



# QUEENSLAND PACIFIC METALS

## **Presentation**

Dr Stephen Grocott  
CEO

March 2021

ASX:QPM

[www.qpmetals.com.au](http://www.qpmetals.com.au)

*Re-energising Australia with  
critical battery metals production*

*121 Mining Investment APAC*

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## Company



**John Downie**

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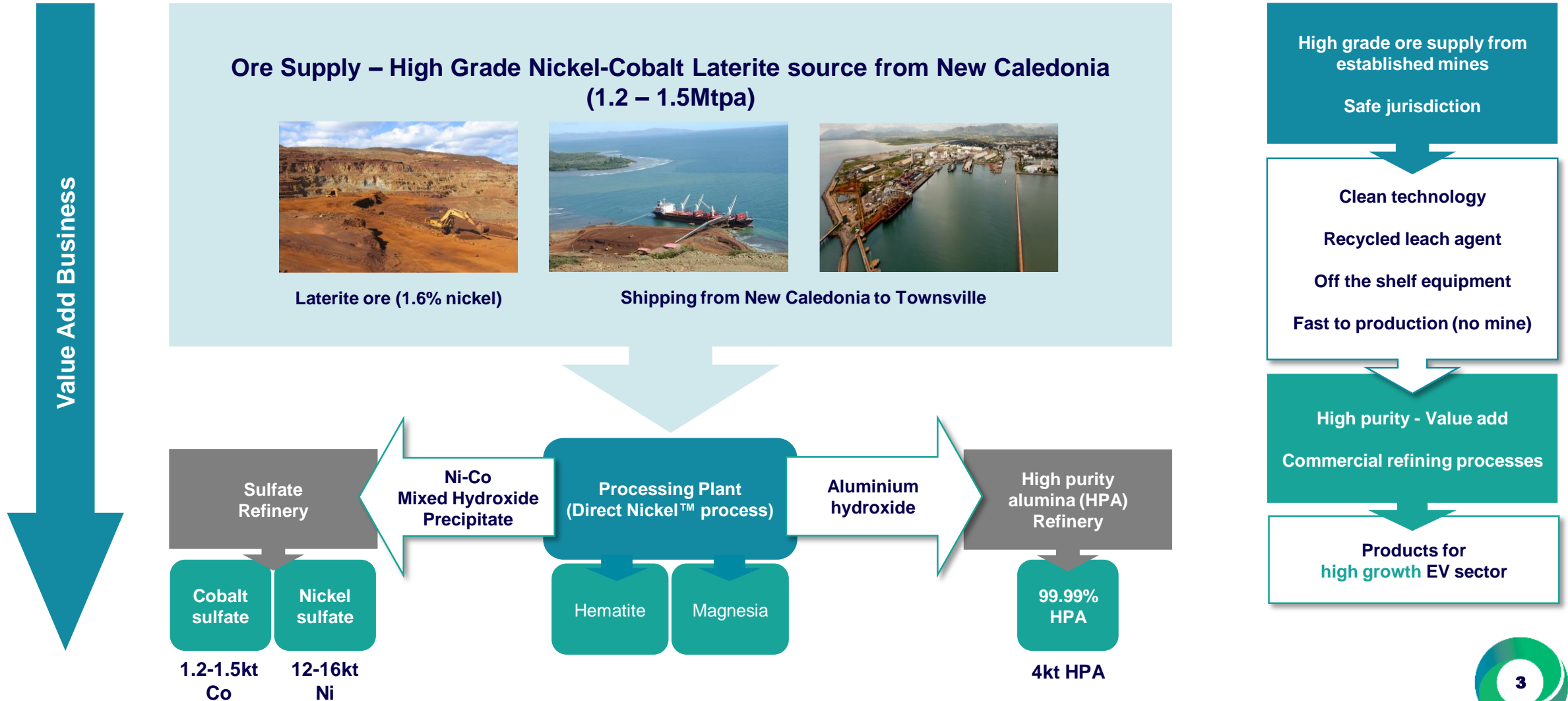


