

DRAFT FOR PUBLIC COMMENT

Draft Specifications for the application of the United Nations Framework Classification for Resources to Anthropogenic Resources

**Prepared by the Expert Group on Resource Classification
(EGRC) Working Group on Anthropogenic Resources**

Summary

Growing interest in sustainable resource supply creates a need to assess the future availability of secondary raw materials. International policy setting, Government resource management, industry business process management and capital allocation require a common and comprehensive understanding for assessing the availability of resources from both natural and anthropogenic sources. In contrast to natural resources, there is currently no internationally applicable guidance scheme that supports the classification and reporting of anthropogenic resources.

To overcome this gap, this document provides the draft Specifications for the application of the United Nations Framework Classification for Resources (UNFC) to Anthropogenic Resources. It incorporates the Specifications for the Application of UNFC as set out in United Nations Economic Commission for Europe (UNECE) Energy Series No. 42.

Opening the dialogue to interested experts worldwide, the Expert Group on Resource Classification (EGRC) Working Group on Anthropogenic Resources encourages involvement in shaping the document. The Draft Specifications are available for public review for a period of sixty days and comments received will for the final draft version that will be presented at the EGRC ninth session in April 2018.

Preface

Growing interest in sustainable resource supply has created a need to assess the future availability of raw materials. International policy setting, Government resource management, industry business process management and capital allocation require a common and comprehensive understanding for assessing the availability of resources from both natural and anthropogenic sources, on project, country and global levels. In contrast to natural resources, classification and reporting of anthropogenic resources is currently not established and guided by standardized and globally accepted frameworks.

To overcome this gap, the Christian Doppler (CD) Laboratory on “Anthropogenic Resources” started functioning at the Technische Universität Wien in October 2012 with a lifetime of six years, aiming to develop methodological fundamentals for characterizing, evaluating and classifying anthropogenic resources. In April 2015, case studies for the application of UNFC to selected anthropogenic resources have been presented and discussed at the sixth session of the Expert Group on Resources Classification (EGRC) of the United Nations Economic Commission for Europe (UNECE).

At its sixth session in April 2015, EGRC noted that “future research is needed to define specific, quantifiable criteria for categorizing various kind of anthropogenic resources under the United Nations Framework Classification for Resources (UNFC) that would allow for fair comparisons between naturally occurring and anthropogenic resource deposits. EGRC confirmed that it encourages ongoing independent review of the potential use of UNFC for anthropogenic resources and other applications such as groundwater and methanol from organic waste”.

Based on the EGRC recommendations and CD Laboratory findings, Technische Universität Wien initiated in December 2015 a pan-European expert network, which it also Chairs, with participants from 26 countries, on “Mining the European Anthroposphere” (COST Action CA15115, Acronym: MINEA). MINEA receives funding from the COST Association and the EU Framework Programme Horizon 2020, respectively. The network aims to develop the classification and reporting of anthropogenic material resources. In April 2016, at the seventh session of EGRC, MINEA invited EGRC members to join the expert network and proposed to establish a new Working Group for developing Specifications and Guidelines to apply UNFC to anthropogenic resources. Consequently, EGRC recommended, a sub-group be established to explore the application of UNFC to anthropogenic resources.

In October 2016, the MINEA Working Group (WG) on “Classification and reporting of material resources/reserves” was consolidated under the leadership of Ludwig-Maximilians-Universität München and organized a first public Workshop on “Opportunities and Challenges of Anthropogenic Resources Classification” on 6-7 October 2016 at the Geological and Geophysical Institute in Budapest and one on 23 February 2017 at the Slovenian Geological Survey in Ljubljana. The WG focused on (a) the development of generic draft Specifications that would allow application of UNFC to Anthropogenic Resources, and (b) on the selection of case studies, which are expected to be released as Guideline for different anthropogenic commodities/deposits. Therefore, three additional MINEA WGs have been instructed to focus on the resource potential of three different anthropogenic resources exemplary, namely, construction & demolition waste, landfills and mining residues, and residues from solid waste incineration.

At its eight session in April 2017, the initial draft specifications were presented and discussed. The Expert Group tasked the Working Group on Anthropogenic Resources to deliver the draft specifications in April 2018. The Working Group encourages the involvement of interested experts from public authorities, industry and business, research institutions and consulting agencies in shaping the document. The final draft specifications will be presented at the EGRC ninth session in April 2018.

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Guidance for reading the document

The United Nations Framework Classification for Resources is a package of documents with the following hierarchical levels:

1. Level 1: United Nations Framework Classification for Resources (UNFC) incorporating Specifications for its Application (UNECE 2013).
2. Level 2: Specifications to apply UNFC (e.g. UNECE 2015b, UNECE 2016, UNECE and IGA 2016).
3. Level 3: Case studies (e.g. UNECE 2014, UNECE 2015c, UNECE 2015a)

The present document (Draft Specifications for the application of the United Nations Framework Classification for Resources to Anthropogenic Resources) is at the second hierarchical level. It is intended for use in conjunction with the first level document, namely UNFC (UNECE 2013), which is available online: https://www.unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/pub/UNFC2009_Spec_ES42.pdf

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I. Introduction

1. The purpose of this document is to enable the application of the United Nations Framework Classification for Resources (UNFC)¹ to Anthropogenic Resources. Additional context is provided where deemed necessary.
2. The Draft Specifications are a living document. Any proposal for modifications should be directed to the Expert Group on Resource Classification.
3. These Specifications represent ‘rules of application’ of UNFC for Anthropogenic Resources. The commodity and/or deposit -specific specifications under development represent ‘rules of application’ of UNFC to specific types of Anthropogenic Resources via these Specifications.
4. The term “Anthropogenic Resource” or “Anthropogenic Material Resource” is defined and adopted from the definition of the term “Natural Resource” from the OECD (Organisation for Economic Co-operation and Development) study “Material Resources, Productivity and the Environment” (OECD 2015):

The term “anthropogenic resources” designates resource stocks that are found in the anthroposphere (mineral resources, energy resources, soil resources, water resources, biological resources). Anthropogenic Stocks are the anthropogenic occurring assets that provide use benefits through the provision of secondary raw materials and energy used in economic activity (or that may provide such benefits one day).

5. “Anthropogenic Resource” or “Anthropogenic Material Resource” is an overarching term for physical matter without a) any attribution from an economic, social or environmental perspective, b) without a specification of the aggregate state (solid, liquid, gaseous) and c) any relation to a specific stage in the life cycle. For instance, an anthropogenic resource might be the physical matter of car components at the construction stage or the car in the use-phase, or the scrap metal from a car in the dismantling stage. It covers also physical matter in dumps, landfills and other disposals. The different types of Anthropogenic Resources should be addressed in commodity and stock-specific specifications.
6. Because Anthropogenic Stocks are an integral part of the anthropogenic material cycle, the estimated resource quantity can be, in theory, equal the total material quantity within the anthroposphere. However, in reality, constraints for material reuse, recycling and recovery, such as economics, environmental impacts, recycling efficiencies and the like, limit and define the amount of useful resources that can realistically be extracted from Anthropogenic Stocks and Flows. The recoverable quantities are most relevant for governments, companies, and society at large. This distinction is addressed in UNFC because its central concept is the Project. The resources classified in UNFC are the (finite) quantities that are estimated to be extracted during the lifetime of the Project, and are classified according to the status of the Project. The identification and definition of the Project therefore remains the fundamental starting point for the application of UNFC to Anthropogenic Resources.
7. It is recognized that there are overlaps between the application of the Anthropogenic Resource Specifications and the Renewable Energy Specifications in terms of sectors, example include those fractions of combustible waste that turn into Secondary Raw Materials (e.g. metals recovery from combustion residues) or those that are used for Renewable Energy Products (e.g., energy recovery from waste combustion).

