



# Bridging CRIRSCO To UNFC

Hendrik Falck  
Minerals Working Group  
Sustainable Energy Division  
UNECE



## KNOWLEDGE SHARING ON RESOURCE CLASSIFICATION AND ESTIMATION

Tbilisi, Georgia 11-12 October 2023



**UNECE**

# Introduction

## International Reporting Standards



### Use of UNFC

UNFC provides a method for governments and NGOs to incorporate published data into databases, mineral inventories, etc.

### Use of CRIRSCO example PERC

PERC is recognised by ESMA for use on European Union stock exchanges (ESMA = European Securities and Markets Authority)

Accepted on a number of other stock exchanges around the world (Canada, Singapore, ...)



### INTERNATIONAL REPORTING TEMPLATE

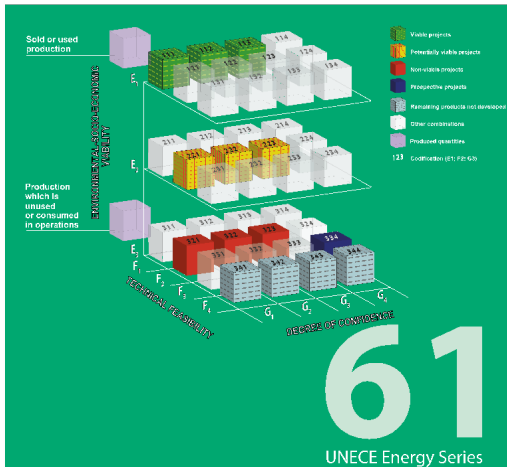
for the public reporting of

EXPLORATION TARGETS, EXPLORATION RESULTS, MINERAL RESOURCES AND MINERAL RESERVES

November 2019



UNECE  
United Nations Framework  
Classification for Resources  
Update 2019



# Introduction

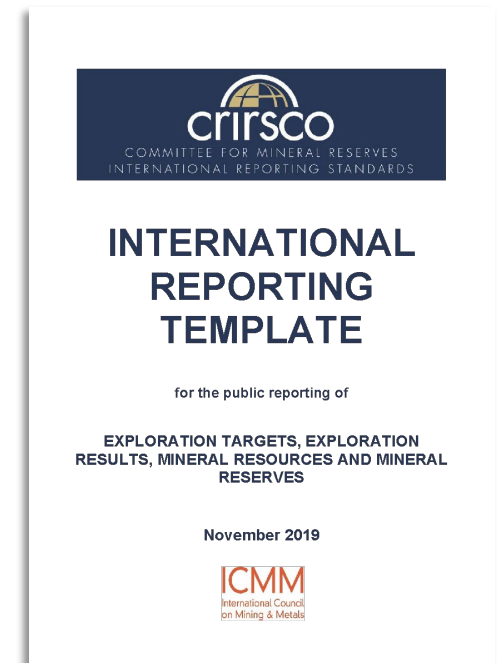
## International Reporting Standards



To promote best practice in the international public reporting of Mineral Exploration Results, Mineral Resources and Mineral Reserves.

CRIRSCO is an international advisory body without legal authority, relying on its constituent members to ensure regulatory and disciplinary oversight at a national level.

It recognises the truly global nature of the minerals industry and the agreed need for international consensus on reporting standards.



# Introduction

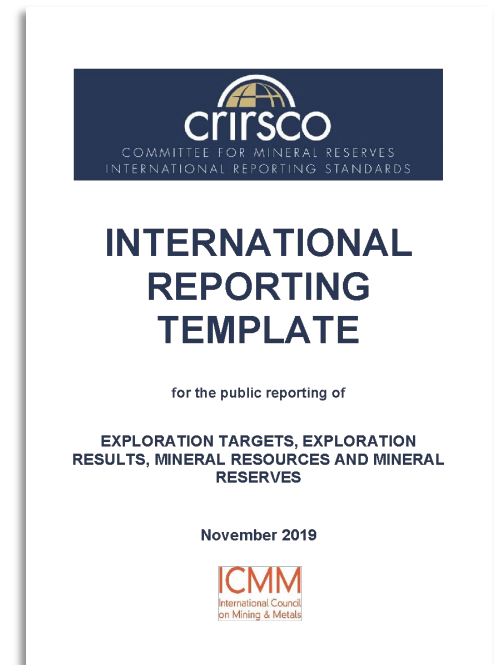
## International Reporting Standards



CRIRSCO was developed to create a world-wide system to harmonize the reporting of Mineral resources and reserves based on a common standard **and to protect the public** against possible misreporting and fraud (Bre-X).

Most companies use this system for their own internal and public reporting.

Most stock exchanges and security commissions require the reports following this standard.



# Guidance Note on Competency Requirements

The guidance



Figure 6. The regulatory environment for the reporting of Exploration Results, Mineral Resources and Ore Reserves in Canada (OSC, 2019)

# Introduction

## International Reporting Standards



*Figure 4. CRIRSCO members. CRIRSCO family reporting codes are being widely adopted throughout the world in major destinations for mining industry investment.*

# Introduction

## International Reporting Standards



A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in **such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.**

The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

# Introduction

## International Reporting Standards



- Corporate mineral inventory management
  - exploration target definition
  - development options
  - purchase price accounting
  - capital allocation





