

# ENABLING COBALT'S POTENTIAL IN THE EU: Towards the Best Workplace Value

**10.30-11.30 CET**

**28 JUNE 2023**

# Speakers



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**Human Health**  
**Cobalt Institute**



# Agenda

**10.30-10.40** Welcome and opening statement

**10.40-10.55** Past, present, and future – The European Union and cobalt regulation

**10.55-11.15** Cobalt Institute's evidence-based EU workplace values

**11.15-11.25** Q & A

**11.25-11.30** Takeaways and next steps



Scene Setting

# Introduction To Cobalt Institute

# Cobalt Institute



Global trade association representing the cobalt industry and value chain.



Promotes the sustainable and responsible production and use of cobalt.



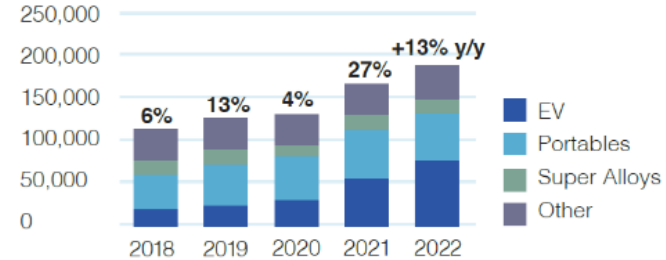
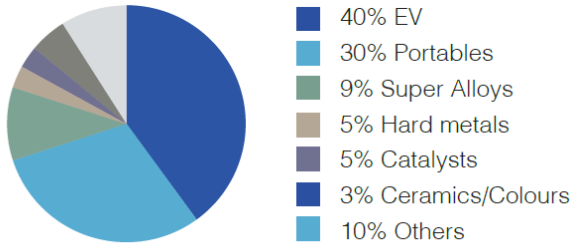
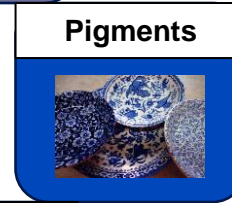
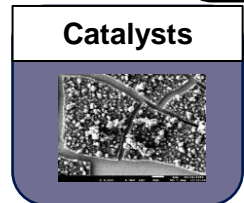
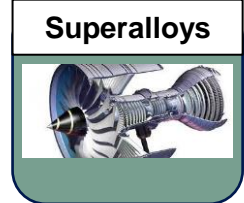
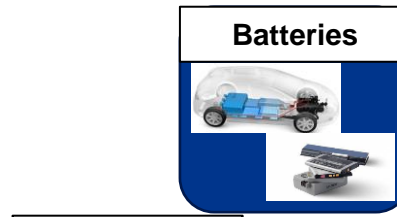
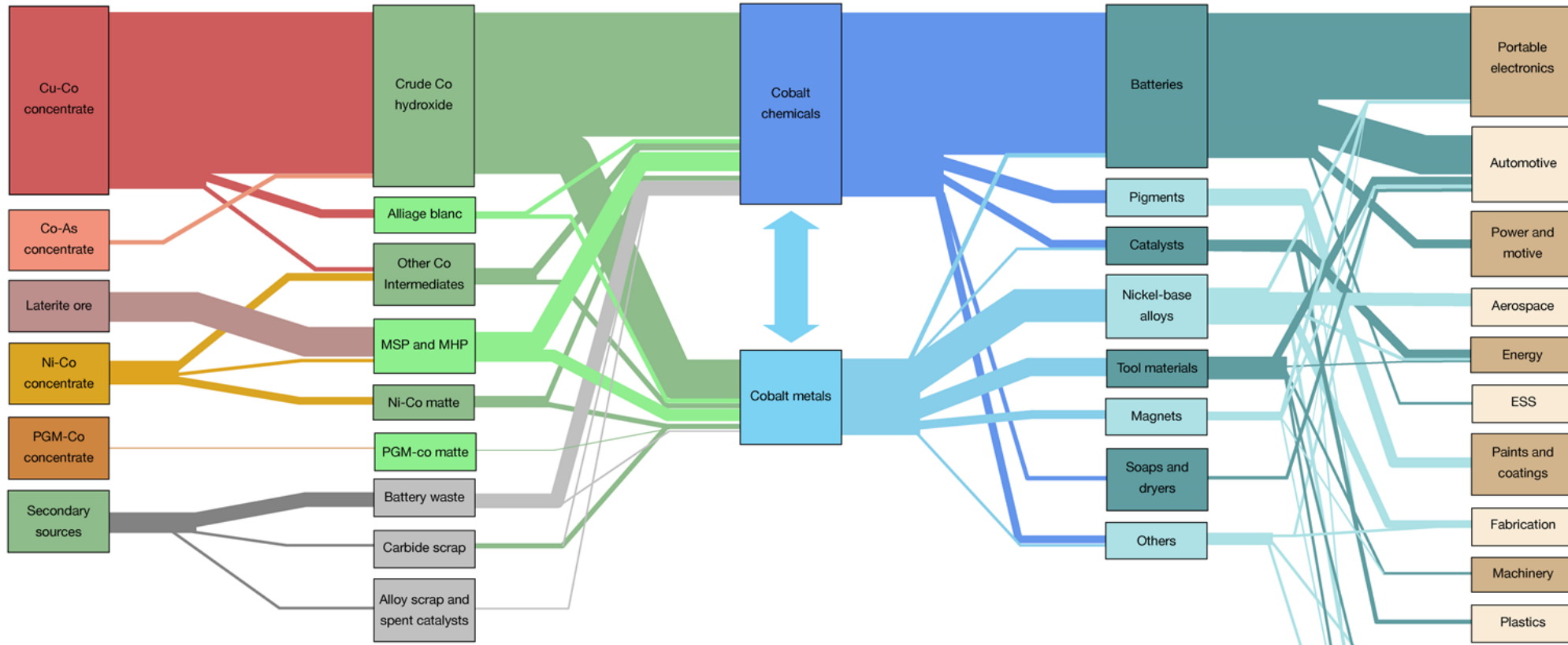
Knowledge centre for regulators, governments, industry, NGOs the media and the public.