¹ The EGRC at its 8th Session in April 2017 has changed the name from “United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 (UNFC-2009)” to “United Nations Framework Classification for Resources (UNFC)”.

II. Anthropogenic Resource definitions

A. Anthroposphere, Anthropogenic Materials, Anthropogenic Material System, Anthropogenic Process, Anthropogenic Stock, Anthropogenic Material Flow, Anthropogenic Material Source, Raw material, Secondary Raw Material or Commodity.

References for each definition and explanations can be found in the footnotes. Terms that are defined within this section, are underlined in the entire document.

8. The **Anthroposphere**² denominates the part of the environment that is made or modified by humans. It includes all domains of human activities, as opposed to those occurring in natural environments without human influences. In the Anthroposphere, human being constitutes a significant source of change in earth system through a significant flow of material and energy. It includes the use and transformation of natural resources, as well as the release of residues.
9. The term “materials” or “material resources”³ designates the usable materials or substances (raw materials, energy) produced from natural or Anthropogenic Resources. These usable “materials” include energy carriers, metal ores and metals, construction minerals and other minerals, soil and biomass. The natural materials originate from natural resources; the **Anthropogenic Materials** originate from Anthropogenic Resources. In context of Material Flow Analysis and Accounting, the term “Materials” is used in a very broad sense so as to record all material related flows at all relevant stages of the material cycle.
10. An **Anthropogenic Material System**⁴ maps the Anthropogenic Materials inside the Anthroposphere or of parts of it. With respect to Figure 1, the Anthropogenic Material System is limited by spatial and temporal system boundaries (dashed line) and comprises Anthropogenic Stocks and Anthropogenic Material Flows, as well as Anthropogenic Processes that include the transformation, storage and transport of materials. Primary raw materials and primary commodities are sourced from Natural Processes and Secondary Raw Materials and Secondary Commodities are sourced from Anthropogenic Processes. Defining an Anthropogenic Material System on Project level limits the scope of the Anthropogenic Material System for the entire Anthroposphere (as visualized in Figure 1) to the relevant system boundaries, Anthropogenic Materials, Anthropogenic Processes and Anthropogenic Material Flows (Figure 2).

² The definition is adopted from Baccini and Brunner (2012), Cambridge dictionary (2017), Wikipedia (2017).

³ The definition of “materials” or “material resources” is given in OECD (2015). The definition and explanations have been modified in order to accommodate anthropogenic resources .

⁴ Adopted from Brunner and Rechberger (2004), Baccini and Brunner (2012).

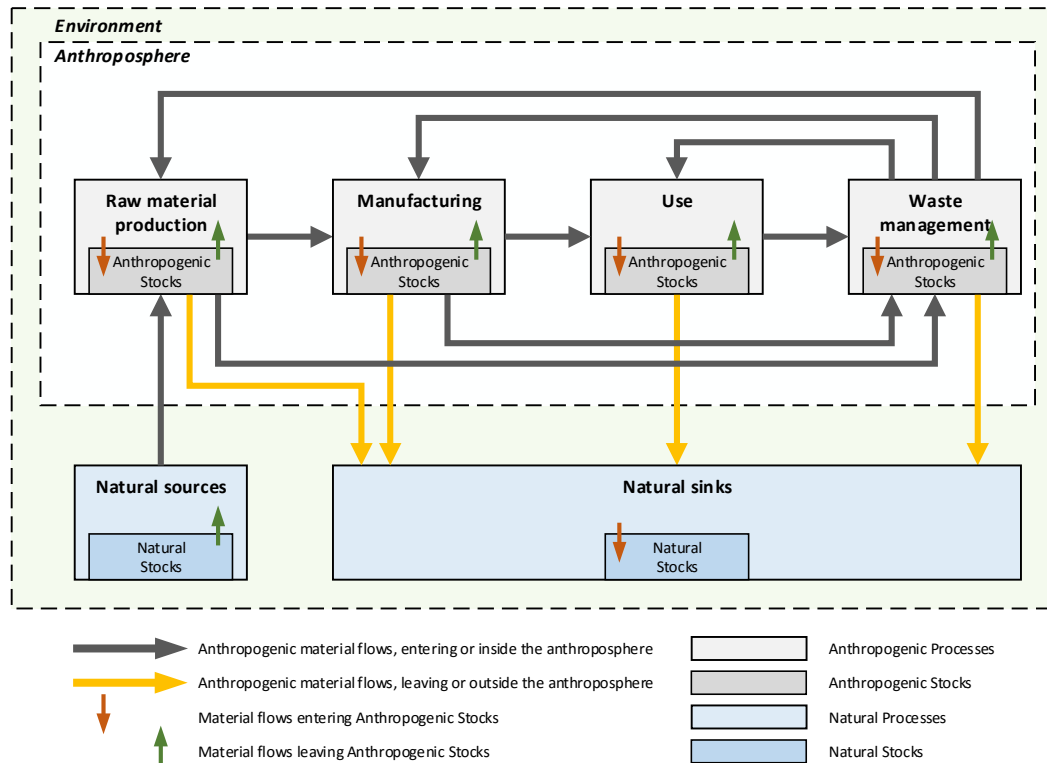


Figure 1: Diagram about Anthropogenic Material System in the Anthroposphere⁵. Light gray boxes represent the Anthropogenic Processes including Anthropogenic Stocks (dark grey). Dark gray arrows represent the Anthropogenic Material Flows.

11. An **Anthropogenic Process**⁶ describes all man-made activities including e.g. extraction, transformation, transport, or storage of related Anthropogenic Materials. The extraction includes activities such as preparation for reuse, recycling and material recovery⁷. The Anthropogenic Process is subject to the mass balance principle. The inflows, stock changes and outflows are balanced (sum is zero) across individual Anthropogenic Processes. In Figure 1, the Anthropogenic Processes are presented as a light gray box.
12. An **Anthropogenic Stock**⁸ is the amount of material in society that has been extracted, processed, put into use, currently providing service, discarded, or dissipated over time. It is a cumulative total amount of Anthropogenic Material contained in an Anthropogenic Process at a certain time⁹. The term “stock” is equivalent to the term “deposit” used for petroleum and solid mineral resources in the Geosphere. The main difference to fossil fuels or solid minerals is that during the lifetime of the Project, the Anthropogenic Stock can act both as sink and as source of Anthropogenic Materials in a dynamic manner. In other words, the stock can act as a reservoir for the production of Secondary Raw Materials or

⁵ The figure has been developed based on various diagrams about the life cycle of materials such as Graedel (2010), Lederer, Laner et al. (2014) and discussions among the authors of the Initial Draft Specifications (EGRC 8/2017/INF.7.).

