



**Workshop on
Implementing the United Nations Framework
Classification for Resources (UNFC) in Southeast
Europe**

**Introduction to
UNFC (2019)**

**Belgrade, Republic of Serbia
4 – 5 July 2024**

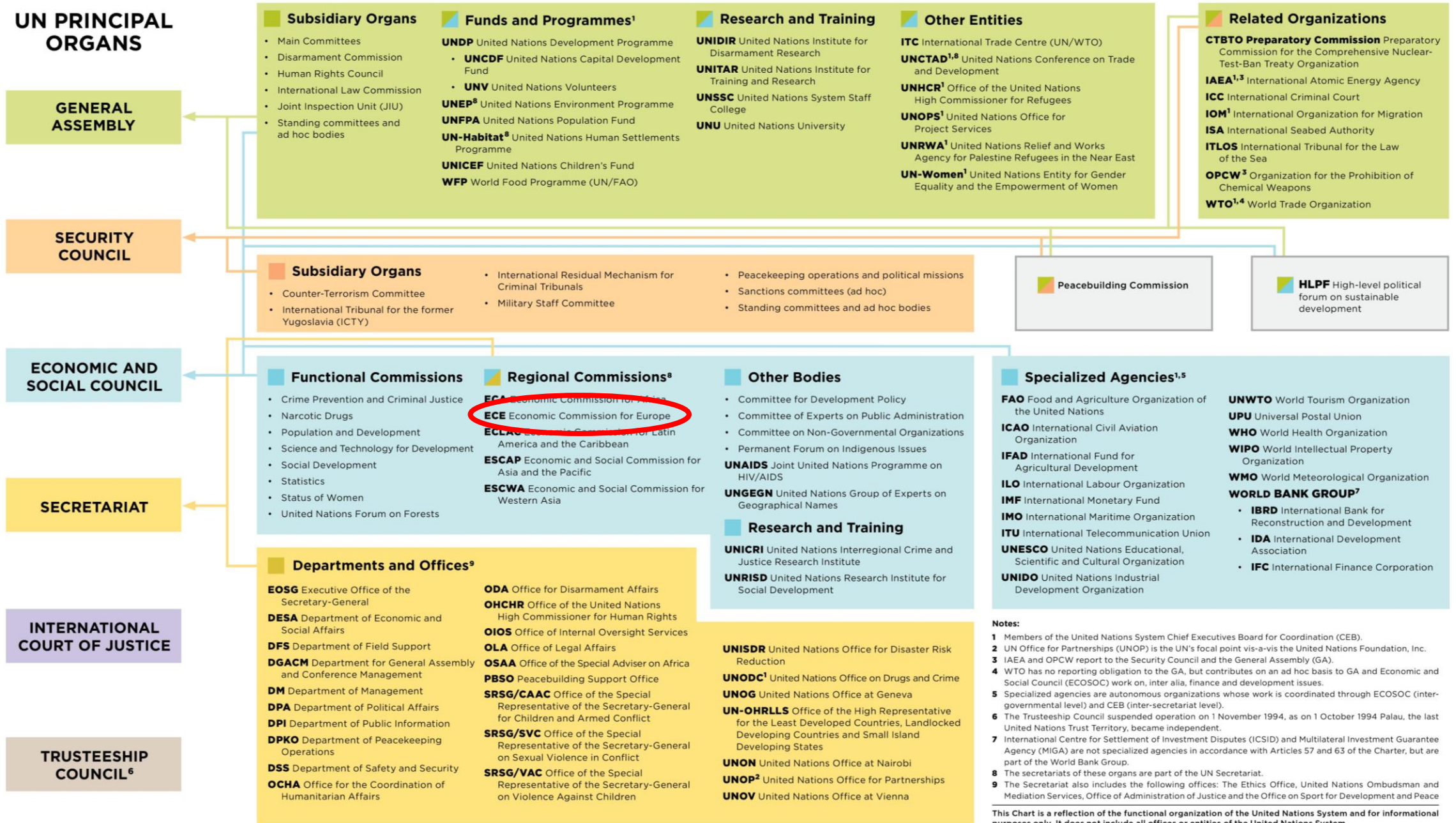
**Slavko Solar
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UNECE Overview



The United Nations



United Nations Economic Commission for Europe

UNECE



The United Nations Economic Commission for Europe (UNECE)
was set up in 1947 by ECOSOC



United Nations Economic Commission for Europe

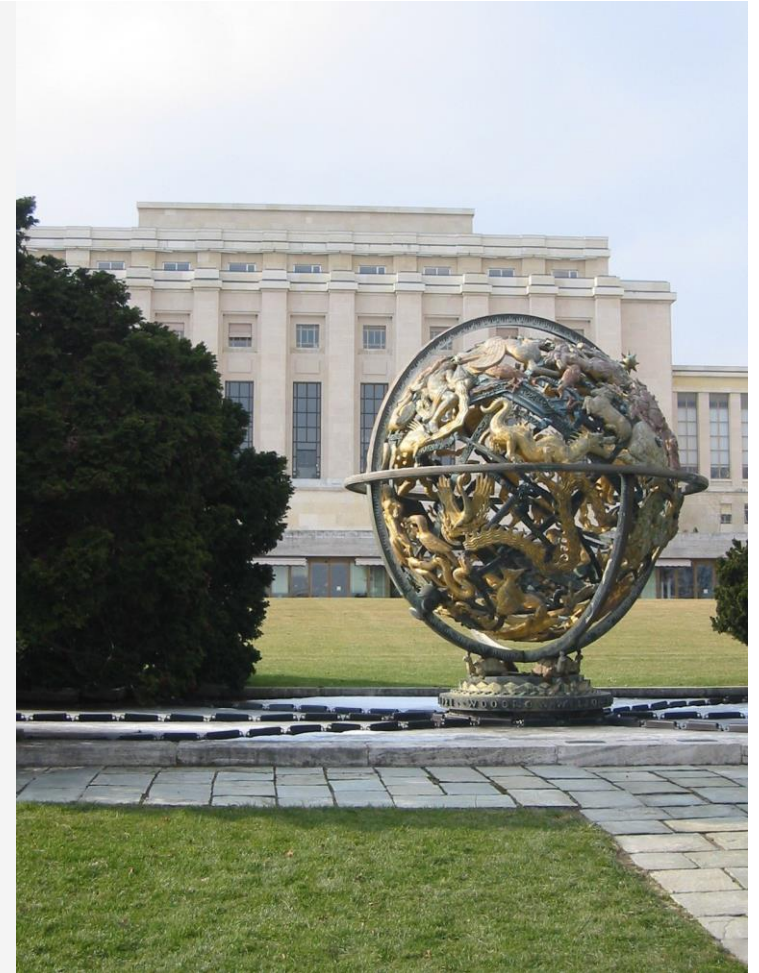
UNECE



UNECE aims to promote **pan-European economic integration**, within its **56 Member States** in Europe, North America, and Asia – Yet, all **interested UN Member States** may participate in the work of UNECE.