# Introduction

## International Reporting Standards

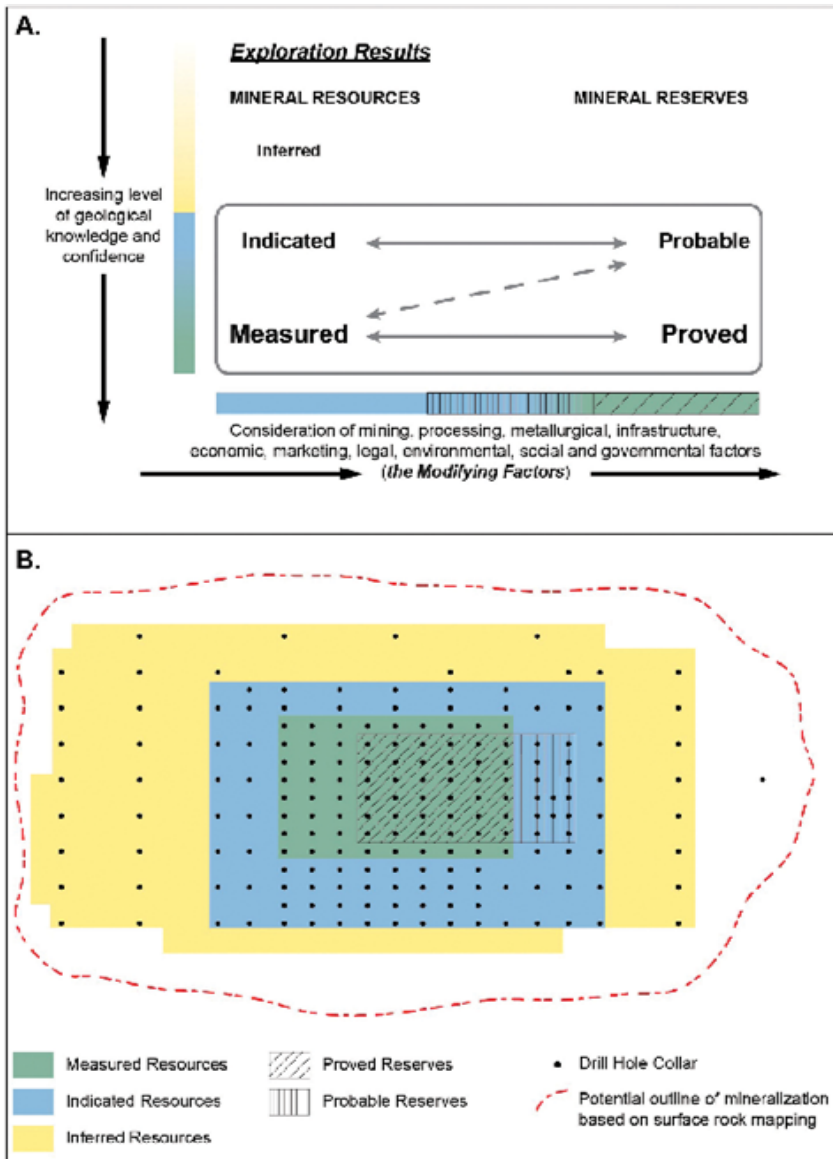


Fig. 1. A. The general relationship between exploration results and mineral resources and mineral reserves as used in the reporting guidelines; based on JORC (1989, 2012). This is adapted from the McKelvey diagram first defined by the U.S. Geological Survey (USGS, 1980), and is the foundation of most formal resource and reserve reporting codes, guidelines, and legal instruments.

*Geology and Mining: Mineral Resources and Reserves: Their Estimation, Use, and Abuse*

