

# CLEAN TEQ

*Powering innovation*

## ANNUAL GENERAL MEETING PRESENTATION

1 NOVEMBER 2017

28

**Ni**

Nickel  
58.693

27

**Co**

Cobalt  
58.933

21

**Sc**

Scandium  
44.956



# DISCLAIMER

---

## IMPORTANT INFORMATION

This presentation has been prepared by the management of Clean TeQ Holdings Limited (the 'Company') in connection with meetings with investors and potential investors and not as specific advice to any particular party or person. The information is based on publicly available information, internally developed data and other sources. Where any opinion is expressed in this presentation, it is based on the assumptions and limitations mentioned herein and is an expression of present opinion only. No warranties or representations can be made as to the origin, validity, accuracy, completeness, currency or reliability of the information. The Company disclaims and excludes all liability (to the extent permitted by law) for losses, claims, damages, demands, costs and expenses of whatever nature arising in any way out of or in connection with the information, its accuracy, completeness or by reason of reliance by any person on any of it.

Certain statements in this presentation are forward looking statements. By their nature, forward looking statements involve a number of risks, uncertainties or assumptions that could cause actual results or events to differ materially from those expressed or implied by the forward looking statements. These risks, uncertainties or assumptions could adversely affect the outcome and financial effects of the plans and events described herein. Forward looking statements contained in this presentation regarding past trends or activities should not be taken as representation that such trends or activities will continue in the future. You should not place undue reliance on forward looking statements, which apply only as of the date of this presentation.

Actual results and developments of projects and nickel, cobalt and scandium market development may differ materially from those expressed or implied by these forward looking statements depending on a variety of factors.

This presentation does not constitute or form part of any offer or invitation to sell, or any solicitation of any offer to purchase any shares in the Company, nor shall it or any part of it or the fact of its distribution form the basis of, or be relied on in connection with, any contract or commitment or investment decisions relating thereto, nor does it constitute a recommendation regarding the shares of the Company. Past performance cannot be relied upon as a guide to future performance.

Please refer to the back of this presentation for information concerning the calculation of reserves and resources referred to herein, and the consents provide the respective Competent Persons.

For further details on the content of this presentation, please refer to the ASX releases on the Company's website.

# CLEAN TEQ'S MISSION

## MISSION

Apply our innovative, proprietary processing technologies to:

- 01 Produce metals** that are highly geared to disruptive changes in technologies and markets, particularly in global energy and transport
- 02 Deliver water purification solutions** for the world's most challenging water treatment problems
- 03 Develop our technology portfolio** to capture new opportunities

### CLEAN TEQ METALS

Rapidly developing the Syerston Nickel/Cobalt/Scandium Project to supply the rapidly expanding lithium-ion global battery industry with high-purity nickel and cobalt sulphate.

Combining Syerston with our Clean iX ion exchange technology will enable production at lowest quartile costs

Project is development ready with Final Investment Decision due in July 2018

### CLEAN TEQ WATER

Applying innovative and low cost solutions to treat waste water streams including

- municipal wastewater
- treating ground or surface water for potable use
- recycling process waters in power, mining and industrial applications.

### CLEAN TEQ TECHNOLOGY

Continue developing our core capabilities in research and technology development.

Assess opportunities where Clean TeQ's proprietary technologies deliver value in new applications in selected markets.

# COMPANY OVERVIEW

## CAPITAL STRUCTURE

ASX code	CLQ
Share Price (27 October 2017)	A\$1.37
Shares	578.9 M
Options	41.7 M
Performance Rights	6.6 M
Market Capitalisation (undiluted <sup>1</sup> )	A\$790 M
Cash @ 30 Sept 2017	A\$62.9 M
Liabilities (Mar-18 notes)	A\$3.0 M

## MAJOR SHAREHOLDERS

Robert Friedland	16.3%
Pengxin Mining	16.0%
Australian Super	5.0%
Board & Management <sup>1</sup>	5.8%



1. Excludes options and performance rights

## SHARE PRICE PERFORMANCE



Source: IRESS, as at 16 October 2017



A scanning electron microscope (SEM) image showing numerous cathode particles of various sizes and shapes. The particles are primarily yellowish-brown and exhibit a porous, textured surface. Some particles are spherical, while others are more irregular and fragmented. The background is a dark, uniform grey.

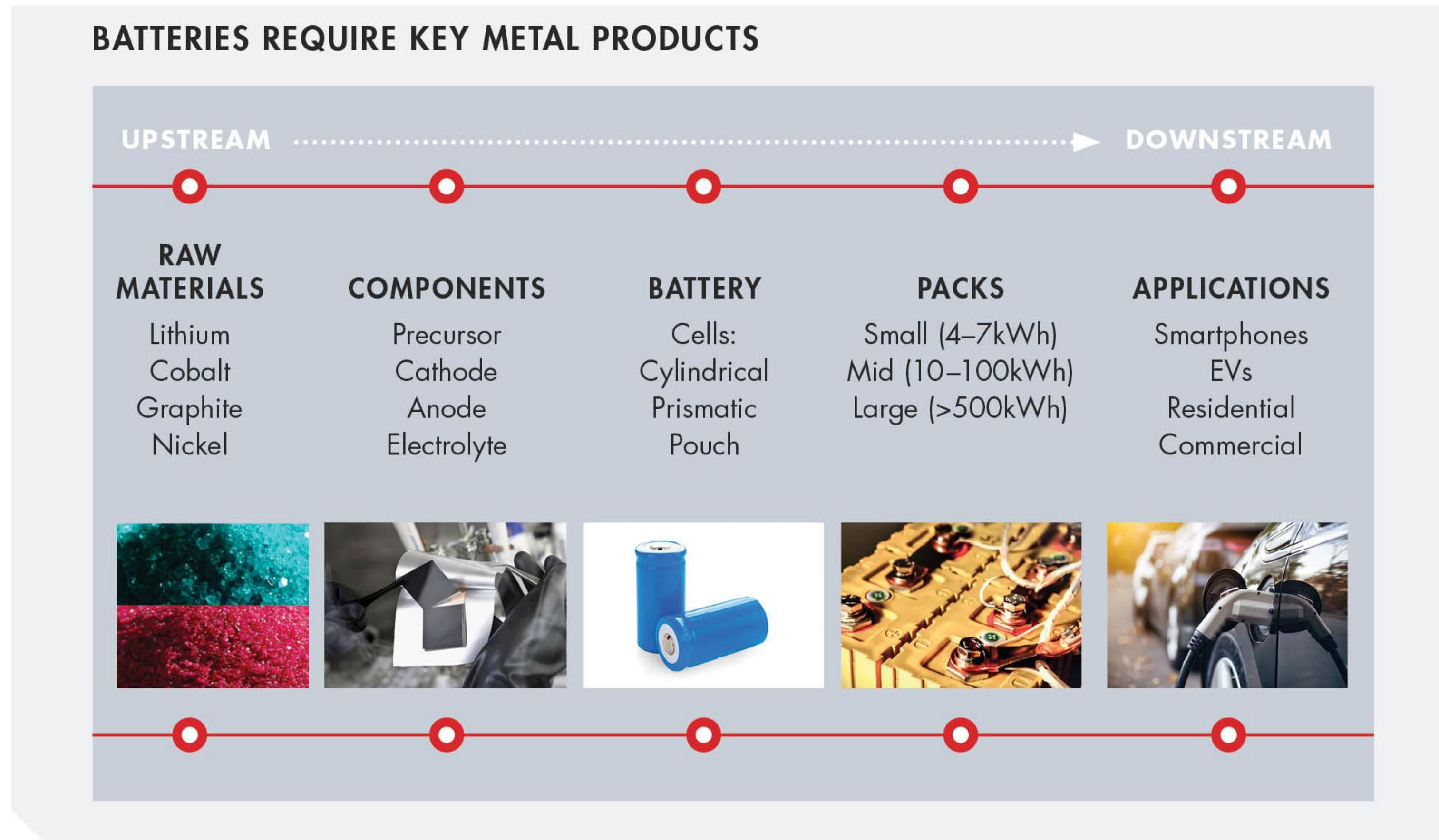
# CATHODE MARKET

---



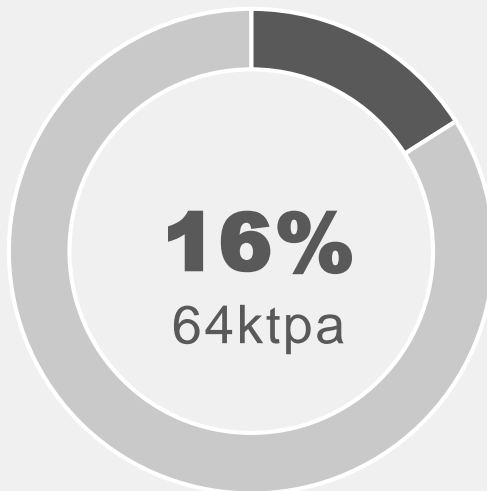
# VALUE CHAIN

MULTIPLE STAGES RELIANT ON QUALITY RAW MATERIALS



# CHEMISTRY BY MARKET

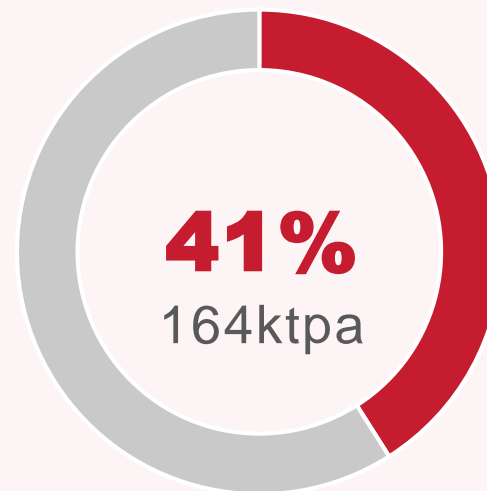

## DOMINANT CHEMISTRIES FOR EV REQUIRE NICKEL AND COBALT



**16%**  
64ktpa

**LCO**  
(Lithium-Cobalt-Oxide)

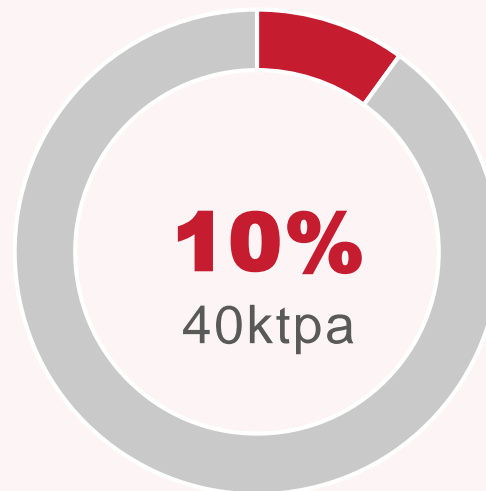

Still one of the highest energy density chemistries, but expect to see only steady growth as automotive and utility-scale applications grow



**41%**  
164ktpa

**NCM**  
(Nickel-Cobalt-Manganese)

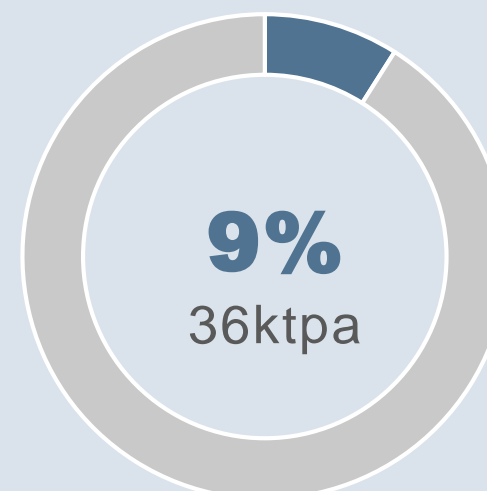
Experiencing fastest growth with a good mix of energy density, power, cost and safety for automotive applications; new chemistries constantly developing