Over **70 International professional organizations** and other **non-governmental organizations** take part in UNECE





- Economic cooperation and integration
- **Sustainable Energy (inc. sustainable resource management)**
- Environment
- Housing and land management
- Gender, population
- Statistics
- Timber
- Trade
- Transport



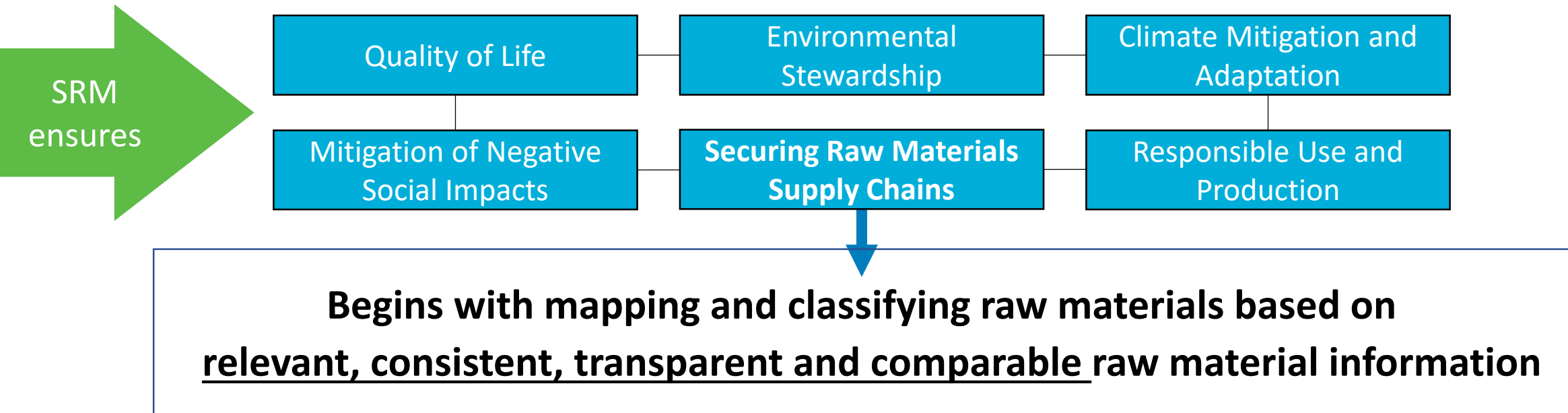
<https://unece.org/sustainable-energy/sustainable-resource-management>

Introduction to UNFC (2019)



Sustainable Resource Management

- How can we ensure production of raw materials without compromising the environment, economic stability, and social equity?
- **Sustainable Resource Management (SRM)** balances the need for economic development with the preservation of the environment and the well-being of future generations. It is critical to deliver the UN Agenda 2030 and its Sustainable Development Goals



Challenge of Classification – How?

How to
Classify?