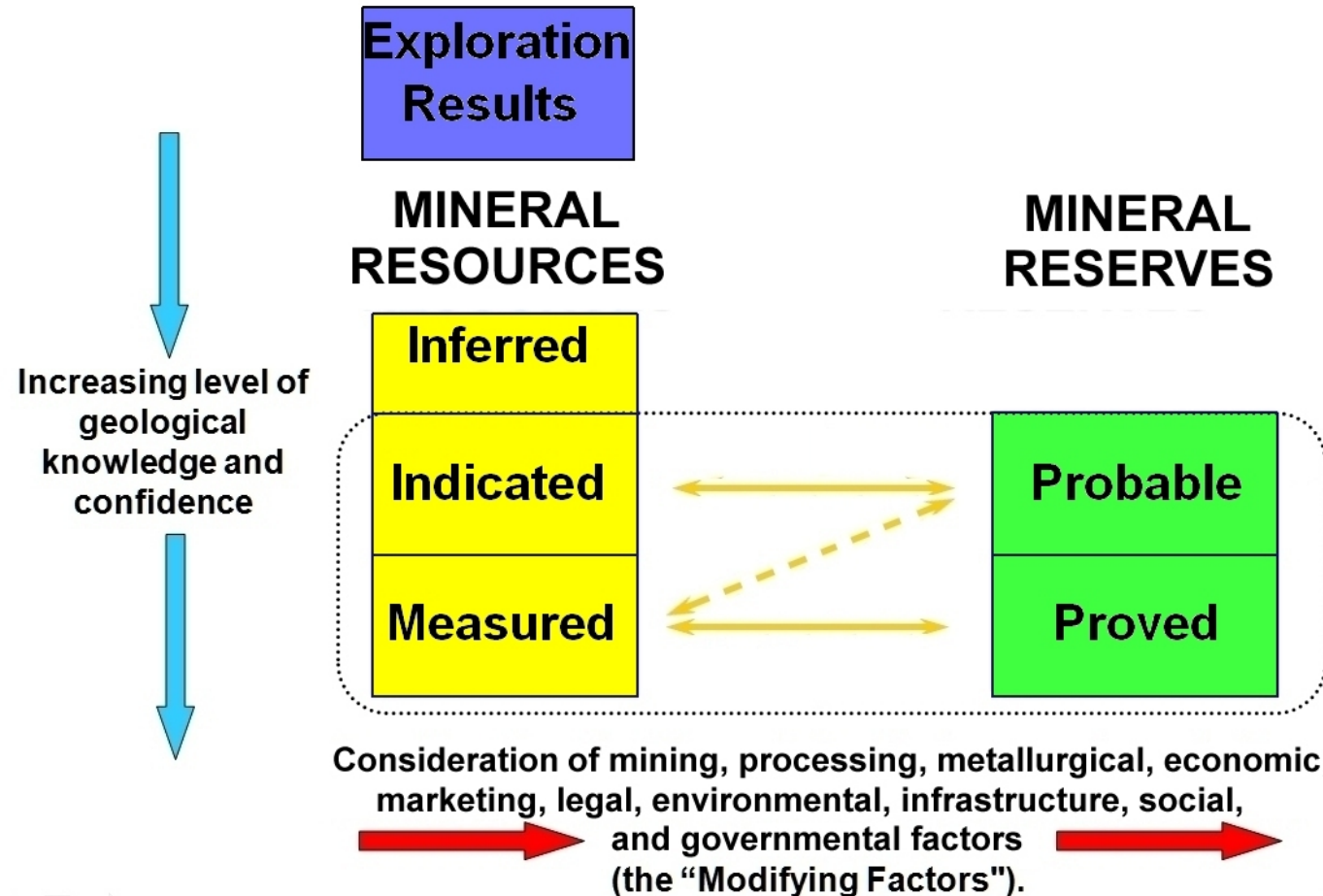
Simon M. Jowitt and Brian A. McNulty,

SEG DISCOVERY, No 125, APRIL 2021

“Finally, resource-reserve estimate and production data are powerful information that can be used to assess future supply for metals and raw materials to meet future demand. However, the **dynamic nature** of the estimation of resources and reserves, combined with the fact that these data usually represent **incomplete assessments** of the total amount of the commodities that may be extracted from a given deposit, mean that they cannot fully reflect how much of a given metal or mineral is “left” in the world.”

# Introduction

## International Reporting Standards



# Introduction

## Bridging Documents



- Aligned System - A classification system that has been aligned with UNFC as demonstrated by the existence of a Bridging Document that has been endorsed by the Expert Group on Resource Management.
- A document that explains the relationship between UNFC and another classification system, including instructions and guidelines on how to classify estimates generated by application of that system using the UNFC Numerical Codes.

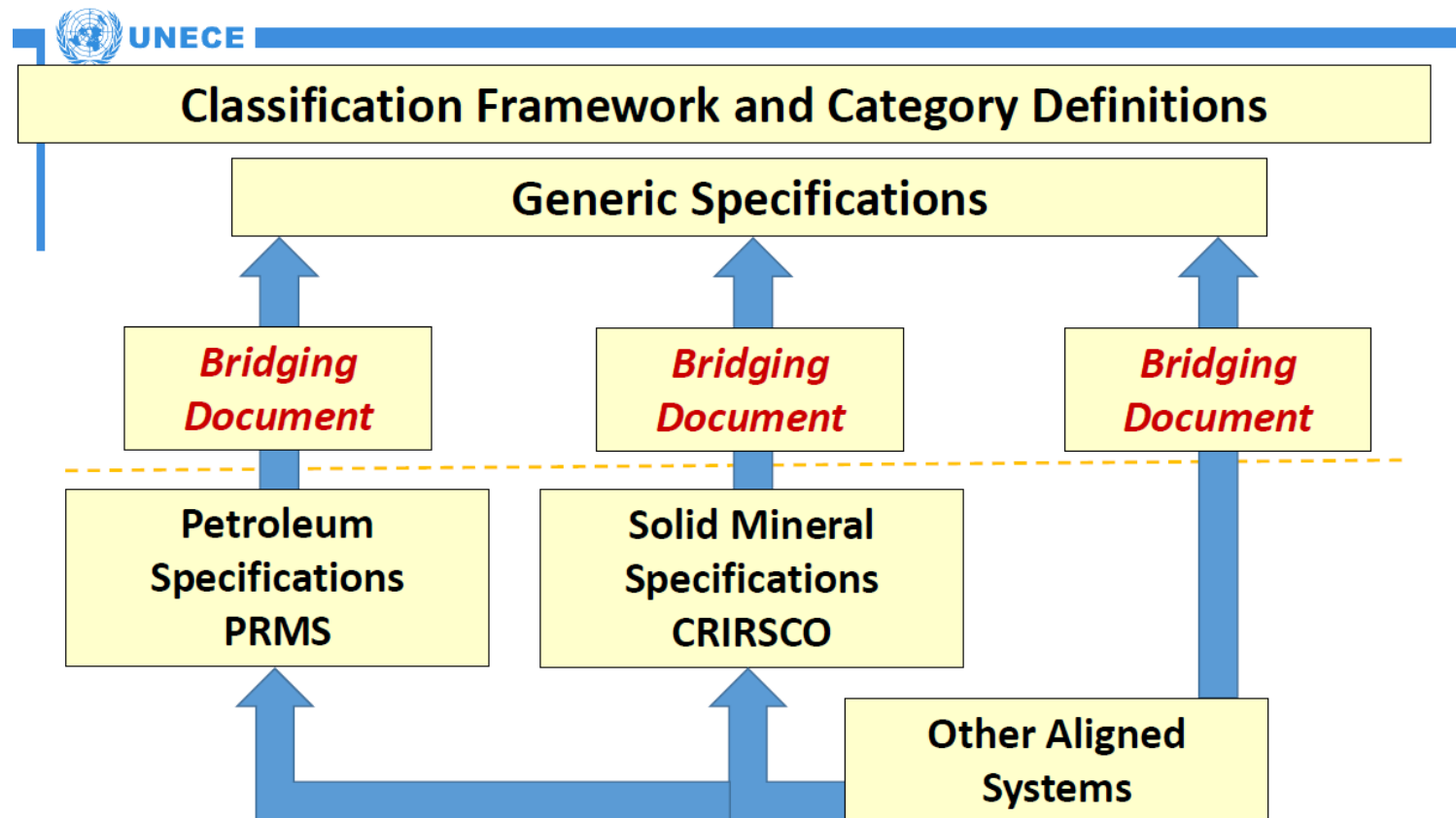


# Bridging Documents

## Basics For Mineral Deposits

UNECE

### Bridging and Aligned Systems



# Bridging Documents

## Basics For Mineral Deposits

UNECE



- CRIRSCO for minerals
- PRMS for petroleum
- IAEA Red Book – Nuclear
- Russian Federation – Petroleum
- China – Minerals
- China – Petroleum

