



WEBINAR

# Copper & Aluminum: What You Need to Know

November 11, 2021

**By: Nexans Canada & Rio Tinto**



**RioTinto**

**Nexans**  
ELECTRIFY THE FUTURE



**Nexans**  
ELECTRIFY THE FUTURE

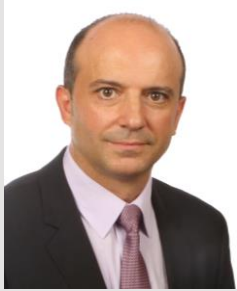
**ATTENTION**

## **AUDIENCE PARTICIPATION**

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- **Questions can be asked at any time using the chat function on the webinar screen**
- **Any unanswered questions will be followed up through email**
- **This presentation, a recording of the webinar and a brief survey will be emailed to all registrants**

## PRESENTERS



**Carlos Sanchez**

Vice President & General  
Manager Metallurgy  
Nexans Canada



**Alain Blezy, P.Eng**

Director of Engineer  
Nexans North America



**Martin Lecours**

Principal Advisor,  
Technical Marketing  
Rio Tinto



**Jonathan Bouchard**

Manager, Sales  
Rio Tinto



# AGENDA

- Nexans Canada & Rio Tinto Introduction
- Copper & Aluminum Technical Characteristics & Developments
- Copper Macro Trends – Supply and Prices
- Aluminum Market Trends
- Corporate Social Responsibility Actions – Nexans Canada & Rio Tinto
- Key Takeaways
- Q&A

# Nexans is a global leader with a long legacy in Canada



**Weyburn, SK**

**Fergus, ON**

**Montreal, QC**



**1911**  **canada<sup>®</sup>  
wire**

Started with Canada Wire in Toronto, ON

**3 Plants**

**750+ Products**

- Residential, Commercial, Industrial & Utility
- Copper Rod & Wire



# Nexans Canada – Standard Product Portfolio



## Residential

- Bare Copper
- CANADEX® NMD90
- HEATEX® NMD90
- SUPERVEX® NMWU

## Commercial

- AC90
- CORFLEX® Armoured Cu & Al
- INSTAGLIDE® RW90 & RWU90 Cu & Al
- INSTAGLIDE® T90 Nylon Cu & Al
- TWU

## Renewable Energy

- RPVU90 2 kV Cu & Al
- ENERGEX® Medium Voltage 90°C 15 to 46 kV
- ENERGEX® Medium Voltage 105°C
- ACSR

## Industrial

- ACWU90
- CP-100 Railway Signal
- DriveRx® VFD
- FIREX® TECK90 – 600 V, 1 kV & 5 kV
- FIREX® Medium Voltage Armoured Power Cable

## Transmission/Distribution

- Bare ACSR & AACSR
- Bare Aluminum & Al Alloy
- Covered Overhead Distribution Line Wire
- ENERGEX® CN & SP Medium Voltage
- NS75 & NS90
- Street Light Cable
- USE175 & USE190 & USEB90

## Copper Rod & Wire

- Copper Rod
- Copper Wire
- Trolley Wire

# Rio Tinto Aluminium

Empowering a sustainable future

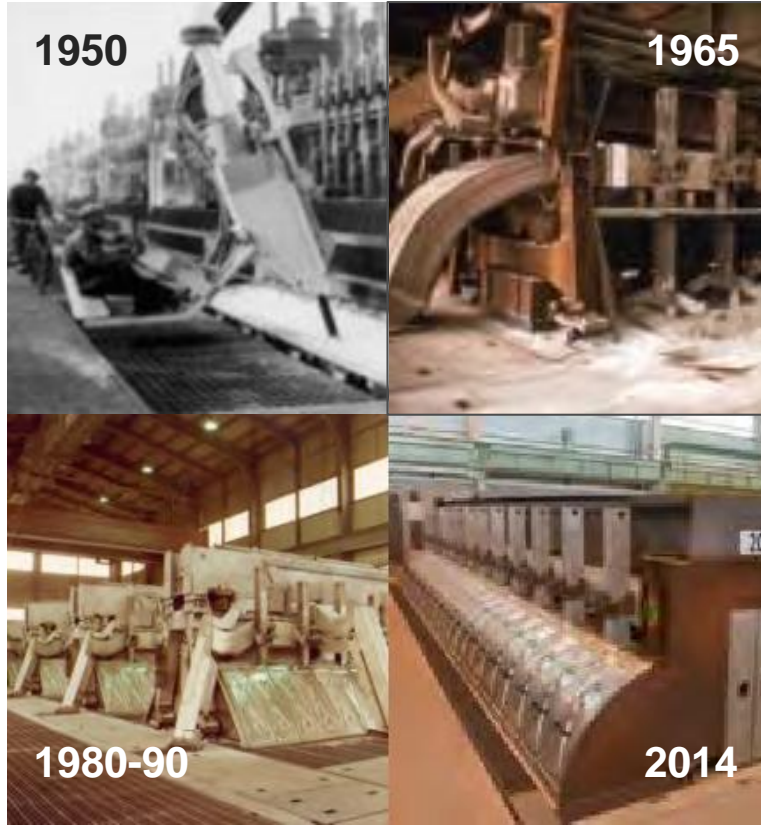




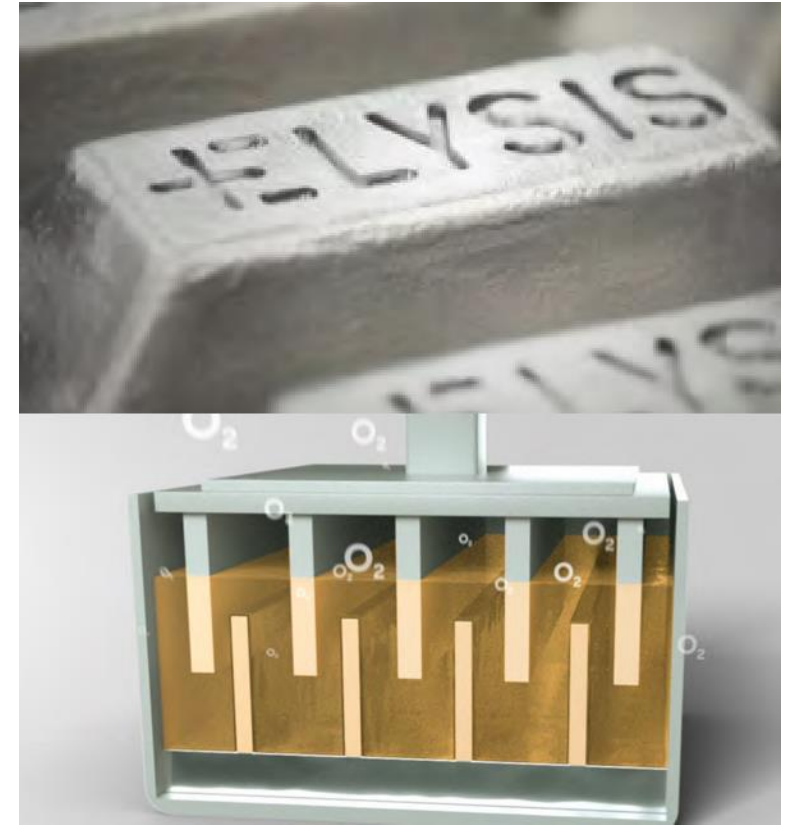
# Over a hundred years of aluminium expertise



**Engineering  
excellence**



**Technological  
expertise**



**Partnership  
and innovation**

# A structurally advantaged integrated business



## Bauxite

4 bauxite mines

56.1Mt\*

Australia, Brazil  
and Guinea



## Alumina

4 alumina refineries

8.0Mt\*

Australia, Brazil  
and Canada



## Energy

7 hydro plants

4.1GW

Supporting our  
assets in Canada



## Aluminium

14 aluminium smelters,  
80% renewables

3.1Mt\*

Australia, Canada, Iceland,  
New Zealand and Oman

\*2020 production



# Consistent high-quality products

## Our products



### Rod

Alloys 1080, 1120, 1188, 1350, 1370, 4043, 4047, 5005, 6101, 6201, 8030, 8176, Al-Zr

**Diameters available**  
9.53mm, 12.0mm, 12.72mm  
**Coil dimensions**  
Width 915mm  
Inner diameter 775mm

**Outer diameter**      **Coil weight**

	in	mm	lbs	kg
	56.4	1,433	4,409	2,000
	60.4	1,533	5,292	2,400
	68.6	1,743	7,385	3,350
	71.4	1,815	8,157	3,700
	73.8	1,874	8,818	4,000



**Robust**  
quality control

# Copper & Aluminum Technical Characteristics & Developments

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# Armoured Products with conductors using Aluminum 8030 Alloy or Copper

Three designs that can be installed in similar locations, can be used in similar applications and installed with similar methods. (CEC Table 19)