By genre

By artist

By composer

By instruments

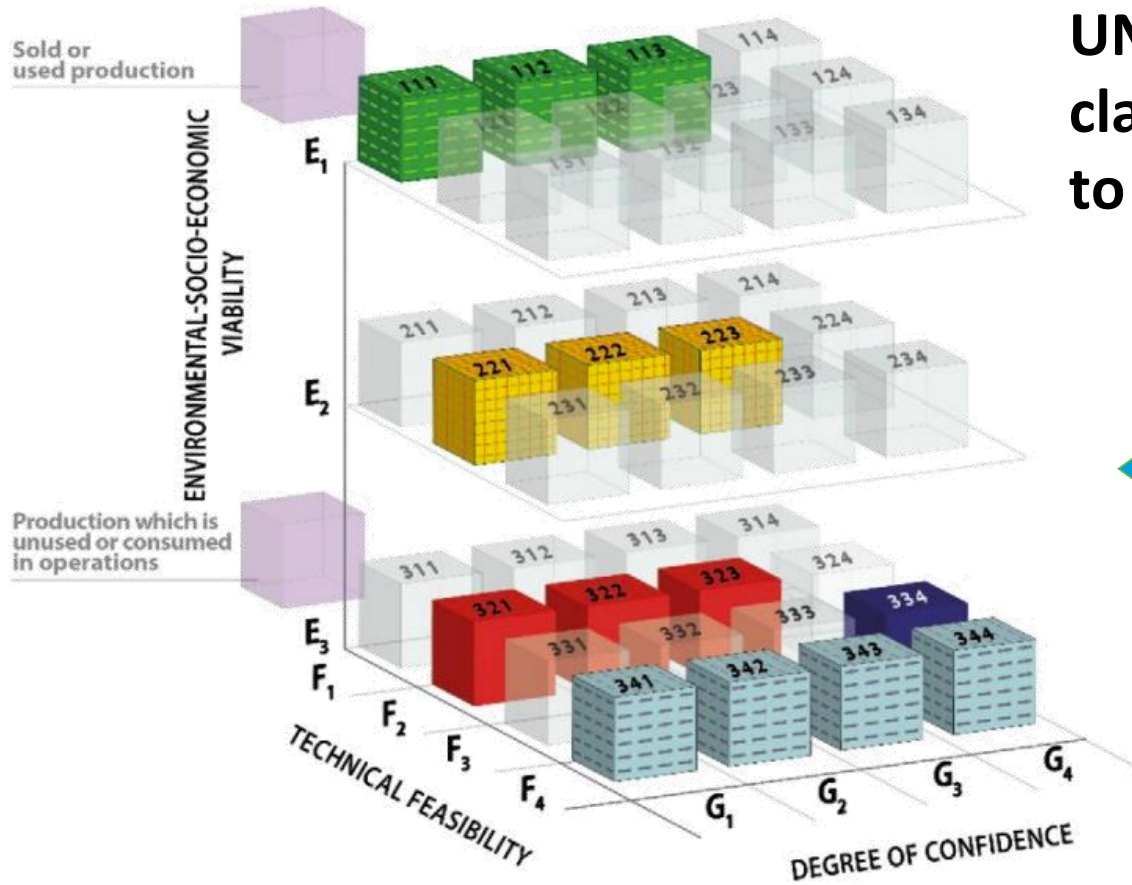
By tempo

By date recorded

By date purchased



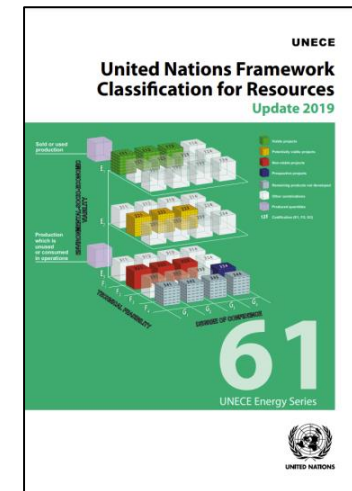
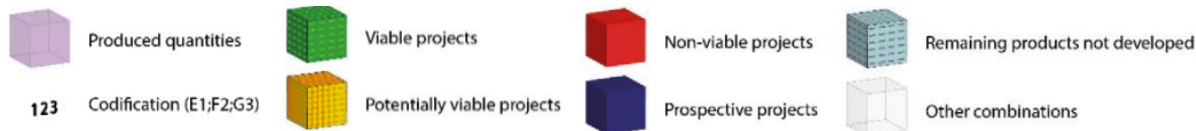
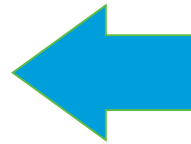
UNFC 2019 Generic – 3 Tier Framework



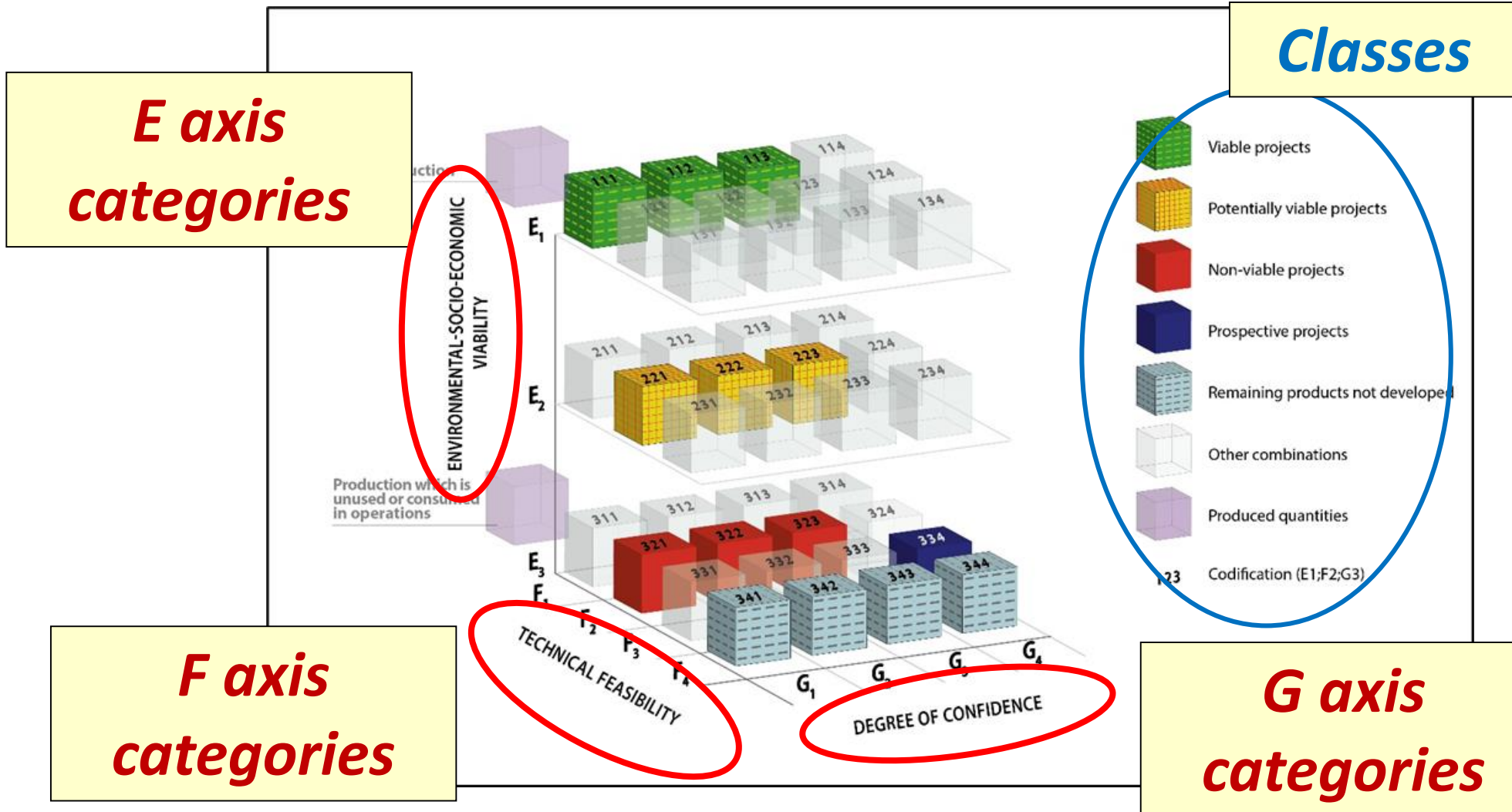
UNFC is a resource project- and principles-based classification system based on 3 fundamental criteria to develop resources

UNFC is based on 3 fundamental criteria:

- **E axis:** Environmental-socio-economic viability
- **F axis:** Technical Feasibility
- **G axis:** Degree of Confidence



UNFC – Categories & Classes



UNFC Categories Definitions – E axis

- Degree of favourability of environmental social and economic conditions in establishing the viability of the project
- Includes consideration of market prices and relevant legal, regulatory, social, environmental and contractual conditions
- E1, E2 and E3 categories
- E1 is “best”
- Definitions should always be read in conjunction with supporting explanation

Category	Definition
E1	Development and operation are confirmed to be environmentally-socially-economically viable.
E2	Development and operation are expected to become environmentally-socially-economically viable in the foreseeable future.
E3	Development and operation are not expected to become environmentally-socially-economically viable in the foreseeable future or evaluation is at too early a stage to determine environmental-socio-economic viability.