**10%**  
40ktpa

**NCA**  
(Nickel-Cobalt-Aluminium)

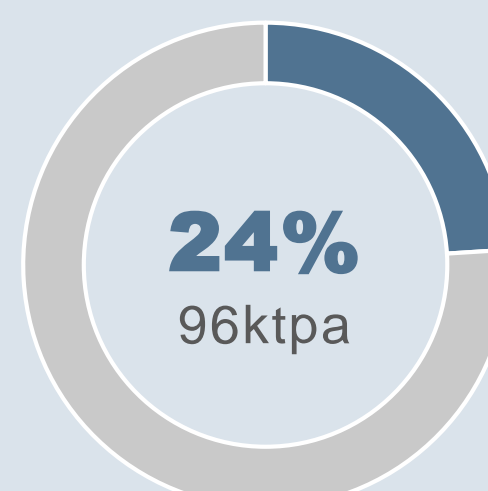

Extremely high energy density, power and manufacturing experience make it a good candidate for automotive, such as the A18650



**9%**  
36ktpa

**LMO**  
(Lithium-Manganese-Oxide)

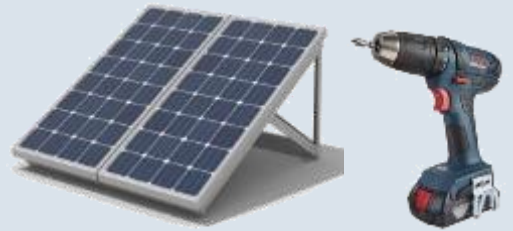
Relatively low energy density (one-third of LCO), but the absence of cobalt makes this a low-cost alternative cathode material



**24%**  
96ktpa

**LFP**  
(Lithium-Iron-Phosphate)

Reasonable energy density but lower power; lower cost raw materials are offset by poor conductivity and higher unit costs from assembly process

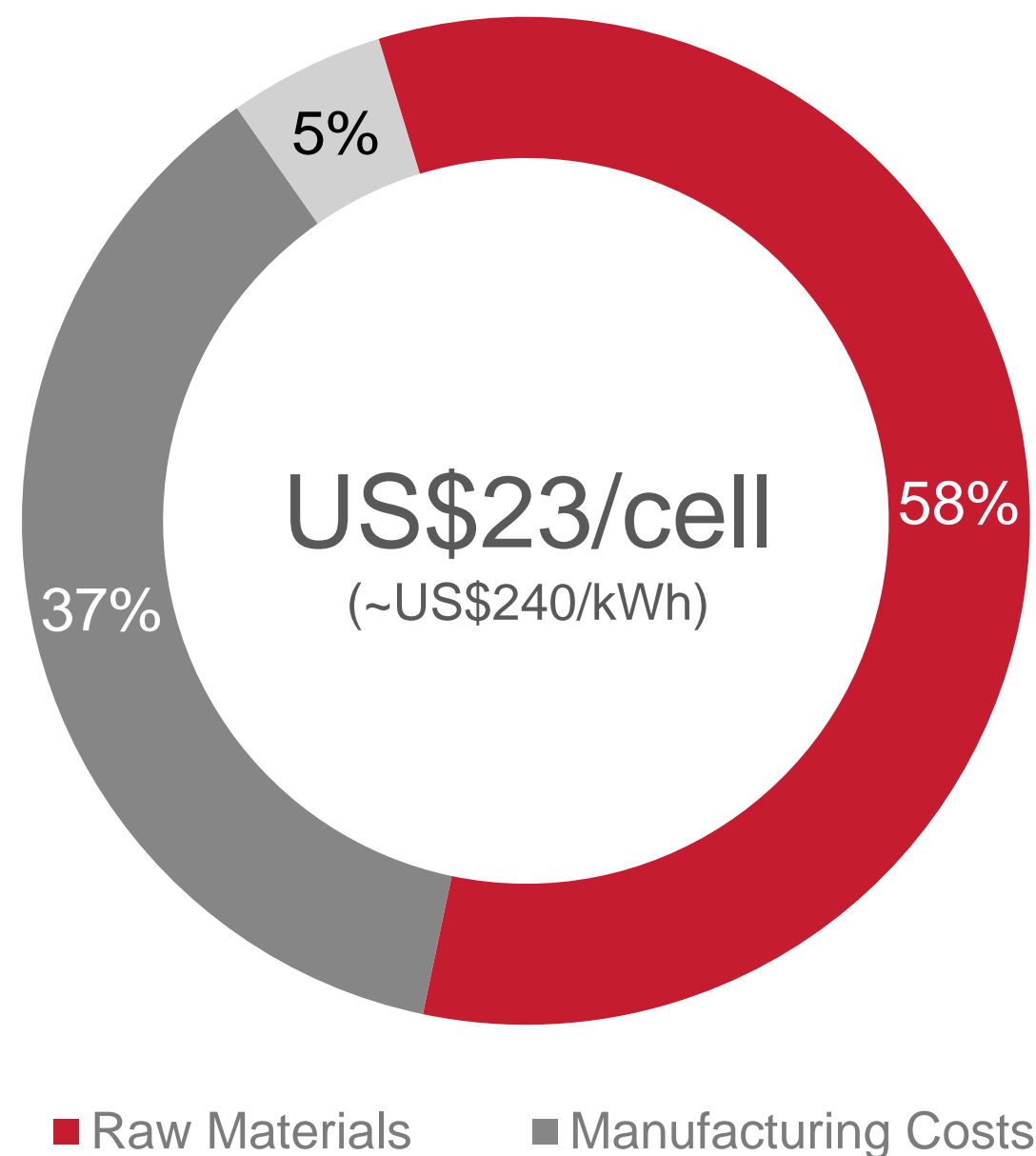


Note: pie charts represent proportion of total cathode active materials forecast in 2025 (400kt)  
Source: Avicenne Energy Analysis 2017