# CI Members





# The Cobalt Value Chain And The Essentiality of Cobalt In Its Uses



Source: Cobalt Institute Market Report 2022

Source: Cobalt Market Report 2022

# What Is An OEL And Why Do We Need One For Cobalt?



## Occupational Exposure Limit

An OEL is a workplace air level for cobalt that is not to be exceeded

### Health Based

- Risks resulting from cobalt exposure in the workplace are best controlled with an OEL

### Technically and economically feasible

- A binding EU-wide OEL will be set across all EU member states, to harmonise the level of cobalt in workplaces



The basis behind CI Recommended OEL Values: Protect workers and allow industry to continue to operate in Europe



# Can A Cobalt OEL Affect The Cobalt Value Chain And Europe's Ambitions For The Green Transition?

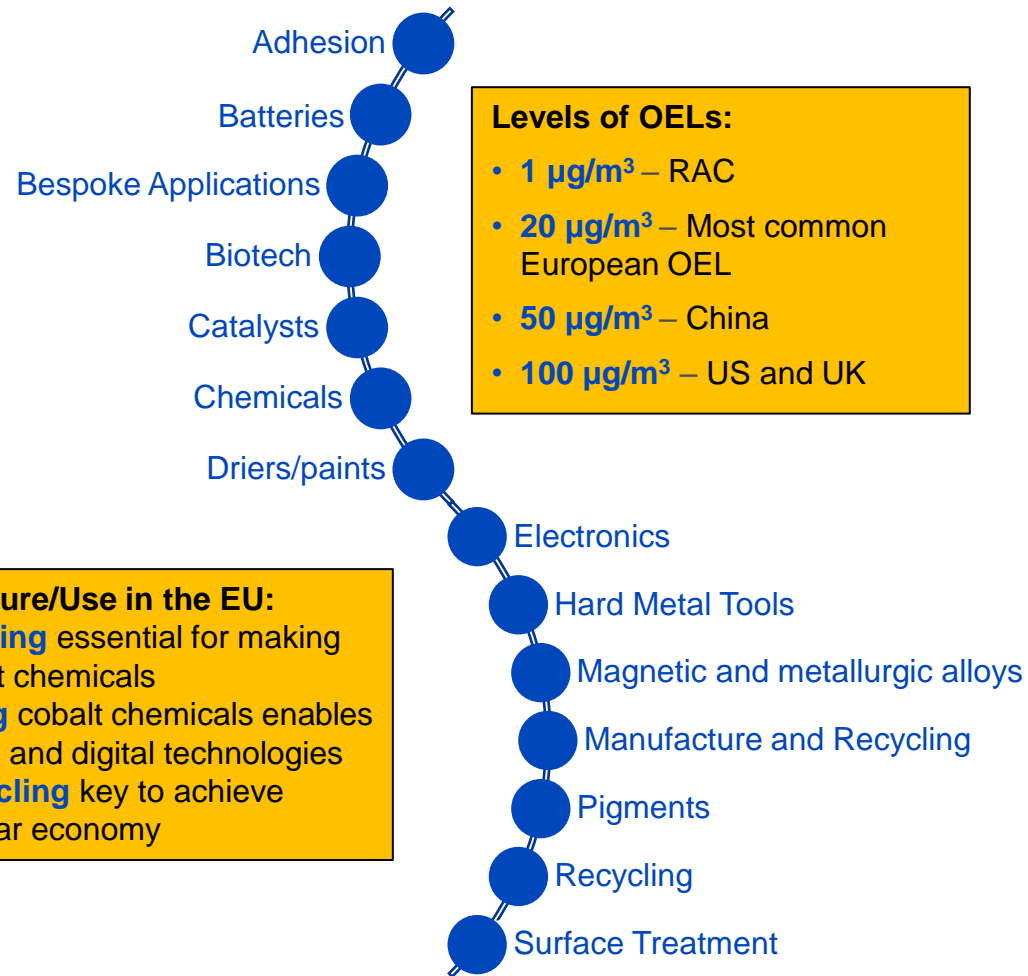
- Cobalt as a Critical Raw Material (CRM)
- Cobalt as a Strategic Raw Material (SRM)
- Cobalt critical and strategic in other regions (i.e. UK, USA, China)



**OEL value**

**Determines economic feasibility and viability of EU investment in cobalt production, refining, use or recycling.**

**Cobalt 'value chain'**  
Impacts can affect multiple sectors



**Levels of OELs:**

- 1  $\mu\text{g}/\text{m}^3$  – RAC
- 20  $\mu\text{g}/\text{m}^3$  – Most common European OEL
- 50  $\mu\text{g}/\text{m}^3$  – China
- 100  $\mu\text{g}/\text{m}^3$  – US and UK

**Manufacture/Use in the EU:**

- **Refining** essential for making cobalt chemicals
- **Using** cobalt chemicals enables green and digital technologies
- **Recycling** key to achieve circular economy

OEL	$\mu\text{g}/\text{m}^3$ fraction
RAC	1
Denmark	10
Belgium	20
Canada - Ontario	20
Canada - Québec	20
Finland	20
Ireland	20
Israel	20
New Zealand	20
Norway	20
Poland	20
Singapore	20
South Korea	20
Spain	20
Sweden	20
Germany	TBD
The Netherlands	20
Australia	50
People's Republic of China	50
Romania	50
Switzerland	50
Austria	100
Hungary	100
USA	100
United Kingdom	100
Latvia	500

# The Right OEL Is Needed To Enable Cobalt's Production And Use In The EU



An OEL needs to be set at an appropriate level to **protect workers and enable industry** to operate in Europe



Cobalt can contribute to a **greener, more circular and sustainable** Europe

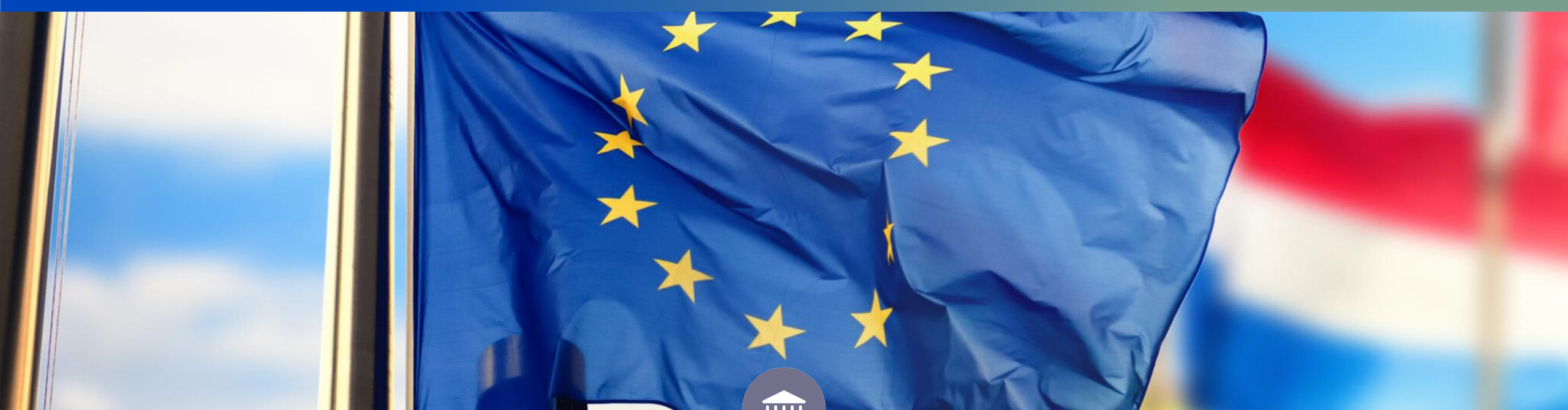


Europe needs cobalt as a **CRM** and **SRM** to reach its **political objectives**