UNFC Sub-Categories Definitions – E axis

Sub-Category	Sub-Category Definition
E1.1	Development is environmentally-socially-economically viable on the basis of current conditions and realistic assumptions of future conditions.
E1.2	Development is not environmentally-socially-economically viable on the basis of current conditions and realistic assumptions of future conditions, but is made viable through government subsidies and/or other considerations.
No Sub-categories defined	
E3.1	Estimate of product that is forecast to be developed, but which will be unused or consumed in operations.
E3.2	Environmental-socio-economic viability cannot yet be determined due to insufficient information.
E3.3	On the basis of realistic assumptions of future conditions, it is currently considered that there are not reasonable prospects for environmental-socio-economic viability in the foreseeable future.

UNFC Categories Definitions – F axis

- Maturity of technology, studies and commitments necessary to implement the project
- These projects range from early conceptual studies through to a fully developed project that is producing
- F1, F2 and F3 and F4 categories
- F1 is “best”
- Definitions should always be read in conjunction with supporting explanation

Category	Definition
F1	Technical feasibility of a development project has been confirmed.
F2	Technical feasibility of a development project is subject to further evaluation.
F3	Technical feasibility of a development project cannot be evaluated due to limited technical data.
F4	No development project has been identified.

UNFC Sub-Categories Definitions – F axis

Sub-Category	Sub-Category Definition
F1.1	Production is currently taking place.
F1.2	Capital funds have been committed and implementation of the development is underway.
F1.3	Studies have been completed to demonstrate the technical feasibility of development and operation. There shall be a reasonable expectation that all necessary approvals/contracts for the project to proceed to development will be forthcoming
F2.1	Project activities are ongoing to justify development in the foreseeable future.
F2.2	Project activities are on hold and/or where justification as a development may be subject to significant delay.
F2.3	There are no plans to develop or to acquire additional data at the current time due to limited potential.

Sub-Category	Sub-Category Definition
F3.1	Site-specific studies have identified a potential development with sufficient confidence to warrant further testing.
F3.2	Local studies indicate the potential for development in a specific area but requires more data acquisition and/or evaluation in order to have sufficient confidence to warrant further testing.
F3.3	At the earliest stage of studies, where favourable conditions for the potential development in an area may be inferred from regional studies.
F4.1	The technology necessary is under active development, following successful pilot studies, but has yet to be demonstrated to be technically feasible for this project.
F4.2	The technology necessary is being researched, but no successful pilot studies have yet been completed.
F4.3	The technology is not currently under research or development.

UNFC Categories Definitions – G axis

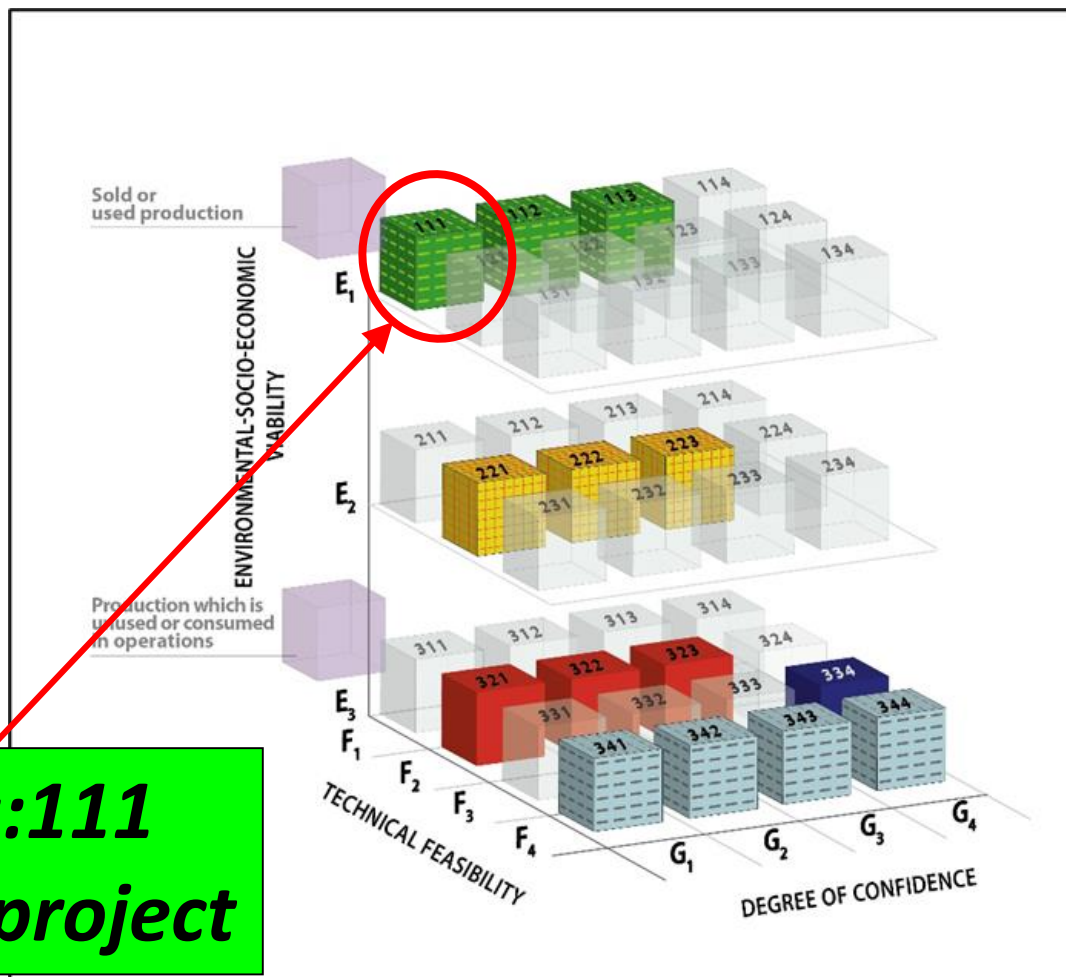
- Degree of confidence in the estimate of the quantities of products from the project
- Generally defined as discrete increments for solids (G1, G2, G3), but often defined as scenarios for fluids (G1, G1+G2, G1+G2+G3)
- G1, G2, G3 and G4 categories
- G1 is “highest confidence”
- Definitions should always be read in conjunction with supporting explanation

Category	Definition
G1	Product quantity associated with a project that can be estimated with a high level of confidence .
G2	Product quantity associated with a project that can be estimated with a moderate level of confidence .
G3	Product quantity associated with a project that can be estimated with a low level of confidence .
G4	Product quantity associated with a Prospective Project, estimated primarily on indirect evidence .