⁶ Adopted from Brunner and Rechberger (2004), Baccini and Brunner (2012).

⁷ The term “extraction” used in these specifications is equivalent to “production” or “recovery”, which are commonly used for petroleum projects. It includes the activities for waste treatment “reuse”, “preparation for reuse”, “recycling” and “material recovery”. The latter terms are used by the EU Waste Directive 2008/98/EC (European Union 2008) and guidance on their interpretation is given in (European Commission 2012). “Extraction” implies the process of converting an Anthropogenic Material Source into Secondary Raw Materials or commodities. Where necessary, the meaning of “extraction” in the context of different types of Anthropogenic Resources is clarified in the aligned commodity-specific specifications.

⁸ Adopted from Brunner and Rechberger (2004), OECD (2015), UNECE (2016).

⁹ For instance the total copper stock in the vehicle fleet in the year 2000, or the total amount of mine waste tailings at a specific mining site.

Commodity. The stock is allocated to an Anthropogenic Process, shown as dark gray box in Figure 1.

13. An **Anthropogenic Material Flow**¹⁰ is the movement of Anthropogenic Material between two Processes and is measured in mass or volume per time. An example is 10 tonnes of Zinc per day.
14. An **Anthropogenic Material Source** relates to an Anthropogenic Process within the Anthropogenic Material System on Project level. Further explanations are given in section II.B.
15. **Raw materials**¹¹ are basic substances or mixtures of substances in an untreated state except for extraction and primary processing. They can be subdivided into primary and secondary raw materials. Primary raw materials are the product of the primary production sectors, which encompass the extraction of natural resources from the environment and their transformation through processing or refining. The obtained raw materials are primary commodities, the base materials for further manufacturing and consumption processes. The primary commodities will finally end up in Anthropogenic Stocks, from which Secondary Raw Materials or Commodities can be derived.
16. A **Secondary Raw Material or Commodity** is material that a) originates from an Anthropogenic Material Source and b) that is saleable in an established market. Examples of Secondary Raw Materials or Commodities are concrete from dismantling the building stock, scrap from car shredding, zinc from waste incineration residues, or metals from mining residues. Other types of raw materials potentially extractable from the Anthropogenic Material Source in the same Anthropogenic Process, such as by-products, should also be considered for the social, economic and environmental evaluation. The cumulative extracted Secondary Raw Materials or Commodities are equivalent to “Saleable Production” according to UNFC.

B. Criteria, Categories and supporting explanations

17. UNFC is a generic principle-based system in which quantities are classified with respect to three fundamental criteria. First, the economic and social viability (E), second the field project status and feasibility (F), and third the geological knowledge (G). Each criteria refers to an axis (E-axis, F-axis, G-axis), which create a three-dimensional system. Each axis is divided in to categories (e.g. E1, E2, E3) and subdivided into sub-categories (e.g. E1.1, E1.2).
18. Principle guidance on the definition of categories and sub-categories is given in UNFC incorporating Specifications for its Application (UNECE 2013, Part I, Section II). In its current version, UNECE (2013) is built to classify traditional exploration and mining Projects and not Projects for the extraction of Secondary Raw Materials or Commodities from Anthropogenic Material Sources. For this reason, the terminology needs to be interpreted by the reader of the UNECE (2013). Guidance for the interpretation of terms is given in the Annex 1: Terms from UNFC and its interpretation in the context of Anthropogenic Resources on page 19.

a. E-axis

19. Additional context is added to Annex I “Definition of Categories and Supporting Explanations” of Part I of UNFC where deemed necessary for the application of UNFC to Anthropogenic Resources. It is noted that a *Draft guidance on accommodating environmental and social considerations in the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009* has been developed by the EGRC E-axis subgroup (UNECE 2017a, UNECE 2017b). The draft guidance documents are also of relevance for Anthropogenic Resources. Further reading at section III.F on page 14.

¹⁰ Adopted from Brunner and Rechberger (2004).

¹¹ Adopted from Eurostat (2017).

Table 1: Definition of E-axis categories and supporting explanations

Category	Definition (UNECE 2013, Part I, Annex I)	Supporting Explanation (UNECE 2013, Part I, Annex I)	Additional Anthropogenic Material Context
<i>E1</i>	Extraction and sale has been confirmed to be economically viable ¹²	Extraction and sale is economic on the basis of current market conditions and realistic assumptions of future market conditions. All necessary approvals/ contracts have been confirmed or there are reasonable expectations that all such approvals/contracts will be obtained within a reasonable timeframe. Economic viability is not affected by short-term adverse market conditions provided that longer-term forecasts remain positive.	Extraction is the process of converting an <u>Anthropogenic Material Source</u> into <u>Secondary Raw Materials</u> or <u>Commodities</u> .
<i>E2</i>	Extraction and sale is expected to become economically viable in the foreseeable future.	Extraction and sale has not yet been confirmed to be economic but, on the basis of realistic assumptions of future market conditions, there are reasonable prospects for economic extraction and sale in the foreseeable future.	Extraction and sale is expected to become commercially viable in the foreseeable future.
<i>E3</i>	Extraction and sale is not expected to become economically viable in the foreseeable future or evaluation is at too early a stage to determine economic viability	On the basis of realistic assumptions of future market conditions, it is currently considered that there are not reasonable prospects for economic extraction and sale in the foreseeable future; or, economic viability of extraction cannot yet be determined due to insufficient information (e.g. during the assessment phase). Also included are quantities that are forecast to be converted, but which will not be available for sale.	

¹² According to UNFC, the phrase “economically viable” encompasses economic (in the narrow sense) plus other relevant “market conditions”, and includes consideration of prices, costs, legal/fiscal framework, environmental, social and all other non-technical factors that could directly impact the viability of a development project.

b. F-axis**Table 2: Definition of F-axis categories and supporting explanations**

Category	Definition (UNECE 2013, Part I, Annex I)	Supporting Explanation (UNECE 2013, Part I, Annex I)	Additional Anthropogenic Material Context
F1	Feasibility of extraction by a defined development project or mining operation has been confirmed.	Extraction is currently taking place; or, implementation of the development project is underway; or, sufficiently detailed studies have been completed to demonstrate the feasibility of extraction by implementing a development project or mining operation.	
F2	Feasibility of extraction by a defined development project or mining operation is subject to further evaluation.	Preliminary studies demonstrate the existence of a project in such form, quality and quantity that the feasibility of extraction by a defined (at least in broad terms) development project or mining operation can be evaluated. Further data acquisition and/or studies may be required to confirm the feasibility of extraction.	
F3	Feasibility of extraction by a defined development project or mining operation cannot be evaluated due to limited technical data.	Very preliminary studies (e.g. during the assessment phase), which may be based on a defined (at least in conceptual terms) development project or mining operation, indicate the need for further data acquisition in order to confirm the existence of a project in such form, quality and quantity that the feasibility of production can be evaluated.	
F4	No development project or mining operation has been identified.	In situ (in-place) quantities that will not be produced by any currently development project or mining operation.	Category F4 can be used to classify the currently non- extractable quantities at the geographical location of the defined project due to multiple constraints, for example, current usage purpose, ownership rights, site/area constraints, technology limitations and/or other constraints.