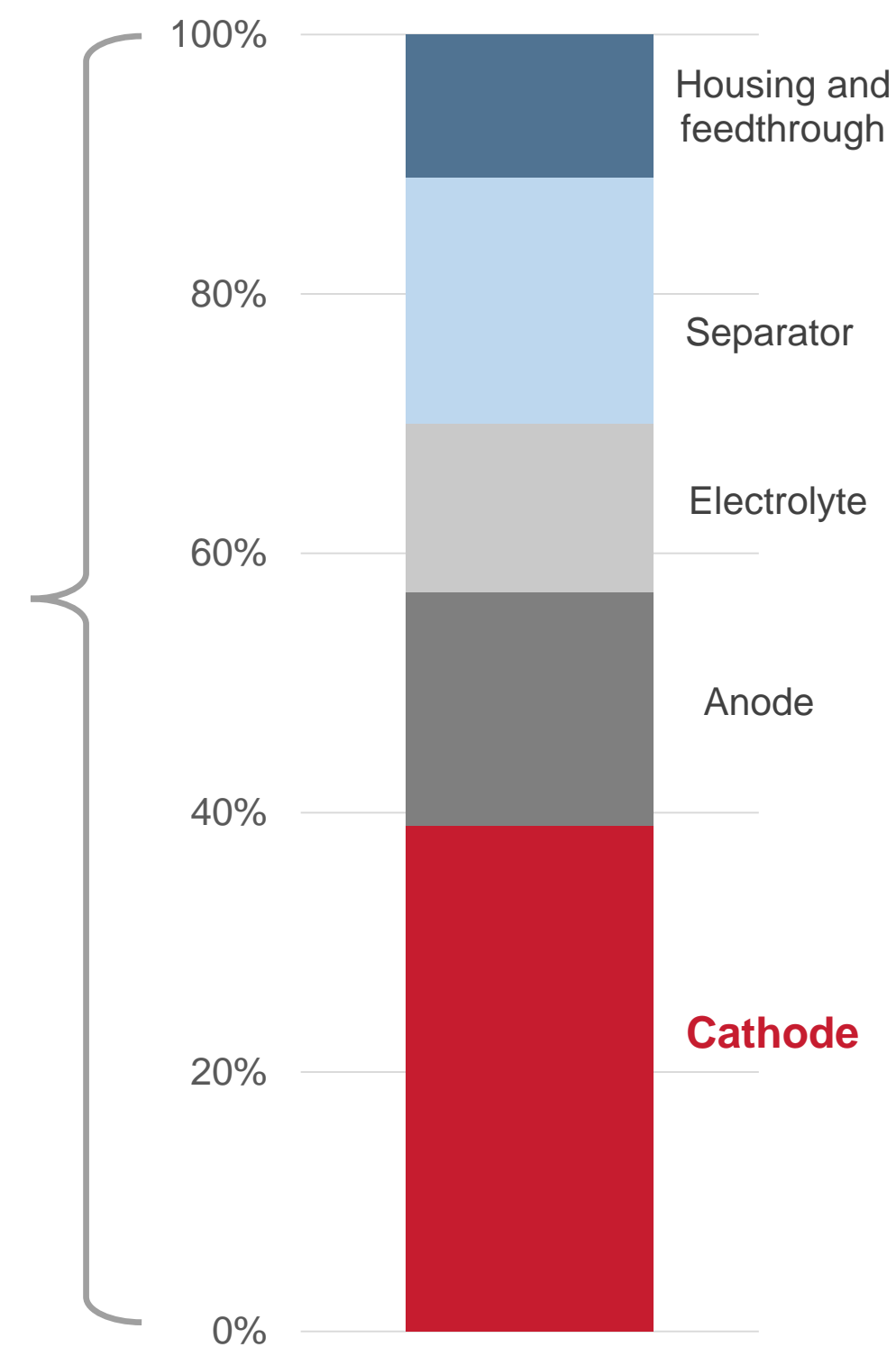
# CATHODE IS THE KEY TO COST

## NICKEL AND COBALT PRICES DRIVE CELL COST

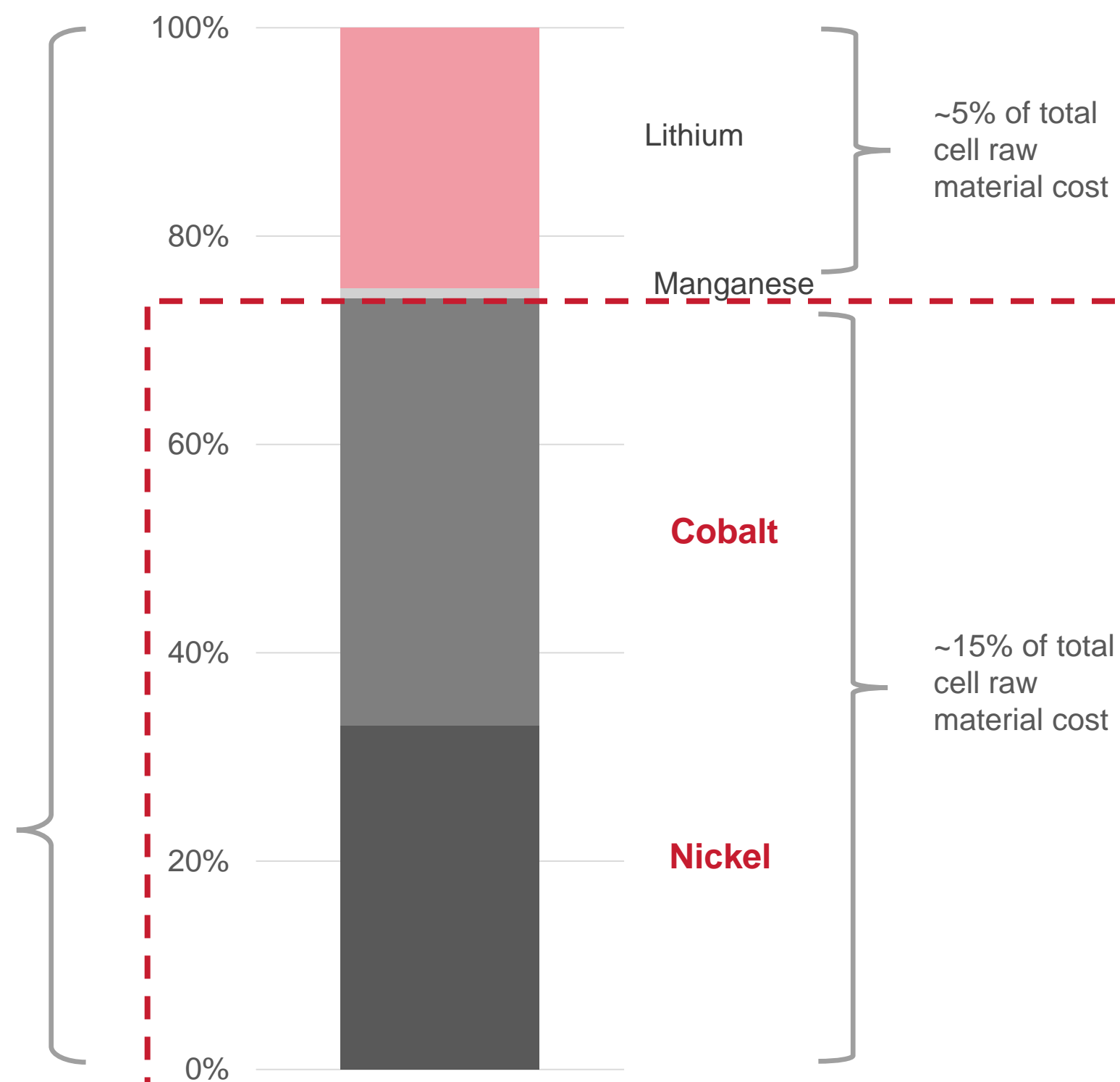
### Battery Production Cost Breakdown



### Raw Material Cost Breakdown



### Metal Cost in Cathode Active Material



Source: Roland Berger (2012) and internal analysis. Assumes a 96Wh PHEV cell (26Ah, 3.7W) using NCM622 cathode chemistry. Cathode raw material cost includes non-metallic materials (carbon black, binder, foil). Internal assumptions concerning split of costs assumes prices of Ni US\$4.20/lb; Co US\$28.00/lb; Mn US\$1.00/lb; Li US\$9,000/t (as LCE)

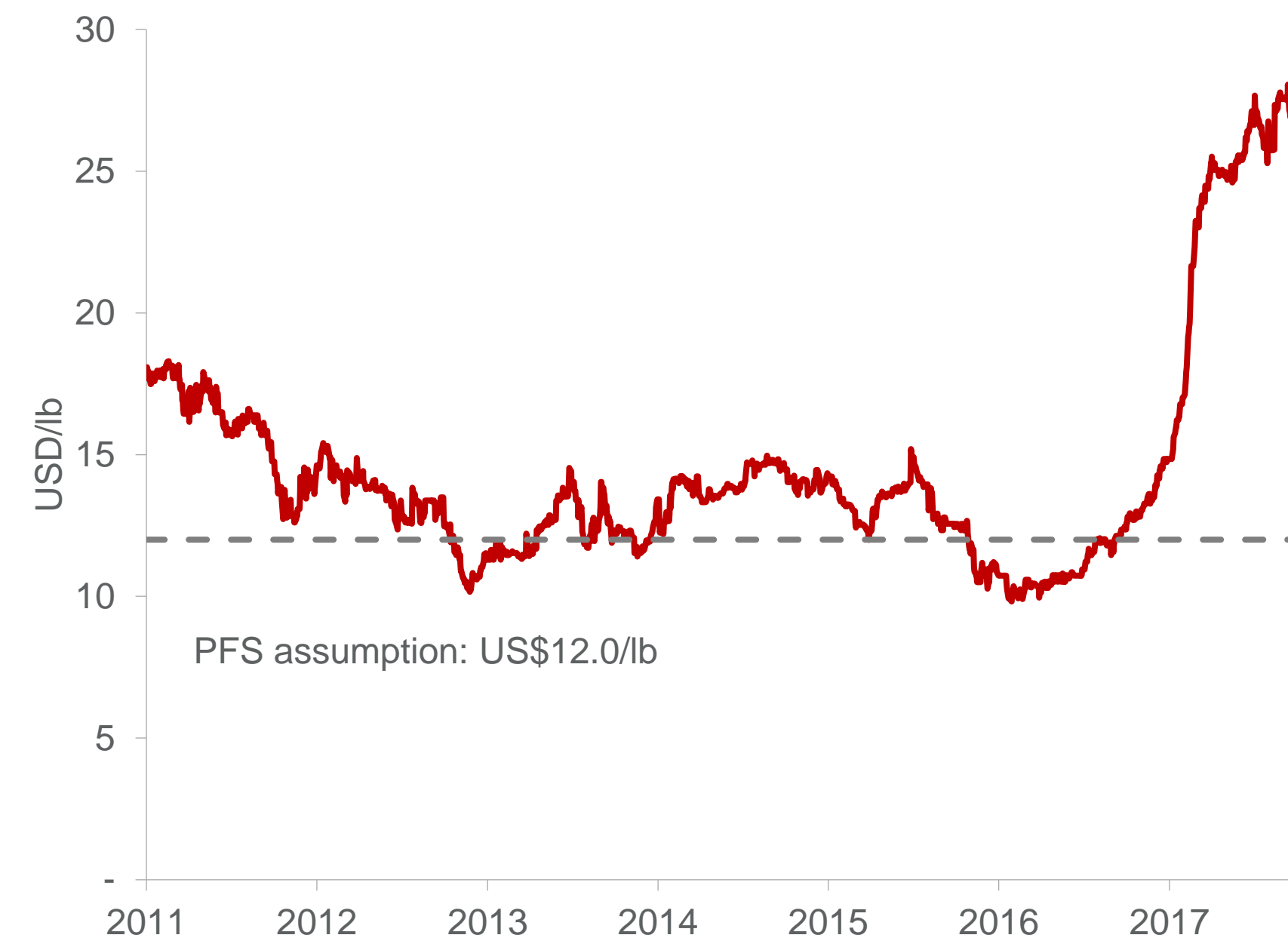


# COBALT MARKET

## COBALT FORECAST TO BE IN SIGNIFICANT DEFICIT IN THE FUTURE

- Battery chemicals dominate cobalt usage representing **78% of total demand in 2016**
- Cobalt has been one of the best performing metals with prices increasing by ~160% since the beginning of 2016
- Significant **upside in the event of supply disruption with supply deficits forecast to continue**
- Major end customers have declared cobalt a **'conflict' mineral** – supply must come from auditable sources and supply chains
- At Syerston cobalt is **co-product, not by-product**: cobalt is **~55% of Syerston's revenues** at today's spot metal prices<sup>1</sup>

**Cobalt Price (US\$/lb)** | 27.20 US\$/lb | 16 October 2017



Source: Bloomberg

1. Spot nickel and cobalt prices as at 16 October 2017, scandium revenue has been excluded



# A PROBLEMATIC SUPPLY CHAIN

## MAJORITY OF CURRENT COBALT SUPPLY SOURCED FROM AFRICA

“The majority of the cobalt is heading **straight to China**. Their global hold is huge.”

- CRU, May 2016

“While the occasional [analyst] questions the availability of enough lithium or flake graphite to satisfy soaring demand from the battery industry, **everybody has overlooked or ignored the most critical mineral constraint – Cobalt**. It’s a truly gargantuan challenge. A Gigarisk!”

- investorintel.com, March 2016



Children sorting cobalt ore, Kolwezi

Source: Amnesty International, Afrewatch

95%

Percentage of global cobalt production as by-product from copper and nickel mining

63%

Percentage of global cobalt production originating in the DRC

15%

Percentage of artisanal-mined DRC cobalt

6

Number of mines located in DRC in the top10 largest cobalt mines

Source: Darton Cobalt Market Review 2016-2017



# SYERSTON PROJECT

---



# RECENT DEVELOPMENTS

## STRONG MOMENTUM TOWARDS DEVELOPMENT OF SYERSTON

- ✓ Upgraded mineral resource confirming 30% increase in cobalt resource (relative to PFS) *October 2017*
- ✓ Announced binding five year offtake for 20% of production with Beijing Easpring *August 2017*
- ✓ Acquisition of two autoclaves – critical component in HPAL circuit reducing lead time *Jul 2017*
- ✓ Development Consent modification for Syerston approved by NSW government *May 2017*
- ✓ Pilot plant has processed ~20t of ore and shipped samples to potential customers *April 2017*
- ✓ Strategic partnership and A\$81m placement to Pengxin Mining *February 2017*
- ✓ A\$15m placement to Australian Super *November 2016*
- ✓ PFS completed highlighting robust economics for Syerston *October 2016*