UNFC Sub-Categories Definitions – G axis

Sub-Category	Sub-Category Definition
G4.1	Low estimate of the quantities.
G4.2	Incremental amount to G4.1 such that $G4.1+G4.2$ equates to a best estimate of the quantities.
G4.3	Incremental amount to $G4.1+G4.2$ such that $G4.1+G4.2+G4.3$ equates to a high estimate of the quantities.

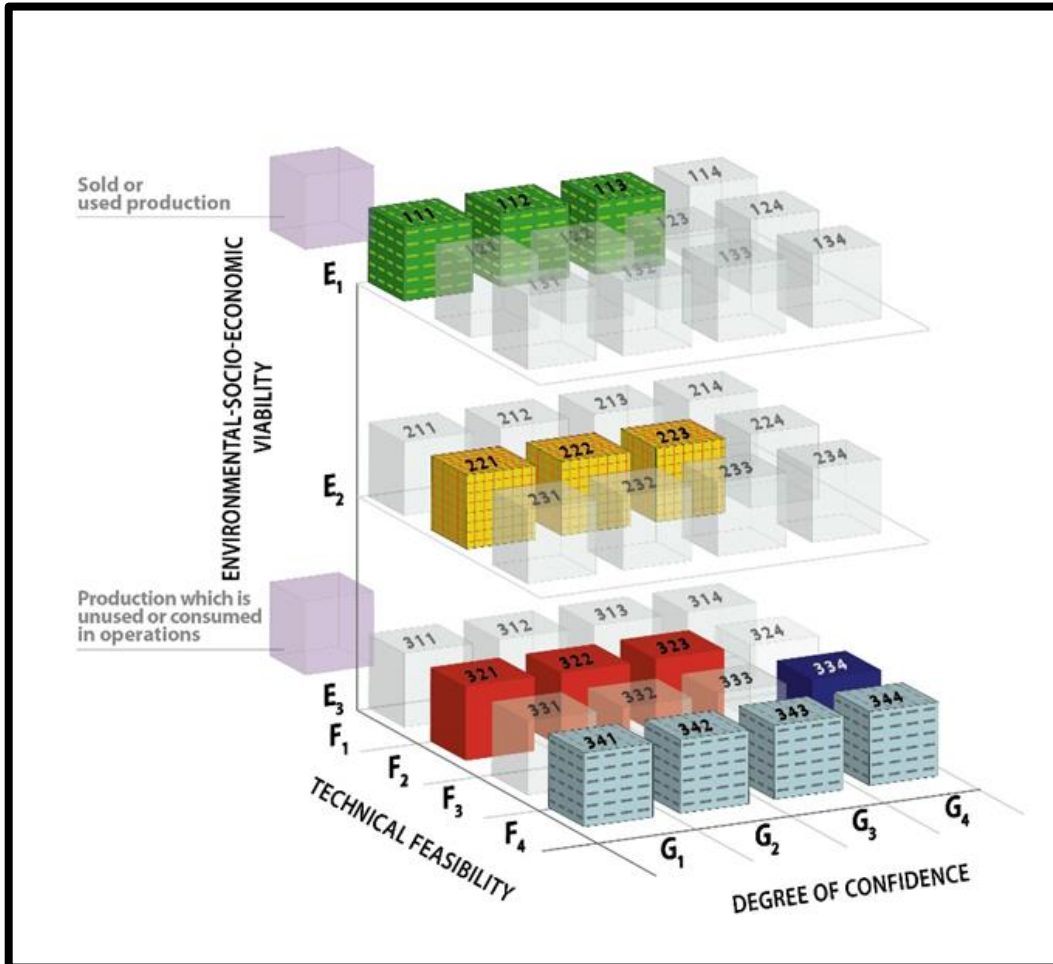
UNFC – How it works



Class:111
Viable project

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.

UNFC – 2D or 3D Representation



	Produced	Sold or used production			
		Production which is unused or consumed in operations ^a			
		Class	Minimum Categories		
	E		F	G ^b	
Total Products	The project's environmental-socio-economic viability and technical feasibility has been confirmed	Viable Projects ^c	1	1	1, 2, 3
	The project's environmental-socio-economic viability and/or technical feasibility has yet to be confirmed	Potentially Viable Projects ^d	2 ^e	2	1, 2, 3
		Non-Viable Projects ^f	3	2	1, 2, 3
	Remaining products not developed from identified projects ^g		3	4	1, 2, 3
	There is insufficient information on the source to assess the project's environmental-socio-economic viability and technical feasibility	Prospective Projects	3	3	4
	Remaining products not developed from prospective projects ^g		3	4	4

UNFC Classes Defined by Categories and Sub-categories

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

UNFC

Sub-Categories and Classes provide more granularity

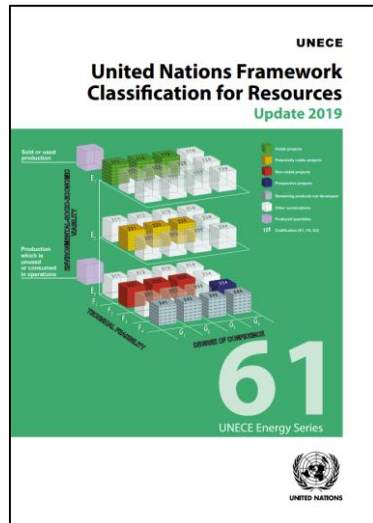
https://unece.org/DAM/energy/se/pdfs/UNFC/publ/UNFC_ES61_Update_2019.pdf