**CI Recommended Values**  
**5  $\mu\text{g Co/m}^3$  (respirable)**  
**20  $\mu\text{g Co/m}^3$  (inhalable)**

Health-based, technically feasible and most economically feasible.



# Past, Present And Future

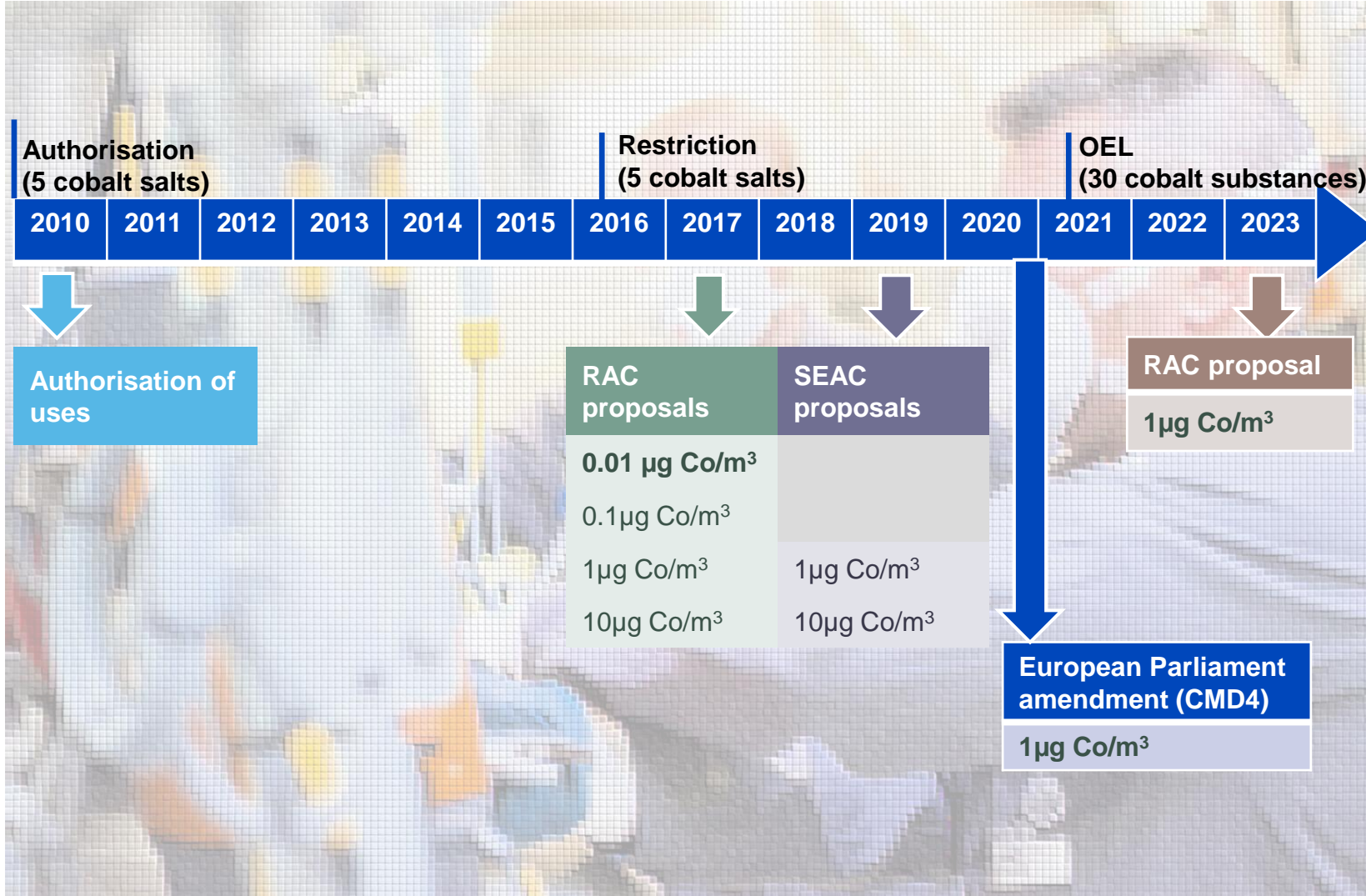
## The European Union And Cobalt Regulation



# An OEL Is The Right Regulatory Measure For Cobalt

Where we came from

Started without an analysis of the best measure to put in place



Where we are now

Risks via cobalt exposure best managed with appropriate workplace legislation

Cobalt is a *precedent-setting, first metal*, to go from a REACH to an OSH process. If done properly, the OEL is the best risk management measure.

# The EU OEL Recommendation And Importance Of The Global Context

RAC Opinion (1 Dec 2022)	
Derived Limit Values <sup>1</sup>	
OEL as 8-hour TWA <sup>2</sup> :	0.0005 mg Co/m <sup>3</sup> (0.5 µg Co/m <sup>3</sup> ; respirable fraction)
	0.001 mg Co/m <sup>3</sup> (1 µg Co/m <sup>3</sup> ; inhalable fraction)

OEL (Gestis)	µg/m <sup>3</sup> *	OEL (Gestis)	µg/m <sup>3</sup> *
<b>RAC recommendation</b>	<b>1</b>	<b>Spain</b>	20
<b>Denmark</b>	10	<b>Sweden</b>	20
<b>Belgium</b>	20	<b>Germany</b>	(TBD)
Canada - Ontario	20	<b>The Netherlands</b>	20
Canada - Québec	20	Australia	50
<b>Finland</b>	20	People's Republic of China	50
<b>Ireland</b>	20	<b>Romania</b>	50
Israel	20	Switzerland	50
New Zealand	20	<b>Austria</b>	100
Norway	20	<b>Hungary</b>	100
<b>Poland</b>	20	USA	100
Singapore	20	United Kingdom	100
South Korea	20	<b>Latvia</b>	500

\*inhalable or total fraction

A disproportionately low value will **have massive impacts on the manufacture, use and recycling of cobalt in Europe**

Disproportionate values will **make Europe less attractive and competitive** than other jurisdictions, drive substitution and industry closures, and make it impossible to meet its Green Deal ambitions

The most common OEL value in the EU is 20 µg Co/m<sup>3</sup> – **workers are protected at this level**

# Cobalt Is A Political Priority For The EU



## Cobalt is a Critical Raw Material

**The European Union cannot function without critical raw materials.**

And the demand for critical raw materials will dramatically rise over the next several years and decades.