c. G-axis

20. In UNECE (2013), the G axis “designates the level of confidence in the geological knowledge and potential recoverability of the quantities”. This definition reflects the fact that, at the time of its publication, UNFC was designed to be applied to fossil energy and mineral reserves and resources. It is recognized that the reference to “geological knowledge” is not generally applicable to Anthropogenic Resources. Guidance for the interpretation of the term is given on page 19
21. There are three established approaches to determining appropriate estimates for G1, G2 and G3, two of which are based on the assessment of a range of uncertainty for quantities associated with a Project, with the other reflecting different levels of confidence. The terms and definitions used within these specifications originate from UNECE (2016). They have been adopted and are as follows:
 - (a) The “incremental” approach, which is based on estimates for discrete portions of the Anthropogenic Material Source and/or the Project, where each estimate is assigned on the basis of its level of confidence (high, moderate and low)¹³ reflecting available knowledge regarding potential recoverability;
 - (b) The “scenario” approach, which is based on three discrete scenarios that are designed to reflect the range of uncertainty in the possible outcomes (low, best and high estimates)¹⁴ of the Project extracting materials from the Anthropogenic Material Source as a whole;
 - (c) The “probabilistic” approach, where multiple possible scenarios are generated (e.g. by Monte Carlo analysis) from input distributions of parameter uncertainty associated with the Project extracting material from the Anthropogenic Material Source as a whole. Three specific outcomes are then selected from the output cumulative probability density distribution as indicators of the range of uncertainty (P90, P50 and P10 values are equated to low, best and high estimates respectively, where P90 means there is 90% probability of exceeding that quantity).
22. In order to maintain alignment between different Anthropogenic Resources, as well as with non-renewable fossil energy and mineral reserves and resources, specifications for application of the G axis categories to Anthropogenic Resources are provided in Part III of this document.

¹³ In the petroleum sector, for example, incremental reserves with high, moderate and low confidence would be documented as proved, probable and possible reserves respectively and would correspond to E1F1G1, E1F1G2 and E1F1G3 in UNFC-2009.

¹⁴ In the petroleum sector, for example, both the scenario and probabilistic approaches would equate low, best and high estimates for reserves with proved (1P), proved plus probable (2P) and proved plus probable plus possible (3P) reserves, which would correspond to E1F1G1, E1F1G1+E1F1G2 and E1F1G1+E1F1G2+E1F1G3 in UNFC-2009.

Table 3: Definition of G-axis categories and supporting explanations

Category	Definition (UNECE 2013, Part I, Annex I)	Supporting Explanation (UNECE 2013, Part I, Annex I)	Additional Anthropogenic Material Context
G1	Quantities associated with a known deposit that can be estimated with a high level of confidence.	<p>For in situ (in-place) quantities, and for recoverable estimates of Fossil Energy and Mineral Resources that are extracted as solids, quantities are typically categorized discretely, where each discrete estimate reflects the level of geological knowledge and confidence associated with a specific part of the deposit. The estimates are categorized as G1, G2 and/or G3 as appropriate.</p> <p>For recoverable estimates of Fossil Energy and Mineral Resources that are extracted as fluids, their mobile nature generally precludes assigning recoverable quantities to discrete parts of an accumulation. Recoverable quantities should be evaluated on the basis of the impact of the development scheme on the accumulation as a whole and are usually categorized on the basis of three scenarios or outcomes that are equivalent to G1, G1+G2 and G1+G2+G3.</p>	<p>The G axis reflects the level of confidence in the potential recoverability of the quantities. Thus, the G axis categories are intended to reflect all significant uncertainties impacting the estimated <u>Anthropogenic</u> quantities that are forecast to be extracted by the Project and typically would include (but not be limited to) areas such as waste sampling and analysis and system analysis of Anthropogenic Material Systems.</p> <p>Uncertainties include both variability in the <u>Anthropogenic Material Source</u> (e.g. composition, quantity) and the efficiency of the extraction and conversion methodology (where relevant). Typically, the various uncertainties will combine to provide a full range of possible outcomes. In such cases, categorization should reflect three scenarios or outcomes that are equivalent to G1, G1+G2 and G1+G2+G3.</p>
G2	Quantities associated with a known deposit that can be estimated with a moderate level of confidence.		
G3	Quantities associated with a known deposit that can be estimated with a low level of confidence.		
G4	Estimated quantities associated with a potential deposit, based primarily on indirect evidence.	Quantities that are estimated during the initial assessment phase are subject to a substantial range of uncertainty as well as a major risk that no development project or mining operation may subsequently be implemented to extract the estimated quantities. Where a single estimate is provided, it should be the expected outcome but, where possible, a full range of uncertainty in the size of the potential deposit should be documented (e.g. in the form of a probability distribution). In addition, it is recommended that the chance (probability) that the potential deposit will become a deposit of any commercial significance is also documented.	Category G4 is equally applicable to <u>Anthropogenic Resources</u> , for “Estimated quantities associated with a potential <u>Anthropogenic Material Source</u> , based primarily on indirect evidence” (e.g. top-down studies to explore the quantities in a region).

C. Classes

23. A class is defined by selecting from each of the three criteria (E-axis, F-axis, G-axis) one particular category or sub-category and combining them. A class is uniquely defined by its codification (e.g. E1 F1 G1). Any combination of categories is allowed to form classes and sub-classes. Typically, Projects hold quantities in several classes or sub-classes. The total commodity initially in place is classified at a given date. Table 4 shows an abbreviated version of UNFC and selected classes for Anthropogenic Resource Projects.
24. A Project is considered to be economic when it indicates a positive return on investment, measured by a monetary criterion, such as having a positive net present value (NPV) at a particular discount factor (UNECE 2017b).
25. A Project is considered to be commercial when it is not only economic, but also satisfies all the other criteria of the E, F, and G axes that are required for the Project to proceed. These requirements are described as contingencies until they are satisfied (UNECE 2017b).

Table 4: An abbreviated version of UNFC, showing selected classes for Anthropogenic Resource Projects.