**Stephen Grocott**

Chief Executive Officer

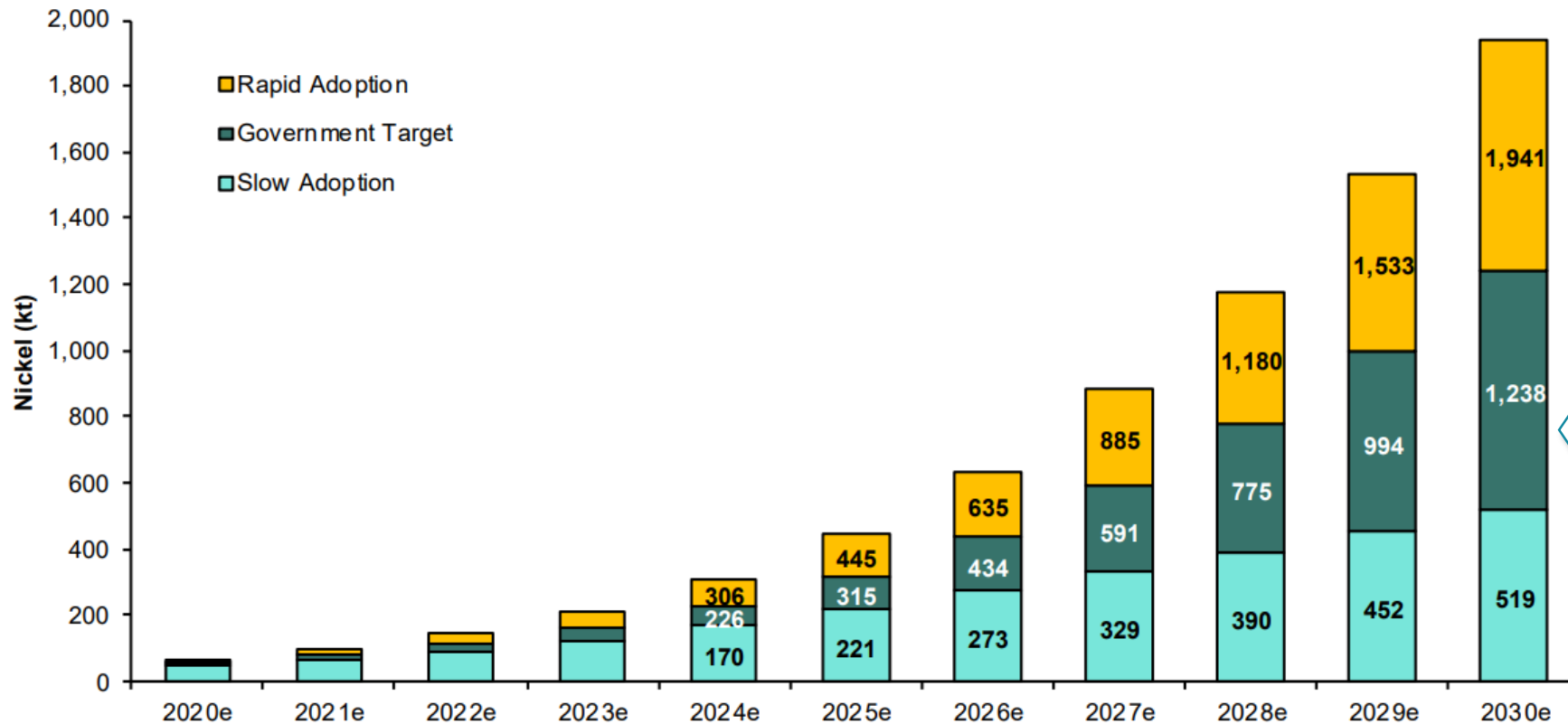
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# Townsville Energy Chemicals Hub – “TECH Project”



# Nickel Demand and the Project Pipeline

*... in addition to current 2.3 Mtpa Ni for stainless steel, alloys, etc!*



Source: Bernstein estimates and analysis

???

*...but where will this extra 0.5 – 2M tpa nickel come from?*

Tesla's estimate (although ambitious) for their own nickel demand alone was 1.15Mt!

# Sources of Nickel

## Nickel Sulfides

- Reserves depleting (and only < 30% of world nickel reserves)
- Sulfide ore processed through to concentrate
- Next processing steps are big, complex and long lead-time
  - Concentrate typically smelted to nickel sulfide matte
  - Matte then refined to nickel metal or sulfate
- New exploration finds will be slow to market vs QPM TECH Project



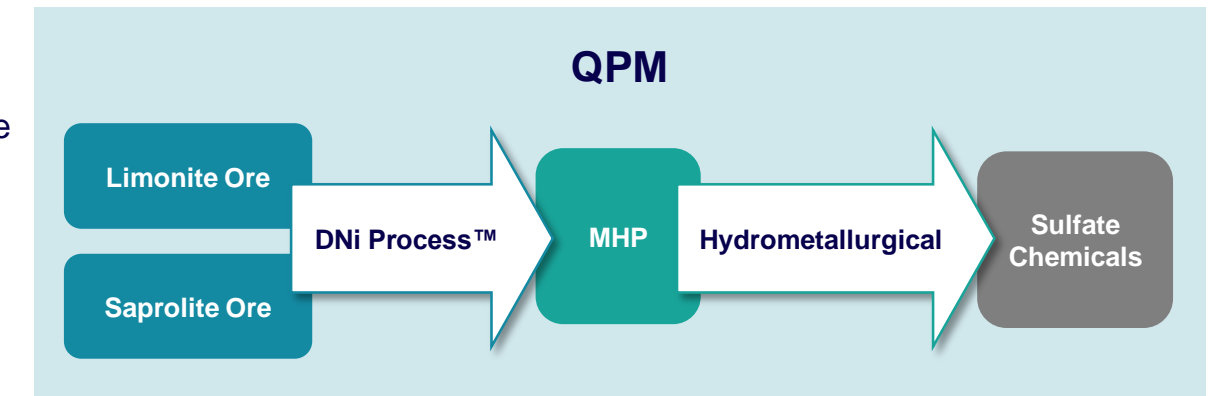
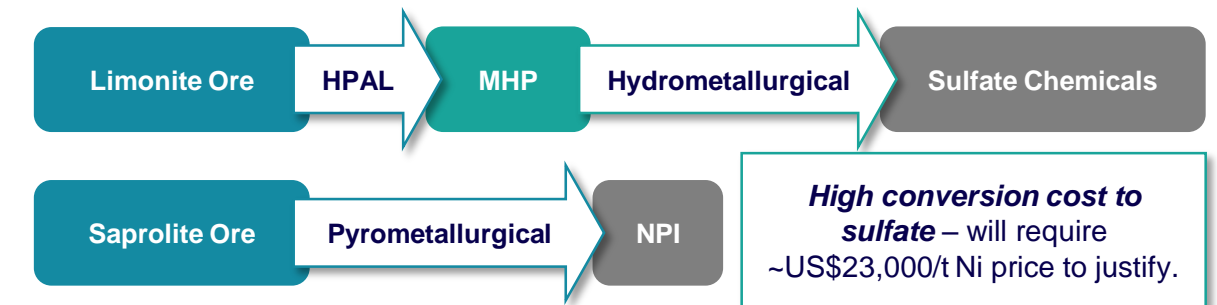
- Processes to convert concentrate straight to sulfate chemicals are in the early stages of development (high risk and expensive)

## Nickel Laterites

- Limonite ore (high iron)
  - Typically processed through to MHP, which can then go straight to sulfate chemicals