# SYERSTON AUTOCLAVES

## CRITICAL EQUIPMENT SECURED



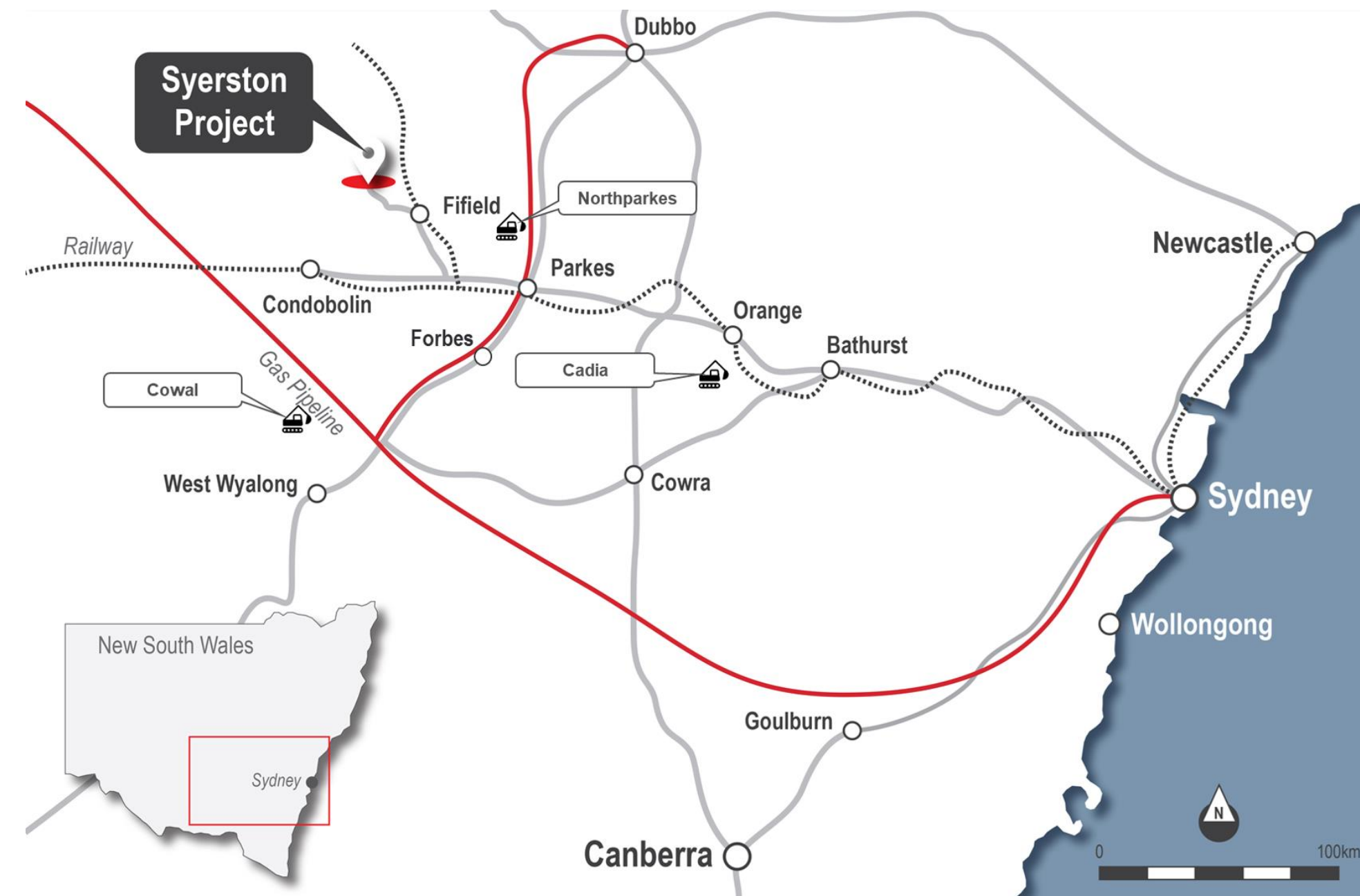
- Acquired from Vale for US\$6.5m in July 2017
- Significantly de-risk project development schedule
- Currently being shipped to Port Pirie, Australia



# SYERSTON PROJECT

## FULLY PERMITTED DEVELOPMENT PROJECT LOCATED IN NSW

- The Syerston Project is **100% owned by Clean TeQ** and located 350km west of Sydney
- Laterite (iron-hosted) mineral resource, rich in **nickel, cobalt and scandium**
- Uniquely positioned as one of the largest and highest grade sources of **cobalt outside Africa**
- **Fully permitted** project targeting release of Bankable Feasibility Study in 1Q 2018
- Only mine in the world seeking to **directly supply the lithium-ion battery industry**
- High-purity nickel and cobalt sulphate are key raw materials in the production of cathodes



Syerston is located in an **established mining region**; other major projects include Cadia Valley, Northparkes and Cobar

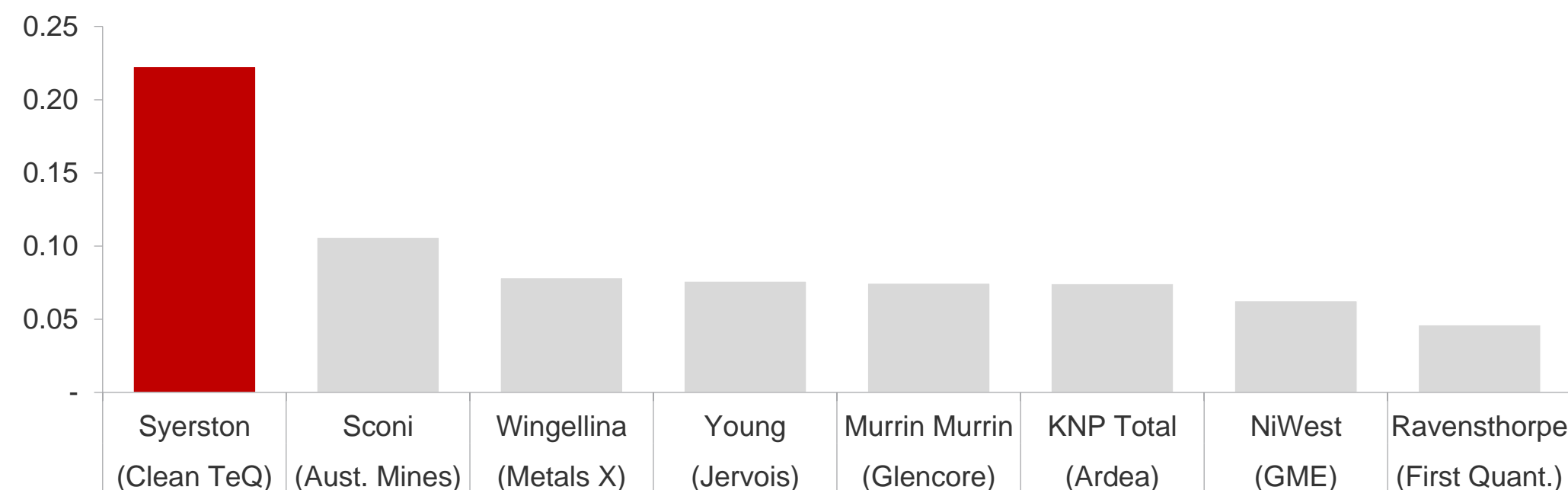


# KNOWN GEOLOGY

## ONE OF AUSTRALIA'S LARGEST UNDEVELOPED NICKEL-COBALT RESOURCES

- Over **1,300 drill holes** provide for strong geological understanding of the resource
- The resource is **shallow (5m to 40m)** and extends over a 2km horizon
- Existing Ore Reserves** sufficient for a 39 year mine life
- Significant cobalt content (relative to nickel) compared to other traditional nickel deposits

Cobalt / Nickel Ratios of Australian Laterite Resources



Source: Company Filings

### Ore Reserves Estimate<sup>1</sup>

Classification	Mt	Ni %	Co %
Proved	55	0.71	0.10
Probable	41	0.58	0.10
<b>Total</b>	<b>96</b>	<b>0.65</b>	<b>0.10</b>

### 2017 Updated Mineral Resource Estimate<sup>2</sup>

Classification	Mt	Ni %	Co %	Ni kt	Co kt
Measured	40	0.75	0.15	299	59
Indicated	47	0.55	0.12	259	58
<b>Meas. &amp; Ind.</b>	<b>87</b>	<b>0.64</b>	<b>0.13</b>	<b>558</b>	<b>116</b>
Inferred	14	0.24	0.11	35	16
<b>Total</b>	<b>101</b>	<b>0.59</b>	<b>0.13</b>	<b>593</b>	<b>132</b>

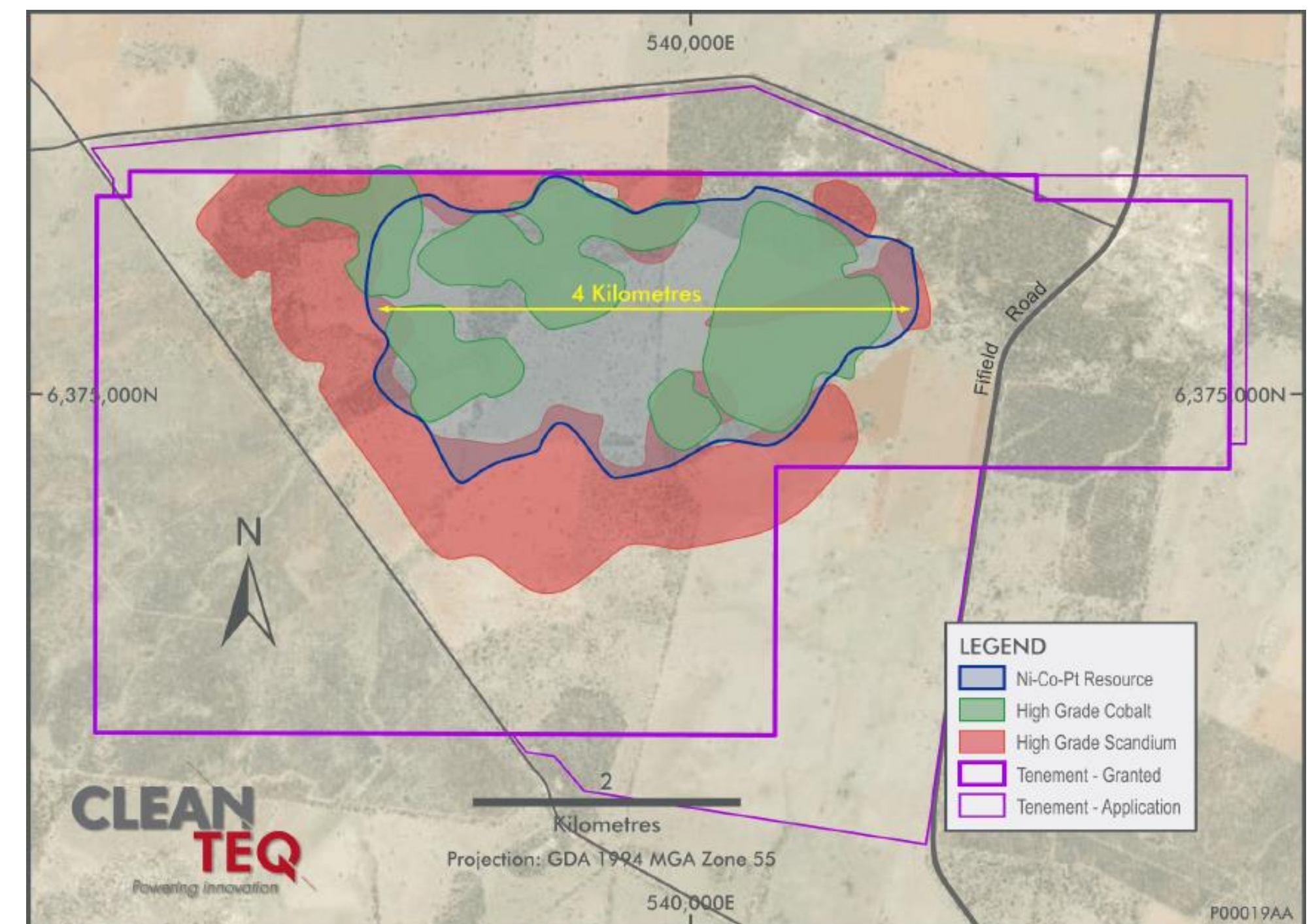
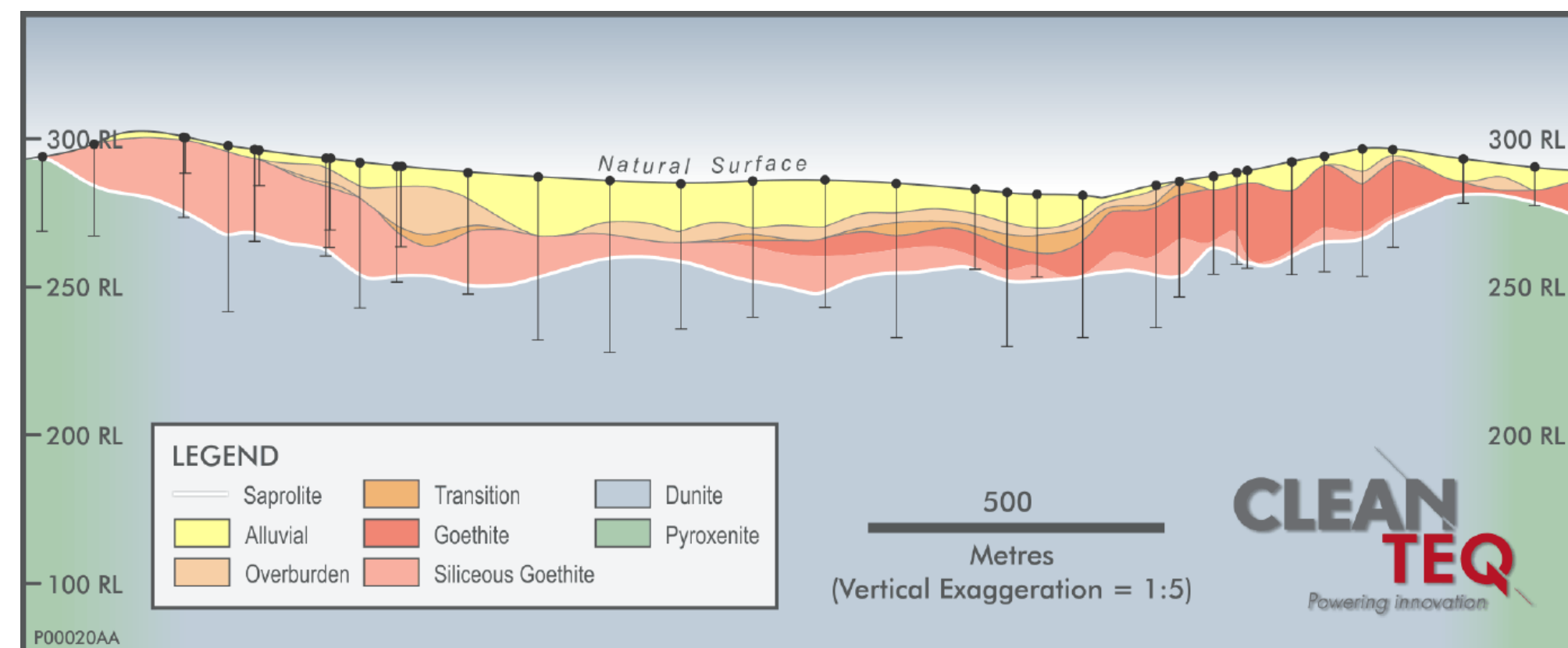
Notes: Any apparent arithmetic discrepancies are due to rounding;  
 1. Ore reserve is based on PFS. Reported as autoclave feed tonnes.  
 2. Based on 0.06% Co cutoff