# Bridging Documents

## Basics For Mineral Deposits



UNFC Classes defined by categories and sub-categories							
	Produced	Sold or used production					
		Production which is unused or consumed in operations					
		Class	Sub-class	Categories			
				E	F	G	
Total products	Known Sources	<b>Viable Projects</b>	On Production	<b>1</b>	<b>1.1</b>	<b>1, 2, 3</b>	
			Approved for Development	<b>1</b>	<b>1.2</b>	<b>1, 2, 3</b>	
			Justified for Development	<b>1</b>	<b>1.3</b>	<b>1, 2, 3</b>	
		<b>Potentially Viable Projects</b>	Development Pending	<b>2*</b>	<b>2.1</b>	<b>1, 2, 3</b>	
			Development On Hold	<b>2*</b>	<b>2.2</b>	<b>1, 2, 3</b>	
		<b>Non-Viable Projects</b>	Development Undarified	<b>3.2</b>	<b>2.2</b>	<b>1, 2, 3</b>	
			Development Not Viable	<b>3.3</b>	<b>2.3</b>	<b>1, 2, 3</b>	
		Remaining products not developed from identified projects		<b>3.3</b>	<b>4</b>	<b>1, 2, 3</b>	
		Potential Sources	<b>Prospective Projects</b>	[No sub-classes defined]	<b>3.2</b>	<b>3</b>	<b>4</b>
			Remaining products not developed from prospective projects		<b>3.3</b>	<b>4</b>	<b>4</b>

**\*Potentially Viable Projects may satisfy the requirements for E1**

# Bridging Documents

## Alignment of Systems



UNECE

### UNFC

Sales Production
Non-sales Production
<u>Class</u>
Commercial Projects
Potentially Commercial Projects
Non-Commercial Projects
Additional quantities in place
Exploration Projects
Additional quantities in place

### PRMS

Production
<u>Class</u>
Reserves
Contingent Resources
Unrecoverable
Prospective Resources
Unrecoverable

### CRIRSCO

Extracted
<u>Class</u>
Mineral Reserves
Mineral Resources
Not reported
Not reported
Exploration Results
Not reported

# Bridging Documents

## Alignment of Systems

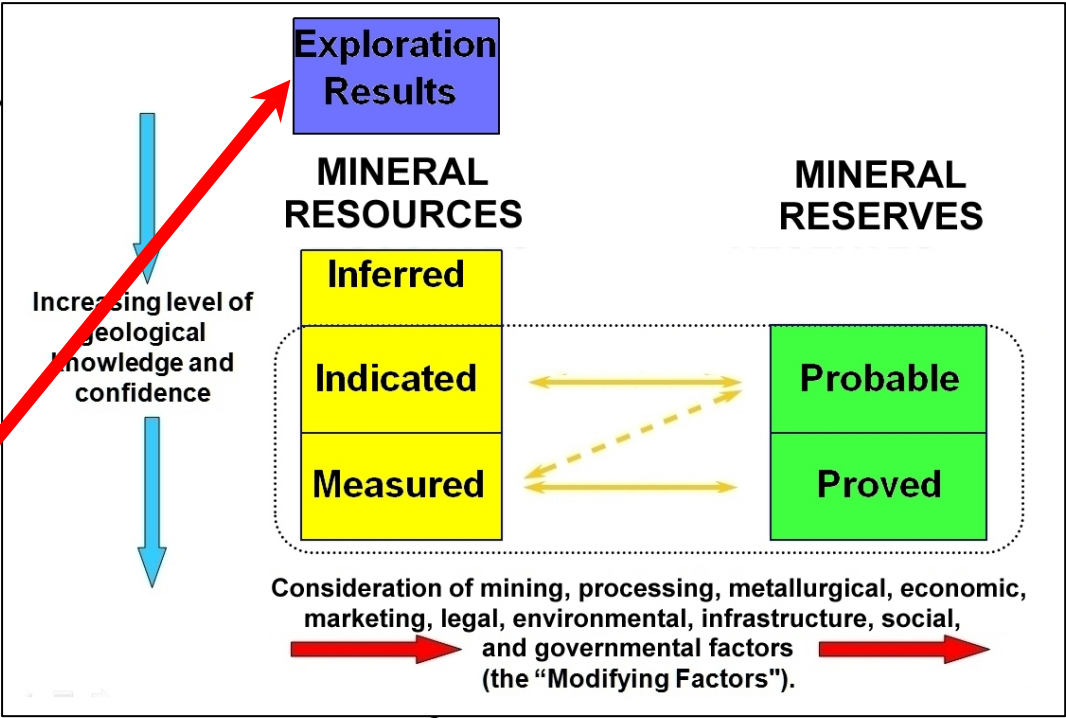
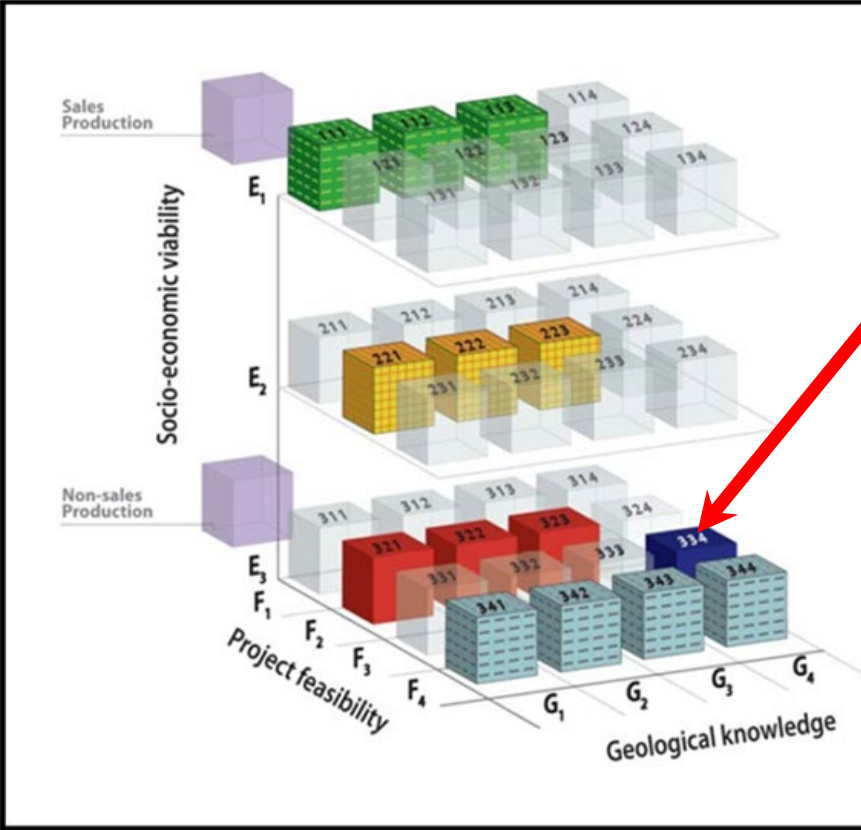
UNFC-2009 Classification					CRIRSCO Template		NEA/IAEA Classification		
UNFC Classes and Sub-classes		UNFC Categories			CRIRSCO Classes and Sub-classes				
Class	Sub-Class	E	F	G	Class	Sub-Class	IAEA-NEA Categories		Status
Commercial Projects	On Production	1	1.1	1	Mineral Reserves	Proved	Reasonably Assured Resources (RAR)		Existing
				2		Probable			
	Approved for Development	1	1.2	1		Proved			Committed
				2		Probable			
	Justified for Development	1	1.3	1		Proved			Planned
				2		Probable			
Potentially Commercial Projects	Development Pending	2	2.1	1	Mineral Resources	Measured	Identified Resources	RAR	Prospective
				2		Indicated			
				3		Inferred			
	Development On Hold	2	2.2	1		Measured		RAR	
				2		Indicated			
				3		Inferred			
Non-commercial Projects	Development Unclearified	3.2	2.2	1,2,3	Inventory (not defined in Template)	Development Unclearified (not defined in Template)	Identified Resources RAR IR*		Unclearified
	Development Not Viable	3.3	2.3	1,2,3		Not Viable (not defined in Template)			Not Viable
Exploration Projects		3.2	3.1	4	Exploration Target		Undiscovered Resources		Prognosticated Resources
		3.2	3.2, 3.3	4					Speculative Resources