- Saprolite ore (low iron, high magnesium)
  - Typically processed into nickel pig iron or ferronickel for stainless steel

## Traditional



# Where will the nickel come from – the cupboard is empty?

Nickel pig iron	<ul style="list-style-type: none"> <li>• Conversion to nickel sulfate is chemically possible but not economically possible</li> <li>• Needs nickel &gt;US\$23,000/t</li> <li>• Very “ugly” environmental footprint</li> </ul>
Ferronickel	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
Nickel sulfides or MSP	<ul style="list-style-type: none"> <li>• Sustainability – tailings, acid mine drainage, etc</li> <li>• Going from a sulfide concentrate to nickel sulfate is complex, difficult and expensive</li> <li>• Going directly from sulfide to nickel sulfate is mostly at lab/pilot scale or challenging</li> <li>• ... anyway, there’s not enough sulfide resource to meet global demand</li> </ul>
Nickel metal	<ul style="list-style-type: none"> <li>• Common practice and temporarily filling the gap (at a cost of ~US\$0.50 – 1.00/lb)</li> <li>• But the world still needs some Class I nickel metal for stainless steel and alloys – so this is only a stop-gap measure</li> <li>• Class I metal deficit by 2023 - 2025</li> </ul>
High pressure acid Leach (HPAL)	<ul style="list-style-type: none"> <li>• 10 – 11 of 12 existing HPAL operations have failed to meet objectives</li> <li>• Big sustainability challenges – effluent to ocean, 1.2 – 1.4t tailings/t ore, tailings disposal or filtration (e.g. Goro - very high capital)</li> <li>• Indonesia? Barriers include sustainability (tailings, effluent), coal electricity, destined for China and jurisdiction</li> <li>• High capital intensity US\$60 - \$120k/annual tonne nickel (including ESG capital and on Nickel-equivalent basis)</li> <li>• Low availability (averages &lt;&lt; 80%)</li> <li>• Long ramp up (averages &gt;5 years)</li> <li>• Very slow development (minimum 5 yrs, typically &gt;10 yrs)</li> <li>• Complex technology (can be done but you have to be good to develop, build and operate)</li> </ul>
MHP refinery	<ul style="list-style-type: none"> <li>• But where will the MHP come from – HPAL (see above !)</li> <li>• Needs a MHP refinery</li> <li>• Brownfields refinery (with HPAL) is attractive but adds to capital intensity</li> </ul>

# MOUs for Offtake – LG Chem and Samsung



**QPM and LG Chem agree to negotiate a binding offtake agreement for:**

- 3-5 year term
- 10,000tpa contained nickel
- 1,000tpa contained cobalt
- Consideration of prepayment by LG Chem

Refer to ASX Announcement 15 October 2020



**QPM and Samsung SDI agree to negotiate a binding offtake agreement for:**

- 3-5 year term
- 6,000tpa contained nickel

Refer to ASX Announcement 26 November 2020



## ***What does this mean for the TECH Project?***

- Attracting the attention of world class, bankable offtake partners
- QPM is being recognised as a potential supplier to address the growing concerns in the industry with respect to nickel supply
- Provides confidence that demand is there for larger scale TECH Project
- Competitive tension for offtake negotiations
- Vote of confidence from two world class battery manufacturers

# Direct Nickel Process™ - Advantages

## Nitric acid leaching: most efficient acid

- Low temperature, atmospheric pressure
- Treats entire orebody
- Simple alloys/construction
- 95% metal extraction
- Licensed from Direct Nickel (DNi Process™)