Resource Classification Stakeholders

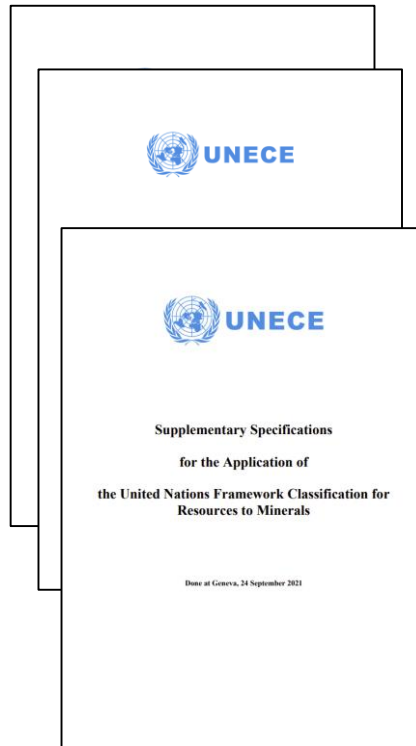


UNFC – Documents Sequence

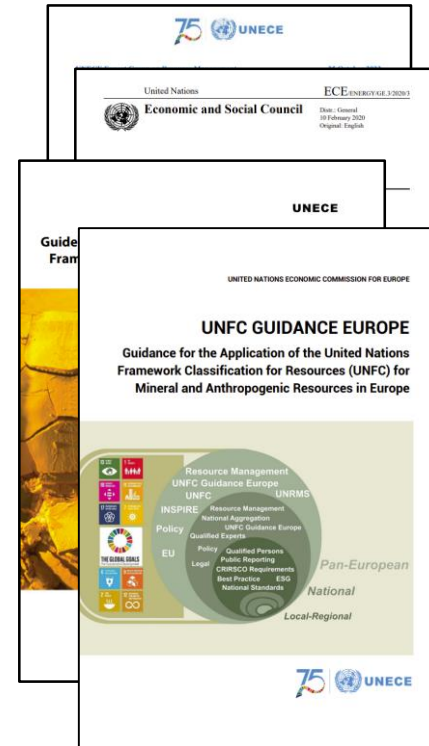
UNFC and Generic Specifications



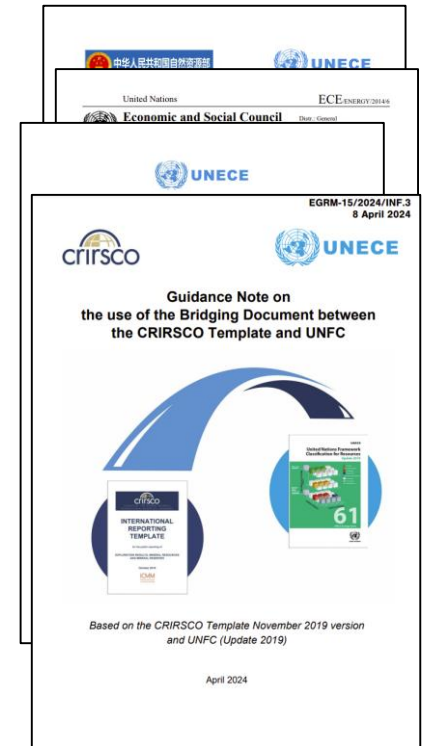
Supplementary Specifications



Guidance



Bridging Documents



- 1. Definitions: Classification framework
- 2. Specifications: Application rules
- 3. Guidelines: Non-mandatory guidance

- Principles
- Rules
- Guidelines

GB/T 17766-1999		UNFC		
		级	亚级	
经济意义	1	E1	E1.1	经济和社会活力
			E1.2	
	2M	E2		
	2S			
	3			
		E3	E3.1	
	E3.2			
	E3.3			
可行性评价阶段		F1/F2		项目状态和技术可行性
	2			
	3	F3		
		F4		
地质可靠程度	1	G1		地质认知程度
	2	G2		

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		
	Justified for Development	1	1.3	1		Probable		Planned
Potentially Commercial Projects	Development Pending	2	2.1	1	Mineral Resources	Measured	Identified Resources	RAR
				2		Indicated		
				3		Inferred		
	Development On Hold	2	2.2	1	Measured	RAR		
				2		Indicated		
				3		Inferred		IR*
						Development Unclassified		

Law (2015) and Proposed New Book of Regulations for Solid Mineral Raw Materials	Results of Geological Exploration	Mineral Resources			Mineral Reserves	
		Inferred	Indicated	Measured	Probable	Proved
Official Book of Regulations for Solid Mineral Raw Materials (1979)	Potential	Potential	Mineral Reserves		Exploitation	
			Established (in situ – Geological: Out-of-Balance and Balance)		(inclusive of dilutions and losses during mining)	
	D ₂ , D ₁	C ₂	C ₁	B, A	C ₁	B, A
UNFC	334	223	Mineral Resources		Mineral Reserves	
			222	221	112	111

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

6 key features

- User / requester dependent
- Uses **Qualified Expert** (instead of Competent Person) and **Qualified Assessments**
- Points out four key aspects that **reinforce trust on estimations**:
 1. **Qualified Experts must be objective and independent,**
 2. **Have adequate and relevant professional qualifications and experience,**
 3. **Endorse their reports,** and
 4. **Provide sufficient transparent and material supporting detail** to allow users of their reports to understand the inherent uncertainties involved.



- Educational **background and experience are aligned** with requirements set out in other standards;
- Advances a **statement** to be signed by the Expert(s) who made the estimates;
- It **does not exclude anyone**

Annex

Template for a Statement of a Qualified Expert

[Date]

[Entity]

[Address]

I, [name] do hereby certify that:

1. I am [consultant/employee] of:

[Entity]

[Address]

2. I have made the estimates of resources as of [dates] set forth in the accompanying [table/report/public disclosure] with respect to the [project] of [Entity]. My examination included such tests and procedures as were considered necessary under the circumstances to render the opinion set forth herein. As of the date of this statement, to the best of my knowledge, information and belief, this Qualified Assessment contains all the scientific and technical information that is required to ensure that it is not misleading.

3. I graduated with a [degree] from the [university] in [year]. In addition, I have obtained a [degree] from the [university] in [year].

4. I am a [professional title] with the [Professional Association or Statutory Body/Government Authority].

[alternatively] 4. I do not have a professional title and I am not registered with a Professional Association/Statutory Body/Government Authority for the following reasons: [stated reasons].

5. I have worked as a [professional qualification] for a total of [years], during which time I have conducted reviews and audits on numerous projects covering [resources/commodities and deposit/reservoir types].

6. I have read the definition of a "Qualified Expert" set out in the United Nations Framework Classification for Resources and certify that by reason of my education, affiliation with a Professional Organisation and past relevant work experience, I fulfil the requirements to be a "Qualified Expert" for the purposes of the United Nations Framework Classification for Resources.