Total Secondary Raw Material or Commodity initially in place	Extracted	Sales Production ^{a)}			
		Non-sales Production ^{b)}			
			Categories		
	Short description	Class	E	F	G
	Future extraction by commercial development projects or ongoing extraction operations. ^{c)}	Commercial Projects	1	1	1, 2, 3
	Potential future extraction by contingent development projects or ongoing extraction operations. ^{c)}	Potentially Commercial Projects	2	2	1, 2, 3
		Non-Commercial Projects	3	2	1, 2, 3
	Additional quantities in place associated with a known <u>Anthropogenic Material Source</u> . ^{d)}		3	4	1, 2, 3
	Potential future extraction by successful exploration activities. ^{c)}	Exploration Projects	3	3	4
	Additional quantities in place associated with potential <u>Anthropogenic Material Sources</u> . ^{f)}		3	4	4

As shown in Table 4, the total Secondary Raw Material or Commodity initially in place is categorized into classes at a given date (see III.B) in terms of the following:

- a) Sales Production: Extracted quantities that have been sold (= Secondary Raw Materials or Commodities that have been sold).¹⁵
- b) Non-sales Production: Extracted quantities that have not been sold.
- c) Quantities associated with a known Anthropogenic Material Source that may be extracted in the future by preparation for reuse, recycling and recovery activities. Technical and commercial evaluation studies based on defined development projects or preparation for reuse, recovery and recycling operations constitute the basis for the classification.
- d) Additional quantities in place associated with a known Anthropogenic Material Source that will not be available and extracted by any currently defined development project or preparation for

¹⁵ In contrast to geogenic deposits, Anthropogenic Stocks are replenished by Secondary Raw Materials or Commodities. Consequently, the reporting of "Sales Production" for two different years might include one and the same physical matter.

- reuse, recycling and recovery operations.¹⁶
- e) Potential future extraction by successful exploration activities: Quantities associated with a potential Anthropogenic Material Source that may be extracted in the future provided that the Anthropogenic Material Source is confirmed.
 - f) Additional quantities in place associated with potential Anthropogenic Material Sources that would not be expected to be recovered even if the Anthropogenic Material Source is confirmed.

D. Sub-classes

26. For the clarity of global communication, Table 5 defines examples of possible sub-classes based on the full granularity provided by the sub-categories included in UNECE (2013, Annex II).

Table 5: UNFC Classes and Sub-classes with selected categories for Anthropogenic Resource Projects.

Total Secondary Raw Materials or Commodity initially in place	Extracted	Sales Production				
		Non-Sales Production				
		Class	Sub-class	Categories		
				E ¹⁷	F	G
	Known <u>Anthropogenic Sources</u>	Commercial 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 Commercial Projects	Development Pending	2	2.1	1, 2, 3
			Development On Hold	2	2.2	1, 2, 3
		Non- Commercial Projects	Development Unclassified	3.2	2.2	1, 2, 3
Development Not Viable			3.3	2.3	1, 2, 3	
Additional quantities in place			3.3	4	1, 2, 3	
Potential <u>Anthropogenic Source</u>	Exploration Projects	[No sub-classes defined]	3.2	3	4	
	Additional quantities in place		3.3	4	4	

E. Defining the Project

27. A Project¹⁸ is a defined development or extraction operation, which provides the basis for socio-economic and environmental evaluation and decision-making. In the early stages of evaluation, including exploration, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail. Where no development or recovery operation can currently be defined for all or part of a Anthropogenic Material Source, based on existing technology or technology currently under development, all quantities associated with that Project (or part thereof) are classified in Category F4.

¹⁶ Example: Concrete and steel in building walls that are still in-use and not available for extraction during the project lifetime. The term „Project Lifetime“ is further explained in section II.F.

¹⁷ These are minimum categories. Classes using higher categories such as E1 F2 G1, 2, 3 are valid.

¹⁸ The definition of a Project originates from UNECE (2013) and has been adopted for Anthropogenic Resource needs.

28. The classification procedure consists of identifying a Project, or Projects, estimating the quantity of Secondary Raw Materials or Commodities that can be extracted from and supplied to an Anthropogenic Material Source, with associated level of confidence, and classifying the Project(s) based on Project status (or maturity) and commercial viability.
29. Figure 2 gives two general examples for defining an Anthropogenic Material System on Project level. Depending on the Project objectives, the Anthropogenic Material Source could be an Anthropogenic Process with or without an Anthropogenic Stock. More details including the definition of terms can be found in section II.A.

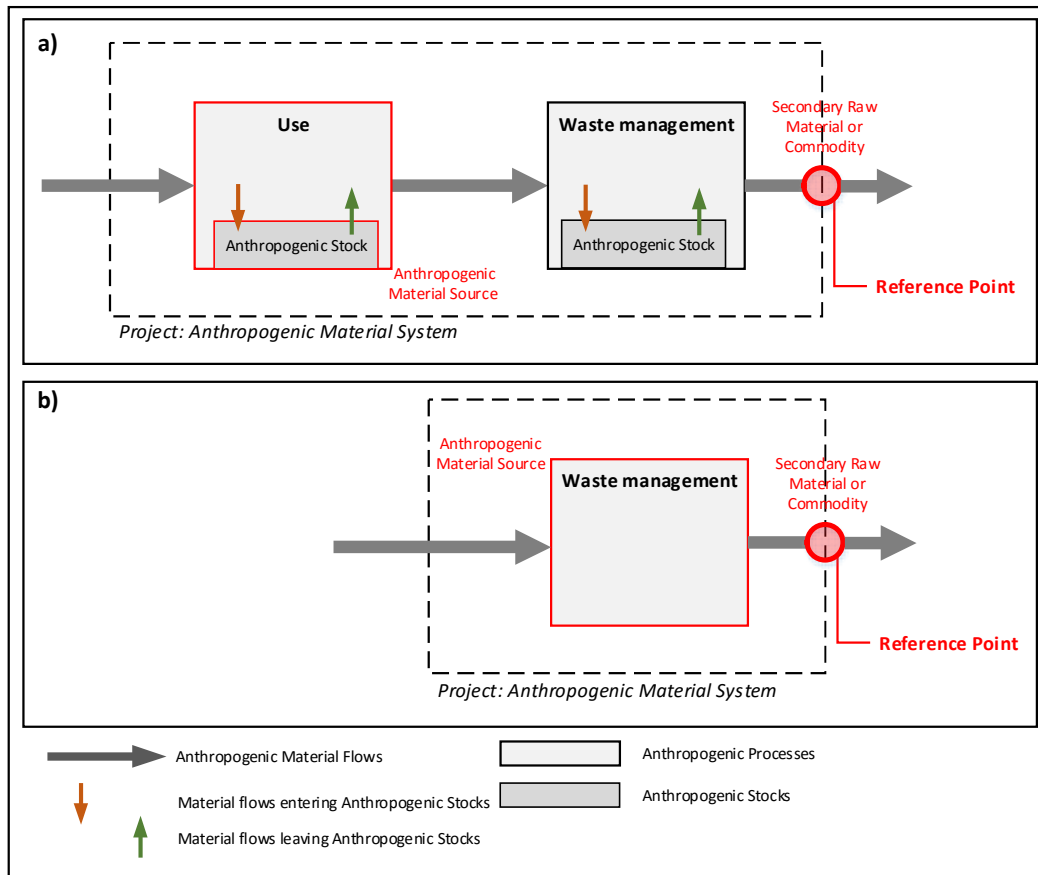


Figure 2: Generic Anthropogenic Material Systems on Project level. The Secondary Raw Materials or Commodities originate either from a) an Anthropogenic Process including an Anthropogenic Stock, or from b) an Anthropogenic Process without an Anthropogenic Stock.