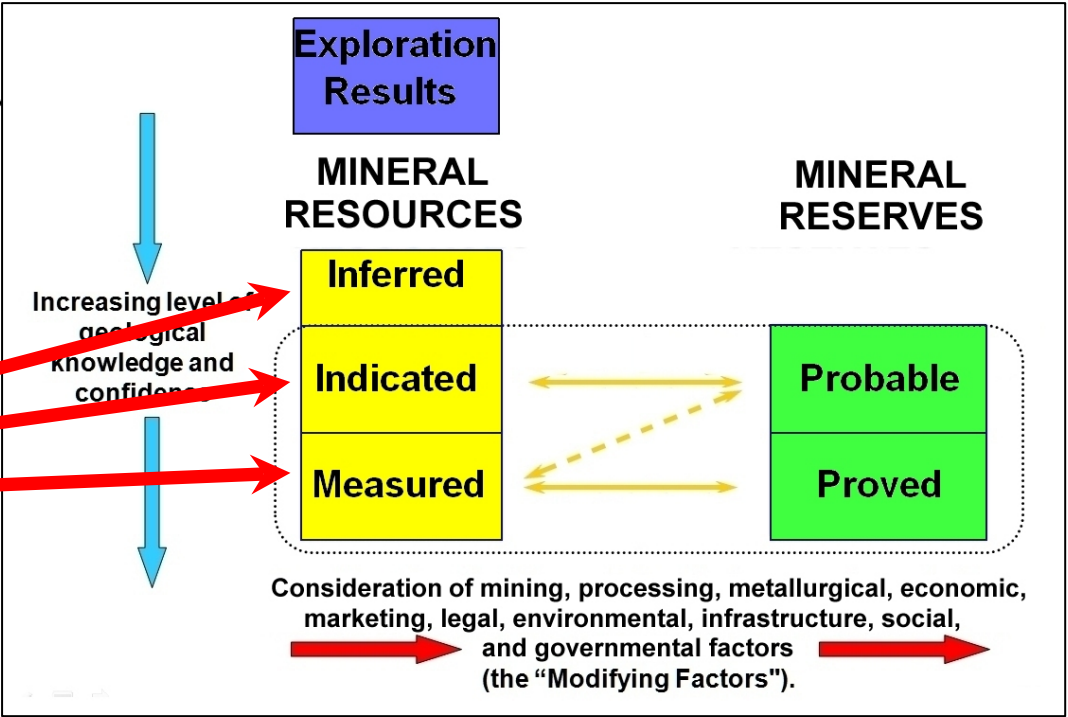
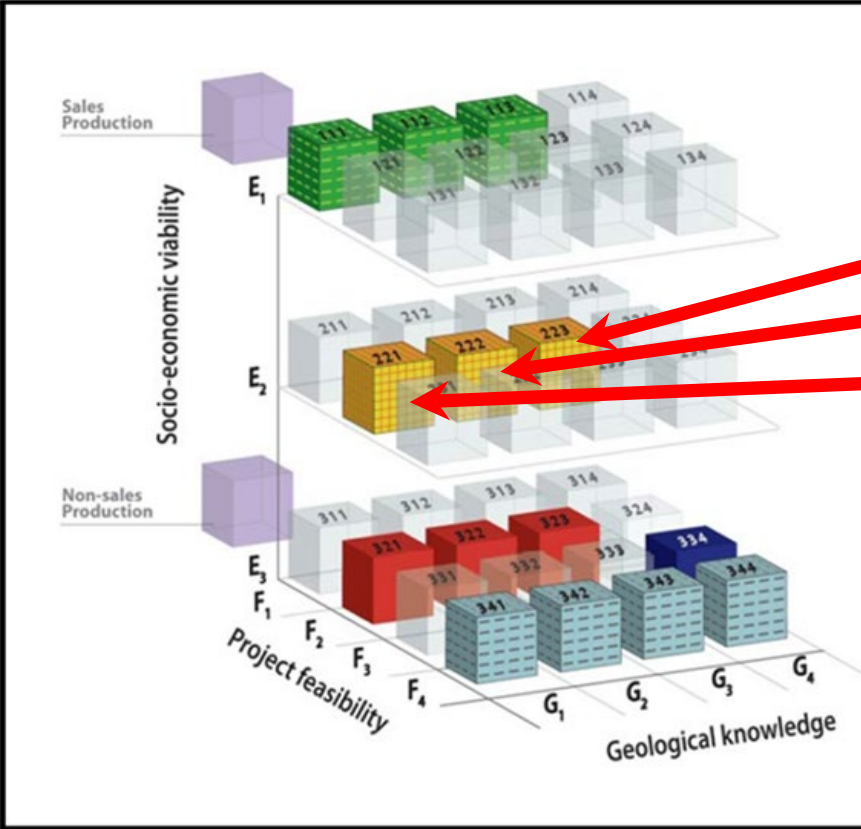
# Bridging Documents