# SIMPLE LOW RISK MINING OPERATION

## SIMPLE AND LOW COST OPEN-PIT MINING AT SHALLOW DEPTHS

- Shallow deposit allows for **simple strip-mining method** and is **amenable to free digging**, with minimal grinding and beneficiation
- The **average strip ratio is 0.8x:1.0** (waste:ore) (i.e. there is more ore than waste)
- Average C1 operating cash cost in years 3-20 of US\$2.96/lb nickel or **US\$0.89/lb** nickel after cobalt co-product credits



# 2016 PFS HIGHLIGHTS

## LARGE, LOW-COST AND WITH ATTRACTIVE ECONOMICS

- PFS completed in September 2016 and demonstrated **highly favourable economics**
- **Processing of 2.5Mtpa ore** over an initial 20-year period with existing Reserves available for up to 19-years of additional mine life extension
- Project designed to produce **high purity nickel sulphate and cobalt sulphate** products targeted solely for the lithium-ion battery market
- Spot cobalt price of US\$27.20/lb is **well above** PFS assumption of US\$12.00/lb
- Potential for **significantly reduced C1 cash costs** after co-credits at spot cobalt prices
- October 2017 Mineral Resource estimate confirmed a **30% increase in cobalt grade**

✓ Nickel sulphate production <sup>1</sup>	85.1ktpa
✓ Contained nickel production <sup>1</sup>	18.7ktpa
✓ Cobalt sulphate production <sup>1</sup>	15.3ktpa
✓ Contained cobalt production <sup>1</sup>	3.2ktpa
✓ Autoclave throughput <sup>2</sup>	2.5mtpa
✓ Life of Mine	39 Years
✓ C1 cash costs (after Co-credits) <sup>3</sup>	US\$0.89/lb Ni
✓ Total capital cost <sup>4</sup>	US\$680m
✓ NPV <sup>8</sup> (post tax) <sup>5</sup>	US\$891m
✓ IRR (post tax)	25%

PFS assumptions: nickel price US\$7.50/lb, cobalt price US\$12.00/lb, AUDUSD 0.75

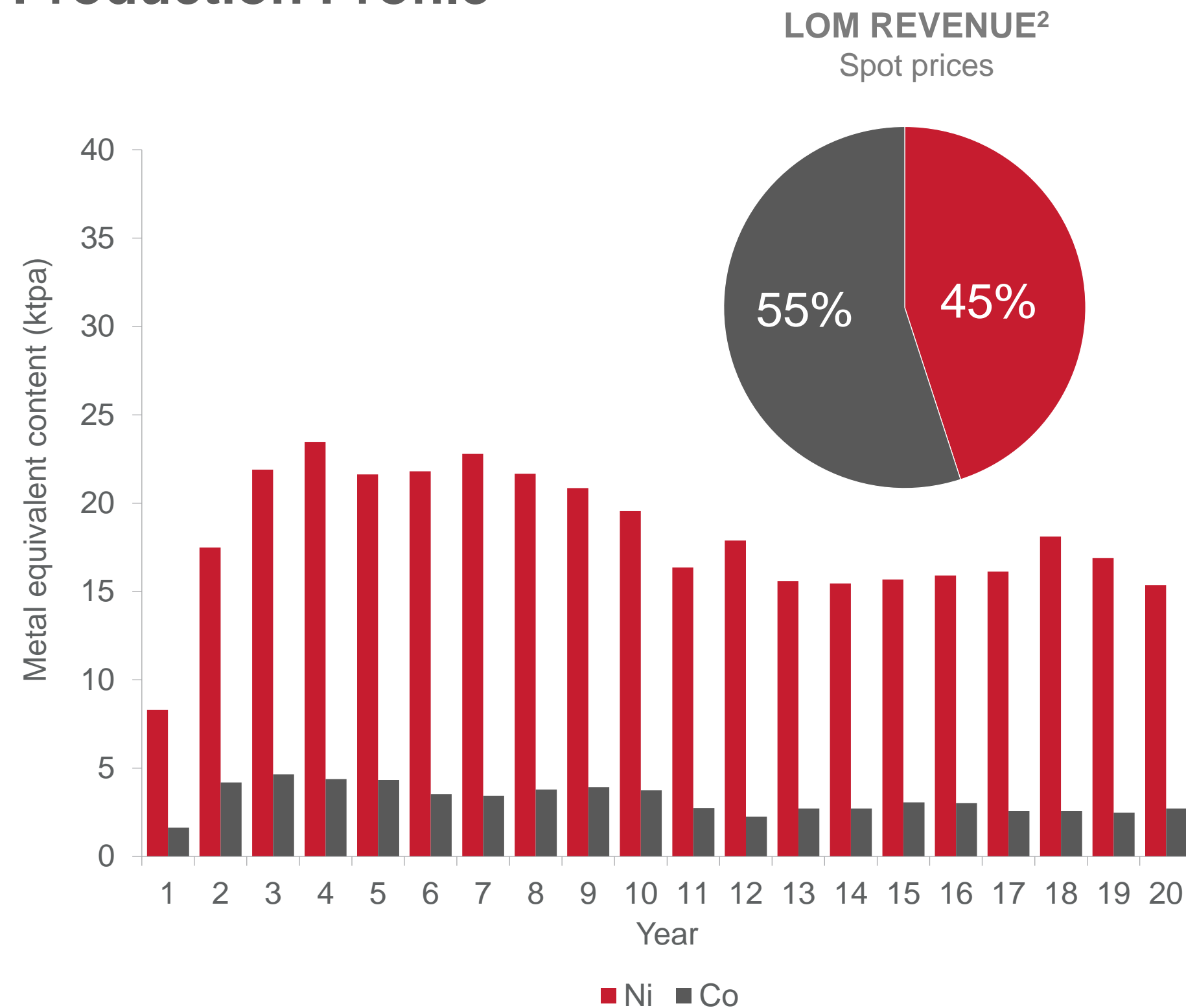
1. Years 3-20 average. 2. Designed processing throughput rate following a 24-month commissioning and ramp-up period. 3. C1 cash cost excludes potential by-product revenue from scandium oxide sales and royalties. 4. Includes US\$62m contingency. 5. Post tax, 8% discount rate, 100% equity, real terms



# 2016 PFS HIGHLIGHTS (CONT.)

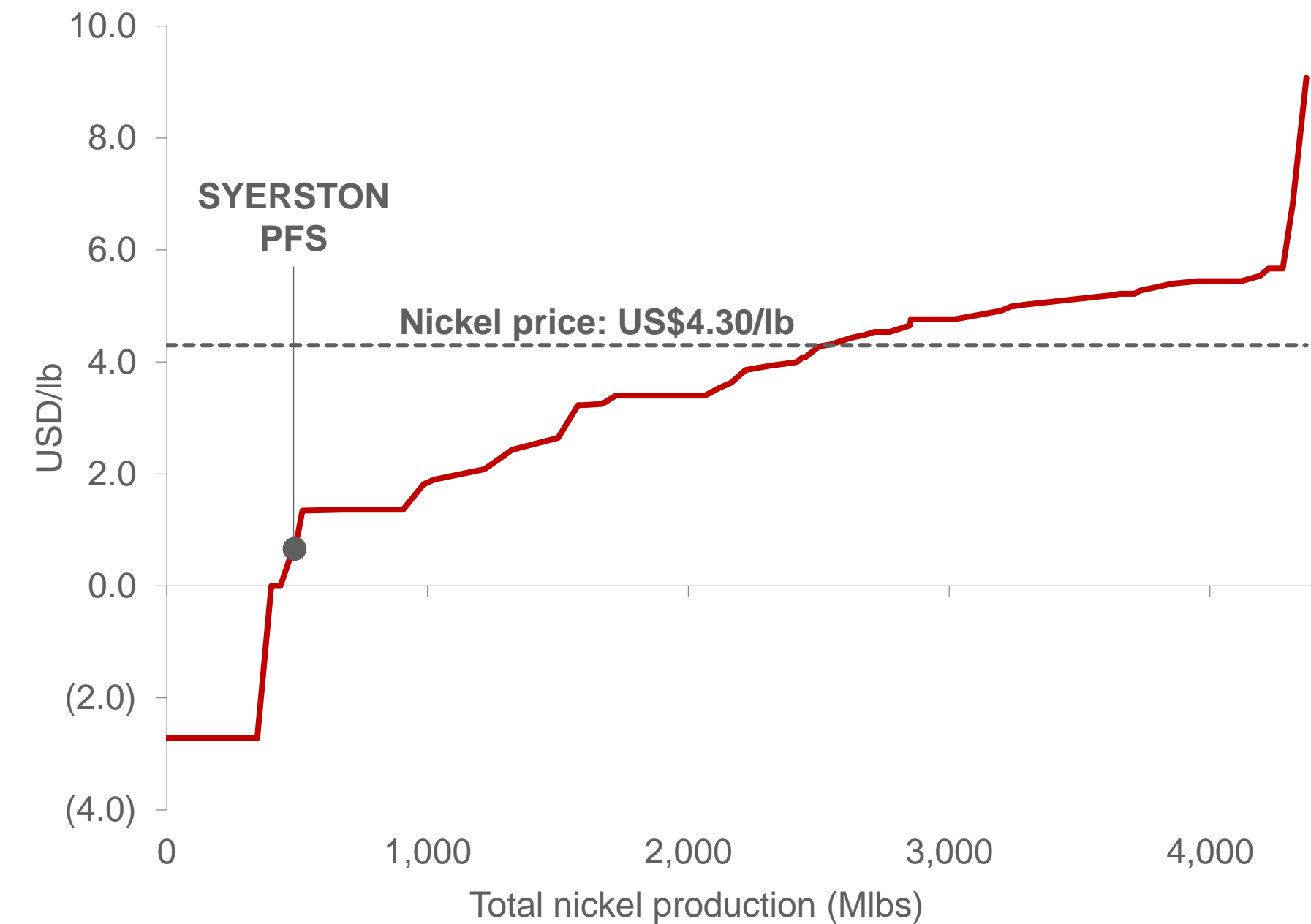
## Q1 COST POSITION WITH MEANINGFUL EXPOSURE TO CO AND NI