30. The Project is the link between the Anthropogenic Material Source and the quantities of Secondary Raw Materials or Commodities and provides the basis for environmental, social and economic evaluation and decision-making. There is a clear recognition of risk versus reward for the investors and key stakeholders such as governments and industry associations, linked to uncertainties and/or variability in the Anthropogenic Material Source (composition, quantity, quality), the efficiency of the extraction and conversion process, Secondary Raw Materials or Commodity prices and market conditions (including policy support mechanisms), social acceptance, and environmental benefits compared to primary resource extraction and processing. In the early stages of evaluation, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail.
31. The selection of the Anthropogenic Material Source depends on the objective of the Project and the corresponding definition of the Anthropogenic Material System. Exemplary Project definitions are given

in Figure 2. Example: long-term predictions of future construction and demolition waste flows in terms of quantity, quality and location require the analysis of dynamics (temporal and spatial change of materials) in the Anthropogenic Stock. Therefore, the Anthropogenic Material Source is the stock of materials (see Fig 2a). If short-term predictions of future waste flows without significant changes in terms of quantity and quality per time are expected, the Anthropogenic Material Source might be the recovery process only and the Anthropogenic Process is without an Anthropogenic Stock (see Fig. 2b). With respect to UNFC, the Anthropogenic Material Source covers the materials initially in place available for extraction of (or conversion into) Secondary Raw Materials or Commodities. The main difference with geogenic deposits is that, during the lifetime of the Project, the output of the Anthropogenic Material Source may vary over time. Temporal variations are, for instance, the waste output rate, the composition, or sometimes also the location of waste production.

F. Project lifetime

The following text originates from the Specifications for the application of UNFC to Geothermal Energy Resources (UNECE and IGA 2016) and terminology and has been adopted for Anthropogenic Resources.

32. The estimated Anthropogenic Resources for a Project shall be limited to quantities that will be produced during the Project Lifetime.
33. The Project Lifetime will be the minimum of the economic limit, design life, contract period and entitlement period, as defined below. Because of its importance in estimating material quantities, the Project Lifetime and its basis shall be disclosed in association with any reported quantities.
 - The ‘economic limit’ is defined as the time at which the Project reaches a point beyond which the subsequent cumulative discounted net operating cash flows from the Project would be negative. For an Extraction Project, the economic limit may be the time when the expected extraction rate declines to a level that makes the Project uneconomic, or when it is uneconomic to invest in further extraction infrastructure such as additional recycling plants.
 - The ‘design life’ of a Project is the expected operating life of major physical infrastructure as defined during the technical and economic assessment of the Project. The replacement of significant project components will constitute a new Project and a new evaluation and estimation of Anthropogenic Resources shall be performed.
 - The ‘contract period’ for an Extraction Project is the term of all existing, or reasonably expected, sales contracts for the Secondary Raw Materials or Commodities. The contract period should not include contract extensions unless there is reasonable expectation of such extensions, based upon historical treatment of similar contracts.

G. Corporate versus National Resource Reporting

The following text originates from the Specifications for the application of UNFC to Geothermal Energy Resources (UNECE and IGA 2016) and terminology has been adopted for Anthropogenic Resources.

34. UNFC is geared toward classifying the resources associated with single projects. For reporting of corporate or national Anthropogenic Resources, the estimated quantities of the ‘single’ projects may need to be aggregated.
35. UNFC, Part II, section IV and section VI.K provide guidance on the issues of national resource reporting and aggregation of estimated quantities.
36. For national resource reporting, the aggregation of known Projects from commercial, non-commercial and/or governmental organizations may not cover the total national Anthropogenic Resources. The creation of national or hypothetical ‘standard’ Projects (with associated reference point) may allow an estimate and classification of all the nation’s Anthropogenic Resources, including those not yet linked to defined Projects. These national resources could be adequately classified as e.g. E3, F3.3, G4.

H. Entitlement

The following text originates from the Specifications for the application of UNFC to Geothermal Energy Resources (UNECE and IGA 2016) and terminology and has been adopted for Anthropogenic Resources.

37. Entitlement defines the quantities that accrue to project participants.
38. The 'entitlement period' is the term of all licenses and permits which provide rights to access the Anthropogenic Material Source, respectively, extract the Anthropogenic Resources and deliver the Secondary Raw Material or Commodity into the market.
39. The Anthropogenic Material Source may be expected to last much longer than the Project Lifetime (see section II.F), but any future extracted quantities beyond those estimated for the Project would be assessed and classified as subsequent or additional Projects.

I. Development plan

The following text origins from the Specifications for the application of UNFC to Renewable Energy Resources (UNECE 2016) and terminology and has been adopted for Anthropogenic Resources.

40. In order to assign Anthropogenic Resources to any class, except for category F4 (No development project or recovery operation has been identified), a development plan needs to be defined consisting of one or more Projects. The level of detail appropriate for such a plan may vary according to the maturity of the Projects and may also be specified by regulation.

III. Generic Specifications for the Application of UNFC in the context of Anthropogenic Resources

This section presents the generic Specifications for the application of UNFC to Anthropogenic Resources through the provision of additional guidance and clarification, where required.

A. Use of numerical codes

41. Guidance on use of numerical codes is given in UNECE (2013, p. 20).

B. Effective date

42. The effective date is defined in UNECE (2013, p. 20).

C. Commodity or product type

43. Guidance on commodity or product type is given in UNECE (2013, Part II, VI.D.)
44. For Projects producing multiple saleable products, multiple material and energy commodity outputs shall be reported. For example, the refuse derived fuel produced from landfill excavation (landfill mining project), such as plastic, wood and paper, that can be extracted from the landfill represent a value to the Project (and the revenue generated by their sale may be included in the economic evaluation of the Project). Further reading in section I, p. 15.
45. Disposal quantities extracted via the defined Project shall be included in the estimate of quantities of Anthropogenic Resources associated to that Project (see also guidance relating to the use of sub-category E3, in section III.F).

D. Reference Point

46. Guidance on the definition of the “Reference Point” is given in UNECE (2013, Part II, VI.F.).
47. Additional guidance for the application of UNFC on Anthropogenic Resources has been adopted from (UNECE 2016) as followed. The default for the Reference Point shall be the location in the extraction and conversion process at which the reported quantities of Secondary Raw Materials or Commodities are measured or estimated. Any deviation from this location shall be clearly justified. In all cases, the additional obligations for disclosure contained in the Specifications for the Application of UNFC as in UNECE (2013, Part II) shall still apply.
48. The Anthropogenic Material Flows through the Reference Point should be coherent (e.g. identical in time, quantity, quality and price) with the common definitions for Anthropogenic Material Flows in general statistics, accounting and reporting schemes.
49. Where a Project produces multiple Secondary Raw Materials or Commodities, there might be different Reference Points for each Anthropogenic Material Flow (see Section I).