## Alignment of Systems



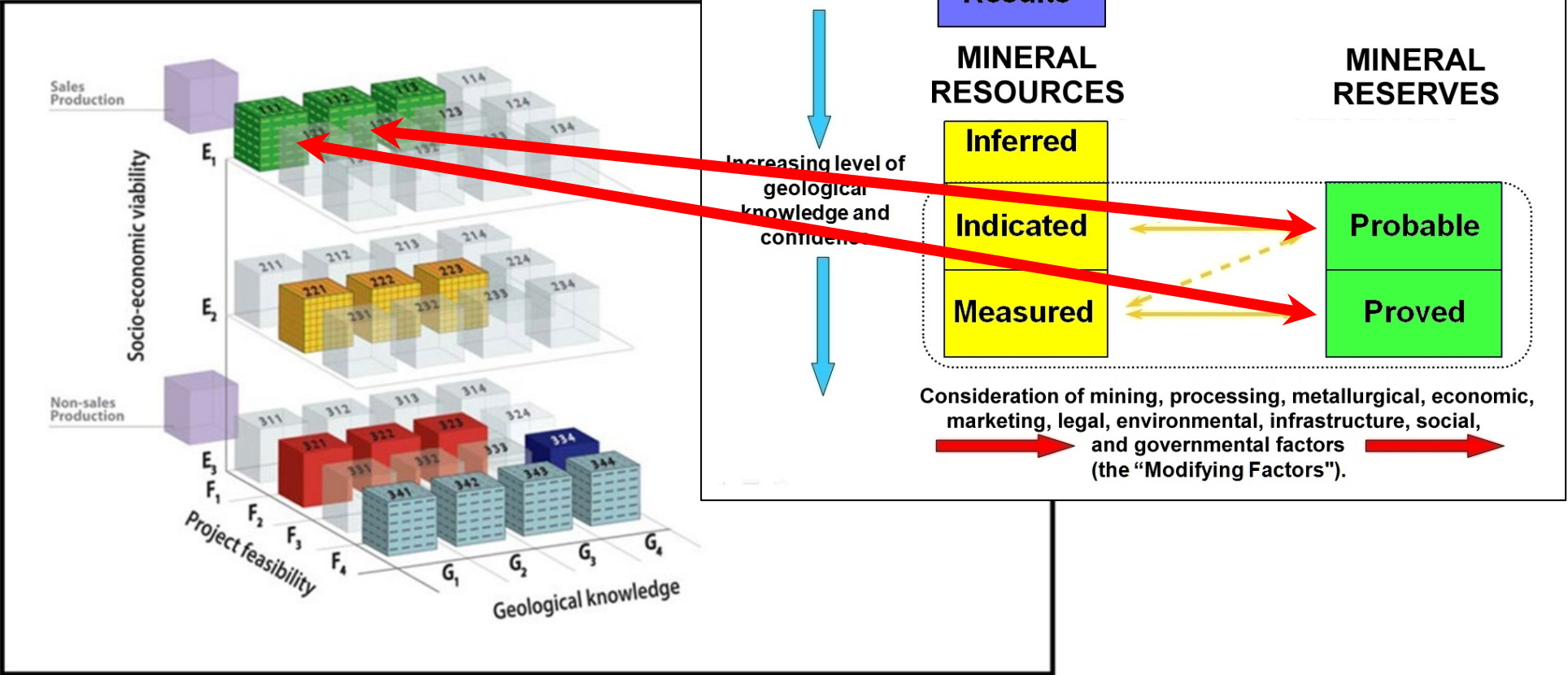
# Bridging Documents

## Alignment of Systems



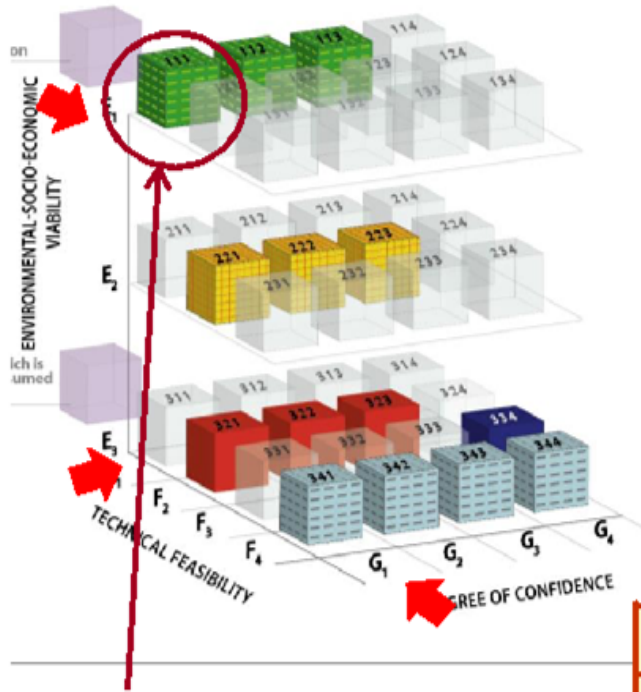
# Bridging Documents

## Alignment of Systems



# Bridging Documents

## Alignment of Systems



**E1;F1;G1**  
**UNFC Class: 111**

Category	Definition
E1	Development and operation are confirmed to be environmentally-socially-economically viable.