### Production Profile<sup>1</sup>



### Global Nickel C1 Cash Cost Curve<sup>3</sup>

After co-credits



1. Per September 2016 PFS  
 2. Spot nickel and cobalt prices as at 28 April 2017, scandium revenue has been excluded  
 3. Macquarie Research, as at Q1 2017. Nickel price as at 28 April 2017



# OFFTAKE / CUSTOMER STRATEGY

## RECENTLY SECURED BINDING OFFTAKE AGREEMENT – SEEKING ADDITIONAL CONTRACTS IN 2017 / 2018

- Clean TeQ's has agreed a **binding five year offtake with Beijing Easpring** for 20% of future production
  - Easpring is a leading Chinese NCM / LCO battery manufacturer
- Received **strong expressions of interest** for offtake from a number of parties, including signing MOUs and participating in site visits
- Aim to secure additional binding agreements over the course of 2017 / 2018
- Customers are very aware of **impending raw material supply shortage** and seeking certainty of supply



- ✓ Binding five-year offtake agreement for 20% of cobalt and nickel sulphate production from Syerston
- ✓ Transparent pricing mechanism with sulphate premia decided quarterly
- ✓ Offtake converts to LOM supply with direct investment by Easpring in Syerston (discussions ongoing)
- ✓ Parties to investigate potential for partnership in downstream precursor and possibly battery cathode production at site



NICKEL & COBALT SULPHATE



# NEAR-TERM OBJECTIVES

---

FAST TRACKING SYERSTON'S DEVELOPMENT IS OUR PRIORITY

- 01 Complete the Definitive Feasibility Study in Q1 2018
- 02 Sign further offtake agreements with strategic counterparties during 2017/18
- 03 Continue progress towards fully financing Syerston
- 04 Optimise to accelerate development of Syerston
- 05 Commence construction in mid 2018



# SCANDIUM

## A NEW GENERATION OF LIGHTWEIGHT ALLOYS

- Syerston is one of the **world's largest** and **highest grade scandium** resources
- Scandium is used to provide next generation **lightweight aluminium alloys** for key transportation markets
- Clean TeQ continues to **promote the use and development** of new scandium alloys
- Current development plan is to **extract scandium oxide as a by-product** of cobalt and nickel sulphate production and at very low cost
- Syerston is uniquely positioned to benefit from two key imperatives facing the global transport industry: **electrification and light weighting**

### Airbus Group's Light-rider



The world's first 3D printed electric bike aluminium-scandium frame makes it lighter and stronger

The bike weighs 35kg, contains a 6kWh battery, has a top speed of 80km/h and a range of 60km



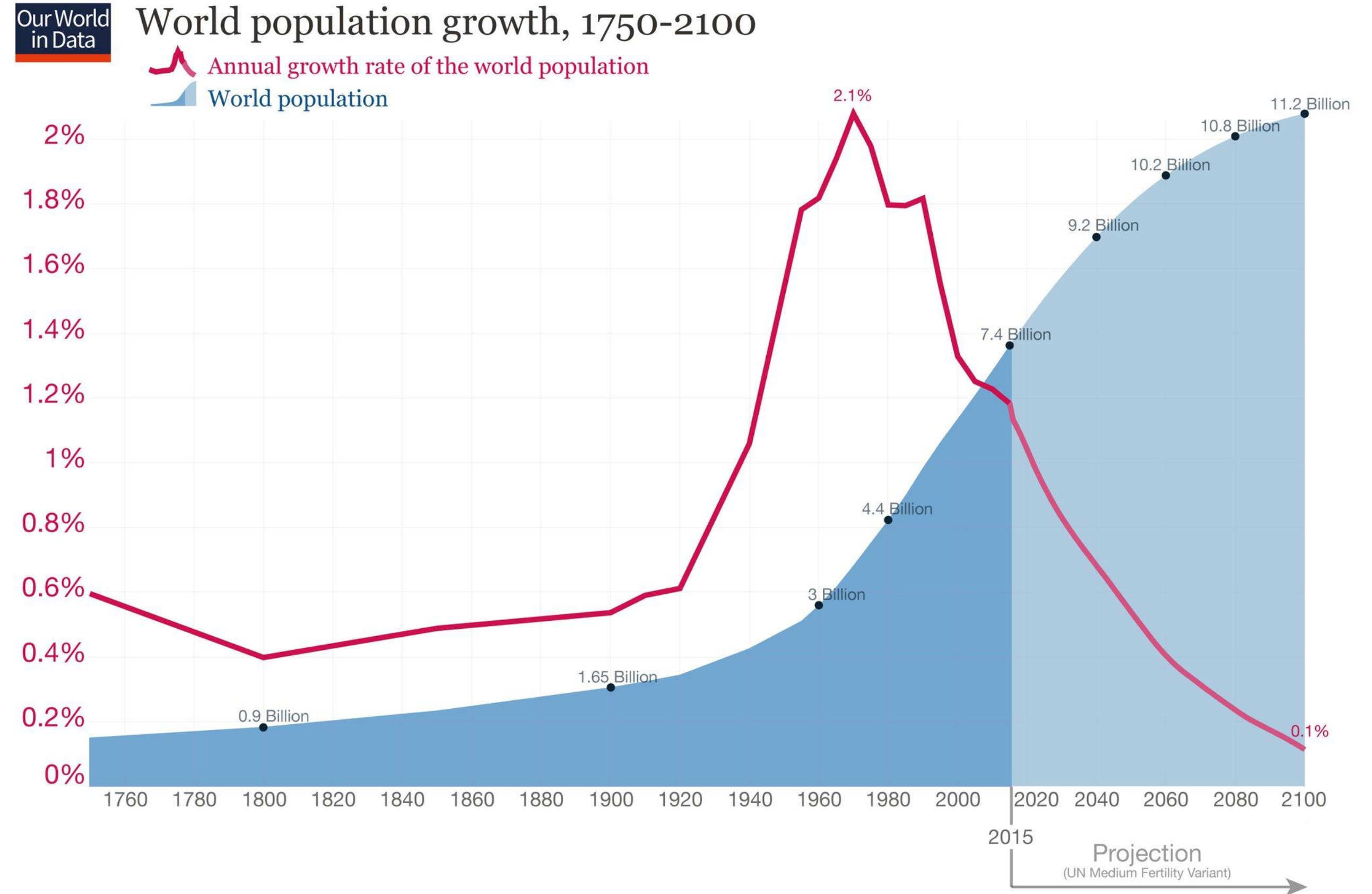
# FRESH WATER

---



# FRESH WATER SCARCITY

## THE ECONOMIC IMPERATIVE FOR TREATMENT AND RECYCLING



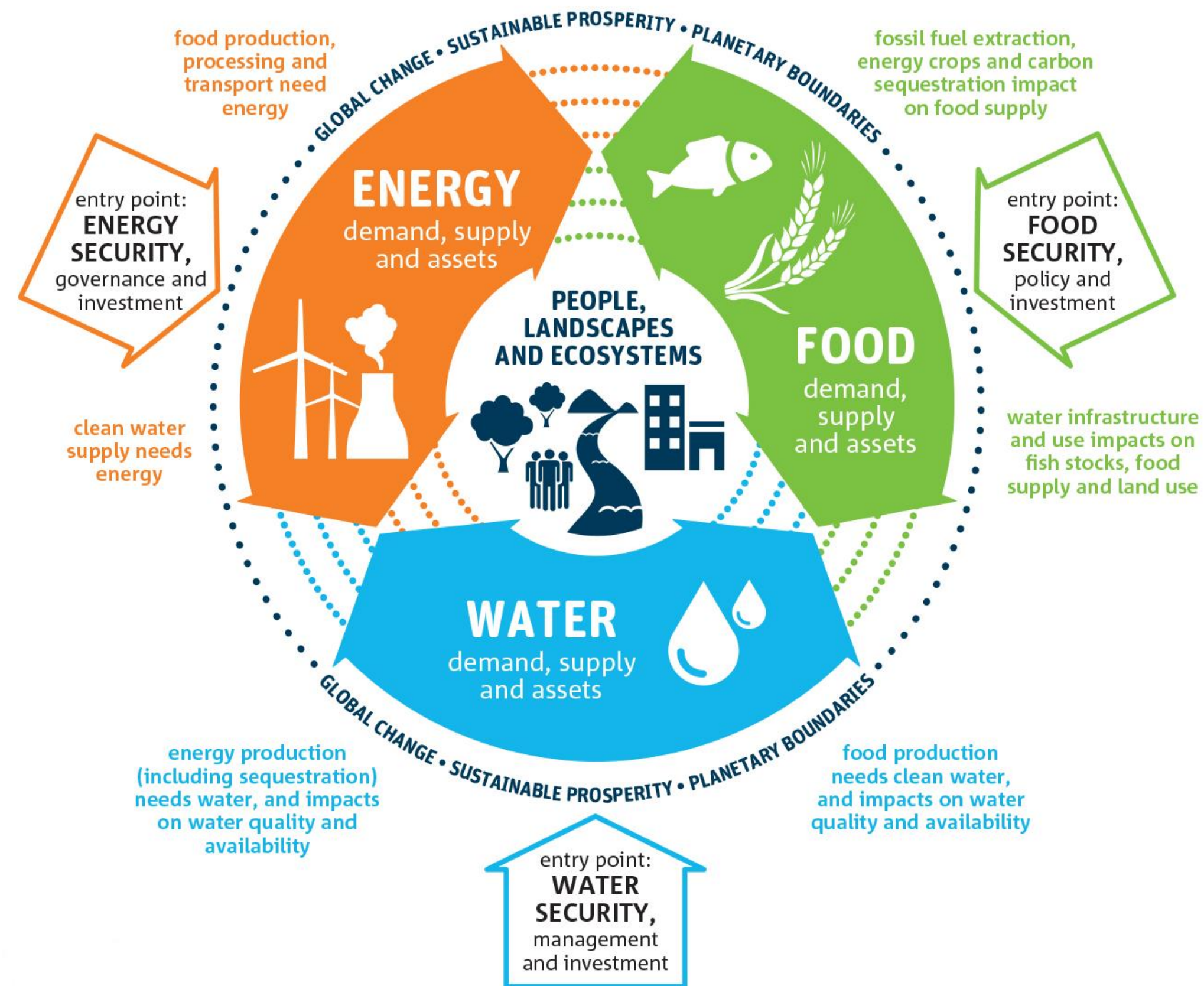
Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant. The data visualization is taken from OurWorldInData.org. There you find the raw data and more visualizations on this topic.