## Cobalt is a Strategic Raw Material

**The EU needs these for key sectors.**

Batteries and defence sectors need strategic raw materials.

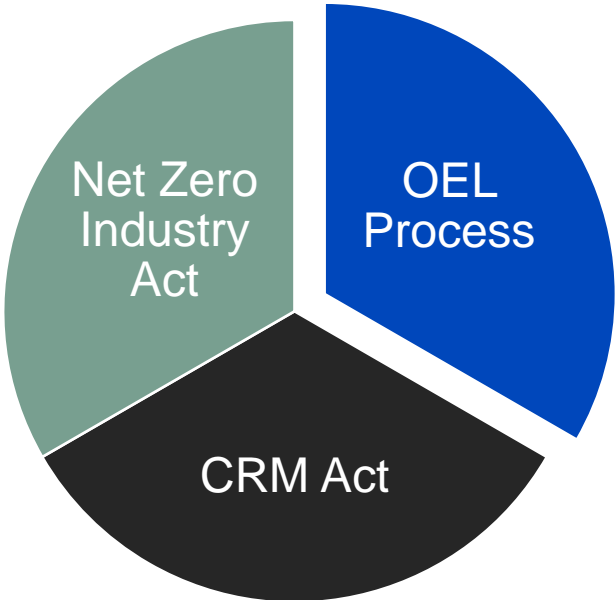
## Resilience of EU Cobalt Sourcing for Strategic Autonomy

**The EU depends heavily on a few third countries** for strategic raw materials.

The EU's ambitious plans will require *substantially increased investment* compared to today.



# Meeting Europe's Ambitions And Securing Investment



Policies need to be aligned to enable the future of cobalt in the EU

2023 / 2024

European refining capacity meets some of its own demand today, but it is behind compared to China, Africa and North America.

2030

CRM Benchmarks  
10% Extraction  
40% Processing/refining  
15% recycling

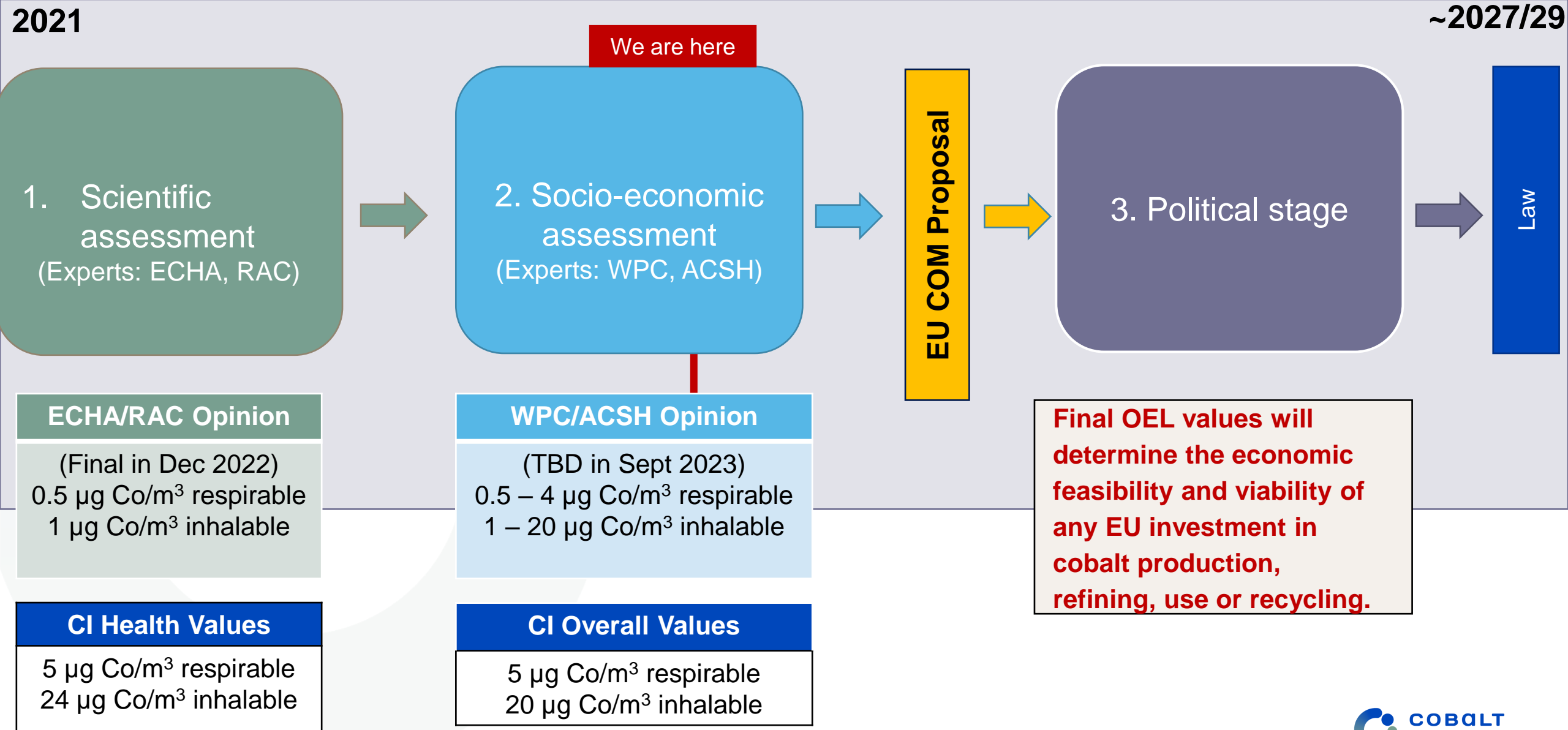
2050

Recycling to theoretically provide 67% of Europe's total cobalt demand.