7. I visited the [project] on [dates] (or, alternatively, [I have not visited the project because (explain reason)]).

8. I am independent from the [organisation] that is the subject of the Qualified Assessment.

[alternatively] 8. I meet the requirements of independence and objectivity of a Qualified Expert employed internally by [Entity] as set forth in the UNFC Guidance Note on Competency Requirements for the Estimation, Classification and Management of Resources (ECE/ENERGY/GE.3/2022/4).

9. I am not aware of any material fact or material change with respect to the subject matter of the resources estimates that is not reflected in the Qualified Assessment, the omission to disclose which makes the Qualified Assessment misleading.

10. I consent to the filing of the Qualified Assessment with any authority and any publication, including electronic publication accessible by the public, of the Qualified Assessment.

[Date]

"Signed" _____

NOTE: Information on qualifications detailed in items 4 and 5 above should be provided on an "if not, why not" basis.

UNFC – Benefits



UNFC allows consistent comparison within and across multiple commodities



Globally deployed and endorsed by the UN ECOSOC for application



Simple to use: 3 categories (E, F, G) lead to 3 basic classes (viable, potentially viable, non-viable)



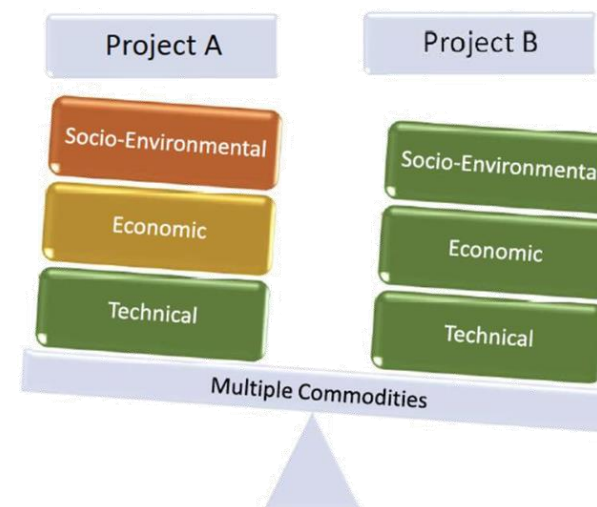
Combines all resources such as **energy, minerals and ground water** into one global classification system



Informs on **environmental, social and governmental issues** at **local, regional, and national level**

UNFC improves financial resilience through business process innovation

UNFC derives necessary social, environmental, and economic outcomes



UNFC speeds up decision-making, rendering it more rational, efficient, predictable, and safe. It makes information processing simpler as it integrates a resource management approach

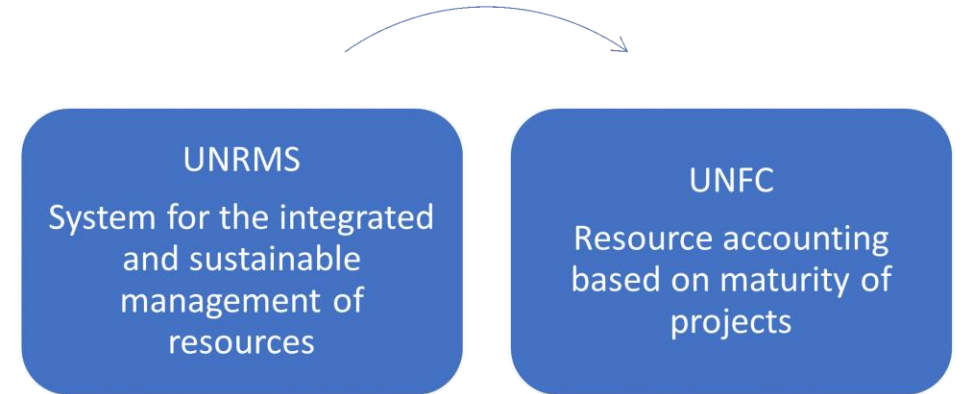
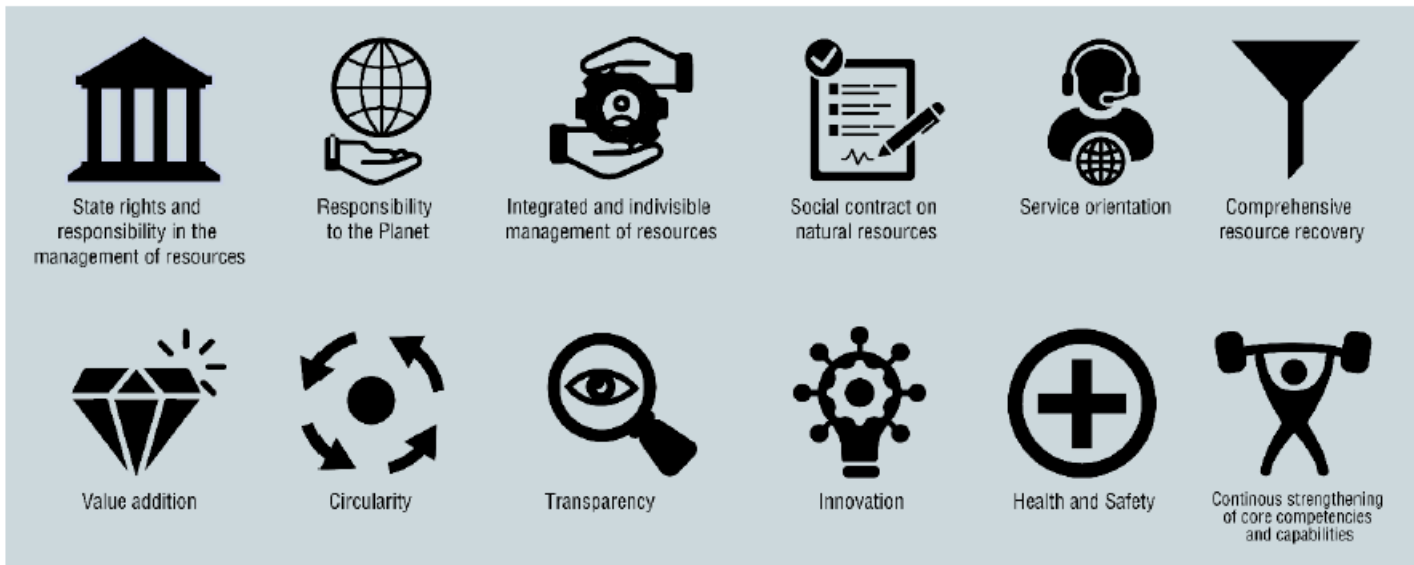
United Nations Resource Management System

UNRMS



UNRMS is the toolkit to tackle sustainability and technology challenges. It includes high-impact technologies that encourage efficient discovery and modelling of in-place resources and allow higher precision during recovery and processing.

