you can:

- Analyse many ideas at low cost
- Identify and address risks and opportunities early
- Optimise design.

Security and cybersecurity, governance and data management

Building data sovereignty and management into all future operations is essential:

- Data is a valuable, tangible asset
- Vulnerable data opens organisations to cyber threats that can significantly disrupt operations
- Critical infrastructure sectors – including energy and transport – will be required to comply with legislated requirements around data management and sovereignty.

Data sovereignty and data management are the focus of the Australian Government's approach to safeguarding critical infrastructure. Increased regulation on sovereign data management is coming and any mine to port haulage solution must be designed with this in mind.

Mine to port haulage projects

The ideal project is 200km or less, from mine to port. The first step is to get in touch to find out more.

About our event sponsors

Shoal Group is a complex systems design company using Systems Engineering, combined with Modelling, Simulation & Analysis to help clients to define, analyse, decide, optimise and deliver technology intensive projects in complex environments. Shoal works across mining, energy, infrastructure, defence, space and transport sectors.

Resource Unicorns Capital mission is to identify, support and finance Australian unicorns in the resources sector. We do this through active monitoring of industry trends and development; providing technical and management support to emerging unicorns; seeding and raising capital for these companies through our network of international investors.

Presented in collaboration with the Electric Vehicle Council and SANY.

Contact us



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A joint event of Shoal Group Pty Ltd and Resource Unicorns Capital. Presentations are available to download from our website.



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