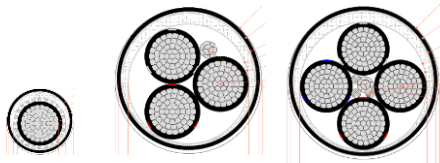
## ACWU90



Conductor Al 8030  
Insulation XLPE 600 V

Interlocked Al Armour  
Jacket PVC FT4 AG14 SR  
**Cable rated HL**

Available in 1c, 3c and 4c

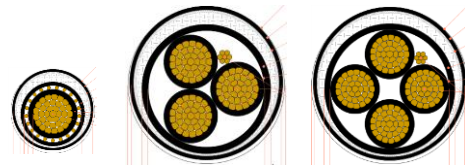


## TECK90



Conductor Copper  
**Insulation XLPE 1000 V**  
**Inner Jacket PVC FT4 AG14 SR**  
Interlocked Al Armour  
Jacket PVC FT4 AG14 SR  
**Cable rated HL**

Available in 1c, 3c and 4c



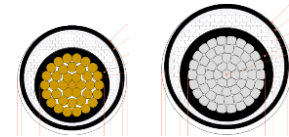
## CORFLEX® RA90



Conductor in Copper or Al 8030  
Insulation XLPE 600 V

**CCW Al Armour (corrugated Al pipe)**  
Jacket PVC FT4 AG14 SR  
**Cable rated HL**

Available in 1c



# Consider a 3 Phase Feeder for 1000 amps Service

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Using the CEC C22.1:21 Tables 2 and 4, the “**uncorrected**” ampacity for common feeder sizes of “*equal*” ampacity are:

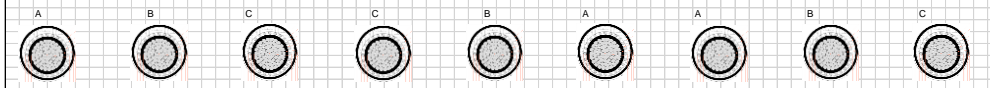
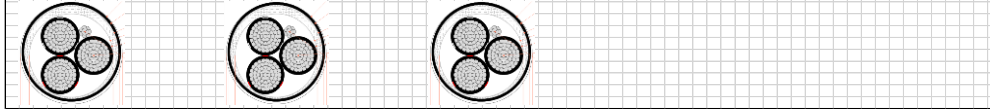
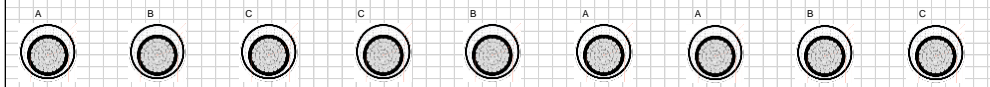
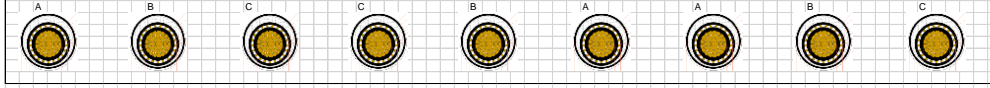

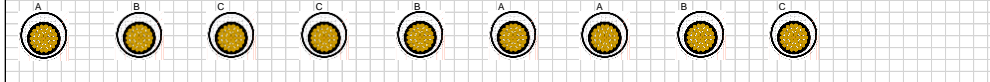
- **Aluminum 750 mcm** = 385 amps (from CEC Table 4) , using 75°C
- **Copper 500 mcm** = 380 amps (from CEC Table 2), using 75°C

Refer to CEC Rule 4-004 to apply correction factors for the ampacity for Ambient Temperature, Cable Spacing, Installation Type. A special note for CEC Rule 4-008 specific to induced currents in armoured cables.

Hypothetically, 3 sets for three phase conductors will be required after ampacity corrections are factored in.

What cable installation configuration works best for the installation as a whole?

# Possible Feeder Cable layouts of "equal" ampacity: 1000amps

<p>3 SETS of 3 X 1C750mcm ACWU90 600v</p> 	<p><b>1C750mcm ACWU90 600v</b></p> <table border="1"> <tr><td>Individual Weight</td><td>2010.5 ka/km</td></tr> <tr><td>Diameter</td><td>40.6 mm</td></tr> <tr><td>Minimum Install Bend Radius</td><td>495 mm</td></tr> <tr><td>Minimum Trained Bend Radius</td><td>289 mm</td></tr> </table>	Individual Weight	2010.5 ka/km	Diameter	40.6 mm	Minimum Install Bend Radius	495 mm	Minimum Trained Bend Radius	289 mm
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<p>3 Cables of 3c750mcm ACWU 600v</p> 	<p><b>3c750mcm ACWU 600v</b></p> <table border="1"> <tr><td>Individual Weight</td><td>5312.3 ka/km</td></tr> <tr><td>Diameter</td><td>72.0 mm</td></tr> <tr><td>Minimum Install Bend Radius</td><td>880 mm</td></tr> <tr><td>Minimum Trained Bend Radius</td><td>513 mm</td></tr> </table>	Individual Weight	5312.3 ka/km	Diameter	72.0 mm	Minimum Install Bend Radius	880 mm	Minimum Trained Bend Radius	513 mm
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<p>3 SETS of 3 X 1C750mcm RA90 CORFLEX 600V</p> 	<p><b>1C750mcm RA90 CORFLEX 600V</b></p> <table border="1"> <tr><td>Individual Weight</td><td>1812.4 ka/km</td></tr> <tr><td>Diameter</td><td>38.8 mm</td></tr> <tr><td>Minimum Install Bend Radius</td><td>555 mm</td></tr> <tr><td>Minimum Trained Bend Radius</td><td>357 mm</td></tr> </table>	Individual Weight	1812.4 ka/km	Diameter	38.8 mm	Minimum Install Bend Radius	555 mm	Minimum Trained Bend Radius	357 mm
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<p>3 SETS of 3 X 1C500mcm TECK90 1000v</p> 	<p><b>1C500mcm TECK90 1000v</b></p> <table border="1"> <tr><td>Individual Weight</td><td>3678.5 ka/km</td></tr> <tr><td>Diameter</td><td>39.8 mm</td></tr> <tr><td>Minimum Install Bend Radius</td><td>565 mm</td></tr> <tr><td>Minimum Trained Bend Radius</td><td>283 mm</td></tr> </table>	Individual Weight	3678.5 ka/km	Diameter	39.8 mm	Minimum Install Bend Radius	565 mm	Minimum Trained Bend Radius	283 mm
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Cable Diameter Range  
= 33 to 72 mm

Installation Bend Radius  
= 478 to 975 mm

Trained Bend Radius  
= 283 to 513 mm

# Referring to the CEC C22.2 :21 Table 19

## Cables having metal armour

ACWU90, TECK90 and CORFLEX® can be installed in similar *locations* when properly marked

ACWU90, TECK90 and CORFLEX® **can be used for** in similar applications

ACWU90, TECK90 and CORFLEX® can be used **when installed** in the method listed when properly marked

- there are a few differences here

Considerations...

Is there a 1000 V requirement or an installation requiring a more robust cable design? then TECK90

Is a complete mechanical barrier required between the conductor to the outside environment? then CORFLEX®

The selection of copper or aluminum size, single or multi conductor is interconnected with the physical restrictions of the installation. Issues of space, cable weight, length of pull, pulling force, bend radius during/after installation, the number of pulls and available cable supports....add to the complexity.

**The cable is part of a system. Each are part of the overall installation cost.**





# **Copper Macro Trends**

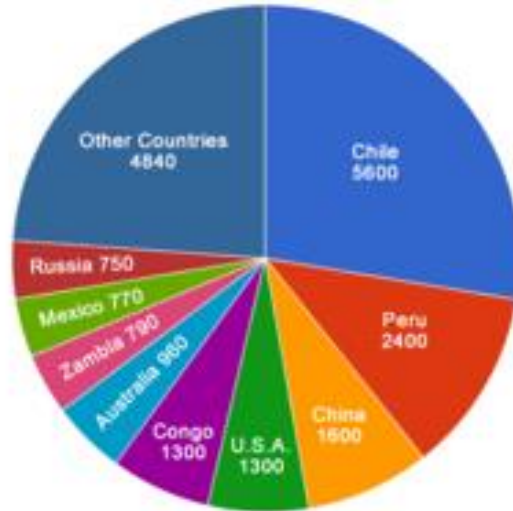
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1. Supply
  - Production by region
  - North America cathode production
  - Global and USA copper inventories
2. Supply vs demand
3. Price fundamentals
4. Demand indicators

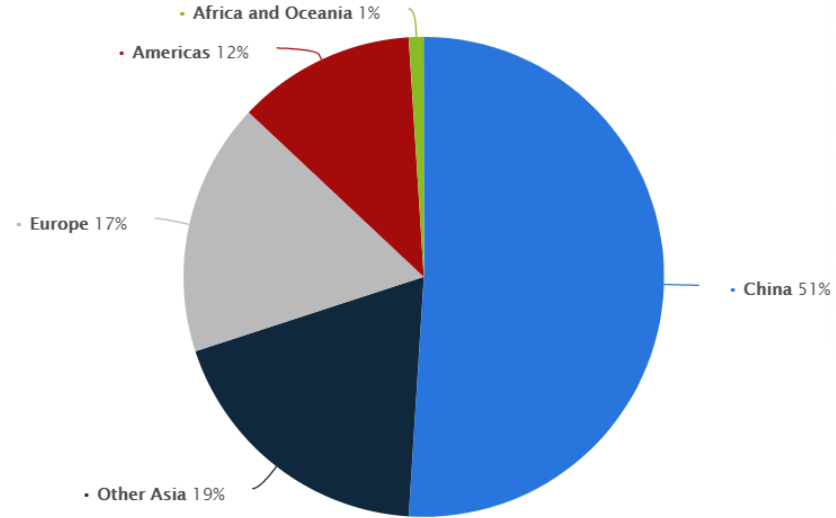
# Supply - Copper Production by Country/Area