Category	Definition
F1	Technical feasibility of a development project has been confirmed.

Category	Definition
G1	Product quantity associated with a project that can be estimated with a high level of confidence.



## Bridging Document

between the

**Committee for Mineral Reserves International Reporting Standards (CRIRSCO) Template**

and the

**United Nations Framework Classification for Resources (UNFC)**


Effective 1 May 2015

As contained in Annex III of Part II of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 incorporating Specifications for its Application (ECE Energy Series No. 42).



# Bridging Documents

## Alignment of Systems



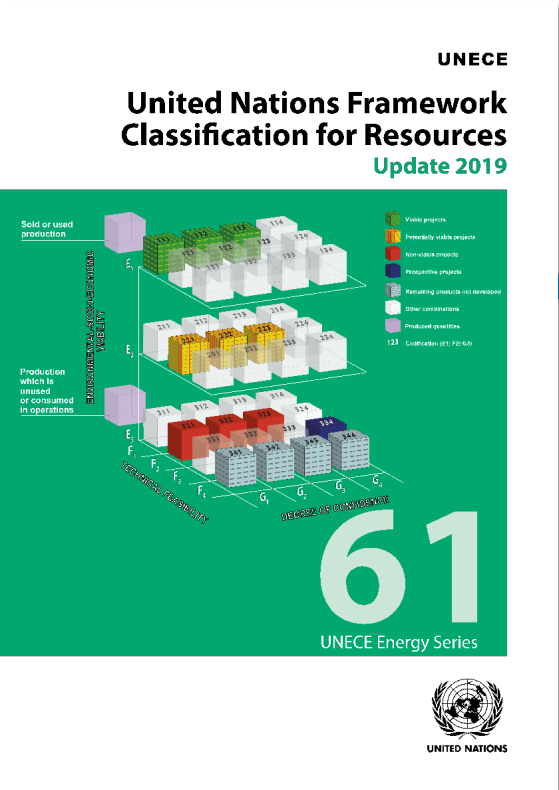
Along with the Generic Specifications, these provide the foundation and keystones for consistent application of UNFC-2009 for solid minerals.

CRIRSCO has provided commodity-specific specifications via the CRIRSCO Template of 2013.

Approved by the Expert Group on Resource Classification at its Sixth Session, 28 April – 1 May 2015.

# Bridging Documents

## Alignment of Systems



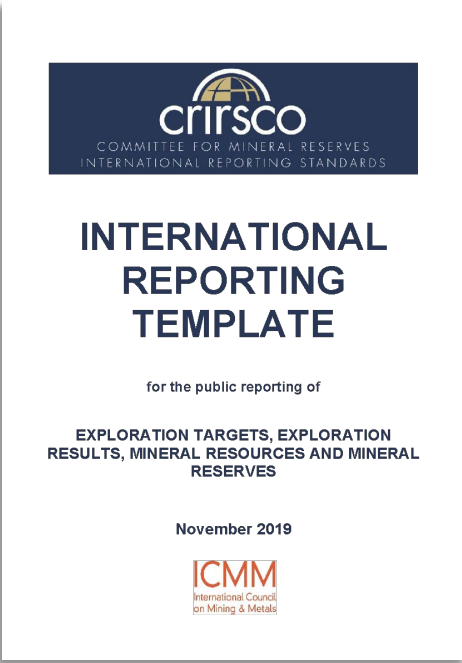
### Use of UNFC

UNFC provides a method for governments and NGOs to incorporate published data into databases, mineral inventories, etc.

### Use of CRIRSCO example PERC

PERC is recognised by ESMA for use on European Union stock exchanges (ESMA = European Securities and Markets Authority)

Accepted on a number of other stock exchanges around the world (Canada, Singapore, ...)



# Bridging Documents

## Alignment of Systems



**Guidance Note on the use of  
The Bridging Document  
between the  
Committee for Mineral Reserves International  
Reporting Standards (CRIRSCO) Template  
and the  
United Nations Framework Classification for  
Resources (UNFC)  
(The CRIRSCO-UNFC Bridging Document)**

**Effective November 2023 [subject to approval]**

Based on the CRIRSCO Template November 2019 version  
and the UNFC-2019 Update

This document has been prepared by the Ad Hoc Task Group for Revising the CRIRSCO-UNFC Bridging Document (2023) which was established in April 2023 at the request of the UNECE's Expert Group on Resource Management and the CRIRSCO Executive. The Task Group was charged with updating the previous version of the CRIRSCO-UNFC Bridging Document, which was issued in 2015, in order to take account of subsequent changes including the publication in 2019 of updated versions of both systems.