## Recycle/re-use > 98% of the leaching agent

- Significantly reduce operating costs
- Greatly reduced environmental impact

## Product options:

- Mixed Hydroxide Product MHP (>40% nickel) or refined, battery-grade products

## Co-product revenues: Hematite, Magnesia, High-Purity Alumina

- Little or no residues

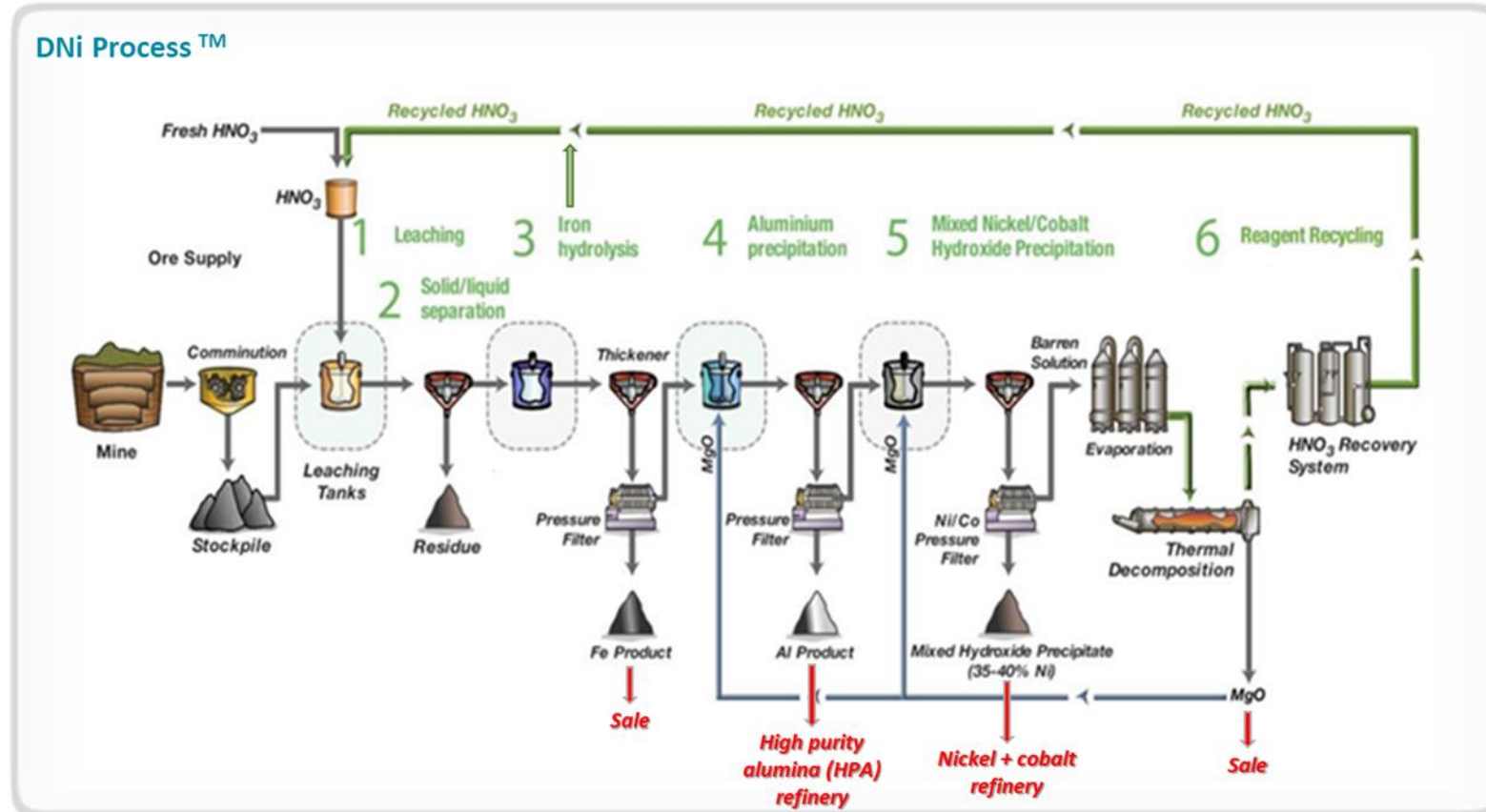
## Scalable:

- Stirred tanks – just make them bigger

## Speed to market:

- Approvals – no mine, no effluent, no tailings
- Construction – simple alloys and vessels

Re-Energising Nickel Production



Direct Nickel Process™ flowsheet



# The Right Time for the Direct Nickel Process

## First HPAL\* 1960

\* HPAL "High pressure acid leach"

## 2nd Generation HPAL

Bulong 1998-2003 (C&M)  
Murrin Murrin 1999 → (operational, 75% design)  
Cawse 1998-2009 (C&M)

## 3rd Generation HPAL

Ravensthorpe 2008-2009, 2011-2017 (C&M), 2020  
Goro 2009 → (operational, 65% design)  
Ramu 2012 → (operational, 5 year ramp-up)  
Ambatovy 2012 → (operational, poor availability)  
Taganito 2013 → (operational, poor availability)  
Gordes 2014 → (operational, low throughput)

**3rd Generation HPAL**  
Coral Bay 2005- (operational)

## 1st Gen Nickel Pig Iron

China plants – 8% Ni (low quality)

## 2nd Gen Nickel Pig Iron (NPI)

14% Ni (high quality) squeezing out need for LME nickel metal for stainless steel.  
Most viable process for stainless steel industry

## DNi Pilot Plant

Successful demonstration of technology - but the time (product market) wasn't right

## EV Revolution

Class 1 nickel (after refining) for batteries – NPI not suitable for batteries.  
Not enough sulfide resources to meet demand – laterites must be developed.  
**HPAL issues (capital, environment, failures) – Right time for DNi Process™**



## The Need for Green

The world is more socially, environmentally conscious.

- HPAL/NPI - sovereign risk, tailings
- NPI - very high GHG intensity

**TECH Project – delivering Ni/Co from a safe jurisdiction with an attractive environmental footprint**

# Sustainable Nickel Production

## Global leader in lowest CO<sub>2</sub> emissions for nickel sulfate production

- 3.4kg CO<sub>2</sub> per kg nickel sulfate
- Industry average per Nickel Institute is 5.4kg CO<sub>2</sub>
- 36% lower than industry average
- Emissions can be further reduced by using vented/flared gas from existing coal mines (CO<sub>2</sub> credit received)
- Nickel matte, which is derived from nickel pig iron, is not a clean source of nickel for nickel sulfate
- Refining nickel matte is complex and capital intensive – it only takes place at a few places in the world

	1kg Class 1 Ni (>99.8% Ni)	1 kg Ni in FeNi (27% Ni in FeNi) Nickel Pig Iron / Pyrometallurgical	1kg Ni Sulfate (22.3% Ni in NiSO <sub>4</sub> )	1kg Ni metal in Ni Sulfate (4.48 kg Ni Sulfate)
CO <sub>2</sub> eq emissions (kg)	13	45	5.4	24.2

## No Tailings Dam

- All metals are leached into solution and nitric acid is recycled
- Residue is inert silicate
- MOU with James Cook University to investigate potential to utilise residue in commercial opportunities such as engineered landfill

# Pilot Plant Activities

## Pilot Plant

- Currently undertaking piloting activities at ALS Global
- Strong team including QPM Owner's team, Altilium Group, CSIRO, ALS Global and Hatch
- Commissioning run completed before end of 2020
- Continuous pilot runs being undertaken Q1 2021

## Objectives

- Confirm flowsheet for TECH Project
- Produce samples of MHP for offtakers
  - MHP is key – offtakers view conversion of MHP to sulfate as low risk, since this is already common practice and MHP is a more liquid market
- Upgrade MHP to nickel sulfate and cobalt sulfate
- Produce aluminium hydroxide for conversion into HPA
- Produce iron product for conversion into saleable high grade haematite
- Produce residue for characterisation testing and evaluation as engineered landfill
- Provide data for DFS