**Top 2 has over 40%**

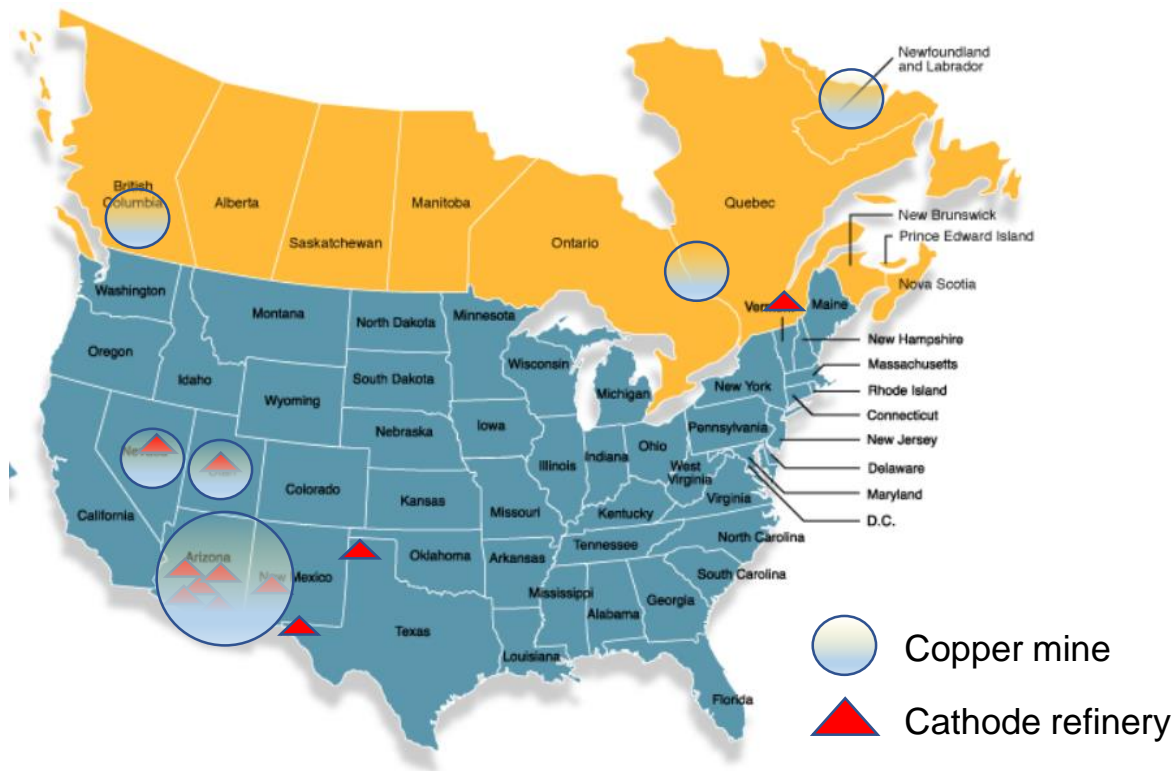


**Top 1 has over 51%**



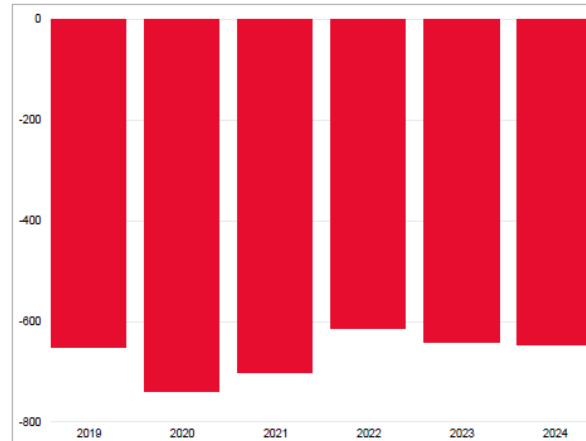
**40% of world's copper is not refined in the country, it is mined**

# Supply - NA Mining and Cathode Production



- ❑ All NA cathode refineries are in US South West (SE) except Montreal Glencore CCR
- ❑ US is short of cathode production versus demand (600 ktonnes)
- ❑ Largest new mine – Resolution (AZ) has still not receive a permit (25% of USA needs)

USA refined copper balance (kt)

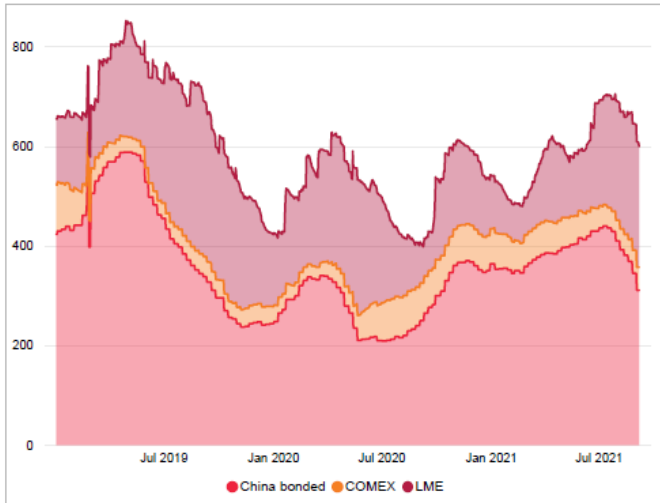


# Copper Inventories

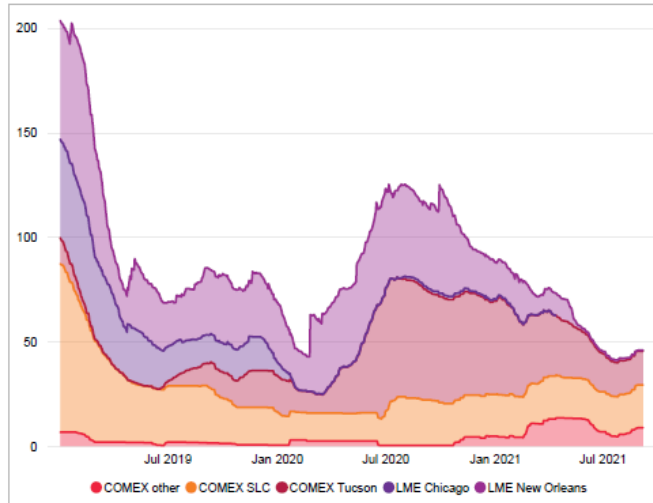
## Global slightly down and USA at very low levels



Global visible cathode stocks (kt)

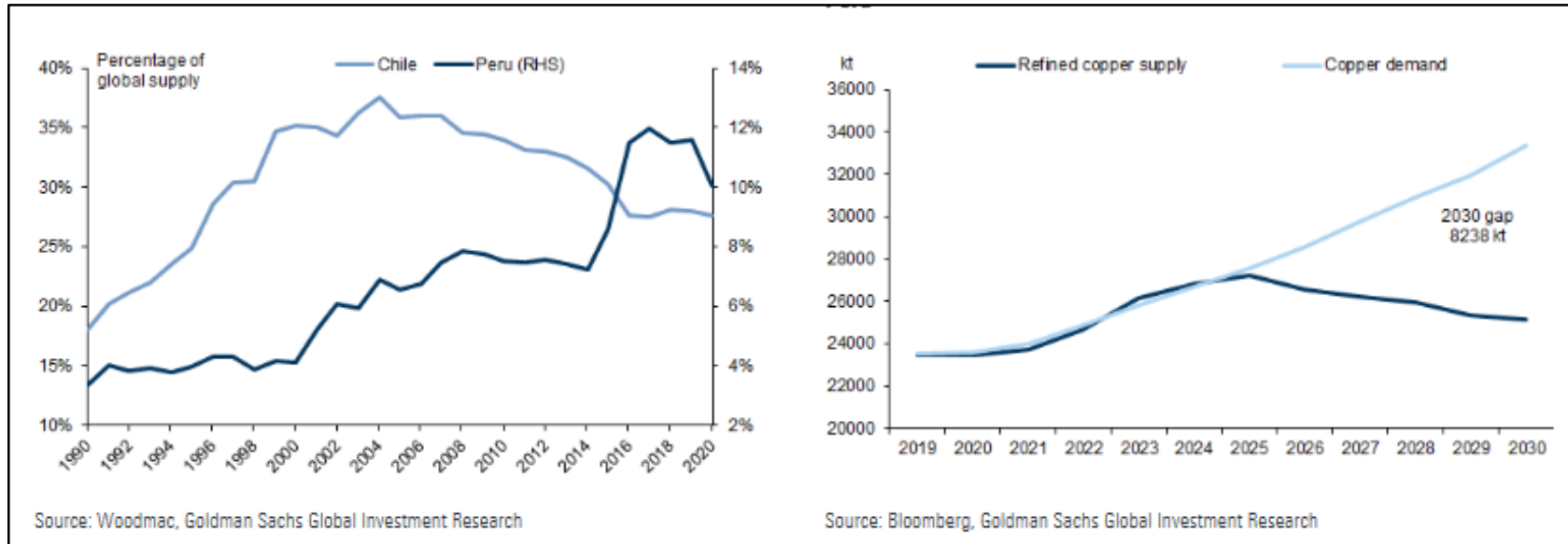
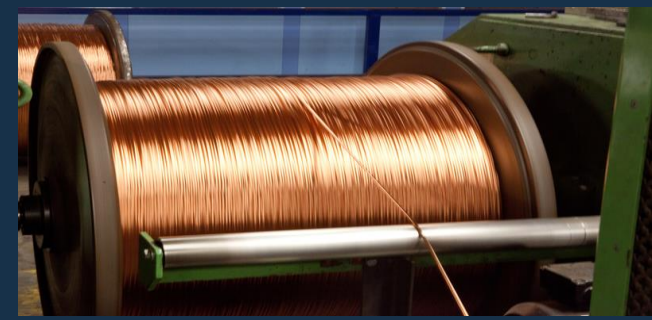