E. Classification of Projects based on level of maturity

50. Guidance on the classification of Projects on the level of maturity is given in UNECE (2013, Part II, VI.G.).

F. Distinction between E1, E2 and E3

51. To further elaborate the E-axis definitions of the UNECE (2013), the EGRC E-axis subgroup prepared two draft guidance documents (UNECE 2017a, UNECE 2017b) and will deliver detailed guidance on assessing the environmental and social considerations for the classification of resources according to UNFC in April 2018 (UNECE 2017c). It is expected, that the detailed guidance will be combined with the other elements reflected on the E-axis (economics in particular) and be of key relevance for classifying Anthropogenic Resource Projects.

The next two paragraphs originate from the Guidelines for Application of the UNFC for Uranium and Thorium Resources (UNECE 2015b) and are applied to Anthropogenic Resources.

52. UNFC defines E1, E2 and E3 based on economic viability of the Project. It may be noted that the phrase “economically viable” encompasses economic (in the narrow sense) plus other relevant “market conditions”, and includes consideration of prices, costs, legal/fiscal framework, environmental, social and all other non-technical factors that could directly impact the viability of a development Project. In classifying estimated quantities that may be extracted in the future from a development project or mining operation, the E-axis Categories are explicitly defined to include both environmental and social issues that may be relevant to the commercial viability of such a venture, in addition to economic, legal and other non-technical factors.
53. In particular, the identification and consideration at the time of the estimate of all known environmental or social impacts of the Project during its entire life cycle is recognized as an integral part of the project assessment. The presence of environmental or social impediments can prevent a Project from proceeding or it can lead to the suspension or termination of activities in an existing operation.
54. Non-technical and external factors are of key importance for classifying Anthropogenic Resource Projects. For instance, the quantities of Secondary Raw materials or Commodities are limited by social, legislative and environmental factors that go beyond the economic aspect in terms of costs and benefits. External factors, induced by the Project, or with direct impact on the viability of a Project in the economic and ecological dimension are relevant for the categorization of Anthropogenic Resources on the E-axis, such as:
 - The economic dimension includes external effects, which are induced by the Project. For instance, municipal solid waste dumpsites in urban areas are excavated due to

environmental concerns and the need for settlement area extensions. Removing and treating the old waste avoids costs for the former landfill in terms of emission treatment and environmental damage. The additional settlement area creates a value for the landowner and the investors.

- To contrast the ecological impact between primary and secondary raw materials, the ecological profile of the Secondary Raw Materials or Commodities can be compared with the equivalent primary or Secondary Raw Materials or Commodities from alternative production schemes.
- The identification and consideration of toxic substances/ the toxicity of substances that can be a part of or are contained in the Anthropogenic Resource, as well as the identification and consideration of all relevant environmental or social impacts and benefits of the project during its entire life cycle, shall be an integral part of the project assessment.

G. Distinction between recoverable quantities and in situ (in-place) quantities

55. Guidelines on Classification of quantities associated with Exploration Projects are given in UNECE (2013, Part II, VI.J.).

H. Aggregation of quantities

56. Guidance on commodity or product type is given in UNECE (2013, Part II, VI.K.)

I. Projects with multiple secondary raw materials or commodities

The following paragraph originate from UNECE and IGA (2016) and terminology has been adopted.

57. Where a Project produces more than one Secondary Raw Material or Commodity (e.g. copper and zinc), the Anthropogenic Resources for each shall be estimated and classified separately, but included in a single report for the Project. For each Reference Point (see C) the same information shall be declared for each reported quantity, including the type of Anthropogenic Material.

J. Economic assumptions

58. Details on economic assumptions are given in UNECE (2013, Part II, VI.L).
59. Current market conditions and realistic assumptions of future market conditions should include favorable and adverse policy support mechanisms for Anthropogenic Resources, but shall not assume that such mechanisms will become more beneficial in the future unless already specified in the regulation (adopted from UNECE 2016, IV., L.).

K. Evaluator qualifications

60. Guidance on evaluator qualifications are given in UNECE (2013, Part II, VI.M.).

The following paragraphs originate from UNECE and IGA (2016) and terminology has been adapted.

61. Evaluators shall possess an appropriate level of expertise and relevant experience in the estimation of Anthropogenic Resources associated with the type of Anthropogenic Stocks under evaluation.
62. Relevant national, industry or financial reporting regulations may require an Evaluator to have specific qualifications and/or experience. In addition, regulatory bodies may explicitly mandate the use of a “competent person”, as defined by regulation, with respect to corporate reporting.

63. Unless such relevant national, industry or financial reporting regulations prevail, the following shall apply when reporting Anthropogenic Resources according to UNFC- 2009.
64. Where a report detailing Anthropogenic Resources is prepared for public reporting or submission to government authorities, the Anthropogenic Resources shall be estimated by, or under the direction of, an Evaluator.
65. Any public report detailing Anthropogenic Resources shall disclose the name of the Evaluator, including qualifications and experience, state whether the Evaluator is an employee of the entity preparing the report, and, if not, name the Evaluator's employer.
66. Estimation of Anthropogenic Resources is very commonly a team effort, involving several technical disciplines. It is, however, recommended that only one Evaluator sign the Anthropogenic Resource report, and that this person be responsible and accountable for the whole of the documentation. It is important in this situation that the Evaluator accepts overall responsibility for an Anthropogenic Resource estimate and supporting documentation prepared in whole or in part by others, and is satisfied that the work of the other contributors is acceptable.
67. Notwithstanding the above, the reporter remains responsible for the report being correct. This will normally be the chairperson of the corporation issuing the report or the equivalent if a public body is issuing it.

L. Units and conversion factors

68. Guidance on units and conversion factors is given in UNECE (2013, Part II, VI.N.)

M. Documentation

69. Guidance on the documentation is given in UNECE (2013, Part II, VI.O.)
70. The documentation shall respect the code of good scientific practice. This includes, for instance, the documentation in sufficient detail to allow an independent external reviewer the reproduction of estimates of resource quantities, the application of sound citation rules, the common responsibility of the authors, the declaration of conflict of interest of each author, the financial transparency of Project development – especially naming the Evaluators that received financial support or that have personal financial interest in the Project development.

N. Expansion of G4 to account for uncertainty

71. Guidance on the expansion of G4 to account for uncertainty is given in (2013Part II, VI.P.)
72. The confidence levels for G1, G2 and G3 shall also apply to G4.1, G4.2 and G4.3 respectively.

O. Optional labels for estimates

73. Guidance on optional labels for estimates is given in UNECE (2013, Part II, VI.Q.)

P. Classification of quantities associated with Exploration Projects

74. Details on Classification of quantities associated with Exploration Projects are given in UNECE (2013, Part II, VI.R.). Instead of terms such as “site-specific geological studies”, “exploration activities”, “drilling” and “testing” use “site-specific studies” or “data acquisition activities” that are relevant to corresponding Anthropogenic Resource Projects. The term “geological province” can be replaced by “geographic area” or “Project area”.

Q. Classification of Additional Quantities in Place

75. Guidance on Classification of Additional Quantities in Place is given in UNECE (2013, Part II, VI.S.)
76. Quantities in place can be Anthropogenic Resources might be locked by unavailable technologies for extraction but there are factors beyond technological aspects that prevent the extraction. For instance, ownership of the materials, temporal availability, environmental hazards.