## Bankable Feasibility Study

- Appoint world class engineering group as study lead manager
- Build out owners team
- Commence towards end of Q1 2021 (post piloting)



John Downie (L) and Dr Stephen Grocott (R) with first MHP produced from pilot plant

# Pilot Plant Activities



QPM Pilot Plant located at ALS Global Hydrometallurgy Centre of Excellence, Perth, Western Australia

# Highly Experienced Technical Team



**John Downie**  
Managing Director

- 40+ years experience
- Extensive nickel laterite experience
- Previous positions include:
  - Director of Mines at Goro
  - Director of Projects at Queensland Nickel
  - CEO of Gladstone Pacific Nickel



**Dr Stephen Grocott**  
CEO

- 40 years experience
- Extensive nickel experience including laterites (HPAL, atmospheric, heap and bio leach) and sulfides
- Extensive alumina refining experience
- Previous positions include:
  - Chief Technical Development Officer at Clean TeQ
  - Chief Advisor Processing at Rio Tinto
  - Global Technology Manager at BHP



**Dr Frank Houllis**  
Study Manager

- 25+ years experience
- Extensive process commercialisation experience
- Previous positions include:
  - CEO Magnis Energy Technologies
  - Director Imperium 3 Townsville
  - Project Leader ANSTO Minerals



**Hermann Scriba**  
Technical Consultant

- 30+ years experience
- Metallurgical process consultant
- Extensive experience in piloting, feasibility, detailed design and commissioning
- Previous positions include:
  - Technical Development Anglo American
  - Engineering Consulting

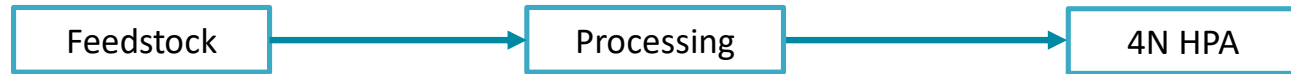


**Boyd Willis**  
Technical Consultant

- 30+ years experience
- Nickel laterite specialist including HPAL, atmospheric and heap leach
- Worked on over 30 nickel laterite projects
- Previous positions include:
  - Kwinana Nickel Refinery
  - Queensland Nickel Refinery

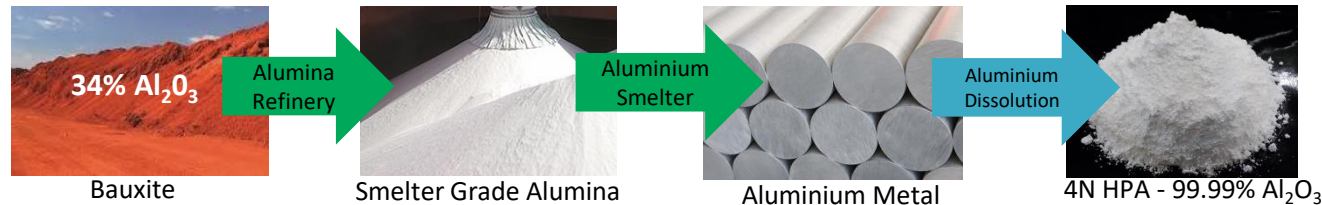
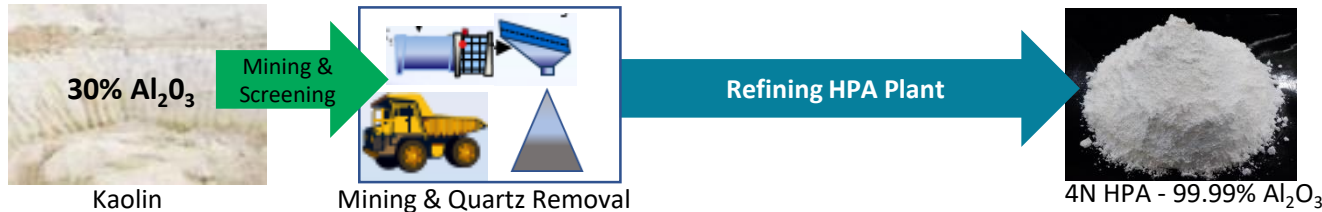
# HPA – TECH Project Advantage

## Project Economics Boosted with Aluminum hydroxide Co-Product Upgraded to produce High Purity Alumina HPA (4N) in lowest cost quartile