US copper cathode stocks by location (kt)



- ❑ Stocks are at less than 2 week inventories in the USA
- ❑ Cathode is the main raw material to produce rod thus it is expected that rod/wire/cables supply will continue be tight in 2H2021+

# Copper Demand vs Supply – In tight balance Demand may overtake Supply by 2025



**We need other countries to take the lead on supply**

# Factors Affecting Copper Price (almost all positive)

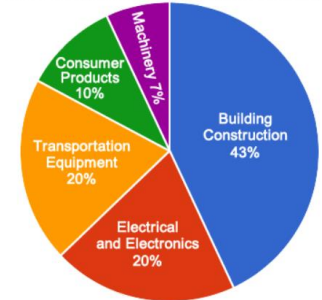
## Last 12 months



**Expect more volatility**

- China economy (+8%) & World GDP (4% to 6%)
- Central banks providing COVID stimulus
- Green initiatives – copper intensive usage
  - Renewables
  - EV (90 kgs/car)
- US Housing starts (better than pre-COVID)
- Manufacturing PMI index (record in July and still at 55+)
- Low inventories (less 2 weeks)
- Labour conflicts (40% - Chile + Peru) were resolved
- Geo political instability (Peru's new President)
- Supply Chain Disruptions (logistics, raw materials etc..)
- Strengthening of US currency (inverse relationship copper)
- Time to start a mine (5-10 years)
- Copper substitution (low to medium) – heat exchangers
- Investment funds (active)

Uses of Copper in the United States During 2019



# Copper Price Indicators

## US and CAD Housing starts taking a pause – Inflation is not!

### Housing Starts



### Inflation



- **Could Keep Copper Prices Under Pressure**
- **Several indicators are showing a downward trend**
- **Labor shortage is a major concern**

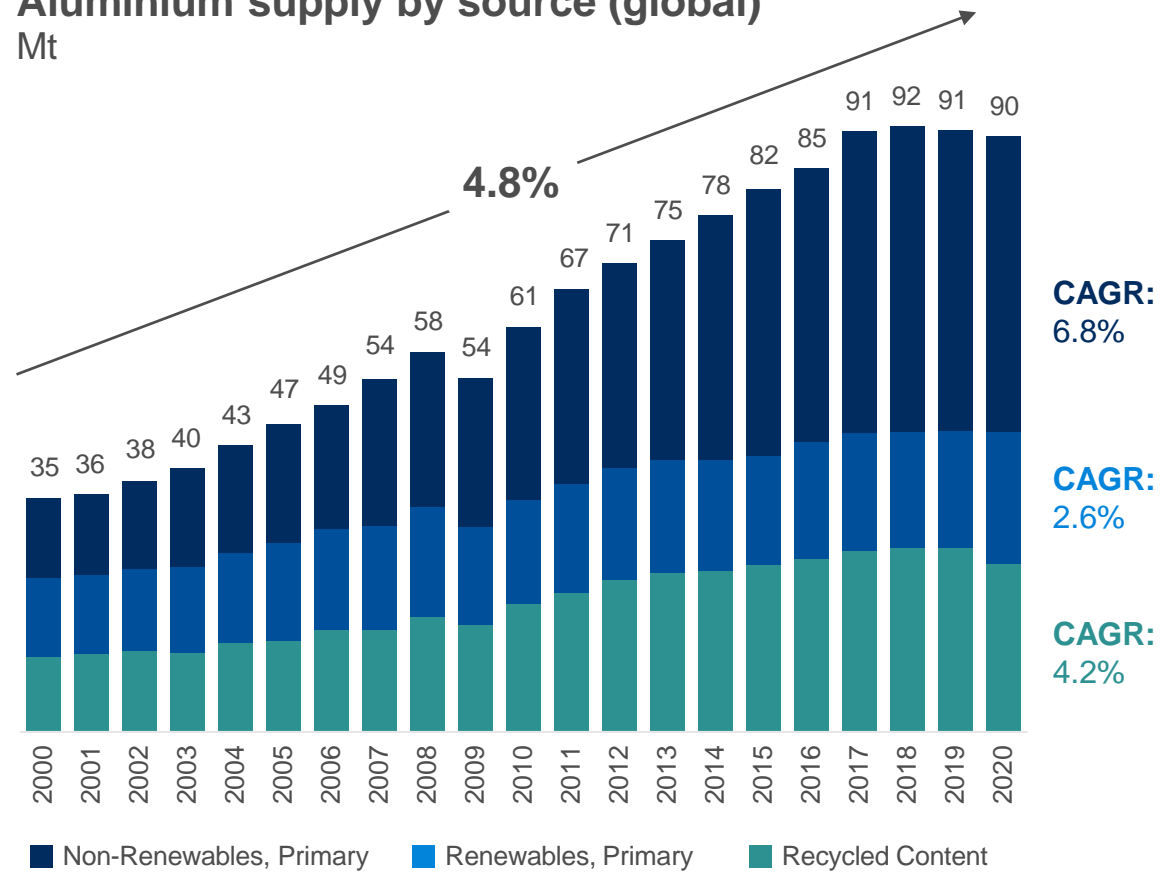
# Aluminium Market





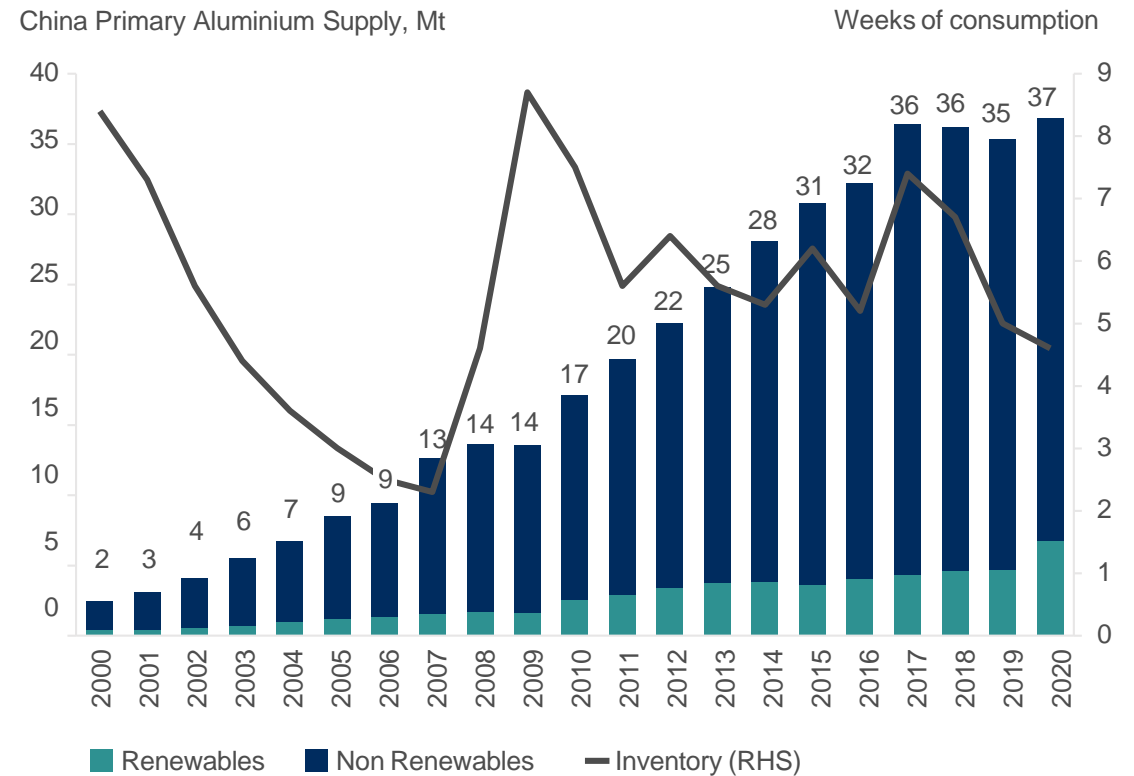
# Potential for positive structural change in the market from energy and smelting caps in China

Aluminium supply by source (global)  
Mt



Sources: Rio Tinto Market Analysis, CRU, IAI.  
Renewables include hydropower and other renewables. Non-Renewables include coal, gas, and nuclear.