United Nations Resource Management System: Principles

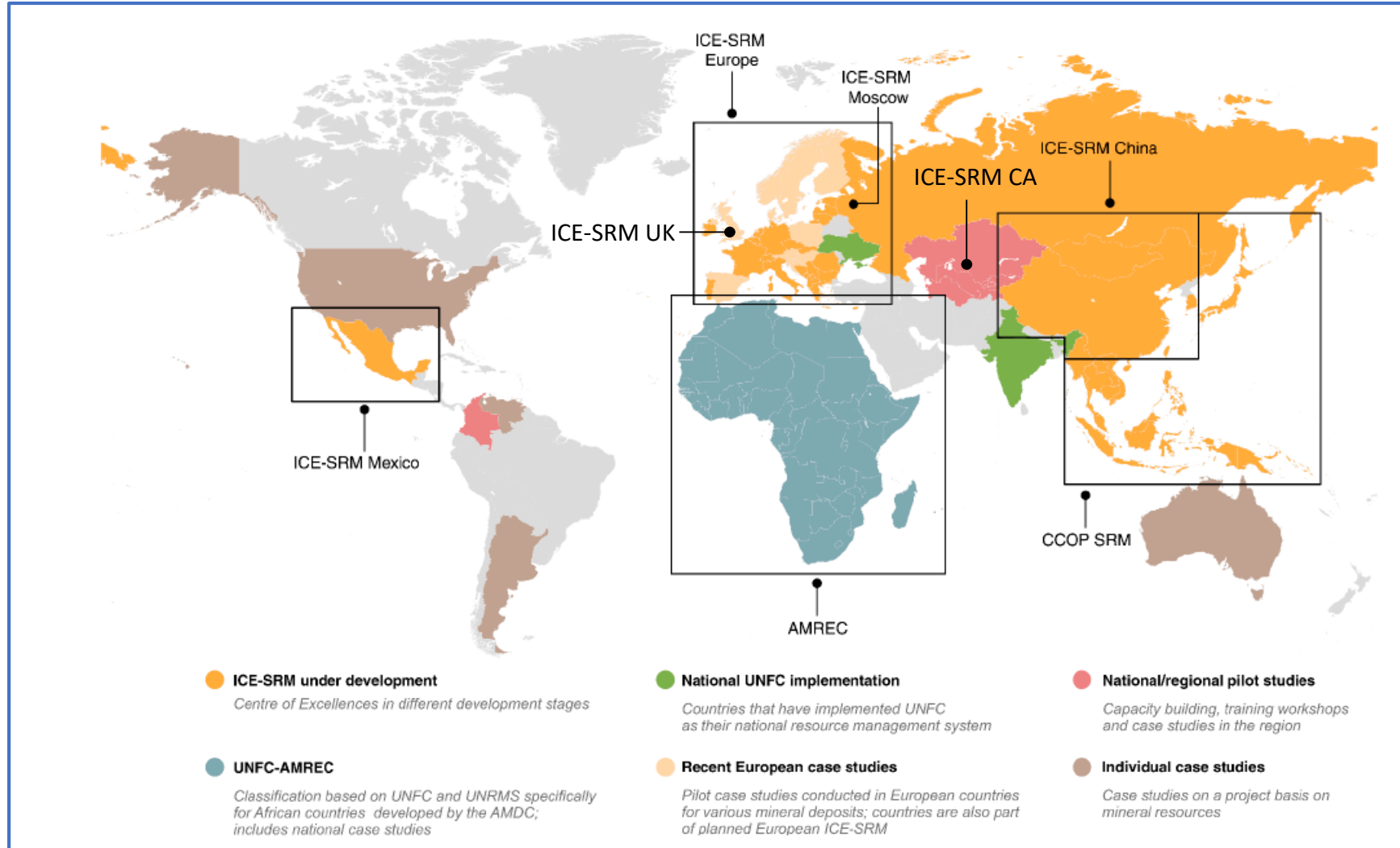


UNRMS Tool Kit Concepts:

- Clean Energy Index
- Service orientation in the use and reuse of resources
- Resource supply system
- Blockchain and machine learning/artificial intelligence model for resource management
- Critical raw materials dashboard

UNFC and UNRMS in the Minerals Sector

Global Outlook



*Modified from
Bibliographical reference*

BIDE, T.P., HORN, S. and GUNN, A.G. 2021. Overview of activities and policy related to critical raw material standards and resource management. *British Geological Survey Commissioned Report, CR/21/124*. 79pp.

Terms of Reference Criteria for Recognition ICE SRMs

Terms of Reference

Support global dissemination and adoption of UNFC and UNRMS through research, testing, consultation, education, and advocacy.

Engage in capacity-building, contribute to the development of UNFC and UNRMS, advocate for best practices, conduct outreach, and report annually on activities and progress.



UNFC 2019 – Key Takeaways

- **UNFC-2019 is a generic, project- and principles-based classification system**
 - Applicable to solid minerals, anthropogenic resources, and a wide range of renewable and non-renewable resources
- **Based on three fundamental criteria**
 - Environmental-socio-economic viability
 - Technical feasibility
 - Degree of confidence
- **Each criterion is sub-divided into 3 or 4 defined categories**
 - Optional use of sub-categories for more granularity
 - Numerical category or sub-category for E, for F and for G (EFG is mandatory order)
 - Axis letters can be dropped: e.g. Class 221
- **Consistent classification depends on careful application of category definitions**
 - Definitions should always be read in conjunction with supporting explanation



**Workshop on
Implementing the United Nations Framework
Classification for Resources (UNFC) in Southeast
Europe**

Thank you!

**THE VIEWS EXPRESSED ARE
THOSE OF THE AUTHOR AND
DO NOT NECESSARILY
REFLECT THE VIEWS OF THE
UNITED NATIONS**

**Belgrade, Republic of Serbia
4 – 5 July 2024**

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