Licensed under CC-BY-SA by the author Max Roser.

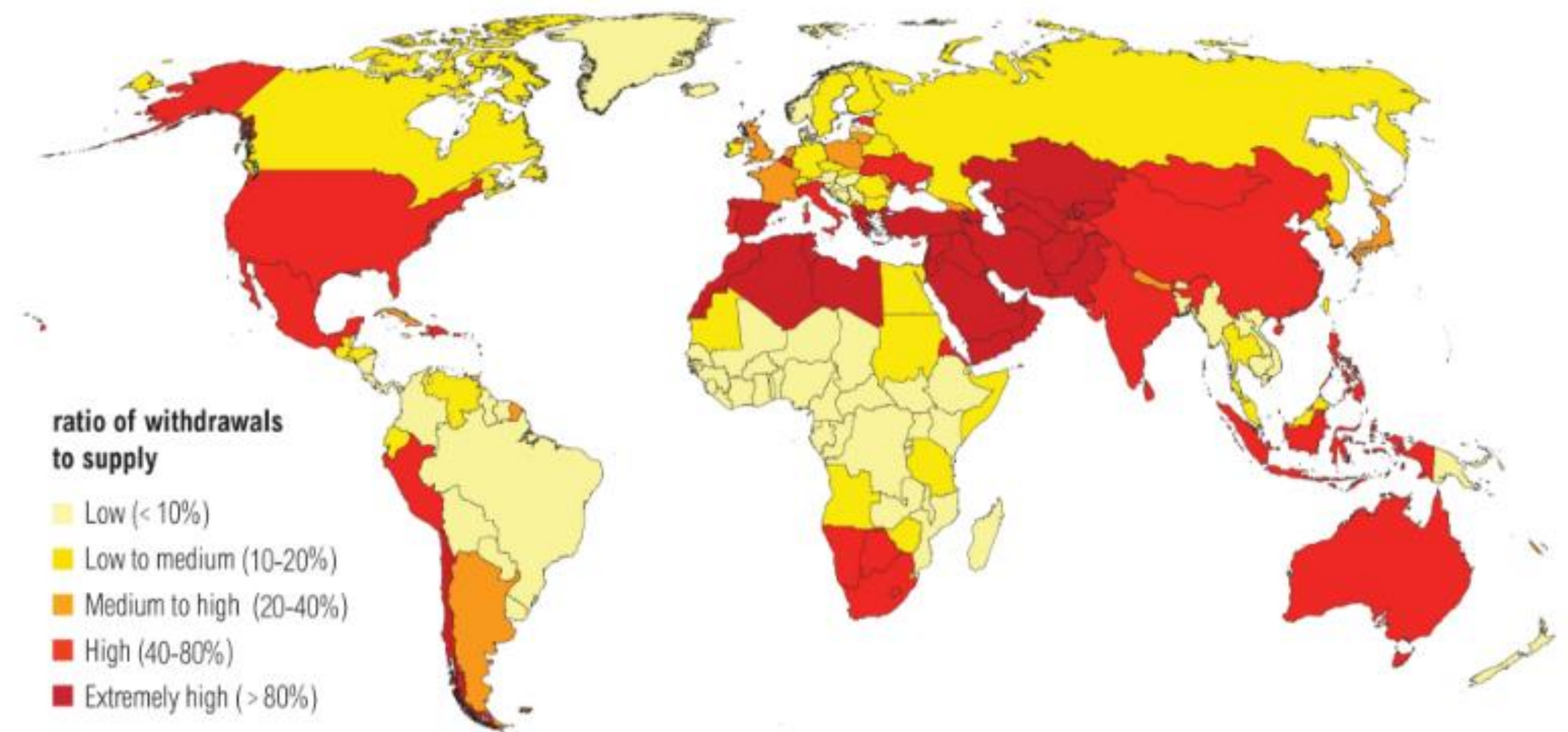


# FRESH WATER SCARCITY

## THE ECONOMIC IMPERATIVE FOR TREATMENT AND RECYCLING



Water Stress by Country: 2040



NOTE: Projections are based on a business-as-usual scenario using SSP2 and RCP8.5.

For more: [ow.ly/RiWop](https://ow.ly/RiWop)

 WORLD RESOURCES INSTITUTE

**CLEAN**  
**TEQ**  
Powering innovation



# WATER MARKETS

## THE ECONOMIC IMPERATIVE FOR TREATMENT AND RECYCLING



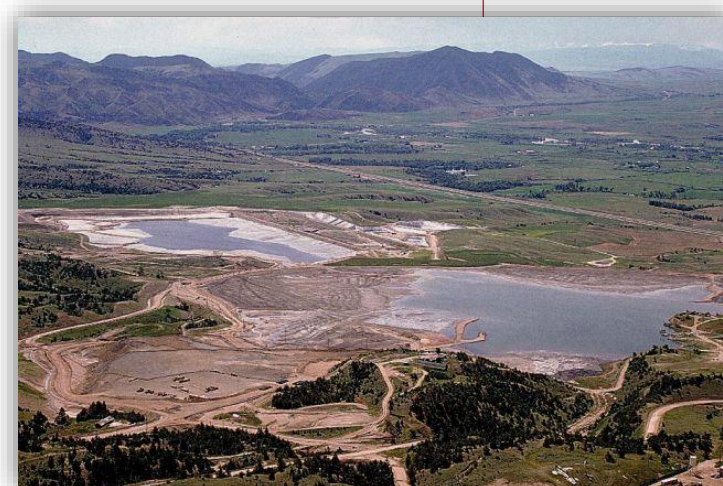
### **Municipal Effluent Treatment**

Purify wastewater effluent to meet more stringent regulations and to allow reuse or disposal to the environment.



### **Power Wastewater Treatment**

Purify highly polluted and hard to treat wastewater. Regulations coming for Zero Liquid Discharge (ZLD) for all existing and new power plants.



### **Mining Process Water Treatment**

Purify mining process and tailings water to recover water for reuse and additional metal values.



### **Coal Chemical Water Treatment**

Purify process water for internal reuse and to meet existing Zero Liquid Discharge regulations.



# DELIVERING ON CONTRACTS

## HOYO JOINT VENTURE – CHINA

- Initial contract to build, own and operate a Clean TeQ CIF® water treatment plant to treat up to 13,000 tonnes of effluent per day for a 20-year period at a waste
- Design & engineering complete with construction expected to commence Q1 2018

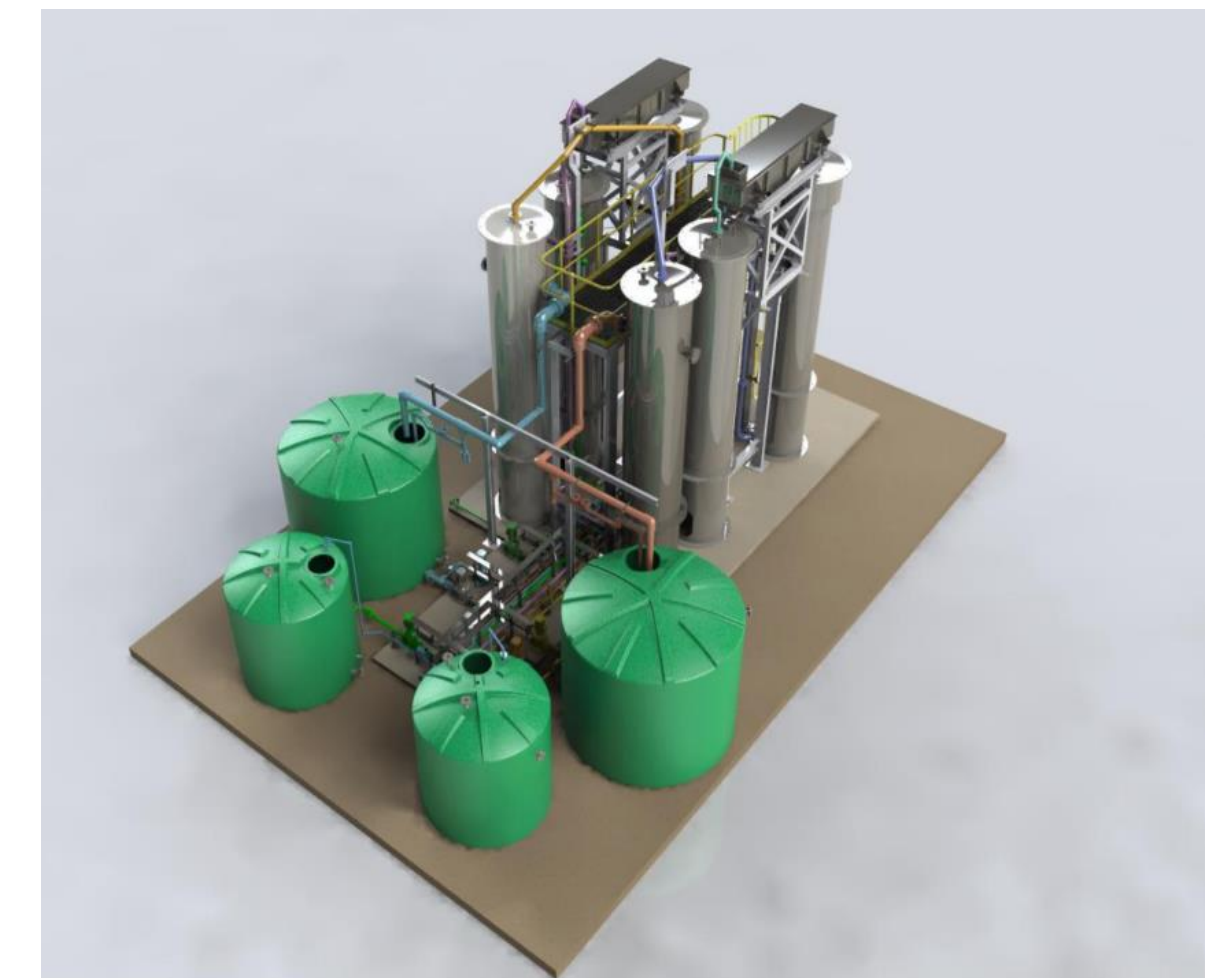
## MULTOTEC CONTRACT – OMAN

- Continuous Ionic Filtration (CIF®) wastewater treatment solution at a minerals processing plant
- Designed to remove toxic pollutants and in particular sulphate, antimony and arsenic
- Design, procure and commission contract with value in excess of \$US400,000
- Manufacture complete with shipment to site in progress and commissioning expected during Q4 2017

## BUSINESS DEVELOPMENT

Engineering/feasibility contracts underway for:

- Wastewater treatment from gold mines in Australia, PNG and Chile
- Uranium recovery from copper/cobalt project in Africa
- Coal-to-chemical and coal mine wastewater plants in China