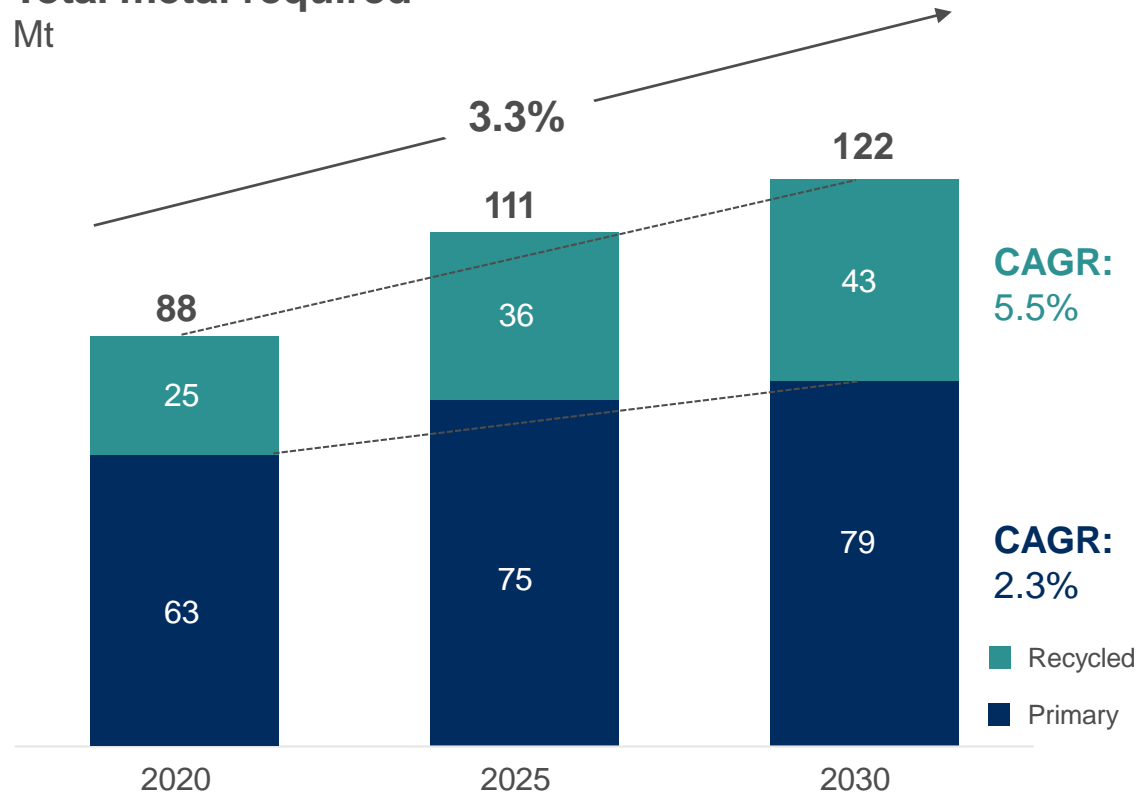
Primary Aluminium supply (China)  
Mt



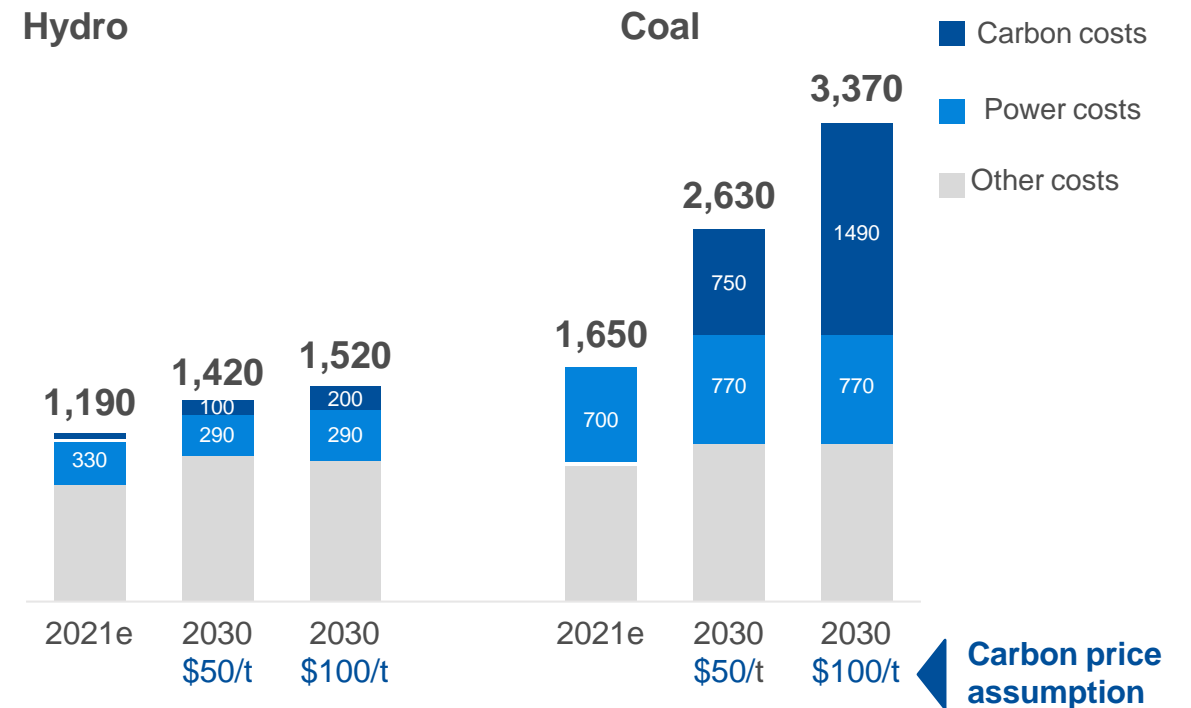
Sources: Rio Tinto Market Analysis, CRU, IAI

# New coal-powered smelting likely to be challenged

Total metal required\*  
Mt



Aluminium smelter all-in cash costs  
(Real US\$2021 per tonne)



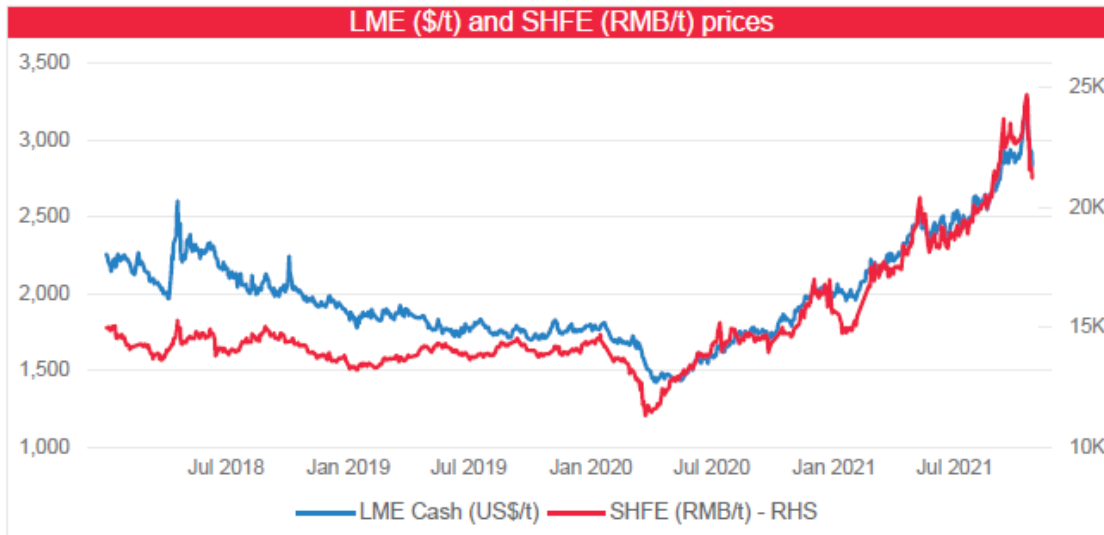
Sources: Rio Tinto Market Analysis, CRU \*Global semis production including melt loss

All non-carbon costs are regional weighted averages from CRU, 2021 (long-run uses 2030 costs). Hydro costs are based on a weighted average of Canadian smelters. Coal costs are based on a weighted average of Chinese smelters from Shandong, Shanxi, Xinjiang and Inner Mongolia.