# Cobalt Institute's Evidence-Based EU Workplace Values (OELs)

# The EU-Wide Cobalt OEL Process Consists of Three Major Stages

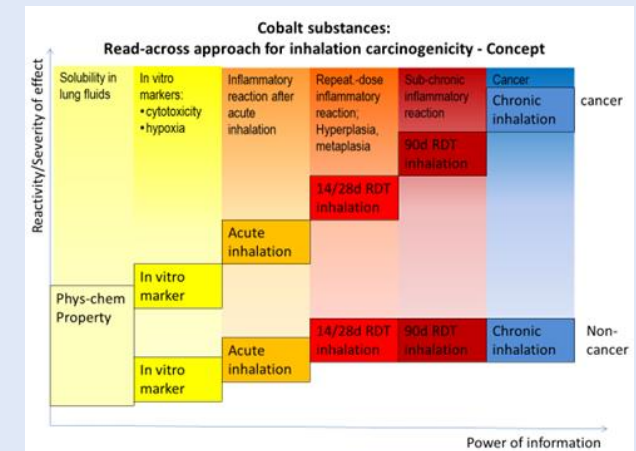




# The Data Behind Cobalt Institute's OEL Recommendations

Toxicology and mode-of-action	Epidemiology	Leading Health effects
<b>Cancer</b> → NTP rodent studies	<b>Cancer</b> → Hard metal epidemiology studies; Marsh et al. 2017 etc.	→ Lack of cancer in human cohorts, at exposures observed  → Cancer in rodents, at high exposures (mice and rats)  → Decrease in lung function (humans)
<b>Mode-of-action, inhalation toxicity</b> → CI inhalation 'read across' carcinogenicity prediction	→ Sauni et al. 2017	
<b>Genotoxicity</b> → CI genotoxicity database, e.g. Kirkland et al. 2015	<b>Non-cancer</b> → Sauni et al. 2010 + Roto et al. 1980; Swennen et al. 1993; Linna et al. 2003; Verougstraete et al. 2004	

## Cobalt Institute Inhalation Carcinogenicity Testing Paradigm

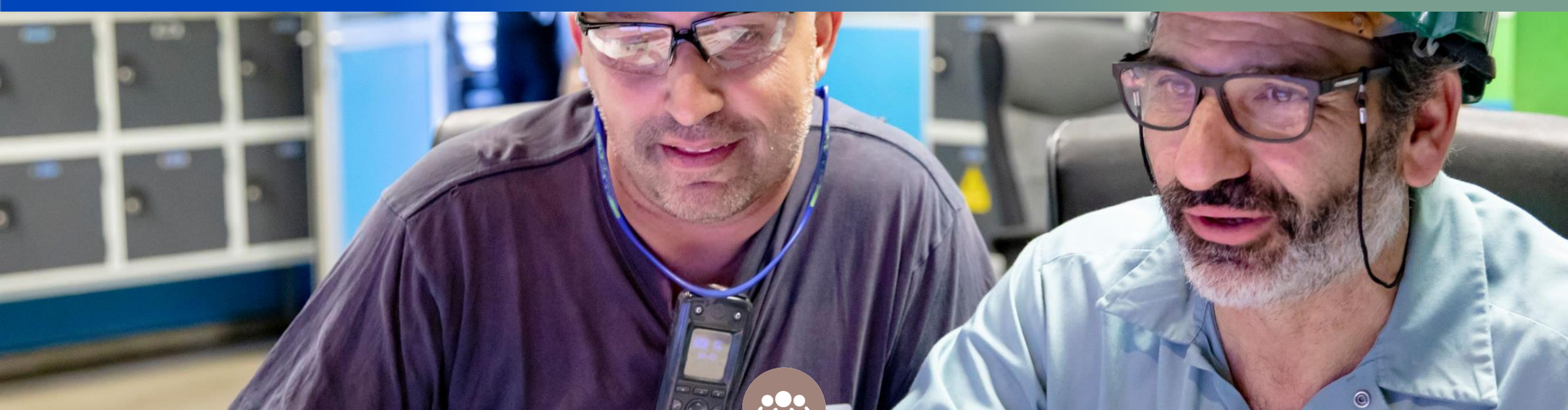


**CI Legal Requests to ECHA → Studies requested that have direct relevance for OEL process**

- In 2018: To support a threshold
- In 2019: To support the poorly reactive group

June 2023 → Awaiting approval to proceed

In addition to most common OEL in EU (inhalable – to protect against respiratory impairment), a respirable OEL is also needed to protect against cancer.



# Cobalt Institute's Scientific OEL Recommendations

# CI Health-Based OEL of 5 $\mu\text{g Co/m}^3$ Respirable Is Protective For Cancer

1. ECHA – No safe level for cancer

0.01 – 20  $\mu\text{g Co/m}^3$

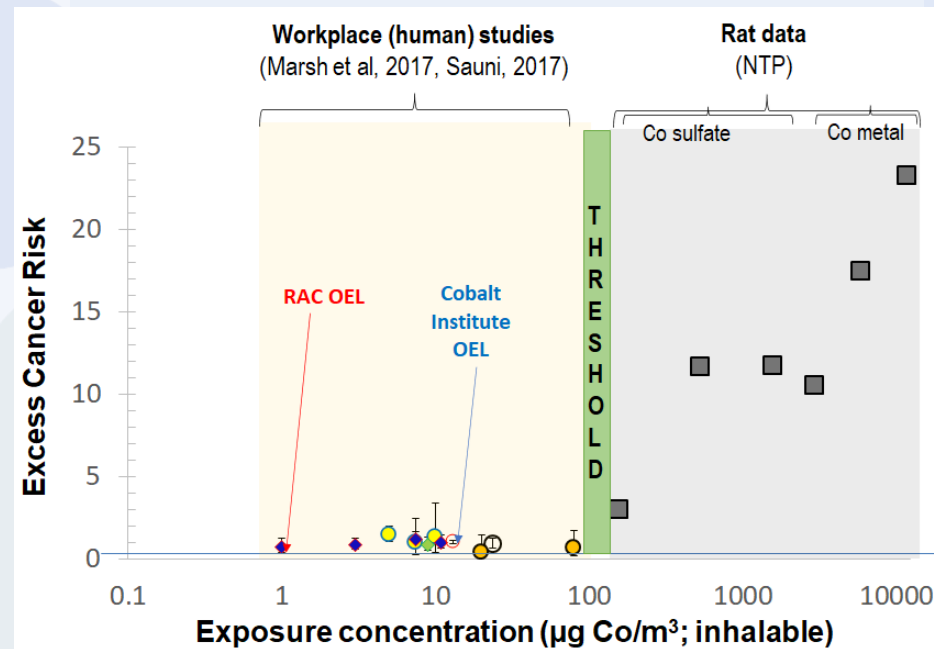
525 cancer cases predicted at 5  $\mu\text{g Co/m}^3$