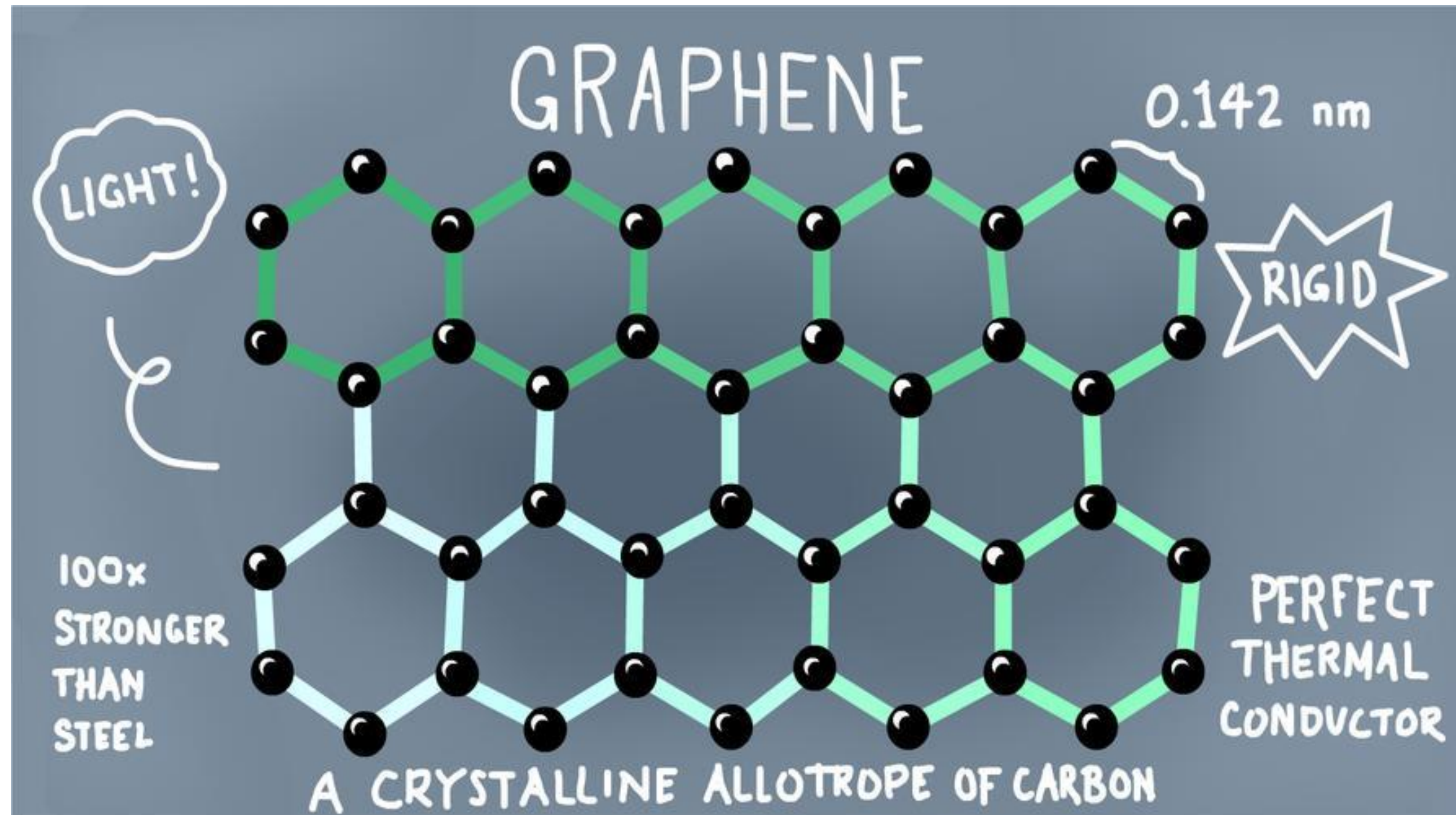
# TECHNOLOGY

---



# DEVELOPING OUR CORE CAPABILITY

## GRAPHENE – A REVOLUTIONARY MATERIAL



- Graphene is the **new plastic**
- Graphene is a **revolutionary material** for a wide variety of fields
- Graphene based products have potential for **disrupting metals separation** and **water treatment** markets



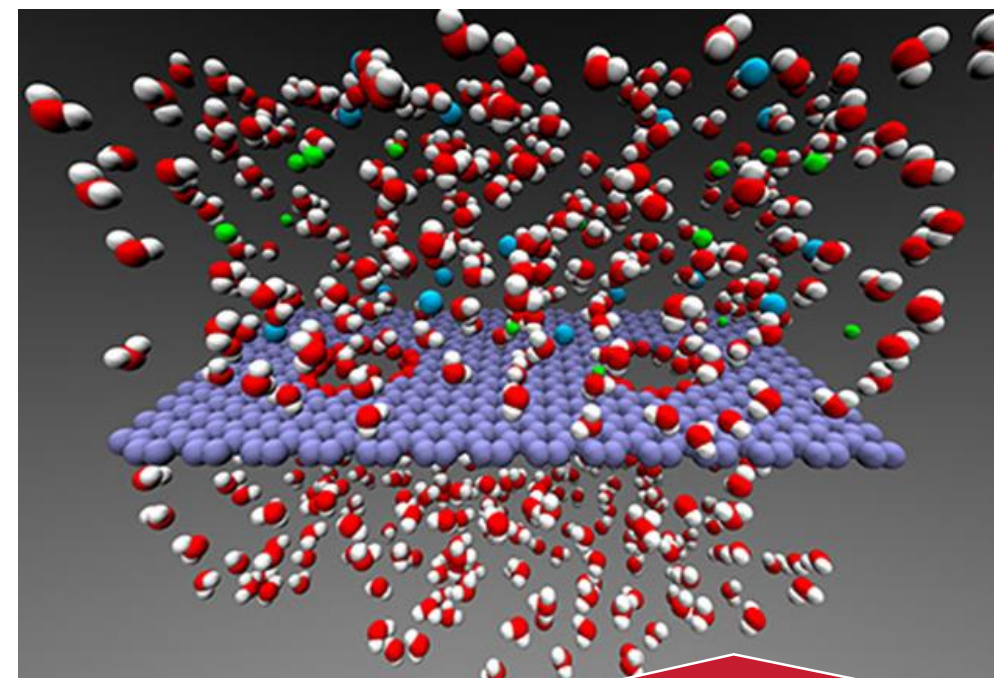
# DEVELOPING OUR CORE CAPABILITY

## CONTINUED FOCUS ON IP DEVELOPMENT



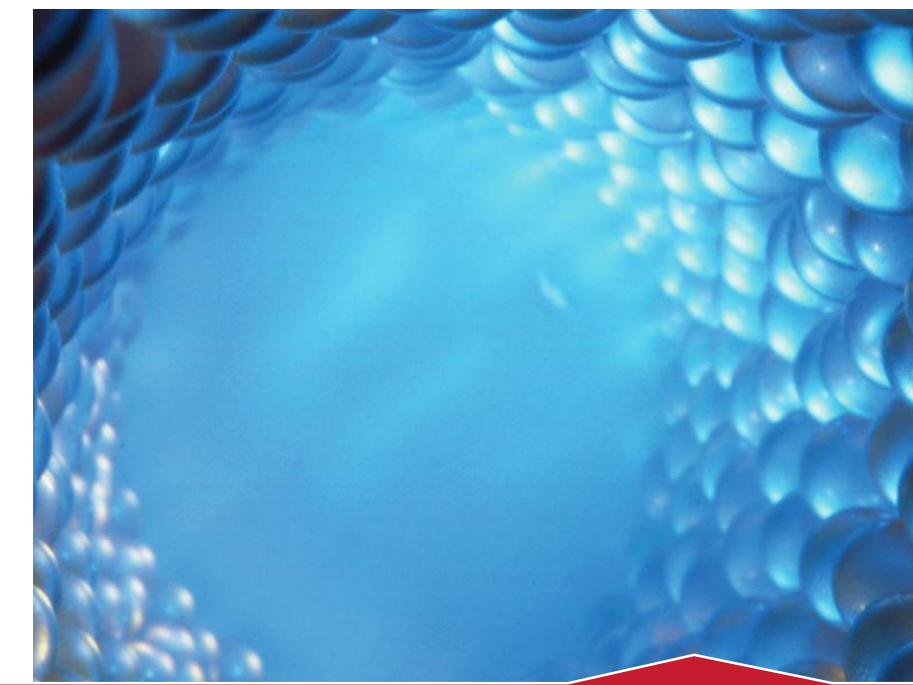
Graphene Adsorbents for Water & Wastewater Treatment

- Targeting multi billion dollar activated carbon market
- Novel product that can be readily regenerated.
- Compatible with our CIF® Continuous Ionic Filtration processes



Graphene Membranes for Municipal and Industrial Applications

- Targeting multi-billion dollar membrane filtration market
- Novel product that resists bacterial fouling
- Provides high water recovery at low energy input



Hybrid Ion Exchange Processes for Water & Metals

- Extend the range of ion exchange materials that can be used in our CIF® continuous ionic filtration process





**Sam Riggall**  
Chief Executive Officer

M: +61 3 9797 6700  
E: [sriggall@cleanteq.com](mailto:sriggall@cleanteq.com)



**Clean TeQ Holdings Limited**  
350 Collins Street  
Melbourne VIC 3000  
AUSTRALIA

[www.cleanteq.com](http://www.cleanteq.com)



# RESERVES AND RESOURCES

---

## COMPETENT PERSON CONSENTS

The information in this document that relates to nickel-cobalt Mineral Resources from the 2016 Pre Feasibility Study is based on information compiled by Diederik Speijers and John McDonald, who are Fellows of The Australasian Institute of Mining & Metallurgy and employees of McDonald Speijers. There was no clear division of responsibility within the McDonald Speijers team in terms of the information that was prepared – Diederik Speijers and John McDonald are jointly responsible for the preparation of the Mineral Resource Estimate. Diederik Speijers and John McDonald have sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are undertaking to qualify as Competent Persons as defined in the 2012 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’. Diederik Speijers and John McDonald, who are consultants to the Company, consent to the inclusion in the report of the matters based on their information in the form and context in which it appears.

The information in this document that relates to ore reserves from the 2016 Pre Feasibility Study is based on information compiled by Michael Ryan, MAusIMM (109558), who is a full time employee of Preston Valley Grove Pty Ltd, trading as Inmett Projects. Michael Ryan has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’. Michael Ryan, who is a consultant to the Company, consents to the inclusion in the report of the matters based on his information in the form and context in which it appears. Michael Ryan holds options in Clean TeQ Holdings Limited, the ultimate parent entity of Scandium21 Pty Ltd, the owner of the Project.

The information in this report that relates to the 2017 Mineral Resource update is based on information compiled by Mr Lynn Widenbar, a member of the Australasian Institute of Mining and Metallurgy. Mr Widenbar is a full-time employee of Widenbar and Associates. Mr Widenbar is a consultant to Clean TeQ and has sufficient experience which is relevant to the style of mineralisation and type of Deposit and to the activity which they are undertaking to qualify as a Competent Person as defined in the 2012 Edition of the “Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves”. Mr Widenbar consent to the inclusion in this report of the matters based on their information in the form and context in which it appears

The information in this document that relates to scandium Mineral Resources is based on information compiled by Sharron Sylvester, who is a Member and Registered Professional of the Australian Institute of Geoscientists and is an employee of OreWin Pty Ltd. Sharron Sylvester has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which she is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’. Sharron Sylvester, who is a consultant to the Company, consents to the inclusion in the report of the matters based on their information in the form and context in which it appears.

For further details on the content of this presentation, please refer to the ASX releases on the Company’s website.