# Volatility in the short term, tight market in the long term

## LME and SHFE

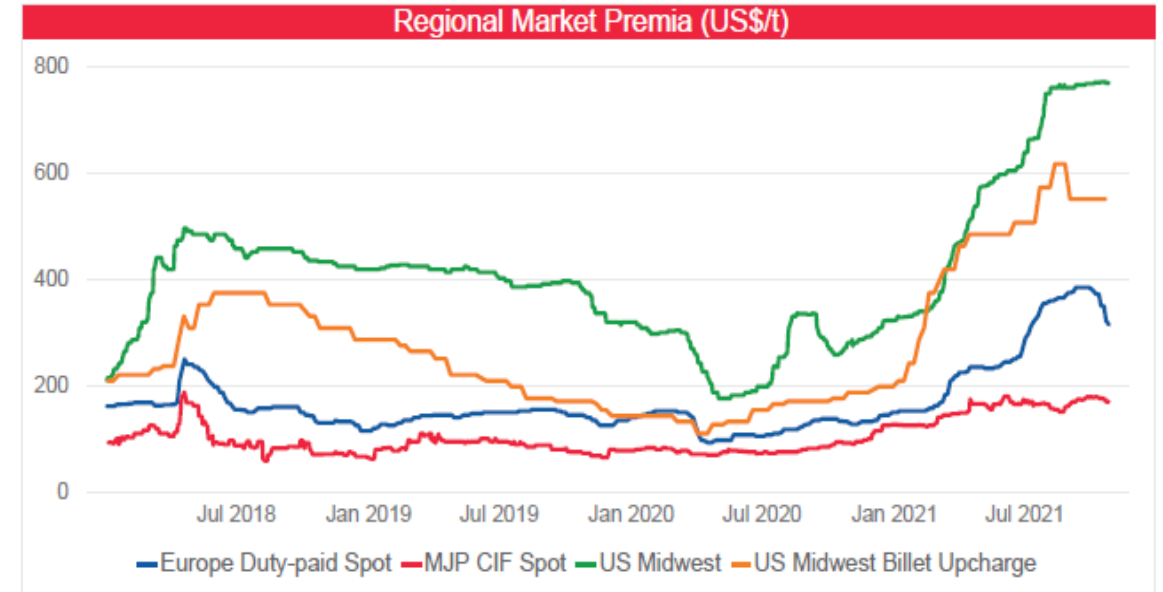
\$/t



LME cash averaged \$2,840/t in September (+8.8% MoM) and SHFE 1M price averaged RMB 22,461/t (+10.8% MoM), supported by power related smelting curtailments and supply cuts in China.

## Regional Premiums

\$/t

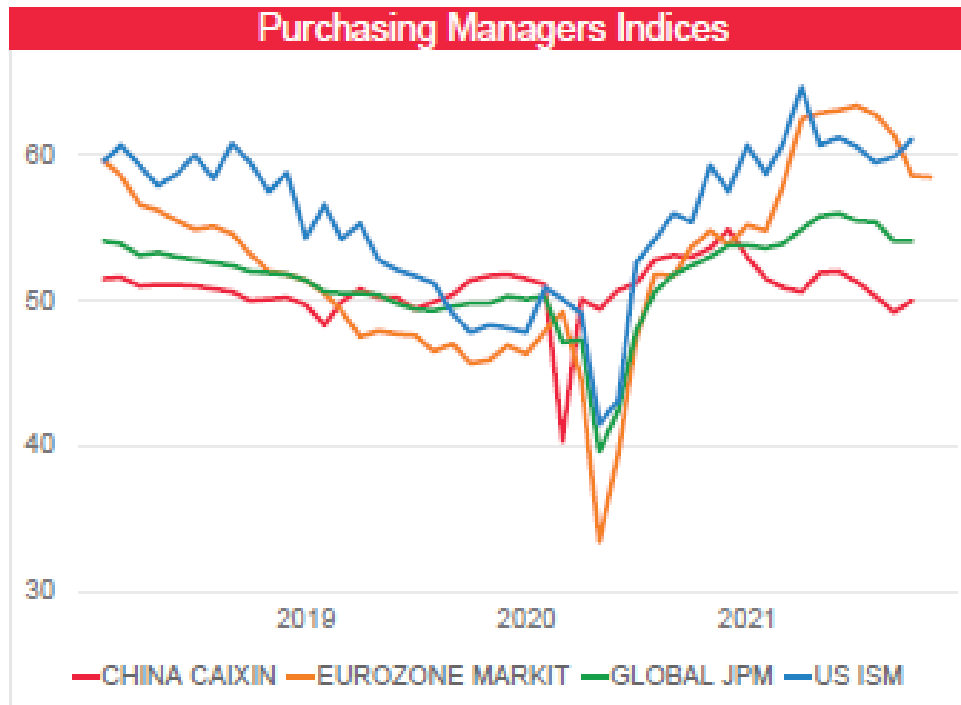


US MW averaged ¢34.7/lb (+0.7% MoM), on dwindling inventories & replacement cost values still prohibitive for bringing metal to the region.

Source: Rio Tinto Market Analysis, Bloomberg, LME, Platts, SHFE, My Metal, CRU

# PMI gains in 2021, near term slowdown

## Purchasing Managers Indices



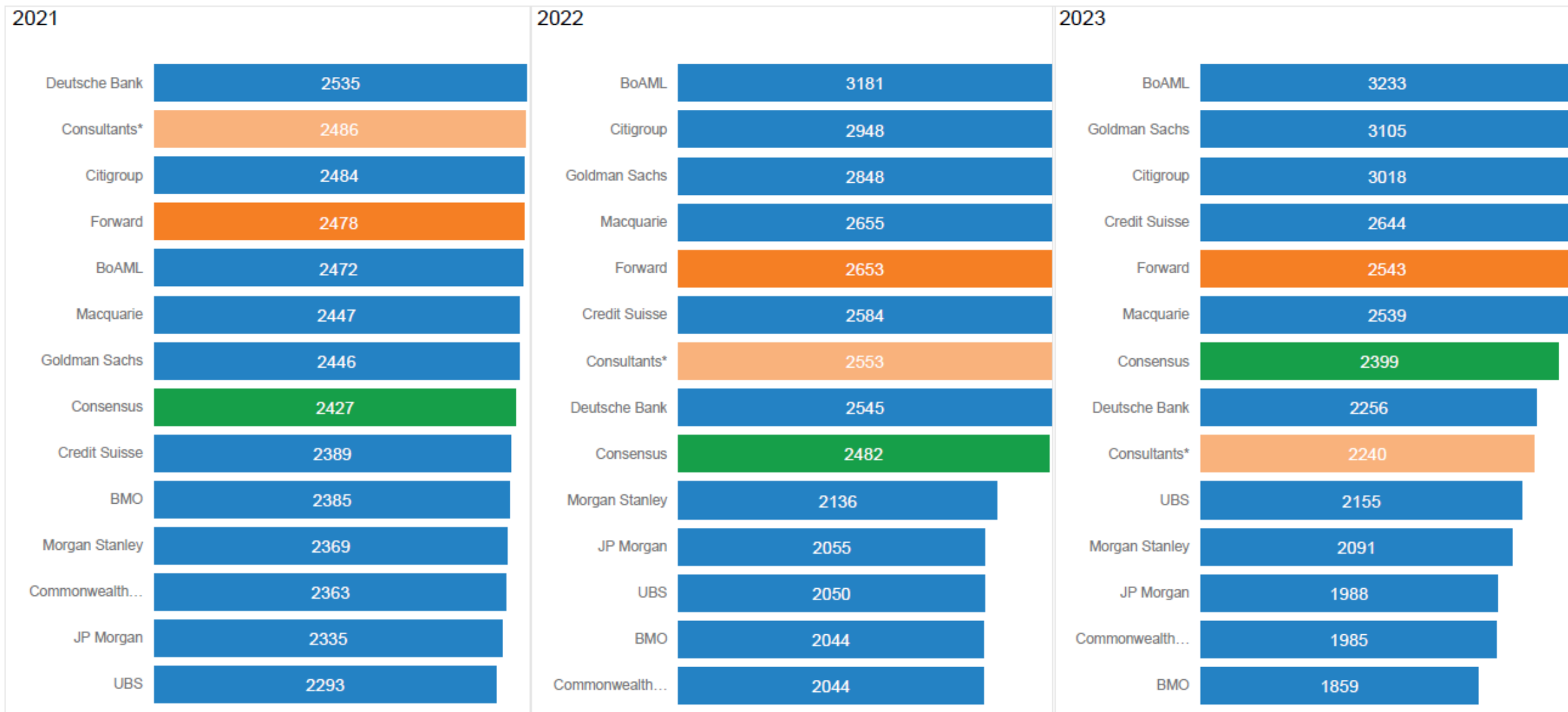
The seasonally adjusted **IHS Global Aluminium Users PMI** indicated a further loss of momentum in September, easing from 53.4 in August to 53.0.

Though the index signaled a continued moderate improvement in overall operating conditions, it was the lowest reading since July 2020.

Companies cited this to supply chain delays and raw material shortages. Softer improvements in new orders were signaled across the three monitored regions with Asia seeing the weakest improvement.