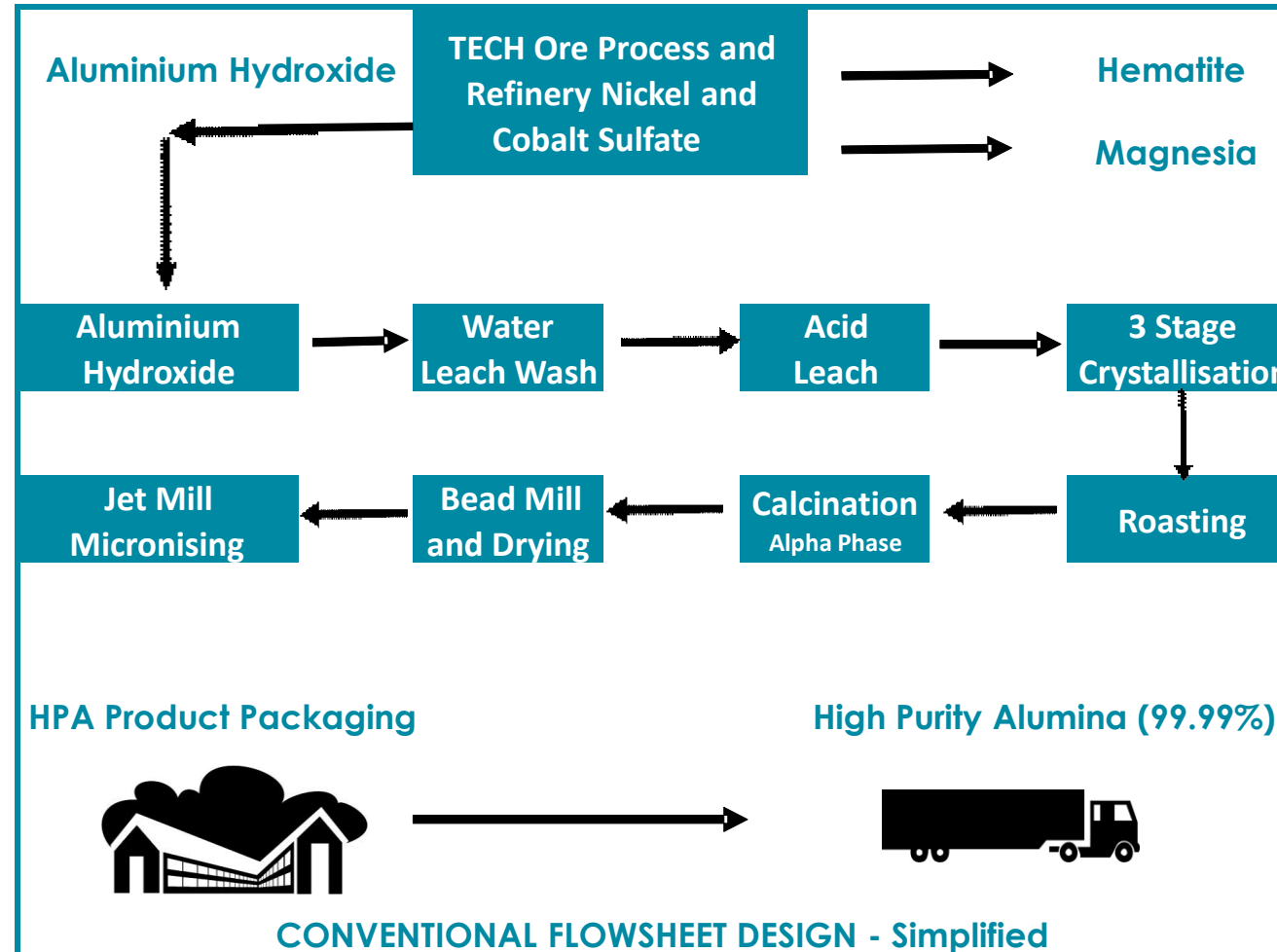


CRU forecast 272,000 tpa of HPA demand by 2028 (i.e. 30% CAGR demand growth by 2028)

- Future LED markets will require higher quality HPA
- LIB separators demand 187,000 tpa by 2028
- LED's demand forecast 85,000 tpa by 2028
- Significant supply deficit forecast