2. RAC – No safe level for cancer + levels with less risk

0.5  $\mu\text{g Co/m}^3$

481 cancer cases predicted at 5  $\mu\text{g Co/m}^3$

In Cobalt Workplaces  
**NO observed excess cancer cases up to threshold**



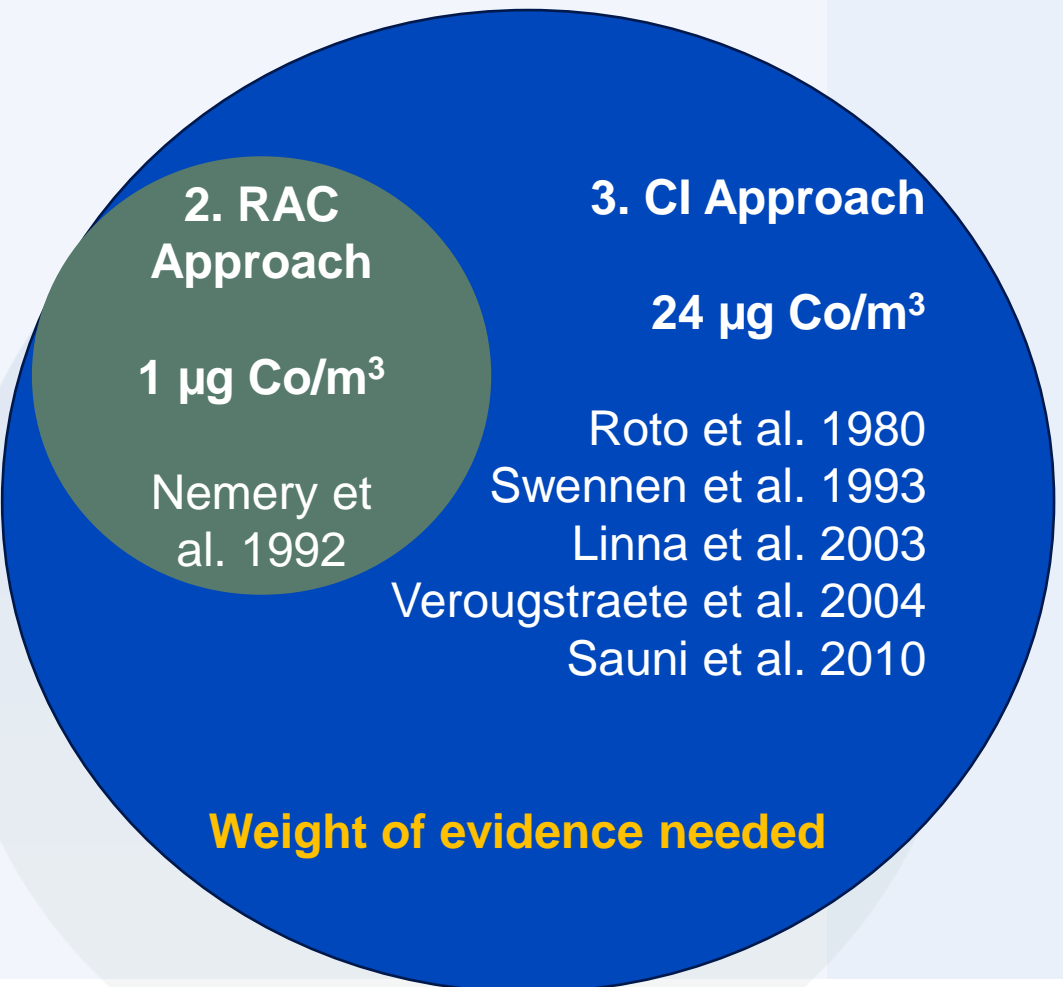
3. CI – Threshold / Safe Level  
5  $\mu\text{g Co/m}^3$

Use of rat data + human workplace data

- Use of all robust scientific evidence
- Safe level / threshold exists



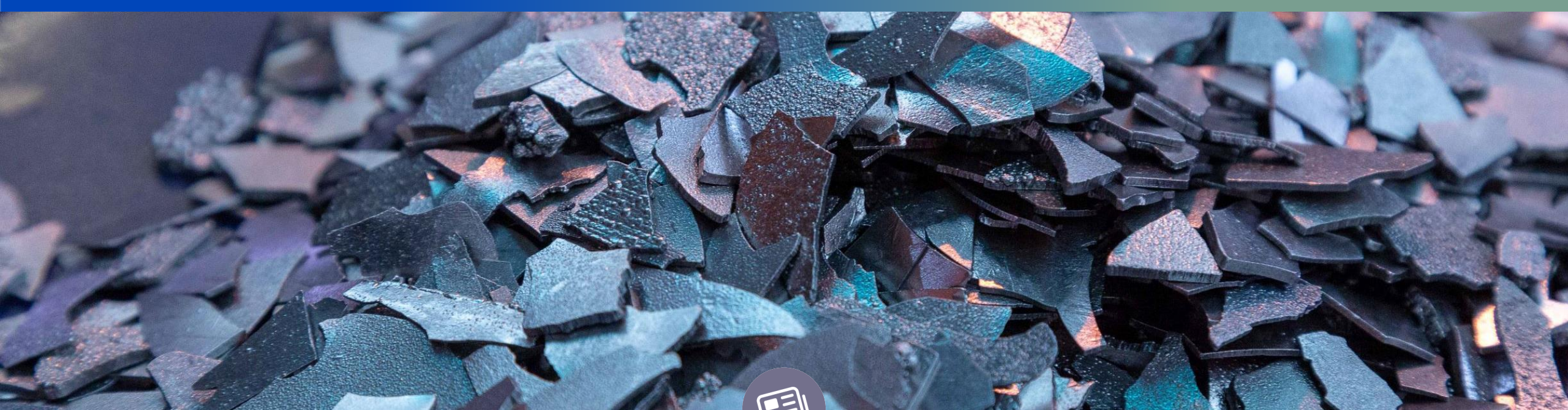
# CI Health-Based OEL Of 24 $\mu\text{g Co/m}^3$ Is Protective For Respiratory Impairment