Source: Rio Tinto Market Analysis, Markit,

# Consensus Aluminium Price View





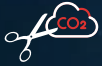
# **Nexans Canada Corporate Social Responsibility Actions**

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# Contribution to Carbon Neutrality by 2030

Action

1



4.2%



average annual reduction of greenhouse gas emissions, particularly on scopes 1&2

Action

2



Use of renewable energy via local production or the purchase of decarbonized energy for all location

Action

3



100%



of production sites certified ISO 14001

Action

4



100%



production waste to be recycled

Action

5



Deployment of energy efficiency solutions at all sites

Action

6



100%



R&D projects to be dedicated to energy efficiency and energy transition, promoting eco-design and low carbon offers

Action

7



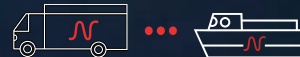
100%



of Nexans cable reels to be connected using IoT and recyclable

Action

8



Optimization of logistical flows by using multi-modal transport and shorter delivery routes

Action

9



100%



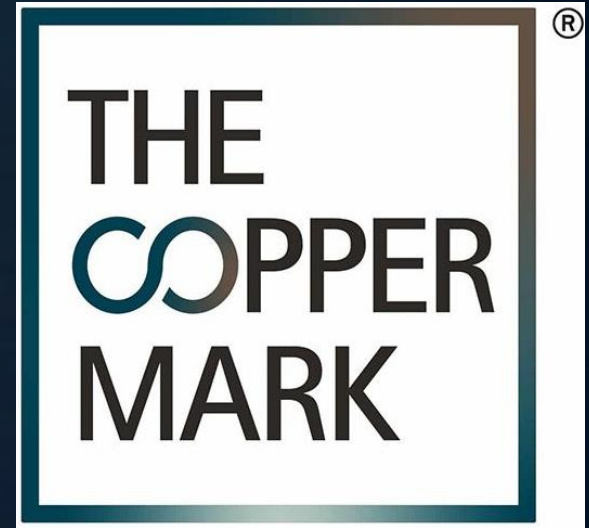
of Nexans employee automobile fleet to switch to either hybrid or electric vehicles

# Corporate Social Responsibility Commitment

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Nexans has joined **The Copper Mark** that demonstrates our commitment to the promotion of responsible copper production.

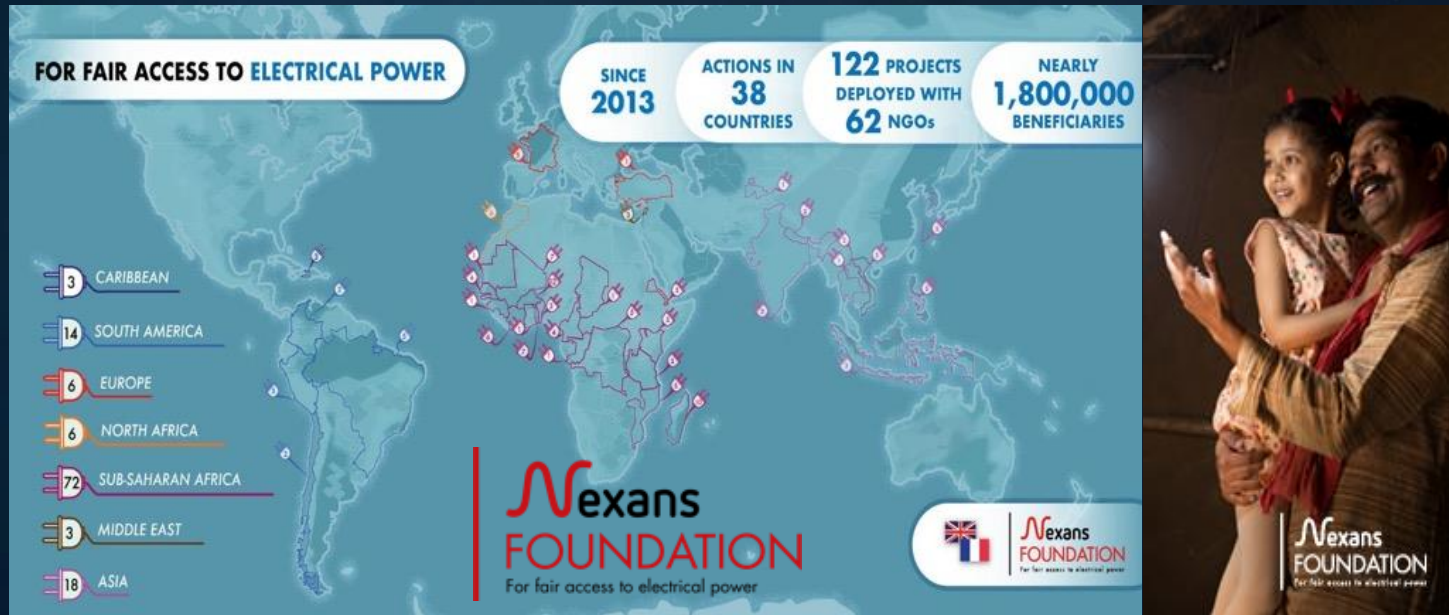
As the only company in its category that is vertically integrated, ensuring responsible copper production with Copper Mark's members reinforces Nexans' overall commitment to the United Nations Sustainable Development Goals.





# Nexans Foundation since 2013

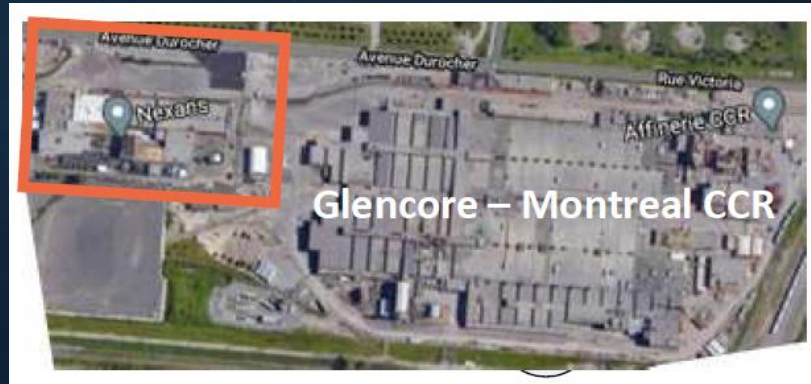
This foundation has been supporting sustainable initiatives bringing access to energy to disadvantaged communities worldwide.



# Corporate Social Responsibility Actions

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- Nexans is fully integrated → 80% copper sourced in Canada
- Glencore – Montreal CCR (2<sup>nd</sup> largest refinery in North America) is next door which means no additional CO2 emission



# Corporate Social Responsibility Services

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## Recycling & Scrap Recovery

We turn scrap or end of life cables into a source of revenue taking care of everything from cable scrap recovery to recycling in strict respect of regulation and legislation.



**ULTRACKER**

## Connected Reels Tracking Solution

These reels tell us where they are, help our customers track their fleet and tell us how much cable is still on the reel. They help our customers monitor their inventory in real time and can also detect any unwanted movement to avoid reels from being stolen.



# START

## Responsible Aluminium

### Empowering a sustainable future

June 2021

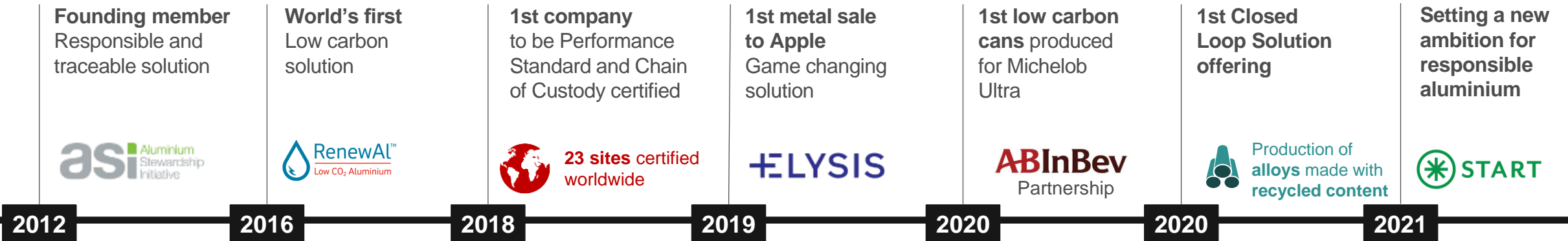
RioTinto

START External Video



# We work hard to leave a lasting, positive legacy in all markets we supply

We are proud to be an industry leader in sustainable thinking and work in partnership across the aluminium value chain to tackle climate change and improve performance.