The following paragraphs originate from UNECE and IGA (2016) and have been adopted.

77. In the context of finite resources, 'additional quantities in place' make up the material balance between extracted quantities and total initial quantities in-place. Although a portion of these quantities may become recoverable in the future, as technological development occurs, some or all of these quantities may never be recovered.
78. In the context of Anthropogenic Resources, however, the total initial quantity in place is poorly defined because, for example:
- the characterization of the Anthropogenic Stock and the Anthropogenic Material Flows out of it, especially in terms of location, quantity and quality are poorly defined;
 - the temporal change of Anthropogenic Stocks and Anthropogenic Material Flows is often poorly defined; and,
 - the "recycling rate" and "recovery rate" below which material extraction is no longer commercially viable is dependent upon the technology used in the Project.
79. There may be situations where it is desirable to report additional quantities in place for an Anthropogenic Resource Project. At such times, by definition, the Reference Point for additional quantities in place is in situ. The assumed physical limits, the recharge rate and the cut-off parameters for the Anthropogenic Material Source shall be stated in any report showing additional quantities in place.

R. Extracted quantities that may be saleable in the future

80. Details on Extracted quantities that may be saleable in the future are given in UNECE (2013, Part II, VI.T.).

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Annex 1: Terms from UNFC and its interpretation in the context of Anthropogenic Resources

Note: Underlined text refers to Anthropogenic Resource definitions from section II, p. 2.

UNECE (2013). United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 incorporating Specifications for its Application. UNECE Energy Series No. 42.	Interpretation in context of Anthropogenic Resources
Geological knowledge	When applied to <u>Anthropogenic Resources</u> , the G axis should be understood to reflect the “level of confidence of the quantities”. Thus, the G axis categories are intended to reflect all significant uncertainties impacting the estimated <u>Anthropogenic Resource</u> quantities that are forecast to be extracted and not extracted by the Project. Uncertainties include both variability in the <u>Anthropogenic Material Source</u> and the efficiency of the extraction and conversion methodology (where relevant).
Mining (the geosphere) Not defined explicitly.	Mining (the anthroposphere) Extraction from Anthropogenic Material Sources. The term “extraction” used in these specifications is equivalent to “production” or “recovery”, which are commonly used for petroleum projects. It includes the activities for waste treatment “reuse”, further non-sales production (waste), “preparation for reuse”, “recycling” and “material recovery”. The latter terms are used by the EU Waste Directive 2008/98/EC (European Union 2008) and guidance on their interpretation is given in (European Commission 2012). “Extraction” implies the process of converting an <u>Anthropogenic Material Source</u> into <u>Secondary Raw Materials or Commodities</u> . Where necessary, the meaning of “extraction” in the context of different types of <u>Anthropogenic Resources</u> is clarified in the aligned commodity-specific specifications.
Exploration Project A Project that is associated with one or more Potential Deposits (as defined below).	Exploration Project A Project that is associated with one or more Potential <u>Anthropogenic Material Sources</u> (as defined below).
Known deposit A deposit that has been demonstrated to exist by direct evidence. More detailed specifications can be found in relevant commodity- specific Aligned Systems.	Known Anthropogenic Material Source An <u>Anthropogenic Material Source</u> that has been demonstrated to exist by direct evidence. More detailed specifications can be found in relevant commodity-specific Aligned Systems.
Potential deposit A deposit that has not yet been demonstrated to exist by direct evidence (e.g. drilling and/or sampling), but is assessed as potentially existing based	Potential Anthropogenic Material Source An <u>Anthropogenic Material Source</u> that has not yet been demonstrated to exist by direct evidence (e.g. sampling), but is assessed as potentially existing based primarily on indirect evidence (e.g. aerial photograph,

<p>primarily on indirect evidence (e.g. surface or airborne geophysical measurements). More detailed specifications can be found in relevant commodity-specific Aligned Systems.</p>	<p>indirect estimations based on statistics and proxy indicators). It also includes anthropogenic quantities that are assumed to become available in the project lifetime, but that are not yet observable in the <u>Anthropogenic Stock</u>. More detailed specifications can be found in relevant commodity-specific Aligned Systems.</p>
<p>Category</p> <p>Primary basis for classification using each of the three fundamental Criteria of economic and social viability (related Categories being E1, E2, and E3), field Project status and feasibility (related Categories being F1, F2, F3 and F4), and geological knowledge (related Categories being G1, G2, G3 and G4). Definitions of Categories are provided in Annex I to UNFC.</p>	<p>No interpretation needed.</p>
<p>Class(es)</p> <p>Primary level of resource classification resulting from the combination of a Category from each of the three Criteria (axes)</p>	<p>No interpretation needed.</p>
<p>Complementary texts</p> <p>Additional texts to provide mandatory requirements (i.e. Specifications) and further guidance regarding the application of UNFC. (This Specifications Document is an example of a complementary text.)</p>	<p>No interpretation needed.</p>
<p>Criteria</p> <p>UNFC utilizes three fundamental Criteria for reserve and resource classification: economic and social viability; field Project status and feasibility; and, geological knowledge. These Criteria are each subdivided into Categories and Sub-categories, which are then combined in the form of Classes or Sub-classes.</p>	<p>No interpretation needed.</p>
<p>Evaluator</p> <p>Person or persons, performing resource estimation and/or Classification</p>	<p>No interpretation needed.</p>
<p>Generic Specifications</p> <p>Specifications (as documented in this Specifications Document) that apply to the classification of quantities of any commodity using UNFC.</p>	<p>No interpretation needed.</p>
<p>Numerical Code</p> <p>Numerical designation of each Class or Sub-class of resource quantity as defined by UNFC. Numerical Codes are always quoted in the same sequence (i.e. E; F; G).</p>	<p>No interpretation needed.</p>

<p>Specifications</p> <p>Additional details (mandatory rules) as to how a resource classification system is to be applied, supplementing the framework definitions of that system. Generic Specifications provided for the UNFC in this Specifications Document ensure clarity and comparability and are complementary to the commodity-specific requirements included in Aligned Systems, as set out in the relevant Bridging Document.</p>	No interpretation needed.
<p>Sub-categories</p> <p>Optional subdivision of Categories for each of the fundamental Criteria of economic and social viability, field Project status and feasibility, and geological knowledge. Definitions of Subcategories are provided in Annex II to UNFC.</p>	No interpretation needed.
<p>Sub-classes</p> <p>Optional subdivision of resource classification based on Project maturity principles resulting from the combination of Subcategories. Project maturity sub-classes are discussed further in Annex V of the Specifications Document.</p>	No interpretation needed.
<p>Système International d'Unités</p> <p>Internationally recognized system of measurement and the modern form of the metric system. Prefixes and units are created and unit definitions are modified through international agreement as the technology of measurement progresses, and as the precision of measurements improves. Abbreviated to SI.</p>	No interpretation needed.
<p>UNFC</p> <p>United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 (ECE Energy series No. 42).</p>	No interpretation needed.