## Robust and relevant studies should be used for derivation

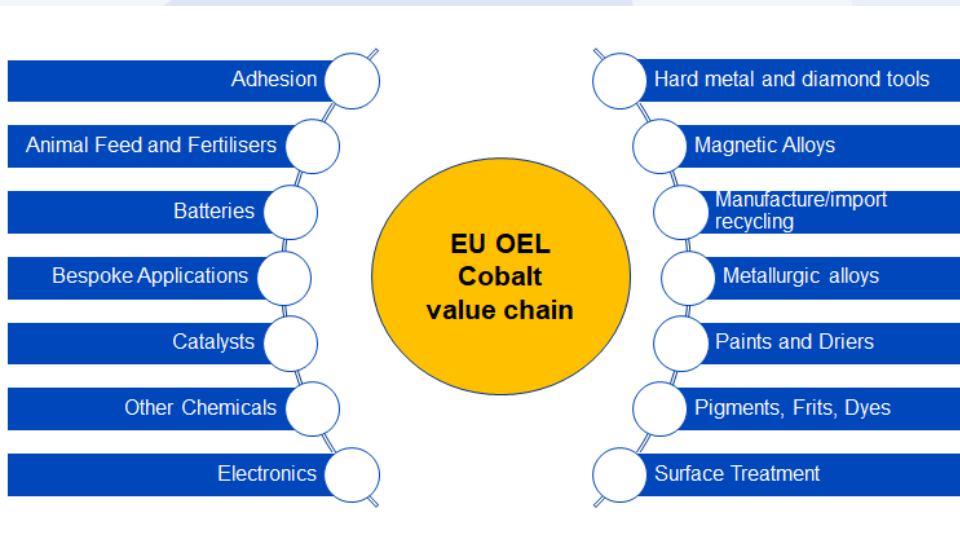
- Use of Sauni et al. 2010, along with Belgian and Finnish Cohort Data
- Over 50 years of information on workplaces
- Derivation performed in workplace without co-exposures
- ACGIH recommendation uses similar database
- Most common EU Member State OELs use similar database

OEL	$\mu\text{g/m}^3$ fraction
<b>RAC</b>	<b>1</b>
<b>Denmark</b>	10
<b>Belgium</b>	20
Canada - Ontario	20
Canada - Québec	20
<b>Finland</b>	20
<b>Ireland</b>	20
Israel	20
New Zealand	20
Norway	20
<b>Poland</b>	20
Singapore	20
South Korea	20
<b>Spain</b>	20
<b>Sweden</b>	20
<b>Germany</b>	TBD
<b>The Netherlands</b>	20
Australia	50
People's Republic of China	50
<b>Romania</b>	50
Switzerland	50
<b>Austria</b>	100
<b>Hungary</b>	100
USA	100
United Kingdom	100
<b>Latvia</b>	500



# Cobalt Institute – Industry-Led Socioeconomic Impact Assessment (SEIA)

# Industry-Led SEIA – Impact Of Introducing EU-Wide Co OEL Values On Cobalt Industry



**eftec**  
economics for  
the environment

## Impact Assessment: Binding Occupational Exposure Limits for cobalt metal and cobalt substances

Final report

Cobalt Institute (CI)

June 2023

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Hackney Road  
London E2 7PR

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eftec@eftec.co.uk  
eftec.co.uk

**Performed by: eftec**

**Aim:** To build on 10 years of SEA and value chain data

**Scope:** OEL values of 30, 20, 10, 1  $\mu\text{g Co/m}^3$  inhalable; manufacture and use of Cobalt and Cobalt Compounds (Direct and Indirect) in EU-27

**\*\*Final report sent to COM SEIA contractor and WPC Employer Rep on 7<sup>th</sup> June**



# Estimates Of Exposure And Conversion Factors Needed for SEIA

High quality exposure data from 10+ years converted from REACH to OSH.

Predominantly inhalable fraction.

Conversion factor (to convert between inhalable and respirable) needed.

Conversion factor may differ between uses, with a factor of at least 4 considered.



# CI Industry SEIA Key Data On EU Value Chain



Covering:  
**30 substances**  
**24 broad uses**



Estimated:  
**7,000 companies**  
**9,000 sites**  
**641,000 FTE Workers\***

\* ~ 72,000 workers exposed



Amount of cobalt and cobalt  
substances used:  
**177,000 tonnes/year**



Estimated current market  
value of substances  
manufactured in EU-27:  
**€7.6 Billion**

# Industry SEIA Shows Net Costs To Society For OELs from 1 – 20 µg Co/m<sup>3</sup> Inhalable

WPC Policy Option	Inhalable Fraction µg Co/m <sup>3</sup>	Total annual costs (€ million per year)	Total annual benefits (€ million per year)	Benefit-Cost Ratio (BCR)
1	20	€400 (€280 – €520)	€14 (€11 – €18)	0.036 (0.021 – 0.064)
2	10	€680 (€490 – €880)	€15 (€11 – €19)	0.022 (0.013 – 0.038)
3	5	Not assessed by Industry		
4	1	€1,160 (€870 – €1,450)	€15 (€12 – €19)	0.013 (0.008 – 0.022)

Total annual costs/benefits: Mid-point shown; low and high range in brackets



**20 µg Co/m<sup>3</sup> is least disproportionate of all values assessed**

**Costs significantly higher (10 – 300x) than benefits for all Policy Scenarios**

- At 10 µg/m<sup>3</sup>: 1,550 sites to close with 110,000 jobs lost
- At 1 µg/m<sup>3</sup>: **3,300 sites close and 220,000 jobs lost**
- **No viable alternatives** to cobalt
- Different sectors will require **longer transition with higher levels**