START provides transparent and traceable information on our aluminium products to empower more informed choices across the supply chain

**Sustainability**

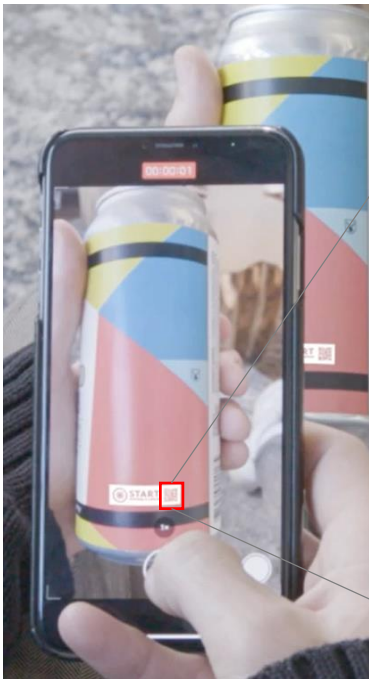
**Traceability**


**Assurance**







Just like a nutrition label that allows us to make more informed decisions about the products we buy, **START** will do the same for the aluminium industry







Please scan this QR code for additional information



## START SUSTAINABILITY LABEL

Customer Name: XXX  
 Site: XXX ASI Certified: XXX Sales Order No.: XXX Total Volume Ordered: XXX Label No.: XXX Date of issue: XXX

ENVIRONMENT*			
<b>LCA Data</b>			
	LCA Values	Sales Order Values	Comparison vs Global Average (%)
<b>Global Warming Potential (CO<sub>2</sub>e / tAl)</b>			
Bauxite Mining	0.02		
Alumina Production	1.33		
Aluminium Production	1.93		
<b>Total</b>	<b>3.29</b>	<b>329.00 tCO<sub>2</sub>e</b>	<b>80% ▼</b>
<b>Site Data</b>			
	Site Values	Sales Order Values	
<b>Water (m<sup>3</sup>/tAl)</b>			
Consumption	0.57	57.00m <sup>3</sup>	
Return	1.82	182.00m <sup>3</sup>	
<b>Energy (electricity)</b>			
Renewable energy %	95%		
<b>Recycled Content (t/tAl)</b>			
Scrap sold externally	0		
External Scrap - Pre-consumer	0		
External Scrap - Post-consumer	0		
<b>Waste (kg/tAl)</b>			
Hazardous waste disposed	0.01	1.00t	
Non-hazardous waste disposed	0.00	0.00t	
Spent pot lining recycled/treated	No		

1. The Comparison vs Global Average demonstrates the advantage of using START vs. a similar product based on global average metrics. The global average is based on 2015 data.

SOCIAL			
	2019 Result	vs 2018 Result	
<b>Rio Tinto Aluminium Safety**</b>			
Fatalities at managed operations	XX	XX	=
All injury frequency rate (AIFR) (per 100,000 hours worked)	X-XX	XX%	▲
Critical Risk Management (CRM) verifications	XXx	XX%	▲
<b>Rio Tinto Aluminium Communities**</b>			
Community Investment	\$28.95 million		
<b>Rio Tinto Third-Party Assessment***</b>			
Due diligence checks completed	3,273	28.8%	▲

GOVERNANCE			
	2019 Result	2018 Result	
<b>Rio Tinto Aluminium Whistleblowing Programme**</b>			
Total number of cases reported	111	77	
Cases substantiated	43%	44%	
<b>Rio Tinto Diversity***</b>			
Women in senior management (target: 2% increase each year)	22.80%	=	
Women in Board roles	11.10%		
Women as a % of graduate intake (target: 50%)	54%	36%	

Rio Tinto's five values – safety, teamwork, respect, integrity and excellence – define how we treat each other and how we work with our partners. For additional information, please go to <https://www.riotinto.com/sustainability/people>

TRANSPARENCY	
Transparency benchmarks are applicable to both Social and Governance categories. Our voluntary commitments and accreditations include participation in a number of global, regional and national organisations and initiatives, and industry accreditation programs.	
<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Aluminium Stewardship Initiative (ASI)</li> <li><input checked="" type="checkbox"/> Extractive Industries Transparency Initiative (EITI)</li> <li><input checked="" type="checkbox"/> Global Reporting Initiative (GRI)</li> <li><input checked="" type="checkbox"/> International Council on Mining &amp; Metals (ICMM)</li> <li><input checked="" type="checkbox"/> International Organisation for Standardisation (ISO)</li> <li><input checked="" type="checkbox"/> Rio Tinto's Sustainable Development Report</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Rio Tinto's Annual Report</li> <li><input checked="" type="checkbox"/> Rio Tinto's Climate Change Report</li> <li><input checked="" type="checkbox"/> United Nations Global Compact (UNGC)</li> <li><input checked="" type="checkbox"/> United Nations Sustainable Development Goals (UNSDG)</li> <li><input checked="" type="checkbox"/> United Nations Universal Declaration of Human Rights (UNUDHR)</li> <li><input checked="" type="checkbox"/> Voluntary Principles on Security &amp; Human Rights (VPSHR)</li> </ul>

\* Environment data - 2019 at site level  
 \*\* Social and Governance data - 2019 at Product-Level (Aluminium)  
 \*\*\* Social and Governance data - 2019 annual values at Corporate level

For further information, including details on the scope, methodology and definitions, visit: [www.startresponsible.com](http://www.startresponsible.com) or contact us at: [START@riotinto.com](mailto:START@riotinto.com)





**START** provides transparent information from mine to market across 10 key criteria

## Environment

1. Greenhouse gases
2. Water management
3. Renewable energy
4. Recycled content
5. Waste management



Bauxite Mining

## Social

6. Safety performance
7. Contribution to communities
8. Third-party due diligence



Alumina Refinery



Aluminium Smelting



Aluminium Casting

## Governance

9. Whistleblowing programme
10. Diversity



End user



# Empowering a sustainable future

Contact us at:

 [START@riotinto.com](mailto:START@riotinto.com)

 [@startresponsible](https://www.instagram.com/startresponsible)

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

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**RioTinto**



# Key Takeaways

- Nexans Canada is a **vertically integrated manufacturer with 80% copper sourced** and has **strong material partners**
- Nexans produces **three cable designs** that have considerable overlap in both **copper and aluminum**
- **Copper Price:** - short term: expect volatility
  - - long term: elevated if demand continues to exceed supply
- Manufacturing is experiencing **supply issues** and **manpower shortage**
- Inflation is at **record high** that could lead to bank rate increases in 2022
- Nexans Canada has implemented **several CSR actions** contributing to carbon neutrality by 2030
  
- Rio Tinto is **reliable supplier with an integrated supply chain**
- Aluminum market fundamentals are **strong –volatility** on the short term, but tight market on the long term
- World faces green evolution, triggering higher **sustainability** requirement
- START provides **transparent and traceable information on our aluminum** products to empower more informed choices across the supply chain



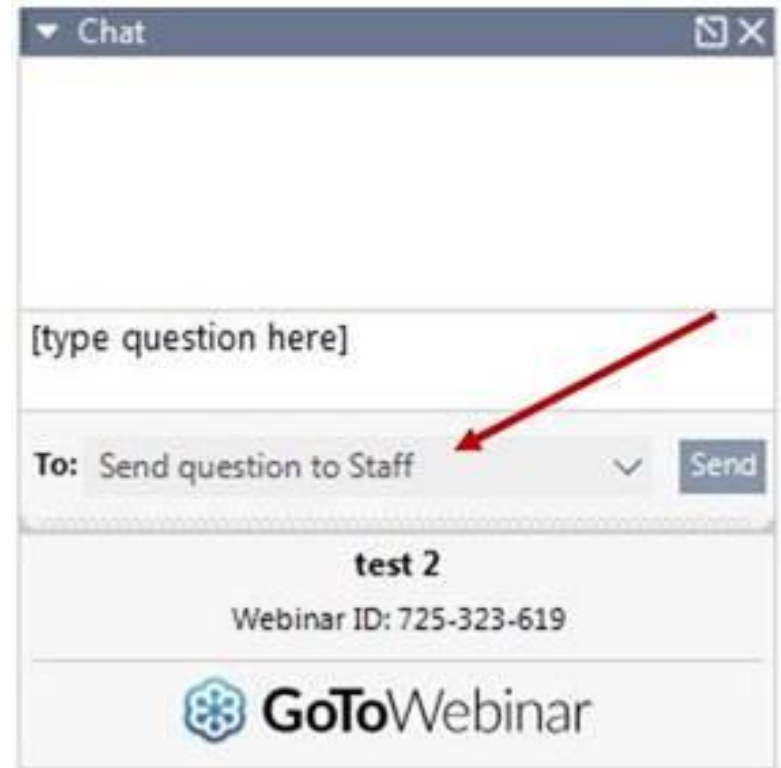
# Industry Education

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## Our Previous Webinar Recordings

- **Cables 101** - click [here](#) to watch it
- **Raw Materials Insights with Dow** - click [here](#) to watch it
- **Renewable Energy Trends** – click [here](#) to watch it
- **Emerging Trends for Utility Cables** – click [here](#) to watch it
- **Key 2021 Electrical Code Changes Impacting Wire and Cable** – click [here](#) to watch it
- **15 kV Medium Voltage Armoured Cables** – click [here](#) to watch it
- **Connected Drums - Nexans Canada's Reel Tracking Solution** – click [here](#) to watch it
- **DriveRx® VFD Cable 2.0** – click [here](#) to watch it
- **CORFLEX®** – click [here](#) to watch it
- **Prior VFD webinar** – click [here](#) to watch it

# Q & A





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