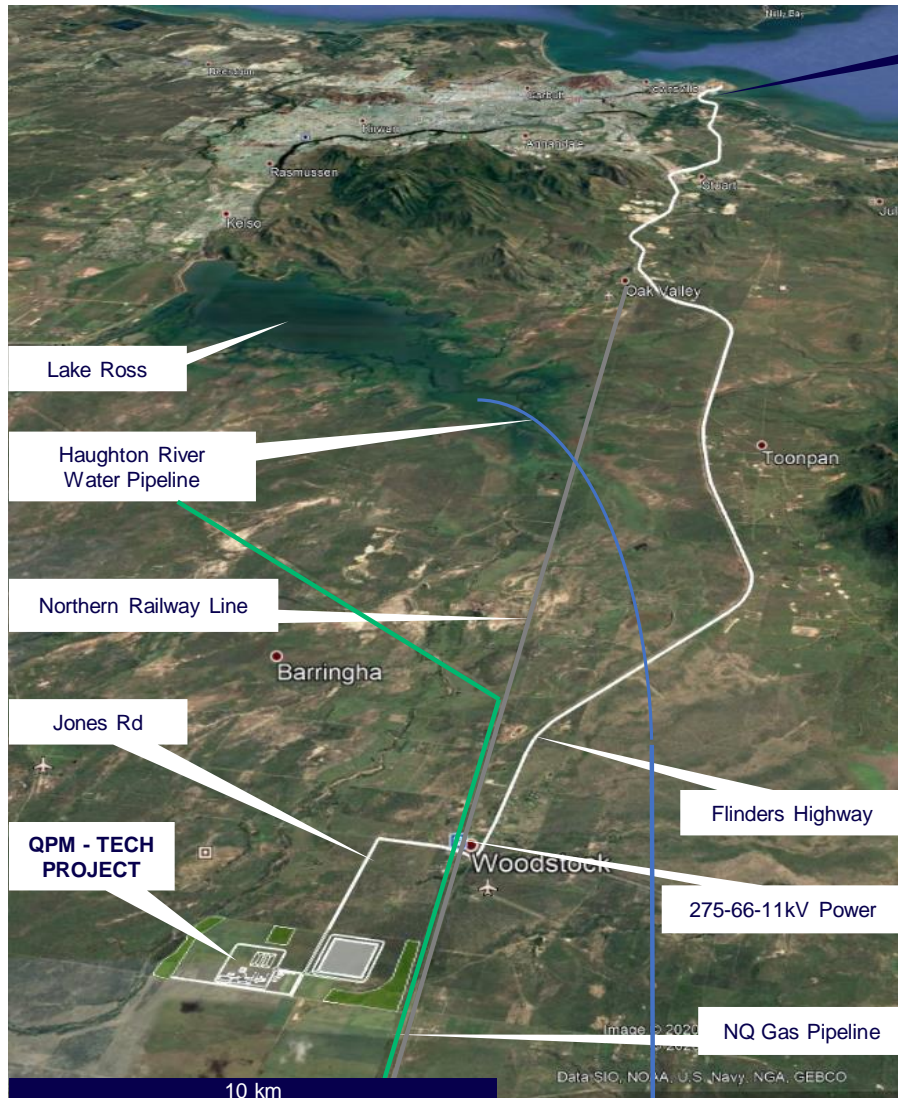


# HPA Flowsheet



HPA process flowsheet

# Project Location: Lansdown



## Ideal site (290 Ha) allocated to QPM in the Lansdown Eco-Industrial Precinct

- Water pipeline
- Gas pipeline (35 PJ/y capacity – we need 10 PJ/y)
- Electric transmission lines (275kV, 66kV and 11kV)
- Fibre optic communications
- Existing Ross River (140 MW) and Edify (400MW) solar arrays
- Road train access to Townsville Port (Flinders Highway)
- Rail line
- Environment - gently undulating grazing land, sparsely wooded
- Zoned heavy industrial



# Infrastructure, Logistics and Supporting Services

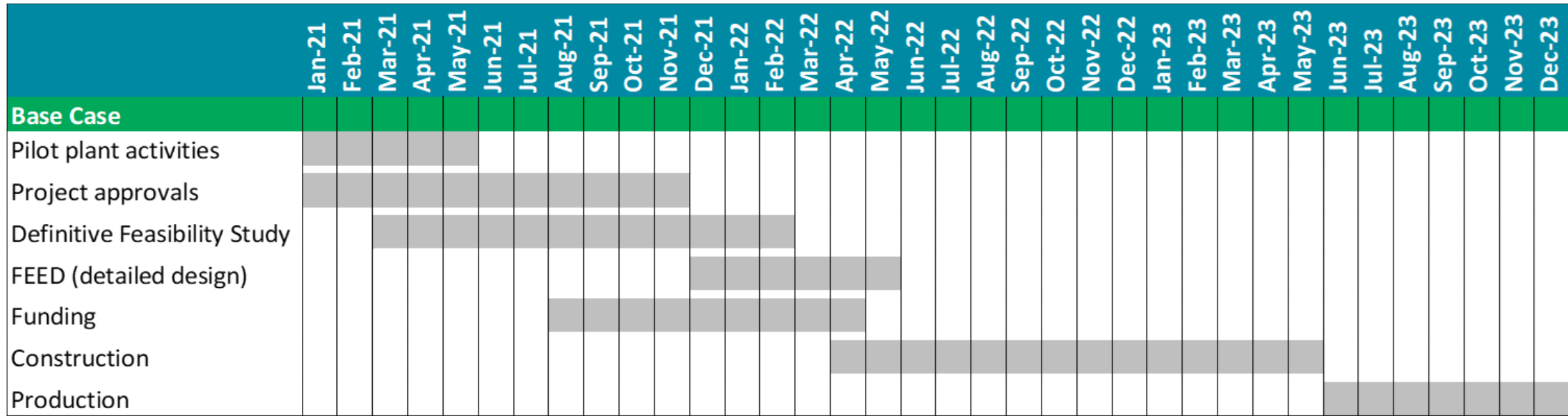
<b>Port</b>	<ul style="list-style-type: none"><li>• Advanced negotiations with Port of Townsville for berth access and development of warehouse for ore stockpile to unload cargoes</li></ul>
<b>Road/Rail</b>	<ul style="list-style-type: none"><li>• Optimisation study for road vs rail to transport ore and final products</li><li>• A\$12M committed by Qld Labor government to upgrade road infrastructure to Lansdown</li></ul>
<b>Gas</b>	<ul style="list-style-type: none"><li>• Confirmed significant availability in gas pipeline owned by Palisade (current utilisation &lt;15%)</li><li>• MOU with Blue Energy</li><li>• Ongoing discussions with other gas suppliers including green gas suppliers (coal mine flared or vented gas)</li></ul>
<b>Power</b>	<ul style="list-style-type: none"><li>• Solar power will reinforce green credentials of TECH Project</li><li>• Existing Ross River solar array and planned 400MW Edify solar station</li><li>• Significant power to come from co-gen (gas used to heat water) which massively improves energy and greenhouse efficiency</li></ul>
<b>Water</b>	<ul style="list-style-type: none"><li>• Existing Haughton River water pipeline</li><li>• Sufficient water supply from Haughton River</li></ul>

# Approvals

## Approvals work has commenced

- Appointed EMM Consulting – highly experienced
- Lansdown Eco Industrial Precinct has been re-zoned heavy industrial – much of the heavy lifting has already been completed by Townsville City Council
- Working closely with Office of Co-Ordinator General in Queensland
- Confident that an EIS approval will not be required, therefore compressing approvals timeline
- Strong support to date from key Federal and State ministers
- Obtain approvals by Q4 2021

# Project Schedule



# PFS Results

## Key Physical Outputs

Annual Production (t)

Nickel Sulphate	26,400 t
Cobalt Sulphate	3,100 t
High Purity Alumina (4N) HPA	4,000 t
Haematite	327,700 t
Magnesia	20,100 t