**10 and 1 are prohibitively expensive and make the EU uncompetitive and less attractive for investment.**



# The CI's Qualitative Impact Assessment Of OELs On The EU Goals Supports A Value Of 20 $\mu\text{g Co/m}^3$

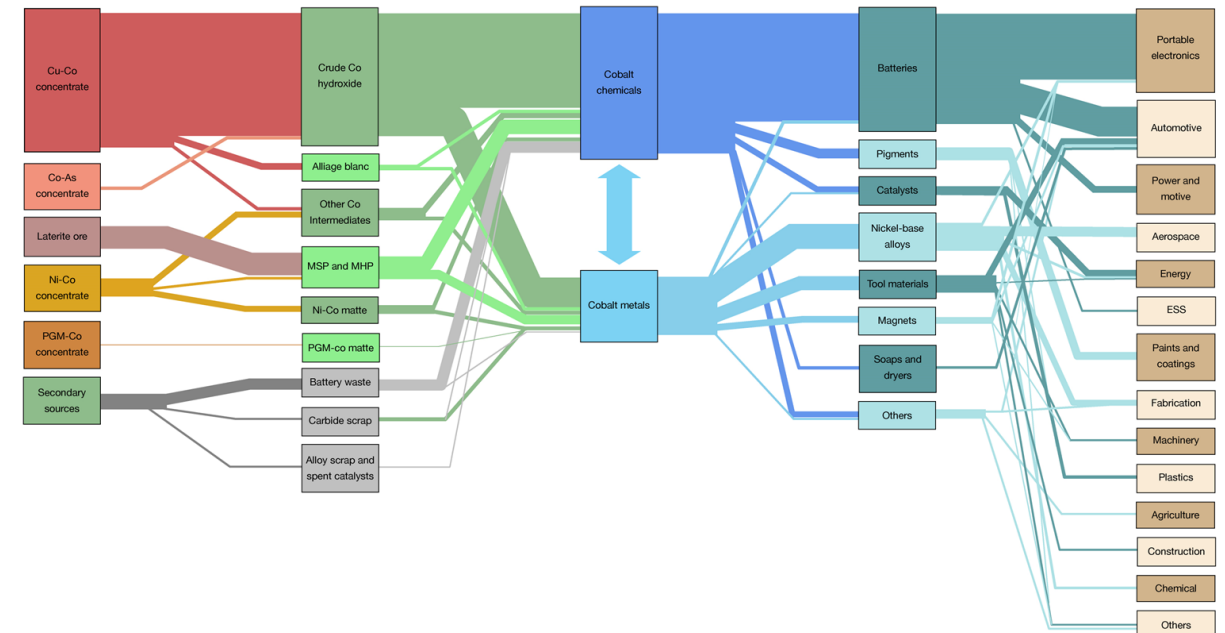
- OEL levels likely to have significant impacts on realising both EU goals from 0.1, 1, 10, 20  $\mu\text{g Co/m}^3$
- All sectors affected, three heavily:
  - Batteries
  - Recycling
  - Interrelated e.g. alloys, steel, tools, surface treatment
- Potential impact on EU security, making EU dependent on third countries for key products:
  - Animal feed
  - Batteries

## Economic Goals

- Competitiveness
- Innovation
- SME / Regions

## Environmental Goals

- Climate change and climate neutrality
- Circular economy
- Renewables
- Mobility of the future



# Cobalt Institute Recommendation For Overall (Science + SEA) EU OEL Values

**5  $\mu\text{g Co/m}^3$  respirable and 20  $\mu\text{g Co/m}^3$  inhalable**

## SCIENCE

→ Data-driven

Respirable (CANCER)

**5  $\mu\text{g Co/m}^3$**

Inhalable (Respiratory Impairment)

**24  $\mu\text{g Co/m}^3$**

## SOCIO-ECONOMICS

→ Data-driven

→ Technically feasible

→ Most proportionate\* of values assessed

Respirable

**Assessed with inhalable value**

Inhalable (Respiratory Impairment)

**20  $\mu\text{g Co/m}^3$**

\*eftec draft SEA report shows BCR < 1

## Overall robust OELs

### CI OEL recommendation:

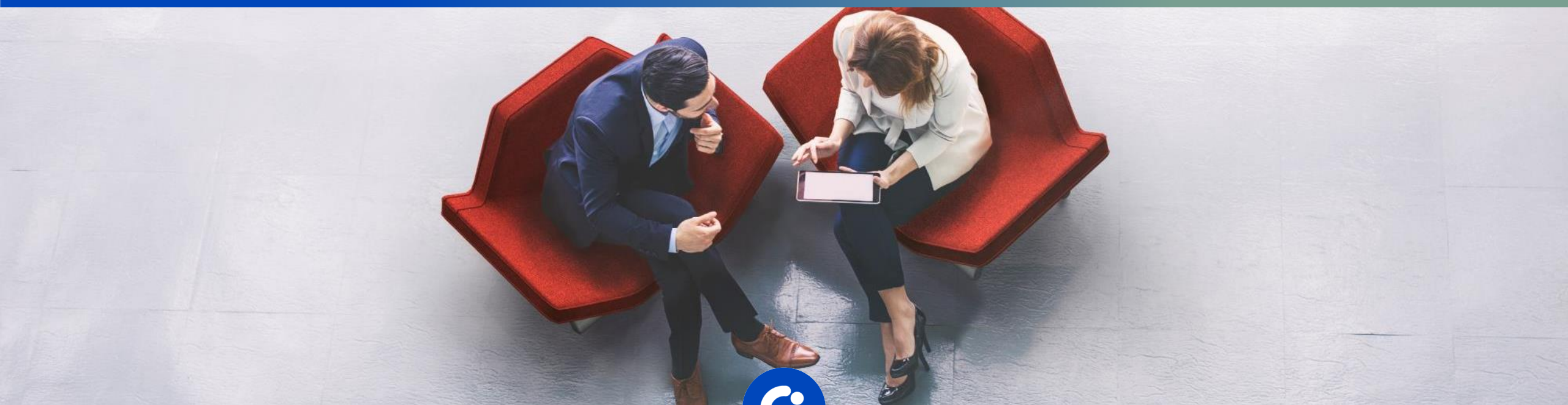
- **STOP Principle** used
- Science → **workers protected** at 20 (and 5)
- **Most common OEL** in Europe AND addition of OEL to protect against cancer
- 20 is least disproportionate value
- Below 20  $\mu\text{g Co/m}^3$  is not economically feasible



**COBALT  
INSTITUTE**







# Key Takeaways

# The Right OEL Is Needed To Enable Cobalt's Production And Use In The EU



An OEL needs to be set at an appropriate level to **protect workers and enable industry** to operate in Europe



Cobalt can contribute to a **greener, more circular and sustainable** Europe



Europe needs cobalt as a **CRM** and **SRM** to reach its **political objectives**



**CI Recommended Values**  
**5  $\mu\text{g Co/m}^3$  (respirable)**  
**20  $\mu\text{g Co/m}^3$  (inhalable)**

Health-based, technically feasible and most economically feasible.

**Please reach out to Cobalt Institute if you are affected by the Cobalt OEL and want to be involved in this process**

## Contact Details

### Cobalt Institute To Make OEL Documents Publicly Available:

- CI Science Position + Summary
- CI Socioeconomic Position + Summary
- Slides from Webinar
- Recording of Webinar

*Thank  
you*

For more information about the Cobalt OEL, please reach out to Cobalt Institute:  
[ci@cobaltinstitute.org](mailto:ci@cobaltinstitute.org)