# Bridging Documents

## Alignment of Systems



CRIRSCO Template		UNFC-2009 "minimum" Categories			UNFC-2009 Class
Mineral Reserve	Proved	E1	F1	G1	Commercial Projects
	Probable			G2	
Mineral Resource	Measured	E2	F2	G1	Potentially Commercial Projects
	Indicated			G2	
	Inferred			G3	
Exploration Results		E3	F3	G4	Exploration Projects

Since their initial releases, both the UNFC and the CRIRSCO Template have been updated several times. Additionally, the national reporting codes and standards aligned to the CRIRSCO Template are also updated periodically and may not necessarily be aligned with the most recent version of the CRIRSCO Template. Relevant information with respect to the use of UNFC in the minerals sector was published in the Supplementary Specifications for the Application of the United Nations Framework Classification for Resources to Minerals as adopted in 2021 (UNECE, 2021). Users of the Bridging Document should use the most recent version of guidance documents for both systems



# Bridging Documents

## Alignment of Systems

CRIRSCO Template		Corresponding UNFC category <sup>(a)</sup>			UNFC Class
Public Report and Study Types	Standard Definitions				
Feasibility Study or Life of Mine Plan (for an operating mine)	Mineral Reserves	Proved	E1	F1	G1
		Probable			G2
Pre-feasibility Study <sup>(b)</sup>	Mineral Reserves	Proved	E2	F2	G1
		Probable			G2
Feasibility Study, Life of Mine Plan (for an operating mine) or Pre-feasibility Study <sup>(c)</sup>	Mineral Resources (exclusive of Mineral Reserves)	Measured	E2	F2	G1
		Indicated			G2
		Inferred			G3
Scoping Study report or other Public Report on a Mineral Resource estimate <sup>(d)</sup>	Mineral Resources	Measured	E2	F2	G1
		Indicated			G2
		Inferred			G3
Public Report on exploration stage projects	Exploration Target		E3	F3	G4
	Exploration Results		Estimates not published		
Not applicable <sup>(e)</sup>	Estimates obtained from historical reports <sup>(f)</sup>				Non-viable Projects
(a)	These are the categories which would normally be used for a study when the mapping is based on a current (or recently published) study. Where there have been material changes since the effective date of a report, or the study is otherwise no longer considered current, the assumptions used in the study should be reviewed in order to determine whether the results obtained are still valid and whether the E and F axis values need to be altered. For instance, where an operating mine has ceased operation, where mining licences have expired or been revoked, or where there have been material changes in costs of prices the mapping of Mineral Reserves from a feasibility study or life of mine plan would be downrated from E1 to E2 and from F1 to F2.				
(b)	Estimates included in a life of mine plan which is potentially viable under current conditions.				
(c)	Estimates of material not included in the life of mine plan which could be economically extracted using reasonably assumed future conditions.				
(d)	Estimates which are considered to have 'reasonable prospects for eventual economic extraction' under reasonably assumed future conditions				
(e)	CRIRSCO Template aligned reporting does not allow the Public Reporting of estimates on non-economic mineralisation.				
(f)	Historical estimates will generally be downrated to E3 and F3, with the original G categories being retained				

Since their initial releases, both the UNFC and the CRIRSCO Template have been updated several times. Additionally, the national reporting codes and standards aligned to the CRIRSCO Template are also updated periodically and may not necessarily be aligned with the most recent version of the CRIRSCO Template. Relevant information with respect to the use of UNFC in the minerals sector was published in the Supplementary Specifications for the Application of the United Nations Framework Classification for Resources to Minerals as adopted in 2021 (UNECE, 2021). Users of the Bridging Document should use the most recent version of guidance documents for both systems.

# Bridging Documents

## Alignment of Systems



### The UK UNFC case study – data types

- These data are well defined and existing bridging documents can be used – however each project will have its own individual characteristics.
- These data will not include anything for lower confidence classes of UNFC – this data gap needs to be recognised.
- Care needs to be taken with consideration of cut off grade/metal contents.
- Data gaps may exist for by or co- products



# Bridging Documents

## Alignment of Systems



UNFC code	Type of study on which the estimates are based	CRIRSCO category
111	Life of Mine Plan or Feasibility Study (estimates included in a life of mine plan which is viable under current conditions)	Proved Mineral Reserve
112		Probable Mineral Reserve
211		Measured Mineral Resource
212		Indicated Mineral Resource
213		Inferred Mineral Resource
221 + 121	Pre-Feasibility Study (estimates included in a life of mine plan which is potentially viable under current conditions)	Proved Mineral Reserve
222 + 122		Probable Mineral Reserve
223 + 123		Inferred Mineral Resource
221 + 121	Pre-Feasibility Study or Scoping Study report or a Public Report on a Mineral Resource estimate (estimates which are considered to be economically extractable under reasonably assumed conditions)	Measured Mineral Resource
222 + 122		Indicated Mineral Resource
223 + 123		Inferred Mineral Resource
NOTES:		

## UNFC to CRIRSCO

# Bridging Documents

## Alignment of Systems



- **Objective:** The purpose of reporting a UNFC estimate in compliance with a CRIRSCO-aligned code or standard should be clarified.

- **Relevant legislation and regulations:** A specific CRIRSCO code or standard recognised by the relevant government legislation or stock exchange regulations must be selected (e.g., the JORC Code, PERC Reporting Standard, NI 43-101 legislation, the SAMREC Code, etc.)

- **Competent Person (CP) requirement:** A minerals industry professional(s) who has a qualification that is recognised by the relevant legislation, regulations and reporting code or standard is needed. Qualified Expert as defined by the UNECE (UNECE, 2022) may not be sufficient.

- **Technical Report requirement:** The release of an accompanying Competent Person's Report (CPR) or public reporting may be required which summarises the information and assumptions on which the estimates are based and also discusses any material uncertainties as clear and transparent information. The Competent Person(s) should, consider the checklist provided in Table 1 of the CRIRSCO Template.

- **Types of estimates that can be reported:** CRIRSCO-aligned codes and standards, do not allow the reporting of estimates for non-viable projects. Estimates for prospective projects can only be reported as Exploration Targets and must be presented as a range of quantities and qualities to indicate the associated uncertainty.

**Thank you!**

Hendrik Falck  
Minerals Working Group  
Sustainable Energy Division  
UNECE  
Date 11-12 | 10 | 2023, Tbilisi



**KNOWLEDGE SHARING ON  
RESOURCE CLASSIFICATION AND  
ESTIMATION**

Tbilisi, Georgia 11-12 October 2023



**UNECE**