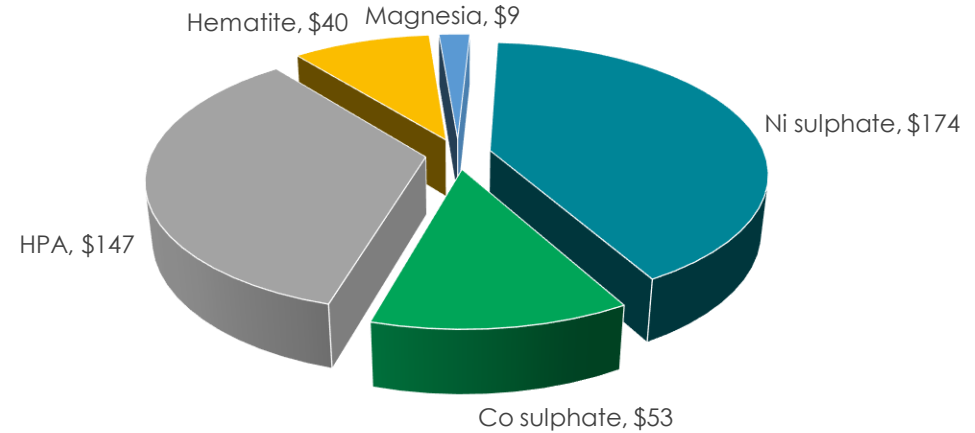
## Capital and Operating Costs

Assumed 0.68 AUD:USD

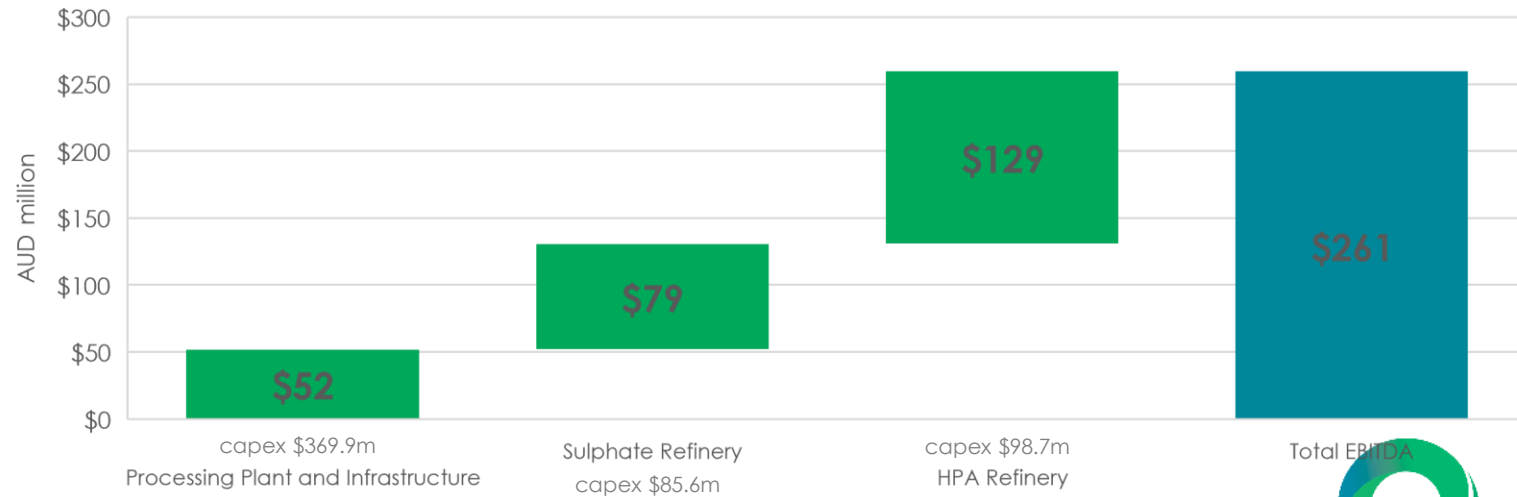
Capex (excluding contingency)	AUD 554m
Contingency	AUD 96m
Operating Expenditure	AUD 163m/a

Key Metric	Units	Base Case	Spot Case
Nickel Price	US\$/lb	7.00	5.70
Nickel Sulphate Premium	US\$/lb	2.00	2.00
Cobalt Price	US\$/lb	25.00	14.15
HPA Price	US\$/t	25,000	20,000
EBITDA	AUD (m)	261	211
Post Tax NPV	AUD (m)	1,470	1,080
Post Tax IRR	%	30.7	24.9
Capital Payback	Years	3.5	4.25

## Revenue Split in AUD million



## Incremental Annual EBITDA



# Funding Considerations

## Project Feasibility Stage (current)

- Piloting
- Feasibility studies
- Regulatory approvals
- Secure project partners/offtake
- Front-end engineering design (FEED) and capital conformation

## Funding Options

- Traditional equity investors
- Strategic investment by partner(s)/offtaker(s)
- Government grants including manufacturing grant
- R&D tax incentive

## Project Construction – Funding Options

*Achieving success in the project feasibility stage will increase the value of the company and open doors to funding opportunities for project construction.*

### Debt

- **Project Partners:** Strategic opportunity for a 'Big Brother' to be involved in a project that would be a game changer for the nickel industry
- **NAIF:** TECH Project meets NAIF criteria being in Northern Australia, is a centralised processing plant and will deliver many social benefits to Townsville and surrounding region
- **Export Finance Australia:** EFA is targeting assistance to critical minerals projects, which the TECH Project will produce
- **Offtake Finance:** Offtake is in high demand given the lack of nickel supply – end users understand the need for project participation or funding to secure offtake
- **International Export Credit Agencies:** Potential to obtain international ECA funding, particularly for plant and equipment being sourced from overseas

### Equity

- **Project Partners/Offtakers:** Securing project or offtake participation by way of equity investment
- **Institutional Investors:** Traditional equity investors targeting critical minerals investment
- **Green Funds:** Many funds targeting green investments and the emerging EV sector



# Corporate Overview

## Capital Structure

Shares on issue	932.9M
Share Price	9.1c
Market cap	A\$84M
Top 20	43%

## Board and Key Management

Eddie King	Non Exec Chair
John Downie	Managing Director
Cameron Mclean	Non Exec Director
Stephen Grocott	CEO

### Share Price Performance



# The QPM TECH Project



*Pathway for nickel and cobalt production*

**QPM - TECH  
PROJECT**